

## Operating Manual

Clamp-on Sensor

### GTL720



## Table of contents

	<b>Page</b>
1	Proper use (application areas) ..... 3
1.1	Safety signs and symbols ..... 3
1.2	Safety instructions ..... 4
1.3	Product liability and guarantee ..... 4
1.4	Standards and directives ..... 4
1.5	Approvals ..... 4
2	Product description ..... 5
2.1	Delivery contents ..... 5
2.2	Operating principle ..... 5
2.3	Design of the measurement system ..... 6
2.4	Response time of the GTL sensor without thermal compound ..... 7
2.5	Response time of the GTL sensor with thermal compound ..... 7
2.6	Type plate ..... 8
3	Mounting and electrical installation ..... 9
3.1	Mechanical mounting ..... 9
3.2	Mounting Guidelines ..... 9
3.3	Mounting notes ..... 10
3.4	Instructions on Ordinance (EC) 1935/2004 ..... 11
3.5	Electrical installation ..... 11
3.6	Connection diagram ..... 11
4	Commissioning, Maintenance and Servicing ..... 12
4.1	Commissioning ..... 12
4.2	Maintenance ..... 12
4.3	Servicing ..... 12
4.4	Calibration/Adjustment ..... 13
5	Technical data ..... 15
5.1	Mechanical design / dimensions ..... 17
5.2	Ordering code ..... 18
5.3	Clamp-on adapter ..... 19
5.4	Accessories ..... 20
5.5	Fault finding ..... 20
6	Device transport and storage ..... 21
7	Returns ..... 21
8	Disposal ..... 21
9	Imprint ..... 22
10	EU-declaration of conformity ..... 23

## 1 Proper use (application areas)

Detailed information on the application area can be found in the Chapter “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.



The device is **not** suitable for use in areas subject to the risk of explosion or system components relevant to safety in accordance with SIL.

### General safety instructions, use

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

All procedures described in these operating instructions must be carried out only by trained personnel authorized by the operator, while wearing the corresponding protective clothing.

All rights reserved.

### 1.1 Safety signs and symbols

Warning instructions are designated in this document as described below in Table 1:




 DANGER	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.

