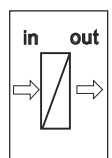


# Operating Instructions

TCDISP Ex

4-20mA signal conditioning instrument



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# 1 About this document

## 1.1 Function

This operating instructions manual has all the information you need for quick setup and safe operation . Please read this manual before you start setup .

## 1.2 Target group

This operating instructions manual is directed to trained personnel. The contents of this manual should be made available to these personnel and put into practice by them .

## 1.3 Symbolism used



Information , tip, note

This symbol indicates helpful additional information .



Caution : If this warning is ignored, faults or malfunctions can result .

Warning : If this warning is ignored, injury to persons and /or serious damage to the instrument can result .

Danger : If this warning is ignored, serious injury to persons and/or destruction of the instrument can result .



Ex applications

This symbol indicates special instructions for Ex applications .



List

The dot set in front indicates a list with no implied sequence .



Action

This arrow indicates a single action .



Sequence

Numbers set in front indicate successive steps in a procedure .

## 2 For your safety

### 2.1 Authorised personnel

All operations described in this operating instructions manual must be carried out only by trained specialist personnel authorised by the operator. For safety and warranty reasons, any internal work on the instruments must be carried out only by personnel authorised by the manufacturer.

### 2.2 Appropriate use

TCDISP Ex is a universal signal conditioning instrument and power supply unit for connection of a 4 ... 20 mA/HART sensor.

### 2.3 Warning about misuse

Inappropriate or incorrect use of the instrument can give rise to application-specific hazards, e.g. vessel over fill or damage to system components through incorrect mounting or adjustment.

### 2.4 General safety instructions

The TCDISP Ex is a high-tech instrument requiring the strict observance of standard regulations and guidelines. The user must take note of the safety instructions in this operating instructions manual, the country-specific installation standards (e.g. the VDE regulations in Germany) as well as all prevailing safety regulations and accident prevention rules.

### 2.5 CE conformity

TCDISP Ex is in CE conformity with EMC (89/336/EEG) and LVD (73/23/EEG).

Conformity has been judged according to the following standards:

- I EMC:
  - Emission DIN/EN 61326: 2004
  - Susceptibility DIN/EN 61326: 2004 incl. supplement A
- I LVD: EN 61010-1: 2001

## 2.6 Safety instructions for Ex areas

Please note the Ex-specific safety information for installation and operation in Ex areas . These safety instructions are part of the operating instructions manual and come with the Ex-approved instruments .

## 2.7 Environmental instructions

Protection of the environment is one of our most important duties. That is why we have introduced an environment management system with the goal of continuously improving company environmental protection . The environment management system is certified according to DIN EN ISO 14001 .

Please help us fulfil this obligation by observing the environmental instructions in this manual :

- | Chapter "Storage and transport "
- | Chapter "Disposal "

## 3 Product description

### 3.1 Configuration

#### Scope of delivery

The scope of delivery encompasses :

- I Indicating and signal conditioning instrument  
TCDISP Ex
- I Mounting set
- I Ex separating chamber
- I Identification label
- I Documentation
  - this operating instructions manual
  - Ex specific safety instructions and , if necessary , further certificates .

#### Overview

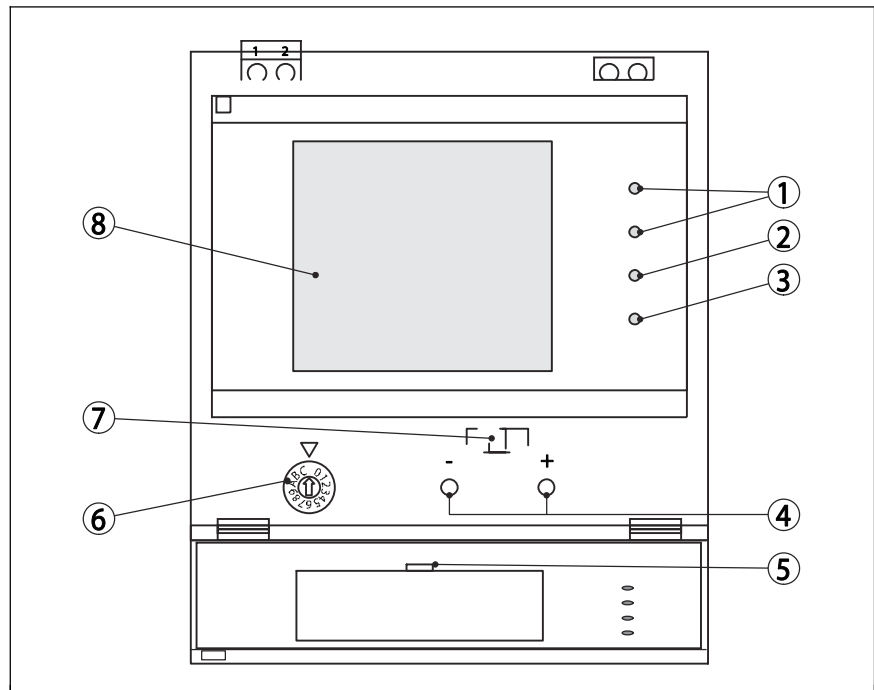


Fig. 1: TCDISP Ex

- 1 S status indication operating relay 1 and 2
- 2 S status indication fail safe relay
- 3 S status indication operation
- 4 [+/-] adjustment keys
- 5 Insertable tag for identification of the measurement loop
- 6 Function switch
- 7 Mode switch for sensor input (active/passive ) on the rear of the instrument
- 8 LC display

## 3.2 Principle of operation

### Area of application

TCDISP Ex is a universal single signal conditioning instrument with integrated level switches and display for continuously measuring sensors . At the same time, it can serve as power supply unit for connected sensors TCDISP Ex is designed for connection of an individual 4 ... 20 mA sensor . The instrument is suitable for carrier rail , panel and surface mounting .

