

# Operating Manual

**CULO-G**

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## ● 1 General informations

### For information

- The current loop display, described in this operating manual, is carefully designed and manufactured using state-of-the-art technology. All components are subject to stringent quality and environmental criteria during production. Our management system is certified to ISO 9001.
- This operating manual includes important information on handling the current loop display. Basis for safe workings is the observance of all given safety and work instructions.
- Observe the relevant local accident prevention regulations and general safety regulations for the instrument's range of use.
- The operating instructions are part of the product and must be kept in the immediate vicinity of the instrument and readily accessible to skilled personnel at any time.
- Skilled personnel must have carefully read and understood the operating instructions, prior to beginning any work.
- The manufacturer's liability is void in the case of any damage caused by using the product contrary to its intended use, non-compliance with these operating instructions, assignment of insufficiently qualified skilled personnel or unauthorised modifications to the instrument.
- If the serial number gets illegible (e. g. by mechanical damage), the retraceability of the device is not possible any more.
- The instrument is subject to technical modifications.

## ● 2 Safety



Before installation, commissioning and operation, ensure that the appropriate current loop display has been selected in terms of measuring range, design and specific measuring conditions.

Non-observance can result in serious injury and/or damage to the equipment.

Further important safety instructions can be found in the individual chapters of these operating instructions.

### Intended Use of product

The current loop display CULO-G is for representation of measured values within a current loop of 4...20 mA.

The current loop display CULO-G has been designed and built solely for the intended use described here, and may only be used accordingly.

The technical specifications contained in these operating instructions must be observed. Improper handling or operation of the device outside of its technical specifications requires the instrument to be taken out of service immediately and inspected by an authorised service engineer.

The manufacturer shall not be liable for claims of any type based on operation contrary to the intended use.

### Personnel qualification



#### Risk of injury if qualification is insufficient!

- Improper handling can result in considerable injury and damage to equipment.

- The activities described in these operating instructions may only be carried out by skilled personnel who have the qualifications described below.

Keep unqualified personnel away from hazardous areas.

### Personnel

Skilled personnel are understood to be personnel who, based on their technical training, knowledge of measurement and control technology and on their experience and knowledge of country-specific regulations, current standards and directives, are capable of carrying out the work described and independently recognising potential hazards.

Special operating conditions require further appropriate knowledge, e.g. of explosive media.

### 3.3 Special hazards



A protection from electrostatic discharge (ESD) is required.

The proper use of grounded work surfaces and personal wrist straps is required when working with exposed circuitry (PCB, printed circuit boards), in order to prevent static discharge from damaging sensitive electronic components.



Electrical instruments may only be installed and connected by skilled electrical personnel.

Operation using a defective power supply unit (e.g. short circuit from the mains voltage to the voltage output) can result in life-threatening voltages at the instrument.



Do not use this instrument in safety or Emergency Stop devices. Incorrect use of the instrument can result in injury.

## ● 3 Transport, Packaging, Storage

### 3.1 Transport

Check the instrument for any damage that may have been caused during transportation. If, report them immediately.

### 3.2 Packaging

Do not remove packaging until just before mounting. Keep the packaging as it will provide optimum protection during transport (e.g. change in installation site, sending back).

### 3.3 Storage

For longer term storage avoid the following influences:

- Direct sunlight or proximity to hot objects
- Mechanical vibration, mechanical shock (putting it hard down)
- Soot, vapour, dust and corrosive gases

If possible store the device in its original package or an equivalent one

## ● 4 Starting, operation

### 4.1 Function

The CULO-G is fitted via the terminals directly into a current loop. A change in current of the source changes the displayed value according to the configuration. The displayed value changes proportional to the current.

### 4.2 Before mounting



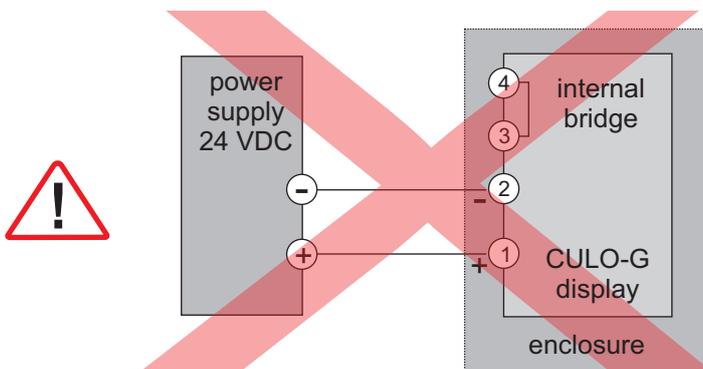
Check if a completely assembled indicator is supplied.

