



Food, beverage, and pharmaceutical industries

Product catalogue 2017

www.ghm-messtechnik.de

Members of GHM GROUP

GREISINGER

HONSBERG

Martens

IMTRON

***Delta* GHM**



Quality is GHM

Uncompromising measurement

Flexibility and Innovation

These two terms are an inseparable part of the success of GHM Messtechnik.

In addition to the extensive standard programme, tailored solutions are developed according to customer needs.



Altium 3D circuit board layout



Pressure testing up to 1000 bar



EMC-Kabine

GHM stands for

☒ Competence

☒ Quality

☒ Service

Competence in the food, beverage, and pharmaceutical industries

Our products satisfy the special requirements of the food, beverage, and pharmaceutical industries to the furthest possible extent and are currently in the approval phase.

- Hygienic design for cleaning and sterilisation processes
- CIP / SIP compatible measurement technology
- Stainless steel sensors
- FDA-compliant materials
- EHEDG certifications
- 3A approval (partially in preparation)
- Protection rating IP67 / IP69K

CIP-/SIP-
capable

Hygienic
Design

FDA conform
materials

Patent
Filed

LAB
Standard



Special aspects in the area of hygienic / aseptic process control



The food safety is a top priority in all countries. In addition to being precise and reliable, the measurement technology used in the food industry must also satisfy strict hygienic regulations.

GHM Messtechnik is a complete provider in this area specifically focussed on the food, beverage, and pharmaceutical industries. With the consolidation of four companies, complete solutions can now be offered.

The German Food Hygiene Regulations have been in effect since the end of the 1990s, replacing the hygiene regulations of the individual states.

Food hygiene can only be safeguarded by the producer when the measurement technology used in this industry also has a hygienic design and conforms to the applicable laws.

Requirements on the measurement technology



The basis for hygienic process control and the associated requirements on the measurement technology are essentially the fulfilment of the following criteria:

- Layout and design of measuring devices corresponding to the rules of hygienic design
- Standard surface roughness $R_a < 0.8 \mu\text{m}$
- Cleaning according to CIP (cleaning in place) and SIP (sterilisation in place)
- Use of materials coming into contact with media in accordance with the positive lists according to the FDA and/or 3A
- Test certificate in accordance with DIN 10204-2005
- Approval in accordance with EHEDG and/or 3A
- High protection rating IP67 or IP69K

CIP-/SIP-
capable

Hygienic
Design

FDA conform
materials

Patent
Filed

LAB
Standard

Measurement technology for the widest range of conditions

The media used, to be processed, or created in the food industry often changes properties in regard to density, consistency, conductivity, and temperature. Boilers, tanks, and similar containers are filled with the widest range of media, to which cleaning processes must be adapted and modified. GHM devices offer reliable and safe measurement for all processes.

CIP/SIP cleaning

Sensors for the food industry must be suitable for CIP and SIP processes and exterior cleaning. That means the highest demands on the housing, electronics, and sensors. This is not a problem for GHM devices, because all components can be designed specifically for the expected conditions. Process connections which are designed to eliminate dead spaces permit all methods of modern and environmentally-compatible cleaning and sterilisation.

Recommended materials for the food industry

The use of materials of coming into contact with media which are listed in accordance with the FDA or 3A carries great importance for us. All parts of sensors coming into contact with media and close to the process are capable of withstanding the cyclical cleaning and sterilisation temperatures.



Hygienic Design

C

C1	GHMadapt, process connection	10
C2	Temperature	22
C3	Flow, magnetic-conductive	92
C4	Flow, calorimetric	114
C5	Point level, calorimetric	144
C6	Point level, capacitive	152
C7	Point level, conductive	168
C8	Level, potentiometric	196
C9	Level, hydrostatic	206
C10	Turbidity	214
C13	Process pressure	220

Further products of GHM portfolio to be used in food & pharmaceutical industry can be found in catalog by B to F

B

B4	Analysis (pH / ORP, conductivity, O ₂ / CO / CO ₂)	226
-----------	---	-----

E

E1	Multifunction controller / Displays / Controller	276
E2	Transmitter / Signal conditioning	312
E3	Isolating converters	328
E4	Safety and monitoring	348
E6	Calibration and testing	368

F

F4	Wireless datalogger	372
-----------	---------------------	-----

C1 Hygienic Design

GHMadapt

10

GHMadapt / Accessories



Characteristics

GHMadapt Welding sleeves without/
with leakage holes,
Adapters,
Welding fittings,
CIP-/SIP-cleaning,
EHEDG certified

**Connection
cables** IP67, IP69K
4-, 5- and 8-pole

Applications

**Food-, beverage and pharmaceutical
industry**

- Tube systems
- Tanks
- Vessels and other containers

Product information

GHMadapt

Function

With the process adaptation it is a matter according to the use in the tanks or in the tubes of choosing a flawless, hygienic process connection.

Diameters, volumes and construction form mark size and type of the connection. Medium, temperature and pressure the possible principle.

Advantage

- Thread types M12, G ½, G 1
- Leakage holes
- Modular adaption at all common process connections
- Hygienic-connection cables

Device overview

Accessories	Page
Mounting notes	12
Welding sleeve	
APH112, APH113, APH121, APH122, APH123, APH132, APH133, APH141, APH142, APH151, APH152	13
Welding tool	
AMH121, AMH122, AMH123	14
Blind gland	
AMH111, AMH112, AMH113	14
Reducing bush	
AMH131, AMH132, AMH133, AMH134	14
Process adapter	
APH2X1, APH2X2, APH2X3, APH3X1, APH3X2, APH3X3, APH4X1, APH4X2, APH4X3	15
Welding fitting	
APH5X1, APH5X2, APH5X3	16
Hygienic connection cable	
ACH111, ACH112, ACH121, ACH122	17
ACH113, ACH123	18
Certificates and Protocols	
Test Report 2.2, Inspection Certificate 3.1	16

Errors and technical changes reserved.

Process Adaptation and Accessories



Application field

Hygienic requirements for dead spot free and elastomer free process adaptation in a wide application field of food and beverage industry.

Function GHMadapt

The hygienically designed cone of the sensor, will be pressed with a defined stud torque against the sealing edge of the welding sleeve.



Technical data

Process connection	: thread M12, G ½", G 1"
	stud torque values see table below
Material	: stainless steel 1.4404, AISI 316L
	2.2 or 3.1 certification optional
<i>Operating temperature</i>	
Sealing metal-metal	: max. 250 °C
Sealing metal-PEEK	: max. 150 °C
<i>Process pressure</i>	
Sealing metal-metal	: max. 50 bar
Sealing metal-PEEK	: max. 10 bar

Mounting notes for fittings

Butt welding in tanks

- drilling the hole with outer diameter of the sleeve,
 - max. tolerance +0.2 mm
- tacking the fitting with 4 point (Figure 1)
 - take care for the tacking sequence
 - for G 1 are 8 tacking points necessary (Figure 2)
- screw in welding tool (see AMH121, -122, -123)
- welding the sectors between the tacks
 - 4 sectors for thread M12 and G ½"
 - 8 sectors for thread G 1"

Butt welding in tubes

Besides the APH tube-system we also offer ball sleeves or sleeves with welding shoulder for pipes with collar.



To prevent a glowing through or warping the sleeve during the welding process, it is necessary between the single sections to take a break, to cool down the sleeve.

Tightening torque

Thread	Sensor / sleeve	Min. torque [Nm]	Max. torque [Nm]
M12x1.5 hygienic	PEEK / metal	5	10
G ½" hygienic	PEEK / metal	5	10
G ½" hygienic	metal / metal	5	20
G 1" hygienic	PEEK / metal	10	20

Approvals / conformities



Characteristics

- Defined position of the cable- or plug entry (sensor) with a mark on the welding fitting
- Only 3 thread types for all sensors: M12, G ½", G 1"
- Adaptation for all popular process connection as: VARINLINE®, Tri-Camp, milk-pipe, DRD, ...
- Reducing adapter for the replacement of existing sensors e.g. vibration limiter
- Models with leakage holes

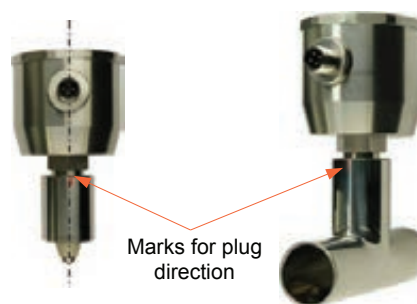
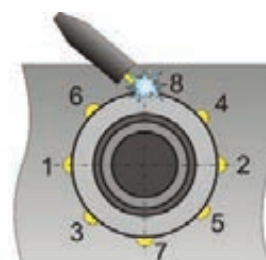


Figure 1

Figure 2

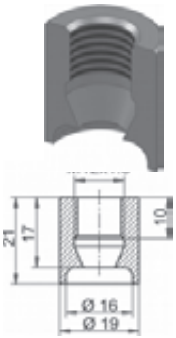

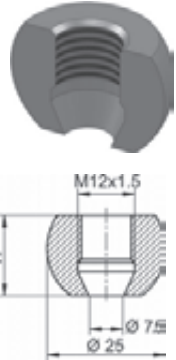
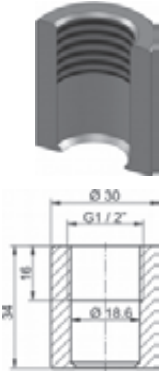
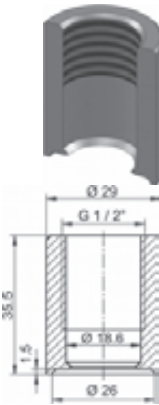
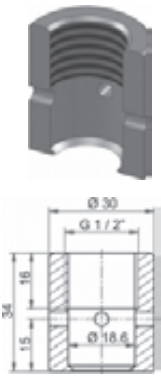
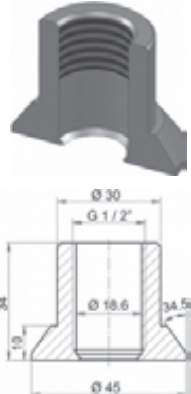
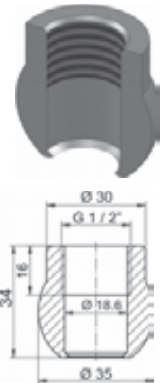
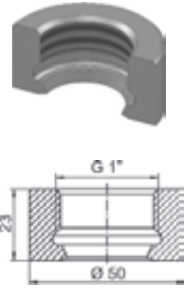
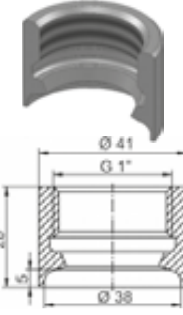
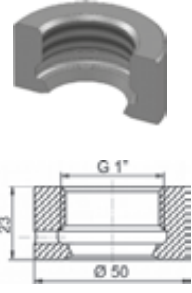


4 sectors with M12 and G ½"













8 sectors with G 1"

Hygienic welding sleeves

Specification	Cylindric sleeve	Cylindric sleeve with collar	Cylindric sleeve with leakage hole	Collar sleeve	Ball sleeve
Applications	for containers	for collars	for containers with leakage hole	for thick-walled containers	for inclined mounting
M12					
	not available	APH121-00	not available	APH141-00	APH151-00
G 1/2"					
	APH112-00	APH122-00	APH132-00	APH142-00	APH152-00
G 1"					
	APH113-00	APH123-00	APH133-00	not available	not available

Additional accessories

Specification	Blind glands	Welding tools (material brass)	Reducing adapter		
Applications	closing of the process thread	prevents the warping of the sleeve	reducing the process thread		
M12					
	AMH111-00	AMH121-00	not available	not available	not available
G 1/2"					
	AMH112-00	AMH122-00	AMH132-00 G 3/4" > G 1/2" hyg. for limit switches (tuning fork)	AMH131-00 G 1" hyg. > G 1/2" hyg.	AMH134-00 G 1" > G 1/2" hyg. for limit switches (tuning fork)
G 1"					
	AMH113-00	AMH123-00	AMH133-00 G 1 1/2" > G 1" hyg.	not available	not available

Product information

GHMadapt

Process adapters (material 1.4404)

Process-connection	VARINLINE® incl. O-Ring	Tri-Camp	Milk pipe DIN 11851	DRD (clamping ring optional)	DRD clamping ring
M12 Nominal diameter (DN)					
10	APH211-00 ¹⁾	APH411-00	APH311-00	APH651-00	APH659-00
15			APH321-00		
25	APH231-00 ²⁾	APH431-00	APH331-00		
40	APH241-00 ³⁾		APH341-00		
50		APH451-00	APH351-00		
65		APH461-00	APH361-00		
80		APH471-00	APH371-00		
100		APH481-00	APH381-00		
G ½"					
25	APH232-00 ²⁾	APH432-00	APH322-00	APH652-00	APH659-00
32	-		APH332-00		
40	APH242-00 ³⁾	APH452-00	APH342-00		
50			APH352-00		
65			APH362-00		
80			APH372-00		
100			APH382-00		
G 1"					
25	APH233-00 ²⁾	APH433-00	APH323-00	APH653-00	APH659-00
32	-		APH333-00		
40	APH243-00 ³⁾	APH453-00	APH343-00		
50			APH353-00		
65			APH363-00		
80			APH373-00		
100			APH383-00		

Other process adapters on request

VARIVENT/VARINLINE® Process connection

¹⁾ Type B

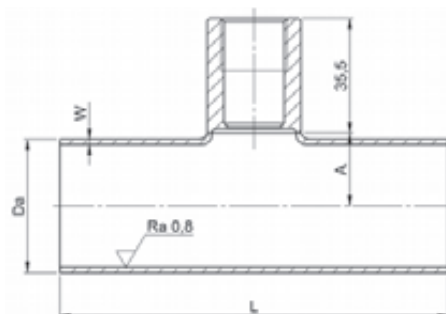
²⁾ Type F

³⁾ Type N

Varinline and Varivent are registered trademarks of GEA Tuchenhausen GmbH.

Hygienic welding fittings series APH material 1.4404 • DIN 11850 series 2

Hygienic welding fittings can also be customized and delivered according to DIN 11850 series 1, DIN 11866 series C (OD Tube) or DIN 11866 series B (EN ISO 1127).



Process thread M12	DN	L	A	Da x W
APH501-015-00	15	70	10	19 x 1.5
APH501-025-00	25	100	15	29 x 1.5
APH501-040-00	40	120	22	41 x 1.5
APH501-050-00	50	140	29	53 x 1.5
APH501-065-00	65	160	38	70 x 2.0
APH501-080-00	80	180	46	85 x 2.0
Process thread G 1/2"				
APH502-025-00	25	100	15	29 x 1.5
APH502-040-00	40	120	22	41 x 1.5
APH502-050-00	50	140	29	53 x 1.5
APH502-065-00	65	160	38	70 x 2.0
APH502-080-00	80	180	46	85 x 2.0
APH502-100-00	100	200	55	104 x 2.0
Process thread G 1"				
APH503-025-00	25	100	15	29 x 1.5
APH503-040-00	40	120	22	41 x 1.5
APH503-050-00	50	140	29	53 x 1.5
APH503-065-00	65	160	38	70 x 2.0
APH503-080-00	80	180	46	85 x 2.0
APH503-100-00	100	200	55	104 x 2.0

Certificates and protocols for all APH articles

The above-named welding sleeves, fittings and process adapters can be also delivered with below-listed test reports, inspection certificates or measurement protocols for surfaces according to DIN EN 10204

Test report 2.2	Option: WZ2.2
Inspection certificate 3.1 material in contact with products	Option: APZMAT
Measurement protocol for surface roughness incl. inspection certificate 3.1 material <div> $R_a \leq 0,8 \mu m$ $R_a \leq 0,6 \mu m$ $R_a \leq 0,4 \mu m$ </div>	<div> Option: RA08 Option: RA06 Option: RA04 </div>

These options will be added to the article number on request, whereby multiple responses are possible. E.g. APH501-015-00-WZ2.2 APH501-015-00-WZ2.2-RA06

Note: All above-listed welding sleeves, fittings and process adapters can be also delivered in stainless steel 1.4435.

Hygienic Connection Cable Series ACH (4- and 5-pole)



- Cable socket M12x1
- PVC-cable flexcord grey
- Straight or angular type
- 4- or 5- pole, wire-end sleeve
- Material stainless steel union nut
- IP67 according to IEC 60529/A1
- IP69K protected against high pressure and steam-cleaning according to IEC 60529/A1
- Heat- and cold-resistant, operating range -25..70°C
- Vibration lock
- Industry-standard-cable colors

Characteristics

The connection cable is suitable for middle mechanical strain. High reliability against acids and caustics. Therefore the cables are ideal for application in food and beverage industry.

Conditional abrasion characteristics, dependent arising oil and chemical resistance.

Technical data

Connector	: socket M12x1
Handle body	: plastic, PVC
Cap nut	: stainless steel 1.4404
Contact retainer	: plastic PVC grey
Contacts	: metal, Cu Zn, gold-plated
Seal	: plastic, FPM, FKM
Current load	: max. 4 A
Rated voltage	: max. 250 V
Isolation resistance	: $\geq 10^9$ MΩ
Degree of pollution	: 3/2, according to DIN VDE 0110
Ambient temperature	: -25..70 °C
Protection class	: IP67/IP69K (only in closed conditions)
Mechanical life	: minimal 100 mating cycles

Cable colors:

1 = brown, 2 = white, 3 = blue, 4 = black, 5 = grey

4-pole

Ordering code for straight sockets

ACH111 - - -

1. Cable length	
005	5 meter (standard)
010	10 meter
2. Shield	
0	without shield
3. Options	
00	without option

Ordering code for angular sockets

ACH121 - - -

1. Cable length	
005	5 meter (standard)
010	10 meter
020	20 meter
0	without shield
2. Shield	
0	without shield
3. Options	
00	without option

5-pole

Ordering code for straight sockets

ACH112 - - -

1. Cable length	
005	5 meter (standard)
010	10 meter
2. Shield	
0	without shield
3. Options	
00	without option

Ordering code for angular sockets

ACH122 - - -

1. Cable length	
005	5 meter (standard)
010	10 meter
020	20 meter
2. Shield	
0	without shield
3. Options	
00	without option

Hygienic Connection Cable Series ACH (8-pole, shielded)



- Cable socket M12x1
- PVC- and halogen-free cable, dove-blue, matt
- Straight or angular type
- 8-pole, wire-end sleeve
- stainless steel union nut
- IP67 according to IEC 60529/A1
- IP69K protected against high-pressure and steam-cleaning according to IEC 60529/A1
- Heat- and cold-resistant, operating temp. -40..+105 °C
- Vibration lock

Characteristics

This shielded, flexible, flame-resistant and halogen-free sensor cable is perfectly suitable for industrial mechanical and plant engineering with highest demands, especially for the application in the food and beverage industry (packaging and filling machines).

Resistant against all common acidic and alkaline detergents and disinfection agents.

Technical data

Connector	: socket M12x1
Handle body	: plastic, PVC
Cap nut	: stainless steel 1.4404
Contact retainer	: plastic PVC grey
Contacts	: metal, Cu Zn, gold-plated
Seal	: plastic, FPM, FKM
Current load	: max. 4 A
Rated voltage	: max. 250 V
Isolation resistance	: $\geq 10^9$ MΩ
Degree of pollution	: 3/2, according to DIN VDE 0110
Ambient temperature	: -25..70 °C
Protection class	: IP67/IP69K (only in closed conditions)
Mechanical life	: minimal 100 mating cycles

Cable colors:

1 = brown, 2 = white, 3 = blue, 4 = black, 5 = gray, 6 = pink,
7 = blue, 8 = red, shield = black

8-pole, straight

Ordering code

ACH113 - 1. - 2. - 3.

Location Martens	
1. Cable length	
005	5 meter
010	10 meter
2. Shield	
1	shield (not placed on the union nut)
3. Options	
00	without option

8-pole, angular

Ordering code

ACH123 - 1. - 2. - 3.

Location Martens	
1. Cable length	
005	5 meter
010	10 meter
2. Shield	
1	shield (not placed on the union nut)
3. Options	
00	without option

Index	Page
-------	------

C2 Hygienic Design

Temperature	22
-------------	----

Temperature - Hygienic Design



Feature

System	Temperature probes / - switches, hygienic design
Process connection	M12, G ½, G ½ (flush mounted), G ½ standard, G ¾ union nut, without thread, clamp-on adapter (no media contact)
Temperature range	-40..+200 °C CIP- / SIP- capable
High flexibility	Modular design, probe length acc. to customer specification
Accuracy	Class A or better
Programming tool	Parameters freely programmable via GTL - Configuration tool

Field of application

- Food and beverage industry
- Breweries
- Dairies
- Chemical industry
- Pharmaceutical industry
- Cosmetics industry
- Biotechnology

System features

Our products largely meet the specific requirements of the food, beverage and pharmaceutical industry.

- „Hygienic Design“ for cleaning and sterilization processes
- CIP- / SIP- capable
- Probes made of stainless steel
- FDA conform materials
- EHEDG certificate (in preparation)

Advantages

- Temperature range -40..+200 °C
- Several design types
- Optional with integrated transducer and on-site display
- Short response time due to tapered measuring tip
- High accuracy (class A, class AA, others upon request)
- Certificate of calibration available
- Variable fitting length
- Protection class IP67 / IP69K
- Available with calibration certificate
- Optionally with acceptance test certificate 3.1 acc. to EN 10204 for part in contact with media

Measuring probes

- Process connection M12, G½" or without thread but with compression fitting
- Compact design
- Design types with neck tube available
- Electric connection via M12-plug, M16 x 1.5 (PG) or fixed cable
- Front-flush installation and several probe lengths depending on design type
- Several probe lengths and diameters
- Process connection and protection tube made of stainless steel 1.4404
- Clamp-on probes, fast responding, for DN 10..80

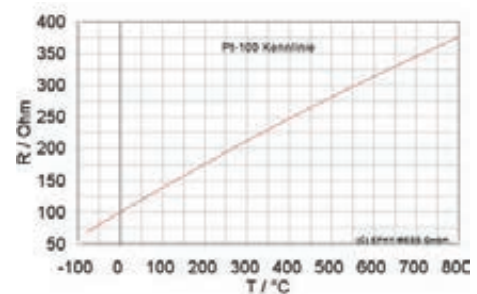
Measuring principle for Pt100

The correlation between temperature and resistance is not directly proportional, but includes terms of higher order.

$$R(t) = R_0 (1 + A \cdot t + B \cdot t^2 + C \cdot t^3 + \dots)$$

Pt100 values:

-40 °C	84.27
-20 °C	92.16
0 °C	100.00
20 °C	107.79
40 °C	115.54
60 °C	123.24
80 °C	130.90
100 °C	138.51
120 °C	146.07
140 °C	153.58
160 °C	161.05



Other used Pt elements:

Pt500 (0 °C = 500 Ω)

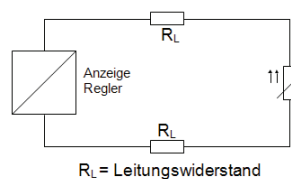
Pt1000 (0 °C = 1000 Ω)

Product information

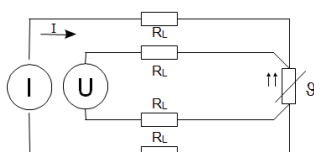
Temperature

Electrical connection

2-wire technology

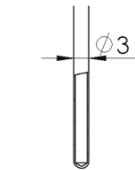


3-/4-wire technology

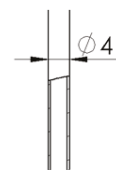


I = constant $I_{RL} = I_{Pt100}$
voltage measurement via
separate circuit,
The equation $R = U / I$ allows
the determination of measuring
resistance.

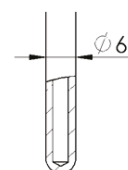
Response time



$T_{90} \leq 1.5 \text{ s}$



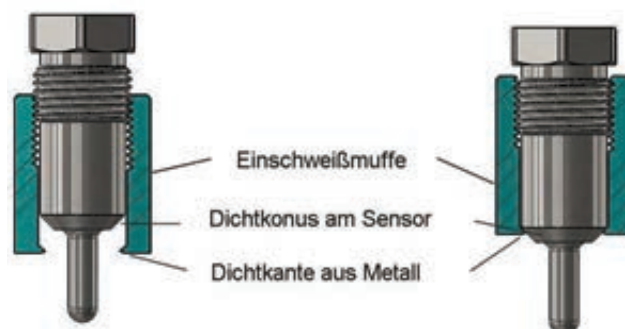
$T_{90} \leq 3.6 \text{ s}$



$T_{90} \leq 7.4 \text{ s}$

Process connection

Principle of elastomer and dead-space-free process connection



Accuracy classes of Pt elements:

Pt100 / Pt1000:

Sensor accuracies acc. to EN 60751:2008

DIN class	Validity range	Accuracy
DIN cl. A	-30...+300 °C	$\pm 0.15 \text{ °C at } 0 \text{ °C}$
DIN cl. AA = 1/3 DIN cl. B	0...150 °C	$\pm 0.1 \text{ °C at } 0 \text{ °C}$

Design types (basic version)

Overview: temperature sensors without/with transducer (head transmitter)

Field housing without
on-site display

Field housing with
on-site display

Compact design with
M12 plug

Compact design with
M12 plug and
transducer

Compact design with
fixed cable

Compact design with
fixed cable and
transducer



M12 hygienic



G 1/2 hygienic



G 1/2 flush mounted



G 1/2 standard



without thread



G 3/8

Product overview

Type	Process connection						Design	Electric connection	Page
	M12	G ½	G ½ flush mounted	standard	without thread	G ¾ union nut	Clamp-on		
Temperature probes (*optionally with transducer / integrated on-site display)									
GTL142	•							Ø 59 mm probe head * Ø 59 mm probe head with neck tube *	M12 or PG 22
GTL162 GTL162M GTL182 GTL182M	• • • •							Ø 18 mm probe head Ø 18 mm probe head incl. transducer Ø 18 mm probe head Ø 18 mm probe head incl. transducer	M12 M12 PG PG 30
GTL240				•				Ø 59 mm probe head * Ø 59 mm probe head with neck tube *	M12 or PG 33
GTL260 GTL260M GTL280 GTL280M				• • • •				Ø 18 mm probe head Ø 18 mm probe head incl. transducer Ø 18 mm probe head Ø 18 mm probe head incl. transducer	M12 M12 PG PG 36
GTL241		•						Ø 59 mm probe head * Ø 59 mm probe head with neck tube *	M12 or PG 39
GTL261 GTL261M GTL281 GTL281M		• • • •						Ø 18 mm probe head Ø 18 mm probe head incl. transducer Ø 18 mm probe head Ø 18 mm probe head incl. transducer	M12 M12 PG PG 42
GTL244			•					Ø 59 mm probe head *	M12 or PG 45
GTL264 GTL264M GTL284 GTL284M			• • • •					Ø 18 mm probe head Ø 18 mm probe head incl. transducer Ø 18 mm probe head Ø 18 mm probe head incl. transducer	M12 M12 PG PG 47
GTL 263 GTL 263M			• •					Ø 18 mm probe head Ø 18 mm probe head incl. transducer	M12 M12 49
GTL349					•			Ø 59 mm probe head *	M12 or PG 51
GTL369 GTL369M GTL389 GTL389M					• • • •			Ø 18 mm probe head Ø 18 mm probe head incl. transducer Ø 18 mm probe head Ø 18 mm probe head incl. transducer	M12 M12 PG PG 53
GTL459						•		Ø 59 mm probe head *	M12 or PG 56
GTL479 GTL479M GTL499 GTL499M						• • • •		Ø 18 mm probe head Ø 18 mm probe head incl. transducer Ø 18 mm probe head Ø 18 mm probe head incl. transducer	M12 M12 PG PG 58
Doppel- Pt100 Ø59	•	•		•	•	•		Ø 59 mm probe head * Ø 59 mm probe head with neck tube *	M12 or PG 61
Doppel- Pt100 Ø18	•	•		•	•	•		Ø 18 mm probe head Ø 18 mm probe head incl. transducer	M12 or PG 64
GTL720 GTL723							• •	Ø 18 mm probe head Ø 18 mm probe head incl. transducer	M12 M12 67
GTL737							•	Ø 59 probe head incl. transducer	M12 70

Product information

Temperature

Type	Process connection							Design	Electric connection	Page
	M12	G ½	G ½ flush mounted	standard	without thread	G ¾ union nut	Clamp-on			
Temperature probes (*optionally with transducer / integrated on-site display)										
HTK12-I/U/F		•						M 12 mm – housing	M12	22
HTK12-S		•						M 12 mm – housing	M12	75
HTK30		•						Ø 30 mm probe head	M12	78
HTK35		•						Ø 45 mm probe head , with integrated on-site display	M12	81
Accessories	<ul style="list-style-type: none">• GTL - Configuration tool• GKEV-25/76• GEMK-25/76• APHG12• APHK25• APHZ18• APHZ30-G12S• APHK35-G12S• WLP10S• ECI-1• KH-PV						Device configurator for GTL Compression fitting for GTL Compression fitting for GTL Adapter sleeve Weld-in sleeve Weld-in sleeve Weld-in sleeve for G ½ standard Weld-in sleeve for G ½ standard Heat transfer paste Device configurator for HTK Screened cables for HTK			84

- For further accessories see product information "GHMadapt / Accessories" in register: Process measuring technology in "Hygienic Design"

Errors and misprints excepted. Subject to technical modifications.

Overview head transducer



	Head transducer T19	Head transducer RT 420	GTML1
Measuring input	PT100	PT100	PT100
Sensor connection	2-or 3-wire (DIN IEC 751)	2-, 3- or 4-wire circuit	2-, 3- or 4-wire circuit
Measuring range	-50..+400 °C configurable	-200..-825 °C, programmable	-40..+200 °C, programmable
Electrical connection	screw terminals; 0.14..1.5 mm²	screw terminals	terminals with cable connection
Output signal	4..20 mA, 2-wire technology	4..20 mA, 2-wire technology	4..20 mA, 2-wire technology
Supply voltage U_B	supply by 4..20 mA loop	8..35 V DC	10..30 V DC
Perm burden R_A	$R_A \leq (U_B - 10 \text{ V}) / 0.02 \text{ A}$	$R_A \leq (U_B - 8 \text{ V}) / 0.023 \text{ A}$ (R_A in Ohm)	$R_A \leq (U_B - 10 \text{ V}) / 0.023 \text{ A}$
Working temperature	-40..+85 °C	-40..+85 °C	-40..+70 °C
Display	none	none	with or without LCD display
Protection class	housing IP50, terminals IP00	housing IP40, terminals IP10	-
Installation in RG59	exchangeable	exchangeable	not exchangeable
Miscellaneous	not programmable	programmable via programming tool for RT420	programmable via GTL - Configurations tool or via buttons (only with on-site display)

Temperature sensor GTL 142



- Hygienic M12 process connection
- Hygienic design and easy-to-sterilize measuring point
- Sensor completely made of stainless steel

Characteristic

The temperature sensor GTL 142 is designed for temperature measurements in pipes or thin-walled tanks.

They can be used for example for process monitoring at tube curvatures, temperature measurements in pressure pipes or at measurements of pasty media in pipes.

The probes can be provided with different electric connections and with or without integrated head transmitter. The probes of design type "with neck tube" are applicable at permanent ambient temperatures up to 200 °C.

Specifications

Temperature ranges	: ambient: -40..+80 °C
	: process: -40..+200 °C
	: CIP- / SIP-temperature: 140 °C < 30 min.
Measuring resistor	: Pt100
Accuracy	: class A, class AA
Electrical connection	: cable gland M16x1.5
	: M12 plug (1.4305)
Process connection	: hygienic M12

Tightening torque	: 5..10 Nm
Insertion length	: 50, 100, 150, 250 mm
Sensor head	: Ø 59 mm
Spacer	: length 100 mm
Thermowell and sensor tip:	
Ø 6 mm, Ø 4 mm	thermowell without taper
Ø 3 mm	thermowell Ø 6 mm and sensor tip Ø 3 mm
Response time	: tip Ø 3 mm: $T_{90} \leq 1.5$ s
	: tip Ø 4 mm: $T_{90} \leq 3.6$ s
	: tip Ø 6 mm: $T_{90} \leq 7.4$ s
Operating pressure	: max. 10 bar
Material	
Sensor head	: 1.4305
Spacer	: 1.4305
Thermowell and sensor tip	: 1.4404
Protection class	: IP67 / IP69K
CE conformity	: EN 61326-1:2013 / -2-3:2013

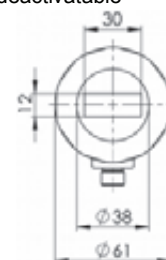
Transducer GTML1

Measuring range	: -10..+40 °C * / 0..50 °C * / 0..100 °C * 0..150 °C * / 0..200 °C * or freely in range -20..200 °C **
Power supply	: 10..30 V DC
Output	: analog, 4..20 mA, 2-wire
Output signal in case of error	: < 3.75 mA or > 21.5 mA, selectable *
Filter	: integrated low-pass, 4-step *
Response time	: < 150 ms (filter 0), < 300 ms (filter 1) < 800 ms (filter 2), < 3 s (filter 3)
Ambient temperature	: -40..+70 °C
Accuracy	: < 0.2 % FS
Temperature drift	: < 0.01 % FS / K

Transducer GTML1 with on-site display

Transducer with integrated **on-site display (LCD)** only in combination with electric connection: cable connection M12 plug and integrated transducer (for further information see transducer GTML1).

Display	: 4-digit LCD
Displayed unit	: °C or °F, selectable *
Resolution	: 0.1 °C or 1 °C, selectable *
Background illumination	: activatable , deactivatable *
Ambient temperature	: -20..+60 °C



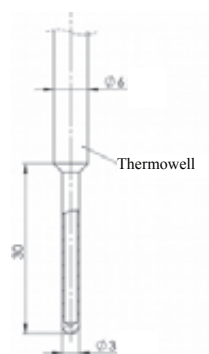
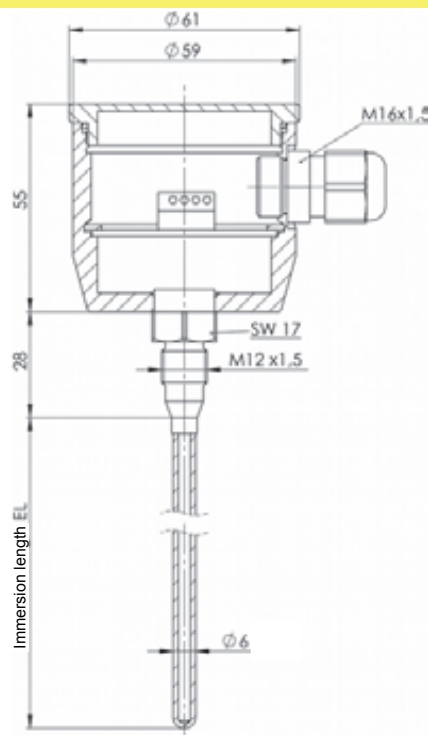
- * Programmable via GTL - Configuration tool (accessories) or buttons (only with on-site display)
- ** Programmable via GTL - Configuration tool (accessories)

Note: The default settings are marked in **bold**.

continued on next page

Dimensions

GTL 142

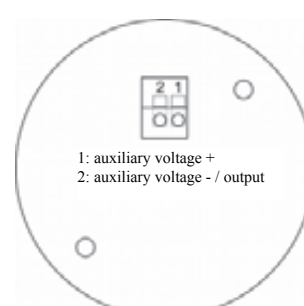
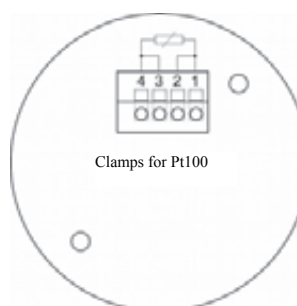


Connection

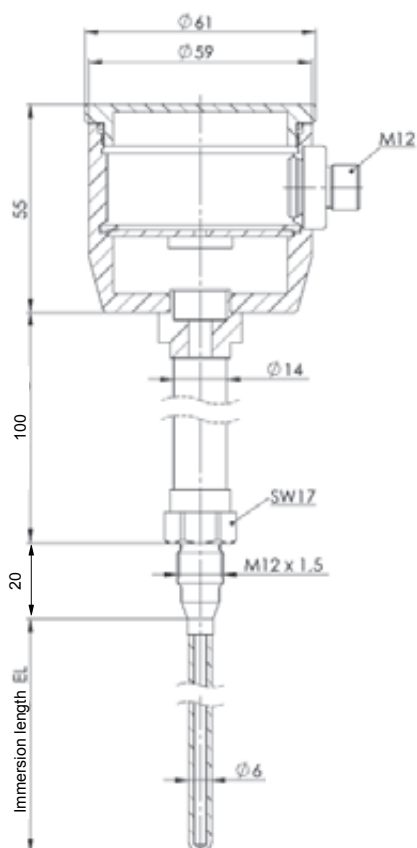
Electrical connection: cable gland M16x1.5 (PG)

without transducer (4-wire):

with transducer (2-wire):



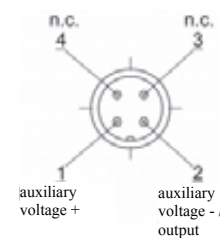
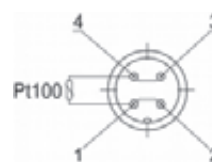
GTL 142 with spacer



Electrical connection: M12-plug (1.4305)

without transducer (4-wire):

with transducer (2-wire):



continued on next page

Product information

Temperature

Product key

1. 2. 3. 4. 5. 6. 7. 8. 9.
GTL - - - - - - - -

1. Design type	
142	with hygienic M12 process connection
2. Electric connection	
P	cable gland M16x1.5
V	V2A cable gland M16x1.5
M	M12-plug
3. Immersion length EL	
0020	20 mm
0050	50 mm
0100	100 mm
0150	150 mm
0250	250 mm
xxxx	any EL in mm (surcharge from 250 mm for each 100 mm started, up to max. immersion length: Ø 6: max. 1000 mm; Ø 4: max. 500 mm)
4. Diameter thermowell and sensor tip	
6	Ø 6 mm, without taper
4	Ø 4 mm, without taper
3	Ø 6 mm, with tapered probe tip Ø 3 mm
5. Accuracy class	
A	class A
D	class AA (1/3 class B)
6. Transducer	
0	without transducer
M	permanently integrated transducer GTML1, without display
V	permanently integrated transducer GTML1, on-site display (LCD)
R	exchangeable head transducer RT420
T	exchangeable head transducer T19
7. Measuring range	
0	without transducer
1	measuring range -10..+40 °C (-50..+50 °C for head transducer T19)
2	measuring range 0..50 °C
3	measuring range 0..100 °C
4	measuring range 0..150 °C
5	measuring range 0..200 °C
B	transducer with special measuring range in °C (not possible for head transducer T19), state special measuring range separately e.g.: 0..75 °C or -20..+30 °C; Mind the minimum range of 50 °C.
8. Option	
00	without option
H	with spacer
9. Certificate DIN EN 10204 (indicate only when required, multiple responses possible)	
WZ2.2	factory certification 2.2
APZMAT	acceptance test certificate 3.1 for material (in contact with products)
APZ2P	acceptance test certificate 3.1 with 2 measuring points (0°C / 70°C)
APZ3P	acceptance test certificate 3.1 with 3 measuring points (0°C, 70°C + 1 test point freely selectable)
APZ4P	acceptance test certificate 3.1 with 4 measuring points (0°C, 70°C + 2 test points freely selectable)

Notes on on-site display (LCD):

Permanently integrated transducer GTML1 (programmable) with on-site display only in combination with electrical connection: cable connection M12 plug.

Information on suitable weld-in sleeves can be found in product information GHMadapt/Accessories.

Temperature sensor

GTL 162 / 162M

GTL 182 / 182M



Insertion length : 50, 100, 150 or 250 mm
 Sensor head : Ø 18 mm

Thermowell and sensor tip:

Ø 6 mm, Ø 4 mm : Thermowell without taper
 Ø 3 mm : Thermowell Ø 6 mm and sensor tip Ø 3 mm

Response time : tip Ø 3 mm: $T_{90} \leq 1.5$ s
 tip Ø 4 mm: $T_{90} \leq 3.6$ s
 tip Ø 6 mm: $T_{90} \leq 7.4$ s

Operating pressure : max. 10 bar

Material

Sensor head : 1.4305 (V2A)

Thermowell and sensor tip : 1.4404 (V4A)

Protection class : IP67 / IP69K

CE conformity : EN 61326-1:2013 / -2-3:2013

Design type

	GTL 162 / 162M	GTL 182 / 182M
Electrical connection	M12-plug, 4-pin (1.4305)	fixed cable 2.5 m, PVC LIYY 182: 4 x 0.25 mm ² 182M: 2 x 0.25 mm ²

Transducer GTML2 (only for GTL 162M / GTL 182M)

Measuring range : -10..+40 °C * / 0..50 °C * / 0..100 °C *
 0..150 °C * / 0..200 °C *
 or freely in range -20..200 °C *

Power supply : 10..30 V DC

Output : analog, 4..20 mA, 2-wire

Output signal in case of error : < **3.75 mA** or > 21.5 mA, selectable *

Filter : integrated low-pass, 4-step *

Response time : < 150 ms (filter 0), < **300 ms (filter 1)**
 < 800 ms (filter 2), < 3 s (filter 3)

Ambient temperature : -40..+70 °C

Accuracy : < 0.2 % FS

Temperature drift : < 0.01 % FS / K

* Programmable via GTL - Configuration tool (accessories)

Note: The default settings are marked in **bold**.

- Hygienic M12 process connection
- Hygienic design and easy-to-sterilize measuring point
- Sensor completely made of stainless steel

Characteristic

The temperature sensors are designed for temperature measurements in pipes or thin-walled tanks.

They can be used for example for process monitoring at tube curvatures, temperature measurements in pressure pipes or at measurements of pasty media in pipes.

The sensors can be provided with different electric connections and with or without integrated head transmitter.

Specifications

Temperature ranges : ambience: -40..+80 °C
 probe tip: -40..+200 °C
 CIP- / SIP-temperature: 140 °C < 30 min.

Measuring resistor : Pt100

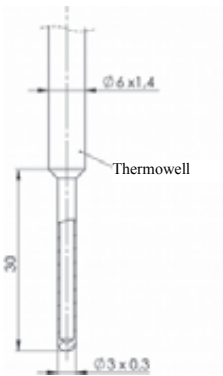
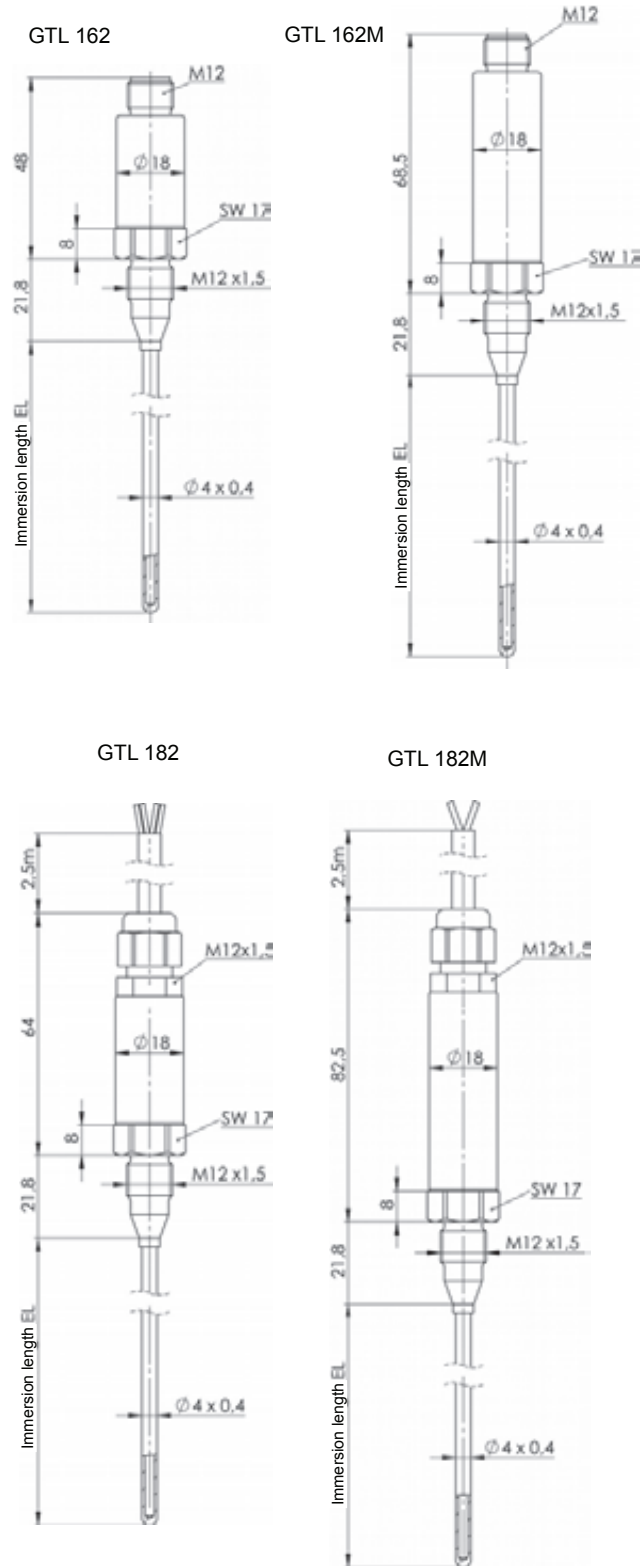
Accuracy : class A, class AA

Process connection : hygienic M12

Tightening torque : 5..10 Nm

continued on next page

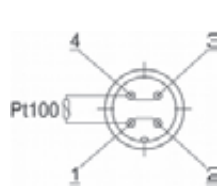
Dimensions



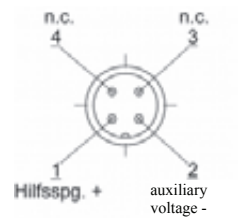
Connection

Design type GTL 162 or GTL 162M:

without transducer (4-wire):

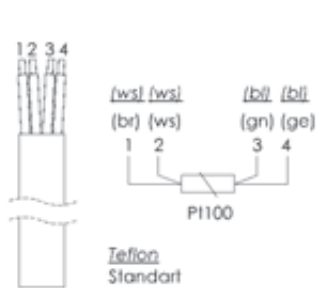


with transducer (2-wire):

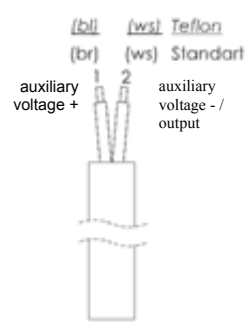


Design type GTL 182 or GTL 182M:

without transducer (4-wire):



with transducer (2-wire):



Options

TK	Design type GTL 182 and GTL 182M with Teflon cable GTL 182: 4 x 0.14 mm ² GTL 182M: 2 x 0.14 mm ² Teflon cable up to 200 °C
----	--

continued on next page

Product key

1. 2. 3. 4. 5. 6. 7.
GTL - - - - - -

Information on suitable weld-in sleeves can be found in product information GHMadapt/Accessories.

1. Design type	
162	M12-plug, without integrated transducer
162M	M12-plug, with integrated transducer
182	fixed cable (PVC) connection 2.5m, without integrated transducer
182M	fixed cable (PVC) connection 2.5m, with integrated transducer
2. Insertion length EL	
0020	20 mm
0050	50 mm
0100	100 mm
0150	150 mm
0250	250 mm
xxxx	any EL in mm (surcharge from 250 mm for each 100 mm started, up to max. insertion length: Ø 6: max. 1000 mm Ø 4: max. 500 mm)
3. Diameter thermowell and sensor tip	
6	Ø 6 mm, without taper
4	Ø 4 mm, without taper
3	Ø 6 mm, with tapered sensor tip Ø 3 mm
4. Accuracy class	
A	class A
D	class AA (1/3 class B)
5. Transducer GTML2 (programmable) ONLY for design types 162M and 182M	
00	without transducer (design types 162 / 182)
M1	measuring range -10..+40 °C
M2	measuring range 0..50 °C
M3	measuring range 0..100 °C
M4	measuring range 0..150 °C
M5	measuring range 0..200 °C
MB	transducer with special measuring range in °C (state special measuring range separately e.g.: 0..75 °C or -20..+30 °C) Mind the minimum range of 50 °C.
6. Option	
00	without option
H	with neck tube
TK	Teflon cable for connection via fixed cable (only available for GTL 182 / 182M)
7. Certificate DIN EN 10204 (indicate only when required, multiple responses possible)	
WZ2.2	factory certification 2.2
APZMAT	acceptance test certificate 3.1 for material (in contact with products)
APZ2P	acceptance test certificate 3.1 with 2 measuring points (0°C / 70°C)
APZ3P	acceptance test certificate 3.1 with 3 measuring points (0°C, 70°C + 1 test point freely selectable)
APZ4P	acceptance test certificate 3.1 with 4 measuring points (0°C, 70°C + 2 test points freely selectable)

Temperature probe GTL 240

GTL 240
standardGTL 240
with neck
tube

- G 1/2" standard process connection hygienic
- Sensor completely made of stainless steel

Characteristic

The temperature probes are designed for temperature monitoring in pipes and tanks, temperature measurements in steam and pressure pipes and for monitoring of CIP- / SIP- processes.

Suitable weld-in sleeves ensures disassembling of the temperature probe without process opening or interruption.

The probes can be provided with different electric connections and with or without integrated head transmitter.

Specifications

Temperature ranges	: ambience: -40..+80 °C probe tip: -40..+200 °C CIP- / SIP-temperature: 140 °C < 30 min.
Measuring resistor	: Pt100
Accuracy	: class A, class AA
Electric connection	: G 1/2" standard suitable weld-in sleeves APHZ30-G12S, APHK35-G12S (see accessories)



Fitting length	: 50, 100, 150, 250 mm
Probe head	: Ø 59 mm
Neck tube	: length 100 mm

Protection tube and probe tip:

Ø 6 mm	protection tube Ø 6 mm without taper
Ø 3 mm	protection tube Ø 6 mm and tapered probe tip Ø 3 mm

Response time	: FS Ø 3 mm: $T_{90} \leq 1.5$ s FS Ø 6 mm: $T_{90} \leq 7.4$ s
---------------	--

Working pressure	: max. 10 bar
------------------	---------------

Material

Probe head	: 1.4305
Neck tube	: 1.4305
Protection tube and tip	: 1.4404

Protection class	: IP67 / IP69K
CE conformity	: EN 61326-1:2013 / -2-3:2013

Transducer GTML1

Integrated head transmitter

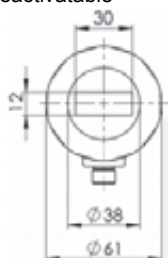
Measuring range	: -10..+40 °C * / 0..50 °C * / 0..100 °C * 0..150 °C * / 0..200 °C * or freely in range -20..200 °C **
Power supply	: 10..30 V DC
Measuring output	: analog, 4..20 mA, 2-wire
Output signal in case of error	: < 3.75 mA or > 21.5 mA, selectable *
Filter	: integrated low-pass, 4-step *
Reaction time	: < 150 ms (filter 0), < 300 ms (filter 1) < 800 ms (filter 2), < 3 s (filter 3)
Working temperature	: -40..+70 °C
Accuracy	: < 0.2 % FS
Temperature drift	: < 0.01 % FS / K

continued on next page

Transducer GTML1 with on-site display

Transducer with integrated **on-site display (LCD)** only in combination with electric connection: cable connection M12 plug and integrated transducer (for further information see transducer GTML1).

Display : 4-digit LCD
 Displayed unit : °C or °F, selectable *
 Resolution : **0.1 °C** or 1 °C, selectable *
 Background illumination : **activatable**, deactivatable *
 Working temperature : -20...+60 °C

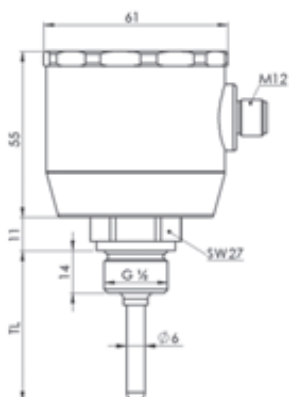


- * Programmable via GTL - Configuration tool (accessories) or buttons (only with on-site display)
- ** Programmable via GTL - Configuration tool (accessories)

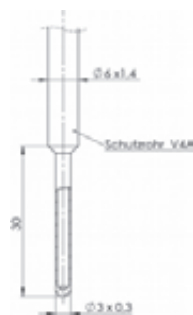
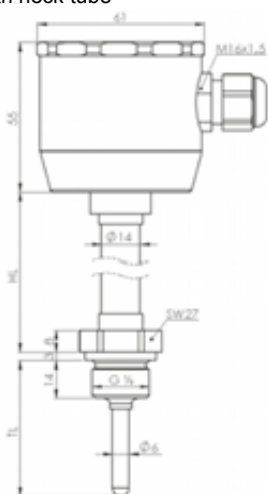
Note: The default settings are marked in **bold**.

Dimensions

GTL 240
standard



GTL 240 with neck tube

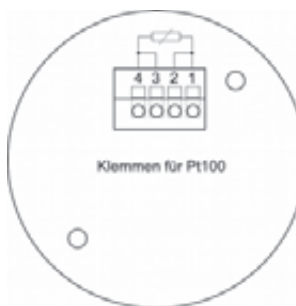


Connection

Electric connection: cable screwing M16x1.5 (PG)

without transducer (4-wire):

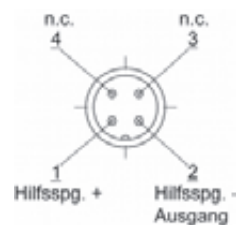
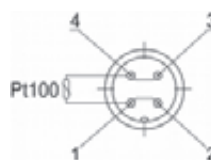
with transducer (2-wire):



Electric connection: cable connection M12-plug (1.4305)

without transducer (4-wire):

with transducer (2-wire):



continued on next page

Product information

Temperature

Product key

1. 2. 3. 4. 5. 6. 7. 8. 9.
GTL - - - - - - - -

Notes on on-site display (LCD):

Permanently integrated transducer GTML1 (programmable) with on-site display only in combination with electric connection: cable connection M12 plug.

Information on suitable weld-in sleeves can be found in product information GHMadapt/Accessories.

1. Design type	
240	without neck tube
2. Electric connection	
P	cable screwing M16x1.5 (PG)
V	V2A cable screwing M16x1.5 (PG)
M	cable connection M12-plug
3. Immersion length TL	
0050	50 mm
0100	100 mm
0150	150 mm
0250	250 mm
xxxx	any EL in mm (e.g. 320 = 320 mm) Ø 6: max. 1000 mm
4. Diameter protection tube and probe tip	
6	Ø 6 mm, without taper
3	Ø 6 mm, with tapered probe tip Ø 3 mm
5. Accuracy class	
A	class A
D	class AA (1/3 class B)
6. Transducer	
0	without transducer
M	permanently integrated transducer GTML1, without display
V	permanently integrated transducer GTML1, on-site display (LCD)
R	exchangeable head transducer RT420
T	exchangeable head transducer T19
7. Measuring range	
0	without transducer
1	measuring range -10..+40 °C (-50..+50 °C for head transducer T19)
2	measuring range 0..50 °C
3	measuring range 0..100 °C
4	measuring range 0..150 °C
5	measuring range 0..200 °C
B	transducer with special measuring range in °C (not possible for head transducer T19), state special measuring range separately e.g.: 0..75 °C or -20..+30 °C Mind the minimum range of 50 °C.
8. Option	
00	without option
H	with neck tube (100 mm)
9. Certificate DIN EN 10204 (indicate only when required, multiple responses possible)	
WZ2.2	factory certification 2.2
APZMAT	acceptance test certificate 3.1 for material (in contact with products)
APZ2P	acceptance test certificate 3.1 with 2 measuring points (0°C / 70°C)
APZ3P	acceptance test certificate 3.1 with 3 measuring points (0°C, 70°C + 1 test point freely selectable)
APZ4P	acceptance test certificate 3.1 with 4 measuring points (0°C, 70°C + 2 test points freely selectable)

Temperature probe

GTL 260 / 260M

GTL 280 / 280M



- G 1/2" standard process connection hygienic
- Sensor completely made of stainless steel

Characteristic

The temperature probes are designed for temperature monitoring in pipes and tanks, temperature measurements in steam and pressure pipes and for monitoring of CIP- / SIP- processes.

Suitable weld-in sleeves ensures disassembling of the temperature probe without process opening or interruption.

The probes can be provided with different electric connections and with or without integrated head transmitter.

Specifications

Temperature ranges	: ambience: -40...+80 °C probe tip: -40...+200 °C CIP- / SIP-temperature: 140 °C < 30 min.
Measuring resistor	: Pt100
Accuracy	: class A, class AA
Electric connection	: G 1/2" standard hygienic suitable weld-in sleeves APHZ30-G12S, APHK35-G12S (see accessories)



Fitting length	: 50, 100, 150, 250 mm
Probe head	: Ø 18 mm

Protection tube and probe tip:

Ø 6 mm	protection tube Ø 6 mm without taper
Ø 3 mm	protection tube Ø 6 mm and tapered probe tip Ø 3 mm

Response time	: FS Ø 3 mm: T ₉₀ ≤ 1.5 s FS Ø 6 mm: T ₉₀ ≤ 7.4 s
---------------	--

Working pressure	: max. 10 bar
------------------	---------------

Material

Probe head	: 1.4305
------------	----------

Protection tube and tip	: 1.4404
-------------------------	----------

Protection class	: IP67 / IP69K
------------------	----------------

CE conformity	: EN 61326-1:2013 / -2-3:2013
---------------	-------------------------------

Design types

	GTL 260 / 260M	GTL 280 / 280M
Electric connection	cable connection M12-plug, 4-pin (1.4305)	fixed cable 2.5 m, PVC LIYY 281: 4 x 0.25 mm ² 281M: 2 x 0.25 mm ²

Transducer GTML2 (only for GTL 260M / GTL 280M)

Integrated head transmitter

Measuring range	: -10...+40 °C * / 0...50 °C * / 0...100 °C * 0...150 °C * / 0...200 °C * or freely in range -20...200 °C *
-----------------	---

Power supply	: 10...30 V DC
--------------	----------------

Measuring output	: analog, 4...20 mA, 2-wire
------------------	-----------------------------

Output signal in case of error	: < 3.75 mA or > 21.5 mA, selectable *
--------------------------------	---

Filter	: integrated low-pass, 4-step *
--------	---------------------------------

Reaction time	: < 150 ms (filter 0), < 300 ms (filter 1) < 800 ms (filter 2), < 3 s (filter 3)
---------------	--

Working temperature	: -40...+70 °C
---------------------	----------------

Measurement accuracy	: < 0.2 % FS
----------------------	--------------

Temperature drift	: < 0.01 % FS / K
-------------------	-------------------

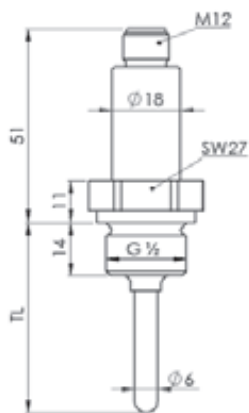
* Programmable via GTL - Configuration tool (accessories)

Note: The default settings are marked in **bold**.

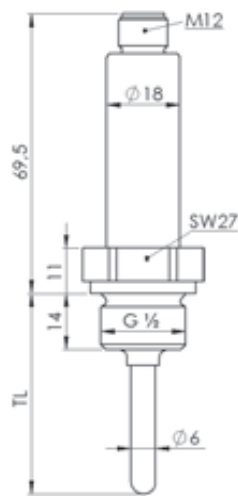
continued on next page

Dimensions

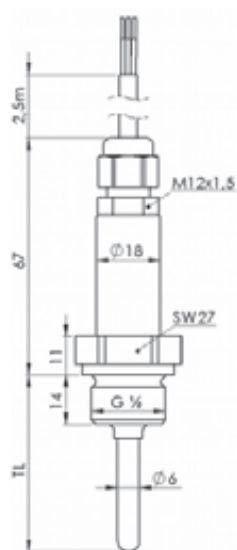
GTL 260



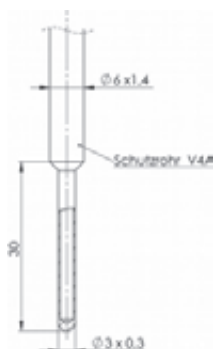
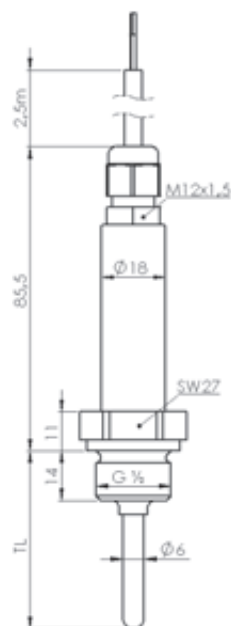
GTL 260M



GTL 280



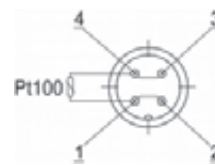
GTL 280M



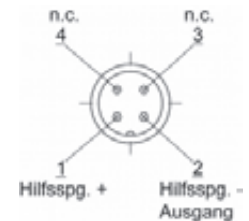
Connection

Design type GTL 260 or GTL 260M:

without transducer (4-wire):

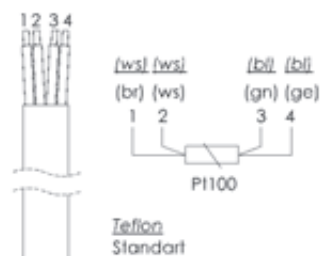


with transducer (2-wire):

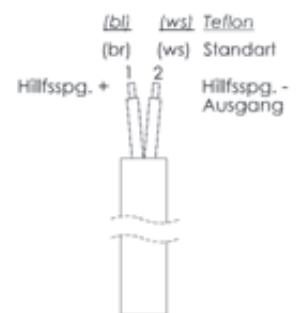


Design type GTL 280 or GTL 280M:

without transducer (4-wire):



with transducer (2-wire):



Option

TK	Design type GTL 280 and GTL 280M with Teflon cable GTL 280: 4 x 0.14 mm ² GTL 280M: 2 x 0.14 mm ² Teflon cable up to 200 °C
----	---

continued on next page

Product key

Information on suitable weld-in sleeves can be found in product information GHMadapt/Accessories.

1. 2. 3. 4. 5. 6. 7.
GTL - - - - - -

1. Design type	
260	cable connection M12-plug, without integrated transducer
260M	cable connection M12-plug with integrated transducer
280	fixed cable (PVC) connection 2.5m, without integrated transducer
280M	fixed cable (PVC) connection 2.5m, with integrated transducer
2. Immersion length TL	
0050	50 mm
0100	100 mm
0150	150 mm
0250	250 mm
xxxx	any EL in mm (e.g. 320 = 320 mm) Ø 6: max. 1000 mm
3. Diameter protection tube and probe tip	
6	Ø 6 mm, without taper
3	Ø 6 mm, with tapered probe tip Ø 3 mm
4. Accuracy class	
A	class A
D	class AA (1/3 class B)
5. Transducer GTML2 (programmable) ONLY for design types 260M and 280M	
00	without transducer (design types 260 / 280)
M1	measuring range -10..+40 °C
M2	measuring range 0..50 °C
M3	measuring range 0..100 °C
M4	measuring range 0..150 °C
M5	measuring range 0..200 °C
MB	transducer with special measuring range in °C (state special measuring range separately e.g.: 0..75 °C or -20..+30 °C Mind the minimum range of 50 °C.)
6. Option	
00	without option
H	with neck tube
TK	Teflon cable for connection via fixed cable (only available for GTL 280 / 280M)
7. Certificate DIN EN 10204 (indicate only when required, multiple responses possible)	
WZ2.2	factory certification 2.2
APZMAT	acceptance test certificate 3.1 for material (in contact with products)
APZ2P	acceptance test certificate 3.1 with 2 measuring points (0°C / 70°C)
APZ3P	acceptance test certificate 3.1 with 3 measuring points (0°C, 70°C + 1 test point freely selectable)
APZ4P	acceptance test certificate 3.1 with 4 measuring points (0°C, 70°C + 2 test points freely selectable)

Temperature probe GTL 241



- G ½" standard process connection hygienic
- Hygienic design and easy-to-sterilize measuring point
- Sensor completely made of stainless steel

Characteristic

The temperature probes GTL 241 and GTL 251 are designed for temperature measurements in pipes or tanks.

They can be used for example for monitoring the CIP / SIP procedures or temperature measurements in milk tanks.

The probes can be provided with different electric connections and with or without integrated head transmitter. The probes of design type "with neck tube" are applicable at permanent ambient temperatures up to 200 °C.

Specifications

Temperature ranges	: ambience: -40..+80 °C
	: probe tip: -40..+200 °C
	: CIP- / SIP-temperature: 140 °C < 30 min.
Measuring resistor	: Pt100
Accuracy	: class A, class AA
Electric connection	: cable screwing M16x1.5 (PG)
	: cable connection M12- plug (1.4305)

Process connection	: G ½
Clamping torque	: 5..20 Nm
Fitting length	: 50, 100, 150, 250 mm
Probe head	: Ø 59 mm
Neck tube	: length 100 mm

Protection tube and probe tip:

Ø 6 mm	protection tube Ø 6 mm without taper
Ø 3 mm	protection tube Ø 6 mm and tapered probe tip Ø 3 mm

Response time	: FS Ø 3 mm: $T_{90} \leq 1.5$ s
	: FS Ø 6 mm: $T_{90} \leq 7.4$ s

Working pressure	: max. 10 bar
------------------	---------------

Material

Probe head	: 1.4305
Neck tube	: 1.4305
Protection tube and tip	: 1.4404

Protection class	: IP67 / IP69K
CE conformity	: EN 61326-1:2013 / -2-3:2013

Transducer GTML1

Integrated head transmitter

Measuring range	: -10..+40 °C * / 0..50 °C * / 0..100 °C * 0..150 °C * / 0..200 °C * or freely in range -20..200 °C **
Power supply	: 10..30 V DC
Measuring output	: analog, 4..20 mA, 2-wire
Output signal in case of error	: < 3.75 mA or > 21.5 mA, selectable *
Filter	: integrated low-pass, 4-step *
Reaction time	: < 150 ms (filter 0), < 300 ms (filter 1) < 800 ms (filter 2), < 3 s (filter 3)
Working temperature	: -40..+70 °C
Accuracy	: < 0.2 % FS
Temperature drift	: < 0.01 % FS / K

Transducer GTML1 with on-site display

Transducer with integrated **on-site display (LCD)** only in combination with electric connection: cable connection M12 plug and integrated transducer (for further information see transducer GTML1).

Display	: 4-digit LCD
Displayed unit	: °C or °F, selectable *
Resolution	: 0.1 °C or 1 °C, selectable *
Background illumination	: activatable , deactivatable *
Working temperature	: -20..+60 °C

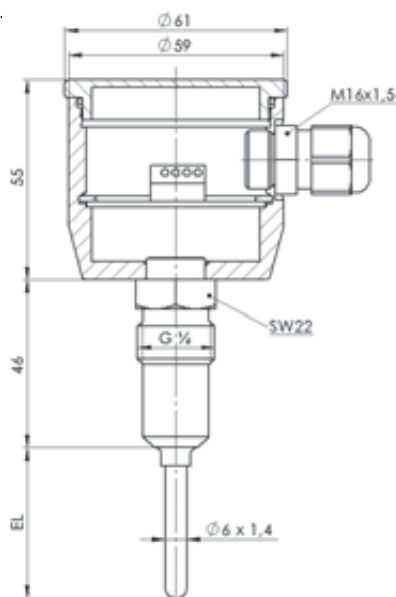


- * Programmable via GTL - Configuration tool (accessories) or buttons (only with on-site display)
- ** Programmable via GTL - Configuration tool (accessories)

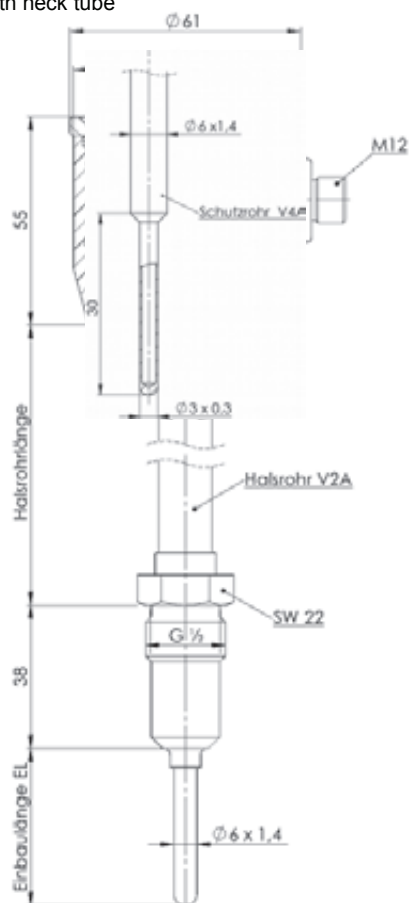
Note: The default settings are marked in **bold**.

Dimensions

GTL 24
standard



GTL 241 with neck tube



Connection

Electric connection: cable screwing M16x1.5 (PG)

without transducer (4-wire):

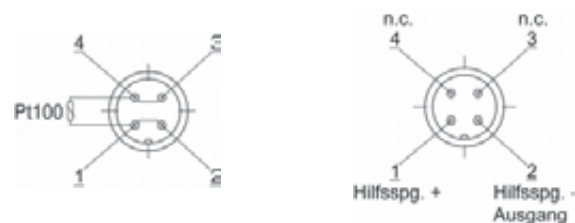
with transducer (2-wire):



Electric connection: cable connection M12-plug (1.4305)

without transducer (4-wire):

with transducer (2-wire):



continued on next page

Product information

Temperature

Product key

1. 2. 3. 4. 5. 6. 7. 8. 9.
GTL - - - - - - - -

1. Design type	
241	without neck tube
2. Electric connection	
P	cable screwing M16x1.5 (PG)
V	V2A cable screwing M16x1.5 (PG)
M	cable connection M12-plug
3. Fitting length EL	
0050	50 mm
0100	100 mm
0150	150 mm
0250	250 mm
xxxx	any EL in mm (surcharge from 250 mm for each 100 mm started, up to max. fitting length: Ø 6: max. 1000 mm)
4. Diameter protection tube and probe tip	
6	Ø 6 mm, without taper
3	Ø 6 mm, with tapered probe tip Ø 3 mm
5. Accuracy class	
A	class A
D	class AA (1/3 class B)
6. Transducer	
0	without transducer
M	permanently integrated transducer GTML1, without display
V	permanently integrated transducer GTML1, on-site display (LCD)
R	exchangeable head transducer RT420
T	exchangeable head transducer T19
7. Measuring range	
0	without transducer
1	measuring range -10..+40 °C (-50..+50 °C for head transducer T19)
2	measuring range 0..50 °C
3	measuring range 0..100 °C
4	measuring range 0..150 °C
5	measuring range 0..200 °C
B	transducer with special measuring range in °C (not possible for head transducer T19), state special measuring range separately e.g.: 0..75 °C or -20..+30 °C Mind the minimum range of 50 °C.
8. Option	
00	without Option
H	with neck tube
9. Certificate DIN EN 10204 (indicate only when required, multiple responses possible)	
WZ2.2	factory certification 2.2
APZMAT	acceptance test certificate 3.1 for material (in contact with products)
APZ2P	acceptance test certificate 3.1 with 2 measuring points (0°C / 70°C)
APZ3P	acceptance test certificate 3.1 with 3 measuring points (0°C, 70°C + 1 test point freely selectable)
APZ4P	acceptance test certificate 3.1 with 4 measuring points (0°C, 70°C + 2 test points freely selectable)

Notes on on-site display (LCD):

Permanently integrated transducer GTML1 (programmable) with on-site display only in combination with electric connection: cable connection M12 plug.

Information on suitable weld-in sleeves can be found in product information GHMadapt/Accessories.

Temperature probe GTL 261 / 261M GTL 281 / 281M



- G 1/2" process connection hygienic
- Hygienic design and easy-to-sterilize measuring point
- Sensor completely made of stainless steel

Characteristic

The temperature probes are designed for temperature measurements in pipes or tanks.

They can be used for example for monitoring the CIP / SIP procedures or temperature measurements in milk tanks.

The probes can be provided with different electric connections and with or without integrated head transmitter.

Specifications

Temperature ranges	: ambience:	-40..+80 °C
	: probe tip:	-40..+200 °C
	: CIP- / SIP-temperature:	140 °C < 30 min.
Measuring resistor	: Pt100	
Accuracy	: class A, class AA	

Electric connection	: G 1/2"
Clamping torque	: 5..20 Nm
Fitting length	: 50, 100, 150, 250 mm
Probe head	: Ø 18 mm
Protection tube and probe tip:	
Ø 6 mm	protection tube Ø 6 mm without taper
Ø 3 mm	protection tube Ø 6 mm and tapered probe tip Ø 3 mm
Response time	: FS Ø 3 mm: T ₉₀ ≤ 1.5 s
	: FS Ø 6 mm: T ₉₀ ≤ 7.4 s
Working pressure	: max. 10 bar
Material	
Probe head	: 1.4305
Protection tube and tip	: 1.4404
Protection class	: IP67 / IP69K
CE conformity	: EN 61326-1:2013 / -2-3:2013

Design types

	GTL 261 / 261M	GTL 281 / 281M
Electric connection	cable connection M12-plug, 4-pin (1.4305)	fixed cable 2.5 m, PVC LIYY 281: 4 x 0.25 mm ² 281M: 2 x 0.25 mm ²

Transducer GTML2 (only for GTL 261M / GTL 281M)

Integrated head transmitter	
Measuring range	: -10..+40 °C * / 0..50 °C * / 0..100 °C * 0..150 °C * / 0..200 °C * or freely in range -20..200 °C *
Power supply	: 10..30 V DC
Measuring output	: analog, 4..20 mA, 2-wire
Output signal in case of error	: < 3.75 mA or > 21.5 mA, selectable *
Filter	: integrated low-pass, 4-step *
Reaction time	: < 150 ms (filter 0), < 300 ms (filter 1) < 800 ms (filter 2), < 3 s (filter 3)
Working temperature	: -40..+70 °C
Measurement accuracy	: < 0.2 % FS
Temperature drift	: < 0.01 % FS / K

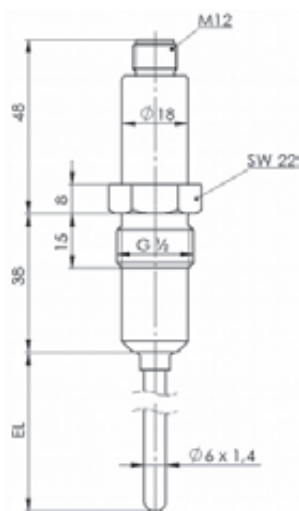
* Programmable via GTL - Configuration tool (accessories)

Note: The default settings are marked in **bold**.

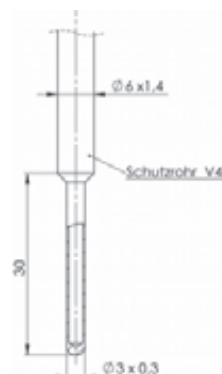
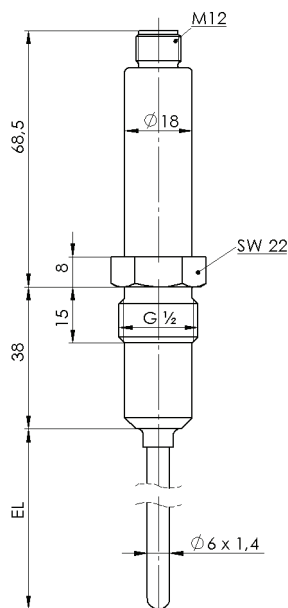
continued on next page

Dimensions

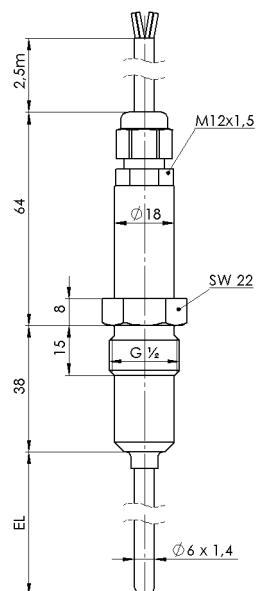
GTL 261



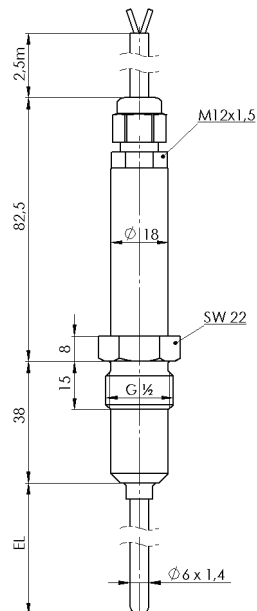
GTL 261M



GTL 281



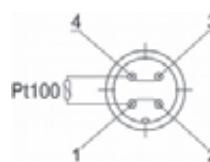
GTL 281M



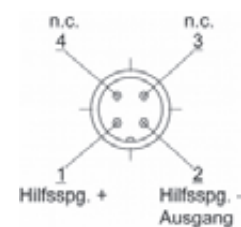
Connection

Design type GTL 261 or GTL 261M:

without transducer (4-wire):

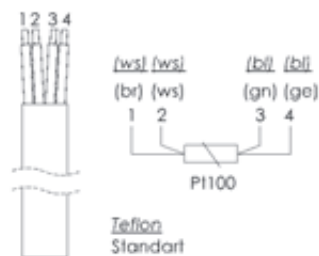


with transducer (2-wire):

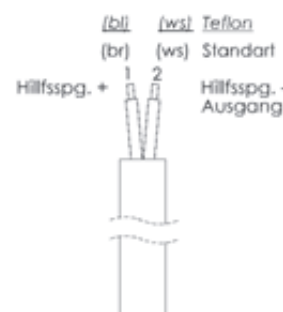


Design type GTL 281 or GTL 281M:

without transducer (4-wire):



with transducer (2-wire):



Option

TK	Design type GTL 281 and GTL 281M with Teflon cable GTL 280: 4 x 0.14 mm ² GTL 280M: 2 x 0.14 mm ² Teflon cable up to 200 °C
----	---

Product key

Information on suitable weld-in sleeves can be found in product information GHMadapt/Accessories.

1. 2. 3. 4. 5. 6. 7.
GTL - - - - - -

1. Design type	
261	cable connection M12-plug, without integrated transducer
261M	cable connection M12-plug with integrated transducer
281	fixed cable (PVC) connection 2.5m, without integrated transducer
281M	fixed cable (PVC) connection 2.5m, with integrated transducer
2. Fitting length EL	
0050	50 mm
0100	100 mm
0150	150 mm
0250	250 mm
xxxx	any EL in mm (surcharge from 250 mm for each 100 mm started, up to max. fitting length: Ø 6: max. 1000 mm)
3. Diameter protection tube and probe tip	
6	Ø 6 mm, without taper
3	Ø 6 mm, with tapered probe tip Ø 3 mm
4. Accuracy class	
A	class A
D	class AA (1/3 class B)
5. Transducer GTML2 (programmable) ONLY for design types 261M and 281M	
00	without transducer (design types 261 / 281)
M1	measuring range -10..+40 °C
M2	measuring range 0..50 °C
M3	measuring range 0..100 °C
M4	measuring range 0..150 °C
M5	measuring range 0..200 °C
MB	transducer with special measuring range in °C (state special measuring range separately e.g.: 0..75 °C or -20..+30 °C Mind the minimum range of 50 °C.)
6. Option	
00	without option
H	with neck tube (100 mm)
TK	Teflon cable for connection via fixed cable (only available for GTL 281 / 281M)
7. Certificate DIN EN 10204 (indicate only when required, multiple responses possible)	
WZ2.2	factory certification 2.2
APZMAT	acceptance test certificate 3.1 for material (in contact with products)
APZ2P	acceptance test certificate 3.1 with 2 measuring points (0°C / 70°C)
APZ3P	acceptance test certificate 3.1 with 3 measuring points (0°C, 70°C + 1 test point freely selectable)
APZ4P	acceptance test certificate 3.1 with 4 measuring points (0°C, 70°C + 2 test points freely selectable)

Temperature probe GTL 244



- Hygienic design and easy-to-sterilize measuring point
- Sensor made of stainless steel and PEEK
- Thermally decoupled

Characteristic

The flush mounted temperature probes are designed for e.g. temperature monitoring in CIP- / SIP- circuits and temperature measurements in tanks with stirrer or in milk tanks.

The probes can be provided with or without integrated head transmitter.

Specifications

Temperature ranges	: ambience: -40..+80 °C
	: probe tip: -40..+150 °C
	: CIP- / SIP-temperature: 140 °C < 30 min.
Measuring resistor	: Pt100
Accuracy	: class A, class AA
Electric connection	: cable screwing M16x1.5 (PG)
	: cable connection M12- plug (1.4305)
Process connection	: G 1/2" hygienic
Clamping torque	: 5..10 Nm
Probe head	: Ø 59 mm
Probe tip	: Ø 10 mm
Response time	: T ₉₀ ≤ 15 s
Working pressure	: max. 10 bar

Material

Probe head	: 1.4305
Tip	: 1.4404, PEEK
Protection class	: IP67 / IP69K
CE conformity	: EN 61326-1:2013 / -2-3:2013

Transducer GTML1

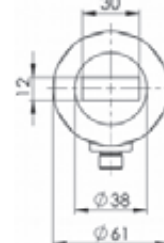
Integrated head transmitter

Measuring range	: -10..+40 °C * / 0..50 °C * / 0..100 °C * 0..150 °C * or freely in range -20..150 °C **
Power supply	: 10..30 V DC
Measuring output	: analog, 4..20 mA, 2-wire
Output signal in case of error	: < 3.75 mA or > 21.5 mA, selectable *
Filter	: integrated low-pass, 4-step *
Reaction time	: < 150 ms (filter 0), < 300 ms (filter 1) < 800 ms (filter 2), < 3 s (filter 3)
Working temperature	: -40..+70 °C
Accuracy	: < 0.2 % FS
Temperature drift	: < 0.01 % FS / K

Transducer GTML1 with on-site display

Transducer with integrated **on-site display (LCD)** only in combination with electric connection: cable connection M12 plug and integrated transducer (for further information see transducer GTML1).

Display	: 4-digit LCD
Displayed unit	: °C or °F, selectable *
Resolution	: 0.1 °C or 1 °C, selectable *
Background illumination	: activatable , deactivatable *
Working temperature	: -20..+60 °C

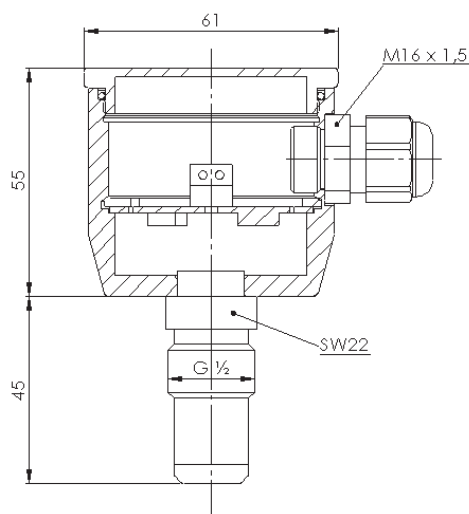


- * Programmable via GTL - Configuration tool (accessories) or buttons (only with on-site display)
- ** Programmable via GTL - Configuration tool (accessories)

Note: The default settings are marked in **bold**.

continued on next page

Dimensions



Connection

Electric connection: cable screwing M16x1.5 (PG)

without transducer (4-wire):

with transducer (2-wire):



Electric connection: cable connection M12-plug (1.4305)

without transducer (4-wire):

with transducer (2-wire):



Product key

1. 2. 3. 4. 5. 6. 7.
GTL - - - - - -

1. Design type	
244	G 1/2" flush mounted
2. Electric connection	
P	cable screwing M16x1.5 (PG)
V	V2A cable screwing M16x1.5 (PG)
M	cable connection M12-plug
3. Accuracy class	
A	class A
D	class AA (1/3 class B)
4. Transducer	
0	without transducer
M	permanently integrated transducer GTML1, without display
V	permanently integrated transducer GTML1, on-site display (LCD)
R	exchangeable head transducer RT420
T	exchangeable head transducer T19
5. Measuring range	
0	without transducer
1	measuring range -10..+40 °C (-50..+50 °C for head transducer T19)
2	measuring range 0..50 °C
3	measuring range 0..100 °C
4	measuring range 0..150 °C
B	transducer with special measuring range in °C (not possible for head transducer T19), state special measuring range separately e.g.: 0..75 °C or -20..+30 °C. Mind the minimum range of 50 °C.
6. Option	
00	without option
H	with neck tube
7. Certificate DIN EN 10204 (indicate only when required, multiple responses possible)	
WZ2.2	factory certification 2.2
APZMAT	acceptance test certificate 3.1 for material (in contact with products)
APZ2P	acceptance test certificate 3.1 with 2 measuring points (0°C / 70°C)
APZ3P	acceptance test certificate 3.1 with 3 measuring points (0°C, 70°C + 1 test point freely selectable)
APZ4P	acceptance test certificate 3.1 with 4 measuring points (0°C, 70°C + 2 test points freely selectable)

Notes on on-site display (LCD):

Permanently integrated transducer GTML1 (programmable) with on-site display only in combination with electric connection: cable connection M12 plug.

Information on suitable weld-in sleeves can be found in product information GHMadapt/Accessories.

Temperature sensor

GTL 264 / 264M

GTL 284 / 284M



GTL 264 GTL 264M

GTL 284 GTL 284M



- Hygienic G 1/2" process connection, flush mounted
- Hygienic design and easy-to-sterilize measuring point
- Sensor made of stainless steel and PEEK
- Thermally decoupled

Characteristic

The flush mounted temperature sensors are designed for e.g. temperature monitoring in CIP- / SIP- circuits and temperature measurements in tanks with stirrer or in milk tanks.

The sensors can be provided with different electric connections and with or without integrated head transmitter.

Specifications

Temperature ranges	: ambience:	-40..+80 °C
	: sensor tip:	-40..+150 °C
	CIP- / SIP-temperature:	140 °C < 30 min.
Measuring resistor	: Pt100	
Accuracy	: class A, class AA	
Process connection	: G 1/2	
Tightening torque	: 5..10 Nm	
Sensor head	: Ø 18 mm	
Sensor tip	: Ø 10 mm	
Response time	: T ₉₀ ≤ 15 s	
Ambient pressure	: max. 10 bar	

Material

Sensor head	: 1.4305
Sensor tip	: 1.4404, PEEK

Protection class	: IP67 / IP69K
CE conformity	: EN 61326-1:2013 / -2-3:2013

Ausführungen

	GTL 264 / 264M	GTL 284 / 284M
Electrical connection	M12-plug, 4-pin (1.4305)	fixed cable 2.5 m, PVC LIYY 281: 4 x 0,25 mm ² 281M: 2 x 0,25 mm ²

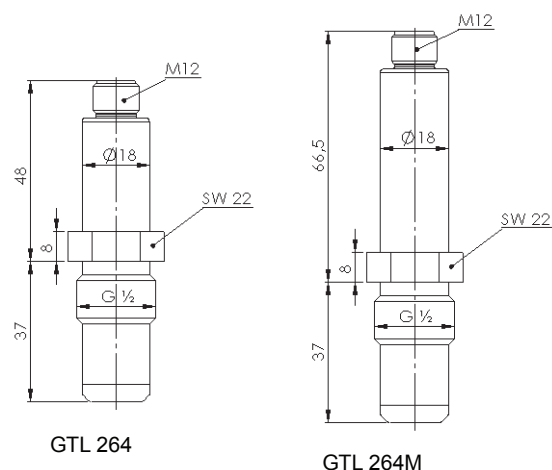
Transducer GTML2 (only for GTL 264M / GTL 284M)

Measuring range	: -10..+40 °C * / 0..50 °C * / 0..100 °C * 0..150 °C * or freely in range -20..150 °C *
Power supply	: 10..30 V DC
Measuring output	: analog, 4..20 mA, 2-wire
Output signal in case of error	: < 3.75 mA or > 21.5 mA, selectable *
Filter	: integrated low-pass, 4-step *
Response time	: < 150 ms (filter 0), < 300 ms (filter 1) < 800 ms (filter 2), < 3 s (filter 3)
Working temperature	: -40..+70 °C
Measurement accuracy	: < 0.2 % FS
Temperature drift	: < 0.01 % FS / K

* Programmable via GTL - Configuration tool (accessories)

Note: The default settings are marked in **bold**.

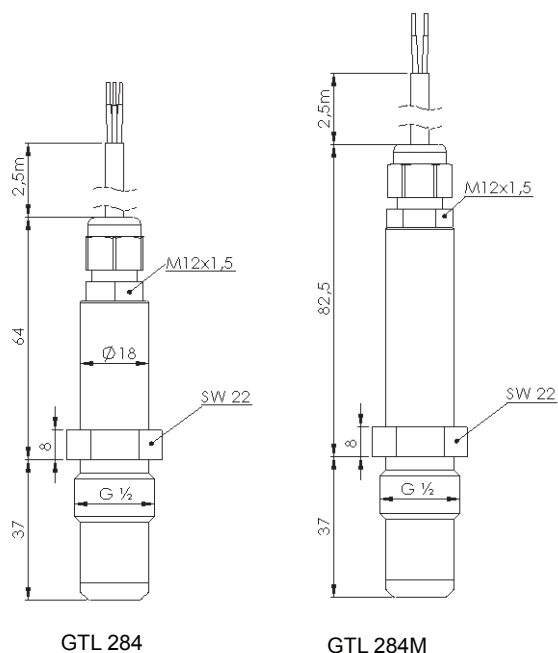
Dimensions



GTL 264

GTL 264M

continued on next page



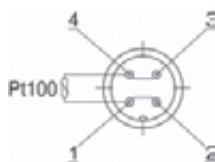
GTL 284

GTL 284M

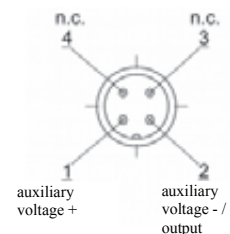
Connection

Design type GTL 264 or GTL 264M:

without transducer (4-wire):

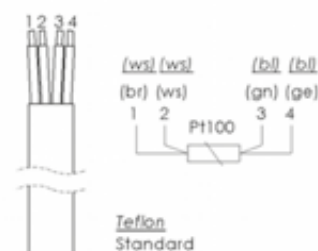


with transducer (2-wire):

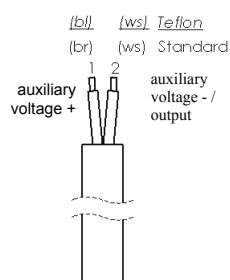


Design type GTL 284 or GTL 284M:

without transducer (4-wire):



with transducer (2-wire):



Option

TK	Design type GTL 284 and GTL 284M with Teflon cable GTL 284: 4 x 0.14 mm ² GTL 284M: 2 x 0.14 mm ² Teflon cable up to 200 °C
----	---

Product key

1. 2. 3. 4. 5.
GTL - - - -

1. Design type (electric connection)	
264	cable connection M12-plug
264M	cable connection M12-plug with integrated transducer
284	fixed cable (PVC) connection 2.5m, without integrated transducer
284M	fixed cable (PVC) connection 2.5m, with integrated transducer
2. Accuracy class	
A	class A
D	class AA (1/3 class B)
3. Transducer GTML2 (programmable) ONLY for design types 264M and 284M	
00	without transducer (design types 264 / 284)
M1	measuring range -10...+40 °C
M2	measuring range 0...50 °C
M3	measuring range 0...100 °C
M4	measuring range 0...150 °C
MB	transducer with special measuring range in °C, max range: -20...+150 °C (state special measuring range separately e.g.: 0...75 °C or -20...+30 °C Mind the minimum range of 50 °C.)
4. Option	
00	without option
H	with spacer (100 mm)
TK	Teflon cable for connection via fixed cable (only available for GTL 284 / 284M)
5. Certificate DIN EN 10204 (indicate only when required, multiple responses possible)	
WZ2.2	factory certification 2.2
APZMAT	acceptance test certificate 3.1 for material (in contact with products)
APZ2P	acceptance test certificate 3.1 with 2 measuring points (0°C / 70°C)
APZ3P	acceptance test certificate 3.1 with 3 measuring points (0°C, 70°C + 1 test point freely selectable)

Temperature probe GTL 263 / 263M



GTL 263M

- G ½" process connection hygienic, flush mounted
- Sensor made of stainless steel and PEEK
- Thermally decoupled

Characteristic

The flush mounted temperature probes with short sensor tip are designed for e.g. temperature measurements or monitoring in tanks with stirrer or for operation monitoring of pumps.

The probes can be provided with or without integrated head transmitter.

Specifications

Temperature ranges	: ambience:	-40..+80 °C
	: probe tip:	-40..+150 °C
	CIP- / SIP-temperature:	140 °C < 30 min.
Measuring resistor	: Pt100	
Accuracy	: class A, class AA	
Process connection	: G ½" hygienic	
Clamping torque	: 5..10 Nm	
Probe head	: Ø 18 mm	

Probe tip	: Ø 10 mm
Response time	: $T_{90} \leq 15$ s
Working pressure	: max. 10 bar

Material

Probe head	: 1.4305
Tip	: 1.4404, PEEK

Protection class	: IP67 / IP69K
CE conformity	: EN 61326-1:2013 / -2-3:2013

Design types

	GTL 263 / 263M
Electric connection	cable connection M12-plug, 4-pin (1.4305)

Transducer GTML2 GTML2 (only for GTL 263M)

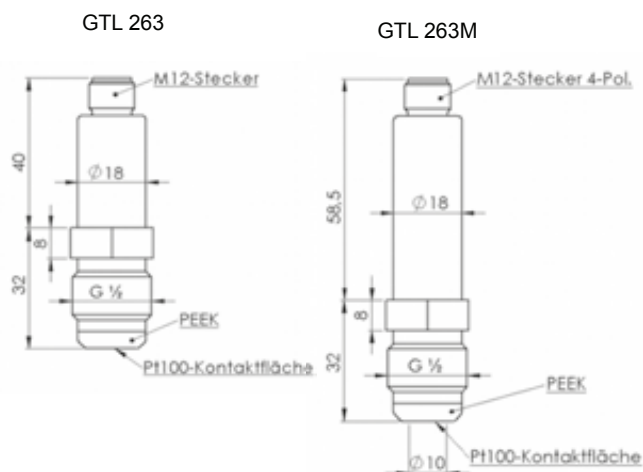
Integrated head transmitter

Measuring range	: -10..+40 °C * / 0..50 °C * / 0..100 °C * 0..150 °C * or freely in range -20..150 °C *
Power supply	: 10..30 V DC
Measuring output	: analog, 4..20 mA, 2-wire
Output signal in case of error	: < 3.75 mA or > 21.5 mA, selectable *
Filter	: integrated low-pass, 4-step *
Reaction time	: < 150 ms (filter 0), < 300 ms (filter 1) < 800 ms (filter 2), < 3 s (filter 3)
Working temperature	: -40..+70 °C
Measurement accuracy	: < 0.2 % FS
Temperature drift	: < 0.01 % FS / K

* Programmable via GTL - Configuration tool (accessories)

Note: The default settings are marked in **bold**.

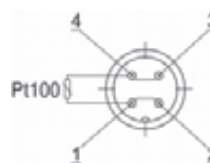
Dimensions



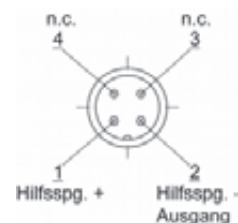
Connection

Design type GTL 263 or GTL 263M:

without transducer (4-wire):



with transducer (2-wire):



continued on next page

Product key

1. 2. 3. 4. 5.
GTL - - - -

1.	Design type (electric connection)
263	cable connection M12-plug
263M	cable connection M12-plug with integrated transducer
2.	Accuracy class
A	class A
D	class AA (1/3 class B)
3.	Transducer GTML2 (programmable) ONLY for design type 263M
00	without transducer (design types 263)
M1	measuring range -10...+40 °C
M2	measuring range 0...50 °C
M3	measuring range 0...100 °C
M4	measuring range 0...150 °C
MB	transducer with special measuring range in °C, max range: -20...+150 °C (state special measuring range separately e.g.: 0...75 °C or -20...+30 °C Mind the minimum range of 50 °C.)
4.	Option
00	without option
5.	Certificate DIN EN 10204 (indicate only when required, multiple responses possible)
WZ2.2	factory certification 2.2
APZMAT	acceptance test certificate 3.1 for material (in contact with products)
APZ2P	acceptance test certificate 3.1 with 2 measuring points (0°C / 70°C)
APZ3P	acceptance test certificate 3.1 with 3 measuring points (0°C, 70°C + 1 test point freely selectable)
APZ4P	acceptance test certificate 3.1 with 4 measuring points (0°C, 70°C + 2 test points freely selectable)

Temperature sensor GTL 349



- Without tread
- Hygienic design and easy-to-sterilize measuring point
- Sensor completely made of stainless steel

Characteristic

The temperature sensor GTL 349 is designed for temperature measurements in pipes of different nominal diameters or thin-walled tubes and tanks.

They can be used for example for process monitoring at tube curvatures, temperature measurements in pressure pipes or at measurements of pasty media in pipes

The fitting length can be varied by use of compression fitting. The probes can be provided with different electric connections and with or without integrated head transmitter.

Specifications

Temperature ranges	: ambience : -40..+80 °C : sensor tip : -40..+200 °C CIP- / SIP-temperature: 140 °C < 30 min.
Measuring resistor	: Pt100
Accuracy	: class A, class AA
Electrical connection	: cable gland M16x1.5 M12-plug (1.4305)

Process connection : no thread
suitable weld-in sleeves e.g.:
GKEV-25/76, GEMK-25/76
(see accessories page 63)



Insertion length : 50, 100, 150, 250 mm
Sensor head : Ø 59 mm

Thermowell and sensor tip:

Ø 6 mm : thermowell Ø 6 mm without taper
Ø 3 mm : thermowell Ø 6 mm and sensor tip Ø 3 mm

Response time : tip Ø 3 mm: $T_{90} \leq 1.5$ s
tip Ø 6 mm: $T_{90} \leq 7.4$ s

Operating pressure : max. 10 bar

Material

Sensor head : 1.4305

Thermowell and sensor tip : 1.4404

Protection class : IP67 / IP69K

CE conformity : EN 61326-1:2013 / -2-3:2013

Transducer GMTL1

Measuring range : -10..+40 °C * / 0..50 °C * / 0..100 °C *
0..150 °C * / 0..200 °C *
or freely in range -20..200 °C **

Power supply : 10..30 V DC

Output : analog, 4..20 mA, 2-wire

Output signal in case of error : < **3.75 mA** or > 21.5 mA, selectable *

Filter : integrated low-pass, 4-step *

Response time : < 150 ms (filter 0), < **300 ms (filter 1)**
< 800 ms (filter 2), < 3 s (filter 3)

Ambient temperature : -40..+70 °C

Accuracy : < 0.2 % FS

Temperature drift : < 0.01 % FS / K

Transducer GMTL1 with on-site display

Transducer with integrated **on-site display (LCD)** only in combination with electric connection: cable connection M12 plug and integrated transducer (for further information see transducer GMTL1).

Display : 4-digit LCD
Displayed unit : °C or °F, selectable *
Resolution : **0.1 °C** or 1 °C, selectable *
Background illumination : **activatable**, deactivatable *
Working temperature : -20..+60 °C

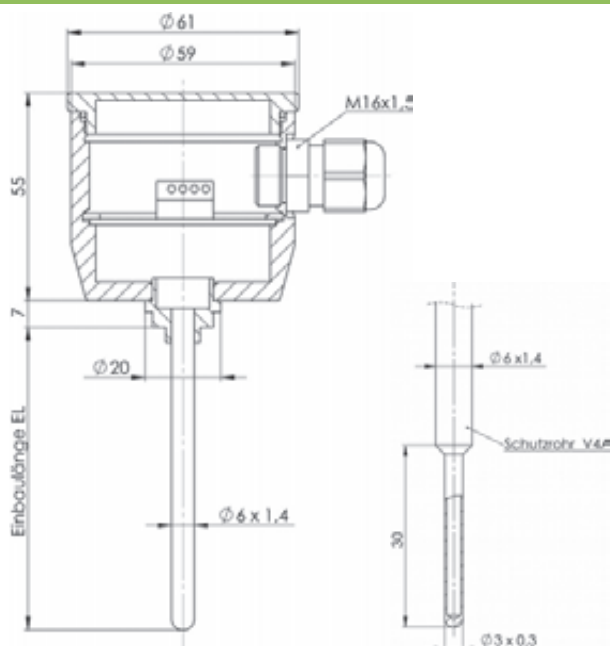


* Programmable via GTL - Configuration tool (accessories) or buttons (only with on-site display)

** Programmable via GTL - Configuration tool (accessories)

Note: The default settings are marked in **bold**.

Dimensions

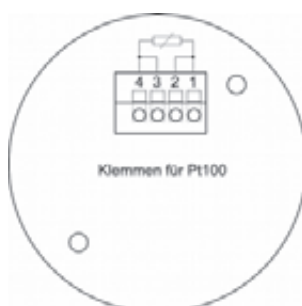


Connection

Electrical connection: cable gland M16x1.5 (PG)

without transducer (4-wire):

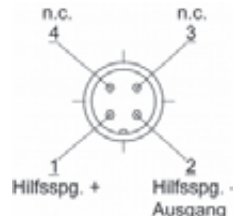
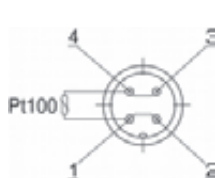
with transducer (2-wire):



Electrical connection: M12-plug (1.4305)

without transducer (4-wire):

with transducer (2-wire):



Product key

1. 2. 3. 4. 5. 6. 7. 8. 9.
GTL - - - - - - - -

1. Design type	
349	without thread
2. Electrical connection	
P	cable screwing M16x1.5 (PG)
V	V2A cable screwing M16x1.5 (PG)
M	cable connection M12-plug
3. Insertion length EL	
0050	50 mm
0100	100 mm
0150	150 mm
0250	250 mm
xxxx	any EL in mm (surcharge from 250 mm for each 100 mm started, up to max. fitting length: Ø 6: max. 1000 mm)
4. Diameter thermowell and sensor tip	
6	Ø 6 mm, without taper
3	Ø 6 mm, with sensor tip Ø 3 mm
5. Accuracy class	
A	class A
D	class AA (1/3 class B)
6. Transducer	
0	without transducer
M	permanently integrated transducer GTML1, without display
V	permanently integrated transducer GTML1, on-site display (LCD)
R	exchangeable head transducer RT420
T	exchangeable head transducer T19
7. Measuring range	
0	without transducer
1	measuring range -10..+40 °C (-50..+50 °C for head transducer T19)
2	measuring range 0..50 °C
3	measuring range 0..100 °C
4	measuring range 0..150 °C
5	measuring range 0..200 °C
B	transducer with special measuring range in °C (not possible for head transducer T19), state special measuring range separately e.g.: 0..75 °C or -20..+30 °C. Mind the minimum range of 50 °C.
8. Option	
0	without transducer
H	mit Halsrohr (100 mm)
9. Certificate DIN EN 10204 (indicate only when required, multiple responses possible)	
WZ2.2	factory certification 2.2
APZMAT	acceptance test certificate 3.1 for material (in contact with products)
APZ2P	acceptance test certificate 3.1 with 2 measuring points (0°C / 70°C)
APZ3P	acceptance test certificate 3.1 with 3 measuring points (0°C, 70°C + 1 test point freely selectable)

Notes on on-site display (LCD):

Permanently integrated transducer GTML1 (programmable) with on-site display only in combination with electrical connection: M12 plug. Information on suitable compression insertions can be found in section Accessories.

Temperature sensor

GTL 369 / 369M

GTL 389 / 389M



- Without tread
- Hygienic design and easy-to-sterilize measuring point
- Sensor completely made of stainless steel

Characteristic

The temperature sensors are designed for temperature measurements in pipes of different nominal diameters or thin-walled tubes and tanks.

They can be used for example for process monitoring at tube curvatures, temperature measurements in pressure pipes or at measurements of pasty media in pipes

The immersion length can be varied by use of compression fitting. The probes can be provided with different electric connections and with or without integrated head transmitter.

Specifications

Temperature ranges	: ambient	: -40..+80 °C
	: sensor tip	: -40..+200 °C
		CIP- / SIP-temperature: 140 °C < 30 min.
Measuring resistor	: Pt100	
Accuracy	: class A, class AA	
Process connection	: no thread	

suitable weld-in sleeves e.g.:
GKEV-25/76, GEMK-25/76



Immersion length	: 50, 100, 150, 250 mm
Sensor head	: Ø 18 mm
Thermowell and sensor tip:	
Ø 6 mm	thermowell Ø 6 mm without taper
Ø 3 mm	thermowell Ø 6 mm and sensor tip Ø 3 mm
Response time	: FS Ø 3 mm: $T_{90} \leq 1.5$ s
	FS Ø 6 mm: $T_{90} \leq 7.4$ s
Operating pressure	: max. 10 bar
Material	
Sensor head	: 1.4305
Thermowell and tip	: 1.4404
Protection class	: IP67 / IP69K
CE conformity	: EN 61326-1:2013 / -2-3:2013

Design type

	GTL 369	GTL 389
Electrical connection	M12-plug, 4-pin (1.4305)	fixed cable 2.5 m, LIYY 389: 4 x 0,25 mm ² 389M: 2 x 0,25 mm ²

Transducer GTML2 (only for GTL 369M / GTL 389M)

Measuring range	: -10..+40 °C * / 0..50 °C * / 0..100 °C * 0..150 °C * / 0..200 °C * or freely in range -20..200 °C *
Power supply	: 10..30 V DC
Output	: analog, 4..20 mA, 2-wire
Output signal in case of error	: < 3.75 mA or > 21.5 mA, selectable *
Filter	: integrated low-pass, 4-step *
Response time	: < 150 ms (filter 0), < 300 ms (filter 1) < 800 ms (filter 2), < 3 s (filter 3)
Ambient temperature	: -40..+70 °C
Measurement accuracy	: < 0.2 % FS
Temperature drift	: < 0.01 % FS / K

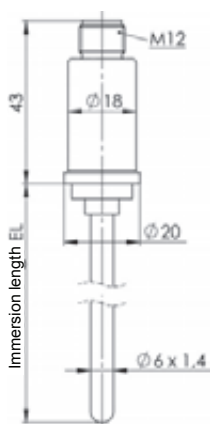
* Programmable via GTL - Configuration tool (accessories)

Note: The default settings are marked in **bold**.

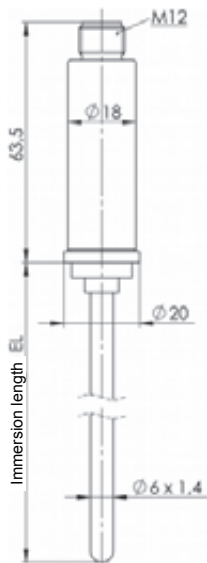
continued on next page

Dimensions

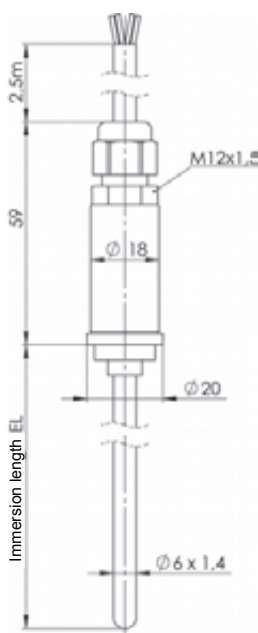
GTL 369



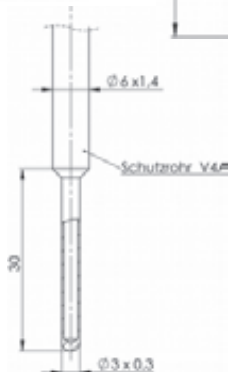
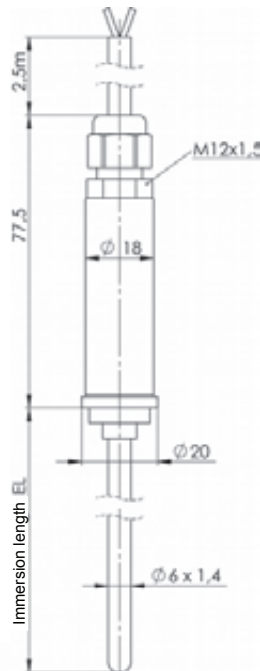
GTL 369M



GTL 389

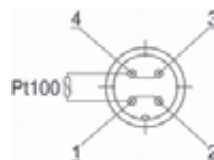


GTL 389M

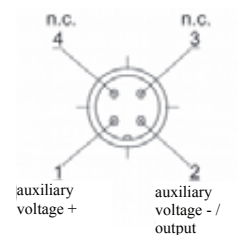


Connection

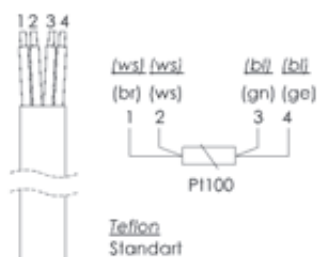
Design type GTL 369 or GTL 369M:
without transducer (4-wire):



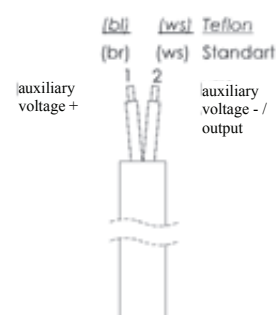
with transducer (2-wire):



Design type GTL 389 or GTL 389M:
without transducer (4-wire):



with transducer (2-wire):



Option

TK	Design type GTL 389 and GTL 389M with Teflon cable GTL 389: 4 x 0.14 mm ² / GTL 389M: 2 x 0.14 mm ² Teflon cable up to 200 °C
----	--

continued on next page

Product key

1. 2. 3. 4. 5. 6. 7.
 GTL - - - - - -

1. Design type	
369	cable connection M12-plug,
369M	cable connection M12-plug with integrated transducer
389	fixed cable (PVC) connection 2.5m
389M	fixed cable (PVC) connection 2.5m, with integrated transducer
2. Fitting length EL	
0050	50 mm
0100	100 mm
0150	150 mm
0250	250 mm
xxxx	any EL in mm (surcharge from 250 mm for each 100 mm started, up to max. fitting length: Ø 6: max. 1000 mm)
3. Diameter protection tube and probe tip	
6	Ø 6 mm, without taper
3	Ø 6 mm, with tapered probe tip Ø 3 mm
4. Accuracy class	
A	class A
D	class AA (1/3 class B)
5. Transducer GTML2 (programmable) ONLY for design types 369M and 389M	
00	without transducer (design types 369 / 389)
M1	measuring range -10..+40 °C
M2	measuring range 0..50 °C
M3	measuring range 0..100 °C
M4	measuring range 0..150 °C
M5	measuring range 0..200 °C
MB	transducer with special measuring range in °C (state special measuring range separately e.g.: 0..75 °C or -20..+30 °C Mind the minimum range of 50 °C.)
6. Option	
00	without option
H	with spacer
TK	Teflon cable for connection via fixed cable (only available for 389 and 389M) (surcharge per meter)
7. Certificate DIN EN 10204 (indicate only when required, multiple responses possible)	
WZ2.2	factory certification 2.2
APZMAT	acceptance test certificate 3.1 for material (in contact with products)
APZ2P	acceptance test certificate 3.1 with 2 measuring points (0°C / 70°C)
APZ3P	acceptance test certificate 3.1 with 3 measuring points (0°C, 70°C + 1 test point freely selectable)

Information on suitable compression fittings can be found in section Accessories.

Temperature sensor GTL 459



In combination
with APH G12



- G 3/8 union nut
- Hygienic design and easy-to-sterilize measuring point
- Sensor completely made of stainless steel

Characteristic

The temperature sensor are designed for temperature monitoring in pipes and tanks, temperature measurements in steam and pressure pipes (closed process) and for monitoring of CIP- / SIP- processes.

The sensor can be provided with different electric connections and with or without integrated head transmitter.

Specifications

Temperature ranges	: ambience: -40..+80 °C
	: sensor tip: -40..+200 °C
	: CIP- / SIP-temperature: 140 °C < 30 min.
Measuring resistor	: Pt100
Accuracy	: class A, class AA
Electrical connection	: cable gland M16x1.5
	: M12- plug (1.4305)
Process connection	: immersion sleeve, G 3/8 outside thread
	: suitable adapter and weld-in sleeves
	: APHG12, APHK25, APHZ18
	(see accessories page 64)



Tightening torque	: hand-tight
Insertion length	: 37, 83, 97, 160 mm
Sensor head	: Ø 59 mm

Thermowell and sensor tip:

Ø 3 mm	: protection tube Ø 3 mm
Response time	: $T_{90} \leq 1.5$ s (without immersion sleeve)
	: $T_{90} \leq 15$ s (with immersion sleeve: <i>The use of heat transfer paste is recommended, because this can reduce the stated time by up to 50 %</i>)
Operating pressure	: max. 10 bar

Material

Sensor head	: 1.4305 (V2A)
Thermowell and tip	: 1.4404 (V4A)
Union nut	: 1.4408 (V4A)

Protection class	: IP67 / IP69K
CE conformity	: EN 61326-1:2013 / -2-3:2013

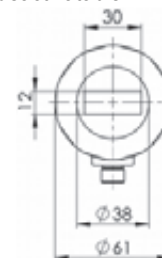
Transducer GMTL1

Measuring range	: -10..+40 °C * / 0..50 °C * / 0..100 °C * 0..150 °C * / 0..200 °C * or freely in range -20..200 °C **
Power supply	: 10..30 V DC
Output	: analog, 4..20 mA, 2-wire
Output signal in case of error	: < 3.75 mA or > 21.5 mA, selectable *
Filter	: integrated low-pass, 4-step *
Response time	: < 150 ms (filter 0), < 300 ms (filter 1) < 800 ms (filter 2), < 3 s (filter 3)
Ambient temperature	: -40..+70 °C
Accuracy	: < 0.2 % FS
Temperature drift	: < 0.01 % FS / K

Transducer GTML1 with on-site display

Transducer with integrated **on-site display (LCD)** only in combination with electric connection: cable connection M12 plug and integrated transducer (for further information see transducer GTML1).

Display	: 4-digit LCD
Displayed unit	: °C or °F, selectable *
Resolution	: 0.1 °C or 1 °C, selectable *
Background illumination	: activatable , deactivatable *
Ambient temperature	: -20..+60 °C

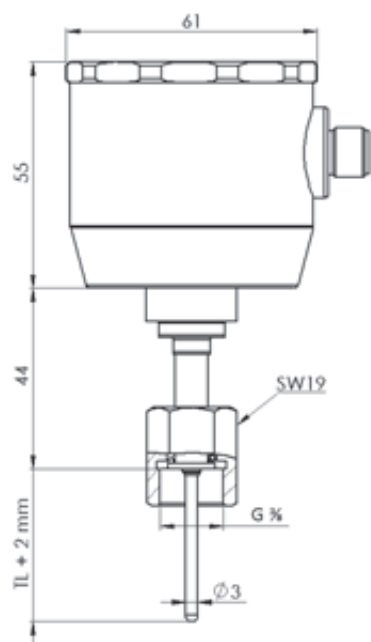


- * Programmable via GTL - Configuration tool (accessories) or buttons (only with on-site display)
- ** Programmable via GTL - Configuration tool (accessories)

Note: The default settings are marked in **bold**.

continued on next page

Dimensions



Connection

Electrical connection: cable gland M16x1.5

without transducer (4-wire):

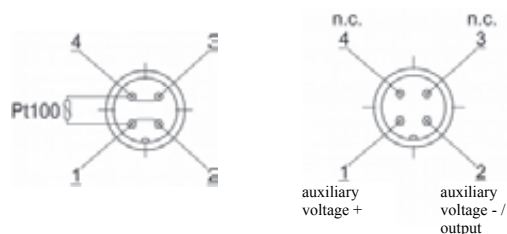
with transducer (2-wire):



Electrical connection: M12-plug (1.4305)

without transducer (4-wire):

with transducer (2-wire):



Product key

1. 2. 3. 4. 5. 6. 7. 8. 9.

GTL - - - - - - -

1. Design type	
459	G 3/8 with union nut
2. Electrical connection	
P	cable gland M16x1.5
V	V2A cable gland M16x1.5
M	M12-plug
3. Immersion length TL	
0037	37 mm
0083	83 mm
0097	97 mm
0160	160 mm
xxxx	any TL in mm: from 200 mm till max. 500 mm, (surcharge from 200 mm for each 100 mm started)
4. Diameter thermowell and sensor tip	
3	Ø 3 mm
5. Accuracy class	
A	class A
D	class AA (1/3 class B)
6. Transducer	
0	without transducer
M	permanently integrated transducer GTML1, without display
V	permanently integrated transducer GTML1, on-site display (LCD)
R	exchangeable head transducer RT420
T	exchangeable head transducer T19
7. Measuring range	
0	without transducer
1	measuring range -10..+40 °C (-50..+50 °C for head transducer T19)
2	measuring range 0..50 °C
3	measuring range 0..100 °C
4	measuring range 0..150 °C
5	measuring range 0..200 °C
B	transducer with special measuring range in °C (not possible for head transducer T19), state special measuring range separately e.g.: 0..75 °C or -20..+30 °C Mind the minimum range of 50 °C.
8. Option	
00	without Option
H	With spacer
9. Certificate DIN EN 10204 (indicate only when required, multiple responses possible)	
WZ2.2	factory certification 2.2
APZMAT	acceptance test certificate 3.1 for material (in contact with products)
APZ2P	acceptance test certificate 3.1 with 2 measuring points (0°C / 70°C)
APZ3P	acceptance test certificate 3.1 with 3 measuring points (0°C, 70°C + 1 test point freely selectable)

Notes on on-site display (LCD): Permanently integrated transducer GTML1 (programmable) with on-site display only in combination with electrical connection: M12 plug. Information on suitable adapter and weld-in sleeves can be found in section Accessories.

Temperature sensor

GTL 479 / 479M

GTL 499 / 499M



In combination
with APH G12



- G 3/8" union nut
- Hygienic design and easy-to-sterilize measuring point
- Sensor completely made of stainless steel

Characteristic

The temperature sensors are designed for temperature monitoring in pipes and tanks, temperature measurements in steam and pressure pipes (closed process) and for monitoring of CIP- / SIP- processes.

The sensors can be provided with different electric connections and with or without integrated head transmitter.

Specifications

Temperature ranges	: ambient: -40..+80 °C
	: process: -40..+200 °C
	: CIP- / SIP-temperature: 140 °C < 30 min.
Measuring resistor	: Pt100
Accuracy	: class A, class AA
Process connection	: immersion sleeve, G 3/8" outside thread
	: suitable adapter and weld-in sleeves
	: APHG12, APHK25, APHZ18
	(see accessories page 64)



Tightening torque	: hand-tight
Immersion length	: 37, 83, 97, 160 mm
Sensor head	: Ø 18 mm

Thermowell and sensor tip:

Ø 3 mm	: thermowell Ø 3 mm
Response time	: $T_{90} \leq 1.5$ s (without immersion sleeve)
	: $T_{90} \leq 15$ s (with immersion sleeve: The use of heat transfer paste is recommended, because this can reduce the stated time by up to 50 %)

Operating pressure	: max. 10 bar
--------------------	---------------

Material

Sensor head	: 1.4305
Thermowell and sensor tip	: 1.4404
Union nut	: 1.4408

Protection class	: IP67 / IP69K
CE conformity	: EN 61326-1:2013 / -2-3:2013

Design type

	GTL 479 / 479M	GTL 499 / 499M
Electrical connection	M12-plug, 4-pin (1.4305)	fixed cable 2.5 m LIYY 499: 4 x 0.25 mm ² 499M: 2 x 0.25 mm ²

Transducer GTML2 (only for GTL 479M / GTL 499M)

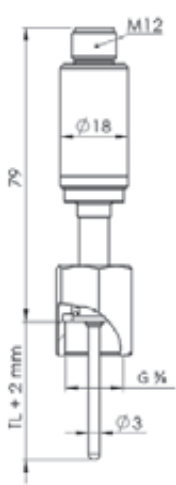
Measuring range	: -10..+40 °C * / 0..50 °C * / 0..100 °C * 0..150 °C * / 0..200 °C * or freely in range -20..200 °C *
Power supply	: 10..30 V DC
Output	: analog, 4..20 mA, 2-wire
Output signal in case of error	: < 3.75 mA or > 21.5 mA, selectable *
Filter	: integrated low-pass, 4-step *
Response time	: < 150 ms (filter 0), < 300 ms (filter 1) < 800 ms (filter 2), < 3 s (filter 3)
Ambient temperature	: -40..+70 °C
Accuracy	: < 0.2 % FS
Temperature drift	: < 0.01 % FS / K

* Programmable via GTL - Configuration tool (accessories)

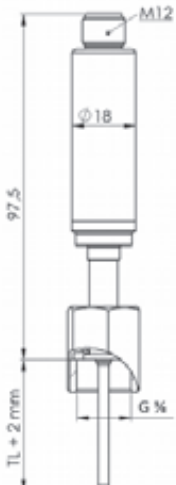
Note: The default settings are marked in **bold**.

continued on next page

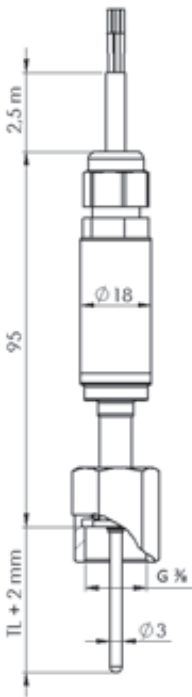
Dimensions



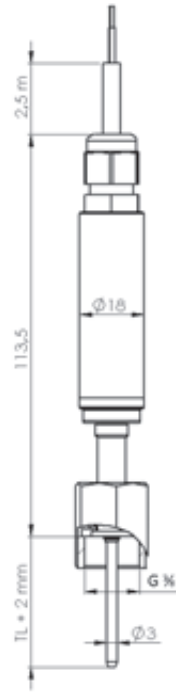
GTL 479



GTL 479M



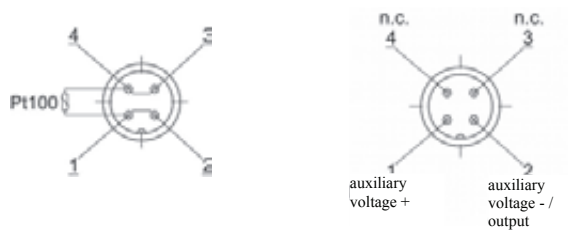
GTL 499



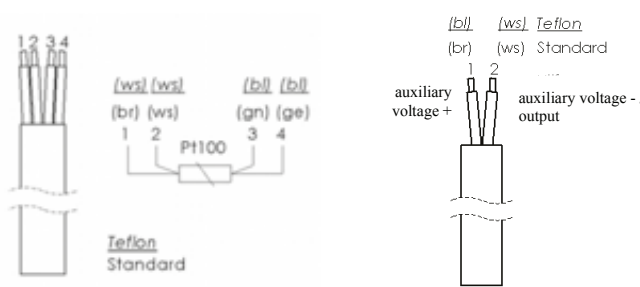
GTL 499M

Connection

Design type GTL 479 or GTL 479M:
without transducer (4-wire): with transducer (2-wire):



Design type GTL 499 or GTL 499M:
without transducer (4-wire): with transducer (2-wire):



Option

TK	Design type GTL 499 and GTL 499M with Teflon cable GTL 499: 4 x 0.14 mm ² / GTL 499M: 2 x 0.14 mm ² Teflon cable up to 200 °C
----	--



Product key

1. 2. 3. 4. 5. 6. 7.
GTL - - - - - -

1. Design type (electrical connection)	
479	M12-plug
479M	M12-plug with integrated transducer
499	fixed cable (PVC) connection 2.5m
499M	fixed cable (PVC) connection 2.5m, with integrated transducer
2. Immersion length TL	
0037	37 mm
0083	83 mm
0097	97 mm
0160	160 mm
xxxx	any TL in mm: from 200 mm till max. 500 mm, (surcharge from 200 mm for each 100 mm started)
3. Diameter thermowell and sensor tip	
3	Ø 3 mm
4. Accuracy class	
A	class A
D	class AA (1/3 class B)
5. Transducer GTML2 (programmable) ONLY for design types 479M and 499M	
00	without transducer (design types 369 / 389)
M1	measuring range -10..+40 °C
M2	measuring range 0..50 °C
M3	measuring range 0..100 °C
M4	measuring range 0..150 °C
M5	measuring range 0..200 °C
MB	transducer with special measuring range in °C (state special measuring range separately e.g.: 0..75 °C or -20..+30 °C Mind the minimum range of 50 °C.)
6. Option	
00	without option
H	with spacer
TK	Teflon cable for connection via fixed cable (only available for 499 and 499M) (surcharge per meter)
7. Certificate DIN EN 10204 (indicate only when required, multiple responses possible)	
WZ2.2	factory certification 2.2
APZMAT	acceptance test certificate 3.1 for material (in contact with products)
APZ2P	acceptance test certificate 3.1 with 2 measuring points (0°C / 70°C)
APZ3P	acceptance test certificate 3.1 with 3 measuring points (0°C, 70°C + 1 test point freely selectable)

Information on suitable adapter and weld-in sleeves can be found in section Accessories.

Temperature probe with double-Pt100 Head Ø 59 mm



- Hygienic design and easy-to-sterilize measuring point
- Sensor completely made of stainless steel
- Redundant temperature measurement in one sensor

Characteristic

The temperature probes are designed for temperature monitoring in pipes and tanks, temperature measurements in steam and pressure pipes and for monitoring of CIP- / SIP- processes.

The probes can be provided with different electric connections and with or without integrated head transmitter.

Specifications

Temperature ranges	: ambience: -40..+80 °C probe tip: -40..+200 °C CIP- / SIP-temperature: 140 °C < 30 min.
Measuring resistor	: 2 x Pt100
Accuracy	: class A, class AA
Process connection	: M12, G ½, G ¾ standard, without thread, G ¾
Clamping torque	: M12 - 5..10 Nm : G ½ - 5..20 Nm : G ¾ - hand-tight
Fitting length	: 50, 100, 150, 250 mm
Probe head	: Ø 59 mm
Protection tube and probe tip:	
Ø 6 mm	: protection tube without taper
Ø 4 mm	: protection tube without taper (only for GTL 142.2 and GTL 152.2)
Ø 3 mm	: protection tube Ø 6 mm and tapered probe tip Ø 3 mm
Response time	: FS Ø 3 mm: $T_{90} \leq 1.5$ s FS Ø 4 mm: $T_{90} \leq 3.6$ s FS Ø 6 mm: $T_{90} \leq 7.4$ s
Working pressure	: max. 10 bar
Material	
Probe head	: 1.4305 (V2A)
Neck tube	: 1.4305 (V2A)
Protection tube and tip	: 1.4404 (V4A)
Protection class	: IP67 / IP69K
CE conformity	: EN 61326-1:2006 / -2-3:2006

Transducer GTML1

Integrated head transmitter

Measuring range	: -10..+40 °C * / 0..50 °C * / 0..100 °C * 0..150 °C * / 0..200 °C * or freely in range -20..200 °C **
Power supply	: 10..30 V DC
Measuring output	: analog, 4..20 mA, 2-wire
Output signal in case of error	: < 3.75 mA or > 21.5 mA, selectable *
Filter	: integrated low-pass, 4-step *
Reaction time	: < 150 ms (filter 0), < 300 ms (filter 1) < 800 ms (filter 2), < 3 s (filter 3)
Working temperature	: -40..+70 °C
Accuracy	: < 0.2 % FS
Temperature drift	: < 0.01 % FS / K

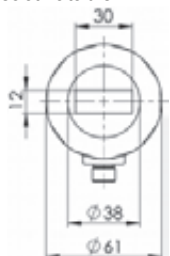
Product information

Temperature

Transducer GTML1 with on-site display

Transducer with integrated **on-site display (LCD)** only in combination with electric connection: cable connection M12 plug and integrated transducer (for further information see transducer GTML1).

Display : 4-digit LCD
 Displayed unit : °C or °F, selectable *
 Resolution : **0.1 °C** or 1 °C, selectable *
 Background illumination : **activatable**, deactivatable *
 Working temperature : -20...+60 °C

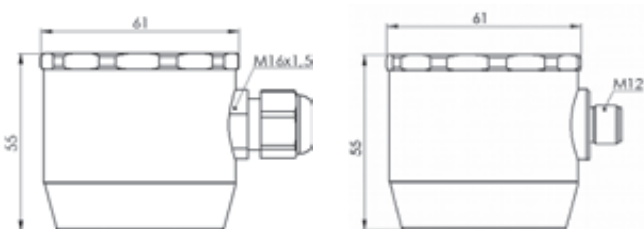


- * Programmable via GTL - Configuration tool (accessories) or buttons (only with on-site display)
- ** Programmable via GTL - Configuration tool (accessories)

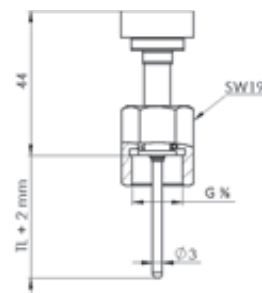
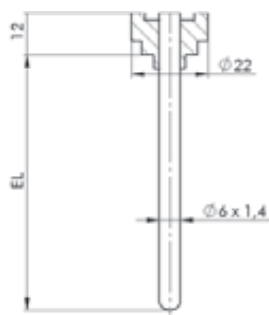
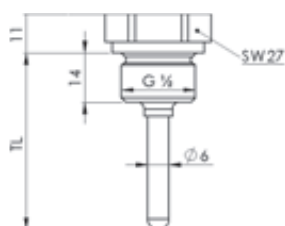
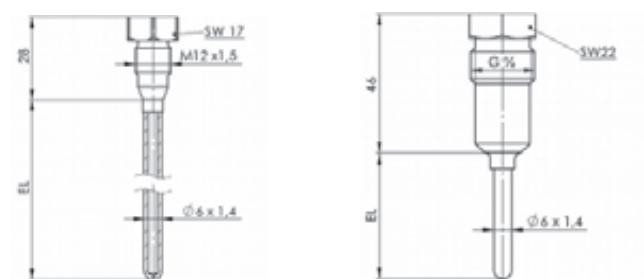
Note: The default settings are marked in **bold**.