### Physical principle

The TCDISP Ex signal conditioning instrument can power connected sensors and process their measured signals . The requested parameter is displayed and outputted in addition to the integrated current output for further processing . Hence the measured signal can be transferred to a remote indication or a superordinate control system . Two level relays for control of pumps or other actors are also integrated.

### Power supply

Wide-range power supply unit with 20 ... 253 V AC /DC for world-wide use .

You can find detailed information on the power supply in the "Technical data " in the "Supplement".

## 3.3 Operation

The adjustment of TCDISP Ex is carried out via the integrated keys and a 16-step function switch .

## 3.4 Storage and transport

### Packaging

Your instrument was protected by packaging during transport . Its capacity to handle normal loads during transport is assured by a test according to DIN EN 24180 .

The packaging of standard instruments consists of environment-friendly, recyclable cardboard . For special versions , PE foam or PE foil is also used . Dispose of the packaging material via specialised recycling companies .

### Storage and transport temperature

- I Storage and transport temperature see "Supplement - Technical data - Ambient conditions"
- I Relative humidity 20 ... 85 %



## 4 Mounting

### 4.1 General instructions

#### Installation location

You can mount the TCDISP Ex signal conditioning instrument onto a carrier rail 35x7.5 acc. to DIN EN 50022, or directly on the wall by means of the three screws or in a front panel or door of a switching cabinet .



#### Note:

Before mounting TCDISP Ex , set the requested mode of the measuring data input . With a slide switch on the rear of the instrument you can choose between active and passive current input (see also chapter " Connecting to power supply "). After mounting the instrument, the slide switch is no longer accessible .

### 4.2 Mounting instructions

#### Carrier rail mounting

- 1 Place the adapter plate [1] to the rear of TCDISP Ex (spring of the adapter plate downward ) and fasten the plate with screw [2] (M4x6).
- 2 Place TCDISP Ex against the carrier rail [3] from below and push the instrument upward until it snaps in .

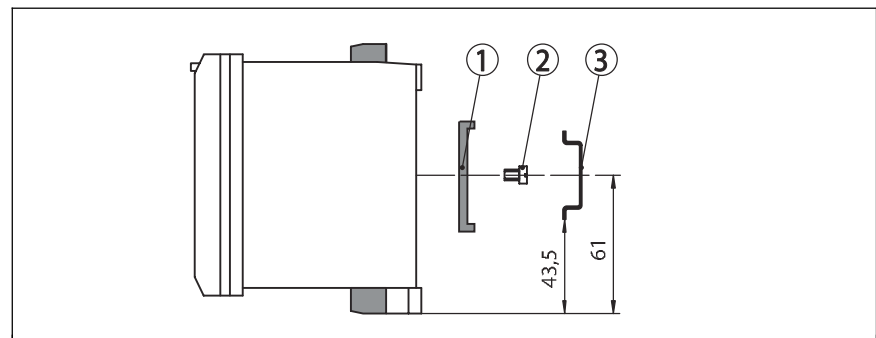


Fig. 2: Carrier rail mounting

- 1 Adapter plate
- 2 Screw (M4x6)
- 3 Carrier rail

#### Wall mounting

- 1 Insert the metal strap [1] from above into the housing cut-out.
- 2 Fasten the instrument directly to the wall with the three screws ( $\varnothing$  max. 4 mm).

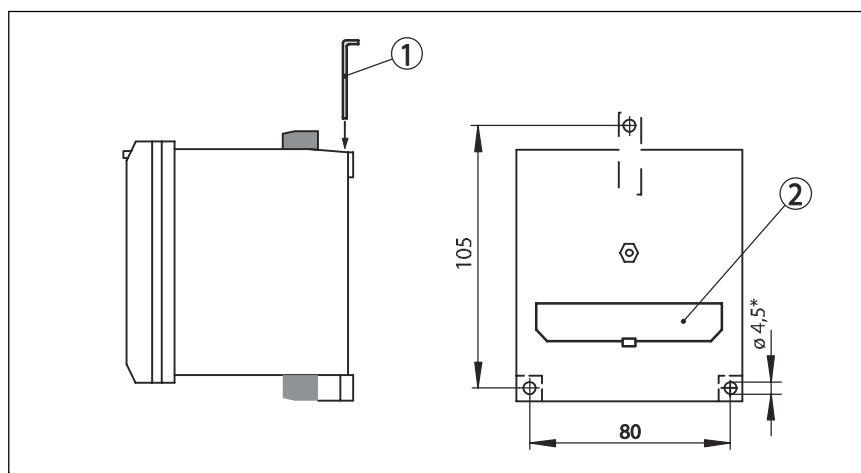


Fig. 3: Wall mounting

- 1 Metal strap
- 2 Covering slide switch active -passive

Front panel mounting

- 1 Remove the pluggable terminal strips from the top and bottom.
- 2 Screw pin [3] into the rear of TCDISP Ex and tighten with a screwdriver .
- 3 Insert TCDISP Ex from the front into the front panel [1].
- 4 Place the clamping strap [2] from the back over the pin [3] and pull it with the knurled nut [4] against the panel [1].

