

EN

Clamp-on Temperature Sensor GTL720



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1 Proper use (application areas)



Detailed information on the application area can be found in the Chapter 2 *Product description*

The operating safety of the device is ensured only with proper use and observation of the information given in the operating instructions.

For safety and guarantee reasons, work above and beyond that described in the operating instructions may only be carried out by personnel authorized by the manufacturer. Unauthorized conversions or modifications are expressly prohibited.

In the event of improper use, this device can pose dangers, depending on the application.



Additional requirements for use in potentially explosive atmospheres:

- 1) The piping adapters must be mounted on a grounded metal pipe.
- 2) In the case of size 4 pipe adapters, the clamp jacket must also be grounded.
- 3) Operation with approved evaluation electronics (associated equipment), only.
- 4) When using thermal compound, it is important to ensure that only electrically conductive thermal paste is used.



General safety instructions, use

These operating instructions must be kept where they are immediately available to specialist personnel at all times.

Only trained personnel authorized by the operator, while wearing the corresponding protective clothing must carry out all procedures described in these operating instructions.

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1.1 Safety signs and symbols

Warning instructions are designated in this document as described below in Table:



Warning! This symbol warns against immediately threatening danger, death, severe physical injury or serious material damage if instructions are not followed.



Attention! This symbol warns against possible dangers or dangerous situations, which can cause damage to the device itself or to the environment if instructions are not followed.



Note! This symbol indicates procedures, which have a direct influence on operation or can cause unforeseen reactions if instructions are not followed.



Warning! In front of an area in which explosive atmospheres can occur. This only applies to devices with an ATEX approval.

Table 1 Safety signs and symbols

1.2 Safety instructions



Read the product description before bringing the device into operation. Ensure that the product is fully suitable for the applications in question.

The operator is responsible for the problem-free operation of the device. The operator is obliged throughout the complete usage time to establish and ensure that the required working and safety measures comply with the relevant applicable regulations.

1.3 Product liability and guarantee

Liability disclaimer:

The content of the operating instructions has been checked for compliance with the device described. Deviations cannot however be excluded, so that we offer no guarantee of full compliance. The information in these instructions is checked regularly, and necessary corrections incorporated into the following editions. We reserve the right to make technical amendments. All claims are also subject to the valid "General delivery conditions for products and services of the electronics industry".



GHM Messtechnik cannot check or repair devices without the specified, fully completed form (see chapter 8.1 Returns).

1.4 Standards and directives

Conformity

Explosionsgefährdete Bereiche	60079-0:2018 60079-11:2012
Vibrations	EN 60068-2-6:2008
FDA conform	

2 Product description

The GTL720 pipe clamp-on sensors are especially useful as an alternative to invasive and inline-measuring procedures for monitoring sterilization processes. Without disturbing the process, the special clamp-on mechanics make the systems flexible, absolutely dead spot-free, and usable without high installation costs. This measuring procedure permits high-precision results.

The pipe clamp-on sensor consists of a sensor insert with the Pt100 sensor and the pipeline adapter. The electric contact is achieved by means of a three-wire system and an M12 round connector.

Block diagram

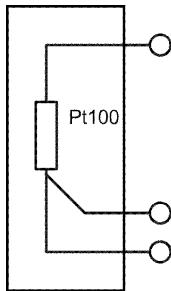


Figure 1 Block diagram

2.1 Delivery content

- Clamp-on Sensor GTL720
- Pipeline adapter, RLA (separate ordering position)
- Silicone insert (RLA included)
- This operating manual (GTL720 included)

2.2 Operating principle

The GTL720 pipe clamp-on sensor measures temperatures of liquids in metal pipelines without a process connector touching the fluid. For this purpose, the pipe clamp sensor is mounted on the exterior of the pipe at a suitable site. The sensor plate is pressed to the exterior of the pipe wall by a spring. Constant pressure and shielding the silicone from the ambient air guarantee an optimal thermal transfer. The one-piece measuring insert, which is manufactured from premium-quality synthetic material prevents undesirable heat dissipation and reduces the response time. The sensor plate inside the measuring insert is in direct thermal contact with the Pt100 sensor.

