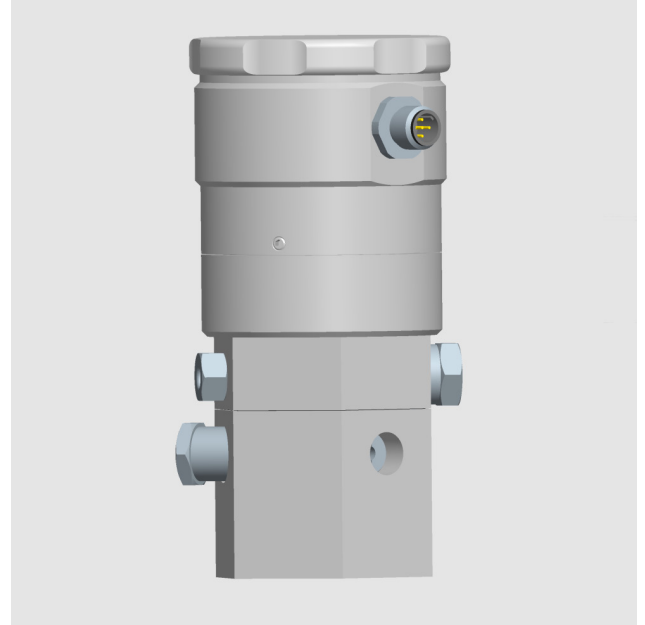


Operating instructions

ME56T | Electropneumatic Level Transmitter

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1 Safety instructions

1.1 General



This 'operating instructions' contain basic and essential instructions on installation, operation and maintenance of the device. Prior to assembly and commissioning, it is imperative

that the assembly technician, the owner and specialist staff responsible for the device read the operating instructions, which shall be available at the operating location at any time.

The sections 1.2 - 1.7 on general safety requirements as well as the following notes on intended use and disposal (2 - 10) contain important safety instructions the non-observance of which may result in animal or human health risks or might endanger property.

1.2 Personnel qualification

The staff commissioned with assembly, operation, maintenance and inspection shall be sufficiently qualified regarding the assigned work and must have had the necessary training for the required assembly, operating, maintenance and inspection tasks.

1.3 Hazards resulting from non-observance of safety instructions

Non-compliance with these safety instructions, putting the device to other than the designated uses or the non-observance of the limit values as specified by the technical device data may result in human or environmental danger or endanger the device itself. In such cases, any claims for compensation against the supplier of the device shall be excluded.



1.4 Safety instructions for owners and operators



Safety instructions on the intended device operation shall be observed. These instructions shall be made available by the owner and be accessible for the assigned staff for assembly, maintenance, inspection and operation.

Hazards resulting from electrical energy, energy released by the medium, exiting media or inadequate connection of the device must be avoided. Corresponding details may be gathered from the respective directives and guidelines such as DIN EN, UVV and - in case of industry-specific applications - also the DVWG, Ex, GL, etc. and the VDE guidelines as well as the respective directives of local energy supply companies.

1.5 Inadmissible modification

Retrofitting or other technical modifications of the device by the customer are inadmissible. This also applies to the installation of spare parts. Any necessary retrofitting / modification shall be exclusively executed by the manufacturer.

1.6 Inadmissible modes of operation

Operational safety of the device is only guaranteed in case of proper use. The device model shall suit the medium as used in the respective system. The limit values as specified in the technical device data must not be exceeded.

1.7 Safety-conscious working during maintenance and assembly

Any safety instructions in this operating instructions, the existing national accident prevention regulations as well as company-specific work, operating and safety regulations of the owner shall be observed.