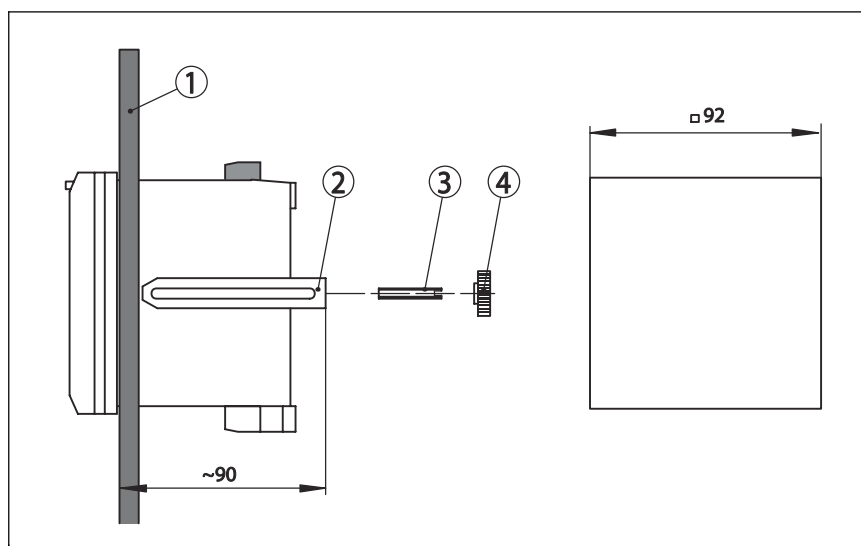


Fig. 4: Front panel mounting

- 1 Front panel
- 2 Terminal strap
- 3 Pin
- 4 Knurled nut

## 5 Connecting to voltage supply

### 5.1 Preparing the connection

#### Note safety instructions

Please note the following safety instructions :

- | Connect only in the complete absence of line voltage
- | If overvoltage surges are expected , overvoltage arresters should be installed



Tip:

We recommend TC overvoltage arresters B61-300 (power supply TCDISP Ex) and B62-36G (sensor supply ).

#### Take note of safety instructions for Ex applications



In hazardous areas you should take note of the appropriate regulations, conformity and type approval certificates of the sensors and power supply units .

#### Select power supply

The power supply can be 20 ... 253 V AC , 50/60 Hz or 20 ... 253 V DC .

#### Selecting connection cable

Power supply of TCDISP Ex is connected with standard cable according to the national installation standards .

Standard two-wire cable without screening can be used to connect sensors . If electromagnetic interference is expected , screened cable must be used .

#### Cable screening and grounding

Connect the cable screen on both ends to ground potential . In the sensor , the screen must be connected directly to the internal ground terminal. The ground terminal outside on the sensor housing must be connected to the potential equalisation .

If potential equalisation currents are expected , the screen connection on the side of TCDISP Ex must be made via a ceramic capacitor (e.g. 1 nF, 1500 V). The low frequency potential equalisation currents are thus suppressed , but the protective effect against high frequency interference signals remains .

#### Select connection cable for Ex applications



Take note of the corresponding installation regulations for Ex applications . In particular, make sure that no potential equalisation currents flow over the cable screen . In case of grounding on both sides this can be achieved by the use of a capacitor or a separate potential equalisation .

## 5.2 Connection procedure

Proceed as follows :

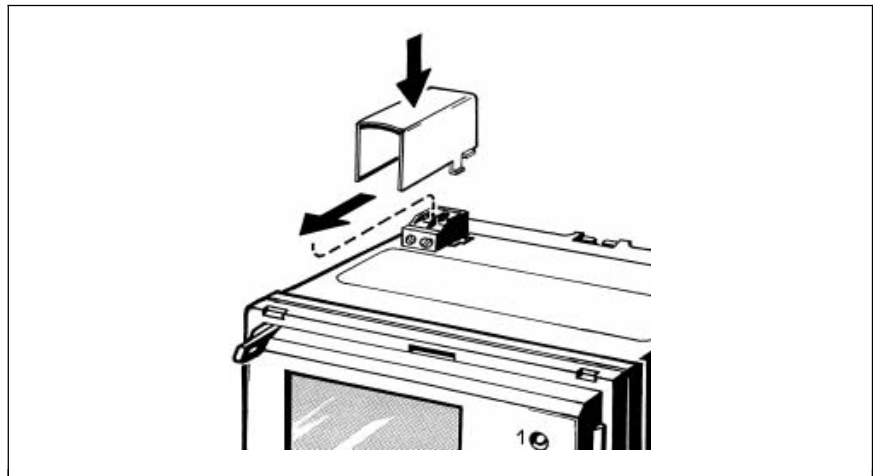
- 1 Mount TCDISP Ex
- 2 Connect sensor cable to terminal 1 and 2, and where applicable, connect the screen
- 3 Connect power supply (switched off) to terminal 5 and 6
- 4 If necessary, connect fail safe and operating relay as well as current output

The electrical connection is hence finished.



After connection, it is absolutely necessary to plug the blue Ex separating chamber to terminals 1 and 2 (sensor input). This ensures the required distance of at least 50 mm (1.97 in) to other instruments.