Table 1

## 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 7, Re- turns).

## 1.4 Standards and directives

RoHS Directive 2011/65/EU  
Testing standard EN50581: 2012  
FDA conform

## 1.5 Approvals

No licenses are given currently

## 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.

### 2.1 Delivery contents

- Clamp-on sensor
- Clamp-on adapter
- Silicon insert
- This operating manual

### 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 P1100 sensor.

### 2.3 Design of the measurement system

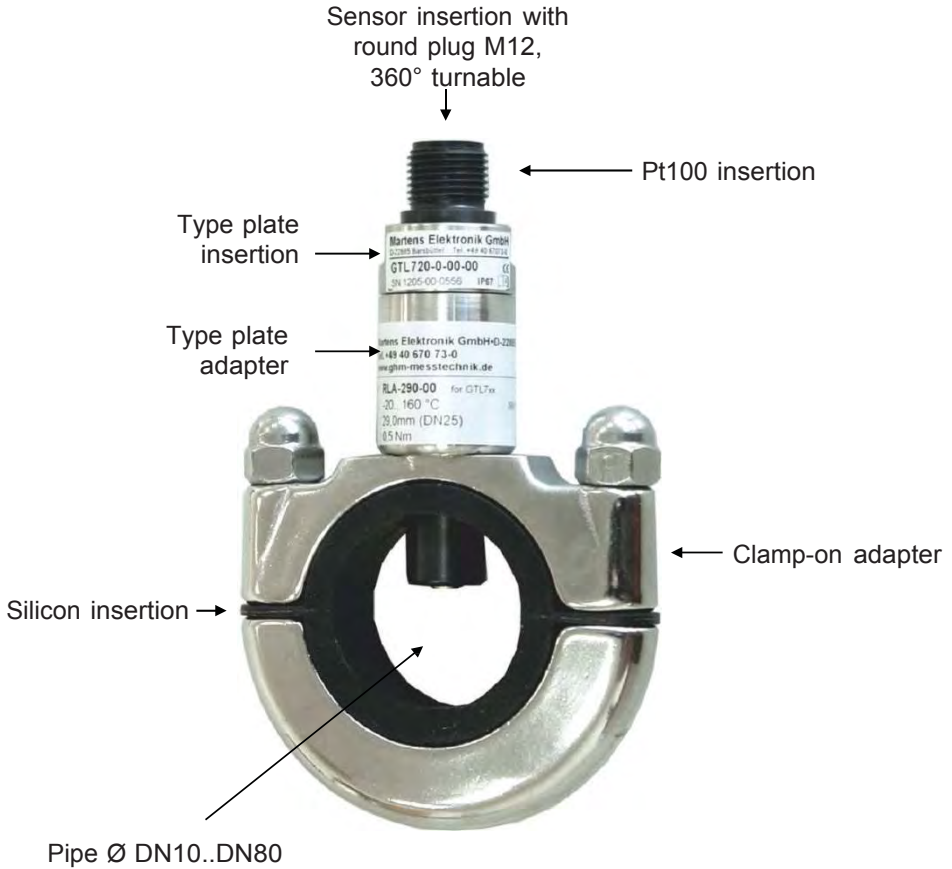


Figure 1

## 2.4 Response time of the GTL sensor without thermal compound

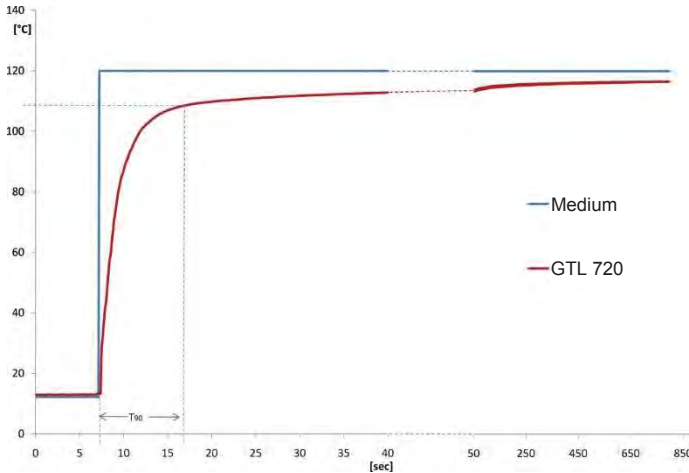


Figure 2

## 2.5 Response time of the GTL sensor with thermal compound

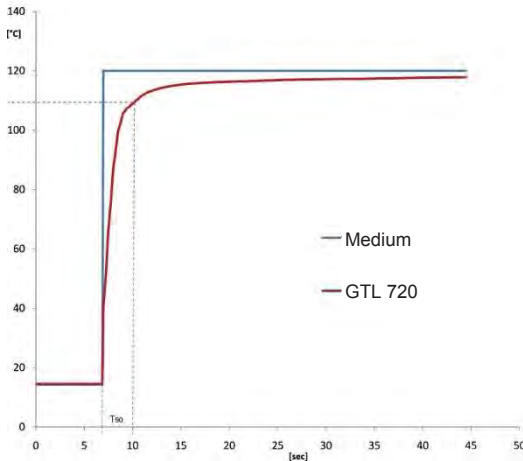


Figure 3

### Reference conditions

Tube diameter	29 mm
Tube wall	1.5 mm
Tube material	1.4404
Flow rate	0.5 ~ 1.5 m/s
Ambient temperature	30 °C
Medium	Water
Mounting direction	Acc. Position 1 , 3.3 mounting notes, page 10)

## Block diagram

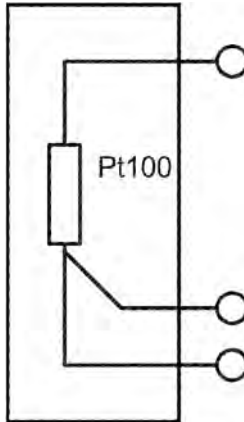


Figure 4

## 2.6 Type plate

The type designation plates (Figure 5, Figure 6) contains the main identification data.

- Type and article designation
- Technical data
- Serial number

Type plate sensor



Figure 5

Type plate clamp-on adapter



Figure 6



### 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.

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.

Available for the following pipe norms:  
 DIN 11850 r2 and DIN 11866 rB, rC.