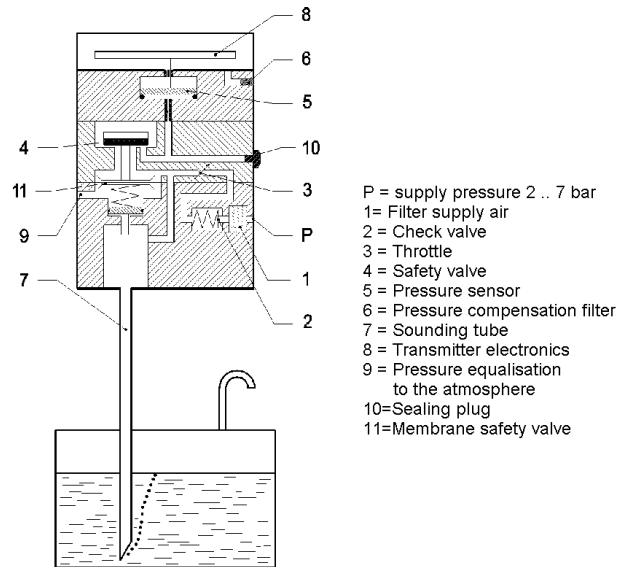
It is the owner's responsibility to make sure, that any stipulated maintenance, inspection and assembly work is carried out by authorized and qualified expert personnel.

2 Designated use

The electropneumatic level transmitter M56T precisely measures fluid fill levels by measuring the hydrostatic pressure using a resistance pressure measuring cell inside tanks or systems that feature pressure equalization with the atmosphere.

3 Product and functional description

3.1 Function diagram



3.2 Design and operation

The electropneumatic level transmitter uses the "bubbling-through principle".

Via the throttle (3), compressed air is continuously bubbled into the sounding tube (7) and into the liquid. Inside the sounding tube, a pressure equal to the pressure level in the liquid starts to build up.

A pressure sensor (5) measures this pressure and the transmitter electronics (8) converts this into a current signal between 4 ... 20 mA, which is proportional to the fluid level.

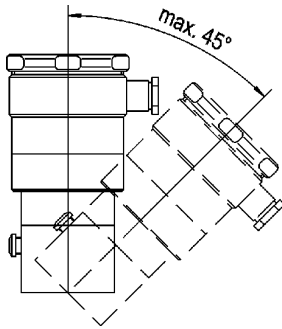
In case the pressure inside the sounding tube exceeds the admissible over-pressure of the pressure sensor, the connection to the pressure sensor is interrupted by the safety valve (4), thus protecting it from overload and damage.

A check valve (2) prevents the backflow of fluid from the sounding valve into the air supply.

4 Installation and assembly

The level transmitter shall be installed at above the tank or at its side. All connection lines must be fitted in such a way as to prevent mechanical forces acting upon the device.

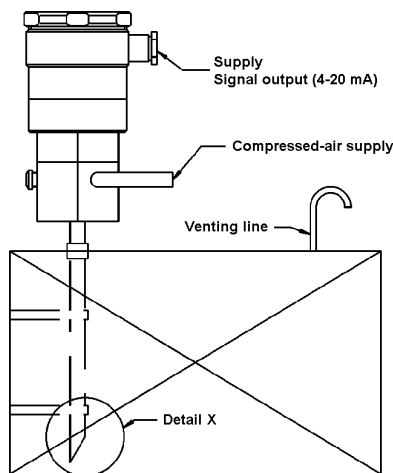
The stated precision relates to an angle of inclination from 0° to a maximum of 22.5°. The level transmitter works well up to an inclination of max. 45°.



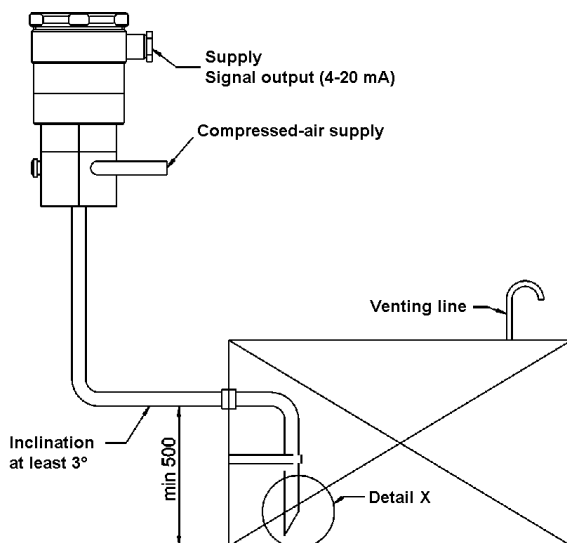
After installation, the level transmitter must not be painted in order to keep the connection to the surrounding atmosphere intact and to prevent faulty measurements.