- 1 Place the Ex separating chamber as shown below on the terminals of the sensor input
- 2 Lead the sensor cable towards the front and out of the Ex separating chamber
- 3 Push the Ex separating chamber towards the front until you hear it snap in



### 5.3 Wiring plan

Overview

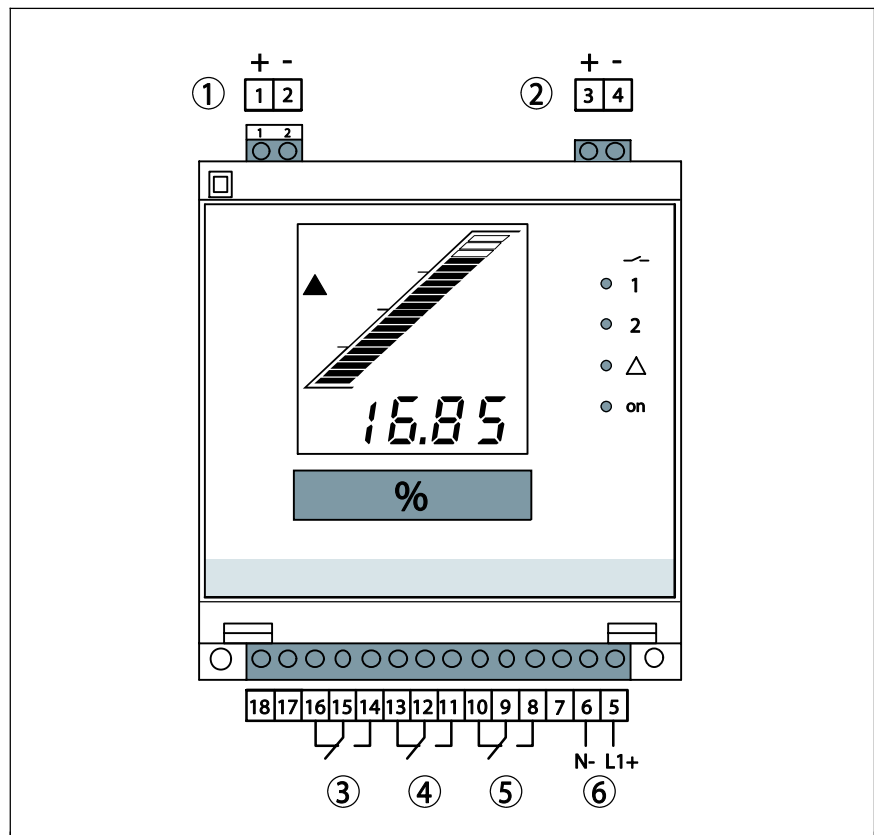


Fig. 5: Terminal assignment TCDISP Ex

- 1 Meas. data input/sensor power supply with sockets for TCCONNECT
- 2 Current output
- 3 Fail safe relay
- 4 Relay 2
- 5 Relay 1
- 6 Supply voltage

**Information :**

Via the slide switch on the rear of the instrument you can switch over between active and passive operation of the measuring data input :

- I In active mode , TCDISP Ex provides the power for the connected sensors . Power supply and measurement data are transmitted over the same two -wire cable . This mode is provided for connection of transmitters without separate power supply (sensors in two -wire version).
- I In passive mode the sensors are not powered , only the measured value is transmitted . This input is for connection of transmitters with own, separate voltage supply (sensors in four-wire version). The TCDISP Ex can be also connected into the existing circuit like a normal current meter.



The position of the slide switch also influences the preconditions for Ex implementation. Take note of the type approval certificate or the conformity certificate of TCDISP Ex.

**Tip:**

For parameter adjustment of connected HART sensors , the sockets are integrated in the terminals of the measuring data input. A TCONNECT can be directly plugged in without the need of an additional HART resistor .

## 6 Setup with the integrated indicating and adjustment unit

### 6.1 Adjustment system

The integrated indicating and adjustment unit is for measured value display, adjustment and diagnosis of TCDISP Ex. Indication and adjustment is carried out in the front via a clear LC-display and a function switch as well as two keys.

To open the cover, insert a screwdriver in the two slots on the top and turn it slightly.