Dimensions

Probe head



Process connection



Connection

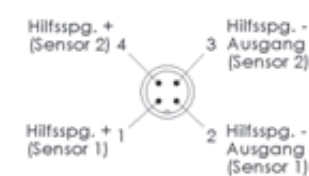
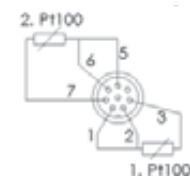
Electric connection: cable connection M12-plug

without transducer:

with transducer:

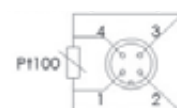
with 1 x 8-Pol-M12-plug:

with 1 x M12-plug



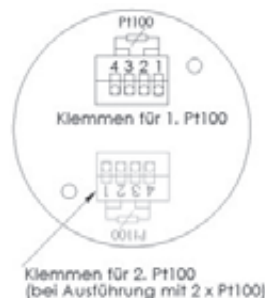
with 2 x M12-plug

with 2 x M12-plug (sensor 1 and 2)



Electric connection: cable screwing M16x1.5 (PG)

without transducer



Product key

1. 2. 3. 4. 5. 6. 7. 8. 9. 10.
GTL - - - - - - - - - -

1. Design type	
142.2	thread M12 hygienic, without neck tube
152.2	thread M12 hygienic, with neck tube (100 mm)
241.2	thread G ½ hygienic, without neck tube
251.2	thread G ½ hygienic, with neck tube (100 mm)
240.2	thread G ½ standard, without neck tube
250.2	thread G ½ standard, with neck tube (100 mm)
349.2	without thread
459.2	G ¾ with union nut
2. Electric connection	
P	1 x cable screwing M16x1.5 (PG) (see note below)
V	1 x V2A cable screwing M16x1.5 (PG) (see note below)
M	1 x cable connection M12 plug (at design type without transducer: 8-pole M12 plug)
2P	2 x cable screwing M16x1.5 (PG) (see note below)
2V	2 x V2A cable screwing M16x1.5 (PG) (see note below)
2M	2 x cable connection M12 plug
3. Fitting length EL or immersion length TL (not for GTL 459.2: see product information GTL 459)	
0050	50 mm
0100	100 mm
0150	150 mm
0250	250 mm
xxxx	any EL in mm (e.g. 320 = 320 mm) Ø 6: max. 1000 mm, Ø 4: max. 500 mm
4. Diameter protection tube and probe tip (not for GTL 459.2: see product information GTL 459)	
6	Ø 6 mm, without taper
4	Ø 4 mm, without taper (not for GTL 142.2 and GTL 152.2)
3	Ø 6 mm, with tapered probe tip Ø 3 mm
5. Accuracy class	
A	class A
D	class AA (1/3 class B)
6. 1st Transducer	
0	without transducer
M	permanently integrated transducer GTML1, without display
V	permanently integrated transducer GTML1, on-site display (LCD)

7. Measuring range 1st transducer	
0	without transducer
1	measuring range -10..+40 °C (-50..+50 °C for head transducer T19)
2	measuring range 0..50 °C
3	measuring range 0..100 °C
4	measuring range 0..150 °C
5	measuring range 0..200 °C
B	transducer with special measuring range in °C, state special measuring range separately e.g.: 0..75 °C or -20..+30 °C Mind the minimum range of 50 °C.
8. 2nd transducer	
0	without transducer
M	permanently integrated transducer GTML1, without display
09. Measuring range 2nd transducer	
09. 13	
0	without transducer
1	measuring range -10..+40 °C (-50..+50 °C for head transducer T19)
2	measuring range 0..50 °C
3	measuring range 0..100 °C
4	measuring range 0..150 °C
5	measuring range 0..200 °C
B	transducer with special measuring range in °C, state special measuring range separately e.g.: 0..75 °C or -20..+30 °C Mind the minimum range of 50 °C.
10. Option	
00	without option

Note:

- 1) Design type with 2 x transducer only in combination with electrical connection: cable connection M12 plug
- 2) For the configuration of the second transducer via GTL Configuration tool at design type 1 x cable connection M12 plug a connection cable KM4P-GTL34 is necessary (see accessories at the end of this PI).

Information on suitable weld-in sleeves for "thread M12 hygienic" and "thread G ½ hygienic" can be found in product information GH-Madapt/Accessories. Suitable compression fittings for design type "without thread" can be found in chapter accessories at page 63. Suitable adapter / weld-in sleeves for design type "G ¾ with union nut" can be found in chapter accessories at page 64 and for design type "G ½ standard" at page 65.

Temperature probe with double-Pt100 Head Ø 18 mm



- Hygienic design and easy-to-sterilize measuring point
- Sensor completely made of stainless steel
- Redundant temperature measurement in one sensor

Characteristic

The temperature probes are designed for temperature monitoring in pipes and tanks, temperature measurements in steam and pressure pipes and for monitoring of CIP- / SIP- processes.

The probes can be provided with different electric connections and with or without integrated head transmitter.

Specifications

Temperature ranges	: ambience: -40..+80 °C probe tip: -40..+200 °C CIP- / SIP-temperature: 140 °C < 30 min.
Measuring resistor	: 2 x Pt100
Accuracy	: class A, class AA
Process connection	: M12, G ½, G ¾ standard, without thread, G ¾
Clamping torque	: M12 - 5..10 Nm : G ½ - 5..20 Nm : G ¾ - hand-tight
Fitting length	: 50, 100, 150, 250 mm
Probe head	: Ø 18 mm
Protection tube and probe tip:	
Ø 6 mm	protection tube without taper
Ø 4 mm	Ø 4 mm, without taper (only for M12 thread hygienic)
Ø 3 mm	protection tube Ø 6 mm and tapered probe tip Ø 3 mm
Response time	: FS Ø 3 mm: $T_{90} \leq 1.5$ s FS Ø 4 mm: $T_{90} \leq 3.6$ s FS Ø 6 mm: $T_{90} \leq 7.4$ s
Working pressure	: max. 10 bar
Material	
Probe head	: 1.4305 (V2A)
Protection tube and tip	: 1.4404 (V4A)
Protection class	: IP67 / IP69K
CE conformity	: EN 61326-1:2006 / -2-3:2006

Transducer GTML2

Integrated head transmitter

Measuring range	: -10..+40 °C * / 0..50 °C * / 0..100 °C * 0..150 °C * / 0..200 °C * or freely in range -20..200 °C *
Power supply	: 10..30 V DC
Measuring output	: analog, 4..20 mA, 2-wire
Output signal in case of error	: < 3.75 mA or > 21.5 mA, selectable *
Filter	: integrated low-pass, 4-step *
Reaction time	: < 150 ms (filter 0), < 300 ms (filter 1) < 800 ms (filter 2), < 3 s (filter 3)
Working temperature	: -40..+70 °C
Accuracy	: < 0.2 % FS
Temperature drift	: < 0.01 % FS / K

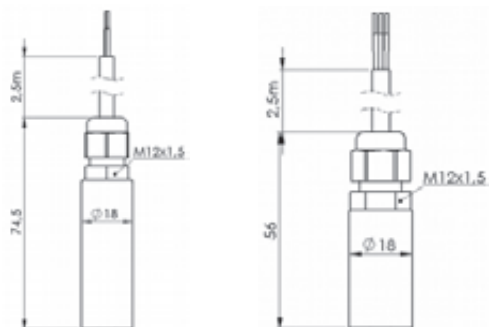
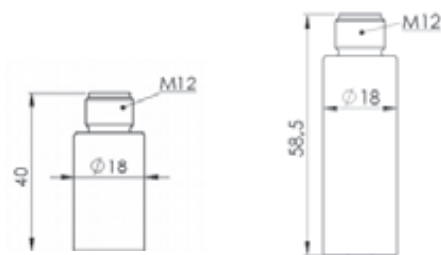
* Programmable via GTL - Configuration tool (accessories)

Note: The default settings are marked in **bold**.

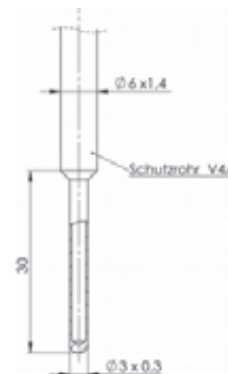
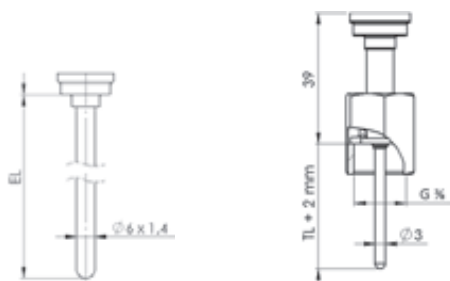
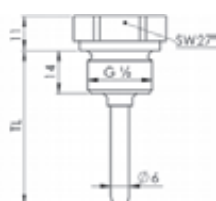
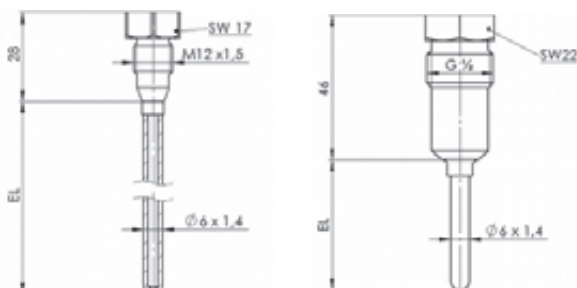
continued on next page

Dimensions

Probe head



Process connection



Connection

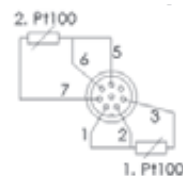
Electric connection: cable connection M12-plug

without transducer:

with transducer:

with 1 x 8-Pol-M12-plug:

with 1 x MR-plug:



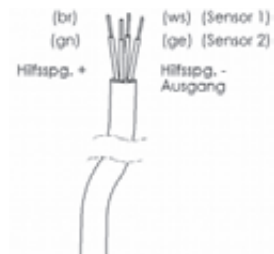
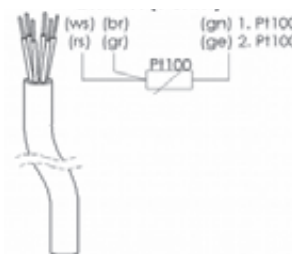
Electric connection: fixed cable (PVC)

without transducer:

with transducer:

2 x Pt100 (3-wire):

2 x Pt100:



Option

TK	with Teflon cable up to 200 °C
----	--------------------------------

Product key

1. 2. 3. 4. 5. 6. 7.
GTL - - - - - -

1.	Design type
162.2	thread M12 hygienic, connection via 8-pole M12-plug, no transducer
162M.2	thread M12 hygienic, connection via M12-plug, 2 x integrated transducer
182.2	thread M12 hygienic, connection via fixed cable (PVC) 2.5 m, no transducer
182M.2	thread M12 hygienic, connection via fixed cable (PVC) 2.5 m, 2 x integrated transducer
261.2	thread G ½ hygienic, connection via 8- pole M12-plug, no transducer
261M.2	thread G ½ hygienic, connection via M12-plug, 2 x integrated transducer
281.2	thread G ½ hygienic, connection via fixed cable (PVC) 2.5 m, no transducer
281M.2	thread G ½ hygienic, connection via fixed cable (PVC) 2.5 m, 2 x integrated transducer
260.2	thread G ½ standard, connection via 8- pole M12-plug, no transducer
260M.2	thread G ½ standard, connection via M12-plug, 2 x integrated transducer
280.2	thread G ½ standard, connection via fixed cable (PVC) 2.5 m, no transducer
280M.2	thread G ½ standard, connection via fixed cable (PVC) 2.5 m, 2 x integrated transducer
369.2	without thread, connection via 8- pole M12-plug, no transducer
369M.2	without thread, connection via M12-plug, 2 x integrated transducer
389.2	without thread, connection via fixed cable (PVC) 2.5 m, no transducer
389M.2	without thread, connection via fixed cable (PVC) 2.5 m, 2 x integrated transducer
479.2	G ¾ with union nut, connection via 8- pole M12-plug, no transducer
479M.2	G ¾ with union nut, connection via M12-plug, 2 x integrated transducer
499.2	G ¾ with union nut, connection via fixed cable (PVC) 2.5 m, no transducer
499M.2	G ¾ with union nut, connection via fixed cable (PVC) 2.5 m, 2 x integrated transducer
2.	Fitting length EL or immersion length TL (not for design type with G ¾ thread: see product information GTL 479)
0050	50 mm
0100	100 mm
0150	150 mm
0250	250 mm
xxxx	any EL in mm (e.g. 320 = 320 mm) Ø 6: max. 1000 mm, Ø 4: max. 500 mm

3.	Diameter protection tube and probe tip (not for design type with G ¾ thread: see product information GTL 479)
6	Ø 6 mm, without taper
4	Ø 4 mm, without taper
3	Ø 6 mm, with tapered probe tip Ø 3 mm
4.	Accuracy class
A	class A
D	class AA (1/3 class B)
5.	1st transducer GTML2 (programmable)
00	without transducer
M1	measuring range -10..+40 °C
M2	measuring range 0..50 °C
M3	measuring range 0..100 °C
M4	measuring range 0..150 °C
M5	measuring range 0..200 °C
MB	transducer with special measuring range in °C (state special measuring range separately e.g.: 0..75 °C or -20..+30 °C) Mind the minimum range of 50 °C.
6.	2nd Transducer GTML2 (programmable)
00	without transducer
M1	measuring range -10..+40 °C
M2	measuring range 0..50 °C
M3	measuring range 0..100 °C
M4	measuring range 0..150 °C
M5	measuring range 0..200 °C
MB	transducer with special measuring range in °C (state special measuring range separately e.g.: 0..75 °C or -20..+30 °C) Mind the minimum range of 50 °C.
7.	Option
00	without option
H	with neck tube (100 mm)
TK	Teflon cable for connection via fixed cable (not for design type with M12 plug)

Note:

- 1) Information on suitable compression fittings and weld-in sleeves can be found in product information GHMadapt/Accessories.
- 2) For the configuration of the second transducer via GTL Configuration tool at design type 1 x cable connection M12 plug a connection cable KM4P-GTL34 is necessary (see accessories at the end of this PI).

Information on suitable weld-in sleeves for "thread M12 hygienic" and "thread G ½ hygienic" can be found in product information GH-Madapt/Accessories. Suitable compression fittings for design type "without thread" can be found in chapter accessories at page 63. Suitable adapter / weld-in sleeves for design type "G ¾ with union nut" can be found in chapter accessories at page 64 and for design type "G ½ standard" at page 65.

Clamp-on temperature sensor GTL720/GTL723



- Simple mounting via clamp-on adapter without media contact
- High accuracy even without thermal compound
- Fast response time
- Replacing/cleaning of the sensor without process interruption
- Pt100 Sensor 3-wire connection of transmitter 4..20 mA, 2-wire connection
- Transmitter programmable via GTL Configuration tool
- GTL720 applicable for Ex areas

Characteristics

Clamp-on temperature sensors GTL720 and GTL723 are specified to measure temperatures without media contact.

The measuring tip is directly located at the pipe wall and will be fixed by the clamp-on adapter on the pipe. This measuring process provides a high accuracy and a fast response time, which is often better than a measuring principle with media contact.

Technical data

Temperature sensor : Pt100, class A acc. to DIN EN 60751

GTL720 *without transmitter*

Measuring range : -20..+160 °C

Working temperature : -20..+85 °C

Ex protection : Ex II 2G [Ex ia] IIC T3/T4/T5
(simple apparatus)
Ui = 30 V, li = 25 mA, Pi = 30 mW

GTL723 *with transmitter*

Measuring range : -20..+100 °C, short time 160 °C < 30 min,
(option 01 = max. 160 °C permanent)
programmable,
minimal measuring span 50 °C

Working temperature : -20..+60 °C

Protection class : IP67
(in connection with mounted M12 plug)

Electrical connection

Round plug : 4-pole M12x1

GTL720

Pt100 sensor current : max. 10 mA (recommended 0.3..1 mA)

GTL723

Supply voltage : 10..30 V DC, 2-wire connection

Error indication : programmable

Response time/accuracy ¹⁾

Data without thermal compound, medium temperature 120 °C

Response time T₉₀ : approx. 10 s

Accuracy : up to 2.5 % f.s. without pipe wall adjustment
: up to 0.6 % f.s. with pipe wall adjustment ²⁾

Data with thermal compound, medium temperature 120 °C

Response time T₉₀ : approx. 3 s

Accuracy : up to 1 % f.s. without pipe wall adjustment
: up to 0.2 % f.s. with pipe wall adjustment ²⁾

Temperature coefficient : 0.02 %/°C

¹⁾ Measurement results depending on the mounting situation.

See next page

²⁾ Measuring values are valid for GTL723

Output : 4..20 mA

Material

Sensor

Spring : 1.4310

Sensor usage : PEEK

Sensor tip : 935er silver

Lid : 1.4305

M12 plug : PA/gold plated contacts

Weight : 17 g

Clamp-on adapter

Adapter : 1.4405

Housing : 1.4305

Adapter insertion : silicone HTV/PTFE

Weight

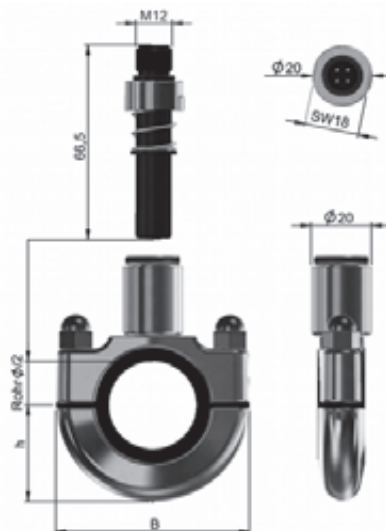
Frame size 1 : 120 g

Frame size 2 : 170 g

Frame size 3 : 395 g

Frame size 4 : 955 g

Dimensions

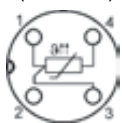


Frame size (Bg)	Pipe Ø [mm]	B [mm]	h [mm]	A/F [mm]
1	13.0..19.9	51	26	11
2	20.0..33.9	64	32	11
3	34.0..53.0	92	46	14
4a	60.3..75.9	133	68	14
4b	76.0..88.9	133	68	14

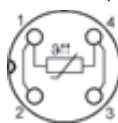
continued on next page

Connection diagrams

GTL720 passive sensor
Connection variant 1
(standard)

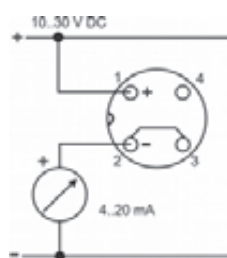


Connection variant 2
(customized)



GTL723 Transmitter
Supply voltage

Analog output



Ordering code

Note: In place order please specify the clamp-on sensor and the clamp-on adapter.

Order example:

Clamp-on sensor **GTL** without transmitter,
with clamp-on adapter **RLA** for DN32:
GTL720-0-00-0-00 + RLA424-00

Clamp-on temperature sensor

1. 2. 3. 4. 5. 6.
GTL - - - - -

1. Design / input	
720	Pt100 (applicable in Ex-areas)
723	Pt100 with transmitter 4..20 mA
2. Electrical connection	
0	GTL720 variant 1 (standard), M12 plug
1	GTL720 variant 2 (customized), M12 plug
2	GTL723 2-wire, 4..20 mA, M12 plug
3. Transmitter GTL723, default ranges (programmable with GTL - Configuration tool via PC)	
00	without transmitter (only GTL720)
M1	measuring range -10..+40 °C
M2	measuring range 0..50 °C
M3	measuring range 0..100 °C
M4	measuring range 0..150 °C temperatures > 100 °C max. 30 min
MB	transmitter with special measuring range in °C (state special measuring range separately e.g.: 20..130 °C)
4. Pipe wall adjustment for SS-type pipes (only GTL723)	
0	not active
1	without thermal compound
2	with thermal compound
5. Options	
00	without option
01	high temperature version for GTL723; max. permanent temperature 160°C
6. Certificate DIN EN 10204 (indicate only when required, multiple responses possible)	
WZ2.2	factory certification 2.2
APZ3P	acceptance test certificate 3.1 with 3 measuring points (0°C, 70°C + 1 test point freely selectable)

Clamp-on adapter

1. 2.
RLA -

1.	Pipe diameter
120*)	12,0 mm: DN10 DIN 11850 Reihe 1
130*)	13,0 mm: DN10 DIN 11850 Reihe 2
	12,7 mm: ½" DIN 11866 Reihe C / ASME-BPE
135*)	13,5 mm: DN8 DIN 11866 Reihe B (ISO 1127)
172*)	17,2 mm: DN10 DIN 11866 Reihe B (ISO 1127)
180*)	18,0 mm: DN15 DIN 11850 Reihe 1
190*)	19,0 mm: DN15 DIN 11850 Reihe 2
	19,0 mm: ¾" DIN 11866 Reihe C / ASME-BPE
213	21,3 mm: DN15 DIN11866 Reihe B
230	23,0 mm: DN20 DIN11850 Reihe 2
254	25,4 mm: 1" DIN11866 Reihe C / ASME-BPE
269	26,9 mm: DN20 DIN11866 Reihe B
280	28,0 mm: DN25 DIN11850 Reihe 1
290	29,0 mm: DN25 DIN11850 Reihe 2
337	33,7 mm: DN25 DIN11866 Reihe B
	34,0 mm: DN32 DIN11850 Reihe 1
350	35,0 mm: DN32 DIN11850 Reihe 2
381	38,1 mm: 1 ½" DIN11866 Reihe C / ASME-BPE
400	40,0 mm: DN40 DIN11850 Reihe 1
410	41,0 mm: DN40 DIN11850 Reihe 2
424	42,4 mm: DN32 DIN11866 Reihe B
483	48,3 mm: DN40 DIN11866 Reihe B
508	50,8 mm: 2" DIN11866 Reihe C / ASME-BPE
520	52,0 mm: DN50 DIN11850 Reihe 1
530	53,0 mm: DN50 DIN11850 Reihe 2
603	60,3 mm: DN50 DIN11866 Reihe B
635	63,5 mm: 2 ½" DIN11866 Reihe C / ASME-BPE
700	70,0 mm: DN65 DIN11850 Reihe 2
761	76,1 mm: DN65 DIN11866 Reihe B
	76,2 mm: 3" DIN11866 Reihe C / ASME-BPE
850	85,0 mm: DN80 DIN11850 Reihe 2
889	88,9 mm: DN80 DIN11866 Reihe B
999	customized diameter on request
2. Options	
00	without option

*RLA120-190 only for GTL720 and GTL723

Accessories:

Thermal compound

Type

WLP10S, containing silicone,

- high thermal conductivity of 10.0 W/mK
- not drying out, silicone parts not fleeing
- storage time up to 12 months at normal ambient conditions, from production date
- syringe containing 3 ml + pipette
- color: silver-gray

Type:

GTL – Configuration tool

- programming the GTL7xx via PC

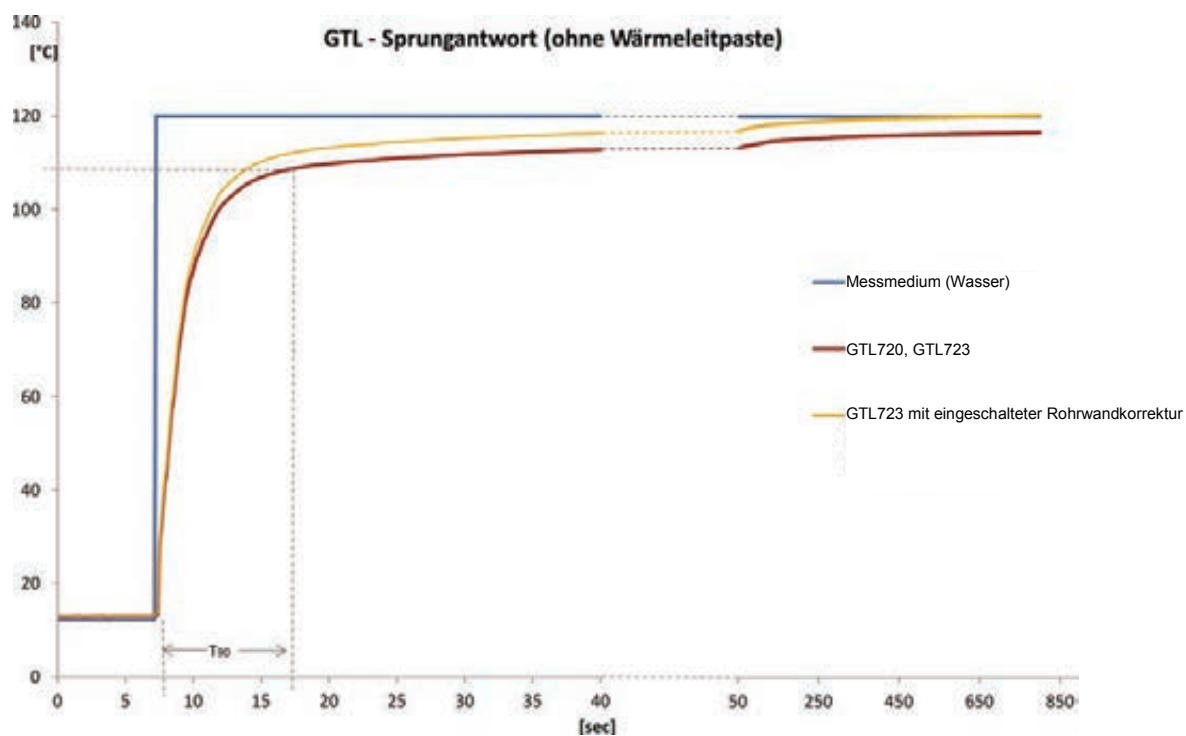
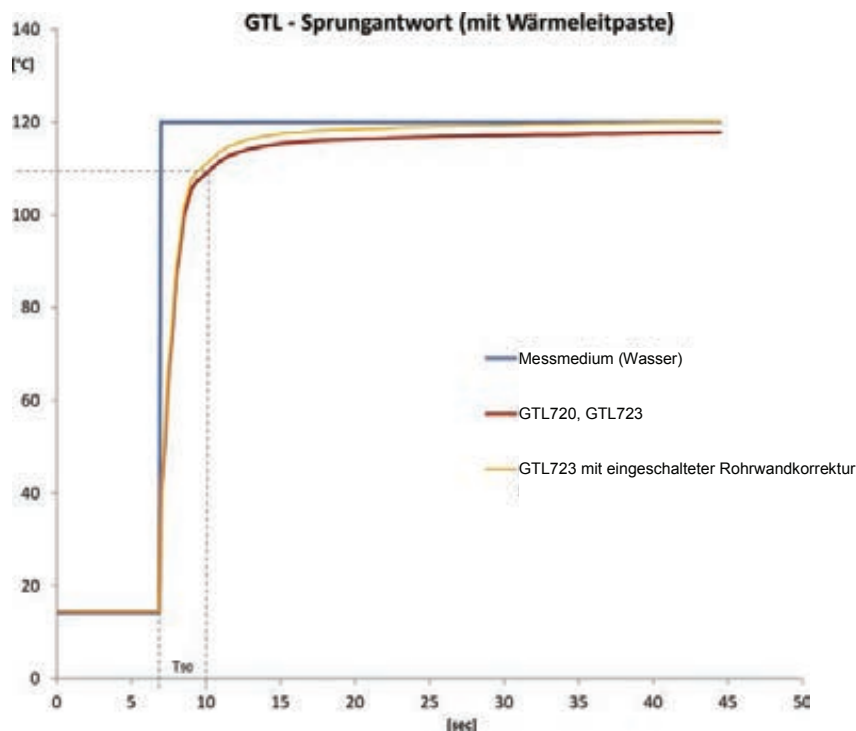
Calibration certificate: on request

For the evaluation of Pt100 signals we recommend our transmitter and temperature displays (PI-Transmitter, PI-Displays and PI-Temperature).

The temperature curves can be seen next page.

Response time at different conditions

Note: measured with SS-type pipe Ø 29 mm, 1.5 mm pipe wall



Clamp-on temperature sensor GTL737



- Simple mounting via clamp-on adapter
- Process connection without media contact
- High accuracy even without thermal compound
- Fast response time
- Replacing/cleaning of the sensor without process interruption
- Pt100 sensor with integrated transmitter
- Transmitter programmable via GTL Configuration tool or buttons
- LCD on-site display, background illumination
- Output 4..20 mA, 2-wire connection

Characteristics

Clamp-on temperature sensor GTL737 is specified to measure temperatures without media contact.

The measuring tip is directly located at the pipe wall and will be fixed by the clamp-on adapter on the pipe. This measuring process provides a high accuracy and a fast response time, which is often better than a measuring principle with media contact.

Technical data

Temperature sensor : Pt100, class A acc. to DIN EN 60751
 Measuring range : -20..+160 °C, programmable, minimal measuring span 50 °C
 Working temperature : -20..+60 °C
 Protection class : IP67
 (in connection with mounted M12 plug)
 Display : LCD, 3 ½ -digit, background illuminated

Electrical connection

Round plug : 4-pole, M12x1
 Supply voltage : 10..30 V DC, 2-wire connection
 Error indication : programmable
 -break of sensor : I > 22 mA (default setting)
 -short circuit : I < 3.7 mA

Response time/accuracy¹⁾

Data without thermal compound, medium temperature 120 °C

Response time T₉₀ : approx. 10 s
 Accuracy : up to 2.5 % f.s. without pipe wall adjustment
 : up to 0.6 % f.s. with pipe wall adjustment

Data with thermal compound, medium temperature 120 °C

Response time T₉₀ : ca. 3 s
 Accuracy : up to 1 % f.s. without pipe wall adjustment
 : up to 0.3 % f.s. with pipe wall adjustment

Temperature coefficient : 0.02 %/°C

¹⁾ Measurement results depending on the mounting situation.
 The data are valid for horizontally assembled pipes.

Output : 4..20 mA

Material Sensor

Spring : 1.4310
 Sensor usage : PEEK
 Sensor tip : 935er silver
 Lid : 1.4305
 M12 plug : PA/gold plated contacts
 Weight : 500 g

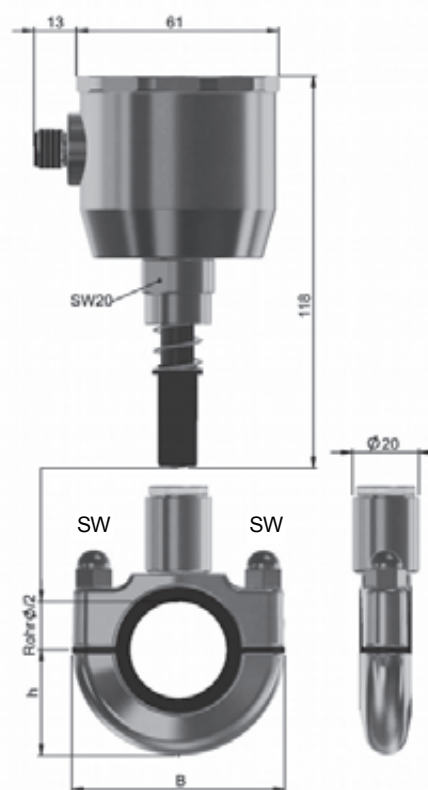
Clamp-on adapter

Adapter : 1.4405
 Housing : 1.4305
 Adapter insertion : silicone HTV/PTFE

Weight

Frame size 1 : not available
 Frame size 2 : 170 g
 Frame size 3 : 395 g
 Frame size 4 : 955 g

Dimensions

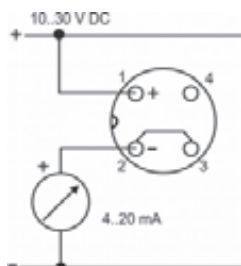


Frame size (Bg)	Pipe Ø [mm]	B [mm]	h [mm]	A/F [mm]
1	not available			
2	20.0..33.9	64	32	11
3	34.0..53.0	92	46	14
4a	60.3..75.9	133	68	14
4b	76.0..88.9	133	68	14

continued on next page

Connection diagram

Supply voltage



Analog output

Ordering code

Note:

In place order please specify the clamp-on sensor and the clamp-on adapter.

Order example:

Transmitter, **GTL** measuring range 0..100 °C
with clamp-on adapter **RLA** for DN32
GTL737-2-M3-00 + RLA424-00

Clamp-on temperature sensor

GTL 1. 2. 3. 4. 5. 6.
 - - - - -

1. Design / input	
737	Pt100 with transmitter and display
2. Electric connection	
2	2-wire, 4..20 mA, M12 plug
3. Transmitter GTL737 , default ranges (programming possible with GTL – Configuration tool via PC)	
M1	measuring range -10..+40 °C
M2	measuring range 0..50 °C
M3	measuring range 0..100 °C
M4	measuring range 0..150 °C
MB	transmitter with special measuring range in °C (state special measuring range separately e.g.: 20..130 °C)
4. Pipe wall adjustment for SS-type pipes (only GTL737)	
0	not active
1	without thermal compound
2	with thermal compound
5. Options	
00	without option
6. Certificate DIN EN 10204 (indicate only when required, multiple responses possible)	
WZ2.2	factory certification 2.2
APZ3P	acceptance test certificate 3.1 with 3 measuring points (0°C, 70°C + 1 test point freely selectable)

Clamp-on adapter

1. 2.
 RLA -

1.	Pipe diameter
120*)	12,0 mm: DN10 DIN 11850 Reihe 1
130*)	13,0 mm: DN10 DIN 11850 Reihe 2
	12,7 mm: ½" DIN 11866 Reihe C / ASME-BPE
135*)	13,5 mm: DN8 DIN 11866 Reihe B (ISO 1127)
172*)	17,2 mm: DN10 DIN 11866 Reihe B (ISO 1127)
180*)	18,0 mm: DN15 DIN 11850 Reihe 1
190*)	19,0 mm: DN15 DIN 11850 Reihe 2
	19,0 mm: ¾" DIN 11866 Reihe C / ASME-BPE
213	21,3 mm: DN15 DIN11866 Reihe B
230	23,0 mm: DN20 DIN11850 Reihe 2
254	25,4 mm: 1" DIN11866 Reihe C / ASME-BPE
269	26,9 mm: DN20 DIN11866 Reihe B
280	28,0 mm: DN25 DIN11850 Reihe 1
290	29,0 mm: DN25 DIN11850 Reihe 2
337	33,7 mm: DN25 DIN11866 Reihe B
	34,0 mm: DN32 DIN11850 Reihe 1
350	35,0 mm: DN32 DIN11850 Reihe 2
381	38,1 mm: 1 ½" DIN11866 Reihe C / ASME-BPE
400	40,0 mm: DN40 DIN11850 Reihe 1
410	41,0 mm: DN40 DIN11850 Reihe 2
424	42,4 mm: DN32 DIN11866 Reihe B
483	48,3 mm: DN40 DIN11866 Reihe B
508	50,8 mm: 2" DIN11866 Reihe C / ASME-BPE
520	52,0 mm: DN50 DIN11850 Reihe 1
530	53,0 mm: DN50 DIN11850 Reihe 2
603	60,3 mm: DN50 DIN11866 Reihe B
635	63,5 mm: 2 ½" DIN11866 Reihe C / ASME-BPE
700	70,0 mm: DN65 DIN11850 Reihe 2
761	76,1 mm: DN65 DIN11866 Reihe B
	76,2 mm: 3" DIN11866 Reihe C / ASME-BPE
850	85,0 mm: DN80 DIN11850 Reihe 2
889	88,9 mm: DN80 DIN11866 Reihe B
999	customized diameter on request
2. Options	
00	without option

*RLA120-190 nur für GTL720 und GTL723

Accessories:

Thermal compound

Type

WLP10S, containing silicone,

- high thermal conductivity of 10.0 W/mK
- not drying out, silicone parts not fleeing
- storage time up to 12 months at normal ambient conditions, from production date
- syringe containing 3 ml + pipette
- color: silver-gray

Type:

GTL – Configuration tool

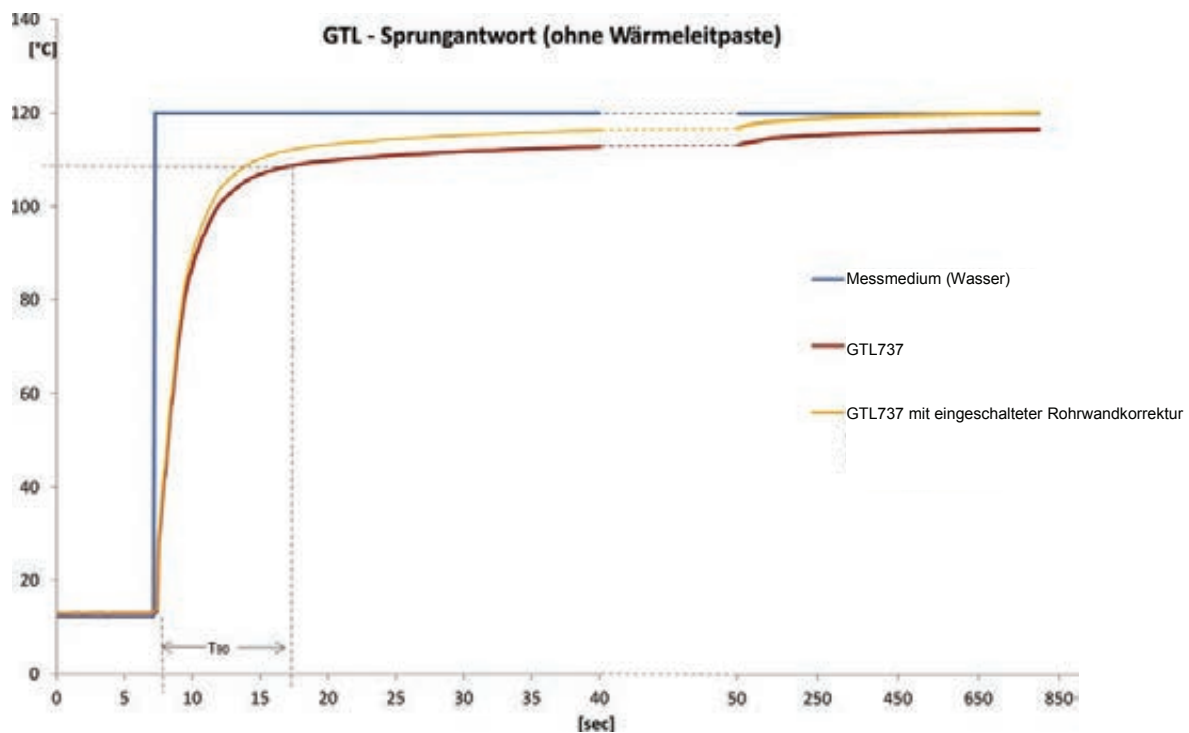
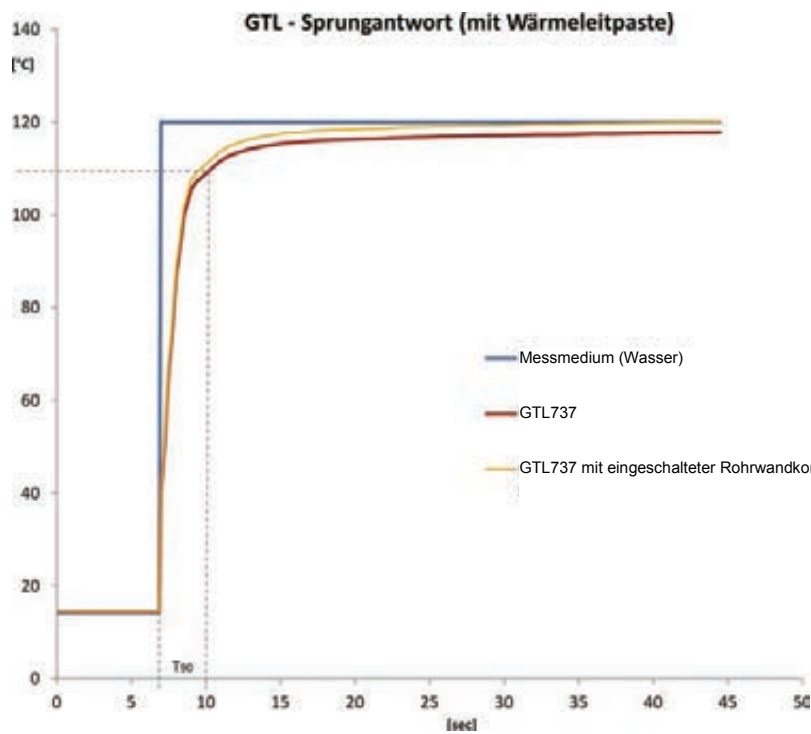
- programming the GTL7xx via PC

Calibration certificate: on request

The temperature curves can be seen next page.

Response time at different conditions

Note: measured with SS-type pipe Ø 29 mm, 1.5 mm pipe wall



Temperature transmitter HTK12-I / U / F



- Complete temperature transmitter for food industry in 12 mm housing
- Analog output 4..20 mA (HTK12-I)
- Analog output 0..10 V (HTK12-U)
- Frequency output (HTK12-F)
- User-configurable via plug pins (Tech-In)
- Identical mechanical design available as temperature switch, flow transmitter/switch or level switch

Characteristic

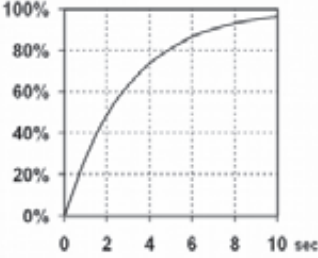
The sensors in the HTK12 family can be used for the measurement and monitoring of temperatures in flowing media, and are specially designed for use in the food industry. The 16-bit processor provides linearization of the PT2000 characteristic curve, and emits the standardized output signal.



The HTK12 electronics transmit the result as

- analog 0/4..20 mA signal (HTK12-I)
- analog 0/2..10 V signal (HTK12-U)
- frequency signal (HTK12-F)

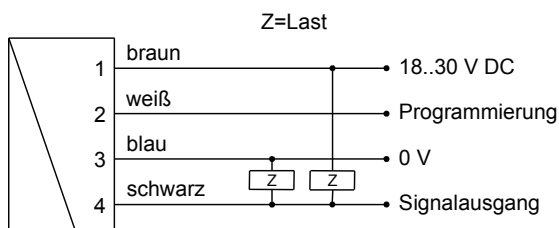
If desired, the range end value can be set to the presently existing temperature using Tech-In (see Handling and Operation).

Specifications

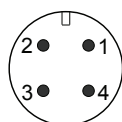
Measuring range	standard: 0..100 °C optional: -20..+100 °C or parts of this
Process connection	Sealing cone screw fitting, compatible with G 1/2 GHMadapt
Medium temperature	-20..+100 °C
Ambient temperature	0..60 °C
CIP- / SIP temperature	140 °C, < 30 min. max.
Dynamic (τ)	3 sec. 
Process pressure	PN 50
Accuracy	±1 °C

Repeatability	±0.5 °C
Supply voltage	18..30 V DC (controlled)
Current consumption at rest	< 60 mA
Output	HTK12-I: 4..20 mA / max. load 500 Ohm HTK12-U: 0..10 V / min load 1 kOhm HTK12-F: Frequency output "push-pull" (resistant to short circuits and reversed polarity protected) $I_{out} = 100$ mA max. selectable output frequency, max. 2 kHz
Protection class	IP 67
Connection	for round plug connector M12x1, 4-pole
Materials in contact with media	sensor tip 1.4435, FDA compliant
Materials not in contact with media	housing 1.4571 pressure screw 1.4404 plug PA contacts gold-plated
Weight	approx. 100 g incl. pressure screw
Conformity	CE, EHEDG  

Wiring

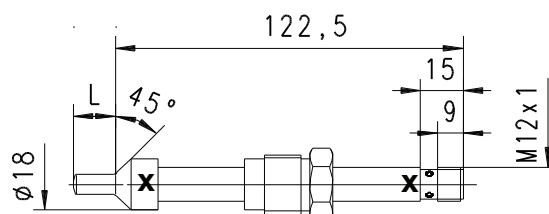


Connection example: PNP NPN



The use of shielded cabling is recommended.

Dimensions



For compatible T-pieces and weld-in sockets of the GHMadapt series, see "Accessories".

Handling or operation

Notes

The metering range end value can be programmed by the user via "Teach-In". Requirement for programmability must be stated when ordering, otherwise the device cannot be programmed.

The ECI-1 interface with associated software is available as a convenient option for programming all parameters by PC, and for adjustment.

Operation and programming

If desired, the metering range end can be set by the user by means of Teach-In.

For this, proceed as follows:

- The temperature which is to be set is applied to the device
- Apply a pulse of at least 0.5 seconds and max. 2 seconds duration to pin 2 (e.g. via a bridge to the auxiliary voltage or a pulse from the PLC), in order to accept the measured value
- When the teaching is complete, pin 2 should be connected to 0 V, so as to prevent unintended programming.

The devices have a yellow LED which flashes during the programming pulse. During operation, the LED acts as a display for the operating voltage.

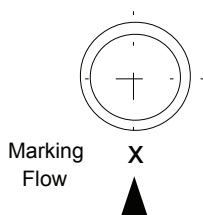
Installation

The sensor is inserted into the boring with a sealing cone, oriented, and fastened in place with a pressure screw.

When a flow is present, this should impinge on the side of the sensor marked with an X, in order to achieve a short response time.

The torque on the pressure screw should be between 5..10 Nm.

Avoid bubbles or deposits on the sensor. It is therefore best to install at the side.



Product key

HTK12- 1. 2. 3. 4.

 HTK12- **015**

Option = ☐

1. Analog output	
I	current output 4..20 mA
U	voltage output 0..10 V
F	frequency output
2. Sensor tip length	
015	L = 15 mm
3. Programming	
N	Cannot be programmed (no Teach-In)
P	<input type="radio"/> programmable (Teach-In possible)
4. Option	
H	CIP- / SIP- version, 140 °C, 30 min. max.
5. Certificate DIN EN 10204 (indicate only when required, multiple responses possible)	
WZ2.2	factory certification 2.2
APZMAT	acceptance test certificate 3.1 for material (in contact with products)

Options

For HTK12-I and HTK12-U

Special range for analog output:

Start of measuring range (4 mA or 0 V) at °C

Standard = 0 °C

End of measuring range (20 mA or 10 V) at °C

Standard = 100 °C

For HTK12-F

End frequency (max. 2000 Hz)

Hz

Standard = 2000 Hz

Special range for frequency output:

Start of measuring range (0 Hz) at °C

Standard = 0 °C

End of measuring range (end frequency) at °C

Standard = 100 °C

Further options available on request.

Accessories

- Device configurator ECI-1 (USB programming adapter)
- Process adapter
- Round plug connector / cable (KH...)

Further information at "Accessories"

Temperature switch HTK12-S



- Temperature sensor with limit switch for food industries in 12 mm housing
- User-configurable via plug pins (Teach-In)
- Identical mechanical design available as temperature transmitter, flow transmitter/switch or level switch

Characteristic

The sensors of the HTK12 family can be used for measuring and monitoring temperatures in flowing media. They provide multiple configuration options combined with low space requirements. The mechanical construction makes them suitable for use in the food-stuffs industry.

The electronics of the HTK12-S are a flexibly configurable limit switch.

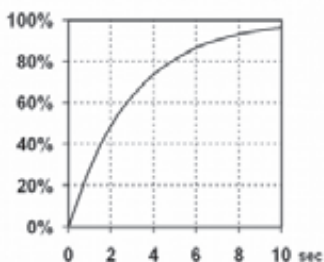
The switching value can be set by the user via teaching (see Handling and operation). All other values have been preset at the factory, but can be modified by the user with the aid of the optionally available ECI1 interface and a PC.

The adjustable parameters are:

- switching value
- hysteresis
- Min / max monitoring
- Switching delay
- Switchback delay
- Power-On delay
- Teach-Offset

Specifications

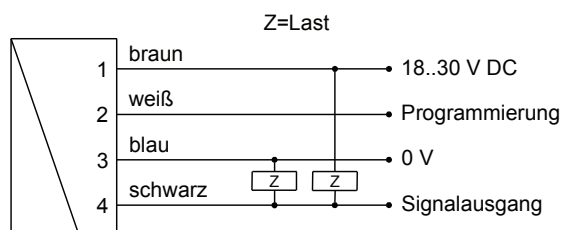
Switching range	-20...+100 °C
Process connection	Sealing cone screw fitting, compatible with G 1/2 GHMadapt
Medium temperature	-20...+100 °C
Ambient temperature	0...60 °C
CIP- / SIP temperature	140 °C, 30 min max.
Dynamic (τ)	3 sec.
Process pressure	PN 50



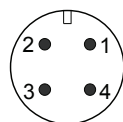
Accuracy	±1 °C
Repeatability	±0.5 °C
Supply voltage	18...30 V DC (controlled)
Current consumption at rest	< 60 mA
Switching output	transistor output "Push-Pull" compatible with PNP and NPN, (resistant to short circuits and reversed polarity protected) $I_{out} = 100 \text{ mA max.}$
Protection class	IP 67
Connection	for round plug connector M12x1, 4-pole
Materials in contact with media	sensor tip 1.4435, FDA compliant
Materials not in contact with media	housing 1.4571 pressure screw 1.4404 plug PA contacts gold-plated
Weight	approx. 100 g incl. pressure screw
Conformity	CE, EHEDG



Wiring

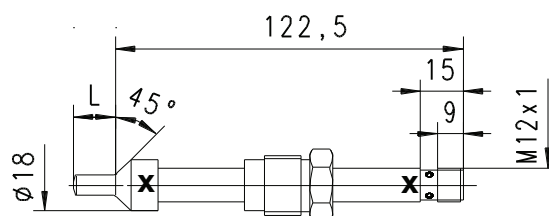


Anschlussbeispiel: PNP NPN



The use of shielded cabling is recommended.

Dimensions



For compatible T-pieces and weld-in sockets of the GHMadapt series, see "Accessories".

Handling or operation

Operation and programming

If desired, the metering range end can be set by the user by means of Teach-In.

For this, proceed as follows:

- The temperature which is to be set is applied to the device
- Apply a pulse of at least 0.5 seconds and max. 2 seconds duration to pin 2 (e.g. via a bridge to the auxiliary voltage or a pulse from the PLC), in order to accept the measured value
- When the teaching is complete, pin 2 should be connected to 0 V, so as to prevent unintended programming.

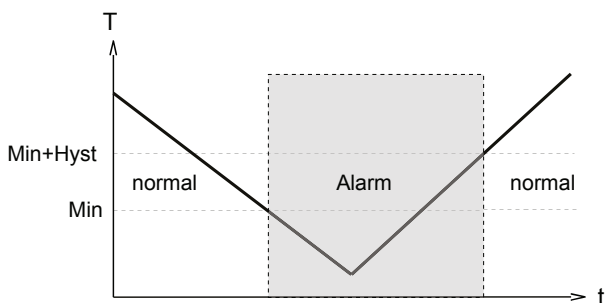
The devices have a yellow LED which flashes during the programming pulse. During operation, the LED acts as a display for the operating voltage.

In order to avoid the need to transit to an undesired operating status during the teach-in, the device can be provided ex-works with a teach-offset. The Teach-In-offset point is added to the currently measured value before saving.

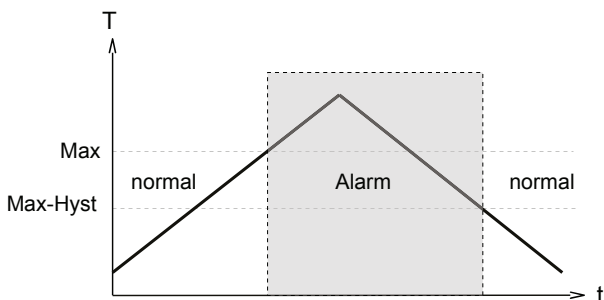
Example: The switching value is to be set to 80 °C, because at this temperature a critical process status is to be notified. However, only 60 °C can be achieved without danger. In this case, the device would be ordered with a "teach-offset" of +20 °C. At 60 °C in the process, a switching value of 80 °C would then be stored during "Teach-In".

The HTK12-S limit switch can be used to monitor minimal or maximal.

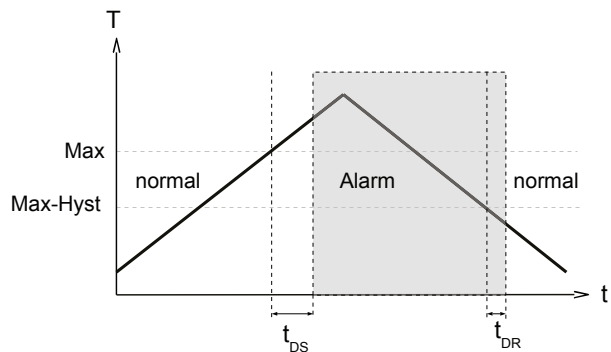
With a minimum-switch, falling below the limit value causes a switchover to the alarm state. Return to the normal state occurs when the limit value plus the set hysteresis is once more exceeded.



With a maximum-switch, exceeding the limit value causes a switchover to the alarm state. Return to the normal state occurs when the measured value once more falls below the limit value minus the set hysteresis.

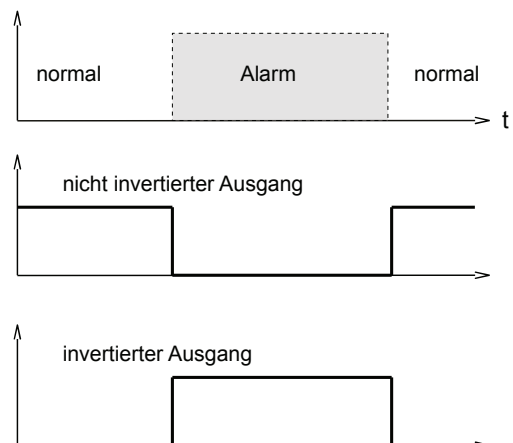


A switchover delay time (t_{DS}) can be applied to the switchover to the alarm state. Equally, one switch-back delay time (t_{DR}) of several can be applied to switching back to the normal state.



In the normal state the integrated LED is on, in the alarm state it is off, and this corresponds to its status when there is no auxiliary voltage.

In the non-inverted (standard) model, while in the normal state the switching output is at the level of the auxiliary voltage; in the alarm state it is at 0 V, so that a wire break would also display as an alarm state at the signal receiver. Optionally, an inverted switching output can also be provided, i.e. in the normal state the output is at 0 V, and in the alarm state it is at the level of the supply voltage.

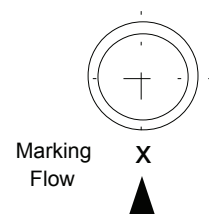


A Power-On-Delay function (ordered as a separate option) makes it possible to maintain the switching output in the normal state for a defined period after application of the supply voltage.

Installation

The sensor is inserted into the boring with a sealing cone, oriented, and fastened in place with a pressure screw.

When a flow is present, this should impinge on the side of the sensor marked with an X, in order to achieve a short response time.



The torque on the pressure screw should be between 5..10 Nm.

Avoid bubbles or deposits on the sensor. It is therefore best to install at the side.

Product information

Temperature

Product key

HTK12- 1. - 2. - 3. - 4. - 5. - 6. - 7.

Option = ☐

1.	Switching output
S	transistor output "push-pull"
2.	Sensor tip length
015	L = 15 mm
3.	Programming
N	cannot be programmed (no Teach-In)
P	<input type="radio"/> programmable (Teach-In possible)
4.	Functioning of switching output
L	minimum-switch
H	maximum-switch
5.	Switching signal
O	non-inverted output
I	<input type="radio"/> inverted output
6.	Option
H	CIP- / SIP- version, 140 °C, 30 min. max.
7.	Certificate DIN EN 10204 (indicate only when required, multiple responses possible)
WZ2.2	factory certification 2.2
APZMAT	acceptance test certificate 3.1 for material (in contact with products)

Options

Switching delay period (0.0..99.9 s) . s
(from Normal to Alarm)

Switch-back delay period (0.0..99.9 s) . s
(from Alarm to Normal)

Power-On-Delay period (0..99 s) s
(Time after power on, during which the outputs are not actuated)

Switching output fixed at °C
Switching hysteresis %

Standard = 2 % of measuring range

Teach-Offset (-100..+100 °C) °C
Standard = 0 °C

Further options available on request.

Accessories

- Device configurator ECI-1 (USB programming adapter)
- Process adapter
- Round plug connector / cable (KH...)

Further information at "Accessories"

Temperature transmitter / switch HTK30



- Compact robust temperature switch/transmitter for use in food industry
- No moving parts in medium
- Only one material in contact with medium
- Simple to use
- Very low pressure loss
- Cable outlet step-less rotatable
- Very small installation width, therefore very narrow pipework is possible

Characteristic

The HTK30 temperature sensor monitors fluid media. Its compact form combines the built-in sensor and the evaluation electronics. The integrated transducer has an analog output (4...20 mA or 0...10 V) and one switching output, which can be configured as a limit switch for monitoring minima or maxima, or as a frequency output. The switching output is designed as a push-pull driver, and can therefore be used both as a PNP or an NPN output. The state of the switching output is signaled with a yellow LED in the switching outlet; the LED has all-round visibility. The sensor is configured in the factory, or alternatively this can be done with the aid of the optionally available ECI-1 device configurator (USB interface for PC). A selectable parameter can be modified on the device, with the aid of the magnet clip provided. In this case, the current measured value is saved as the parameter value. Examples of these parameters are the switching value or the fullscale value.

The stainless steel electronics housing is rotatable, so it is possible to orient the cable outlet after installation.

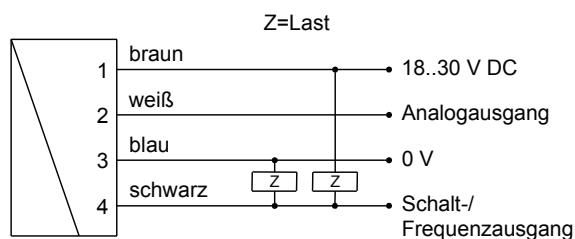
Specifications

Measuring range	0...100 °C, 0...140 °C on request
Accuracy	±1 % FS
Repeatability	±0.1 % FS
Process pressure	PN 50
CIP- / SIP temperature	140 °C, < 30 min. max.
Ambient temperature	-20...+70 °C
Storage temp.	-20...+80 °C
Teach-In / configuration	by means of magnet
Weight	ca. 200 g (standard version)
Supply voltage	24 V DC ± 10%
Current consumption	max. 100 mA

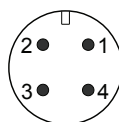
Switching output	transistor output "Push-Pull" (resistant to short circuits and reversed polarity protected) $I_{out} = 100$ mA max.
Switching hysteresis	2 °C (others available on request)
Display (only with switching output)	yellow LED (on = OK / out = alarm)
Analog output	4...20 mA /load 500 Ohm max. or 0...10 V /load min. 1 kOhm
Connection	for round plug connector M12x1, 4-pole
Materials in contact with media	sensor 1.4435, FDA compliant
Materials not in contact with media	housing 1.4305 plug PA6.6 clip PA6.6
Protection class	IP 67
Weight	CE, EHEDG



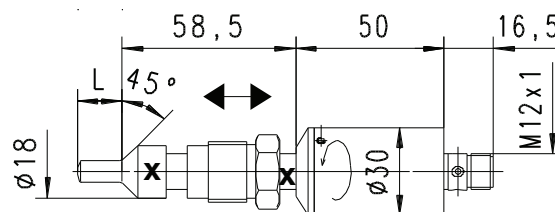
Wiring



Anschlussbeispiel: PNP NPN



Dimensions



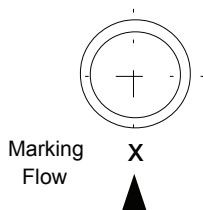
For compatible T-pieces and weld-in sockets of the GHMadapt series, see "Accessories".

Handling and operation

Installation

The sensor is inserted into the boring with a sealing cone, oriented, and fastened in place with a pressure screw.

When a flow is present, this should impinge on the side of the sensor marked with an X, in order to achieve a short response time.



The torque on the pressure screw should be between 5..10 Nm.

Avoid bubbles or deposits on the sensor. It is therefore best to install at the side.

Programming

The electronics contain a magnetic contact, with the aid of which different parameters can be programmed. Programming takes place when a magnet clip is applied for a period between 0.5 and 2 seconds to the marking located on the label. If the contact time is longer or shorter than this, no programming takes place (protection against external magnetic fields).



After the programming ("Teach-In"), the clip can either be left on the device, or removed to protect data.

The device has a yellow LED which flashes during the programming pulse. During operation, the LED serves as a status display for the switching output.

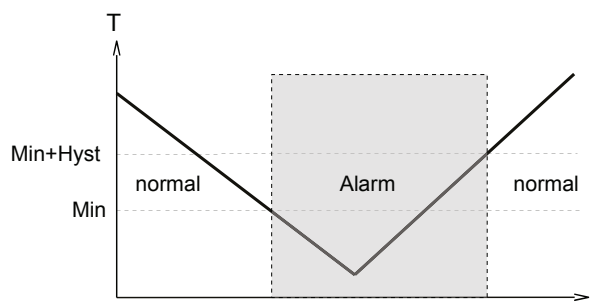
In order to avoid the need to transit to an undesired operating status during "teaching", the device can be provided ex-works with a "teach-offset". The "teach-offset" value is added to the currently measured value before saving (or is subtracted if a negative value is entered).

Example: The switching value is to be set to 70 % of the metering range, because at this flow rate a critical process status is to be notified. However, only 50% can be achieved without danger. In this case, the device would be ordered with a "teach-offset" of +20 %. At 50 % in the process, a switching value of 70 % would then be stored during "Teach-In".

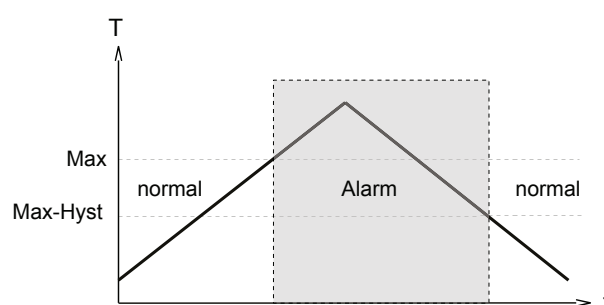
Normally, programming is used to set the limit switch. However, if desired, other parameters such as the end value of the analog or frequency output may also be set.

The limit switch can be used to monitor minima or maxima.

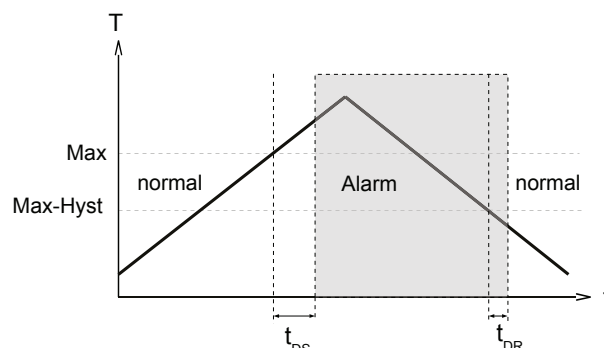
With a minimum-switch, falling below the limit value causes a switchover to the alarm state. Return to the normal state occurs when the limit value plus the set hysteresis is again exceeded.



With a maximum-switch, exceeding the limit value causes a switchover to the alarm state. Return to the normal state occurs when the measured value once more falls below the limit value minus the set hysteresis.

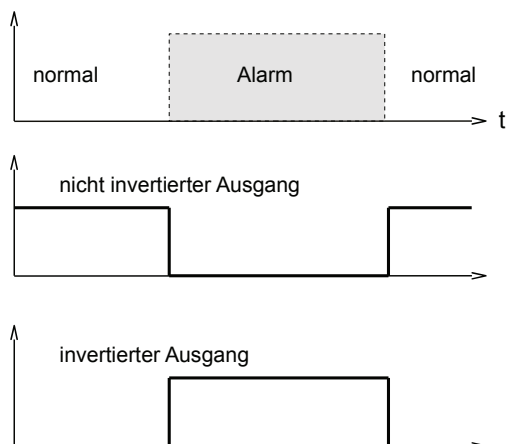


A switchover delay time (t_{DS}) can be applied to the switchover to the alarm state. Equally, one switch-back delay time (t_{DR}) of several can be applied to switching back to the normal state.



In the normal state the integrated LED is on, in the alarm state it is off, and this corresponds to its status when there is no auxiliary voltage.

In the non-inverted (standard) model, while in the normal state the switching output is at the level of the auxiliary voltage; in the alarm state it is at 0 V, so that a wire break would also display as an alarm state at the signal receiver. Optionally, an inverted switching output can also be provided, i.e. in the normal state the output is at 0 V, and in the alarm state it is at the level of the supply voltage.



A Power-On-Delay function (ordered as a separate option) makes it possible to maintain the switching output in the normal state for a defined period after application of the supply voltage.

Product key

HTK30- 1. 015 2. K1 3. 4. 5. 6. 7.

○ = Option

1. Sensor tip length	
015	L = 15 mm
2. Materials	
K1	stainless steel 1.4571
3. Analog output	
I	current output 4..20 mA
U	voltage output 0..10 V
K	no analog output
4. Switching output	
T	transistor output "push-pull"
M	○ NPN (open collector)
K	no switching output
5. Functioning of switching output	
L	minimum-switch
H	maximum-switch
R	frequency output
K	no switching output
6. Switching signal	
O	non-inverted output
I	○ inverted output
7. Certificate DIN EN 10204 (indicate only when required, multiple responses possible)	
WZ2.2	factory certification 2.2
APZMAT	acceptance test certificate 3.1 for material (in contact with products)

Options

Special measuring range for temperature:

Maximum 140 °C (standard = 100 °C)

Minimum -20 °C (standard = 0 °C)

 °C
 °C

Special range for analog output:

<= meas. range (standard = meas. range)

Special range for frequency output:

<= meas. range (standard = meas. range)

End frequency (max. 2000 Hz)

 Hz

Switch-on delay (from OK to Alarm)

 s

Switch-off delay (from OK to Alarm)

 s

Power-On-Delay period (0..99 s)

(Time after power on, during which the outputs are not actuated)

 s

Switching output fixed at

 °C

Special hysteresis

 °C

For not specified fields the standard settings are selected automatically.

Accessories

- Device configurator ECI-1 (USB programming adapter)
- Process adapter
- Round plug connector / cable (KH...)

Further information at "Accessories"

Temperature transmitter / switch HTK35



- Compact robust temperature transmitter for use in food industry
- Only one material in contact with medium
- Analog output 4..20 mA or 0..10 V
- Two programmable switches (push-pull)
- Graphical LCD display, background illuminated (transreflective) can be read in sunlight and in the dark
- Programmable parameters via rotatable, removable ring (programming protection)
- Full metal housing with non-scratch, chemically resistant glass
- Rotatable electronic head for best reading position
- Small, compact housing
- Simple installation

Characteristic



The sensors of the HTK35 range can be used for measuring and monitoring temperatures in flowing media, and are specially designed for use in the foodstuffs industry.

The integrated transducer has a backlit graphics LCD display which is very easy to read both in the dark and in bright sunlight. The graphics display allows the presentation of measured values and parameters in a clearly understandable form. The measured values are displayed to 4 places, together with their physical unit, which may also be modified by the user. The electronics have an analog output (4..20 mA or 0..10 V) and two switching outputs, which can be used as limit switches for monitoring minima or maxima, or as two-point controllers. The switching outputs are designed as push-pull drivers, and can therefore be used both as PNP and NPN outputs. Exceeding limit values is signaled by a red LED which is visible over a long distance, and by a clear-text in the display. The stainless steel case has a hardened non-scratch mineral glass pane. It is operated by a programming ring fitted with a magnet, so there is no need to open the operating controls housing, and its leakproofness is permanently ensured.

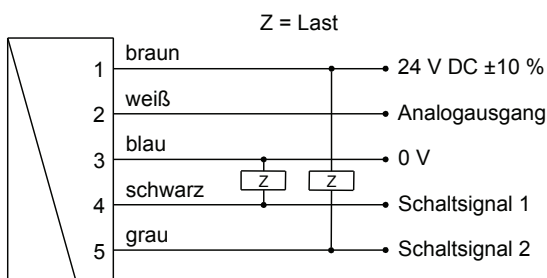
By turning the ring to right or left, it is simple to modify the parameters (e.g. switching point, hysteresis...). To protect from unintended programming, it can be removed, turned through 180° and replaced, or completely removed, thus acting as a key.



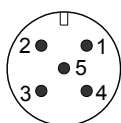
Specifications

Measuring range	0..100 °C 0..130 °C on request	
Accuracy	±1 % FS	
Repeatability	±0.1 % FS	
Process pressure	PN 50	
Ambient temperature	-20..+70 °C	
Storage temp.	-20..+80 °C	
CIP- / SIP temperature	140 °C, < 30 min. max.	
Supply voltage	24 V DC ± 10%	
Current consumption	< 1 W	
Dynamic (τ)	3 sec.	
Analog output	4..20 mA or 0..10 V	
Switching outputs S1 and S2	transistor output "Push-Pull" compatible with PNP and NPN, (resistant to short circuits and reversed polarity protected) I _{out} = 100 mA max. each output	
Hysteresis	adjustable, position of the hysteresis depends on minimum or maximum switching value	
Display	backlit graphical LCD display (transreflective), extended temperature range -20..+70 °C, 32 x 16 pixels, background illumination, displays value and unit, flashing LED signal lamp with simultaneous message on the display.	
Connection	for round plug connector M12x1, 4-pole	
Protection class	IP 67	
Materials	medium contact electronics housing	sensor 1.4435, FDA compliant housing stainless steel 1.4305 glass mineral glass, hardened magnet Samarium-Cobalt ring POM
Conformity	CE, EHEDG <div></div>	

Wiring



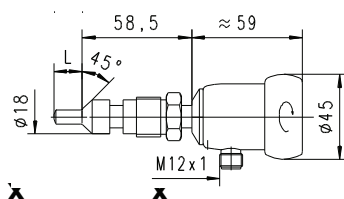
Anschlussbeispiel: PNP NPN



Before the electrical installation, it must be ensured that the auxiliary voltage corresponds to the data sheet.

The switching outputs are self-configuring, depending on whether they are connected as PNP or NPN switches (push-pull). It is recommended to use shielded wiring.

Dimensions

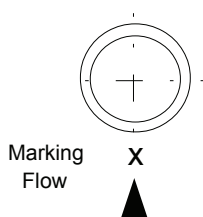


Handling and operation

Installation

The sensor is inserted into the boring with a sealing cone, oriented, and fastened in place with a pressure screw.

When a flow is present, this should impinge on the side of the sensor marked with an X, in order to achieve a short response time.



The torque on the pressure screw should be between 5..10 Nm.

Avoid bubbles or deposits on the sensor. It is therefore best to install at the side.

For T-pieces or welded-on nozzles, see Accessories.

Programming

The annular gap of the programming ring can be turned to positions 1 and 2. The following actions are possible:



Set to 1 = continue (STEP)
 Set to 2 = modify (PROG)

Neutral position between 1 and 2

The ring can be removed to act as a key, or turned through 180° and replaced to create a programming protector.

Operation is by dialog with the display messages, which makes its use very simple.

Starting from the normal display (present value and unit), if 1 (STEP) is repeatedly selected, then the display shows the following information in this order:

Display of the parameters, using position 1

- Switching value S1 (switching point 1 in the selected unit)
- Switching characteristic of S1
 - MIN = Monitoring of minimum value
 - MAX = Monitoring of maximum value
- Hysteresis 1 (hysteresis value of S1 in the set unit)
- Switching value S2
- Switching characteristic of S2
- Hysteresis 2
- Code
 - After entering the **code 111**, further parameters can be defined:
- Filter (settling time of the display and output)
- Physical unit (Units)
- Output: 0..20 mA or 4..20 mA
- 0/4 mA (measured value corresponding to 0/4 mA)
- 20 mA (measured value corresponding to 20 mA)

For models with a voltage output, replace 20 mA accordingly with 10 V.

Edit, using position 2

If the currently visible parameter is to be modified:

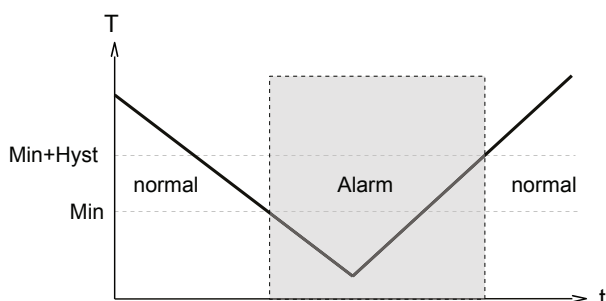
- Turn the annular gap to position 2, so that a flashing cursor appears which displays the position which can be modified.
- By repeatedly turning to position 2, values are increased; by turning to position 1, the cursor moves to the next digit.
- Leave the parameter by turning to position 1 (until the cursor leaves the row); this accepts the modification.
- If there is no action within 30 seconds, the device returns to the normal display range without accepting the modification.

Product information

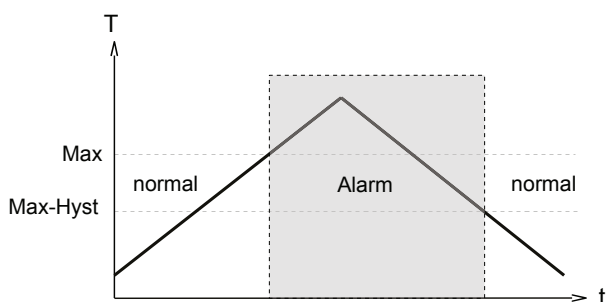
Temperature

The limit switches S1 and S2 can be used to monitor minima or maxima.

With a minimum-switch, falling below the limit value causes a switchover to the alarm state. Return to the normal state occurs when the limit value plus the set hysteresis is once more exceeded.



With a maximum-switch, exceeding the limit value causes a switchover to the alarm state. Return to the normal state occurs when the measured value once more falls below the limit value minus the set hysteresis.



The change to the alarm state is indicated by the integrated red LED and a cleartext in the display. While in the normal state the switching outputs are at the level of the supply voltage; in the alarm state they are at 0 V, so that a wire break would also display as an alarm state at the signal receiver.

Overload display

Overload of a switching output is detected and indicated on the display ("Check S1 / S2"), and the switching output is switched off.

Simulation mode

To simplify commissioning, the sensor provides a simulation mode for the analog output. It is possible to create a programmable value in the range 0..26.0 mA at the output (without modifying the process variable). This allows the wiring run between the sensor and the downstream electronics to be tested during commissioning. This mode is accessed by means of **Code 311**.

Factory settings

After modifying the configuration parameters, it is possible to reset them to the factory settings at any time using **Code 989**.

Product key

HTK35- 1. 015 2. K1 3. 4. S 5.

○ = Option

1.	Sensor tip length
015	L = 15 mm
2.	Medium-contact material
K1	stainless steel 1.4435
3.	Analog output
I	4..20 mA
U	○ 0..10 V
4.	Electrical connection
S	for round plug connector M12x1, 5-pole
5.	Certificate DIN EN 10204 (indicate only when required, multiple responses possible)
WZ2.2	factory certification 2.2
APZMAT	acceptance test certificate 3.1 for material (in contact with products)

Accessories

- Round plug connector / cable (KH...)

Further information at "Accessories"

Accessories

GTL - Configuration tool

Suitable for all GTL with integrated transducer GTML1 / 2

The GTL - Configuration tool contains:

- **Software GTL - Configurator**
Setting of unit, resolution, measuring range, filter, output in case of error, etc.
- **GTL - Configuration adapter**
- **Connection cable with M12 plug**
- **Connection cable with loose ends**
- **Connection cable with crocodile clamps**
- **GKK 252 case**
with burl foams size: 235 x 185 x 48 mm (W x H x D)
- **Manual**



System requirements

32 or 64 bit version of Windows XP SP3, Windows Vista, Windows 7, Windows 8 (not working with Windows RT, ARM or Intel Itanium based Windows systems)

Accessories

KM4P-GTL34

Connection cable with M12 plug for configuration of temperature sensors with double Pt100 for design type 1 x cable connection M12 plug with 2 x transducer

Compression fitting for GTL

GKEV-25/76

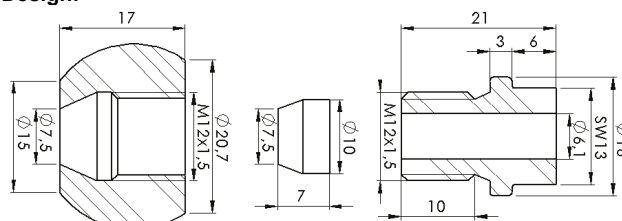
Spherical weld-in sleeve for inclined mounting, containing weld-in sleeve, PEEK clamp ring and clamp screw.



Specifications:

Material	: V4A (1.4404)
Type of installation	: PEEK clamping ring, thread M12x1.5
Clamping torque	: max. 10 Nm
Working pressure	: max. 10 bar
Application	: for mounting of temperature probes of series: GTL 349, GTL 369 / M, GTL 389 / M

Design:



Spare parts:

Clamp screw KS-M12
PEEK clamp ring PKR-6



GEMK-25/76

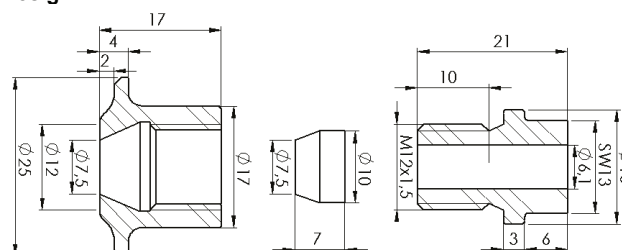
Collar welding sleeve for tanks thick / thin, containing weld-in sleeve, PEEK clamp ring and clamp screw.



Specifications:

Material	: V4A (1.4404)
Type of installation	: PEEK clamping ring, thread M12x1.5
Clamping torque	: max. 10 Nm
Working pressure	: max. 10 bar
Application	: for mounting of temperature probes of series: GTL 349, GTL 369 / M, GTL 389 / M

Design:



Spare parts:

Clamp screw KS-M12
PEEK clamp ring PKR-6

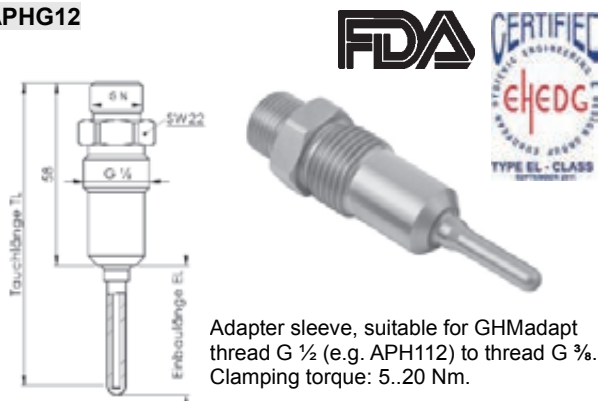


Product information

Temperature

Adapter / weld-in sleeves for GTL

APHG12



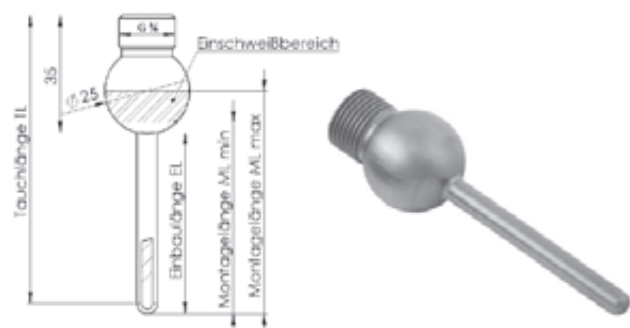
Product key

1.

APHG12 -

1.	Immersion length TL		
0083	TL = 83 mm	Fitting length EL = 27 mm	
0097	TL = 97 mm	Fitting length EL = 41 mm	
0160	TL = 160 mm	Fitting length EL = 104 mm	
xxxx	Any immersion length in mm: from 200 mm till max.: 500 mm (e.g. 320 = 320 mm)		

APHK25



Spherical weld-in sleeve to thread G 3/8, for installation at tube curvatures and tanks.

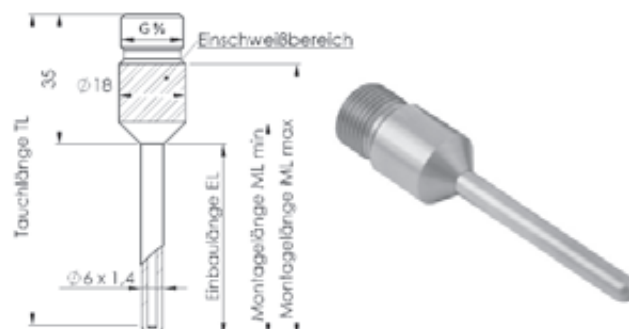
Product key

1.

APHK25 -

1.	Immersion length TL		
0083	TL = 83 mm	Fitting length EL = 50 mm Installation length ML: 56..63 mm	
0097	TL = 97 mm	Fitting length EL = 64 mm Installation length ML: 70..77 mm	
0160	TL = 160 mm	Fitting length EL = 127 mm Install. length ML: 133..140 mm	
xxxx	Any immersion length in mm: from 200 mm till max.: 500 mm (e.g. 320 = 320 mm)		

APHZ18



Product key

1.

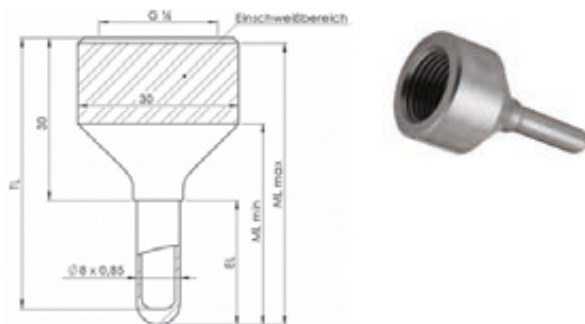
APHZ18 -

1.	Immersion length TL		
	0083	TL = 83 mm	<i>Fitting length EL = 50 mm</i> <i>Installation length ML: 56..71 mm</i>
	0097	TL = 97 mm	<i>Fitting length EL = 64 mm</i> <i>Installation length ML: 70..85 mm</i>
	0160	TL = 160 mm	<i>Fitting length EL = 127 mm</i> <i>Install. length ML: 133..148 mm</i>
	xxxx	Any immersion length in mm: from 200 mm till max.: 500 mm (e.g. 320 = 320 mm)	

Product information

Temperature

APHZ30-G12S



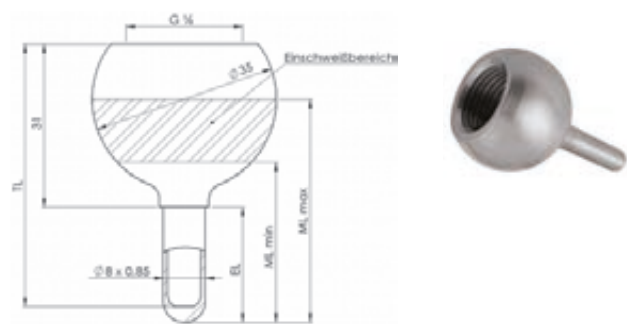
Cylindrical weld-in sleeve to thread G 1/2 standard, for installation in pipes and tanks.

Product key

APHZ30 - G12S - 1. ☐

1.	Immersion length TL	
0050	TL = 50 mm	Fitting length EL = 25 mm Installation length ML: 39..54 mm
0100	TL = 100 mm	Fitting length EL = 75 mm Install. length ML: 89..104 mm
0150	TL = 150 mm	Fitting length EL = 125 mm Install. length ML: 139..154 mm
0200	TL = 200 mm	Fitting length EL = 175 mm Install. length ML: 189..204 mm
0250	TL = 250 mm	Fitting length EL = 225 mm Install. length ML: 239..254 mm
xxxx	Any immersion length in mm: from 300 mm till max.: 1000 mm (e.g. 320 = 320 mm)	

APHK35-G12S



Spherical weld-in sleeve to thread G 1/2 standard, for installation in pipes and tanks.

Product key

APHK35 - G12S - 1. ☐

1.	Immersion length TL	
0050	TL = 50 mm	Fitting length EL = 25 mm Installation length ML: 33..45 mm
0100	TL = 100 mm	Fitting length EL = 75 mm Installation length ML: 83..95 mm
0150	TL = 150 mm	Fitting length EL = 125 mm Install. length ML: 133..145 mm
0200	TL = 200 mm	Fitting length EL = 175 mm Install. length ML: 183..195 mm
0250	TL = 250 mm	Fitting length EL = 225 mm Install. length ML: 233..245 mm
xxxx	Any immersion length in mm: from 300 mm till max.: 1000 mm (e.g. 320 = 320 mm)	

Heat transfer paste

WLP10S

- syringe containing 3 ml paste, silicone-containing, with pipette, color: silver-gray
- high heat conductivity of 10.0 W/mK
- not drying out, silicone parts not fleeing
- storage time up to 12 months at normal ambient conditions

Device configurator ECI-1



- Usable for on-site
 - parameter changes
 - firmware update
 - adjustment of in- and outputs
- Connection via USB

Characteristic

The device configurator ECI-1 is an interface allowing the microprocessor controlled connection of HONSBERG sensors to the USB port of a PC. Combined with the Windows software "HONSBERG Device Configurator" it allows

- changing all configuration settings des Sensors
- read-out of measuring values
- **adjustment of in- and outputs**
- firmware updates

Specifications

Supply voltage	12..30 V DC (depends on connected sensor) and via USB
Power consumption	< 1 W
Connection	
Sensor	Cable socket M12x1, 5-pole, length approx. 50 cm
Feed line	Device plug M12x1, 5-pole
USB	USB-socket type B
Working temperature	0..50 °C
Storage temperature	-20..+80 °C
Housing dimensions	98 mm (L) x 64 mm (B) x 38 mm (H)
Housing material	ABS
Protection class	IP 40

Handling and operation

Connection



The device configurator is intended for temporary connection to the application. It is connected between the existing sensor lead and the sensor. Power supply is via the supply to the sensor and the computer's USB port. When inactive (no communication), the configurator behaves completely neutrally; all signals from the sensor remain available to the application. During communication between computer and sensor, the signal wirings are separated in the configurator, so that in this state the sensor's output signals are not available.

To connect 4-pole leads without a middle hole to the installed 5-pole device connector, adapter K04-05 is included. 4-pole leads with a middle hole can be used without an adapter.

Product key

Device configurator (scope of supply: see figure below)	ECI-1
---	--------------

Scope of supply:

1. Device configurator ECI-1
2. USB-cable
3. Adapter K04-05
4. Plug KB05G
5. Cable K05PU-02SG
6. Case

(Software and power supply unit not included)



Accessories:

Software 'Device Configurator 1.00' Description of software see data sheet "EDC"	EDC 1.00
Power supply unit 24 V DC (with round plug, 5-pole)	EPWR24-1



Spare parts:

M12x1-adapter 4- / 5-pole	K04-05
PUR-cable, 5-pole, screened with circular connector M12x1	K05PU-02SG
Circular connector M12x1, 5-pole (without cable)	KB05G

Product information

Temperature

Hygienic connection cable shielded series KH for HTK12, HTK30 and HTK35



- Connection M12x1
- PVC cable flexcord gray shielded
- Straight or angled model
- 4- or 5-pole, cable end made up with end sleeves for wires
- Union nut made of V4A
- IP67 acc. to IEC 60529
- IP69K protected against water during high pressure and steam jet cleaning acc. to IEC 60529
- Resistant to heat and cold, application range -25..+70 °C
- Vibration protection
- Color coding acc. to industry standards

Characteristic

The connection cable is suitable for moderate mechanical stress. Good resistance to acids and alkalis. Therefore aimed mainly at food and drink industries. Restricted abrasion behavior, and limited oil and chemical resistance. The shielding increases the shear strength, and this also improves the protection from external radiation interference.

Specifications

Connector	connection M12x1
Grip body	plastic, PVC
Union nut	stainless steel 1.4404
Contact block/ cable	plastic PVC gray
Contacts	metal, CuZn, gold-plated
Seal	plastic, FPM, FKM
Current carrying capacity	4 A
Rated voltage	max. 250 V
Insulation resis- tance	≥ 10 ⁹ MΩ
Degree of contami- nation	3/2, acc. to DIN VDE 0110
Ambient tempera- ture	-25..+70 °C
Protection class	IP 67 / IP 69K (only when screwed together)
Mechanical work- ing life	min. 100 mating cycles

Cable colors:

1 = brown, 2 = white, 3 = blue, 4 = black, 5 = gray

Product key

KH - ^{1.} PV ^{2.} - ^{3.} 1 ^{4.} ^{5.} ^{6.} 00

1. Cable material	PV	PVC
2. Cable length	002	2 meter
	005	5 meter
	010	10 meter
3. Shielding	1	shielding (not applied to union nut)
4. Number of poles	04	4-pole
	05	5-pole
5. Connector output	G	straight
	W	angled 90 °
6. Option	00	none

Note:

Hygienic connection cables of series ACH for all temperature probes and clamp-on sensors of series GTL can be found in product information GHMadapt / Accessories.

C3 Hygienic Design

Flow magnetic inductive

92

Electromagnetic flowmeter



Characteristics

Measuring principle	Electromagnetic principle
Process connection	Various hygienic process adapters
Conformity	According to EHEDG, 3-A
Design	<ul style="list-style-type: none"> • Ultra-compact design (space-saving installation) • Complete stainless steel construction • DN1 ... 100
Media	Liquid, pulpy and pasty
Pressure range	Max. 10 bar
Media temperature	-20...+150 °C CIP-/SIP capable

Applications

Applications

- Measurement of conductive liquids with a minimum conductivity of $> 5 \mu\text{S/cm}$
- Hygienic and sterile applications
- Monitoring and control of processes, e.g. CIP-circuits or filtration processes
- Measurement of pulsating media
- Simple dosing and filling tasks

Branches

- Pharmaceutical industry
- Biotechnology, life science
- Cosmetics
- Food & beverage industry
- Chemical industry

Magnetic inductive Flow Meter MFI447



- Very compact design
- High precision ($\pm 0.5\%$) with flow speed > 0.5 m/s (optional $\pm 0.3\%$ for nominal widths DN3..15) $< \pm 1\%$ for DN1 and DN2
- No moving parts in the medium being measured
- Measurement of flowing, pulpy, or pasty media
- Continuously variable housing rotation ($\pm 170^\circ$)
- Operation from outside without aids
- Conformity in accordance with EHEDG, 3-A
- CIP- / SIP capable
- Integrated electronic flow meter
- Integrated dosing control (optional)

Characteristics

A magnetic inductive flow meter is primarily composed of a measuring tube, a magnetic circuit, and two electrodes. Medium with a minimum electrical conductivity flows through the measuring tube. A magnetic field oriented vertically in relation to the flow direction is applied from outside via coils. A voltage is induced in the medium and tapped at the two electrodes on opposite sides. This is proportional to the flow speed of the medium to be measured. Based on the known tube geometry, the electronics calculates the current volume flow rate. The data for the outputs and the integrated volume meter are derived from this value.

The MFI447 has been designed for measurements of flowing, pulpy, or pasty media with a minimum electrical conductivity of $> 5 \mu\text{S}$.

Technical data

Auxiliary energy

Auxiliary voltage	: 18..30 V DC, max. 100 mA
Power consumption	: max. 5 W
Electrical connection	: M12 plug, 5-pin
Galvanic separation	: Sensors / auxiliary volt., outputs / housing
CE conformity	: EN 61326-1:2013, EN 61326-2-3:2013

Environmental conditions

Environmental temperature	: $-20..+60^\circ\text{C}$
Climate classification	: EN 60068-2-38:2009
Vibrations	: EN 60068-2-6:2008, GL Test 2

Approval

Conformity	: EHEDG, 3-A
Metering range	: 0..12 m/s
Basic precision	: $\pm 1\%$ (DN1 and DN2) $\pm 0.5\%$ optional $\pm 0.3\%$ v. M. (DN3..15)

Min. conductivity	: $> 5 \mu\text{S/cm}$, $> 20 \mu\text{S/cm}$ for demineralised water $> 20 \mu\text{S/cm}$ for DN1..2
-------------------	---

Process temperature	: $-20 .. +130^\circ\text{C}$, $150^\circ\text{C} < 60$ min CIP-/SIP-capable ($T_{\text{env.}} 25^\circ\text{C}$)
---------------------	---

Process pressure	: DN3..40 ≤ 40 bar DN50, DN80 ≤ 16 bar DN1, DN2, DN65, DN100 ≤ 10 bar
------------------	--

Process material	: Coating: PEEK (DN1..2) PFA (DN3..100)
Electrodes	: 1.4539
Pipe connection	: 1.4435
Seal	: EPDM
FDA-compliant	: Suitable for foodstuffs use in accordance with EHEDG
Conform regulation	: EC 1935/2004 & 10/2011

Process connection	: Weld spigots, Tri-Clamp DIN 32676, DIN11851 milk tube, DIN11864-1 Form A Südmo aseptic connection
--------------------	---

Housing	: Round stainless steel housing $\varnothing 79$ mm
Material	: 1.4305

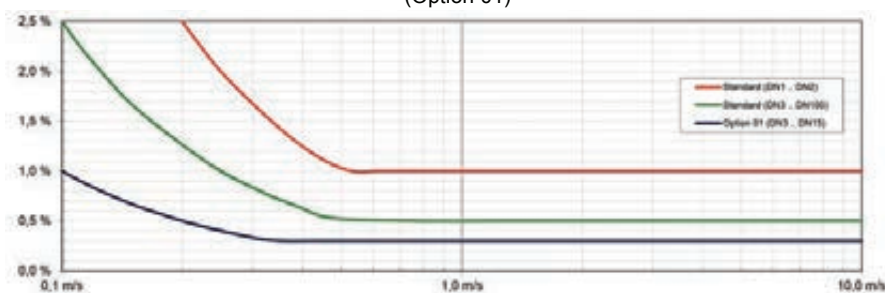
Ingress protection	: IP67 / IP69K
Viewing window	: Acrylic glass (PMMA)

Electrical outputs

Analogue	: Active, 0/4..20 mA, Resistance $< 600 \Omega$
Switching outputs	: 2 x transistor PNP / NPN programmable max. 30 V DC, 100 mA
Programmable as:	: - Pulse output (max. 10 kHz) - Switching output - Control input

Display	: backlit graphic LCD
Operation	: 4 capacitive buttons

Error curves for basic precision 1 % of the measured value, 0.5 % of the measured value. (Standard) and 0.3 % of the measured value (Option 01)

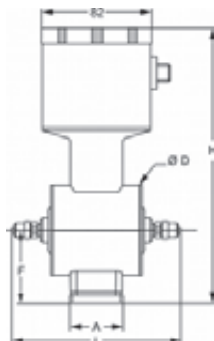


Flow speed

Subject to errors and changes.

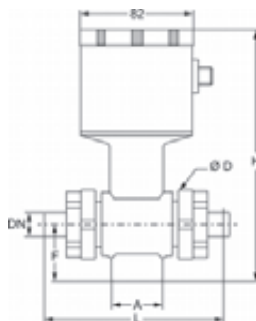
Process connection dimensions

DN1..DN2
1/8" female thread



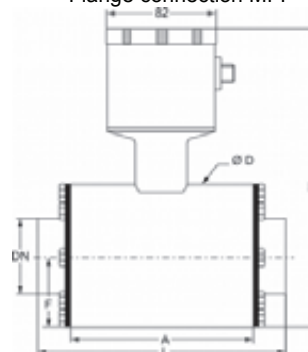
(Figure with PVC hose connection)

DN3..DN40
Process thread MFI



(Figure with welded-on nozzle process connection)

DN50..DN100
Flange connection MFI



(Figure with welded-on nozzle process connection)

The MFI447 base unit is equipped with a 1/8" sanitary female thread on both sides and is supplied with PV hose connection pieces for hose inside diameter 4 mm / outside diameter = 6mm as standard equipment.



'Welded-on nozzle' process connection with union nut for DN 3..40 devices

For installation size DN3..DN8, the following applies:

With tube widths <DN10, only the measuring tube in the device is adapted to the nominal diameter. The connection nozzle is always DN10.



'Welded-on nozzle' process connection with flange for DN 50..100 devices



Housing dimensions

	DN1..DN2	DN3..DN15	DN20	DN25	DN32	DN40	DN50	DN65	DN80	DN100
H (overall) [mm]	215	175	185	194	203	212	208	230	247	275
F (axis height) [mm]	59	38.5	43	48	53	57	50	58	67	81
D (housing diameter) [mm]	73	44	63	63	78	78	100	116	133	160
A (housing width) [mm]	43	37	42	54	62	67	128	114	114	145

Order information

For operation of the MFI447 flow meter, the appropriate process connection is always required in addition to the base unit in order to be able to integrate the device in pipelines.








The process connection is **not** included in the scope of supply of the base unit (except for with installation sizes DN1 and DN2), and must be ordered separately. A process connection always comprises two connection nozzles.



Figure:
MFI447 DN25 base unit with process connection AP232-025 milk tube screw coupling in accordance with DIN 11851.





left: reduction nozzle with union nut
right: threaded nozzle

Overview of process connections with union nut, DN 3..40

Process process connection	Figure	Pipe standard	Ordering code – DN (nominal Ø) <small>see also page 15</small>
Welded-on nozzle both sides		DIN EN 10357, Series B DIN EN 10357, Series A DIN 11866 Series A DIN 11866 Series B DIN 11866 Series C OD tube ISO2037	APF 110-□□□-00 APF 210-□□□-00 APF 310-□□□-00 APF 410-□□□-00 APF 510-□□□-00 APF 610-□□□-00 APF 710-□□□-00
Tri-Clamp in accordance with DIN 32676 both sides		DIN EN 10357, Series A DIN 11866 Series A DIN 11866 Series B DIN 11866 Series C OD Tube ISO2037	APF 220-□□□-00 APF 320-□□□-00 APF 420-□□□-00 APF 520-□□□-00 APF 620-□□□-00 APF 720-□□□-00
Milk tube threaded nozzle in accordance with DIN 11851, both sides		DIN EN 10357, Series A	APF 230-□□□-00
Milk tube reduction nozzle with union nut in accordance with DIN 11851 one side Milk tube threaded nozzle opposite side		DIN EN 10357, Series A	APF 232-□□□-00
Aseptic threaded nozzle in accordance with DIN 11864-1 (Form A with O-ring) both sides		DIN EN 10357, Series A DIN 11866 Series A DIN 11866 Series B DIN 11866 Series C OD tube ISO2037	APF 240-□□□-00 APF 340-□□□-00 APF 440-□□□-00 APF 540-□□□-00 APF 640-□□□-00 APF 740-□□□-00
Aseptic collared nozzle with union nut in accordance with DIN 11864-1, one side Aseptic threaded nozzle opposite side		DIN EN 10357, Series A DIN 11866 Series A DIN 11866 Series B DIN 11866 Series C OD tube ISO2037	APF 242-□□□-00 APF 342-□□□-00 APF 442-□□□-00 APF 542-□□□-00 APF 642-□□□-00 APF 742-□□□-00
Hose nozzles both sides			APF 860-□□□-□□-00

Additional process connections are available on request.

Overview of process connections with flange, DN 50..100

Process process connection	Figure	Pipe standard	Ordering code – DN (nominal Ø) see also page 15
Welded-on nozzle both sides		DIN EN 10357, Series B DIN EN 10357, Series A DIN 11866 Series A DIN 11866 Series B DIN 11866 Series C OD tube ISO2037	APF 110-□□□-00 APF 210-□□□-00 APF 310-□□□-00 APF 410-□□□-00 APF 510-□□□-00 APF 610-□□□-00 APF 710-□□□-00
Tri-Clamp in accordance with DIN 32676 both sides		DIN EN 10357, Series A DIN 11866 Series A DIN 11866 Series B DIN 11866 Series C OD Tube ISO2037	APF 220-□□□-00 APF 320-□□□-00 APF 420-□□□-00 APF 520-□□□-00 APF 620-□□□-00 APF 720-□□□-00
Milk tube threaded nozzle in accordance with DIN 11851, both sides		DIN EN 10357, Series A	APF 230-□□□-00
Milk tube reduction nozzle with union nut in accordance with DIN 11851 one side Milk tube threaded nozzle opposite side		DIN EN 10357, Series A	APF 232-□□□-00
Aseptic threaded nozzle in accordance with DIN 11864-1 (Form A with O-ring) both sides		DIN EN 10357, Series A DIN 11866 Series A DIN 11866 Series B DIN 11866 Series C OD tube ISO2037	APF 240-□□□-00 APF 340-□□□-00 APF 440-□□□-00 APF 540-□□□-00 APF 640-□□□-00 APF 740-□□□-00
Aseptic collared nozzle with union nut in accordance with DIN 11864-1, one side Aseptic threaded nozzle opposite side		DIN EN 10357, Series A DIN 11866 Series A DIN 11866 Series B DIN 11866 Series C OD tube ISO2037	APF 242-□□□-00 APF 342-□□□-00 APF 442-□□□-00 APF 542-□□□-00 APF 642-□□□-00 APF 742-□□□-00
Hose nozzles both sides			APF 860 see page 15

Additional process connections are available on request.

Product information

Flow magnetic inductive

Pipe dimensions and installation lengths (MFI447 with process connection on both sides)

Installation lengths with process connection in accordance with DIN EN 10357, Series A (formerly DIN 11850, Series 2): (APF2XX, material 1.4404) and DIN 11866 Series A (APF3XX, material 1.4435)

DIN EN 10357, Series A DIN 11866, Series A			Welded-on nozzle both sides	Tri-Clamp DIN 32676 both sides	Milk tube screw coupling DIN 11851 (only for DIN EN 10357, Series A)		Aseptic thread connection DIN 11864-1 Form A	
Ø MFI DN	Nomi- nal pipe width DN	Pipe dimensions Outside Ø x wall thickness Do x S [mm]			Threaded nozzle both sides	Threaded nozzle - Reduction nozzle	Threaded nozzle both sides	Threaded nozzle - Collared nozzle
Order code			APF210-... APF310-...	APF220-... APF320-...	APF230-...	APF232-...	APF240-... APF340-...	APF242-... APF342-...
3	010	13x1.5	127	163	169	165	165	163
4	010	13x1.5	127	163	169	165	165	163
6	010	13x1.5	127	163	169	165	165	163
8	010	13x1.5	127	163	169	165	165	163
10	010	13x1.5	127	163	169	165	165	163
15	015	19x1.5	127	163	169	165	165	163
20	020	23x1.5	132	168	180	174	174	171
25	025	29x1.5	149	192	207	200	201	197
32	032	35x1.5	166	209	230	223	226	221
40	040	41x1.5	171	214	237	230	233	228
50	050	53x1.5	173	216	243	236	235	234
65	065	70x2.0	165	221	245	237	237	235
80	080	85x2.0	169	225	259	251	253	249
100	100	104x2.0	199	255	307	297	299	295

Installation lengths with process connection in accordance with DIN EN 10357, Series B (formerly DIN 11850, Series 1): (APF110, material 1.4404)

DIN EN 10357, series B (material 1.4404)			Welded-on nozzle both sides	Tri-Clamp DIN 32676 both sides	Milk tube screw coupling DIN 11851		Aseptic thread connection DIN 11864-1 Form A	
Ø MFI DN	Nomi- nal pipe width DN	Pipe dimensions Outside Ø x wall thickness Do x S [mm]			Threaded nozzle both sides	Threaded nozzle - Reduction nozzle	Threaded nozzle both sides	Threaded nozzle - Collared nozzle
Order code			APF110-...					
3	010	12x1	127	-	-	-	-	-
4	010	12x1	127	-	-	-	-	-
6	010	12x1	127	-	-	-	-	-
8	010	12x1	127	-	-	-	-	-
10	010	12x1	127	-	-	-	-	-
15	015	18x1	127	-	-	-	-	-
20	020	22x1	132	-	-	-	-	-
25	025	28x1	149	-	-	-	-	-
32	032	34x1	166	-	-	-	-	-
40	040	40x1	171	-	-	-	-	-
50	050	52x1	173	-	-	-	-	-

Installation lengths with process connection in accordance with DIN 11866 Series B / DIN EN ISO1127 (APF4XX, material 1.4435)

DIN 11866 Series B / DIN EN ISO 1127			Welded-on nozzle both sides	Tri-Clamp DIN 32676 both sides	Milk tube screw coupling DIN 11851		Aseptic thread connection DIN 11864-1 Form A	
Ø MFI DN	Nomi- nal pipe width DN	Pipe dimensions Outside Ø x wall thickness Do x S [mm]			Threaded nozzle both sides	Threaded nozzle - Reduction nozzle	Threaded nozzle both sides	Threaded nozzle - Collared nozzle
Order code			APF410-...	APF420-...			APF440-...	APF442-...
3	008	13.5x1.6	127	162.6	-	-	165	163
4	008	13.5x1.6	127	162.6	-	-	165	163
6	008	13.5x1.6	127	162.6	-	-	165	163
8	008	13.5x1.6	127	162.6	-	-	165	163
10	010	17.2x1.6	127	162.6	-	-	165	163
15	015	21.3x1.6	127	162.6	-	-	169	166
20	020	26.9x1.6	132	162.6	-	-	184	180
25	025	33.7x1.6	149	267.0	-	-	209	204
32	032	42.4x2.0	166	267.0	-	-	228	223
40	040	48.3x2.0	171	280.0	-	-	233	232
50	050	60.3x2.0	173	280.0	-	-	245	243
65	065	76.1x2.0	165	225.0	-	-	249	245
80	080	88.9x2.0	169	225.0	-	-	269	265

Installation lengths with process connection in accordance with DIN 11866, Series C (APF 5XX, material 1.4435) and OD tube (APF 6XX, material 1.4404)

DIN 11866, Series C OD tube			Welded-on nozzle both sides	Tri-Clamp DIN 32676 both sides	Milk tube screw coupling DIN 11851		Aseptic thread connection DIN 11864-1 Form A	
Ø MFI DN	Nomi- nal pipe width DN	Pipe dimensions Outside Ø x wall thickness Do x S [mm]			Threaded nozzle both sides	Threaded nozzle - Reduction nozzle	Threaded nozzle both sides	Threaded nozzle - Collared nozzle
Ordering code			APF510-... APF610-...	APF520-... APF620-...			APF540-... APF640-...	APF542-... APF642-...
3	3/8	9.53x0.89	127	152.4	-	-	165	163
4	3/8	9.53x0.89	127	152.4	-	-	165	163
6	3/8	9.53x0.89	127	152.4	-	-	165	163
8	3/8	9.53x0.89	127	152.4	-	-	165	163
10	½	12.7x1.65	127	152.4	-	-	165	163
20	¾	19.05x1.65	132	152.4	-	-	170	168
25	1	25.4x1.65	149	192.0	-	-	201	197
40	1½	38.1x1.65	171	214.0	-	-	233	228
50	2	50.8x1.65	173	229.0	-	-	235	224
65	2½	63.5x1.65	165	221.0	-	-	237	235
80	3	76.2x1.65	169	225.0	-	-	253	249
100	4	101.6x2.11	199	225.0	-	-	299	295

Installation lengths with process connection in accordance with ISO 2037 (APF 7X0, material 1.4404)
-> new standard EN10357-C

ISO 2037			Welded-on nozzle both sides	Tri-Clamp DIN 32676 both sides	Milk tube screw coupling DIN 11851		Aseptic thread connection DIN 11864-1 Form A	
Ø MFI DN	Nomi- nal pipe width DN	Pipe dimensions Outside Ø x wall thickness Do x S [mm]			Threaded nozzle both sides	Threaded nozzle - Reduction nozzle	Threaded nozzle both sides	Threaded nozzle - Collared nozzle
Order code			APF710-...	APF720-...			APF740-...	APF742-...
25	1"	25.0x1.6	149	192	-	-	201	197
32	1 ¼"	31.8x1.6	-	-	-	-	-	-
40	1 ½"	31.8x1.6	171	214	-	-	233	228
50	2"	51x1.6	173	216	-	-	235	234
65	2 ½"	63.5x1.6	165	221	-	-	237	235
80	3"	76.1x1.6	169	225	-	-	253	249
100	4"	101.6x2.01	199	255	-	-	299	295

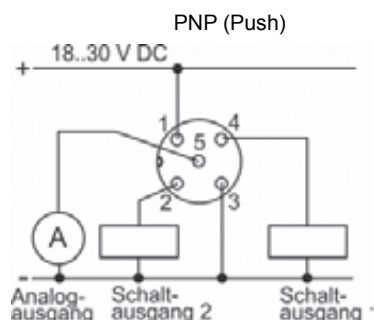
Hose nozzle process connection (APF 860, material 1.4404)

available for all nominal device diameters, specify hose inside diameters –XX in the ordering code)

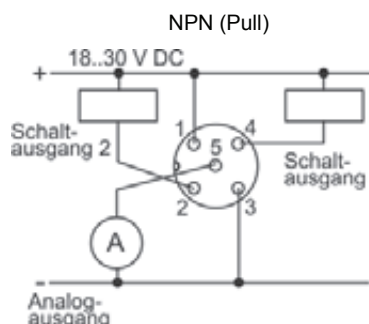
Ø MFI DN	Hose inside Ø Di [mm]	Hose nozzle both sides
Order code		
1	4	APF860-001-XX-00
2	4	APF860-002-XX-00
3	13	APF860-003-XX-00
4	13	APF860-004-XX-00
6	13	APF860-006-XX-00
8	13	APF860-008-XX-00
10	13	APF860-010-XX-00
15	19	APF860-015-XX-00
20	23	APF860-020-XX-00
25	29	APF860-025-XX-00
32	35	APF860-032-XX-00
40	41	APF860-040-XX-00
50	53	APF860-050-XX-00
65	70	APF860-065-XX-00
80	85	APF860-080-XX-00
100	104	APF860-100-XX-00

Wiring

M12 plug connection



M12 plug connection



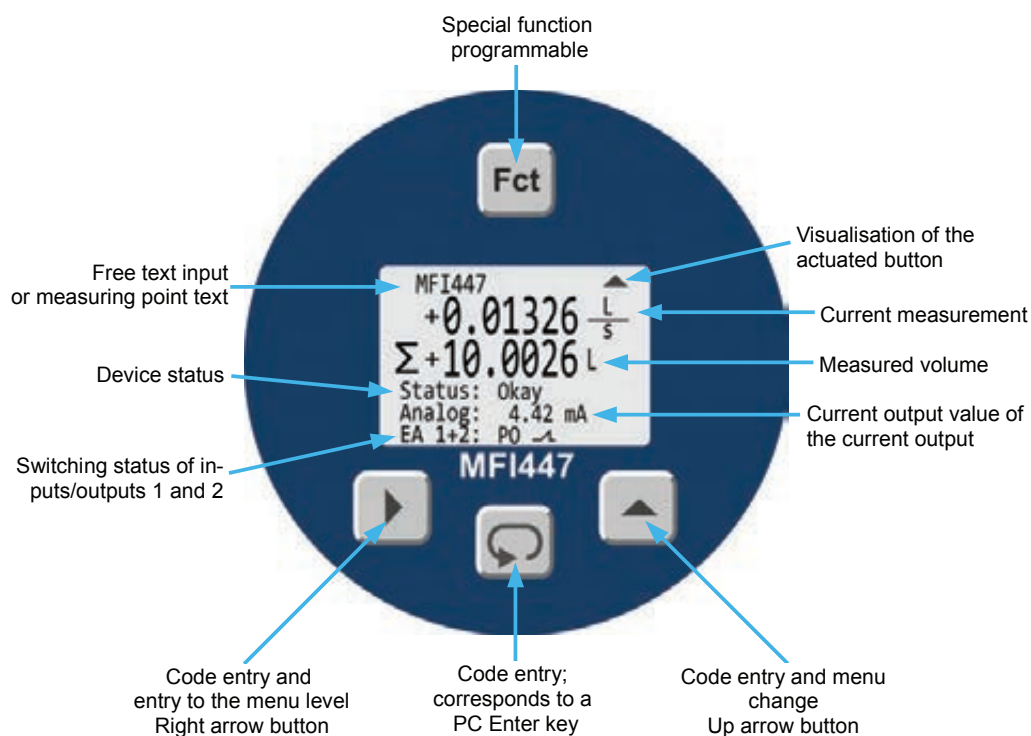
Cable colours: 1 = brown, 2 = white, 3 = blue, 4 = black, 5 = grey

Display and operation

Four capacitive buttons are provided. The function of the individual buttons depends on the operating status of the MFI447.

NOTE: Capacitive buttons react to the change in capacity due to the approach of the finger. They have no moving parts and are thus very durable. However, gloves, dirt, and moisture can cause malfunctions. The LC display shows measurements and status information during measuring operation. The display values change depending on the parameterisation and status of the device.

The display is generally divided as follows:



List of parameters - operating structure of the MFI447

1. Menu level	2. Menu level	1. Menu level	2. Menu level
	Parameter		Parameter
	0.2 Read data		
1 - Application data	1.1 Measuring point	5 - Analogue output	5.1 Function
	1.2 Operating language		5.2 Range
	1.3 Reset meter	6 - Filling function	6.1 Fill function
	1.4 Function key		6.2 Target volume
2 - Sensor input	2.1 Measuring range	7 - LC display	7.1 Flow rate display
	2.2 Time constant		7.2 Flow speed
	2.3 Leak flow volume		7.3 Positive meter
	2.4 Flow direction		7.4 Negative meter
	2.5 Zero point		7.5 Totaliser
3 – Input/output 1	3.1 I/O function		7.6 Status display
	<i>If switching output has been selected</i>		7.7 Display change
	3.2 Hardware config.		7.8 LCD contrast
	3.3 Switching function		7.9 LCD brightness
	<i>If switching point has been selected</i>	8 - Test functions	8.1 Input/output 1
	3.4 ON switching point		8.2 Input/output 2
	3.5 OFF switching point		8.3 Analogue output
	<i>If pulse output has been selected</i>	9 - Information	9.1 ADW version
	3.2 Hardware config.		9.2 IO version
	3.3 Output version		9.3 Nominal width
	3.4 Pulse value		9.4 Field frequency
	3.5 Pulse width		9.5 Nominal frequency
	<i>If control input has been selected</i>		9.6 Calibration value
	3.2 Hardware config.		9.7 Operating hours
	3.3 Control function		
	<i>If analogue input has been selected</i>		
	3.2 Scaling 1		
	3.3 Scaling 2		
4 – Input/output 2	4.1 I/O function		
	<i>If switching output has been selected</i>		
	4.2 Hardware config.		
	4.3 Switching function		
	<i>If switching point has been selected</i>		
	4.4 ON Switching value		
	4.5 OFF Switching value		
	<i>If pulse output has been selected</i>		
	4.2 Hardware config.		
	4.3 Output version		
	4.4 Pulse value		
	4.5 Pulse width		
	<i>If control input has been selected</i>		
	4.2 Hardware config.		
	4.3 Control function		
	<i>If analogue input has been selected</i>		
	4.2 Scaling 1		
	4.3 Scaling 2		

Installation conditions

Potential equalisation

With the metal connection between welded-on nozzle and/or a different process connection and the pipeline, it is assured that the measuring sensor housing has the same potential as the pipeline. The additional connection of earthing cables is only necessary with the use of plastic pipelines.

Installation

The following must be observed:

- The measuring tube must be completely filled
- The mark of the flow direction on the measuring tube must match flow direction of the pipeline
- Installation must take place without mechanical forces (torsion, bending) on the process adapter for the measuring sensor
- Seals may not protrude into the pipe cross-section, because they influence the accuracy of the device
- The transducer may not be exposed to direct sunlight

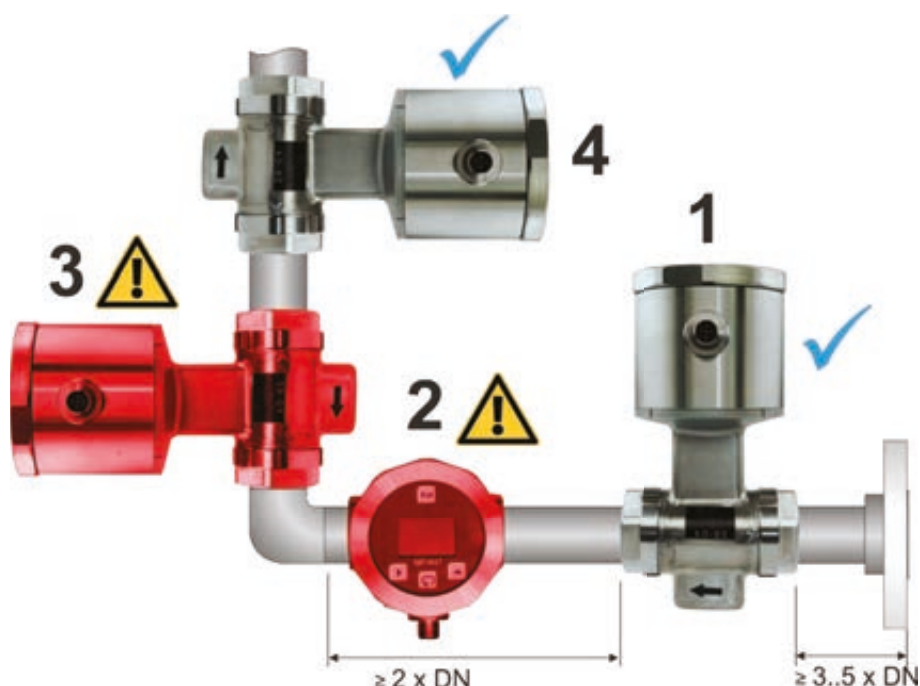


Figure 1

Position	Characteristics
1	<i>Ideal:</i> Good measuring result if no air bubbles form. Minimum distance from the pipe angle 3.5 x DN in the inlet and 2 x DN in the outlet. (DN=nominal diameter)
2	<i>Not recommended:</i> Fault-free functionality cannot be assured due to the arrangement of measuring electrodes allowing for incorrect measurements (with penetration of air).
3	<i>Questionable (only with free outlet):</i> A falling flow direction can lead to incorrect measurements.
4	<i>Ideal:</i> Good measuring result if no air bubbles form. Same minimum distance from the pipe angle as 1.

Table 1

Inlet and outlet section (Figure 1)

To avoid incorrect measurements, a straight, uninterrupted inlet section of $\geq 3.5 \times \text{DN}$ on the inlet side of the measuring sensor and section $\geq 2 \times \text{DN}$ on the outlet side of the measuring sensor are required.

Valves and other actuators should be installed after the measuring sensor, downstream from the outlet section.

Electrode axis, horizontal installation position (Table 1, position 1, 2).

The electrode axis should be horizontal. If this is not possible, it must be ensured that the electrode axis comes into contact in the pipeline at the 2:00 position, and not at the highest point (12:00 installation position).

Free outlet, fall pipe (Table 1, position 3).

In order to prevent the accumulation of gas and air, do not install the measuring device at the highest point (risk of air accumulation) or immediately before a free outlet or in a fall pipe. With fall pipes having a distance to the upper point of the measuring point of $> 5 \text{ m}$, a siphon or degassing valve must be provided. This will prevent a breakaway of the liquid flow and thus the penetration of air.

Installation near pumps

Do not install the device on the suction side of pumps in order to avoid negative pressure and damage to the pipe cladding. In order to avoid the transmission of vibrations to the measuring device, the use of pulsation attenuators and/or vibration compensators is recommended. This can compensate for pulsations arising during the pumping process with dosing pumps.

Vertical installation position (Table 1, position 4)

Installation of a rising pipe is ideal for a vertical pipeline. Only in this way can it be ensured that the measuring tube is always completely full and that gas bubbles can escape.

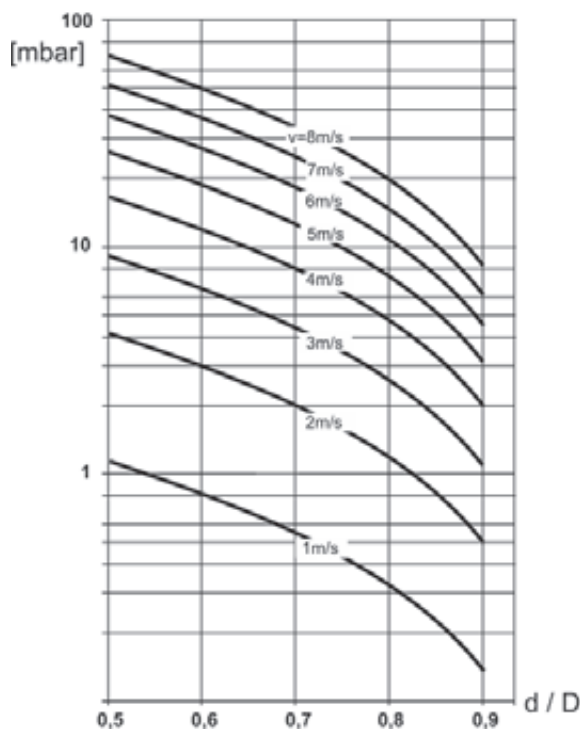
Partially filled pipelines

Installation similar to an inverted siphon is necessary for partially filled pipelines. In order to avoid disruptive deposits due to accumulation of solid matter, the measuring sensor may not be installed at the lowest point of the inverted siphon.

Increase of flow speed, installation in pipelines with larger nominal widths

With an appropriate adapter piece, the measuring sensor can also be installed in a pipeline with a larger nominal width. The flow speed can be increased as a result and the accuracy can be improved. With the use of a reducing adapter, the pressure loss can be determined as follows:

1. Determine the diameter ratio d/D (d = measuring sensor nominal width, D = pipeline inside diameter).
2. Refer to the flow diagram for the flow speed.
3. Read the pressure loss on the Y-axis in the diagram.



Instructions for flow meter layout

Abrasive media

... comprising a mixture of water and floating substances and/or solid particles varying in grain size, such as clay, sand, cement, concrete, etc., which can have very sharp edges, depending on the production process. Depending on the flow speed, this can wear away the pipe cladding and heavily reduced product service life.

In order to avoid this, the following must be observed for the use of MIDs for abrasive media:

- Discuss the application with the manufacturer during the planning phase.
- Select the minimum suitable flow speed ($< 1 \text{ m/s}$). This can be achieved by choosing a larger measuring sensor.
- Installation in a vertical rising pipe is ideal.

Highly adhesive media

Deposits and adhering material can be prevented with an appropriately high flow speed. The flow speed can be increased by selecting a smaller measuring sensor.

Filmy, greasy media

Tip electrodes (special design) should be used for this type of media (e.g. cream). Due to their design, these electrodes have a self-cleaning effect, wherein the isolation of the electrodes and thus a disturbance of the measuring signal can be avoided.

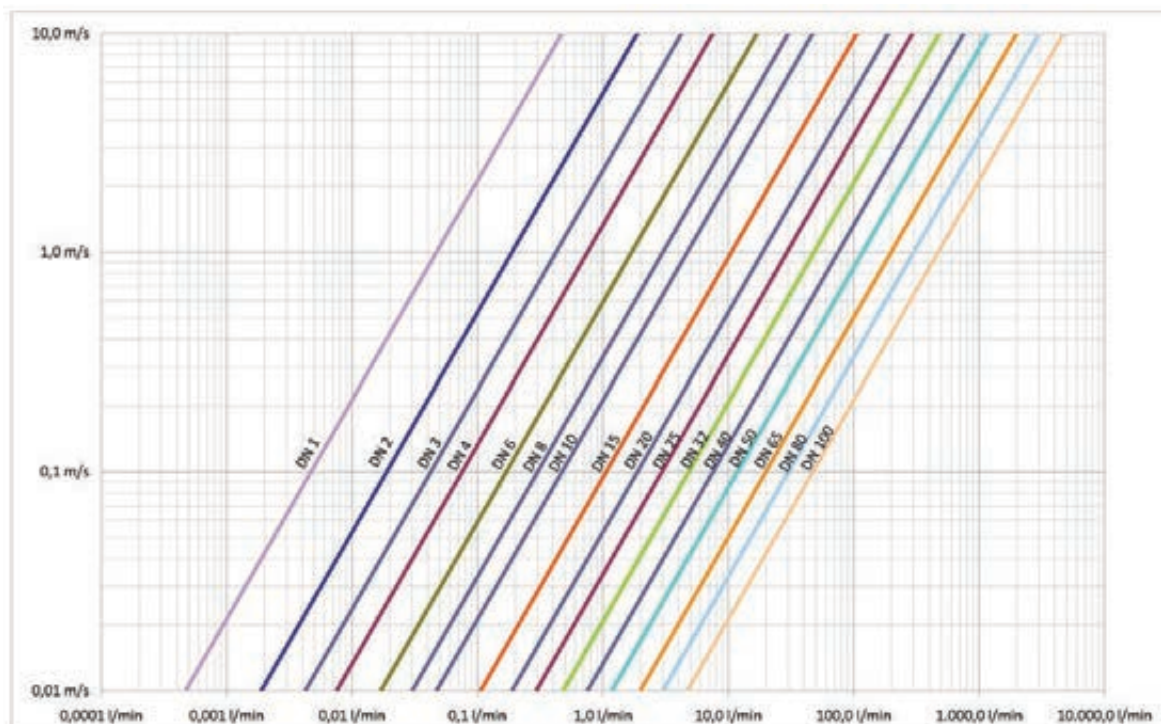
Vacuum resistance

The measuring sensor fulfils the highest requirements with its high-quality, vacuum-resistant, dimensionally stable, and smooth PFA cladding. It is resistant to rapid temperature increases (hot-cold change in the CIP process) or vacuum suction which can arise with the emptying of pipelines.

Dimensioning

If flow speeds are too low, the pipeline must be reduced to a suitable MFI diameter.

With nominal pipe widths $< \text{DN}10$, reduction to a smaller diameter takes place in the measuring tube of the MFI.


Conversion table l/min \leftrightarrow m/s

Product information

Flow magnetic inductive

Nominal-width-dependent conversion table for flow speed (m/s) to volume flow (l/min)

Sensor diameter DN in mm	1	2	3	4	6	8	10	15	20	25	32	40	50	65	80	100
Flow speed in m/s	in litres/min															
0.20	0.009	0.038	0.085	0.151	0.34	0.60	0.94	2.12	3.77	5.89	9.65	15.07	23.55	39.80	60.29	94.20
0.40	0.019	0.075	0.170	0.301	0.68	1.21	1.88	4.24	7.54	11.78	19.29	30.14	47.10	79.60	120.58	188.40
0.60	0.028	0.113	0.254	0.452	1.02	1.81	2.83	6.36	11.30	17.66	28.94	45.22	70.65	119.40	180.86	282.60
0.80	0.038	0.151	0.339	0.603	1.36	2.41	3.77	8.48	15.07	23.55	38.58	60.29	94.20	159.20	241.15	376.80
1.00	0.047	0.188	0.424	0.754	1.70	3.01	4.71	10.60	18.84	29.44	48.23	75.36	117.75	199.00	301.44	471.00
1.20	0.057	0.226	0.509	0.904	2.03	3.62	5.65	12.72	22.61	35.33	57.88	90.43	141.30	238.80	361.73	565.20
1.40	0.066	0.264	0.593	1.055	2.37	4.22	6.59	14.84	26.38	41.21	67.52	105.50	164.85	278.60	422.02	659.40
1.60	0.075	0.301	0.678	1.206	2.71	4.82	7.54	16.96	30.14	47.10	77.17	120.58	188.40	318.40	482.30	753.60
1.80	0.085	0.339	0.763	1.356	3.05	5.43	8.48	19.08	33.91	52.99	86.81	135.65	211.95	358.20	542.59	847.80
2.00	0.094	0.377	0.848	1.507	3.39	6.03	9.42	21.20	37.68	58.88	96.46	150.72	235.50	398.00	602.88	942.00
2.50	0.118	0.471	1.060	1.884	4.24	7.54	11.78	26.49	47.10	73.59	120.58	188.40	294.38	497.49	753.60	1177.50
3.00	0.141	0.565	1.272	2.261	5.09	9.04	14.13	31.79	56.52	88.31	144.69	226.08	353.25	596.99	904.32	1413.00
4.00	0.188	0.754	1.696	3.014	6.78	12.06	18.84	42.39	75.36	117.75	192.92	301.44	471.00	795.99	1205.76	1884.00
5.00	0.236	0.942	2.120	3.768	8.48	15.07	23.55	52.99	94.20	147.19	241.15	376.80	588.75	994.99	1507.20	2355.00
6.00	0.283	1.130	2.543	4.522	10.17	18.09	28.26	63.59	113.04	176.63	289.38	452.16	706.50	1193.99	1808.64	2826.00
7.00	0.330	1.319	2.967	5.275	11.87	21.10	32.97	74.18	131.88	206.06	337.61	527.52	824.25	1392.98	2110.08	3297.00
8.00	0.377	1.507	3.391	6.029	13.56	24.12	37.68	84.78	150.72	235.50	385.84	602.88	942.00	1591.98	2411.52	3768.00
9.00	0.424	1.696	3.815	6.782	15.26	27.13	42.39	95.38	169.56	264.94	434.07	678.24	1059.75	1790.98	2712.96	4239.00
10.00	0.471	1.884	4.239	7.536	16.96	30.14	47.10	105.98	188.40	294.38	482.30	753.60	1177.50	1989.98	3014.40	4710.00

 = The measuring precision is optimal in the green range

Product information

Flow magnetic inductive

Adjustable measuring range end value

Nominal width	smallest	largest	smallest	largest	smallest	largest	smallest	largest	smallest	largest	smallest	largest
[mm]	[cm³/s]		[cm³/min]		[cm³/h]		[l/s]		[l/min]		[l/h]	
1	0.15708	7.85398	9.425	471.239	565.5	28274.3			0.00942	0.47124	0.5655	28.2743
2	0.6283	31.4159	37.70	1884.96	2262	113097	0.00063	0.03142	0.03770	1.88496	2.262	113.097
3	1.4137	70.6858	84.82	4241.15	5089	254469	0.00141	0.07069	0.08482	4.24115	5.089	254.469
4	2.5133	125.6637	150.80	7539.82	9048	452389	0.00251	0.12566	0.15080	7.53982	9.048	452.389
6	5.655	282.743	339.3	16964.6			0.00565	0.28274	0.3393	16.9646	20.36	1017.88
8	10.053	502.655	603.2	30159.3			0.01005	0.50265	0.6032	30.1593	36.19	1809.56
10	15.708	785.398	942.5	47123.9			0.01571	0.78540	0.9425	47.1239	56.55	2827.43
15	35.34	1767.15	2121	106029			0.03534	1.76715	2.121	106.029	127.23	6361.73
20	62.83	3141.59	3770	188496			0.06283	3.14159	3.770	188.496	226.2	11309.7
25	98.17	4908.74	5890	294524			0.09817	4.90874	5.890	294.524	353.4	17671.5
32	160.85	8042.48	9651	482549			0.16085	8.04248	9.651	482.549	579.1	28952.9
40	251.3	12566.4	15080	753982			0.2513	12.5664	15.080	753.982	904.8	45238.9
50	392.7	19635.0					0.3927	19.6350	23.56	1178.10	1413.7	70685.8
65	663.7	33183.1					0.6637	33.1831	39.82	1990.98	2389	119459
80	1005.3	50265.5					1.0053	50.2655	60.32	3015.93	3619	180956
100	1570.8	78539.8					1.5708	78.5398	94.25	4712.39	5655	282743

Nominal width	smallest	largest	smallest	largest	smallest	largest	smallest	largest	smallest	largest	smallest	largest	smallest	largest
[mm]	[l/s]		[hl/min]		[hl/h]		[m³/s]		[m³/min]		[m³/h]		[gal/min]	
1					0.00565	0.28274							0.00249	0.12449
2					0.02262	1.13097					0.00226	0.11310	0.00996	0.49795
3					0.05089	2.54469					0.00509	0.25447	0.02241	1.12039
4			0.00151	0.07540	0.09048	4.52389					0.00905	0.45239	0.03984	1.99181
6			0.00339	0.16965	0.2036	10.1788			0.00034	0.01696	0.02036	1.01788	0.08963	4.48157
8	0.00010	0.00503	0.00603	0.30159	0.3619	18.0956			0.00060	0.03016	0.03619	1.80956	0.15934	7.96724
10	0.00016	0.00785	0.00942	0.47124	0.5655	28.2743			0.00094	0.04712	0.05655	2.82743	0.2490	12.4488
15	0.00035	0.01767	0.02121	1.06029	1.2723	63.6173			0.00212	0.10603	0.12723	6.36173	0.5602	28.0098
20	0.00063	0.03142	0.03770	1.88496	2.262	113.097			0.00377	0.18850	0.2262	11.3097	0.9959	49.7953
25	0.00098	0.04909	0.05890	2.94524	3.534	176.715			0.00589	0.29452	0.3534	17.6715	1.5561	77.8051
32	0.00161	0.08042	0.09651	4.82549	5.791	289.529			0.00965	0.48255	0.5791	28.9529	2.550	127.476
40	0.00251	0.12566	0.15080	7.53982	9.048	452.389	0.00025	0.01257	0.01508	0.75398	0.9048	45.2389	3.984	199.181
50	0.00393	0.19635	0.2356	11.7810	14.137	706.858	0.00039	0.01963	0.02356	1.17810	1.4137	70.6858	6.224	311.220
65	0.00664	0.33183	0.3982	19.9098	23.89	1194.59	0.00066	0.03318	0.03982	1.99098	2.389	119.459	10.519	525.962
80	0.01005	0.50265	0.6032	30.1593	36.19	1809.56	0.00101	0.05027	0.06032	3.01593	3.619	180.956	15.934	796.724
100	0.01571	0.78540	0.9425	47.1239	56.55	2827.43	0.00157	0.07854	0.09425	4.71239	5.655	282.743	24.90	1244.88

= no value can be specified due to display numerical resolution

Product information

Flow magnetic inductive

Note:

An MFI always comprises a base unit and its process connections.
Please specify both when ordering.