4.1 Installation examples

4.1.1 Above the tank



4.1.2 At the side of the tank

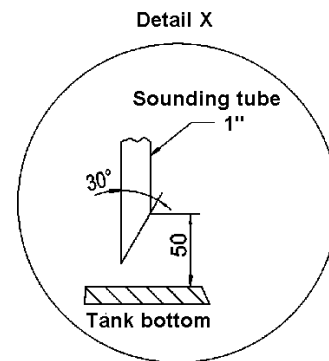


4.2 Sounding pipe

A G1" thread is provided for the sounding pipe's connection.

Therefore, a 1" tube should be used as a sounding tube. For high-viscosity measuring media, tubes with a smaller diameter can be used, but diameters should not fall below 6 mm clear width.

The sounding pipe end shall be cut off at an angle and end at least 50 mm above the tank bottom, to ensure that air can bubble through without an increased resistance. The cut-off angle must be between 30° and 45° (cf. detail X below).



4.3 Connection to central compressed air

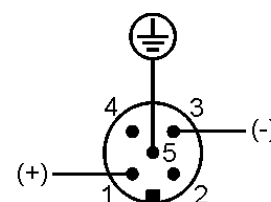
The supply line's connection may be effected using commercially available cutting ring connection, compression fitting or pneumatic screw connection. The tubes used for connection should have an internal diameter of 4 to 6.

Hazards posed by pressure inside the device shall be prevented by adequate measures.

4.4 Electrical installation

The device may only be installed by an authorized electrician or qualified personnel who have had proper instruction.

- Disconnect the system from the mains before connecting the device.
- Do not disconnect the connector plug while it carries current.



5 Commissioning

A precondition for commissioning is the correct installation of all electrical supply, switching and measuring lines as well as pressure connection lines (cf. section 4).

To ensure trouble-free function of mechanical components, make sure of the following:

- Air supply shall comply with the limits as stipulated by the technical data. Requirements on air quality shall be particularly observed.
- The sounding tube shall be free from contamination or the like and be laid in a manner as to avoid sharp turns that would affect the passage of the air bubbles and ensures that a precise counter-pressure can build up inside the tube.

5.1 Measuring media

Due to the fact that the level transmitter has no direct contact with the measuring media, it is possible to measure most types of measuring media.

5.2 Parameterization

In order to optimally adapt the device to the measuring location, it provides a great variety of parameters that can be set via the menu.¹

The keyboard and LC display required for setting are accessible after taking off the housing cover.

During operation, the LC display indicates the currently measured pressure. Using the keyboard, you can enter the required settings.

To prevent inadvertent entries or unauthorized interference, the keyboard lock is activated 3 minutes after the last keystroke. To release the keyboard again, the transmitter must be shut off and on again. To do so, just pull the M12 plug and restore connection again.

5.2.1 Navigation in the parameters menu

For menu navigation, use the keys \odot , \ominus and \oplus .

To activate the menu, please press the \odot key until the display shows $--/-$. This is the first parameter. In all, there are 10 parameters.

For parameter entry, use the \ominus key to change into the input mode. Now, enter the value by using the numeric keypad. Afterwards, you can change the algebraic sign by pressing \oplus . Input is completed by pressing the \odot key.

Use the \odot key to get to the next parameter.

Close the menu and change into operating mode by pressing the \oplus key.

5.2.2 Example: Input of damping

- Press the \odot key until $--/-$ comes up on the display.
- Now press the \odot key several times, until the display shows the identification $--5-$ for the offset correction parameter.
- Press \ominus to change into input mode.
- Enter the value for the desired damping (e.g. 150 for 15s).
- Press the \odot key to complete the input. The display again shows the identification $--5-$ for the damping parameter.
- Press the \oplus key to exit the menu and to change into operating mode.