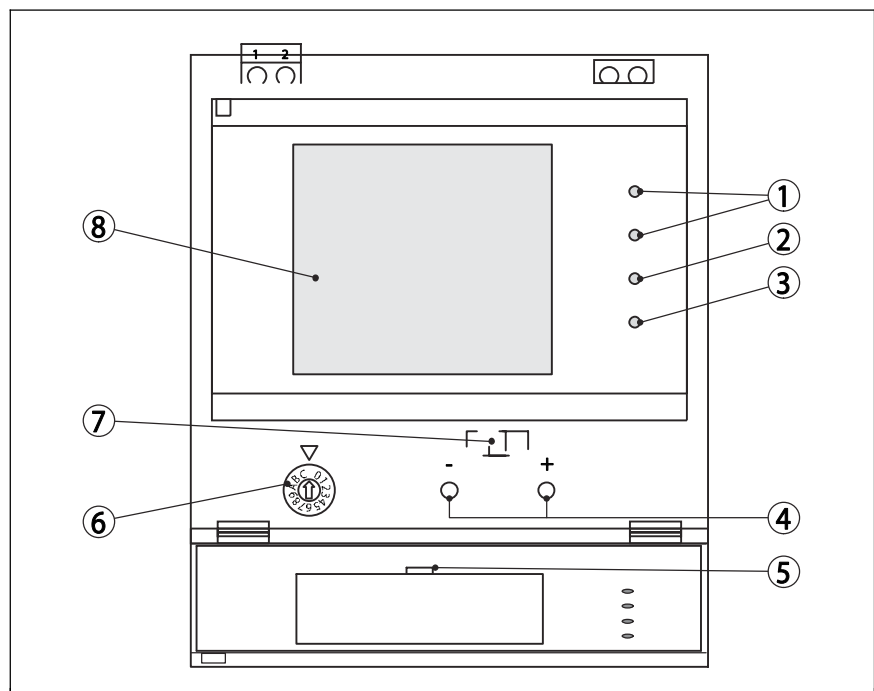


Fig. 6: Indicating and adjustment elements

- 1 Status indication operating relay 1 and 2
- 2 Status indication fail safe relay
- 3 Status indication operation
- 4 [+/-] adjustment keys
- 5 Insertable tag for identification of the measurement loop
- 6 Function switch
- 7 Mode switch for sensor input (active/passive) on the rear of the instrument
- 8 LC display

- Key functions
- I [Function switch ] for selection of:
    - Adjustment
    - Relay switching points
    - Indication scaling
    - Current output
    - Integration time
    - Offset correction
  - I [+/-] key:
    - Change value of the parameter

By pushing the [+/-] key, you change the individual parameters of the selected function. In this phase, the processed parameter is flashing. By briefly pushing the two keys simultaneously, you save your settings. "Save" is briefly displayed.

## 6.2 Setup procedure

Setup The setup comprises first of all the adjustment of the measurement loop. A scaling of the measured value for the LC display and the adaptation of the relay switching points are further settings. Additional setup steps would be, if necessary, the adjustment of an integration time to smooth the measured value or a modification of the current output characteristics.

To clearly denote the measuring unit, the supplied labels can be inserted in the cover. In case several TCDISP Ex are used, each measurement loop should be clearly labelled.

Switch-on phase After being switched on, TCDISP Ex first of all carries out a short self-check. The following steps are carried out:

- I Internal check of the electronics
- I Indication of the firmware version
- I the output signal jumps briefly to the set fault current

Then the actual measured value is displayed and the corresponding current is transmitted to the current output.

Measured value indication The measured value indication shows the digital indication value and also an analogue bargraph. Here, it is absolutely necessary that the function switch is set to position [ 0] ("OPERATE").

Function switch The following functions can be selected via the rotary switch:

- I 0: Measured value display and simulation
- I 1: Relay 1 switching point ON
- I 2: Relay 1 switching point OFF



- I 3: Relay 2 switching point ON
- I 4: Relay 2 switching point OFF
- I 5: Decimal point position of the scaling
- I 6: Scaling for 100 %
- I 7: Scaling for 0 %
- I 8: Switch over current output 0/4 ... 20 mA
- I 9: Damping of the measured value (integration time)
- I A: Offset correction
- I B: Min. adjustment in percent by changing the level
- I C: Max. adjustment in percent by changing the level
- I D: Min. adjustment in mA without modifying the level
- I E: Max. adjustment in mA without modifying the level
- I F: No function

#### Offset correction

When a pressure transmitter is used, an offset correction should be carried out first. These instruments are factory-set in a certain position. If the pressure transmitter is now mounted in a different position, its measuring range is shifted slightly. The zero point is readjusted by carrying out the offset correction in uncovered (unpressurised) condition. The complete measuring range will be shifted by the deviating amount.

- à Make sure that the pressure transmitter is completely unpressurised, uncovered (unimmersed) and mounted in its final position.
- à Set the function switch to position [A]. The display indicates now the actual sensor current in mA. Save the current status by pushing the [+/-] keys simultaneously.

#### Adjustment in mA without changing the level

For this adjustment procedure, two sensor current values (4 ... 20 mA) must be entered corresponding to the levels 0 % and 100 %.

When using a pressure transmitter, an offset correction should be carried out to reach maximum accuracy. Carry out this offset correction before adjustment and with the sensor uncovered (unimmersed).

- à Select now position [D] or [E] on the function switch, enter the current values in mA for min. or max. adjustment and save your settings.

#### Adjustment in % by changing the level

During this adjustment procedure, the current level is assigned to a certain percentage value. For this reason, percentage values that correspond to the actual filling levels must be entered for the min. and max. adjustment. The ideal calibration is at 0 % and 100 %. Because it is not always possible to empty or fill a vessel completely, any value can of course be

entered. The greater the difference between the two adjustment points, the more precise the measurement. It does not matter which value is entered first.

- à Select position [B] or [C] on the function switch, enter the percentage values for the min. and max. adjustment and save your settings

#### Relay outputs

Two operating relays are integrated in TCDISP Ex for level detection. First of all, determine at which switching points the relays should switch on and off again. Furthermore you have to distinguish between the relay modes over fill and dry run protection. You switch over by exchanging the ON/OFF values of the relay.

- I Over fill protection : Relay is switched off when the max. level is exceeded (safe currentless condition), relay is switched on again when the level falls below the min. level (switch on point < switch off point)
- I Dry run protection : Relay is switched off when the level falls below the min. level (safe currentless condition), relay is switched on again when the max. level is exceeded (switch on point > switch off point)
- à To adjust the on and off switching points of relay 1, set the function switch to position [1] or [2], enter the switching points for ON or OFF and save your settings. If necessary, proceed in the same way with relay 2 (position [3] or [4]).

