



Thermal
Mass flow meter
for COMPRESSED AIR and GASES

Model **KMT**

Manual
Hardware and Software

We doesn't accept warranty and liability claims neither upon this publication nor in case of improper treatment of the described products.

The document may contain technical inaccuracies and typographical errors. The content will be revised on a regular basis. These changes will be implemented in later versions. The described products can be improved and changed at any time without prior notice.

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USA FCC notice:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the installation manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution:

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this device.

CANADIAN ICES-003 notification:

This Device B digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

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1. GENERAL

This manual is a part of the scope of supply and serves to ensure optimal operation and functioning of the equipment.

For this reason, the manual must be read before start-up.

Therefore, it is necessary that this manual is read and understood by those responsible for the handling, installation, and maintenance of the equipment.

This manual may not be used for competitive purposes or passed on to third parties without the written consent.

It is permitted to make copies for personal use.

All information, technical data and illustrations contained in these instructions are based on information available at the time of publication.

1.1. Symbol Clarification



This symbol indicates safety instructions.

The safety instructions have to be carried out unconditionally. If disregarded loss, injury, or damage may be inflicted to people and property. In any case we cannot be hold responsible.



This symbol indicates attention.

The note should be observed to achieve an optimal functioning of the equipment.

1.2. Safety Instructions

1.2.1. Intended Use

The flow meter is intended to be used for the measurement of air and other non-corrosive gases in pipelines only. Consult the factory first before the measurement of wet or filthy gases.

The design of the flow meter allows for the KMT to be installed in a pressurized system up to PN16 – is 16 bar (230 psi).



For KMT-1, KMT-2 and KMT-3:

Prior to the start of the installation, the system has to be depressurized. Before the installation or removal of the sensing probe or the screw cap, the measurement ball valve should be closed.

Mounting, electrical installation, putting in operation and maintenance should only be done by qualified personnel.

The use of the flow meter in any other way than described in this manual bears a safety risk for people and the entire measurement installation and is therefore not allowed.

The manufacturer cannot be hold responsible for damages as a result of incorrect handling, installation, and maintenance of the equipment.

To avoid health risks or damage to the equipment, the installation should not be operated on with tools, which are not specifically mentioned or described in this manual.

Excessive mechanical stress and inappropriate handling must be avoided.

For KMT-1, KMT-2 and KMT-3:

A short interruption of the flow using the measurement ball valve cannot be avoided when exchanging the sensing probe.

The flow meter can only be utilized in accordance with the conditions defined in the technical data. Otherwise, inaccuracies of the measurement will occur and equipment failures cannot be ruled out.

For the safety of the user and for the functionality of the equipment the recommended steps by the manufacturer to put into operation, to test and to maintain should be taken and completed.

1.2.2. Installation, start up and control

The flow meter is designed and built in accordance with the latest state in technology, tested adequately and has been shipped from the factory in good order and condition.

As the user, you are responsible to comply with all applicable safety regulations amongst others:

- Instruction for the installation
- Local standards and codes

The manufacturer has taken all measures to assure safe operation. The user has to make sure that the equipment is positioned and installed in such a way that safe operation is not impaired. The equipment is tested in the factory and shipped in good order and condition. This manual contains information and notes of caution, which have to be adhered to by the user to assure a safe operation.

- Mounting, electrical installation, putting into operation and maintenance should only be done by qualified personnel. The plant operator should authorize qualified personnel to operate on the installation.
- It is necessary that this manual is read and understood by these professionals and that they follow the instructions as detailed in this manual.
- Check all connections of the entire installation thoroughly, before putting the system into operation.
- Disconnect the device from power supply before opening or closing to avoid damages.
- Do not put a damaged product into operation and make sure that that does not happen inadvertently.
- A malfunction of the equipment should only be handled and fixed by authorized and qualified personnel.
- If it is not possible to repair the malfunction, put the equipment out of operation and make sure that it cannot be put back into operation again.
- Repairs not described in this manual may only be carried out by the manufacturer or by the respective service organization.

Disclaimer of Liability

The manufacturer or their delegated representative is only liable in case of intend or gross negligence. The accountability is limited to the value of the order issued at the time to the manufacturer.

The manufacturer is not liable for damages, originated from disregarding the safety instructions or violating the instructions of the manual or operating conditions.

Consequential damages are excluded from the any liability.

1.3. Environmental aspects



The products are developed and designed in due consideration to the importance of the protection of the environment. Therefore, disposal of the product also should not lead to pollution of the environment.

The single-variety components must be separated before the transmitter is disposed of. The electronic components must be collected and as electronic scrap properly be disposed of.