5.2.3 Overview

- \odot Activates the menu
Goes to the next parameter
End of input mode
Closes the menu with the last parameter
- \ominus Changes into input mode
Change of algebraic sign
- \oplus Closes the menu
- $--/-$ Measuring range spread (4 mA point)
- $--2-$ Measuring range spread (20 mA point)
- $--3-$ Offset correction
- $--4-$ Range correction
- $--5-$ Damping
- $--6-$ Lower output current limit
- $--7-$ Upper output current limit
- $--8-$ Transmitter error
- $--9-$ Number of reference points
- $--10$ Reference point table

5.2.4 Measurement range spread, inverting

Via the keyboard, current output scaling can be adapted to suit individual application requirements. In addition to signal spread (max. 1:4) you can also invert the characteristic curve.

The measuring range is spread by defining the measuring values for pressure to be 4mA and

¹ Adaptation is also possible by way of remote parameterization.

20mA. Between these two values, the current signal is linearly scaled. The corresponding parameters may be gathered from the above list.

For current signal inversion, the values for 4mA and 20mA have to be exchanged.

Entries are checked for validity. Faulty input is indicated by *Err* on the display, which means that at least one of the values is outside the calibrated measuring range or the spread is set too wide.

5.2.5 Offset correction

Disconnect the transmitter from the pressure supply by e.g. shutting off the compressed air supply or emptying the tank.

Go to parameter --3- and change into input mode. Now, the display shows the current measuring value, which might deviate from zero slightly.

Using the keys ①-⑥, you can correct the displayed value. Each key is allocated a position on the display, which you may gather from the following table.

Key	Offset correction
①	+1
②	+10
③	+100
④	-1
⑤	-10
⑥	-100
Ⓢ	ENTER

Example:

The display shows *001.5*. To set this value to zero, please proceed as follows:

5x key ④ *001.0*
 1x key ⑤ *000.0*

5.2.6 Range correction

A correction of the range is only required for calibration purposes. Charge the transmitter with a measuring pressure corresponding to the measuring range value.

Go to parameter --4- and change into input mode. As with offset correction, you can now correct the displayed value by using the ①-⑥ keys.

5.2.7 Damping

For measurement variation suppression, this parameter may be used to set a reaction time to the changes in pressure.

Go to parameter --5- and change into input mode. the admissible value range is between 0 and 2000. This equals a damping of between 0 and 200s.

5.2.8 Limitation of output current

For output current, a lower and upper threshold can be entered. The technical limitations of the output signal should be regarded (3.5...22.5mA).

For input of the lower limit, go to parameter --6-.

For input of the upper limit, go to parameter --7-.

5.2.9 Transmitter error

The transmitter electronics will detect internal errors such as sensor break. This type of error is indicated by a continuous output signal.

Within the technical limits of the output signal (3.5...22.5mA), the current signal is freely selectable, but should be outside the range of the normal output signal (cf. Limitation of output current).

For the required input, go to parameter --8-.

5.2.10 Reference point table

There is a linear correlation between the hydrostatic pressure measured at the tank bottom and the filling level, which in turn results from the introduced volume of liquid and tank geometry. In a container with irregular geometry, the characteristic curve of hydrostatic pressure and fill level may deviate from the linear characteristics to a greater or lesser extent.

To compensate for these deviations and to enable precise measuring of contents, a reference point table can be drawn up. In this table, a number of selected current output values are allocated to certain pressure values.

At first, define the number of reference points using parameter --9-. The admissible range of values is between 3 and 30. If you enter 0 at this point, the table is deactivated and parameter --10 is locked.

Parameter --10 is used to create the actual reference point table. Linearity correction is made for the entire 4...20 mA output signal, independent of the output current limitation setting.

The first and last line of the table are default, as shown in the example. The other value pairs are linearly interpolated.

The input of the filling level is in % of the set measuring range. Please make sure to enter the values of the table in ascending order, with each output

value (e.g. *I-01*) being followed by the corresponding input value (e.g. *P-01*).

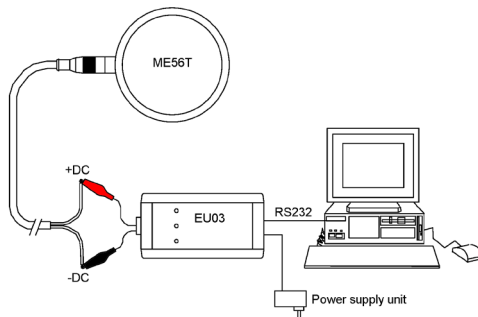
Input errors are indicated display by *Err* on the display.