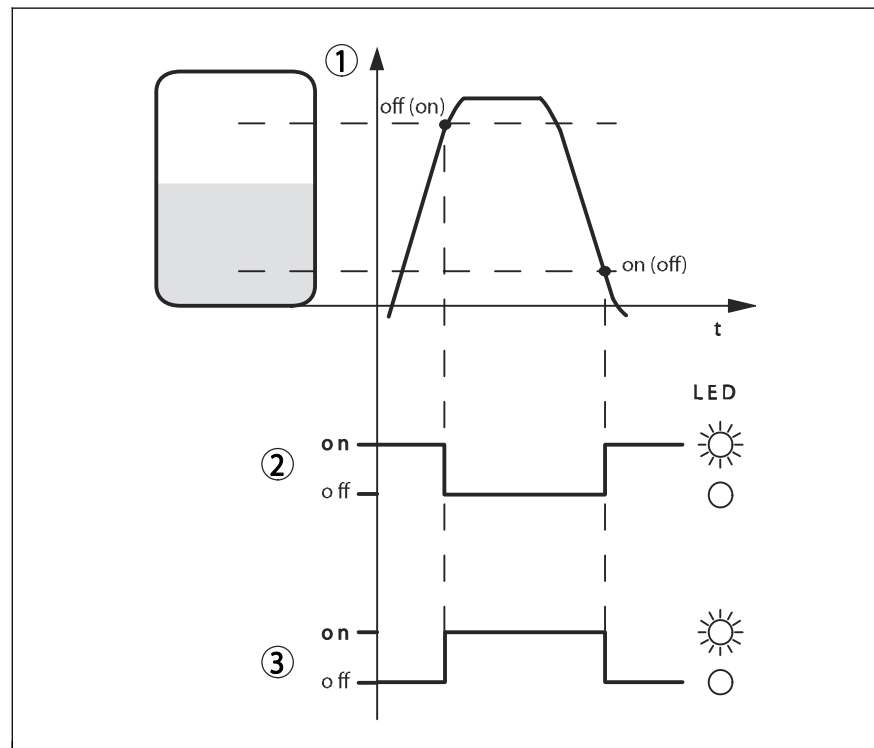


Fig. 7: Relay modes  
 1 Level  
 2 Mode overfill protection  
 3 Mode dry run protection

### Scaling

Scaling means the conversion of the measured value into a certain parameter and unit. The indication can then show e.g. instead of the percentage value, the volume in l. Indication values of max. -9999 to +9999 are possible.

- à First of all, determine the max. indicating range and the number of decimal places after the decimal point – max. four decimal places can be displayed. Select position [ 5 ] of the function switch, place the decimal point in the required position and save your settings.
- à Now select position [6] or [7] on the function switch, enter the requested values for 100 % or 0 % and save your settings.

### Damping

To suppress fluctuations in the measured value display, e.g. by fluctuating product surfaces, an integration time can be set. This time can be between 0 and 250 seconds. Make sure that also the reaction time of the complete measurement will be bigger and the sensor will react on measured value changes with a delay. In general a time of a few seconds will be sufficient to smooth the measured value display.

	<p>Now select position [9] on the function switch, enter the requested value and save your settings</p>
Current output 0/4 ... 20 mA	<p>The characteristics of the current output can be switched over from 4 ... 20 mA to 0 ... 20 mA.</p> <p>Now select position [8] on the function switch, adjust the requested characteristics curve and save your settings</p>
Simulation	<p>To check if the settings of TCDISP Ex are correct, the simulation mode can be used. Any individual measured value can be simulated and e.g. the correct behaviour of the relays and the connected instruments can be checked.</p> <p>Switching over between the functions "OPERATE" and "Simulation" is done by pushing the [+/-] keys for at least 3 seconds. In the simulation mode, the set value flashes on the display. The simulation can be switched off by pushing both keys again for approx. 3 seconds. If no key is pushed, the display switches automatically over to "OPERATE" after approx. 60 minutes and the simulation is terminated.</p> <p>To start simulation, push the [+/-] keys simultaneously until the displayed value starts flashing (approx. 3 seconds). By pushing either of the [+/-] keys, you can set the requested simulation value and make your check.</p>
Reset	<p>With a reset, all values set by the user will be lost and are reset to factory settings.</p> <p>Interrupt the power supply of TCDISP Ex. Push the [+/-] keys simultaneously and hold them while you switch on the power supply. The display shows "RES" and the default settings will be restored. These are the following:</p> <ul style="list-style-type: none"> <li>  Relay switch on points : 10 %</li> <li>  Relay switch off points: 100 %</li> <li>  Decimal point: 888.8</li> <li>  Display min.: 0</li> <li>  Display max.: 100.0</li> <li>  Integration time: 0 s</li> <li>  Offset correction : 0</li> <li>  Current output 4 ... 20 mA</li> <li>  Min. adjustment: 0 % or 4 mA</li> <li>  Max. adjustment: 100 % or 20 mA</li> </ul>

### 6.3 Application example

- | An upright cylindrical (linear) tank has a volume of 2700 l
- | The max. filling volume is 2650 l, the min. filling volume 50 l

The level sensor in the vessel is a pressure transmitter (passive), outputting a standardised 4 ... 20 mA signal. For further processing, an additional 4 ... 20 mA output signal is required.

