

# Operating Manual



## CULO-F

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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.
- The general terms and conditions contained in the sales documentation shall apply.
- 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 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.

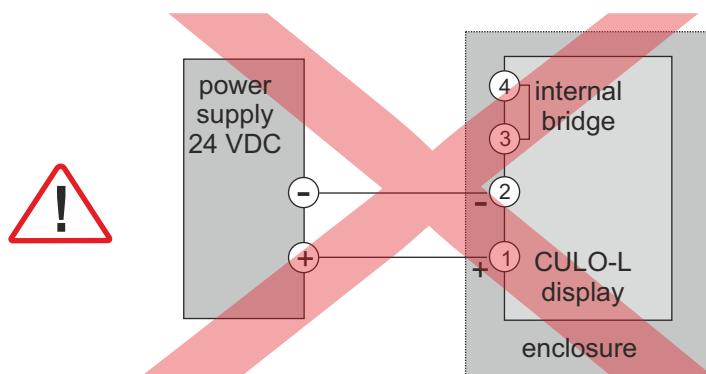
### Personnel

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 aggressive media.

### ● 3 Mounting / commissioning

#### Note for running a current loop display

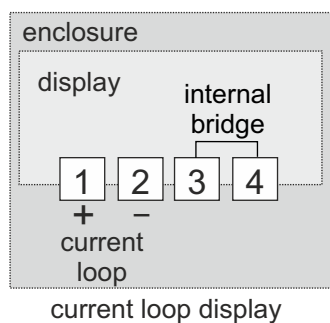


The display is operated in a current loop of 4...20 mA absolutely. A direct connection to a voltage supply (eg 24 VDC) will destroy the indicator and the guarantee does not cover this.

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.

#### General connection (terminal strip)



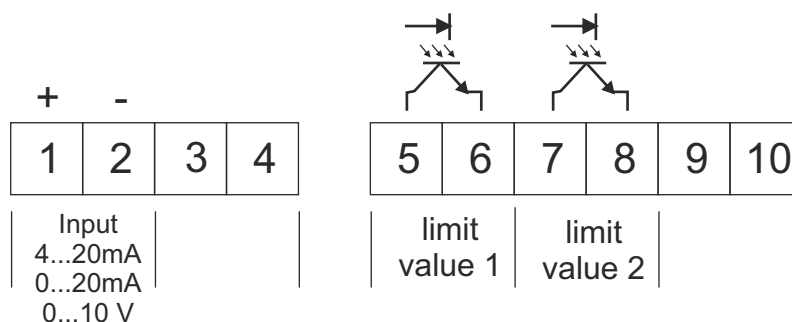
The 4-pole plug-in terminal strip to connect the current loop indicator is at the back of the display and is accessible after the enclosure is opened.

**Terminal 1:** positive pole of the current loop

**Terminal 2:** negative pole of the current loop

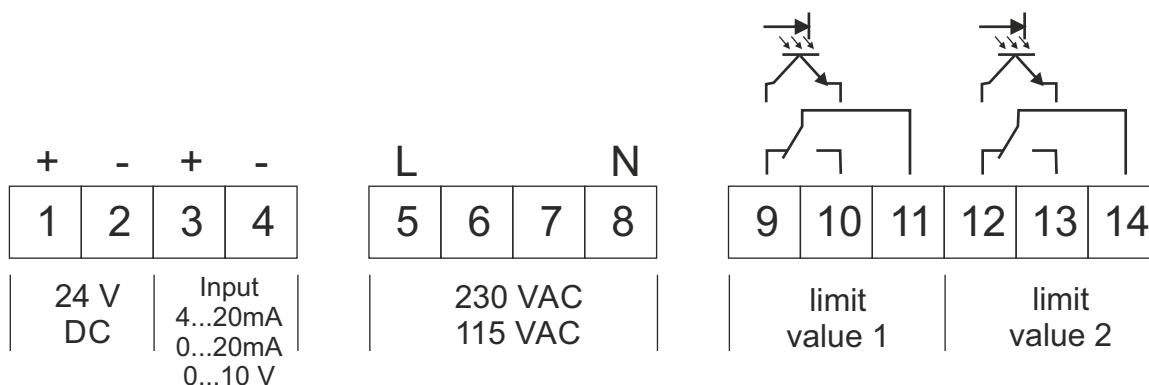
Terminal 3 and terminal 4 are bridged on the PCB and can be used for easy connection of a transmitter.