MFI447 base unit order code

MFI447 - ^{1.} - ^{2.} - ^{3.} - ^{4.} - ^{5.}

1. Nominal width	
001 ^a	DN 1
002 ^a	DN 2
003 ^b	DN 3
004 ^b	DN 4
006 ^b	DN 6
008	DN 8
010	DN 10
015	DN 15
020	DN 20
025	DN 25
032	DN 32
040	DN 40
050	DN 50
065	DN 65
080	DN 80
100	DN 100
2. Electrode material	
0	stainless steel 1.4539 (standard)
3. Electrode shape	
0	flush mounted (standard)
4. Options	
00	no options
01	accuracy ± 0.3 % for DN ≥ 3..15
02	dosing control
5. Certificate DIN EN 10204 (indicate only when required, multiple responses possible)	
WZ2.2	factory certification 2.2
APZ2P	acceptance test certificate 3.1 with 2 measuring points (0°C / 70°C)
APZ4P	acceptance test certificate 3.1 with 4 measuring points (0°C, 70°C + 2 test points freely selectable)

^a incl. 1/8" sanitary connection (PVC)

^b with nominal pipe widths < DN10 the measuring tube in the sensor is reduced a smaller DN.

Order codes

Process connection foodstuffs

APF ^{1.} ^{2.} ^{3.} ^{4.} ^{5.} ^{6.}

Area of application: foodstuffs; Material 1.4404, Seal EPDM

1. Connection standard	
1	DIN EN 10357 series B / DIN 11850 series 1
2. Type	
1	welding nozzle
3. Type standards	
0	standard (as described above under construction)
4. Nominal pipe width DN	
010, 015, 020, 025, 032, 040, 050	
5. Options	
00	without option
6. Certificate DIN EN 10204. Indicate only when required.	
WZ2.2	factory certification 2.2

APF ^{1.} ^{2.} ^{3.} ^{4.} ^{5.} ^{6.}

Area of application: foodstuffs; Material 1.4404

1. Connection standard	
2	DIN EN 10357 series A / DIN 11850 series 2
2. Type	
1	welding nozzle
2	Tri-Clamp DIN 32676
3	milk pipe DIN 11851 process connection; threaded connections on both sides
4	aseptic-thread nozzle DIN 11864; threaded connectors on both sides
3. Type standards	
0	standard (as described above under type)
1	milk pipe DIN 11851 on both sides conical port with union nut
2	milk tube DIN 11851 thread-/conical port with union nut
1	aseptic-thread nozzle DIN 11864 on both sides nozzle with union nut
2	aseptic-thread nozzle DIN 11864 thread/female union with union nut
4. Nominal pipe width DN [mm]	
010	DN 10
015	DN 15
020	DN 20
025	DN 25
032	DN 32
040	DN 40
050	DN 50
065	DN 65
080	DN 80
100	DN 100
5. Options	
00	without option
6. Certificate DIN EN 10204. Specify only when required.	
WZ2.2	factory certification 2.2

APF ^{1.} ^{2.} ^{3.} ^{4.} ^{5.} ^{6.}

Area of application: foodstuffs; Material 1.4404

1. Connection standard	
6	OD-Tube (ASME)
2. Type	
1	welding nozzle
2	Tri-Clamp (from 1/2") DIN 32676
4	aseptic-thread nozzle DIN 11864-1 (from 1/2") threaded connectors on both sides
3. Type standards	
0	standard (as described above under type)
1	aseptic-thread nozzle DIN 11864; on both sides female union with slotted nut
2	aseptic-thread nozzle DIN 11864; thread/female union with slotted nut
4. Nominal pipe width in inch ["]	
008	3/8
010	1/2
020	3/4
025	1
040	1 1/2
050	2
065	2 1/2
080	3
100	4
5. Options	
00	without option
6. Certificate DIN EN 10204. Specify only when required.	
WZ2.2	factory certification 2.2

Product information

Flow magnetic inductive

1. 2. 3. 4. 5. 6.
APF 7 - - - -

Area of application: foodstuffs; Material 1.4404

1.	Connection standard
7	ISO 2037
2.	Type
1	welding nozzle
4	aseptic-thread nozzle DIN 11864-1; threaded connectors on both sides
3.	Type standards
0	standard (as described above under type)
1	aseptic-thread nozzle DIN 11864; on both sides female union with slotted nut
2	aseptic-thread nozzle DIN 11864; thread/female union with slotted nut
4.	Nominal pipe width DN [mm]
025	DN 25
032	DN 32
040	DN 40
050	DN 50
065	DN 65
080	DN 80
100	DN 100
5.	Options
00	without option
6.	Certificate DIN EN 10204. Specify only when required.
WZ2.2	factory certification 2.2

1. 2. 3. 4. 5. 6.
APF 8 0 - - - -

Area of application: foodstuffs; material 1.4404; seal EPDM

1.	Connection standard
8	process thread sensor MFI
2.	Type
6	hose connection
3.	Type standards
0	standard (as described above under type)
4.	Nominal width MFI [mm]
010	DN 10
015	DN 15
5.	Hose inner diameter [mm]
13	13,4 mm (suitable to DN 10)
19	19,0 mm (suitable to DN 15)
xx	on request
6.	Options
00	without option
7.	Certificate DIN EN 10204. Specify only when required.
WZ2.2	factory certification 2.2

Process connections for pharma

1. 2. 3. 4. 5. 6.
APF 3 - - - -

Pharmacy industry; material 1.4435; incl. 3.1 certificate

1.	Connection standard
3	DIN 11866 Line A
2.	Type
1	welding nozzle
2	Tri-Clamp DIN 32676
4	aseptic-thread nozzle DIN 11864-1 threaded connectors on both sides
3.	Type standards
0	standard (as described above under type)
1	aseptic-thread nozzle DIN 11864; on both sides female union with slotted nut
2	aseptic-thread nozzle DIN 11864; thread/female union with slotted nut
4.	Nominal pipe width DN [mm]
010	DN 10
015	DN 15
020	DN 20
025	DN 25
032	DN 32
040	DN 40
050	DN 50
065	DN 65
080	DN 80
100	DN 100
5.	Options
00	without option
6.	Certificate DIN EN 10204. Specify only when required.
WZ2.2	factory certification 2.2

1. 2. 3. 4. 5. 6.
APF 4 - - - -

Pharmacy industry; material 1.4435; incl. 3.1 certificate

1.	Connection standard
4	DIN 11866 Line B (ISO 1127)
2.	Type
1	welding nozzle
2	Tri-Clamp DIN 32676
4	aseptic-thread nozzle DIN 11864-1 threaded connectors on both sides
3.	Type standards
0	standard (as described above under type)
1	aseptic-thread nozzle DIN 11864; on both sides female union with slotted nut
2	aseptic-thread nozzle DIN 11864; thread/female union with slotted nut
4.	Nominal pipe width DN [mm]
008	DN 8
010	DN 10
015	DN 15
020	DN 20
025	DN 25
032	DN 32
040	DN 40
050	DN 50
065	DN 65
080	DN 80
5.	Options
00	without option
6.	Certificate DIN EN 10204. Specify only when required.
WZ2.2	factory certification 2.2

Product information

Flow magnetic inductive

1. 2. 3. 4. 5. 6.
APF **5** - - -

Pharmacy industry; material 1.4435; incl. 3.1 certificate

1. Connection standard	
5	DIN 11866 Line C (ASME)
2. Type	
1	welding nozzle
2	Tri-Clamp DIN 32676
4	aseptic-thread nozzle DIN 11864-1 threaded connectors on both sides
3. Type standards	
0	standard (as described above under type)
1	aseptic-thread nozzle DIN 11864; on both sides female union with slotted nut
2	aseptic-thread nozzle DIN 11864; thread/female union with slotted nut
4. Nominal pipe width in inch [""]	
008	3/8
010	1/2
020	3/4
025	1
040	1 1/2
050	2
065	2 1/2
080	3
5. Options	
00	without option
6. Certificate DIN EN 10204. Specify only when required.	
WZ2.2	factory certification 2.2

Further information

Overview of standards

DIN EN 10357 - Austenitic, austenitic-ferritic and ferritic longitudinally welded stainless steel tubes for the food and chemical industry

This standard has been valid since March 2014 and replaces DIN 11850.

Pipes in accordance with DIN EN 10357 are classified in Series A, B, C, and D, depending on their dimensions (Series A corresponds to Series 2 of the old standard 11850, Series B corresponds to

Series 1 of the old standard 11850, and Series C corresponds to the dimension in accordance with DIN EN ISO 1127 and DIN 11866 Series B).

The surface finish is classified as CC, CD, BC, and BD (exactly the same as the old DIN standard 11850). Pipes with a ground outside surface (CD, BD) must have an Ra value of $\leq 1.0\mu\text{m}$ on the outside surface. The standard roughness on the inside is Ra $\leq 0.8\mu\text{m}$ /weld seam $\leq 1.6\mu\text{m}$. Standard materials are stainless steel 1.4301, 1.4307, 1.4404, 1.4432 and 1.4435. The material 1.4404 is predominantly used.

Pipes according to this standard are primarily used in the foodstuffs and beverage industry, as well as for cosmetics and fine chemicals.

GHM offers the following process connections in accordance with this standard:

DIN EN 10357, Series A (formerly DIN 11850, Series 2):

- | | |
|-----------------|---|
| Material 1.4404 | welded-on nozzle |
| | - Tri-Clamp in accordance with DIN 32676 |
| | - Milk tube thread and |
| | - Reduction nozzle in accordance with DIN 11851 |
| | - Sterile thread and |
| | collared nozzle in accordance with DIN 11864-1 |

DIN EN 10357, Series B (formerly DIN 11850, Series 1):

- | | |
|-----------------|--------------------|
| Material 1.4404 | - Welded-on nozzle |
| | - Hose nozzle |

DIN 11850 (10/1999) Pipes for foodstuffs, chemicals, and pharmaceuticals - pipes made of non-rusting steels - dimensions, materials.

The standard DIN 11850 has not longer been valid since March 2014 and has been replaced by DIN EN 10357. However, since it was applicable for many decades, it should be mentioned. The standard 11850 was developed for welded pipes made of non-rusting steels for pipeline systems in the foodstuffs, pharmaceutical, and chemical industries. The pipes are classified in Series 1 and 2 depending on their dimensions (ISO dimensions are listed in DIN EN 1127) and, depending on their surface finish, as CC (pickled inside and out), CD (pickled inside and ground outside), BC (annealed inside and out and pickled or bright-annealed), and BD (annealed inside and pickled or bright-annealed and ground outside).

The standard roughness inside has the value Ra $< 0.8\mu\text{m}/\text{SN}$ 1.6 μm (wherein 'SN' is the German abbreviation for weld seam). Standard materials in accordance with the standard are 1.4301, 1.4307, and 1.4404. The material 1.4404 is predominantly used.

GHM offers the following process connections in accordance with this standard:

DIN 11850, Series 1 (new standard DIN EN 10357, Series B):

- | | |
|-----------------|--------------------|
| Material 1.4404 | - Welded-on nozzle |
| | - Hose nozzle |

DIN 11850, Series 2 (new standard DIN EN 10357, Series A):

- | | |
|-----------------|---|
| Material 1.4404 | - Welded-on nozzle |
| | - Tri-Clamp in accordance with DIN 32676 |
| | - Milk tube thread and |
| | - Reduction nozzle in accordance with DIN 11851 |
| | - Sterile thread and |
| | collared nozzle in accordance with DIN 11864-1 |
| | - Hose nozzle |

DIN 11866 (1/2003) Pipes made of non-rusting steel for aseptic, chemical, and pharmaceutical applications

The standard was developed for welded and seamless pipes of Test Class 2 in accordance with DIN 17457 and DIN 17458 made of non-rusting steels for pipeline systems in aseptic, chemical, and pharmaceutical applications. They are classified in Series A to C according to the pipe dimensions.

Series A corresponds to the dimensions according to DIN EN 10357 Series A (formerly DIN 11850 Series 2), Series B corresponds to the dimensions according to DIN EN 10357 Series C and/or DIN EN ISO 1127.

Series C corresponds to the dimensions according to ASME-BPE 2005 (American Society of Mechanical Engineers- Bioprocessing Equipment Standard).

The surface finishes are classified in hygiene classes H1 (1.6 $\mu\text{m}/\text{SN}$ 3.2 μm), H2 (0.8 $\mu\text{m}/\text{SN}$ 1.6 μm), H3 (0.8 $\mu\text{m}/\text{SN}$ 0.8 μm), H4 (0.4 $\mu\text{m}/\text{SN}$ 0.4 μm) and H5 (0.25 $\mu\text{m}/\text{SN}$ 0.25 μm). Standard materials in accordance with the standard are 1.4404, 1.4435, and 1.4539. The material 1.4435 is predominantly used.

GHM offers everything in accordance with this standard, including 3.1 certificate: DIN 11866 Series A,B,C:

- | | |
|-----------------|---|
| Material 1.4435 | - Welded-on nozzle |
| | - Tri-Clamp in accordance with DIN 32676 |
| | - Sterile thread and collared nozzle in accordance with DIN 11864-1 |
| | - Hose nozzle |

OD tube accord to ASME standard

OD = outside diameter,

ASME = American Society of Mechanical Engineers

These pipe sizes correspond to DIN 11866, Series C. The process connections are made of the material 1.4404.

GHM offers the following process connections in accordance with this standard:

- | | |
|--------------------------|---|
| OD tube: Material 1.4404 | - Welded-on nozzle |
| | - Tri-Clamp in accordance with DIN 32676 |
| | - Sterile thread and collared nozzle in accordance with DIN 11864-1 |
| | - Hose nozzle |

ISO 2037 pipes made of non-rusting steels for foodstuffs

Standard of the International Organization for Standardization.

The standard includes pipe dimensions, surface roughness, and materials for welded and seamless pipes.

GHM offers the following process connections in accordance with this standard:

- | | |
|--------------------------|---|
| ISO2037: Material 1.4404 | - Welded-on nozzle |
| | - Tri-Clamp in accordance with DIN 32676 |
| | - Sterile thread and collared nozzle in accordance with DIN 11864-1 |
| | - Hose nozzle |

C4 Hygienic Design

Flow calorimetry

114

Flow, calorimetry - Hygienic Design



Characteristics

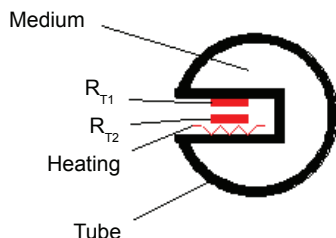
System	Calorimetric flow sensors
Evaluation	Displays Switching Measuring
Process connection	GHMadapt G 1/2
Process pressure	PN 50
Temperature	-20..+140°C
Materials	1.4404, 1.4435 only one material in contact with the medium

Applications

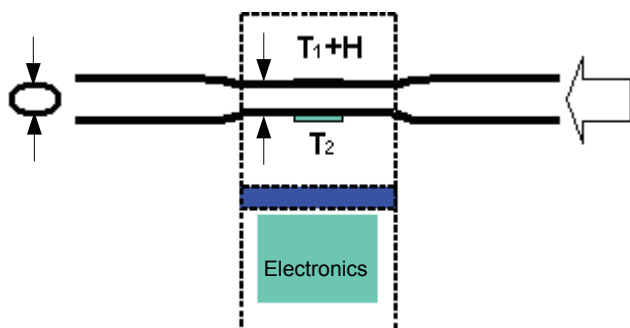
- Food and drink industries
- Pharmaceutical industry
- Flow switching
- Dry-run protection

Function and benefits

The calorimetric principle of the flow transmitter / switch from HONSBERG is based on two temperature sensors, both in good heat-conducting contact with the medium with simultaneously good heat insulation from one another.



Plug-in sensor construction principle



Inline sensor construction principle

One of the sensors is heated to a constant ΔT to the unheated sensor, so that a constant temperature difference between the two temperature sensors is set while the medium being measured is at a standstill. If the medium being measured moves, the thermal energy is extracted from heated temperature sensor and is immediately returned through a regulation until the same difference is provided. The energy required to do so is proportional to the current mass flow of the medium being measured.

In the process, the unheated temperature sensor detects the medium temperature and thereby enables a temperature compensation. In doing so, the flow is even correctly detected in the event of fluctuations of the medium temperature.

Different media influence the response time, because they have different heat conductivity. In general, the following rule applies: the lower the heat conductivity of the medium, the greater the medium flow must be in order to be detected.

With operation of the calorimetric measurement and monitoring principle, the state of the test medium as well as the medium temperature in relation to the desired measurement results play a crucial role. The present standard devices are designed and calibrated for the following parameters: Medium: water, temperature range 0 ..85 °C.

With a deviating medium consistence, e.g. viscosity or air and gases or enduring temperatures of more than 85 °C or less than 0 °C, we recommend leaving the device configuration according to the individual recommendation of the manufacturer.

Explanation of terms

Temperature gradient = temperature change per time unit of the medium (K/s). With volatile changes of the medium temperature, compensation can only be made within a specific range. The range in which fault-free operation is guaranteed is specified. If this temperature is exceeded by the medium, an error message may be issued by the system for a brief time. On such message can, of course be suppressed by switching delays, however, the switch-on and switch-off time of the system in general will be altered.

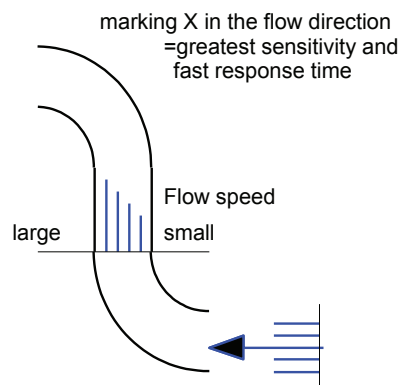
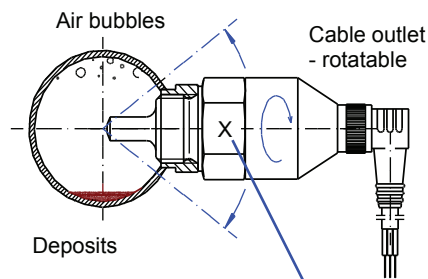
Start-up time is the time in which the device reaches its specified operating mode after operating voltage is applied. After they are switched on, the displays and outputs initially go to the maximum value of the metering range. After approximately three seconds, the current measurement is displayed and output.

Switch-on and switch-off time is the time in which the regular measurement parameter is detected after a volatile increase or drop of the flow speed. With a medium temperature of approximately 25 °C and a stainless steel sensor in water as a medium, there is an average switch-on and switch-off time of approximately two seconds. Please observe that this time depends on the operating conditions. With media with poor thermal conductivity or poor sensor materials, slower switching times arise.

Temperature range of the medium is the range in which the calorimetric sensor functions faultlessly.

General installation instructions

As a basic principle, any installation location and position in which the "nose" of the sensor completely protrudes into the flowing media is suitable (see diagram). If the sensor is used for the detection of filled or non-filled pipes, of course this does not apply!



Programmability of parameters

All calorimetric sensors from HONSBERG are a part of the family of intelligent sensors. They have a microcontroller which enables a multitude of parameter changes.

By standard, all three main electronics have the capability of making local changes. In addition, an interface (device configurator ECI-1) can be used to change all saved parameters of a device at any time, if desired or necessary.

HFK12



Pulse programming on pin 2:
Apply the supply voltage level for one second and save the current value as the full scale value (for analog outputs) or as a switching value (for limit switches).

HFK35



Programming with Magnet-Ring:
With the aid of the display and of the movable ring, numerous parameters can be conveniently set on the spot.

HFK30



Programming with Magnet-Clip:
Hold the magnet to the marking for 1 second and save the present value as the full scale value (for analog outputs) or as a switching value (for limit switches).

ECI-1



If required, all parameters can be set at any time on all intelligent sensors, using the ECI-1 device configurator.

Universal switching outputs

The push-pull transistor outputs enable the simplest installation. Therefore, they can be installed like an NPN or like a PNP switch and function accordingly without requiring additional configuration with the parameter settings and without wire breaks or the like.

You are assured a resistance to short circuits and pole reversal and an overload or short circuit is also shown in the display with HFK35 electronics.

Product family









Calorimetric sensors can also be used as:

- Limit status sensors
- Drip sensors
- Temperature sensors
-

For this purpose, see the separate product information.

The same operation and the same or a similar installation type are the benefits of a product family.

Device overview

Device		Measurement accuracy	Range	Resistance Pressure In bar	Medium temperature	Displays	Output signal		Page
							Switching	Measuring	
HFK35		±10 % from full scale value	2..300 cm/s	PN 50	-20..+140°C	Graphic LCD illuminated trans- reflective	2 x Push-Pull	0/4..20 mA or 0/2..10 V	118
HFK30		±10 % of full scale value	2..300 cm/s	PN 50	-20..+140°C	-	1 x Push-Pull or Frequency 0..2 kHz	4..20 mA or 0..10 V	121
HFK12-I		±10 % of full scale value	2..300 cm/s	PN 50	-20..+140°C	-	-	4..20 mA	125
HFK12-U		±10 % of full scale value	2..300 cm/s	PN 50	-20..+140°C	-	-	0..10 V	125
HFK12-F		±10 % of full scale value	2..300 cm/s	PN 50	-20..+140°C	-	-	Frequency 0..2 kHz	125
HFK12-C		±10 % of full scale value	2..300 cm/s	PN 50	-20..+140°C	-	-	Quantity pulse	125
HFK12-S		±10 % of full scale value	2..300 cm/s	PN 50	-20..+130°C	-	1 x Push-Pull	-	128
HFK35- FIN		±3 % of full scale value	0.001..2 l/min or 0.025..5 l/min or 0.05..10 l/min	PN 10	-20..+130°C	Graphic LCD illuminated trans reflective	2 x Push-Pull	0/4..20 mA or 0/2..10 V	131
HFK30- FIN		±3 % of full scale value	0.001..2 l/min or 0.025..5 l/min or 0.05..10 l/min	PN 10	-20..+130°C	-	1 x Push-Pull or Frequency 0..2 kHz	4..20 mA or 0..10 V	134
Accessories		● ECI-1 (Device Configurator)							138
		● KH-...(Cables)							139
		● APH-... / AMH-...(Process adapter)							140

Errors and technical modifications reserved.

Flow Transmitter / Switch HFK35



- Flow indicator for foodstuffs use, without moving parts
- Short response times for a calorimetric sensor
- Medium comes into contact with only one material
- Analog output 0/4..20 mA or 0/2..10 V
- Two programmable switches (push-pull)
- Graphical LCD display, backlit (transreflective), can be read in sunlight and in the dark
- Programmable parameters via rotatable, removable ring (programming protection)
- Full metal housing with non-scratch, chemically resistant glass
- Rotatable electronic head for best reading position
- Small, compact construction
- Simple installation

Characteristics

The calorimetric sensor measures the flow speed in aqueous fluids. The integrated transducer has a backlit graphics LCD display which is very easy to read both in the dark and in bright sunlight. The graphics display allows the presentation of measured values and parameters in a clearly understandable form. The measured values are displayed to 4 places, together with their physical unit, which may also be modified by the user. The electronics have an analog output (4..20 mA or 0..10 V) and two switching outputs, which can be used as limit switches for monitoring minimal or maximal, or as two-point controllers.

The switching outputs are designed as push-pull drivers, and can therefore be used both as PNP and NPN outputs. Exceeding limit values is signalled by a red LED which is visible over a long distance, and by a cleartext in the display. The stainless steel case has a hardened non-scratch mineral glass pane. It is operated by a programming ring fitted with a magnet, so there is no need to open the operating controls housing, and its leakproofness is permanently ensured.

By turning the ring to right or left, it is simple to modify the parameters (e.g. switching point, hysteresis...). To protect from unintended programming, it can be removed, turned through 180 ° and replaced, or completely removed, thus acting as a key.

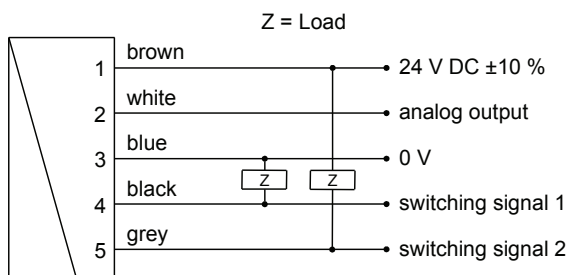
It is recommended also to order a T-piece, as the later installation position corresponds to the factory calibration situation.

Technical data

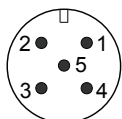
Sensor	calorimetric measurement principle
Process connection	GHMadapt G 1/2
Metering range	water 2..150 cm/s range, 2..300 cm/s available on request oil (available on request)
Measurement accuracy	±10 % end value, tested with 10 x D in inlet and output, with a rising pipe (medium: water)
Repeatability	±1 %
Temperature gradient	4 K/s
Start-up time	10 sec. after application of operating voltage
Response time	in water (25 °C) at an average flow speed of approx. 1-2 sec.
Process pressure	PN 50
Media temperature	0..+100 °C
Ambient temperature	-20..+70 °C
Storage temperature	-20..+80 °C
CIP- / SIP temperature	140 °C, < 30 min
Materials medium-contact	stainless steel 1.4435, FDA-compliant
Materials, non-medium-contact	Housing: stainless steel 1.4305 Glass: mineral glass, hardened Magnet: samarium-Cobalt Ring: POM
Supply voltage	24 V DC ±10 %
Analog output	0/4..20 mA or 0/2..10 V
Power consumption	max. 2.5 W
Switching outputs S1 and S2	transistor output "push-pull" (resistant to short circuits and polarity reversal) I _{out} = 100 mA max. per output
Hysteresis	adjustable, position of the hysteresis depends on minimum or maximum switching value
Display	backlit graphical LCD-Display (transreflective), extended temperature range -20..+70 °C, 32 x 16 pixels, background illumination, displays value and unit, flashing LED signal lamp with simultaneous message on the display.
Electrical connection	for round plug connector M12x1, 5-pole
Ingress protection	IP 67
Weight	approx. 0.25 kg
Conformity	CE, EHEDG



Wiring

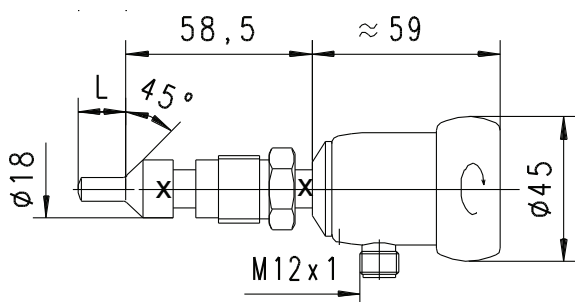


Connection example: PNP NPN



The switching outputs are self-configuring, depending on whether they are connected as PNP or NPN switches (push-pull). It is recommended to use shielded wiring.

Dimensions



For compatible adapters in the GHMadapt series, see attachment.

Handling and operation

Installation

- In order to ensure the sensor's maximum insensitivity to interference, the flow should run from bottom to top (best degassing even at the slowest flow speed).
- Installation in the pipework is achieved by means of GHMadapt T-pieces, or welded-on nozzles.
- The reduction of the sensor tip must lie completely in the open flow cross-section.
- Run-in and run-out sections of 10 x D should be ensured.

Programming

The annular gap of the programming ring can be turned to positions 1 and 2. The following actions are possible:



Set to 1 = continue (STEP)
 Set to 2 = modify (PROG)

Neutral position between 1 and 2

The ring can be removed to act as a key, or turned through 180 ° and replaced to create a programming protector. Operation is by dialog with the display messages, which makes its use very simple.

Starting from the normal display (present value and unit), if 1 (STEP) is repeatedly selected, then the display shows the following information in this order:

Display of the parameters, using position 1

- Switching value S1 (switching point 1 in the selected unit)
- Switching characteristic of S1
 MIN = Monitoring of minimum value
 MAX = Monitoring of maximum value
- Hysteresis 1 (hysteresis value of S1 in the set unit)
- Switching value S2
- Switching characteristic of S2
- Hysteresis 2
- Code
 After entering the **code 111**, further parameters can be defined:
- Filter (settling time of the display and output)
- Physical unit (Units)
- Output: 0..20 mA or 4..20 mA
- 0/4 mA (measured value corresponding to 0/4 mA)
- 20 mA (measured value corresponding to 20 mA)

For models with a voltage output, replace 20 mA accordingly with 10 V.

Edit, using position 2

If the currently visible parameter is to be modified:

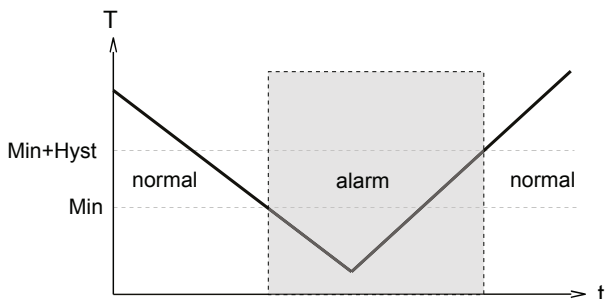
- Turn the annular gap to position 2, so that a flashing cursor appears which displays the position which can be modified.
- By repeatedly turning to position 2, values are increased; by turning to position 1, the cursor moves to the next digit.
- Leave the parameter by turning to position 1 (until the cursor leaves the row); this accepts the modification.
- If there is no action within 30 seconds, the device returns to the normal display range without accepting the modification.

Product information

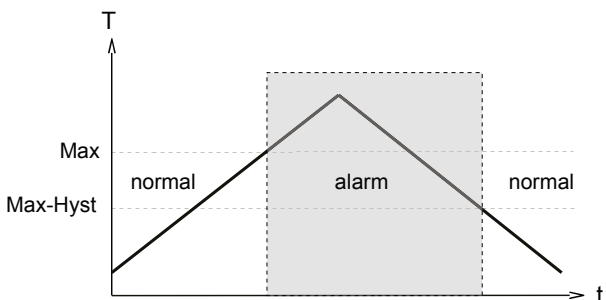
Flow calorimetry

The limit switches S1 and S2 can be used to monitor minimal or maximal.

With a minimum-switch, falling below the limit value causes a switchover to the alarm state. Return to the normal state occurs when the limit value plus the set hysteresis is once more exceeded.



With a maximum-switch, exceeding the limit value causes a switchover to the alarm state. Return to the normal state occurs when the measured value once more falls below the limit value minus the set hysteresis.



The change to the alarm state is indicated by the integrated red LED and a cleartext in the display. While in the normal state the switching outputs are at the level of the supply voltage; in the alarm state they are at 0 V, so that a wire break would also display as an alarm state at the signal receiver.

Overload display

Overload of a switching output is detected and indicated on the display ("Check S1 / S2"), and the switching output is switched off.

Simulation mode

To simplify commissioning, the sensor provides a simulation mode for the analog output. It is possible to create a programmable value in the range 0..26.0 mA at the output (without modifying the process variable). This allows the wiring run between the sensor and the downstream electronics to be tested during commissioning. This mode is accessed by means of code **311**.

Factory settings

After modifying the configuration parameters, it is possible to reset them to the factory settings at any time using **code 989**.

Ordering code

HFK35 - 1. 015 2. K1 3. 4. S 5. 6.

○=Option

1. Sensor tip length	
015	L = 15 mm
2. Sensor material	
K1	stainless steel 1.4435
3. Analog output	
I	current output 0/4..20 mA
U ○	voltage output 0/2..10 V
4. Electrical connection	
S	for round plug connector M12x1, 5-pole
5. Options	
00	without option
6. Certificate DIN EN 10204 (indicate only when required, multiple responses possible)	
APZMAT	acceptance test certificate 3.1 for material (in contact with products)
WZ2.2	factory certification 2.2

Accessories

- ECI-1 device configurator (USB programming adapter)
- Process adapter
- Cable/round plug connector (KH...) see additional information "Accessories"

Flow and Temperature Transmitter / Switch HFK30



- Compact robust flow rate switch/transmitter for foodstuffs use
- Combination with temperature switch or transmitter possible
- No moving parts in the medium being monitored
- Only one medium-contact material
- Simple to use
- Very low pressure loss
- Rapid response times for a calorimetric Sensor
- Cable outlet infinitely rotatable
- Very small installation width, therefore very narrow pipework is possible

Characteristics

The HFK30 flow sensor monitors fluid media. Its compact form combines the measurement tube and the converter / counter. The integrated transducer has an analog output (4..20 mA or 0..10 V) and one switching output, which can be configured as a limit switch for monitoring minima or maximal, or as a frequency output.

The switching output is designed as a push-pull driver, and can therefore be used both as a PNP or an NPN output. The state of the switching output is signalled with a yellow LED in the switching outlet; the LED has all-round visibility.

The sensor is configured in the factory, or alternatively this can be done with the aid of the optionally available ECI-1 device configurator (USB interface for PC). A selectable parameter can be modified on the device, with the aid of the magnet clip provided. In this case, the current measured value is saved as the parameter value. Examples of these parameters are the switching value or the metering range end value. The stainless steel electronics housing is rotatable, so it is possible to orient the cable outlet after installation.

The converter / counter record two process parameters: the flow speed of the medium and its temperature. Both parameters can be assigned to the analog output or to the switching output. The following output combinations are available:

Flow		Temperature	
Analog output	Switching output	Analog output	Switching output
●			
	●		
●	●		
●			●
	●	●	

the switching output can be ordered as a minimum or a maximum

switch. It is recommended also to order a T-piece, as the later installation position corresponds to the factory calibration situation.

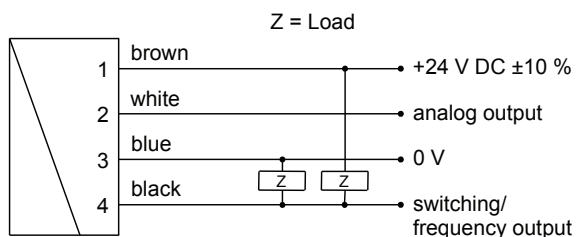
Technical data

Sensor	calorimetric measurement principle
Process connection	GHMadapt G 1/2
Metering ranges Flow	water 2..150 cm/s range, 2..300 cm/s available on request oil (available on request)
Measurement accuracy Flow	±10 % end value, tested with 10 x D in inlet and output, with a rising pipe (medium: water)
Repeatability	±1 %
Temperature gradient	4 K/s
Start-up time	10 sec. after application of operating voltage
Response time	in water (25 °C) at an average flow speed of approx. 1-2 sec.
Process pressure	PN 50
Metering range Temperature	0..+100 °C (steam cannot be measured)
Measurement accuracy Temperature	±2 °C
Media temperature	0..+100 °C
Ambient temperature	-20..+70 °C
CIP- / SIP temperature	140 °C, < 30 min
Storage temperature	-20..+80 °C
Programming/ settings	by means of magnet
Materials medium-contact	sensor 1.4435, FDA-compliant
Materials, non-medium-contact	housing 1.4305, plug PA6.6, clip PA6.6
Supply voltage	24 V DC ±10 %
Current consumption	max. 100 mA
Switching output	transistor output "push-pull", compatible with PNP and NPN, (resistant to short circuits and polarity reversal) I _{out} = 100 mA max.
Switching hysteresis	flow 4 % of end value, temp.: approx. 2 °C
Display (only with switching output)	yellow LED (On = OK / Off = Alarm)
Analog output	4..20 mA / Load 500 Ohm max. or 0..10 V / Load min. 1 kOhm
Electrical connection	for round plug connector M12x1, 4-pole
Ingress protection	IP 67
Weight	approx. 0.2 kg (standard version)
Conformity	CE, EHEDG

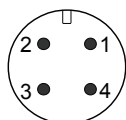


Product information

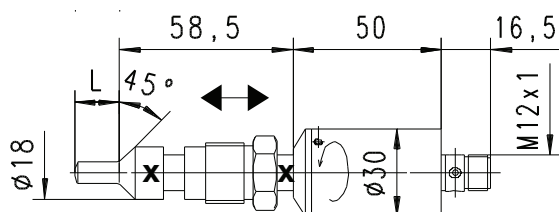
Wiring



Connection example: PNP NPN



Dimensions



For compatible T-pieces and weld-on sockets in the GHMadaptseries, see "Accessories".

Handling and operation

Installation

The sensor is inserted into the boring together with a sealing cone, oriented, and fastened in place with a pressure screw. When a flow is present, this should impinge on the side of the sensor marked with an X, in order to achieve as small a response time as possible.

The torque on the pressure screw should be between 5..10 Nm.

Avoid bubbles or deposits on the sensor. It is therefore best to install at the side.

For T-pieces or welded-on nozzles, see Accessories.

Programming

The electronics contain a magnetic contact, with the aid of which different parameters can be programmed. Programming takes place when a magnet clip is applied for a period between 0.5 and 2 seconds to the marking located on the label. If the contact time is longer or shorter than this, no programming takes place (protection against external magnetic fields).



Flow calorimetry

After the programming ("teaching"), the clip can either be left on the device, or removed to protect data.

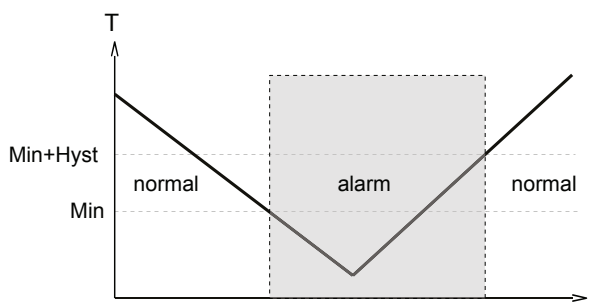
The device has a yellow LED which flashes during the programming pulse. During operation, the LED serves as a status display for the switching output.

In order to avoid the need to transit to an undesired operating status during "teaching", the device can be provided ex-works with a "teach-offset". The "teach-offset" value is added to the currently measured value before saving (or is subtracted if a negative value is entered).

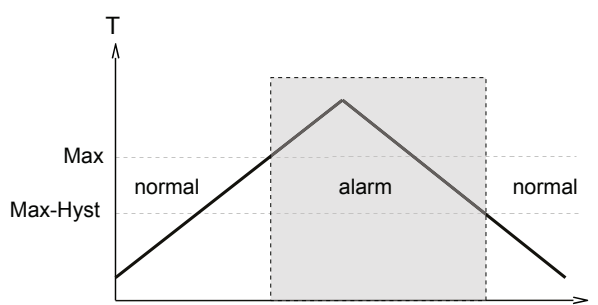
Example: The switching value is to be set to 70 % of the metering range, because at this flow rate a critical process status is to be notified. However, only 50% can be achieved without danger. In this case, the device would be ordered with a "teach-offset" of +20 %. At 50 % in the process, a switching value of 70 % would then be stored during "teaching".

Normally, programming is used to set the limit switch. However, if desired, other parameters such as the end value of the analog or frequency output may also be set.

The limit switch can be used to monitor minimal or maximal. With a minimum-switch, falling below the limit value causes a switchover to the alarm state. Return to the normal state occurs when the limit value plus the set hysteresis is once more exceeded.



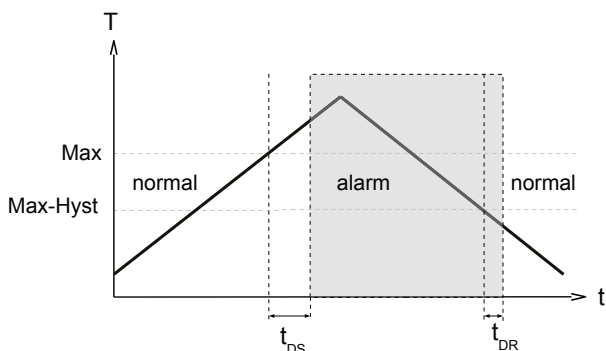
With a maximum-switch, exceeding the limit value causes a switchover to the alarm state. Return to the normal state occurs when the measured value once more falls below the limit value minus the set hysteresis.



Product information

Flow calorimetry

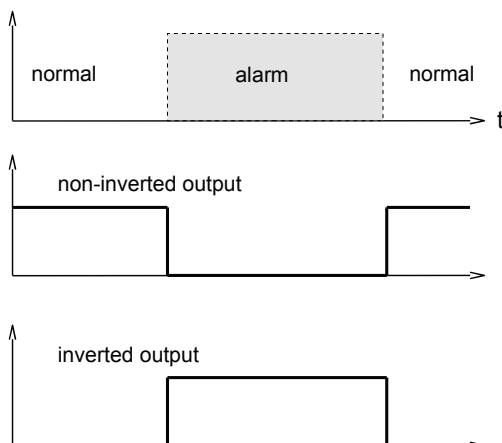
A switchover delay time (t_{DS}) can be applied to the switchover to the alarm state. Equally, one switch-back delay time (t_{DR}) of several can be applied to switching back to the normal state.



In the normal state the integrated LED is on, in the alarm state it is off, and this corresponds to its status when there is no supply voltage.

In the non-inverted (standard) model, while in the normal state the switching output is at the level of the supply voltage; in the alarm state it is at 0 V, so that a wire break would also display as an alarm state at the signal receiver.

Optionally, an inverted switching output can also be provided, i.e. in the normal state the output is at 0 V, and in the alarm state it is at the level of the supply voltage.



A Power-On delay function (ordered as a separate option) makes it possible to maintain the switching output in the normal state for a defined period after application of the supply voltage.

Ordering code

HFK30 - 1. 015 2. K1 3. 4. 5. 6. 7. 8. 9. 10.

○=Option

1. Sensor tip length	015	L = 15 mm
2. Sensor material	K1	stainless steel 1.4435
3. Analog output	I	current output 4..20 mA
	U	voltage output 0..10 V
4. Measurement parameter to analog output	F	flow rate to analog output
	T	temperature to analog output
5. Switching output	T	transistor output "push-pull"
	M	○ NPN (open collector)
6. Measurement parameter to switching output	F	flow to switching output
	T	temperature to switching output
7. Functioning of the switching output	L	minimum-switch
	H	maximum-switch
	R	frequency output
8. Switching signal	O	standard
	I	inverted
9. Options	00	without option
10. Certificate DIN EN 10204 (indicate only when required, multiple responses possible)	APZMAT	acceptance test certificate 3.1 for material (in contact with products)
	WZ2.2	factory certification 2.2

Options

Special measuring range for flow: cm/s
max. 300 cm/s (standard = 150 cm/s)

Special measuring range for temperature: °C
Maximum 130 °C (standard = 100 °C)

Minimum -20 °C (standard = 0 °C) °C

Special range for analog output: cm/s
<= metering range (standard = metering range) °C

Special range for frequency output: cm/s
<= metering range (standard = metering range) °C

End frequency (max. 2000 Hz) Hz

Switching delay period (0.0..99.9 s) . s
(from Normal to Alarm)

Switch-back delay period (0.0..99.9 s) . s
(from Alarm to Normal)

Power-On-Delay period (0..99 s) s
(time after applying power during which the outputs are not activated or set to defined values)

Switching output fixed cm/s
°C

Special hysteresis %/ °C

Teach-offset %
(in percent of the metering range)
Standard = 0 %

If the field is not completed, the standard setting is selected automatically.

Accessories

- ECI-1 device configurator (USB programming adapter)
- Process adapter
- Cable/round plug connector (KH...) see additional information "Accessories"
- External display OMNI-TA or OMNI Remote

Calorimetric Flow Transmitter HFK12-I / U / F / C



- Complete flow transmitter for the foodstuffs industry, in 12 mm housing
- Analog output 4..20 mA (HFK12-I)
- Analog output 0..10 V (HFK12-U)
- Frequency output (HFK12-F)
- Pulse output (HFK12-C)
- User-configurable via plug pin (teaching)
- Same mechanical construction available as temperature transmitter/switch, flow transmitter/switch or as a level switch or drip sensor

Characteristics

The sensors in the HFK12 family can be used for the measurement and monitoring of flows, and are specially designed for use in the foodstuffs industry. They require little space, yet offer a variable sensor length, as well as various fastening options. The 16-bit processor provides linearisation and temperature compensation, and emits the standardised output signal.

The HFK12 electronics transmit the result as



- an analog 4..20 mA signal (HFK12-I)
- an analog 0..10 V signal (HFK12-U)
- a frequency signal (HFK12-F)
- a value signal Pulse / x Litres (HFK12-C)

If desired, the range end value can be set to the presently existing flow rate using teaching (see Handling and Operation).

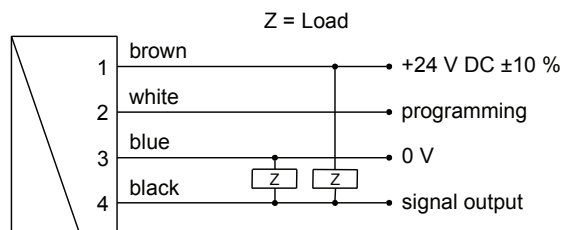
It is recommended also to order a T-piece, as the later installation position corresponds to the factory calibration situation.

Technical data

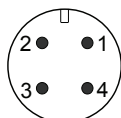
Sensor	calorimetric measurement principle
Process connection	GHMadapt G 1/2
Metering range	water 2..150 cm/s range, 2..300 cm/s available on request oil (available on request)
Measurement accuracy	±10 % end value, tested with 10 x D in inlet and output, with a rising pipe (medium: water)
Repeatability	±1 %
Temperature gradient	4 K/s
Start-up time	10 sec. after application of operating voltage
Response time	in water (25 °C) at an average flow speed of approx. 1-2 sec.

Process pressure	PN 50
Media temperature	0..+85 °C
Ambient temperature	0..+60 °C
Storage temperature	-20..+80 °C
CIP- / SIP temperature	140 °C, < 30 min
Materials medium-contact	sensor tip 1.4435, FDA-compliant
Non-medium-contact materials	Housing: 1.4571 Pressure screw: 1.4404 Plug: PA Contacts: gold-plated
Supply voltage	24 V DC ±10 %
Current consumption at rest	< 60 mA
Output	HFK12-I: 4..20 mA / max. load 500 Ohm HFK12-U: 0..10 V / min. load 1 kOhm HFK12-F: Frequency output "push-pull" (resistant to short circuits and polarity reversal) I _{out} = 100 mA max. selectable output frequency, max. 2 kHz HFK12-C: transistor output "push-pull", (resistant to short circuits and polarity reversal) I _{out} = 100 mA max. selectable pulse per volume, details of nominal pipework width required, pulse width 50 ms
Electrical connection	for round plug connector M12x1, 4-pole
Ingress protection	IP 67
Weight	approx. 0.1 kg incl. pressure screw
Conformity	CE, EHEDG  

Wiring

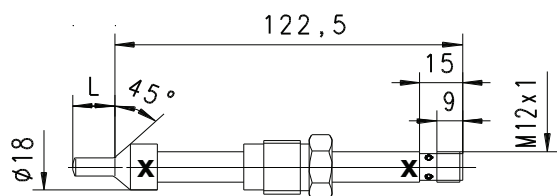


Connection example: PNP NPN



The use of shielded cabling is recommended.

Dimensions



For compatible T-pieces and weld-on sockets in the GHMadaptseries, see "Accessories".

Handling and operation

Note

The metering range end value can be programmed by the user via "teaching". Requirement for programmability must be stated when ordering, otherwise the device cannot be programmed.

The ECI-1 device configurator with associated software is available as a convenient option for programming all parameters by PC, and for adjustment.

Operation and programming

If desired, the metering range end can be set by the user by means of teaching.

For this, proceed as follows:

- Apply the flow rate end range to the device
- Apply an impulse of at least 0.5 seconds and max. 2 seconds duration to pin 2 (e.g. via a bridge to the auxiliary voltage or a pulse from the PLC), in order to accept the measured value.
- When the teaching is complete, pin 2 should be connected to 0 V, so as to prevent unintended programming.

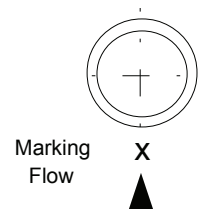
The devices have a yellow LED which flashes during the programming pulse. During operation, the LED acts as a display for the operating voltage.

With the HFK12-C, the teaching option is not available.

Installation

The sensor is inserted into the boring together with a sealing cone, oriented, and fastened in place with a pressure screw.

When a flow is present, this should impinge on the side of the sensor marked with an X, in order to achieve as small a response time as possible.



The torque on the pressure screw should be between 5..10 Nm.

Avoid bubbles or deposits on the sensor! It is therefore best to install at the side.

Product information

Flow calorimetry

Order code

HFK12- 1. 2. 015 3. K1 4. 5. H 6. 7.

○=Option

1. Electrical output	
I	current output 4..20 mA
U	voltage output 0..10 V
F	frequency output
C	pulse output
2. Sensor tip length	
015	L = 15 mm
3. Sensor material	
K1	stainless steel 1.4435
4. Programming	
N	cannot be programmed (no teaching)
P	<input type="radio"/> programmable (teaching possible)
5. Temperature	
H	CIP- / SIP version, 140 °C, 30 minutes max.
6. Options	
00	without option
P	programmable (teaching possible)
7. Certificate DIN EN 10204 (indicate only when required, multiple responses possible)	
APZMAT	acceptance test certificate 3.1 for material (in contact with products)
WZ2.2	factory certification 2.2

Accessories

- ECI-1 device configurator (USB programming adapter)
- Process adapter
- Cable/round plug connector (KH...) see additional information "Accessories"
- External display OMNI-TA or OMNI Remote

Required order information

For HFK12-F:

Output frequency at full scale

Hz

Maximum value: 2.000 Hz

For HFK12-C:

For HFK12-C, the volume must be stated (with numerical value and unit) which will correspond to one pulse. Here, the adjustment depends on the internal tubing diameter, which therefore must also be stated. If the order for the device includes the T-piece, then there is no need to state the internal tubing diameter.

Volume per pulse (numerical value)

Volume per pulse (unit)

Tubing diameter

mm

Options

Special range for analog output:

cm/s

<= Metering range (standard=metering range)

Special range for frequency output:

cm/s

<= Metering range (standard=metering range)

Power-On-Delay period (0..99 s)

s

(time after applying power during which the outputs are not activated or set to defined values)

Calorimetric Flow Switch HFK12-S



- Calorimetric flow switch for the foodstuffs industry in 12 mm housing
- User-configurable via plug pin (teaching)
- Same mechanical construction available as temperature transmitter/switch, as level switch, or as drip sensor

Characteristics

The sensors of the HFK12 family can be used for measuring and monitoring flows in aqueous fluid media. They provide multiple configuration options combined with low space requirements. The mechanical construction makes them suitable for use in the foodstuffs industry.

The electronics of the HFK12 are a flexibly configurable limit switch.

The switching value can be set by the user via teaching (see Handling and Operation). All other values have been preset at the factory, but can be modified by the user with the aid of the optionally available ECI-1 device configurator and a PC.

The adjustable parameters are:

- Switching value
- Hysteresis
- Minimum/maximum monitoring
- Switching delay
- Switchback delay
- Power-On delay
- Teach-Offset

It is recommended also to order a T-piece, as the later installation position corresponds to the factory calibration situation.

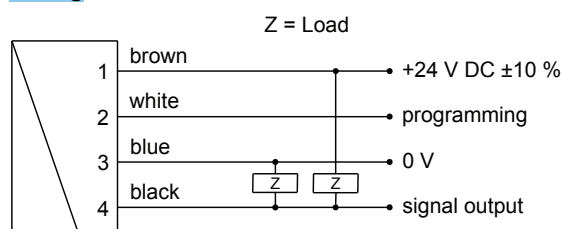
Technical data

Sensor	calorimetric measurement principle
Process connection	GHMadapt G $\frac{1}{2}$
Metering range	water 2..150 cm/s range, 2..300 cm/s available on request, oil (available on request)
Measurement accuracy	± 10 % end value, tested with 10 x D in inlet and output, with a rising pipe (medium: water)
Repeatability	± 1 %
Temperature gradient	4 K/s
Start-up time	10 sec. after application of operating voltage
Response time	in water (25 °C) at average flow speed of approx. 1-2 sec.

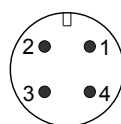
Process pressure	PN 50
Media temperature	0..+85 °C
Ambient temperature	0..+60 °C
Storage temperature	-20..+80 °C
CIP/ SIP temperature	140 °C, < 30 min
Materials medium-contact	sensor tip 1.4435, FDA-compliant
Materials non-medium-contact	Housing: 1.4571 Pressure screw: 1.4404 Plug: PA Contacts: gold-plated
Supply voltage	24 V DC ± 10 %
Current consumption at rest	< 60 mA
Switching output	transistor output "push-pull", compatible with PNP and NPN, (resistant to short circuits and polarity reversal) $I_{out} = 100$ mA max.
Electrical connection	for round plug connector M12x1, 4-pole
Ingress protection	IP 67
Weight	approx. 0.1 kg incl. pressure screw
Conformity	CE, EHEDG



Wiring



Connection example: PNP NPN

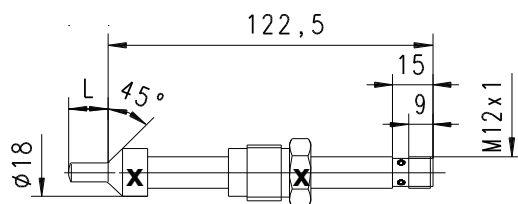


The use of shielded cabling is recommended!

Product information

Flow calorimetry

Dimensions



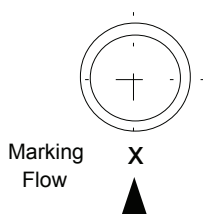
For T-pieces (recommended) and weld-on sockets in the GHMadapt series, see "Accessories".

Handling and operation

Installation

The sensor is inserted into the boring together with a sealing cone, oriented, and fastened in place with a pressure screw.

The flow should impinge on the side of the sensor marked with an X, in order to achieve as small a response time as possible.



The torque on the pressure screw should be between 5..10 Nm.

Avoid bubbles or deposits on the sensor. It is therefore best to install at the side.

Operation and programming

The switching value can be set by the user by means of teaching. For this, proceed as follows:

- The flow which is to be set is applied to the device.
- Apply an impulse of at least 0.5 seconds and max. 2 seconds duration to pin 2 (e.g. via a bridge to the auxiliary voltage or a pulse from the PLC), in order to accept the measured value.
- When the teaching is complete, pin 2 should be connected to 0 V, so as to prevent unintended programming.

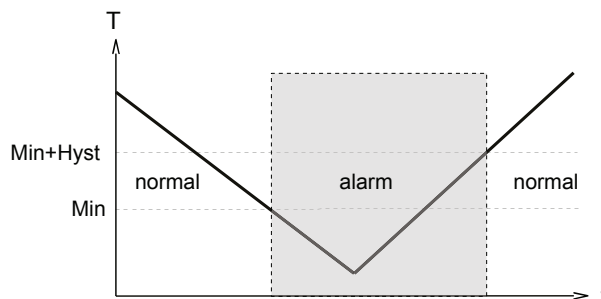
The device has a yellow LED which flashes during the programming pulse. During operation, the LED serves as a status display for the switching output.

In order to avoid the need to transit to an undesired operating status during the teach-in, the device can be provided ex-works with a teach-offset. The teach-offset point is added to the currently measured value before saving.

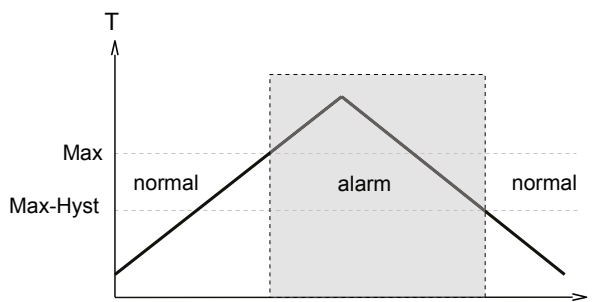
Example: The switching value is to be set to 80 cm/s, because at this flow rate a critical process status is to be notified. However, it is possible to reach only 60 cm/s without danger. In this case, the device would be ordered with a teach-offset of +20 cm/s. At 60 cm in the process, a switching value of 80 cm would then be stored during "teaching".

The HFK12-S limit switch can be used to monitor minimal or maximal.

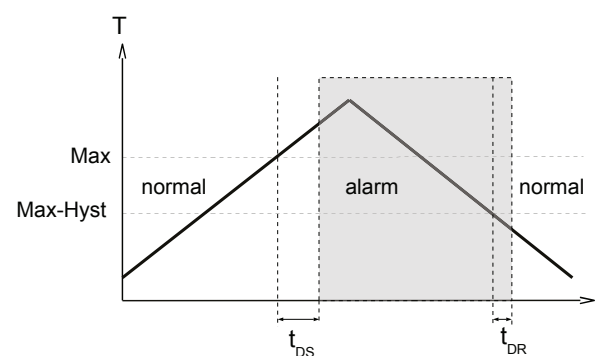
With a minimum-switch, falling below the limit value causes a switchover to the alarm state. Return to the normal state occurs when the limit value plus the set hysteresis is once more exceeded.



With a maximum-switch, exceeding the limit value causes a switchover to the alarm state. Return to the normal state occurs when the measured value once more falls below the limit value minus the set hysteresis.

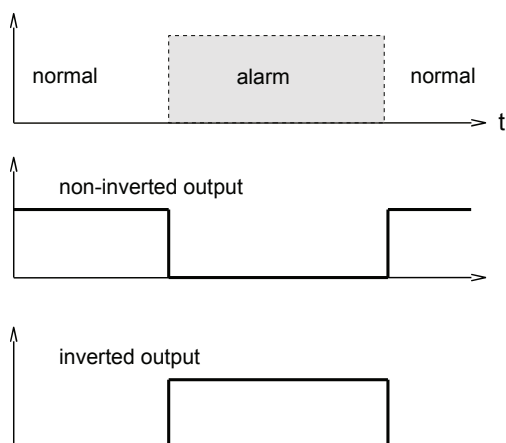


A switchover delay time (t_{DS}) can be applied to the switchover to the alarm state. Equally, one switch-back delay time (t_{DR}) of several can be applied to switching back to the normal state.



In the normal state the integrated LED is on, in the alarm state it is off, and this corresponds to its status when there is no auxiliary voltage.

In the non-inverted (standard) version, while in the normal state the switching output is at the level of the auxiliary voltage; in the alarm state it is at 0 V, so that a wire break would also display as an alarm state at the signal receiver. Optionally, an inverted switching output can also be provided, i.e. in the normal state the output is at 0 V, and in the alarm state it is at the level of the supply voltage.



A Power-On-Delay function (ordered as a separate option) makes it possible to maintain the switching output in the normal state for a defined period after application of the supply voltage.

Ordering code

HFK12 - 1. S 2. 015 3. K1 4. 5. 6. H 7. 8. 9.

○=Option

1.	Limit switch
S	transistor output "push-pull"
2.	Sensor tip length
015	L = 15 mm
3.	Sensor material
K1	stainless steel 1.4435
4.	Programming
N	cannot be programmed (no teaching)
P	○ programmable (teaching possible)
5.	Function
L	minimum-switch
H	maximum-switch
6.	Switching signal
O	standard
I	○ inverted
7.	Temperature
H	CIP- / SIP version, 140 °C, 30 minutes max.
8.	Options
00	without option
9.	Certificate DIN EN 10204 (indicate only when required, multiple responses possible)
APZMAT	Acceptance test certificate 3.1 for material (in contact with products)
WZ2.2	Factory certification 2.2

Options

Switching delay period (0.0..99.9 s) . s
(from Normal to Alarm)

Switch-back delay period (0.0..99.9 s) . s
(from Alarm to Normal)

Power-On-Delay period (0..99 s) s
(After connecting the supply, time during which the switching output is not activated)

Switching output fixed at cm/s

Switching hysteresis %
Standard = 2 % of the metering range

Teach-offset %
(in percent of the metering range)
Standard = 0 %

Accessories

- ECI-1 device configurator (USB programming adapter)
- Process adapter
- Cable/round plug connector (KH...) see additional information "Accessories"

Flow Transmitter / Switch HFK35-FIN



- For foodstuffs use
- Analog output 0/4..20 mA or 0/2..10 V
- Two programmable switches (push-pull)
- Graphical LCD display, backlit (transreflective), can be read in sunlight and in the dark
- Programmable parameters via rotatable, removable ring (programming protection)
- Full metal housing with non-scratch, chemically resistant glass
- Physical unit in the display (selectable)
- Rotatable electronic head for best reading position
- Optionally CIP/SIP-capable (130 °C)
- Connection to USB interface for setting parameters

Characteristics

The HFK35-FIN calorimetric sensor measures small fluid flows, and has been designed specially for use in the foodstuffs industry (for the measurement principle, see also "General description: calorimetric sensors").

The integrated transformer has a backlit graphics LCD display which is very easy to read both in the dark and in bright sunlight. The graphics display allows the presentation of measured values and parameters in a clearly understandable form. The measured values are displayed to 4 places, together with their physical unit, which may also be modified by the user. The electronics have an analog output (4..20 mA or 0..10 V) and two switching outputs, which can be used as limit switches for monitoring minimal or maximal, or as two-point controllers. The switching outputs are designed as push-pull drivers, and can therefore be used both as PNP and NPN outputs. Exceeding limit values is signalled by a red LED which is visible over a long distance, and by a cleartext in the display. The stainless steel case has a hardened non-scratch mineral glass pane. It is operated by a programming ring fitted with a magnet, so there is no need to open the operating controls housing, and its leakproofness is permanently ensured.

By turning the ring to right or left, it is simple to modify the parameters (e.g. switching point, hysteresis...). To protect from unintended programming, it can be removed, turned through 180 ° and replaced, or completely removed, thus acting as a key.

Technical data

Sensor	calorimetric measurement principle	
Process connection	smooth tube for crimp connector or hose connection	
Metering ranges (for water)	6 mm tube	(0.001)
		0.01..2 l/min
	8 mm tube	0.025..5 l/min
	10 mm tube	0.05..10 l/min
	() = special ranges available on request	
Measurement accuracy	±3 % MW (H ₂ O dist.)	
Repeatability	±1 % MW (H ₂ O dist.)	
Temperature gradient	4 K/s	
Start-up time	10 sec. after application of operating volt.	
Response time	in water (25 °C) at average Flow speed of approx. 1-2 sec.	
Process pressure	PN 10	
Medium temperature	0..+100 °C	
Ambient temperature	-20..+70 °C	
Storage temperature	-20..+80 °C	
CIP- / SIP temperature	with spacer: 140 °C, 30 minutes max.	
Materials medium-contact	stainless steel 1.4404 (others available on request)	
Non-medium-contact materials	Housing:	stainless steel 1.4305
	Glass:	mineral glass, hardened
	Magnet:	samarium-Cobalt
	Ring:	POM
Supply voltage	24 V DC ±10 %	
Analog output	0/4..20 mA or 0/2..10 V	
Power consumption	max. 2.5 W	
Switching outputs	transistor output "push-pull", compatible with PNP and NPN, (resistant to short circuits, and reversal polarity protected) <i>I</i> _{out} = 100 mA max.	
Hysteresis	adjustable, position of the hysteresis depends on minimum or maximum switching value	
Display	extendable graphic LCD display temperature range -20..+70 °C, 32 x 16 pixels, background illuminated, flashing LED signal lamp with simultaneous message on the display.	
Electrical connection	for round plug connector M12x1, 5-pole	
Ingress protection	IP 67	
Weight	approx. 0.25 kg	
Conformity	CE, EHEDG	



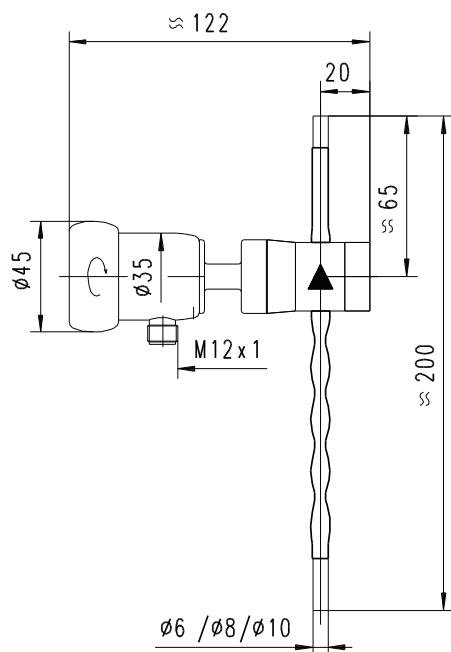
Wiring

Before the electrical installation, it must be ensured that the auxiliary voltage corresponds to the data sheet.

The switching outputs are self-configuring, depending on whether they are connected as PNP or NPN switches (push-pull). It is recommended to use shielded wiring.

Dimensions

A spacer between the electronics head and the medium-contact measurement tube provides thermal decoupling between the two units. The media temperature may be raised for 45 min. to 130 °C.



Handling and operation

Installation

In order to ensure the sensor's maximum insensitivity to interference, the flow should run from bottom to top (best degassing even at the slowest flow speed). Standard crimp connectors, hoses with crush protection, or the crimp connectors provided by HONSBURG can be used for the connection.

The insulation hoses provide the best possible insulation from the environment, and should therefore not be removed.

It must be ensured that the calming section with the static mixer is not kinked.

Programming

The annular gap of the programming ring can be turned to positions 1 and 2. The following actions are possible:



Set to 1 = continue (STEP)
Set to 2 = modify (PROG)

Neutral position between 1 and 2

The ring can be removed to act as a key, or turned through 180 ° and replaced to create a programming protector. Operation is by dialog with the display messages, which makes its use very simple.

Starting from the normal display (present value and unit), if 1 (STEP) is repeatedly selected, then the display shows the following information in this order:

Display of the parameters, using position 1

- Switching value S 1 (switching point 1 in the selected unit)
- Switching characteristic of S 1
 - MIN = Monitoring of minimum value
 - MAX = Monitoring of maximum value
- Hysteresis 1 (hysteresis value of S 1 in the set unit)
- Switching value S 2
- Switching characteristic of S 2
- Hysteresis 2
- Code
 - After entering the **code 111**, further parameters can be defined:
- Filter (settling time of the display and output)
- Physical unit (Units)
- Output: 0..20 mA or 4..20 mA
- 0/4 mA (measured value corresponding to 0/4 mA)
- 20 mA (measured value corresponding to 20 mA)

For models with a voltage output, replace 20 mA accordingly with 10 V.

Edit, using position 2

If the currently visible parameter is to be modified:

- Turn the annular gap to position 2, so that a flashing cursor appears which displays the position which can be modified.
- By repeatedly turning to position 2, values are increased; by turning to position 1, the cursor moves to the next digit.
- Leave the parameter by turning to position 1 (until the cursor leaves the row); this accepts the modification.
- If there is no action within 30 seconds, the device returns to the normal display range without accepting the modification.

The limit switches S 1 and S 2 can be used to monitor minimal or maximal.

Product information

Flow calorimetry

With a minimum-switch, falling below the limit value causes a switchover to the alarm state. Return to the normal state occurs when the limit value plus the set hysteresis is once more exceeded.

With a maximum-switch, exceeding the limit value causes a switchover to the alarm state. Return to the normal state occurs when the measured value once more falls below the limit value minus the set hysteresis.

The change to the alarm state is indicated by the integrated red LED and a cleartext in the display.

While in the normal state the switching outputs are at the level of the supply voltage; in the alarm state they are at 0 V, so that a wire break would also display as an alarm state at the signal receiver.

Overload display

Overload of a switching output is detected and indicated on the display ("Check S 1 / S 2"), and the switching output is switched off.

Simulation mode

To simplify commissioning, the sensor provides a simulation mode for the analog output. It is possible to create a programmable value in the range 0..26.0 mA at the output (without modifying the process variable). This allows the wiring run between the sensor and the downstream electronics to be tested during commissioning. This mode is accessed by means of code **311**.

Factory settings

After modifying the configuration parameters, it is possible to reset them to the factory settings at any time using **Code 989**.

Ordering code

HFK35-FIN - 1. 2. 3. 4. 5. 6. 7. 8.

For combination option, see table "Technical data".

○=Option

1. Tubing diameter	
006	6 mm
008	8 mm
010	10 mm
2. Metering range	
02000	(0.001) 0.01..2 l/min
05000	0.025..5 l/min
10000	0.05..10 l/min
3. Pipework material	
K1	stainless steel 1.4404
4. Analog output	
I	current output 0/4..20 mA
U	○ voltage output 0/2..10 V
5. Electrical connection	
S	for round plug connector M12x1.5-pole
6. Spacer	
H	CIP/SIP version, 140 °C, 30 minutes max.
7. Options	
00	without option
8. Certificate DIN EN 10204 (indicate only when required, multiple responses possible)	
APZMAT	acceptance test certificate 3.1 for material (in contact with products)
WZ2.2	factory certification 2.2

Accessories

- ECI-1 device configurator (USB programming adapter)
- Process adapter
- Cable/round plug connector (KH...) see additional information "Accessories"

Flow Switch and Temperature Transmitter / Switch HFK30-FIN



- Flow switch/transmitter for small flows in the foodstuffs industry
- Combination with temperature switch or transmitter possible
- No moving parts in the medium being measured
- Only one medium-contact material
- Simple to use
- Low pressure loss
- Various nominal widths
- Rapid response times for a calorimetric Sensor
- Linearised and temperature compensated

Characteristics

The HFK30-FIN flow sensor monitors fluid media. Its compact form combines the measurement tube and converter / counter. The integrated transducer has an analog output (4..20 mA or 0..10 V) and one switching output, which can be configured as a limit switch for monitoring minimal or maximal, or as a frequency output.

The switching output is designed as a push-pull driver, and can therefore be used both as a PNP or an NPN output. The state of the switching output is signalled with a yellow LED in the switching outlet; the LED has all-round visibility.

The sensor is configured in the factory, or alternatively this can be done with the aid of the optionally available ECI-1 device configurator (USB interface for PC). A selectable parameter can be modified on the device, with the aid of the magnet clip provided. In this case, the current measured value is saved as the parameter value. Examples of these parameters are the switching value or the metering range end value. The stainless steel electronics housing is rotatable, so it is possible to orient the cable outlet after installation.

The converter / counter record two process parameters: the flow speed of the medium and its temperature. Both parameters can be assigned to the analog output or to the switching output.

The following output combinations are available:

Flow		Temperature	
Analog	Switching output	Analog	Switching output
●			
	●		
●	●		
●			●
	●	●	

The switching output is a "push-pull" transistor output and provides PNP and NPN inputs equally. It can be offered as a minimum switch or a maximum switch, or as a frequency output.

Technical data

Sensor	calorimetric measurement principle		
Process connection	smooth tube for crimp adapter or hose connection		
Metering ranges (for water)	6 mm tube	(0.001) 0.01..2 l/min	
	8 mm tube	0.025..5 l/min	
	10 mm tube	0.05..10 l/min	
	() = special ranges available on request		
Measurement accuracy	±3 % MW (H ₂ O dist.)		
Repeatability	±1 % MW (H ₂ O dist.)		
Temperature gradient	4 K/s		
Start-up time	10 sec. after application of operating voltage		
Response time	in water (25 °C) at an average flow speed of approx. 1-2 sec.		
Process pressure	PN 10		
Pressure loss	max. 0.3 bar at max. flow		
Media temperature	0..+100 °C		
Ambient temperature	-20..+70 °C		
Storage temperature	-20..+80 °C		
CIP- / SIP temperature	with spacer 140 °C, 30 minutes max.		
Materials medium-contact	1.4404 (others available on request)		
Materials, non-medium-contact	PPS, PA6.6, 1.4305		
Power consumption	max. 2.5 W		
Supply voltage	24 V DC ±10 %		
Analog output	4..20 mA / Load 500 Ohm max. or 0..10 V / Load min. 1 kOhm		
Electrical connection	for round plug connector M12x1, 4-pole		
Current consumption	max. 100 mA		
Switching output	transistor output "push-pull", compatible with PNP and NPN, (resistant to short circuits and polarity reversal) I _{out} = 100 mA max.		
Switching hysteresis	flow 2 % of end value temperature: approx. 2 °C		
Display (only with switching output)	yellow LED (On = OK / Off = Alarm)		
Adjustment	by means of magnet		

Product information

Ingress protection	IP 67
Weight	approx. 0.2 kg
Conformity	CE, EHEDG



Flow calorimetry

Handling and operation

Installation

In order to ensure the sensor's maximum insensitivity to interference, the flow should run from bottom to top (best degassing even at the slowest flow speed). Standard crimp connectors, hoses with crush protection, or the crimp connectors provided by HONSBERG can be used for the connection.

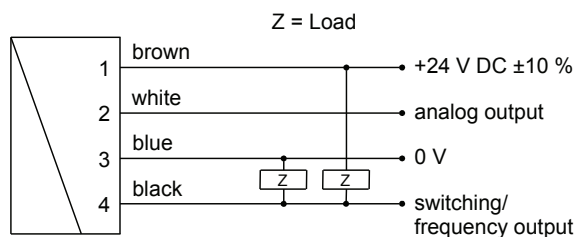
The insulation hoses offer the best possible insulation against the surroundings, and must therefore not be removed.

Programming

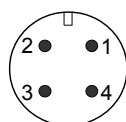
The electronics contain a magnetic contact, with the aid of which different parameters can be programmed. Programming takes place when a magnet clip is applied for a period between 0.5 and 2 seconds to the marking located on the label. If the contact time is longer or shorter than this, no programming takes place (protection against external magnetic fields).



Wiring

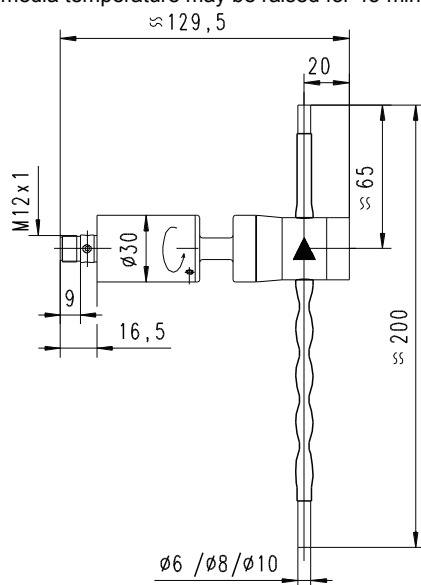


Connection example: PNP NPN



Dimensions

A spacer between the electronics head and the medium-contact measurement tube provides thermal decoupling between the two units. The media temperature may be raised for 45 min. to 130 °C.



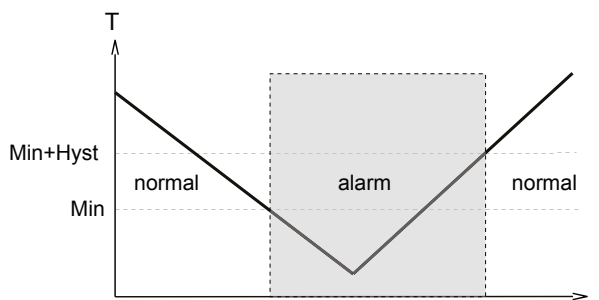
After the programming ("teaching"), the clip can either be left on the device, or removed to protect data.

The device has a yellow LED which flashes during the programming pulse. During operation, the LED serves as a status display for the switching output. In order to avoid the need to transit to an undesired operating status during "teaching", the device can be provided ex-works with a "teach-offset". The "teach-offset" value is added to the currently measured value before saving (or is subtracted if a negative value is entered).

Example: The switching value is to be set to 70 % of the metering range, because at this flow rate a critical process status is to be notified. However, only 50% can be achieved without danger. In this case, the device would be ordered with a "teach-offset" of +20 %. At 50 % in the process, a switching value of 70 % would then be stored during "teaching".

Normally, programming is used to set the limit switch. However, if desired, other parameters such as the end value of the analog or frequency output may also be set.

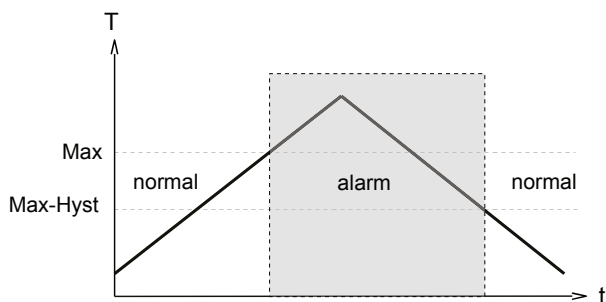
The limit switch can be used to monitor minimal or maximal. With a minimum-switch, falling below the limit value causes a switchover to the alarm state. Return to the normal state occurs when the limit value plus the set hysteresis is once more exceeded.



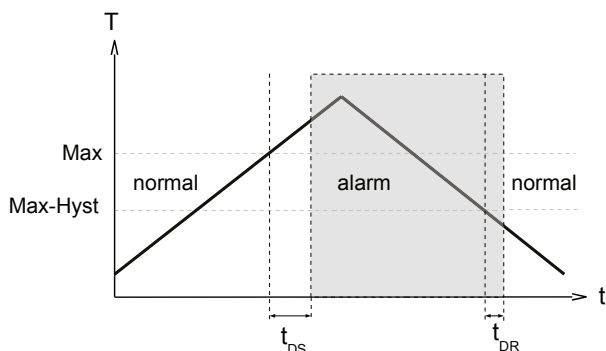
Product information

Flow calorimetry

With a maximum-switch, exceeding the limit value causes a switchover to the alarm state. Return to the normal state occurs when the measured value once more falls below the limit value minus the set hysteresis.

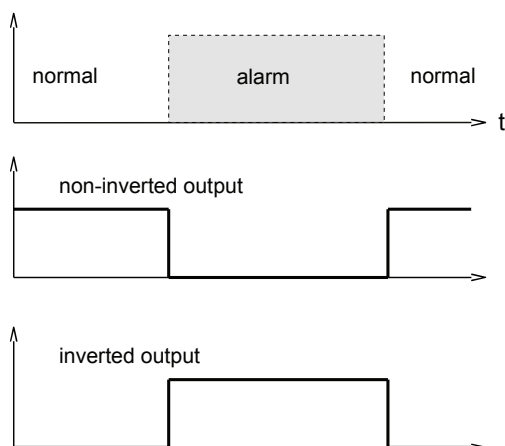


A switchover delay time (t_{DS}) can be applied to the switchover to the alarm state. Equally, one switch-back delay time (t_{DR}) of several can be applied to switching back to the normal state.



In the normal state the integrated LED is on, in the alarm state it is off, and this corresponds to its status when there is no supply voltage.

In the non-inverted (standard) version, while in the normal state the switching output is at the level of the supply voltage; in the alarm state it is at 0 V, so that a wire break would also display as an alarm state at the signal receiver. Optionally, an inverted switching output can also be provided, i.e. in the normal state the output is at 0 V, and in the alarm state it is at the level of the supply voltage.



A Power-On delay function (ordered as a separate option) makes it possible to maintain the switching output in the normal state for a defined period after application of the supply voltage.

Ordering code

HFK30-FIN - 1. 2. 3. 4. 5. 6. 7. 8.
9. 10. 11. 12.
H K1

For combination option, see table "Technical data".

○=Option

1. Tubing diameter	
006	6 mm
008	8 mm
010	10 mm
2. Metering range	
02000	(0.001) 0.01..2 l/min
05000	0.025..5 l/min
10000	0.05..10 l/min
3. Pipework material	
K1	stainless steel 1.4404
4. Analog output	
I	current output 4..20 mA
U	voltage output 0..10 V
5. Measurement parameter to analog output	
F	flow rate to analog output
T	temperature to analog output
6. Switching output	
T	transistor output "push-pull"
M	○ NPN (open collector)
7. Measurement parameter to switching output	
F	flow to switching output
T	temperature to switching output
8. Functioning of the switching output	
L	minimum-switch
H	maximum-switch
R	frequency output
9. Switching signal	
O	standard
I	inverted
10. Spacer	
H	CIP- / SIP version, 140 °C, 30 minutes max.
11. Options	
00	without option
12. Certificate DIN EN 10204 (indicate only when required, multiple responses possible)	
APZMAT	acceptance test certificate 3.1 for material (in contact with products)
WZ2.2	factory certification 2.2

Options

Special measuring range for flow:

Metering range start value ml/min

Metering range end value ml/min

Special measuring range for temperature:

Maximum 100 °C (standard = 70 °C) °C

Minimum -20 °C (standard = 0 °C) °C

Special range for analog output:

<= Metering range ml/min
(Standard = Metering range) °C

Special range for frequency output:

<= Metering range ml/min
(Standard = Metering range) °C

End frequency (max. 2000 Hz) Hz

Switching delay period (0.0..99.9 s) . s
(from Normal to Alarm)

Switch-back delay period (0.0..99.9 s) . s
(from Alarm to Normal)

Power-On delay s
(After connecting the supply, time during which the switching output is not activated)

Switching output fixed ml/min
°C

Special hysteresis %
(standard = 2 % EW)

Teach-offset %
(in percent of the metering range)
Standard = 0 %

If the field is not completed, the standard setting is selected automatically.

Accessories

- ECI-1 device configurator (USB programming adapter)
- Process adapter
- Cable/round plug connector (KH...) see additional information "Accessories"
- External display OMNI-TA or OMNI Remote

Device Configurator ECI-1



- Can be used on site for:
 - parameter modification
 - firmware update
 - adjustment of inputs and outputs
- Can be connected via USB

Characteristics

The device configurator ECI-1 is an interface which allows the connection of microcontroller-managed HONSBERG sensors to the USB port of a computer. Together with the Windows software "HONSBERG Device Configurator" it enables

- the modification of all the sensor's configuration settings
- the reading of measured values
- the adjustment of inputs and outputs
- firmware updates

Technical data

Supply voltage	12..30 V DC (depending on the connected sensor) and via USB
Power consumption	< 1 W
Connection	
Sensor	cable bushing M12x1, 5-pole, straight length approx. 50 cm
Lead	device connector M12x1, 5-pole
USB	USB bushing type B
Operating temperature	0..50 °C
Storage temperature	-20..+80 °C
Dimensions of housing	98 mm (L) x 64 mm (W) x 38 mm (H)
Housing material	ABS
Ingress protection	IP 40

Handling and operation

Connection



The device configurator is intended for temporary connection to the application. It is connected between the the existing sensor lead and the sensor. Power supply is via the supply to the sensor and the computer's USB port. When inactive (no communication), the configurator behaves completely neutrally; all signals from the sensor remain available to the application. During communication between computer and sensor, the signal wirings are separated in the configurator, so that in this state the sensor's output signals are not available.

To connect 4-pole leads without a middle hole to the installed 5-pole device connector, adapter K04-05 is included. 4-pole leads with a middle hole can be used without an adapter.

Ordering code

Device configurator (for scope of delivery, see the diagram below)	ECI-1
--	--------------

Scope of delivery

1. Device configurator ECI-1
2. USB cable
3. Adapter K04-05
4. Plug KB05G
5. Cable K05PU-02SG
6. Carrying case



Incl. software

Accessories:

Mains connector 24 V DC (with fitted round plug connector, 5-pole, incl. international plug set)	EPWR24-1
--	-----------------



Replacement parts:

M12x1 adapter 4- / 5-pole	K04-05
PUR cable, 5-pole, shielded with round plug connector M12x1	K05PU-02SG
Round plug connector M12x1, 5-pole (without cable)	KB05G

Hygienic Connection Cable Shielded Series KH



- Connection M12x1
- PVC cable flexcord grey shielded
- Straight or angled model
- 4- or 5-pole, cable end made up with end sleeves for wires
- Union nut made from V4A
- IP67 as per IEC 60529
- IP 69K protected against water during high pressure and steam jet cleaning as per IEC 60529
- Resistant to heat and cold, range of use -25..+70 °C
- Vibration protection
- Colour coding as per industry standards

Characteristics

The connection cable is suitable for moderate mechanical stress. Good resistance to acids and alkalis. Therefore aimed mainly at food and drink industries. Restricted abrasion behaviour, and limited oil and chemical resistance. The shielding increases the shear strength, and also improves the protection from external radiation interference.

Technical data

Connector	connection M12x1
Grip body	plastic, PVC
Union nut	stainless steel 1.4404
Contact block / Cable	grey plastic PVC
Contacts	metal, CuZn, gold-plated
Seal	plastic, FPM, FKM
Current carrying capacity	4 A
Rated voltage	max. 250 V
Insulation resistance	$\geq 10^9$ M Ω
Degree of contamination	3/2, as per DIN VDE 0110
Ambient temperature	-25..+70 °C
Ingress protection	IP 67 / IP 69K (only when screwed together)
Mechanical working life	min. 100 mating cycles

Cable colours:

1 = brown, 2 = white, 3 = blue, 4 = black, 5 = grey

Ordering code

KH - -

1. Cable material	PV	PVC
2. Cable length	002	2 metres
	005	5 metres
	010	10 metres
3. Shielding	1	shielding (not applied to union nut)
4. Number of poles	04	4-pole
	05	5-pole
5. Connector output	G	straight
	W	angled 90 °

Process adaptation for HFK, HTK, HLK..



- Hygienically-appropriate process adaptation free of dead spaces and elastomers for wide-ranging applications in the food production industry.

Characteristics

The hygienically design cone of the sensor is pressed against the sealing edge of the welded sleeve when screwed on with the prescribed torque, whereby a hygienically-correct seat of the respective sensor is provided.

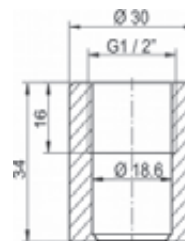
Technical data

Process connection	GHMadapt G 1/2
Torques	thread G 1/2, VA / VA, 5 - 20 Nm
Material	stainless steel 1.4404, AISI 316L 2.2 Certification or 3.1 Certification optional
Working temperature	metal-metal seal max. 250 °C see the sensors to be installed for restrictions
Operating pressure	metal-metal seal max. 50 bar see the sensors to be installed for restrictions

Dimensions

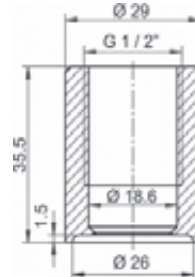
Cylindrical sleeve

for containers



APH-112

with welded collar for extrusion



APH-122

Accessories for cylindrical sleeves

Blank plug G 1/2



AMH-112

Weld-on aid G 1/2
(Material: brass)

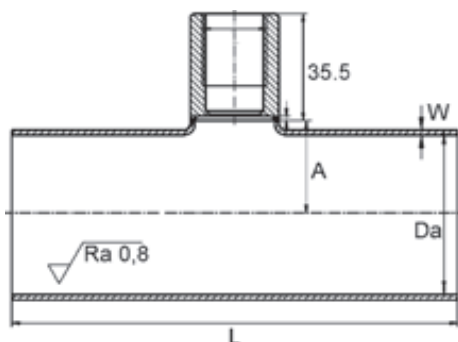


AMH-122

Product information

Hygienic weld-on fittings, series APH,

DIN 11850 series 2



Process connection GHMadapt G 1/2

	DN	L	A	Da x W	
APH-532	25	100	15	29 x 1.5	
APH-542	40	120	22	41 x 1.5	
APH-552	50	140	29	53 x 1.5	
APH-562	65	160	38	70 x 2.0	
APH-572	80	180	46	85 x 2.0	available on request
APH-582	100	200	55	104 x 2.0	available on request

Other standard pipe sizes on request

Accessories for weld-on fittings

Blank plug G 1/2



AMH-112

Flow calorimetry

Handling and operation

Installation

Welding in tanks or large pipework



Sections at G 1/2

1. Drill hole with outside diameter of the sleeve, max. tolerance +0.2 mm
2. Tack on sleeve at four points (observe the sequence of the tacking)
3. Screw in the weld-on aid (see AMH112, AMH122)
4. Weld the sections between the weld points.

In order to avoid the red heating or distortion of the sleeve during the welding process, it is necessary to take pauses between the individual sections so that the sleeve can cool down.

Welding in pipework

There are also ball sleeves in addition to the APH pipe system or sleeves with a welded collar are available for pipes with an extrusion (please request).

Ordering code

Weld-on adapter

APH-112	Cylindrical sleeve for container in G 1/2
APH-122	Cylindrical sleeve with welded collar for extrusion (G 1/2)

T-piece according to DIN11850 series 2

APH-532	T-piece DN 25
APH-542	T-piece DN 40
APH-552	T-piece DN 50
APH-562	T-piece DN 65
APH-572	T-piece DN 80
APH-582	T-piece DN 100

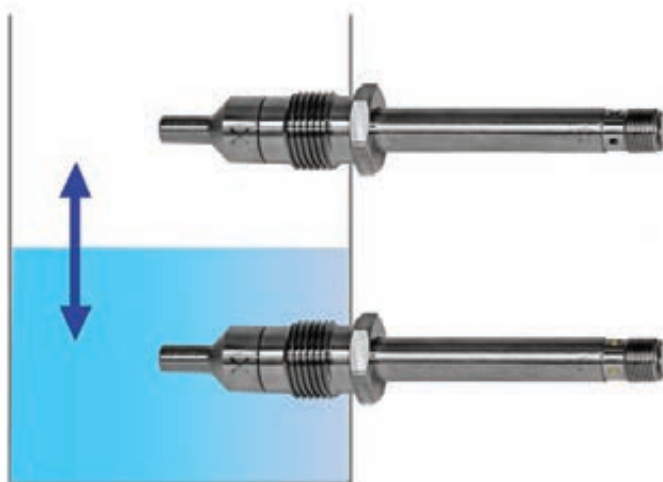
Accessories

AMH-112	Blank plug G 1/2
AMH-122	Weld-on aid G 1/2

C5 Hygienic Design

Point level, calorimetric	144
---------------------------	-----

Level, calorimetry - Hygienic Design



Characteristics

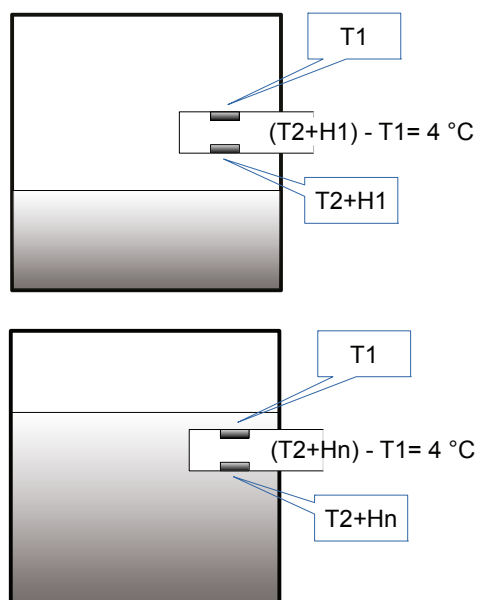
System	Calorimetric level switch for foodstuffs use
Evaluation	Displays Switching
Process connection	GHMadapt G 1/2
Process pressure	PN 50 bar
Medium temperature	-20..+140 °C
Materials	1.4435, only one material in contact with the medium

Applications

- Food and drink industries
- Pharmaceutical industry
- Level monitoring
- Dry-run protection
- Drip sensors

Function and benefits

The calorimetric principle of the level switches from HONSBURG is based on two temperature sensors, both in good heat-conducting contact with the medium with simultaneously good heat insulation from one another.



Design principle of calorimetric level switch

One of the sensors (T2) is heated (H1) in the air environment in such a way that a constant temperature difference (4 Kelvin) arises between the heated and unheated sensors.

If the sensor tip is immersed into another medium which has better thermal conductivity than air (gas), another heat flow (Hn) must be used to re-establish the same heat difference.

The differences in the heat flows thus indicate the different thermal conductivities of the actual medium around the sensor nose, and can therefore be used to recognise the level.

The unheated temperature sensor (T1) detects the medium temperature and thereby enables a temperature compensation. The level switch is therefore able to detect the differences between gas and liquid or granulate, even if the temperature varies.

Different media influence the reaction time, because they have different heat conductivity.

In the operation of the calorimetric monitoring principle, the state of the test medium and the medium temperature in relation to the test results achieved play a crucial role. The present standard devices are designed and calibrated for the following parameters: air / aqueous solutions, temperature range 0..85 °C.

With media of higher viscosity, or granulates, or lasting temperatures of more than 85 °C or less than 0 °C, we recommend setting the device configuration according to the individual recommendation of the manufacturer.

Explanation of terms

Temperature gradient = temperature change per time unit of the medium (K/s). Where the medium temperature changes rapidly, compensation can be made only within a specific range. The range in which fault-free operation is guaranteed is specified. If this temperature is exceeded by the medium, an incorrect signal may be issued by the system for a brief time. Such a signal can, of course be suppressed by switching delays, however, the switch-on and switch-off time of the system in general will be negatively affected.

Start-up time is the time taken by the device to reach its specified operating mode after the operating voltage is applied. After they are switched on, the displays and outputs initially go to the maximum value of the metering range. After approximately 3.5 seconds, the actual measurement is displayed and output.

Switch-on and switch-off time is the time that the switching process lasts after the stainless steel sensor is suddenly immersed into water from the gas (medium temperature approx. 25 °C). For air / water, the switch-on and switch-off time is approx. 2s.

Please note that this time depends on the operating conditions. With media with poor thermal conductivity or poor sensor materials (teflonised), slower switching times arise.

Temperature range of the medium is the range in which the calorimetric sensor functions faultlessly.

General installation instructions

As a basic principle, any installation location and position in which the "nose" of the sensor is completely surrounded by the flowing media is suitable.

The sensor can also be used for the detection of filled or unfilled pipes.

It can also be used as a drip sensor.

The heated side (X marking) should always be turned to one side so that it is affected as little as possible by the build-up of granulate or deposits, and so that the temperature changes are detected as uniformly as possible by the reference sensor (T1).

Programmability of parameters

All calorimetric sensors from HONSBURG are members of the family of intelligent sensors. They have a microcontroller which enables a multitude of parameter changes.

As standard, the HLK12 sensor provides the option of determining the reference environment of the medium with poorer thermal conductivity (e.g. air); this is done by "teaching".

In addition, an interface (device configurator ECI-1) can be used to change all saved parameters of a device at any time, if desired or necessary.



Pulse programming on pin 2:
Apply 24 V DC for 1 second for the present value to be saved as the reference value for thermal conductivity.

If required, all parameters can be set at any time on the sensor, using the ECI-1 device configurator.

Product information

Universal switching outputs

The push-pull transistor outputs make installation extremely easy. It can be installed either as an NPN or a PNP switch, and functions accordingly without requiring additional configuration with parameter settings, wire breaks, or the like.

Resistance to short circuits and reversal polarity protection are ensured.

Analog outputs

Although when a calorimetric sensor such as this is used, the level can be measured only as a Yes/No, it is sometimes useful to use an analog output. The threshold values are then to be taken from the PLC, for example, or other effects detected or determined more

Level calorimetry

quickly (e.g. the size of the difference in thermal conductivities of the media being detected is immediately clear). In that case, please contact HONSBERG.

Product family

Calorimetric sensors can also be used as:

- Flow sensors
- Drip sensors
- Temperature sensors

For this purpose, see the separate product information. The same operation and the same or a similar installation type are the benefits of a product family.

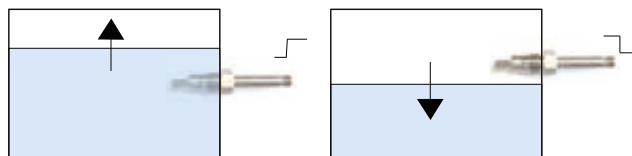
Level Switch or Drip Sensor HLK12-S



- Independent of conductivity, colour, ...
- Suitable for fluids and finer granulates
- Deposit must be permeable to water (e.g. sugar...)
- Programmable hysteresis
- Suitable for very variable fluids
- Programmable switching and switch-back delays
- Very simple to use

Characteristics



The tips of the sensors of the HLK12 family recognise a difference between fluid and air (gas). Temperature changes are compensated. The system is tolerant of contamination which lets water through (paper, mud, sugar solution...).



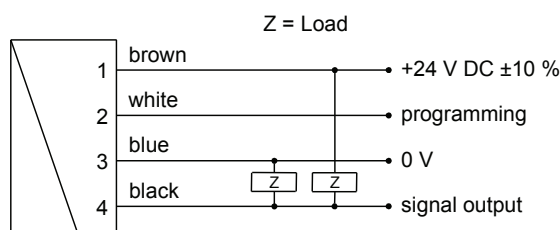
The same design can be used as a calorimetric flow sensor, or as an electronic temperature switch, or as a drip sensor for guidable leaks.

Technical data

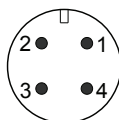
Process connection	GHMadapt G 1½
Medium temperature	0..+70 °C
Ambient temperature	0..+60 °C
CIP- / SIP Temperature	140 °C, < 30 min.
Process pressure	PN 50 bar
Tolerance	±2 mm (dependent on contamination)
Repeatability	±0.5 mm (for the same fluid and the same deposit)
Supply voltage	24 V DC ±10 % (controlled)
Power consumption	< 1 W
Switching output	transistor output "push-pull", compatible with PNP and NPN, (resistant to short circuits and polarity reversal) I _{out} = 100 mA max.

LED	yellow LED (On = Normal / Off = Alarm, flashes = programming or error)
Ingress protection	IP 67
Electrical connection	for round plug connector M12x1, 4-pole
Materials medium-contact	sensor tip 1.4435, FDA-compliant
Non-medium-contact materials	Housing 1.4571 Pressure screw 1.4404 Plug PA Contacts gold-plated
Weight	approx. 100 g incl. pressure screw
Installation location	dependent on direction of rotation (see marking) Avoid bubbles or deposits on the sensor. Best installation position therefore at the side.
Conformity	CE, EHEDG  

Wiring

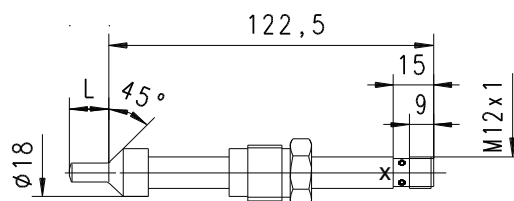


Connection example: PNP NPN



The use of shielded cabling is recommended.

Dimensions



For T-pieces (recommended) and weld-on sockets in the GHMadapt series, see "Accessories".

Handling and Operation

The air reference value is stored via "teaching". Any deviation (incl. programmable tolerance) from this is evaluated as a switching value.

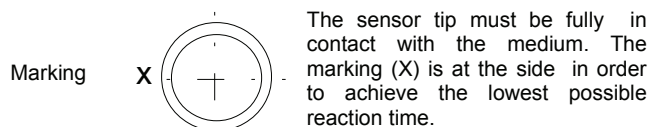
- Keep the transmitter in air (no flow!)
- Apply an impulse of at least 0.5 seconds and max. 2 seconds duration to pin 2 (e.g. via a bridge to the auxiliary voltage or a pulse from the PLC), in order to accept value as the switching value.
- When the teaching is complete, pin 2 should be connected to 0 V, so as to prevent unintended programming.

Note: Requirement for programmability must be stated when ordering, otherwise the device cannot be programmed.

A USB interface with associated software is available as a convenient option for programming all parameters by PC, and for adjustment.

Installation

The sensor is inserted into the boring together with a sealing cone, oriented, and fastened in place with a pressure screw.



The torque on the pressure screw should be between 5..10 Nm.

Ordering code

HLK12 - 1. 2. 3. 4. 5. 6.
S **015**

○=Option

1. Limit switch	
S	transistor output "push-pull"
2. Sensor tip length	
015	L = 15 mm
3. Programming	
N	cannot be programmed (no teaching)
P	○ programmable (teaching possible)
4. Function	
L	minimum-switch
H	maximum-switch
5. Switching signal	
O	standard
I	○ inverted
6. Optional	
H	CIP- / SIP version, 140 °C, 30 minutes max.

Options

Switching delay s

(from Normal to Alarm)

Switchback delay s

(from Alarm to Normal)

Power-On delay s

(after connecting the supply, time during which the switching output is not activated)

Special hysteresis (standard = 2 % EW) %

If no details are provided when ordering, the standard setting is automatically selected.

Accessories

- Cable/round plug connector (KH...) see additional information "Accessories"

C6 Hygienic Design

Point level capacitive	152
------------------------	-----

Level Capacitive



Characteristics

System	Capacity measurement with high frequency
Processing	Indicating, switching, measuring
Process connection	G ½, G 1
Media	Liquids, viscous media
Pressure range	-1..+10 bar
Media temperature	-20..+100 °C CIP-/SIP-capable, 140 °C < 30 min.

Applications

- Dry-run and overflow monitoring
- Pump monitoring
- Food- and beverage industry
- Chemical industry
- Machine building
- Thermo facilities
- Pharmacy industry
- Cosmetic industry
- Biotechnology

Product information

Level capacitive

Function

In this measuring method the storage capacity of charges in medium is used. Thereby the tip of the probe and the installation adaptor form an electric condenser. If the probe is in the air, a certain low starting capacity is measured. The capacity value changes when the probe is inserted in the medium. This value is defined by the geometry of the probe and the DK value of the medium. Here are some examples in the table drawn up below.

All types of the MLC system family are based on this measuring principle. In all forms of design the switching point can, be set to a DK value, which is sensitive for the application. Thanks to the programmable response time the wave movements of the medium in the transition area between full and empty do not lead to uncontrolled switching processes.

The electric constant (permittivity) of media

DK value at 25°C, Measuring frequency 40.68 MHz







Medium	Air	Oil	Orange juice	Beer	Chocolate
DK-value	1	1.5..3	151	115..126	3.1

Advantage

The parts coming into contact with the media complies with FDA requirements and are CIP-/SIP capable. Steam sterilisation for a short time – up to 140°C.

- No mechanical moving parts
- Compact construction design for food and hygiene compliance
- Detects separator layers such as oil and water
- Foam has no influence
- Suitable for various pressures and temperatures
- Installation by welding sleeves for hygiene compliance
- Maintenance-free
- EHEDG certification (applied for), in compliance with FDA and 3A
- Hygienic non-elastomeric sealing principle*
- Installation without gaps and cavity-free
- Acquisition of liquids such as water and beer as well as viscous or adherent media such as honey, yoghurt, chocolate cream, toothpaste. Powdery media can also be detected.
- All the conventional process connectors such as Varivent, clamps etc. can be supplied for food compatible assembly.

Device Overview

Device type		Process connection	Function	Medium	Material		Page
					Case	Sensor tip	
MLC420 MLC421 MLC422		G ½	Level switch with switching output	Liquids, viscous media, adherent media	Stainless steel 1.4305	PEEK	155
MLC430		G ½	Level switch with LED indicator, switching outputs	Liquids, viscous media, adherent media	Stainless steel 1.4305	PEEK	156
MLC433		G ½	Level switch with continuous DK value measurement, LED-indicator, analog output, switching outputs	Liquids, viscous media, adherent media	Stainless steel 1.4305	PEEK	158
MLC437		G ½	Level switch with continuous DK value measurement, display, analog output, switching outputs	Liquids, viscous media, adherent media	Stainless steel 1.4305	PEEK	160
MLC490 MLC491 MLC492		G 1	Level switch with switching output	Liquids, viscous media, adherent media	Stainless steel 1.4404	PEEK	162
Accessories							
EYY120		5-pole cable plug	Programming adapter		ABS		164

Mistakes reserved, technical specifications subject to change without notice.

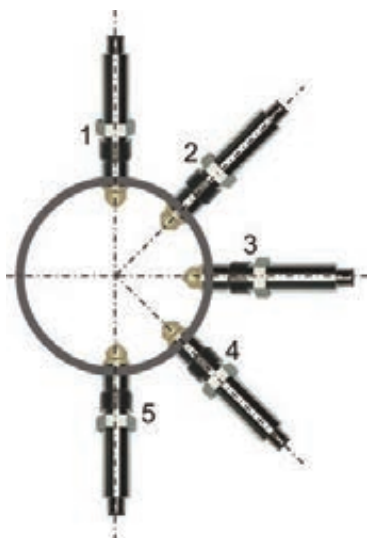
Accessories:

ACH connection cable, APH process connection see separate [product information GHMadapt/Accessories](#).

UBS adapter cable ACI211 for MLC43X programming, see [price list GHMadapt/Accessories](#).



Mounting notes



Pos.	Angel [°]	Level
1	180	100 %
2	135	approx. 92 %
3	90	approx. 60 %
4	45	approx. 30 %
5	0	≥12mm

Mounting direction in horizontal installed tubes

Use as full detector:

Pos. 2 This installation position ensures that the sensor tip is not isolated by an air bubble.

Use as empty detector:

Pos. 4 This installation position ensures that the sensor tip is not covered by residuals of the medium.

Notes

0 To ensure safe functioning of the system please use the process adaptation **GHMadapt**. We offer the suitable welded sealing aids for the correct installation of the welding sleeves.

\$ Please consider the maximum permissible torque for the installation (see process adaptation)

Standards and principles

- The applicable standards and principles must be abided by

Cleaning and maintenance

- Do not aim the high-pressure jet of the cleaning device on the electric connection when cleaning the system.

Transport and storage

- Store dry and dust free
- Do not expose to aggressive media
- Avoid mechanical vibrations
- Storage temperature -20...+80 °C
- Relative humidity max. 95%

Return consignment

- The sensor must be cleaned for return consignment. Make sure there is no contamination by dangerous media. The return consignment form is at disposal as download in the Internet.

Capacitive Level Switch MLC420/422



- 2-port isolation
- Microprocessor controlled measurement
- Parametrization via GHMware and adapter EYY120
- No moving parts in the medium
- Switching function depends to the polarity of the supply voltage
- Condensate-stability type

Technical data

Power supply

Supply voltage : 18..30 V DC, max. 50 mA
Electrical connection : M12x1 plug
CE-conformity : EN 61326:2007-05

Ambient conditions

Ambient temperature : -20..+80 °C
Climatic class : EN 60068-2-38:2010-06
Vibration class : EN 60068-2-6, GL test2

Certifications

EHEDG certificate no. : 28/2011

Sensor

Radiated frequency : 40.68 MHz, <1 mW
Measuring range : DK-value 5..175 (MLC420)
DK-value 1..175 (MLC422)

Factory setting : DK-value = 20 (MLC420)
DK-value = 1 (MLC422)

Initialization time : 3 s
Process temperature : -20..+100 °C, 140 °C < 30 min
CIP-/SIP-capable

Process pressure : -1..10 bar
Process material : PEEK, FDA approval number
21CFR177.2415
food-safe acc. to EHEDG
Conform regulation EC 1935/2004 &
10/2011

Surface quality : $R_a \leq 0,8\mu\text{m}$
Process connection : G1/2" hygienic
Stud torque : 5..10 Nm
Mounting direction : arbitrary,
see mounting notes

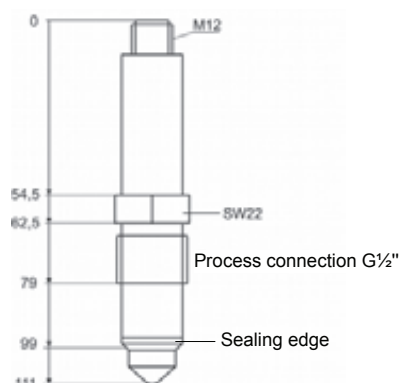
Output

Switching output : transistor PNP / NPN
max. 30 V / 100 mA
Response time : programmable from 0.01..10 s
Isolation : sensor, case/supply, outputs

Case

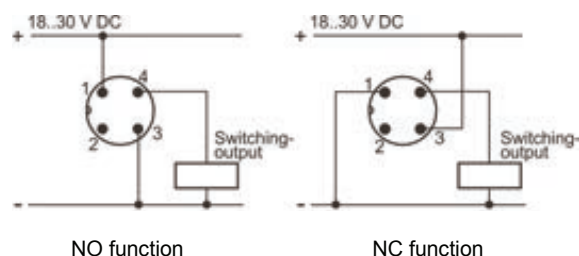
Material : 1.4305
Protection class : IP67 / IP69K

Dimension



Connection diagram

M12 plug (PNP = factory setting)



Cable colors: 1 = brown, 2 = white, 3 = blue, 4 = black

Ordering code

1. 2. 3. 4. 5. 6.
MLC42 - - - - -

1. Measuring range	
0	DK-value 5..175
2	DK-value 1..175
2. Switching output	
0	PNP (standard)
1	NPN
3. Electrical connection	
0	M12-plug
4. Inspection window	
0	without window
5. Options	
00	without option
6. Certificate DIN EN 10204 (indicate only when required, multiple responses possible)	
RA08	$R_a < 0,8\mu\text{m}$ (with acceptance test certificate 3.1 incl. measurement report)
RA06	$R_a < 0,6\mu\text{m}$ (with acceptance test certificate 3.1 incl. measurement report)
WZ2.2	factory certification 2.2
APZMAT	acceptance test certificate 3.1 for material (in contact with products)

Accessories:

ACH connection cable
APH process connection
see separate product information **GHMadapt/Accessories**.
EYY120 Programming adapter

Capacitive Level Switch MLC430



- 2-port isolation
- Microprocessor controlled measurement
- Parametrization via GHMware and internal Mini USB interface
- No moving parts in the medium
- 2 switching outputs
- Switching functions programmable
- Condensate-stability type
- Ultra-wide LED indicator

Technical data

Power supply

Supply voltage : 18...30 V DC, max. 80 mA
Electrical connection : M12x1 plug or cable gland M16x1.5
Polyamide (PA) or SS-type 1.4305

CE-conformity : EN 61326:2007-05

Ambient conditions

Ambient temperature : -20...+80 °C
Climatic class : EN 60068-2-38:2010-06
Vibration class : EN 60068-2-6, GL test2

Certifications

EHEDG certificate no. : 28/2011

Sensor

Radiated frequency : 40.68 MHz, <1 mW
Measuring range : DK-value 1...175
Initialization time : 3 s
Process temperature : -20...+100 °C, 140 °C < 30 min
CIP-/SIP-capable
Process pressure : -1...10 bar
Process material : PEEK, FDA approval number 21CFR177.2415
food-safe acc. to EHEDG
conform regulation EC 1935/2004 & 10/2001

Process connection : G1/2" hygienic
Stud torque : 5...10 Nm
Mounting direction : arbitrary, see mounting notes

Output

Switching output : transistor PNP / NPN
max. 30 V / 100 mA
LED indicator S1, S2 : S1 active = green, S2 active = red
S1+S2 active = mixed color

Response time : programmable in range 0.02...10 s

Isolation : sensor, case/supply, output

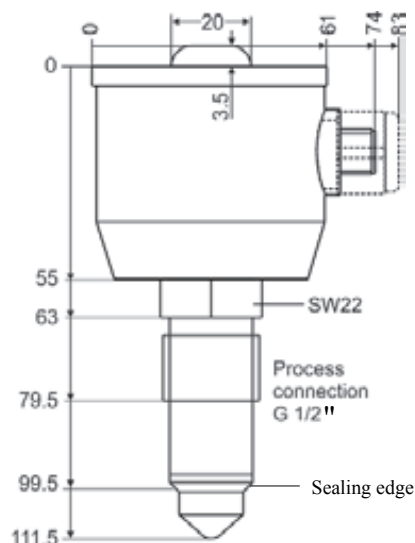
Case : SS-type round case 59 mm

LED-cap : Acrylic glass (PMMA)

Material : 1.4305

Protection class : IP67 / IP69K

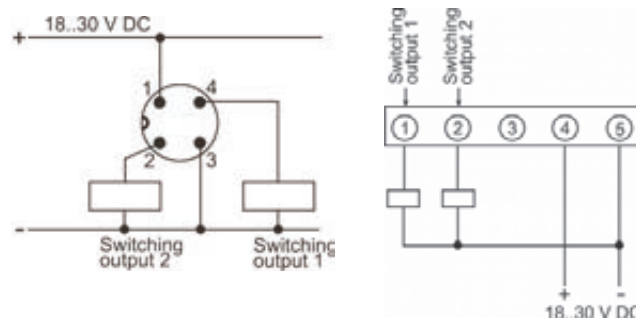
Dimension



Connection diagrams

M12 device plug (PNP)

Terminal clamps (PNP)
(factory setting)



Cable colors (plug):

1 = brown, 2 = white, 3 = blue, 4 = black

Ordering code

MLC430 - ^{1.} - ^{2.} - ^{3.} - ^{4.} - ^{5.}

1. Switching output	
0	2 x PNP / NPN programmable
2. Electrical connection	
0	M12 plug (standard)
1	cable gland, PA
2	cable gland VA (1.4305)
3. Inspection window	
0	without window (standard)
1	lid with LED indicator
4. Options	
00	without option
02	internal fixing element stainless steel
5. Certificate DIN EN 10204 (indicate only when required, multiple responses possible)	
RA08	R _a < 0,8µm (with acceptance test certificate 3.1 incl. measurement report)
RA06	R _a < 0,6µm (with acceptance test certificate 3.1 incl. measurement report)
WZ2.2	factory certification 2.2
APZMAT	acceptance test certificate 3.1 for material (in contact with products)
Accessory	
ACI211	USB connection cable for programming MLC43x

Additional accessories:

ACH connection cables

APH process connection

see separate product information **GHMadapt/Accessories**.

Capacitive Level Switch MLC433



- 2-port isolation
- Microprocessor controlled measurement
- Parametrization via GHMware and internal Mini USB interface
- No moving parts in the medium
- 2 switching outputs
- Analog output for DK value
- Switching functions programmable
- Condensate-stability type
- Ultra-wide LED indicator

Technical data

Power supply

Supply voltage : 18..30 V DC, max. 100 mA
Electrical connection : M12x1 plug or cable gland M16x1.5
Polyamide (PA) or SS-type 1.4305
CE-conformity : EN 61326:2007-05

Ambient conditions

Ambient temperature : -20..+60 °C
Climatic class : EN 60068-2-38:2010-06
Vibration class : EN 60068-2-6, GL test2

Certifications

EHEDG certificate no. : 28/2011

Sensor

Radiated frequency : 40.68 MHz, <1 mW
Measuring range : DK-value 1.5..175
Initialization time : 3 s
Process temperature : -20..+100 °C, 140 °C < 30 min
CIP-/SIP-capable
Process pressure : -1..+10 bar
Process material : PEEK, FDA approval number 21CFR177.2415
food-safe according to EHEDG conform regulation EC 1935/2004 & 10/2001

Process connection : G1/2" hygienic
Stud torque : 5..10 Nm
Mounting direction : arbitrary,
see mounting notes

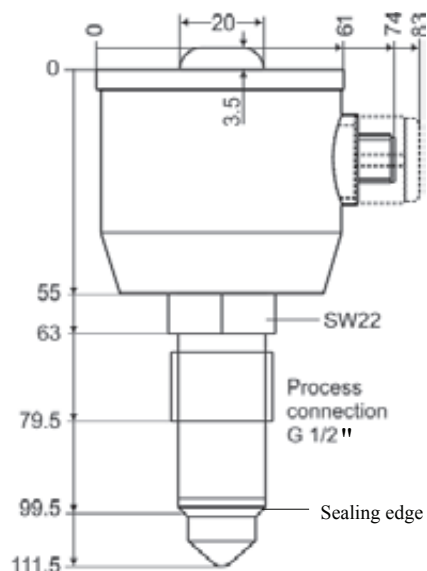
Outputs

Switching output : transistor PNP / NPN programmable
max. 30 V / 100 mA
LED indicator S1, S2 : S1 active = green, S2 active = red
S1+S2 active = mixed color
Response time : 20 ms
Analog output : active 0/4..20 mA, burden <600 Ω
Response time : programmable from 0.1..10 s
Isolation : sensor, case / supply, outputs

Case

Material : 1.4305
LED-cap : Acrylic glass (PMMA)
Protection class : IP67 / IP69K

Dimension

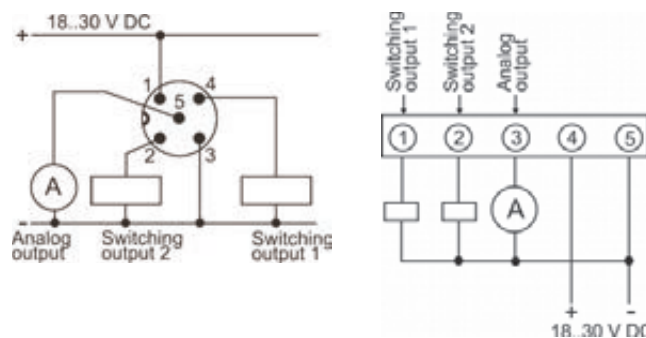


Connection diagram

M12 device plug (PNP)

Terminal clamps (PNP)

(factory setting)



Cable colors (plug):

1 = brown, 2 = white, 3 = blue, 4 = black, 5 = grey

Ordering code

MLC433 - ^{1.} - ^{2.} - ^{3.} - ^{4.} - ^{5.}

1. Output	
0	2 x PNP / NPN programmable and 1 x analog 0/4...20mA
2. Electrical connection	
0	M12 plug
1	cable gland M16x1,5
2	cable gland VA (1.4305) M16x1,5
3. Inspection window	
0	without window (standard)
1	lid with LED indicator
4. Options	
00	without option
01	measuring range optimized for media (Dk 1...4)
02	internal fixing element stainless steel
5. Certificate DIN EN 10204 (indicate only when required, multiple responses possible)	
RA08	R _a < 0,8µm (with acceptance test certificate 3.1 incl. measurement report)
RA06	R _a < 0,6µm (with acceptance test certificate 3.1 incl. measurement report)
WZ2.2	factory certification 2.2
APZMAT	acceptance test certificate 3.1 for material (in contact with products)
Accessory	
ACI211	USB connection cable for programming MLC43x

Additional accessories:

ACH connection cables

APH process connection

see separate product information **GHMadapt/Accessories**.

Capacitive Level Switch MLC437



- 2-port isolation
- Microprocessor controlled measurement
- Parametrization via build-in display and GHMware with Mini USB interface
- No moving parts in the medium
- 2 switching outputs
- Analog output for DK value
- Switching functions programmable
- Condensate-stability type

Technical data

Power supply

Supply voltage : 18..30 V DC, max. 100 mA
Electrical connection : M12x1 plug
CE-conformity : EN 61326:2007-05

Ambient conditions

Ambient temperature : -20..+60 °C
Climatic class : EN 60068-2-38:2010-06
Vibration class : EN 60068-2-6, GL test2

Certifications

EHEDG certificate no. : 28/2011

Sensor

Radiated frequency : 40.68 MHz, <1 mW
Measuring range : DK-value 1.5..175
Initialization time : 3 s
Process temperature : -20..+100 °C, 140 °C < 30 min
CIP-/SIP-capable
Process pressure : -1..+10 bar
Process material : PEEK, FDA approval number 21CFR177.2415
food-safe according to EHEDG
conform regulation EC 1935/2004 & 10/2011

Process connection : G1/2" hygienic
Stud torque : 5..10 Nm
Mounting direction : arbitrary, see mounting notes

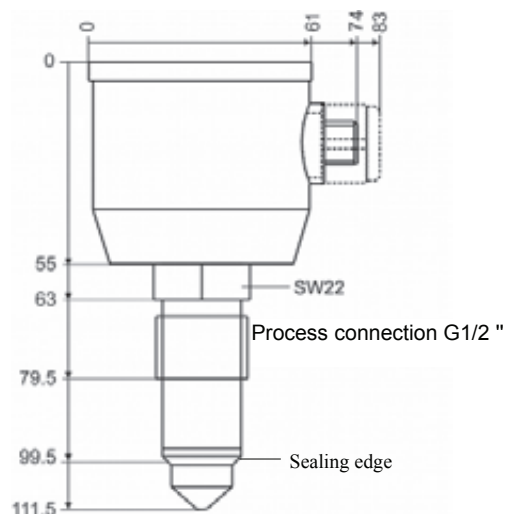
Outputs

Switching output : transistor PNP / NPN programmable
max. 30 V / 100 mA
Response time : 20 ms
Analog output : active 0/4..20 mA, burden <600 Ω
Response time : programmable from 0.1..10 s
Isolation : sensor, case / supply, outputs

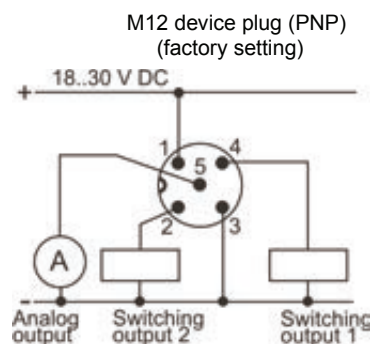
Case

Material : 1.4305
Display window : Acrylic glass (PMMA)
Protection class : IP67 / IP69K

Dimension



Connection diagram



Cable colors:

1 = brown, 2 = white, 3 = blue, 4 = black, 5 = gray

Ordering code

MLC437 - ^{1.} - ^{2.} - ^{3.} - ^{4.} - ^{5.}

1. Outputs	
0	2x PNP / NPN programmable and 1x analog output 0/4...20 mA
2. Electrical connection	
0	M12 plug
3. Inspection window	
0	cap with window for LC display
4. Options	
00	without option
01	measuring range optimized for media (Dk 1...4)
02	internal fixing element stainless steel
5. Certificate DIN EN 10204 (indicate only when required, multiple responses possible)	
RA08	$R_a < 0,8\mu\text{m}$ (with acceptance test certificate 3.1 incl. measurement report)
RA06	$R_a < 0,6\mu\text{m}$ (with acceptance test certificate 3.1 incl. measurement report)
WZ2.2	factory certification 2.2
APZMAT	acceptance test certificate 3.1 for material (in contact with products)
Accessory	
ACI211	USB connection cable for programming MLC43x

Additional accessories:

ACH connection cables

APH process connection

See separate product information **GHMadapt/Accessories**.

Capacitive Level Switch MLC490/492



Sensor	
Radiated frequency	: 40.68 MHz, <1 mW
Measuring range	: DK-value 5..175 MLC490 DK-value 1..175 MLC492
Factory setting	: DK-value = 20 (MLC490) DK-value = 1 (MLC492)
Initialization time	: 3 s
Process temperature	: -20..+80 °C 100 °C < 60 min CIP-capable *
Process pressure	: -1..+10 bar
Process material	: 1.4404, PEEK, FDA approval number 21CFR177.2415, food-safe acc. to EHEDG Conform regulation EC 1935/2004 & 10/2011
Surface quality	: $R_a \leq 0,8 \mu\text{m}$
Process connection	: G1" hygienic EHEDG certificate no. 28/2011
Stud torque	: 10..20 Nm
Mounting length	: min. 130 mm; max. 1000 mm
Mounting direction	: arbitrary, see mounting notes
Output	
Switching output	: transistor PNP or NPN max. 30 V / 100 mA
Response time	: programmable from 0.01..10 s
Isolation	: sensor, case/supply, outputs
Case	: SS-type round case
Material	: 1.4305
Protection class	: IP67 / IP69K

* For sterilisation processes with more than 100°C the device must be cut off from the power supply.

- Galvanic isolation
- Microprocessor controlled measurement
- Parametrization via GHMware and adapter EYY120
- No moving parts in the medium
- Switching function depends to the polarity of the supply voltage
- Condensate-stability type

Technical data

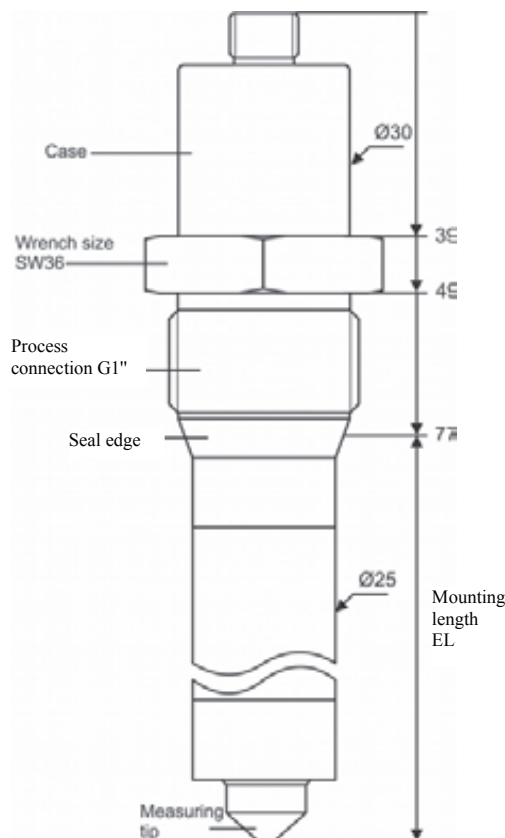
Power supply

Supply voltage	: 18..30 V DC, max. 50 mA
Electrical connection	: M12x1 plug
CE-conformity	: EN 61326:2007-05

Ambient conditions

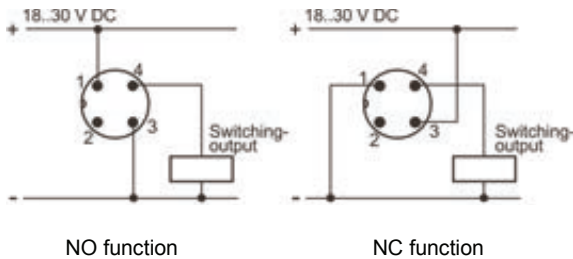
Ambient temperature	: -20..+80 °C
Storage temperature	: -20..+105 °C
Climatic class	: EN 60068-2-38:2010-06
Vibration class	: EN 60068-2-6, GL test2

Dimensions



Connection diagram

M12 plug (PNP)
(factory setting)



Cable colors:
1 = brown, 2 = white, 3 = blue, 4 = black

Ordering code

MLC49 1. 2. 3. 4. 5. 6. 7.
[] - [] - [] - [] - [] - [] - []

1. Measuring range	
0	DK-value 5..175
2	DK-value 1..175
2. Mounting length EL [mm]	
130	
200	
300	
400	
500	
600	
700	
800	
900	
1000	
XXX	custom length min. 130 mm, max. 1000 mm
3. Switching output	
0	PNP (standard)
1	NPN
4. Electrical connection	
0	M12-plug
5. Inspection window	
0	without window
6. Options	
00	without option
11	
7. Certificate DIN EN 10204 (indicate only when required, multiple responses possible)	
RA08	R _a < 0,8µm (with acceptance test certificate 3.1 incl. measurement report)
RA06	R _a < 0,6µm (with acceptance test certificate 3.1 incl. measurement report)
WZ2.2	factory certification 2.2
APZMAT	acceptance test certificate 3.1 for material (in contact with products)

Accessories:
ACH connection cables
APH process connection
see separate product information **GHMadapt/Accessories**.

EYY120 Programming adapter

Programming Adapter EYY120



- Universal adapter
- Suitable for all conductive and capacitive point-level switches series MLX42(9)X
- USB 2.0 compatible

Characteristics

The programming adapter fulfills all requirements for the configuration of point level switches series MLX42(9)X. Selectable parameters include measuring range (sensitivity for conductive switches), response time, switching mode, operating mode and designation of the measuring device.

A free download of the GHMware Programming Software can be found on our website at:
www.ghm-messtechnik.de/downloads/ghm-software.

Technical Data

Power supply

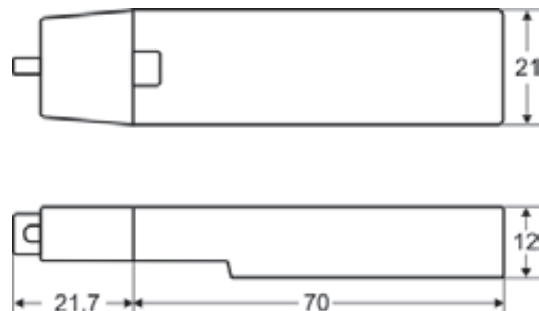
Supply voltage : USB Bus
 Power consumption : 1.5 W

Operating temperature : -10...+55 °C
 Storage temperature : -40...+60 °C
 Relative humidity : < 95 %
 Bedewing : not permissible

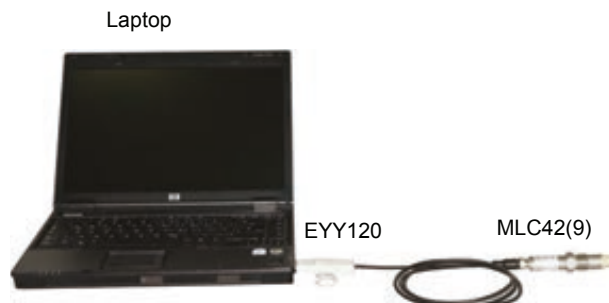
CE-conformity : EN 55022: 2011-12
 EN 55024: 2011-09

Electrical connection : USB2.0
 Sensor connection : 5-pole round plug M12x1
 Connection cable : PUR cable 1.5 m
 Case : ABS, grey

Dimensions



Operation example



Ordering code

1.
 EYY -

1. Design type
120 Input USB 2.0

C7 Hygienic Design

Point level conductive

168

Level Conductive



Characteristics

System/ Principle	Conductive resistance measurement, temperature measurement
Evaluation	Indicating, switching, point level
Process connection	M12, G ½, G 1
Electrode length	Rod / cable 4..5000 mm
Media	Liquids, viscose media
Pressure range	-1..+10 bar
Media temperature	-20..+120°C CIP-/SIP-capable 140 °C < 30 min

Applications

- Dry-run and overfill monitoring
- Pump monitoring
- Food and beverage industry
- Cosmetics industry
- Biotechnology
- Chemical industry
- Mechanical engineering
- Thermo facilities
- Water preparation
- Automotive manufacturing

Product information

Level conductive

Function

The level is acquired by an electric measuring process. For this purpose the electrodes have an alternating voltage of < 5 V. As soon as the electrodes are immersed by a conductive liquid, a current flows that is evaluated. The alternating voltage prevents the electrodes from destruction and degradation of the medium. The material of the tank wall is insignificant for the measurement process as in the case of metal walls the process connection, and in the case of non-conductive walls, an additional probe rod is used as ground-electrode (ground potential).

The parts in contact with the medium are made of FDA compatible materials and are CIP-/SIP capable. 30-minute steam sterilisation possible at max. 140 °C.

Advantage

- Installation without gaps and cavity-free *
- No mechanical moving parts
- Compact construction design for hygienic compliance
- Suitable for different pressures and temperatures
- Overfill protection according to Article 19 WHG/German Water Resources Act (in preparation)
- Hygiene compatible installation by welding sleeves
- The electrodes can be subsequently shortened to any desired length and bent into the desired position
- Hygienic non-elastomeric sealing principle *
- With the compact version up to 3 levels can be detected without separate electronics

*Hygienic non-elastomeric sealing principle



Selection of electrodes for the corresponding field of utilisation

Uncoated electrodes:

Can be implemented for aqueous, non-adhesive media and rods pointing downwards.

For multi-rod sensors and electrode rods that are longer than 500 mm the coated type and the spacer AMD100 are recommended to ensure that the rods are fixed, do not come into contact with each other and thus do not cause any false reports.

Coated electrodes:

For the implementation in foaming and adhesive/moistening media the coated version is recommended.

If the sensor is mounted in the casing floor, the rods point upwards. The coated version must be used for this installation position.

Mounting notes

It is necessary to avoid trapped air in horizontal mounted tubes, particularly by sensors with a stub rod.

Notes

0 To ensure a safe functioning of the system please use the process adaptation **GHMadapt**. We offer welding aids for the correct installation of the welding sleeves.

\$ Please consider the maximum permissible torque for the installation (see process adaptation)

Standards and principles

The applicable standards and principles must be adhered.

Cleaning and maintenance

- Do not aim the high-pressure jet of the cleaning device on the electric connection when cleaning the instrument.





Transport and storage






- Store dry and dust-free
- Do not expose to aggressive media
- Avoid mechanical vibrations
- Storage temperature -20...+80 °C
- Relative humidity max. 95%

Return consignment

- The sensor must be cleaned for return consignment. Make sure there is no contamination by dangerous media. The return consignment form is at disposal as download in the Internet.