Inspect the indicator for possible damage during transportation. Should there be any obvious damage, inform the transport company and supplier without delay.

Keep the packaging, as it offers optimal protection during transportation.

Ensure that the connection contacts will not be damaged.

### 4.3 Note for running a current loop display



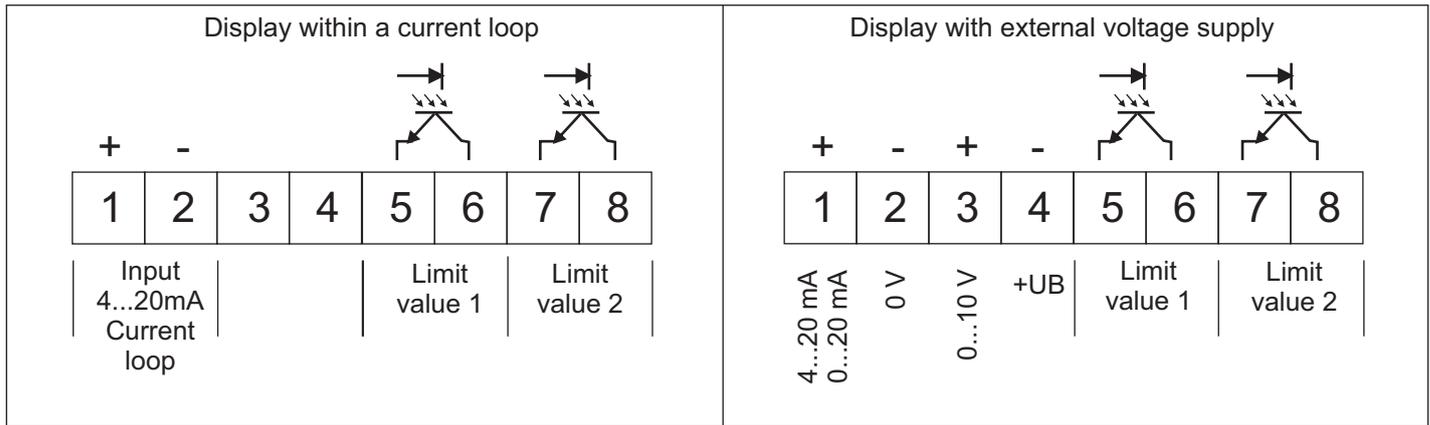
The display is operated in a current loop of 4...20 mA absolutely. A direct connection to a voltage supply (eg 24 VDC) will destroy the indicator and the guarantee does not cover this.

For an operational test the display has to be supplied out of a power source of 4...20 mA (eg mA source / calibration instrument).

In normal operation the display is connected in series with a transmitter (4...20 mA) or is connected to a 4...20 mA analogue output of a device.

## 4 Starting , operation (continued)

### 4.4 Electrical connection



The 8-pole plug-in terminal strip to connect the indicator is at the back of the display.

Terminal 1: Input for connection of 0/4...20 mA (+)

Terminal 2: Negative reference potential for terminals 1, 3 and 4 (-)