2. PRODUCT DESCRIPTION

The flow meter of the series KMT, based on the measurement principle of thermal mass flow, is suited for the measurement of flow of air and gases in pipelines. Measurement of for instance the consumption of compressed air, nitrogen, CO₂, oxygen or other non-corrosive and non-flammable gases.

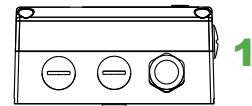
The KMT measures the volume flow at standard conditions according to DIN 1343 (P₀ = 1023.25 mbar; t₀ = 273.15 K or 0 °C (32 °F)). In addition to the standard volume flow, the measurand mass flow, norm flow and temperature are available.

The KMT has an integrated consumption counter. The consumption quantity is indicated in the display and is not lost after a power failure. Two signal outputs are available. Depending on the application, the outputs can be configured as analogue (current or voltage), switch output or as pulse output for the measurement of the consumption.

1 Signal conditioning with optional display

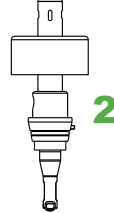
The enclosure with the signal conditioning is mounted either on the measurement probe (model 1 or 2 compact) or is remote with a plug-gable sensor cable up to 10 meter (33 feet) – (model 3 with remote probe).

KMT-1, KMT-2 and KMT-3



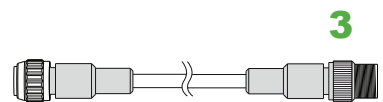
2 Sensing probe with measurement electronics

The interchangeable sensing probe contains the sensor element and the measurement electronics, in which the data of the factory calibration is stored. The sensing probe is easy and quickly interchangeable in the field, independent of the electronics for the signal conditioning. After the exchange, the configuration of the outputs is unchanged.



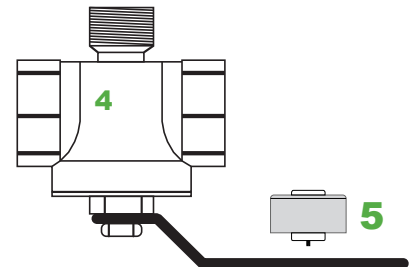
3 Sensor cable (only by model 3 with remote sensing probe)

The sensor cable allows for the remote installation, up to 10 meter (33 feet), of the sensing probe from the housing with the signal conditioning.



4 Measurement ball valve

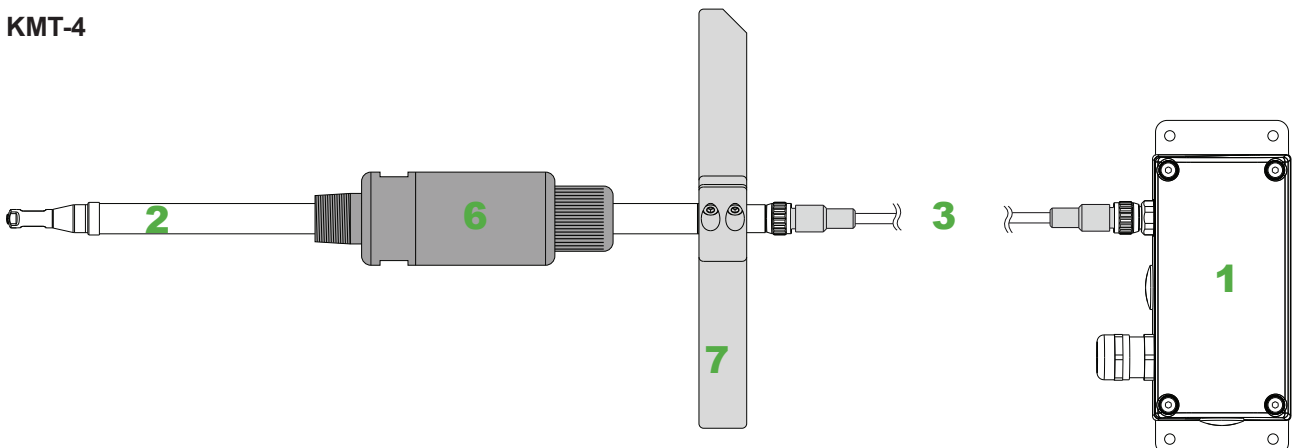
The measurement ball valve allows for the easy and reliable installation within the pipeline. During installation in the pipeline, observe the required inlet and outlet paths (see page 10). The nominal size of the measurement ball valve must match the nominal size of the pipe. The measurement valve with shut-off function allows for the instalment and removal of the sensing probe with only interrupting the process flow for a short moment. The measurement ball valve is suitable for pressures up to 16 bar (PN16) and available for pipe diameters DN15 (1/2") to DN50 (2").