2.3 Design of the measurement system

The GTL720 measuring system consists of an RLA piping adapter and a GTL720 measuring insert.

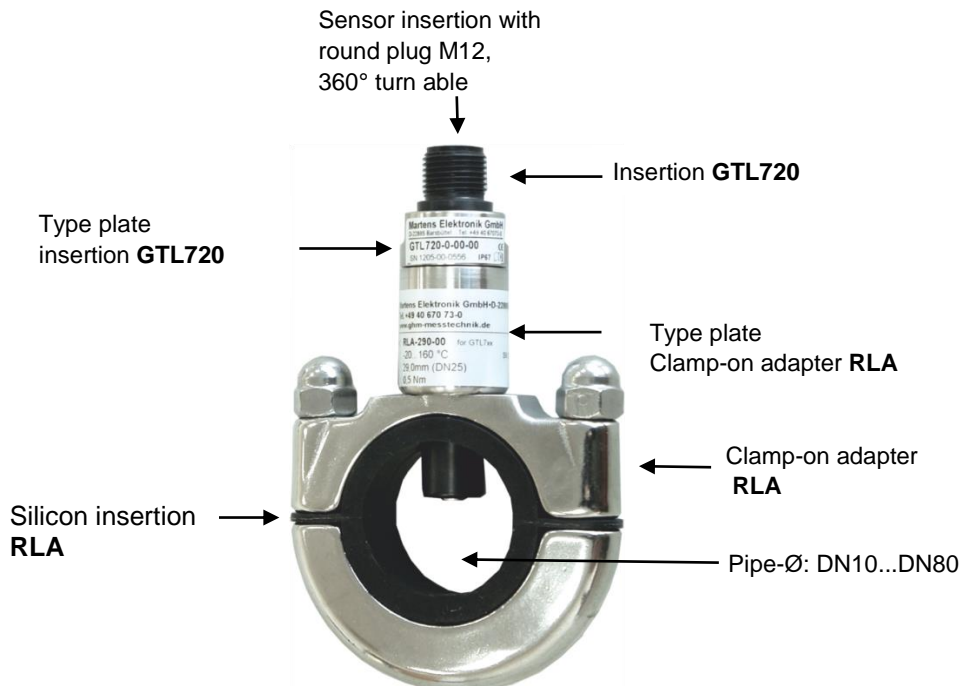


Figure 2 Design of measurement system

2.4 Type plate

The nameplate contains the most important identification data:

- Connection diagram
- Manufacturer
- Type and article designation
- Technical data
- Serial number



Figure 3 Type plate GTL720



Figure 4 Type plate RLA

2.5 Step response of clamp-on sensor

Reference conditions

Pipe diameter	29 mm
Pipe wall thickness	1,5 mm
Pipe material	1.4404
Flow rate	0,5 ~ 1,5 m/s
Ambient temperature	30 °C
Medium	Water
Mounting direction	Acc. to position 1, 3.1 Mechanical mounting