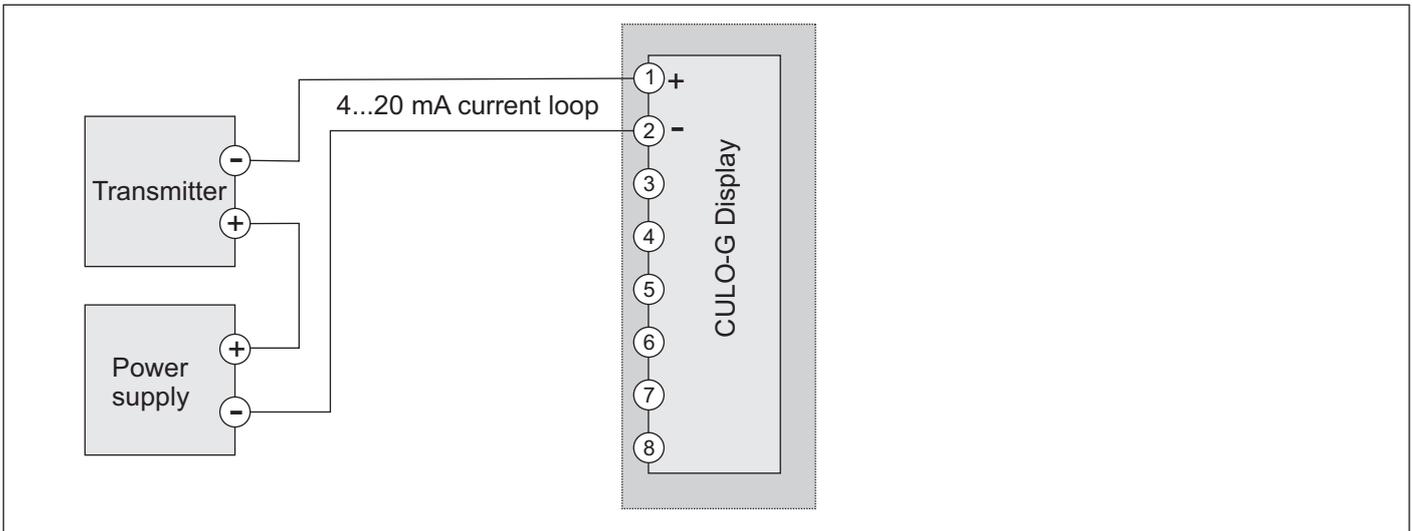
Terminal 3: Input for connection of 0...10 V (+)

Terminal 4: External supply input (+)