Device Overview

Device		Process-connection / design	Function	Medium min. conductance >2 µS	Materials		Page
					Case	Sensor	
SLR420-1		M12	Point level sensor passive, electrode length 4..200 mm 1 point	Liquids, viscose media, adherent media	Ø 18 mm SS type 1.4305	SS-type 1.4404 Peek PFA-coated	172
SLR420-2		G½	As SLR420-1 but electrode length 4..5000 mm	Liquids, viscose media, adherent media	Ø 18 mm SS type 1.4305	SS-type 1.4404 PEEK PFA-coated	173
SLT420-2		G½	Point level- and Temperature sensor passive, electrode length 15...1000 mm	Liquids, viscose media, adherent media	Ø 18 mm SS type 1.4305	SS-type 1.4404, PEEK, Pt100	174
SLR430-1		M12	Point level sensor passive, electrode length 4..200 mm 1 point	Liquids, viscose media, adherent media	Ø 59 mm SS type 1.4305	SS-type 1.4404 Peek PFA-coated	175
SLR430-2		G½	As SLR430-1 but electrode length 4..5000 mm	Liquids, viscose media, adherent media	Ø 59 mm SS type 1.4305	SS-type 1.4404 PEEK PFA-coated	176
SLT430-2		G½	Point level- and Temperature sensor passive, electrode length 15..1000 mm	Liquids, viscose media, adherent media	Ø 59 mm SS type 1.4305	SS-type 1.4404, PEEK, Pt100	177
SLR430-3		G1	Point level sensor passive, electrode length 200..5000 mm 1-4 point levels	Liquids, viscose media, adherent media	Ø 59 mm SS type 1.4305	SS-type 1.4404 Peek PFA-coated	178
SLT430-3		G1	Point level- and Temperature sensor passive, electrode length 200..1000 mm, 1-4 point levels	Liquids, viscose media, adherent media	Ø 59 mm SS type 1.4305	SS-type 1.4404, PEEK, Pt100	179
MLR420-1		M12	Point level switch active, with transmitter electrode length 4..200 mm 1 point level	Liquids, viscose media, adherent media	Ø 18 mm SS type 1.4305	SS-type 1.4404 PEEK PFA-coated	180
MLR420-2		G½	As MLR420-1 but electrode length 200..5000 mm	Liquids, viscose media, adherent media	Ø 18 mm SS type 1.4305	SS-type 1.4404 PEEK PFA-coated	181

Device		Process-connection / design	Function	Medium min. conductance >2 µS	Materials		Page
MLT420-2		G½	Point level switch with electronic and passive temperature sensor, MR 15..1000 mm, 1 point level	Liquids, viscose media, adherent media	Ø 18 mm SS-type 1.4305	SS-type 1.4404, PEEK, Pt100	183
MLR430-1		M12	Point level switch active, with transmitter, electrode length 4..200 mm, 1 point level	Liquids, viscose media, adherent media	Ø 59 mm SS type 1.4305	SS-type 1.4404 PEEK PFA-coated	184
MLR430-2		G½	As MLR430-1 but electrode length 4..5000 mm	Liquids, viscose media, adherent media	Ø 59 mm SS type 1.4305	SS-type 1.4404 PEEK PFA-coated	185
MLT430-2		G½	Point level switch with electronic and passive temperature sensor, electrode length 15..1000 mm, 1 point level	Liquids, viscose media, adherent media	Ø 59 mm SS-type 1.4305	SS-type 1.4404, PEEK, Pt100	187
MLR430-3		G1	Point level sensor active, with transmitter, electrode length 200..5000 mm, 1-4 point levels	Liquids, viscose media, adherent media	Ø 59 mm SS type 1.4305	SS-type 1.4404 PEEK PFA-coated	188
MLT430-3		G1	Point level switch with electronic and passive temperature sensor, electrode length 15..1000 mm, 1-4 point levels	Liquids, viscose media, adherent media	Ø 59 mm SS-typel 1.4305	SS-type 1.4404, PEEK, Pt100	190
MLR120		2 measuring inputs 2 outputs	Evaluation electronic for point level sensors	-	Polyamide PA6.6	-	191
MLR157		4 point level inputs 1 RTD Pt100 5 outputs	Evaluation electronic for point level sensors	-	Polyamide PA6.6	-	192
Accessories							
EYY120		USB 2.0 Port 5-pole cable plug	Programming adapter		ABS		193

Mistakes reserved, technical specifications subject to change without notice.

Accessories:

Connection cable and Process adaption see separate [Product information GHMadapt/Accessories](#).

USB adapter cable for programming devices MLX43X see [price list chapter C1 GHMadapt/Accessories](#)

Conductive Point Level Sensor SLR420-1



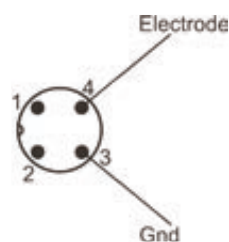
- 1 point level
- Process connection GHMadapt M12x1.5
- Round case SS-type Ø 18 mm
- No moving parts in the medium
- Without electronic
- Passive sensor

Technical data

Number of electrodes	: 1
Electrode length	: 4..200 mm
Process temperature	: -20..+120 °C, 140 °C < 30 min CIP-/SIP-capable
Ambient temperature	: -20..+80 °C
Process pressure	: -1..+10 bar
Process material	: 1.4404, PEEK, PFA-coated, FDA conform food safe acc. to EHEDG
EHEDG certificate no.	: 28/2011
Process connection	: compatible to standard hygienic threads M12x1.5
Stud torque	: 5..10 Nm
Case	: round case SS-type Ø18 mm
Electrical connection	: M12 plug
Material	: 1.4305
Protection class	: IP67 / IP69K

Connection diagram

M12 device plug, 4-pole



Cable colors:

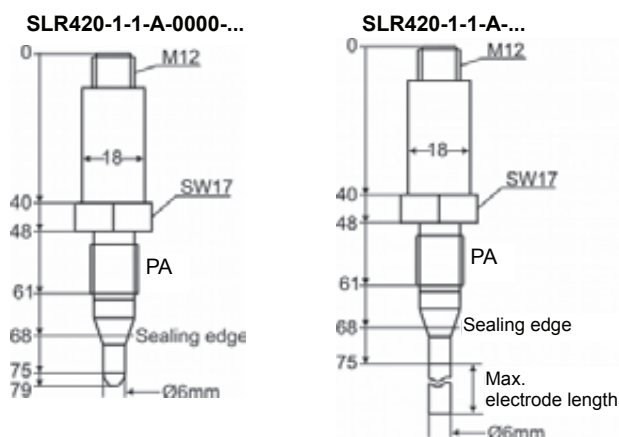
1 = n.c., 2 = n.c., 3 = blue, 4 = black

Ordering code

SLR420 - 1. - 2. - 3. - 4. - 5. - 6. - 7. - 8.

1. Process connection (PA)	
1	M12x1.5
2. Number of electrodes	
1	1 electrode
3. Electrode type (rod or cable)	
A	rod
B	cable (on request)
4. Electrode length [mm]	
0000	stub rod
0200	200
XXXX	customized length (on request)
5. Electrode surface	
0	uncoated (standard)
1	PFA, black coated
6. Electrical connection	
0	M12 plug
7. Options	
00	without option
8. Certificate DIN EN 10204, indicate only when required	
WZ2.2	factory certification 2.2

Dimensions



Conductive Point Level Sensor SLR420-2

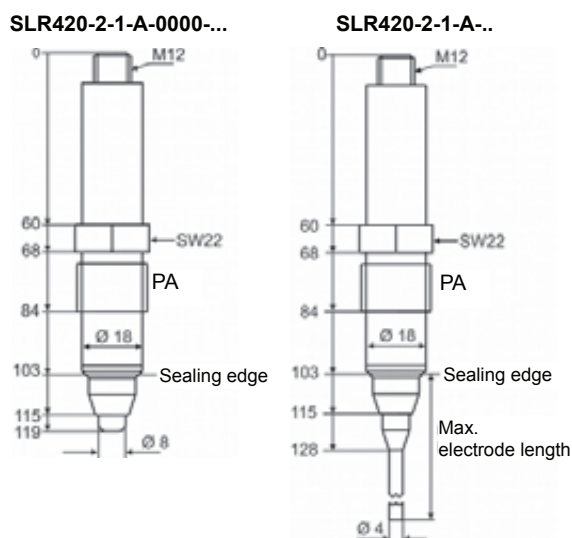


- 1 point level
- Process connection GHMadapt G $\frac{1}{2}$
- Round case SS-type Ø 18 mm
- No moving parts in the medium
- Without electronic
- Passive sensor

Technical data

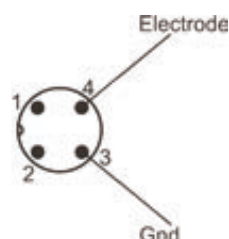
Number of electrodes	: 1
Electrode length	: 4..5000 mm
Process temperature	: -20..+120 °C, 140 °C < 30 min CIP-/SIP-capable
Ambient temperature	: -20..+80 °C
Process pressure	: -1..+10 bar
Process material	: 1.4404, PEEK, PFA-coated, FDA conform food safe acc. to EHEDG
EHEDG certificate no.	: 28/2011
Process connection	: compatible to standard hygienic threads G $\frac{1}{2}$
Stud torque	: 5..10 Nm
Case	: round case SS-type Ø18 mm
Electrical connection	: M12 plug
Material	: 1.4305
Protection class	: IP67 / IP69K

Dimensions



Connection diagram

M12 device plug, 4-pole



Cable colors:

1 = n.c., 2 = n.c. 3 = blue, 4 = black

Ordering code

SLR420 - 1. - 2. - 3. - 4. - 5. - 6. - 7. - 8.

1. Process connection (PA)	
2	G $\frac{1}{2}$
2. Number of electrodes	
1	1 electrode
3. Electrode type (rod or cable)	
A	rod
B	cable (on request)
4. Electrode length [mm]	
0000	stub rod
0200	200
0500	500
1000	1000
1500	1500
2000	2000
2500	2500
3000	3000
3500	3500
4000	4000
4500	4500
5000	5000
XXXX	customized length (on request)
5. Electrode surface	
0	uncoated (standard)
1	0200 PFA black
	0500 PFA black
	1000 PFA black
	1500 PFA black
	2000 PFA black
	Custom length (on request)
6. Electrical connection	
0	M12 plug
7. Options	
00	without option
8. Certificate DIN EN 10204, indicate only when required	
WZ2.2	factory certification 2.2

Conductive Point Level Sensor with Pt100 Sensor SLT420-2

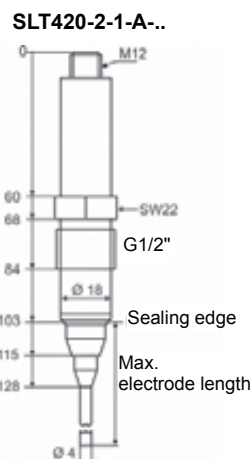


- Passive point level and temperature measurement
- 1 point level with integrated RTD Pt100 sensor
- Process connection GHMadapt G½" hygienic
- Round case stainless steel type Ø 18 mm
- No moving parts in the medium
- Without electronic
- Electrode cannot be shortened afterwards

Technical data

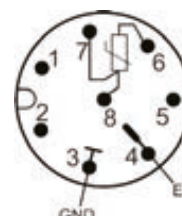
Number of electrodes	: 1
Electrode length	: 15..1000 mm
Temperature sensor	: Pt100, class A
Process temperature	: -20..+120 °C, 140 °C < 30 min CIP-/SIP-capable
Ambient temperature	: -20..+80 °C
Process pressure	: -1..+10 bar
Process material	: 1.4404, PEEK, FDA conform food safe acc. to EHEDG conform regulation 1935/2004 & 10/2011
EHEDG	: certificate no. 28/2011
Process connection	: compatible to standard hygienic threads G½" hygienic
Stud torque	: 5..10 Nm
Case	: round case stainless steel type Ø18 mm
Electrical connection	: M12 plug (8-pin)
Material	: 1.4305
Protection class	: IP67 / IP69K
CE-conformity	: EN 50581:2012

Dimensions



Connection diagram

M12 plug, 8-pin



Cable colors:
 3 = green : ground
 4 = black : electrode
 6 = pink, 7 = blue, 8 = red : Pt100 sensor

Order code

SLT420 - 1. - 2. - 3. - 4. - 5. - 6. - 7. - 8.

1.	Process connection
2	G½" hygienic
2.	Number of electrodes
1	1 electrode
3.	Electrode type
A	rod
4.	Electrode length [mm]
0015	15 (min. length)
0200	200
0500	500
1000	1000
xxx	special length on request
5.	Electrode surface
0	uncoated
6.	Electrical connection
0	M12 plug
7.	Options
00	without option
8.	Certificate DIN EN 10204, indicate only when required
WZ2.2	factory certification 2.2
Accessories	
ACH113	8-pole hygienic connection cable, straight
ACH123	8-pole hygienic connection cable, angular

Conductive Point Level Sensor SLR430-1

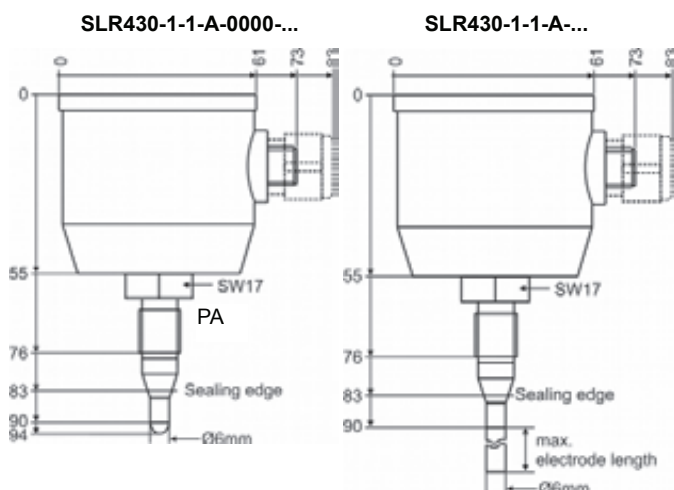


- 1 point level
- Process connection GHMadapt M12x1,5
- Round case SS-type Ø 59 mm
- No moving parts in the medium
- Without electronic
- Passive sensor

Technical data

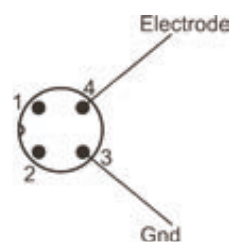
Number of electrodes	: 1
Electrode length	: 4..200 mm
Process temperature	: -20...+120 °C, 140 °C < 30 min CIP-/SIP-capable
Ambient temperature	: -20...+80 °C
Process pressure	: -1...+10 bar
Process material	: 1.4404, PEEK, PFA-coated, FDA conform food safe acc. to EHEDG
EHEDG certificate no.	: 28/2011
Process connection	: compatible to standard hygienic threads M12x1.5
Stud torque	: 5..10 Nm
Case	: round case SS-type Ø 59 mm
Material	: 1.4305
Electrical connection	: M12 plug or cable gland M16x1.5 Polyamide (PA) or SS-type 1.4305
Protection class	: IP67 / IP69K

Dimensions



Connection diagram

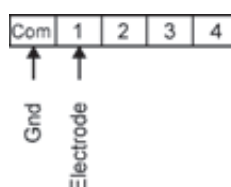
M12 device plug, 4-pole



Cable colors:

1 = n.c. , 2 = n.c. , 3 = blue, 4 = black

Internal terminal strip



Ordering code

SLR430 - 1. - 2. - 3. - 4. - 5. - 6. - 7. - 8.

1. Process connection (PA)	
1	M12x1.5
2. Number of electrodes	
1	1 electrode
3. Electrode type (rod or cable)	
A	rod
B	cable (on request)
4. Electrode length [mm]	
0000	stub rod
0200	200
XXXX	customized length (on request)
5. Electrode surface	
0	uncoated (standard)
1	PFA, black coated
6. Electrical connection	
0	M12 plug
1	cable gland PA
2	cable gland 1.4305
7. Options	
00	without option
8. Certificate DIN EN 10204, indicate only when required	
WZ2.2	factory certification 2.2

Conductive Point Level Sensor SLR430-2

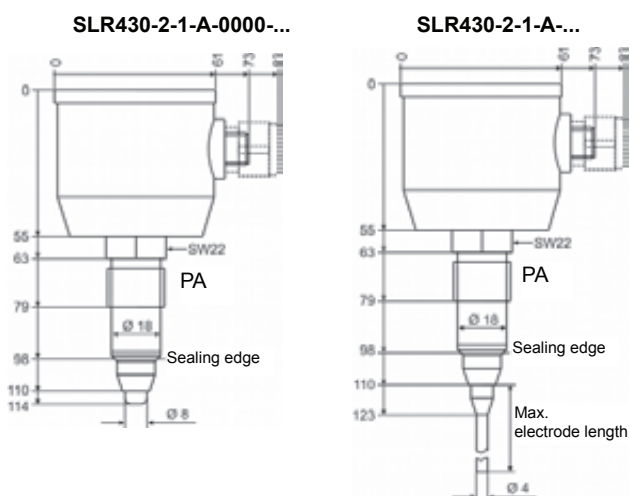


- 1 point level
- Process connection GHMadapt G $\frac{1}{2}$
- Round case SS-type Ø 59 mm
- No moving parts in the medium
- Without electronic
- Passive sensor

Technical data

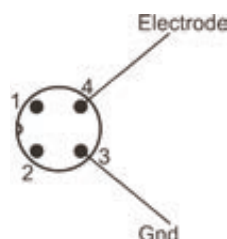
Number of electrodes	: 1
Electrode length	: 4..200 mm
Process temperature	: -20..+120 °C, 140 °C < 30 min CIP-/SIP-capable
Ambient temperature	: -20..+80 °C
Process pressure	: -1..+10 bar
Process material	: 1.4404, PEEK, PFA-coated, FDA conform food safe acc. to EHEDG
EHEDG certificate no.	: 28/2011
Process connection	: compatible to standard hygienic threads G $\frac{1}{2}$
Stud torque	: 5..10 Nm
Case	: round case SS-type Ø 59 mm
Material	: 1.4305
Electrical connection	: M12 plug or cable gland M16x1.5 Polyamide (PA) or SS-type 1.4305
Protection class	: IP67 / IP69K

Dimensions

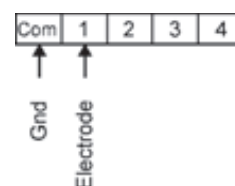


Connection diagram

M12 device plug, 4-pole



Internal terminal strip



Cable colors:

1 = n.c. , 2 = n.c. , 3 = blue, 4 = black

Ordering code

SLR430 - 1. - 2. - 3. - 4. - 5. - 6. - 7. - 8.

1. Process connection (PA)	
1	M12x1.5
2. Number of electrodes	
1	1 electrode
3. Electrode type (rod or cable)	
A	rod
B	cable (on request)
4. Electrode length [mm]	
0000	stub rod
0200	200
0500	500
1000	1000
1500	1500
2000	2000
2500	2500
3000	3000
3500	3500
4000	4000
4500	4500
5000	5000
XXXX	customized length (on request)
5. Electrode surface	
0	uncoated (standard)
1	0200 PFA, black coated
	0500 PFA, black coated
	1000 PFA, black coated
	1500 PFA, black coated
	2000 PFA, black coated
	Custom length (on request)
6. Electrical connection	
0	M12 plug
1	cable gland PA M16x1.5
2	cable gland V2A (1.4305) M16x1.5
7. Options	
00	without option
8. Certificate DIN EN 10204, indicate only when required	
WZ2.2	factory certification 2.2

Conductive Point Level Sensor with Pt100 Sensor SLT430-2

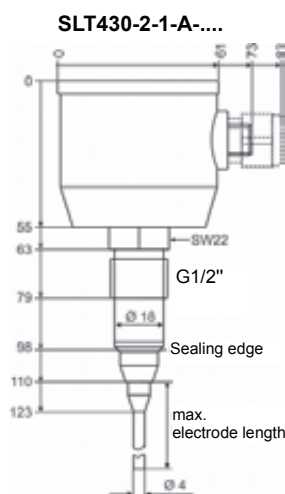


- Passive point level and temperature measurement
- 1 point level with integrated RTD Pt100 sensor
- Process connection GHMadapt G $\frac{1}{2}$ " hygienic
- Round case stainless steel type Ø 59 mm
- No moving parts in the medium
- Without electronic
- Electrode cannot be shortened afterwards

Technical data

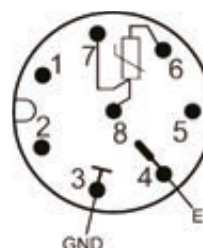
Number of electrodes	: 1
Electrode length	: 15..1000 mm
Temperature sensor	: Pt100 class A
Process temperature	: -20..+120 °C, 140 °C < 30 min CIP-/SIP-capable
Ambient temperature	: -20..+80 °C
Process pressure	: -1..+10 bar
Process material	: 1.4404, PEEK, FDA conform, food safe according to EHEDG conform regulation 1935/2004 & 10/2011
EHEDG certificate no.	: 28/2011
Process connection	: compatible to standard hygienic threads G $\frac{1}{2}$ " hygienic
Stud torque	: 5..10 Nm
Case	: round case stainless steel type Ø 59 mm
Material	: 1.4305
Electrical connection	: M12 plug, 8-pin
Protection class	: IP67 / IP69K
CE-conformity	: EN 50581:2012

Dimensions



Connection diagram

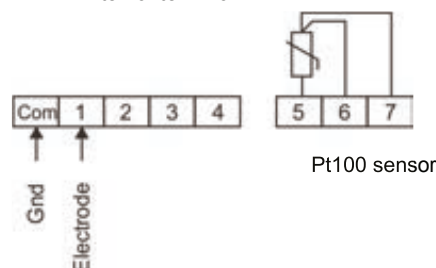
M12 plug, 8-pin



Cable colors:

3 = green	: ground
4 = yellow	: electrode
6 = pink, 7 = blue, 8 = red	: Pt100 sensor

Internal terminal



Order code

SLT430 - 1. - 2. - 3. - 4. - 5. - 6. - 7. - 8.

1. Process connection	
2	G $\frac{1}{2}$ " hygienic
2. Number of electrodes	
1	1 electrode
3. Electrode type	
A	rod
4. Electrode length [mm]	
0015	15 (min. length)
0200	200
0500	500
1000	1000
xxx	special length on request
5. Electrode surface	
0	uncoated (standard)
1	PFA black on request
6. Electrical connection	
0	M12 plug
1	cable gland Poliamide (PA) M16x1.5
2	cable gland stainless steel (1.4305) M16x1.5
7. Options	
00	without option
8. Certificate DIN EN 10204, indicate only when required	
WZ2.2	factory certification 2.2
Accessories	
ACH113	8-pole hygienic connection cable, straight
ACH123	8-pole hygienic connection cable, angular

Conductive Point Level Sensor SLR430-3

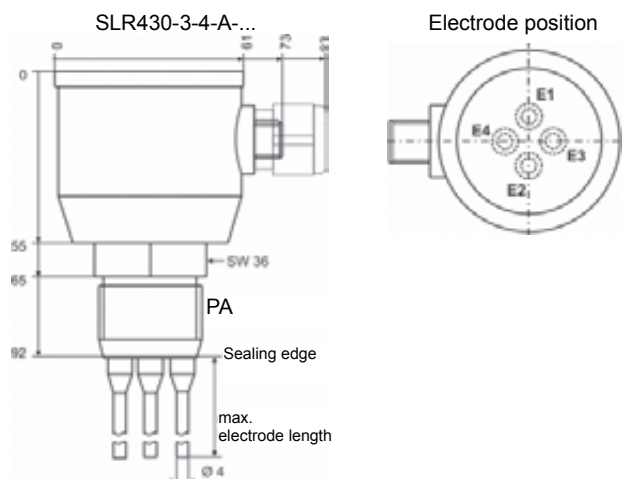


- 4 point levels
- Process connection GHMadapt G1
- Round case SS-type Ø 59 mm
- No moving parts in the medium
- Without electronic
- Passive sensor

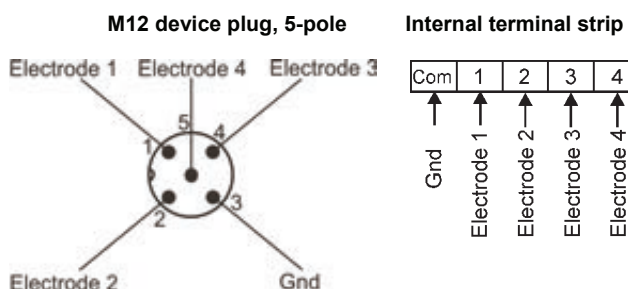
Technical data

Number of electrodes	: 1..4
Electrode length	: 15..5000 mm
Process temperature	: -20..+120 °C, 140 °C < 30 min CIP-/SIP-capable
Ambient temperature	: -20..+80 °C
Process pressure	: -1..+10 bar
Process material	: 1.4404, PEEK, PFA-coated, FDA conform food safe according to EHEDG
EHEDG certificate no.	: 28/2011
Process connection	: compatible to standard hygienic threads G1
Stud torque	: 10..20 Nm
Case	: round case SS-type Ø 59 mm
Material	: 1.4305
Electrical connection	: M12 plug or cable gland M16x1.5 Polyamide (PA) or SS-type 1.4305
Protection class	: IP67 / IP69K

Dimensions



Connection diagram



Cable colors: 1 = brown, 2 = white, 3 = blue, 4 = black, 5 = grey

Ordering code

SLR430 - 1. - 2. - 3. - 4. - 5. - 6. - 7. - 8.

1.	Process connection (PA)
3	G1
2.	Number of electrodes
1	1 electrode
2	2 electrodes
3	3 electrodes
4	4 electrodes
3.	Electrode type (rod or cable)
A	rod
B	cable (on request)
4.	Electrode length [mm]
0200	200
0500	500
1000	1000
1500	1500
2000	2000
2500	2500
3000	3000
3500	3500
4000	4000
4500	4500
5000	5000
XXXX	customized length (on request)
5.	Electrode surface
0	uncoated (standard)
1	0200 PFA, black coated
	0500 PFA, black coated
	1000 PFA, black coated
	1500 PFA, black coated
	2000 PFA, black coated
	Custom length (on request)
6.	Electrical connection
0	M12 plug
1	cable gland PA M16x1.5
2	cable gland V2A (1.4305) M16x1.5
7.	Options
00	without option
8.	Certificate DIN EN 10204, indicate only when required
WZ2.2	factory certification 2.2
	Accessories
AMD100	Spacer for multi-rod sensors

Conductive Point Level Sensor with Pt100 Sensor SLT430-3

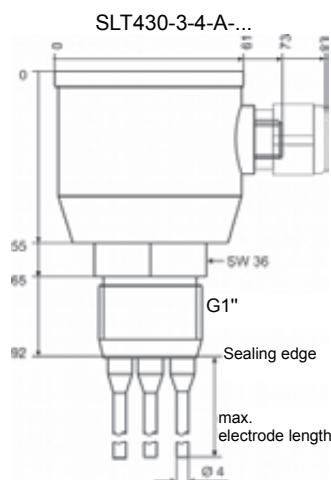


- Passive point level and temperature measurement
- 4 point levels with 1x integrated RTD
- Process connection GHMadapt G1" hygienic
- Round case stainless steel type Ø 59 mm
- No moving parts in the medium
- Without electronic
- Electrode E2 cannot be shortened afterwards

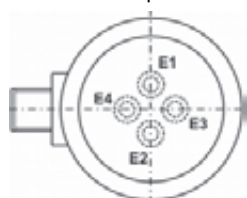
Technical data

Number of electrodes	: 1..4
Electrode length	: 15..1000 mm
Temperature sensor	: Pt100 class A
Process temperature	: -20...+120 °C, 140 °C < 30 min CIP-/SIP-capable
Ambient temperature	: -20...+80 °C
Process pressure	: -1...+10 bar
Process material	: 1.4404, PEEK, FDA conform food safe according to EHEDG conform regulation 1935/2004 & 10/2011
EHEDG certificate no.	: 28/2011
Process connection	: G1" hygienic
Stud torque	: 10..20 Nm
Case	: round case stainless steel type Ø 59 mm
Material	: 1.4305
Electrical connection	: M12 plug or cable gland M16x1.5 Polyamide (PA) or stainless steel type 1.4305
Protection class	: IP67 / IP69K
CE-conformity	: EN 50581:2012

Dimensions



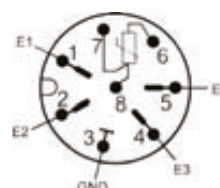
Electrode position



E2 = Rod with integr. Pt100 Sensor
Note:
 Electrode cannot be shortened afterwards.

Connection diagram

M12 plug, 8-pin

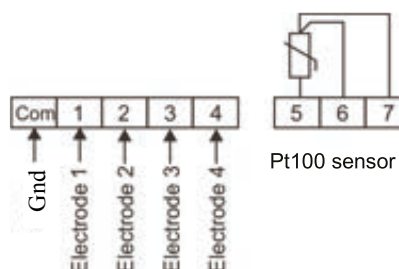


E1-E4 = Electrodes

Cable colours:

1 = white, 2 = brown, 4 = yellow, 5 = grey	: electrodes
3 = green	: ground
6 = pink, 7 = blue, 8 = red	: Pt100 sensor

Internal terminal



Order code

SLT430 - 1. - 2. - 3. - 4. - 5. - 6. - 7. - 8.

1. Process connection	
3	G1" hygienic
2. Number of electrodes	
1	1 electrode
2	2 electrodes
3	3 electrodes
4	4 electrodes
3. Electrode type	
A	rod
4. Electrode length [mm]	
0200	200
0500	500
1000	1000
xxx	special length on request
5. Electrode surface	
0	uncoated (standard)
6. Electrical connection	
0	M12 plug
1	cable gland Polyamide (PA) M16x1.5
2	cable gland stainless steel (1.4305) M16x1.5
7. Options	
00	without option
8. Certificate DIN EN 10204, indicate only when required	
WZ2.2	factory certification 2.2
Accessories	
AMD100	Spacer for multi-rod sensors
ACH113	8-pole hygienic connection cable, straight
ACH123	8-pole hygienic connection cable, angular

Conductive Point Level Switch MLR420-1



- 1 point level with switching output
- Process connection GHMadapt M12x1.5
- Round case, stainless steel type Ø 18 mm
- Flexible mounting: compact version
- No moving parts in the medium
- Sensitivity programmable
- Parameters programmable with GHMware via USB programming adapter EYY120
- Isolation between sensor, case / supply, output

Technical data

Compact version

Supply voltage : 18..30 V DC
Power consumption : < 3 VA
CE-conformity : EN 61326-1:2013

Ambient conditions

Ambient temperature : -20..+70 °C
Climatic class : EN 60068-2-38:2009
Vibration class : EN 60068-2-6:2008, GL Test 2

Certifications

EHEDG certificate no. : 28/2011

Input

Response time : 0.05..10 s, programmable

Output

Electronic : transistor PNP, max. 30 V DC / 100 mA

Electrical connection : M12 plug

Isolation : sensor system, case / supply, output

Case : round case, stainless steel type Ø 18

Material : 1.4305

Protection class : IP67 / IP69K

Electrode

Electrode length : 4..200 mm

Process temperature : -20..+100 °C, 140 °C < 30 min

CIP-/SIP-capable

Process pressure : -1..+10 bar

Min. media conductance : > 2µS

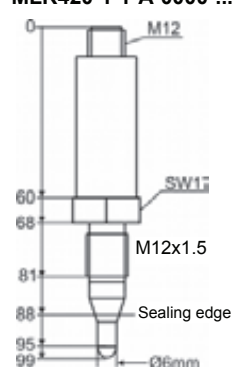
Process material : 1.4404, PEEK, PFA-coated,
FDA conform
food safe according to EHEDG
conform regulation EC 1935/2004 &
10/2011

Process connection : M12x1.5 hygienic

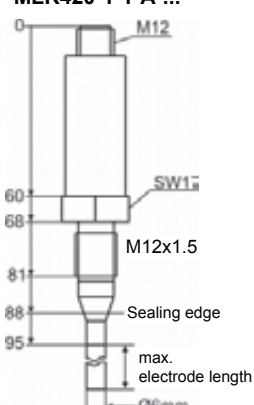
Stud torque : 5..10 Nm

Dimensions

MLR420-1-1-A-0000-...

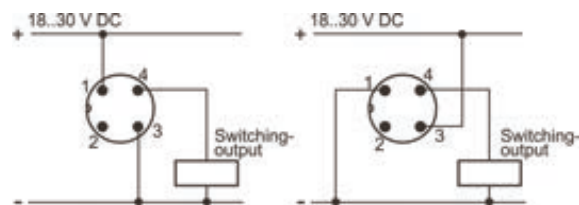


MLR420-1-1-A-...



Connection diagrams

M12 device plug, 4-pole



NO

NC

Cable colors: 1 = brown, 2 = white, 3 = blue, 4 = black

Order code

MLR420 - - - - - - - -

1. Process connection	
1	M12x1.5
2. Number of electrodes	
1	1 electrode
3. Electrode type (rod or cable)	
A	rod
B	rope (on request)
4. Electrode length [mm]	
0000	stub rod
0200	200
XXXX	customized length (on request)
5. Electrode surface	
0	uncoated (standard)
1	black coated, PFA material
6. Electrical connection	
0	M12 plug
7. Options	
00	without option
8. Certificate DIN EN 10204, indicate only when required	
WZ2.2	factory certification 2.2

Accessories	
EYY120	USB programming adapter

Conductive Point Level Switch MLR420-2



- 1 point level with switching output
- Process connection GHMadapt G $\frac{1}{2}$ " hygienic
- Round case, stainless steel type Ø 18 mm
- Flexible mounting: compact version
- No moving parts in the medium
- Sensitivity programmable
- Parameters programmable with GHMware via USB programming adapter EYY120
- Isolation between sensor, case / supply, output

Technical data

Compact version

Supply voltage : 18..30 V DC
Power consumption : < 3 VA
CE-conformity : EN 61326-1:2013

Ambient conditions

Ambient temperature : -20..+70 °C
Climatic class : EN 60068-2-38:2009
Vibration class : EN 60068-2-6:2008, GL Test 2

Certifications

EHEDG certificate no. : 28/2011

Input

Response time : 0.05..10 s, programmable

Output

Electronic : NO / NC programmable

Electrical connection : M12 plug

Isolation : sensor system, case / supply, output

Case : round case, stainless steel type Ø 18 mm

Material : 1.4305

Protection class : IP67 / IP69K

Electrode

Electrode length : 4..5000 mm

Process temperature : -20..+100 °C, 140 °C < 30 min
CIP-/SIP-capable

Process pressure : -1..+10 bar

Min. media conductance : > 2µS

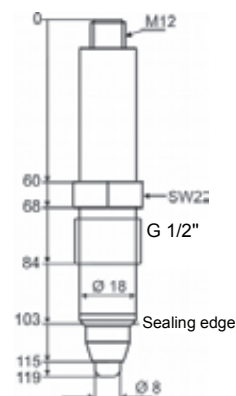
Process material : 1.4404, PEEK, PFA-coated,
FDA conform
food safe according to EHEDG
conform regulation EC 1935/2004 &
10/2011

Process connection : G $\frac{1}{2}$ " hygienic

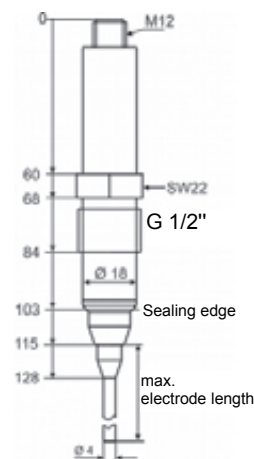
Stud torque : 5..10 Nm

Dimensions

MLR420-2-1-A-0000-...

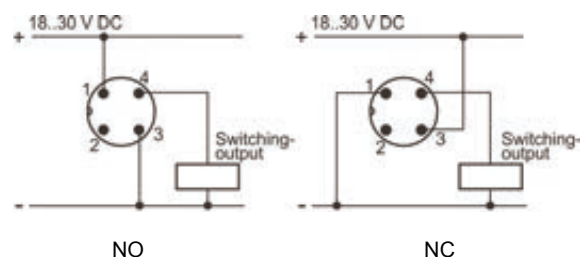


MLR420-2-1-A-...



Connection diagram

M12 device plug, 4-pole



Cable colors:

1 = brown, 2 = white, 3 = blue, 4 = black

Order code

MLR420 - 1. - 2. - 3. - 4. - 5. - 6. - 7. - 8.

1. Process connection	
2	G½" hygienic
2. Number of Electrodes	
1	1 electrode
3. Electrode type	
A	rod
B	rope (on request)
4. Electrode length [mm]	
0000	stub rod
0200	200
0500	500
1000	1000
1500	1500
2000	2000
2500	2500
3000	3000
3500	3500
4000	4000
4500	4500
5000	5000
XXXX	customized length (on request)
5. Electrode surface	
0	uncotaed (standard)
1	0200 PFA, black coated
	500 PFA, black coated
	1000 PFA, black coated
	1500 PFA, black coated
	2000 PFA, black coated
	customized length (on request)
6. Electrical connection	
0	M12 plug
7. Options	
00	without option
8. Certificate DIN EN 10204 (indicate only when required)	
WZ2.2	factory certification 2.2

Accessories	
EYY120	USB programming adapter

Conductive Point Level Switch MLT420-2



- 1 point level with switching output
- integrated RTD Pt100 sensor isolated
- Process connection GHMadapt G ½" hygienic
- Round case, stainless steel type Ø 18 mm
- Flexible mounting: compact version
- No moving parts in the medium
- Sensitivity programmable
- Parameters programmable with GHMware via USB programming adapter EYY120
- Isolation between sensor, case / supply, output
- Electrode cannot be shortened afterwards

Technical data

Compact version

Supply voltage : 18..30 V DC
Power consumption : < 3 VA
CE-conformity : EN 61326-1:2013

Ambient conditions

Ambient temperature : -20..+70 °C
Climatic class : EN 60068-2-38:2009
Vibration class : EN 60068-2-6:2008, GL Test 2

Certifications

EHEDG certificate no. : 28/2011

Input

Response time : 0.05..10 s, programmable

Output

Electronic : NO / NC programmable
Electrical connection : transistor PNP, max. 30 V DC / 100 mA
Electrical connection : M12 plug 8-pole

Isolation : sensor system, case / supply, output

Case

round case, stainless steel type

Ø 18 mm

Material : 1.4305

Protection class : IP67 / IP69K

Electrode

Electrode length : 15..1000 mm
Temperature sensor : RTDv Pt100 class A, isolated
Process temperature : -20..+100 °C, 140 °C < 30 min
CIP-/SIP-capable

Process pressure : -1..+10 bar

Min. media conductance : > 2µS

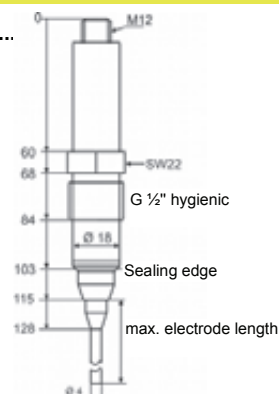
Process material : 1.4404, PEEK, PFA-coated,
FDA conform
food safe according to EHEDG
conform regulation 1935/2004 &
10/2011

Process connection : G ½" hygienic

Stud torque : 5..10 Nm

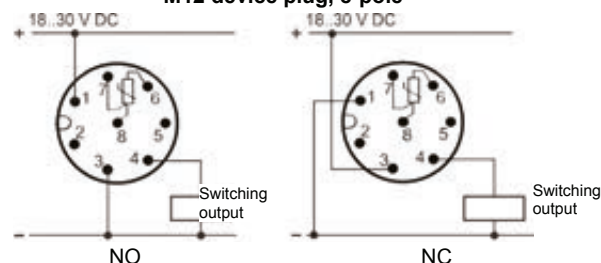
Dimensions

MLT420-2-1-A-...



Connection diagram

M12 device plug, 8-pole



Cable colors:

1 = white, 3 = green

4 = yellow

6 = pink, 7 = blue, 8 = red

: supply voltage

: output

: Pt100 sensor

Order code

MLT420 - 1. - 2. - 3. - 4. - 5. - 6. - 7. - 8.

1. Process connection	
2	G ½" hygienic
2. Number of Electrodes	
1	1 electrode
3. Electrode type	
A	rod
4. Electrode length [mm]	
0015	15 (min. electrode length)
0040	40
0200	200
0500	500
1000	1000
5. Electrode surface	
0	uncoated (standard)
6. Electrical connection	
0	M12 plug
7. Options	
00	without option
8. Certificate DIN EN 10204, indicate only when required	
WZ2.2	factory certification 2.2
Accessories	
EYY120	USB programming adapter for MLx42x
ACH113	8-pole hygienic connection cable, straight
ACH123	8-pole hygienic connection cable, angular

Conductive Point Level Switch MLR430-1



- 1 limit level with 3 switch outputs, freely configurable
- Process connection GHMadapt M12x1.5 hygienic
- Round case, stainless steel type Ø 59 mm
- Flexible mounting: compact version
- No moving parts in the medium
- Sensitivity programmable
- Parameters programmable with GHMware via USB interface
- Isolation between sensor system, case / supply, output
- Wide range LED indicator

Technical data

Compact version

Supply voltage : 18..30 V DC
Power consumption : < 3 VA
CE-conformity : EN 61326-1:2013

Ambient conditions

Ambient temperature : -20..+70 °C
Climatic class : EN 60068-2-38:2009
Vibration class : EN 60068-2-6:2008, GL Test 2

Certifications

EHEDG certificate no. : 28/2011

Input

Response time : 0.05..10 s, programmable

Output

NO / NC programmable

3 x Electronic

transistor PNP,

max. 30 V DC / 100 mA

Electrical connection : M12x1 plug or cable gland M12x1.5
Polyamide (PA) or stainless steel type 1.4305

Isolation : sensor system, case / supply, output

LED indicator : red/green programmable

Case

round case, stainless steel type

Ø 59 mm

Material

: 1.4305

LED-cap

: Acrylic glass (PMMA)

Protection class

: IP67 / IP69K

Electrode

: 1

Electrode length

: 4..200 mm

Process temperature

: -20..+100 °C, 140 °C < 30 min

CIP-/SIP-capable

Process pressure

: -1..+10 bar

Min. media conductance

: > 2µS

Process material

: 1.4404, PEEK, PFA-coated,
FDA conform
food safe according to EHEDG
conform regulation EC 1935/2004 &
10/2011

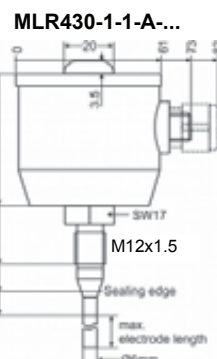
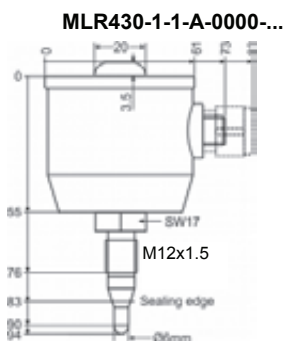
Process connection

: M12x1.5

Stud torque

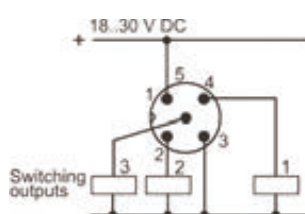
: 5..10 Nm

Dimensions

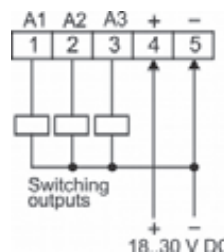


Connection diagram

M12 device plug, 5-pole



Internal terminal



Cable colors:

1 = brown, 2 = white, 3 = blue, 4 = black, 5 = grey

Order code

MLR430 - 1. - 2. - 3. - 4. - 5. - 6. - 7. - 8.

1. Process connection	
1	M12x1.5 hygienic
2. Number of electrodes	
1	1 electrode
3. Electrode type	
A	rod
B	rope (on request)
4. Electrode length [mm]	
0000	stub rod
0200	200
XXXX	customized length (on request)
5. Electrode surface	
0	uncoated (standard)
1	black coated, PFA material
6. Electrical connection	
0	M12 plug
1	cable gland, plastic (PA) M12x1.5
2	cable gland, stainless steel type (1.4305) M12x1.5
7. Options	
00	without option
8. Certificate DIN EN 10204 (indicate only when required)	
WZ2.2	factory certification 2.2
Accessories	
ACI211	USB programming cable for MLx43x

Conductive Point Level Switch MLR430-2



- 1 point level with 3 switch outputs, freely configurable
- Process connection GHMadapt G $\frac{1}{2}$ " hygienic
- Round case, stainless steel type Ø 59 mm
- Flexible mounting: compact version
- No moving parts in the medium
- Sensitivity programmable
- Parameter programmable with GHMware via USB interface
- Isolation between sensor system, case / supply, output
- Wide range LED indicator

Technical data

Compact version

Supply voltage : 18..30 V DC
 Power consumption : < 3 VA
 CE-conformity : EN 61326-1:2013

Ambient conditions

Ambient temperature : -20..+70 °C
 Climatic class : EN 60068-2-38:2009
 Vibration class : EN 60068-2-6:2008, GL Test 2

Certifications

EHEDG certificate no. : 28/2011

Input

Response time : 0.05..10 s, programmable

Output

3 x Electronic : transistor PNP, max. 30 V DC / 100 mA

Electrical connection : M12 plug or cable gland M16x1.5 polyamide (PA) or stainless steel type 1.4305

Isolation : sensor system, case / supply, output

LED indicator : red/green programmable

Case : round case, stainless steel type Ø 59 mm

Material : 1.4305

LED-cap : Acrylic glass (PMMA)

Protection class : IP67 / IP69K

Electrode

Electrode length : 4..5000 mm

Process temperature : -20..+100 °C, 140 °C < 30 min CIP-/SIP-capable

Process pressure : -1..+10 bar

Min. media conductance : > 2µS

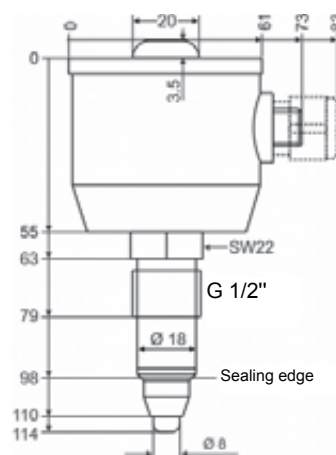
Process material : 1.4404, PEEK, PFA-coated, FDA conform food safe according to EHEDG conform regulation EC1935/2004 & 10/2011

Process connection : G $\frac{1}{2}$ " hygienic

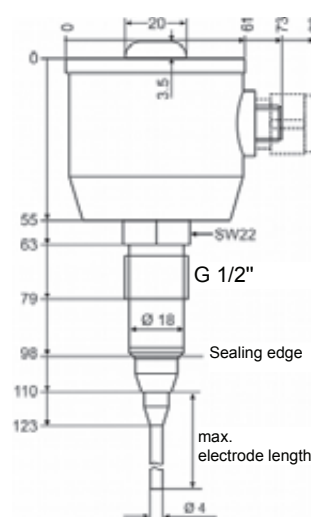
Stud torque : 5..10 Nm

Dimensions

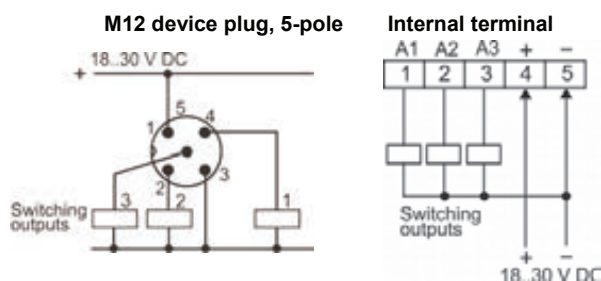
MLR430-2-1-A-0000-...



MLR430-2-1-A-...



Connection diagrams



Cable colors: 1 = brown, 2 = white, 3 = blue, 4 = black, 5 = grey

Order code

MLR430 - ^{1.} - ^{2.} - ^{3.} - ^{4.} - ^{5.} - ^{6.} - ^{7.} - ^{8.}

1. Process connection	
2	G½" hygienic
2. Number of electrodes	
1	1 electrode
3. Electrode type (rod or cable)	
A	rod
B	rope (on request)
4. Electrode length [mm]	
0000	stub rod
0200	200
0500	500
1000	1000
1500	1500
2000	2000
2500	2500
3000	3000
3500	3500
4000	4000
4500	4500
5000	5000
XXXX	customized length (on request)
5. Electrode surface	
0	uncoated (standard)
1	0200 PFA, black coated
	0500 PFA, black coated
	1000 PFA, black coated
	1500 PFA, black coated
	2000 PFA, black coated
	customized length (on request)
6. Electrical connection	
0	M12 plug
1	cable gland, plastic (PA) M16x1.5
2	cable gland, stainless steel type (1.4305) M16x1.5
7. Options	
00	without option
8. Certificate DIN EN 10204, indicate only when required	
WZ2.2	factory certification 2.2

Accessories	
ACI211	USB programming cable for MLx43x

Conductive Point Level Switch MLT430-2



- 1 point level with 3 switch outputs, freely configurable
- integrated RTD Pt100 sensor
- Process connection GHMadapt G ½" hygienic
- Round case, stainless steel type Ø 59 mm
- Flexible mounting: compact version
- No moving parts in the medium
- Sensitivity programmable
- Parameters programmable with GHMware via USB interface
- Isolation between sensor system, case / supply, output
- Wide range LED indicator
- Electrode cannot be shortened afterwards

Technical data

Compact version

Supply voltage : 18..30 V DC
Power consumption : < 3 VA
CE-conformity : EN 61326-1:2013

Ambient conditions

Ambient temperature : -20..+70 °C
Climatic class : EN 60068-2-38:2009
Vibration class : EN 60068-2-6:2008, GL Test 2

Certifications

EHEDG certificate no. : 28/2011

Input

Response time : 0.05..10 s, programmable

Output

3 x Electronic : NO / NC programmable

Electrical connection : M12 plug

Isolation : sensor system, case / supply, output

LED indicator : red/green programmable

Case : round case, stainless steel type Ø 59 mm

Material : 1.4305

LED-cap : Acrylic glass (PMMA)

Protection class : IP67 / IP69K

Electrode

Electrode length : 15..1000 mm

Process temperature : -20..+100 °C, 140 °C < 30 min

CIP-/SIP-capable

Temperature sensor : RTD Pt100, class A

Process pressure : -1..+10 bar

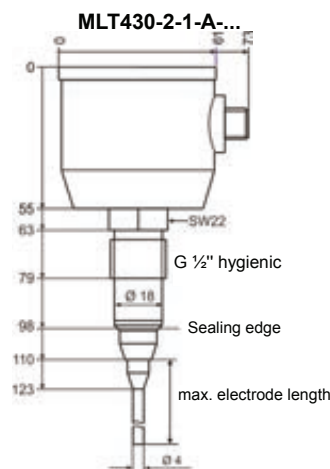
Min. media conductance : > 2 µS

Process material : 1.4404, PEEK, FDA conform
food safe according to EHEDG
conform regulation 1935/2004 &
10/2011

Process connection : G ½" hygienic

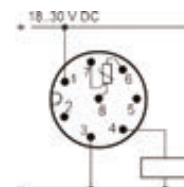
Stud torque : 5..10 Nm

Dimensions



Connection diagrams

M12 device plug, 8-pole



Cable colors:

1 = white, 3 = green

4 = yellow

6 = pink, 7 = blue, 8 = red

: supply voltage

: output

: Pt100 sensor

Order code

MLR430 - 1. - 2. - 3. - 4. - 5. - 6. - 7. - 8.

1.	Process connection
2	G ½" hygienic
2.	Number of electrodes
1	1 electrode
3.	Electrode type
A	rod
B	rope (on request)
4.	Electrode length [mm]
0015	15 (min. length)
0200	200
0500	500
1000	1000
5.	Electrode surface
0	uncoated
6.	Electrical connection
0	M12 plug
7.	Options
00	without option
8.	Certificate DIN EN 10204, indicate only when required
WZ2.2	factory certification 2.2
Accessories	
ACI211	USB programming cable for MLx43x
ACH113	8-pole hygienic connection cable, straight
ACH123	8-pole hygienic connection cable, angular

Conductive Point Level Switch MLR430-3



- 4 point levels with 3 switch outputs, freely configurable
- Process connection GHMadapt G1" hygienic
- Round case, stainless steel type Ø 59 mm
- Flexible mounting: compact version
- No moving parts in the medium
- Sensitivity programmable
- Parameters programmable with GHMware via USB interface
- Isolation between sensor system, case / supply, output
- Wide range LED indicator

Technical data

Compact version

Supply voltage : 18...30 V DC
 Power consumption : < 3 VA
 CE-conformity : EN 61326-1:2013

Ambient conditions

Ambient temperature : -20...+70 °C
 Climatic class : EN 60068-2-38:2009
 Vibration class : EN 60068-2-6:2008, GL Test 2

Certifications

EHEDG certificate no. : 28/2011

Input

Response time : selectable from 0.05...10 s

Output

3 x Electronic : transistor PNP, max. 30 V DC, 100 mA
 Electrical connection : M12 plug or cable gland M16x1.5
 Polyamide (PA) or stainless steel type 1.4305

Isolation : sensor system, case / supply, output
 LED indicator : red/green programmable

Case

round case, stainless steel type

Ø 59 mm

Material : 1.4305

LED-cap : Acrylic glass (PMMA)

Protection class : IP67 / IP69K

Electrode : max. 4

Electrode length : 15...5000 mm

Process temperature : -20...+100 °C, 140 °C < 30 min

CIP-/SIP-capable

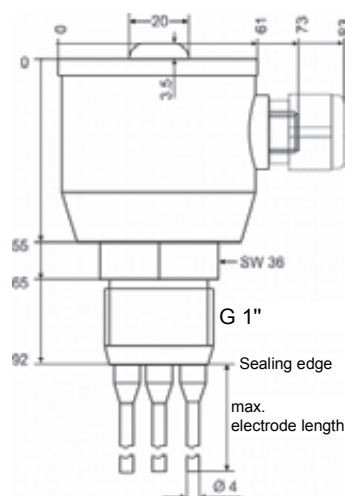
Process pressure : -1...+10 bar
 Min. media conductance : > 2 µS
 Process material : 1.4404, PEEK, PFA-coated, FDA conform
 food safe according to EHEDG
 conform regulation EC 1935/2004 & 10/2011

Process connection : G1" hygienic

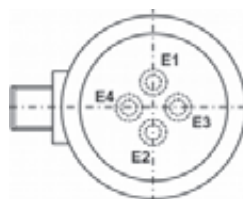
Stud torque : 10...20 Nm

Dimensions

MLR430-3-4-A-...

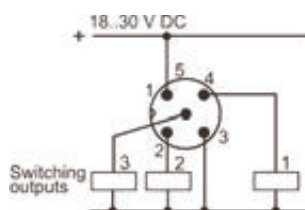


Position of electrodes

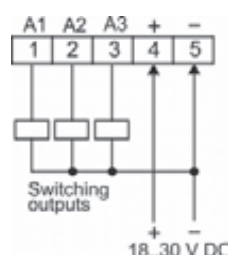


Connection diagrams

M12 device plug, 5-pole



Internal terminal



Cable colors:

1 = brown, 2 = white, 3 = blue, 4 = black, 5 = grey

Order code

MLR430 - 1. - 2. - 3. - 4. - 5. - 6. - 7. - 8.

1. Process connection	
3	G1" hygienic
2. Number of electrodes	
2	2 electrodes
3	3 electrodes
4	4 electrodes
3. Electrode type (rod or cable)	
A	rod
B	rope (on request)
4. Electrode length [mm]	
0200	200
0500	500
1000	1000
1500	1500
2000	2000
2500	2500
3000	3000
3500	3500
4000	4000
4500	4500
5000	5000
XXXX	customized length (on request)
5. Electrode surface	
0	uncoated (standard)
1	0200 PFA, black coated
	0500 PFA, black coated
	1000 PFA, black coated
	1500 PFA, black coated
	2000 PFA, black coated
	customized length (on request)
6. Electrical connection	
0	M12 plug
1	cable gland, plastic (PA) M16x1.5
2	cable gland, stainless steel type (1.4305) M16x1.5
7. Options	
00	without option
8. Certificate DIN EN 10204, indicate only when required	
WZ2.2	factory certification 2.2

Accessories	
AMD100	Spacer for multi-rod sensors
ACI211	USB programming cable for MLx43x

Conductive Point Level Switch MLT430-3



- 4 point levels with 3 switch outputs, freely configurable
- integrated RTD Pt100, isolated
- Process connection GHMadapt G 1" hygienic
- Round case, stainless steel type Ø 59 mm
- Flexible mounting: compact version
- No moving parts in the medium
- Sensitivity programmable
- Parameter programmable with GHMware via USB interface
- Isolation between sensor system, case / supply, output
- Wide range LED indicator
- Electrode E2 cannot be shortened afterwards

Technical data

Compact version

Supply voltage : 18..30 V DC
Power consumption : < 3 VA
CE-conformity : EN 61326-1:2013

Ambient conditions

Ambient temperature : -20..+70 °C
Climatic class : EN 60068-2-38:2009
Vibration class : EN 60068-2-6:2008, GL Test 2

Certifications

EHEDG certificate no. : 28/2011

Input

Response time : selectable from 0.05..10 s

Output

3 x Electronic : NO / NC programmable

Electrical connection : M12 plug, 8-pole

Isolation : sensor system, case / supply, output

LED indicator : red/green programmable

Case : round case, stainless steel type Ø 59 mm

LED-cap : Acrylic glass (PMMA)

Material : 1.4305

Protection class : IP67 / IP69K

Electrode : max. 4

Electrode length : 15..1000 mm

Temperature sensor : Pt100 class A, isolated

Process temperature : -20..+100 °C, 140 °C < 30 min
CIP-/SIP-capable

Process pressure : -1..+10 bar

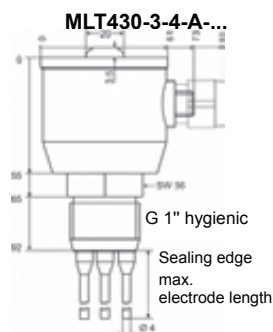
Min. media conductance : > 2µS

Process material : 1.4404, PEEK, FDA conform
food safe according to EHEDG
conform regulation 1935/2004 &
10/2011

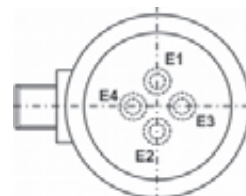
Process connection : G 1" hygienic

Stud torque : 10..20 Nm

Dimensions



Position of electrodes

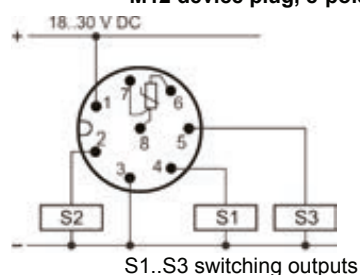


E2 = Rod with integr. Pt100 Sensor

Note:
Electrode cannot be shortened afterwards.

Connection diagrams

M12 device plug, 8-pole



Cable colors:

1 = white, 3 = green : Supply voltage
2 = brown, 4 = yellow, 5 = grey : Outputs S1, S2, S3
6 = pink, 7 = blue, 8 = red : Pt100 sensor

Order code

MLT430 - 1. - 2. - 3. - 4. - 5. - 6. - 7. - 8.

1.	Process connection
3	G 1" hygienic
2.	Number of electrodes
2	2 electrodes
3	3 electrodes
4	4 electrodes
3.	Electrode type
A	rod
4.	Electrode length [mm]
0015	15 (min. length)
0200	200
0500	500
1000	1000
5.	Electrode surface
0	uncoated
6.	Electrical connection
0	M12 plug
7.	Options
00	without option
8.	Certificate DIN EN 10204, indicate only when required
WZ2.2	factory certification 2.2

Accessories	
AMD100	Spacer for multi-rod sensors
ACI211	USB programming cable for MLx43x
ACH113	8-pole hygienic connection cable, straight
ACH123	8-pole hygienic connection cable, angular

Conductive Point Level Switch MLR120



- Processor controlled switching device
- Up to 2 electrodes or point sensors
- Sensitivity adjustable
- Switch-on delay adjustable
- Wide range power supply 18..230 V AC/DC
- 2 alarm outputs, relay SPDT
- Case width 22.5 mm
- DIN rail mounting TS35 according to DIN EN 60715

Technical data

Power supply

Supply voltage	: 18..253 V AC/DC
Power consumption	: < 2 VA
Ambient temperature	: -10..55 °C
Storage temperature	: -40..+60 °C
Relative humidity	: < 95 %
Condensation	: not allowed
CE-conformity	: EN 61326-1:2013

Input

Electrodes	: 2
Switching point	: selectable from 0.05..500 kΩ
Response time	: selectable from 1..10 s
Min. media conductance	: > 2 μS
Measuring voltage	: < 5 V AC

Outputs

2 relay SPDT	: < 250 V AC < 50 VA < 2 A, ohmic load < 100 V DC < 50 W < 2 A, ohmic load
--------------	---

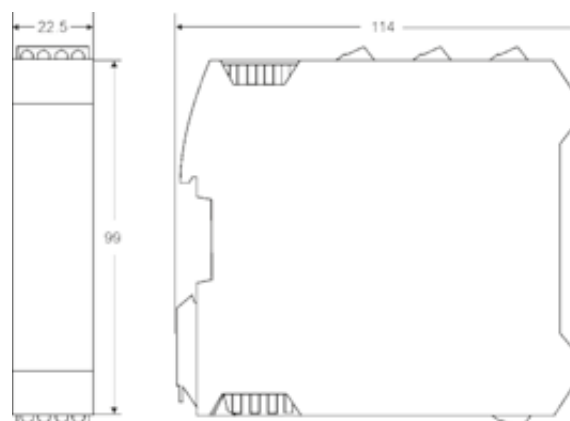
Indicators	: LED green (operating) LED red (limit CH1 + CH2)
------------	--

Case	: Polyamide (PA) 6.6, UL94V-0 DIN rail mounting TS35 according to DIN EN 60715
-------------	--

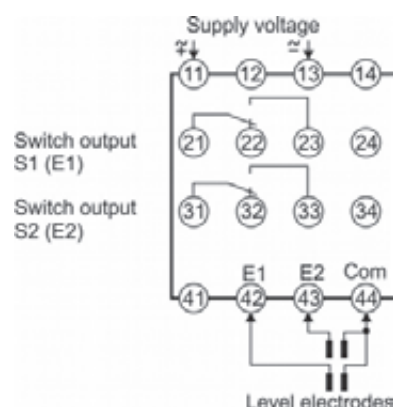
Weight	: approx. 200 g
Connection	: slide-in screw terminals with pressure plates 0.14..2.5 mm ² (AWG 26..14)

Protection class	: IP20, acc. to BGV A3
------------------	------------------------

Dimensions



Connection diagram



Order code

MLR120 - 1. - 2. - 3. - 4. - 5.

1. Measuring input	
0	2 electrodes
2. Output	
0	2 relays
3. Supply voltage	
0	18..253 V AC/DC
4. Options	
00	without option
01	fast switching ≥ 50 ms
5. Certificate DIN EN 10204, indicate only when required	
WZ2.2	factory certification 2.2

Conductive Point Level Switch MLR157



GHMware

- Processor controlled switching device
- Programming via Touch-Screen and USB interface
- Up to 4 electrodes or point level sensors
- Sensitivity programmable
- Switch-on delay programmable
- Temperature input RTD Pt100
- Wide range power supply 18..253 V AC/DC
- 5 alarm outputs, relay SPDT and transistor
- Analog output 0/4..20 mA; 0/2..10 V DC
- Case width 50 mm
- DIN rail mounting TS35 according to DIN EN 60715

Technical data

Power supply

Supply voltage	: 18..253 V AC/DC
Power consumption	: < 5 VA
Ambient temperature	: -10..+55 °C
Storage temperature	: -40..+60 °C
Relative humidity	: < 95 %
Condensation	: not allowed
CE-conformity	: EN 61326-1:2013

Input

Electrodes	: 4
Switching point	: selectable from 0.05..500 kΩ
Response time	: selectable from 0.05..10 s
Min. media conductance	: > 2 μS
Measuring voltage	: < 5 V AC
Temperature input	: Pt100

Ext. programming : via USB interface

Output

Switching outputs	: 3 x relay; 2 x electronic PNP/NPN
relay SPDT	: < 250 V AC < 50 VA < 2 A ohmic load < 100 V DC < 50 W < 2 A ohmic load
Electronic	: transistor PNP, max. 32 V DC, 50 mA
Analog output	: 0/4..20 mA burden ≤ 500 Ω, 0/2..10 V burden > 500 Ω, isolated output burden depending

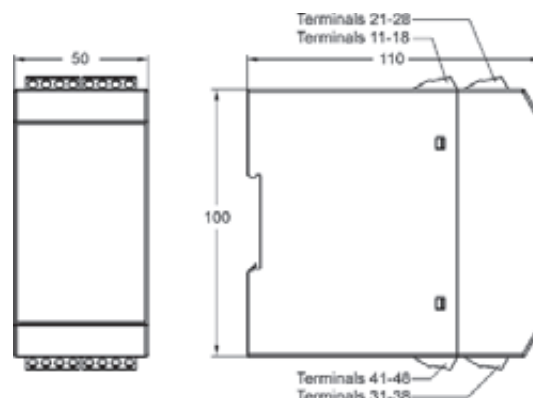
Case : Polyamide (PA) 6.6, UL94V-0
DIN rail mounting TS35
acc. to DIN EN 60715

Weight : approx. 200 g

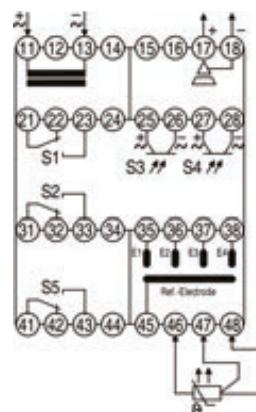
Connection : slide-in screw terminals
with pressure plates
0.14..2.5 mm² (AWG 26..14)

Protection class : IP20, acc. to BGV A3

Dimensions



Connection diagram



Order code

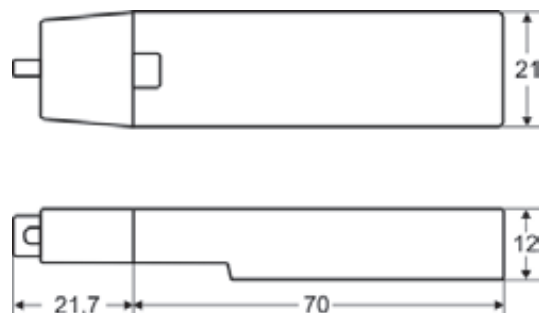
MLR157 - 1. - 2. - 3. - 4. - 5.

1. Measuring input	
0	4 electrodes + 1 RTD Pt100
2. Outputs	
0	3 relays, 2 transistors
3. Supply voltage	
0	18..253 V AC/DC
4. Options	
00	without option
5. Certificate DIN EN 10204, indicate only when required	
WZ2.2	factory certification 2.2

Programming Adapter EYY120



Dimensions



- Universal adapter
- Suitable for all conductive and capacitive point-level switches series MLX42(9)X
- USB 2.0 compatible

Characteristics

The programming adapter fulfills all requirements for the configuration of point level switches series MLX42(9)X. Selectable parameters include measuring range (sensitivity for conductive switches), response time, switching mode, operating mode and designation of the measuring device.

A free download of the GHMware Programming Software can be found on our website at:
www.ghm-messtechnik.de/downloads/ghm-software.

Technical Data

Power supply

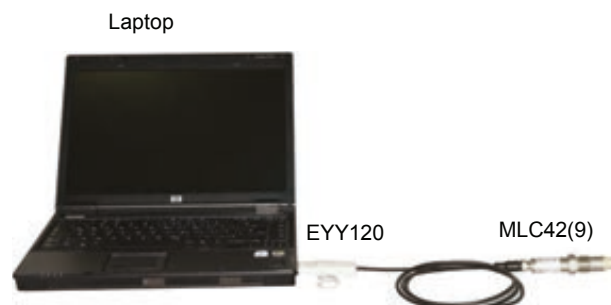
Supply voltage : USB Bus
 Power consumption : 1.5 W

Operating temperature : -10...+55 °C
 Storage temperature : -40...+60 °C
 Relative humidity : < 95 %
 Bedewing : not permissible

CE-conformity : EN 55022: 2011-12
 EN 55024: 2011-09

Electrical connection : USB2.0
 Sensor connection : 5-pole round plug M12x1
 Connection cable : PUR cable 1.5 m
 Case : ABS, grey

Operation example



Ordering code

1.
 EYY -

1. Design type		
120		Input USB 2.0

C8 Hygienic Design

Level potentiometric

196

Potentiometric level measurement



Characteristics

System	Level measurement according to the potentiometric measurement process
Evaluation	Display, Switching, Measuring
Process connection	G ½, G 1
Media	Fluids, viscous media
Pressure range	-1...+10 bar
Media temperature	-20 to +100°C CIP/SIP capable 140°C < 30 min

Areas of application

- Continuous level measurement in tanks and containers
- Food and beverage industry
- Chemical industry
- Mechanical engineering
- Thermal plants
- Pharmaceutical industry
- Cosmetics industry
- Biotechnology

Produktinformation

Füllstand potenziometrisch

Function

In this measurement process, microcontroller-operated electronics drive alternating current at 500 Hz through the probe tube, which is electrically insulated from the tank or container. This causes a linear voltage drop over the entire length of the probe tube. If the sensor is immersed in a conductive fluid, an electrical connection to the tank wall (MLP43x-OR) or reference electrode (MLP43x-MR) is established. The voltage potential created in the process is proportional to the level. This voltage is supplied to a high-impedance amplifier. The sensor microcontroller converts the voltage into digital signals using a high-resolution AD converter. The voltage fed via the probe tube is also measured for increased precision. The microcontroller calculates the ratio of the immersed length to the overall probe tube length. This ratio, combined with the high-impedance voltage tap, explains the independence with respect to the conductivity of the medium. Disturbances are digitally filtered out from the result and then transmitted via a galvanically isolated connection to the IO microcontroller. This microcontroller calculates the desired signals for the current output, the two switching outputs and the optionally connected LC display.





All types in the MLP family of devices are based on the same measuring principle.

Benefits

The parts coming into contact with the media are made of FDA-compliant material and are CIP/SIP capable. Temporary steam sterilisation up to 140°C

- No mechanically moving parts
- Compact design suitable for food and hygienic applications
- Independent of pressure, temperature and density changes
- Hygienic installation by means of weld-on sockets.
- Maintenance-free
- EHEDG Certificate 28/2011, FDA compliant
- Hygienic and elastomer-free seal principle (see page 3)
- Installation free from gaps and dead space
- Detection of liquids such as water and beer, as well as viscous or adhesive media such as honey, yoghurt, chocolate cream or toothpaste.
- The measuring range can be freely adjusted over the entire sensor length.
- All standard process adapters for installation appropriate for food applications, such as Varivent, Clamp, etc. are available.

Device overview

		Process connection	Function	Medium	Materials		Page
					Casing	Sensor	
MLP433-OR		G ½	Continuous level measurement in metallic tanks and containers with current and two switching outputs	Fluids: viscous media, adhesive media	Stainless steel 1.4305 LED sight glass Acrylic glass (PMMA)	Stainless steel 1.4404 Process connection PEEK	200
MLP433-MR		G 1	Continuous level measurement in non-metallic tanks and containers with current and two switching outputs	Fluids: viscous media, adhesive media	Stainless steel 1.4305 LED sight glass Acrylic glass (PMMA)	Stainless steel 1.4404 Process connection PEEK	201
MLP437-OR		G ½	Continuous level measurement in metallic tanks and containers with current outputs, two switching outputs and LC display	Fluids: viscous media, adhesive media	Stainless steel 1.4305 LC display viewing window Acrylic glass (PMMA)	Stainless steel 1.4404 Process connection PEEK	202
MLP437-MR		G 1	Continuous level measurement in non-metallic tanks and containers with current outputs, two switching outputs and LC display	Fluids: viscous media, adhesive media	Stainless steel 1.4305 LC display viewing window Acrylic glass (PMMA)	Stainless steel 1.4404 Process connection PEEK	203

Subject to errors and changes.

Accessories and spare parts:

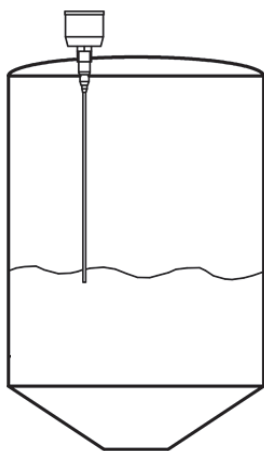
For connecting lines and process adaptation, refer to the separate product information **GHMadapt/Accessories**.

USB adapter cable ACI211 for programming of the MLP43X, [see price list GHMadapt/Accessories](#)

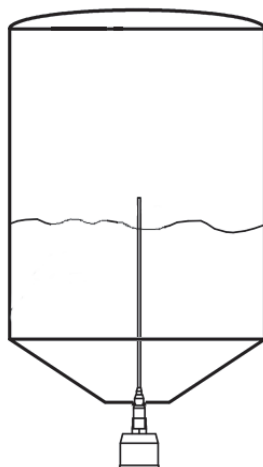
AMD200 and AMD201 spacer for probe tubes



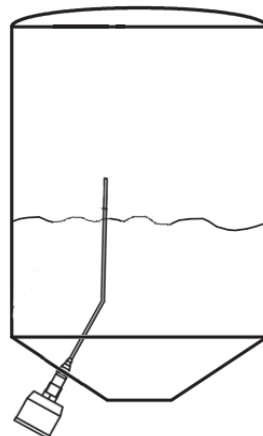
Installation instructions



Pos. 1



Pos. 2



Pos. 3

Pos. 1 : Normal installation position with strongly adherent media and levels up to the process adaptation (bridging between probe tube and tank lid); the variant 'with probe tube insulation' is recommended to guarantee problem-free function.

Pos. 2 : Overhead installation position; the function 'Installation position: from below' must be selected in the device parameterisation. The device handles the conversion to the actual level.

Pos. 3 : Oblique installation with a bend of the probe tube. This installation position is also possible. The probe tube should not be kinked; it should be bent with a minimum radius of 30 mm (use a bending tool). In this variant, a linearisation of the measurement must take place with an external device (e.g. digital tank display TA1010 or TA9648, PLC, etc.).

Note

- In order to ensure safe function of the system, please use the **GHMadapt** process adaptation. We offer appropriate weld-on aids for correct installation of the weld-on sockets.
- When installing, please observe the maximum permissible torque (see product description).
- The probe tube may not have any electrical contact with the tank and/or container wall. This would disable the measurement principle.
- Cross flows, especially viscous media and stirring units can subject the probe tube mount to mechanical stress. In such applications, it must be ensured that the probe tube is installed in a protected area of the tank or that a surge pipe is used.
- The process connection thread requires electrical contact with the metallic container for the version MLP43x-OR.
- The single-rod variant requires a conductive tank wall. If this is not provided (i.e. with use of a plastic tank), a two-rod variant MLR43x-MR should be used. In this variant, the reference electrode is integrated in the sensor.
- The length of the probe tube can be ordered down to the exact millimetre; subsequent shortening is not possible. The sensor measures linearly over the entire length of the metallic probe tube. Only about 8 mm of the lower end of the probe tube are to be considered dead range.

Produktinformation

Füllstand potenziometrisch

Signal outputs

The MLP433 and MLP437 are equipped with the same signal outputs.

The analogue output is an active current output (0/4...20 mA) with a wide range of parameterisation options. This includes free definition of the measurement range over the length of the probe tube, behaviour in the event of errors and the time constant in order to have a steady average displayed, e.g. with wave movements.

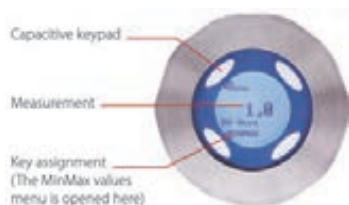
The two switching outputs are adjustable independently of each other. Depending on requirements, they can be programmed as PNP, NPN or push-pull outputs. They are short-circuit-proof and capable of recognising and reporting fault conditions. With the programmable time behaviour, wave movements of the medium do not result in uncontrolled switching processes.



Versions MLP433 and MLP437

The electronics of the two devices differ only in the lid design.

There is one red LED and one green LED under the viewing window in the centre of the lid with the MLP433 variant. The function of the LEDs is programmable. In the condition as supplied, 'Green' indicates operating voltage and 'Red' indicates a warning (e.g.: probe tube not immersed). The LEDs can be switched off or be assigned to switching outputs as necessary in the display menu.



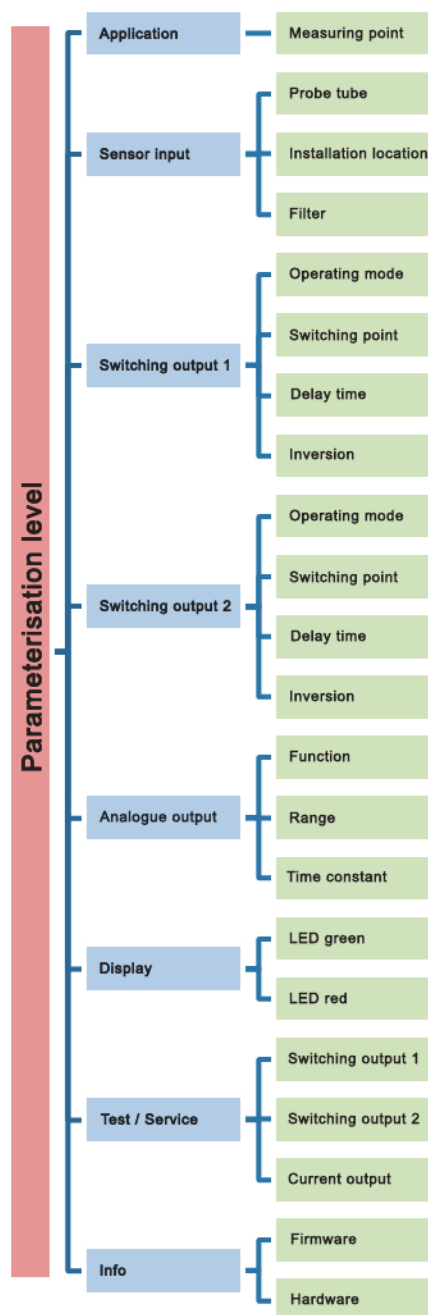
The MLP437 is equipped with a graphic LC display and four capacitive keypads that make it unnecessary to open the device for parameterisation. In addition to measurements, status information can be displayed. The backlighting of the display also switches from white to red if there is an error or warning. The display can be electronically rotated in 90° increments to ensure that it can be read in any installation position.

Parameterisation

There is a possibility of parameterisation via the internal USB interface with both device versions. In the process, the parameters are read, edited and loaded into the device by the connected PC with the software **GHMware** (available free of charge on the GHM web page). Archiving of the parameters and creation of a list of all settings can also take place with the software.

All parameters that can be adjusted with **GHMware** can also be changed via the LC display and the four capacitive keys.

MLP433 operating menu



The MLP437 operating menu structure only differs in the points 'Application' and 'Display'.

Potentiometric level meter MLP433-OR



- Continuous level measurement
- Suitable for metallic tanks and containers
- Process connection GHMadapt G ½" hygienic
- Flexible installation, compact version
- No moving parts in the measured fluid
- 2 switching outputs, analogue output
- Wide view LED status display
- Parameterisation with GHMware via USB interface

Technical data

Power supply

Supply voltage : 18..30 V DC, max. 130 mA

Electrical connection : M12 plug connector or cable gland M16x1,5
Polyamide (PA) or stainless steel (1.4305)

CE conformity : EN 61326-1:2013

Ambient conditions

Ambient temperature : -20..+60 °C

Climate class : EN 60068-2-38:2009

Vibrations : EN 60068-2-6:2008, GL Test 2

Approvals : EHEDG Certificate no.: 28/2011

Sensor

Probe tube length : 100..999 mm (Ø 6 mm),

(Measuring range) 1000..2500 mm (Ø 10 mm)

Process temperature : -20..+100 °C, 140 °C < 30 min.
CIP- / SIP capable

Process pressure : -1..10 bar

Process material : 1.4404, PEEK, FDA compliant,
Suitable for foodstuffs in accordance
with EHEDG

Process connection : G ½" hygienic

Torque : 5..10 Nm

Min. media conductivity : 1 µS < 20 µS, ≥ 20 µS

Measuring accuracy : < 3% < 0.5 % of measuring range

Linearity : < 2% < 0.3 % of measuring range

Output

Analogue output : Active, 0/4..20 mA, Resistance < 600 Ω

Damping : Programmable from 0.05..10 s

Switching outputs : Transistor PNP / NPN programmable,
max. 30 V / 100 mA

Response time : Programmable from 0.01..10 s

Galvanic isolation : Sensor, power supply/outputs

LED status message : 3 colours, programmable

Housing : Round stainless steel housing Ø 59 mm

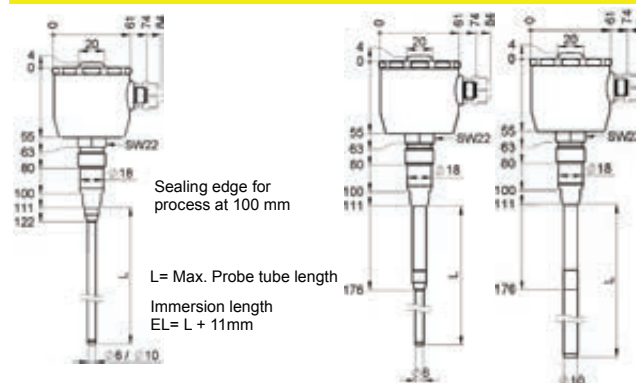
Material : 1.4305

LED viewing window : Acrylic glass (PMMA)

Protection class : IP67 / IP69K

Accessories	
ACI211	USB connection cable
APH process adaptation, ACH connection lines see separate product information GHMadapt / Accessories	

Dimensions



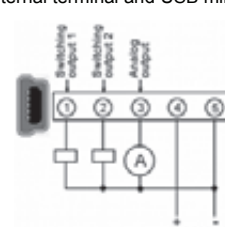
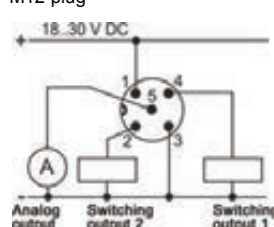
without probe tube insulation

with probe tube insulation

Wiring

M12 plug

internal terminal and USB mini B jack



Cable colours M12 plug: 1 = brown, 2 = white, 3 = blue, 4 = black, 5 = grey

Order code

MLP433 - **OR** - - - - - - - -

1. Type		
OR	Without reference electrode	
2. Process connection		
2	G½" hygienic	
3. Probe tube material		
0	stainless steel (316L) 1.4404	
1	stainless steel (316L) 1.4435	
4. Probe tube diameter		
06	6 mm	
10	10 mm	
5. Immersion length (length specification to 1 mm)		
0100..0500	100 to 500 mm	•
0501..0999	501 to 999 mm	•
0500..1500	500 to 1500 mm	•
1501..2500	1501 to 2500 mm	•
6. Probe tube insulation		
0	without insulation	
1	with PFA-insulation (For installation from top)	
7. Electrical connection		
0	M12-plug (standard)	
1	cable gland M16x1.5; polyamide (PA)	
2	cable gland M16x1,5; stainless steel (1.4305)	
8. Options		
00	without option	
9. Certificate according to DIN EN 10204. Please specify only if required.		
WZ2.2	certificate of conformity 2.2	

Subject to technical changes

Potentiometric level meter MLP433-MR



- Continuous level measurement
- Suitable for non-metallic tanks and containers
- Process connection GHMadapt G 1" hygienic
- Flexible installation, compact version
- No moving parts in the measured fluid
- 2 switching outputs, analogue output
- Wide view LED status display
- Parameterisation with GHMware via USB interface

Technical data

Power supply

Supply voltage : 18..30 V DC, max. 130 mA
Electrical connection : M12 plug or cable gland M16x1,5 gland Polyamide (PA) or stainless steel (1.4305)

CE conformity : EN 61326-1:2013

Ambient conditions

Ambient temperatur : -20..+60 °C
Climate class : EN 60068-2-38:2009
Vibrations : EN 60068-2-6:2008, GL Test 2

Approvals : EHEDG Certificate no.: 28/2011

Sensor

Probe tube length : 100..999 mm (Ø 6 mm),
(Measuring range) 1000..2500 mm (Ø 10 mm)
Reference rod : Ø 4 mm, independent from range
Process temperature : -20..+100 °C, 140 °C < 30 min.
CIP- / SIP capable

Process pressure : -1..10 bar

Process material : 1.4404, PEEK, FDA compliant, Suitable for foodstuffs in accordance with EHEDG

Process connection : G 1" hygienic

Torque : 5..10 Nm

Min. media conductivity : 1µS < 20 µS, ≥ 20µS

Measuring accuracy : < 3% < 0.5 % of measuring range

Linearity : < 2% < 0.3 % of measuring range

Outputs

Analogue output : Active, 0/4..20 mA, Resistance < 600 Ω

Damping : Programmable from 0.05..10 s

Switching outputs : Transistor PNP / NPN programmable, max. 30 V / 100 mA

Response time : Programmable from 0.01..10 s

Galvanic isolation : Sensor, Power supply/outputs

LED status message : 3 colours, programmable

Housing : Round stainless steel housing Ø 59 mm

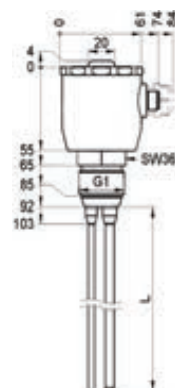
Material : 1.4305

LED viewing window : Acrylic glass (PMMA)

Protection class : IP67 / IP69K

Accessories / spare parts	
AMD200	Spacer for probe tube diameter 6 mm
AMD201	Spacer for probe tube diameter 10 mm
ACI211	USB connection cable
ACH connection lines, APH process adaptation, see separate product information GHMadapt/Accessories	

Dimensions



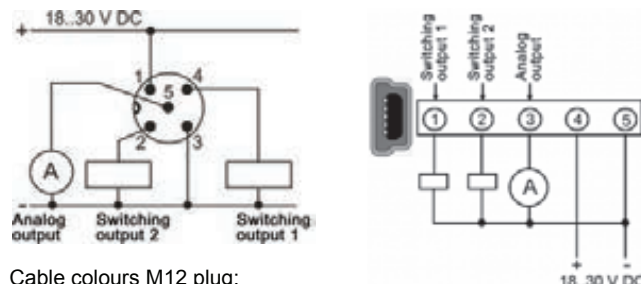
Sealing edge to process at 92 mm

L= Max. Probe tube length
= Immersion length in the tank

Wiring

M12 plug

internal terminal and USB mini B jack



Cable colours M12 plug:

1 = brown, 2 = white, 3 = blue, 4 = black, 5 = grey

Order code

MLP433 - 1. 2. 3. 4. 5. 6. 7. 8. 9.
MR - - - - -

1. Type		
MR	Without reference electrode	
2. Process connection		
3	G1" hygienic	
3. Probe tube material		
0	stainless steel (316L) 1.4404	
1	stainless steel (316L) 1.4435	
4. Probe tube diameter		
06	6 mm	
10	10 mm	
5. Immersion length (length specification to 1 mm)		
0100..0500	100 to 500 mm	•
0501..0999	501 to 999 mm	•
0500..1500	500 to 1500 mm	•
1501..2500	1501 to 2500 mm	•
6. Probe tube insulation		
0	without insulation	
7. Electrical connection		
0	M12- plug (standard)	
1	cable gland M16x1.5; polyamide (PA)	
2	cable gland M16x1,5; stainless steel (1.4305)	
8. Option		
00	without option	
9. Certificate according to DIN EN 10204. Please specify only if required.		
WZ2.2	certificate of conformity 2.2	

Subject to technical changes

Potentiometric level sensor MLP437-OR



- Continuous level measurement
- Suitable for metallic tanks and containers
- Process connection GHMadapt G ½" hygienic
- Flexible installation, compact version
- No moving parts in the measured fluid
- 2 switching outputs, analogue output
- Parameterisation via local display with capacitive keys and internal USB interface

Technical data

Power supply

Supply voltage : 18..30 V DC, max. 130 mA
Electrical connection : M12 plug or cable M16x1,5 gland
Polyamide (PA) or stainless steel (1.4305)

CE conformity : EN 61326-1:2013

Ambient conditions

Ambient temperature : -20..+60 °C
Climate class : EN 60068-2-38:2009
Vibrations : EN 60068-2-6:2008, GL Test 2
Approvals : EHEDG Certificate no.: 28/2011

Sensor

Probe tube length : 100..999 mm (Ø 6 mm),
(Measuring range) 1000..2500 mm (Ø 10 mm)
Process temperature : -20..+100 °C, 140 °C < 30 min.
CIP- / SIP capable
Process pressure : -1..10 bar
Process material : 1.4404, PEEK, FDA compliant,
Suitable for foodstuffs in accordance with
EHEDG, compliant to regulation
1935/2004 & 10/2011

Process connection : G ½" hygienic
Torque : 5..10 Nm
Min. media conductivity : 1µS < 20 µS, ≥ 20µS
Measuring accuracy : < 3% < 0.5 % of measuring range
Linearity : < 2% < 0.3 % of measuring range

Output

Analogue output : Active, 0/4..20 mA, Resistance < 600 Ω
Damping : Programmable from 0.05..10 s
Switching outputs : Transistor PNP / NPN programmable,
max. 30 V / 100 mA

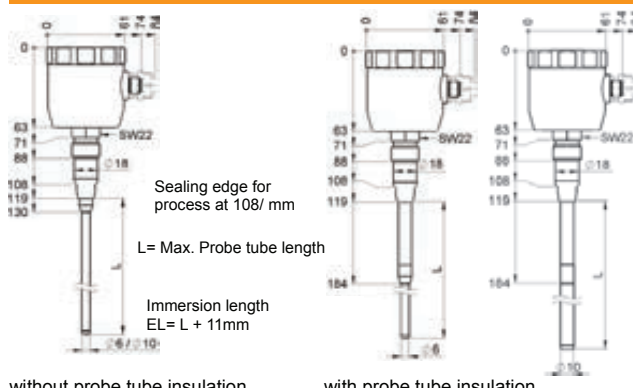
Response time : Programmable from 0.01..10 s
Galvanic isolation : Sensor, Power supply/outputs
Display : Graphic LC display, white/red backlighting
Keys : 4 capacitive keypads

Housing

Material : Round stainless steel housing Ø 59 mm
Viewing window : Acrylic glass (PMMA)
Protection class : IP67 / IP69K

Accessories	
ACI211	USB connection cable
APH process adaptation, ACH connection lines see separate product information GHMadapt / Accessories	

Dimensions



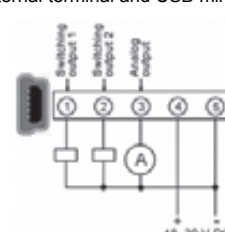
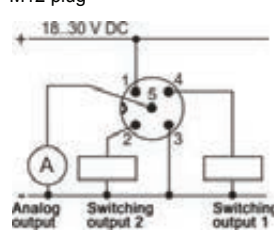
without probe tube insulation

with probe tube insulation

Wiring

M12 plug

internal terminal and USB mini B jack



Cable colours M12 plug: 1 = brown, 2 = white, 3 = blue, 4 = black, 5 = grey

Order code

MLP437 - 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9 -
OR - - - - -

1. Type	OR	Without reference electrode
2. Process connection	2	G½" hygienic
3. Probe tube material	0	stainless steel (316L) 1.4404
	1	stainless steel (316L) 1.4435
4. Probe tube diameter	06	6 mm
	10	10 mm
5. Immersion length (length specification to 1 mm)	0100..0500	100 to 500 mm
	0501..0999	501 to 999 mm
	500..1500	500 to 1500 mm
	1501..2500	1501 to 2500 mm
6. Probe tube insulation	0	without insulation
	1	with PFA-insulation (For installation from top)
7. Electrical connection	0	M12- plug (standard)
	1	cable gland M16x1,5; polyamide (PA)
	2	cable gland M16x1,5; stainless steel (1.4305)
8. Options	00	without option
9. Certificate according to DIN EN 10204. Please specify only if required.	WZ2.2	certificate of conformity 2.2

Subject to technical changes

Potentiometric level sensor MLP437-MR



- Continuous level measurement
- Suitable for non-metallic tanks and containers
- Process connection GHMadapt G 1" hygienic
- Flexible installation, compact version
- No moving parts in the measured fluid
- 2 switching outputs, analogue output
- Parameterisation via local display & internal USB interface

Technical data

Power supply

Supply voltage : 18..30 V DC, max. 130 mA
Electrical connection : M12 plug or cable gland M16x1,5
Polyamide (PA) or stainless steel (1.4305)

CE conformity : EN 61326-1:2013

Ambient conditions

Ambient temperature : -20..+60 °C
Climate class : EN 60068-2-38:2009
Vibrations : EN 60068-2-6:2008, GL Test 2

Approvals : EHEDG Certificate no.: 28/2011

Sensor

Probe tube length : 100..999 mm (Ø 6 mm),
(Measuring range) 1000..2500 mm (Ø 10 mm)
Reference rod : Ø 4 mm, independent from range
Process temperature : -20..+100 °C, 140 °C < 30 min.
CIP- / SIP capable
Process pressure : -1..10 bar
Process material : 1.4404, PEEK, FDA compliant,
Suitable for foodstuffs in accordance with
EHEDG, conform regulation
1935/2004 & 10/2011

Process connection : G 1" hygienic

Torque : 5..10 Nm

Min. media conductivity : 1µS < 20 µS, ≥ 20µS

Measuring accuracy : < 3% < 0.5 % of measuring range

Linearity : < 2% < 0.3 % of measuring range

Output

Analogue output : Active, 0/4..20 mA, Resistance < 600 Ω

Damping : Programmable from 0.05..10 s

Switching outputs : Transistor PNP / NPN programmable,
max. 30 V / 100 mA

Response time : Programmable from 0.01..10 s

Galvanic isolation : Sensor, Power supply/outputs

Display : Graphic LC display, white/red backlighting

Keys : 4 capacitive keypads

Housing : Round stainless steel housing Ø 59 mm

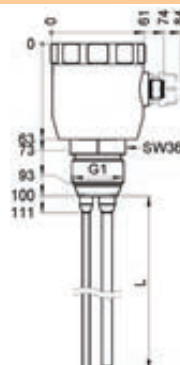
Material : 1.4305

LED viewing window : acrylic glass (PMMA)

Protection class : IP67 / IP69K

Accessories / spare parts	
AMD200	Spacer for probe tube diameter 6 mm
AMD201	Spacer for probe tube diameter 10 mm
ACI211	USB connection cable
ACH connection lines, APH process adaptation, see separate product information GHMadapt/Accessories	

Dimensions



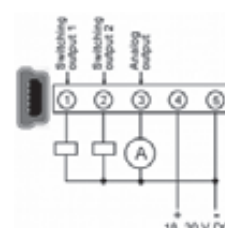
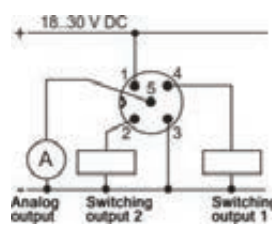
Sealing edge for process at 100 mm

L = Max. Probe tube diameter
= Immersion length in the tank

Wiring

M12 plug

internal terminal and USB mini B jack



Cable colours M12 plug:

1 = brown, 2 = white, 3 = blue, 4 = black, 5 = grey

Order code

MLP437 - 1. 2. 3. 4. 5. 6. 7. 8. 9.
MR - - - - -

1. Type		
MR	with reference electrode	
2. Process connection		
3	G1" hygienic	
3. Probe tube material		
0	stainless steel (316L) 1.4404	
1	stainless steel (316L) 1.4435	
4. Probe tube diameter		
06	6 mm	
10	10 mm	
5. Immersion length (length specification to 1 mm)		
0100..0500	100 to 500 mm	•
0501..0999	501 to 999 mm	•
500..1500	500 to 1500 mm	•
1501..2500	1501 to 2500 mm	•
6. Probe tube insulation		
0	without insulation	
7. Electrical connection		
0	M12- plug (standard)	
1	cable gland M16x1.5; polyamide (PA)	
2	cable gland M16x1,5; stainless steel (1.4305)	
8. Option		
00	without option	
9. Certificate according to DIN EN 10204. Please specify only if required.		
WZ2.2	certificate of conformity 2.2	

Subject to technical changes

C9 Hygienic Design

Level hydrostatic	206
-------------------	-----



DMP 331P

Industrial Pressure Transmitter

Process Connections With
Flush Welded Stainless Steel
Diaphragm

accuracy according to IEC 60770:
standard: 0.35 % FSO
option: 0.25 % FSO

Nominal pressure

from 0 ... 100 mbar up to 0 ... 40 bar

Output signals

2-wire: 4 ... 20 mA / 3-wire: 0 ... 10 V
others on request

Special characteristics

- ▶ hygienic version
- ▶ diaphragm with low surface roughness
- ▶ CIP / SIP cleaning up to 150 °C
- ▶ vacuum resistant

Optional versions

- ▶ IS-version
Ex ia = intrinsically safe for gases and dust
- ▶ SIL 2
according to IEC 61508 / IEC 61511
- ▶ Diaphragm in
Hastelloy® or Tantalum
- ▶ cooling element for media
temperatures up to 300 °C

The pressure transmitter DMP 331P was designed for use in the food / beverage and pharmaceutical industry. The compact design with hygienic versions makes it possible to achieve an outstanding performance in terms of accuracy, temperature behavior and long term stability.

The modular construction concept allows a combination of various process connections with different filling fluids and a cooling element. Several electrical connections complete the profile of DMP 331P.

Preferred areas of use are



Food and Beverage



Pharmaceutical Industry

Material and test certificates

- ▶ inspection certificate 3.1
according to EN 10204
- ▶ test report 2.2
according to EN 10204



Input pressure range ¹									
Nominal pressure gauge	[bar]	-1...0	0.10	0.16	0.25	0.40	0.60	1	1.6
Nominal pressure abs.	[bar]	-	-	-	-	0.40	0.60	1	1.6
Overpressure	[bar]	5	0.5	1	1	2	5	5	10
Burst pressure ≥	[bar]	7.5	1.5	1.5	1.5	3	7.5	7.5	15
Nominal pressure gauge / abs.	[bar]	2.5	4	6	10	16	25	40	
Overpressure	[bar]	10	20	40	40	80	80	105	
Burst pressure ≥	[bar]	15	25	50	50	120	120	210	
Vacuum resistance		P _N > 1 bar: unlimited vacuum resistance P _N ≤ 1 bar: on request							
¹ consider the pressure resistance of fitting and clamps									
Output signal / Supply									
Standard		2-wire: 4 ... 20 mA / V _S = 8 ... 32 V _{DC}				SIL-version: V _S = 14 ... 28 V _{DC}			
Option IS-protection		2-wire: 4 ... 20 mA / V _S = 10 ... 28 V _{DC}				SIL-version: V _S = 14 ... 28 V _{DC}			
Options 3-wire		3-wire: 0 ... 20 mA / V _S = 14 ... 30 V _{DC} 0 ... 10 V / V _S = 14 ... 30 V _{DC}							
Performance									
Accuracy ²		standard: nominal pressure < 0.4 bar: ≤ ± 0.5 % FSO nominal pressure ≥ 0.4 bar: ≤ ± 0.35 % FSO option: nominal pressure ≥ 0.4 bar: ≤ ± 0.25 % FSO							
Permissible load		current 2-wire: R _{max} = [(V _S – V _{S min}) / 0.02 A] Ω current 3-wire: R _{max} = 500 Ω voltage 3-wire: R _{min} = 10 kΩ							
Influence effects		supply: 0.05 % FSO / 10 V				load: 0.05 % FSO / kΩ			
Long term stability		≤ ± 0.1 % FSO / year at reference conditions							
Response time		2-wire: < 10 msec				3-wire: ≤ 3 msec			
² accuracy according to IEC 60770 – limit point adjustment (non-linearity, hysteresis, repeatability)									
Thermal effects (Offset and Span) ³ / Permissible temperatures									
Nominal pressure P _N	[bar]	-1 ... 0			< 0.40			≥ 0.40	
Tolerance band	[% FSO]	≤ ± 0.75			≤ ± 1,5			≤ ± 0.75	
in compensated range	[°C]	-20 ... 85			0 ... 50			-20 ... 85	
Permissible temperatures ⁴		medium: -40 ... 125 °C for filling fluid silicone oil -10 ... 125 °C for filling fluid food grade oil electronics / environment: -40 ... 85 °C storage: -40 ... 100 °C							
Permissible temperature medium for cooling element 300°C		filling fluid silicone oil				overpressure: -40 ... 300 °C		vacuum: -40 ... 150 °C ⁵	
		filling fluid food grade oil				overpressure: -10 ... 250 °C		vacuum: -10 ... 150 °C ⁵	
³ an optional cooling element can influence thermal effects for offset and span depending on installation position and filling conditions.									
⁴ max. temperature of the medium for nominal pressure gauge > 0 bar: 150 °C for 60 minutes with a max. environmental temperature of 50 °C									
⁵ also for P _{abs} ≤ 1 bar									
Electrical protection									
Short-circuit protection		permanent							
Reverse polarity protection		no damage, but also no function							
Electromagnetic compatibility		emission and immunity according to EN 61326							
Mechanical stability									
Vibration according to DIN EN 60068-2-6		G 1/2": 20 g RMS (25 ... 2000 Hz)				others: 10 g RMS (25 ... 2000 Hz)			
Shock according to DIN EN 60068-2-27		G 1/2": 500 g / 1 msec				others: 100 g / 1 msec			
Filling fluids									
Standard		silicone oil							
Options		food grade oil, compliant with 21CFR178.3570 (Mobil SHC Cibus 32; Category Code: H1; NSF Registration No.: 141500) others on request							
Materials									
Pressure port		stainless steel 1.4404 (316 L)				others on request			
Housing		stainless steel 1.4404 (316 L)							
Option compact field housing		stainless steel 1.4305 (303), cable gland brass, nickel plated							others on request
Seals (media wetted)									
Standard		FKM (recommended for medium temperatures ≤ 200 °C)							
Optional		FFKM (recommended for medium temperatures > 200 °C) others on request							
		Clamp, dairy pipe, Varivent®: without							
Diaphragm									
Standard		stainless steel 1.4435 (316 L)							
Optional		Hastelloy® C-276 (2.4819) Tantalum on request							
Media wetted parts		pressure port, seal, diaphragm							

Explosion protection (only for 4 ... 20 mA / 2-wire)

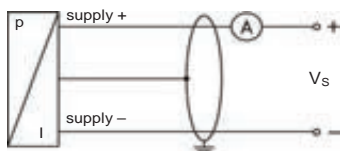
Approvals DX 19-DMP 331P	IBExU 10 ATEX 1068 X / IECEx IBE 12.0027X zone 0: II 1G Ex ia IIC T4 Ga zone 20: II 1D Ex ia IIIC T 85°C Da	
Safety technical maximum values	$U_i = 28 \text{ V}$, $I_i = 93 \text{ mA}$, $P_i = 660 \text{ mW}$, $C_i \approx 0 \text{ nF}$, $L_i \approx 0 \text{ }\mu\text{H}$, the supply connections have an inner capacity of max. 27 nF to the housing	
Ambient temperature range	in zone 0: -20 ... 60 °C with p_{atm} 0.8 bar up to 1.1 bar in zone 1 or higher: -20 ... 70 °C	
Connecting cables (by factory)	cable capacitance: signal line/shield also signal line/signal line: 160 pF/m cable inductance: signal line/shield also signal line/signal line: 1 $\mu\text{H}/\text{m}$	

Miscellaneous

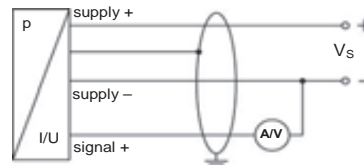
Option SIL ⁶ 2	according to IEC 61508 / IEC 61511	
Current consumption	signal output current: max. 25 mA	signal output voltage: max. 7 mA
Weight	min. 200 g (depending on process connection)	
Installation position	any (standard calibration in a vertical position with the pressure port connection down; differing installation position for $P_N \leq 2 \text{ bar}$ have to be specified in the order)	
Operational life	> 100 x 10 ⁶ pressure cycles	
CE-conformity	EMC Directive: 2014/30/EU	
ATEX Directive	94/9/EG	

⁶ only for 4 ... 20 mA / 2-wire**Wiring diagrams**

2-wire-system (current)



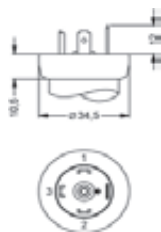
3-wire-system (current / voltage)

**Pin configuration**

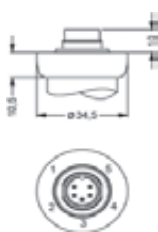
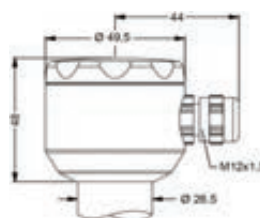
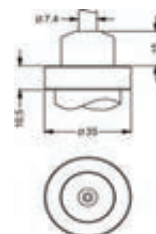
Electrical connection	ISO 4400	Binder 723 (5-pin)	M12x1 / metal (4-pin)	field housing	cable colours (DIN 47100)
Supply +	1	3	1	IN +	wh (white)
Supply -	2	4	2	IN -	bn (brown)
Signal (only 3-wire)	3	1	3	OUT+	gn (green)
Shield	ground pin	5	4		ye/gn (yellow / green)

Electrical connections (dimensions in mm)

standard

ISO 4400
(IP 65)

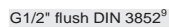
option

Binder Series 723
(IP 67)M12x1 4-pin
(IP 67)cable outlet with PVC cable
(IP 67)⁷compact field housing
(IP 67)cable outlet, cable with ventilation tube
(IP 68)⁸

⇒ universal field housing stainless steel 1.4404 (316 L) with cable gland M20x1.5 (ordering code 880)
and other versions on request

⁷ standard: 2 m PVC cable without ventilation tube (permissible temperature: -5 ... 70 °C)⁸ different cable types and lengths available, permissible temperature depends on kind of cable

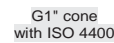
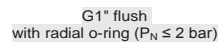
Standard



G 3/4" flush DIN 3852
with ISO 4400



G1/2" flush
with radial o-ring⁹



dimension in mm				
size	¾"	DN 25	DN 32	DN 50
A	14	23	32	45
B	25	50.5	50.5	64
P _N	≥ 4	≥ 0,25	≤ 16	≤ 16
[bar]	≤ 8	≤ 16		

* higher pressure ranges on request

⁹ possible only for $P_N \geq 1$ bar

DMP 331P

			-				-		-		-			-			-		-		-		
--	--	--	---	--	--	--	---	--	---	--	---	--	--	---	--	--	---	--	---	--	---	--	--

absolute pressure possible from 0.4 bar
standard: 2 m PVC cable without ventilation tube (permissible temperature: -5 ... 70°C), others on request
cable with ventilation tube (code TR0 = PVC cable), different cable types and lengths available, price without cable
The cup nut has to be mounted by production of pressure transmitter with electrical connection field housing and mechanical connection dairy pipe.
The cup nut has to be ordered as separate position.
possible only for $P_N \geq 1$ bar
possible only for $P_N \leq 2$ bar
Varivent® is a brand name of GEA Tuchenhagen GmbH. Hastellov® is a brand name of Haynes International Inc.

C10 Hygienic Design

Turbidity	214
-----------	-----

Turbidity



Characteristics

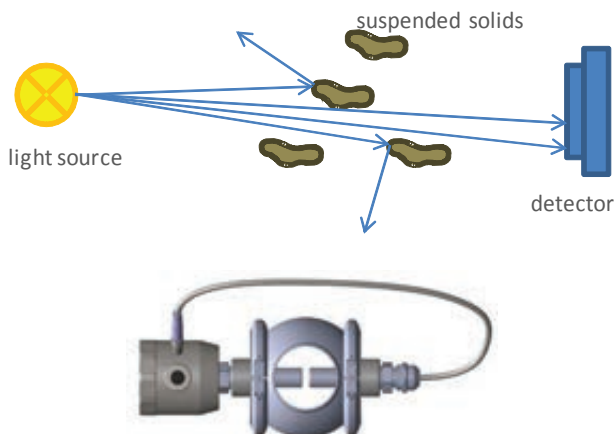
System	Optical Turbidimeter
Processing	Indication, switching, measuring
Process connection	Welded nozzle, Milk-pipe connection
Media	Liquids, viscous media
Pressure range	-1...+10 bar
Media temperature	0...+90°C CIP-/SIP-capable, 120°C < 30 min

Application

- Continuous turbidity measurement
- Brewery
- Dairy
- Food- and beverage industry
- Machine building
- Pharmacy industry
- Cosmetic industry
- Biotechnology

Function

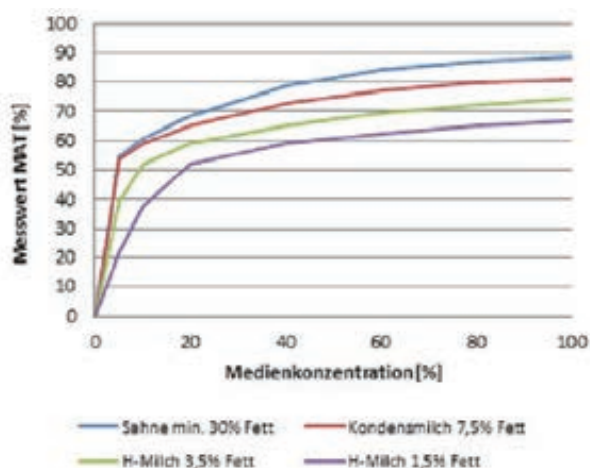
The turbidity measurement method is based on the optical principle of light scattering. The device emits a light beam. This applies to particles in the fluid and parts of the light will be reflected (scattered). In the opposite to the light source is a light sensor, receiving with increasing scattering (higher proportion of particles → greater turbidity) less and less light. The following images show the effect :



From knowledge of the emitted and the received light, the integrated microcontroller computes the turbidity as a percentage of the maximum measurement value. This value can be converted with an integrated conversion table into a material-specific concentration values, or in the formazine based unit FAU. The values for the current output, the two switching outputs and the optional connected LC display derived from this result.

There are a variety of parameters in the operating menu to fit the turbidimeter for the best result in the application. For instance : because of the programmable time behavior, short-term disturbances in the medium courses no uncontrolled switching operations or troubled measured values at the current output.

As an example, measurement diagrams for various dairy products



Advantage

The parts coming into contact with the media complies with FDA requirements and are CIP-/SIP capable. Steam sterilization for a short time – up to 120°C.

- No mechanical moving parts
- Compact construction design for food and hygiene compliance
- Independent of pressure, temperature and density changes
- Maintenance-free
- Installation without gaps and cavity-free
- Detection of liquids such as milk or beer

Mounting

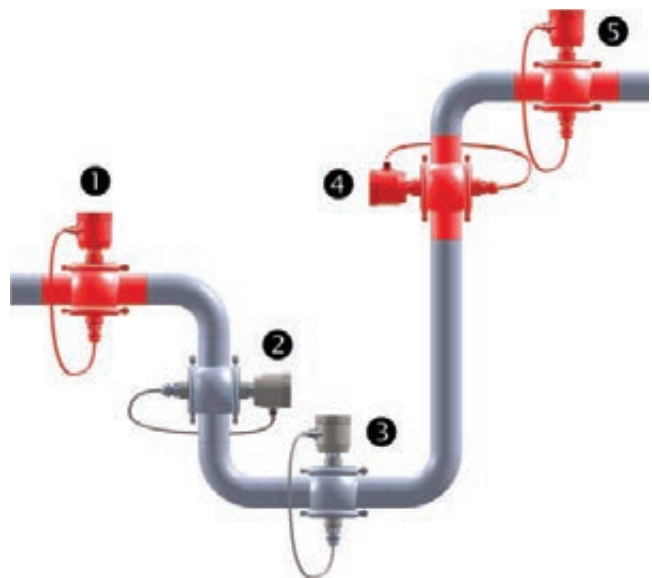
The following notes must be observed :

- The measuring tube must be completely filled
- Air bubbles and foam formation should be avoided
- The installation near inspection glasses should be avoided
- No sedimentation in the near of the optic itself

Installation

The following instructions must be observed:

- The measuring tube must be completely filled
- Air bubbles and foaming must be prevented.
- Installation near viewing glasses must be avoided.
- Sediments may not deposit near the lens.



Position	Characteristic
1	Danger – bubbles or partly filled pipe
2	Ideal – good measurement result
3	Ideal – good measurement result
4	Danger – open line section
5	Danger – bubbles or partly filled pipe

Mistakes reserved, technical specifications subject to change without notice.

Turbidimeters

MAT433 / MAT437



- Wide measuring range for scanning high turbidity level
- Absorption turbidity measurement according to EN ISO 27027
- 2 switch outputs, function programmable
- Analog output 0/4...20 mA
- Parametrization via GHMware and internal mini USB interface
- Wide view LED status display (MAT433)
- Graphic LC-Display with capacitive buttons (MAT437)

Characteristics

The turbidimeters MAT433 and MAT437 are used for phase detection in food and beverage industry. The absorption measurement principle according to EN ISO 27027 is designed to measure very high turbidities. The turbidity is output as a percentage of the maximum measurement value. This value can be converted with an integrated conversion table into material-specific concentrations or into the formazine based unit FAU.

Technical data

Power supply

Supply voltage : 18...30 V DC, max. 3 W
Electrical connection : M12 plug or cable gland M16x1.5 polyamide (PA) or stainless steel (1.4305)
CE-conformity : EN 61326-1:2013

Ambient conditions

Ambient temperature : -10...+60 °C
Climatic class : EN 60068-2-38:2009
Vibration class : EN 60068-2-6:2008, GL test 2

Sensor

Measuring range : 0...100 % Absorption, scalable in material specific concentration units, 0...4000 FAU
Accuracy : +/- 2 %
Process temperature : 0...+90 °C, 120 °C < 30 min
Process pressure : 0...10 bar
Process material : 1.4404, sapphire glass
Process connection : welded connection acc. EN 10357:2013 series A (former DIN 11850, series2), Milk pipe thread acc. DIN 11851 (optional)

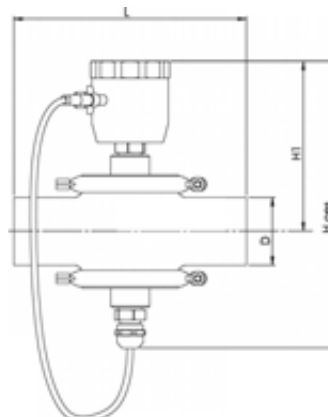
Outputs

Analog output : active 0/4...20 mA, burden < 600 Ω
Switching outputs : 2 x transistor PNP / NPN programmable max. 30 V DC, 100 mA
Response time : programmable 0,01 .. 10 s
Display MAT433 : LED's, 3 colors, programmable
Display MAT437 : Graphic LC-Display, lighted white/red
4 capacitive buttons

Case

Material : round stainless steel housing Ø 59 mm
LED / LCD window : acrylic glass (PMMA)
Protection class : IP67 / IP69K

Dimensions



Dimensions MAT433

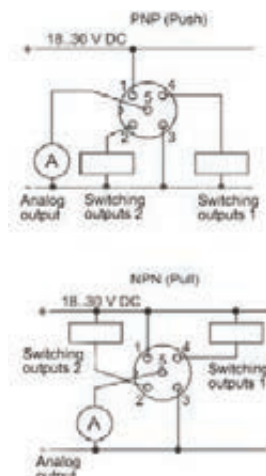
DN	H1 [mm]	H ges [mm]	D [mm] DIN EN 10357 Series A	L [mm] VARINLINE® - housing with welded nozzle	L [mm] milk-pipe thread nozzle DIN 11851
DN25	112	191	29x1,5	180	238
DN40	118	203	41x1,5	180	246
DN50	124	215	53x1,5	180	250
DN65	132	231	70x2	250	330
DN80	139,5	246	85x2	250	340
DN100	149	265	104x2	250	358

Dimensions MAT437

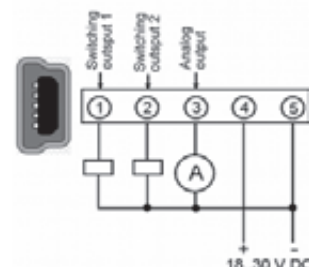
DN	H1 [mm]	H ges [mm]	D [mm] DIN EN 10357 series A	L [mm] VARINLINE® - housing with welded nozzle	L [mm] milk-pipe thread nozzle DIN 11851
DN25	120	199	29x1,5	180	238
DN40	126	211	41x1,5	180	246
DN50	132	223	53x1,5	180	250
DN65	140	239	70x2	250	330
DN80	147,5	254	85x2	250	340
DN100	157	273	104x2	250	358

Connection diagrams

M12 plug



Terminal clamps and USB Mini-B plug



Cable colors (plug):

- 1 = brown
- 2 = white
- 3 = blue
- 4 = black
- 5 = gray

Displays



Order Code

MAT433 - 1. - 2. - 3. - 4. - 5. - 6.

1.	Nominal diameter
025	DN25
040	DN40
050	DN50
065	DN65
080	DN80
100	DN100
2.	Optical path length
06	6 mm
3.	Process connection
1	Welded nozzle (incl. VARINLINE® housing)
2	Process connection according to APT article
4.	Electrical connection
0	M12-plug (standard)
1	Cable gland M16x1,5; polyamide (PA)
2	Cable gland M16x1,5; stainless steel (1.4305)
5.	Optionen
00	Without Options
6.	Certificate acc. DIN EN 10204. Specify when requested
WZ2.2	Certificate of conformity 2.2

Process adaptations

Additional milk-pipe-adaptor weld on the VARINLINE®-case of the MAT43x.

APT - 1. - 2. - 3. - 4.

1.	Process connection
3	Milk pipe DIN11851 two-sided thread nozzle
2.	Nominal diameter
3	DN25
4	DN40
5	DN50
6	DN65
7	DN80
8	DN100
3.	Optionen
0	Without Options
1	Two-sided cone nozzle with union nut
2	Thread- / cone nozzle with union nut
4.	Certificate acc. DIN EN 10204. Specify when requested
WZ2.2	Certificate of conformity 2.2

VARINLINE is a registered trademark of GEA Tuchenhausen GmbH, Büchen, Germany

MAT437 - 1. - 2. - 3. - 4. - 5. - 6.

1.	Nominal diameter
025	DN25
040	DN40
050	DN50
065	DN65
080	DN80
100	DN100
2.	Optical path length
06	6 mm
3.	Process connection
1	Welded nozzle (incl. VARINLINE® housing)
2	Process connection according to APT article
4.	Electrical connection
0	M12-plug (standard)
1	Cable gland M16x1,5; polyamide (PA)
2	Cable gland M16x1,5; stainless steel (1.4305)
5.	Options
00	Without Options
6.	Certificate acc. DIN EN 10204. Specify when requested
WZ2.2	Certificate of conformity 2.2

Accessory

ACI211 USB connection cable
ACH connection cable

C13 Hygienic Design

Process pressure

220

Pressure




PROFIBUS

Characteristics

System	Differential pressure Overload pressure, Vacuum, Absolute pressure, Flow
Metering ranges	±0.3 mbar..+1000 bar
Evaluation	Analog output with unit signals 0/4..20 mA, 0..10 V
Process connection	Male thread G 1/4 A...G 1 A, Female thread G 1, Push-on nipple Bulkhead fittings
Installation	Screw-in sensors Field housing

Applications

- Filter and cleanroom technology
- Control, measurement and monitoring technology
- Medium: air and non-aggressive gases. Also fluids
-  - Uses

Function and benefits

Pressure transducers

Function

Pressure transducers were designed to cover the majority of applications in the area of industrial pressure measurement technology. The field devices are approved for use only with dry non-aggressive gases. The screw-in sensors can also be used for fluids. Silicon oil is used as the internal transfer liquid for the screw-in sensors. Vegetable oil is used for the foodstuffs model.

Benefits

- Compact construction for field housing
- Generous metering ranges
- Condensate-resistant models
- Foodstuffs model

Pressure switch

Function

In the membrane and piston models, the pressure is transferred to a micro switch. The simple mechanical system allows the switching point to be adjusted by means of an adjustment screw.

Benefits

- These robust devices require no voltage supply, and are suitable for air, oil, and water.
- Models are available with normally open (n.o) and normally closed (n.c.) contacts constructed from brass, steel, and stainless steel.

Pressure Transmitter Series SA-11



SA-11-0

SA-11-1



- Measuring range from 0.25..25 bar
- Output signal 0..20 mA, 4..20 mA, 0..10 V DC
- Certified for EHEDG, 3A and FDA
- Max. process temperature -20..150 °C

Characteristics

The SA-11 pressure transmitter has been specially designed to meet the requirements of the food, beverage, pharmaceutical and biotechnology industries. With its resistance to chemical cleaning liquids and high temperatures, this transmitter is particularly suited for CIP/SIP cleaning processes. The flush diaphragm is directly welded to the process connection, thus ensuring a gap-free connection and eliminating the need for additional sealing gaskets. The SA-11 pressure transmitter meets the high requirements of sterile engineering processes and is certified in accordance with the 3-A Sanitary Standards and the EHEDG.

Technical data

Power supply

Supply voltage : 10/(14)..30 V DC
 Process temperature : -20..+150 °C
 Ambient temperature : -20..+80 °C
 CE-conformity : 97/23 EG, 2004/108/EG, EN 61326
 emission (group 1 and class B) and immunity

Certification : EHEDG, A3, FDA conform

Output

Current : 0..20 mA, 3-wire; 4..20 mA, 2-wire
 Max. burden R_A : 2-wire, $R_A \leq (U + -10 \text{ V}) \div 0.02 \text{ A} [\Omega]$
 3-wire, $R_A \leq (U + -3 \text{ V}) \div 0.02 \text{ A} [\Omega]$

Voltage : 0..10 V DC, 3-wire

Max. burden R_A : >10 k Ω

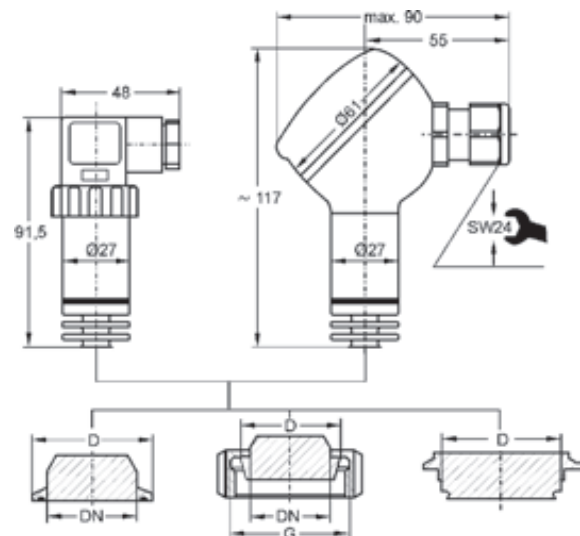
Accuracy : 0.5 %

Material

Process connection : stainless-steel 1.4435
 Surface roughness : $R_a < 0.4 \mu\text{m}$
 Case : stainless-steel 1.4571
 System fill fluid : synthetic oil, FDA approved
 Membrane : gap free connection, free of dead spaces

Electrical connection : field case (IP68)
 or L-connector acc. to EN 175301-803/A (IP65)

Dimensions



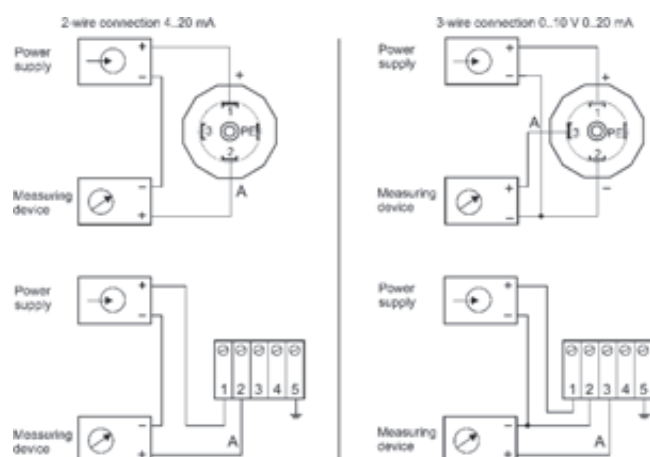
Clamp

DIN11851

VARIVENT®

Process connection		DN [mm/inch]	D [mm]	G
Tri-Clamp		1 1/2"	50	
		2"	64	
Clamp	DIN32676	DN32	50	
		DN40	50	
		DN50	64	
Female union nut	DIN11851	DN25	44	Rd52x1/6
		DN40	56	Rd65x1/6
		DN50	68,5	Rd78x1/6
VARIVENT®	Form F	DN25/32	50	
	Form N	DN50/DN50	68	

Connection diagram



Continue next page

Product information

Process pressure

Ordering code

SA-11 - 1. - 2. - 3. - 4. - 5.

1. Electrical connection	
0	L-connector EN175301-803/A, IP65
1	field case, IP68
2. Output	
0	0..10 V 3-wire
1	0..20 mA 3-wire
2	4..20 mA 2-wire
3. Process connection	
TC15	Tri-Clamp 1 ½"
TC20	Tri-Clamp 2"
NM25	female union nut DN25
NM40	female union nut DN40
NM50	female union nut DN50
CL25	Clamp DN25
CL32	Clamp DN32
CL40	Clamp DN40
CL50	Clamp DN50
WV25	VARIVENT® Form F
WV40	VARIVENT® Form N
4. Options	
00	without option
5. Measuring range [bar]	
0.25/ 0.4/ 0.6/ 1/ 2.5/ 4/ 6/ 10/ 16/ 25 -1..0/ -1..1/ -1..2/ -1..4/ -1..10	

Index	Page
-------	------

B4 Analysis

pH / ORP	226
Analysis conductivity	244
O ₂ , CO, CO ₂	268

Analysis pH / ORP



Characteristics

System	Transmitter, digital displays, combined electrodes, inline fittings
Process connection	Combined electrodes with PG13.5 process thread pH-value -1..+15 pH, ORP-value ± 1500 mV
Pressure range	Max. 10 bar
Media temperature	-30..+135 °C

Applications

- Food industry
- Chemical and Pharmaceutical industry
- Water and Sewage treatment

Product information

ph/ORP

Function

The measuring devices and the transducers operate with the standard pH and ORP measurement chains. The measuring devices are fitted with comprehensive monitoring functions of the measurement chains. For measuring tasks that are to be carried out over a greater distance of 5 m to 100 m, the impedance converter pH40 is implemented.

Advantage

- Compact version
- Automatic and manual calibration
- Impedance monitoring of glass and reference electrode of the combined electrode
- Monitoring the calibration interval
- Can be used for many standard combined electrodes
- Long cable length possible by impedance transmitter
- Temperature compensation by RTD PT100/Pt1000 sensor

pH and ORP Panelmeter pH9648



- LED-Display 14,2 mm red
- Measuring range programmable -1..+15 pH / ± 1500 mV
- Temperature compensation via P100/Pt1000 sensor
- Analog output 0/4..20 mA or 0/2..10 V for pH/ORP
- Max. 4 alarm outputs relay or transistor

Characteristics

The pH and ORP Panelmeter pH9648 is suitable for pH and ORP measurement in food technology, chemistry within pharmaceutical and sewage-water technology. The pH9648 operates with all common pH- and ORP electrodes. It is recommended to connect the Impedance-Converter pH40 for cable length > 5 m.

Technical data

Power supply

Supply voltage : 230 V AC ± 10 %; 115 V AC ± 10 %;
24 V AC ± 10 % or 24 V DC ± 15 %
Power consumption: max. 3.5 VA, with analog output 5 VA
Operating temperature : -10..+55 °C
CE- conformity : EN 55022, EN 60555,
IEC 61000-4-3/4/5/11/13

Input pH/ORP

Measuring range : -1.00..+15.00 pH or -1500..+1500 mV
 R_i : $> 10^{12} \Omega$
Input current : $< 10^{-12}$ A
Accuracy : 0.2 % measuring value, ± 2 Digit
pH setup : electrode zero point 4.00..10.00 pH
slope 40.0..70.0 mV/pH
ORP setup : ± 200 mV
Calibration mode : - **1- or 2-point-calibration**
Buffer selection possible:
-Schott
-WTW
-Ingold (Mettler Toledo)
-Puffer acc. to DIN 19266
-or manual buffer input
- **Data** entering for zero point and slope
- **ORP** offset

Temperature

Sensor : RTD, Pt100 or Pt1000,
(2- or 3-wire connection)
Unit : programmable °C, °F
Measuring range : -40.0..+160.0 °C (-40.0..+320.0 °F)
Accuracy : ± 0.1 %, ± 1 Digit
Transmitter supply : 24 V DC, R_i approx. 150 Ω ,
max. 50 mA (25 mA with 4 relay outputs)
Display : LED red, 14.2 mm
Parameter display : LED 2-digit red, 7 mm
(Parameter - and output indicator)

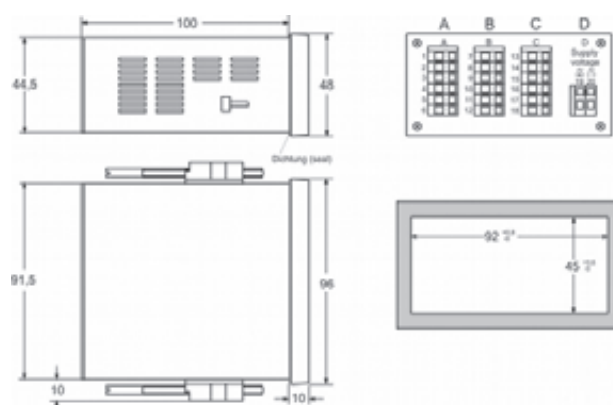
Output

Relay SPDT : < 250 V AC < 250 VA < 2 A,
 < 300 V DC < 50 W < 2 A
Transistor : < 35 V AC/DC, max. 100 mA,
short-circuit-proof
Analog output
active : 0/4..20 mA burden $\leq 500 \Omega$;
0/2..10 V burden $> 500 \Omega$, isolated
automatic output changing
(burden dependent)

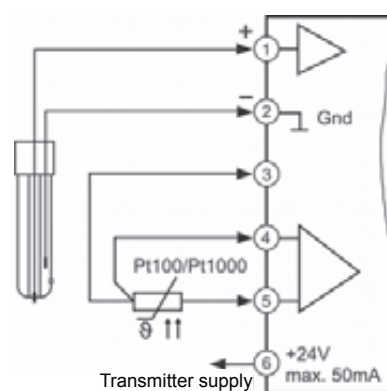
Analog output passive

4..20 mA, ext. burden =
 $RA[\Omega] \leq (U_B - 5 \text{ V}) \div 0.02 \text{ A}$;
supply voltage 5..30 V DC
Accuracy : 0.1 %
Panel case : DIN 96x48 mm, material PA6-GF; UL94V-0
Dimensions : Front 96x48 mm, mounting depth 100 mm,
Weight : max. 390 g
Connection : clamp terminals, 2.5 mm² single wire,
1.5 mm² flex wire, AWG14
Protection class : Front IP65, terminals IP20,
finger save acc. to BGV A3

Dimensions



Connection diagram input



Product information

pH/ORP

Ordering code

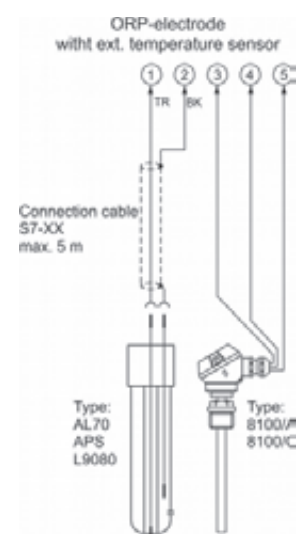
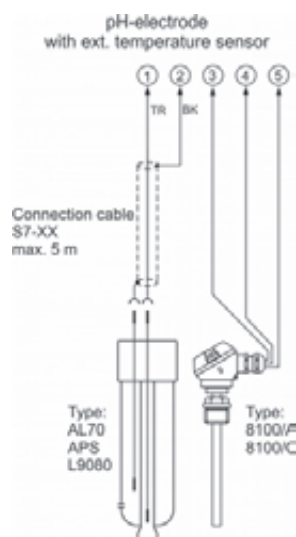
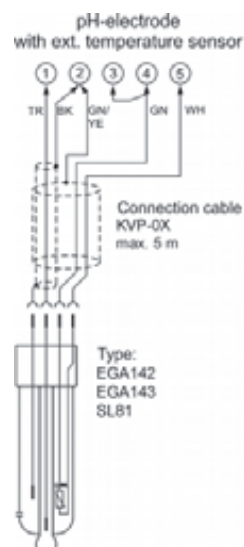
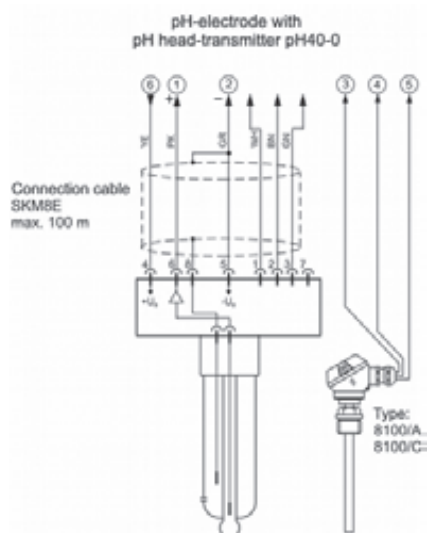
pH9648 - 1. - 2. - 3. - 4. - 5. - 6. - 7.