Table 2 Reference condition for step response

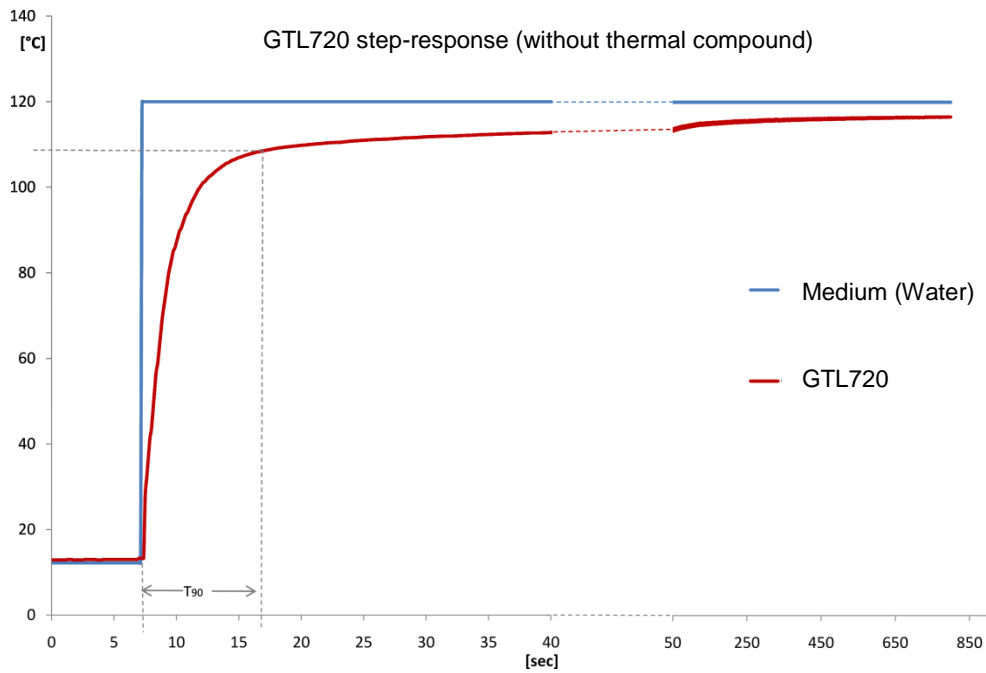


Figure 5 Step-response (T_{90}) in water, without thermal compound

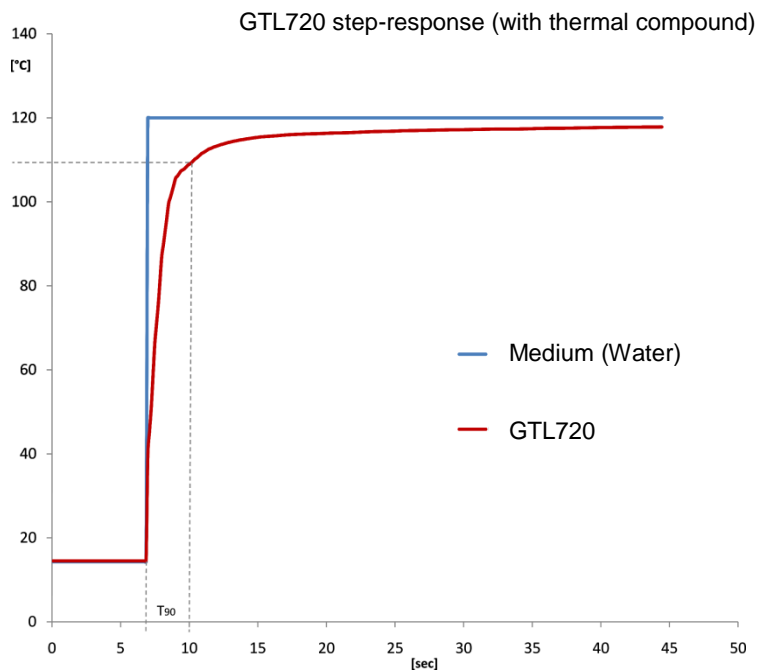


Figure 6 Step-response (T_{90}) in water, with thermal compound

3 Mounting and electrical installation

3.1 Mechanical mounting

The RLA pipe clamp sensors are available in three sizes. The adapters are adjusted to the pipe diameter (DN10 to DN80) with different highly heat-resistant silicone inserts.

Frame size (Bg)	Pipe Ø [mm]
1	12,0..19,0
2	20,0..33,9
3	34,0..53,0
4a	60,3..75,9
4b	76,0..88,9

Table 3 Frame size and pipe diameter

Available for pipe standards: DIN 11850 r1, r2 and DIN11866 rB, rC.

The cap nuts of the two adapter parts should be torqued to a value from 0.5 to 1 Nm (0.37 to 0.74 ft-lb) to avoid a deformation of the silicone insert, which would prevent a correct fitting of the pipes.



For the same reason, all cap nuts must be torqued equally. This is especially important for pipes with small diameters without the use of heat-conductive paste.