The full and empty adjustment was carried out directly in the sensor. The following values are outputted:

- Max. volume (display max.) 20 mA = 2650 l
- Min. volume (display min.) 4 mA = 50 l

Relay 1 should switch on an emptying pump at a level of 90 % and switch off the pump at a level of 10 %

#### General procedure

- 1 Select the following functions with the rotary switch.
- 2 Push one of the two [+/-] adjustment keys, the digital indication flashes (if the rotary switch is set to "OPERATE", the [+/-] keys are inoperable).
- 3 Adjust the requested value with the [+/-] keys. If you hold the key pushed, the digital indication changes the value more quickly.
- 4 Save your settings by pushing the [+/-] keys simultaneously.

#### Current output

Set the function switch to position [8]. Select with the [+/-] keys the measured value output 4 ... 20 mA or 0 ... 20 mA. For this example, choose 4 - 20.

The displayed numbers have the following meanings:

- 0 - 20 = 0 ... 20 mA
- 4 - 20 = 4 ... 20 mA

Save the value by pushing the [+/-] keys simultaneously.

To scale the indication of TCDISP Ex, the filling volumes for 0 % and 100 %. The vessel does not have to be filled or emptied.

#### Scaled indication at 0 %

- 1 Set the function switch to position [7] (display min.)
- 2 Set the value to 50 via the [+/-] keys
- 3 Save the value by pushing both keys simultaneously

#### Scaled indication at 100 %

- 1 Set the function switch to position [6] (display max.)
- 2 Set the value to 2650 via the [+/-] keys
- 3 Save the value by pushing both keys simultaneously

#### Decimal point

Since the range of the example tank is between 50 l and 2650 l, you need a digital indication for every four positions.

- 1 Set the function switch to position [5] (Decimal Point)
- 2 By pushing the [+/-] keys, you move the decimal point
- 3 Save the value by pushing both keys simultaneously

## Relay

- I Set the function switch to position [ 1 ] (relay 1 on). For the given example , select the value 90.0 (90.0 %) with the [ +/- ] keys . The internal relay 1 then switches on when this value is reached . Save the value by pushing the two keys simultaneously .
- I Set the function switch to position [ 2 ] (relay 1 off). Select the value 10.0 (10.0 %) with the [ +/- ] keys . The internal relay 1 then switches off when the value falls below this value. The respective relay control lamp lights when the relay is energized . If the switching points are too close together (<0.1 %), the appropriate LED flashes . The relay takes on the safe condition . In mode "OPERATE " an error message is outputted on the display .
- I If you want to control additional relays , proceed in the same way, as with relay 1. The switch positions for setting the respective relays are stated in the list of the function switch under "Setup procedure".



## Note:

If you want to change the mode (i.e. the switching function of the relays), you have to exchange the On and Off values .

## 7 Maintenance and fault rectification

### 7.1 Maintenance

When used as directed in normal operation, TCDISP Ex is completely maintenance free.

### 7.2 Rectify faults

#### Causes of malfunction

TCDISP Ex offers maximum reliability. Nevertheless faults can occur during operation. These may be caused by the following, e.g.:

- I Measured value of the sensor not correct
- I Voltage supply
- I Interference on the cables

#### Fault rectification

The first measures to be taken are to check the input/output signals as well as to evaluate the error messages via the display. The procedure is described below. In many cases, the causes can be determined in this way and faults can be rectified.

#### 24 hour service hotline

However, should these measures not be successful, call the TC service hotline in urgent cases under the phone no. +44 (0)1322 622400

#### Fault messages

##### ? E003

- I CRC -error
- Carry out a reset
- Send instrument for repair

##### ? E014

- I Short-circuit
- Eliminate short-circuit
- If necessary, exchange defective sensor

##### ? E015

- I Line break
- Repair or exchange sensor cable

### Checking the sensor connection

? E016

- | Empty/full adjustment reversed  
Carry out a fresh adjustment

? E017

- | Adjustment span too low  
Carry out a fresh adjustment and increase the distance  
**between min. and max. adjustment**

? E021

- | Scaling span too small  
Carry out a fresh scaling , increase the distance  
**between min. and max. scaling .**

? E110

- | Relay switching points too close together  
**Increase the difference between the two relay switching  
points**

### 7.3 Instrument repair

If a repair is necessary , please proceed as follows :

**Contact: TC Sales on +44(0)1322 622400 .**



## 8 Dismounting

### 8.1 Dismounting procedure



**Warning :**

Before dismounting, be aware of dangerous process conditions such as e.g. pressure in the vessel , high temperatures, corrosive or toxic products etc .

Take note of chapters "Mounting" and "Connecting to power supply" and carry out the listed steps in reverse order .

### 8.2 Disposal

The instrument consists of materials which can be recycled by specialised recycling companies . We use recyclable materials and have designed the electronic modules to be easily separable .

**WEEE directive 2002 /96/EG**

This instrument is not subject to the WEEE directive 2002 /96/ EG and the respective national laws (in Germany, e.g. ElektroG). Pass the instrument directly on to a specialised recycling company and do not use the municipal collecting points. These may be used only for privately used products according to the WEEE directive.

Correct disposal avoids negative effects to persons and environment and ensures recycling of useful raw materials .

Materials: see "Technical data "

If you cannot dispose of the instrument properly , please contact us about disposal methods or return .