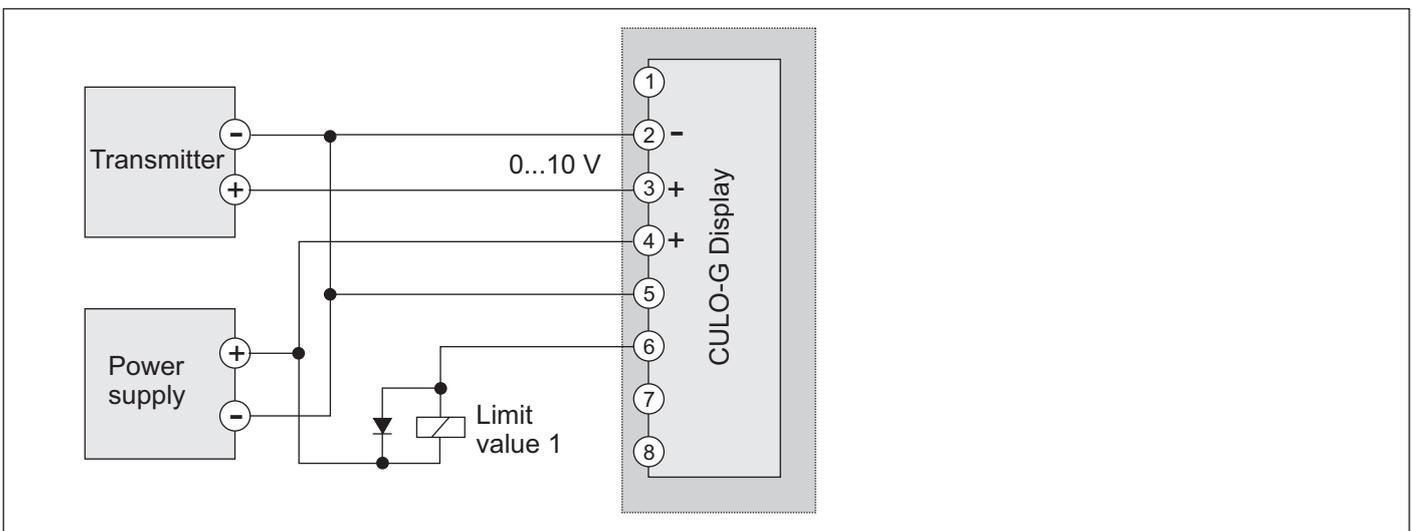
Terminal 5, 6: Limit value 1

Terminal 7, 8: Limit value 2

### 4.5 Example of connection for use in a current loop



### 4.6 Example of connection for use with an external voltage supply



## ● 5 Setting of the display

Table of program numbers

PN	Description	Range	Delivered state <sup>1)</sup>
0	Calibration mode 0 = sensor calibration (with applied signal, factory configuration) 1 = programming (indicated value at 4/20 mA, 0/20 mA, 0/10 V)	0/1	1
1	Final value (Programming the value at 20 mA (10 V), eg 600)	-999...9999	250
2	Initial value ( Programming the value at 4 mA (0 mA, 0 V), eg 100)	-999...9999	0
3	Selection of decimal point or unit (Programming a unit the indication shifts to the left) Representation: 0 / 0.0 / 0.00 / 0.000 / °C / °F		°C
4	Time of average / refresh of display (in 1/10 seconds)	5...10	10
5 <sup>2)</sup>	Stabilisation zero (the +/- range where 0000 is indicated)	0...100	2
9	Switch off time of average (jump of input signal of x% of adjusted range of indication)	5...100	5
50 <sup>3)</sup>	Definition PIN-code for programming interlock (value >0000))	0000...9999	0000
51	Version of program		
52	Version of program day/month		
53	Version of program year		
54	Serial number manufacturer		
55	Serial number customer		
56	Day/month of delivery		
57	Year of delivery		
100	Number of calibration setpoints (calibration points for sensor calibration only, calibration points reduce the measuring rate)	0...30	0
101...130	Calibration points (the visible number of calibration points is fixed under PN100)	-999...9999	0
150 <sup>4)</sup>	Limit value 1: trigger value	-999...9999	110
151 <sup>4)</sup>	Limit value 1: reset value (hysteresis value)	-999...9999	90
152	Limit value 1: delay of trigger (x100 ms)	0...9000	0
153	Limit value 1: delay of reset (x100 ms)	0...9000	10
160 <sup>4)</sup>	Limit value 2: trigger value	-999...9999	40
161 <sup>4)</sup>	Limit value 2: reset value (hysteresis value)	-999...9999	60
162	Limit value 2: delay of trigger (x100 ms)	0...9000	0
163	Limit value 2: delay of reset (x100 ms)	0...9000	10
200	TAG number	0000...9999	0

1) With factory configuration

2) When programming a value >1 a hysteresis of 0,1% is activated. This avoids a jumping indication.

3) Optionally (if a PIN-code is not defined, PN50 is hidden). A PIN-code can be programmed via PC-interface only during factory settings. When there is a definition for a PIN-code (indication of **Pin** during segment test), for programming (after key **P** was pressed) the defined PIN-code of PN51 has to be input. This has to be confirmed by pressing the **P**-Key for 2 seconds. If no key is used for approx. 1 minute, the programming mode is blocked again.

When PN50 is selected to change an existing PIN-code, 5 times **Pin** is indicated before the changings can be started.

4) The difference between trigger value and reset value is the hysteresis.

## ● Setting of the display (continued)

### 5.2 Function of the programming keys

1. Connect the instrument according to the wiring diagram.
2. Switch power of the current loop (current between 4...20 mA) or the external power supply on. This is followed by an initialisation and a segment test. Then **CULO** is indicated and afterwards the version of firmware (eg **F1.16**). Subsequent current loop display is switching to the operation mode.
3. Press the **P** key. Indication of program number **P 0**.
4. Change the program number by simultaneous pressing of **P** & **▲** keys or **P** & **▼** keys.
5. With the desired program number being chosen, go to the stored value by pressing the **P** key.
6. Short pressing of **P** results in a change of digit. The value of the chosen digit is changed by pressing the **▼** or **▲** key.
7. Storing of the new settings is effected by pressing the **P** for approx. 2 sec. This procedure is acknowledged by transversal bars in the display.
8. If no other key is actuated, the unit switches to its operation mode after seven seconds.

#### Additional key functions in standard mode for indication of min/max values

The **▲** key serves for indicating the value of the Max memory in the display for some seconds

The **▼** key serves for indicating the value of the Min memory in the display for some seconds

Simultaneous pressing of the **▲** and **▼** keys erases the values of the memory (minimum / maximum)