3.2 Mounting guidelines



For mounting instructions, see *Figure 7 Permissible types of mounting*

To ensure secure functionality and the best measuring results, please follow these mounting steps:

1. The pipe diameter should not deviate more than $\pm 1\%$ from the nominal diameter of the silicone insert.
2. Clean the exterior of the pipe before installation. Be sure that no chips, swarf, or other particles are lodged between sensor and pipe because this would prevent the contact plate of the sensor from being flush against the pipe, which reduces accuracy.
3. The installation site should be at least 15 cm (6 inches) from pipe elbows, pipe reducers, and radial welded seams. The sensor must not be placed on welded seams of axially welded pipes. The sensor should be installed at a distance of at least 15 cm (6 inches) from other installed sensors with fluid contact.
4. Behind pipe elbows, the sensor housing should be installed on the outside to prevent measuring errors due to bubble formation or flow characteristics.
5. If the pipes are not completely filled, the sensor should be installed in the fluid-covered area of the pipe.
6. Unilateral strain due to suspending heavy objects or taut connection wires should be avoided.
The sensor plate must be flush against the pipe.
7. If thermal compound is used between pipe wall and measuring tip, it should be replaced in the maintenance interval according to the maximum storage period of the paste.
8. The electrical installation must be made after the pipeline adapter is installed on the process line.

3.3 Mounting notes

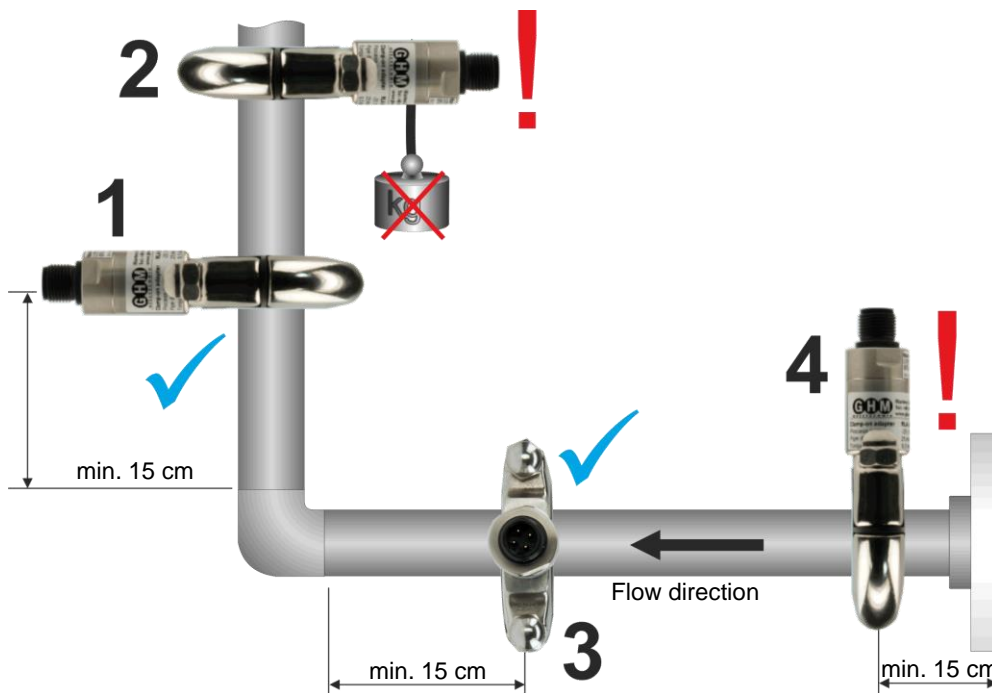


Figure 7 Permissible types of mounting

Position	Characteristics
1	<i>Ideal:</i> Achieves the best result, since there are no bubbles, deposits, or rising lost heat in the pipes to distort the measuring result.
2	<i>Questionable:</i> Lost heat and moving the contact area may lead to distorted measuring results.
3	<i>Ideal:</i> Good measuring result, if no air bubbles form. Minimum distance to pipe angle 15 cm (6 inches)
4	<i>Questionable:</i> Lost heat and too small a distance from the connection flange may lead to distorted measuring results.

Table 4 Description to Fig. 7

3.4 Instruction on Ordinance (EUR) 20/1011 / (EC) 1935/2004

The following components of the product are designed in accordance with Ordinance for permanent contact with foodstuffs:

- FDA approved components

3.5 Electrical installation

The electrical connection happens via the M12 round connector. For the wiring see *Figure 8 Connection diagram*.



The device must be installed only by a qualified electrician. The national and international regulations for the installation of electrical systems of the relevant operator country apply.



