

# Operating Manual

**NC56**
**Capacitive filling level probe**

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## 1 Safety Instructions

### 1.1 General



This operating manual contains instructions fundamental to the installation, operation and maintenance of the device that must be observed unconditionally. It must be read by the assembler, operator and the specialized personnel in charge of the device before it is installed and put into operation.

This operating manual is part of the product and must be kept close by where it is easily accessible to the responsible specialized personnel.

The subsequent sections, in particular the instructions on assembly, commissioning and maintenance, contain important safety instructions, non-observance of which can endanger persons, animals, the environment and physical objects.

### 1.2 Personnel Qualification

The device may only be installed and commissioned by specialized personnel familiar with the installation, commissioning and operation of this product.

Specialized personnel are persons who can assess the work they have been assigned and recognize potential dangers by virtue of their specialized training, their skills and experience and their knowledge of the relevant standards.



### 1.3 Risks due to Non-Observance of Safety Instructions

Non-observance of these safety instructions, the intended use of the device or the limit values given in the technical specifications can be hazardous or cause harm to persons, the environment or the system itself.

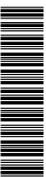
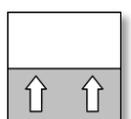
The manufacturer will not be liable for damage claims if this should happen.

### 1.4 Safety Instructions for the Operating Company and the Operator

The safety instructions on correct operation of the device must be observed. The operating company must make them available to the installation, maintenance, inspection and operating personnel.

Dangers arising from electrical components, energy discharged by the medium, escaping medium and incorrect installation of the device must be eliminated. For more information, please see the applicable national and international regulations.

In Germany these are the DIN EN, UVV regulations, specific industrial guidelines such as DVGW, Ex, GL, etc., the VDE- regulations and the regulations of the local energy supply companies.



### 1.5 Unauthorised Modification

Modifications of or other technical alterations to the device by the customer are not permitted. This also applies to replacement parts. Any modifications / alterations required must be carried out by Fischer Mess- und Regeltechnik GmbH only.

### 1.6 Inadmissible Modes of Operation

The operational safety of this device can only be guaranteed if it is used as intended. The device model must be suitable for the medium used in the system. The limit values given in the technical data may not be exceeded.

### 1.7 Safe working practices for maintenance and installation work

The safety instructions given in this operating manual, any nationally applicable regulations on accident prevention and any of the operating company's internal work, operating and safety guidelines must be observed.

The operating company is responsible for ensuring that all required maintenance, inspection and installation work is carried out by qualified specialized personnel.

### 1.8 Pictogram explanation



**WARNING!**

... indicates a potentially dangerous situation, non-observance of which could endanger persons, animals, the environment or objects.

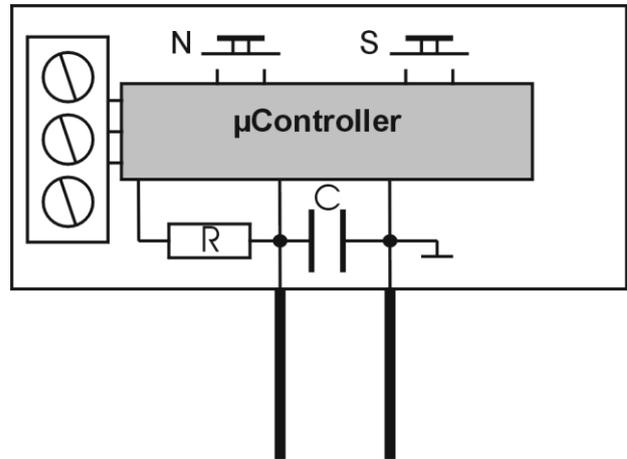
## 2 Application Purpose

The capacitive filling level probe NC56 with an electrical output is suitable for various measuring tasks in the following areas: procedure technology, process technology, environment technology, vehicle technology and ship technology. The capacitive filling level probe NC56 serves to measure tank filling levels in plastic and metal tanks containing fresh water, waste water, diesel fuel and extinguishing foam. Filling level heights of between 400 - 2000 mm can be measured.

It may only be used for the intended use given in the manufacturer's data sheet. If there is dirty or aggressive media in the system, or if this is to be expected, the device must be modified in terms of those parts that come into contact with the media. Please talk to the manufacturer first before placing the order.