1. Terminal strip A	
13	input pH / ORP electrode, temperature compensation via Pt100 / Pt1000
2. Terminal strip B	
00	not installed
2R	2 relay outputs
2T	2 electronic outputs
3. Terminal strip C	
00	not installed
2R	2 relay outputs
2T	2 electronic outputs
AO	analog output 0/4..20 mA, 0/2..10 V DC
2A	2 analog outputs 4..20 mA passive
4. Terminal strip B supply voltage	
0	230 V AC $\pm 10\%$ 50-60Hz
1	115 V AC $\pm 10\%$ 50-60Hz
4	24 V AC $\pm 10\%$ 50-60Hz
5	24 V DC $\pm 15\%$
5. Options	
00	without option
6. Unit appears in the unit field	
7. Additional text above the display (3x90 mm HxW)	

Connection diagram for terminal strips B-D see page 5

Accessories see page 18

Connection examples pH9648

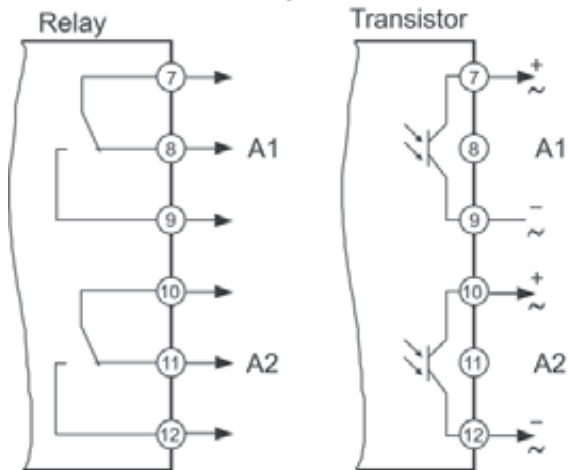


Connection Diagrams X9648, Terminals B-D

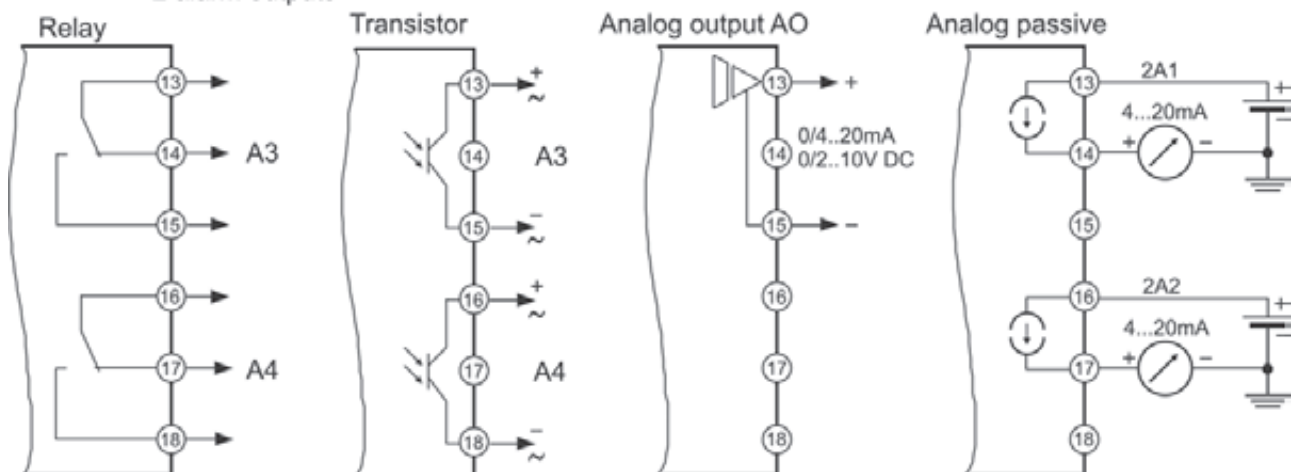
Terminal strips B, C, D

Terminal strip A belongs to each article.

Terminal strip B (varies with versions) 2 alarm outputs



Terminal strip C (varies with versions) 2 alarm outputs



Terminal strip D supply voltage (varies with version)



Product information

pH/ORP

pH and ORP Converter UNICON®-pH



- Field or head mounting
- Measuring range programmable -1..+15 pH / ±1500 mV
- Temperature compensation via P100/Pt1000 sensor
- Analog output 4..20 mA for pH/ORP and temperature
- 2 alarm outputs, transistor

Characteristics

The pH and ORP converter UNICON-pH is suitable for pH and ORP measurement in food technology, chemistry within pharmaceutical and sewage-water technology. The converter works with all common pH- and ORP electrodes.

Technical data

Power supply

Supply voltage : 14..30 V DC, 2-wire
Operating temperature : 0..55 °C
CE- conformity : EN 55022, IEC 61000-4-3/4/5

Input pH/ORP

Output signal : 4..20 mA
Burden : $RA[\Omega] \leq (U_B - 14 \text{ V}) \div 0,02 \text{ A}$
Measuring range : -1.00..+15.00 pH or -1500..+1500 mV
 R_i : $>10^{12} \Omega$
Input current : $<10^{-12} \text{ A}$
Accuracy : 0.2 % measuring value, ±2 Digit
Electrode zero point : 7.00 pH
Slope : 30..80 mV/pH
ORP setup : ± 200 mV
Calibration mode : - **1- or 2-point-calibration**
buffer selection possible :
- Schott
- WTW
- Ingold (Mettler Toledo)
- Buffer acc. to DIN 19266
- or manual buffer input
- **Data** entering for zero point and slope
- **ORP** setup

Temperature

Output signal : 4..20 mA
Burden : $RA[\Omega] \leq (U_B - 14 \text{ V}) \div 0,02 \text{ A}$
Temperature sensor : Pt100 or Pt1000, (2-wire)
Unit : programmable °C, °F
Measuring range : -40.0..+160.0 °C (-40.0..+320.0 °F)
Accuracy : ± 0.1 %, ±1Digit
Glass impedance : 0..1 GΩ (temperature compensated)
Detection range : 0.001..2 GΩ (non compensated)

Accuracy : ± 20 %
Reference imped. : 0..100 kΩ (non compensated)
Monitoring of the calibration interval : 1..1000 days
Display : LCD-dot matrix, 3.8 mm characters
2 lines 16 characters each

Alarm outputs

Transistor : 14..30 V DC, max.60 mA, with short-circuit-proof

Voltage drop : < 2 V

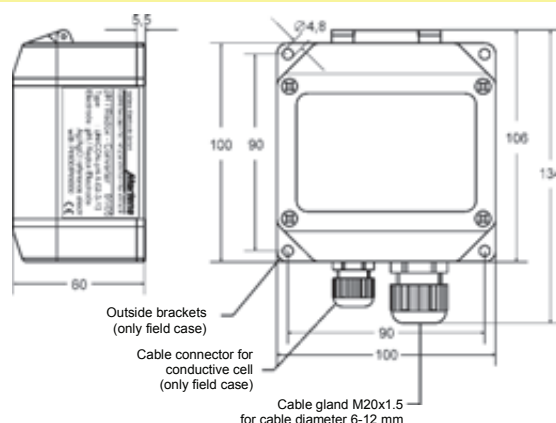
Range switch

R_i : >10 kΩ
MB1 active : $U = 0..3 \text{ V DC}$
MB2 active : $U = 12..30 \text{ V DC}$
Case : Head-field case
Material : Polyamide fiber glass
PA6-GF/GK 15/15, front foil polyester

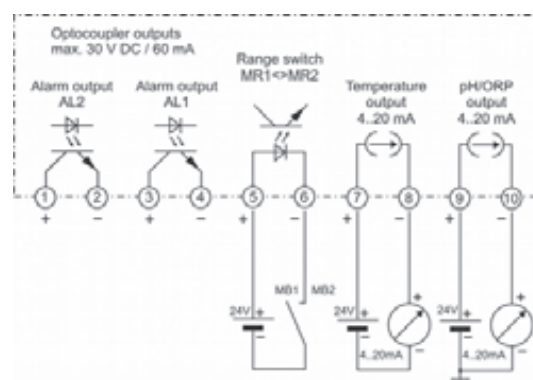
Dimensions : 100 x 100 x 60 mm (WxHxD)
Weight : max. 360 g
Connection : screw terminals pressure plate,
2.5 mm² flexible, 4 mm² single wire
connection cable

Protection class : IP65, terminals IP20 acc. to BGV A3

Dimensions



Connection diagram



For supplying the converter use terminals 9 and 10 as shown. If the converter is used form monitoring only, terminals 9 and 10 must be connected directly to the supply voltage.

Continue next page

Product information

pH/ORP

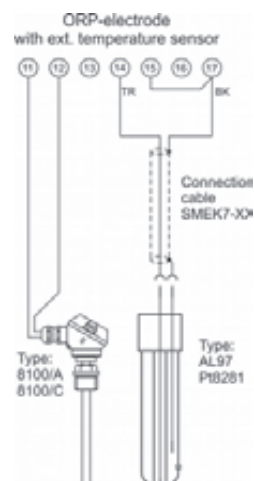
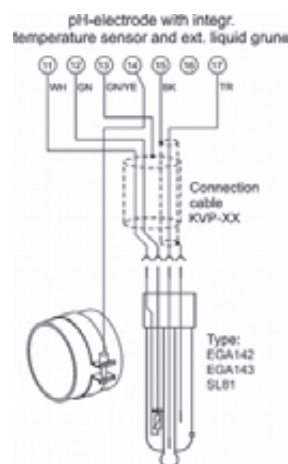
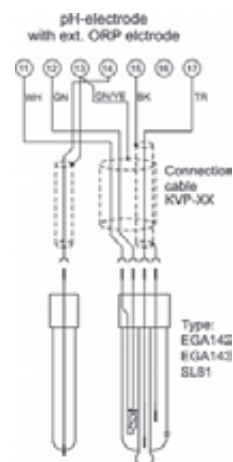
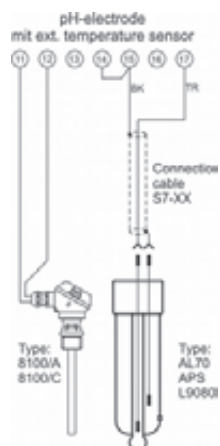
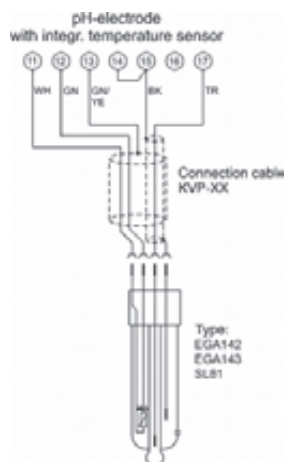
Ordering code

UNICON-pH - 1. - 2. - 3. - 4. - 5.

1. Model	
1	output 4...20 mA for pH/ORP, 2 electronic alarm outputs
2	as 1, but 2 nd measuring range for pH/ORP, output 4...20 mA for temperature, monitoring of the glass impedance, reference electrode and the calibration interval
2. Mounting	
01	head mounting, on the electrode
02	field mounting, separate connection cable see page 18
3. Reference system	
3	all systems with electrode zero point pH7.00 e.g. silver/silver chloride
4. Temperature compensation	
13	Pt100/Pt1000 sensor via software selectable
5. Options	
00	without option

Accessories see page 18

Connection diagram input UNICON-pH



Product information

pH/ORP

pH Head-Transmitter pH40



pH40

pH-electrode

- Measuring range -1..+15 pH
- 2-wire transmitter 4..20 mA
- Error free measurement up to 100 m

Characteristics

The head transmitter is designed for direct mounting on the pH-electrode with input lock nut connector B.
The output signal is located at output connector A.

Technical data

Power supply

Supply voltage : 5..30 V DC output 0
: 10..30 V DC output 2

Operating temperature : -10..+60 °C

Input pH/ORP

Measuring range : -1..+15 pH / ± 1500 mV
Input resistance : $>10^{12} \Omega$

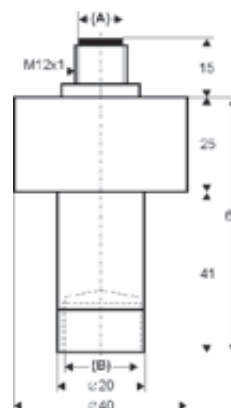
Output

Type 0 : 1:1 transfer of the pH-signal with low output impedance, error free measurement up to 100 m
Type 2 : 4..20 mA, 2-wire technology in the range -1..+15 pH depending at 25 °C, zero-point pH 7.0, slope 59.2 mV/pH, not compensated
Accuracy : type 0 = 0.01 %
: type 2 = 0.2 %

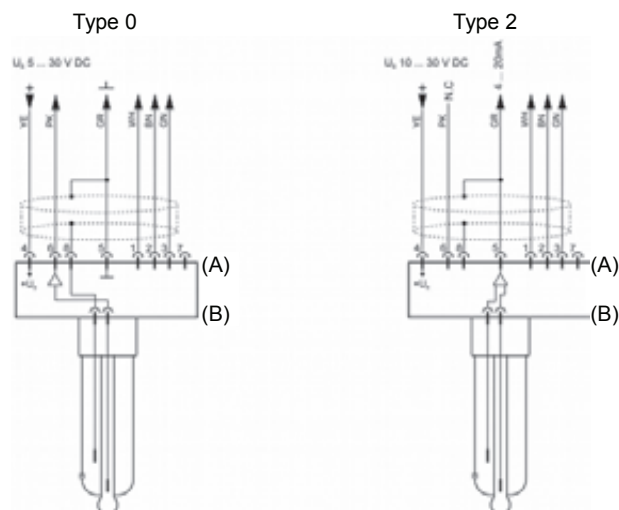
Case

Material : PVC-U
Weight : approx. 100 g
Process connection : S7 or SMEK plug
Electrical connection : 8 pole round socket, M12x1
Material : brass plated
Protection class : IP65

Dimensions



Connection diagram



Ordering code

pH40 - 1. - 2. - 3.

1. Output	
0	-1..+15 pH = 1:1 signal transfer
2	4..20 mA = -1..+15 pH
2. Input plug B process connection for pH-electrode	
2	S7 socket
3. Options	
00	without option
Accessories connection cable with 8 pole cable socket brass plated and pigtail, PU-cable	
SKM8E-02	2 m IP67
SKM8E-05	5 m IP67
SKM8E-10	10 m IP67
SKM8E-25	25 m IP67
	other length on request
	8 pole cable socket for self assembling

pH Transmitter GPHU



- With on-site display and electric isolation
- Automatic and manual temperature compensation
- 2-point calibration

Characteristics

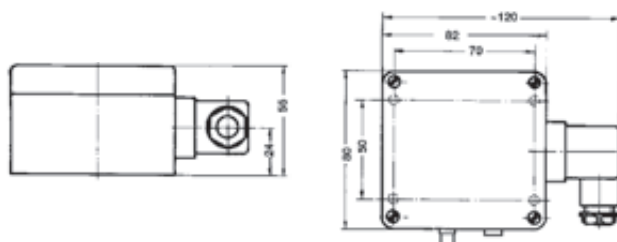
The GPHU is used for regulating, measuring and monitoring tasks e.g. in environmental and medical technology.

Every standard pH electrode can be used together with the GPHU, because the device has both, a BNC and a Cinch socket. Additionally it provides two banana sockets for a Pt1000 probe for temperature compensation. The values for temperature can also be entered manually via buttons.

Technical data

Measuring range	: 0.00..14.00 pH
Accuracy	: 0.02 pH \pm 1 digit (at nominal temperature 25 °C)
Output signal	: 4..20 mA (2-wire) 0..10 V (3-wire)
Electric isolation	: input electrically isolated
Power supply	: 12..30 V DC for 4..20 mA 18..30 V DC for 0..10 V
Permissible burden	: $R_A[\Omega] = (U_V[V] - 12V) / 0.02 A$
Permissible load	: $R_L > 3000 \Omega$
Electrode	: any standard pH electrode is suitable (electrode not included)
Input resistance	: $10^{12} \Omega$
Electrode socket	: BNC / Cinch
Temp. compensation	: -30..+150 °C, manually selectable via buttons or automatically via external Pt1000 probe
Temp.connection socket:	: 2x banana socket \varnothing 4 mm, for Pt1000 probe
Display	: 10 mm high, 4-digit LCD display
Electric connection	: elbow-type plug (EN 175301-803/A)
Housing	: ABS
Working temperature	: 0..50 °C
Protection class	: IP65 (except electrode and temperature socket)

Dimensions



Ordering code

GPHU14MP - 1. - 2. - 3.

1. Electrode socket	
BNC	BNC socket
CINCH	Cinch socket
2. Output signal	
A1	4..20 mA
V2	0..10 V
3. Option	
00	without option
MB	limited measuring range (please state the desired range, e.g.: 2.00..10.00 pH)

Ordering example:
GPHU-14MP-BNC-A1-00

Accessories

GTF 2000 WD-B

Water-proof Pt1000 temperature probe with
2 banana plugs \varnothing 4 mm, measuring range: -20..+105 °C

GE 100

Standard electrode, Cinch plug
measuring range: 0..14 pH
temperature range: 0..80 °C;
> 200 μ S/cm, not pressure resistant, 1 m cable

GE 100 BNC

Standard electrode, BNC plug
(specifications: p.r.t. GE 100)

GE 117

pH electrode with integrated Pt1000 sensor
1x BNC plug and 1x banana plug \varnothing 4 mm
and thread PG 13.5 pressure resistant up to 6 bar

PG 13.5

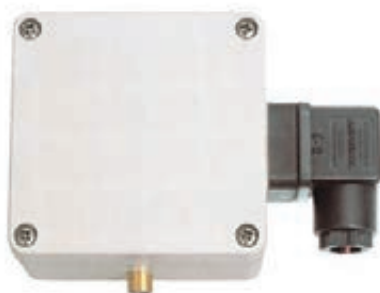
Plug-on thread adapter for pressureless use
with external thread PG 13.5 (can be attached to any electrode)

further accessories upon request

Product information

pH/ORP

ORP Transmitter GRMU



- Electrically isolated
- Optional on-site display

Characteristics

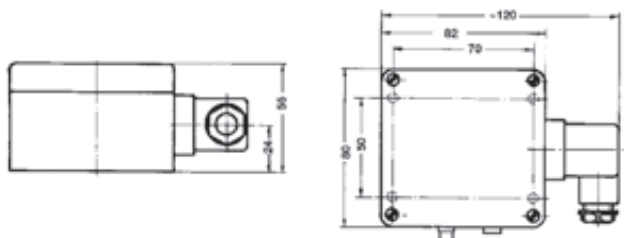
The GRMU is suited for regulating, measuring and monitoring tasks e.g. at environmental and medical technology

Every standard ORP electrode can be used in combination with the GRMU that provides alternatively a BNC or Cinch socket.

Technical data

Measuring range	: ± 2000 mV
Accuracy	: 0.2 % FS
Output signal	: 4..20 mA (2-wire) 0..10 V (3-wire)
Electric isolation	: input electrically isolated
Power supply	: 12..30 V DC for 4..20 mA 18..30 V DC for 0..10 V
Permissible burden	: $R_A [\Omega] = (U_V [V] - 12V) / 0.02 A$
Permissible load	: $R_L > 3000 \Omega$
Electrode	: any standard ORP electrode is suitable (electrode not included)
Input resistance	: $10^{12} \Omega$
Electrode socket	: BNC / Cinch
Display	: 10 mm high, 4-digit LCD display
Electric connection	: elbow-type plug (EN 175301-803/A)
Housing	: ABS
Working temperature	: 0..50 °C
Protection class	: IP65 (except electrode socket)

Dimensions



Ordering code

GRMU2000MP - ☐ 1. - ☐ 2. - ☐ 3.

1. Electrode socket	
BNC	BNC socket
CINCH	Cinch socket
2. Output signal	
A1	4..20 mA
V2	0..10 V
3. Option	
00	without option
VO	on-site display (display)
MB	limited measuring range (please state the desired range)

Ordering example:

GRMU-2000MP-CINCH-A1-VO

Accessories

GE 105

ORP electrode with Cinch plug and buffer solution
Measuring range: ± 2000 mV
Temperature range: 0..80 °C;
> 25 $\mu S/cm$, not pressure resistant, 1 m cable

PG 13.5

Plug-on thread adapter for pressureless use
with external thread PG 13.5 (can be attached to any electrode)

Standard Combined pH and ORP Electrodes



pH Electrodes

Technical data

Type	AL70pH-00	EGA142-VP	EGA143-VP	SL81-120pH-VP	APS-X1Q2K1A-00	L9080
Functional range	2..13 pH	0..14 pH	0..14 pH	0..14 pH	1..12 pH	0..12 pH
Field of application	Water	Water, Waste water	Strongly contaminated waste water, electroplating technology	Food (sterilizing possible)	Refrigeration engineering	Ultra pure water, boiler feed water
Operating temperature	-5..+80 °C	-5..+80 °C	-5..+80 °C	0..135 °C	-15..+80 °C	-30..+80 °C
Max. process pressure	3 bar	6 bar	6 bar	10 bar	6 bar	6 bar
Mounting length	120 mm	120 mm	120 mm	120 mm	120 mm	120 mm
Process connection	PG13,5	PG13,5	PG13,5	PG13,5	PG13,5	PG13,5
Temperature sensor	-	Pt1000	Pt1000	Pt1000	-	-
Electrical connection*	S7	VP	VP	VP	S7	S7
Reference system	Silver/silver chloride (Ag/AgCl) electrode zero point pH7.00					
Reference filling solution	Gel	Gel	Gel	Gel	Gel	Liquid
Diaphragm	ceramic	ceramic		ceramic	PTFE	ceramic
Min. conductivity of the media	50 µS/cm	100 µS/cm	50 µS/cm	50 µS/cm	50 µS/cm	< 1 µS/cm
Mounting position	10..170°	30..150°	30..150°	10..170°	10..170°	10..170°

* Connection cable see page 18

Mounting position



Product information

pH/ORP

Combined ORP electrodes

Technical data

Type	AL79Pt-00	Pt8281HD-00
Functional range	2..13 pH	2..13 pH
Field of application	Environmental engineering, disinfection	Environmental engineering, disinfection
Operating temperature	-5..+80 °C	-5..+100 °C
Max. process pressure	3 bar	10 bar
Mounting length	120 mm	120 mm
Process connection	PG13.5	PG13.5
Temperature sensor	-	-
Electrical connection*	S7	S7
Reference system	Silver/silver chloride (Ag/AgCl) electrode zero point pH7.00	
Reference filling solution	Polymer (Referid)	Polymer (Referid)
Diaphragm	ceramic	KPG
Min. conductivity of the media	50 µS/cm	50 µS/cm
Mounting position, see page before	10..170°	10..170°

* Connection cable see page 18

Utilization notes for combined pH and ORP electrodes

1. Combined pH and ORP electrodes are supplied with a protective cap, which is filled with a 3mol KCL solution. In this condition the electrodes can be stored max. 1 year. Therefore the protective cap should be removed only just before installation and use.
2. The shank of the combined electrode consists of glass and is easily fragile. At installation it must be ensured absolutely that the tube does not push anywhere.
3. Because the characteristics deviate from the ideal line, for the precise measurement it is necessary to calibrate the electrode after start-up and then in regular time intervals.
4. A combined electrode must not drain at the active tip, otherwise it becomes useless. To recover the active tip of the electrode it can be dipped for about 24 hours into a 3mol KCL storage solution. Subsequently, a calibration is necessary, because zero point and slope may have been drifted.
5. In dirty and containing protein media a cleaning of the electrodes is necessary occasionally. When using purpose we offer a special cleaning solution. After cleaning, the electrodes must be rinsed with water.

Attention note!

pH and ORP electrodes only have a limited life of operating. It depends on the field of application such as medium, pressure and temperature. It can differ between a number of weeks and several years. There are special cases, of environment conditions where operating life will be only some days. Characteristic and response time will change by aging. Up to a certain aging point an error can be compensated by using electronic circuit (e.g. Converter UNICON-pH). Combined pH and ORP electrodes are articles of consumption and no subject to a common guarantee. Retaking or exchanges are generally excluded.

Our offer includes free technical support for selection optimal combined pH and ORP electrodes. Beside listed standard electrodes we can also offer special models on customers request.

In-line Fitting

EA1200 / EA2200



Characteristics

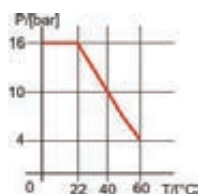
For flow fittings with outer pipe diameter from 20mm up to 63 mm. This In-line fitting has been designed for electrochemical cells like pH/ORP-, conductivity-cells with PG13.5 process connection. It protects the sensor and ensures a proper measurement. The fitting fits for operating at the flow-fitting DFA32. The application field includes swimming pools technology and drinking water measurement.

Technical data

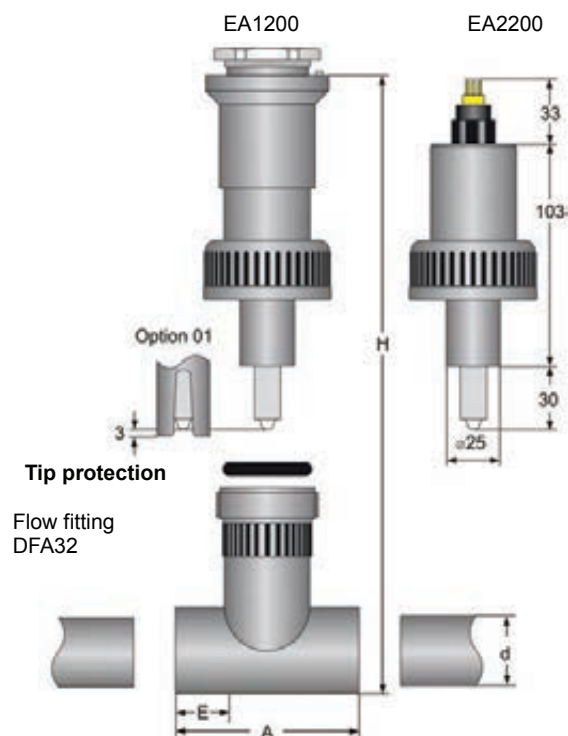
Sensor connection : PG13.5
 Process connection : screw cap for adhesive coupling
 Process material : PVC-U acc. to DIN 8061 and 8062

Screw cap : PVC-U
 Operating temperature : 0..60 °C
 Process pressure : max. 16 bar at 22 °C

Pressure-temperature table PVC-U



Dimensions



Dimensions [mm]

d	H	A	E
20	180	78	22
25	180	78	22
32	180	78	22
40	192	98	26
50	202	118	31
63	216	144	38

Ordering code

EA 1. - 2. - 3.

1. Model	
1200	head mounting at UNICON-pH, incl. cap nut
2200	field mounting, incl. cap nut
2. Sensor type	
0	standard pH / ORP combined-electrodes
3. Options	
00	without option
01	with integrated tip protection (only for pH and ORP combined-electrodes)
Accessories	flow fitting DFA32 material PVC-U
DFA32-20-1-1	outer pipe diameter d=20 mm
DFA32-25-1-1	outer pipe diameter d=25 mm
DFA32-32-1-1	outer pipe diameter d=32 mm
DFA32-40-1-1	outer pipe diameter d=40 mm
DFA32-50-1-1	outer pipe diameter d=50 mm
DFA32-63-1-1	outer pipe diameter d=63 mm

Product information

pH/ORP

In-line Fitting

EA1630 / EA2630



Characteristics

Compact fitting with Whitworth process connection acc. to DIN ISO 228.

This In-line fitting has been designed for electrochemical cells like pH/ORP-, conductivity-cells with PG13.5 process connection. It protects the sensor and ensures a proper measurement.

The fitting is conceived for the application in the chemical industry.

Technical data

Process connection : pipe thread acc. to DIN ISO 228

Process material : PVDF

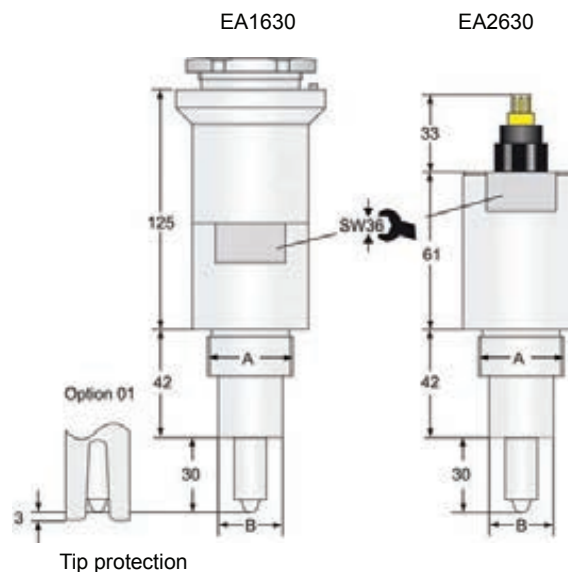
Operating

temperature : -10..+120 °C

steam sterilization 140 °C < 1 h

Process pressure : max. 16 bar

Dimensions



Tip protection

Process connection

A	B
G ¾ A	Ø23.5
G 1 A	Ø25

Ordering code

EA 1. - 2. - 3. - 4.

1. Model	
1630	head mounting at UNICON-pH
2630	field mounting
2. Process connection (A)	
G ¾ A	
G 1 A	
3. Sensor type	
0	standard pH / ORP combined-electrodes
4. Options	
00	without option
01	with integrated tip protection (only for pH and ORP combined-electrodes)

In-line Fitting

EA1730 / EA2730



Characteristics

Hygienic fitting; material PVDF for milk-pipe connection acc. to DIN 11887.

This In-line fitting has been designed for electrochemical cells like pH/ORP-, conductivity-cells with PG13.5 process connection. It protects the sensor and ensures a proper measurement.

The application field includes food and chemical technology.

Technical data

Process connection: milk pipe acc. to DIN 11887

Process material : PVDF

FDA compliant

Cap nut : stainless steel 1.4301

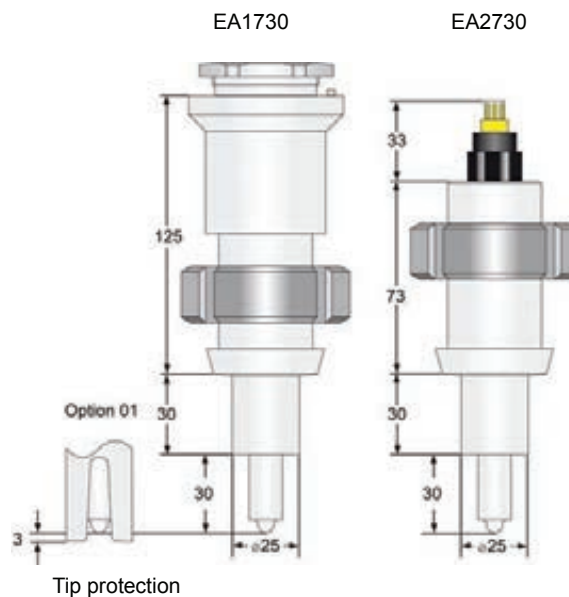
Operating

temperature : -10...+120 °C

steam sterilization 140 °C < 1 h

Process pressure : max. 16 bar

Dimensions



Ordering code

EA

1.

 -

2.

 -

3.

 -

4.

1. Model	
1730	head mounting at UNICON-pH, incl. Cap nut
2730	field mounting, incl. cap nut
2. Process connection	
DN25	
DN40	
DN50	
DN65	
3. Sensor type	
0	standard pH / ORP combined-electrodes
4. Options	
00	without option
01	with integrated tip protection (only for pH and ORP combined-electrodes)

Product information

pH/ORP

In-line Fitting EA2650



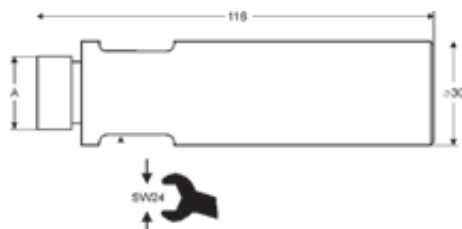
Characteristics

This In-line fitting has been designed for electrochemical cells like pH/ORP-, conductivity-cells with PG13.5 process connection.

Technical data

Material : stainless steel 1.4571, seal Viton®
 Process pressure : max. 16 bar
 Operating temperature : depends to the sensor
 Process connection : G ½ A, G ¾ A, G 1 A

Dimensions



Ordering code

EA 1. - 2. - 3. - 4.

1. Model	2650	field mounting
2. Process connection (A)	G ½ A	
	G ¾ A	
	G 1 A	
3. Cells/combined electrodes	0	for standard pH / ORP electrodes
4. Options	00	without option

Change Fitting WA120



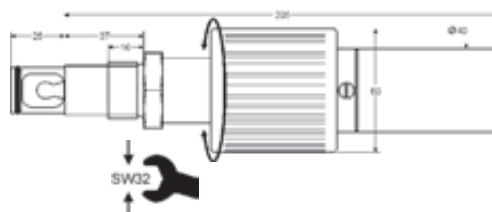
Characteristics

Change fittings makes re-movement and replacement of pH and ORP electrodes under process (In-line) very simple.
 The fitting is designed for cells/electrodes with process thread PG13.5 and a mounting length of 120 mm.
 The concerned cycle will not disturb or interrupted at any time.

Technical data

Process material : stainless steel 1.4571, seal Viton®
 Case material : PP
 Process pressure : max. 10 bar
 Operating temperature : max. 135°C
 Process connection : G ¾ A
 Installation length : 120 mm

Dimensions



Ordering code

WA120 - 1. - G3/4A - 2. - 3.

1. Model	1	for sensors with 120mm mounting length
2. Process material	E	stainless steel DIN 1.4571
3. Options	00	without option

Viton® is a registered trademark of DuPont

Flow-Tank DFG



Accessories



Lid with 3 x PG13.5 process connections and blind gland VS

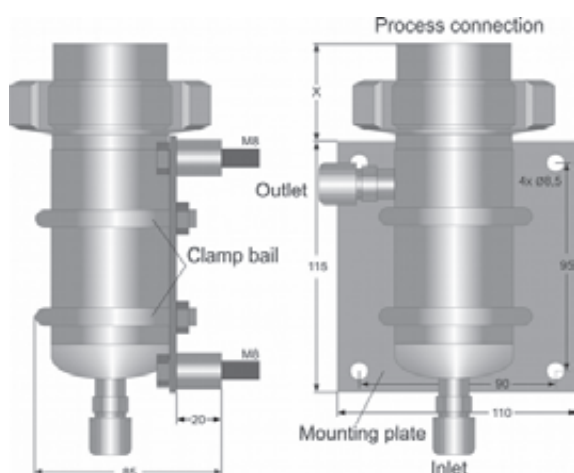
Characteristics

For continuous analysis measurement with pH-, ORP-cells in liquid media with installation length of max. 120 mm.

Technical data

Material	: stainless steel 1.4571
Process pressure	: max. 16 bar
Operating temperature	: max. 140 °C
Process connection	: PG 13.5, G ¼ B or G1A
Inlet-, outlet	: clamping sleeve for pipes 10x2 mm
Tank diameter	: 54 mm

Dimensions



Ordering code

DFG - 1. - 2. - 3.

1. Model	
50	measuring tank D=54 mm
2. Process connection	
1 x PG13.5	*X = 45 mm
3 x PG13.5	*X = 45 mm
3 x G ¼ B	*X = 45 mm
1 x G 1 A	*X = 27 mm
3. Options	
00	without option
Accessories (stainless steel 1.4571)	
MP50	mounting plate incl. Mounting parts
RSB50	2 clamp bails incl. Bolt nuts
VS PG13,5	blind glands PG13.5

Product information

pH/ORP

Connection cable



Connection cable 1
for electrodes with S7-connector

Order no.	Length [m]	Protection class
S7-02	2	IP67
S7-05	5	IP67

Connection cable 2
for electrodes with S7-connector at UNICON-pH, head mounting.

Order no.	Length [m]	Protection class
S7-K	-	-

Connection cable 3
for electrodes with SMEK-VP-connector

Order no.	Length [m]	Protection class
KVP-02	2	IP67
KVP-05	5	IP67
KVP-10	10	IP67

(not used cables could be cutting)

Connection cable 4
for electrodes with SMEK-VP-connector at UNICON-pH, head mounting.

Order no.	Length [m]	Protection class
KVP-K	-	-

Calibrations tools

WTW technical buffer, 1000 ml with dosing container

Order no.	PH-buffer value
TEP-4	4.01
TEP-7	7.00
TEP-10	10.00



WTW ORP-buffer 250 ml bottle

Order no.	Buffer value [mV]
RH28	427 (pH7)

Storage solutions 250 ml DURAN-glass bottle,
3 mol KCL sterilized

Order no.
pH-AL-250



Cleaning solution 250 ml DURAN-glass bottle,
Pepsin / hydrochloride acid

Order no.
pH-RL-250

Calibration container
for in-front-calibration material PMMA with level sign(20ml) and
screw-cap PG13.5.
(the pH-electrode must be screwed-in with the filled container).

Order no.
pH-KR-250



Cleaning container 250 ml, to rinse the electrodes with water,
material PP

Order no.
pH-SB-250



Analysis Conductivity



Characteristics

System	2- and 4- electrode measurement, calibration acc. to USP<645>
Interpretation	Conductivity from 50 μ S up to 2000 mS/cm
Process connection	G 1/2 A, G 3/4 A, G 1 A Clamp, VARIVENT®, Milk pipe
Media	Ultra pure water up to seawater/sewage
Process pressure	10 bar up to 60 bar
Medium temperature	-10 °C up to +200°C

Applications

- Ultra pure water
- Food - and Pharmaceutical industry
- Chemical industry
- Drinking water preparation
- Desalination of sea water
- Sewage treatment

Product information

Functions

The conductive measurement of the conductivity of liquids for monitoring and controlling in the ongoing process is a varied measurement process in industry.

By the increasing strict conditions and purity requirements of authorities ever increasing standards have been created for the food and beverage industry for the purity and hygiene in production. For this reason process engineering demands that plants and measurement must comply with a specified cleaning and sterilization procedure (CIP, SIP). In the pharmaceutical industry a high degree of hygiene and cleaning of the plants is necessary. This process is fulfilled by ultra-pure water.

As a standard for the purity of the water a standard of the United States Pharmacopeia <USP> recognized worldwide applies. Our

Analysis conductivity

measurement devices have the corresponding parameters to monitor pharmaceutical water and rinsing water.

Advantages

- Various standardized process connections
- Measuring cells for the most varying applications
- FDA compatible measuring cells
- Ultra-pure water measurement
- High level of precision and long-term stability measurement achieved by 4-electrodes
- Temperature-compensated measurement by PT1000 sensor
- CIP-/SIP capable

Conductivity Meter LF9648



Characteristics

The Conductivity Meter LF9648 has been designed for the measurement of conductivity, as a degree of the purity or concentration of a liquid. In connection with 4-electrode-conductivity cells a high accuracy and insensitivity of contamination can be achieved. A further advantage is a broad range of application with only one cell. Only for measurement in ultra-pure water a special 2-electrode conductivity cell must be used.

Technical data

Power supply

Supply voltage : 230 V AC $\pm 10\%$; 115 V AC $\pm 10\%$;
24 V AC $\pm 10\%$ or 24 V DC $\pm 15\%$
Power consumption : max. 3.5 VA, 5 VA with analog output
Operating temp. : $-10\ldots+55\text{ }^{\circ}\text{C}$
CE-conformity : EN55022, EN60555,
IEC61000-4-3/4/5/11/13

Inputs

MR conductivity : 0..2.000(0) $\mu\text{S/cm}$ up to
0..2000 / 200(0) mS/cm (at $25\text{ }^{\circ}\text{C}$)
-Cell constant : 0.080..9.999
-Accuracy : 0.5 % of the measuring value, ± 2 Digit
-Temperature comp. : non linear for ultra pure water and natural
water or linear programmable from
0.000..9.999 $\%/K$

MR temperature : $-50.0\ldots+200.0\text{ }^{\circ}\text{C}$; Sensor Pt100 or Pt1000
-Accuracy : $\pm 0.2\text{ }^{\circ}\text{C}$

Display : LED red, 14.2 mm

Indicating range : 2000(0) Digit with leading zero suppression

Parameter display : LED 2-digit red, 7 mm
(parameter - and output indicator)

Outputs

Relay : SPDT $< 250\text{ V AC}$ $< 250\text{ VA}$ $< 2\text{ A}$,
 $< 300\text{ V DC}$ $< 50\text{ W}$ $< 2\text{ A}$

Transistor : transistor, $< 35\text{ V AC/DC}$, max. 100 mA,
short circuit protected

Analog output

Active : 0/4..20 mA burden $\leq 500\text{ }\Omega$;
0/2..10 V burden $> 500\text{ }\Omega$, isolated
automatic burden changing
(burden dependent)

Passive : 4..20 mA, ext.
burden = $RA[\Omega] \leq (\text{supply} - 5\text{ V}) \div 0.02\text{ A}$;
supply voltage 5..30 V DC,

Accuracy : 0.1 %; TK 0.01 $\%/K$

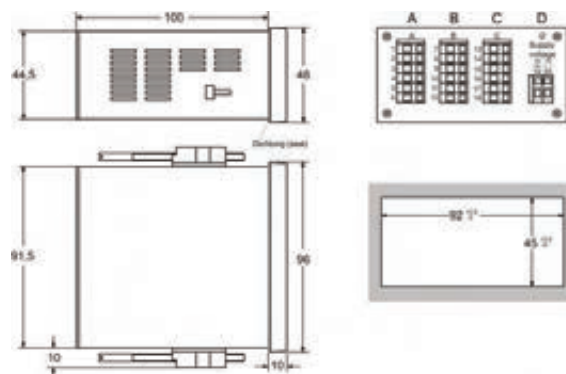
Case : panel mounting DIN 96x48 mm,
material PA6-GF; UL94V-0

Dimensions : front 96x48 mm, mounting depth 100 mm,

Weight : max. 390 g

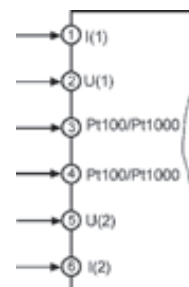
Connection : clamp terminals, 0.08..1.5 mm^2 ,
AWG28..AWG14

Dimensions



Connection diagram

Terminal strip A



Ordering code

LF9648 - 1. - 2. - 3. - 4. - 5. - 6. - 7.

1. Terminal strip A		
1	input for 2- or 4-electrode-cells, temperature compensation via Pt100	
3	as 1, but temperature compensation via Pt1000	
2. Terminal strip B		
00	not installed	
2R	2 relay outputs	
2T	2 electronic outputs	
3. Terminal strip C		
00	not installed	
2R	2 relay outputs	
2T	2 electronic outputs	
AO	analog output 0/4..20 mA, 0/2..10 V DC	
2A	2 analog outputs 4..20 mA passive	
4. Terminal strip D Supply voltage		
0	230 V AC	±10 % 50-60Hz
1	115 V AC	±10 % 50-60Hz
4	24 V AC	±10 % 50-60Hz
5	24 V DC	±15 %
5. Options		
00	without option	
01	min- and max-peak hold	
14	measuring/monitoring acc. to USP<645>	
6. Unit appears on the unit field		
7. Additional text above the display (3x90 mm HxW)		

Connection diagram for terminal strip B-D see page 4

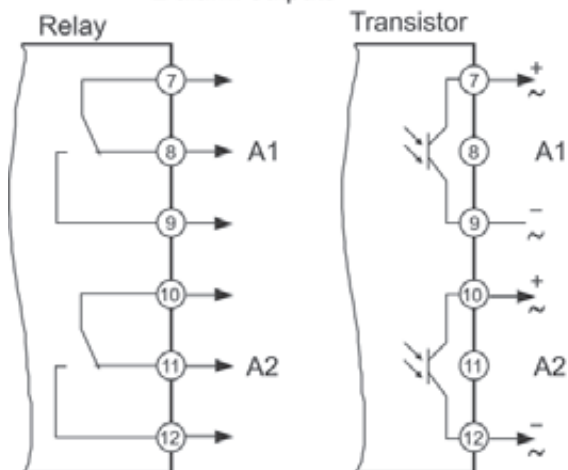
Connection Diagrams X9648, Terminals B-D

Terminal strips B, C, D

Terminal strip A belongs to each article.

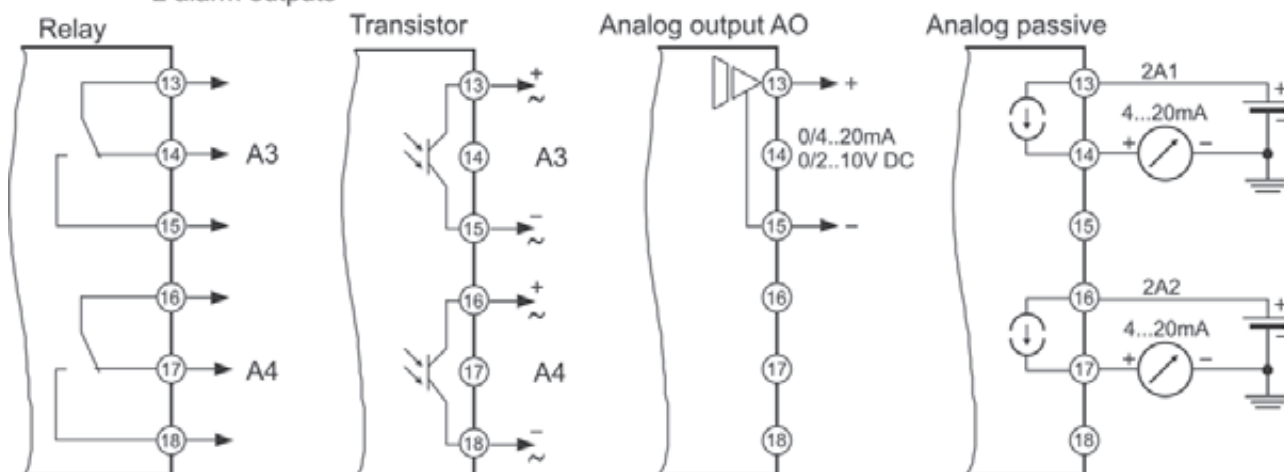
Terminal strip B (varies with versions)

2 alarm outputs



Terminal strip C (varies with versions)

2 alarm outputs



Terminal strip D supply voltage (varies with version)



Conductivity Meter LF1010



Characteristics

The Conductivity-Meter LF1010 has been designed for the measurement of conductivity, as a degree of the purity or concentration of a liquid. In connection with 4-electrode-conductivity cells a high accuracy and insensitivity of contamination can be achieved. A further advantage is a broad range of application with only one cell. Only for measurement in ultra-pure water a special 2-electrode conductivity cell must be used.

Technical data

Power supply

Supply voltage : 230 V AC $\pm 10\%$; 115 V AC $\pm 10\%$;
24 V AC $\pm 10\%$ or 24 V DC $\pm 15\%$

Power consumption : max. 3.5 VA

Operating temp. : -20...+55 °C

CE-conformity : EN55022, EN60555,
IEC61000-4-3/4/5/11/13

Inputs

MR conductivity : 0..2.000(0) $\mu\text{S}/\text{cm}$ up to
0..2000 / 200(0) mS/cm (at 25 °C)

-Cell constant : 0.080..9.999

-Accuracy : 0.5 % of the measuring value, ± 2 Digit

-Temperature comp. : non linear for ultra pure water and natural
water or linear programmable from
0.000..9.999 %/K

MR temperature : -50.0..200.0 °C; Sensor Pt100 or Pt1000

-Accuracy : ± 0.2 °C

Display : LED red, 14.2 mm

Indicating range : 2000(0) Digit with leading zero suppression

Parameter display : LED 2-digit red, 7 mm
(Parameter - and output indicator)

Outputs

Relay : SPDT < 250 V AC < 250 VA < 2 A,
 < 300 V DC < 50 W < 2 A

Field case : Material PA6-GF15/15, keypad polyester

Dimensions : 100x100x60 mm

Weight : max. 450 g

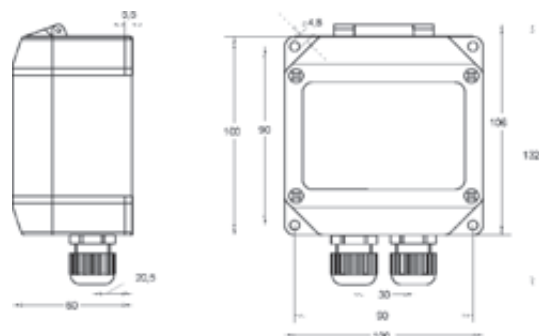
Connection : clamp terminals

Terminals 1-4 : *single wire* 0.75 mm², AWG18 0.5 mm², AWG 20

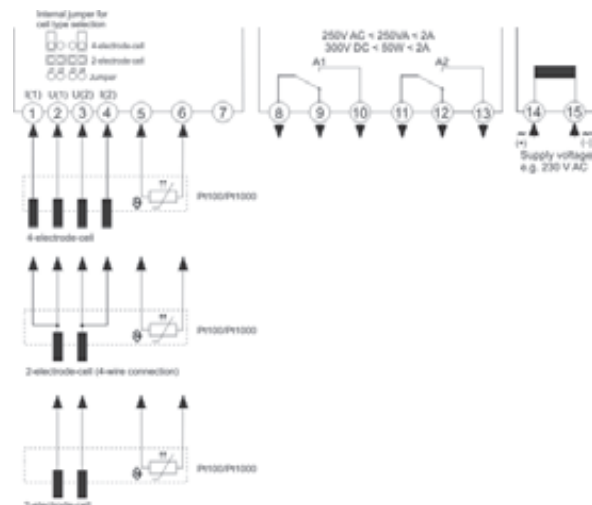
Terminals 5-15 : 2.5 mm², AWG13 1.5 mm², AWG 15

Protection class : IP65, terminals IP20 acc. to BGV A3

Dimensions



Connection diagram



Ordering code

LF1010 - 1. - 2. - 3. - 4. - 5. - 6.

1. Input		
1	input for 2- or 4-electrode-cells, temperature compensation via Pt100	
3	as 1, but temperature compensation via Pt1000	
2. Alarm output		
00	not installed	
2R	2 relay	
3. Supply voltage		
0	230 V AC	±10 % 50-60Hz
1	115 V AC	±10 % 50-60Hz
4	24 V AC	±10 % 50-60Hz
5	24 V DC	±15 %
4. Options		
00	without option	
01	min- and max-peak hold	
09	1xM20x1.5 Multi (2xØ6 mm), 1xM20x1.5	
14	measuring and monitoring of ultra-pure water acc. to USP<645>	
5. Unit appears on the unit field		
6. Additional text above the display (3x70 mm HxW)		

Product information

Analysis conductivity

Conductivity Converter UNICON®-LF



Characteristics

The Conductivity Converter UNICON-LF has been designed for the measurement of conductivity, as a degree of the purity or concentration of a liquid. In connection with 4-electrode-conductivity cells a high accuracy and insensitivity of contamination can be achieved. A further advantage is a broad range of application with only one cell. Only for measurement in ultra-pure water a special 2-electrode conductivity cell must be used.

Technical data

Power supply

Loop voltage : U_B 14..30 V DC, 2-wire connection
 Operating temperature : 0..50 °C
 CE- conformity : EN50022, IEC61000-4-3/4/5

Conductivity output

Current : 4..20 mA
 Unit : programmable $\mu\text{S}/\text{cm}$; mS/cm ; $\text{k}\Omega/\text{cm}$; $\text{M}\Omega/\text{cm}$
 Decimals : 0..3 digit (unit depending)
 Indicating range : 500..9999 Digit (unit and decimals depending)
 min./max. MR : 0..5.00 $\mu\text{S}/\text{cm}$ bis 0..500.0 mS/cm ;
 0..0.500 $\mu\text{S}/\text{cm}$ / 0..50.0 $\mu\text{S}/\text{cm}$
 with ultra-pure cell

Temperature comp. : non linear for ultra pure water and natural water or linear programmable from 0.000..8.000 $\%/^{\circ}\text{C}$

-Cell constant : 0.080..9.999
 -Accuracy : $\pm 0.5\%$ of the measuring value, ± 2 Digit

Temperature output

Current : 4..20 mA
 Burden : $RA \leq (U_B - 14 \text{ V}) \div 0.02 \text{ A}$
 Temperature sensor : RTD Pt100 or Pt1000 acc. to DIN IEC 751
 Unit : °C, °F programmable
 Measuring range : -40.0..+160.0 °C

Alarm outputs

Transistor : 14..30 V DC, max. 60 mA
 Voltage drop : < 2V

MR switch over

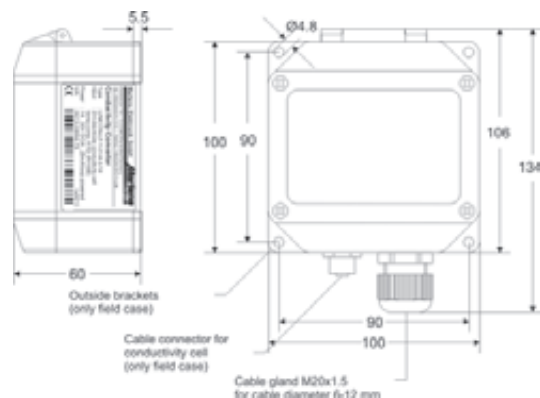
R_i : >10 k Ω
 MB1 active : $U = 0..3 \text{ V DC}$
 MB2 active : $U = 12..30 \text{ V DC}$

Display

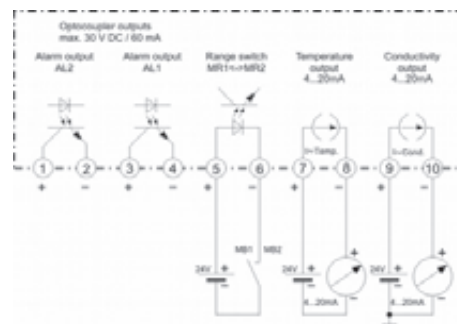
Range : 2 lines 16 characters each
 Case : head case / field case
 Material : case polyamide with fiber glass
 PA6-GF/GK 15/15, front foil polyester
 Dimensions : 100 x 100 x 60 mm (WxHxD)

Weight : max. 360 g
 Connection : screw terminal with pressure plate,
 2.5 mm² flexible wire, 4 mm² single wire
 and plug-in cable for sensor
 Protection class : IP65, terminals IP20 acc. to BGV A3

Dimensions



Connection diagram



Ordering code

UNICON-LF - 1. - 2. - 3. - 4. - 5.

1. Model	
1	output 4..20 mA for conductivity 2 electronic alarm outputs
2	as 1, but 2 nd measuring range for conductivity, output 4..20 mA for temperature
2. Mounting	
01	head mounting, on the cell
02	field mounting, separate connection cable page 24
03	as 02, but plug stainless steel
3. Measuring principle	
4	4-electrode measurement (2-electrode cell connectable)
4. Temperature compensation	
1	RTD Pt100
3	RTD Pt1000
5. Options	
00	without option
14	measurement/monitoring acc. to USP <645>

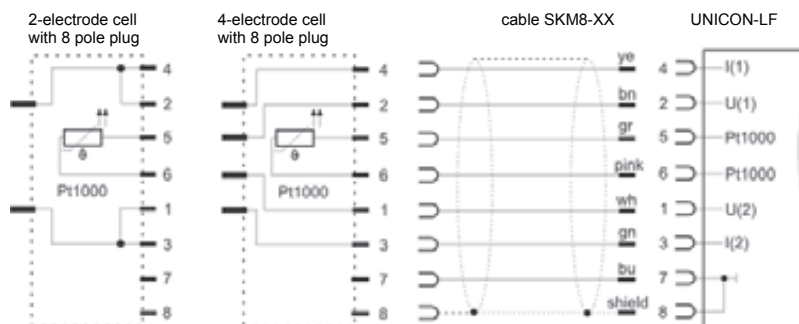
Accessories see page 24

Connection diagrams see page 9

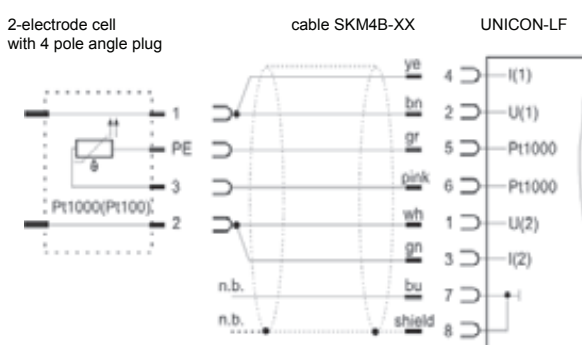
Connection Diagrams Conductivity Measurement

Connection at UNICON-LF field case

A

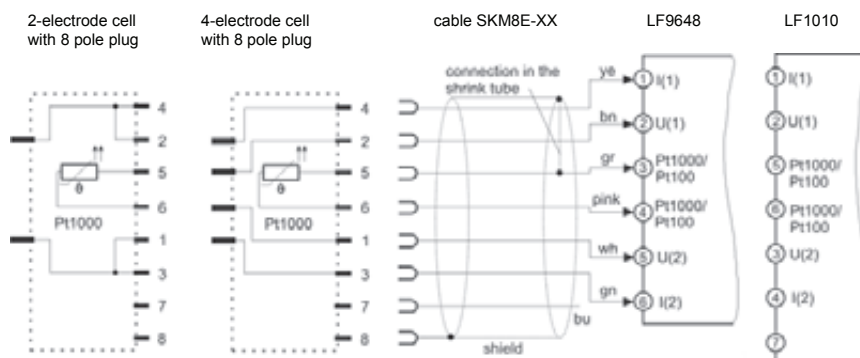


B

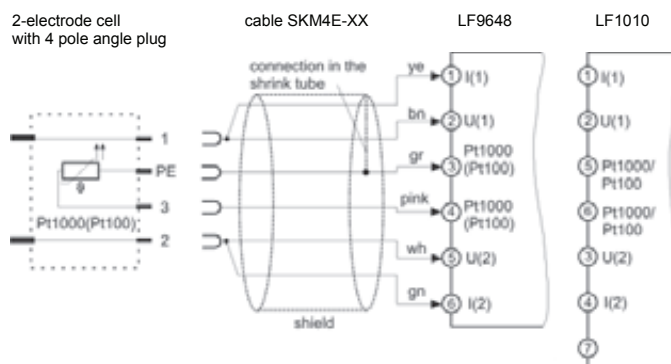


Connection at LF1010 and LF9648

D



E



Product information

Analysis conductivity

Conductivity Transmitter incl. Measuring Cell GLMU



- On-site display for conductivity and temperature
- Output signals freely scalable
- Type of temperature compensation selectable

Characteristics

The GLMU is suited for drinking water and waterbodies monitoring, for applications in fish farming and aquaristics, for measurements in polluted solutions and waste waters as well as for neutralization control.

The 4-pole measuring cell of the GLMU-400-MP is applicable for higher salt concentration, because its particularly insensitive to dirt.

The GLMU has an on-site display for conductivity and temperature. The output signal is freely scalable and the temperature compensation type can be selected.

Design types

GLMU-200-MP	GLMU-400-MP
2-pole conductivity measuring cell compact, basic measuring cell	4-pole conductivity measuring cell high-quality, measuring cell, insensitive to dirt

Measuring range	(decimal point and resolution can be selected by customer; min. and max. possible measuring ranges are stated)	
Conductivity	0.0..200.0 µS/cm 0.0..200.0 mS/cm	0.0..200.0 µS/cm 0..500 mS/cm
Specific resistance	5.0..100.0 kOhm*cm 50..1000 Ohm*cm	0.0..200.0 kOhm*cm 1..5000 Ohm*cm
TDS	0.0..200.0 mg/l 0..2000 mg/l	0.0..200.0 mg/l 0..200 g/l
Salinity	0.0..70.0	0.0..70.0
Temperature	-5.0..+140.0 °C (device) 0.0..80.0 °C (measuring cell)	

Measuring cell : conductivity measuring cell with graphite electrodes and integrated temperature sensor; cell constant is measured and preset ex works; measuring cell in breakage-protected plastic pole, heat resistant up to 80 °C, Ø 12 mm, shaft length 120 mm, 1m connection cable

Accuracy

Conductivity : ±0.5 % of m.v. ±0.3 % FS
 Temperature : ±0.2 °C ±1 digit
 Meas. cell connection : 7-pole diode connector
 Cell constant : K = 0.30..1.20 freely adjustable
 Temperature compensation
 off : no compensation
 Lin : linear compensation (from 0.3..3.0 %/K)
 nLF : non-linear compensation for natural water acc. to EN27888 (DIN 38404)

Output signal

: 4..20 mA (2-wire)
 0..1 V or 0..10 V (3-wire)

Power supply

: 12..30 V DC for 4..20 mA
 18..30 V DC for 0..10 V

Permissible burden : $R_A [\Omega] = (U_V [V] - 12V) / 0.02 A$

Permissible load : $R_L > 3000 \Omega$

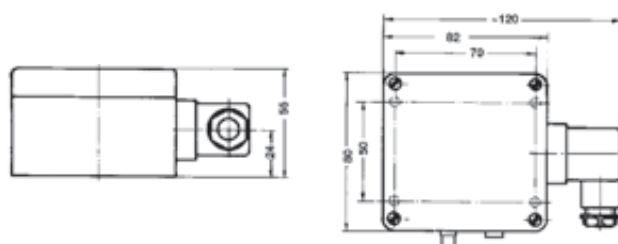
Display : 10 mm high, 4-digit LCD display

Electric connection : elbow-type plug (EN 175301-803/A)

Housing : ABS

Protection class : IP65 (with the exception of electrode socket)

Dimensions



continued on next page

Technical data

	GLMU-200-MP	GLMU-400-MP
--	-------------	-------------

Ordering code

GLMU - ^{1.} - MP - ^{2.} - ^{3.}

1. Measuring cell	
200	2-pole measuring cell
400	4-pole measuring cell
2. Output signal	
A1	4..20 mA
V1	0..1 V
V2	0..10 V
3. Options	
00	without option
LTG	conductivity measuring cell for organic media (alcohol, benzine, diesel) up to max 1000 µS/cm with glass shaft, unplatinized, 1.35 m PUR cable
PG	measuring cell with thread PG13.5 for pressure applications (up to max. 6 bar)

Ordering example:
GLMU-200-MP-A1-00

Accessories / Spare parts

LFE 202

2-pole spare measuring cell (for GLMU-200-MP)

LFE 200

4-pole spare measuring cell (for GLMU-400-MP)

PG13.5

Plug-on thread adapter for pressureless use

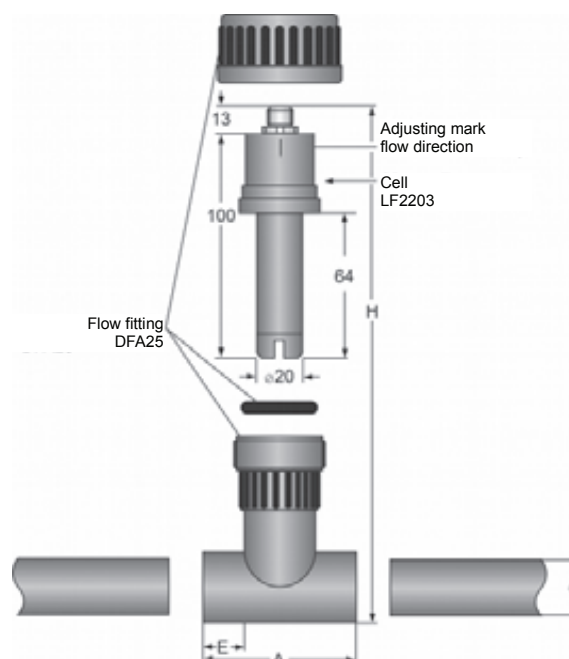
Product information

Analysis conductivity

Conductivity Cell LF2203



Dimensions



Characteristics

- 2-electrode conductive flow cell for pipe diameter 25-63 mm
- Measuring range 0..100 $\mu\text{S}/\text{cm}$ up to 2 mS/cm

Technical data

Cell constant	: $C = 1.0 \pm 3.5 \%$
Operating temperature	: 0..60 °C
Process pressure	: max. 16 bar at 22 °C
Process material	: graphite (electrodes), PVC-U acc. to DIN8061/8062
Electrical connection	: 8 pole round connector plug, M12x1, IP67
-Material	brass nickel plated
Temperature measurement	: integrated Pt1000 Sensor DIN IEC751, class A

d	H	A	E
25	97	66	19
32	106	78	22
40	116	98	26
50	127	118	31
63	141	144	38

Ordering code

LF2203 - C1.0 -

1. Options	
00	without option
03	8 pole round plug SS-type
Accessories	
Flow fitting DFA 25 d = outer pipe diameter	
DFA25-25-1-1	d = 25 mm
DFA25-32-1-1	d = 32 mm
DFA25-40-1-1	d = 40 mm
DFA25-50-1-1	d = 50 mm
DFA25-63-1-1	d = 63 mm

Connection diagram see page 9

Additional accessories see page 24

Conductivity Cell LF2603

Dimensions

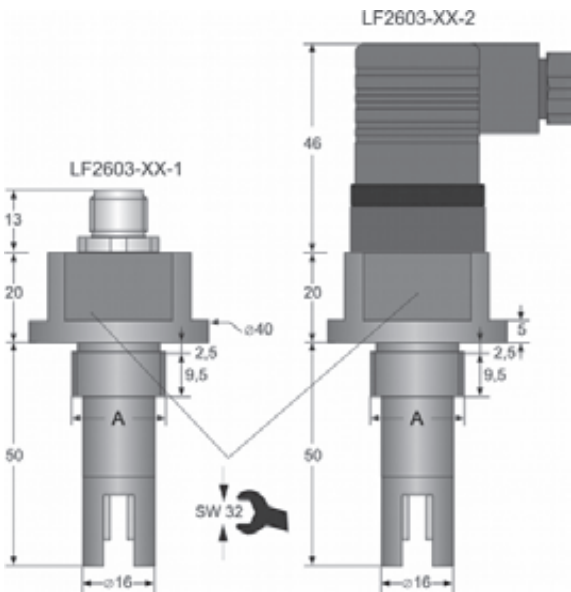


Characteristics

- 2-electrode conductive flow cell for pipe ultra pure water
- Measuring range 0..20 µS/cm up to 0..100 µS/cm

Technical data

Cell constant : C = 0.5 ± 3.5%
Operating temperature : 0..60 °C
Process pressure : max. 16 bar at 22°C
Process material : stainless steel (electrodes),
PVC-U acc. to DIN8061/8062
Electrical connection : 4 pole angle plug acc. to
EN 175301-803/A, IP65 or
8 pole round connector plug
M12x1, IP67
-Material : brass nickel plated
Temperature
measurement : integrated Pt1000 Sensor DIN IEC751,
class A



Ordering code

LF2603 - C0.5 - 1. - 2. - 3.

1. Process connection (A)	
G ½ A	cylindrical thread
R ½	conical thread
G ¾ A	cylindrical thread
R ¾	conical thread
2. Electrical connection	
1	8 pole round connector
2	4 pole angle entry plug
3. Options	
00	without option
03	8 pole round connector plug SS-type

Connection diagram see page 9

Additional accessories see page 24

Product information

Analysis conductivity

Conductivity Cell LF2613



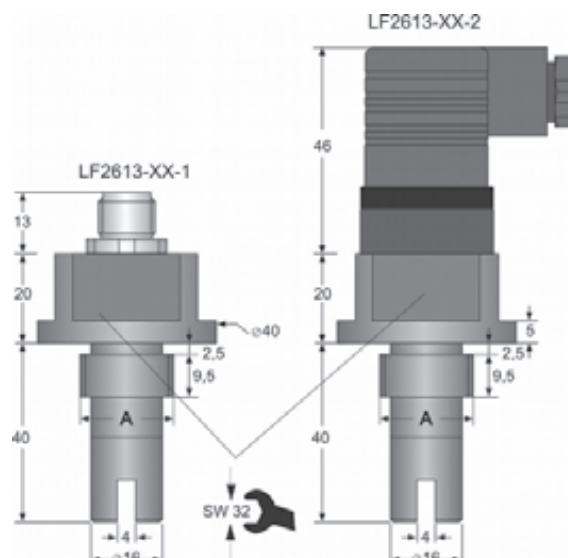
Characteristics

- 2-electrode conductive flow cell for drinking water
- Measuring range 0..100 $\mu\text{S}/\text{cm}$ up to 0..2 mS/cm

Technical data

Cell constant	: $C = 0.9 \pm 3.5 \%$
Operating temperature	: 0..60 °C
Process pressure	: max. 16 bar at 22 °C
Process material	: Graphite electrodes, PVC-U acc. to DIN8061/8062
Electrical connection	: 4 pole angle entry plug EN 175301-803/A, IP65 or 8 pole round connector plug M12x1, IP67
-Material	: brass nickel plated
Temperature measurement	: integrated Pt1000 Sensor DIN IEC751, class A

Dimensions



Ordering code

LF2613 - C0.9 - 1. - 2. - 3.

1. Process connection (A)	
G 1/2 A	cylindrical thread
R 1/2	conical thread
G 3/4 A	cylindrical thread
R 3/4	conical thread
2. Electrical connection	
1	8 pole round connector
2	4 pole angle entry plug
3. Options	
00	without option
03	8 pole round connector plug SS-type

Connection diagram see page 9

Additional accessories see page 24

Conductivity Cell
LF2653HT



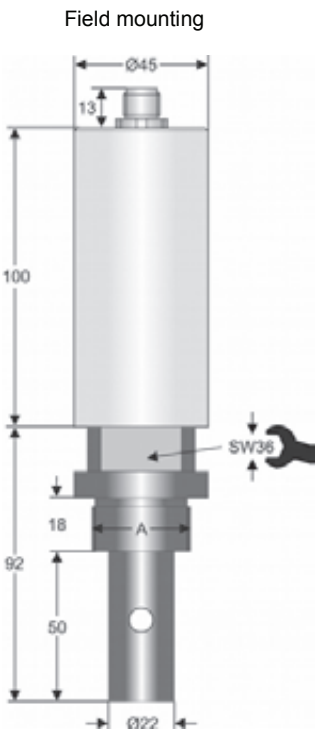
Characteristics

- 2-electrode conductive high temperature cell for pure- and ultra-pure water with pipe thread acc. to DIN ISO 228
- Measuring range 0..0.5 µS/cm up to 0..50 µS/cm

Technical data

Cell constant	: C = 0.1 exact cell constant labeled on the type plate
Operating temperature	: 0..200 °C
Process pressure	: max. 20 bar
Process material	: stainless steel 1.4404, ceramic
Electrical connection	
Field mounting	: 8 pole round connector plug M12x1, IP67
-Material	: brass nickel plated
Temperature measurement	: integrated Pt1000 sensor DIN IEC751, Class A

Dimensions



Ordering code

1. 2. 3.
LF - C0.1 - -

1. Model	2653HT	field mounting
2. Process connection	G ¾ A	
	G 1 A	
	G 1 ¼ A	
3. Options	00	without option
	03	8 pole round connector plug SS-type

Connection diagram see page 9

Additional accessories see page 24

Product information

Analysis conductivity

Conductivity Cell

LF1453 / LF2453



Characteristics

- 2-electrode ultra-pure water cell with Clamp connection acc. to DIN 32676 or Südmo Aseptic connection
- FDA compliant
- Application field: food industry
- Measuring range 0..0.5 $\mu\text{S}/\text{cm}$ up to 0..50 $\mu\text{S}/\text{cm}$

Technical data

Cell constant : C = 0.1 exact cell constant labeled on the type plate

Process temperature : -10..+120 °C
CIP-/SIP-capable 140 °C < 1 h

Process pressure : max. 16 bar

Process material : stainless steel 1.4404 electropolished; PVDF; seal EPDM, FDA-certified

Electrical connection

LF1453 : flat cable connector, only head mounting UNICON-LF

LF2453 : 8 pole round connector plug M12x1, IP67

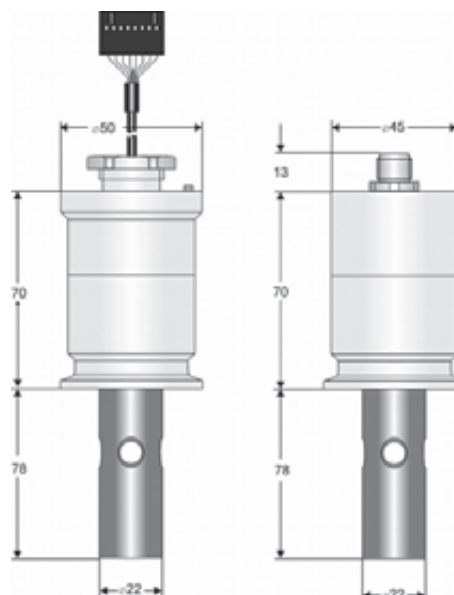
-Material : brass nickel plated

Temperature measurement : integrated Pt1000 sensor DIN IEC751, class A

Dimensions

Head mounting
LF1453

Field mounting
LF2453



Ordering code

LF ^{1.} - C0.1 - ^{2.}

1. Model	
1453	head mounting UNICON-LF
2453	field mounting
2. Options	
00	without option
03	8 pole round plug SS-type
11	Process connection Südmo Aseptic, DIN 11850

Connection diagram see page 9

Accessories see page 24

Conductivity Cell

LF1553 / LF2553



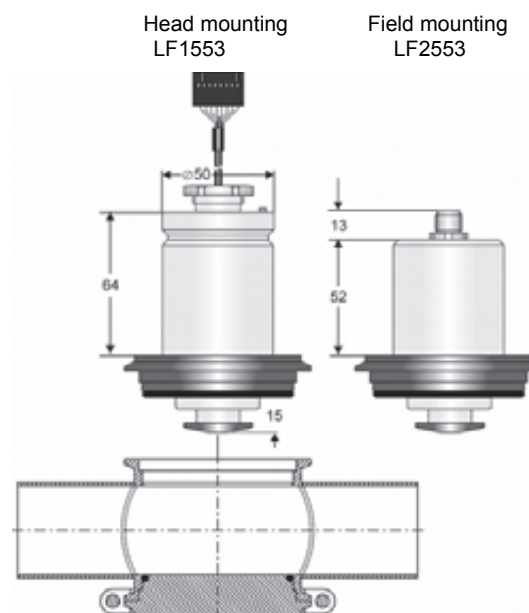
Characteristics

- 2-electrode ultra pure water cell for VARIVENT® Inline-case
- FDA compliant
- Application field food industry
- Measuring range 0..0.5 µS/cm up to 0.50 µS/cm

Technical data

Cell constant	: C = 0.1 exact cell constant labeled on the type plate
Process temperature	: -10..+120 °C CIP-/SIP-capable 140 °C < 1 h
Process pressure	: max. 16 bar
Process material	: stainless steel 1.4404; PEEK; seal EPDM, FDA compliant
Electrical connection	
LF1553	: flat cable connector, only head mounting UNICON-LF
LF2553	: 8 pole round connector plug M12x1, IP67
-Material	: brass nickel plated
Temperature measurement	: integrated Pt1000 sensor DIN IEC751, class A

Dimensions



Ordering code

LF ^{1.} - C0.1 - ^{2.} - ^{3.}

1. Model	
1553	head mounting UNICON-LF
2553	field mounting
2. Process connection	
DN25	VARIVENT® DN25
DN40	VARIVENT® DN40..DN125
3. Options	
00	without option
03	8 pole round plug SS-type

Connection diagram see page 9

Accessories see page 24

Note:

Conductivity cells LF1553 / LF2553 should **not** be mounted together with other cells in **one** VARIVENT® case.

Product information

Analysis conductivity

Conductivity Cell

LF1653 / LF2653



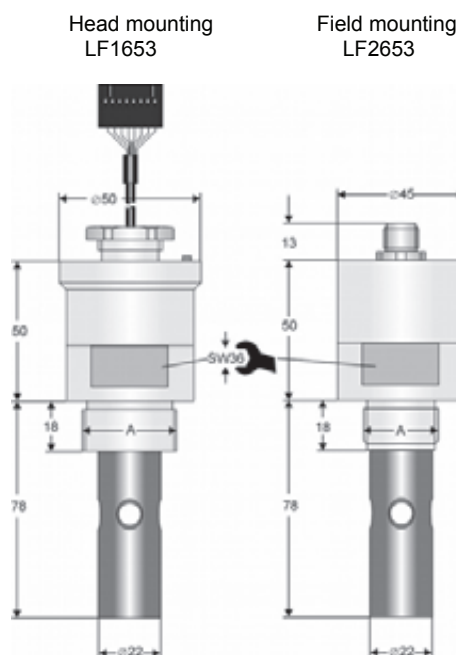
Characteristics

- 2-electrode ultra-pure water cell with pipe thread acc. to DIN ISO228
- Measuring range from 0..0.5 $\mu\text{S}/\text{cm}$ up to 0..50 $\mu\text{S}/\text{cm}$

Technical data

Cell constant	: C = 0.1 exact cell constant labeled on the type plate
Process temperature	: -10..+120 °C CIP-/SIP-capable 140 °C < 1 h
Process pressure	: max. 16 bar
Process material	: stainless steel 1.4404 electropolished; PVDF; seal EPDM
<i>Electrical connection</i>	
LF1653	: flat cable connector, only head mounting UNICON-LF
LF2653	: 8 pole round connector plug M12x1, IP67
-Material	: brass nickel plated
Temperature measurement	: integrated Pt1000 sensor DIN IEC751, class A

Dimensions



Ordering code

LF ^{1.} - C0.1 - ^{2.} - ^{3.}

1. Model	
1653	head mounting UNICON-LF
2653	field mounting
2. Process connection A	
G 3/4 A	
G 1 A	
3. Options	
00	without option
03	8 pole round plug SS-type

Connection diagram see page 9

Accessories see page 24

Conductivity Cell LF4003



Characteristics

- 4-electrode immersion cell for wells and open systems up to 100 m depth of water
- Measuring range 0..20 µS/cm up to 0..500 mS/cm
- Insensitive against soiling
- No influence from polarization effects and line resistance

Technical data

Cell constant : C = 0.5 exact cell constant labeled on the type plate

Operating temperature : 0..60 °C

Process pressure : max. 10 bar

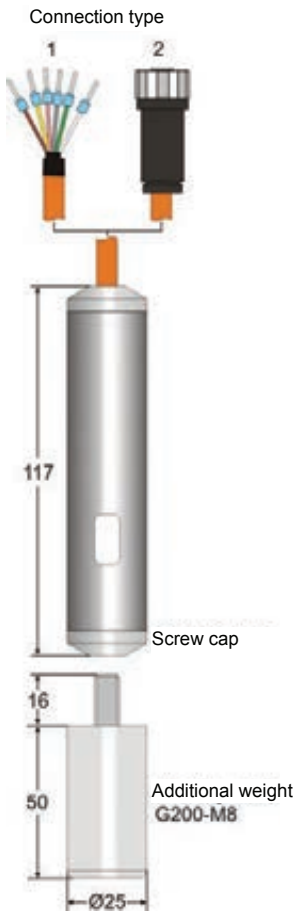
Process material : PVC-U acc. to DIN 8061/8062, casting resin, stainless steel 1.4305, graphite (electrodes), PUR cable

Electrical connection : 8 pole round connector plug M12x1, IP67

-Material : brass nickel plated

Temperature measurement : integrated Pt1000 sensor DIN IEC751, Class A

Dimensions



Ordering code

LF4003 - C0.5 - 1. - 2. - 3.

1. Connection type	
1	cable with 6 pole pigtail, PU-cable
2	8 pole cable plug for connection at UNICON-LF, field case, plug SS-type
2. Cable length [m] please state in clear text	
3. Options	
00	without option
Accessories	
G200-M8	additional weight 200g with thread bolt, SS-type 1.4401
ASK-6	anchor clamp, range 5.5..9.5 mm (steel zinc plated)

Connection diagram see page 9

Additional accessories see page 24

Product information

Analysis conductivity

Conductivity Cell

LF3043 / LF4043



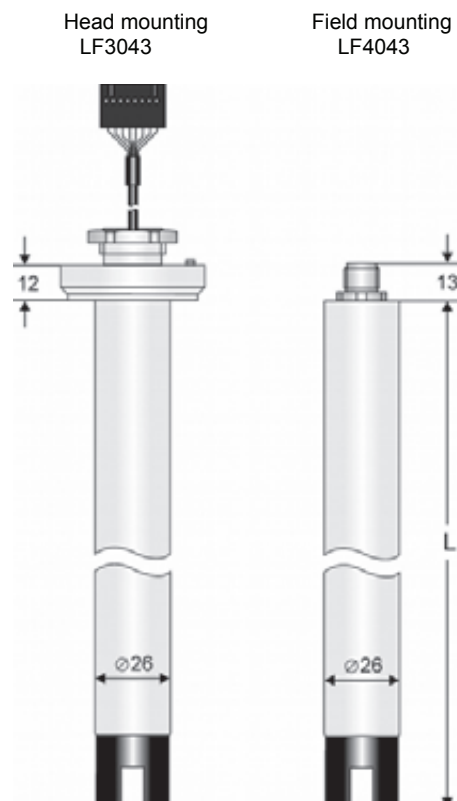
Characteristics

- 4-electrode immersion cell for wells and open systems
- Measuring range 0..20 $\mu\text{S}/\text{cm}$ up to 0..500 mS/cm
- Insensitive against soiling
- No influence from polarization effects and line resistance

Technical data

Cell constant	: C = 0.5 exact cell constant labeled on the type plate
Operating temperature	: -20..60 °C
Process material (electrodes)	: PA polyamide, casting resin, graphite
Electrical connection	
LF3043	: flat cable connector, only head mounting UNICON-LF
LF4043	: 8 pole round connector plug M12x1, IP67
-Material	brass nickel plated
Temperature measurement	: integrated Pt1000 sensor DIN IEC751, class A

Dimensions



Ordering code

1. 2. 3.
LF - C0.5 - -

1. Model	
3043	head mounting UNICON-LF
4043	field mounting
2. Process length (L) [mm]*	
300	
500	
600	
800	
1000	
3. Options	
00	without option
03	8 pole round plug SS-type

* custom length on request

Connection diagram see page 9

Additional accessories see page 24

Conductivity Cell

LF3213 / LF4213



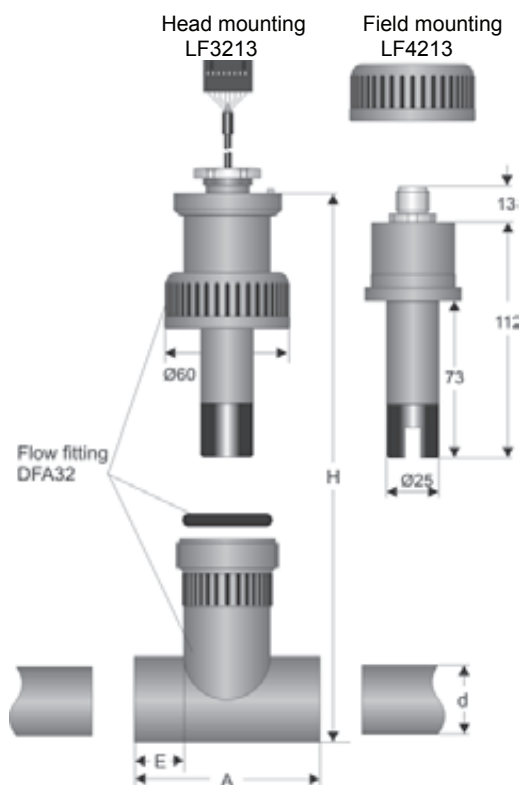
Characteristics

- 4-electrode flow cell for outer pipe diameter from 20 mm up to 63 mm
- Mounting with PVC-U standard fittings
- Measuring range from 0..20 $\mu\text{S}/\text{cm}$ up to 0..500 mS/cm
- Insensitive against soiling
- No influence from polarization effects and line resistance
- Accessory flow fitting DFA32

Technical data

Cell constant	: C = 0.5 exact cell constant labeled on the type plate
Operating temperature	: 0..60 °C
Process pressure	: max. 16 bar at 22°C
Process connection	: PVC fitting with cap nut
Process material	: PVC-U, casting resin, graphite (electrodes)
Electrical connection	
LF3213	: flat cable connector, only head mounting UNICON-LF
LF4213	: 8 pole round connector plug M12x1, IP67
-Material	: brass nickel plated
Temperature measurement	: integrated Pt1000 sensor DIN IEC751, class A

Dimensions



d	H	A	E
20	142	78	22
25	142	78	22
32	142	78	22
40	154	98	26
50	165	118	31
63	179	144	38

Ordering code

1. 2.
 LF - C0.5 -

1. Model (including cap nut)	
3213	head mounting UNICON-LF
4213	field mounting
2. Options	
00	without option
03	8 pole cable plug SS-type for connection at UNICON-LF, field case
Accessory flow fitting DFA 32, PVC-U	
DFA32-20-1-1	d = 20 mm
DFA32-25-1-1	d = 25 mm
DFA32-32-1-1	d = 32 mm
DFA32-40-1-1	d = 40 mm
DFA32-50-1-1	d = 50 mm
DFA32-63-1-1	d = 63 mm

Connection diagram see page 9

Additional accessories see page 24

Product information

Analysis conductivity

Conductivity Cell

LF3433 / LF4433



Characteristics

- 4-electrode conductive flow cell for pipe systems with Clamp-connection acc. to DIN 32676
- Measuring range 0..20 $\mu\text{S}/\text{cm}$ up to 0..500 mS/cm
- Insensitive against soiling
- No influence from polarization effects and line resistance

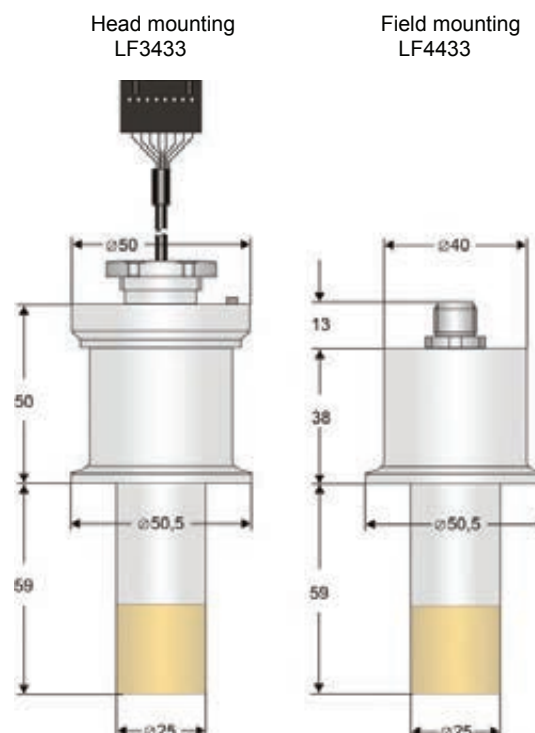
Technical data

Cell constant	: C = 0.4 exact cell constant labeled on the type plate
Operating temperature	: -10..+120 °C CIP-/SIP-capable 140°C < 1h
Process pressure	: max. 16 bar
Process connection	: Clamp acc. to DIN 32676
Process material	: PEEK, PVDF, stainless steel 1.4404, Graphite (electrodes), Seal EPDM

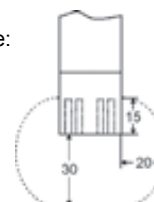
Electrical connection

LF3433	: flat cable connector, only head mounting UNICON-LF
LF4433	: 8 pole round connector plug M12x1, IP67
-Material	: brass nickel plated
Temperature measurement	: integrated Pt1000 sensor DIN IEC751, class A

Dimensions



Mounting distance:



Note:

Cell constant must be checked again, if the free space is less than illustrated.

Ordering code

1. LF - C0.4 - 2.

1. Model	
3433	head mounting UNICON-LF
4433	field mounting
2. Options	
00	without option
03	8 pole round plug SS-type

Connection diagram see page 9

Accessories see page 24

Conductivity Cell

LF3533 / LF4533



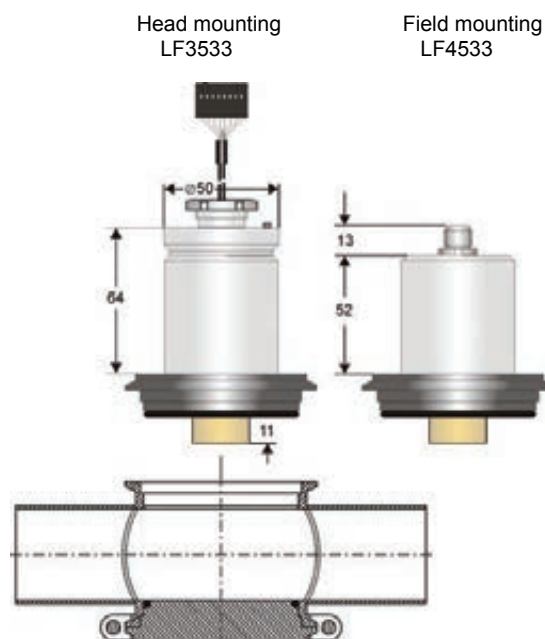
Characteristics

- 4-electrode hygienic flow-cell for VARIVENT®-Inline cases
- Application fields food- and chemical industry
- Measuring range from 0..20 µS/cm up to 0..500 mS/cm
- Insensitive against soiling
- No influence from polarization effects and line resistance

Technical data

Cell constant	: C = 0.4 exact cell constant labeled on the type plate
Process temperature	: -10..+120 °C CIP-/SIP-capable 140°C < 1h
Process pressure	: max. 16 bar
Process connection	: VARIVENT® Inline case
Process material	: PEEK, stainless steel 1.4404, graphite (electrodes) seal EPDM
Electrical connection	
LF3533	: flat cable connector, only head mounting UNICON-LF
LF4533	: 8 pole round connector plug M12x1, IP67
-Material	: brass nickel plated
Temperature measurement	: integrated Pt1000 sensor DIN IEC751, class A

Dimensions



Ordering code

1. 2. 3.
LF - C0.4 - -

1. Model	
3533	head mounting UNICON-LF
4533	field mounting
2. Process connection	
DN25	VARIVENT connection DN25
DN40	VARIVENT connection DN40..DN125
3. Options	
00	without option
03	8 pole round plug SS-type

Connection diagram see page 9

Accessories see page 24

Note:

Conductivity cells LF1553 / LF2553 should **not** be mounted together with other cells in **one** VARIVENT® case.

Product information

Analysis conductivity

Conductivity Cell

LF3623 / LF4623



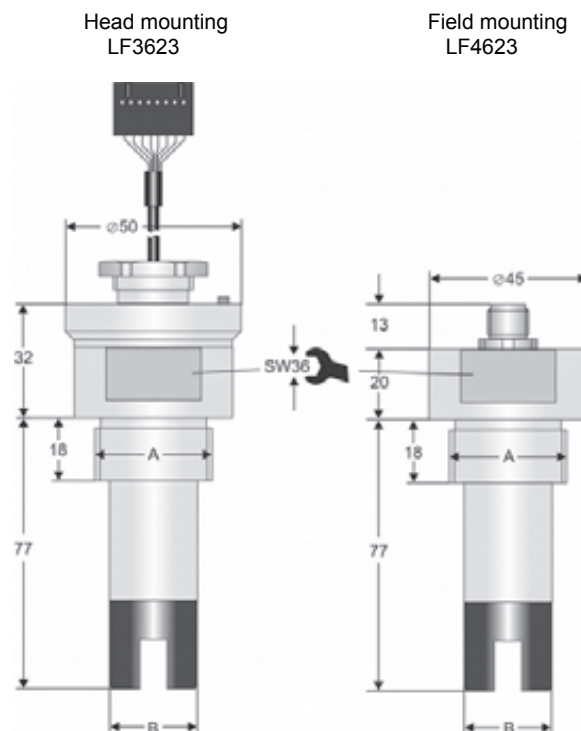
Characteristics

- 4-electrode screw-in cell; pipe thread acc. to DIN ISO 228
- Measuring range 0..20 $\mu\text{S}/\text{cm}$ up to 0..500 mS/cm
- Insensitive against soiling
- No influence from polarization effects and line resistance

Technical data

Cell constant	: C = 0.5 exact cell constant labeled on the type plate
Process temperature	: -10..+120 °C
Process pressure	: max. 16 bar
Process connection	: pipe thread acc. to DIN ISO228
Process material (electrodes)	: PVDF, casting resin, graphite
Electrical connection	
LF3623	: flat cable connector, only head mounting UNICON-LF
LF4623	: 8 pole round connector plug M12x1, IP67
-Material	: brass nickel plated
Temperature measurement	: integrated Pt1000 sensor DIN IEC751, class A

Dimensions



Ordering code

LF ^{1.} - C0.5 - ^{2.} - ^{3.}

1. Model	
3623	head mounting UNICON-LF
4623	field mounting
2. Process connection A	
G 3/4 A	
G 1 A	
3. Options	
00	without option
03	8 pole round plug SS-type

Connection diagram see page 9

Accessories see page 24

Conductivity Cell

LF3733 / LF4733



Characteristics

- 4-electrode hygienic cell for milk pipe connection acc. to DIN 11887
- Application fields: food- and chemical industry
- Measuring range from 0..20 $\mu\text{S}/\text{cm}$ up to 0..500 mS/cm
- Insensitive against soiling
- No influence from polarization effects and line resistance

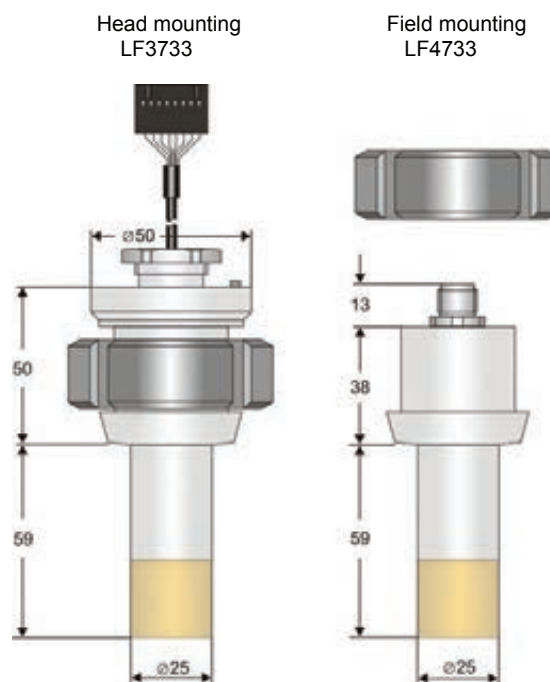
Technical data

Cell constant	: C = 0.4 exact cell constant labeled on the type plate
Process temperature	: -10..+120 °C CIP-/SIP-capable 140°C < 1h
Process pressure	: max. 16 bar
Process connection	: milk pipe acc. to DIN 11887
Process material	: PEEK, PVDF, stainless steel 1.4404 , graphite (electrodes), seal EPDM

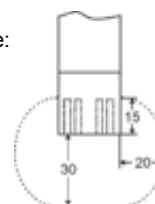
Electrical connection

LF3733	: flat cable connector, only head mounting UNICON-LF
LF4733	: 8 pole round connector plug M12x1, IP67
-Material	: brass nickel plated
Temperature measurement	: integrated Pt1000 sensor DIN IEC751, class A

Dimensions



Mounting distance:



Note:

Cell constant must be checked again, if the free space is less than illustrated.

Ordering code

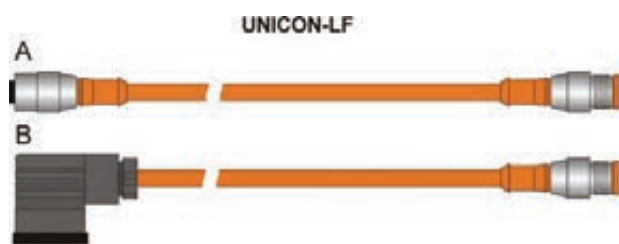
1. LF - C0.4 - 2.

1. Model	
3733	head mounting UNICON-LF
4733	field mounting
2. Process connection (incl. Slot nut 1.4301))	
DN25	
DN40	
DN50	
DN65	
3. Options	
00	without option
03	8 pole round plug SS-type

Connection diagram see page 9

Accessories see page 24

Accessories for Conductivity Measurement



Connection cable

Connection cable A

for 2- and 4-electrode cells at UNICON-LF field case with 8 pole cable socket and 8 pole cable plug, brass plated, PU-cable

Ordering No.	length [m]	protection class
SKM8-02	2	IP67
SKM8-05	5	IP67
as before, but plug SS-type, PVC cable		
SKM8-02-VA	2	IP67
SKM8-05-VA	5	IP67

Connection cable B

for 2-electrode-cells at UNICON-LF field case with 4 pole angle entry socket acc. to DIN EN 175301-803/A and 8 pole cable plug brass plated, PU-cable

Ordering No.	length [m]	protection class
SKM4B-02	2	IP65
SKM4B-05	5	IP65
as before, but plug SS-type, PVC cable		
SKM4B-02-VA	2	IP65
SKM4B-05-VA	5	IP65

Connection cable D

for 2- and 4-electrode-cells at LF1010/LF9648 with 8 pole cable socket brass plated and 6 pole pigtail, PU-cable

Ordering No.	length [m]	protection class
SKM8E-02	2	IP67
SKM8E-05	5	IP67
SKM8E-10	10	IP67
SKM8E-25	25	IP67
as before, but plug SS-type, PVC cable		
SKM8E-02-VA	2	IP67
SKM8E-05-VA	5	IP67
SKM8E-10-VA	10	IP67
SKM8E-25-VA	25	IP67

Connection cable E

for 2-electrode-cells at LF1010/LF9648 with 4 pole angle entry socket DIN EN 175301-803/A and 6 pole pigtail, PU-cable

Ordering No.	length [m]	protection class
SKM4E-02	2	IP65
SKM4E-05	5	IP65
SKM4E-10	10	IP65
SKM4E-25	25	IP65

Calibration accessories

Reference solution for calibration (250 ml)

Ordering No.	Conductivity [mS/cm] at 25°C
REF-LF-0001	0.147
REF-LF-0010	1.413
REF-LF-0100	12.88
REF-LF-1000	111.8

Reference solution for calibration acc. to USP<645>, (1000 ml)

Ordering No.	Conductivity [µS/cm] at 25°C
EC23,8	23.8

Precision-thermometer

Ordering No.	Measuring range °C
N63802	17.0..35.0 scale solution 0.05 °C accuracy ±0.1 °C



Analysis O₂, CO, CO₂



Characteristics

System Analysis
oxygen,
carbon monoxide
and carbon dioxide

Measurands O₂, CO, CO₂
in air / gases

O₂ (dissolved O₂)
in liquids

Applications

● Air monitoring

- Underground and parking garages
- Factory and office rooms
- Storage rooms
- Garages
- Green houses

● Measurement in liquids

- Aquaristics
- Fish farming
- measurement of spring and well water

Product information

Analysis O₂, CO, CO₂

Function

Oxygen (O₂), carbon monoxide (CO) and carbon dioxide (CO₂) measurements are mainly used for ambient air monitoring.

CO₂ and O₂ are important indicators for ambient air quality and therefore important for modern climate control.

The recommended CO₂ limit for indoor air is 1000 ppm. Concentrations considerable above this limit causes fatigue and poor concentration. At values considerably lower than that limit there is a high energy saving potential at the climate control with optimized air change rates.

Air is composed of approximately 21% O₂ and 78% nitrogen, beyond that it contains approximately 0.04% CO₂ and other components.

CO is a toxic gas that is produced by incomplete combustion of fossil fuels. This gas is normally measured in underground and parking garages and motor vehicle workshops.

The oxygen measurement in liquids serves the monitoring of spring and well water quality as well as checking the water quality for fish farming.

Advantages

- Robust ABS housing
- Suitable for wall mounting
- On-site display and operating buttons
- Electric connection via elbow-type plug
- Transmitter incl. electrode, sensor or measuring cell
- Extensive range of accessories and spare parts

Air Oxygen Transmitter incl. Electrode OXY 3690 MP



- O₂-sensor element exchangeable
- Appropriate to air with high CO₂-concentrations
- Input electrically isolated

Characteristics

The OXY 3690 MP measures the oxygen concentration in air. Depending on the selected design type the device is appropriate to either pure oxygen (i.e. low CO₂ concentration) or to air with very high CO₂ concentration.

Technical data

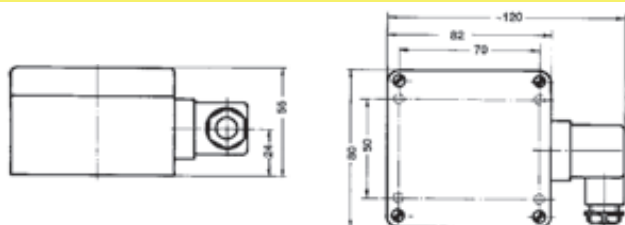
Measuring range	
Oxygen concentration	: 0.0..100.0 % O ₂
Temperature	: -20.0..+50.0 °C
Accuracy (transmitter) at 20.9 % O ₂ , 1000 mbar abs.	
Oxygen	: ±0.1 % ± 1 digit
Temperature	: ±0.1 °C ±1 digit
Output signal (only O ₂)	
	: 4..20 mA (2-wire)
	: 0..10 V (3-wire)
Electrical isolation	
	: input electrically isolated
Working temperature	
	: 0..50 °C
Power supply	
	: 12..30 V DC at 4..20 mA
	: 18..30 V DC at 0..10 V
Permissible impedance	
	: $R_A [\Omega] = (U_V [V] - 12 V) / 0.02 \text{ mA}$
Permissible load	
	: $R_L > 3000 \Omega$
Reverse voltage protect.	
	: 50 V permanent
Display	
	: 10 mm high, 4-digit LCD display
Electric connection	
	: elbow-type plug (EN 175301-803/A), max. wire cross-section: 1.5 mm ² , wire diameter from 4.5..7.0 mm
Sensor connection	
	: 5-pole screw-able diode socket
Calibration	
	: 1-point-calibration at atmospheric air
Air pressure compensat.	
	: 500..2000 hPa abs., manual input
Over- / under-pressure	
	: max. 0.25 bar
Housing	
	: ABS

O₂-sensor element

	GOEL 370
Measuring range	0.0..100.0 % O ₂
Response time T ₉₀	< 10 s
Application	for air or pure oxygen or for air or air with high CO ₂ -concentration
	GOEL 380
Measuring range	0.0..25.0 % O ₂
Response time T ₉₀	< 5 s
Application	for air with little CO ₂ -concentration, response time shoots

Temp. compensation	: integrated in oxygen sensor
Connection cable	: 1.3 m with 5-pole screw-able diode plug
Working pressure	: 500..2000 hPa (static) for air or gas inflow option GOO (oxygen probe GOO ... / MU) is needed

Dimensions



Measuring probe	: Ø 40 x 103 mm (153 mm incl. bend protection)
-----------------	---

Ordering code

	1.	2.	3.	4.
OXY3690MP	-	-	-	-

1. O₂-sensor element	
0	GOEL 370 for air and pure oxygen
1	GOEL 380
2. Sensor design	
GGO	closed sensor design (suited for over- and under- pressure, used at gas-tight systems)
GOO	open sensor design (e.g. suitable for air or gas inflow, pressure cannot be built up)
3. Output signal	
A1	4..20 mA (2-wire)
V2	0..10 V (3-wire)
4. Cable length	
L01	1.3 m cable
L10	10 m cable

Ordering example: OXY3690MP-0-GGO-A1-L01

Accessories / Spare parts

GOEL 370

Spare sensor element

Product information

Analysis O₂, CO, CO₂

Transmitter incl. Electrode for Dissolved Oxygen in Liquids OXY 3610 MP



- O₂-electrode exchangeable
- Electrode: active diaphragm type with integrated NTC resistance
- Input electrically isolated

Characteristics

The OXY 3610 MP measures the oxygen concentration in liquids. The device can be used in aquaristics, fish farming as well as for the measurement of spring water and well water.

Technical data

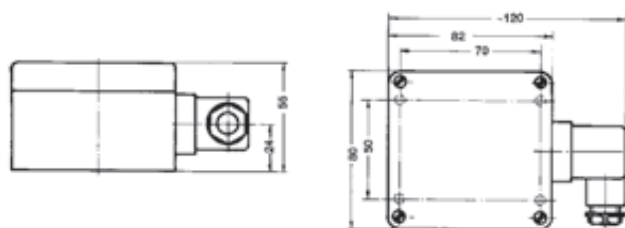
Measuring range
 Oxygen concentration : 0.00..25.00 mg/l (solved)
 Temperature : 0.0..50.0 °C
 Accuracy (transmitter)
 Oxygen : ±1.5 % of meas. value ±0.2 mg/l
 Temperature : ±0.1 °C ±1 digit
 Output signal (only O₂) : 4..20 mA (2-wire)
 : 0..10 V (3-wire)
 Electrical isolation : input electrically isolated
 Working temperature : 0..50 °C
 Power supply : 12..30 V DC at 4..20 mA
 : 18..30 V DC at 0..10 V
 Permissible impedance : $R_A [\Omega] = (U_V [V] - 12 V) / 0.02 \text{ mA}$
 Permissible load : $R_L > 3000 \Omega$
 Reverse voltage protect.: 50 V permanent
 Display : 10 mm high, 4-digit LCD-display
 Electric connection : elbow-type plug (EN 175301-803/A),
 max. wire cross-section: 1,5 mm²,
 wire diameter from 4.5..7.0 mm

Sensor connection : 5-pole screw-able diode socket
 Calibration : 1-point-calibration at atmospheric air
 Housing : ABS

O₂-electrode (GWO 3600 MU)

Electrode : active diaphragm type with integrated NTC resistance
 Response time : 95 % in 10 s, depending on temperature
 Working pressure : max. 3 bar
 Inflow velocity : min. 30 cm/s
 Connection cable : 4 m with 5-pole screw-able diode plug

Dimensions



Oxygen probe : diameter Ø: 12.0 ±0.2 mm
 installation length: 110 mm
 overall length: 220 mm incl. bend protection

Ordering code

1. 2.
 OXY3610MP - ☐ - ☐

1. Output signal	
A1	4..20 mA (2-wire)
V2	0..10 V (3-wire)
2. Cable length	
L04	4 m cable
L10	10 m cable
L30	30 m cable

Ordering example:
 OXY3610MP-A1-L04

Accessories / Spare parts

GWO 3600 MU

Spare electrode with 4 m cable

GSKA 3600

Protection cab for measuring in great depths

GWOK 01

Spare diaphragm head

CO Transmitter GT1-CO



- TÜV certification according to VDI 2053
- Long-lasting electrochemical measuring cell
- Automatic zero calibration

Characteristics

The GT1-CO is a high-quality and TÜV certified CO transmitter (incl. measuring cell) for detection of carbon monoxide in underground and parking garages, boiler plants, heating systems, garages as well as in ambient air.

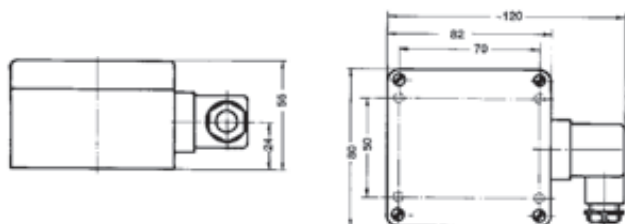
The GT1-CO has a very long-lasting electrochemical measuring cell. It can be easily integrated in existing CO surveillance systems (without loss of validity of existing TÜV certificates).

Displays, controller and alarm devices can be connected via 2-wire system without difficulty.

Technical data

Measuring range	: 0..300 ppm CO (carbon monoxide)
Measuring principle	: electrochemical, permanent measuring
Reproducibility	: < 3 ppm according to VDI 2053
Response time T ₉₀	: < 60 s
Cross sensitivity	: ≤ 2 % of 300 ppm CO
Linearity error	: ≤ 2 % of 300 ppm CO
Offset adjustment	: automatic
Output signal	: 4..20 mA, 2-wire
Working temperature	: -10..+40 °C
Power supply	: 12..28 V DC (at option VO: 16..26 V DC)
Permissible burden	: R _A [Ω] = (U _V [V] - 12 V or 16 V) / 0.02 A
Electric connection	: elbow-type plug (EN 175301-803/A), max. wire cross section: 1.5 mm ² , wire diameter from 4.5..7.0 mm
Housing	: ABS

Dimensions



Ordering code

1.
GT1-CO - ☐

1. Option	
00	without option
VO	on-site display

Ordering example:
GT1-CO-00

Accessories

GZ-01

Test gas cap GT (for controlled flow with test gas)

GZ-02

Gas bottle with 12l test gas: 30 ppm CO

GZ-03

Gas bottle with 12l test gas: 300 ppm CO

GZ-04

Gas valve unit MiniFlo for 12l gas bottles

Product information

Analysis O₂, CO, CO₂

CO₂ Transmitter

GT10-CO2-1R



- Excellent long term stability
- Auto-calibration procedure
- Output signal freely scalable

Characteristics

The high-quality and precise CO₂ transmitter works according to the infrared principle (NDIR). An auto-calibration procedure compensates aging effects. This ensures the excellent long-term stability of this transmitter.

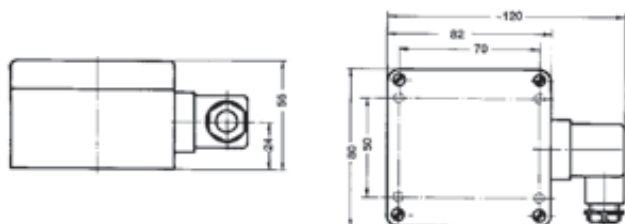
Due to the fact that CO₂ is an important indicator for air quality in rooms, it is very important for modern climate control to measure the CO₂ content.

Due to the freely adjustable output signal the transmitter can be used for nearly each existing controller input. Additionally, there is an on-site display which shows beside the current CO₂ concentration the minimum and maximum values as well as an optical alarm.

Technical data

Measuring range	
MB1	: 0..2000 ppm CO ₂
MB2	: 0..5000 ppm CO ₂
Measuring principle	
: infrared principle (NDIR)	
Accuracy	
MB1	: ±50 ppm ± 2 % of meas. value
MB2	: ±50 ppm ± 3 % of meas. value
Output signal (only O ₂)	
: 4..20 mA, 0..1 V, 0..10 V (3-wire)	
Working temperature	
: -10..+50°C	
Power supply	
: 12..30 V DC at 4..20 mA and 0..1 V	
: 18..30 V DC at 0..10 V	
max. 600 mA	
Permissible burden	: R _A < 200 Ω
Permissible load	: R _L > 3000 Ω
Display	: 10 mm high, 4-digit LCD-display
Electric connection	
: elbow-type plug (EN 175301-803/A),	
max. wire cross section: 1.5 mm ² ,	
wire diameter from 4.5..7.0 mm	
Housing	
: ABS	

Dimensions



Ordering code

GT10-CO2-1R - 1. - 2.

1. Measuring range	
MB1	MB1: 0..2000 ppm CO ₂
MB2	MB2: 0..5000 ppm CO ₂
2. Output signal	
A1	4..20 mA (3-wire)
V1	0..1 V (3-wire)
V2	0..10 V (3-wire)

Ordering example:
GT10-CO2-1R-MB1-A1

E1 Displays

Multifunction controller GHM-ONE	276
Digital displays	290

Multifunction controller



Features

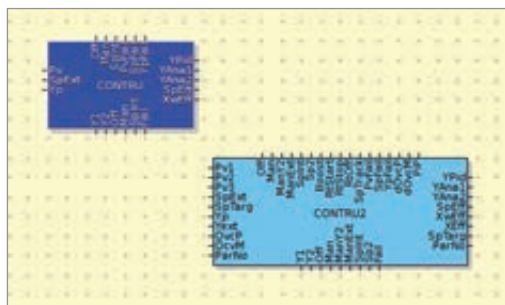
- PID control function
- Multi-Loop system
- Program controller function
- Process control with more than 100 functions
- Process calculations with mathematical library
- Screen recorder function
- Data logger function
- Communications card with various field buses
- Process visualisation with 3.5" TFT display
- Process control with 4 function keys and touch display
- Modular I/O concept

Application areas

- Industrial plants
- Food industry
- Machine construction
- Power generation
- Water supply
- Hardening plants
- Plastics industry
- Shipbuilding
- Pharmaceutical industry

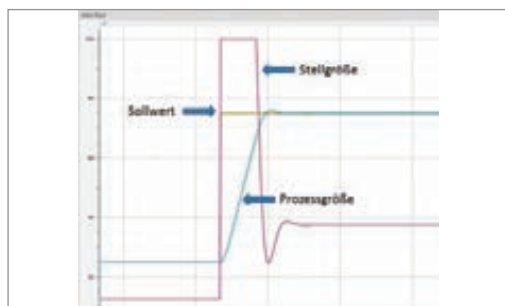
Function

The GHM ONE is the centrepiece of development for control technology in the GHM Group, and serves as a basis for further development in industrial compact controllers. The GHM ONE is a multifunction platform with a modern and innovative concept for measuring, controlling, computing, data recording, visualisation, operating and regulation. Adaptation to the requirements of the systems takes place with a single software package, "GHM CAT", which can be operated without any programming skills. The core of the GHM ONE is a high-precision PID controller with self-tuning that can be adapted for the widest range of control and regulation tasks. In the process, the aim is optimal regulation of the process according to the operating company's requirements. In this connection, product quality, process stability, and a minimisation of process times are emphasised. The GHM ONE offers various controller functions that can be combined using efficient function blocks to create an overall application in order to implement these requirements. (Fig. 1)



(Fig. 1)

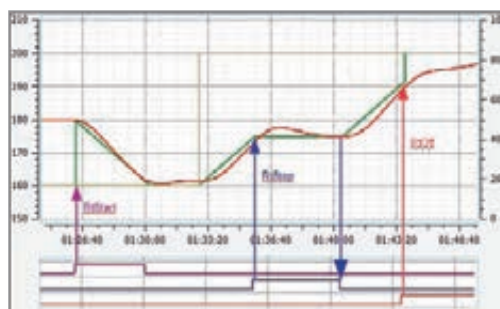
The newly developed algorithm for self-tuning already uses the optimal controller parameters in numerous processes and thereby assures short commissioning times. The controller algorithm developed specially for the GHM ONE is the basis for short adjustment times with only minor deviations of the control variable. (Fig. 2)



(Fig. 2)

The control quality can be influenced at any time by the user or even by the process in order to also continuously ensure the optimum utilisation of energy and material during the operating time. For instance, sensible adaptation of the setpoint is always a challenge in order to avoid putting product quality at risk or subjecting the switching equipment to excessive stress. The GHM ONE controller offers the possibility of a setpoint ramp for this purpose. The setpoint jump of the operator or the SCADA system is automatically implemented as a ramp. (Fig. 3)

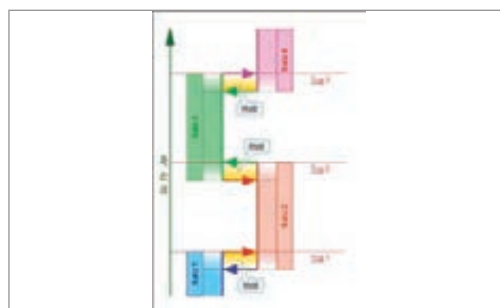
The ramp function can be activated and deactivated again at any time. Normally, the regulation of non-linear segments or of systems with various load structures also poses a challenge. The GHM ONE supports the user in this connection with the possibility



(Fig. 3)

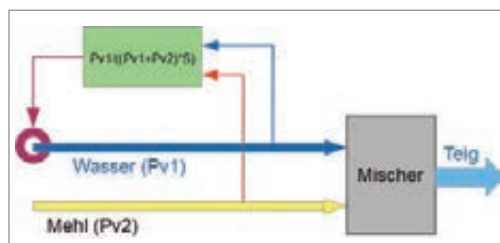
of process-dependent PID parameters, among other things. Therefore, a suitable set of parameters can be used for various phases of the process.

(Fig. 4)

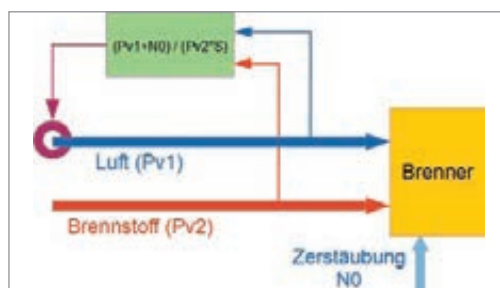


(Fig. 4)

In the process, the switching takes place either automatically or via operator command. In addition to the regulation of a process factor, there is always the requirement of controlling the relationship of process factors. The control module supports the user in this connection with special functions for actual value processing. Therefore, the user can create a regulation of the mixture ratio of materials (Fig. 5) or even correct a stoichiometric combustion air ratio. (Fig. 6) The user can even implement the requirement of a three-component regulation without programming skills. (Fig. 7)



(Fig. 5)

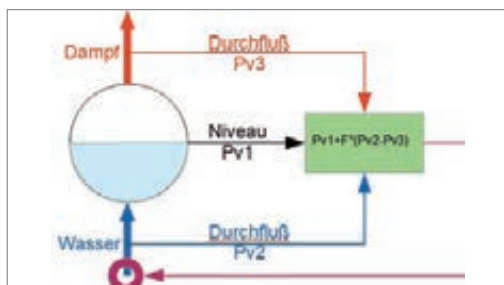


(Fig. 6)

Product information

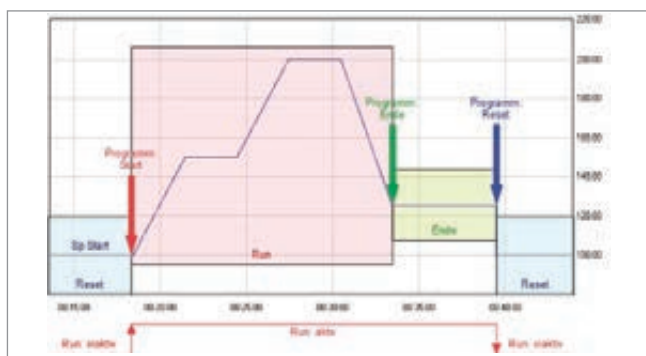
Multifunction controller

Since the controller module can be used multiple times in GHM ONE, it is possible for the user to also build more complex control structures, such as cascade control to increase the control quality of intricate processes or an override control (forced control) to avoid excessive stress of components. Of course, it is also possible to build a multi-loop control system without difficulty.



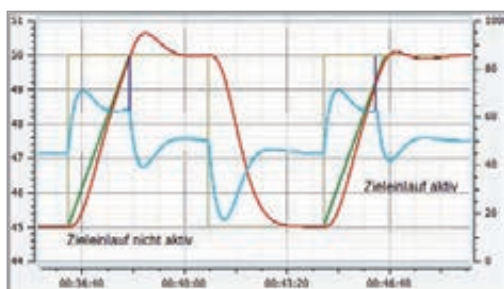
(Fig. 7)

In many processes a temperature profile or various mixture ratio play an important role during production. In order to ensure that the user does not have to create an elaborate profiler on their own, GHM ONE offers a profiler with profile editor. (Fig. 8)



(Fig. 8)

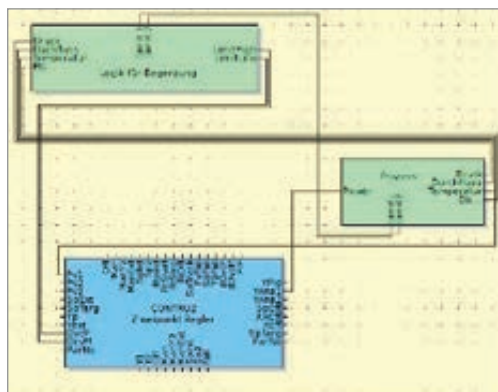
This profiler can be used multiple times within an application. An essential element for setpoint profiles is the ramp function. With an external profiler the user is repeatedly faced with the situation of a heavy overshoot occurring at the end of a ramp. GHM ONE knows to counteract this disadvantage with a connection between the profiler and the controller module. (Fig. 9)



(Fig. 9)

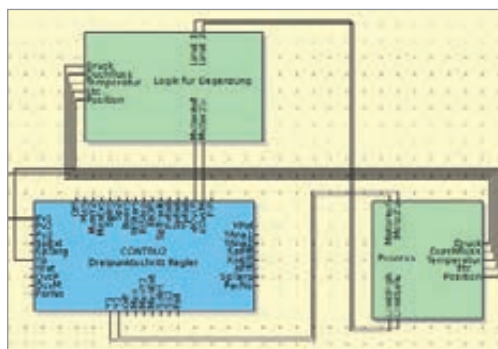
For this purpose, the controller module has a newly developed finish function. This function ensures that undesired jumps of the variable at the end of the ramp are avoided. Therefore, a gentle approach to the setpoint is realised. The computing functions of GHM ONE can be used for the calculation of process factors, such as a heat quantity. It is also possible to use the results for additional control processes.

For instance, a limit control can be effectively implemented in a chemical application (Fig. 10) or the regulation of the C-level in carbonisation processes.



(Fig. 10)

The logic modules can also be optimally used in this connection. (Fig. 11)



(Fig. 11)

Along with the functions for control technology that are expected in today's industry, the GHM ONE controller offers numerous additional functions such as individual adaptation of the operation and visualisation, the possibility of integration of process control, the recording and visualisation of process variables, and communications modules for integration into various process landscapes. This all makes GHM ONE the complete solution for smaller to medium-sized processes.

Multifunction controller GHM-ONE MSR9696H



- Visualisation system with 3.5" TFT display
- Control unit with 4 function keys and touch display
- Modular I/O concept
- PID control function
- Multi-Loop system
- Profiler function
- Process control with more than 100 functions
- Process calculation with mathematical library
- Screen recorder function
- Data logger function
- Communications card with various field buses

Features

The GHM ONE is a multifunction unit that can be specifically adapted to process and control requirements with the GHM CAT configuration software. Therefore, the system becomes an ideal control, regulating, and operating unit.

The GHM ONE gives the user the possibility of effectively implementing their ideas in the areas of automation and visualisation without the need for programming skills. The platform is an ideal basis for a wide range of applications, including:

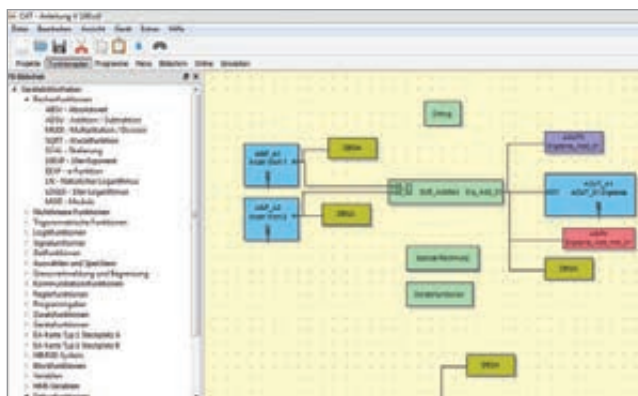
- Industrial furnaces
- Laboratory ovens
- Heat treatment systems
- Microbreweries
- Dryers
- Test stands
- Building automation
- Climate control
- Pasteurisation systems

The MSR9696H is based on a powerful processor which, in combination with a relay card and mains adapter card, serves as the base unit. The base unit can be adapted to applications with a communications card and up to 2 I/O cards. The number of physical inputs and outputs can be expanded with external I/O's. This modular layout enables specific adaptation of the hardware to the automation task. The creation of the application itself takes place in the MSR 9696H with the 'Configuration and Application Tool' CAT. The software assists the user with more than 100 complete function blocks and intuitive operation for the implementation of their ideas.

This saves time when creating applications with high operational reliability.

Quick and easy to put ideas into practice

The creation of applications is child's play with the MSR 9696H. Based on the concept of connecting of existing function blocks, the user creates applications comprising process controls, mathematical calculations and process regulation in the shortest possible time. For this purpose the CAT configuration software provides a function library with more than 100 tested functions from the following areas:



- Input and output signals
- Computing functions
- Logic functions
- Signal conversion
- Time functions
- Memory functions
- Communications functions
- Profiler functions
- Regulating functions

The user only has to combine and connect these functions in the editor and thereby implement their idea without the need for any programming skills. Testing of the individual functions is omitted, because they are provided ready-to-use, and were not created by the user. Therefore, the user can concentrate entirely on implementing their idea. In addition to the support provided to the user by the function library, the CAT configuration tool offers additional functions in the editor. For instance, the user can structure their application in order to maintain an overview, create their own function blocks for recurring functions in order to save time, and test sub-areas of their application independently of other project areas with simulation functions.

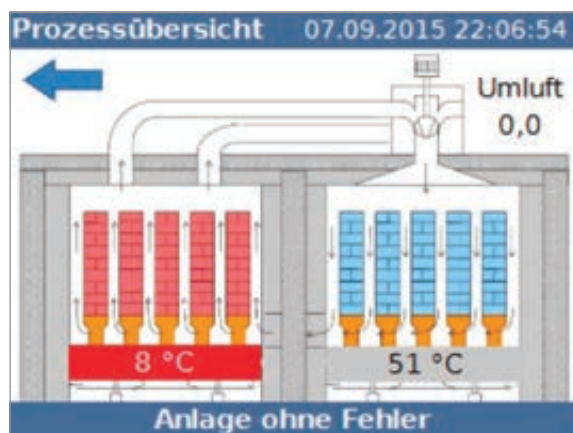
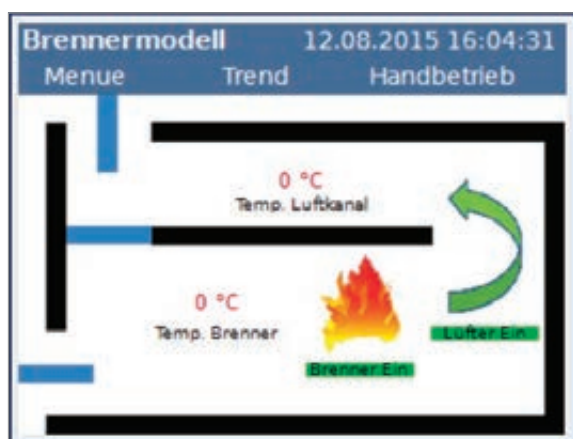
With consistent use of the latest software architectures and functions, it is possible for the user to realise their application with CAT without an extensive familiarisation period.

Individual operating and monitoring concepts

The work does not end with the creation of pure process control and regulation for modern machine and system parts. The process technician must provide the operator on site with the possibility of effectively monitoring and operating the system. The user must also remain well-informed in the event of a fault in order to keep the system downtime to an absolute minimum. Standard operating concepts are of little help in this connection. Therefore, the MSR 9696H is based on a concept that enables individual design of the operation and visualisation.

For this purpose, the CAT software provides an image editor that makes it possible to realise the widest range of operating and monitoring concepts with a few simple standard functions. In addition to the individual operating screens, there are standards screens such as:

Regulator operation	Program controller operation
Trend visualisation	Parameter dialogue



available in the screen editor. With the combination of standard operating screens and individually designed screen, an efficient interface between the operator and the process is created in the shortest time.

Thanks to the efficient software structure, even complex operating structures are easy to realise with the image editor.

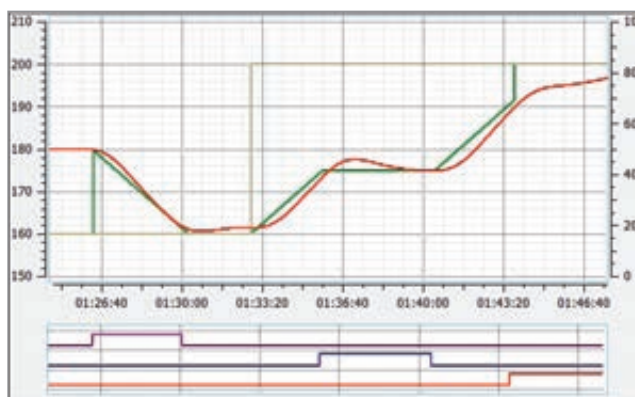
Commissioning and testing quickly and easily

Of course, the process technician's work is not finished with the creation of an application and its operation. The application still has to be tested and commissioned afterwards. For this important and in some cases lengthy phase, the new GHM platform provides various functions to streamline this phase.



An essential point is the PC simulation of the complete application. The entire application can be tested on a PC independently of the actual process. For this purpose, the CAT software has a simulation environment for the MSR 9696H and for connected I/O assemblies. With this environment, the user is capable of testing the entire application, including operation on the PC, without endangering the real process. Simply test the application at a desk without risk.

There are additional testing functions available to the user for the on-site system commissioning phase. An essential component is an integrated online trend function that allows the user to view all analogue and digital signals online in a trend and thereby quickly and easily monitor the desired functions. Of course, there are also debugging and various forcing functions available for the testing.



Simulation on a PC significantly shortens testing and commissioning times and increases system safety.

Application designer in CAT

CAT software configuration tool

The CAT (Configuration and Application Tool) tool enables the user to completely configure the GHM ONE. It essentially comprises the function plan editor, the HMI editor, the menu editor, the simulation, and commissioning assistance with debugging function and online diagrams.