5 Screw cap

The screw cap, with female thread, is screwed in place if the flow meter is not installed and the pipeline has to be used.

KMT-4



6 Non-return protection for secure mounting

The patented non-return protection combines three functions in one device:

- **Non-return protection**
The sensor can only be pushed in one direction during installation. The sensor cannot return at all, even if it is released.
- **Seal**
By means of an encapsulated O-ring, no compressed air can escape under pressure during assembly.
- **Precise positioning**
The precise positioning with respect to immersion depth and orientation is easy to perform, guaranteeing accurate measurement results.

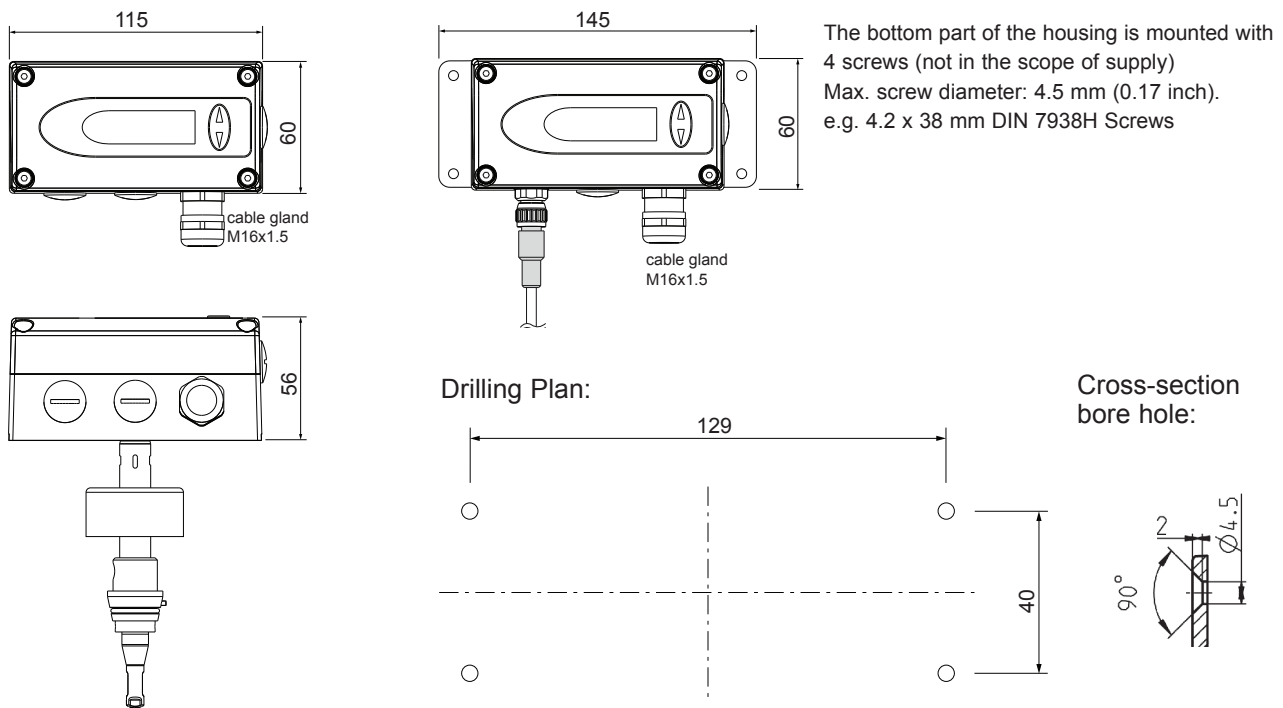
7 Mounting grip

With the mounting grip, the sensing probe is inserted and correctly positioned into the pipe line.