## 3 Description of the Product

### 3.1 Function Diagram



### 3.2 Design and mode of operation

An AC voltage signal is exerted onto two metal rods held at a defined distance to each other that act as a capacitor. The capacitive values of this capacitor are primarily determined via the filling level height and the resulting change in the dielectrics. Electronics integrated into the device convert these capacity changes into linear electrical uniform signals 0...20 mA / 4...20 mA / 0...10 V DC / 0...5 V DC / 1...5 V DC / 2...10 V DC um.

## 4 Installation and Assembly

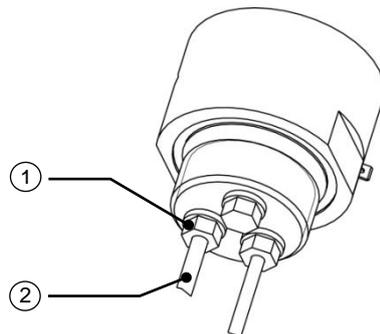
As standard the instrument comes with a thread socket G 1/4 for the mounting in a mounting flange. The instrument is suited only for vertical installation and, if possible, should be mounted at the highest point of the tank. If the probes were not ordered to measure the rods can be shortened by the user easily (see 4.3. Shortening the electrodes). Both rod ends need to be shortened at the same length. A distance of at least 10 mm between tank bottom and probe end should be observed because of possible formation of sediment or eventual tank movement (e.g. during transport). Pulsating impacts from the installation on the tank installation itself might cause functional impairment of the instrument.

Appropriate measures have to be taken by the installer of the tank installation in which the capacitive filling level probe is used in order to ensure general safety during installation and maintenance

## 4.1 Process connection

- By authorized and qualified specialized personnel only.
- The connection must be effected for the intended mechanical process connection only. See also purchase order indicator on the identification plate.
- Approved only for operation in tank installations with operating pressures up to 10 bar.
- Check the suitability of the device for the media to be measured.

### 4.1.1 Shortening the electrodes



- If electrodes need to be shortened, please proceed as follows:
- Unscrew the terminal screws (1) by two turns.
- Pull out the electrodes (2).
- Shorten the electrodes to the required length. (Installation length +25mm for model without protection tube / Installation length +37mm for model with protection tube)

**⚠ Only shorten the upper ends of the electrodes! Insulated electrodes can become unserviceable after impacts or jolts (e.g. if placed onto the floor)!**

- Remove the insulation on the head side by 21mm (ECT-FE-coating or shrink hose). The ECTFE coating is removed best with a belt grinder.
- Insert the electrodes until you feel them click into place. Re-tighten all terminal screws (until the head of the screw lies flush with the surface).

## 4.2 Electronic connection

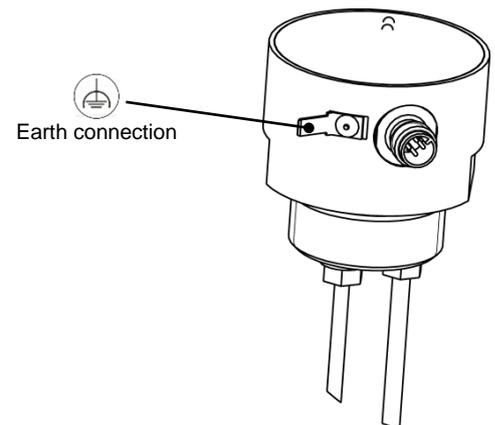
- By authorized and qualified specialized personnel only.
- The electrical connection of the device shall be performed according to relevant VDE and local electricity board regulations.
- Disconnect the system from the mains before connecting the device.
- Add a fuse adapted to the energy requirements.

### 4.2.1 Potential equalisation

Please note the following when installing the level probe:

To avoid measuring errors caused by wire-bound malfunctions, we recommend potential equalisations between the probe and tank, especially in the case of conductive fluids. To do this, connect both to an low voltage external earth.

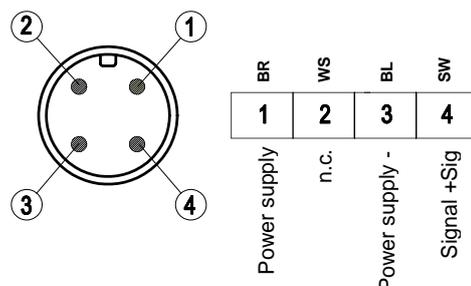
**In the case of plastic containers, the earth connection of the probe needs to be connected to a low voltage external earth.**



### 4.2.2 Supply voltage

The nominal supply voltage and the permissible range can be found in the technical data (11). The admissible load / resistance for the signal output is stated in the technical data.