### 5.3 Display info underflow / overflow

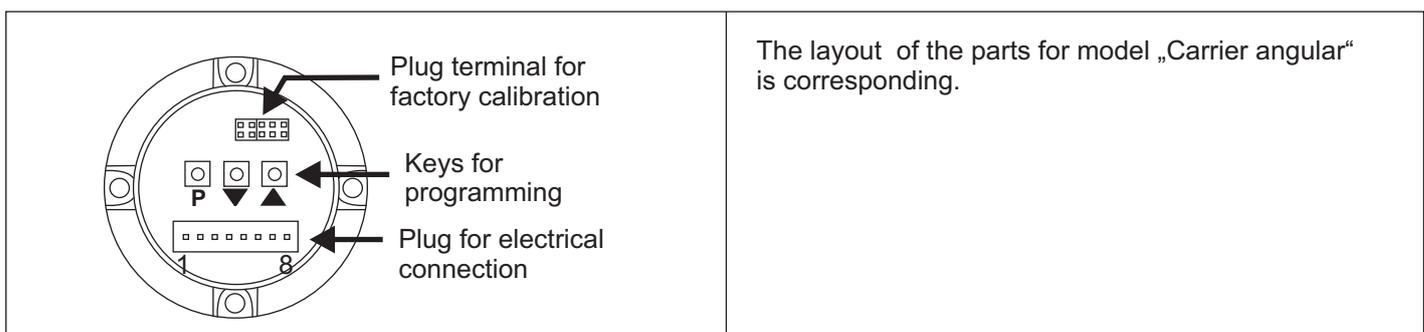
Standard input range:	4,00...20 mA
Displayed standard input range:	3,90...20,10 mA
Usable input range:	3,60...21,50 mA
Warning underflow:	3,60...<3,9 mA
Warning overflow:	>20,10...21,50 mA
Indication underflow:	<3,60 mA
Indication overflow:	>21,50 mA

On warning the indicator flashes (normal indication is changing with bars).

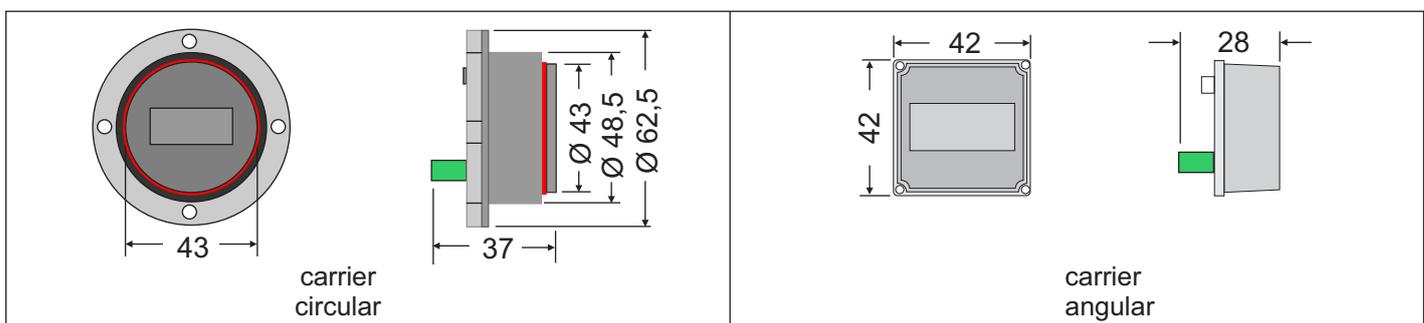
Values below 3,60 mA: a bar is changing with indication **undr**.

Values above 21,50 mA: a bar is changing with indication **over**.

### 5.4 Back of the display



## ● 6 Dimensions of the displays in the carrier (in mm)



## ● 7 Technical data

### Input

Current loop:	4...20 mA
Input resistance:	Ri <160 ohms (U= <3,2 V)
With external supply:	
4...20 mA / 0...20 mA:	Ri approx. 10 Ω
0...10 V:	Ri approx. 100 kΩ

### Accuracy

Resolution:	-999...9999 digit
Measuring fault:	±0,2% of measuring range, ±1 digit
Temperature drift:	100 ppm/K

### Indication

Display:	7- segment, 8 mm, red, 4 digits
Overflow/Underflow:	to HI / to LO
Time of indication:	0,1 s - 1 s - 10 s (adjustable)
Memory:	minimum / maximum values

### Ambient conditions

Operating temperature:	0...+60°C
Storing temperature:	-20...+80 °C

### Limit contacts

Electronically:	2 open collectors (36 VDC, 150 mA)
Leakage current:	approx. 0,1 mA
Indication:	Limit value reached: LED red Limit value not reached: LED green
Adjustment:	limit value, hysteresis value and delay times with 3 keys
Failsafe function:	voltage supply „ON“ = contacts active

### Supply

Current loop:	4...20 mA
Direct current:	24 VDC ±5% (maximal 50 mA) (without galvanical insulation)