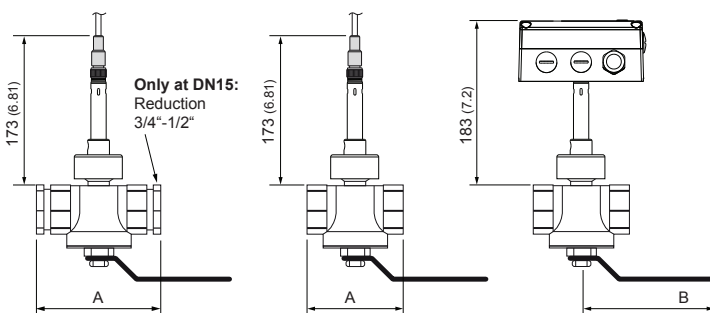
3. INSTALLATION

3.1. Mounting dimensions

3.1.1. KMT-1, KMT-2 and KMT-3



Measurement ball valve

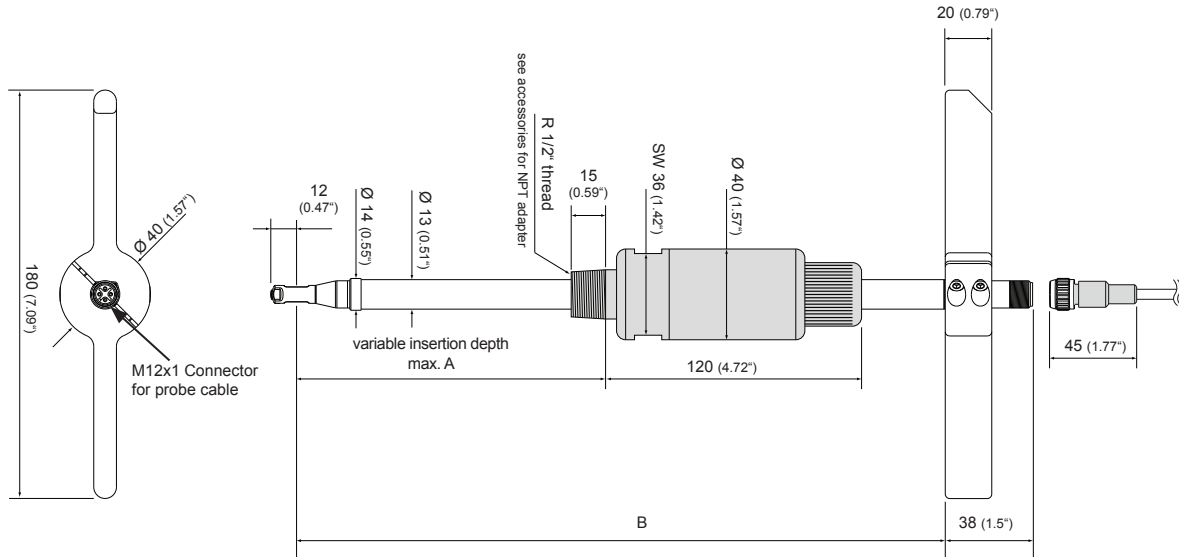


Measurement ball valve	Thread	A	B
DN15	R _p 1/2"	100±8 (3.94±0.32)	92 (3.62)
DN20	R _p or NPT 3/4"	72 (2.83)	92 (3.62)
DN25	R _p or NPT 1"	83 (3.27)	124 (4.88)
DN32	R _p 1 1/4"	100 (3.94)	124 (4.88)
DN40	R _p or NPT 1 1/2"	110 (4.33)	147 (5.79)
DN50	R _p or NPT 2"	131 (5.16)	147 (5.79)

dimensions in mm (inch)

Female thread: BSP thread acc. EN 10226 (old DIN 2999) or NPT

3.1.2. KMT-4



Pipe Ø	A [mm]	B [mm]	A [inch]	B [inch]
DN50...DN100	165	285	6.5	11.22
DN125...DN300	315	435	12.4	17.13
DN350...DN700	465	585	18.3	23.03

3.2. Determining installation site

- The installation site should be easy accessible and free of vibrations and shocks
- Observe enough clearance above the mounting position, in order to be able to install and remove the sensing probe:
at least **120 mm (4.72)** for KMT-1, KMT-2 and KMT-3
at least **450 mm (17.7")** for KMT-4 probe length 165 mm (6.5") DN65 (2 1/2") up to DN100 (4")
at least **600 mm (23.6")** for KMT-4 probe length 315 mm (12.4") DN125 (5") up to DN300 (12")
at least **750 mm (30.0")** for KMT-4 probe length 465 mm (18.3") DN305 (14") up to DN700 (28")
- The ambient temperature should not exceed the value as stated in the specifications (see page 22) – consider heating by radiation.
- The fluid should not condense at the installation site. Condensation on the tip of the sensing probe must be avoided.
- In compressed air systems, the installation should be downstream of the dryer.
- Observe the direction of the flow by the installation (see page 11).
- Observe the required straight pipe lengths up and downstream, in order to warrant the specified measurement accuracy.
- The flow meter should be installed as far as possible from any flow disturbance. Valves or check-valves should be installed in a respective distance from the flow meter.

3.2.1. Process pressure

Because of the measuring principle the thermal mass flow meter KMT is largely independent of the process pressure and is factory calibrated at a pressure of 7 bar (100 psi) (KMT-1, KMT-2 and KMT-3) or 9 bar (130.5 psi) (KMT-4).