## 9 Supplement

### 9.1 Technical data

#### General data

Series	instrument for panel or wall mounting or mounting on carrier rail 35x7.5 acc. to EN 50022
Dimensions	W = 96 mm (3.78 in), H = 104 mm (4.09 in), D = 90 mm (3.54 in)
Weight	approx. 400 g (0.88 lbs)
Housing material	plastic ABS /POM
Screw terminals	max. wire cross -section 1.5 mm <sup>2</sup>

#### Voltage supply

Supply voltage	20 ... 253 V AC , 50/60 Hz, 20 ... 253 V DC
Power consumption	12.4 VA, 4 W

#### Sensor input

Number of sensors	1x 4 ... 20 mA
Kind of input (switch over)	
- mode active	sensor is powered by TCDISP Ex
- mode passive	sensor has own power supply
Measured value transmission	4 ... 20 mA analogue
Terminal voltage mode active	20 ... 15 V at 4 ... 20 mA
Current limitation mode active	approx. 30 mA
Inner resistance mode passive	<250 Ohm
Detection line break	<=3.6 mA
Detection shortcircuit	>=21 mA
Adjustment range	
- Empty adjustment	3.8 ... 20.2 mA
- Full adjustment	4.1 ... 20.5 mA
- min. adjustment delta	300 µA
Connection cable	2-wire standard cable (screening recommended)

#### Relay outputs

Quantity	2x operating relay , 1x fail safe relay
----------	---

Contact	Floating spdt
Contact material	AG NI 0.15 hard gold-plated
Turn-on voltage	min. 10 mV DC , max. 250 V AC /DC
Switching current	min. 10 µA DC , max. 3 A AC , 1 A DC
Breaking capacity	min. 50 mW, max. 500 VA, max. 54 W DC <sup>1)</sup>
Min. switching hysteresis	0.5 %

#### Current outputs

Quantity	1x output
Range	0/4 ... 20 mA
Resolution	0.1 % or 20 µA
Max. load	500 Ohm
Fault signal	22 mA
Linearity error	0.1 % (relating to 20 mA)
Temperature error	0.01 %/K (relating to 20 mA)

#### Indications

Measured value indication	
- LC display (45x45 mm)	digital and quasianalogue indication
- Max. indicating range	-9999 ... 9999
LED displays	
- Status indication operating voltage	1x LED green
- Status indication fault signal	1x LED red
- Status indication operating relay 1/2	2x LED yellow

#### Operation

Adjustment elements	2x keys in the front, 1x function switch, 1x slide switch active-passive
---------------------	--

#### Ambient conditions

Ambient temperature	-20 ... +60 °C (-4 ... +140 °F)
Storage and transport temperature	-40 ... +80 °C (-40 ... +176 °F)

<sup>1)</sup> If inductive loads or stronger currents are switched through , the gold plating on the relay contact surface will be permanently damaged . The contact is then no longer suitable for switching low-level signal circuits .

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**Electrical protective measures**

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**Protection**

- |                        |       |
|------------------------|-------|
| - Wall/rail mounting   | IP 20 |
| - Front panel mounting | IP 40 |

Overvoltage category	II
----------------------	----

Protection class	II
------------------	----

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**Electrical separating measures**

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Reliable separation acc . to VDE 0106 part 1 between power supply , sensor input and digital part

- |                        |         |
|------------------------|---------|
| - Reference voltage    | 250 V   |
| - Isolation resistance | 3.75 kV |

Galvanic separation between relay output and digital part

- |                        |       |
|------------------------|-------|
| - Reference voltage    | 250 V |
| - Isolation resistance | 4 kV  |

## 9.2 Dimensions

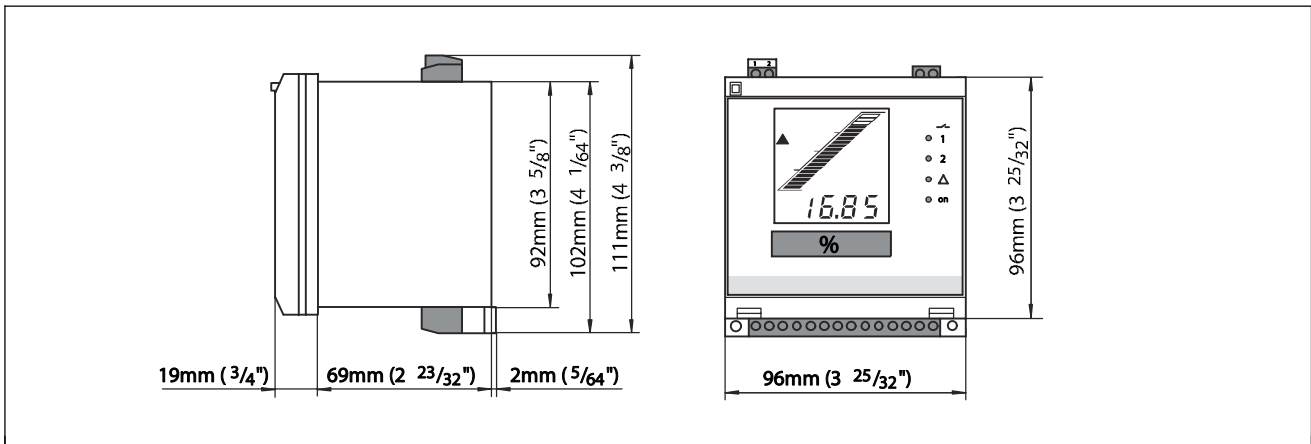


Fig. 8: Dimensions TCDISP Ex







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All statements concerning scope of delivery , application, practical use and operating conditions of the sensors and processing systems correspond to the information available at the time of printing.

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Subject to change without prior notice