### Mechanics

Enclosure:	Material: Macrolon
Protection:	Front: IP 67 Connection: IP 20
Connection:	plug-in connector 8-pole, up to 1,5 mm <sup>2</sup>
Carrier circular:	Dimension: Ø 43/48,5/62,5 mm x 37mm Fastening: 4 mounting holes for M4 Weight: approx. 55 g
Carrier angular:	Dimension: 42 x 42 x 28 mm Fastening: 4 mounting holes for 2 mm screws Weight: approx. 45 g

### Accessories

Enclosures for mounting of display	
DIN-BUZ-H:	Special model
For wall:	- top DIN BUZ-H with built-on bottom part
Tube:	- top DIN BUZ-H with built-on bottom part and additional holders for tubes

### Programmable features

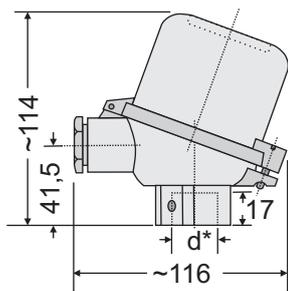
range of indication / time of indication / decimal point / unit (°C/°F) / stabilisation zero point / limit value 1 + 2  
hysteresis 1 + 2 / delay 1 + 2 / locking of programming / calibration points / TAG number

### Possibilities of indication

Programming the decimal point and unit:  
XXXX / XXX.X / XX.XX / X.XXX / XXX°C / XXX°F

## 8 Accessoiriers : Enclosures for mounting the display

### 8.1 Special enclosure DIN BUZ-H

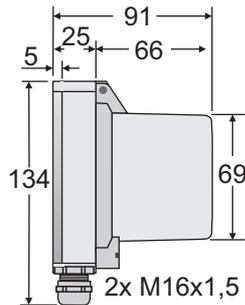
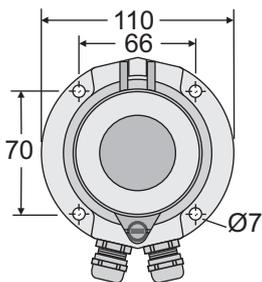


\*d: M24x1,5  
 Ø15,3  
 Ø22,5



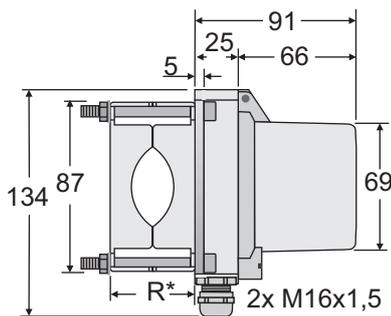
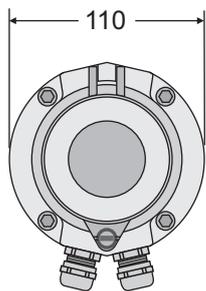
Special model  
 Connections process: M24x1,5  
 Ø15,3 mm  
 Ø22,5 mm  
 Material: diecast aluminium with powder coating  
 Screwed cable gland: 1x M20x1,5  
 Protection: IP67  
 Weight: approx. 350 g

### 8.2 Wall mounting enclosure, built-on enclosure with magnetic holder



Top BUZ-H special model  
 Material: diecast aluminium with powder coating  
 Bottom part: aluminium with powder coating  
 Magnetic holder: embedded foil  
 Screwed cable gland: 2x M16x1,5  
 Protection: IP67  
 Weight: approx. 500 g

### 8.3 Enclosure with holder for tubes



Top BUZ-H special model  
 Material: diecast aluminium with powder coating  
 Bottom part: aluminium with powder coating  
 Holder for tube: sheet steel, mirror finish galvanized  
 Diameter of tube: 42...60 mm  
 Screwed cable gland: 2x M16x1,5  
 Protection: IP67  
 Weight: approx. 950 g

\*R = overall diameter of tube = 42...60 mm

## 9 Maintenance, Return, Cleaning, Disposal

### 9.1 Maintenance

The current loop display CULO-G require no maintenance and contain no components which could be repaired or replaced.

### 9.2 Return



When returning the instrument, use the original packaging or a suitable packagr.

To avoid a damage, use for example antistatic plastic film, shock-absorbent material, a marking as highly sensitive measuring instrument.

### 9.3 Cleaning



- Before cleaning the instrument disconnect the electrical connection.
- Clean the instrument with a moist cloth.
- Electrical connections must not come into contact with moisture.

### 9.4 Disposal



Dispose instrument components and packaging materials in accordance with the respective waste treatment and disposal regulations of the region or country to which the sensor is supplied