The major functions are:

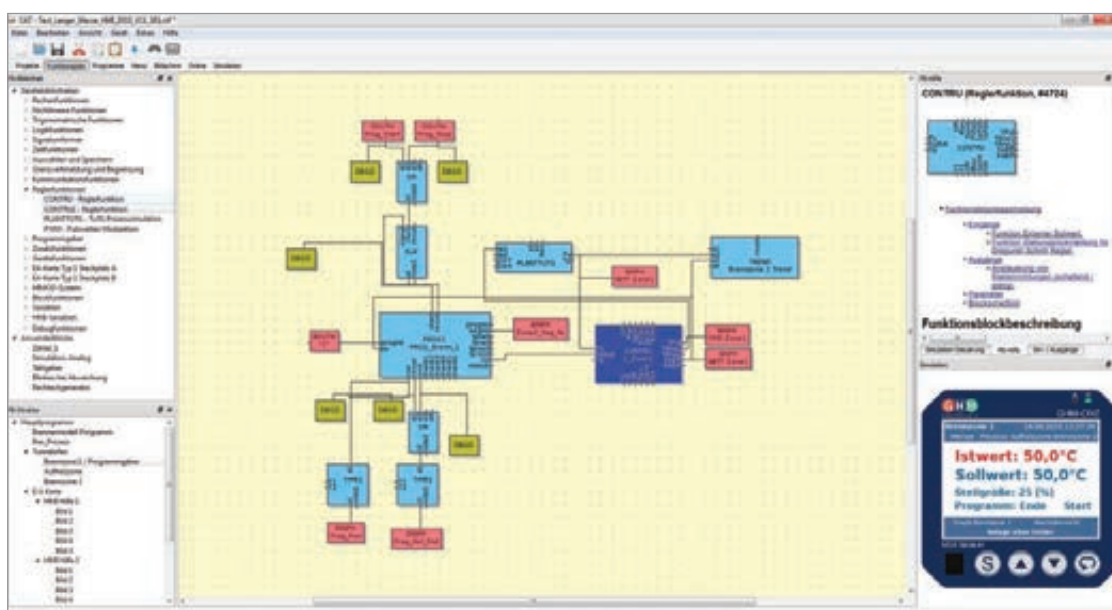
- Creation of the application from finished functions found in various libraries
- Graphic linking of functions in the function plan editor
- Automatic alignment of connections
- Parameterisation of functions
- Creation of operating structure and visualisation (HMI)
- Creation of test menus for parameterisation on the GHM ONE
- Creation of programs for the program controller
- Simulation of the overall application on the PC, including simulation of control paths
- Online device function with debugging functions for application testing
- Transfer of applications to the GHM ONE.
- Firmware update function
- Online help for all functions

The core of the application creation is the function plan editor with the function module library. With the help of the function modules, the user assembles their application without the need for any programming skills. Three are more than 100 tested functions in the library which can be easily placed on the desktop and connected using the mouse. Declaring of variables and complex assignment of functions are omitted. In this manner, the user can effectively create their system or process from finished modules. The application operating and monitoring screens are then created based on the function block application. Therefore, specific information can be displayed for the person on site and detailed screens can be created for service technicians. These screens are freely configurable. It is even possible to integrate process screens or other graphics. The user can also create text-based operating screens in order to enable efficient input of several types of process data.

After the application has been created, it can also be tested in the CAT tool. With the simulation, the software offers an exact representation of the device in all its functions. Even the hardware inputs and outputs can be simulated. Therefore, the user can test the application in an initial step without any risk for the system. Support of the user by the CAT software continues in the scope of the commissioning with various forcing and debugging functions and a refined online visualisation of analogue and digital values. With this wide variety of information and intervention possibilities, efficient commissioning is practically assured.

All configurations for the GHM One takes place in a single tool. The elaborate orientation in various software packages for controllers, data monitors, data loggers, mini-SCADA and mini-PLC can be dispensed with.

Application commissioning and testing times are minimised with a complete device simulation.



Communication channels

The expansion of the MSR9696H with additional analogue and digital signals from the field is possible with the optional communications card. The expansion can take place via the GHM I/O system, in which case no additional bus coupler is required in the field. The hardware concept of the MSR 9696H also provides the possibility of connecting external I/O and other field bus participants via various field bus system

- ModbusTCP
- Modbus RTU (* in preparation)
- CanOpen (* in preparation)

In the modern world of automation it is becoming increasingly important that devices exchange data with other devices M2M.

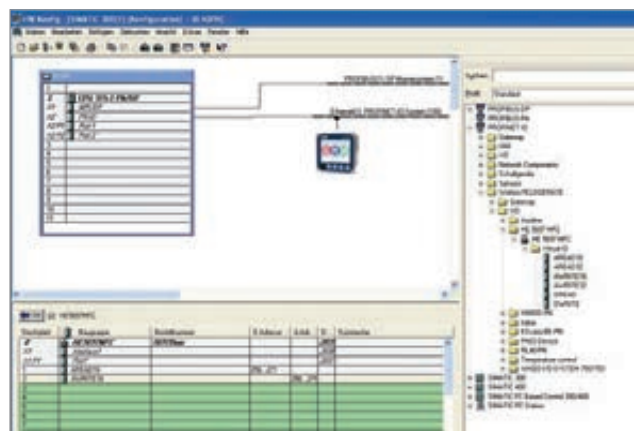
The user can address this task with various interfaces to the PLC and control system level. For this purpose, the MSR 9696H offers

- ProfiNet (*currently without a certificate / certification pending)
- Profibus DP (* in preparation)
- ModbusTCP
- Modbus RTU (* in preparation)

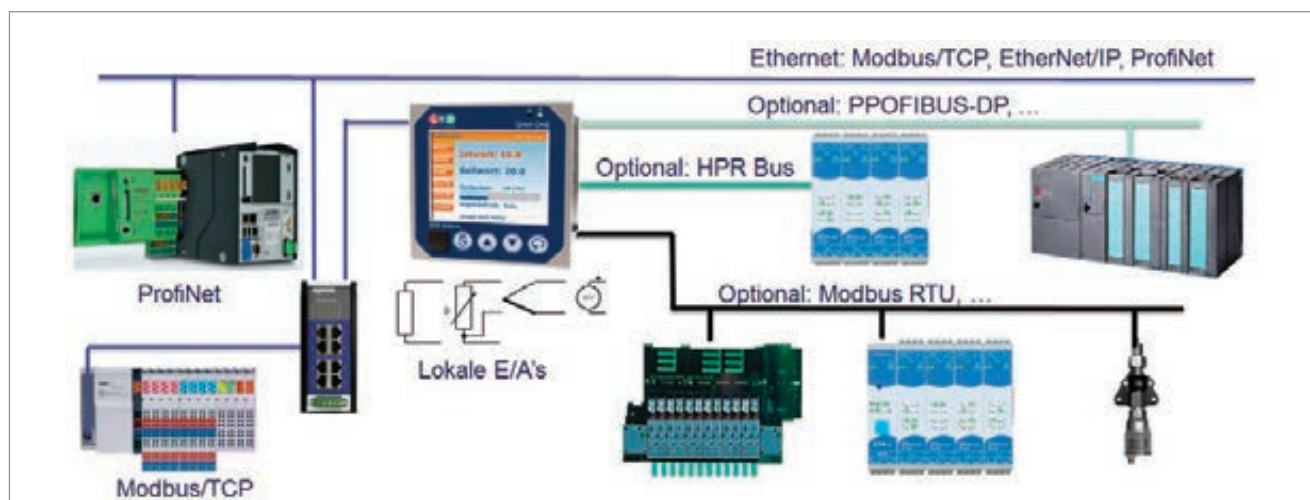
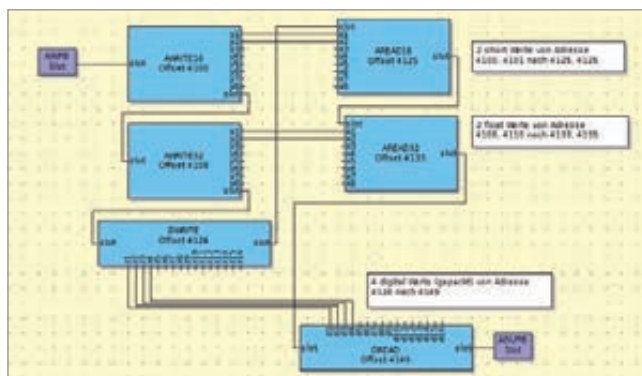
as possible connections. With this communications concept, the device can be individually integrated into various process areas. In addition to I/O systems, field-bus compatible sensors and actuators connected directly to the MSR 9696H with the standard systems. The overall configuration of the process values for external communication is created exclusively in CAT.

The files required for the master systems such as ProfiNet and Profibus are included. Integration takes place with the standard systems of the respective manufacturer. Therefore, integration ex-

isting systems is possible without extensive additional work. The user relies on standards that are established in the market.



Time-saving integration of the MSR 9696H in superordinate SCADA or PLC worlds with the help of standard field buses. Simple expansion of the MSR 9696H I/O with external field bus systems.



Control technology, profiler

The function library provides controller modules as a basis for control-related tasks. These modules can be operated as

- 2-point controllers
- 3-point controllers
- Motor step controllers

In the process, it is possible to operate the controllers as analog or switching controllers. A wide spectrum of setpoint and actual value functions and setpoint functions round out the scope of module functions. Additional functions are available for specific tasks, such as:

- Boost function
- Soft start
- Smooth switching
- PID parameter adaptation

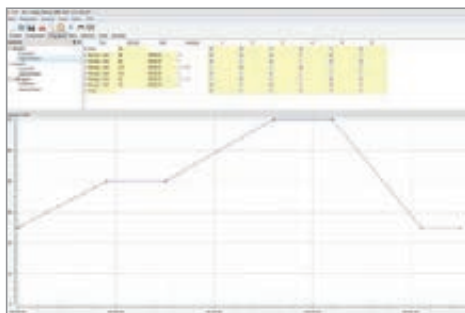
in order to assist the user in the realisation of tasks. With the help of several controller modules, even complex control technology structures can be implemented. This enables implementation of solutions such as

- Cascade regulation
- Limit control
- Ratio control
- Multi-Loop control / multi-variable control

and other control strategies with the assistance of standard functions. Of course, all controllers have the possibility of self-tuning.



But that is not all when it comes to control technology and process control. The library also provides a profiler that is needed in many cases to adopt the control for certain processes. This is necessary whenever the material structure must be influenced over the course of a process. The profiler comprises up to 20 programs with 60 segments each. One analogue and 6 digital tracks are available per segment. The program structure is realised in CAT with simple input of the segment times and setpoints.



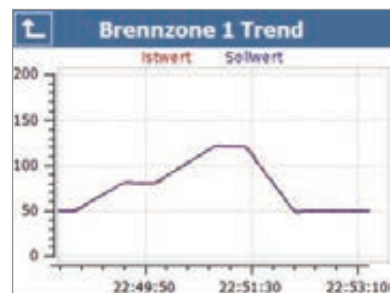
With the help of finished controller modules, realisation of control technology tasks is possible without extensive knowledge in the area of control technology.

Data recording

In many areas of industry, the recording of process data is an essential element of quality assurance. The GHM One library offers the possibility of realising a data logger and a data recorder in the device. Configuration of the data logger takes place directly in CAT with function blocks. This makes it possible to log digital and analogue signals in various time periods.

The analogue data can be recorded as minimum, maximum or mean values over a specific time period. The data is saved in the device on an eMMC chip and can be read via the Ethernet port via FTP. The device has a data storage capacity of 2GB. The readout of data via USB ports on the front and rear sides is in preparation. The data is provided to the user in a standard ASCII format (csv) for further processing and analysis.

The trend representation on the device takes place on predefined operating screens. Up to 4 curves can be represented in one trend. By cascading the function, various time periods can be represented. Since the trend block can be opened multiple times in the HMI application, it is possible to use the GHM one as a multi-channel recorder.



The trend representation is independent of the logger function, and so various process signals can be displayed and recorded. The library also provides an alarm block. This block can be used to display alarm lists in plain text on the device. The alarms can be acknowledged on the device and even used for further processing within the application.



Data recording, data logging and alarming round out the performance spectrum of GHM ONE. No additional devices are required for visualisation and data backup.

Device front

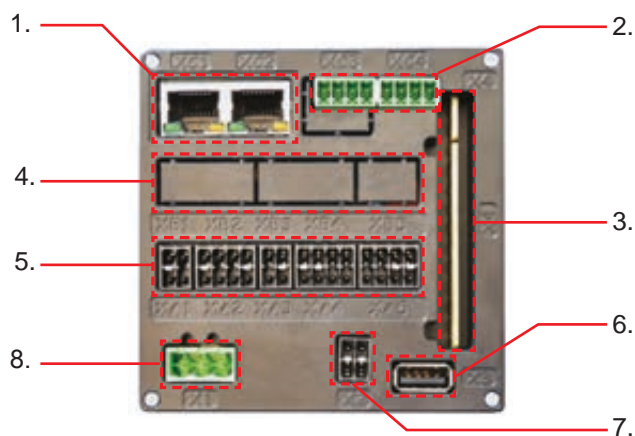


1. Definable red/green status display LEDs
2. 3.5" TFT colour touch display
3. 4 freely configurable operating keys
 - Load / read application
 - Debugging function (online representation)
 - Write / read parameters
4. USB device

General

- Protection rating IP 65 (front side only! rear side IP 20)
- Outside dimensions 96mm x 96 mm x 115 mm (installation length without plugs and cables)

Device rear side

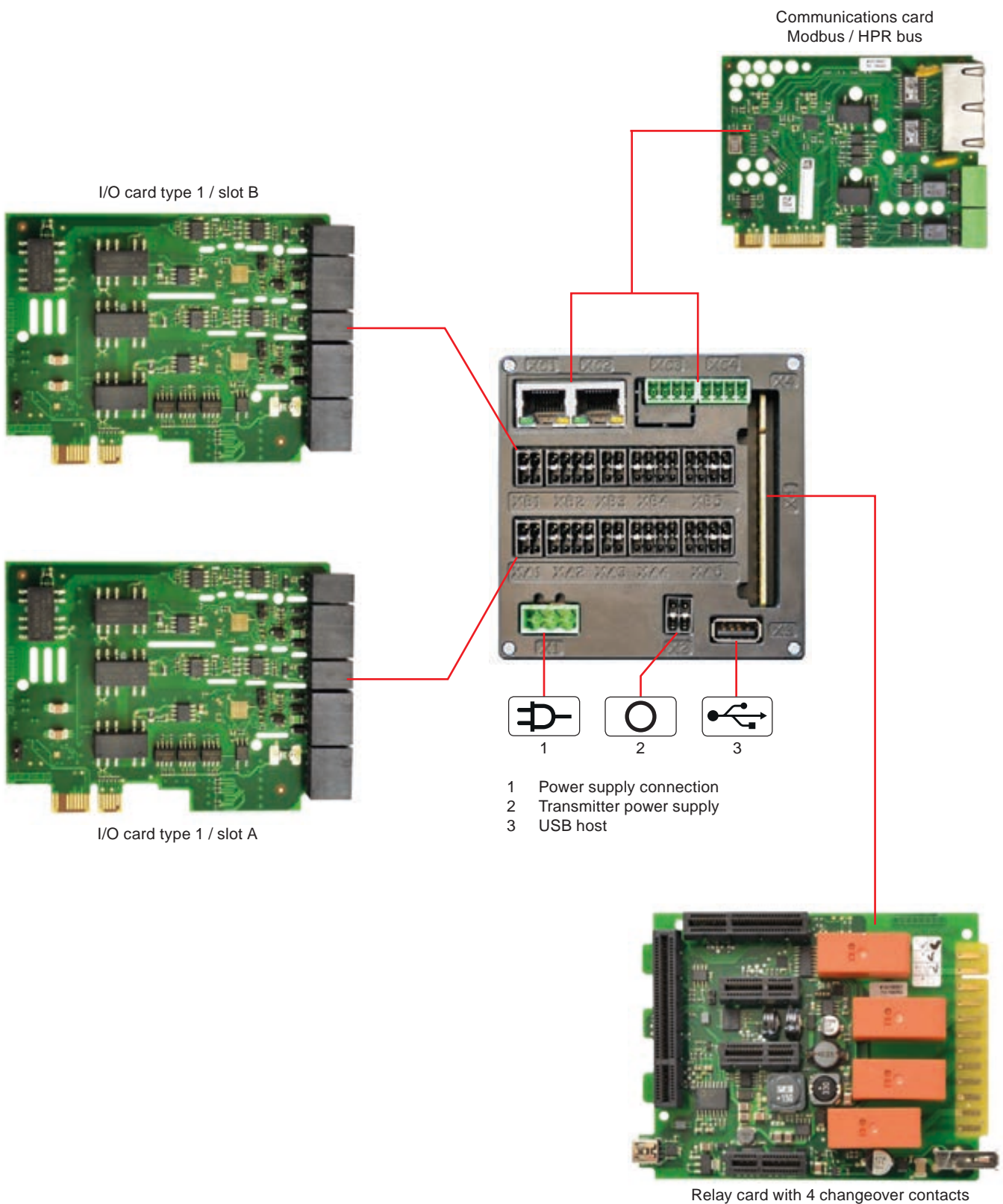


1. Ethernet communications interface
(see detailed description under 'Communication')
2. Serial RS485 Modbus / HPR bus communications interface
3. Relay card with 4 changeover contacts
(see detailed description under 'Relay outputs')
4. I/O card - slot B
(see detailed description under 'Standard I/O card')
5. I/O card - slot A
6. USB host (see detailed description under 'Data transfer')
7. Transmitter power supply
8. Power supply



- Coding protection of terminals
- Easy to use spring-type terminals
- Lockable circuit board terminal for relay connections

Overview of slots / rear side connections



E1

Functions in detail

MSR9696H base unit



Base unit general technical data

Controls / device front

Keys : 4 freely assigned keys
Touch function : Resistive touch display

Display

Front LEDs : 1 red freely assigned LED
1 green freely assigned LED
Display : 3.5" TFT display
320 x 240 pixel QVGA resolution

Data logger

Storage medium : eMMC chip
Storage capacity : approx. 1 GB
Storage rate : ≥ 1 second

Auxiliary energy

Supply voltage : 100 – 240 V AC or 24 V DC
Power consumption : Typically 10W
Electrical connection : Spring-type terminal, 3-pin
Conductor cross-section : 0.25mm to 2.5mm
Galvanic isolation : I/O level / auxiliary energy / processor

Environmental conditions

Operating temperature : 0...+55 °C
Storage temperature : -20...+70 °C
Relative air humidity : 95%, non-condensing

Air and creep distances

Degree of contamination : 2
Overvoltage category : II
Maximum elevation : 2000m
Rated voltage category a : 230V
Test voltage category a : 3000 VAC 1min.
Rated voltage category b : 50V
Test voltage category b : 520 VAC 1min.

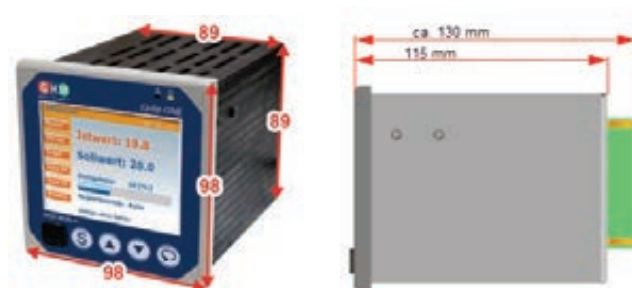
Housing

Type : Device for control panel installation
Protection rating : IP65 front side
IP20 lens tube and rear side

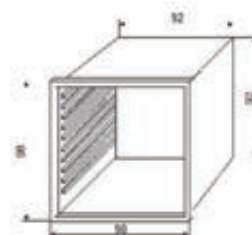
Dimensions

width / height / depth : 98 mm x 98 mm x 115 mm
(without plug)
98 mm x 98 mm x 130 mm
(with plug)

Housing dimensions in mm



Dimensions for the control panel cutout



Minimum spacing between devices



Outputs (relay card)

The relay card is a base card with 4 relays designed as change-over contacts. It is not possible to exchange the relay card with other I/O cards.

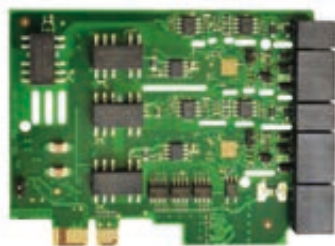
Relay

Type : Changeover contacts
Number : 4
Electrical connection : Spring-type terminal
Conductor cross-section : 0.25mm to 1.5mm
Switching voltage : $< 250V AC < 4A$

Note:

If a control contactor is connected to a relay output, an RC protective circuit (RC snubber) required according to the contactor manufacturer specifications in order to prevent high voltage peaks. Varistor protective circuits are not recommended.

Option 1: I/O card type 1



Up to 2 I/O cards can be installed in the device.
The type '1' card has:

- 2 analogue universal inputs
TC / RTD / -1000..+1000mV / 0..+20mA)
- 2 analogue standard inputs
(0..+10V / 0..+20mA)
- 2 analogue standard outputs
(0..+10V / 0..+20mA)
- 6 digital inputs or outputs

Analogue universal input

The card is equipped with 2 analogue universal inputs

Galvanic isolation

The two universal inputs are galvanically isolated from each other. There is also galvanic isolation for the power supply, the digital inputs and outputs, analogue outputs, and the processor and the communications. There is a galvanic connection to the corresponding analogue standard input (terminal X2 / terminal X4).

Converter resolution : > 18 Bit
Cycle time : 50ms
Galvanic isolation : corresponding to category a

RTD measurements

Input type : Resistance
Connection type : 3-wire

Measuring ranges

Pt100 / Pt1000	-200..+850°C
Ni100 / Ni1000	-60..+300°C
KTY 11-6	-50..+125°C

Measured current

Pt100 / Ni100	I < 0,5mA
Pt1000 / Ni 1000	I < 50µA
KTY 11-6	I < 50µA

Accuracy : ≤ 1K
Temperature drift : ≤ 0.08% / 10K
Measuring circuit monitoring : Short-circuit and interruption

Thermocouple measurements

Input type : Voltage measurement
Connection type : 2-wire
Input resistance : >10 MΩ

Thermocouples

Type	Measuring range	Accuracy	Resolution
L	-200..+900°C	≤ 2 K	0,05 K
J	-210..+1200°C	≤ 2 K	0,05 K
K	-270..+1370°C	≤ 2 K	0,08 K
N	-196..+1299°C	≤ 2 K	0,08 K
S	-50..+1760°C	≤ 2 K	0,07 K
R	-50..+1760°C	≤ 2 K	0,07 K
T	-270..+400°C	≤ 2 K	0,02 K
E	-270..+1000°C	≤ 2 K	0,04 K
B	+25..+1820°C	≤ 3 K	0,1 K
W	0..+2299°C	≤ 3 K	0,1 K

Temperature drift : ≤ 0.08% / 10K
Measuring circuit monitoring : Interruption
Cold-junction compensation : internal / auxiliary error < 2 K

Resistance measurement

Input type : Resistance measurement
Connection type : 2-wire
Measuring range : 0..20 kΩ
Detection range : Measuring range + 10%
Accuracy : ≤ 0.1%
Temperature drift : ≤ 0.08% / 10K
Measuring circuit monitoring : Exceeding the detection range

Current measurement

Input type : Current
Connection type : 2-wire
Measuring range : 0..20mA
Detection range : Measuring range + 10%
Input impedance : max. 50Ω
Accuracy : ≤ 0.1%
Temperature drift : ≤ 0.08% / 10K
Measuring circuit monitoring : Exceeding and/or undercutting the detection range

Analogue standard input

The card is equipped with 2 analogue standard inputs.

Galvanic isolation

The two standard inputs are galvanically isolated from each other. There is also galvanic isolation for the power supply, the digital inputs and outputs, analogue outputs, and the processor and the communications. There is a galvanic connection to the corresponding analogue universal input (terminal X2 / terminal X4).

Converter resolution : > 18 Bit
Cycle time : 50ms
Galvanic isolation : corresponding to category a

Current measurement

Input type : Current
Connection type : 2-wire
Measuring range : 0..20mA
Detection range : Measuring range + 10%
Input impedance : max. 50Ω
Accuracy : ≤ 0.1%
Temperature drift : ≤ 0.08% / 10K
Measuring circuit monitoring : Exceeding and/or undercutting the detection range

Product information

Multifunction controller

Voltage measurement

Input type	: Voltage
Connection type	: 2-wire
Measuring range	: 0..10V
Detection range	: Measuring range + 10%
Input impedance	: typically 1.2M Ω
Accuracy	: $\leq 0.1\%$
Temperature drift	: $\leq 0.08\%$ / 10K
Measuring circuit monitoring	: Exceeding and/or

Analog output

The card is equipped with 2 analogue standard outputs

Galvanic isolation

The two standard outputs are galvanically isolated from each other. There is also galvanic isolation for the power supply, the digital inputs and outputs, analogue outputs, and the processor and the communications.

Converter resolution	: 12 Bit
Linearity	: $< 0.1\%$
Accuracy	: $< 0.2\%$
Temperature drift	: $\leq 0.1\%$ / 10K
Cycle time	: 50ms
Galvanic isolation	: corresponding to category a

Current output

Dynamic range	: 0..+22mA
Output resistance	: max. 500 Ω

Voltage output

Dynamic range	: 0..+11V
Output load	: $RL \geq 1\text{ k}\Omega$

Digital inputs and outputs

The I/O card is equipped with six inputs/outputs; the function for the respective signal can be configured in CAT. The supply of the inputs/outputs must be provided externally.

Galvanic isolation

The inputs/outputs are not galvanically isolated from each other. There is galvanic isolation for the power supply, the analogue inputs and outputs and the processor and the communications.

Supply voltage	: 24V DC +/- 20%
Galvanic isolation	: corresponding to category a
Digital outputs	: maximum output current 100 mA

Counter input

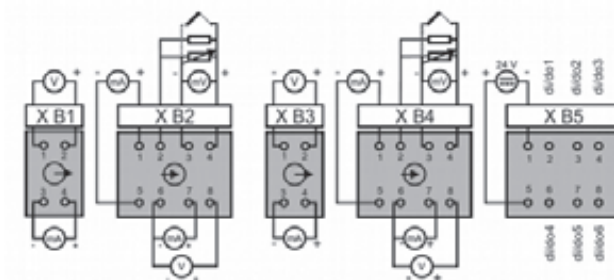
Two digital inputs (Inputs 1 and 3) can be configured as counter inputs

Limit frequency	: 10kHz
Output signal	: Pulses per time unit (configurable)

Electrical connections

Electrical connection	: Spring-type terminal
Conductor cross-section	: 0.25 mm to 1.5 mm (with wire end ferrule / without plastic sleeve)
Conductor cross-section	: 0.25 mm to 0.75 mm (with wire end ferrule / without plastic sleeve)

I/O card connections



Option 2: Modbus / HPR bus communications card



The communications card is equipped with 2 Ethernet ports (IEEE 802.3) and 2 RS485 interfaces.

Ethernet	
Connection	: RJ-45
Function	: 10/100 Mbit/s Auto-negotiation Auto-MDIX IP via DHCP or fix
LED	: Link / data
Protocol	: ModBusTCP Slave ModBusTCP Master FT server

Ordering code

MSR9696H -

1.	I/O card slot A	
	0	No I/O card in slot A
	1	I/O card with 2 universal / 2 standard inputs; 2 standard outputs; 6 digital inputs or outputs in slot A
2.	I/O card slot B	
	0	No I/O card in slot B
	1	I/O card with 2 universal / 2 standard inputs; 2 standard outputs; 6 digital inputs or outputs in slot B
3.	Communication card	
	0	No communications card
	1	Communication card with 2 x Ethernet; 2 x RS485 (Modbus TCP / Modbus RTU and HPR bus)
4.	Auxiliary voltage	
	1	230V AC
5.	Options	
	0	Without options

CAT-LZ

1.	Software licenses	
	1	1 license dongle
	3	3 license dongle
	5	5 license dongle
	10	10 license dongle

Subject to errors and changes.

Displays



Characteristics

Display	7-segment 7.6, 10, 14, 20 mm
Color	Red, green, blue, yellow
Display	Bar-graph Red, green
Case	Panel mounting
Front dimensions	48x24 mm 48x48 mm 72x24 mm 96x48 mm Field case
Connection	Slide-in terminals Clamp terminals

Applications

- Industry metrology
- Indicating of process data
- Alarm display
- Indicating state for drum-, machine- and tank-engineering
- Temperature measurement

Function and Advantages

Simple user-friendly programming, or, to be precise, the setting of the operating parameters of each digital display, makes the trouble-free adaptation of the display systems and the fixed measuring instruments to the customized application possible. We also have large displays in our portfolio to display information on ongoing processes or to display key process data.

The multitude of modifiable settings of each display remains very clearly arranged and simple thanks to the menu-driven parametrization, even without separate parametrization software. As manufacturer and supplier of digital displays, and the many years of experience gained there while, we provide our customers a high degree of flexibility and efficiency in start-up.

All devices built-in the instrument panel of this product group can be supplied in sturdy, closed plastic casings for front face panel installation in the prevalent casing dimensions of 48x24 mm, 48x48 mm, 72x24 mm, 96x24 mm and 96x48 mm. Auxiliary power of the field measuring devices, digital fixed measuring instruments and panel meter is potential-free from the measurement input.

General

Measuring Input – Sensor type

- Industry standard signal 0/4...20 mA
- Industry standard signal 0/2...10 V DC
- Voltage AC/DC
- Current AC/DC
- RTD Pt100/Pt1000
- Thermocouple type J, K, N

Instrumentation – Connection

- 2-wire connection
- 3-wire connection

Output

- Analogue output active 0/4...20 mA
- Analogue output active 0/2...10 V DC
- Impulse output 0/18 V DC
- Relay output change-over contact
- Transistor output PNP

Features

- 7-segment displays character height 7, 10, 14.2 and 20 mm
- Display color red, yellow, green, blue (EP9648)
- Loop powered displays
- Graphic recorder
- Large size displays LED dot matrix max. 100mm character height
- Large size displays 7-segment character height from 50 up to 150 mm

Universal Display GA 9648



- Universal input for standard signals, frequency, Pt100/Pt1000 and thermocouples
- Self-diagnostics
- Integrated electrically isolated transmitter supply
- Interface

Characteristics

The GA 9648 is a microprocessor-controlled displaying device for universal use.

It has a universal input for standard signals (0..20 mA, 4..20 mA, 0..50 mV, 0..1 V, 0..2 V and 0..10 V), resistance thermometers (Pt100 and Pt1000), thermocouples (type J, K, N, S and T) and frequency (TTL and switch contact). Additionally the device provides functions like flow measurement, rotation speed measurement and counter.

The GA 9648 saves the highest and lowest measured value in the min/max value memory. Furthermore it automatically detects impermissible operating states like display or system error and displays a corresponding error code.

Technical Data

Measuring inputs

Measuring type	Input signal	Measuring range	Note
Voltage signal	0..10 V	0..10 V	Ri ≥ 200 kOhm
	0..2 V	0..2 V	Ri ≥ 10 kOhm
	0..1 V	0..1 V	Ri ≥ 10 kOhm
	0..50 mV	0..50 mV	Ri ≥ 10 kOhm
Current signal	4..20 mA	4..20 mA	Ri = ~125 Ohm
	0..20 mA	0..20 mA	Ri = ~125 Ohm
Resistance	Pt100	-50.0..+200.0 °C	3-wire connection
		-200..+850 °C	
	Pt1000	-200..+850 °C	2-wire connection
		-200..+850 °C	

Thermocouple	NiCr-Ni type K	-70.0..+250.0 °C	
		-270..+1372 °C	
	Pt10Rh-Pt type S	-50..+1750 °C	
	NiCrSi-NiSi type N	-100.0..+300.0 °C	
		-270..+1350 °C	
	Fe-CuNi type J	70.0..+300.0 °C	
		-170..+950 °C	
Frequency	Cu-CuNi type T	-70.0..+200.0 °C	
		-270..+400 °C	
	TTL signal	0..10 kHz	
	switching contact NPN	0..3 kHz	internal pull-up-resistor is switched on
	switching contact PNP	0..1 kHz	internal pull-down-resistor is switched on
Flow	TTL signal, switching contact NPN, PNP	analog to frequency	
Rotation speed	TTL signal, switching contact NPN, PNP	0..9999 U/min	switchable predistributor (1..1000), pulse frequency: max. 600000 pulses/min.
Rotation speed	TTL signal, switching contact NPN, PNP	0..9999 U/min	switchable predistributor (1..1000), pulse frequency: max. 600000 pulses/min.
	TTL signal, switching contact NPN, PNP	0..9999 U/min	switchable predistributor (1..1000), pulse frequency: max. 10000 pulses/min.

Accuracy

Standard signal	: < 0.2 % FS ±1digit (at 0..50 mV: < 0.3 % FS ±1digit)
Resistance thermometer	: < 0.3 % FS ±1digit
Thermocouple	: < 0.3 % FS ±1digit (at type S: < 0.5 % FS ±1digit)
Frequency	: < 0.1 % FS ±1digit

Measuring rate

Standard signal	: 100 measurements / second
Temperature	: 4 measurements / second
Frequency	: 100 measurements / second
Power supply	: 230 V AC, 50 / 60 Hz
Power consumption	: approx. 5 VA
Working temperature	: -20..+50 °C

continued on next page

Product information

Displays

Display

Display	: LED display
Height	: 13 mm
Display range	: -1999..+9999 digit initial, final value and decimal point freely selectable

Operation	: via 4 buttons or via interface
Interface	: EASYBus interface, electrically isolated
Transmitter supply	: 24 V DC $\pm 5\%$, 22 mA, electr. isolated at DC supply: 18 V DC
Electric connection	: via screw / clamp terminals wire cross section from 0.14..1.5 mm ²
Protection class	: front IP54, with optional sealing IP65

Dimensions

Housing

Size	: 48 x 96 mm (H x W)
Mounting depth	: 115 mm (incl. screw / clamp terminals)
Panel mounting	: by fixing clamps
Panel cutout	: 43.0 x 90.5 mm [± 0.5 mm] (H x W)

Connection diagram

15	EASYBus interface
14	EASYBus interface
13	input: 0..10 V
12	input: 0..1 V, 0..2 V, mA, frequency, Pt100, Pt1000
11	input: 0..50 mV, thermocouple, Pt100
10	input: GND, Pt100, Pt1000
9	transmitter supply (-)
8	transmitter supply (+)
2	power supply
1	power supply



Options

230A	supply voltage: 230 V AC (standard)
012D	supply voltage: 12 V DC (11..14 V)
024D	supply voltage: 24 V DC (22..27 V)
024A	supply voltage: 24 V AC ($\pm 5\%$)
115A	supply voltage: 115 V AC ($\pm 5\%$)
AA	analog output 0..20 mA, 4..20 mA (selectable)
AV	analog output 0..10 V

Ordering code

GA9648 - 1 - 2 - 3

1. Supply voltage	
230A	230 V AC (standard)
012D	12 V DC
024D	24 V DC
024A	24 V AC
115A	115 V AC
2. Analog output	
00	no analog output (standard)
AA	analog output 0..20 mA, 4..20 mA
AV	analog output 0..10 V
3. Option	
00	without option
IP	sealing to increase protection class to IP65

Special design types (upon request)

SA1	Selectable scaling with input 0..10 V and control input 24 V The device has a 0..10 V standard signal input and a 24 V control input. By means of the 24 V control input it is possible to switch between two freely programmable scalings.
SA2	Input ± 10 V DC
SA3	Set-point controller This special design type makes the GA 9648 to a microprocessor-controlled set-point controller for universal use. The output value can be set via button 2 and 3 and then be output as analog signal corresponding to selected analog output type.

Accessories

- **EAK 36**
Unit stickers (black with white characters), 36 different units, for labeling of display devices

Economy Panelmeter EP9648



- Multipurpose input for 0/4..20 mA, 0..10 V and Pt100
- LED-Display 14,2 mm red, yellow, green or blue or 20.3 mm red
- Indicating range and decimal point free programmable
- Programmable display time

Characteristics

The Economy Panelmeter EP9648 is a technical advancement of the DP9648. With universal input conditions and easy programming the Panelmeter receive a powerful instrument for monitoring, measurement and control applications. As highlight the device offers a self acting display brightness. A built-in photo sensor controls the ambient brightness and corrects the display brightness.

Technical data

Power supply

Supply voltage : 230 / 115 V AC 50/60 Hz $\pm 10\%$ %
or 24 V DC $\pm 20\%$ %

Power consumption: 3 VA

Working temp. : -10..+60 °C

CE- conformity : EN 55022, EN 60555,
IEC 61000-4-3/4/5/11/13

Input

Current : 0/4..20 mA, Ri 10 Ω , overload max. 3-times

Voltage : 0..10 V, Ri 100 k Ω , overload max. 3-times

Pt100 : -100..400 °C

sensor current < 1 mA (low self heating)

Accuracy : voltage/current $\pm 0.1\%$, ± 1 digit;
Pt100 ± 0.2 °C, ± 1 digit

Display : LED 14.2 mm yellow, green, blue
or 20.3mm red

Indicating range : -1999..2000 Digit

Decimal point : programmable

Overflow indication : "-1999" or "9999" ,
flashing with 2 Hz

Display brightness : programmable from 2..100 %,
with photo sensor (only display red, optional)

Analog output

Voltage : 0..10 V DC, linearized,
short circuit proof max. 5 mA

Accuracy : 0.1 %

Case : panel case DIN 96x48 mm,
material PA6-GF; UL94V-0

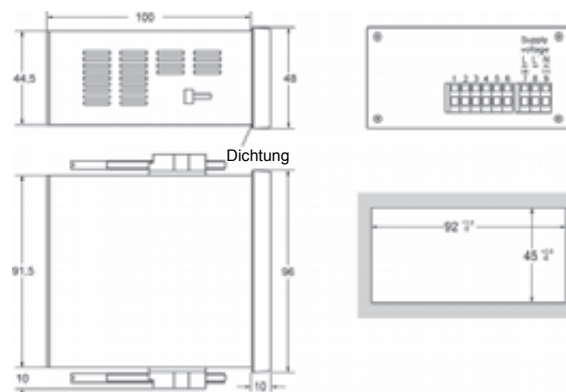
Dimensions : front 96x48 mm, mounting depth 100mm

Weight : max. 390 g

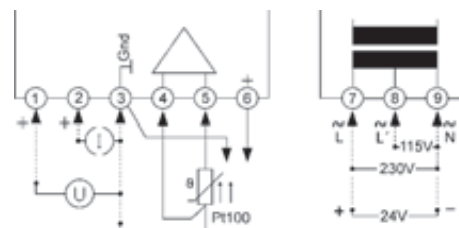
Connection : clamp terminals, 0.08..1.5 mm²
AWG28..AWG14

Protection class : front IP65, terminals IP20 acc. to BGV A3

Dimensions



Connection diagram



Ordering code

EP9648 - 1. - 2. - 3. - 4. - 5. - 6.

1. Display		
1	LED red	14.2 mm
3	LED red	20.3 mm
4	LED yellow	14.2 mm
6	LED green	14.2 mm
8	LED blue	14.2 mm
2. Model		
15	Industry standard signal	
	0/4...20 mA, 0...10 V DC and Pt100	
3. Supply voltage		
0	230 V AC	±10 % 50-60Hz
5	24 V DC	±20 %
4. Options		
00	without option	
07	self acting display brightness (only display LED red 1 and 3)	
5. Unit appears in the unit field		
6. Additional text above the display (3x90 mm HxW)		

Temperature Panelmeter T9648



- Measuring input for Pt100, Pt1000 or Thermocouple
- LED-Display 14.2 mm red
- Max. 4 alarm outputs relay SPDT or transistor

Characteristics

The Temperature Panelmeter T9648 is suitable for measurement of temperatures in connection with RTD sensors Pt100, Pt1000 and thermocouples Fe-CuNi (J), NiCr-Ni (K), Pt10Rh-Pt (S). Devices for other temperature sensors are available on request. The measuring input is isolated. The measuring range can be limited in the configuration level. It is identical with the range of the analog output.

Technical data

Power supply

Supply voltage : 230 V AC $\pm 10\%$; 115 V AC $\pm 10\%$;
24 V AC $\pm 10\%$ or 24 V DC $\pm 15\%$
Power consumption : max. 3.5 VA, with analog output 5 VA
Operating temp. : -10...+55 °C
CE- conformity : EN55022, EN60555,
IEC61000-4-3/4/5/11/13

Input

Pt100 : -100...+600 °C
Pt1000 : -50...+200 °C
Accuracy : Pt100 or Pt1000 $< 0.1\% \pm 2$ Digit,
max. 100 Ohm line resistance
Thermocouple : Fe-CuNi (J) 0...+800 °C,
NiCr-Ni (K) 0...+1200 °C
Pt10Rh-Pt (S) 0...+1600 °C
built-in cold junction

Accuracy : $< 0.1\% \pm 2$ Digit with compensating line

Display

Indicating range : LED red, 14.2 mm
Parameter display : LED 2-digit red, 7 mm
(parameter - and output indicator)

Output

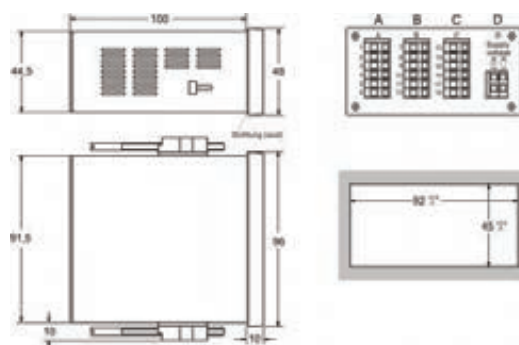
Relay SPDT : < 250 V AC < 250 VA < 2 A,
 < 300 V DC < 50 W < 2 A
Transistor : max. 35 V AC/DC, 100 mA,
short circuit protected
Analog output : 0/4...20 mA burden $\leq 500 \Omega$; 0/2...10 V
burden $> 500 \Omega$, isolated
automatic output changing
(burden depending)

- Accuracy : 0.1 %; TK 0.01 %/K

Case

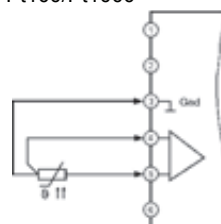
Dimensions : front 96x48 mm, mounting depth 100 mm
Weight : max. 390 g
Connection : clamp terminals, 0.08...1.5 mm²
AWG28...AWG14
Protection class : front IP65, terminals IP20 acc. to BGV A3

Dimensions

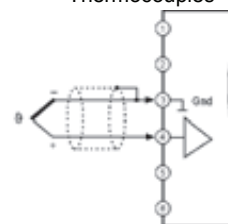


Connection diagram

Pt100/Pt1000



Thermocouples



Order code

T9648 - 1. - 2. - 3. - 4. - 5. - 6. - 7.

1. Terminal strip A	
1	input Pt100
3	input Pt1000
5	input thermocouple
2. Terminal strip B	
00	not installed
2R	2 relay outputs
2T	2 electronic outputs
T1*	2 nd input Pt100
T3*	2 nd input Pt1000
3. Terminal strip C	
00	not installed
2R	2 relay outputs
2T	2 electronic outputs
AO	analog output 0/4...20 mA, 0/2...10 V
4. Terminal strip D; supply voltage	
0	230 V AC $\pm 10\%$ 50-60Hz
1	115 V AC $\pm 10\%$ 50-60Hz
4	24 V AC $\pm 10\%$ 50-60Hz
5	24 V DC $\pm 15\%$
5. Options	
00	without option
01	min-and max-peak hold
02	difference-, average-, larger-, smaller value
07	display brightness programmable
6. Unit (appears in the unit field)	
7. Additional text placed above the display (3x90 mm HxW)	

*In connection with terminal strip A, only Pt100 or Pt1000; Pt100 and Pt1000 can not be mixed. Not isolated to terminal strip A.

Tank Display TA9648



- Inputs for standard signals 0/4..20 mA or 0/2..10 V
- 2nd input for pressure transmitter at pressure loaded tanks
- Input automatic level correction
- 6 standard- and custom sized tanks selectable
- Max. 4 alarm outputs, relay SPDT or transistor

Characteristics

The Tank Display TA9648 offers content measurement of tanks with no linear connection between level and content. Measurement will be realized by hydrostatic pressure or distance sensors. The device offers the possibility to connect a level sensor. Reaching a certain level, the displayed value will be corrected automatically to the value according to the position of the installed sensor.

Technical data

Power supply

Supply voltage : 230 V AC $\pm 10\%$; 115 V AC $\pm 10\%$,
24 V AC $\pm 10\%$ or 24 V DC $\pm 15\%$
Power consumption : max. 3.5 VA, with analog output 5 VA
Operating temp. : -10...+55 °C
CE-conformity : EN 55022, EN 60555,
IEC 61000-4-3/4/5/11/13

Input

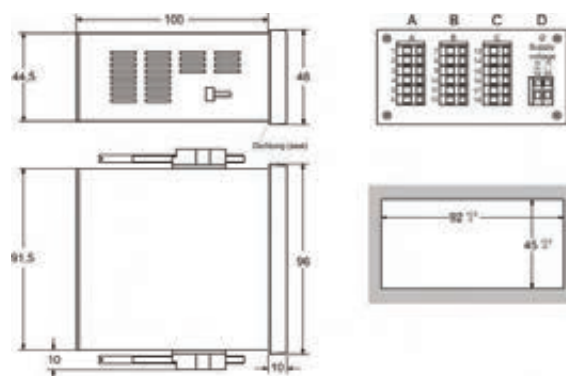
Current : 0/4..20 mA; $R_i = 10\ \Omega$
overload 2-times; 4-times for max. 5 s
Voltage : 0/2..10 V DC; $R_i = 100\ k\Omega$
overload max. 100 V

Accuracy : $< 0.1\% \pm 2$ Digit
Transmitter supply : U_0 appr. 24 V; R_i appr. 150 Ω ; max. 50 mA
(max. 25 mA, with 4 relays)
Display : LED red, 14.2 mm
Indicating range : 999999 Digit with leading zero suppression
Parameter display : LED 2 digit red, 7 mm
(parameter - and output indicating)

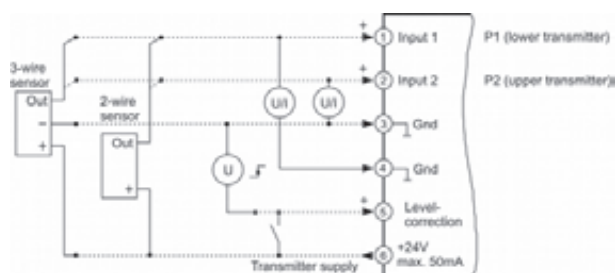
Output

Relay : SPDT $< 250\ V\ AC < 250\ VA < 2\ A$,
 $< 300\ V\ DC < 50\ W < 2\ A$
Transistor : max. 35 V AC/DC max. 100 mA,
with short circuit protection
Analog : 0/4..20 mA burden $\leq 500\ \Omega$; 0/2..10 V
burden $> 500\ \Omega$, isolated
automatic output changing
- Accuracy : 0.1 %; TK 0.01 %/K
Case : panel case DIN 96x48mm,
material PA6-GF; UL94V-0
Dimensions : front 96x48 mm, mounting depth 100 mm
Weight : max. 390 g
Connection : clamp terminals, 0.08..1.5 mm²
AWG28..AWG14
Protection class : front IP65, terminals IP20 acc. to BGV A3

Dimensions



Connection diagram



* only with pressure loaded tanks

Ordering code

TA9648 - 1. - 2. - 3. - 4. - 5. - 6. - 7.

1. Terminal strip A	
1	2 inputs 0/4..20 mA, 1 input for level correction, Integrated, transmitter supply 24V max. 50 mA
2	as 1, but inputs 0/2..10 V
2. Terminal strip B	
00	not installed
2R	2 relay outputs
2T	2 electronic outputs
3. Terminal strip C	
00	not installed
2R	2 relay outputs
2T	2 electronic outputs
AO	analog output 0/4..20 mA, 0/2..10 V
4. Terminal strip D; supply voltage	
0	230 V AC $\pm 10\%$ 50-60Hz
1	115 V AC $\pm 10\%$ 50-60Hz
4	24 V AC $\pm 10\%$ 50-60Hz
5	24 V DC $\pm 15\%$
5. Options	
00	without option
6. Unit (appears in the unit field)	
7. Additional text placed above the display (3x90 mm HxW)	

Universal Counter UZ9648



- Counting, length measurement, metering, positioning
- 2 digital input channels for summation- and subtraction
- Integrated transmitter supply
- Max. 4 preselect outputs, relay SPDT or transistor

The universal counter UZ9648 has been designed for field application in process control and automation. Parameters for operation mode can be programmed. The counter can be used wherever quantity processes should be measured, displayed and monitored.

Technical data

Power supply

Supply voltage : 230 V AC $\pm 10\%$; 115 V AC $\pm 10\%$;
24 V AC $\pm 10\%$ or 24 V DC $\pm 15\%$
Power consumption : max. 3.5 VA, 5 VA with analog output
Operating temp. : -10...+55 °C
CE- conformity : EN 55022, EN 60555,
IEC 61000-4-3/4/5/11/13

Input

PNP sensor : Ri = 6.3 k Ω
level: < 4 V low; > 8.5 V high;
hysteresis > 2.5 V; max. 35 V DC
Namur sensor : Ri approx. 1 k Ω (< 4 mA)
level: < 1 mA low; > 2.2 mA high;
hysteresis > 0.5 mA; max. 35 V DC
Pulse frequency : input A or B = 15 kHz,
A and B together = 6 kHz,
contact = 30 Hz debounced,
2-channel rotary encoder = 8 kHz

Counting loss : 100 μ s at reset;
20 ms changing of preselect value

Min. pulse width : electronic 50 μ s, contact 5 ms

External reset : reset impulse \geq 10 ms

Transmitter supply : 8 V DC (Namur), 24 V DC (PNP),
Ri approx. 150 Ω , max. 50 mA
(25 mA with 4 relay outputs)

Display

Indicating range : -99999...999999 Digit
Additional display : LED 2-digit red, 7 mm
(parameter - and output indicator)

Output

Relay : SPDT < 250 V AC < 250 VA < 2 A,
< 300 V DC < 50 W < 2 A

Transistor : max. 35 V AC/DC, 100 mA,
with short circuit protection

Analog output : 0/4...20 mA burden \leq 500 Ω ; 0/2...10 V,
burden > 500 Ω , with isolation

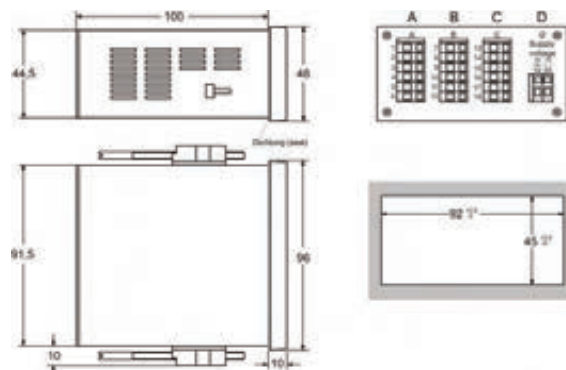
-Accuracy : 0.1 %; TK 0.01 %/K

Case : panel case DIN 96x48 mm,
material PA6-GF; UL94V-0

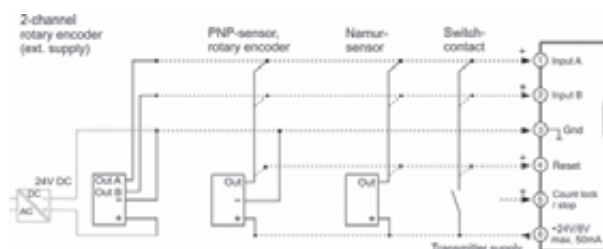
Dimensions : front 96x48 mm, mounting depth 100mm

Weight : max. 390 g
Connection : clamp terminals, 0.08...1.5 mm²,
AWG28...AWG14
Protection class : front IP65, terminals IP20 acc. to BGV A3

Dimensions



Connection diagram



Ordering code

UZ9648 - 1. - 2. - 3. - 4. - 5. - 6. - 7.

1. Terminal strip A	
1	2 configurable count inputs, display conversion, wide range of count functions, integrated transmitter supply 24V max. 50 mA
2. Terminal strip B	
00	not installed
2R	2 relay outputs
2T	2 electronic outputs
3. Terminal strip C	
00	not installed
2R	2 relay outputs
2T	2 electronic outputs
AO	analog output 0/4...20 mA, 0/2...10 V DC
4. Terminal strip D; supply voltage	
0	230 V AC $\pm 10\%$ 50-60Hz
1	115 V AC $\pm 10\%$ 50-60Hz
4	24 V AC $\pm 10\%$ 50-60Hz
5	24 V DC $\pm 15\%$
5. Options	
00	without option
6. Unit (appears in the unit field)	
7. Additional text placed above the display (3x90 mm HxW)	

Conductivity Meter LF9648



Characteristics

The Conductivity Meter LF9648 has been designed for the measurement of conductivity, as a degree of the purity or concentration of a liquid. In connection with 4-electrode-conductivity cells a high accuracy and insensitivity of contamination can be achieved. A further advantage is a broad range of application with only one cell. Only for measurement in ultra-pure water a special 2-electrode conductivity cell must be used.

Technical data

Power supply

Supply voltage : 230 V AC $\pm 10\%$; 115 V AC $\pm 10\%$;
24 V AC $\pm 10\%$ or 24 V DC $\pm 15\%$
Power consumption : max. 3.5 VA, 5 VA with analog output
Operating temp. : $-10\ldots+55\text{ }^{\circ}\text{C}$
CE-conformity : EN55022, EN60555,
IEC61000-4-3/4/5/11/13

Inputs

MR conductivity : 0.02000(0) $\mu\text{S/cm}$ up to
0.2000 / 200(0) mS/cm (at $25\text{ }^{\circ}\text{C}$)
-Cell constant : 0.080..9.999
-Accuracy : 0.5 % of the measuring value, ± 2 Digit
-Temperature comp. : non linear for ultra pure water and natural
water or linear programmable from
0.000..9.999 $\%/K$

MR temperature : $-50.0\ldots+200.0\text{ }^{\circ}\text{C}$; Sensor Pt100 or Pt1000
-Accuracy : $\pm 0.2\text{ }^{\circ}\text{C}$

Display : LED red, 14.2 mm

Indicating range : 2000(0) Digit with leading zero suppression

Parameter display : LED 2-digit red, 7 mm
(parameter - and output indicator)

Outputs

Relay : SPDT $< 250\text{ V AC}$ $< 250\text{ VA}$ $< 2\text{ A}$,
 $< 300\text{ V DC}$ $< 50\text{ W}$ $< 2\text{ A}$
Transistor : transistor, $< 35\text{ V AC/DC}$, max.100 mA,
short circuit protected

Analog output

Active : 0/4..20 mA burden $\leq 500\text{ }\Omega$;
0/2..10 V burden $> 500\text{ }\Omega$, isolated
automatic burden changing
(burden dependent)

Passive : 4..20 mA, ext.
burden = $RA[\Omega] \leq (\text{supply} - 5\text{ V}) \div 0.02\text{ A}$;
supply voltage 5..30 V DC,

Accuracy : 0.1 %; TK 0.01 $\%/K$

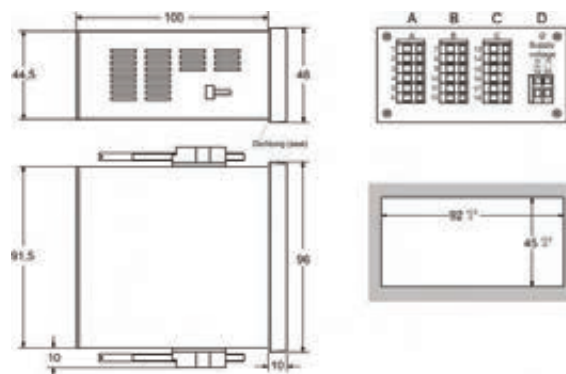
Case : panel mounting DIN 96x48 mm,
material PA6-GF; UL94V-0

Dimensions : front 96x48 mm, mounting depth 100 mm,

Weight : max. 390 g

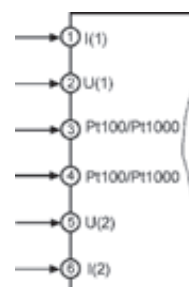
Connection : clamp terminals, 0.08..1.5 mm^2 ,
AWG28..AWG14

Dimensions



Connection diagram

Terminal strip A



Ordering code

LF9648 - 1. - 2. - 3. - 4. - 5. - 6. - 7.

1. Terminal strip A		
1	input for 2- or 4-electrode-cells, temperature compensation via Pt100	
3	as 1, but temperature compensation via Pt1000	
2. Terminal strip B		
00	not installed	
2R	2 relay outputs	
2T	2 electronic outputs	
3. Terminal strip C		
00	not installed	
2R	2 relay outputs	
2T	2 electronic outputs	
AO	analog output 0/4..20 mA, 0/2..10 V DC	
2A	2 analog outputs 4..20 mA passive	
4. Terminal strip D Supply voltage		
0	230 V AC	±10 % 50-60Hz
1	115 V AC	±10 % 50-60Hz
4	24 V AC	±10 % 50-60Hz
5	24 V DC	±15 %
5. Options		
00	without option	
01	min- and max-peak hold	
14	measuring/monitoring acc. to USP<645>	
6. Unit appears on the unit field		
7. Additional text above the display (3x90 mm HxW)		

Conductivity Converter UNICON®-LF



Characteristics

The Conductivity Converter UNICON-LF has been designed for the measurement of conductivity, as a degree of the purity or concentration of a liquid. In connection with 4-electrode-conductivity cells a high accuracy and insensitivity of contamination can be achieved. A further advantage is a broad range of application with only one cell. Only for measurement in ultra-pure water a special 2-electrode conductivity cell must be used.

Technical data

Power supply

Loop voltage : U_B 14..30 V DC, 2-wire connection
Operating temperature : 0..50 °C
CE- conformity : EN50022, IEC61000-4-3/4/5

Conductivity output

Current : 4..20 mA
Unit : programmable $\mu\text{S}/\text{cm}$; mS/cm ; $\text{k}\Omega/\text{cm}$; $\text{M}\Omega/\text{cm}$
Decimals : 0..3 digit (unit depending)
Indicating range : 500..9999 Digit (unit and decimals depending)
min./max. MR : 0..5.00 $\mu\text{S}/\text{cm}$ bis 0..500.0 mS/cm ;
0..0.500 $\mu\text{S}/\text{cm}$ / 0..50.0 $\mu\text{S}/\text{cm}$
with ultra-pure cell

Temperature comp. : non linear for ultra pure water and natural water or linear programmable from 0.000..8.000 $\%/^{\circ}\text{C}$

-Cell constant : 0.080..9.999
-Accuracy : $\pm 0.5\%$ of the measuring value, ± 2 Digit

Temperature output

Current : 4..20 mA
Burden : $RA \leq (U_B - 14 \text{ V}) \div 0.02 \text{ A}$
Temperature sensor : RTD Pt100 or Pt1000 acc. to DIN IEC 751
Unit : °C, °F programmable
Measuring range : -40.0..+160.0 °C

Alarm outputs

Transistor : 14..30 V DC, max. 60 mA
Voltage drop : < 2V

MR switch over

R_i : >10 k Ω
MB1 active : $U = 0..3 \text{ V DC}$
MB2 active : $U = 12..30 \text{ V DC}$

Display

Range : 2 lines 16 characters each

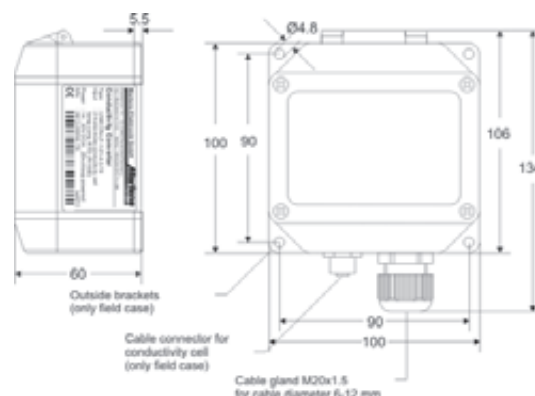
Case : head case / field case

Material : case polyamide with fiber glass
PA6-GF/GK 15/15, front foil polyester

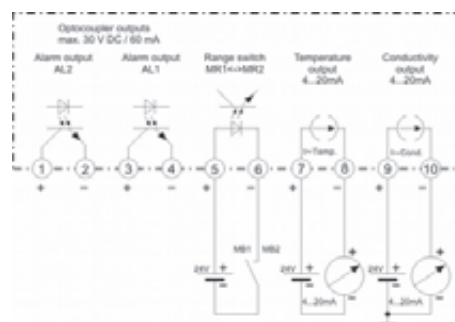
Dimensions : 100 x 100 x 60 mm (WxHxD)

Weight : max. 360 g
Connection : screw terminal with pressure plate, 2.5 mm² flexible wire, 4 mm² single wire and plug-in cable for sensor
Protection class : IP65, terminals IP20 acc. to BGV A3

Dimensions



Connection diagram



Ordering code

UNICON-LF - 1. - 2. - 3. - 4. - 5.

1. Model	
1	output 4..20 mA for conductivity 2 electronic alarm outputs
2	as 1, but 2 nd measuring range for conductivity, output 4..20 mA for temperature
2. Mounting	
01	head mounting, on the cell
02	field mounting, separate connection cable page Fehler: Referenz nicht gefunden
03	as 02, but plug stainless steel
3. Measuring principle	
4	4-electrode measurement (2-electrode cell connectable)
4. Temperature compensation	
1	RTD Pt100
3	RTD Pt1000
5. Options	
00	without option
14	measurement/monitoring acc. to USP <645>

pH and ORP Panelmeter pH9648



- LED-Display 14,2 mm red
- Measuring range programmable -1..+15 pH / ± 1500 mV
- Temperature compensation via P100/Pt1000 sensor
- Analog output 0/4..20 mA or 0/2..10 V for pH/ORP
- Max. 4 alarm outputs relay or transistor

Characteristics

The pH and ORP Panelmeter pH9648 is suitable for pH and ORP measurement in food technology, chemistry within pharmaceutical and sewage-water technology. The pH9648 operates with all common pH- and ORP electrodes. It is recommended to connect the Impedance-Converter pH40 for cable length > 5 m.

Technical data

Power supply

Supply voltage : 230 V AC $\pm 10\%$; 115 V AC $\pm 10\%$;
24 V AC $\pm 10\%$ or 24 V DC $\pm 15\%$
Power consumption: max. 3.5 VA, with analog output 5 VA
Operating temperature : -10..+55 °C
CE- conformity : EN 55022, EN 60555,
IEC 61000-4-3/4/5/11/13

Input pH/ORP

Measuring range : -1.00..+15.00 pH or -1500..+1500 mV
 R_i : $> 10^{12} \Omega$
Input current : $< 10^{-12}$ A
Accuracy : 0.2 % measuring value, ± 2 Digit
pH setup : electrode zero point 4.00..10.00 pH
slope 40.0..70.0 mV/pH
ORP setup : ± 200 mV
Calibration mode : - **1- or 2-point-calibration**

Buffer selection possible:
-Schott
-WTW
-Ingold (Mettler Toledo)
-Puffer acc. to DIN 19266
-or manual buffer input
- **Data** entering for zero point and slope
- **ORP** offset

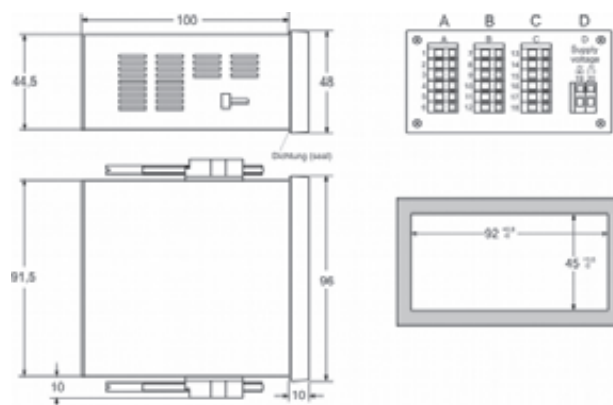
Temperature

Sensor : RTD, Pt100 or Pt1000,
(2- or 3-wire connection)
Unit : programmable °C, °F
Measuring range : -40.0..+160.0 °C (-40.0..+320.0 °F)
Accuracy : $\pm 0.1\%$, ± 1 Digit
Transmitter supply : 24 V DC, R_i approx. 150 Ω ,
max. 50 mA (25 mA with 4 relay outputs)
Display : LED red, 14.2 mm
Parameter display : LED 2-digit red, 7 mm
(Parameter - and output indicator)

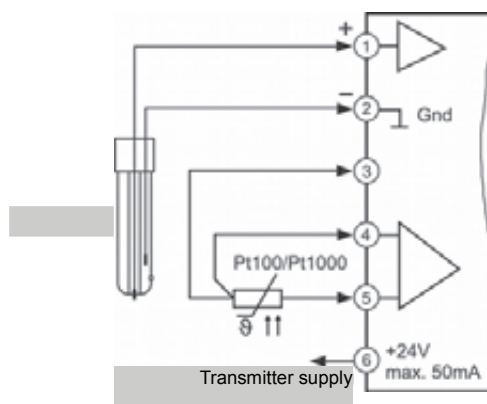
Output

Relay SPDT : < 250 V AC < 250 VA < 2 A,
 < 300 V DC < 50 W < 2 A
Transistor : < 35 V AC/DC, max. 100 mA,
short-circuit-proof
Analog output
active : 0/4..20 mA burden $\leq 500 \Omega$;
0/2..10 V burden $> 500 \Omega$, isolated
automatic output changing
(burden dependent)
Analog output
passive : 4..20 mA, ext. burden =
 $RA[\Omega] \leq (U_B - 5 \text{ V}) \div 0.02 \text{ A}$;
supply voltage 5..30 V DC
Accuracy : 0.1 %
Panel case : DIN 96x48 mm, material PA6-GF; UL94V-0
Dimensions : Front 96x48 mm, mounting depth 100 mm,
Weight : max. 390 g
Connection : clamp terminals, 2.5 mm² single wire,
1.5 mm² flex wire, AWG14
Protection class : Front IP65, terminals IP20,
finger save acc. to BGV A3

Dimensions



Connection diagram input

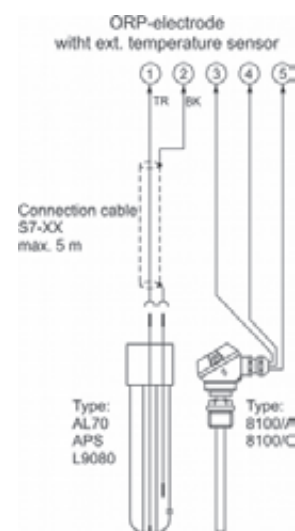
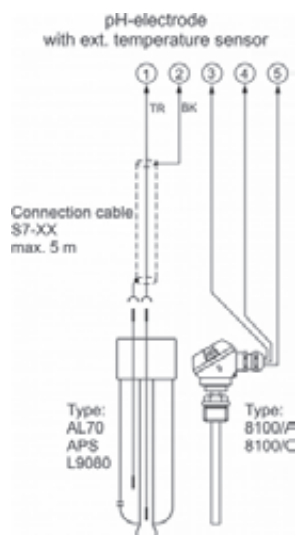
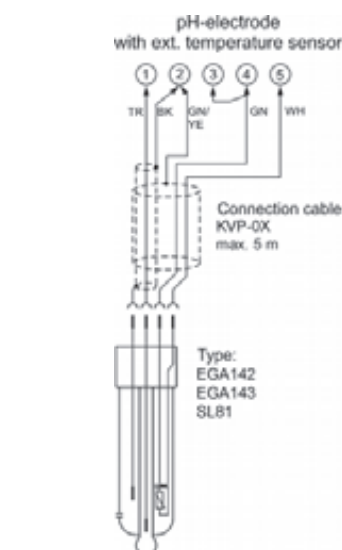
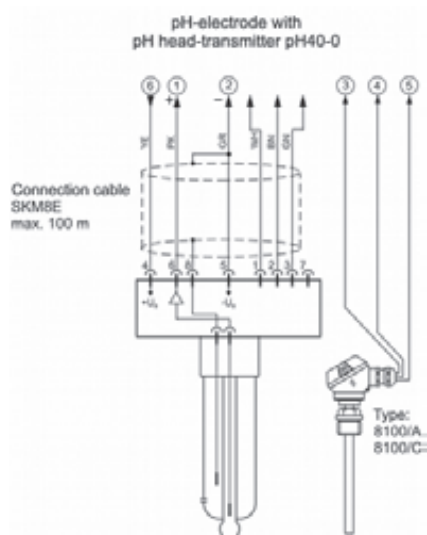


Ordering code

pH9648 - 1. - 2. - 3. - 4. - 5. - 6. - 7.

1. Terminal strip A	
13	input pH / ORP electrode, temperature compensation via Pt100 / Pt1000
2. Terminal strip B	
00	not installed
2R	2 relay outputs
2T	2 electronic outputs
3. Terminal strip C	
00	not installed
2R	2 relay outputs
2T	2 electronic outputs
AO	analog output 0/4..20 mA, 0/2..10 V DC
2A	2 analog outputs 4..20 mA passive
4. Terminal strip B supply voltage	
0	230 V AC $\pm 10\%$ 50-60Hz
1	115 V AC $\pm 10\%$ 50-60Hz
4	24 V AC $\pm 10\%$ 50-60Hz
5	24 V DC $\pm 15\%$
5. Options	
00	without option
6. Unit appears in the unit field	
7. Additional text above the display (3x90 mm HxW)	

Connection examples pH9648



pH and ORP Converter UNICON®-pH



- Field or head mounting
- Measuring range programmable -1..+15 pH / ±1500 mV
- Temperature compensation via P100/Pt1000 sensor
- Analog output 4..20 mA for pH/ORP and temperature
- 2 alarm outputs, transistor

Characteristics

The pH and ORP converter UNICON-pH is suitable for pH and ORP measurement in food technology, chemistry within pharmaceutical and sewage-water technology. The converter works with all common pH- and ORP electrodes.

Technical data

Power supply

Supply voltage : 14..30 V DC, 2-wire
 Operating temperature : 0..55 °C
 CE- conformity : EN 55022, IEC 61000-4-3/4/5

Input pH/ORP

Output signal : 4..20 mA
 Burden : $RA[\Omega] \leq (U_B - 14 \text{ V}) \div 0,02 \text{ A}$
 Measuring range : -1.00..+15.00 pH or -1500..+1500 mV
 R_i : $> 10^{12} \Omega$
 Input current : $< 10^{-12} \text{ A}$
 Accuracy : 0.2 % measuring value, ±2 Digit
 Electrode zero point : 7.00 pH
 Slope : 30..80 mV/pH
 ORP setup : ± 200 mV
 Calibration mode : - **1- or 2-point-calibration**
 buffer selection possible :
 - Schott
 - WTW
 - Ingold (Mettler Toledo)
 - Buffer acc. to DIN 19266
 - or manual buffer input
 - **Data** entering for zero point and slope
 - **ORP** setup

Temperature

Output signal : 4..20 mA
 Burden : $RA[\Omega] \leq (U_B - 14 \text{ V}) \div 0,02 \text{ A}$
 Temperature sensor : Pt100 or Pt1000, (2-wire)
 Unit : programmable °C, °F
 Measuring range : -40.0..+160.0 °C (-40.0..+320.0 °F)
 Accuracy : ± 0.1 %, ±1Digit
 Glass impedance : 0..1 GΩ (temperature compensated)
 Detection range : 0.001..2 GΩ (non compensated)

Accuracy : ± 20 %
 Reference imp. : 0..100 kΩ (non compensated)
 Monitoring of the calibration interval : 1..1000 days
Display : LCD-dot matrix, 3.8 mm characters
 2 lines 16 characters each

Alarm outputs

Transistor : 14..30 V DC<, max.60 mA, with short-circuit-proof

Voltage drop : < 2 V

Range switch

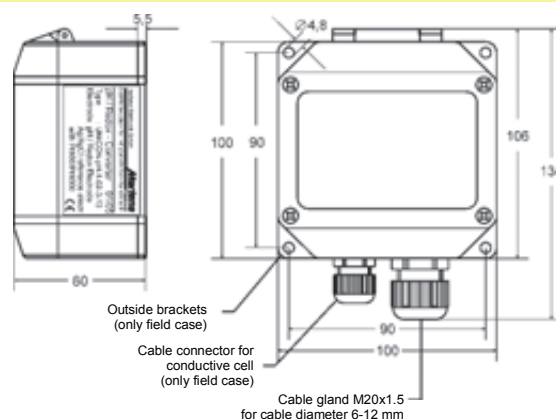
R_i : >10 kΩ
 MB1 active : U = 0..3 V DC
 MB2 active : U = 12..30 V DC

Case

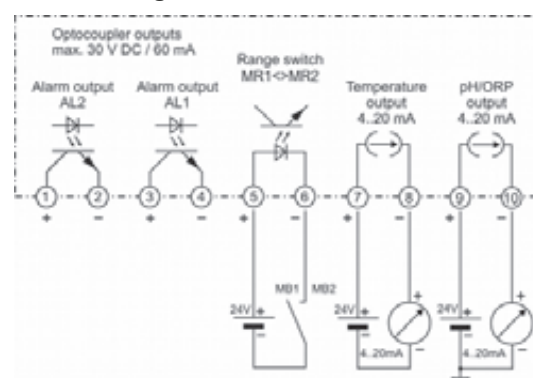
Material : Polyamide fiber glass
 PA6-GF/GK 15/15, front foil polyester
 Dimensions : 100 x 100 x 60 mm (WxHxD)
 Weight : max. 360 g
 Connection : screw terminals pressure plate,
 2.5 mm² flexible, 4 mm² single wire
 connection cable

Protection class : IP65, terminals IP20 acc. to BGV A3

Dimensions



Connection diagram



For supplying the converter use terminals 9 and 10 as shown. If the converter is used form monitoring only, terminals 9 and 10 must be connected directly to the supply voltage.

Continue next page

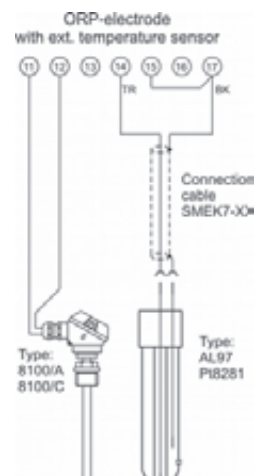
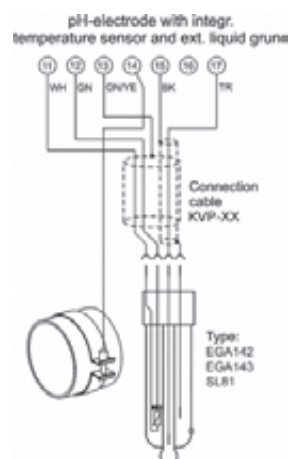
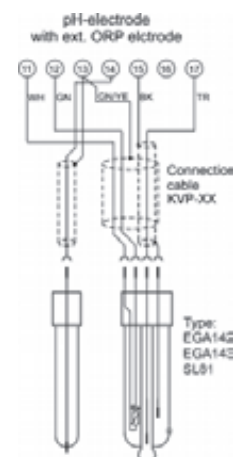
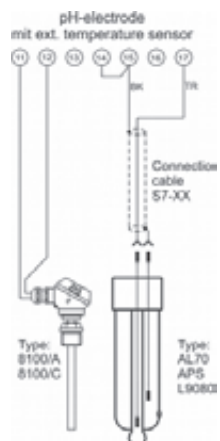
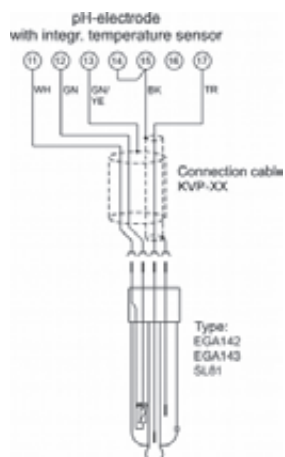
Ordering code

UNICON-pH - 1. - 2. - 3. - 4. - 5.

1. Model	
1	output 4..20 mA for pH/ORP, 2 electronic alarm outputs
2	as 1, but 2 nd measuring range for pH/ORP, output 4..20 mA for temperature, monitoring of the glass impedance, reference electrode and the calibration interval
2. Mounting	
01	head mounting, on the electrode
02	field mounting, separate connection cable see page Fehler: Referenz nicht gefunden
3. Reference system	
3	all systems with electrode zero point pH7.00 e.g. silver/silver chloride
4. Temperature compensation	
13	Pt100/Pt1000 sensor via software selectable
5. Options	
00	without option

Accessories see page Fehler: Referenz nicht gefunden

Connection diagram input UNICON-pH



Tank Display TA1010



- Inputs for standard signals 0/4..20 mA or 0/2..10 V
- 2nd input for pressure transmitter at pressure loaded tanks
- Input automatic level correction
- 6 standard- and custom sized tanks selectable
- Max. 2 alarm outputs, relay SPDT
- Field case with snap lid, cable glands 2 x M16x1.5

Characteristics

The Tank Display TA1010 offers content measurement of tanks with no linear connection between level and content. Measurement will be realized by hydrostatic pressure or distance sensors. The device offers the possibility to connect a level sensor. Reaching a certain level, the displayed value will be corrected automatically to the value according to the position of the installed sensor.

Technical data

Power supply

Supply voltage : 230 V AC $\pm 10\%$; 115 V AC $\pm 10\%$,
24 V AC $\pm 10\%$ or 24 V DC $\pm 15\%$

Power consumption : max. 3.5 VA

Operating temp. : -20...+55 °C

CE-conformity : EN 55022, EN 60555,
IEC 61000-4-3/4/5/11/13

Input

Current : 0/4..20 mA; $R_i = 10\ \Omega$
overload 2-times; 4-times for max. 5 s

Voltage : 0/2..10 V DC; $R_i = 100\ k\Omega$
overload max. 100 V

Accuracy : $< 0.15\% \pm 2$ digit

Transmitter supply : U_0 approx. 24 V;
 R_i approx. 150 Ω ; max. 50 mA

Display

: LED red, 14.2 mm

Indicating range : 999999 Digit, with leading zero suppression

Parameter display : LED 2 digit red, 7 mm
(parameter - and output indicator)

Output

Relay : SPDT $< 250\ V\ AC < 250\ VA < 2\ A$,
 $< 300\ V\ DC < 50\ W < 2\ A$

Analog : 0/4..20 mA burden $\leq 500\ \Omega$; 0/2..10 V
burden $> 500\ \Omega$, **without** isolation,
automatic output changing

- Accuracy : 0.1 %; TK 0.01 %/K

Field case : material PA6-GFGFK 15/15

Dimensions : 100x100x60 mm

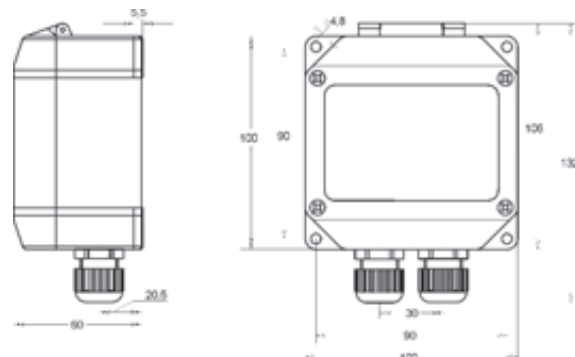
Weight : max. 450 g

Cable gland : 2 x M16x1.5

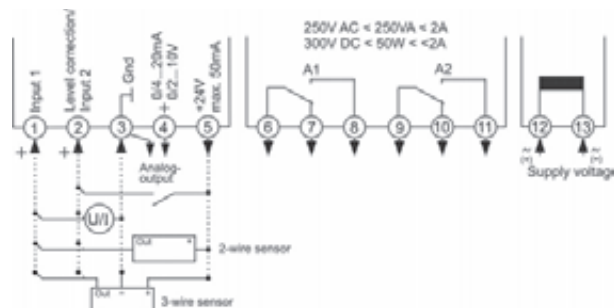
Connection : clamp terminals, 0.08..1.5 mm²,
AWG28..AWG14

Protection class : front IP65, terminals IP20, acc. to BGV A3

Dimensions



Connection diagram



Ordering code

TA1010 - 1. - 2. - 3. - 4. - 5. - 6. - 7.

1. Input		
01	1 x 0/4..20 mA, 1 x input for level correction	
11	2 x 0/4..20 mA	
02	1 x 0/2..10 V, 1 x input for level correction	
22	2 x 0/2..10 V	
2. Alarm output		
00	not installed	
2R	2 relay	
3. Analog output		
00	not installed	
AO	analog output 0/4..20 mA, 0/2..10 V DC	
4. Supply voltage		
0	230 V AC	$\pm 10\%$ 50-60Hz
1	115 V AC	$\pm 10\%$ 50-60Hz
4	24 V AC	$\pm 10\%$ 50-60Hz
5	24 V DC	$\pm 15\%$
5. Options		
00	without option	
09	1xM20x1.5 multi (2x \varnothing 6mm), 1xM20x1.5	
6. Unit (appears in the unit field)		
7. Additional text placed above the display (3x70 mm HxW)		

Temperature-Meter T1010



- Measuring input Pt100 -100.0..+600.0 °C
Pt1000 -50.0..+200.0 °C
- LED-Display 14.2 mm red, indicating range ±9999(0) Digit
- Max. 2 alarm outputs, relay SPDT
- Analog output 0/4..20 mA, 0/2..10 V
- Field case with snap lid, 2 x M16x1.5

Characteristics

The Temperature-Meter T1010 is suitable for measurement of temperatures in connection with RTD sensors Pt100, Pt1000. Devices for other temperature sensors are available on request. The measuring input is isolated. The measuring range can be limited in the configuration level. This is identical with the range of the analog output.

Technical data

Power supply

Supply voltage : 230 V AC ±10 %; 115 V AC ±10 %, 24 V AC ±10 % or 24 V DC ±15 %

Power consumption : max. 3.5 VA

Operating temp. : -20..+55 °C

CE-conformity : EN55022, EN60555, IEC61000-4-3/4/5/11/13

Input

Pt100; Pt1000 : -100..+600 °C ; -50..+200 °C

Accuracy : Pt100 or Pt1000 < 0.1% ±2 Digit, max. 100 Ω line resistance

Display

: LED red, 14.2 mm

Indicating range : ±9999(0) digit, with leading zero suppression

Additional display : LED 2-digit red, 7 mm (Parameter - and output indicator)

Output

Relay : SPDT < 250 V AC < 250 VA < 2 A, < 300 V DC < 50 W < 2 A

Analog : 0/4..20 mA burden ≤ 500 Ω; 0/2..10 V burden > 500 Ω, **no** isolation, automatic output changing (burden dependent)

- Accuracy : 0.1 %; TK 0.01 %/K

Field case : Material PA6-GF/GFK 15/15

Dimensions : 100x100x60 mm

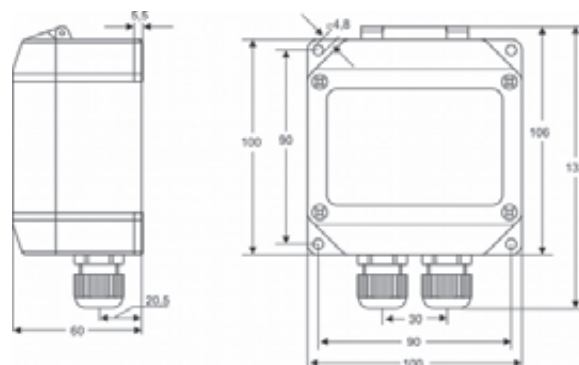
Weight : max. 450 g

Cable gland : 2 x M16x1.5

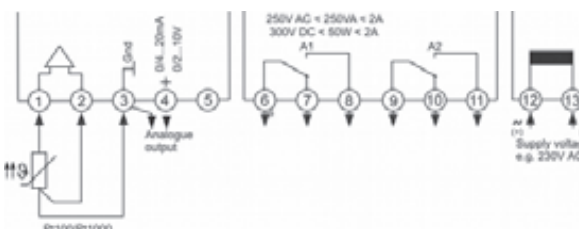
Connection : clamp terminals, 0.08..1.5 mm², AWG28..AWG14

Protection class : front IP65, terminals IP20 acc. to BGV A3

Dimensions



Connection diagram



Ordering code

T1010 - 1. - 2. - 3. - 4. - 5. - 6. - 7.

1. Input			
1	Pt100	-100.0..+600.0 °C	
3	Pt1000	-50.0..+200.0 °C	
2. Alarm output			
00	not installed		
2R	2 relay SPDT		
3. Analog output			
00	not installed		
AO	analog output 0/4..20 mA, 0/2..10 V DC		
4. Supply voltage			
0	230 V AC	±10 %	50-60Hz
1	115 V AC	±10 %	50-60Hz
4	24 V AC	±10 %	50-60Hz
5	24 V DC	±15 %	
5. Options			
00	without option		
01	min-max-value hold		
07	display brightness programmable		
09	1xM20x1.5 multi (2xØ 6 mm), 1xM20x1.5		
6. Unit (appears in the unit field)			
7. Additional text above the display (3x70 mm HxW)			

Universal Counter UZ1010



- Counting, length measurement, metering, positioning
- 2 digital input channels for summation- and subtraction
- Integrated transmitter-supply
- Max. 2 preselect outputs, relay SPDT
- Field case with snap lid, cable glands 2xM16x1.5

Characteristics

The universal counter UZ1010 has been designed for field application in process control and automation. Parameters for operation mode can be programmed. The counter can be used wherever quantity processes should be measured, displayed and monitored.

Technical data

Power supply

Supply voltage : 230 V AC $\pm 10\%$; 115 V AC $\pm 10\%$;
24 V AC $\pm 10\%$ or 24 V DC $\pm 15\%$

Power consumption : max. 3.5 VA

Operating temp. : -20...+55 °C

CE- conformity : EN 55022, EN 60555,
IEC 61000-4-3/4/5/11/13

Input

PNP sensor : Ri = 6.3 k Ω
level: < 4 V low; > 8.5 V high;
hysteresis > 2.5 V; max. 35 V DC

Namur sensor : Ri approx. 1 k Ω (< 4 mA)
level: < 1 mA low; > 2.2 mA high;
hysteresis > 0.5 mA; max. 35 V DC

Counting frequency : input A or B = 15 kHz
A and B together = 6 kHz,
debounced for contact = 30 Hz

Counting loss : 100 μ s at reset;
20 ms changing of preselect value

Min. pulse width : electronic pulse 50 μ s, switch contact 5 ms

External reset : min. pulse width ≥ 10 ms

Transmitter-supply : 8 V DC (Namur), 24 V DC (PNP),
Ri approx. 150 Ω , max. 50 mA

Display

Indicating range : -99999...999999 digit

Additional display : LED 2-digit red, 7 mm
(parameter- and output indicator)

Output

Relay : SPDT < 250 V AC < 250 VA < 2 A,
< 300 V DC < 50 W < 2 A

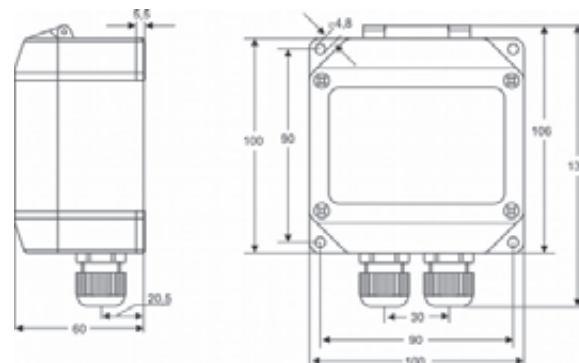
Field case : material PA6-GF 15/15

Dimensions : 100x100x60 mm

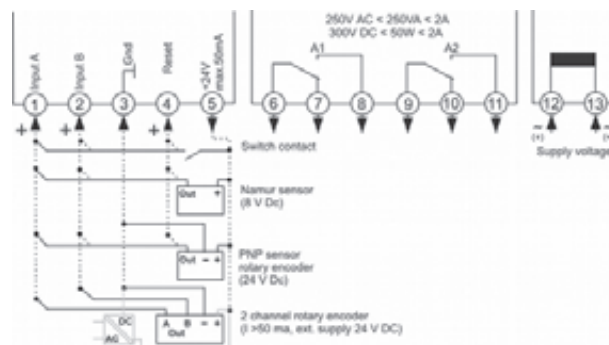
Weight : max. 450 g
Cable glands : 2 x M16x1.5
Connection : clamp terminals, 0.08...1.5 mm²,
AWG28...AWG14

Protection class : front IP65, terminals IP20 acc. to BGV A3

Dimensions



Connection diagram



Ordering code

UZ1010 - 1. - 2. - 3. - 4. - 5. - 6.

1. Input	
1	2 configurable count inputs, wide range of count functions, display conversion, reset input, integrated transmitter supply 24V max. 50 mA
2. Alarm output	
00	not installed
2R	2 relay outputs
3. Supply voltage	
0	230 V AC $\pm 10\%$ 50-60Hz
1	115 V AC $\pm 10\%$ 50-60Hz
4	24 V AC $\pm 10\%$ 50-60Hz
5	24 V DC $\pm 15\%$
4. Options	
00	without options
09	1xM20x1.5 multi (2x \varnothing 6 mm), 1xM20x1.5
5. Unit (appears in the unit field)	
6. Additional text placed above the display (3x70 mm HxW)	

Conductivity Meter LF1010



Characteristics

The Conductivity-Meter LF1010 has been designed for the measurement of conductivity, as a degree of the purity or concentration of a liquid. In connection with 4-electrode-conductivity cells a high accuracy and insensitivity of contamination can be achieved. A further advantage is a broad range of application with only one cell. Only for measurement in ultra-pure water a special 2-electrode conductivity cell must be used.

Technical data

Power supply

Supply voltage : 230 V AC $\pm 10\%$; 115 V AC $\pm 10\%$;
24 V AC $\pm 10\%$ or 24 V DC $\pm 15\%$

Power consumption : max. 3.5 VA

Operating temp. : -20...+55 °C

CE-conformity : EN55022, EN60555,
IEC61000-4-3/4/5/11/13

Inputs

MR conductivity : 0..2.000(0) $\mu\text{S}/\text{cm}$ up to
0..2000 / 200(0) mS/cm (at 25 °C)

-Cell constant : 0.080..9.999

-Accuracy : 0.5 % of the measuring value, ± 2 Digit

-Temperature comp. : non linear for ultra pure water and natural
water or linear programmable from
0.000..9.999 %/K

MR temperature : -50.0..200.0 °C; Sensor Pt100 or Pt1000

-Accuracy : ± 0.2 °C

Display : LED red, 14.2 mm

Indicating range : 2000(0) Digit with leading zero suppression

Parameter display : LED 2-digit red, 7 mm
(Parameter - and output indicator)

Outputs

Relay : SPDT < 250 V AC < 250 VA < 2 A,
< 300 V DC < 50 W < 2 A

Field case : Material PA6-GF15/15, keypad polyester

Dimensions : 100x100x60 mm

Weight : max. 450 g

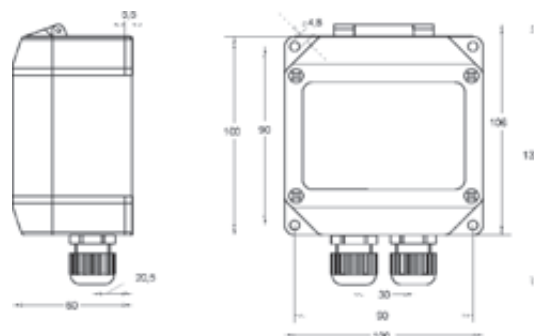
Connection : clamp terminals

Terminals 1-4 : *single wire* 0.75 mm², AWG18 0.5 mm², AWG 20

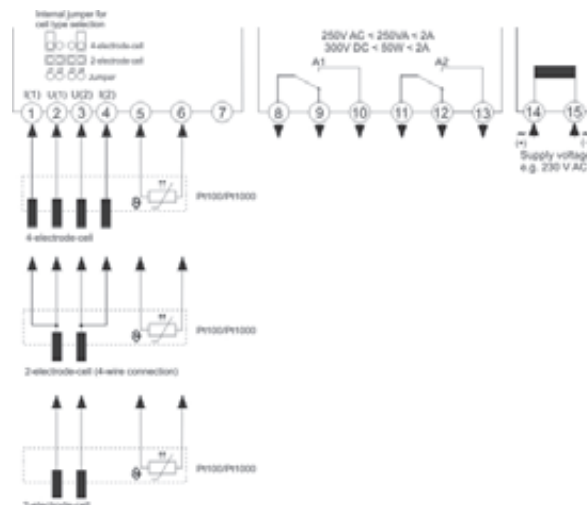
Terminals 5-15 : 2.5 mm², AWG13 1.5 mm², AWG 15

Protection class : IP65, terminals IP20 acc. to BGV A3

Dimensions



Connection diagram



Ordering code

LF1010 - 1. - 2. - 3. - 4. - 5. - 6.

1. Input		
1	input for 2- or 4-electrode-cells, temperature compensation via Pt100	
3	as 1, but temperature compensation via Pt1000	
2. Alarm output		
00	not installed	
2R	2 relay	
3. Supply voltage		
0	230 V AC	±10 % 50-60Hz
1	115 V AC	±10 % 50-60Hz
4	24 V AC	±10 % 50-60Hz
5	24 V DC	±15 %
4. Options		
00	without option	
01	min- and max-peak hold	
09	1xM20x1.5 Multi (2xØ6 mm), 1xM20x1.5	
14	measuring and monitoring of ultra-pure water acc. to USP<645>	
5. Unit appears on the unit field		
6. Additional text above the display (3x70 mm HxW)		

Set Point Adjuster SG9648



- Output 0/4..20 mA, 0/2..10 V DC
- Set point adjustment with front buttons or external signals
- Indicating range and decimal point programmable
- Set point output isolated

Characteristics

The Set point adjuster SG9648 has been designed for generating adjustable set point value signals 0/4..20mA and 0/2..10V DC. Any display value can be assigned to the respective output signal. The operator can work with real values. The adjustment speed is programmable.

Technical data

Power supply

Supply voltage : 230 V AC $\pm 10\%$; 115 V AC $\pm 10\%$;
24 V AC $\pm 10\%$ or 24 V DC $\pm 15\%$

Power consumption : 5 VA

Operating

temperature : -20..+55 °C

CE-conformity : EN 55022, EN 60555,
IEC 61000-4-3/4/5/11/13

Input

Control : 0/24 V DC Ri 6.3 k Ω < 4 V low,
>8.5 V high, hysteresis >2.5 V,
max. 35 VDC

Transmitter supply : 24 V DC (pnp), Ri approx. 150 Ω ,
max.50 mA

Display

: LED red, 14.2 mm

Indicating range : $\pm 9999(0)$ Digit

Additional display : LED 2-digit red, 7 mm
(Parameter - and status indicator)

Output

Relay SPDT : < 250 V AC < 250 VA < 2 A,
< 300 V DC < 50 W < 2 A

Transistor : max. 35V AC/DC, max. 100mA,
short-circuit-proof

Analog output : 0/4..20 mA burden $\leq 500 \Omega$; 0/2..10 V
burden > 500 Ω , isolated
output changes burden dependent

- Accuracy : 0.1 %; TK 0.01 %/K

Case : panel case DIN 96x48 mm,
material PA6-GF; UL94V-0

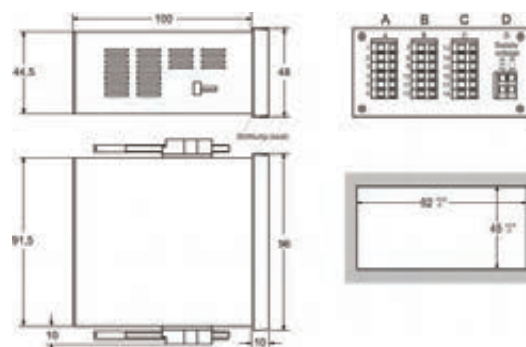
Dimensions : front 96x48 mm, mounting depth 100 mm,

Weight : max. 390 g

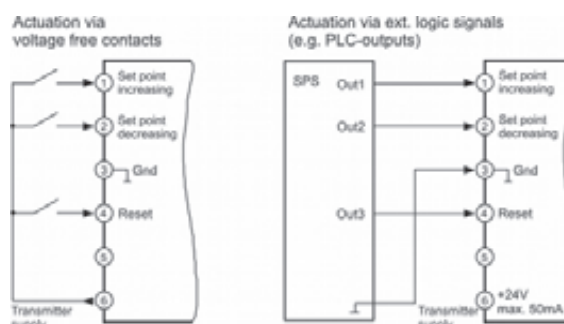
Electrical connection: clamp terminals, 0.08..1.5 mm²
AWG28..AWG14

Protection class : front IP65, terminals IP20, acc. to BGV A3

Dimensions



Connection diagram



Ordering code

SG9648 - 1. - 2. - 3. - 4. - 5. - 6. - 7.

1. Terminal strip A		
0	not installed, set point adjustment via front buttons, adjustment speed dynamically, (Power-on)-reset to the last stored value or programmed reset value	
1	as 0, but additional 2 control inputs for ext. adjustment, ext. reset to a programmed reset value adjustment speed dynamically	
2. Terminals strip B		
00	not installed	
2R	2 relay outputs	
2T	2 transistor outputs	
3. Terminal strip C (standard)		
AO	analog output 0/4..20 mA, 0/2..10 V	
4. Terminal strip D supply voltage		
0	230 V AC	±10 % 50-60Hz
1	115 V AC	±10 % 50-60Hz
4	24 V AC	±10 % 50-60Hz
5	24 V DC	±15 %
5. Options		
00	without option	
6. Unit appears on the front panel		
7. Additional text above the display (3x90 mm HxW)		

Set Point Adjuster SG1010



- Output 0/4..20 mA, 0/2..10 V DC
- Set point adjustment with front buttons or external signals
- Indicating range and decimal point programmable
- Set point output isolated

Characteristics

The Set point adjuster SG1010 has been designed for generating adjustable set point value signals 0/4..20mA and 0/2..10V DC. Any display value can be assigned to the respective output signal. The operator can work with real values. The adjustment speed is programmable.

Technical data

Power supply

Supply voltage : 230 V AC $\pm 10\%$; 115 V AC $\pm 10\%$;
24 V AC $\pm 10\%$ or 24 V DC $\pm 15\%$

Power consumption : 5 VA

Operating

temperature : $-20..+55\text{ }^{\circ}\text{C}$

CE-conformity : EN 55022, EN 60555,
IEC 61000-4-3/4/5/11/13

Input

Control : 0/24 V DC Ri 6.3 k Ω < 4 V low,
> 8.5 V high, hysteresis >2.5 V,
max. 35 VDC

Transmitter supply : 24 V DC (pnp), Ri approx. 150 Ω ,
max. 50 mA

Display

: LED red, 14.2 mm

Indicating range : $\pm 9999(0)$ Digit with leading zero suppression

Additional display : LED 2 digit red, 7 mm
(Parameter - and status indicator)

Output

Relay SPDT : < 250 V AC < 250 VA < 2 A,
< 300 V DC < 50 W < 2 A

Analog output : 0/4..20 mA burden $\leq 500\text{ }\Omega$; 0/2..10 V
burden >500 Ω , **not** isolated
output changes burden dependent

- Accuracy : 0.1 %; TK 0.01 %/K

Field case : material PA6-GF 15/15

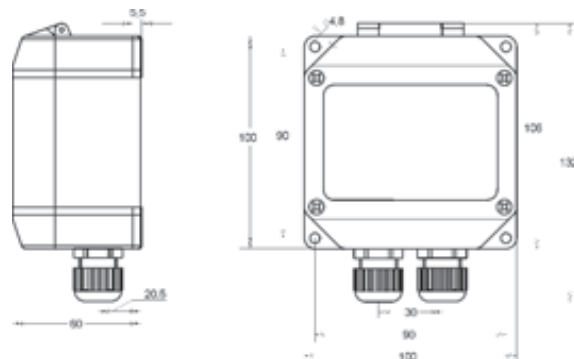
Dimensions : 100x100x60 mm

Weight : max. 350 g

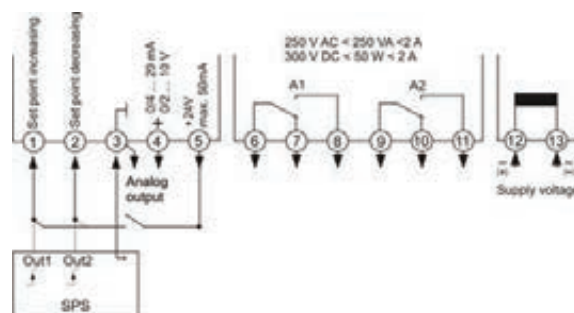
Electrical connection: clamp terminals, 2.5 mm² single wire,
1.5 mm² flexi wire, AWG14

Protection class : IP65, terminals IP20, BGV A3

Dimensions



Connection diagram



Ordering code

SG1010 - 1. - 2. - 3. - 4. - 5. - 6. - 7.

1. Set point adjustment		
0	Set point adjustment via front buttons, adjustment speed dynamically	
1	as 0, but additional control inputs, adjustment speed dynamically or linear programmable	
2. Alarm output		
00	not installed	
2R	2 relay outputs	
3. Analog output (standard)		
AO	analog output 0/4..20 mA, 0/2..10 V	
4. Supply voltage		
0	230 V AC	±10 % 50-60Hz
1	115 V AC	±10 % 50-60Hz
4	24 V AC	±10 % 50-60Hz
5	24 V DC	±15 %
5. Options		
00	without option	
09	1xM20x1.5 multi (2xØ6 mm), 1xM20x1.5	
6. Unit appears on the lid		
7. Additional text above the display (3x70mm HxW)		

E2 Transmitter / Signal conditioning

Transmitter / Signal conditioning

312

Transmitter / Signal Conditioning




PROFIBUS

Characteristics

System	Direct connection of sensors Converting of Industry Standard Signals
Measuring input	<ul style="list-style-type: none"> • Voltage • Current • Power • Frequency • Resistance

Applications

- Industry Instrumentation
- Process Instrumentation
- Mechanical Engineering and
Construction
- -Applications
- Interface Profibus DP

Product information

Transmitter / Signal conditioning

Function

According to the basic standard DIN 1319 a measuring transducer is measuring equipment which transforms an input value corresponding to a fixed relation in an output value. This output value which is given in the form of industrial standard signals, can be further processed in the standard way by display devices or programmable logic controllers (PLC).

Advantages

- Direct connection of sensors
- Galvanic separation of the input signal to the output
- No ground loops
- Signal adaptation to downstream devices
- Compact construction design
- DIN rail mounting TS35 acc. to DIN EN 60715
- Field case

General

Measuring inputs

- 0/4...20 mA
- 0/2...10 V DC
- Voltage AC/DC
- Current AC/DC
- Resistance / Potentiometer

Outputs

- Analogue output active 0/4...20 mA
- Analogue output active 0/2...10 V DC
- Impulse output 0/18 V DC
- Relay output SPDT
- Transistor output PNP

Measuring mode – Connection types

- 2-wire
- 3-wire
- Plug-in terminals
- Screw terminals

Specials

- Without supply
- Field bus Profibus DP
- Custom devices on request
- Integrated display
- Device for rail vehicles (FT500)

Universal Transmitter MU500



Characteristics

Temperature transmitter MU500 accept field signals of Pt100 or Pt1000 RTD sensors to the input which is filtered, isolated and converted into industry standard signals for process control systems. The multipurpose design of inputs and outputs, also the wide range of the supply voltage reduces the number of types. The small case allows space-saving mounting.

Technical data

Power supply

Supply voltage	: 85..265 V AC/110..125 V DC or 10..30 V AC/10..42 V DC
Frequency AC	: 40..400 Hz
Power consumption	: max. 2.2 W, max. 3.3 VA
Operating temperature	: -10..+60 °C
CE-conformity	: EN55022, EN60555-2 IEC61000-4-4/5/11/13

Input

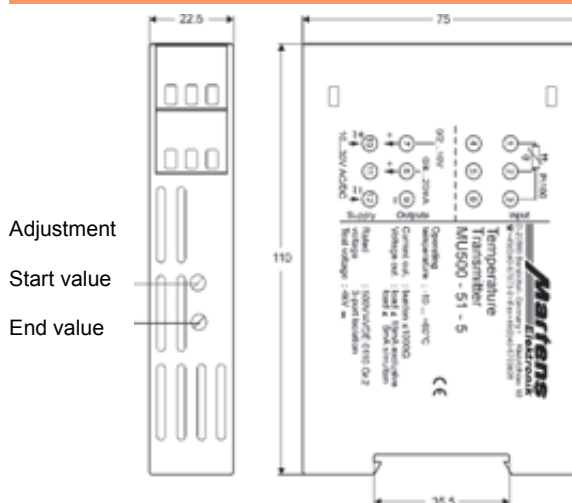
RTD Pt100	: 13 ranges, switch selectable
- Sensor current	: Pt100 approx. 1 mA
RTD Pt1000	: 16 ranges, switch selectable
- Sensor current	: Pt1000 approx. 0.25 mA
Line resistance	: max. 100 Ω
Accuracy	: ≤ 0.2 %
Zero adjust	: Pt100 approx. ± 8 Ω (± 20 °C) Pt1000 approx. ± 8 Ω (± 2 °C)
End value	: adjustable approx. +/-20 %
Sensor error;	
- broken or shorted line:	output rises to max. output value

Outputs

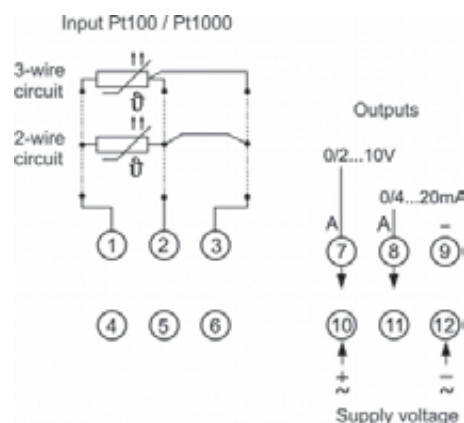
Current	: 0/4..20 mA switch selectable burden ≤ 1 kΩ
Voltage	: 0/2..10 V switch selectable load max. 15 mA, short-circuit-proof (simultaneously to the current output max. 5 mA)

Case	: Polycarbonate, UL94V-0 TS 35 acc. to DIN EN 60715:2001-09
Weight	: approx. 200 g
Protection class	: case IP30, terminals IP20, BGV A3
Electrical connection	: screw terminals with pressure plate, max. 2.5 mm ²

Dimensions



Connection diagram



Ordering code

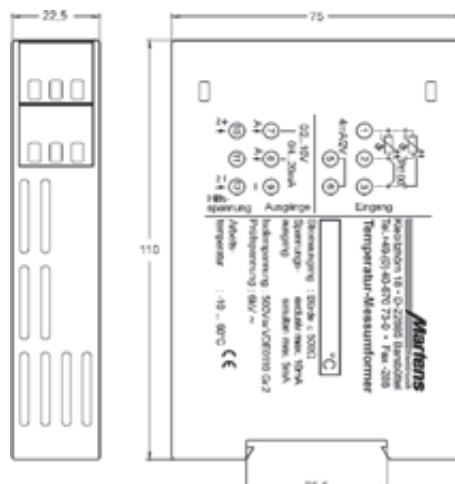
1. 2.
MU500 - -

1. Device type	
51	Pt100, 13 measuring ranges
53	Pt1000, 16 measuring ranges
2. Supply voltage	
0	85..265 V AC
5	10..30 V AC/DC

Temperature Transmitter MU500L



Dimensions



Characteristics

Temperature transmitter MU500L accept field signals of Pt100 or Pt1000 RTD sensors to the input which is filtered, isolated and converted into industry standard signals for process control systems. Special circuit design makes it possible, to produce any useful measurement ranges.

Technical data

Power supply

Supply voltage	: 230 V AC $\pm 10\%$; 24 V DC $\pm 20\%$
Frequency AC	: 47..63 Hz
Power consumption	: <1.5 VA
Operating temperature	: -10..+60 °C
CE- conformity	: EN55022, EN60555 IEC61000-4-3/4/5/11/13

Measuring input *

Start value Pt100	: in the range -100 °C.. +100 °C
Span Pt100	: in the range 50..600 °C
Start value Pt1000	: in the range -50 °C..+50 °C
Span Pt1000	: in the range 10..200 °C
Sensor current	: ca. 0.6 mA (no self heating)
Line resistance	: max. 10 Ω , automatic compensation at 3-wire connection

Start value adjustment	: approx. ± 10 °C
4mA /2V adjustment	: approx. ± 1 mA or ± 0.5 V
Span	: approx. $\pm 10\%$

Broken line	: output shows max. value
short circuit	: output shows min. value

Outputs

Current	: 0/4..20 mA, max. 500 Ω
Voltage	: 0/2..10 V, max. 10 mA, simultaneously to the current output max. 1 mA

Accuracy	: $\leq 0.2\%$
----------	----------------

Temperature error	: $\leq 0.01\%$ /K
-------------------	--------------------

Case	: PC, UL94V-0 acc. to DIN EN 60715:2001-09
------	---

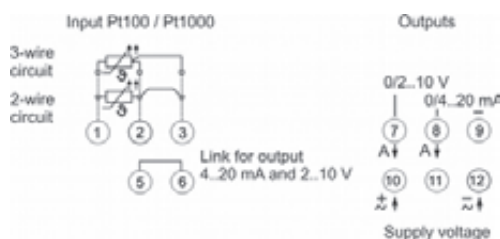
Weight	: approx. 140g
--------	----------------

Connection	: screw terminals with pressure plate, max. 2.5 mm ²
------------	--

Protection class	: case IP30, terminals IP20, BGVA3
------------------	------------------------------------

*Minimal and maximal range for start value and span of the measuring range.

Connection diagram



Ordering code

1. 2. 3.
MU500L - - -

1. Device type	
51	Pt100
53	Pt1000
2. Supply voltage	
0	230 V AC $\pm 10\%$
5	24 V DC $\pm 15\%$
3. Measuring range	
Please state in clear text e. g.: -50..+100 °C	

Universal Transmitter MU500Ex



Characteristics

Temperature transmitters series MU500-Ex offer an intrinsically safe input and convert RTD sensor signals (Pt100 or Pt1000) into industry standard signals. The device includes a full 3-port isolation.

Technical data

Power supply

Supply voltage : 85..253 V AC/110..125 V DC
10..30 V AC/DC

Frequency AC : 40..400 Hz

Power consumption : < 3.3 VA

Operating temperature : -10..+60 °C

CE-conformity : ATEX directive 94/9/EG

EMC directive 2004/108/EG

Standards : EN 60079-0:2013,
EN 60079-11:2012,
EN 61326-1:2004-05

Explosion protection

Approval : TÜV 03 ATEX 2283,
Marking : II (1) G [Ex ia Ga] IIC or
II (1) D [Ex ia Da] IIIC

	U ₀	I ₀	P ₀	C ₀	L ₀
MU500Ex- ... -51	: 1.3 V	<3mA	<3mW	29µF	100mH
MU500Ex- ... -53	: 4.9 V	<3mA	<3mW	2.2µF	100mH
Ci, Li	: 5 nF, ca. 0 mH				

The intrinsically safe circuit is galvanically separated from the non-intrinsically safe circuits up to a peak crest value of the voltage of 375 V.

Measuring input

Sensor current : Pt100 approx 1 mA,
Pt1000 approx. 0.25 mA

Line resistance : max. 100 Ω, automatic compensation
with 3-wire connection

Zero adjust : Pt100 approx. ± 8 Ω, (± 20 °C)
Pt1000 approx. ± 8 Ω (± 2 °C)

End value : approx. +/-20 % adjustable

Sensor error : output rises to max. output
(voltage output >12V DC
current output > 25 mA)

Outputs

Current : 0/4..20 mA DC switch selectable,
burden ≤ 1 kΩ

Voltage : 0/2..10 V DC switch selectable,
load max. 15 mA, short-circuit-proof
(simultaneously with current output
5 mA)

Rated voltage : 253 V AC or 125 V DC (U_m)
acc. to EN 60079-0

Accuracy : ≤ 0.2 %

Case : Polycarbonate UL94V-0
TS 35 acc. to DIN EN 60715:2001-09

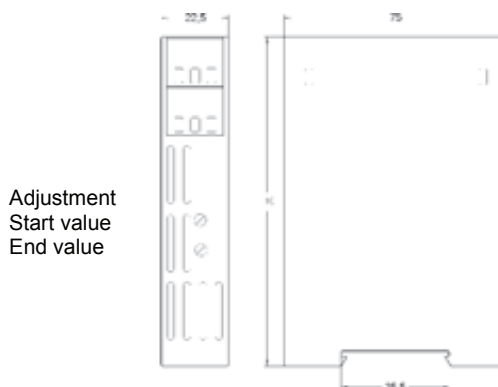
Weight : approx. 200 g

Protection class : case IP30, terminals IP20 (BGV A3)

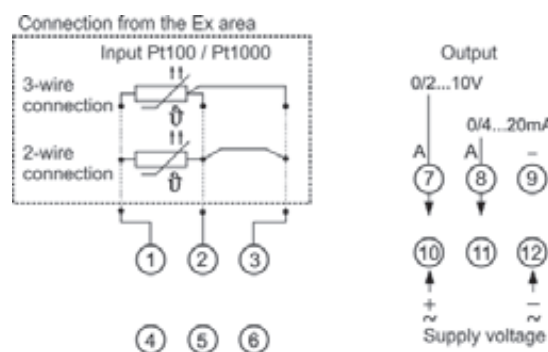
Connection : screw terminals with pressure plate
max. 2.5 mm²

Mounting : installation in dry, clean and well
monitored areas

Dimensions



Connection diagram



Ordering code

MU500Ex - 1. - 2. - 3.

1. Device type	
51	Pt100, 13 measuring ranges
53	Pt1000, 16 measuring ranges
2. Supply voltage	
0	85..253 V AC/110..125 V DC
5	10..30 V AC/DC
3. Options	
00	without option

Temperature Measuring Transducer MU125



- Universal input for Pt100, Pt1000, thermocouple, NTC and resistance measurement value
- Configuration via front DIP switches
- Analog actual value output 4 .. 20mA
- Zero point and limit value can be adjusted via trim potentiometers on the front
- With Pt100 and Pt1000 sensors, monitoring of sensor break and short-circuit
- Wide-range mains adapter or 24 V DC
- Optional supply via carrier rail bus
- Removable coded screw terminals or optional push-in terminals
- Housing width 12.5 mm
- Carrier rail mounting TS35 EN60715

Characteristics

Devices of the MU125 series convert a temperature measurement value or resistance measurement value from various sensors to a current signal of 4..20mA. The universal configurability of the measuring inputs reduces the stock requirement for various applications. The housing width of only 12.5 mm enables space-saving installation in the switch cabinet.

Measurement inputs

Switchable via DIP switch:

	Measuring range	Basic precision	Temperature deviation *)
Pt100	-50.. 50°C	0.4%	0.01%/K
	0.. 50°C	0.6%	0.02%/K
	0..100°C	0.4%	0.02%/K
	0..150°C	0.4%	0.01%/K
	0..200°C	0.3%	0.01%/K
	0..250°C	0.3%	0.01%/K
	0..300°C	0.2%	0.005%/K
	0..500°C	0.2%	0.005%/K
Pt1000	-50.. 50°C	0.4%	0.01%/K
	-30.. 70°C	0.4%	0.01%/K
	-20.. 40°C	0.4%	0.01%/K
	0.. 50°C	0.6%	0.02%/K
	0..100°C	0.4%	0.02%/K
	0..150°C	0.4%	0.01%/K
	0..200°C	0.3%	0.01%/K
	0..250°C	0.3%	0.005%/K
FeCuNi	0..250°C	1.0%	0.04%/K
	0..500°C	0.5%	0.03%/K
NiCrNi	-50..250°C	0.7%	0.05%/K
	0..500°C	0.5%	0.04%/K
	0..750°C	0.4%	0.03%/K
	0..1000°C	0.3%	0.02%/K
	0..1250°C	0.3%	0.02%/K
PtRhPt	0..1500°C	1.0%	0.04%/K
	0..100°C	1.0%	0.01%/K
NTC R ₂₅ =10kΩ B _{25/85} =3977K	-20.. 50°C	1.5%	0.01%/K
	0.. 100°C	1.0%	0.01%/K
NTC R ₂₅ =2kΩ B _{25/85} =3528K	0.. 100°C	1.0%	0.01%/K
	0.. 100°C	1.0%	0.01%/K
Resistance (linear**)	0.. 2kΩ	0.3%	0.005%/K
	0.. 5kΩ	0.5%	0.01%/K
	0..10kΩ	0.3%	0.005%/K

*) Measurement deviation depending on the environmental temperature in the switch cabinet (-10..+60°C)

**) Adjusting zero point and limit value via the integrated trim potentiometers makes it possible to also connect KTY sensors for these measuring ranges. The linearisation must then be accomplished with the help of a parallel resistor.

(Special measurement ranges available on request)

Technical data

Wide-range power supply

Supply voltage : 20..125VDC and
20..250VAC (47..63Hz), max. 1.5W

24V power supply

Supply voltage : 24V DC +/-15%, max. 1.5W

Combined data

Rated voltage : 253V AC
Test voltage : 3kV AC between
supply // input = output

Working temperature : -10..60°C

Storage temperature : -20..80°C

Humidity : 10..90% (no condensation)

Measurement inputs

Pt100 : linearised,
measuring current approx. 1.6mA

Pt1000 : linearised,
measuring current approx. 130µA
In the event of a sensor break or short
circuit, the analog output drops to 0mA.
The operation LED blinks red

Thermocouple : linearised with comparison position
compensation
(optionally without internal
compensation)

NTC : linearised for B_{25/85}=3977K or 3528K

Max. load 200µW (averaged)

Linear resistance : Mb. 0..2kΩ: approx. 1.4mA

Mbs. 0..5kΩ, 0..10kΩ: approx. 300µA

Zero point setting : +/-40% of the factory measuring range
(= end value – start value)
via 12-turn trim potentiometer

End value

reduction : -50% based on the factory end value
via 12-turn trim potentiometer
Note: The measuring accuracy drops
proportionally with the narrowing of the
measuring range

Potentiometer setting

limits : Limitation of the aforementioned
adjustment ranges

Pt100 -50..500°C (..600°C)

Pt1000 -50..250°C (..300°C)

FeCuNi -100..500°C (..800°C)

NiCrNi -150..1250°C

PtRhPt 0..1500°C (..1600°C)

NTC (10kΩ) -20..100°C (..150°C)

NTC (2kΩ) -40..100°C (-50°C..150°C)

R linear 0..10kΩ

(values in parentheses apply for optional,
customer-specific special measuring
ranges that are configured at the factory)

Analog output : 4..20mA, max. burden 400Ω,
no galvanic isolation
from the input signal
(max. burden error of 0.2% at 400Ωm)

Dimensions (WxDxH) : 12.5 x 114 x 108mm

Material : PA6.6, light grey,
Flammability class V0 (UL94)

Weight : 120g

Protection rating : IP20

Screw terminals : 0.2..2.5 mm², AWG 24..14,
removable, coded

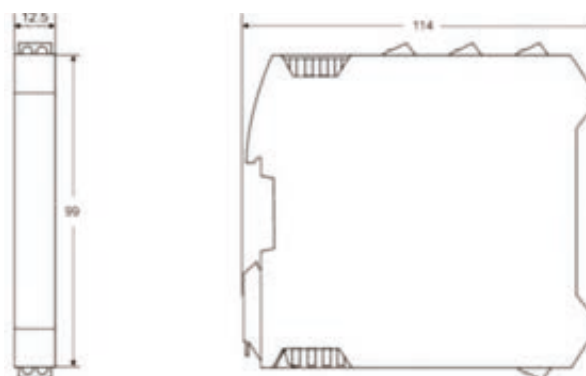
Push-in terminals : 0.5..1.5 mm², AWG 25..16,
(spring-type terminals)
Double connection (12A between
the connections), removable, coded

Power Rail : 8A over the entire bus system
(power supply via removable terminals
0.2..2.5 mm², AWG 24..14)

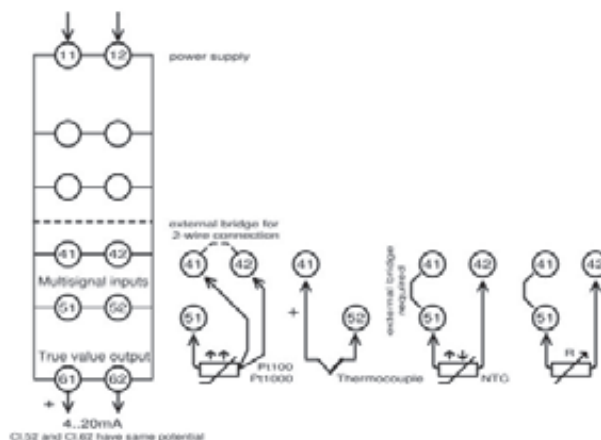
A service mode for the trim potentiometers on the front offers the following possibilities:

- 1) A check of whether potentiometers are positioned at the calibrated factory settings
- 2) The pre-adjustment of a new output characteristic curve only with connection of a current measuring device.
(a temperature calibrator is not necessary)
- 3) Specification of a constant value at the current output, e.g. in order to test the reaction of connected devices.
(Limited range from 5.6..20mA)

Dimensions



Connection diagram



Ordering code

1. 2.
MU -

1.	Device version
125L	Supply voltage 24V DC +/- 15%
125LP	Supply voltage: 24V DC +/-15% with carrier rail bus connection *)
125M	Wide-range mains adapter 20..125VDC / 20..253V AC
4.	Options
00	No options
01	Push-in terminals (plug-in)

*) see separate Power-Rail information sheet

Temperature Transmitter MU500L



Characteristics

Temperature transmitter MU500L accept field signals of Pt100 or Pt1000 RTD sensors to the input which is filtered, isolated and converted into industry standard signals for process control systems. Special circuit design makes it possible, to produce any useful measurement ranges.

Technical data

Power supply

Supply voltage	: 230 V AC $\pm 10\%$; 24 V DC $\pm 20\%$
Frequency AC	: 47..63 Hz
Power consumption	: <1.5 VA
Operating temperature	: -10..+60 °C
CE- conformity	: EN55022, EN60555 IEC61000-4-3/4/5/11/13

Measuring input *

Start value Pt100	: in the range -100 °C.. +100 °C
Span Pt100	: in the range 50..600 °C
Start value Pt1000	: in the range -50 °C..+50 °C
Span Pt1000	: in the range 10..200 °C
Sensor current	: ca. 0.6 mA (no self heating)
Line resistance	: max. 10 Ω , automatic compensation at 3-wire connection

Start value adjustment	: approx. ± 10 °C
4mA /2V adjustment	: approx. ± 1 mA or ± 0.5 V
Span	: approx. $\pm 10\%$
Broken line	: output shows max. value
short circuit	: output shows min. value

Outputs

Current	: 0/4..20 mA, max. 500 Ω
Voltage	: 0/2..10 V, max. 10 mA, simultaneously to the current output max. 1 mA

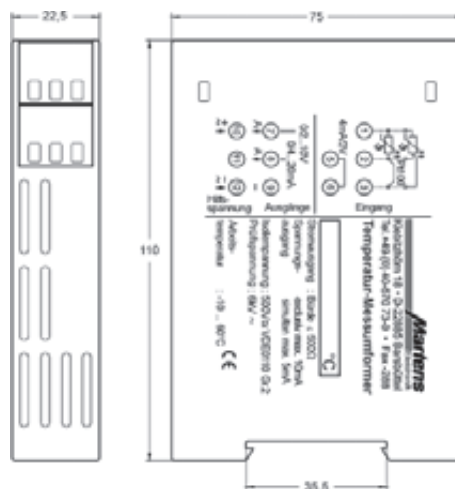
Accuracy	: $\leq 0.2\%$
Temperature error	: $\leq 0.01\%/K$
Case	: PC, UL94V-0 acc. to DIN EN 60715:2001-09

Weight	: approx. 140g
Connection	: screw terminals with pressure plate, max. 2.5 mm ²

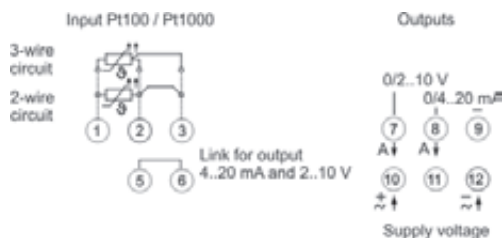
Protection class	: case IP30, terminals IP20, BGVA3
------------------	------------------------------------

*Minimal and maximal range for start value and span of the measuring range.

Dimensions



Connection diagram



Ordering code

1. 2. 3.
MU500L - - -

1.	Device type	
	51	Pt100
	53	Pt1000
2.	Supply voltage	
	0	230 V AC $\pm 10\%$
	5	24 V DC $\pm 15\%$
3.	Measuring range	
	Please state in clear text e. g.: -50..+100 °C	

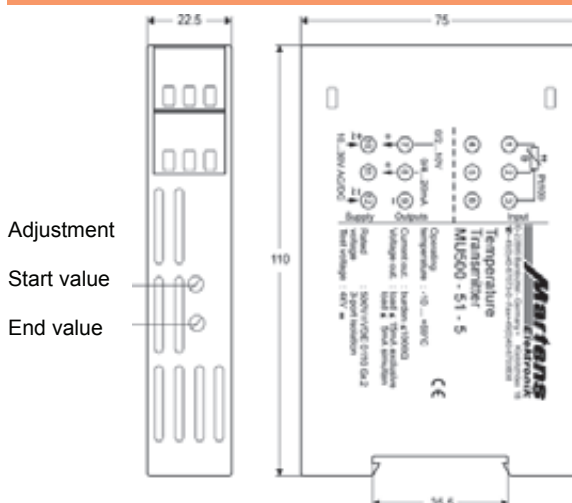
Product information

Universal Transmitter MU500



Transmitter / Signal conditioning

Dimensions



Adjustment

Start value

End value

Characteristics

Temperature transmitter MU500 accept field signals of Pt100 or Pt1000 RTD sensors to the input which is filtered, isolated and converted into industry standard signals for process control systems. The multipurpose design of inputs and outputs, also the wide range of the supply voltage reduces the number of types. The small case allows space-saving mounting.

Technical data

Power supply

Supply voltage : 85..265 V AC/110..125 V DC or
10..30 V AC/10..42 V DC
Frequency AC : 40..400 Hz
Power consumption : max. 2.2 W , max. 3.3 VA
Operating temperature : -10..+60 °C
CE-conformity : EN55022, EN60555-2
IEC61000-4-4/5/11/13

Input

RTD Pt100 : 13 ranges, switch selectable
- Sensor current : Pt100 approx. 1 mA
RTD Pt1000 : 16 ranges, switch selectable
- Sensor current : Pt1000 approx. 0.25 mA
Line resistance : max. 100 Ω
Accuracy : ≤ 0.2 %
Zero adjust : Pt100 approx. ± 8 Ω (± 20 °C)
Pt1000 approx. ± 8 Ω (± 2 °C)
End value : adjustable approx. +/-20 %

Sensor error;

- broken or shorted line: output rises to max. output value

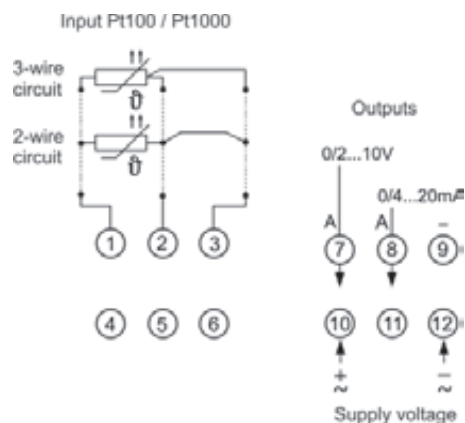
Outputs

Current : 0/4..20 mA switch selectable
burden ≤ 1 kΩ
Voltage : 0/2..10 V switch selectable
load max. 15 mA , short-circuit-proof
(simultaneously to the current output
max. 5 mA)

Case

: Polycarbonate, UL94V-0
TS 35 acc. to DIN EN 60715:2001-09
Weight : approx. 200 g
Protection class : case IP30, terminals IP20, BGV A3
Electrical connection : screw terminals with pressure plate,
max. 2.5 mm²

Connection diagram



Ordering code

1. 2.
MU500 - -

1.	Device type
51	Pt100, 13 measuring ranges
53	Pt1000, 16 measuring ranges
2.	Supply voltage
0	85..265 V AC
5	10..30 V AC/DC

Temperature Transmitter PMT50-2 /-3



PROFIBUS

- Signal conditioning – linearisation – output characteristic transformation
- Input for resistance and Potentiometer or RTD Pt100/Pt1000 and thermocouples
- Measuring range programmable
- Linearisation or transformation of output characteristic via 32 base-points programmable
- Automatic fault detection in the measuring circuit

Characteristics

The programmable universal transmitter PMT50 operates with analog input signals. The device convert input signals to analog output 0/4...20 mA; 0/2...10 V DC. Optional a serial interface is available. The device offers a linearisation function for any sensor curves and a simulator function. The integrated transmitter supply 24 V DC max. 30 mA allows the feeding of 2-and 3-wire sensors. 4 alarm outputs for monitoring and controlling are available.