Additional requirements for use in potentially explosive atmospheres:

- 1) The temperature sensor GTL must be connected to an for intrinsic safety certified Ex-transmitter.
- 2) The temperature sensor GTL must be used together with the clamp-on adapters RLA.
- 3) The clamp-on adapters must be mounted on a grounded tube.
- 4) The declarations are only valid for operating conditions, which means the sensor must touch the pipe, possibly with conductive thermal compound.
- 5) For RLAs in FS.4 the metal clamp must be grounded.



3.6 Connection diagram

View at the plugs:

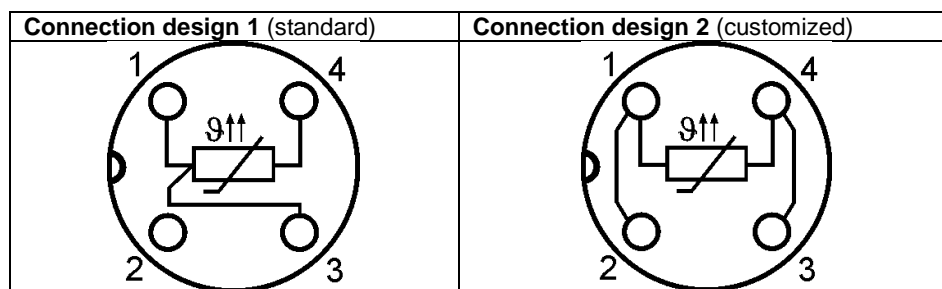


Figure 8 Connection diagram

4 Commissioning, Maintenance and Servicing

4.1 Commissioning

1. Be sure that the pipe clamp sensor is flush with the pipe.
2. Be sure that the M-12 connector is screwed on correctly and the cable is not pulling on the sensor.
3. Check the correct measuring function after connecting the evaluation device.

4.2 Maintenance

Housing

When cleaning the device, make sure that its connections are firm and tight. Cleansers must not harm the housing surface and gaskets.

If the housing is cleaned with a high-pressure cleaning device, make sure the electric connection and the device are not sprayed directly. Avoid cleanser deposits on the thread and inside the guide of the interior part.

Sensor

During cleaning, it is essential not to damage the sensor tip. If cleansers are used, make sure that they do not harm any materials.

4.3 Servicing



The device itself cannot be repaired. Replacement of the insertion is possible without process interruption

4.4 Calibration / Adjustment

The GTL720 pipe clamp sensors are tested prior to delivery. Upon request, this sensor can also be delivered with a certificate of calibration. A recalibration in our facilities is also possible.

Please notice the following for external recalibration:

Depending on the purpose of the pipe clamp sensor, the test should be conducted by placing the evaluative silver plate in the sensor insert on a heat-controlled reference surface (dry calibration).

Wet calibration, e.g. in an oil bath, is possible in principle but not recommended, due to the submergence, which deviates from normal application. The utilization data limits (see technical specifications) for the device must be considered at all times.

For a wet calibration, the maximum temperatures, listed under measurement range, are only used for the underside of the sensor. During progressive submergences of the sensor tip, the calibration temperature is reduced to the valid ambient temperature.

Specially constructed inserts for customary block calibrators and suitable retaining pieces for housing the sensor and a reference thermometer with certificate of calibration are available from the manufacturer upon request.

Acceptable deviation date (Pt100 A class, acc. to IEC 60751)

Acceptable temperature error: $dT [^{\circ}\text{C}] = \pm (0,15 \text{ }^{\circ}\text{C} + 0,002 \times T)$
 T = real temperature

Acceptable deviation at 120 °C: $dT [^{\circ}\text{C}] = \pm (0,15 \text{ }^{\circ}\text{C} + 0,002 \times 120 \text{ }^{\circ}\text{C})$
 $= \pm \underline{0,39 \text{ }^{\circ}\text{C}}$ (0,325 % of 120 °C)