Example: Table with 11 reference points

Input		Output	
<i>I-01</i>	4.0 mA	<i>P-01</i>	0%
<i>I-02</i>	5.6 mA	<i>P-02</i>	10%
<i>I-03</i>	7.2 mA	<i>P-03</i>	20%
<i>I-04</i>	8.8 mA	<i>P-04</i>	30%
<i>I-05</i>	10.4 mA	<i>P-05</i>	40%
<i>I-06</i>	12.0 mA	<i>P-06</i>	50%
<i>I-07</i>	13.6 mA	<i>P-07</i>	60%
<i>I-08</i>	15.2 mA	<i>P-08</i>	70%
<i>I-09</i>	16.8 mA	<i>P-09</i>	80%
<i>I-10</i>	18.4 mA	<i>P-10</i>	90%
<i>I-11</i>	20.0 mA	<i>P-11</i>	100%

5.3 Remote parameterization

Instead of performing parameterization via keyboard you can also use a PC for remote parameterization. To do so, you require the EU03 transmitter/PC interface that is connected to the 4...20mA signal line.



Begin with connecting the RS-232 cable to the PC. If your PC does not feature an RS-232 interface, please use the RS-232/USB adapter supplied with the device.

Then connect the transmitter using the alligator clips, as shown. The line resistance between transmitter and PC interface must not exceed 100 ohms, because otherwise data transfer is no longer possible.

Therefore, make sure not to use further devices in the current loop.

For power supply, you can either use the supplied mains adapter or connect a standard 9V block battery via adapter cable. Please note that due to the high power consumption you can operate the device only for 1 to 2 hours.

As soon as the EU03 is supplied with electrical power, the green Power LED lights up. The LED's for Transmit and Receive signal that data transmission is in progress. During data transmission, the PC software switches the transmitter on and off.

If you want to check data transmission, please select "Measurement" from the menu "Send/Receive" and check, if the current measuring values are transmitted. You can get further instructions on remote parameterization by calling up the Help file of the PC software.

6 Maintenance

The device is maintenance-free. However, to ensure a reliable and long service life of the device, we recommend regular inspection of the device.

- Checking the output signal.
- Checking the pressure connection lines
- Checking the electrical connection

The exact inspection dates may be adapted to meet the operating and environmental conditions. When different device components are working together, also make sure to observe the operating manual instructions of the other devices, too.

7 Transport

The measuring device shall be protected of mechanical shock. The device may only be transported in the specific transport packaging.

8 Service

All damaged or defective devices shall be directly shipped to our repair department.

9 Accessories

- EU03 Transmitter/PC interface

10 Disposal

For the sake of the environment...



Please help to protect our environment by disposing of used components in accordance with the current directives or by reusing them.

11 Technical Data

Measuring range	40 mbar	60 mbar	100 mbar	160 mbar	250 mbar	400 mbar	600 mbar	1 bar	1,6 bar
Excess pressure protection	Up to a maximum supply pressure (7 bar)								

General

Linearity	± 0.5 % of the measuring range
Hysteresis	< 0,1 % of the measuring range
Admissible ambient temperature	-20°C to +60 °C
Admissible medium temperature	-20°C to +60 °C
Sounding tube pressure connection	Internal thread G 1"
Pressure port for compressed air supply	Internal thread G ¼"
Material for medium-contacted parts	CrNi steel 1.4571 and 1.4305 Chemically nickel-plated brass, ceramics, FPM
Housing material	CrNi steel 1.4571
Protection class	IP 65 as per DIN EN 60529