Frame size (Bg)	Tube Ø [mm]
1	13.0..19.9
2	20.0..33.9
3	34.0..53.0
4a	60.3..75.9
4b	76.0..88.9

#### 3.2 Mounting Guidelines

Table 2

For mounting instructions, see Figure 7, page 10

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 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

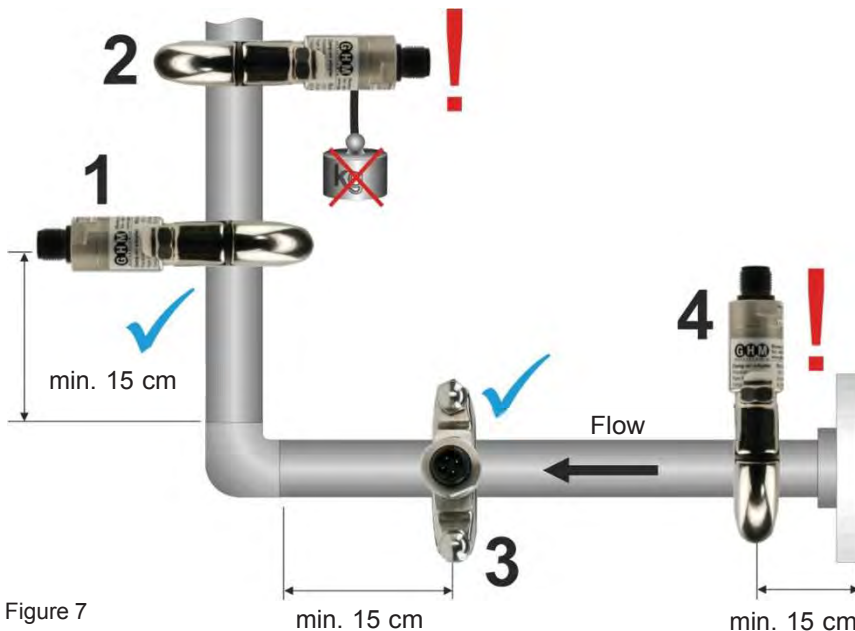


Figure 7

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 3

### 3.4 Instructions on Ordinance (EC) 1935/2004

The following components of the product are designed in accordance with Ordinance (EC) 1935/2004 for permanent contact with foodstuffs:  
Non media contact

### 3.5 Electrical installation



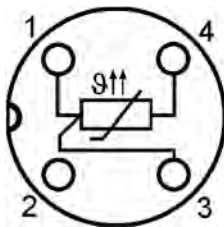
The device must be installed only by a qualified electrician. The national and international regulations for the installation of electrical systems of the relevant operator country apply.

The electrical connection happens via the M12 round connector. For the wiring see figure 8.

### 3.6 Connection diagram

View at the plugs

**Connection design 1**  
(Standard)



**Connection design 2**  
(customized)

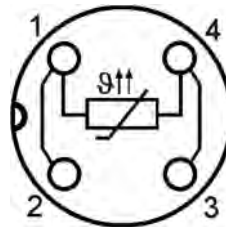


Figure 8

## 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. The housing surface and gaskets must not be harmed by cleansers.

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 data (Pt100 class A acc. to IEC 60751)**

Acceptable temperature error  $dT$  [°C] =  $\pm (0.15 \text{ °C} + 0.002 \times T)$

$T$  = real temperature

Acceptable deviation at 120 °C:

$dT$  [°C] =  $\pm (0.15 \text{ °C} + 0.002 \times 120 \text{ °C})$   
=  $\pm 0.39 \text{ °C}$  (0.325 % of 120 °C)

### Proposed Calibrating System

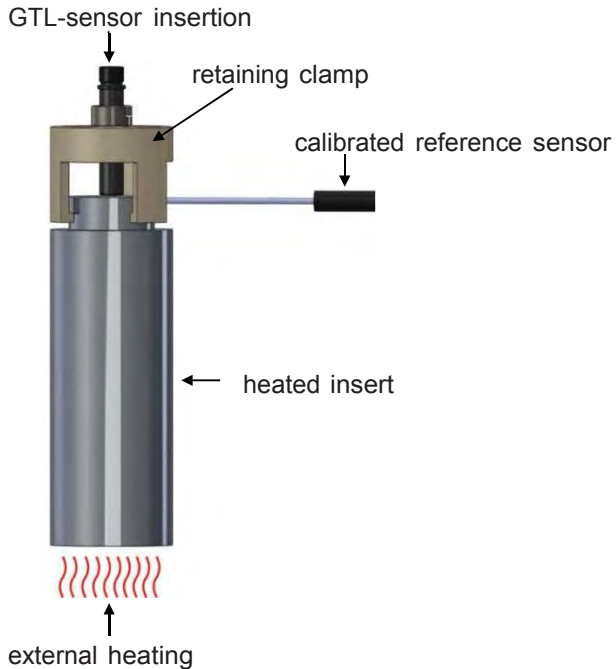


Figure 9

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 Technical data

Temperature sensor : Pt100, class A acc. to DIN EN 60751  
Measuring range : -20..+160 °C  
Ambient temperature : -20..+85 °C  
Ex-protection : Ex II 2G [Ex ia] IIC  
(simple apparatus) T3 = 160 °C  
T4 = 125 °C  
T5 = 90 °C