Proposed calibrating system

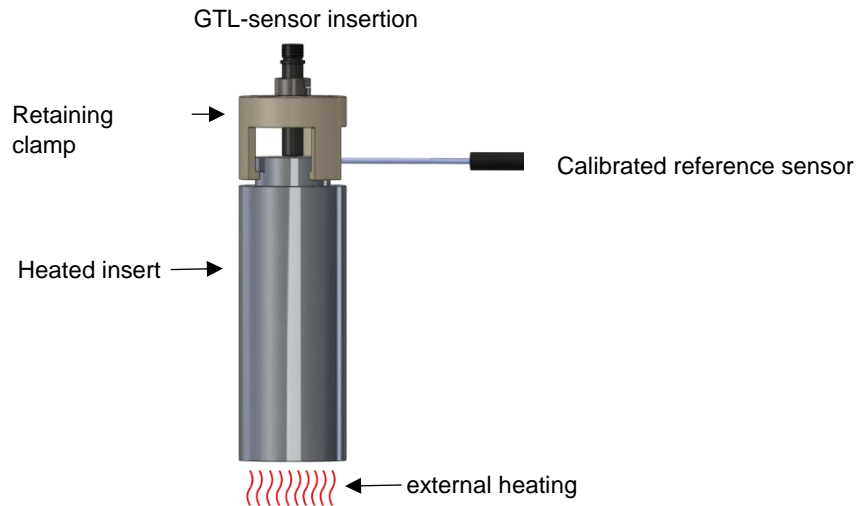


Figure 9 Proposed calibration system

The insert is constructed in a way to position the calibrated reference sensor very closely under the active heating surface, so that it may be used as a reference meter or regulator of the application temperature. The GTL sensor insert must at all times be guided in a way to ensure a totally flush position of the evaluative silver plate on the heating surface. **(Placing the sensor by hand is not practicable.)**

5 Faultfinding

Fault	Cause	Remedy
Device offers no signal	Break of wire	Check wiring
Device offers wrong signal	Sensor tip has no full contact with the pipe	Check mounting
	Pipe isn't filled with medium	Check sensor or change installation site
	Pipe wall has a bad thermal conductivity, not clean enough or made of plastic	Change installation site
Output signal out of range	Temperature too high	Check wiring
	Break of wire	

Table 5 Faultfinding

6 Technical Data

Temperature sensor	Pt100 A class, acc. to DIN EN 60751	
Measuring range	-20..+160 °C	
Ambient temperature	-20..+85 °C	
Ex-protection (simple electrical equipment) GTL72x + RLA, Frame size 1, 2 GTL72x + RLA, Frame size 3, 4	according to Ex II 1G Ex ia IIB T3/T4/T5 Ga Ex II 2G Ex ib IIB T3/T4/T5 Gb	
Maximum measuring temperatures	T3 = 160 °C T4 = 125 °C T5 = 90 °C	
Maximum values U _i I _i P _i C _i /L _i	2,2 V 25 mA 25 mW ~ 0	
Electrical connection		
Round plug	4-pole, M12x1	
Sensor current	10 mA, max. (0,3..1 mA, recommended)	
Protection class	IP67 in connection with mounted M12-plug, only	
Response time / accuracy¹		
Date, medium temperature 120 °C	without thermal compound	with thermal compound
Step response T ₉₀	10 s, approx.	3 s, approx.
Accuracy	up to 2,5 % f. s.	up to 1 % f. s.
Temperature coefficient	0,02 %/°C	
Sensor		
Material - Spring - Insert sensor - Tip sensor - M12 plug	SS-type 1.4310 (spring power 21 N, max.) PEEK Silver 935 PA / gold plated contacts	
Housing	18 mm round case	
Weight	17g	
Clamp-on adapter		
Material - Adapter - Case - Adapter insertion	SS-type 1.4405 SS-type 1.4305 Silicon HTV	
Weight • Frame size 1 • Frame size 2 • Frame size 3 • Frame size 4	120 g 170 g 395 g 955 g	

Table 6 Technical data

- 1) See also Figure 5 and Figure 6. Measurement results depend on the respective installation situation (see 3.3 Mounting notes).