#### M12 plug



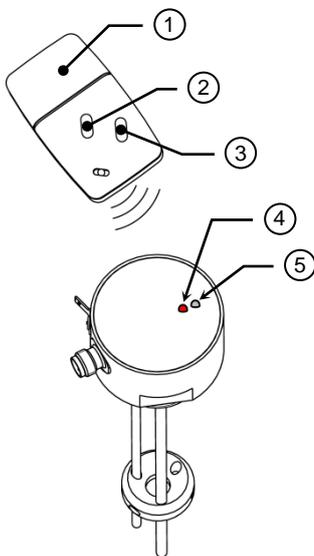
The connection "Signal mass" (-Sig) is connected internally to the supply mass (-Ub). This means that the output signal is free of interference levels on the power supply lines.

## 5 Commissioning

All electrical supply, operating and measuring lines, and the pressure connections must have been correctly installed before commissioning. All supply lines are arranged so that there are no mechanical forces acting on the device.

- The relevant installation regulations for tank installations have to be observed for the correct mechanical installation.
- The instrument must not be exposed to frost.
- Appropriate measures have to be taken by the installer of the tank in which the capacitive filling level probe is used in order to ensure general safety during installation and maintenance

### 5.1 Filling level comparison



- 1 Infrared remote control
- 2 Min button
- 3 Max button
- 4 LED lamp
- 5 Receiver

After fitting the probe into the tank and after all electrical connections have been made, the power supply can be switched on. A small lamp diode flashes briefly at regular intervals.

The filling level is compared in two steps:

Bring the tank to the lowest required filling level. Press and hold the button "MIN" of the infrared remote control. The lamp diode will now start to flash quickly. After 2..3 seconds, the lamp diode shines permanently. This signals that the device has saved the zero-point. Now release the button.

Fill the tank to the highest required filling level. Press and hold the button "MAX" of the infrared remote control. The lamp diode will now start to flash quickly. After 2..3 seconds, the lamp diode shines permanently. This signals that the device has saved the end value. Now release the button.

This marks the end of the comparison.

If the filling levels for the lowest and highest measured value need to be changed, the comparison can be repeated at any time.

If only one of the two filling heights changes, only the starting value (MIN) or the end value (MAX) need to be compared in this case.

### 5.2 Comparison information

It is also possible to not use the entire electrode length as the measuring path; however the accuracy deteriorates as the measuring path decreases. Optimum results are achieved when the electrodes have just been wetted for the zero-point comparison and have not yet been fully submerged for the end point comparison.

The output signal of the probe has a linear relationship to the wetting height on the electrodes. In a cylindrical tank the filling height is proportional to the filling volume. This relationship does not apply in complex tank designs!

In the case of nonconductive fluids and very short electrodes, the impact of the stray capacitance of the environment increases consistently. For this reason, the installation position of the probe needs to lie in the centre of the tank if possible. The further away the metal walls or metal frame are from the electrodes, the lower the effect of this stray capacitance.

If there are several filling level probes next to each other, all probes can be compared at the same time with an infrared remote control. If you want to avoid this, it is generally possible to target the specific probe that is to be compared. To be on the safe side, it is better to switch off all other probes (briefly).



In the case of a falling characteristic curve<sup>1</sup>, simple comparison of the MAX of an empty tank and MIN of a full tank is sufficient.

<sup>1</sup> (Tank empty = large output signal and tank full = small output signal)

## 6 Maintenance

The instrument is maintenance-free.

We recommend checking the instrument and the electrical connections at regular intervals to ensure reliable operation and a long service life.

The precise test cycles need to be adapted to the operating and ambient conditions. If various instrument components interact, the operating instructions of all the other instruments also need to be observed.

## 7 Transport

The measuring device must be protected against impacts. It may only be transported in packaging specifically intended for transport.

## 8 Service

All damaged or faulty devices must be sent directly to our repair department.