#### Connection in a current loop



The terminal blocks are located in the cover of the enclosure

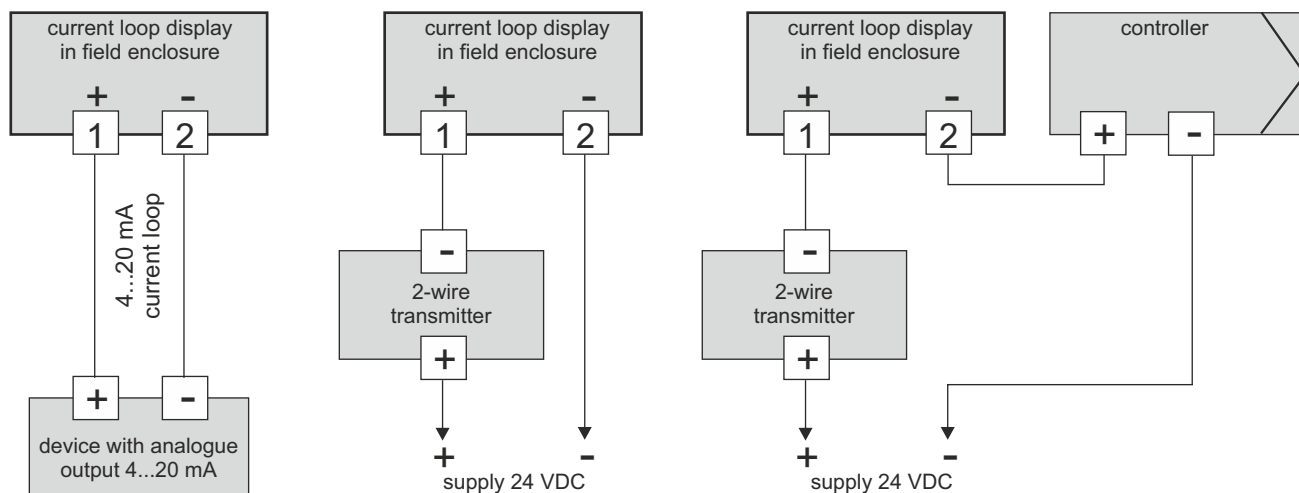
#### Connection with additional voltage supply



The terminal blocks are located in the bottom of the enclosure

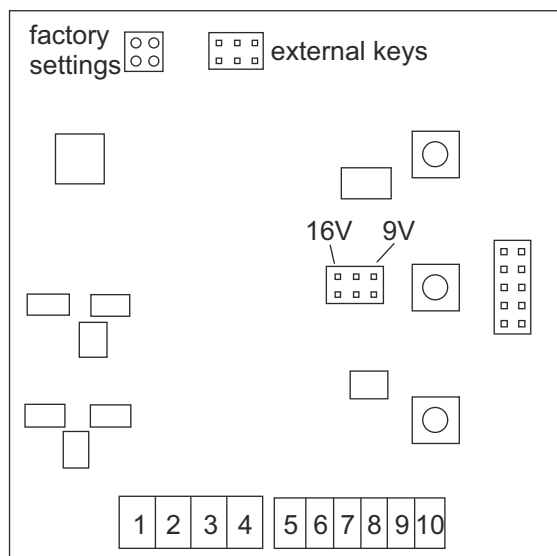
### ● 3 Mounting, commissioning (continued)

#### Examples of connection

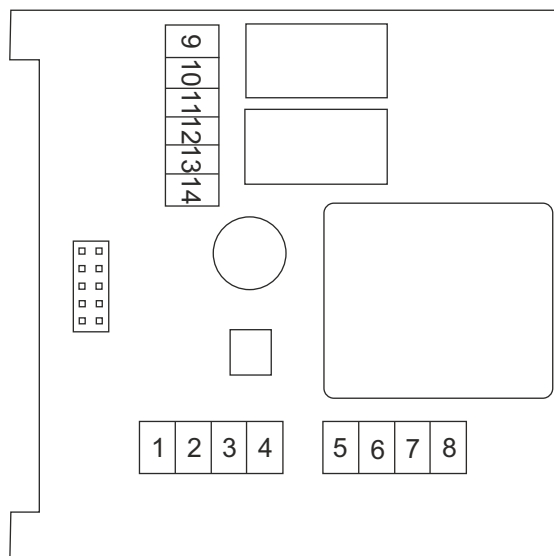


#### View of the connection board

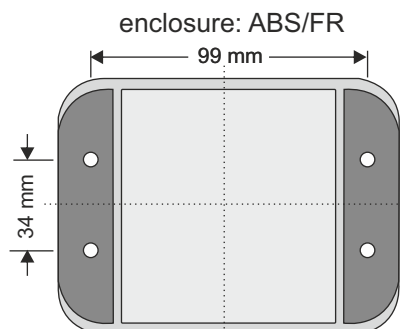
PCB in the cover to connect the device as a current loop.



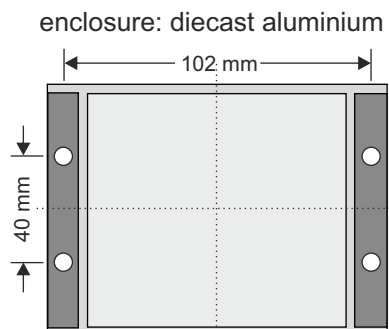
PCB in the bottom part to connect the device with additional power supply



#### Mounting holes



Mounting: Open covers of left and right side.  
Bore holes for mounting for screws up to 4,5 mm.