6.1 Mechanical design / dimensions

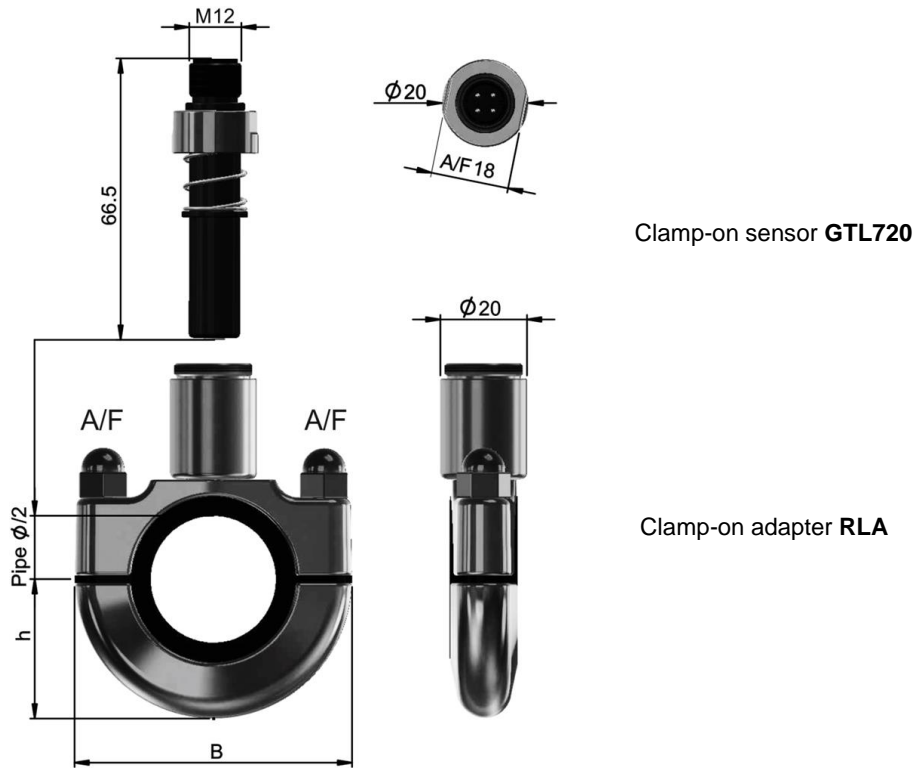


Figure 10 Dimensions GTL720, RLA

Frame size	Pipe [mm]	B [mm]	h [mm]	SW [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

Table 7 Frame size and dimensions RLA

7 Ordering code



Note:

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

Clamp-on temperature sensor

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

1.	Design / input	
	GTL720	Pt100 Sensor with M12-round plug
2.	Electrical connection	
	0	GTL720 Variation 1 (standard)
	1	GTL720 Variation 2 (customized)
3.	Measuring range	
	00	Range 0...160 °C
4.	Pipe wall adjustment for SS-Type pipes (GTL723, only)	
	0	Not active
5.	Options	
	00	Without option

Table 8 GTL720 Ordering code

Clamp-on adapter

RLA 1. - 2.

1.	Pipe diameter	DIN11850		DIN11866		ISO 1127
		r1	r2	rC ASME-BPE	rB	
Frame Size 1	120 (12,0mm)	DN10				
	130 (13,0 / 12,7mm)		DN10	1/2"		
	135 (13,5mm)				DN8	DN8
	172 (17,2mm)				DN10	DN10
	180 (18,0mm)	DN15				
Frame Size 2	190 (19,0 mm)		DN15	3/4"		
	213 (21,3mm)				DN15	
	230 (23,0mm)		DN20			
	254 (25,4mm)			1"		
	269 (26,9mm)				DN20	
	280 (28,0mm)	DN25				
	290 (29,0mm)		DN25			
	337 (34,0 / 33,7mm)	DN32				DN25
Frame Size 3	350 (35,0mm)		DN32			
	381 (38,1mm)			1 1/2"		
	400 (40,0mm)	DN40				
	410 (41,0mm)		DN40/			
	424 (42,4mm)				DN32	
	483 (48,3mm)				DN40	
	508 (50,8 mm)				2"	
	520 (52,0mm)	DN50				
Frame Size 4a	530 (53,0mm)		DN50			
	603 (60,3mm)				DN50	
	635 (63,5mm)			2 1/2"		
Frame Size 4b	700 (70,0mm)		DN65			
	761 (76,2 / 76,1mm)			3"	DN65	
	850 (85,0mm)		DN80			
	889 (88,9 mm)				DN80	
xxx	999	Customized diameter. On request.				
2.	Options					
	00	Without option				