Electrical Data

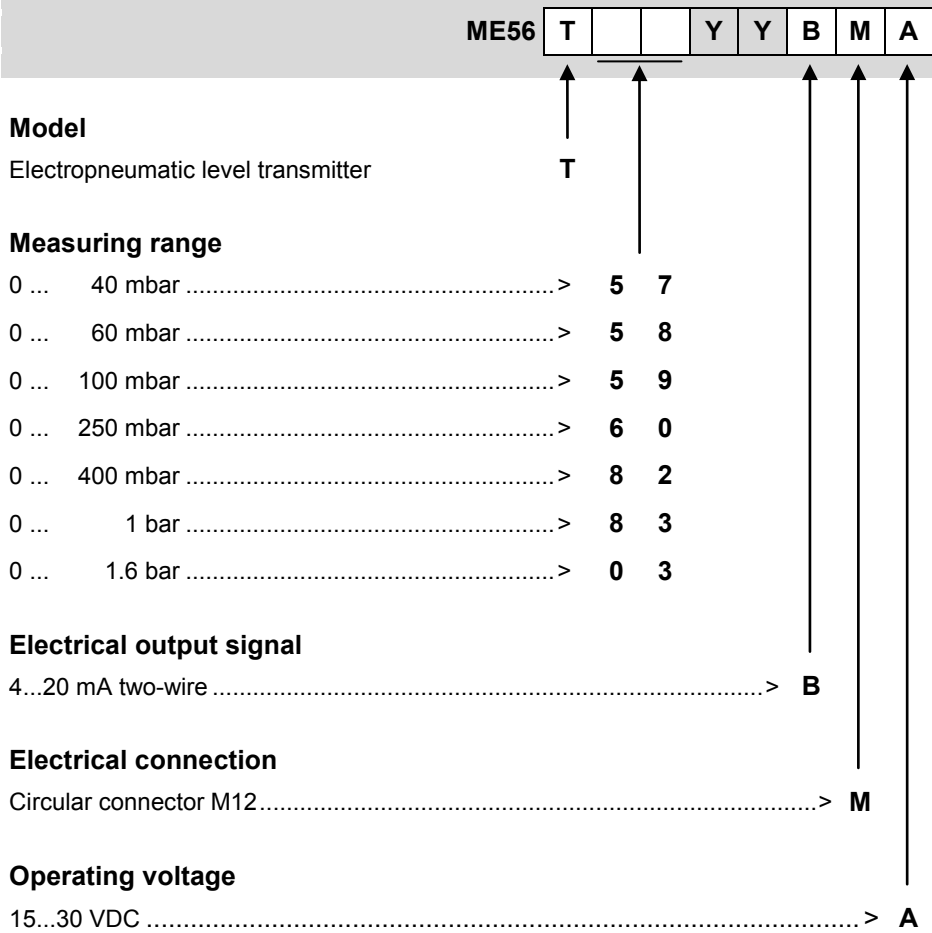
Rated voltage	24 VDC
Operating voltage	15...30 VDC
Output voltage	4...20 mA
Current limitation	3.2...22.5 mA
Burden at rated voltage	≤ 400 Ω
Burden	$R_L [\Omega] \leq (U_B - 15 \text{ V}) / 0.0225 \text{ A}$
Temperature drift at the zero point	0.4 %FS/10 K
Temperature drift in the measuring range	0.05% FS/10 K
Connection	Circular connector M12
Type of connection	Two-wire

Pneumatics

Compressed air supply	2...7 bar
Min. supply pressure	0.5 bar over the measuring range
Air consumption	ca. 30 NI/h
Air quality	pure, dry and oil-free < 5 µm filtered dew point < -25°C