### Max. values

U<sub>i</sub> : 30 V  
I<sub>i</sub> : 25 mA  
P<sub>i</sub> : 30 mW  
C<sub>i</sub>/L<sub>i</sub> : ~ 0

## Electrical connection

Round plug : 4-pole, M12x1  
Sensor current : max. 10 mA (recommended 0.3..1 mA)  
Protection class : IP67, in connection with mounted M12 plug

## Response time/accuracy (see Figure 2, Figure 3, page 7) <sup>1)</sup> Data without thermal compound, medium temperature 120 °C

Rise time T<sub>90</sub> : approx. 10 s  
Accuracy : up to 2.5 % f. s.

## Data with thermal compound, medium temperature 120 °C

Rise time T<sub>90</sub> : approx. 3 s  
Accuracy : up to 1 % f. s.

Temperature coefficient : 0.02 %/°C

<sup>1)</sup> Measurement results depending to the mounting situation.  
(see mounting notes 3.2 consecutive)

**Housing** : 18 mm round case

## Material Sensor

Spring : SS-type 1.4310 (spring power max. 21 N)  
Sensor usage : PEEK  
Sensor tip : silver 935  
M12-plug : PA / gold plated contacts  
Weight : 17 g

**Clamp-on adapter**

Adapter : SS-type 1.4405  
Case : SS-type 1.4305  
Adapter insertion : Silicon HTV

**Weight**

Frame size Bg 1 : 120 g  
Frame size Bg 2 : 170 g  
Frame size Bg 3 : 395 g  
Frame size Bg 4 : 955 g



### 5.1 Mechanical design / dimensions

Sensor insertion with single inner part

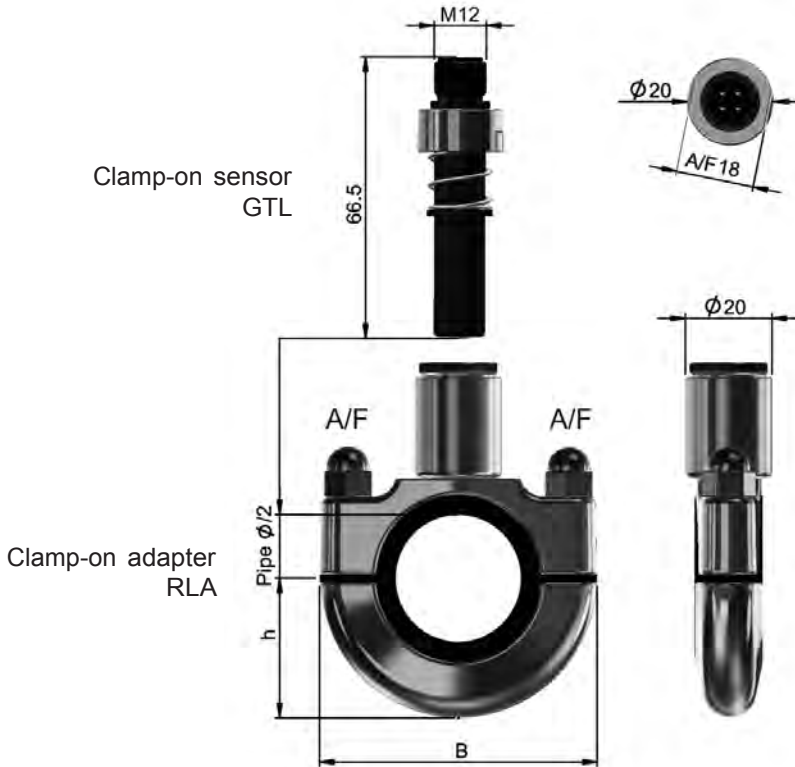


Figure 10

Frame size (Bg)	Pipe [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	60.3..75.9	133	68	14

Table 4

## 5.2 Ordering code



**Note:**

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

### Clamp-on Temperature sensor

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

<b>1.</b>	<b>Design / input</b>	
	720	Pt100 Sensor with M12 round plug
<b>2.</b>	<b>Electrical connection</b>	
	0	GTL720 Variation 1 (standard)
	1	GTL720 Variation 2 (customized)
<b>3.</b>	<b>Measuring range</b>	
	00	Range 0..160 °C
<b>4.</b>	<b>Pipe wall adjustment for SS-type pipes (only GTL723/737)</b>	
	0	not active
<b>5.</b>	<b>Options</b>	
	00	without option