Table 9 RLA Ordering code

7.1 Accessories

Type	Description
WLP10S	Thermal compound <ul style="list-style-type: none"> • Containing silicone • High thermal conductivity of 10.0 W/mK • Not drying out, silicone parts not fleeing • Storage time up to 12 month at normal ambient conditions at delivery

Table 10 optional accessories



For the evaluation of Pt100 signals, we recommend our control cabinet transmitters, temperature limit transmitters, temperature and safety temperature limiters as well as temperature displays

(see homepage <https://www.ghm-group.de>)

8 Device transport and storage

The case must be packed carefully and stress-free for transport (no automatic binding of the packaging). The device must be stored under the ambient conditions specified in the technical data.

8.1 Returns



Legal regulations for the protection of the environment and our personnel require that returned devices which have come into contact with fluid can be handled without risk to personnel and the environment.

If you send a device back to us for checking and repair, we must request that you pay strict attention to the following requirements:

The returns form can be downloaded from GHM-Messtechnik homepage under: "Downloads/Forms".

The repair can be carried out quickly and without further questions if:

1. a completed form is available for every device.
2. the device has been cleaned and returned in packaging which prevents any damage to the device.
3. the completed form and any possible safety data sheet on the measurement medium are attached to the outside of the packaging.

8.2 Disposal



Materials for disposal must separate the device components and packaging. The legal regulations and guidelines applicable at the relevant time must be observed.

The device must not be disposed of as general waste. If a device is to be disposed of, send it back to us direct with the completed Returns form specified under *8.1 Returns*, and we will then take care of proper disposal.

9 Service

9.1 Manufacturer

In case of any question, don't hesitate contacting us:

Contact GHM Messtechnik GmbH
 GHM GROUP - Martens
 Kiebitzhörn 18
 22885 Barsbüttel | GERMANY

9.2 Service processing

Defective products are repaired competently and quickly in our service center.

Opening hours Monday to Thursday 8 am to 4 pm
and contact Friday 8 am to 1 pm

 GHM Messtechnik GmbH
 GHM GROUP - Martens
 Kiebitzhörn 18
 Service center
 22885 Barsbüttel | GERMANY
 Tel: +49 40 67073-143
 service.martens@ghm-messtechnik.de

10 EU-Declaration of conformity


EU-KONFORMITÄTSERKLÄRUNG
EU-DECLARATION OF CONFORMITY

GHM GROUP - Martens | GHM Messtechnik GmbH | Kiebitzhörn 18 | 22885 Barsbüttel | GERMANY

 Dokument-Nr. / Monat.Jahr: **3204 / 01.2022**
 Document-No. / Month.Year:

Wir erklären hiermit als Hersteller in alleiniger Verantwortung, dass die folgenden Produkte konform sind mit den Schutzziele der Richtlinie des Europäischen Parlaments:
 We declare as manufacturer herewith under our sole responsibility that the following products are in compliance with the protection requirements defined in the European Council directives:

 Produktbezeichnung: **GTL720**
 Product identifier:

 Produktbeschreibung: **Rohranlegefühler**
 Product description: **Clamp-on temperature sensor**

Die Produkte entsprechen den folgenden Europäischen Richtlinien:
 The products conforms to following European Directives:

Richtlinien / Directives	Angewandte harmonisierte Normen oder angeführte technische Normen <i>Applied harmonized standards or mentioned technical specifications</i>
2011/65/EU RoHS / RoHS	EN IEC 63000:2018

Diese Erklärung wird verantwortlich für den Hersteller abgegeben durch:
 The manufacturer is responsible for the declaration released by:

 Dr. Axel Lamprecht
 Geschäftsführer
 CEO

Barsbüttel, 07. Januar 2022

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Harmonisierungsrechtsvorschriften, beinhaltet jedoch keine Zusicherung von Eigenschaften.
 This declaration certifies the agreement with the harmonization legislation mentioned, contained however no warranty of characteristics.