Technical data

Power supply

Supply voltage : 230 V AC $\pm 10\%$
115 V AC $\pm 10\%$
24 V DC $\pm 15\%$

Power consumption : < 5 VA

Operating temperature : -10...+55 °C

CE – conformity : IEC61326 05/2004, IEC 61000-4-2,
IEC 61000-4-3, IEC 61000-4-4,
IEC 61000-4-5, IEC 61000-4-6,
IEC 61000-4-8, IEC 61000-4-11,
CISPR16-1/16-2

Inputs

Fault detection : type -2: (only resistance measurement)
broken line;
type -3: broken line (Pt100 / Pt1000,TC)
and short circuit (only Pt100 / Pt1000)

Device type 2

Input : resistance 0...100 k Ω ,
potentiometer min.1 k Ω .. max. 100 k Ω
Accuracy : < 0.2 %, ± 1 Digit

Device type 3

Input : Pt100 (3-wire) -100.0...+600.0 °C
Pt1000 (3-wire) -100.0...+300.0 °C
: Thermocouple (TC)
type J -100.0...+800.0 °C
type K -150...+1200 °C
type N -150...+1200 °C
type S -50...+1600 °C

Accuracy

: < 0.1 %, ± 1 Digit

Outputs

Alarm outputs

: relay SPDT
< 250 V AC < 250 VA < 2 A
cos $\Phi \geq 0.3$
< 300 V DC < 40 W < 2 A

Analog output

: 0/4...20 mA burden $\leq 500 \Omega$,
0/2...10 V burden > 500 Ω isolated
output changes automatically
(burden depending)

Fault indication

: for broken line or short circuit detection
→ analog output (programmable)
0 mA, < 3.6 mA or > 21.5 mA
→ Alarm relays
min. or max. programmable

Bus system

Modbus

: RS485, RTU or ASCII
max. 38400 Baud

Profibus

: Profibus DP

Connection

: 9 pole D-SUB plug in the front

Display

: Graphic-LCD-Display
128 x 64 Pixel,
with white LCD backlight

Case

: Polyamide (PA) 6.6 , UL94V-0
TS35 acc. to DIN EN 60715:2001-09

Weight

: approx. 450 g

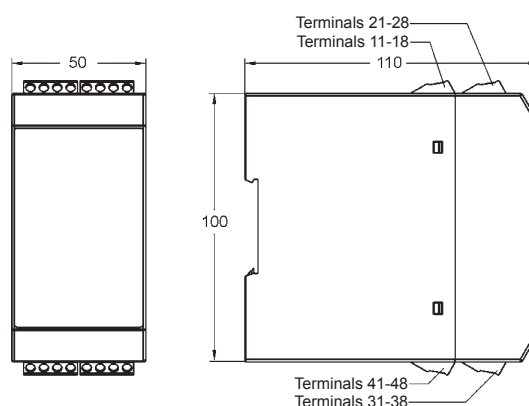
Connection

: screw terminals 0.14...2.5 mm²
AWG 26...AWG14

Protection class

: case IP30, terminals IP20 acc. to
BGV A3

Dimensions



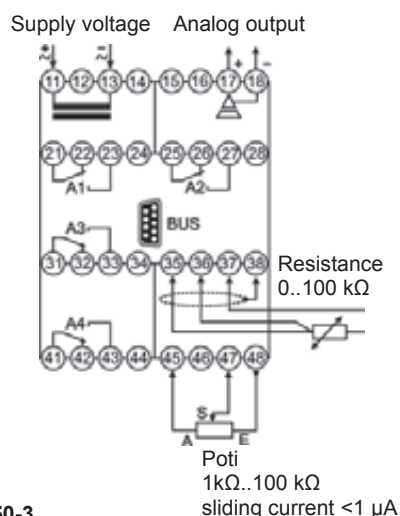
continue next page

Product information

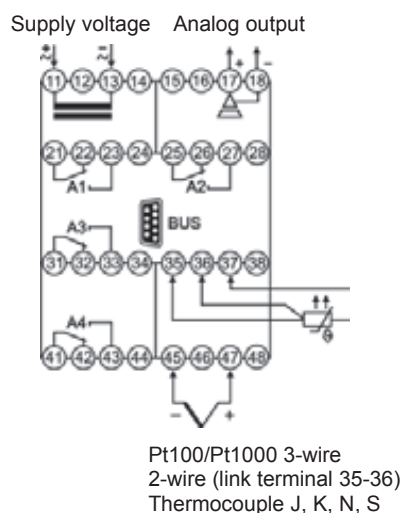
Transmitter / Signal conditioning

Connection diagrams

Device type PMT50-2
Resistance, Potentiometer



Device type PMT50-3
Pt100, Pt1000, thermocouple



Ordering code

1. 2. 3. 4. 5. 6.
PMT50 - - - - - -

1. Device type/input

2	Resistance in the range 0..100 kΩ Poti 1 kΩ..100 kΩ
3	RTD Pt100, 3-wire, -100.0..+600.0 °C RTD Pt1000, 3-wire, -100.0..+300.0 °C Thermocouple J (Fe-CuNi), -100.0..+800.0 °C K (NiCr-Ni), -150..+1200 °C N (NiCrSi-NiSi), -150..+1200 °C S (Pt10Rh-Pt), -50..+1600 °C

2. Analog output

AO	0/4..20 mA, 0/2..10 V DC isolated
----	--------------------------------------

3. Alarm outputs

00	not installed
2R	2 relay outputs, A1, A2 SPDT

4. Alarm output/BUS configuration

00	not installed
2R	2 relay outputs, A3, A4 SPDT
MB	Modbus RTU/ASCII, RS485
PB	Profibus DP

5. Supply voltage

0	230 V AC, ± 10 % 50-60 Hz
1	115 V AC, ± 10 % 50-60 Hz
5	24 V DC, ± 15 %

6. Options

00	without option
----	----------------

Bus connection

Modbus		
PIN	Signal	EIA/TIA-485 Name
5	D1	B / B'
9	D0	A / A'
1	Common	C / C'
Profibus		
3	RxD / TxD-P	
5	DGND	
6	VP / +5V max. 10 mA	
8	RxD / TxD-N	

9-pol. D-Sub plug
in the front

Temperature Transmitter PMT50Ex-2 /-3


PROFIBUS

- Signal conditioning – linearisation – output characteristic transformation
- Input for resistance and Potentiometer or RTD Pt100/Pt1000 and thermocouples
- Measuring range programmable
- Linearisation or transformation of output characteristic via 32 base-points programmable
- Automatic input fault detection

Characteristics

The programmable Temperature Transmitter PMT50 operates with RTD and thermocouple input signals. The device convert the signal to analog output 0/4...20 mA; 0/2...10 V DC. Optional a serial interface is available. The device offers a linearisation function for any sensor curves and a simulator function. The integrated transmitter supply 24 V DC max. 30 mA allows the feeding of 2-and 3-wire sensors. 4 alarm outputs for monitoring and controlling are available.

Technical data

Power supply

Supply voltage : 230 V AC $\pm 10\%$
 115 V AC $\pm 10\%$
 24 V DC $\pm 15\%$
 $U_m = 253$ V AC or 125 V DC
 (terminals 11 and 13)

Power consumption : < 5 VA

Operating temperature : -10...+55 °C

CE-conformity : ATEX-directive 94/9/EG
 (certificate PMT50ATEX.001)
 EN 60079-0:2006 EN60079-11:2007
 EN 61241-0:2006 EN61241-11:2006
 IEC61326 05/2004, IEC 61000-4-2,
 IEC 61000-4-3, IEC 61000-4-4,
 IEC 61000-4-5, IEC 61000-4-6,
 IEC 61000-4-8, IEC 61000-4-11,
 CISPR16-1/16-2

Explosion protection

Marking : II (1) G [Ex ia] IIC/IIB bzw. II (1) D
 [Ex iaD]

Approval : TÜV 08 ATEX 554329

Device type 2

Input : resistance 0...20 k Ω
 (terminals 35, 36, 37, 38)

Fault detection : broken line

Accuracy : < 0.2 %, ± 1 Digit

Max. U_0 no load	: 1.4 V
Max. I_0 short circuit	: 2,5 mA
Max. output power P_0	: 3 mW
Resistance	: 5600 Ω
Characteristic curve	: trapezoidal
Internal inductivity	: 4 μ H
Internal capacity	: 135 nF
Explosion protection	Ex ia/IIC ia/IIB
Max. external inductivity	: 100 mH 100 mH
Max. external capacity	: 25 μ F 120 μ F
Input	: Potentiometer min. 1 k Ω ..max. 100 k Ω (terminals 45, 47, 48)
Accuracy	: <0.2 %, ± 1 Digit
Max. values U_0	: 9.6 V
Max. I_0	: 56 mA
Max. P_0	: 200 mW
Resistance R	: 259 Ω
Characteristic curve	: trapezoidal
Internal inductivity	: 4 μ H
Internal capacity	: negligible
Explosion protection	Ex ia/IIC ia/IIB
Max. external inductivity	: 5 mH 20 mH
Max. external capacity	: 0.48 μ F 2 μ F

Device type 3

Input : Pt100 (3-wire) -100.0...+600.0 °C
 Pt1000 (3-wire) -100.0...+300.0 °C
 thermocouple (TC)
 type J -100.0...+800.0 °C
 type K -150...+1200 °C
 type N -150...+1200 °C
 type S -50...+1600 °C
 (terminals 35, 36, 37; 45, 47)

Fault detection : broken line (Pt100 / Pt1000,TC) or
 short circuit (only Pt100 / Pt1000)

Accuracy : < 0.1 %, ± 1 Digit

Max. voltage no load U_0 : 1.4 V

Max. short circuit curr. I_0 : 2.5 mA

Max. output power P_0 : 3 mW

Resistance R : 5600 Ω

Characteristic curve : trapezoidal

Internal inductivity : 4 μ H

Internal capacity : 135 nF

Explosion protection **Ex ia/IIC** **ia/IIB**

Max. external inductivity : 100 mH 100 mH

Max. external capacity : 25 μ F 120 μ F

Outputs

Alarm outputs : relay SPDT
 < 250 V AC < 250 VA < 2 A
 $\cos \Phi \geq 0.3$

< 300 V DC < 40 W < 2 A
 (terminals 21, 22, 23; 25, 26, 27)

Analog output : 0/4...20 mA burden $\leq 500 \Omega$
 0/2...10 V burden > 500 Ω , isolated
 output changes automatically
 (burden depending)

- Accuracy : 0.2 %; TK 0.01 % / K
 (terminals 17, 18)

Fault function : for broken line or short circuit detection
 → analog output (programmable)
 0 mA, < 3.6 mA or > 21.5 mA
 → alarm relays
 min. or max. programmable

Bus system

Modbus : RS485, RTU or ASCII
 max. 38400 Baud

Profibus : Profibus DP

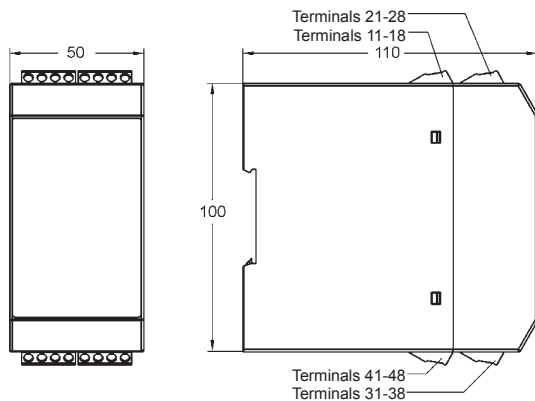
Connection : 9 pole D-SUB plug in the front

Display : graphic-LCD-display, 128 x 64 Pixel
 with white LCD backlight

Product information

Case : Polyamide (PA) 6.6, UL94V-0
 TS35 acc. to DIN EN 60715:2001-09
Weight : approx. 450 g
Connection : screw terminals 0.14..2.5 mm²
 AWG 26..AWG14
Protection class : case IP30, terminals IP20 acc. to
 BGV A3

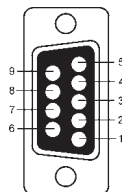
Dimensions



Bus connection

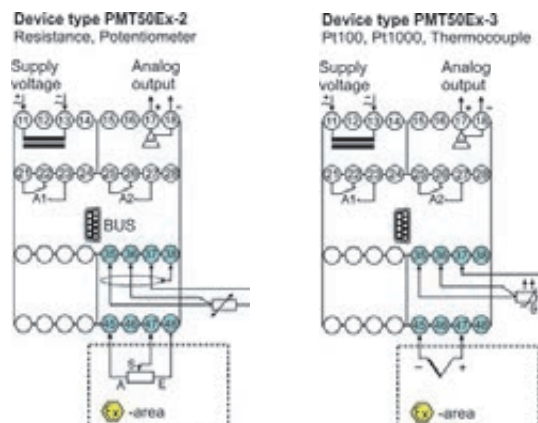
Modbus		
PIN	Signal	EIA / TIA-485 Name
5	D1	B / B'
9	D0	A / A'
1	Common	C / C'
Profibus		
3	RxD / TxD-P	
5	DGND	
6	VP / +5V max. 10 mA	
8	RxD / TxD-N	

9 pol. D-Sub plug
in the front



Transmitter / Signal conditioning

Connection diagram



Ordering code

1. 2. 3. 4. 5. 6.
 PMT50Ex - - - - - -

1. Device type/input

2 Resistance in the range 0..20 kΩ
 Poti 1 kΩ..100 kΩ
 3 RTD Pt100, 3-wire, -100.0..+600.0 °C
 RTD Pt1000, 3-wire, -100.0..+300.0 °C
 Thermocouple
 J (Fe-CuNi), -100.0..+800.0 °C
 K (NiCr-Ni), -150..+1200 °C
 N (NiCrSi-NiSi), -150..+1200 °C
 S (Pt10Rh-Pt), -50..+1600 °C

Inputs intrinsically safe EX II (1) G [Ex ia] IIC/IIB
 EX II (1) D [Ex iaD]

2. Analog output

AO 0/4..20 mA, 0/2..10 V DC
 isolated

3. Alarm outputs

00 not installed
 2R 2 relay outputs, A1, A2 SPDT

4. BUS configuration

00 not installed
 MB Modbus RTU/ASCII, RS485
 PB Profibus DP

5. Supply voltage

0 230 V AC, ± 10 % 50-60 Hz
 1 115 V AC, ± 10 % 50-60 Hz
 5 24 V DC, ± 15 %

6. Options

00 without option

E3 Isolating converters

Devices for rail mounting / Isolating converters

328


Isolating Converter



Characteristics

System	3-port isolation Signal conditioning $0..20\text{ mA} \Rightarrow 4..20\text{ mA}$ $0..10\text{ V} \Rightarrow 2..10\text{ V}$ Decoupling Transmitter supply into the Ex-area Safety barriers for RTD (Pt100/Pt1000) and $0/4..20\text{ mA}$
---------------	---

Applications

- Industry Instrumentation
- Process Instrumentation
- Oil- and Gas industry
- -Applications

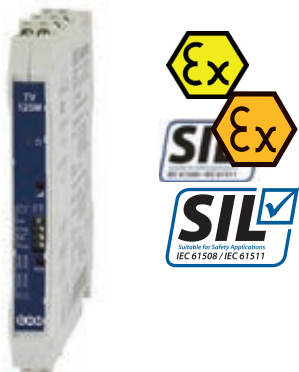
Function

Isolating amplifiers are suitable for potential separation or to convert standard signals. The universal design of the inputs and outputs and the wide back-up voltage ranges limit the variety of models to two designs. Furthermore, the transmitter allows for the direct connection of 2 active wire sensors (4..20 mA) and 3 wire sensors. They also guaranteed for a high degree of safety for signals from the Ex-range. Safety barriers are available as accessories to setup Ex measuring circuits for devices without Ex certification.

Advantages

- Safe 3-port signal isolation
- Transmitter supply for active sensors
- Universal inputs
- Range switchover
- Signal output in the ex range (only TV501Ex)
- Outputs 0/4..20 mA simultaneous 0/2..10 V DC
- 22.5mm standard case for DIN rail mounting TS35

Universal Isolating Amplifier TV125M / ST125M



- Standard inputs and outputs with adjustment function
- Safe electrical isolation between input / output / power supply by reinforced insulation in accordance to DIN EN 61010-1
- Functional safety to EN61508 SIL2
- Input intrinsically safe for the connection of sensors in the Ex-zone 0 and 20 possible
- Equipment installation in ex-zone 2
- Wide range power supply for AC and DC supply
- Power rail supply
- Output accuracy < 0.2% of full scale
- Operating display and status messages bi-color LED
- Configuration via front panel dip switches
- Coded Plug-in terminal blocks
- Small design, width 12.5 mm
- Mounting rail TS 35 and EN60715

Characteristics

Isolation amplifiers of series TV/ST125M are suitable for potential separation or to convert the standard signals. The universal design of inputs and outputs, and the internal power supply with wide-range power supply enable a wide spectrum of applications with only one type of device.

Alternatively the power supply can be carried out via a mounting rail bus connector. The pluggable terminal strips allow a simple and time-saving wiring.

The configuration of input and output signals is done by front panel dip switches in a very easy and fast way.

Because of the microprocessor design it's possible to interpret undershooting or exceedance of the measurement range and reported about by a bi-color status LED on the front panel. In case of an error the output is then set to a defined initial value or ending value.

The initial value and the end value of the measuring range can be adjusted by means of two front-mounted trimmers. The device version of ST125 additionally provides a transmitter power supply for external 2 and 3 sensors.

Technical data

Explosion protection

- Gas : II (1) G [Ex ia Ga] IIC/IIB
 Dust : II (1) D [Ex ia Da] IIIC
 Intrinsically safe + Zone 2: II 3 G nA nC [ic] IIB T4 Gc *)
 Ignition protection type „n“: II 3 G nA nC IIB T4 Gc X *)

*) Installation in a clean environment in a conductive, earthed housing (switch cabinet) with a minimum protection rating of IP54.

Characteristics intrinsically safe circuits

	All types (Terminals 41, 42)	ST125M(MP)-Ex (Terminals 51, 52)
U ₀	27,6 V	25,9 V
I ₀	1,3 mA	92,6 mA
P ₀	9,6 mW	598 mW
U _i	26 V	-
I _i	113 mA	-
P _i	660 mW	-
	max. inductivity capacity	
C _i	1 nF	1 nF
L _i	240 nH	240 nH
	IIB / IIIC	
C ₀	667 nF	769 nF
L ₀	200 mH	8 mH
	IIC	
C ₀	85 nF	99 nF
L ₀	100 mH	2 mH

External Power

Auxiliary voltage

Wide-range power supply : 20..125 V DC / 85..253 V AC (47..63Hz)

Power-Rail-supply : 24 V DC +/- 15 %

Power consumption

wide-range power supply

Wide-range power supply : < 4 VA
 Power-Rail-supply : < 2 W
 Conformity : Directive 2014/35/EU
 EMC : Directive 2014/30/EU
 Standards : EN 61010-1: 2010,
 EN 61326-1: 2013,
 EN 61326-3-1: 2008,

Rated voltage : 253 V AC, 125 V DC according to EN 60079-11
 300 V AC/DC according to DIN EN 61010-1
 with overvoltage Category 2 and Degree of Contamination 2
 between all circuits. Safe separation with amplified isolation
 : 3kV AC Input/Output/Power supply

Test voltage

Ambient conditions

Working temperature : -10..60°C
 Storage temperature : -20..80°C
 Relative air humidity : 10..90% (no condensation)

Input

Voltage input : 0..10V oder 2..10 V switchable, R_i = 30 kΩ, overload max. 26 V AC/DC
 Current input : 0..20 mA or 4..20 mA switchable; R_i = 51 Ω, 113mA
 Measuring span : adjustable ± 2 %
 Zero point : adjustable ± 2 %

Product information

Isolating converters

Output

Voltage output	: 0...10 V or 2...10 V switchable, Load > 500 Ω
Current output	: 0...20 mA or 4...20 mA switchable, Load < 600 Ω
Step response T90	: 40 ms
Standard error	: < 0,2 % of the end value
Temperature coefficient	: < 0,01 % / K

Transmitter feed

Rated voltage at 20 mA output current	: > 15 V DC; terminals 51, 52 > 14 V DC; terminals 51, 41, Ri = 300 Ω
--	---

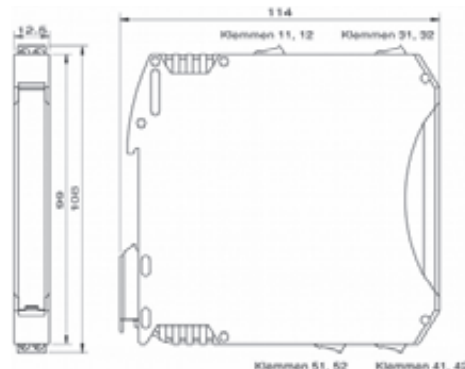
Housing

Material	: Polyamid (PA) 6.6, UL94V-0
Weight	: 91g
Protection class	: Housing IP30, terminals IP20 BGV A3
Colour	: light grey
Installation width	: 12,5 mm
Dimension (HxT)	: 108 x 114 mm
Assembly	: Mounting rail assembly TS35 DIN EN 60715

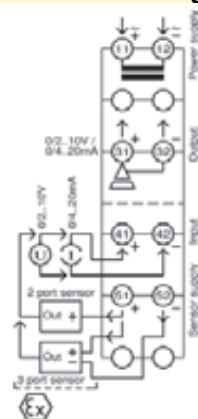
Safety Integrity

Level	: Sil 2 (parameters in accordance with EN 61508 and SN 29500) for input types 4...20 mA or 2...10 V and output types 4...20 mA or 2...10 V
Device type	: B
HFT	: 0
Error signalling	: Output 0 V respective 0 mA
Reaction time	: Normal function → error: 40 ms, error → normal function: 1s (self resetting)

Mechanical design / dimensions



Connection diagram



Hilfsspannung:
85...253 VAC / 20 ... 125 VDC
Oder 24 VDC +/- 15 %

Ausgang:
0/2 ... 10V oder 0/4...20 mA

Eingang:
0/2 ... 10 V oder 0/4...20 mA

Controls, functional description

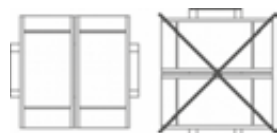


Status-LED	Message
Green LED illuminates	Operating voltage connected
Red and green LED illuminates	See manual tab. 7: Status messages
Red LED illuminates	Electronic defect

Configuration:

DIP	On	Off
S1	Voltage input	Current input
S2	Voltage output	Current output
S3	Input: S1 = On: 0 ... 10 V, S1 = Off: 0 ... 20 mA	Input: S1 = On: 2 ... 10 V, S1 = Off: 4 ... 20 mA
S4	Output: S2 = On: 0 ... 10 V, S2 = Off: 0 ... 20 mA	Output: S2 = On: 2 ... 10 V, S2 = Off: 4 ... 20 mA

Montage



Carrier rail mounting TS35,
DIN EN 60715
Mounting of multiple units without
distance is only permitted in hori-
zontal orientation.

Order code

1. 2. 3. 4.
□ - □ - □ - □

1. Device version	
TV125M	Wide-range mains adapter
TV125MP	Mounting rail bus connection *), Auxiliary voltage 24 V DC +/- 15 %
ST125M	Transmitter feed, Wide-range mains adapter
ST125MP	Transmitter feed, mounting rail bus connection *), Auxiliary voltage 24 V DC +/- 15 %
2. Explosion protection	
00	No intrinsically safe input and no intrinsically safe trans- mitter feed. The devices TV125MP and ST125MP may be installed in zone 2 according to ATEX-ignition protec- tion type "n"
Ex	In case of installing the devices out of the ex-zone: Input and transmitter feed are intrinsically safe in accor- dance to ignition protection type "ia" for zones 0 and 20. The devices TV125MP and ST125MP may be installed in zone 2 according to ATEX-ignition protection type „ic“
3. Input	
10	0/2...10 V / 0/4...20 mA
4. Options	
00	without option
01	Push-In terminals (plug-in)

*) see separate information sheet power rail

Universal Isolating Amplifier TV125L



- **Safe galvanic isolation between input / output / auxiliary voltage** with reinforced isolation in accordance with DIN EN 61010-1
- Step response T_{90} 40ms
- Output deviation < 0.2% of the limit value
- Overload protection of the current input with automatically resetting fuse
- Operating display and status messages via two-colour LED
- **Configuration via front DIP switches**
- Plug-in terminal strips
- Narrow installation width of 12.5 mm for carrier rail mounting TS 35

Characteristics

Isolating amplifiers of the series TV125L are suitable for potential isolation or for conversion of unit signals. The universal layout of the inputs and the output enables a broad range of applications with only one type of device. The plug-in terminal strips enable simple and time-saving wiring. The configuration is also quick and easy with the front DIP switches.

Brief information

The input measuring ranges can be switched between 0..20 mA and 4..20 mA or 0..10 V and 2..10 V with a DIP switch on the front. The input measuring ranges can be switched between 0..20 mA and 4..20 mA or 0..10 V and 2..10 V with a DIP switch on the front.

With the microprocessor-controlled measurement logging, undercutting and exceeding of the measurement range are detected and indicated via a two-colour status LED on the front side. Then the current output is set to a defined starting or final value.

The current input is protected with an automatically resetting fuse (PTC) against static overvoltages up to 32 V AC/DC.

The required auxiliary energy is less than 0.5 VA.

The three circuits: Inputs, outputs, and auxiliary voltage, are galvanically separated with amplified isolation.

Technical data

Auxiliary power

Auxiliary voltage :	18 - 30V DC
Power consumption :	< 0.5 VA
Conformity :	CE ; Directive 2004/108/EC

EMC :	DIN EN 61326-1: 2013-07, Class A
Standards :	DIN EN 61010-1: 2011-07, DIN EN 61010-2: 2011-07

Rated voltage:	300 V AC/DC in accordance with DIN EN 61010-1 with Overvoltage category 2 and Degree of contamination 2 between all circuits. Safe separation with amplified isolation
----------------	--

Test voltage :	3 kV AC, 50 Hz, 1 min
----------------	-----------------------

Input / Output /
Auxiliary power

Environmental conditions

Working temperature :	-10..60°C
Storage temperature :	-20..60°C
Air humidity :	< 95% (no condensation)

Inputs

Voltage input :	Switchable, 0..10V or 2..10 V. $R_i = 47 \text{ k}\Omega$. Max. overload 32 V AC
Current input :	Switchable, 0..20 mA or 4..20 mA. $R_i = 48 \Omega + 15 \Omega$ (RiPTC). Max. overload 32 V AC/DC in accordance with DIN EN 61010-2-30

Output

Current output	Switchable, 0..20 mA or 4..20 mA. Load < 150 Ω .
Step response :	40 ms
Standard error :	< 0.2 % of final value
Temperature coefficient :	< 0.01 % / K

Casing

Material :	Polyamide (PA) 6.6 , UL94V-0,
Weight :	91g
Protection rating :	Housing IP30, terminals IP20 BGV A3
Colour :	light grey
Installation width :	12.5 mm
Dimensions (HxD) :	108 x 114 mm
Installation :	Carrier rail mounting TS35 DIN EN 60715

Operation

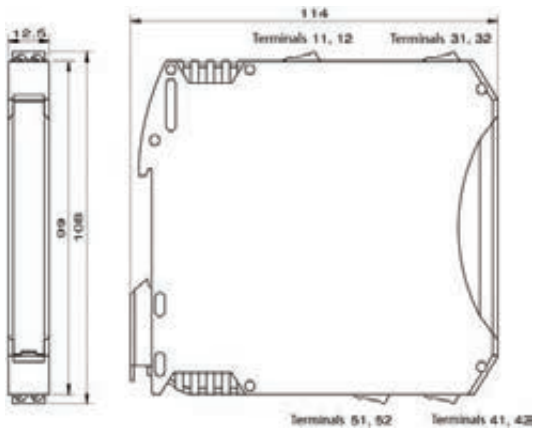


Status LED	Message
Green LED illuminates	Operating voltage applied
Red and green LED blink alternately with 2 Hz	measuring range undercutting or measuring range exceeding
Red LED illuminates	Failure of the unit, please return to manufacturer!

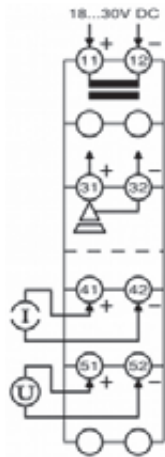
Configuration

S1	S2	Input	Output
Off	Off	4..20 mA, 2..10 V	4..20 mA
Off	On	4..20 mA, 2..10 V	0..20 mA
On	Off	0..20 mA, 0..10 V	4..20 mA
On	On	0..20 mA, 0..10 V	0..20 mA

Dimensions



Connection diagram



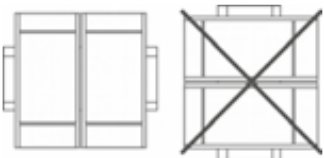
Auxiliary voltage: 18 – 30 V DC

Current output: 0/4 – 20 mA

Current input 0/4 – 20 mA

Voltage input: 0/2 – 10 V

Installation



Carrier rail mounting TS35, DIN EN 60715
The gapless installation of multiple devices is now permissible with horizontally installed carrier rails.

Ordering code

TV - 1. - 2. - 3. - 4.

1. Device version	
125L	Auxiliary voltage 18..30 V DC
125LP	Auxiliary voltage 18..30 V DC Tragschienenbusanschluss *)
2. Metering range	
10	Inputs 0/4..20 mA and 0/2..10 V Outputs 0/4..20 mA
3. Auxiliary voltage	
5	18..30 V DC
4. Options	
00	without option
01	Push-in-clamp (plug-in)

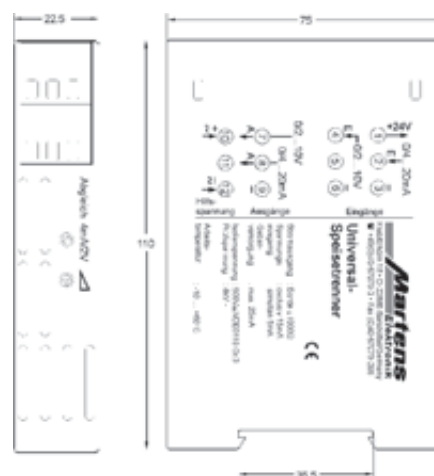
*) siehe gesondertes Informationsblatt Power-Rail

Isolating Signal Converter TV500 / ST500

With integr. transmitter supply



Dimensions



DIN rail mounting TS35

Characteristics

TV500 isolating signal converter can be used to isolate and convert field signals 0/4...20 mA or 0/2...10 V DC into industry standard signals for process control systems. The ST500 provides a fully floating isolated transmitter supply.

Technical data

Power supply

Supply voltage : 100...265 V AC or 10.8...30 V AC/DC
Frequency AC : 47...63 Hz
Power consumption: < 3.5 VA
Operating temperature : -10...+60 °C
CE-conformity : EN 55022, EN 60555-2, IEC 61000-4-4/5/11/13

Inputs

Current : 0/4...20 mA selectable, $R_i = 25 \Omega$
overload max. 100 mA
Voltage : 0/2...10 V DC selectable,
 R_i approx. 40 k Ω , overload max. 100 V

Span and start value

4 mA/2 V : adjustable approx. $\pm 5 \%$
Transmitter supply : approx 24 V DC, R_i approx. 150 Ω ,
(only ST500) short-circuit current approx. 35 mA

Outputs

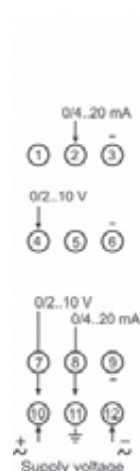
Current : 0/4...20 mA selectable,
burden max. 1 k Ω
Voltage : 0/2...10 V selectable,
load max. 15 mA, short-circuit-proof
(parallel with the current output max. 5 mA)
Rise time (T_{90}) : model 10: < 20 ms, max. frequency 18 Hz
model 11: < 100 μ s, max. frequency 1 kHz
Accuracy : $\leq 0.2 \%$
(single range adjustment $\leq 0.1 \%$)

Case

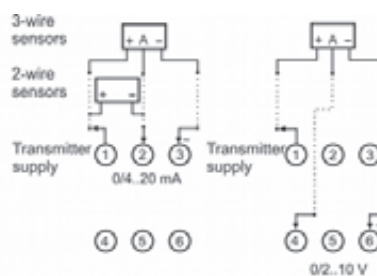
: standard case polycarbonate 8020 UL94V-1
acc. to DIN EN 60715:2001-09, DIN rail TS35
Weight : approx. 200 g
Connection : screw terminals, max. 2.5 mm²
Protection class : case IP30,
terminals IP20 acc. to BGV A3

Connection diagram

Signal converter
TV500



Power feed signal converter
ST500



Ordering code

1. 2. 3.
□ - □ - □

1.	Model
TV500	signal converter
ST500	power feed signal converter
2.	Measuring range
10	inputs 0/4...20 mA and 0/2...10 V
	outputs 0/4...20 mA and 0/2...10 V
11	as 10, but rise time $T_{90} < 100 \mu$ s
3.	Supply voltage
0	100...265 V AC
5	10.8...30 V AC/DC

Isolating Signal Converter TV500Ex / ST500Ex

With integr. transmitter supply



Characteristics

TV500 isolating signal converter can be used to isolate and convert field signals 0/4...20 mA or 0/2...10 V DC out of the intrinsically area. The ST500 provides a fully floating isolated transmitter supply.

Technical data

Power supply

Supply voltage : 85...253 V AC/110...125 V DC or
10...30 V AC/DC

Frequency : 40...400 Hz

Power consumption : < 3.5 VA

Operating temperature : -10...+55 °C

CE-conformity : ATEX directive 94/9/EG
EMC directive 2004/108/EG

Standards : EN 60079-0:2013,
EN 60079-11:2012,
EN 61326-1:2004-05

Explosion protection

Certification : TÜV 97 ATEX 1150, 2. annex

Approval : II (1) G [Ex ia Ga] IIC,
II (1) D [Ex ia Da] IIIC

Inputs

Current : 0/4...20 mA selectable, R_i 25 Ω
overload max. 100 mA

Voltage : 0/2...10 V DC selectable,
 R_i 40 k Ω , overload max. 100 V

Span and start value

4 mA/2 V : adjustable approx. \pm 20 %

Transmitter supply : approx. 20 V DC, R_i approx. 300 Ω ,
(only ST500Ex) short-circuit current < 27 mA

Outputs

Current : 0/4...20 mA selectable,
burden max. 1 k Ω

Voltage : 0/2...10 V selectable,
load max. 15 mA, short-circuit-proof
(parallel with current output max. 5 mA)

Rise time (t_{90}) : < 100 ms

Accuracy : 0.25 %

Case : standard case polycarbonate 8020 UL94V-1
acc. to DIN EN 60715:2001-09, TS35

Weight : approx. 200 g

Connection : screw terminals, max. 2.5 mm²

Protection class : case IP30,
terminals IP20 acc. to BGV A3

Mounting area

Mounting in dry, clean and well monitored areas
For more details see user manual.

Dimensions

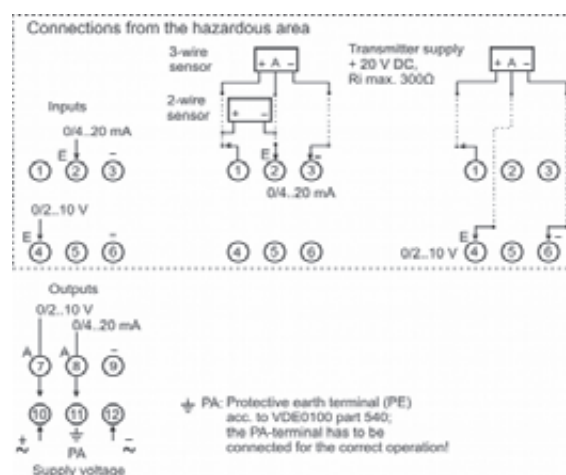


DIN rail mounting TS35

Connection diagram

Signal converter
TV500Ex

Power feed signal converter
ST500Ex



Ordering code

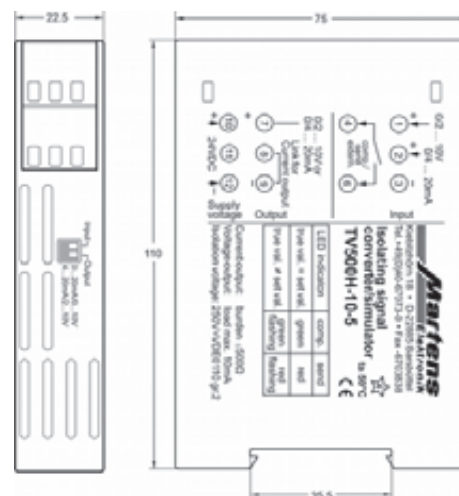
1. 2. 3.
□ - □ - □

1. Model	
TV500Ex	signal converter
ST500Ex	power feed signal converter
2. Measuring range	
10	inputs 0/4...20 mA and 0/2...10V
	outputs 0/4...20 mA and 0/2...10V
3. Supply voltage	
0	85...253 V AC
5	10...30 V AC/DC

Isolating Signal Converter TV500H



Dimensions



DIN rail mounting TS35

Characteristics

The TV500H brings the function of an isolating signal converter together with a set point adjuster and offers comparator and hold function. This combination offers therefore the possibility, to simulate a measuring value and the easy way to change the sensor without process interruption.

Technical data

Power supply

Supply voltage : 230 V AC $\pm 10\%$ 47..63 Hz or
24 V DC $\pm 15\%$

Power consumption : < 3 VA

Operating temperature : -10..+50 °C

CE-conformity : EN 55022, EN 60555-2
IEC 61000-4-3/4/5/11/13

Input

Current : 0/4..20 mA selectable, $R_i = 43\ \Omega$,
overload max. 100 mA

Voltage : 0/2..10 V selectable, $R_i = 175\ k\Omega$,
overload max. 100 V

Output

Programmable output

Voltage \rightarrow current : link between terminal 8 and 9

Current : 0/4..20 mA selectable, burden < 500 Ω

Voltage : 0/2..10 V selectable, load max. 10 mA

Accuracy : < 0.2 %

Rise time (T_{90}) : < 40 ms

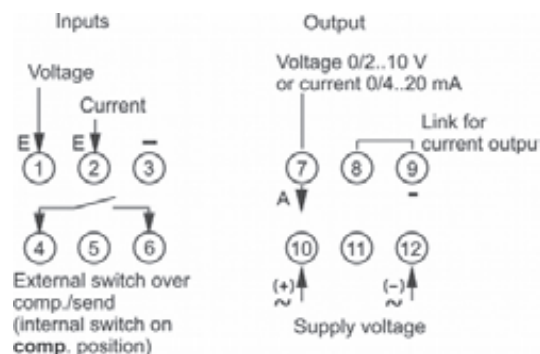
Case : standard polycarbonate 8020 UL94V-1
acc. to DIN EN 60715:2001-09

Weight : approx. 200 g

Electrical connection : screw terminals, max. 2.5 mm²

Protection class : case IP30,
terminals IP20 acc. to BGV A3

Connection diagram



Ordering code

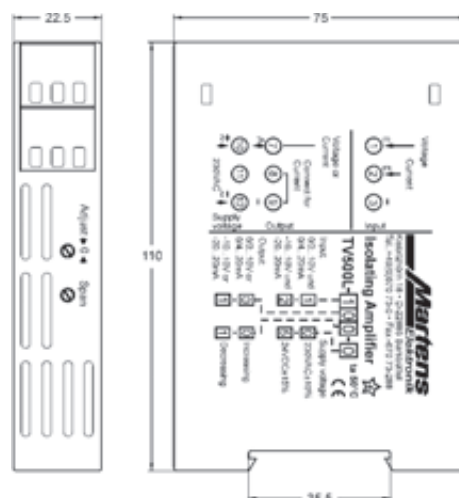
TV500H - 10 - 1.

1. Supply voltage	
0	230 V AC $\pm 10\%$
5	24V DC $\pm 15\%$

Isolating Signal Converter TV500L



Dimensions



DIN rail mounting TS35

Characteristics

Isolating signal converter TV500L can be used to isolate and convert unipolar or bipolar field signals into industry standard unipolar 0/4...20 mA and 0/2...10 V DC or bipolar signals for process control systems. The output characteristic curve is programmable for increasing or decreasing performance.

Technical data

Power supply

Supply voltage : 230 V AC \pm 10 % or 24 V DC \pm 15 %
 Frequency AC : 47...63 Hz
 Power consumption : < 3 VA (at 24 V DC, 80 mA)
 Operating temperature : -10...+50 °C
 CE-conformity : EN 55022, EN 60555, IEC 61000-4-3/4/5/11/13

Inputs

Current : \pm 20 mA or 0/4...20 mA selectable,
 $R_i = 43 \Omega$, overload max. 100 mA
 Voltage : \pm 10 V or 0/2...10 V selectable,
 $R_i = 40 \text{ k}\Omega$, overload max. 100 V
 Start value : adjustable \pm 1.5 %
 End value : adjustable \pm 1.5 %
 Accuracy : < 0.3 %, (single range adjustment < 0.1 %)

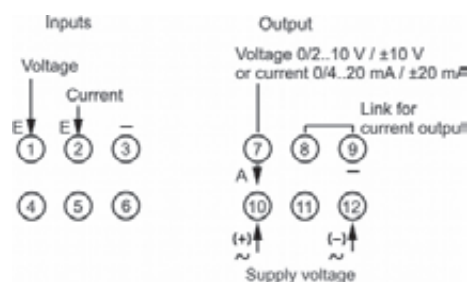
Output

Programmable output

Voltage \rightarrow current : link between terminal 8 and 9

Current : 0/4...20 mA selectable, burden \leq 400 Ω ;
 \pm 20 mA, burden \leq 150 Ω
 Burden error : < 0.1 % ($R_L = 0\text{...}200 \Omega$),
 < 0.2 % ($R_L = 0\text{...}400 \Omega$)
 Voltage : 0/2...10V selectable, load max. 10 mA;
 \pm 10 V, load max. 5 mA
 Rise time (T_{90}) : < 40 ms
Case : standard case polycarbonate 8020 UL94V-1
 acc. to DIN EN 60715:2001-09, TS35
 Weight : approx. 200 g
 Electrical connection : screw terminals, max. 2.5 mm²
 Protection class : case IP30,
 terminals IP20, acc. to BGV A3

Connection diagram



Ordering code

TV500L - 1. 2. 3. 4.

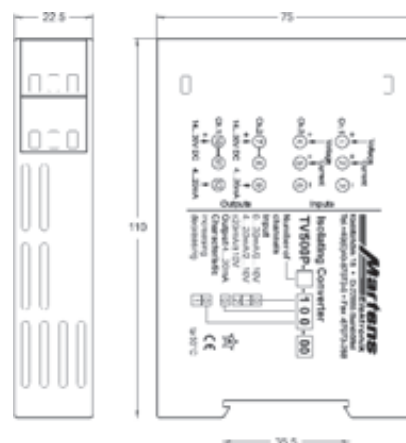
1. Inputs	
1	0/4...20 mA and 0/2...10 V DC
2	\pm 20 mA and \pm 10 V DC
2. Outputs	
0	0/4...20 mA and 0/2...10 V DC
1	\pm 20 mA and \pm 10 V DC
3. Characteristic curve	
0	increasing
1	decreasing (inverted)*
4. Supply voltage	
0	230 V AC \pm 10 %
5	24V DC \pm 15 %

* please state input- and output signal in clear text

Isolating Signal Converter TV500P



Dimensions



DIN rail mounting TS35

Characteristics

Loop powered signal converter series TV500P are highly compact devices to isolate and adapt standard signals to active inputs of SPC- and DC-systems.
The device is loop powered via the 4-20 mA output.

Technical data

Power supply

Supply voltage : 14...30 V DC (loop voltage)
Operating temperature : -10...+50 °C
CE-conformity : EN 55022, IEC 61000-4-3/4/5

Inputs

Current : 0...20, 4...20 mA or ± 20 mA
 $R_i = 43 \Omega$, overload max. 100 mA
Voltage : 0...10, 2...10 V or ± 10 V
 $R_i = 160 \text{ k}\Omega$, overload max. 100 V
End value 20 mA : adjustable $\pm 5 \%$
Accuracy : $< 0.2 \%$,
(single range adjustment $< 0.1 \%$)

Outputs

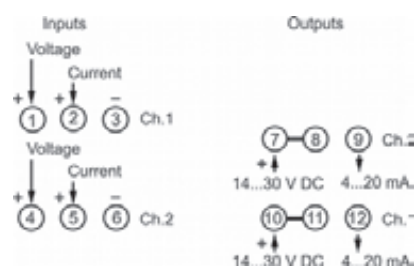
Current : 4...20 mA,
Burden : $R_{\text{max}} = (U_B - 14 \text{ V}) \div 20 \text{ mA}$
Rise time T_{90} : $< 70 \text{ ms}$

Note!

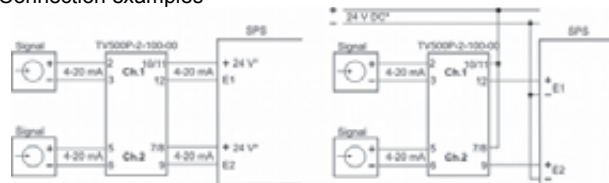
Output switches to 22 mA, if the input signal fall below -34 % or exceeds +34 % of the input signal.

Case : standard case polycarbonate 8020 UL94V-1 acc. to DIN EN 60715:2001-09
Weight : approx. 200 g
Electrical connection : screw terminals, max. 2.5 mm²
Protection class : case IP30, terminals IP20, acc. to BGV A3

Connection diagram



Connection examples



Ordering code

TV500P -

1.	2.	3.	4.	5.
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

1. No. of channels	
1	1 channel
2	2 channels
2. Inputs	
0	0...20 mA and 0...10 V DC
1	4...20 mA and 2...10 V DC
2	± 20 mA and ± 10 V DC
3. Output	
0	4...20 mA passive
4. Characteristic curve	
0	increasing
1	decreasing (inverted)
5. Options	
00	without option

Isolating Signal Converter TW500

Loop powered 0(4)..20 mA



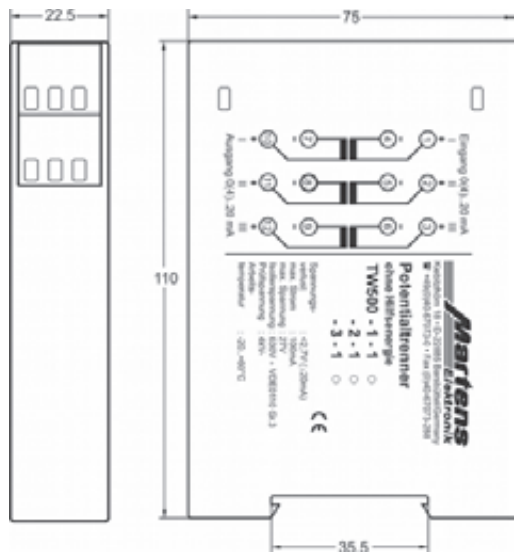
Characteristics

Loop powered signal isolator TW 500 are highly compact devices to isolate DC-current signals 0(4)..20 mA without power supply. Up to 3 channels are deliverable in one 22.5 mm DIN rail housing.

Technical data

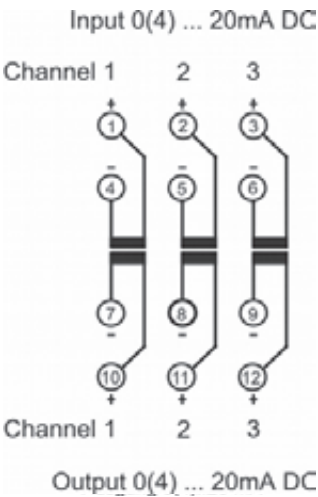
- Input**
 - Current : 0(4)..20 mA DC
 - Max. current : 100 mA
 - Max. voltage : 27 V DC
 - Voltage drop : < 2.7 V (I ≤ 20 mA)
 - Test voltage : 4 kV DC input / output
 - Rated voltage : 630 V acc. to VDE 0110 group 2
 - Operating temperature : -20..+60 °C
 - CE-conformity : EN55022, IEC61000-4-2/4
- Output**
 - Current : 0(4)..20 mA
 - Max. current : max. input current
 - Burden : < 1200 Ω (I ≤ 20 mA)
 - Rise time (T₉₀) : < 30 ms
 - Accuracy : < 0.1 %
 - Burden error : < 0.0008 %/Ω
 - Temperature coefficient : < 0.001 %/°C
 - Ripple : < 0.2 %
- Case**
 - : standard case polycarbonate 8020 UL94V-1 acc. to DIN EN 60715:2001-09, DIN rail TS35
- Weight**
 - : approx. 140 g
- Connection**
 - : screw terminals, max. 2.5 mm²
- Protection class**
 - : case IP30, terminals IP20, acc. to BGV A3

Dimensions



DIN rail mounting TS35

Connection diagram



Note:
Not used outputs must be shorted by a link.

Ordering code

TW500 - ^{1.}□ - 1

1.	Model
1	1-channel
2	2-channels
3	3-channels

Isolating Signal Converter TV501Ex

Intrinsically safe outputs



Characteristics

Isolating signal converter TV501 can be used to isolate and convert 0/4..20 mA and 0/2..10 V signals to the hazardous area. The universal design of the in- and outputs and the wide range of supply voltage limits the devices into 2 models.

Technical data

Power supply

Supply voltage : 85..253 V AC / 110..125 V DC or
10..30 V AC/DC

Frequency AC : 40..400 Hz

Power consumption : < 3.5 VA

Operating

temperature : -10..+55 °C

CE-conformity : ATEX directive 94/9/EG

EMC directive 2004/108/EG

Standards : EN 60079-0:2013,

EN 60079-11:2012,

EN 61326-1:2004-05

Inputs

Current : 0/4..20 mA DC, selectable, $R_i = 25 \Omega$,
overload max. 100 mA

Voltage : 0/2..10 V DC, selectable, R_i ca. 40 k Ω ,
overload max. 100 V

Span : adjustable approx. $\pm 5 \%$

Zero point : adjustable approx. $\pm 5 \%$

Explosion protection

Certification : TÜV 97 ATEX 1164

Approval : II (1) G [Ex ia Ga] IIC or

II (1) D [Ex ia Da] IIIC

Outputs

Current : 0/4..20 mA DC, selectable
burden $\leq 320 \Omega$ (TV501Ex-...-10)
burden $\leq 1 \text{ k}\Omega$ (TV501Ex-...-20)

Voltage : 0/2..10 V DC, selectable,
max. 15 mA short-circuit-proof,
(parallel with voltage output max. 5 mA)

Rise time (T_{90}) : < 20 ms

Accuracy : $\leq 0.3 \%$

Case : standard case polycarbonate 8020 UL94V-1
DIN rail mounting TS35

Weight : approx. 200 g

Electrical connection : screw terminals, max. 2.5 mm²

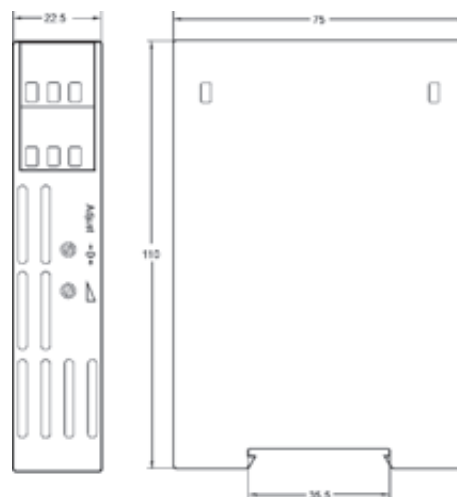
Protection class : case IP30, terminals IP20
acc. to BGV A3

Mounting area

Mounting in dry, clean and well monitored areas

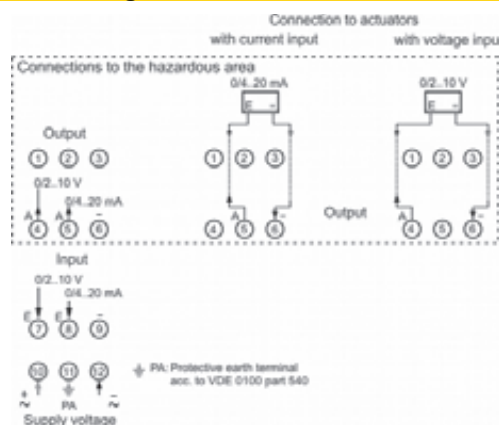
For more details see user manual.

Dimensions



DIN rail mounting TS35

Connection diagram



Ordering code

TV501Ex - 1. - 2. - 3.

1. Measuring range		
10	inputs 0/4..20 mA and 0/2..10V DC outputs 0/4..20 mA burden 320 Ω, 0/2..10 VDC	
20	inputs 0/4..20 mA and 0/2..10V DC outputs 0/4..20 mA burden 1 kΩ, 0/2..10 VDC	
2. Supply voltage		
0	85..253 V AC	
5	10..30 V AC/DC	
3. Options		
00	without option	

Switch amplifier TS125 and TS225



- 1 or 2 channel version
- Safe galvanic isolation between input / output / auxiliary voltage
- Functional safety up to SIL2 EN61508
- Inputs for switching contacts, Namur initiators, or optocouplers
- Intrinsically safe inputs for connection of sensors in Ex Zones 0 and 20
- Device installation in Ex Zone 2 possible
- Galvanic isolation in accordance with the requirements for amplified isolation (EN60664)
- Switchable monitoring of the input circuit for wire breaks and short-circuit
- Relay outputs as normally open contacts or changeovers (invertible effect)
- Wide-range mains adapter or 24 V DC
- Configuration via front DIP switches
- Plug-in coded terminal strips
- Housing width of 12.5 or 22.5mm
- Carrier rail mounting TS35 EN60715
- Operating display, switching status and error message display via LEDs

Characteristics

Switch amplifiers of the series TS125 and TW255 are used in switch cabinets for the conversion and isolation of digital switching signals, as well as in explosion-prone areas.

The devices are available in one- or two-channel versions.

Passive sensors, such as switching contacts, Namur initiators, or passive electronic outputs of third-party devices, can be connected to the intrinsically safe inputs.

The TS125 series in 12.5 mm wide carrier rail housing offers relay outputs with output make circuit. The TW225 series in 22.5 mm wide carrier rail housing offers relay outputs with changeover function. The plug-in terminal strips enable simple and time-saving wiring. The configuration is also quick and easy with the front DIP switches.

Technical data

Explosion protection

Gas:	II (1) G [Ex ia Ga] IIC/IIB
Dust:	II (1) D [Ex ia Da] IIIC
Intrinsically safe + Zone	II 3 G nA nC [ic] IIB T4 Gc *)
Protection rating 'n':	II 3 G nA nC IIB T4 Gc X *)

*) Manufacturer's certificate, requires installation in an earthed, conductive housing (minimum protection rating IP54)

Wide-range mains

Auxiliary voltage:	20..125VDC and 20..250VAC, (47..63Hz), max. 1.5W
ATEX thresholds:	$U_o = 8.7V$; $I_o = 19mA$; $P_o = 42mW$ $L_i = 20\mu H$; $C_i = 10nF$ IIB/IIIC: L_o 100 μH 1mH 100mH C_o 12.9 μF 7.3 μF 2.8 μF IIC : L_o 100 μH 1mH 100mH C_o 2.2 μF 1.2 μF 0.4 μF

24V mains adapter

Auxiliary voltage:	24V DC +/-15%, max. 1.5W
ATEX thresholds:	$U_o = 8.7V$; $I_o = 17mA$; $P_o = 37mW$ $L_i = 20\mu H$; $C_i = 10nF$ IIB/IIIB: L_o 100 μH 1mH 100mH C_o 13.9 μF 7.3 μF 2.9 μF IIC/IIIC: L_o 100 μH 1mH 100mH C_o 2.2 μF 1.3 μF 0.4 μF

Combined data

Um (according to ATEX):	253V AC / 125V DC
Test voltage :	3kV AC between input/output/auxiliary voltage
Working temperature :	-10..60°C
Storage temperature :	-20..80°C
Air humidity :	10..90% (no condensation)

Measuring inputs (in accordance with EN60947-5-6 Namur)

Open circuit voltage :	approx. 8V
Short circuit voltage :	approx. 8mA
Switching points :	inactive $\leq 1.2mA$, active $\geq 2.1mA$, hyst. $< 0.5mA$

Error recognition

-Wire break :	<0.2mA
-Short circuit :	>7mA

Relay outputs

Switching voltage :	<250V AC <2A <500VA <125V DC <0.2A <25W < 30V DC <2A <60W
---------------------	---

Switching frequency :	max. 5Hz
-delay :	max. 30ms

Casing

Dimensions (WxDxH)	TS125: 12.5 x 114 x 108mm TS225: 22.5 x 114 x 108mm
Material :	PA6.6, light grey, Flammability class V0 (UL94)
Weight :	TS125: 120g; TS225: 140g
Protection rating :	IP20
Terminals :	0.2 - 2.5mm ² , AWG 24 - 14 Removable coded terminals

Functional safety :



SIL2 in accordance with EN61508
(specific data on request)

Operation

- Green Power ON operating display

TS125....-1, TS125....-2, TS225....-1 TS225....-2

Operating elements per channel Ch.1 / Ch.2






- LEDs A1 / A2 : yellow  with active relay
blinks red  with error status
(wire break or short circuit)
- Switch INV : off: active input switches on the assigned relay
off: active input switches off the assigned relay

(condition as delivered underlined)

Applications with functional safety (SIL2) require switch **INV = off** and **ERR = on** !

TS125....-F, TS225....-F

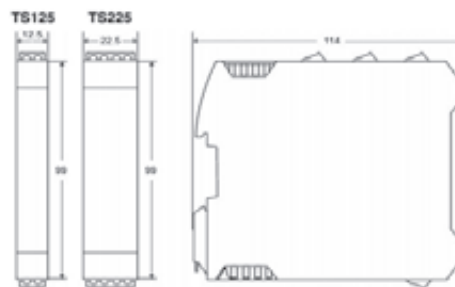
Single-channel isolating amplifier with additional error relay or parallel relay. Operating elements :

- LED A1 : yellow  with active Relay A1
blinks red  with error status
(wire break or short circuit)
- LED A2 : yellow  with active Relay A2
(if switch ERR-Ch.2 = off)
blinks red/yellow  with active Relay A2 with error status
blinks red  with inactive Relay A2 with error status
(if switch ERR-Ch.2 = on)
- Switch INV-Ch.1 : off: active input Ch.1 switches on Relay A1
on: active input Ch.1 switches off Relay A1
- Switch ERR-Ch.1 : off: Error recognition via Relay A1 inactive
on: Error recognition active
With error status, switches off Relay A1
- Switch INV-Ch.2 : off: active input Ch.1 or alternatively an error status*) switch on Relay A2
on: active input Ch.1 or alternatively an error status*) switch off Relay A2
- Switch ERR-Ch.2 : off: Error recognition via relay A2 inactive
(A2 switches parallel to A1)
*) on: Error recognition active
(see Switch INV-Ch.2)

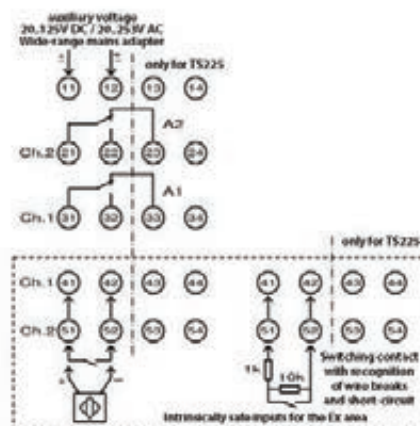
(condition as delivered underlined)

Applications with functional safety (SIL2) require switch **INV-Ch.2 = on**, **ERR-Ch.2 = on** !
INV-Ch.1 = off, INV-Ch.2 = on, ERR-Ch.2 = off simulates a changeover contact with Relay A1 / A2

Dimensions



Connection diagram



Ordering code

1. 2. 3. 4.
TS - - - -

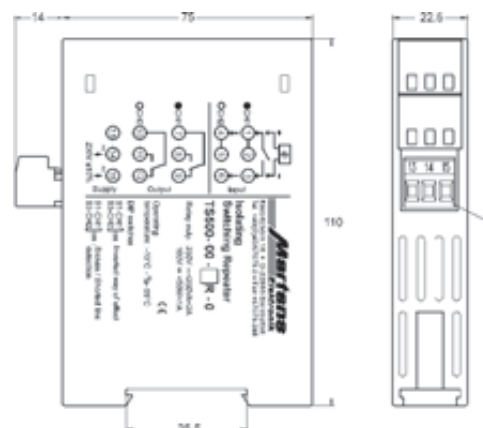
1. Device version	
125L	Housing width 12.5mm, Relay NO contacts, Auxiliary voltage 24V DC +/-15%
125LP	Housing width 12.5mm, Relay NO contacts, Auxiliary voltage 24V DC +/-15% with DIN-rail bus connector / Power Rail *)
125M	Housing width 12.5mm, Relay NO contacts, Wide-range mains adapter 20..125 VDC, 20..250 VAC
225M	Housing width 22.5mm, Relay changeover contacts, Wide-range mains adapter 20..125 VDC, 20..250 VAC
2. Explosion protection	
00	Installation of the device TV125L in Zone 2 permitted, in accordance with ATEX ignition protection rating 'n'
Ex	With installation of the devices outside the Ex area: Inputs intrinsically safe in accordance with ATEX ignition protection rating 'ia' for Zones 0 and 20 The device TS125L may be installed in Zone 2 in accordance with ATEX ignition protection rating 'ic'.
3. Number of channels	
1	Single channel
2	Dual channel
F	Single channel with additional error relay or parallel relay
4. Options	
00	without option

*)see separate information sheet Power Rail

Isolating Switching Repeater TS500



Dimensions



DIN rail mounting TS35

Characteristics

Isolating switching repeater TS500 can be used for monitoring and controlling digital signals. The input is suitable for switching contact, proximity switch acc. Namur DIN EN 60947-5-6, or passive electronic outputs of other devices. The output can be delivered as relay SPDT or transistor (voltage free).

Technical data

Power supply

Supply voltage : 230 V AC $\pm 10\%$, 47..63 Hz
24 V $\pm 15\%$

Power consumption : < 2 W

Operating

temperature : -10..+55 °C

CE-conformity : EN 55022, EN 60555,
IEC 61000-4-4/5/11/13

Inputs

Namur (acc. to DIN EN 60947-5-6)

- No load voltage : approx. 8 V

- max. current : approx. 8 mA

- Switching points : inactive ≤ 1.2 mA, active ≥ 2.1 mA,
hysteresis approx. 0.5 mA

- Break of wire : ≤ 0.1 mA

- Short circuit : ≥ 7.5 mA

Switching contact

Output

Relay SPDT : < 253 V AC < 100 VA < 2 A;
< 100 V DC < 50 W < 2 A

- max. frequency : 5 Hz

- max. delay : 20 ms (2-channel: 50 ms)

Transistor : max. 35 V DC, max. 50 mA, voltage free
(short-circuit-proof)

- voltage drop : ≤ 3.5 V active (at load 50 mA)

- max. frequency : 2 kHz

Case

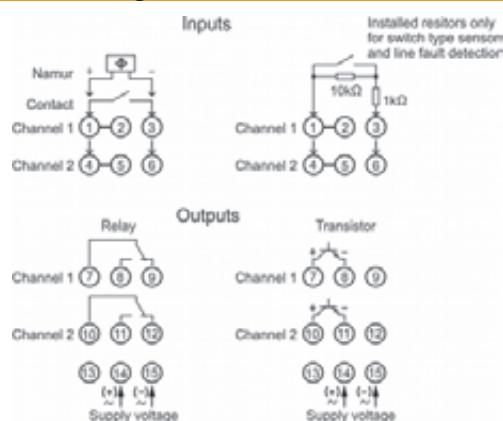
: standard case poly carbonate 8020 UL94V-1
acc. to DIN EN 60715:2001-09, TS35

Weight : approx. 200 g

Electrical connection: screw terminals, max. 2.5 mm²

Protection class : case IP30,
terminals IP20 acc. to BGV A3

Connection diagram



Ordering code

TS500 - 1. - 2. - 3.

1. Model	
00	Standard
2. Output	
1R	1-channel relay output
2R	2-channels relay output
1T	1-channel transistor output
2T	2-channels transistor output
3. Supply voltage	
0	230 V AC $\pm 10\%$
5	24 V DC $\pm 15\%$

Note:

The TS500 is also available as Ex-ia.

Isolating Switching Repeater TS500-Ex



Characteristics

Isolating switching repeater TS500-Ex can be used for monitoring and controlling digital signals out of the hazardous area. The intrinsically safe input is suitable for switching contact, proximity switch according to Namur DIN EN 60947-5-6, or passive electronic outputs of other devices. The devices must be installed out of the Ex-area because only the input is intrinsically safe.

Technical data

Explosion protection

Certification : DMT 99 ATEX E 079
Approval : ATEX II (1) G [Ex ia] IIC/IIB or (1) D [Ex iaD]

Power supply

Supply voltage : 230 V AC $\pm 10\%$, 47..63 Hz
24 V $\pm 15\%$

Power consumption : < 2 W

Operating

temperature : $-10..+55\text{ }^{\circ}\text{C}$
CE-conformity : ATE-directive 94/9/EG,
Standards : EN 60079-0:2006, EN 60079-11:2007,
EN 61241-0:2006, EN 61241-11:2006

Inputs (intrinsically safe)

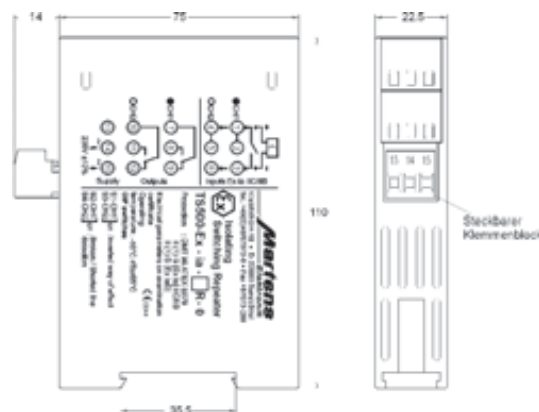
Namur (acc. to DIN EN 60947-5-6)
- No load voltage : approx. 8 V
- max. current : approx. 8 mA
- Switching points : inactive ≤ 1.2 mA, active ≥ 2.1 mA, hysteresis approx. 0.5 mA
- Break of wire : ≤ 0.1 mA
- Short circuit : ≥ 7.5 mA

Switching contact

Output

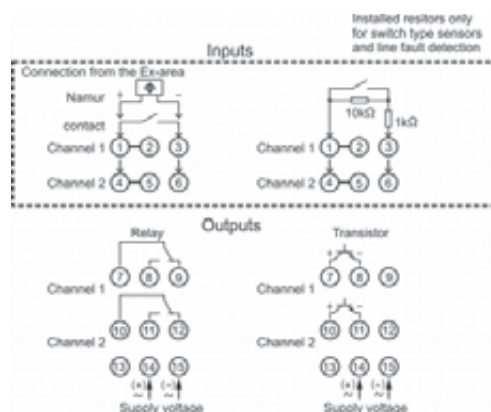
Relay SPDT : < 253 V AC < 100 VA < 2 A;
 < 100 V DC < 50 W < 2 A
- max. frequency : 5 Hz
- max. delay : 20 ms (2-channel: 50 ms)
Transistor : max. 35 V DC, max. 50 mA, voltage free (short-circuit-proof), safety voltage 253 V AC/125 V DC
- voltage drop : ≤ 3.5 V active (at load 50 mA)
- max. frequency : 2 kHz
Case : standard case poly carbonate 8020 UL94V-1 acc. to DIN EN 60715:2001-09, TS35
Weight : approx. 200 g
Electrical connection: screw terminals, max. 2.5 mm²
Protection class : case IP30, terminals IP20 acc. to BGV A3
More details see user manual

Dimensions



DIN rail mounting TS35

Connection diagram



Ordering code

TS500-Ex - ia - ☐ 1. - ☐ 2.

1. Output		
1R	1-channel relay output	
2R	2-channels relay output	
1T	1-channel transistor output	
2T	2-channels transistor output	
2. Supply voltage		
0	230 V AC $\pm 10\%$	
5	24 V DC $\pm 15\%$	

E4 Safety and monitoring

Monitoring relays, temperature monitors, safety temperature limiters	348
--	-----

Safety and Monitoring



Characteristics

System	Current, voltage, power, temperature
Principle	Vibration, insulation resistance, safety end switch, safety-temperature limiting/-monitoring
Evaluation	Standard-signals, switching outputs with display
Mounting	Switch panel case, DIN rail mounting TS35

Applications

- Monitoring of AC Power systems
- Temperature limiter acc. to SIL2
- Battery guard for solar systems and wind power stations
- Insulation guard for health care facility's and railway vehicles
- Pressure monitoring, filling height
- Live saving in machine controls for cutters, mixing machines etc.

Monitoring Relay MR50



- Input standard signals 0/4..20 mA, 0/2..10 V DC
- Measuring range programmable
- Max. 4 alarm outputs
- Isolated analog output 0/4..20 mA, 0/2..10 V DC

Characteristics

The Monitoring Relay MR50 has inputs for industry standard signals 0/4..20 mA and 0/2..10 V DC. Measuring value and programmed unit are shown in the display. The integrated transmitter supply offers direct connection of loop powered sensors. Simple programming, up to 4 alarm outputs (SPDT) and optional available fully isolated free programmable analog output 0/4..20 mA; 0/2..10 V DC meets the demand for different applications.

Technical data

Power supply

Supply voltage : 230 V AC $\pm 10\%$, 115 V AC $\pm 10\%$, or
24 V DC $\pm 15\%$

Power consumption : max. 5 VA

Operating

temperature : -10..+55 °C

CE-conformity : Norm IEC 61326 05/2004,

IEC 61000-4-2/3/4/5/6/8/11, CISPR16-1/16-2

Input

Ri : 0/4..20 mA; 0/2..10 V DC

Rs : current 10 Ω ,
voltage 10 k Ω

Fault detection : break of wire

Accuracy : <0,1 %, ± 1 Digit

Transmitter supply : 24 V DC max. 30mA

Outputs

Relay SPDT : < 250 V AC < 250 VA < 2 A
 $\cos\phi \geq 0.3$, < 300 V DC < 40 W < 2 A

Analog output : 0/4..20 mA, burden $\leq 500 \Omega$;
0/2..10 V burden >500 Ω , isolated,
output changes automatically
(burden dependent)

Accuracy : 0.2 %; TK 0.01 %/K

Fault function at break of wire:

→ Analog output : 0 mA, < 3.6 mA or >21.5 mA

→ Alarm contact(s) : min. or max. programmable

Display

: graphic LCD-display with 128 x 64 Pixel,
and white back-light

Case

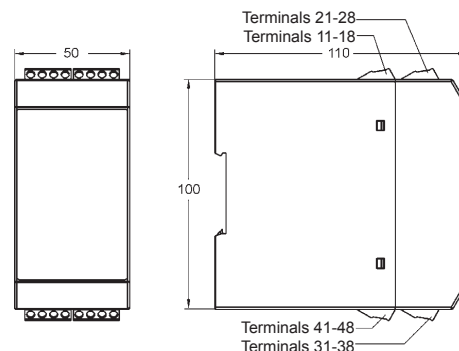
: Polyamide (PA) 6.6, UL94V-0
acc. to DIN EN 60715:2001-09

Weight : approx. 450 g

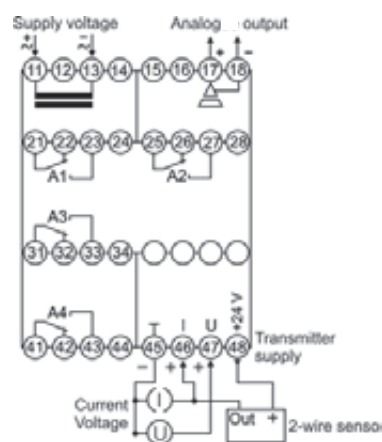
Connection : screw terminals 0.14..2.5 mm²
(AWG 26..14)

Protection class : case IP30, terminals IP20, BGV A3

Dimensions



Connection diagram



Ordering code

MR50 - 1. - 2. - 3. - 4. - 5. - 6.

1. Input	
1	standard signals 0/4..20 mA, 0/2..10 V DC, transmitter supply 24 V DC, max. 30 mA
2. Alarm output A1, A2	
2R	2 relays SPDT
3. Alarm output A3, A4	
00	not installed
2R	2 relays SPDT
4. Analog output	
00	not installed
AO	0/4..20 mA, 0/2..10 V DC
5. Supply voltage	
0	230 V AC, $\pm 10\%$ 50-60 Hz
1	115 V AC, $\pm 10\%$ 50-60 Hz
5	24 V DC, $\pm 15\%$
6. Options	
00	without option

Monitoring Relay MR50Ex



- Input standard signals 0/4..20 mA, 0/2..10 V DC
- Measuring range programmable
- Max. 2 alarm outputs
- Isolated analog output 0/4..20 mA, 0/2..10 V DC

Characteristics

The Monitoring Relay MR50Ex has inputs for industry standard signals 0/4..20 mA and 0/2..10 V DC. Measuring value and the programmed unit are shown in the display. The integrated transmitter supply offers direct connection of loop powered sensors. Simple programming, up to 2 alarm outputs (SPDT) and an optional available fully isolated free programmable analog output 0/4..20mA; 0/2..10 V DC meets the demand for different applications.

Technical data

Power supply

Supply voltage	: 230 V AC $\pm 10\%$, 115 V AC $\pm 10\%$, 24 V DC $\pm 15\%$ $U_m = 253$ V AC or 125 V DC (terminals 11 and 13)
Power consumption	: max. 5 VA
Operating temperature	: $-10..+55\text{ }^{\circ}\text{C}$
CE-conformity	: ATEX- directive 94/9/EG (certificate MR50ATEX.001) EN 60079-0:2006 EN 60079-11:2007 EN 61241-0:2006 EN 61241-11:2006, IEC 61000-4-2 IEC 61000-4-3 IEC 61000-4-4 IEC 61000-4-5 IEC 61000-4-6 IEC 61000-4-8 IEC 61000-4-11 CISPR16-1/16-2

Inputs

Explosion protection	: Ex II (1) G [Ex ia] IIC/IIB or II (1) D [Ex iaD]
Approval	: TÜV 08 ATEX 554329
Input	: 0/4..20 mA; 0/2..10 V DC
Ri	: current 10 Ω , voltage 10 k Ω
Fault detection	: break of wire in the measuring circuit (terminals 45, 46 and 47)
Accuracy	: $< 0.1\%$, ± 1 Digit
Temperature coefficient	: 0.01% /K

Safety data

Max. no load voltage U_0	: 18.9 V
Max. short circuit curr. I_0	: 92.5 mA
Max. output power P_0	: 580 mW
Resistance R	: 272 Ω
Characteristics	: trapezoidal
Internal inductivity	: 4 μH
Internal capacity	: 1.2 nF
Transmitter supply	: approx. 16 V DC max. 20 mA (terminal 48)

Explosion protection

	Ex ia/IIC or ia/IIC	ia/IIB
Max. ext. inductivity	: 2.3 mH	0.1 mH
Max. ext. capacity	: 0.12 μF	0.22 μF

At connecting of externally supplied active intrinsically safe circuits the rules for the interconnection of intrinsically safe circuits have to be observed.

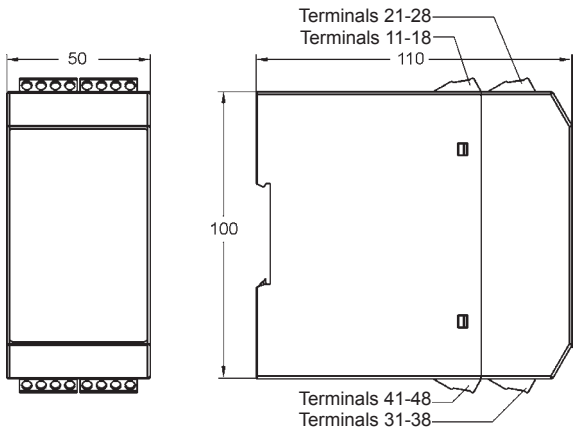
Max. values	U_i	: 30 V
	I_i	: 52 mA
	P_i	: 980 mW

Outputs

Relay SPDT	: < 250 V AC < 250 VA < 2 A $\cos \varphi \geq 0.3$, < 300 V DC < 40 W < 2 A (terminals 21, 22, 23; 25, 26, 27)
Analog output	: 0/4..20 mA, burden $\leq 500\text{ }\Omega$; 0/2..10 V burden $> 500\text{ }\Omega$, isolated, output changes automatically (burden dependent)
Accuracy	: 0.2% ; TK 0.01% /K for connection at electrical equipments with supply voltage of max. 230V (terminals 17 and 18)
Fault function	: break of wire in the measuring circuit: → analog output 0 mA, < 3.6 mA or > 21.5 mA → alarm contact(s) min. or max. programmable
Display	: Graphic-LCD-Display, 128 x 64 Pixel, with white back-light
Case	: Polyamide (PA) 6.6, UL94V-0 acc. to DIN EN 60715:2001-09
Weight	: approx. 450 g
Connection	: screw terminals 0.14..2.5 mm 2 (AWG 26..14)
Protection class	: case IP30, terminals IP20, BGV A3

Continue next page

Dimensions

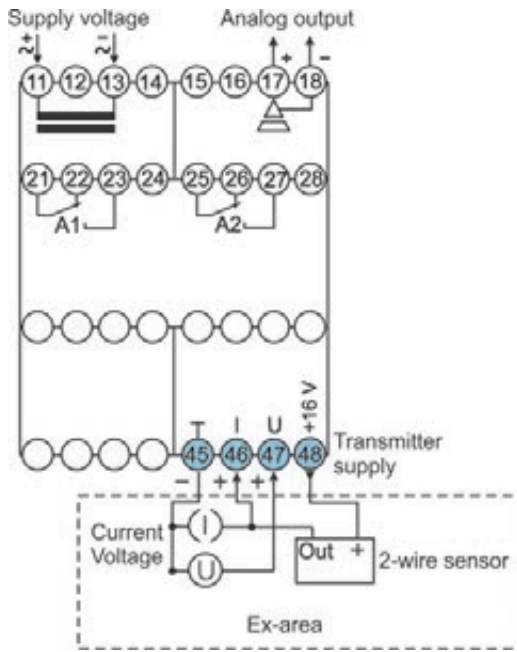


Ordering code

MR50Ex - 1. - 2. - 3. - 4. - 5. - 6.

1.	Input	
1	standard signals 0/4..20 mA, 0/2..10 V DC, transmitter supply approx. 16 V DC, max. 20 mA, inputs intrinsically safe	
2.	Alarm output A1, A2	
2R	2 relay SPDT	
3.	Alarm output A3, A4	
00	not available	
4.	Analog output	
00	not installed	
AO	0/4..20 mA, 0/2..10 V DC	
5.	Supply voltage	
0	230 V AC, $\pm 10\%$ 50-60 Hz	
1	115 V AC, $\pm 10\%$ 50-60 Hz	
5	24 V DC, $\pm 15\%$	
6.	Options	
00	without option	

Connection diagram



Monitoring Relay GS500



- Input 0/4...20 mA, 0/2...10 V DC
- Contact function min/max selectable
- Hysteresis and switching delay adjustable

Characteristics

The GS500 can be used for monitoring physical processes presented as industry standard signal. Limit value can be set from 0...100%. The adjustable switching delay prevents that short signal peaks does not activate the alarm.

By an adjustable switching hysteresis a frequently switching can be suppressed with small signal variations.

Technical data

Power supply

Supply voltage : 230 V AC $\pm 10\%$ or 24 V DC -30/+40 %
 Frequency AC : 47...63 Hz
 Power consumption : <3 VA
 Operating temperature : -10...+50 °C
 (-25...+70 °C special device)
 CE-conformity : EN 55022, IEC 61000-4-3/4/5/11/13, EN 60555

Inputs

Scale error : $\leq 2\%$
 Repeatability : $\leq 0.1\%$
Current
 Range : 0/4...20 mA selectable
 Input resistance : 125 Ω
 Over-load : 2-times, 4-times for max. 5 seconds

Voltage

Range : 0/2...10 V DC selectable
 Input resistance : 40 k Ω
 Over-load : max. 100 V DC

Outputs

Relay SPDT : 250 V AC < 250 V A < 2 A;
 100 V DC < 50 W < 1 A

Switching function : min./max. selectable

Hysteresis : 1...25 %

Time delay : 0.1...8 seconds

Case : standard case polycarbonate

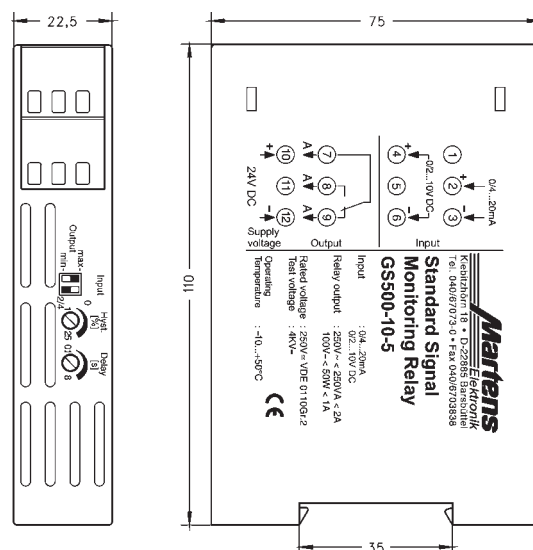
8020 UL 94 V-1 acc. to
 DIN EN 60715:2001-09, DIN rail TS35

Weight : approx. 200 g

Connection : screw terminals, max. 2.5 mm²

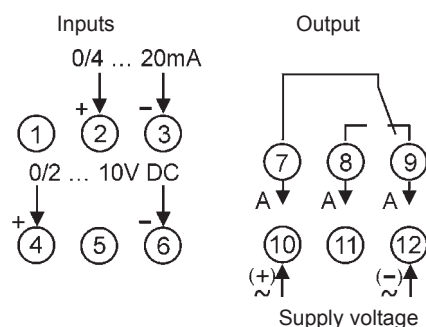
Protection class : case IP30, terminals IP20 acc. to BGV A3

Dimensions



DIN rail mounting TS35

Connection diagram



Caution:

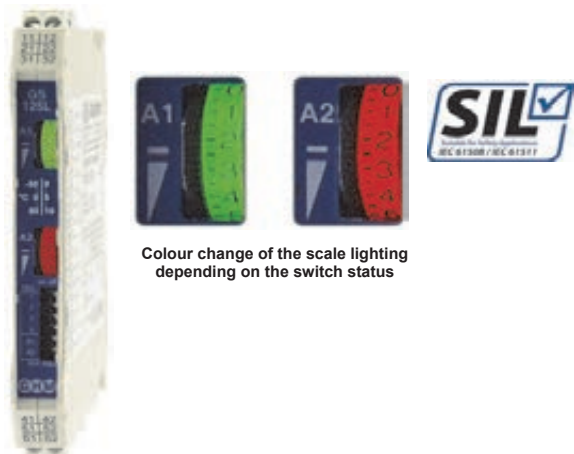
It is not permissible to use current and voltage inputs at the same time!

Ordering code

GS500 - 1. - 2.

1. Measuring range			
10	Standard device 0/4..20 mA, 0/2..10 V DC		
2. Supply voltage			
0	230 V AC	±10 %	
5	24 V DC	-30..40 %	

Limit value switch GS125



- Universal input for unit signals,
- Pt100, thermocouple, potentiometer, switchable via front-side DIP switch
- 1 or 2 relay outputs
- Universal relay connection
- Adjustable min/max contact function
- Actual value output 4 .. 20mA
- 2-colour illuminated scales for limit value adjustment, colour depends on switch status
- With Pt100 sensors, monitoring of sensor break and short-circuit
- Wide-range mains adapter or 24 V DC
- Functional safety up to SIL2
- Housing width 12.5 mm
- Removal coded terminals
- Carrier rail mounting TS35 EN60715
- Safe galvanic isolation between input / output / auxiliary voltage

Technical data

Limit value switches of the series GS125 are used in switch cabinets for process monitoring or for simple process regulation.

Both temperatures and derived variables such as voltage, current and resistance are used as control signals. In the process, 1 or 2 limit values can be monitored.

The universal configurability of the measuring inputs reduces the stock requirement for various applications.

The housing width of only 12.5mm enables space-saving installation in the switch cabinet. The scales for the limit value setting, illuminated red or green depending on the switch status, also enable operating in dark environments.

For assignment of the measuring unit to the scale labelling, 24 transparent adhesive labels are supplied. They can be glued between the adjusting wheels on the front panel.

Measurement inputs

Switchable via DIP switch	
Unit signals	: 0/2..10 V 0/4..20 mA
Potentiometer	: 500 Ω..20 kΩ
Pt100	: -50..50°C 0..50°C 0..100°C 0..150°C 0..200°C 0..300°C 0..500°C
Thermocouple	
FeCuNi, Type J	: 0..250°C 0..500°C
NiCrNi, Type K	: 0..500°C 0..750°C 0..1000°C
PtRhPt, Type S	: 0..1500°C

(Special measurement ranges available on request)

Technical data

Wide-range power supply

Voltage	: 20..125 V DC and 20..250 V AC, (47 - 63Hz), max. 1.5W
---------	--

24 V power supply

Voltage	: 24 V DC +/-15%, max. 1.5W
---------	-----------------------------

Combined data

Rated voltage	: 253 V AC
Test voltage	: 3kV AC between input/relay output/auxiliary voltage
Operating temperature	: -10..60 °C
Storage temperature	: -20..80 °C
Air humidity	: 10..90 % (non-condensing)

Measurement inputs

Voltage	: 0/2..10 V, Ri approx. 20 kΩ
Current	: 0/4..20 mA, Ri approx. 60 Ω
Pt100	: linearised, measurement current approx. 1.6 mA Relays become inactive if there is a sensor break or short-circuit
Thermocouple	: linearised with comparison position compensation
Resistance	: (3-wire), nominal value 500 Ω..20 kΩ Internal reference voltage approx. 1.5 V

Relay outputs

Switching voltage	: < 250 V AC <2 A <500 VA < 125 V DC <0.2 A <25 W < 30 V DC <2 A <60 W
Switching frequency	: max. 5 Hz
Switching hysteresis	: approx. 1%

Functional safety

: SIL2 in accordance with EN61508 (specific data available on request)

Setpoint setting

: Scale precision: 2 %

Actual value output

: 4..20 mA, resistance max. 120 Ω, No galvanic isolation from the input signal
--

Product information

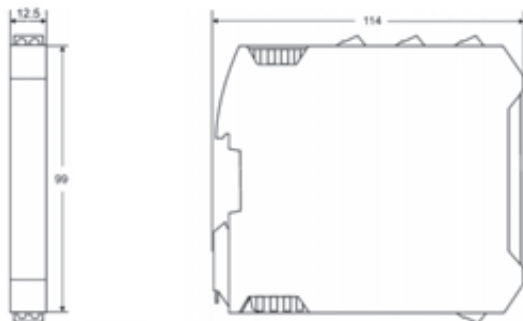
Input signal	Basic precision-actual value output	Temperature deviation *)
0/2...10V	0.2%	0.004%/K
0/4...20mA	0.2%	0.004%/K
Potentiometer	1%	0.007%/K
Pt100 -50... 50°C	0.5%	0.03%/K
Pt100 0... 50°C	0.9%	0.04%/K
Pt100 0...100°C	0.5%	0.03%/K
Pt100 0...150°C	0.2%	0.02%/K
Pt100 0...200°C	0.4%	0.02%/K
Pt100 0...300°C	0.3%	0.01%/K
Pt100 0...500°C	0.2%	0.007%/K
FeCuNi 0...250°C	1.0%	0.04%/K
FeCuNi 0...500°C	0.5%	0.03%/K
NiCrNi 0...500°C	0.5%	0.04%/K
NiCrNi 0...750°C	0.4%	0.03%/K
NiCrNi 0...1000°C	0.3%	0.02%/K
PtRhPt 0...1500°C	1.0%	0.04%/K

*) Measurement deviation depending on the environmental temperature in the switch cabinet (-10...+60°C)

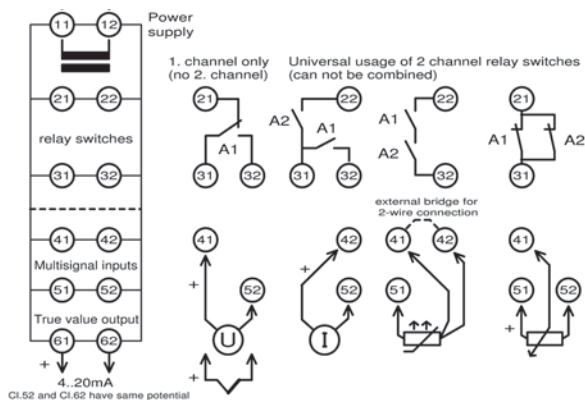
Housing

Dimensions (WxDxH)	: 12.5 x 115 x 108 mm
Material	: PA6.6, light grey, Flammability class V0 (UL94)
Weight	: 120 g
Protection class	: IP20
Screw terminals	: 0,2...2,5 mm ² , AWG 24...14,
Push-In-Terminals	: 0,5...1,5 mm ² , AWG 25...16, coded terminals

Dimensions

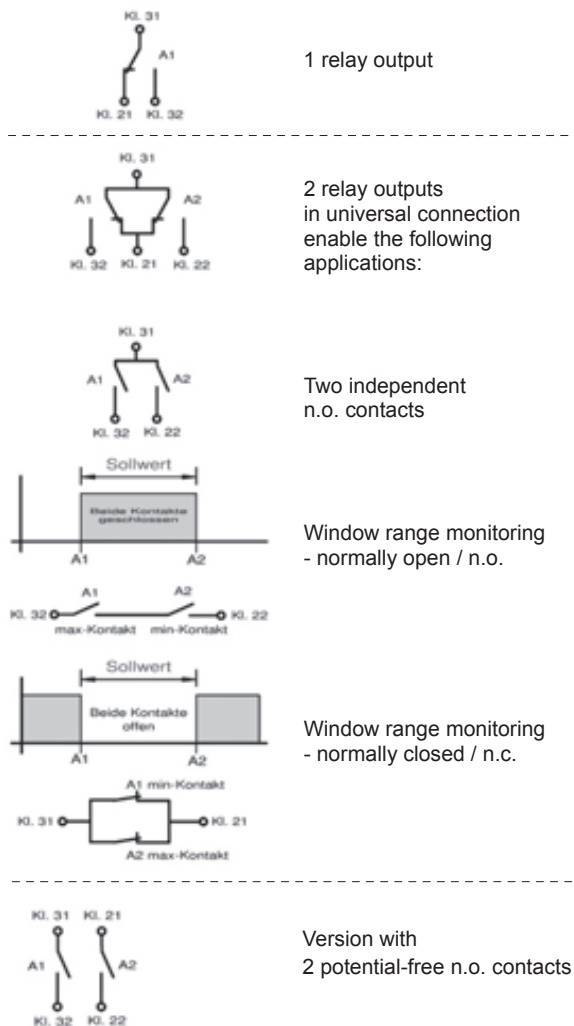


Connection diagram



Safety and Monitoring

Limit value contacts



Ordering code

GS 1. 2. 3. 4.

1. Device version				
125L	Power supply 24V DC +/-15%			
125LP	Power supply:24V DC +/-15% with carrier rail bus connection *)			
125M	Wide-range power supply 20...125 V DC / 20...253V AC			
2. Limit value contacts				
1	1 relay (changeover contact)			
2	2 relays (universal connection)			
3	2 relays (potential-free n.o. contacts)			
3. Actual value output				
0	not provided			
1	Output 4...20 mA			
4. Options				
00	No options			
01	Push-in terminals (plug-in)			

*) Delivery incl. bus adapter see also separate information sheet Power-Rail

Temperature Guard TG50



Output

Alarm A1-A4	: relay SPDT : < 250 V AC < 250 VA < 2 A : cos Phi ≥ 0.3 : < 300 V DC < 40 W < 2 A
Analog	: 0/4...20 mA burden ≤500 Ω : 0/2...10 V burden >500 Ω : isolated, automatic output changing (burden dependent)
- Accuracy	: 0.2 %; TK 0.01 %/K
Fault indication	: for broken line or short circuit detection → analog output (programmable) 0 mA, < 3.6 mA or >21.5 mA → Alarm relays min. or max. function programmable
Case	: Polyamide (PA) 6.6, UL94V-0 TS35 acc. to DIN EN 60715:2001-09
Weight	: approx. 450 g
Connection	: screw terminals 0.14...2.5 mm ² AWG 26...AWG14
Protection class	: case IP30, terminals IP20 acc. to BGV A3

Characteristics

The Temperature-Guard TG50 has inputs for temperature probes RTD (Pt100/Pt1000) and thermocouple J, K, N and S. Simple programming, up to 4 alarm outputs (SPDT) and an available fully isolated free programmable analog output 0/4...20 mA; 0/2...10 V DC offers a lot of solutions for temperature monitoring. Peak value indication for minimum and maximum measured temperature are stored in the background and can be read out from the display at any time.

Technical data

Power supply

Supply voltage	: 230 V AC ±10 % : 115 V AC ±10 % : 24 V DC ±15 % : < 5 VA
----------------	---

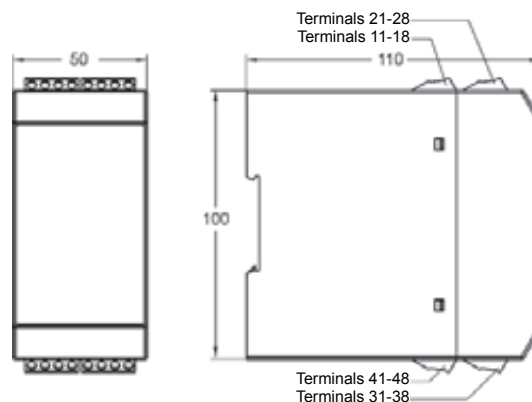
Operating temperature : -10...+55 °C

CE-conformity : ATEX-directive 94/9/EG
(certificate PMT50ATEX.001)
EN 60079-0:2006 EN60079-11:2007
EN 61241-0:2006 EN61241-11:2006
IEC61326 05/2004, IEC 61000-4-2,
IEC 61000-4-3, IEC 61000-4-4,
IEC 61000-4-5, IEC 61000-4-6,
IEC 61000-4-8, IEC 61000-4-11,
CISPR16-1/16-2

Input

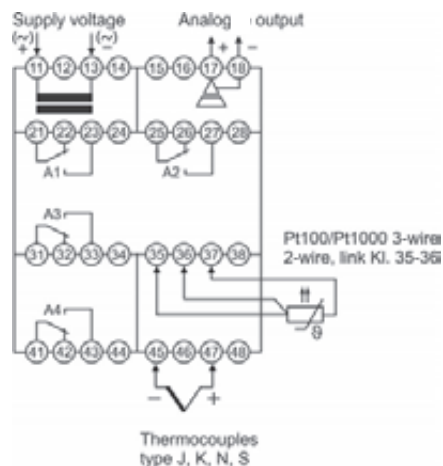
Fault function	: break of wire (RTD Pt100/1000, Thermocouple) and short-circuit (only Pt100/1000)
RTD	: Pt100 (3-wire) -100.0...+600.0 °C : Pt1000 (3-wire) -100.0...+300.0 °C : Thermocouple (TC) : type J -100.0...+800.0 °C : type K -150...+1200 °C : type N -150...+1200 °C : type S -50...+1600 °C : cold junction compensation integrated
Accuracy	: <0.1 %, ±1 Digit
Display	: Graphic LCD-Display, 128 x 64 Pixel, with white back-lite

Dimensions



Continue next page.

Connection diagram



Ordering code

1. 2. 3. 4. 5. 6.

TG50 - - - - - -

1. Device type/input

- 3 RTD Pt100, 3-wire, -100.0..+600.0 °C
 RTD Pt1000, 3-wire, -100.0..+300.0 °C
 Thermocouple
 J (Fe-CuNi), -100.0..+800.0 °C
 K (NiCr-Ni), -150..+1200 °C
 N (NiCrSi-NiSi), -150..+1200 °C
 S (Pt10Rh-Pt), -50..+1600 °C

2. Alarm output A1, A2

- 2R 2 relay SPDT

3. Alarm output A3, A4

- 00 not installed
 2R 2 relay SPDT

4. Analog output

- 00 not installed
 AO 0/4..20 mA, 0/2..10 V DC, isolated

5. Supply voltage

- 0 230 V AC, ± 10 % 50-60 Hz
 1 115 V AC, ± 10 % 50-60 Hz
 5 24 V DC, ± 15 %

6. Options

- 00 without option

Temperature Guard TG50Ex



Characteristics

The Temperature Guard TG50Ex offers intrinsically safe inputs for direct connection of temperature probes RTD (Pt100, Pt1000) and thermocouples type J, K, N or S, which are installed in the explosion endangered area.

Simple programming, 2 alarm outputs (SPDT) and an optional available fully free programmable isolated analog output 0/4...20 mA; 0/2...10 V DC offers a lot of solutions for temperature monitoring. The peak value indication for minimum and maximum measured temperature are stored in the background and can be read out from the display at any time.

Technical data

Power supply

Supply voltage : 230 V AC $\pm 10\%$
115 V AC $\pm 10\%$
24 V DC $\pm 15\%$
Um = 253 V AC or 125 V DC
(terminals 11 and 13)

Power consumption : max. 5 VA

Operating temperature : -10...+55 °C

CE-conformity : ATEX-directive 94/9/EG
(certificate TG50ATEX.001)
EN 60079-0:2006 EN 60079-11:2007
EN 61241-0:2006 EN 61241-11-0:2006
IEC61326 05/2004,
IEC 61000-4-2
IEC 61000-4-3
IEC 61000-4-4
IEC 61000-4-5
IEC 61000-4-6
IEC 61000-4-8
IEC 61000-4-11
CISPR16-1/16-2

Inputs

Explosions protection : II (1) G [Ex ia] IIC/IIB or
II (1) D [Ex iaD]
Approval : TÜV 08 ATEX 554329
Fault detection : broken line (Pt100/1000 and thermo-
couple) and short circuit (only
Pt100/1000)

Input RTD : Pt100 (3-wire) -100.0...+600.0 °C
Pt1000 (3-wire) -100.0...+300.0 °C
(terminals 35, 36, 37)

Input TC : Thermocouple
type J -100.0...+800.0 °C
type K -150...+1200 °C
type N -150...+1200 °C
type S -50...+1600 °C
cold junction compensation integrated
(terminals 45 and 47)

Accuracy : <0.1 %, ± 1 Digit

Temperature coefficient : 0.01 %/K

Safety data

Max. voltage no load U₀ : 1,4 V

Max. short circuit curr. I₀ : 2.5 mA

Max. output power P₀ : 3 mW

Resistance R : 5600 Ω

Characteristic curve : trapezoidal

Internal inductivity : 4 μ H

Internal capacity : 135 nF

Explosion protection Ex ia/IIC ia/IIB

Max. external inductivity : 100 mH 100 mH

Max. external capacity : 25 μ F 120 μ F

Outputs

Alarm outputs : relay SPDT
< 250 V AC < 250 VA < 2 A
cos $\Phi \geq 0.3$
< 300 V DC < 40 W < 2 A
(terminals 21, 22, 23; 25, 26, 27)

Analog output : 0/4...20 mA burden $\leq 500 \Omega$
0/2...10 V burden > 500 Ω , isolated
output changes automatically
(burden depending)

- Accuracy : 0.2 %; TK 0.01 % / K
(terminals 17 and 18)

Fault function : for broken line or short circuit detection
→ analog output (programmable)
0 mA, < 3.6 mA or > 21.5 mA
→ alarm relays

min. or max. function programmable
Display : graphic-LCD-display, 128 x 64 Pixel
with white LCD backlight

Case : Polyamide (PA) 6.6, UL94V-0
TS35 acc. to DIN EN 60715:2001-09

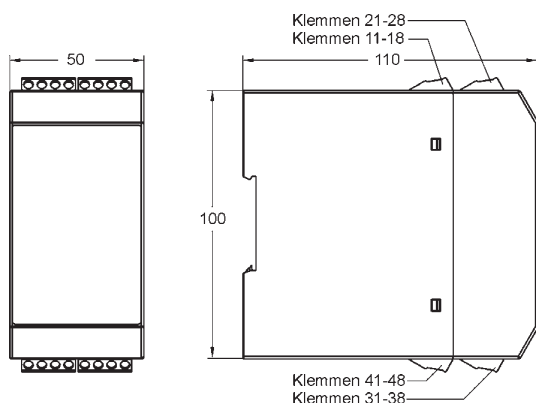
Weight : approx. 450 g

Connection : screw terminals 0.14...2.5 mm²
AWG 26...AWG14

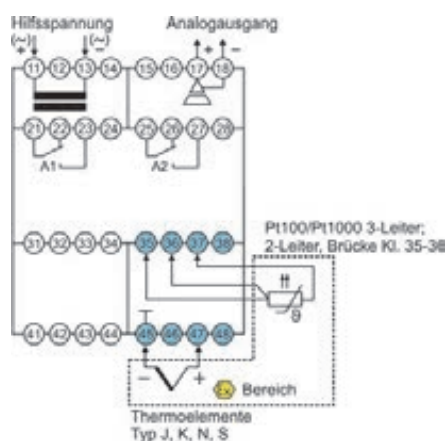
Protection class : case IP30, terminals IP20 acc. to
BGV A3

Continue next page

Abmessungen



Anschlussbild



Bestellschlüssel

TG50Ex - 1. - 2. - 3. - 4. - 5. - 6.

1. Ausführung/Eingang	
3	Pt100, 3-Leiter, -100,0..+600,0 °C Pt1000, 3-Leiter, -100,0..+300,0 °C Thermoelement J (Fe-CuNi), -100,0..+800,0 °C K (NiCr-Ni), -150..+1200 °C N (NiCrSi-NiSi), -150..+1200 °C S (Pt10Rh-Pt), -50..+1600 °C
Eingänge eigensicher ATEX II (1) G [Ex ia] IIC/IIB ATEX II (1) D [Ex iaD]	
2. Alarmausgänge A1, A2	
2R	2 Relaiswechsler
3. Alarmausgänge A3, A4	
00	nicht bestückt (nicht lieferbar)
4. Analogausgang	
00	nicht bestückt
AO	0/4..20 mA, 0/2..10 V DC galvanisch getrennt
5. Hilfsspannung	
0	230 V AC, ± 10 % 50-60 Hz
1	115 V AC, ± 10 % 50-60 Hz
5	24 V DC, ± 15 %
6. Optionen	
00	ohne Option

Thermal Limiter TB225

(in accordance with DIN EN 14597)



- Can be used as a temperature limiter and monitor
- Certified in accordance with DIN EN 14597
- Pt100 inputs, dual thermocouple, input signals
- 2 changeover relays
- Configuration via backlit graphic display
- 'White / Red' display colour change in the case of an alarm
- Safe galvanic isolation between input / output / auxiliary voltage
- Automatic recognition of the output signal
- Wide-range mains adapter
- Carrier rail mounting TS 35

Characteristics

The safety temperature limiter TB225 is used for applications where thermal processes must be monitored and the system must be switched to a safe operating state in the case of a fault. The device has universal inputs for the connection of dual thermocouples, Pt100 sensors, and input signals (0/4...20mA or 0/2...10V). The safety function is provided by means of the main relay with configurable threshold. An additional relay with an independently adjustable threshold is provided for additional signalling. The TB225 also offers an analog output which can be freely defined within the measuring range of the temperature input. The resetting of the device in the operating mode as a temperature limiter can take place via the buttons on the front, the integrated graphic display, or using an external switch or external voltage. The TB225 has safe 3-way electrical isolation between input, output, and auxiliary voltage.

Brief information

The connected temperature signal is evaluated and monitored. If the permissible threshold is reached or an error occurs within the permissible temperature range, the TB225 switches off immediately. The additional relay output of the TB225 enables the function of a preliminary alarm with an independent threshold. The following operating modes are possible through configuration:

Temperature limiter:

Maximum or minimum monitoring with catch, manual resetting after fault elimination via the front keys or an external switch / voltage signal
Operating methods in accordance with EN14597: 09/2012: Type 2B, 2H, 2V

Temperature monitor:

Maximum or minimum monitoring without catch, automatic resetting on return to the permissible range operating methods in accordance with EN 14597: 09/2012: Type 2B

Technical data

Auxiliary power

Auxiliary voltage	: 18 – 230 V AC/DC
Power consumption	: < 5 VA
Rated voltage	: 250V AC in accordance with EN 60730-1: 10/2012, between input / relay output / auxiliary voltage, Degree of contamination 2, Overvoltage category III Rated surge voltage 4kV

CE Conformity	: EN 14597 09/2012 EN 61326: 07/2013
---------------	---

Environmental conditions

Operating temperature	: -10...+55 °C
Transport and storage temperature	: -20...+60 °C
Relative air humidity	: < 95 %
Condensation	: not permitted

Approvals

DIN EN 14597	: 09/2012
--------------	-----------

Input

Pt100	: -100.0...600.0°C
Type J	: Fe-CuNi-100...800°C
Type K	: NiCr-Ni -150...1200°C
Type N	: NiCrSi-NiSi -150...1200°C
Type S	: Pt10RH-PT 0...1600°C
Reference junction compensation	: integrated

Basic precision	: <0.3 %, ±1 digit
-----------------	--------------------

Temperature coefficient	: 0.01 %/K
-------------------------	------------

Display

Display	: graphic LC display with 32 x 90 pixel, with white/red background lighting
---------	---

Outputs

Switching outputs	: 2 x relay
Changeover relay	: < 250 V AC < 500 VA < 2 A ohmic load < 30 V DC < 60W < 2 A ohmic load Internal main relay secured with 2A fuse! Fuse is not interchangeable!

Analog output	: 0/4...20 mA load ≤ 500 Ω
---------------	----------------------------

	: 0/2...10 V DC load > 500 Ω electrically isolated. Output switches automatically (load-dependent)
--	---

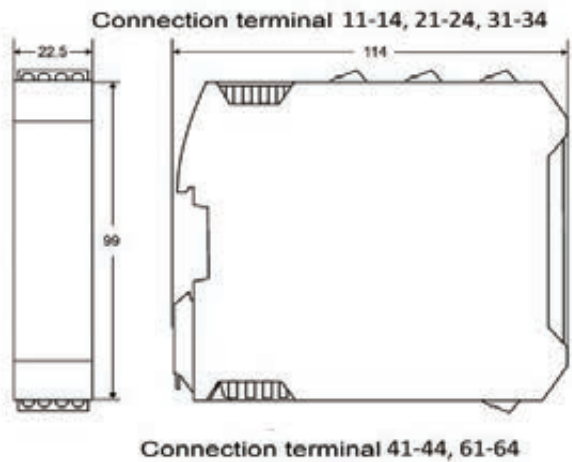
Housing

60715	: polyamide (PA) 6.6 , UL94V-0, TS35 in accordance with DIN EN
-------	--

Weight	: approximately 180 g
Connection	: screw terminals 0.14...2.5 mm ² with wire protection 0.14 - 2.5 mm ² (AWG 26 - 14)

Protection rating	: IP20, BGV A3
-------------------	----------------

Dimensions

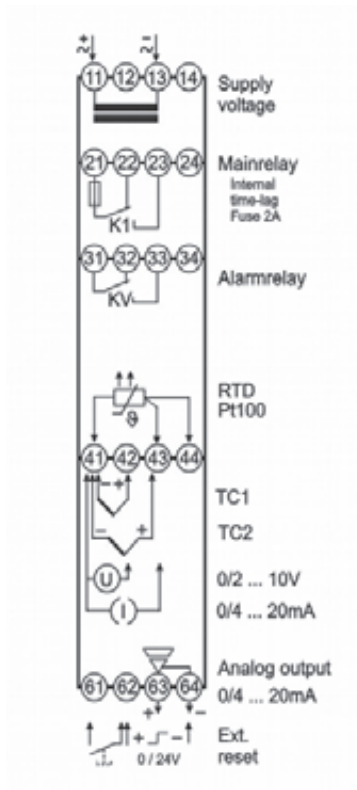


Ordering code

1. 2. 3. 4.
TB225 - - - -

1.	Version/input
0	Universal input
2.	Output
0	2 relay / 1 analog output 0/4..20 mA
3.	Auxiliary voltage
0	18 – 230 V AC/DC
4.	Options
00	without option

Connection diagram



Safety Temperature Limiter STL50

(acc. to DIN EN 14597, SIL 2)



- Useful as Temperature Limiter/-Guard and Exhaust gas Temperature Limiter
- Certified according to DIN EN 14597 SIL 2
- Inputs RTD Pt100 or double-thermocouple
- Alarm output 1 relay SPDT
- Programming via backlit LCD-graphic-Display

Characteristics

The STL50 safety temperature limiter is used where ever thermal processes must be monitored and the system must be transferred into a safe operational state in case of fault. If the permissible temperature limit value is reached, or if a fault occurs within the permissible temperature range on the monitoring equipment (sensor open, sensor short-circuit, failure of a component part in the device, fault in the software, failure or inadmissible value of the supply voltage etc.), the STL50 switches off without delay.

The alarm contact is activated, the LED ALARM on the front panel and the back-lighting of the display light up, and the error cause is indicated as plain text on the display. In addition, there is a 24 V DC signal present on the terminals 17-18 for an external alarm signal.

Description

Programming

The device is programmable via front side buttons in connection with the graphic display.

Operating modes

The device can be used as:

STB → Maximum- or minimum-monitoring with hold. Reset possible after omission of the fault with the external or internal button.

ASTB → as before, but monitoring the exhaust gas temperature

STW → Maximum- or minimum-monitoring without hold. Automatic reset after leaving the dangerous range

Switching hysteresis always acts in the direction of safe range. The last fault is stored as plain text and can be called up in the working level and deleted.

Temperature sensor

The device may be operate only with temperature probes which are certified according to DIN EN 14597!

Technical data

Power supply

Supply voltage : 230 V AC $\pm 10\%$
115 V AC $\pm 10\%$
24 V DC $\pm 15\%$

Power consumption : < 4 VA

CE-conformity : EN 55022, EN 60555
IEC 61000-4-2/3/4/5/6/11/13

Ambient conditions

Operating temperature : -10...+55 °C
Storage temperature : -30...+60 °C
Relative humidity : < 95 %
Condensation : not permitted
operation only in vibration less ambient

Approvals

EN 14597:2005 : temperature control devices and temperature limiters for heat-generating systems
EN 61508:2001 SIL2 : functional security safety-related electrical/electronic/programmable electronic systems

Input

Pt100 : in the range -100.0...+600.0 °C
3-wire, max. line resistance 4 Ω each line
sensor current < 1 mA (non self heating)

Thermocouple

Type J : Fe-CuNi, -100.0...+800.0 °C
Type K : NiCr-Ni, -150...+1200 °C
Type N : NiCrSi-NiSi, -150...+1200 °C
Type S : Pt10Rh-Pt, 0...+1600 °C
cold junction compensation integrated
Accuracy : < 0.5 %, ± 2 Digit
Temperature coefficient : 0.01 %/K
Display : graphic-LCD-display 28 x 64 Pixel, with white LCD-backlight

Output

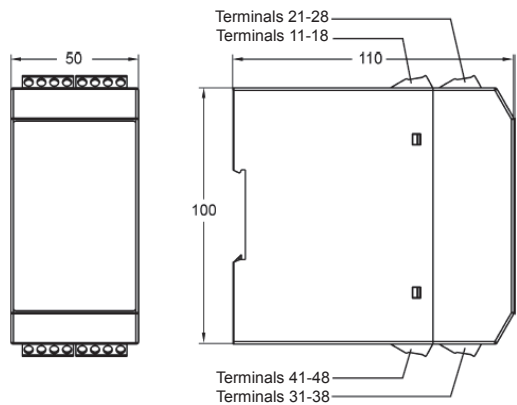
Relay : SPDT
< 250 V AC < 200 VA < 2 A
 $\cos \Phi \geq 0.7$
< 250 VDC < 80 W < 2 A,
internal fused 2 A (slow-blow)
Case : Polyamide (PA) 6.6, UL94V-0,
TS35 acc. to DIN EN 60715:2001-09

Weight : approx. 450 g
Connection : screw terminals 0.14...2.5 mm² (AWG 26 .. 14)

Protection class : IP20, DIN EN 60529, BGV A3

Continue next page

Dimensions

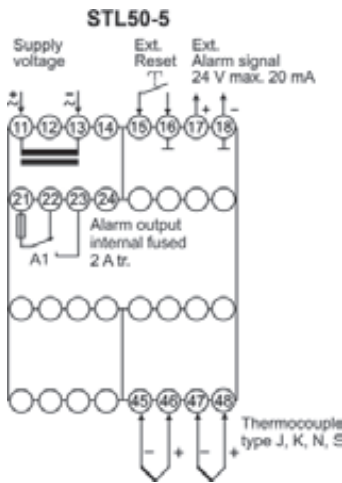
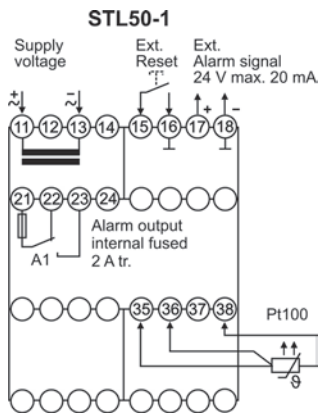


Ordering code

STL50 - 1. - 2. - 3. - 4.

1. Device type/input	
1	Pt100, 3-wire, -100.0..+600.0 °C
5	Thermocouple J (Fe-CuNi), -100.0..+800.0 °C K (NiCr-Ni), -150..+1200 °C N (NiCrSi-NiSi), -150..+1200 °C S (Pt10Rh-Pt), 0..1600 °C
2. Output	
1R	1 alarm output, relay SPDT
3. Supply voltage	
0	230 V AC, ± 10 % 50-60 Hz
1	115 V AC, ± 10 % 50-60 Hz
5	24 V DC, ± 15 %
4. Options	
00	without option

Connection diagrams



Safety Temperature Limiter STL50Ex

(acc. to DIN EN 14597, SIL 2)



- Useful as Temperature Limiter/-Guard and Exhaust gas Temperature Limiter
- Certified according to DIN EN 14597 SIL 2
- Inputs RTD Pt100 or double-thermocouple
- Alarm output 1 relay SPDT
- Programming via backlit LCD-graphic-Display

Characteristics

The STL50Ex safety temperature limiter is used where ever thermal processes must be monitored and the system must be transferred into a safe operational state in case of fault. If the permissible temperature limit value is reached, or if a fault occurs within the permissible temperature range on the monitoring equipment (sensor open, sensor short-circuit, failure of a component part in the device, fault in the software, failure or inadmissible value of the supply voltage etc.), the STL50Ex switches off without delay.

The alarm contact is activated, the LED ALARM on the front panel and the back-lighting of the display light up, and the error cause is indicated as plain text on the display. In addition, there is a 24 V DC signal present on the terminals 17-18 for an external alarm signal.

Description

Programming

The device is programmable via front side buttons in connection with the graphic display.

Operating modes

The device can be used as:

- STB → Maximum- or minimum-monitoring with hold. Reset possible after omission of the fault with the external or internal button.
- ASTB → as before, but monitoring the exhaust gas temperature
- STW → Maximum- or minimum-monitoring without hold. Automatic reset after leaving the dangerous range.

Switching hysteresis always acts in the direction of safe range.

The last fault is stored as plain text and can be called up in the working level and deleted.

Temperature sensor

The device may be operate only with temperature probes which are certified according to DIN EN 14597!

Technical data

Power supply

- Supply voltage : 230 V AC $\pm 10\%$
115 V AC $\pm 10\%$
24 V DC $\pm 15\%$
- Power consumption : < 4 VA
- CE-conformity : EN 55022, EN 60555
IEC 61000-4-2/3/4/5/6/11/13

Ambient conditions

- Operating temperature : -10...+55 °C
- Storage temperature : -30...+60 °C
- Relative humidity : < 95 %
- Condensation : not permitted, operation only in vibration less ambient

Approvals

- EN 14597:2005 : temperature control devices and temperature limiters for heat-generating systems
- EN 61508:2001 SIL2 : Functional security safety-related electrical/electronic/programmable electronic systems

Input

- Explosion protection : II (1) G [Ex ia] IIC/IIB or II (1) D [Ex iaD]
- Approval : TÜV 07 ATEX 554295
- Pt100 : -100.0...+600.0 °C, 3-wire, 3-wire, max. line resistance 4 Ω each line, sensor current < 1 mA (non self heating)

Data in case of an error

- Max. voltage no load U_0 : 1.4 V
- Max. short circuit current I_0 : 6 mA
- Max. power loss P_0 : 7 mW
- Min. internal resistor R : 1.6 k Ω (curve trapezoidal)

Explosion protection

- Max. external inductivity : 100mH
- Max. external capacity : 110 μ F
- Internal capacity : negligible
- Internal inductivity : negligible

Thermocouple

- Type J : Fe-CuNi, -100.0...+800.0 °C
- Type K : NiCr-Ni, -150...+1200 °C
- Type N : NiCrSi-NiSi, -150...+1200 °C
- Type S : Pt10Rh-Pt, 0...1600 °C
cold junction compensation integrated

Data in case of an error

- Max. voltage no load U_0 : 0.7 V
- Max. short circuit current I_0 : 2 mA
- Max. power loss P_0 : 1.5 mW
- Min. internal resistor R : 5 k Ω (curve trapezoidal)

Explosion protection

- Max. external inductivity : 100mH
- Max. external capacity : 240 μ F
- Internal capacity : negligible
- Internal inductivity : negligible

Accuracy

- Temperature coefficient : < 0.5 %, ± 2 Digit

Temperature coefficient

- Display : graphic LCD-display 28 x 64 Pixel, with white LCD-backlight

Output

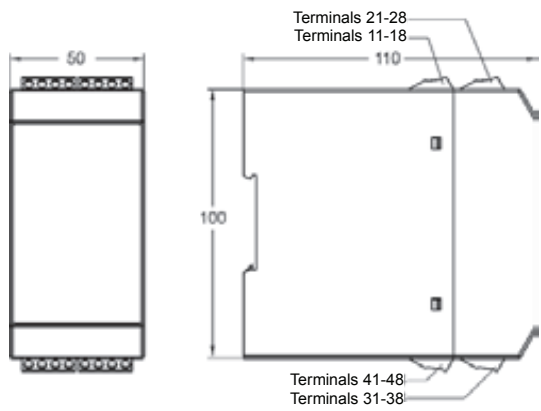
- Relay : SPDT
< 250 V AC < 200 VA < 2 A
 $\cos \Phi \geq 0.7$
< 250 VDC < 80 W < 2 A,
internal fused 2 A (slow-blow)

Continue next page

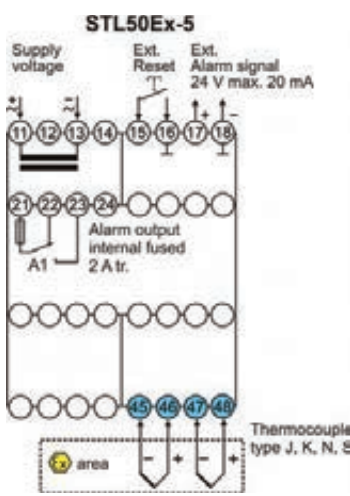
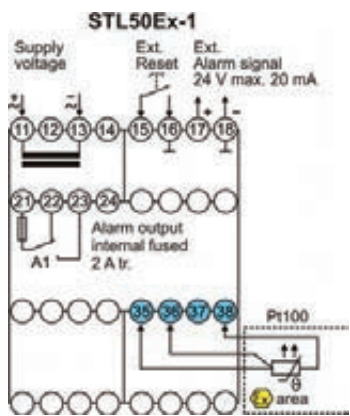
Product information

Case : Polyamide (PA) 6.6 , UL94V-0, TS35 acc. to DIN EN 60715:2001-09
Weight : approx. 450 g
Connection : screw terminals 0.14..2.5 mm² (AWG 26 .. 14)
Protection class : IP20, DIN EN 60529, BGV A3

Dimensions



Connection diagrams



Safety and Monitoring

Ordering code

STL50Ex - 1 - 2 - 3 - 4

1. Device type/input	
1	Pt100, 3-wire, -100.0..+600.0 °C
5	Thermocouple J (Fe-CuNi), -100.0..+800.0 °C K (NiCr-Ni), -150..+1200 °C N (NiCrSi-NiSi), -150..+1200 °C S (Pt10Rh-Pt), 0..1600 °C
2. Output	
1R	1 alarm output relay
3. Supply voltage	
0	230 V AC, ± 10 % 50-60 Hz
1	115 V AC, ± 10 % 50-60 Hz
5	24 V DC, ± 15 %
4. Options	
00	without option

E6 Calibration and testing

GHM SensorSimulator	368
---------------------	-----

GHM SensorSimulator SIM-1



Characteristics

The GHM SensorSimulator outputs various voltage and current signals.

The GHM SensorSimulator can also simulate sensors such as Pt100, thermocouples and strain gage sensors optimally through the additional back-up measurement of the supply voltages and currents of the connected measuring amplifiers.

It can be used to calibrate and verify displays, transducers or complete measurement chains.

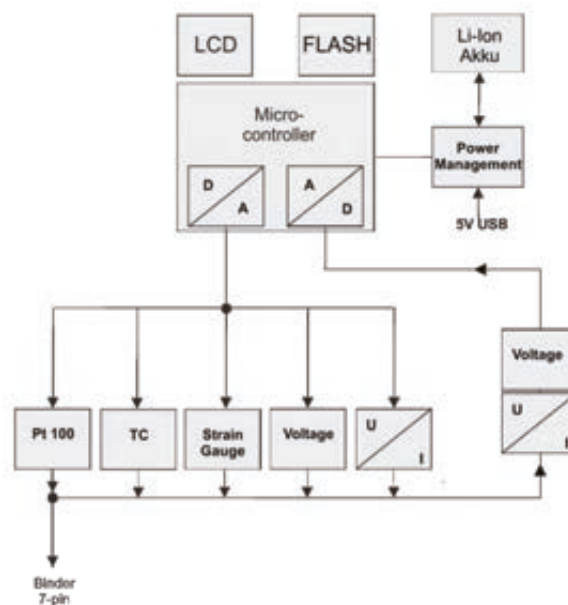
In addition, voltages and currents can be measured with the device.

Technical Data

General	
Accuracy	See Simulation and Measure
Connection	7-pol. Binder socket for Signal In- and Output Mini-USB for Supply voltage and charging
Display	Graphic-LCD, monochrome, (180 x 128 Pixel) adjustable backlighting
Operation	Keypad
Languages	German, English
Dimensions	160 x 86 x 37 mm (H x W x D)
Weight	250g (incl. Accu)
Supply voltage	5 V DC (Mini-USB)
Accu	Lithium-Ion
Ambient temperature	0..+50 °C

Simulation		
Voltage	Simulation Range	$\pm 10 \text{ V}$
	Accuracy	$\pm 1 \%$
Signal Current	Simulation Range	$\pm 25 \text{ mA}$
	Accuracy	$\pm 1 \%$
Strain Gage	Simulation Range	0.5, 1, 2, 4, 5, 10, 25, 50 mV/V
	Accuracy	$\pm 1 \%$
	Supply	2,5 V, 5 V, 10 V
Thermo-couple, Type K (Others opt.)	Simulation Range	-100..+1000 °C (-100 .. 100 °C: 10°C steps 100 .. 500 °C: 25°C steps 500 .. 1000 °C: 50°C steps)
	Accuracy	$\pm 1 \%$
Pt100	Simulation Range	-100..+850 °C (-100 .. 100 °C: 10°C steps 100 .. 500 °C: 25°C steps 500 .. 850 °C: 50°C steps)
	Accuracy	$\pm 1 \%$
Measure		
Voltage	Measuring Range	$\pm 30 \text{ V}$
	Accuracy	$\pm 0,5 \%$
Current	Measuring Range	$\pm 30 \text{ mA}$
	Accuracy	$\pm 0,5 \%$

Block Diagram



Delivery Content

- GHM SensorSimulator with protective silicon cover
- Accu
- Charger
- User Manual

Ordering Code

SIM-SenSim-1

F4 Wireless datalogger

Wireless datalogger GHM DeltaBus

372

Wireless data loggers GHM DeltaBus



Characteristics

- Connection via
 - WLAN, Ethernet, RS485, GSM/GPRS, USB
- Acquisition of (environmental data)
 - Temperature
 - Humidity
 - Atmospheric pressure and differential pressure
 - Illuminance (lux)
 - UVA, UVB and UVC irradiance
 - Carbon monoxide (CO), Carbon dioxide (CO₂)
 - Solar radiation
 - Rainfall quantity
 - Wind speed and direction
 - Leaf wetness
 - Acceleration

Application fields

- Building automation
- Meteorology
- Agriculture
- Industry
- Food industry
- Pharma industry
- Museums
- Warehouses
- Carriage of goods
- Photovoltaics

Introduction to the wireless data recording systems

A data recording system is a set of instruments which allows measuring and storing the values of certain physical quantities, such as temperature, humidity, pressure, solar radiation, etc.

A data recording system is generally made of:

- **Sensors:** they are placed at the measuring points and convert the values of the physical quantities into electrical analog or digital signals.
- **Acquisition system:** it reads and logs the electrical signals outgoing from the sensors. If the acquisition system is digital, the acquired values are kept in the system's internal memory until the memory is full.
- **PC:** the transfer of data from a digital acquisition system to a PC allows storing the measured values even after the internal memory of the acquisition system is full. The PC also allows processing and analyzing the acquired values.

Connecting the components of the system

The components of the recording system can be connected in two different ways:

- Wired connection
- Wireless connection by radio frequency transmission

The type of connection depends on various factors, such as:

- the distance among the various components of the system;
- ease of installation;
- cost of installation;
- possibility to easily modify the system;
- electromagnetic interferences in the environment of installation.

Advantages of the wireless connection

- **Quick and easy installation:** as it is not necessary the laying of cables and conduits, a wireless system is installed much more easily and quickly than a wired system, especially when the components are at a great distance from one another.
- **Reduction of installation costs:** the absence of cables allows a considerable saving in cost of material and labor.
- **Flexibility of the system:** the absence of fixed links between the various parts allows moving the system components at any time without problems.
- **Low maintenance:** the cables are subject to deterioration over time, the absence of cables reduces the maintenance costs of the system.

Contraindications of the wireless connection

The operation of a wireless system can be difficult in environments with excessive electromagnetic interferences (in which case a wired shielded connection may be preferable) or in areas particularly shielded that hinder the radio transmission between the parts of the system.

Radio frequency transmission in wireless systems

In the case of wireless connections, the acquisition system is made of a radiofrequency transmitting part and a radiofrequency receiving part:

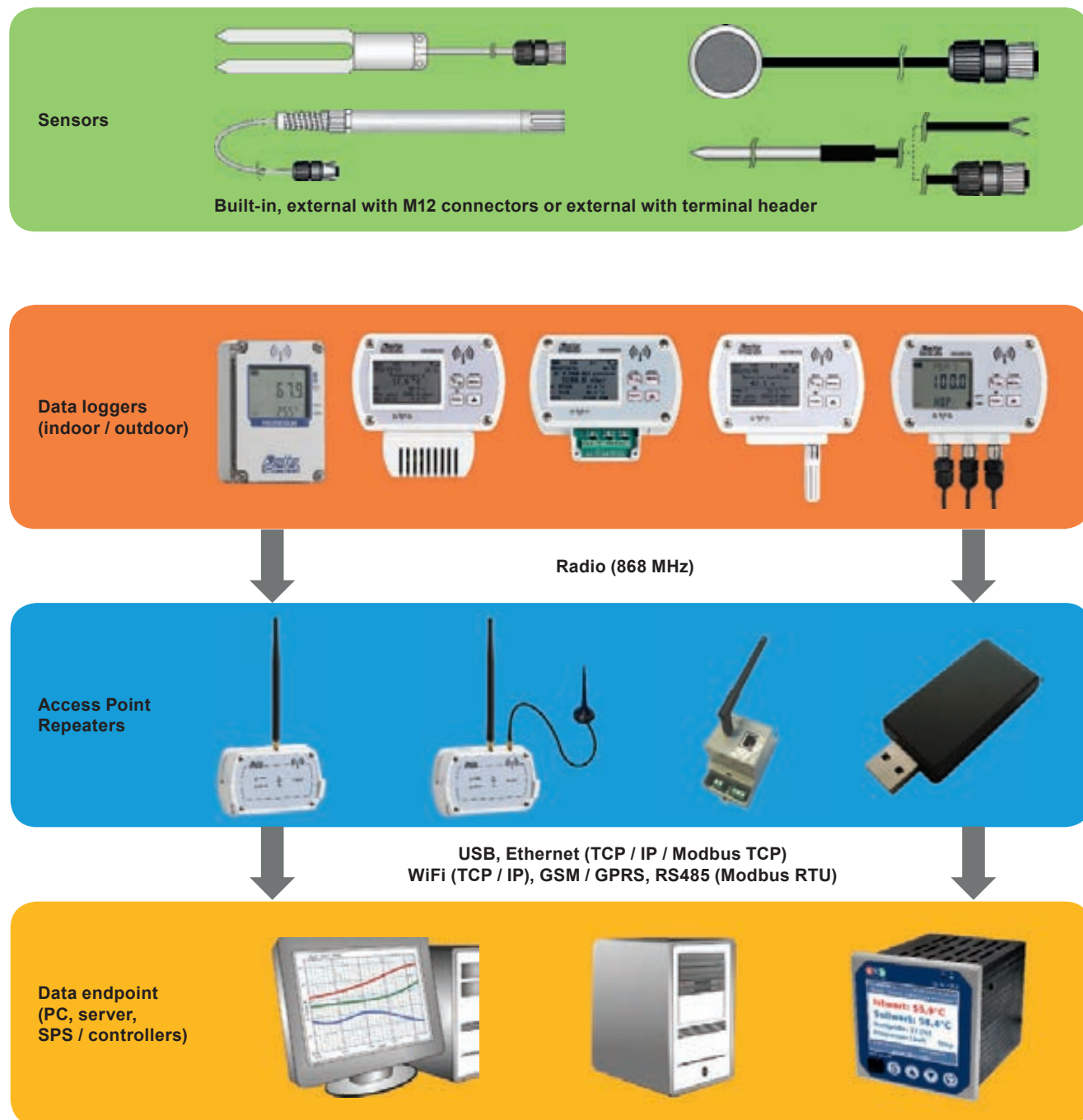
- **Transmitting part:** positioned near the sensor, it transmits the measured values to the receiving part. The transmitter part is normally integrated in the measuring instrument to which the sensor is connected.
- **Receiving part:** positioned close to the PC, it receives the measured values and transmits them to the PC. The receiving part is usually indicated by the terms Base Unit or Access Point.



Wireless data recording system

The transmitter part of the acquisition system can be unique for all the sensors or can be made of multiple transmitters, each of which sends the measurements of some of the sensors. The receiving part of the system is the same for all sensors.

System overview



System description

The Delta OHM wireless data logging system allows the monitoring of many physical quantities in various application fields. The data loggers are available for the monitoring of:

- Temperature
- Humidity
- Atmospheric pressure and differential pressure
- Illuminance (lux)
- UVA, UVB and UVC irradiance
- Carbon monoxide (CO)
- Carbon dioxide (CO₂)
- Solar radiation
- Rainfall quantity
- Wind speed and direction
- Leaf wetness
- Acceleration

The models that measure relative humidity and temperature calculate derived humidity quantities. The calculated quantities depend on the model and can be: Dew Point, wet bulb temperature, absolute humidity, mixing ratio, partial vapour pressure.

Depending on the model, the external measuring probes are connected to the data logger via M12 connector or screw terminal header. Some of the models are equipped with built in sensors.

Data loggers with terminal header inputs are available for the connection of:

- Transmitters with 0÷20 or 4÷20 mA current output and 0÷50 mV, 0÷1 V or 0÷10 V voltage output
- Pt100 / Pt1000 and K, J, T, N, E type thermocouple temperature sensors
- Sensors with voltage free contact output (counting of switchings) or potentiometric output

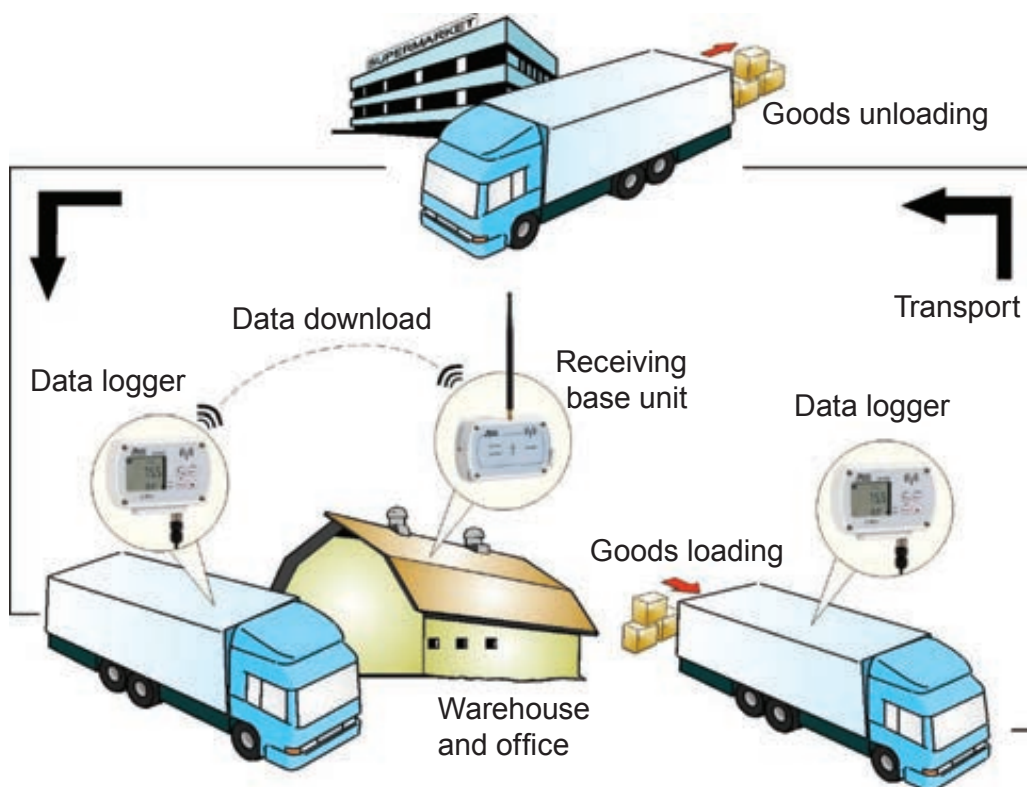
This allows extending the monitoring capability of the system to countless other quantities, in addition to those listed above.