Table 5

Continued next page

### 5.3 Clamp-on adapter

1. 2.  
 RLA  -

1.	Pipe diameter
120*)	12,0 mm: DN10 DIN 11850 r1
130*)	13,0 mm: DN10 DIN 11850 r2
	12,7 mm: ½" DIN 11866 rC / ASME-BPE
135*)	13,5 mm: DN8 DIN 11866 rB (ISO 1127)
172*)	17,2 mm: DN10 DIN 11866 rB (ISO 1127)
180*)	18,0 mm: DN15 DIN 11850 r1
190*)	19,0 mm: DN15 DIN 11850 r2
	19,0 mm: ¾" DIN 11866 rC / ASME-BPE
213	21,3 mm: DN15 DIN11866 rB
230	23,0 mm: DN20 DIN11850 r2
254	25,4 mm: 1 " DIN11866 rC / ASME-BPE
269	26,9 mm: DN20 DIN11866 rB
280	28,0 mm: DN25 DIN11850 r1
290	29,0 mm: DN25 DIN11850 r2
337	33,7 mm: DN25 DIN11866 rB
	34,0 mm: DN32 DIN11850 r1
350	35,0 mm: DN32 DIN11850 r2
381	38,1 mm: 1 ½ " DIN11866 rC / ASME-BPE
400	40,0 mm: DN40 DIN11850 r1
410	41,0 mm: DN40 DIN11850 r2
424	42,4 mm: DN32 DIN11866 rB
483	48,3 mm: DN40 DIN11866 rB
508	50,8 mm: 2 " DIN11866 rC / ASME-BPE
520	52,0 mm: DN50 DIN11850 r1
530	53,0 mm: DN50 DIN11850 r2
603	60,3 mm: DN50 DIN11866 rB
635	63,5 mm: 2 ½" DIN11866 rC / ASME-BPE
700	70,0 mm: DN65 DIN11850 r2
761	76,1 mm: DN65 DIN11866 rB
	76,2 mm: 3" DIN11866 rC / ASME-BPE
850	85,0 mm: DN80 DIN11850 r2
889	88,9 mm: DN80 DIN11866 rB
999	Customized diameter on request
<b>2.</b>	<b>Options</b>
00	none

Table 6

## 5.4 Accessories

Type	Description
WLP10S	Thermal compound - Containing silicone - High thermal conductivity of 10.0 W/mK - Not drying out, silicone parts not fleeting - Storage time up to 12 month at normal ambient conditions at delivery - Syringe containing 3 ml+ pipette - Color silver grey
Calibration certificate	on request

Table 7



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

## 5.5 Fault finding

Fault	Cause	Remedy
Device offers no signal	Cable break	Check wiring
Device offers the wrong signal	Sensor tip has no full contact with the pipe	Check mounting
	Pipe isn't filled with medium	Check sensor or change the 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
	Cable break	

Table 8

## 6 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.

## 7 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 Disposal



The device components and packaging must be separated by materials for disposal. 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 Point 6, and we will then take care of proper disposal.

## 9 Imprint

Martens Elektronik GmbH, 22885 Barsbüttel, Kiebitzhörn 18

A subsidiary of GHM-Messtechnik GmbH

GHM Messtechnik GmbH

Site Martens, Kiebitzhörn 18, 22885 Barsbüttel

Managing Director: Johannes Overhues

Place of fulfilment and jurisdiction: Barsbüttel

Copyright:

Martens Elektronik GmbH. All rights reserved. Reprinting, digital use of any type and duplication is allowed only with the written permission of Martens Elektronik GmbH.

## 10 EU-declaration of conformity

... professionelle Messtechnik „MADE IN GERMANY“



### EU-KONFORMITÄTSERKLÄRUNG EU-DECLARATION OF CONFORMITY

GHM Messtechnik GmbH Standort Martens, Kiebitzhörn 18, 22885 Barsbüttel, Germany

Dokument-Nr. / Monat, Jahr: **3204 / 04.2016**  
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
2011/65/EU   RoHS / RoHS

Angewandte harmonisierte Normen oder angeführte technische Normen:  
*Applied harmonized standards or mentioned technical specifications:*

Harmonisierte Normen / harmonized standards
EN 50581:2012   Beschränkung der gefährlichen Stoffe / Restriction of hazardous substances

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

Michael Wulf

Standortleiter  
Business unit manager

Barsbüttel, 07. Juni 2016

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.*