Mounting: Lift off the left and right design covers.  
Bore holes for mounting for screws up to 5,5 mm.

## ● 4 Programming the indicator

Program table

PN	Description	Range	Delivered state
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)	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>1)</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
42	Input selection (2="current") 1= Current, extern supply, round carrier (BUZ-H) 2= Current, extern supply and loop 3= Voltage (CULO-B, CULO-F) 4= Voltage 0,4...4,5 V (CULO-B, CULO F)	1...4	2
50 <sup>2)</sup>	Definition PIN-code for programming interlock (value >0000))	0000...9999	0000
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>3)</sup>	Limit value 1: trigger value	-999...9999	110
151 <sup>3)</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
154	„Failsafe“ (switch open if power loss or limit triggered) 0 = „Failsafe“ off (limit contacts active, if limit triggered) 1 = „Failsafe“ on (limit contacts not active, if limit triggered)	0...1	1
155	Show also as text 0 = no text output 1 = if limit is triggered, show as text in display	0...1	0
160 <sup>3)</sup>	Limit value 2: trigger value	-999...9999	40
161 <sup>3)</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
164	„Failsafe“ (switch open if power loss or limit triggered)	0...1	1
165	Show also as text	0...1	0
200	TAG number	0000....9999	0

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

2) 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.

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

## ● 4 Programming the indicator (continued)

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)

### 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 Transport, packaging and storage**

**Transport**

Check the current loop display for any damage that may have been caused during transportation. Obvious damage must be reported immediately.

**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 for repair).

● **6 Other**

**Maintenance**



- The current loop display CULO-F requires no maintenance.
- Have repairs performed by the manufacturer only.

**Cleaning**



Attention

- Clean the instrument with a moist cloth.

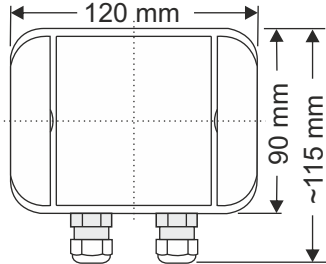
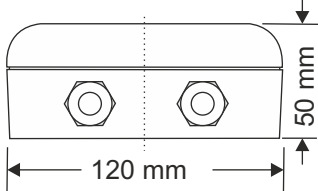
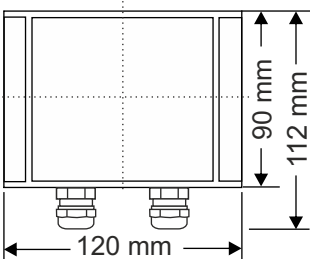
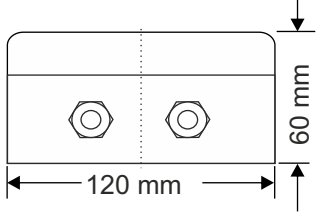
**Return**

When returning the instrument, use the original packaging or a suitable transport package. Be sure to include detailed information about the problem.

**Disposal**

Incorrect disposal can put the environment at risk. Dispose of instrument components and packaging materials in an environmentally compatible way and in accordance with the country-specific waste disposal regulations.

● **7 Dimensions**

Enclosure: ABS/FR		
Enclosure: diecast aluminium		

## 8 Technical data

### Input

Current loop:	4...20 mA
Input resistance:	Ri: ~450 $\Omega$ (U = 9 V) / Ri: ~800 $\Omega$ (U = 16 V)
With external supply:	
4...20 mA / 0...20 mA:	Ri: ~10 $\Omega$
0...10 V:	Ri: ~k100 $\Omega$

### Accuracy

Resolution:	-999...9999 digit
Measuring fault:	$\pm 0,2\%$ of measuring range, $\pm 1$ digit
Temperature drift:	100 ppm/K
Measuring principle:	ramp conversion

### 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
Mechanically:	2 relays (changeover contact)
Switching voltage:	min. 10 V AC/DC, max. 125 VDC / 250 VAC
Switching current:	VA: 0,1...1250 / W: 0,1...120
Sontinuous current:	5 A
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
voltage drop:	9 or 17 VDC (adjustable with jumper)
External supply:	DC: 24 VDC $\pm 5\%$ (maximal 50 mA), without galvanical insulation AC: 115 / 230 VAC, power consumption: 1,5 VA

### Mechanics

Enclosure:	starCase: SC90 (120 x 90 x 50 mm) aluCase: AC90 (120 x 90 x 60 mm)
Material:	starCase: ABS/FR (halogen free) aluCase: diecast aluminium
Color:	starCase: light grey (RAL 7035) aluCase: aluminium white (RAL 9006)
Weight:	starCase: approx. 350 g aluCase: approx. 800 g
Mounting:	4 screw channel
Protection:	IP 66
Connection:	plug-in terminal strip up to 1,5 mm <sup>2</sup> / screwed cable gland 2x M16x1,5

### 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