## 11 Technical data

### General points

Measuring procedure	capacitive measurement				
for tank heights	400-2000 mm (other lengths available on request)				
Operating pressure	max. 10 bar				
Temperature	max. 80°C (environment and medium)				
Number of electrodes	2 (for Diesel 3)				
Threaded connection	G 1¼", for protective tube version G2"				
Type of protection	IP 67				

### Electrical data

Operating voltage	9 - 32 V DC	9 - 32 V DC	12 - 32 V DC	12 - 32 V DC	12 - 32 V DC
Current draw (without signal)	ca. 30 mA	ca. 30 mA	ca. 30 mA	ca. 30 mA	ca. 30 mA
Output signal	0 - 20 mA	4 - 20 mA	0 - 10 V DC	0/1 - 5 V linear	2 - 10 V linear
Apparent ohmic resistance	$(U_B - 9 V) / 20$ mA	$(U_B - 9 V) / 20$ mA	> 5 k Ω	> 5 k Ω	> 5 k Ω

$U_B$  = Operating voltage

### Electrical connection

4-pin M12 connector (male)

### Materials

Housing	Plastic
Media-contacting	Stainless steel 1.4404, ECTFE, shrink hose (polyolefin)
Authorization	e-approval acc. to 72/245/EEC, 95/54/EEC Approval no.: e13*72/245*95/54*2182*00

We would ask you to please coordinate all return shipments with our sales department so that we can ensure careful processing of all faulty devices for our customers.



Process media residues in and on dismantled devices can be a hazard to people, animals and the environment. Take adequate preventive measures. If required, the devices must be cleaned thoroughly.

## 9 Accessories

EU04 Infrared remote control

## 10 Disposal

For the sake of the environment ....

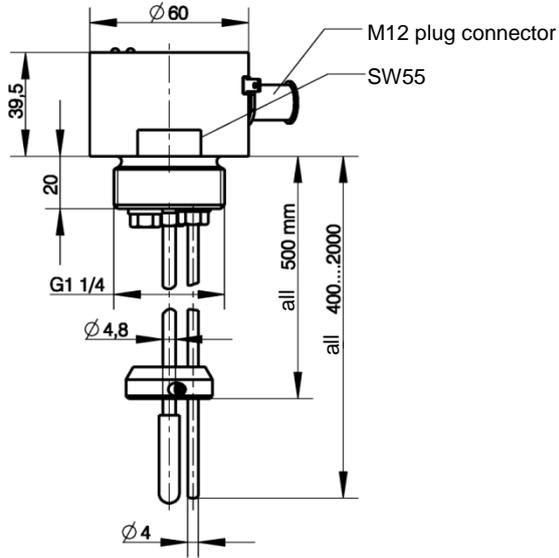


Please help to protect our environment and dispose of or recycle used instruments as stipulated by the applicable regulations.

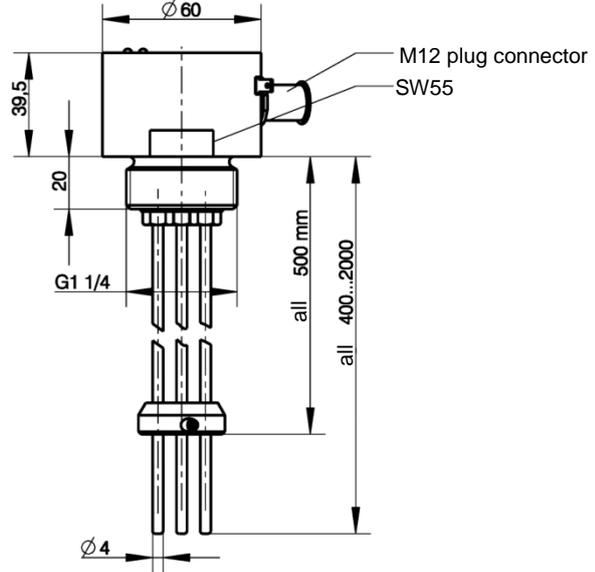
In the case of a falling characteristic curve (Tank empty = large output signal and Tank full = small output signal) simple comparison of the MAX of an empty tank and MIN of a full tank is sufficient.