12 Order information

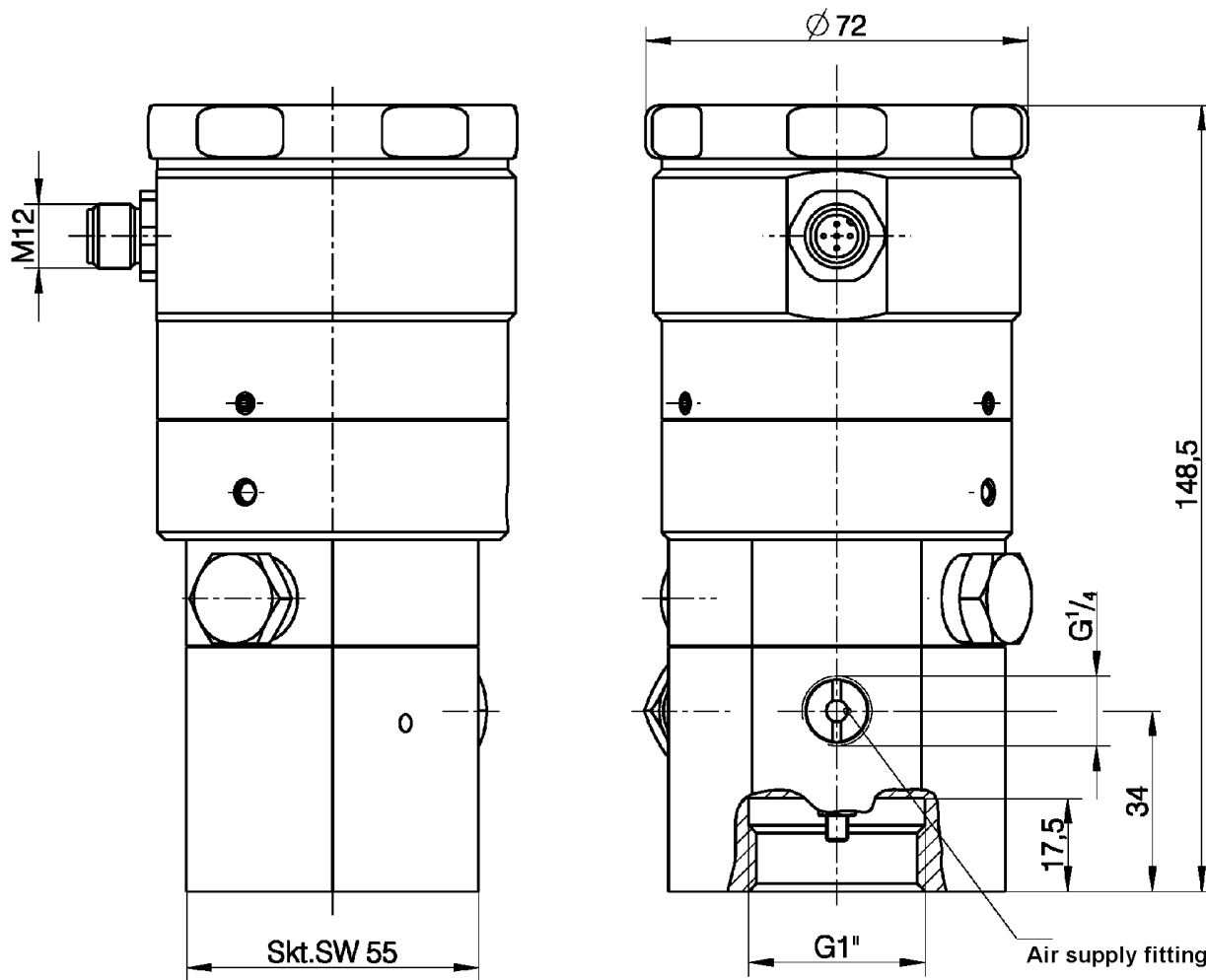
Electropneumatic level transmitter



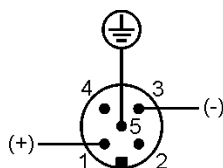
12.1 Accessories

Order number	Description
EU03 F200	Transmitter/PC interface incl. software, RS232 cable, RS-232/USB adapter and PSU incl. adapter cable for 9V block battery

13 Dimensional drawing



13.1 Electrical connection



14 Declaration of Conformity

developing solutions



EG-Konformitätserklärung

Wir erklären in alleiniger Verantwortung, dass nachstehend genannte Produkte

Elektropneumatischer Füllstandstransmitter

EC Declaration of Conformity

We declare under our sole responsibility that the products mentioned below

Electropneumatic Level Transmitter

ME56T #####

gemäß gültigem Datenblatt übereinstimmen mit den

as specified by the current data sheet, complies with

EMV-Richtlinien

2004/108/EG (EMV)

EMC-directives

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 products were tested in compliance with the following standards (Interference immunity for industrial environments, interference 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 devices bear the following marking:



Bad Salzuflen, 20.05.10

(Ort, Datum / place, date)

(rechtsverb. Unterschrift / legally authorized signature)

Technische Änderungen vorbehalten • Subject to change without notice • Changements techniques sous réserve

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