Application fields

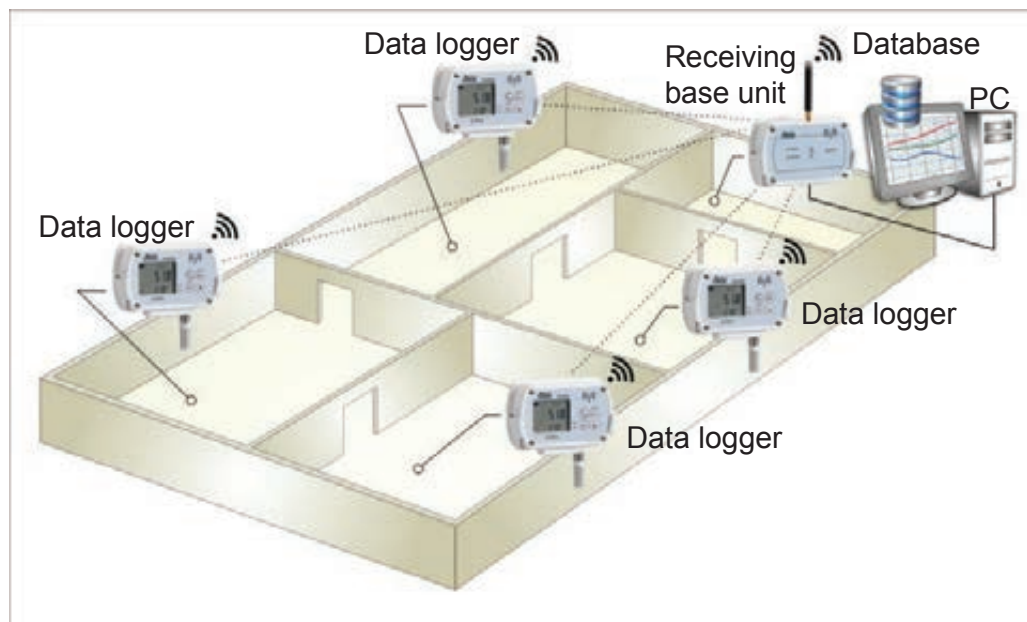


Typical application fields of the Delta OHM wireless data logging system are:

- Food services (refrigerated containers, cold storage, production and carriage of food)
- Health (storage of medicines, vaccines, blood, monitoring of incubators and operating rooms)
- Greenhouses and agriculture
- Environmental analyses (Air quality, meteorology and hydrology)
- Monitoring of solar panels
- Museums and document archives
- Transportation of perishable and fragile goods (monitoring of shocks by measuring the acceleration)
- Air conditioning
- Clean rooms
- Laboratories
- Industrial processes
- Buildings, offices, schools



Monitoring of perishable (food, medicines, etc.) or fragile goods during transport.


















Example of monitoring of an environment composed of several distinct areas.

Available Data loggers

The following tables list the HD35ED... data logger models available. Other models, in addition to those listed, can be supplied upon request for quantities.

To highlight the physical quantities measured by the data loggers, the ordering codes include some characters that identify the various quantities, according to the following convention:

	1 = Humidity
	4b = Atmospheric pressure (barometer)
	4 = Differential pressure (4r1 = range 1, 4r2 = range 2, etc.)
	N = Temperature with NTC10K sensor (N/1 = 1 channel, N/2 = 2 channels, N/3 = 3 channels)
	7P = Temperature with Pt100/Pt1000 sensor (7P/1 = 1 channel, 7P/2 = 2 channels, 7P/3 = 3 channels)
	K = Temperature with thermocouple sensor (K/4 = 4 channels)
	A = Carbon monoxide (CO)
	B = Carbon dioxide (CO ₂)
	I = Illuminance low range (0...20,000 lux), I2 = Illuminance high range (0...200,000 lux)
	U = UV irradiance (U =UVA, UB =UVB, UC =UVC)
	R = Solar radiation (pyranometer)
	P = Rainfall quantity
	V = Acceleration
	L = Leaf wetness
	S = Soil moisture









To indicate the fixed probe or the probe with cable, the following indications are used:










TC	=	Probe with cable
TV	=	Temperature and/or R.H. fixed vertical probe without cable, with high accuracy R.H. sensor
TVI	=	Temperature and R.H. fixed vertical probe without cable
TCV	=	Illuminance/UV irradiance or temperature only probe with cable and temperature/R.H. fixed vertical probe without cable, with high accuracy R.H. sensor

The models that measure temperature and humidity with combined probe with cable (models ...**TC**) use the probes of the series **HP3517...** with **high accuracy relative humidity sensor** and, depending on the model, NTC 10KΩ @ 25 °C or Pt100 temperature sensor. **The replacement of the probe HP3517... requires the recalibration of the instrument in line with the new probe.**

The models with M12 connectors equipped with inputs for measuring only the temperature use the temperature probes of the series **TP35...** with NTC 10KΩ @ 25 °C or Pt100/Pt1000 sensor.

TAB. 1A: Data loggers in housing for indoor use

	Measures									Optional LCD		Inputs		Fig.	Page
Model										L	G	Number of M12 connectors	Built-in sensors		
	NTC 10KQ	Pt100 Pt1000	RH	Patm	ΔP	Lux	UV	CO	CO ₂	Custom	Graphic				
HD35ED 7P/1 TC		•									•	1		A	60
HD35ED 7P/2 TC		•									•	2		A	60
HD35ED 7P/3 TC		•									•	3		A	60
HD35ED N/1 TC	•									•		1		A	62
HD35ED N/2 TC	•									•		2		A	62
HD35ED N/3 TC	•									•		3		A	62
HD35ED N TV	•									•				B	64
HD35ED 1 TV			•							•				B	65
HD35ED 1 TVI			•							•				B	66
HD35ED 1N TC	•		•							•		1		A	67
HD35ED 17P TC		•	•							•		1	•	A	69
HD35ED 1N TV	•		•							•			•	B	71
HD35ED 1N TVI	Sensor integrated in RH module		•							•			•	B	72
HD35ED 1N/2 TC	•		•							•		2		A	74
HD35ED 1N/2 TCV	•		•							•		1	T / RH	C	76
HD35ED 14bN TC	•		•	•								1	Patm	A	78
HD35ED 14bN TV	•		•	•						•			•	B	80
HD35ED 14bN TVI	Sensor integrated in RH module		•	•							•		•	B	82
HD35ED 1N4r...TV (*)	•		•		•					•			•	F	84
HD35ED 4r... (*)					•					•			•	E	86
HD35ED 1NI TCV	•		•			•				•			T / RH	C	87
HD35ED 1NI2 TCV	•		•			•				•			T / RH	C	87
HD35ED 1NI TV	•		•			•				•			•	D	89
HD35ED 14bNI TCV	•		•	•		•				•		1	T / RH Patm	C	91
HD35ED 14bNI2 TCV	•		•	•		•				•		1	T / RH Patm	C	91
HD35ED 14bNI TV	•		•	•		•				•			•	D	93
HD35ED 1NIU TCV	•		•			•	UVA			•		1	T / RH	C	95
HD35ED 1NIU TV	•		•			•	UVA			•			•	D	97

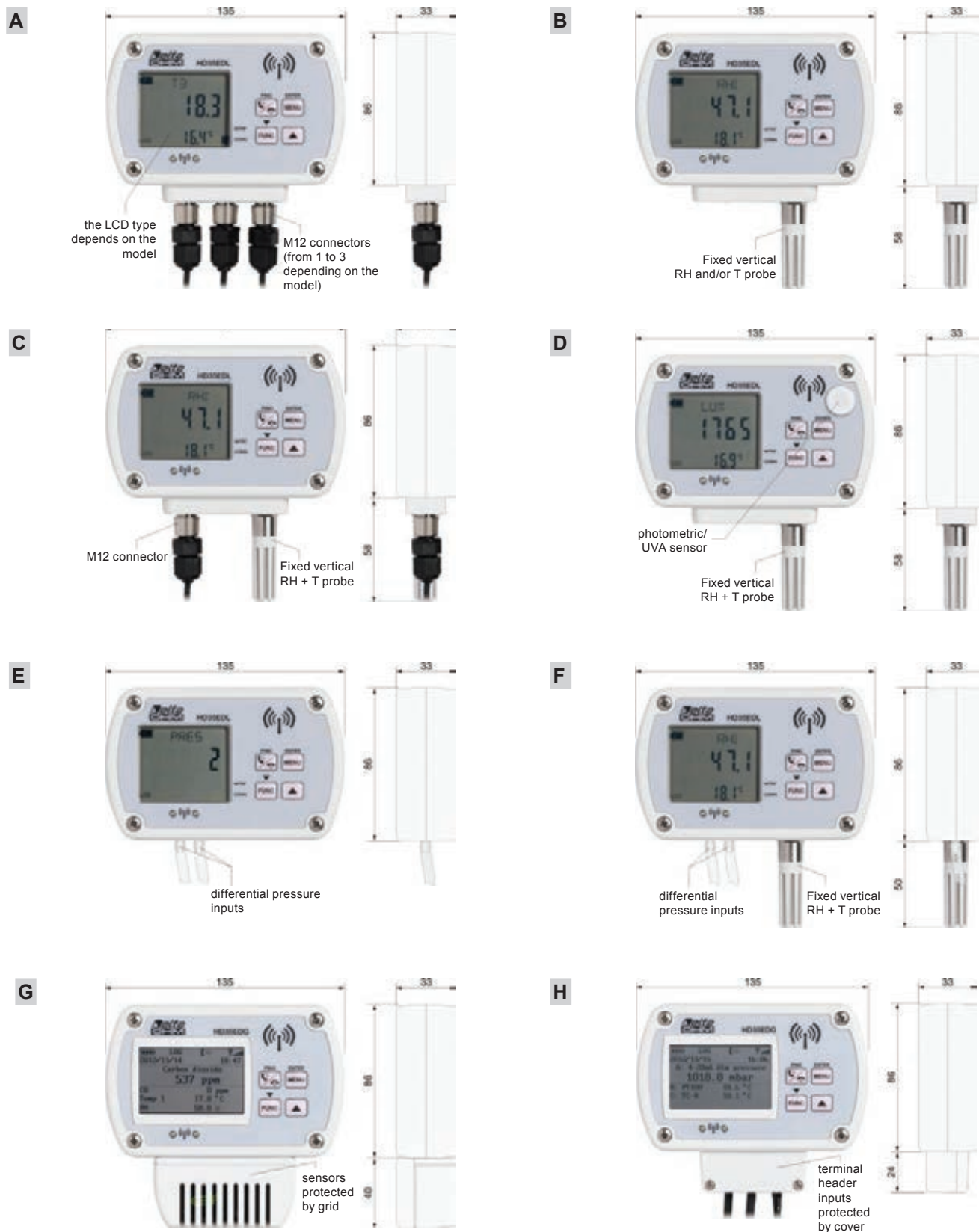
	Measures									Optional LCD		Inputs		Fig.	Page	
Model											L	G	Number of M12 connectors			Built-in sensors
	NTC 10KΩ	Pt100 Pt1000	RH	Patm	ΔP	Lux	UV	CO	CO ₂	Custom	Graphic					
HD35ED 1NUB TCV	●		●				UVC			●		1	T / RH	C	99	
HD35ED 1NUC TCV	●		●				UVC			●		1	T / RH	C	101	
HD35ED 14bNIU TCV	●		●	●		●	UVA			●		1	T / RH Patm	C	103	
HD35ED 14bNIU TV	●		●	●		●	UVA			●			●	D	105	
HD35ED 1NB	Sensor integrated in RH module		●						●		●		●	G	107	
HD35ED 1NAB			●					●	●		●		●	G	109	
HD35ED 14bNAB			●	●				●	●		●		●	G	111	
HD35ED H	Transmitters with 0÷20 mA, 4÷20 mA, 0÷50 mV or 0÷1 V output Pt100 / Pt1000 sensors, thermocouples K, J, T, N, E Sensors with voltage free contact or potentiometric output										●	3 terminal header inputs		H	113	

(*) Differential pressure ranges available

Model	Measuring range
HD35ED...4r1...	-2.5...+2.5 hPa (mbar)
HD35ED...4r2...	-10...+10 hPa (mbar)
HD35ED...4r3...	-100...+100 hPa (mbar)
HD35ED...4r4...	-2000...+2000 hPa (= 2 bar)
HD35ED...4r5... (**)	-125...+125 Pa (for clean rooms)

(**) The model r5 measures dynamic pressures (not suitable for the measurement of static pressures) and requires a small air flow between the two pressure inputs. Metal inputs with tube clamp ring to minimize pressure losses.

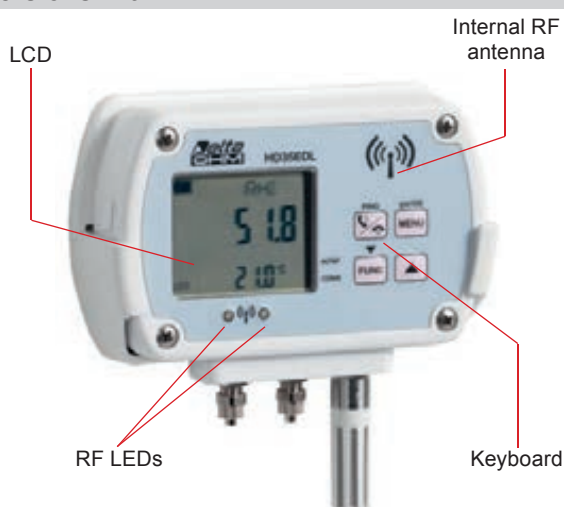
TAB. 1B: Data loggers in housing for indoor use - Figures



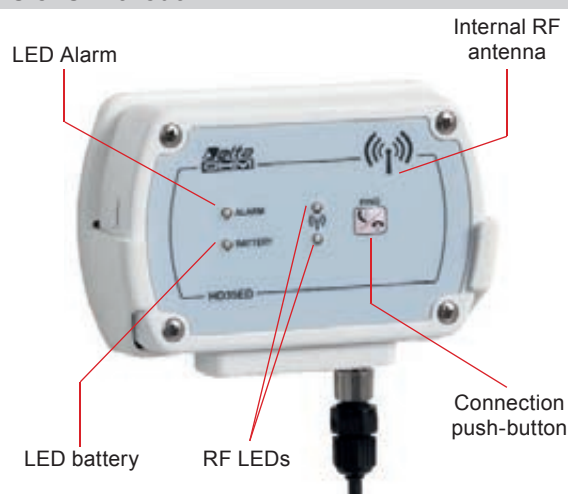
Technical measurements

HD35ED... data loggers in housing for indoor use	
Transmitting frequency	868 MHz, 902-928 MHz or 915.9-929.7 MHz depending on the model
Antenna	Internal
Transmitting range	See table 7
Measuring interval (*)	1, 2, 5, 10, 15, 30 s / 1, 2, 5, 10, 15, 30, 60 min
Logging and transmitting interval (*)	1, 2, 5, 10, 15, 30 s / 1, 2, 5, 10, 15, 30, 60 min
Internal memory	Circular management or stop logging if full. The number of samples that can be stored depends on the number of acquired quantities (see table 2).
Alarm	Acoustic by means of the internal buzzer
Power supply	Internal 3.6 V lithium thionyl chloride (Li-SOCl ₂) not rechargeable battery, size AA, Molex 5264 2-pole connector. In the models in housing with grid, a connector for external power supply (SWD 06) is available.
Battery autonomy (without repeaters, direct communication with HD35AP...)	1.5 years typical for CO/CO ₂ models (with 2 min measurement and logging intervals) and for ΔP range r5 model (with 30 s measurement and logging intervals); 2 years typical for the other models, with 5 s measurement interval (10 s for HD35EDH) and 30 s logging interval.
Display	Optional. Custom or graphic LCD depending on the model (see table 1A).
Keyboard	Push-buttons for connection / PING (for testing RF). The models with LCD are provided with buttons for configuration and scrolling of the measured value.
LED indicators	RF communication status. The models without LCD are provided with alarm LED and battery level LED.
Working temperature and humidity range	-20...+70 °C (-10...+70 °C for the models with grid) / 0...85 %RH not condensing
Housing	Material: LURAN® S 777K Dimensions: see table 1B Protection degree: IP 64 (versions with M12 connectors)
Connectors for external probes with cable	Depending on the model, M12 connectors or terminal header inputs 3.5 mm pitch.
Weight	200 g approx. (version with LCD, including battery)
Installation	Wall mount support (supplied) for removable installation or flanges (optional) for fixed installation.

Versions with LCD



Versions without LCD



(*) Some models measuring several quantities may have a minimum interval greater than 1 second (see table 2).

TAB. 2: Capacity of the internal memory of the data logger for indoor use

Model	Number of samples that can be stored (**)	Minimum logging interval	Stored quantities (*)
HD35ED 7P/1 TC	68,000	5 s	T
HD35ED 7P/2 TC	52,000	5 s	T
HD35ED 7P/3 TC	42,000	5 s	T
HD35ED N/1 TC	68,000	1 s	T
HD35ED N/2 TC	52,000	1 s	T
HD35ED N/3 TC	42,000	1 s	T
HD35ED N TV	68,000	1 s	T
HD35ED 1 TV	68,000	1 s	RH
HD35ED 1 TVI	68,000	1 s	RH
HD35ED 1N TC	24,000	1 s	T, RH, TD, TW, AH, MR, PVP
HD35ED 17P TC	24,000	1 s	T, RH, TD, TW, AH, MR, PVP
HD35ED 1N TV	24,000	1 s	T, RH, TD, TW, AH, MR, PVP
HD35ED 1N TVI	24,000	1 s	T, RH, TD, TW, AH, MR, PVP
HD35ED 1N/2 TC	22,000	1 s	T, RH, TD, TW, AH, MR, PVP
HD35ED 1N/2 TCV	22,000	1 s	T, RH, TD, TW, AH, MR, PVP
HD35ED 14bN TC	22,000	2 s	T, RH, TD, TW, AH, MR, PVP, PATM
HD35ED 14bN TV	22,000	2 s	T, RH, TD, TW, AH, MR, PVP, PATM
HD35ED 14bN TVI	22,000	2 s	T, RH, TD, TW, AH, MR, PVP, PATM
HD35ED 1N4r...TV	22,000	1 s	T, RH, TD, TW, AH, MR, PVP, ΔP
HD35ED 4r...	68,000	1 s	ΔP
HD35ED 1NI TCV	44,000	1 s	T, RH, TD, TW, AH, MR, PVP, I
HD35ED 1NI2 TCV	44,000	1 s	T, RH, TD, TW, AH, MR, PVP, I
HD35ED 1NI TV	44,000	1 s	T, RH, TD, TW, AH, MR, PVP, I
HD35ED 14bNI TCV	36,000	2 s	T, RH, TD, TW, AH, MR, PVP, PATM, I
HD35ED 14bNI2 TCV	36,000	2 s	T, RH, TD, TW, AH, MR, PVP, PATM, I
HD35ED 14bNI TV	36,000	2 s	T, RH, TD, TW, AH, MR, PVP, PATM, I
HD35ED 1NIU TCV	32,000	1 s	T, RH, TD, TW, AH, MR, PVP, I, UVA, PUV
HD35ED 1NIU TV	32,000	1 s	T, RH, TD, TW, AH, MR, PVP, I, UVA, PUV
HD35ED 1NUB TCV	44,000	1 s	T, RH, TD, TW, AH, MR, PVP, UVB
HD35ED 1NUC TCV	44,000	1 s	T, RH, TD, TW, AH, MR, PVP, UVC
HD35ED 14bNIU TCV	32,000	2 s	T, RH, TD, TW, AH, MR, PVP, PATM, I, UVA, PUV
HD35ED 14bNIU TV	32,000	2 s	T, RH, TD, TW, AH, MR, PVP, PATM, I, UVA, PUV
HD35ED 1NB	44,000	10 s	T, RH, TD, TW, AH, MR, PVP, CO
HD35ED 1NAB	36,000	10 s	T, RH, TD, TW, AH, MR, PVP, CO, CO2
HD35ED 14bNAB	32,000	10 s	T, RH, TD, TW, AH, MR, PVP, PATM, CO, CO2
HD35ED H	from 36,000 to 68,000	5 s	depends on the inputs configuration

(*) List of the quantities:

T: temperature	ΔP: differential pressure
RH: relative humidity	I: illuminance
TD: dew point	UVA: UVA irradiance
TW: wet bulb temperature	UVB: UVB irradiance
AH: absolute humidity	UVC: UVC irradiance
MR: mixing ratio	PUV: proportion of UV present ($\mu W/lumen$)
PVP: partial vapour pressure	CO: carbon monoxide
PATM: atmospheric pressure	CO2: carbon dioxide

(**) One sample consists of all the quantities measured and calculated by the data logger at the same instant of acquisition. For example, the model HD35ED1NAB measures four quantities and calculates five quantities (the derived humidity quantities) and one sample includes one temperature measure, one CO measure, one CO2 measure and six humidity measures (the relative humidity measure plus the five derived quantities).

TAB. 3: Number of data loggers in the system as a function of the data transmission interval

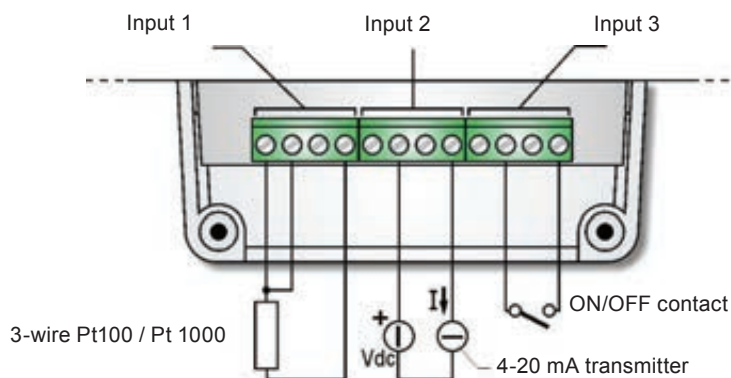
Data transmission interval	Number of data loggers manageable by the base unit	Data transmission interval	Number of data loggers manageable by the base unit
1 s	12	10 s	120
2 s	24	15 s	180
5 s	60	> 30 s	254

Table 3 refers to the case of direct connection among the base unit and the data loggers (1 "Hop"). If repeaters are present, the transmission of the data requires more time and the number of data loggers manageable by the base unit could be lower than that reported in table 3.

The number of devices in the system (base unit + repeaters + data loggers) should not exceed 255.

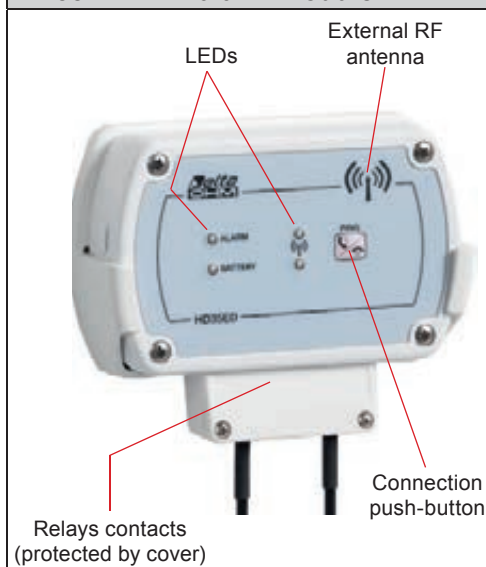
Terminal header in the model HD35EDH

The model HD35EDH is equipped with three terminal header inputs. Each input can be configured as input for: Pt100/Pt1000, thermocouple, 0/4...20 mA (the shunt resistance is internal), 0...50 mV, 0...1 V or potentiometer. Only input 3 can also be configured as pulse counter (counting of switchings of a voltage free contact).



Example of connection of HD35EDH model inputs

HD35ED-ALM alarm module



Power supply	Internal 3.6 V lithium thionyl chloride (Li-SOCl ₂) not rechargeable battery, size AA, Molex 5264 2-pole connector
Battery autonomy	1 year in typical operating conditions (the actual autonomy depends on how often the alarm condition is generated)
Transmitting frequency	868 MHz, 902-928 MHz or 915.9-929.7 MHz, depending on the model
Antenna	Whip internal
Transmitting range	See table 7
Keyboard	Push-button for connection / PING (for testing RF)
LED indicators	Presence of alarm, battery charge level, RF communication status.
Relay	2 bistable relays with voltage free contact Contact: max 1A @ 30Vdc resistive load
Working temperature and humidity range	-10...+70 °C / 0...85 %RH not condensing
Housing	Material: LURAN® S 777K Dimensions: 135 x 110 x 33 mm
Weight	200 g approx. (including battery)
Installation	Wall mount support (supplied) for removable installation or flanges (optional) for fixed installation

WATERPROOF VERSIONS FOR OUTDOOR USE**WATERPROOF VERSIONS FOR OUTDOOR USE AND INDUSTRIAL APPLICATIONS (HD35EDW... series)**

For outdoor use or in severe environmental conditions (e.g. in the case of industrial applications), data loggers in housing with front dimensions 120 x 80 mm and **IP 67** protection degree are available.

To ensure IP 67 seal, the data loggers have no front keys.



**Outdoor transmitting station
with data logger of the series HD35EDW...**



**Receiving station
with base unit HD35AP**

The housing of the waterproof versions can be wall mounted or, in the case of outdoor installation, fixed on a 40 mm diameter mast by means of the HD2003.77/40 clamping. For outdoor installation, the data logger can be supplied with the **protection shield from solar radiations (HD9217TF1)**.

For outdoor installation on a mast, the data logger can be supplied with the mast clamping already mounted on the back of the housing and provided with internal over-voltage protection devices, connected to the clamping. For the correct operation of the protection devices, the yellow/green cable with faston connector fixed to the clamping must be connected to ground.

The outdoor installation of the combined temperature and relative humidity probe requires the protection from solar radiations HD9007A-1 or HD9007A-2.










Product information

Wireless datalogger

The following tables list the **HD35EDW...** data logger models available in waterproof housing. Other models, in addition to those listed, can be supplied upon request for quantities.

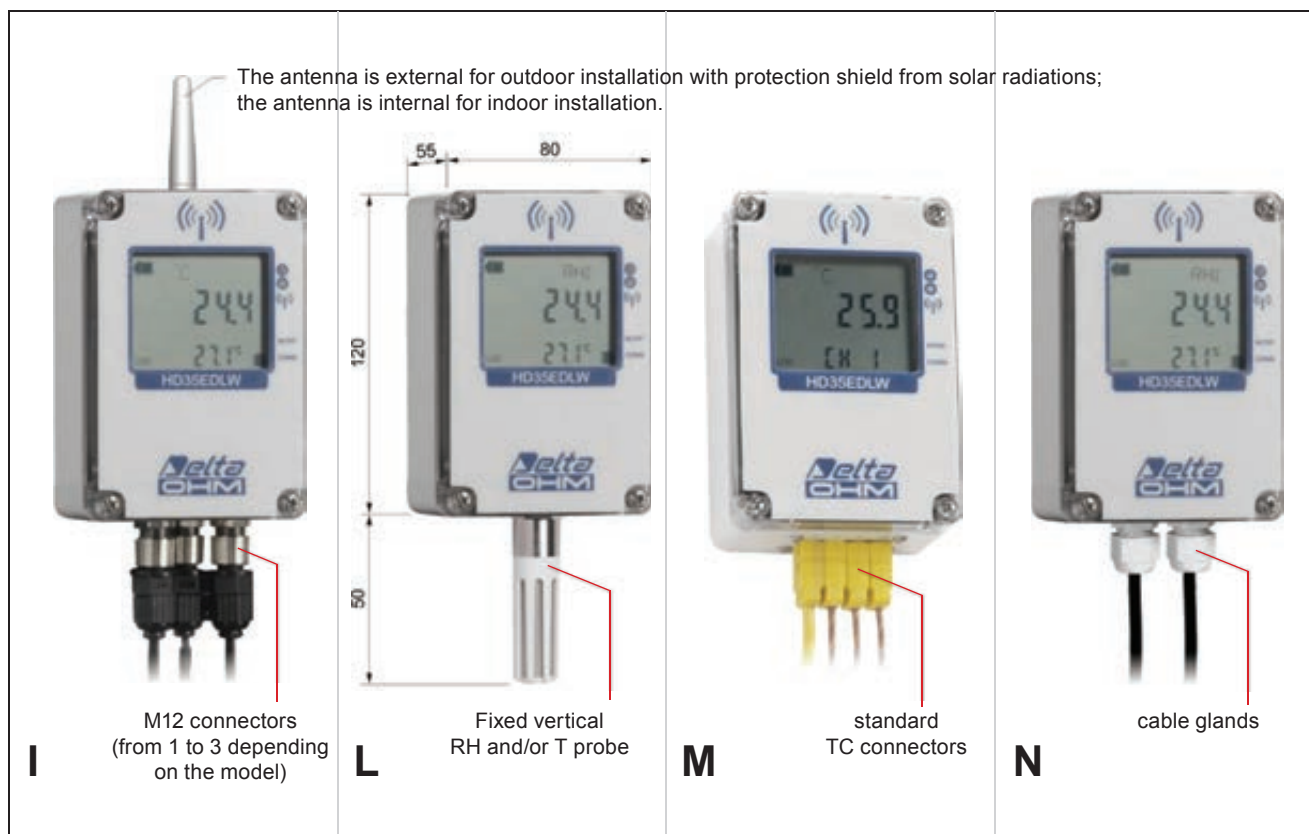
All the models **HD35EDW...** are also available with **custom LCD** (option L).

TAB. 4A: Data loggers in waterproof housing for outdoor use

	Measures												Inputs		Fig.	Page
Model													Number of M12 connectors	Built-in sensors		
	NTC 10KΩ	Pt100 Pt1000	TC	Solar panel	RH	Patm	PYRA	Rainfall	<i>a</i>	Leaf	CO2	Lux				
HD35EDW 7P/1 TC		●											1		I	122
HD35EDW 7P/2 TC		●											2		I	
HD35EDW 7P/3 TC		●											3		I	
HD35EDW N/1 TC	●												1		I	124
HD35EDW N/2 TC	●												2		I	
HD35EDW N/3 TC	●												3		I	
HD35EDW N TV	●													●	L	126
HD35EDW N TV61	●															127
HD35EDW K/4 TC			●										4 standard TC conn.		M	128
HD35EDW 1 TV					●									●	L	129
HD35EDW 1 TVI					●									●	L	130
HD35EDW 1N TC	●				●								1		I	131
HD35EDW 17P TC		●			●								1		I	133
HD35EDW 1N TV	●				●									●	L	135
HD35EDW 1N TVI	Sensor integrated in RH module				●									●	L	137
HD35EDW 1N/2 TC	●				●								2		I	139
HD35EDW 14bN TC	●				●	●							1	Patm	I	141
HD35EDW 14b7P TC		●			●	●							1	Patm	I	143
HD35EDW 1NV	Sensor integrated in RH module				●				●					●	L	145
HD35EDW R TC							●						1		I	147
HD35EDW 1NR TC	●				●		●						2		I	149
HD35EDW 7PR TC				●			●						2		I	151
HD35EDW 1N7PR TC	●			●	●		●						3		I	153
HD35EDW RP TC							●	●					2		I	155
HD35EDW P TC								●					1		I	157
HD35EDW 1NL TC	●				●					●			2		I	159
HD35EDW S TC	Soil temperature and moisture												1		I	161
HD35EDLW 1NB TV	●				●						●			●	I	118

Modell	Measures												Inputs		Fig.	Page
	NTC 10K Ω	Pt100 Pt1000	TC	Solar panel	RH	Patm	PYRA	Rainfall	<i>a</i>	Leaf	CO2	Lux	Number of M12 connectors	Built-in sensors		
HD35EDLW 1NI2 TCV	•				•							•	1	T/RH		120
HD35EDLW 1NBI TCV	•				•						•	•	1	T/RH/CO2		116
HD35EDW H	Transmitters with 0÷20 mA, 4÷20 mA, 0÷50 mV, 0÷1 V or 0÷10 V output Pt100 / Pt1000 sensors, thermocouples K, J, T, N, E Sensors with voltage free contact or potentiometric output												4 terminal header inputs		N	165
HD35EDW-MB	Sensors with RS485 MODBUS-RTU output												4 terminal header inputs		N	167

TAB. 4B: Data logger in waterproof housing for outdoor use - figures

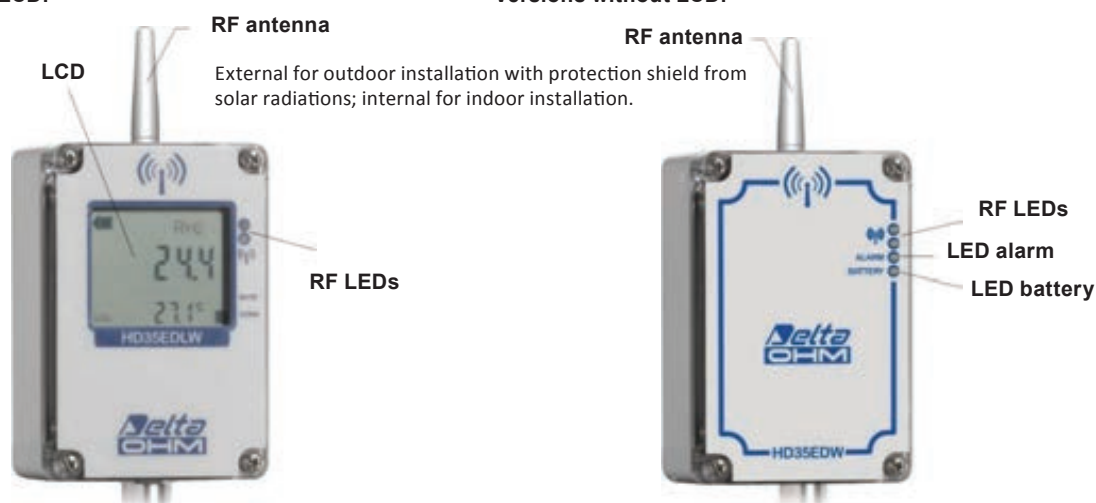


Technical specifications

HD35EDW... data loggers in waterproof housing for outdoor use	
Transmitting frequency	868 MHz, 902-928 MHz or 915.9-929.7 MHz depending on the model
Antenna	External for outdoor installation with protection shield from solar radiations. Internal for indoor installation.
Transmitting range	See table 7
Measuring interval (*)	1, 2, 5, 10, 15, 30 s / 1, 2, 5, 10, 15, 30, 60 min
Logging and transmitting interval (*)	1, 2, 5, 10, 15, 30 s / 1, 2, 5, 10, 15, 30, 60 min
Internal memory	Circular management or stop logging when full. The number of samples that can be stored depends on the number of acquired quantities (see table 5).
Alarm	Acoustic by means of the internal buzzer
Power supply	Internal 3.6 V lithium thionyl chloride (Li-SOCl ₂) not rechargeable battery, size AA (size C for HD35EDWK/4TC and HD35EDWH), Molex 5264 2-pole connector. Optional 24 Vac/dc power supply.
Battery autonomy (without repeaters, direct communication with HD35AP...)	4 years typical for HD35EDWK/4 and HD35EDWH models (with 10 s measurement interval and 30 s logging interval); 2 years typical for the other models, with 5 s measurement interval (10 s for HD35EDW7P/...TC, HD35EDW14bNTC, HD35EDW14b7PTC, HD35EDWVBGT) and 30 s logging interval.
Display	Optional custom LCD
Push-buttons	Push-button for connection inside the instrument
LED indicators	RF communication status. The models without LCD are provided with alarm LED and battery level LED.
Working temperature and humidity range	-20...+70 °C / 0...100 %RH (-10...+60 °C for HD35EDW1NV)
Housing	Material: Polycarbonate Dimensions: see table 4B Protection degree: IP 67
Connectors for external probes	Depending on the model: M12 connectors, thermocouple connectors or terminal header inputs 3.5 mm pitch.
Weight	250 g approx. (including battery)
Installation	Wall mounted or fixed to the 40 mm diameter mast by means of the HD2003.77/40 clamping (optional). Protection shield from solar radiations HD9217TF1 (optional) for outdoor installation.

Versions with LCD:

Versions without LCD:



(*) Some models measuring several quantities may have a minimum interval greater than 1 second (see table 7).

TAB. 5: Capacity of the internal memory of the data loggers in housing for outdoor use

Model	Number of samples that can be stored (**)	Minimum logging interval	Stored quantities (*)
HD35EDW 7P/1 TC	68,000	5 s	T
HD35EDW 7P/2 TC	52,000	5 s	T
HD35EDW 7P/3 TC	42,000	5 s	T
HD35EDW N/1 TC	68,000	1 s	T
HD35EDW N/2 TC	52,000	1 s	T
HD35EDW N/3 TC	42,000	1 s	T
HD35EDW N TV	68,000	1 s	T
HD35EDW K/4 TC	36,000	5 s	T
HD35EDW 1 TV	68,000	1 s	RH
HD35EDW 1 TVI	68,000	1 s	RH
HD35EDW 1N TC	24,000	1 s	T, RH, T _D , T _W , AH, MR, PVP
HD35EDW 17P TC	24,000	1 s	T, RH, T _D , T _W , AH, MR, PVP
HD35EDW 1N TV	24,000	1 s	T, RH, T _D , T _W , AH, MR, PVP
HD35EDW 1N TVI	24,000	1 s	T, RH, T _D , T _W , AH, MR, PVP
HD35EDW 1N/2 TC	22,000	1 s	T, RH, T _D , T _W , AH, MR, PVP
HD35EDW 14bN TC	22,000	2 s	T, RH, T _D , T _W , AH, MR, PVP, P _{ATM}
HD35EDW 14b7P TC	22,000	2 s	T, RH, T _D , T _W , AH, MR, PVP, P _{ATM}
HD35EDW R TC	42,000	1 s	R, D _R , mV
HD35EDW 1NR TC	24,000	1 s	T, RH, T _D , T _W , AH, R, D _R , mV
HD35EDW 7PR TC	36,000	1 s	T, R, D _R , mV
HD35EDW 1N7PR TC	22,000	1 s	T, RH, T _D , AH, R, D _R , mV
HD35EDW P TC	36,000	1 s	P, D _P , I _P
HD35EDW 1NL TC	22,000	1 s	T, RH, T _D , T _W , AH, MR, PVP, H _{LEAF}
HD35EDW S TC	52,000	1 s	T, H _{SOIL}
HD35EDW 1NB TV	30,000	10 s	RH, T, CO ₂
HD35EDW 1NI2 TCV	30,000	10 s	RH, T, I
HD35EDW 1NIB TCV	26,000	10 s	RH, T, CO ₂ , I
HD35EDW H	from 28,000 to 58,000	5 s	depends on the inputs configuration
HD35EDW-MB	from 14,000 to 52,000	1 s	RS 485 MODBUS-RTU

(*) List of the quantities:

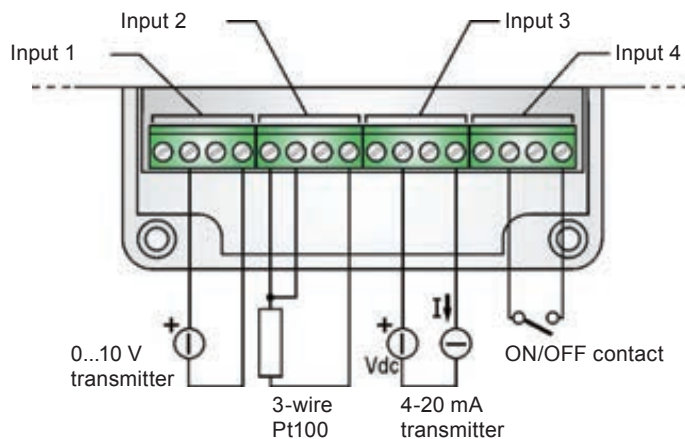
T: temperature
RH: relative humidity
T_D: dew point
T_W: wet bulb temperature
AH: absolute humidity
MR: mixing ratio
PVP: partial vapour pressure
P_{ATM}: atmospheric pressure
CO₂: carbon dioxide

R: solar radiation (pyranometer)
D_R: daily solar radiation (Wh/m²)
mV: pyranometer output in mV
P: rainfall quantity
D_P: daily rainfall quantity
I_P: rainfall rate (mm/h)
H_{LEAF}: leaf wetness
H_{SOIL}: soil moisture
I: illuminance

(**) One sample consists of all the quantities measured and calculated by the data logger at the same instant of acquisition. For example, the model HD35EDW1NTC measures two quantities and calculates five quantities (the derived humidity quantities) and one sample includes one temperature measure and six humidity measurements (the relative humidity measure plus the five derived quantities).

Terminal header in the model HD35EDH

The model HD35EDWH is equipped with four terminal header inputs. Each input can be configured as input for: Pt100/Pt1000, thermocouple, 0/4...20 mA (the shunt resistance is internal), 0...50 mV, 0...1 V, 0...10 V or potentiometer. Only input 4 can also be configured as pulse counter (counting of switchings of a voltage free contact).

**Example of connection of DHD35EDWH model inputs**

The model HD35EDWH is also available with 7...28 V_{dc} external power supply (HD35EDWHE, without battery).

MEASUREMENT CHARACTERISTICS (instrument in line with the sensor; for all data loggers except the versions with terminal header inputs)

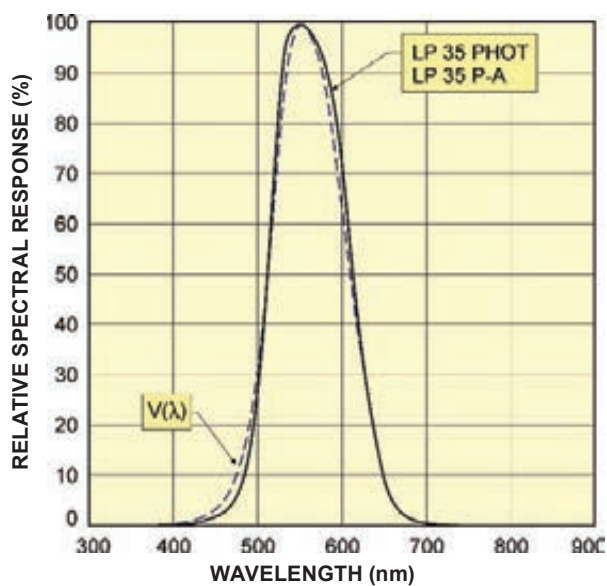
Temperature – NTC10KΩ sensor For HD35ED...N...TC and HD35ED...TV	
Sensor	NTC 10 kΩ @ 25 °C
Measuring range	-40...+105 °C
Resolution (of the instrument)	0.1 °C
Accuracy	± 0.3 °C in the range 0...+70 °C / ± 0.4 °C outside
Stability	0.1 °C/year
Temperature – Sensor integrated in the RH module For HD35ED...TVI, HD35ED...B, HD35ED...AB and HD35EDW1NV	
Sensor	Sensor integrated in the humidity module
Measuring range	-40...+105 °C
Resolution (of the instrument)	0.1 °C
Accuracy	± 0.2 °C in the range 0...+60 °C ± (0.2 – 0.05 * T) °C in the range T=-40...0 °C ± [0.2 + 0.032 * (T-60)] °C in the range T=+60...+105 °C
Stability	0.05 °C/year
Temperature - Pt100/Pt1000 Sensor For HD35ED...7P...TC	
Sensor	Pt100 / Pt1000 1/3 DIN Dünnsfilm
Measuring range	-100...+350 °C max. for probes measuring only temperature (the measuring range can be limited by the operating temperature of the probe used) -40...+150 °C for T/RH combined probes DHD3517ETC...
Resolution (of the instrument)	0.1 °C
Accuracy	1/3 DIN
Stability	0.1 °C/year
Temperature - Thermocouple sensor For HD35EDW...K...TC	
Thermocouple type	K, J, T, N, E The inputs are isolated from each other (60 V insulation)
Measuring range	type K: -200...+1370 °C type J: -100...+750 °C type T: -200...+400 °C type N: -200...+1300 °C type E: -200...+750 °C
Resolution	0.1 °C
Accuracy (excluding probe error)	type K: ± 0.1 °C (< 600 °C) type J: ± 0.1 °C ± 0.2 °C (> 600 °C) type T: ± 0.1 °C type N: ± 0.1 °C (< 600 °C) ± 0.2 °C (> 600 °C) type E: ± 0.1 °C (< 300 °C) ± 0.2 °C (> 300 °C)
Relative humidity – High accuracy sensor For HD35ED...TC and HD35ED...TV	
Sensor	Capacitive
Measuring range	0...100 %RH
Resolution (of the instrument)	0.1 %
Accuracy	± 1.5 %RH (0..90 %RH) / ± 2 %RH (remaining range)
Sensor working temperature	-20...+80 °C standard -40...+150 °C with probe HP3517E...
Response time	T90 < 20 s (air speed = 2 m/s, without filter)
Temperature drift	±2% in all the working temperature range
Stability	1%/year

Relative humidity For HD35ED...TVI, HD35ED...B, HD35ED...AB and HD35EDW1NV models					
Sensor	Capacitive				
Measuring range	0...100 %RH				
Resolution (of the instrument)	0.1 %				
Accuracy	± 1.8 %RH (0..80 %RH) ± [1.8 + 0,11 * (UR-80)] %RH (remaining range)				
Sensor working temperature	-40...+105 °C (R.H.max=[100-2*(T-80)] @ T=80...105 °C)				
Response time	T63 < 4 s (air speed = 2 m/s, without filter)				
Temperature drift	±2% in all the working temperature range				
Stability	< 0.5%/year				
Soil moisture					
Measuring principle	Capacitive				
Measuring range	0...100% VWC (Volumetric Water Content)				
Resolution (of the instrument)	0.1%				
Accuracy	± 3 % between 0 and 0.57 m3/m3 (standard mineral soil up to 5 mS/cm)				
Sensor working temperature	-40...+60 °C				
Leaf wetness					
Sensor	Capacitive				
Measuring range	0...100% of leaf area wetness				
Resolution (of the instrument)	0.1%				
Accuracy (@ 23 °C)	± 5 %				
Sensor working temperature	-30...+60 °C				
Atmospheric pressure					
Sensor	Piezoresistive				
Measuring range	300...1100 hPa				
Resolution (of the instrument)	0.1 hPa				
Accuracy	± 0.5 hPa (800...1100 hPa) @ T=25°C ± 1 hPa (300...1100 hPa) @ T=0...50°C				
Stability	1 hPa/year				
Temperature drift	±3 hPa between -20...+60 °C				
Differential pressure					
Sensor	range 1...4: Piezoresistive range 5: Thermal mass flow sensing element				
Measuring range	Depending on the model:				
	range 1	range 2	range 3	range 4	range 5
	±2.5 hPa	±10 hPa	±100 hPa	±2000 hPa	±125 Pa
Resolution (of the instrument)	0.001 hPa	0.005 hPa	0.05 hPa	1 hPa	0.01 Pa
Accuracy	range 1...4: ± 1% f.s. range 5: ± 3% of reading, ± 0.1 Pa @ 0 Pa over the entire compensated temperature range (0...50 °C)				
Connection	Tube Ø 5 mm. In the model r5 it is recommended to use tubes with at least 5 mm internal diameter.				

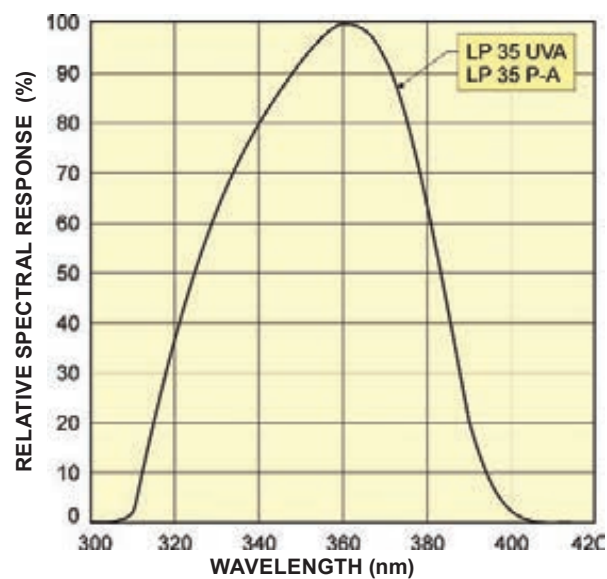
Carbon monoxide (CO)	
Sensor	Electrochemical cell
Measuring range	0 ... 500 ppm
Resolution (of the instrument)	1 ppm
Accuracy	±3 ppm +3% of the measure
Working temperature	-5...50 °C
Response time	T90 < 50 s
Stability	5% of the measure/year
Sensor life	> 5 years under normal environmental conditions
Carbon dioxide (CO2)	
Sensor	Non-Dispersive Infrared (NDIR)
Measuring range	0...5000 ppm
Resolution (of the instrument)	1 ppm
Accuracy	±(50 ppm+3% of the measure) @ 20 °C and 1013 hPa
Working temperature	-5...50 °C
Response time	T90 < 120 s (air speed = 2 m/s)
Stability	5% of the measure/5 years
Temperature drift	0.1% f.s. / °C
Acceleration	
Sensor	Tri-axial accelerometer
Measuring range	0...16 g
Resolution (of the instrument)	< 0,05 g (function of measured value)
Accuracy	< 0,1 g (function of measured value)
Wind speed – Characteristics of the HD54.3 cup anemometer	
Sensor	Passive 3-cup anemometer
Measuring range	1...65 m/s
Resolution (of the instrument)	0.1 m/s
Accuracy	±0.14 m/s @ 10 m/s installed on a flat terrain site
Offset	0.35 m/s
Gain	0.765 m s-1/Hz
Distance constant (63% recovery)	2.55 m @ 5 m/s / 2.56 m @ 10 m/s (ASTM D 5096-02)
Wind direction – Characteristics of the HD54.D vane	
Sensor	Continuous rotation potentiometric vane
Measuring range	0...359.9°
Resolution (of the instrument)	0.1°
Accuracy	< 1%
Dead band	4° typical, 8° max.
Threshold	1 m/s

Rainfall quantity	
Sensor	Tipping bucket with NC or NO configurable contact
Resolution (of the instrument)	Configurable 0.1 – 0.2 – 0.5 mm/tipping
Other characteristics not reported depends on the sensor connected, please refer to the data sheet of the chosen rain gauge.	
Solar radiation	
Sensor	Thermopile
Measuring range	0...2000 W/m ²
Resolution (of the instrument)	1 W/m ²
Sensitivity	Configurable in mV/(kW m ⁻²)
Other characteristics not reported depends on the sensor connected, please refer to the data sheet of the chosen pyranometer. The instrument also displays the mV signal of the pyranometer.	
Illuminance	
Sensor	Photodiode
Messbereich	I: 0...20,000 lux I2: 0...200,000 lux
Auflösung (des Datenloggers)	I: 1 lux (0...2,000 lux), 10 lux (>2,000 lux) I2: 10 lux (0...20,000 lux), 100 lux (>20,000 lux)
Spectral range	According to photopic curve V(λ)
Spectral response	See graph 1
α (temperature coefficient) f6(T)	<0.05% K
Calibration uncertainty	<4%
f'1 (according to photopic curve V(λ))	<6%
f2 (response according to the cosine law)	<3%
f3 (linearity)	<1%
f4 (instrument reading error)	<0.5%
f5 (fatigue)	<0.5%
Class	B
Drift after 1 year	<1%
Operating temperature	0...50 °C
Reference Standard	CIE n°69 – UNI 11142
UVA irradiance	
Sensor	Photodiode
Measuring range	0...10,000 mW/m ²
Resolution (of the instrument)	1 mW/m ² (0...2,000 mW/m ²) / 5 mW/m ² (> 2,000... mW/m ²)
Spectral range	UVA, peak \approx 360 nm
Spectral response	See graph 2
Calibration uncertainty	<5%
f2 (response according to the cosine law)	<6%
f3 (linearity)	<1%
f4 (instrument reading error)	± 1 digit
f5 (fatigue)	<0.5%
Drift after 1 year	<2%
Operating temperature	0...50 °C

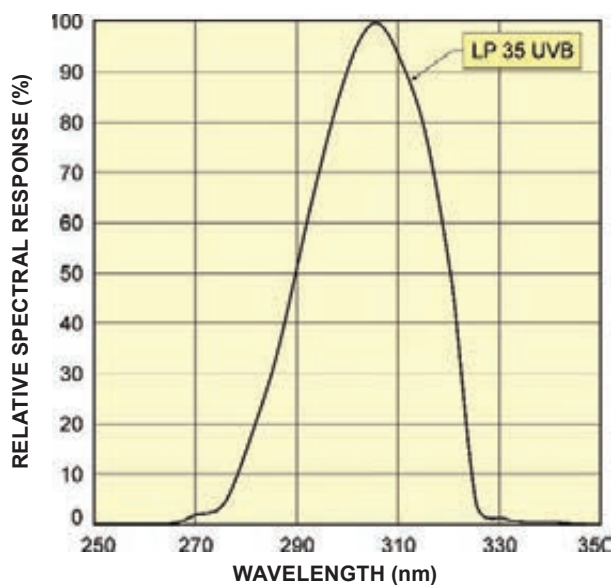
UVB irradiance	
Sensor	Photodiode
Measuring range	0...100 W/m ²
Resolution (of the instrument)	0.01 W/m ² (0...10 W/m ²) / 0.1 W/m ² (10...100 W/m ²)
Spectral range	UVB, peak \approx 305 nm
Spectral response	See graph 3
Calibration uncertainty	<5%
f2 (response according to the cosine law)	<6%
f3 (linearity)	<2%
f4 (instrument reading error)	± 1 digit
f5 (fatigue)	<0.5%
Drift after 1 year	<2%
Operating temperature	0...50 °C
UVC irradiance	
Sensor	Photodiode
Measuring range	0...100 W/m ²
Resolution (of the instrument)	0.01 W/m ² (0...10 W/m ²) / 0.1 W/m ² (10...100 W/m ²)
Spectral range	UVC, peak \approx 260 nm
Spectral response	See graph 4
Calibration uncertainty	<5%
f2 (response according to the cosine law)	<6%
f3 (linearity)	<1%
f4 (instrument reading error)	± 1 digit
f5 (fatigue)	<0.5%
Drift after 1 year	<2%
Operating temperature	0...50 °C



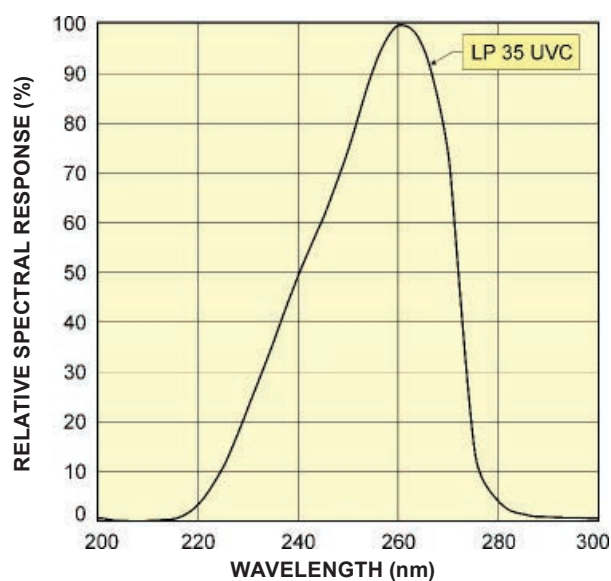
Graph 1 – Relative spectral response of the illuminance sensor



Graph 2 – Relative spectral response of the UVA irradiance sensor



Graph 3 – Relative spectral response of the UVB irradiance sensor



Graph 4 – Relative spectral response of the UVC irradiance sensor

Characteristics of the terminal header inputs (HD35ED...H):

Pt100 / Pt1000	
Measuring range	-200...+650 °C
Resolution	0.1 °C
Accuracy	± 0.1 °C (excluding probe error)
Sensor coefficient	$\alpha = 0.00385 \text{ }^{\circ}\text{X-1}$
Connection	2, 3 or 4 wires
Thermocouple	
Thermocouple type	K, J, T, N, E. The inputs are not isolated, use thermocouples with isolated hot junction.
Measuring range	type K: -200...+1370 °C type J: -100...+750 °C type T: -200...+400 °C type N: -200...+1300 °C type E: -200...+750 °C
Resolution	0.1 °C
Accuracy (excluding probe error)	type K: ± 0.1 °C (< 600 °C) type J: ± 0.1 °C ± 0.2 °C (> 600 °C) type T: ± 0.1 °C type N: ± 0.1 °C (< 600 °C) ± 0.2 °C (> 600 °C) type E: ± 0.1 °C (< 300 °C) ± 0.2 °C (> 300 °C)
0/4...20 mA input	
Shunt resistance	Internal (50 Ω)
Resolution	16 bits
Accuracy	± 2 µA
0...50 mV, 0...1 V and 0...10 V inputs (0...10 V only in HD35EDWH)	
Input resistance	100 MΩ
Resolution	16 bits
Accuracy	± 0.01% f.s.
Input for counting the switchings of a voltage-free contact	
Switching frequency	50 Hz max.
Hold Time	10 ms min.
Potentiometric input	
Potentiometer	Typically 10 kΩ.
Resolution	16 bit
Accuracy	± 0,01% f.s.

Access Points

The base unit is available in the following versions:

- HD35AP, with the USB output only.
- HD35APD, with the USB output only. "Dongle" version powered only by the PC USB port (without internal battery and without input for the external power supply). Available with internal (HD35APD) or external (HD35APD-EXT) antenna.
- HD35APS, with:
 - USB output
 - RS485 output with MODBUS RTU protocol

The base unit acts as a multiplexer to address the MODBUS commands from the PC/PLC to the devices in the network.

- HD35APW, with:
 - USB output
 - Wi Fi interface for the connection to the wireless local network
 - ETHERNET interface for the cable connection to the local network

Permits (if the Internet connection via local network is available) sending alarm e-mail and the recorded data via e-mail or to an FTP address (*).

Allows using the MODBUS TCP/IP protocol (version of the MODBUS protocol for the communication via the ETHERNET connection).

Multi-client feature: multiple HD35APW base units can be connected to the same local network.

Integrated web server with monitor function.

- HD35APG, with:
 - USB output
 - integrated GSM module


Permits sending alarm e-mail or SMS and the recorded data via e-mail or to an FTP address (*).

Allows the communication with the PC via the GSM network through the GPRS TCP/IP protocol.

(*) In the basic version, the data are sent via FTP with an interval of not less than 2 minutes and only if in the network there are up to 5 data loggers. For the full FTP functionality, the PLUS option has to be requested.

TAB 6: Comparison among the versions of base units HD35AP...


	HD35AP	HD35APD	HD35APS	HD35APW	HD35APG
Connection systems					
USB	•	•	•	•	•
RS485			•		
Wi-Fi				•	
Ethernet				•	
GSM/GPRS					•
Protocols					
Proprietary on USB	•	•	•	•	•
Proprietary on TCP/IP				•	•
Modbus RTU			•		
Modbus TCP/IP				•	
SMS commands					•
Data download					
Automatical data download in the Database	•	•	•	•	•
Sending of data via e-mail				•	•
Sending of data to an FTP address				•	•
Integrated web server				•	
Alarms					
Alarm thresholds	•	•	•	•	•
Alarm SMSes					•
Alarm e-mails				•	•

HD35AP... base unit (except HD35APD...)		
	Versions	HD35AP: USB output only HD35APS: USB and RS485 MODBUS-RTU outputs HD35APW: USB output, Wi Fi and ETHERNET interface HD35APG: USB output and GSM module
	Power supply	Internal 3.7 V lithium ion rechargeable battery, capacity 2250 mA/h, JST 3-pole connector Optional 6 Vdc external power adapter (SWD06) Powered directly from the PC USB port (*)
	Power consumption	30 mA without Ethernet/Wi-Fi and with typical GSM activity (**) 160 mA with Ethernet, 275 mA with Wi-Fi
	Battery autonomy (typical)	3 days if not connected to the local network and with typical GSM activity (**) 11 hours with Ethernet, 8 hours with Wi-Fi
	Transmitting frequency	868 MHz, 902-928 MHz or 915.9-929.7 MHz depending on the model
	Antenna	Whip external
	Transmitting range	See table 7
	Serial outputs	USB with Mini USB type connector (cable CP23) RS485 with MODBUS-RTU protocol (HD35APS only)
	Ethernet connection	Only in HD35APW model. Permits (if the Internet connection is available) sending alarm e-mail and the recorded data via e-mail or to an FTP address (***). Allows the MODBUS TCP/IP protocol. With integrated Web server.
	Wi Fi connection	Only in HD35APW model. Permits (if the Internet connection is available) sending alarm e-mail and the recorded data via e-mail or to an FTP address (***). Allows the MODBUS TCP/IP protocol. With integrated Web server.
	GSM connection	Only in HD35APG model. For sending alarm e-mail or SMS and data via e-mail or FTP (***). Allows the GPRS TCP/IP protocol.
	Internal memory	The number of samples that can be stored depends on the type of data loggers connected. The capacity is 226,700 samples if all the data loggers record 7 quantities.
	LED indicators	Presence of external power supply, battery charge level, RF communication status.
	Working temperature and humidity range	-10...+60 °C / 0...85 % RH not condensing
	Housing	Material: LURAN® S 777K Dimensions: 135 x 86 x 33 mm (excluding antenna)
	Weight	200 g approx. (including battery)
	Installation	Wall mount support (supplied) for removable installation or flanges (optional) for fixed installation

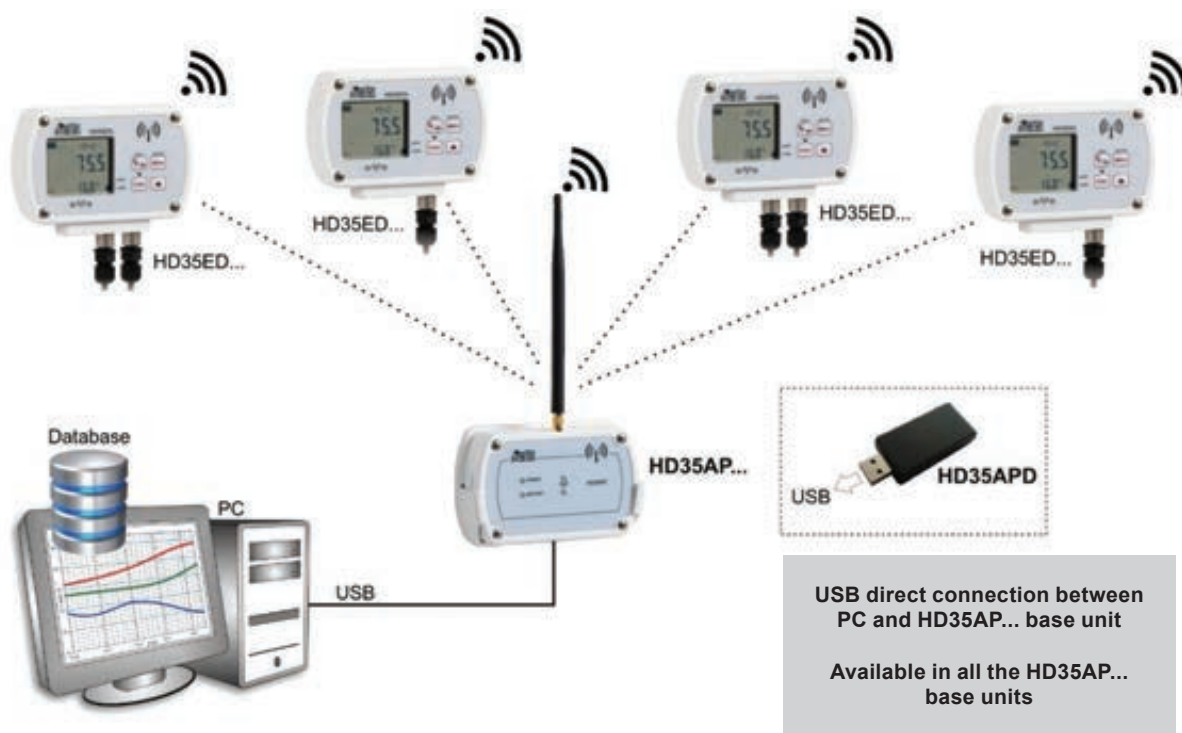
(*) The connection of the SWD06 external power supply is recommended if the Ethernet, Wi Fi or GSM transmission is used.

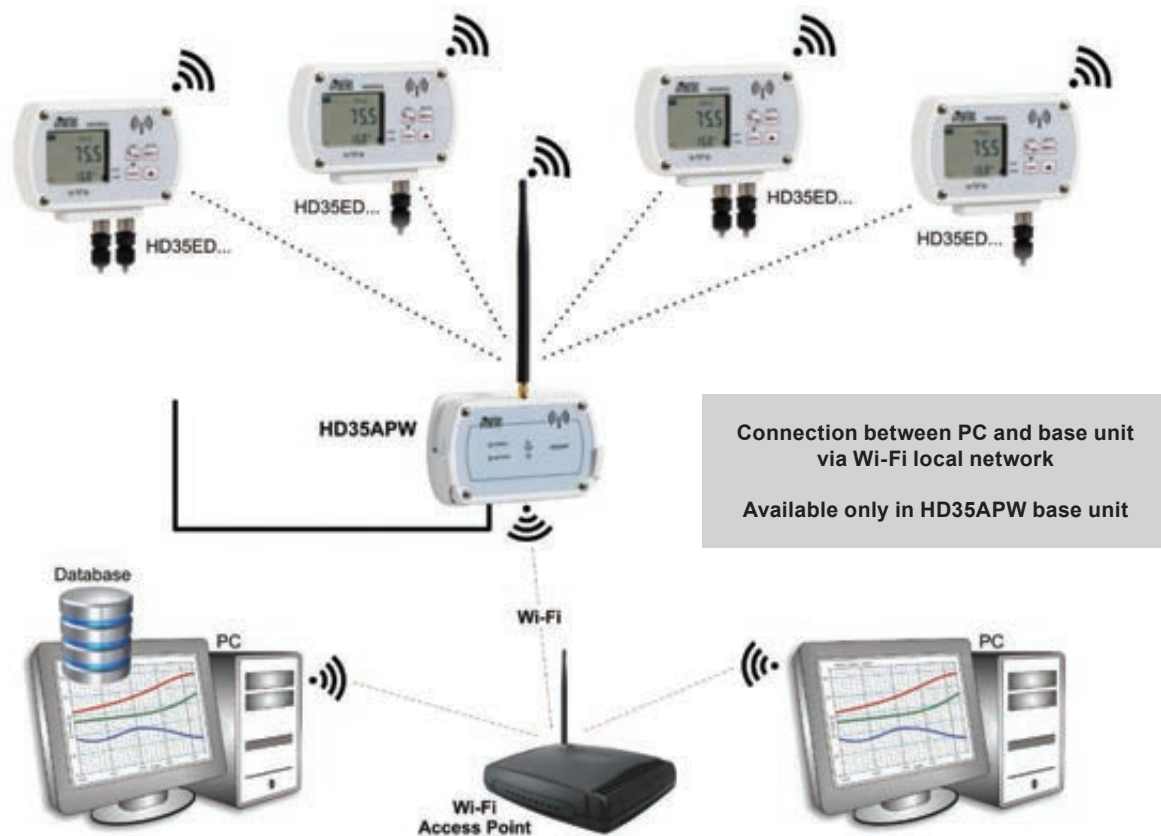
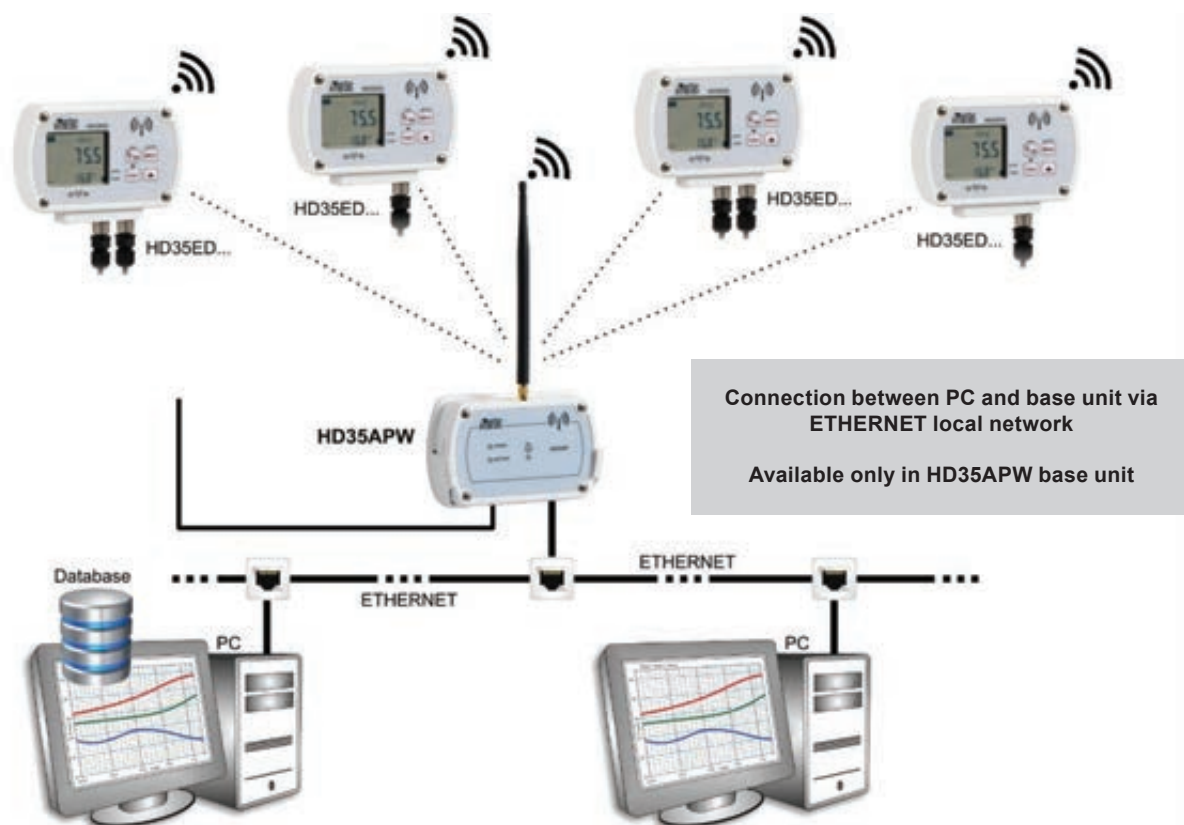
(**) The intensive use of the GSM transmission can significantly increase the power consumption and reduce the battery life.

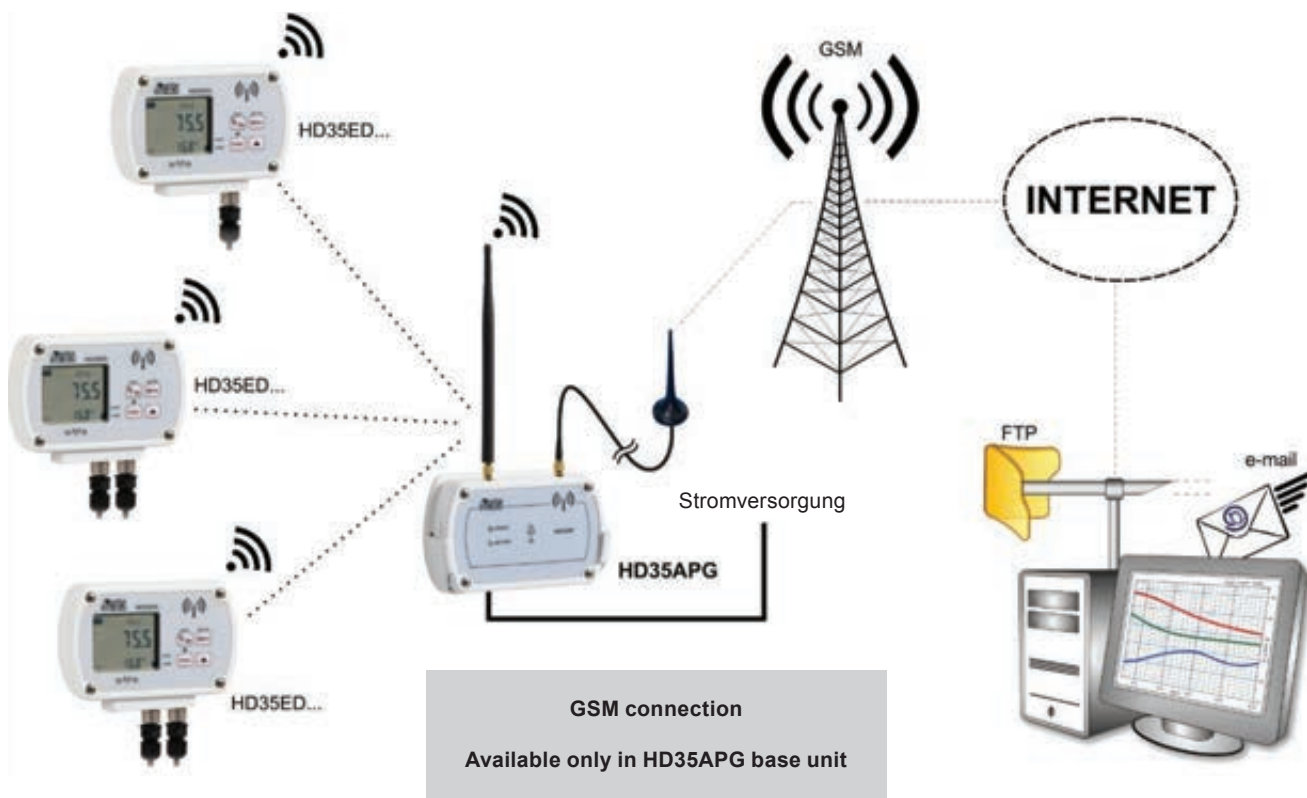
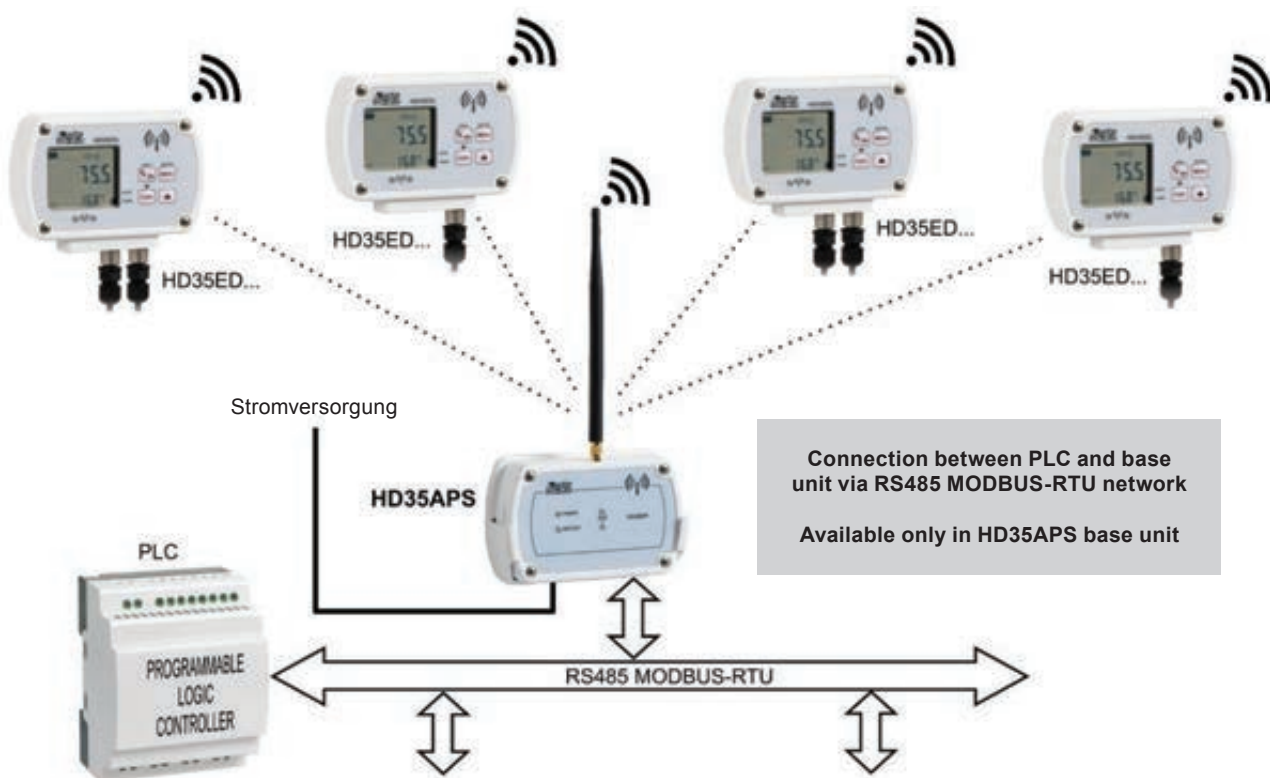
(***) In the basic version, the data are sent via FTP with an interval of not less than 2 minutes and only if in the network there are up to 5 data loggers. For the full FTP functionality, the PLUS option has to be requested.

HD35APD... base unit		
	Versions	HD35APD: with internal antenna HD35APD-EXT: with whip external antenna
	Power supply	Powered directly from the PC USB port
	Transmitting frequency	868 MHz or 902-928 MHz depending on the model (915.9-929.7 MHz not available)
	Transmitting range	See table 7
	Output	USB with type A connector
	Internal memory	The number of samples that can be stored depends on the type of data loggers connected. The capacity is 226,700 samples if all the data loggers record 7 quantities.
	LED indicators	RF communication status
	Working temperature and humidity range	-10...+60 °C / 0...85 %RH not condensing
	Dimensions	62 x 25,5 x 13,2 mm (excluding antenna)

Examples for base unit connection systems







Transmitting frequency

All the models (except HD35APD...) are available in three versions, depending on the transmitting frequency band:

- 868 MHz (in compliance with the european normative EN 300 220);
- 902-928 MHz (in compliance with U.S. FCC part 15 section 247 and I.C. RSS 210 regulations);
- 915.9-929.7 MHz (in compliance with ARIB STD-T108 standard).

The base unit HD35APD is available only with 868 MHz or 902-928 MHz frequency band.

The 902-928 MHz frequency band can be reduced to 915-928 MHz (Australia) or 921 928 MHz (New Zealand).

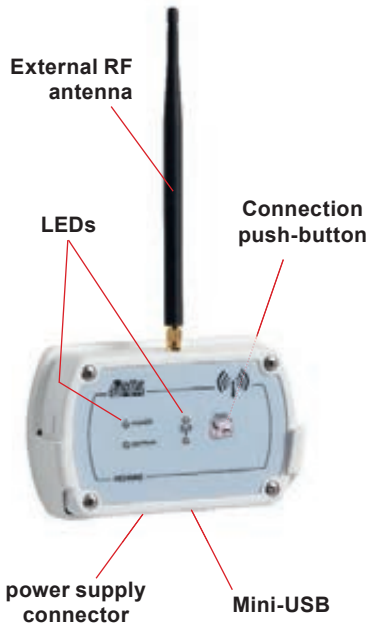

The wireless transmission of the Delta OHM system is extremely robust against radio frequency interference. The system is able to detect any RF interference in the transmission channel, and to transfer, upon request, the data communication in another channel of the same transmitting band. The correctness of the transmitted data is ensured by the bidirectional communication between the base unit and the remote data loggers.

Transmitting range and repeaters

To increase the distance between the base unit and the data loggers, the HD35RE... repeaters are used. More repeaters in cascade can be used („multi-hop“ network). Depending on the RF frequency band, the typical transmitting range between two devices in open field (the range could be reduced if there are obstacles between the devices) is:

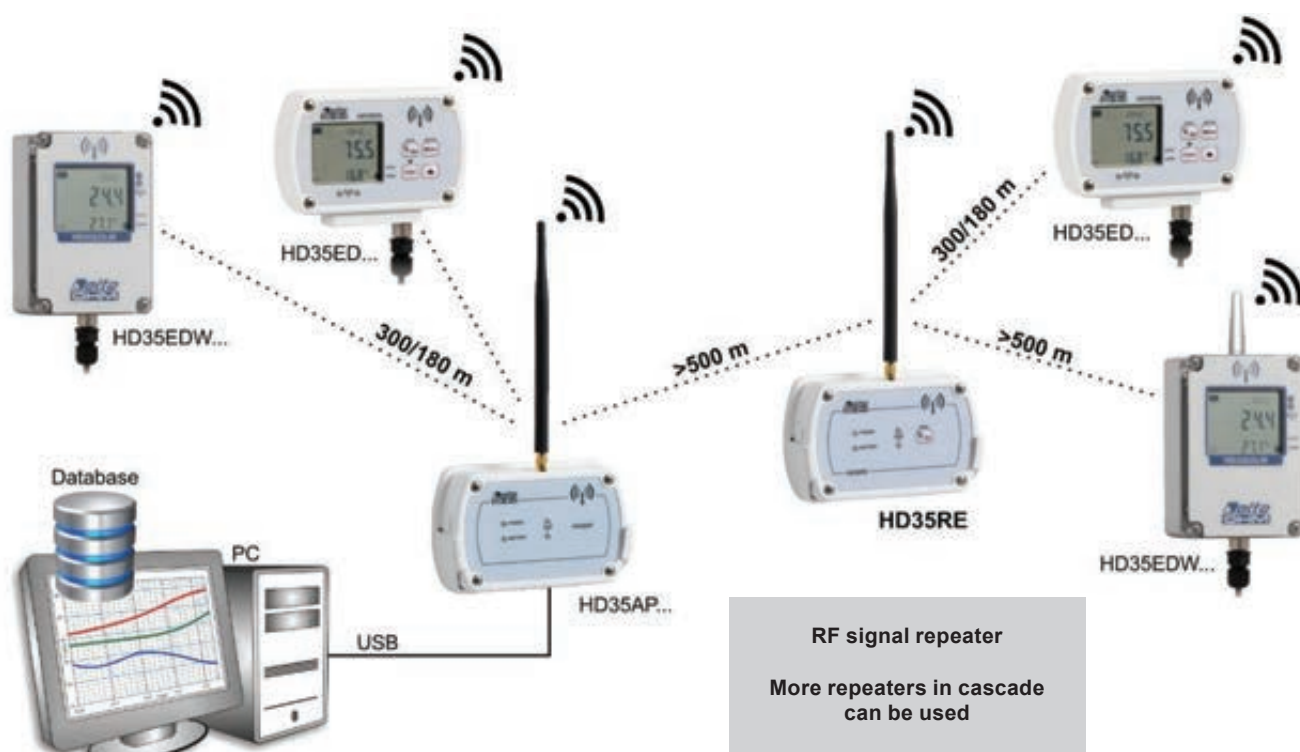
TAB. 7: Transmitting range

	HD35RE...	HD35AP... (except HD35APD...)	HD35APD-EXT	HD35APD
868 MHz frequency band				
HD35ED... with internal antenna	300 m	300 m	300 m	180 m
HD35ED... with external antenna HD35RE...	>500 m	>500 m	300 m	180 m
902-928 MHz frequency band				
HD35ED... with internal antenna	180 m	180 m	180 m	180 m
HD35ED... with external antenna HD35RE...	>500 m	>500 m	300 m	180 m
915.9-929.7 MHz frequency band				
HD35ED... with internal antenna	300 m	300 m	---	---
HD35ED... with external antenna HD35RE...	>500 m	>500 m	---	---

HD35RE repeater		
	Power supply	Internal 3.7 V lithium ion rechargeable battery, capacity 2250 mA/h, JST 3-pole connector Optional 6 Vdc external power adapter (SWD06) Powered directly from the PC USB port
	Power consumption	30 mA
	Battery autonomy	3 days typical
	Transmitting frequency	868 MHz, 902-928 MHz or 915.9-929.7 MHz depending on the model
	Antenna	Whip external
	Transmitting range	See table 7
	Serial outputs	USB with Mini USB type connector (cable CP23) Only for configuration and firmware update, not for data download
	LED indicators	Presence of external power supply, battery charge level, RF communication status.
	Keyboard	Push-button for connection / PING (for testing RF)
	Working temperature and humidity range	-10...+60 °C / 0...85 %RH not condensing
	Housing	Material: LURAN® S 777K Dimensions: 135 x 86 x 33 mm (excluding antenna)
	Weight	200 g approx. (including battery)
	Installation	Wall mount support (supplied) for removable installation or flanges (optional) for fixed installation
HD35REW repeater		
	Power supply	Internal 3.6 V lithium thionyl chloride (Li-SOCl ₂) not rechargeable battery, capacity 8400 mA/h, size C, Molex 5264 2-pole connector
	Battery autonomy	2 years typical (repeating the signal of 5 data loggers transmitting every 30 s)
	Transmitting frequency	868 MHz, 902-928 MHz or 915.9-929.7 MHz depending on the model
	Antenna	Whip external
	Transmitting range	See table 7
	LED indicators	Battery charge level, RF communication status.
	Push-buttons	Push-button for connection inside the instrument
	Working temperature and humidity range	-20...+70 °C / 0...100 %RH not condensing
	Housing	Material: Polycarbonate Dimensions: 80 x 120 x 55 mm (excluding antenna) Protection degree: IP 67
	Weight	250 g approx. (including battery)
	Installation	Wall mounted or fixed to the 40 mm diameter mast by means of the HD2003.77/40 clamping (optional). Protection shield from solar radiations HD9217TF1 (optional) for outdoor installation.

Warning: unlike HD35RE repeaters, which have external power supply, the HD35REW repeaters are powered only by the internal battery. To extend the battery life, the RF stage of the HD35REW repeaters is not continuously active; therefore, the HD35REW repeaters are subject to the following restrictions:

- o the alarm events may be reported with a certain delay;
- o the reconfiguration of the system may take longer; furthermore, if the configuration of a data logger with LCD is changed via the logger keyboard, the change is not notified to the base unit and to the HD35AP-S software.



ORDERING CODES

BASE UNIT / ACCESS POINT

HD35AP...

Base unit for the interfacing between the PC and the data loggers of the system. USB connection. In addition to the USB output, one of the following options is available:

- o RS485 with MODBUS-RTU protocol (option S)
- o Wi-Fi interface and Ethernet connection with integrated Web server (option W)
- o GSM module (option G)

Powered by the PC USB port or external power adapter SWD06 (optional). The unit is supplied with: internal lithium ion rechargeable battery HD35 BAT1, software HD35AP S basic, wall mount support HD35.03, operating manual.

The radio frequency (868, 902-928 or 915.9-929.7 MHz) has to be specified when ordering.

The serial cable **CP23** and the kit **HD35.11K** (pair of flanges, pin for padlock and padlock) for fixed installation have to be ordered separately.

HD35APD and HD35APD-EXT are without internal battery, without input for the external power supply and do not require the serial cable and the support. HD35APD and HD35APD-EXT are not available with radio frequency 915.9-929.7 MHz (Japan).

HD35AP 1. 2.

□ - □

1.	Type of connection
0	USB output only
D	USB output only, dongle version with internal antenna
D-EXT	USB output only, dongle version with external antenna
S	USB output and RS485 output with MOD-BUS-RTU protocol
W	USB output, Wi-Fi interface and ETHERNET connection with Web server integrated
G	USB output and GSM module

2.	Radio frequency
E	868 MHz (Europe)
U	902-928 MHz (U.S.A. and Canada)
J	915.9-929.7 MHz (Japan)

REPEATER

HD35RE RF signal repeater. Housing for indoor. Powered by the PC USB port or external power adapter SWD06 (optional).

Supplied with: internal lithium ion **rechargeable battery HD35 BAT1**, wall mount support HD35.03, operating manual.

The radio frequency (868, 902-928 or 915.9-929.7 MHz) has to be specified when ordering.

The serial cable **CP23** and the kit **HD35.11K** (pair of flanges, pin for padlock and padlock) for fixed installation **have to be ordered separately.**

HD35REW

RF signal repeater. Waterproof housing. Powered by the internal battery.

Supplied with: internal lithium ion **rechargeable battery BAT-2013DB**, operating manual.

The radio frequency (868, 902-928 or 915.9-929.7 MHz) has to be specified when ordering.

The shield from solar radiations **HD9217TF1** and the clamp **HD2003.77/40** for fixing to the mast or the flange **HD35.24W** for fixing to the wall **have to be ordered separately.**

HD35RE 1. 2.

□ - □

1.	Housing
0	for indoor use
W	waterproof

2.	Radio frequency
E	868 MHz (Europe)
U	902-928 MHz (U.S.A. and Canada)
J	915.9-929.7 MHz (Japan)

ALARM MODULE

- HD35ED-ALM** Module with two relay outputs for signalling alarm events. Powered by the internal 3.6V **not rechargeable** lithium thionyl chloride (Li-SOCl₂) **battery**.
- Supplied with: internal 3.6V **not rechargeable** lithium thionyl chloride (Li-SOCl₂) **battery HD35 BAT2**, wall mount support **HD35.03**, operating manual.
- The radio frequency (868, 902-928 or 915.9-929.7 MHz) has to be specified when ordering.**
- The kit **HD35.11K** (pair of flanges, pin for padlock and padlock) for fixed installation **has to be ordered separately.**

1.

HD35ED-ALM - ☐

1.	Radio frequency	
	E	868 MHz (Europe)
	U	902-928 MHz (U.S.A. and Canada)
	J	915.9-929.7 MHz (Japan)

DATA LOGGERS

- HD35ED...** Wireless data logger that stores the measures in the internal memory and transmits the acquired data to the base unit automatically at regular intervals or upon request. **Optional LCD.** Acoustic alarm with internal buzzer. Powered by the internal **not rechargeable battery**.
- Supplied with: internal 3.6V not rechargeable lithium thionyl chloride (Li-SOCl₂) battery, wall mount support **HD35.03** (models for indoor only), operating manual.
- The radio frequency (868, 902-928 or 915.9-929.7 MHz) has to be specified when ordering.**
- The kit HD35.11K (pair of flanges, pin for padlock and padlock) for the fixed installation of the housing for indoor use has to be ordered separately.
- For the versions in waterproof housing, **please specify when ordering whether the installation will be outdoor with protection shield from solar radiations and if the housing has to be supplied with the mast clamping HD2003.77/40 already installed.**
- The external probes have to be ordered separately.**

1. 2. 3. 4.

HD35ED ☐ ☐ ☐ - ☐

1.	LCD	
	0	without LCD
	L	with custom LCD
	G	with graphic LCD
	The type of LCD (custom or graphic) is not a choice, but enforced by the data logger model.	
2.	Measured quantities	
	See table 1A for the combinations of quantities measured by the available data loggers. Other models can be supplied upon request.	
	1	Humidity
	4b	Atmospheric pressure (barometer)
	4	Differential pressure: 4r1 =range 1, 4r2 =range 2, ...(**)
	N	Temperature NTC10K probe: N/1 =1 channel, N/2 =2 channels, N/3 =3 channels
	7P	Temperature Pt100/Pt1000 probe: 7P/1 =1 channel, 7P/2 =2 channels, 7P/3 =3 channels
	A	Carbon monoxide (CO)

	B	Carbon dioxide (CO ₂)
	I	Illuminance (lux): I =low range, I2 =high range
	U	UV irradiance (U =UVA, UB =UVB, UC =UVC)
(**) For the differential pressure ranges available see table 1A.		
3.	Probe type	
	0	Internal probes protected by grid
	H	Terminal header inputs
	TC	Probe with cable
	TV	Combined T/R.H. fixed vertical probe without cable, with high accuracy R.H. sensor
	TVI	Combined T/R.H. fixed vertical probe without cable
4.	Radio frequency	
	E	868 MHz (Europe)
	U	902-928 MHz (U.S.A. and Canada)
	J	915.9-929.7 MHz (Japan)

WATERPROOF 120 X 80 mm HOUSING FOR OUTDOOR USE

HD35E 1. 2. W 3. - 4.

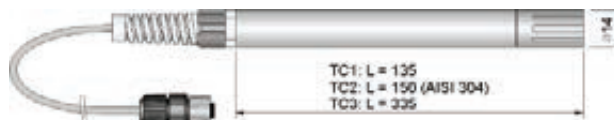
1.	LCD
	0 without LCD
	L with custom LCD
2.	Measured quantities
	See table 4A for the combinations of quantities measured by the available data loggers. Other models can be supplied upon request.
	1 Humidity
	4b Atmospheric pressure (barometer)
	N Temperature NTC10K probe: N/1=1 channel, N/2=2 channels, N/3=3 channels
	7P Temperature Pt100/Pt1000 probe: 7P/1=1 channel, 7P/2=2 channels, 7P/3=3 channels
	K Temperature thermocouple: K/4=4 channels
	P Rainfall quantity
	R Solar radiation (pyranometer)
	S Soil moisture and temperature
	L Leaf wetness
	V Acceleration
	B Carbon dioxide (CO ₂)
	I Illuminance (Lux): I=low range, I2=high range

3.	Probe type
	0 Internal probes protected by grid
	H terminal header inputs
	TC Probe with cable
	TV Combined T/R.H. fixed vertical probe without cable, with high accuracy R.H. sensor
	TVI Combined T/R.H. fixed vertical probe without cable
4.	Radio frequency
	J 915.9-929.7 MHz (Japan)
	E 868 MHz (Europe)
	U 902-928 MHz (U.S.A. and Canada)

SENSORS

TEMPERATURE AND RELATIVE HUMIDITY COMBINED SENSORS

HP3517... Temperature and relative humidity combined probe with high accuracy R.H. probe.



R.H. sensor	: Capacitive
Temperature sensor	: NTC 10 kΩ @ 25 °C (HP3517TC...) Pt100 1/3 DIN (HP3517ETC...)
R.H. sensor measuring range	: 0...100 % RH
Temperature sensor measuring range	: -40...+105 °C (HP3517TC... with NTC 10 kΩ probe) -40...+150 °C (HP3517ETC... with Pt100 probe)
R.H. sensor operating range	: -20...+80 °C standard -40...+150 °C with option E
Accuracy	: ± 1.5 %rF (0..90 %RH) / ± 2 %RH (remaining range)
Cable length	: 2, 5 oder 10 m standard
Connection	: 4-pole M12 female connector

HP3517 1. 2. 3.

1.	RH sensor operating temperature	
	0	-20...+80 °C
	E	-40...+150 °C
2.	Stem length	
	TC1	135 mm
	TC2	150 mm (AISI 304)
	TC3	335 mm

3.	Cable length	
	2	2 m
	5	5 m
	10	10 m

HD9007A-1 12-ring protection from solar radiations. Supplied with mounting bracket.

HD9007A-2 16-ring protection from solar radiations. Supplied with mounting bracket.

HD9007T26.2 Fitting for Ø 14 mm probes for the protections from solar radiations HD9007A-1 and HD9007A-2.

Pt100 AND Pt1000 TEMPERATURE PROBES

TP35.1... 3-wire 1/3 DIN **Pt1000** temperature probe.



Temperature range	: -50...+105 °C
Accuracy	: 1/3 DIN
Dimensions	: Ø 6 x 50 mm
Cable length	: 3, 5 or 10 m standard, other lengths on request
Connection	: open wires or 4-pole M12 female connector (option /C)
Material	: AISI 316 stainless steel tube

TP35.1 1. 2.

1.	Cable length	
	3	3 m
	5	5 m
	10	10 m

2.	Cable termination	
	0	open wires
	/C	4-pole M12 female connector

TP35.2... 3-wire 1/3 DIN Pt1000 temperature sensor.



- Temperature range : 0...+70 °C
- Accuracy : 1/3 DIN
- Dimensions : Ø 5 x 20 mm
- Cable length : 3 or 5 m standard, **other lengths on request**
- Connection : Open wires or 4-pole M12 female connector (option /C)
- Material : Thermoplastic rubber

TP35.2

1.

2.

1.	Cable length	
	3	3 m
	5	5 m

2.	Cable termination	
	0	open wires
	/C	4-pole M12 female connector

TP35.4... 4-wire 1/3 DIN Pt100 temperature sensor.



- Temperature range : -50...+105 °C
- Accuracy : 1/3 DIN
- Dimensions : Ø 6 x 50 mm
- Cable length : 3, 5 oder 10 m standard, **other lengths on request**
- Connection : open wires or 4-pole M12 female connector (option /C)
- Material : AISI 316 stainless steel tube

TP35.4

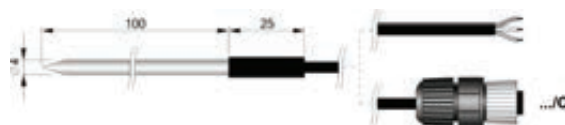
1.

2.

1.	Cable length	
	3	3 m
	5	5 m
	10	10 m

2.	Cable termination	
	0	open wires
	/C	4-pole M12 female connector

TP35.5... 4-wire 1/3 DIN **Pt1000** penetration temperature sensor.



Temperature range : -40...+300 °C
 Accuracy : 1/3 DIN
 Dimensions : Ø 4 x 100 mm
 Cable length : 3 oder 5 m standard, **other lengths on request**
 Connection : open wires or 4-pole M12 female connector (option /C)
 Material : AISI 316 stainless steel tube

TP35.5

1.

☐

2.

☐

1.	Cable length	
	3	3 m
	5	5 m

2.	Cable termination	
	0	open wires
	/C	4-pole M12 female connector

TP35878ISS... 1/3 DIN **Pt100** contact temperature sensor for solar panel.



Temperature range : -40...+85 °C
 Accuracy : 1/3 DIN
 Dimensions : Ø 30 mm
 Cable length : 5 oder 10 m standard, **other lengths on request**
 Connection : 4-pole M12 female connector

TP35878ISS

1.

☐

1.	Cable length	
	5	5 m
	10	10 m

TP35.5AF.5 Stainless steel temperature sensor. 4-wire class A wire wound Pt100 sensor. Stem dimensions: Ø 3 x 60 mm. Cable length: 5 m. Cable termination: open wires. Shield: Inox + Teflon.

TP35.5AF.5/C Stainless steel temperature sensor. 4-wire class A wire wound Pt100 sensor. Stem dimensions: Ø 3 x 60 mm. Cable length: 5 m. Cable termination: 4-pole M12 female connector. Shield: Inox + Teflon.

TP35.5AF1.2 Stainless steel temperature sensor. 4-wire class A wire wound Pt100 sensor. Stem dimensions: Ø 12 x 150 mm. Cable length: 2 m. Cable termination: open wires. Teflon insulated cable.

TP35.5AF1.2/C Stainless steel temperature sensor. 4-wire class A wire wound Pt100 sensor. Stem dimensions: Ø 12 x 150 mm. Cable length: 2 m. Cable termination: 4-pole M12 female connector. Teflon insulated cable.

NTC 10KΩ @ 25 °C TEMPERATURE SENSORS

TP35N1... NTC 10KΩ @ 25 °C temperature sensor.



Temperature range : -20...+85 °C
Accuracy : ± 0.3 °C in the range 0...+70 °C / ± 0.4 °C outside
Dimensions : Ø 5 x 40 mm
Cable length : 3, 5 oder 10 m standard, **other lengths on request**
Connection : open wires or 4-pole M12 female connector (option /C)
Material : AISI 316 stainless steel tube

TP35N1 - 1. 2.

1.	Cable length	
3	3 m	
5	5 m	
10	10 m	

2.	Cable termination	
0	open wire	
/C	4-pole M12 female connector	

TP35N2... NTC 10KΩ @ 25 °C temperature sensor.



Temperature range : 0...+70 °C
Accuracy : ± 0.3 °C
Dimensions : Ø 6 x 50 mm
Cable length : 3, 5 or 10 m standard, **other lengths on request**
Connection : open wires or 4-pole M12 female connector (option /C)
Material : AISI 316 stainless steel tube

TP35N2 - 1. 2.

1.	Cable length	
3	3 m	
5	5 m	
10	10 m	

2.	Cable termination	
0	open wires	
/C	4-pole M12 female connector	

TP35N5... NTC 10KΩ @ 25 °C temperature sensor.



- Temperature range : -20...+105 °C
- Accuracy : ± 0.3 °C in the range 0...+70 °C / ± 0.4 °C outside
- Dimensions : Ø 4 x 100 mm
- Cable length : 3 or 5 m standard, **other length on request**
- Connection : open wires or 4-pole M12 female connector (option /C)
- Material : AISI 316 stainless steel tube

TP35N1 -

1.

2.

1.	Cable length	
	3	3 m
	5	5 m

2.	Cable termination	
	0	open wires
	/C	4-pole M12 female connector

THERMOCOUPLE TEMPERATURE SENSORS

TP35K6.5... K-type thermocouple sensor with isolated hot junction.



- Max. temperature : -50...+750 °C
- Accuracy : class 1 according to IEC 60584-2
- Dimensions : Ø 3 x 150 mm
- Cable length : 5 m standard, **other lengths on request**
- Connection : open wires
- Material : AISI 316 stainless steel tube

PHOTOMETRIC - RADIOMETRIC SENSORS

LP 35 PHOT	Photometric sensor for measuring illuminance, CIE photopic filter, spectral response according to the standard photopic curve, diffuser for cosine correction. Measuring range: 0.1...200,000 lux. Cable length 2m.
LP 35 P-A	Combined sensor with two sensors for measuring illuminance, with standard photopic spectral response, and irradiance in the UVA spectral range 315 nm...400 nm, diffuser for cosine correction. Illuminance measuring range: 0.3...20.000 lux. Irradiance measuring range: 1...10.000 mW/m ² . Cable length 2m.
LP 35 UVA	Radiometric sensor for measuring irradiance in the UVA spectral range 315 nm...400 nm, diffuser for cosine correction. Measuring range: 1...10.000 mW/m ² . Cable length 2m.
LP 35 UVB	Radiometric sensor for measuring irradiance in the UVB spectral range 280 nm...315 nm, diffuser for cosine correction. Measuring range: 1•10-3...100 W/m ² . Cable length 2m.
LP 35 UVC	Radiometric sensor for measuring irradiance in the UVC spectral range 220 nm...280 nm, diffuser for cosine correction. Measuring range: 1•10-3...100 W/m ² . Cable length 2m.
LP BL	Base with levelling device. Upon request for assembly with the sensor when placing the order. For photometric and radiometric probes.
LP BL3	Adjustable wall support for Ø 30 mm photometric and radiometric sensor.

PYRANOMETERS

LP PYRA 02	First Class pyranometer according to ISO 9060. Output in $\mu\text{V}/(\text{Wm}^{-2})$. Supplied with: shade disk, cartridge with silica-gel crystals, 2 spare sachets, levelling device, connector and calibration report. On request 5 or 10 m cables with 4-pole M12 connectors.
LP PYRA 03	Second Class pyranometer according to ISO 9060. Output in $\mu\text{V}/(\text{Wm}^{-2})$. Supplied with levelling device and calibration report. On request shade disk and 5 or 10 m cables with 4-pole M12 connectors.
LP SILICON-PYRA 04	Pyranometer with silicon photodiode for measuring the global solar irradiance , diffuser for cosine correction. Spectral range 350...1100 nm. Typical sensitivity: 10 $\mu\text{V}/\text{W m}^{-2}$. Measuring range: 0...2000 W/m ² . Fixed cable 5 m long..

RAIN GAUGES

HD2013	Rain gauge with tipping bucket, area 400 cm ² , for temperature range +4 °C... +60 °C. Standard resolution 0.2 mm. On request when placing the order resolution 0.1 or 0.5 mm. Output contact normally closed.
HD2013R	Rain gauge with tipping bucket, area 400 cm ² , equipped with heater for temperature range 20 °C...+60 °C. Standard resolution 0.2 mm. On request when placing the order resolution 0.1 or 0.5 mm. Output contact normally closed. Power voltage 12 Vdc or 24 Vdc \pm 10% / power absorption 165 W.
HD2015	Rain gauge with tipping bucket, area 200 cm ² , for temperature range +4 °C... +60 °C. Standard resolution 0.2 mm. On request when placing the order resolution 0.1 or 0.5 mm. Output contact normally closed.
HD2015R	Rain gauge with tipping bucket, area 200 cm ² , equipped with heater for temperature range 20 °C...+60 °C. Standard resolution 0.2 mm. On request when placing the order resolution 0.1 or 0.5 mm. Output contact normally closed. Power voltage 12 Vdc or 24 Vdc \pm 10% / power absorption 50 W.

LEAF WETNESS PROBES

HD3501.5	Leaf wetness probe with double sensitive surface. IP 67 protection degree. 5 m cable ending with M12 connector.
HD3501.10	Leaf wetness probe with double sensitive surface. IP 67 protection degree. 10 m cable ending with M12 connector.



SOIL MOISTURE PROBES

HD3510.1 2-electrode probe for measuring the soil humidity. With integrated NTC 10 k Ω temperature sensor. M12 connector. 5 m cable.



HD3510.2 3-electrode probe for measuring the soil humidity in restricted volumes. With integrated NTC 10 k Ω temperature sensor. M12 connector. 5 m cable.



WIND SPEED AND DIRECTION PROBES

HD54.3 Passive cup anemometer. Measuring range: 1...65 m/s. Operating conditions: -40...+60 °C / 0...100% RH. Rod mounting. Height 81 mm assembled.

HD54.D Wind direction vane probe. Measuring range: 0...360°. Dead band: typical 4°, maximum 8°. Threshold: 1 m/s. Operating conditions: -40...+60 °C / 0...100% RH. Rod mounting. Dimensions: 210 x 120 mm.

ACCESSORIES

HD35AP-S Further copy of the CD-ROM with HD35AP-S basic software for the system configuration, the real time viewing of the measures and the data download. The access to the data is allowed only from the PC where the Data Base is installed. For Windows® operating systems.

HD35AP-PLUS Advanced version of the HD35AP-S software that provides access to the Data Base from all the PCs connected in the network to the server where the Data Base is installed. For Windows® operating systems.

CP23 Direct USB connection cable with male mini USB connector on the side of the instrument and male A type USB connector on the side of the PC.

CPM12-8P.2 8-pole cable. Length 2 m. 8-pole M12 connector on one side, free wires on the other. For RS485 connection to HD35APS base unit.

CPM12-8P.5 8-pole cable. Length 5 m. 8-pole M12 connector on one side, free wires on the other. For RS485 connection to HD35APS base unit.

CPM12-8P.10 8-pole cable. Length 10 m. 8-pole M12 connector on one side, free wires on the other. For RS485 connection to HD35APS base unit.

SWD06 Mains power adapter 100-240 Vac / 6 Vdc - 1 A.

HD35.03 Plastic support for the removable installation of base unit, repeaters and data loggers in housing for indoor use.

HD35.11K Pair of flanges made of anodized aluminium alloy for the fixed installation of base unit, repeaters and data loggers in housing for indoor use. Pin for padlock and padlock included.

HD35.24W Flange for fixing to the wall the models HD35EDW... in waterproof housing.

HD35-ANT Spare external RF antenna for the base units HD35AP... (except HD35APD-EXT) and the repeater HD35RE (not for HD35REW).

HD35-ANT2 Spare external RF antenna for the base unit HD35APD-EXT.

Product information

Wireless datalogger

HD35-ANT3	Spare external RF antenna for the repeater HD35REW and the data loggers HD35EDW... with external antenna.
HD35-BAT1	3.7 V lithium ion rechargeable battery, capacity 2250 mA/h, 3-pole JST connector. For the base units HD35AP... and the repeater HD35RE.
HD35-BAT2	3.6 V lithium thionyl chloride (Li-SOCl ₂) not rechargeable battery, size AA, 2-pole Molex 5264 connector. For the alarm module HD35ED ALM and the data loggers HD35ED....
BAT-2013DB	3.6 V lithium thionyl chloride (Li-SOCl ₂) not rechargeable battery, size C, 2-pole Molex 5264 connector. For the repeater HD35REW and the data loggers HD35EDWK/4TC, HD35EDWH and HD35EDM...TC.
HD2003.77/40	Clamp to fix the waterproof housing to the 40 mm diameter mast.
HD2003.71K	40 mm diameter mast kit, height 2 m, in two pieces.
HD2003.75	Pointed grounding rod for 40 mm diameter mast.
HD2003.78	Flange for 40 mm diameter mast, to be fastened on the floor.
HD2005.20	Anodized aluminum tripod kit with adjustable legs for installing environmental sensors. It can be fixed on a flat base with screws or to the ground with pegs.
HD9217TF1	Protection shield from solar radiations for outdoor installation. For the HD35EDW... waterproof data loggers.
HD32MT4.6	Protection shield from solar radiations for outdoor installation. For the HD35EDM...TC waterproof data loggers.

Accessories for humidity sensors

HD75	75% RH saturated solution for checking the relative humidity sensors, supplied with threaded ring for 14 mm diameter probes M12×1 thread.
HD33	33% RH saturated solution for checking the relative humidity sensors, supplied with threaded ring for 14 mm diameter probes M12×1 thread.

Accessories for CO sensors

MINICAN.12A	Nitrogen can for CO calibration at 0 ppm. Volume 20 litres. With regulating valve.
MINICAN.12A1	Nitrogen can for CO calibration at 0 ppm. Volume 20 litres. Without regulating valve.
ECO-SURE-2E CO	CO spare probe.
HD37.36	Connection tube kit between instrument and nitrogen can for CO calibration.

GHM GROUP - general terms and conditions of business

This document has been translated from German into English. In case of doubt, the German version shall always take precedence.

§ 1 Field of Application and Definitions

1. For legal relationships between the GHM Group (hereinafter GHM) and customers, these General Terms and Conditions of Business shall apply exclusively. Any conditions in deviation, contradiction or addition to these Terms, are hereby excluded even if known, unless there is express written agreement to the customer's contradicting Conditions of Business.

2. For the purposes of these Terms, a customer is an entrepreneur who places an order with GHM or who concludes a contract with GHM.

3. For the purposes of this contract, according to § 14 of the German Civil Code, an entrepreneur is a natural or legal entity who makes contracts while practising their business or professional freelance activity. We do not supply to consumers as defined in § 13 of the German Civil Code.

4. GHM reserves the right to change their Terms at any time. The customer is to be informed immediately about this in writing or via email. If the customer does not object within 2 weeks of the written notice or sending of the email, the imparted amendments to the Terms will be considered accepted by that customer. The message will inform the customer of the consequences of missing this deadline.

§ 2 Concluding Contracts

1. The product catalogues issued by GHM, as well as other brochures and technical documentation, are intended only for business customers and do not represent an offer to conclude a contract, but only an invitation to the customer to submit a written offer for a contract to GHM.

2. Offers from GHM are non-binding. Contracts can only be concluded via delivery or written confirmation of an assignment. Verbal orders only become effective when they are confirmed by GHM in writing. Changes to signed contracts must be confirmed by GHM in writing in order to be effective.

3. GHM reserves the right to change the technical data, shape and colour, and/or weight within reasonable bounds.

4. If GHM is not supplied correctly or promptly due to a circumstance beyond its control and therefore does not have the object of the contract available, GHM shall have the contractual right to withdraw from the contract. If this withdrawal right is used, the contract must be completely reversed and any received payments are to be returned.

§ 3 Prices, Payments, Discounts, Interest on Late Payments, Offset

1. All prices specified in the product catalogues, brochures and technical documentation issued by GHM are to be understood as without VAT unless we have indicated that they include VAT. Packaging, freight, postage and any other shipping costs are additionally to be paid by the customer unless otherwise agreed.

2. Insofar as expressly fixed prices are agreed upon, the given prices are based on GHM's acquisition costs at the time the order was confirmed. In case of unforeseen increases in acquisition costs beyond GHM's control, GHM reserves the right to raise the prices correspondingly if the delivery or service was not required within four months of signing the contract.

3. If not otherwise agreed in writing, all payments must be made in full, without deduction, to the given payment recipient, within 30 days of the date of invoicing. A discount of 2% is given for payments made within 10 days. This discount is excluded if the customer is late with other payment obligations due to us.

4. If payments are deferred or if the customer is in arrears with payments, the legal interest fees for lateness between companies will become due (currently 8% above the baseline interest according to § 288(2) of the German Civil Code). According to § 286 of the German Civil Code, lateness with payments occurs – even without a reminder – no later than 30 days after receiving the goods or services and the invoice.

5. The customer may only offset costs towards GHM with recognised or legally effective claims.

§ 4 Delivery and Transfer of Risk

1. The location of service and fulfilment is the applicable GHM branch.

2. If the customer requests the contractual object to be sent to another location, the danger of its becoming mislaid transfers to the customer when the goods are given to the freight carrier. In the absence of other agreements, GHM is free to select any type of shipping. The packaging material required for shipping will be invoiced separately and is to be recycled or properly disposed of by the customers at their own cost.

3. Delivery dates and deadlines are only considered binding if the contract parties have expressly made an agreement in this regard. In case of doubt, delivery periods begin on the date of job confirmation. If there is a temporary hindrance to service which is beyond GHM's control, the delivery dates and periods will extend correspondingly. This applies particularly in cases of force majeure, and strikes.

4. GHM has the right to make partial deliveries.

§ 5 Retention of Ownership

1. GHM reserves the right of ownership over contractual objects for itself until all GHM's claims towards the customer from the business relationship have been fulfilled. The customer is therefore obligated to handle the contractual objects with care. If there is an open account relationship, the reserved ownership covers the recognised balance. Violation of this instruction shall give GHM the right to withdraw from the relevant contract.

2. The customer is permitted to process the purchased object or combine it with other objects. Processing or combining is done for GHM. The new object resulting from this process (new goods) is to be carefully kept and used for us by the customer. In case of processing with other objects not belonging to the customer, we are owed an ownership share of the new goods, at a proportion determined by the relation of the value of the item we delivered which has been processed or combined, to the value of the other processed goods at the time of processing. If the customer purchases sole ownership of the new goods, the customer shall agree to assign to GHM partial ownership of the new goods in proportion to the value of the processed item we delivered and the other processed goods at the time of processing.

3. While ownership retention is applicable, the customer is not permitted to pawn

the goods or use them as security. Onselling is only permitted to resellers in the usual course of business and only on condition that the reseller receives full payment from his customers or reserves the right that ownership only transfers to the customer when the customer has fulfilled his payment obligations.

4. In case of pawning, seizure or other control or intervention of third parties regarding the contractual objects, the customer must inform GHM immediately.

§ 6 Guarantee

1. In case of faults in the contractual objects, guarantee claims are limited to replacement. If the fault is still present after two replacements, then the replacement is considered to have failed. The customer can then request an appropriate reduction in the price or withdraw from the contract.

2. All guarantee claims expire in 12 months as of the legal start date of expiration. This period is not applicable if the law according to the German Civil Code §438(1) no. 2 (Buildings and Items for Buildings) and §634a(1) no. 2 (Building Faults) prescribes longer deadlines, or in case of deliberate action, fraudulent concealment of the fault, or if a guarantee of quality has not been fulfilled.

3. Damage compensation to the client due to material fault is excluded. This does not apply in case of fraudulent concealment of the fault, if a guaranteed quality has not been fulfilled, if there is injury to life, body or health, or if GHM deliberately or grossly negligently violated its obligation. These stipulations do not change the burden of proof to the customer's disadvantage. Further or other claims than those in this § 6 due to material fault from the entity making the order are excluded.

§ 7 Exchanges and Repairs

1. GHM is not obligated to replace or take back goods without fault, and in case of special orders, replacement or return is excluded per se.

2. If GHM states it is willing to take back a standard item without being obligated to do so according to guarantee laws or their own given guarantee, then 15% of the purchase price will be retained if the goods are undamaged. If the goods are damaged, additional necessary repair costs will also be deducted. The buyer is permitted to prove that damage or reduction in value has not occurred at all or is significantly lower than the sum specified.

3. If GHM is to carry out repairs for the customer which do not fall within guarantee laws or their own guarantee, the item for repair will be sent back to the client by default at the client's own cost. If the customer requests a price quote for the repair, GHM has the right to invoice for this additional work to the amount of the actual costs incurred.

4. Special devices and modified standard versions cannot be exchanged or returned. A return subject to a return fee of 30% of the purchase price can be agreed upon in special cases.

§ 8 Limitation of Liability

GHM is only liable in cases where it, its legal representative or a subcontractor/fulfilment agent is guilty of deliberate or gross negligence. This does not apply if the damages are for injury to life, the body or health, or in case of violation of contractual obligations.

§ 9 Disposal of electronic devices

If the contractual items delivered include such, their disposal is governed by the following paragraphs regarding old devices (§ 3(3), German Electronics Law) which are used outside of private households (§ 3(4), German Electronics Law).

1. The customer will dispose of the delivered electronic devices at the end of their useful lives at his own cost and according to relevant legal regulations. The customer releases GHM from the manufacturer's obligations according to § 10(2) and (3) of the German Electronics Law and therefore also from any connected claims from third parties.

2. If the delivered goods are passed on to industrial third parties, the customer must also obligate these parties in writing to dispose of the devices properly after the end of their lives, to bear the related costs for this, and to impose a similar obligation if they pass the devices on again.

3. If the customer neglects to contractually obligate third parties to proper disposal and to obligate further recipients according to Para. 2 above, then the customer is obligated to take back the items after the end of their useful lives and dispose of them properly according to legal regulations. This shall also apply if the onwards obligation to the third party was not in writing and the third party disputes their responsibility for disposal.

4. GHM's right to have the customer take over and release GHM will not expire before two years have passed after the final use of the device. This two-year expiry restriction begins no earlier than the date of the manufacturer receiving a written notice from the customer about the end of the device's use. However, the claim on takeover and release will expire no later than 30 years after it comes into existence.

5. Conformity with WEEE for all electronic devices from GHM is ensured, based on the existing registration at the Foundation for Registering Old Electronic Devices. Our WEEE registration number is DE 93889386.

§ 10 Other

1. The exclusive application of the law of the Federal Republic of Germany is agreed upon. The stipulations of the United Nations Convention on Contracts for the International Sale of Goods are not applicable.

2. If the customer is a businessperson, a legal entity under public law or a special fund under public law, the agreed exclusive court of jurisdiction for any disputes from this contract is Regensburg. GHM shall also have the right to bring a case at the customer's location.

3. Should individual terms of this contract be ineffective, this will not affect the effectiveness of the remainder. In such a case, the ineffective term is to be changed or extended so that the economic goal it targets is fulfilled. § 139 of the German Civil Code [Partial Invalidity] is hereby waived.

Version dated: 31.12.2016

Product index

Product	Page	Product	Page
A		G	
Accessories for Conductivity Measurement	267	GTL 142.....	27
Accessories pH/ORP	243	GTL 162/162M / GTL 182/182M.....	30
Accessories temperature.....	84	GTL 240.....	33
B		GTL 241.....	39
Blind glands.....	14	GTL 244.....	45
C		GTL 260/260M / GTL 280/280M.....	36
Connection cable series ACH (4- and 5-pole)	17	GTL 261/261M / GTL 281/281M.....	42
Connection cable series ACH (8-pole, shielded).....	18	GTL 263/263M.....	49
Connection cable shielded series KH.....	139	GTL 264/264M / GTL 284/284M.....	47
Connection Diagrams Conductivity Measurement	250	GTL 349.....	51
Connection Diagrams X9648.....	230	GTL 369/369M / GTL 389/389M.....	53
Connection Diagrams X9648.....	247	GTL 459.....	56
D		GTL 479/479M / GTL 499/499M.....	58
DFG.....	242	GTL720 / GTL723.....	67
DMP331.....	206	GTL737.....	70
Doppel-Pt100 Ø 18.....	64	H	
Doppel-Pt100 Ø 59.....	61	HD35	372
E		HD35	372
EA1200 / EA2200	238	HFK12-C.....	125
EA1630 / EA2630	239	HFK12-F	125
EA1730 / EA2730	240	HFK12-I	125
EA2650.....	241	HFK12-S.....	128
ECI-1	138	HFK12-U.....	125
EP9648.....	294	HFK30	121
EYY120 programming adapter	164	HFK30-FIN	134
EYY120 programming adapter	193	HFK35	118
F		HFK35-FIN	131
FT500	317	HLK12-S.....	147
G		HTK12-I/U/F	73
GA9648	292	HTK12-S.....	75
GHM SIM-1.....	368	HTK30	78
GLMU	251	HTK35	81
GPHU	234	L	
GRMU.....	235	LF1010	248
GS125	353	LF1010	307
GS500	352	LF1453 / LF2453	257
GT1-CO	272	LF1553 / LF2553	258
GT10-CO2-1R	273	LF1653 / LF2653	259
		LF2203	253
		LF2603	254
		LF2613	255
		LF2653HT.....	256
		LF3043 / LF4043	261
		LF3213 / LF4213	262
		LF3433 / LF4433	263
		LF3533 / LF4533	264

Product index

Product	Page	Product	Page
L		R	
LF3623 / LF4623	265	Reducing adapter	14
LF3733 / LF4733	266	RT500	318
LF4003	260	S	
LF9648	246	SA-11	222
LF9648	298	SLR420-1	172
M		SLR420-2	173
MAT433/437	216	SLR420-3	178
MAT433/437	279	SLR430-1	175
MFI447	93	SLR430-2	176
MLC420/422	155	SLT420-2	174
MLC430	156	SLT430-2	177
MLC433	158	SLT430-3	179
MLC437	160	ST125M	330
MLC490/492	162	ST500	334
MLP433-MR	201	ST500Ex	335
MLP433-OR	200	Standard pH and ORP Electrodes	236
MLP437-MR	203	STL50	361
MLP437-OR	202	STL50Ex	363
MLR120	191	T	
MLR157	192	T9648	295
MLR420-1	180	TB225	359
MLR420-2	181	TG50	355
MLR430-1	184	TG50Ex	357
MLR430-2	185	TS125 / TS225	341
MLR430-3	188	TS500	343
MLT420-2	183	TS500Ex	344
MLT430-2	187	TV125L	332
MLT430-3	190	TV125M	330
MR50	349	TV500	334
MR50Ex	350	TV500Ex	335
MU500	314	TV500H	336
MU500Ex	316	TV500L	337
MU500L	315	TV500P	338
O		TW500	339
OXY 3610 MP	271	TW501Ex	340
OXY 3690 MP	270	U	
OXY 3690 MP	270	UNICON-LF	249
P		UNICON-pH	231
pH40	233	UNICON-pH	302
pH9648	228	UT125	319
pH9648	300	UZ9648	297
PMT50-2/-3	321	W	
PMT50Ex-2 /-3	323	WA120	241
Process adaptation for HFK, HTK, HLK	140	Welding fittings series APH	16
Process adapters	15		
Process adaption and accessories	12		

Product index

Product	Page	Product	Page
W			
Welding sleeves	13		
Welding tools	14		
Weld-on fittings series APH	141		

Sales Germany



Thomas Stumpe

Sales Director Germany / Austria

Schloßstraße 6 Phone +49 7354 937233-0
88453 Erolzheim Fax +49 7354 937233-88
GERMANY Mobile +49 172 4346882



Sales area 3

40000 – 41999
45000 – 50999
52000 – 52999

Jürgen Kersten

Kamperlingsweg 9
47906 Kempen
Phone +49 2152 80907-95
Fax +49 2152 80907-97
Mobile +49 172 5298587
j.kersten@ghm-messtechnik.de



Sales area 1 + 2

10000 – 19999	21451 – 21480	23000 – 23999
20000 – 20449	21481 – 21508	24000 – 25999
20450 – 20458	21509 – 21513	27000 – 27729
20459 – 21040	21514 – 21999	27778 – 27793
21041 – 21450	22000 – 22999	28000 – 28999

Hans-Joachim Petermann

Krögerstraße 30
22145 Hamburg
Phone +49 40 67998410
Fax +49 40 67998411
Mobile +49 172 4346881
h.petermann@ghm-messtechnik.de



Sales area 10

26000 – 26999
27730 – 27777
27794 – 27999

Michael Wulf

Kiebitzhörn 18
22885 Barsbüttel
Phone +49 40 67073-201
Fax +49 40 67073-238
Mobile +49 172 1474407
m.wulf@ghm-messtechnik.de



Sales area 4

35000 – 36999 57000 – 59999
42000 – 42999 61000 – 61999
44000 – 44999
51000 – 51999
53000 – 53999

Stefan Müller

Ottostraße 51
42289 Wuppertal
Phone +49 202 6093374
Mobile +49 171 4108173
s.mueller@ghm-messtechnik.de



Sales area 5

29000 – 9999
30000 – 34999
37000 – 39999

Jörg Winter

Vor dem Lohholze 17
29690 Schwarmstedt
Mobile +49 172 4346880
j.winter@ghm-messtechnik.de



Sales area 7

54000 – 56999
60000 – 60999
63000 – 69999

Christian Rösner

Joseph-Berberich-Str. 8
63538 Großkrotzenburg
Phone +49 7354 937233-0
Fax +49 7354 937233-88
Mobile +49 151 12098192
c.roesner@ghm-messtechnik.de



Sales area 6

00000 – 09999
98000 – 99999

Peter Taubert

Stralsunder Straße 149
04349 Leipzig
Phone +49 34298 159606
Fax +49 34298 159605
Mobile +49 171 3377475
p.taubert@ghm-messtechnik.de



**Customer support
Sales area 9**

70000 – 79999
88000 – 89999

Elfi Lucas

Phone +49 7354 937233-58
Fax +49 7354 937233-88
e.lucas@ghm-messtechnik.de



Sales area 8

80000 – 87999
90000 – 97999

Joachim Höfling

Kleinhaslach 80
90599 Dietenhofen
Phone +49 9824 928682
Fax +49 9824 928681
Mobile +49 172 8460512
j.hoeftling@ghm-messtechnik.de



Sales international

Our International Area Sales Management Team



Anita Renc
Direction sales international

GHM GROUP – Headquarters
Schloßstraße 6
88453 Erolzheim
GERMANY

Phone +49 7354 937233-401
Mobile +49 173 8233998
a.renc@ghm-messtechnik.de

Area:
South-East Asia, France,
Switzerland, Spain, PortugalZ

Language:
German, English, Italian, Czech



Parimal Sharma
Sales Export

GHM GROUP – Headquarters
Schloßstraße 6
88453 Erolzheim
GERMANY

Phone +49 7354 937233-403
p.sharma@ghm-messtechnik.de

Area:
Russia, India, Estonia, Lithuania,
Latvia, Romania, Hungary,
Bulgaria

Language:
English, Hindi, German



Feifan Jin
Sales Export

GHM GROUP – Headquarters
Schloßstraße 6
88453 Erolzheim
GERMANY

Phone +49 7354 937233-405
f.jin@ghm-messtechnik.de

Area:
China, Japan, South Korea,
South-East Asia

Language:
Chinese, German, English



Mina Kamal
Sales Export

GHM GROUP – Headquarters
Schloßstraße 6
88453 Erolzheim
GERMANY

Phone +49 7354 937233-409
m.kamal@ghm-messtechnik.de

Area:
Africa, Arabic States, Israel,
Greece

Language:
English



Peter Wüster
Sales Export

GHM GROUP – Honsberg
Tenter Weg 2-8
42897 Remscheid
GERMANY

Phone +49 2191 9672-35
p.wuester@ghm-messtechnik.de

Area:
Scandinavia, UK, Ireland

Language:
German, English

GHM Sales Subsidiaries



Occo Andriessen
Director



Netherlands

GHM-Meettechnik BV
Zeeltweg 30
3755 KA Eemnes
NETHERLANDS

Phone +31 35 53805-40
Fax +31 35 53805-41
info@ghm-nl.com
www.ghm-nl.com



Michal Doubek
Director



Czech Republic / Slovakia

GHM-Greisinger s.r.o.
Ovci hajek 2 / 2153
158 00 Prague 5
Nove Butovice
CZECH REPUBLIC

Phone +420 251 613-828
Fax +420 251 612-607
info@greisinger.cz
www.greisinger.cz



Erling Mathiesen
Director



Denmark

GHM Maaleteknik ApS
Maarslet Byvej 2
8320 Maarslet
DENMARK

Phone +45 6464 92-00
Fax +45 6464 92-01
info@ghm.dk
www.ghm.dk



Jan Grobler
Managing Director



South Africa

GHM Messtechnik
SA (PTY) Ltd
16 Olivier Street
Verwoerdpark, Alberton 1453
SOUTH AFRICA

Phone +27 74 4590040
j.grobler@ghm-sa.co.za
www.ghm-sa.co.za



Carlo Mei
Sales Manager



Italy

Delta OHM S.r.l.
Via Marconi 5
35030 Caselle di Selvazzano
Padova (PD)
ITALY

Phone +39 049 8977150
Fax +39 049 635596
info@deltaohm.com
www.deltaohm.com

GHM Foreign Sales



Andrea Casati
Office Italy / Delta OHM S.r.l.

Via G. Marconi 5
35030 Caselle di Selvazzano
ITALY

Phone +39 049 8977150
Fax +39 049 63 5596
Mobile +39 340 0063879
a.casati@ghm-messtechnik.de



Alfred Fröstl
Office Austria

Breitenseer Str. 76/1/36
A-1140 Wien
AUSTRIA

Phone +43 660 7335603
a.fröstl@ghm-messtechnik.de

GHM Centers of Competence

GHM GROUP - Greisinger
GHM Messtechnik GmbH
Hans-Sachs-Straße 26
93128 Regenstein | GERMANY
Phone +49 9402 9383-0
Fax +49 9402 9383-33
www.greisinger.de
info@greisinger.de

GHM GROUP - Honsberg
GHM Messtechnik GmbH
Tenter Weg 2-8
42897 Remscheid | GERMANY

GHM GROUP - Martens
GHM Messtechnik GmbH
Kiebitzhörn 18
22885 Barsbüttel / Germany

GHM GROUP - Imtron
GHM Messtechnik GmbH
Carl-Benz-Straße 11
88696 Owingen | GERMANY

GHM GROUP - Delta OHM
Delta OHM S.r.l. a socio
Via Marconi 5
35030 Caselle di Selvazzano,
Padova (PD) | ITALY
www.deltaohm.com
info@deltaohm.com

Sales Offices

Austria
Alfred Fröstl
Breitenseer Str. 76/1/36
1140 Vienna | AUSTRIA
Phone +43 660 7335603
a.froestl@ghm-messtechnik.de

Italy
Andrea Casati
Via Marconi 5
35030 Caselle di Selvazzano
Padova (PD) | ITALY
Phone +39 049 8977150
a.casati@ghm-messtechnik.de



Sales Subsidiaries

Netherlands
GHM Meettechnik BV
Zeeltweg 30
3755 KA Eemnes | NETHERLANDS
Phone +31 35 53805-40
Fax +31 35 53805-41
www.ghm-nl.com
info@ghm-nl.com

Czech Republic / Slovakia
GHM Greisinger s.r.o.
Ovci hajek 2 / 2153
158 00 Prague 5
Nove Butovice | CZECH REPUBLIC
Phone +420 251 613828
Fax +420 251 612607
www.greisinger.cz
info@greisinger.cz

Denmark
GHM Maaletchnik ApS
Maarslet Byvej 2
8320 Maarslet | DENMARK
Phone +45 646492-00
Fax +45 646492-01
www.ghm.dk
info@ghm.dk

South Africa
GHM Messtechnik SA (Pty) Ltd
16 Olivier Street
Verwoerdpark, Alberton 1453 |
SOUTH AFRICA
Phone +27 74 4590040
j.grobler@ghm-sa.co.za

Italy
Delta OHM S.r.l.
Via Marconi 5
35030 Caselle di Selvazzano
Padova (PD) | ITALY
Phone +39 049 8977150
www.deltaohm.com
info@deltaohm.com

Worldwide Sales

Europe:

Austria
Belgium
Bulgaria
Denmark
Finland
Estonia
Finland
France
Greece
United Kingdom
Ireland
Italy
Croatia
Lithuania

Moldova
Netherlands
Norway
Austria
Poland
Portugal
Romania

Russia
Sweden
Switzerland
Serbia
Slovakia
Slovenia
Spain

Czech Republic
Turkey
Hungary
Ukraine
Belarus

Worldwide:

Egypt
Australia
Brazil
Chile
China
India
Israel

Japan
Malaysia
Morocco
Oman
Philippines
Singapore
South Africa

South Korea
Taiwan
Thailand
USA
United Arab
Emirates
Vietnam

GHM GROUP CORPORATE

GHM Messtechnik GmbH | Schloßstraße 6 | 88453 Erolzheim | GERMANY
Phone +49 7354 937233-0 | info@ghm-messtechnik.de | ghm-messtechnik.de