12 Dimensional drawings

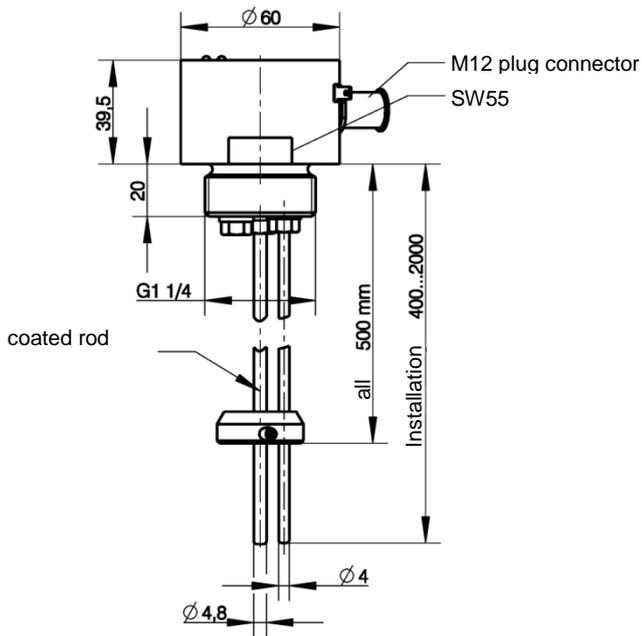
Probe for water



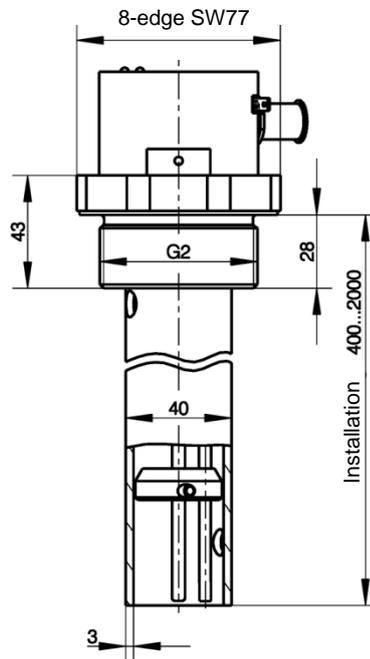
Probe for diesel, heating oil



Probe for extinguishing foam / waste



Protection



### 13 Order Codes

#### Level probe

Type NC56

									2	0	1	1
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**Design**

- Water/waste water  
(1 rod shrink hose / 1 rod bare, 1.4404)..... > 2
- Diesel  
(3 rods bare, 1.4404)..... > 3
- Faeces  
(1 rod ECTFE-coated / 1 rod bare, 1.4404) ..... > 4
- Extinguishing foam agent  
(1 rod ECTFE-coated / 1 rod bare, 1.44.04)..... > 5
- Rope probe with weight, for metal tanks  
(1 stainless steel cable as electrode) ..... > S
- Chemicals  
(2 rods ECTFE coated) ..... > 6

**Casing material / connection**

- Plastic casing G1/4 for external applications..... > 0
- Plastic casing including protection tube G2  
For external applications ..... > P
- Plastic casing including protection tube G2  
For external applications and boreholes for suction vehicles  
**only for model 4 (faeces)** ..... > G

**Installation length (from sealing surface)**

- From 400 – 2000 mm / graduation 50 mm ..... > 0 4 0 0
- ..... >
- ..... >
- ..... >
- ..... > 2 0 0 0

**Installation length (from sealing surface)**

- 0 – 20 mA 3-WIRE (Standard) ..... > A
- 0 – 10 V DC 3-WIRE (Standard) ..... > C
- 1 – 5 V DC linear 3-wire ..... > D
- 4 – 20 mA 3-WIRE (Standard) ..... > P
- 0 – 5 V DC linear (three-wire voltage)..... > U
- 2 – 10 V DC linear (three-wire voltage)..... > Z

**Operating voltage**

- 9 – 32 V DC (only for current output) ..... > E
- 12 – 32 V DC (only for voltage output) ..... > F

**Version**

- 2011 ..... > 2011

## 14 Manufacturer's Declarations and Certificates

### EG-Konformitätserklärung

Wir erklären in alleiniger Verantwortung, dass nachstehend genannte Produkte

### EC Declaration of Conformity

We declare under our sole responsibility that the products mentioned below

#### Kapazitive Füllstandssonde / Capacitive Level Sensor

**NC56 #####**

gemäß gültigem Datenblatt übereinstimmen mit der

specified by the actual data sheet complies with the

### EG-Richtlinie

2004/108/EG (EMV)

### EC Directive

2004/108/EC (EMC)

Die Produkte wurden entsprechend der folgenden Normen geprüft (Störfestigkeit für Industriebereich, Störaussendung für Wohnbereich):

DIN EN 61326-1:2004-05  
DIN EN 61326-2-3  
DIN EN 61010-1:2002-08

The instruments have been tested in compliance with the norms (Immunity for industrial environments, emission for residential environments):

DIN EN 61326-1:2004-05  
DIN EN 61326-2-3  
DIN EN 61010-1:2002-08

Die Geräte werden gekennzeichnet mit:

The gauges are marked with:



Bad Salzuffen, 24.01.08  
(Ort, Datum / place, date)

  
(rechtsverb. Unterschrift / authorized signature)