In order to achieve the highest measurement accuracy, the slight dependence on process pressure can be compensated for in two ways:

- if the process pressure is stable, by programming the pressure value in the configuration software (see page 35).
- in case of strong fluctuations of the process pressure (e.g. 3 to 10 bar (40 to 150 psi)) an external pressure transmitter can be installed and connected to the pressure-compensation input (see page 35).

3.3. Installation position

Make sure that the arrow on the tip of the sensing probe is pointing in the direction of the flow.

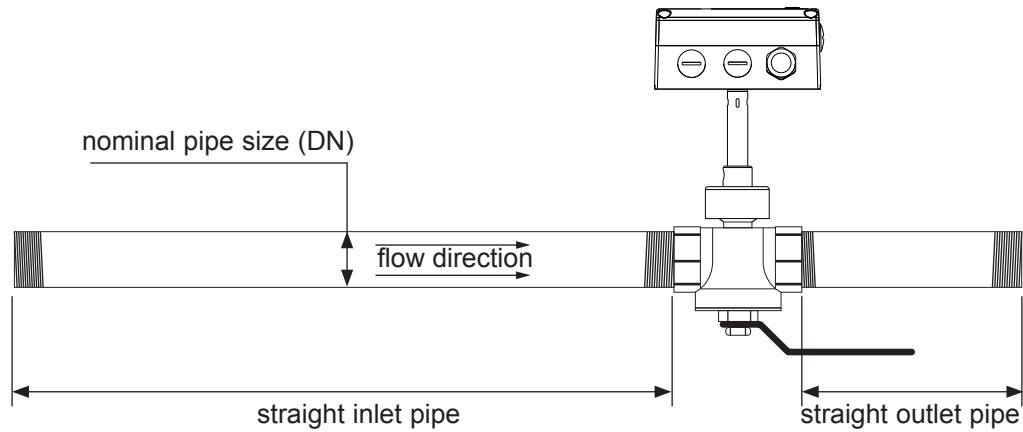
		Model	
		Compact	Remote
Vertical Mounting			
		+	++
Horizontal Mounting, sensor upwards			
		++	++
Horizontal Mounting, sensor downwards			
		-	-
Horizontal Mounting, sensor across			
		+	++



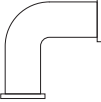
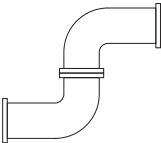
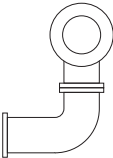
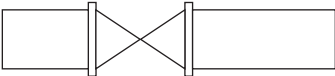
- ++ ... recommended installation position
- + not recommended if there is vibration on the pipeline
- not recommended

3.4. Required length of straight pipe

The flow meter should be installed as far as possible from disturbances of the flow. The causes for disturbance of the flow are for instance, reducers, elbows, T-pieces, valves, gate valves, etc. The specified measurement accuracy can be achieved only when the following straight inlet and outlet pipe lengths are installed:

- The stated values are as a minimum. If possible, allow for greater distances.
- Valves or gate valves should be installed downstream of the flow meter.
- With lighter gases the inlet straight pipe should be longer.
- Only for KMT-1, KMT-2 and KMT-3: The wall thickness of the inlet and outlet pipe should be 2,6 mm



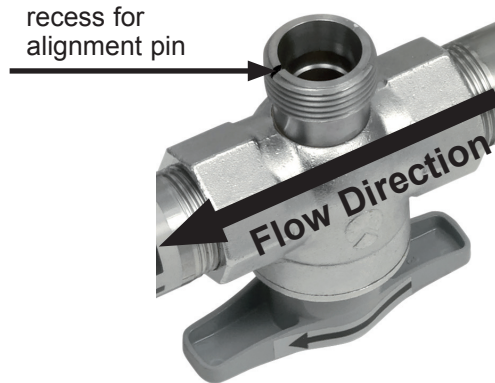
	Type	(DN = Nominal Pipe Size)	
		Straight inlet pipe	Straight outlet pipe
	Extension	15 x DN	5 x DN
	Reduction	15 x DN	5 x DN
	90° - elbow	20 x DN	5 x DN
	Two 90° - elbows, in one level	25 x DN	5 x DN
	Two 90° - elbows, in two levels	30 x DN	5 x DN
	Valve, gate valve	50 x DN	5 x DN

3.5. Installation KMT-1, KMT-2 and KMT-3

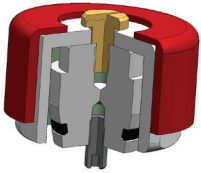


3.5.1. Measurement ball valve

- all connections to be made with appropriated sealing material on the threads.
- the sealing material should not change the area of the inner cross section of the pipe. It must be warranted that the connections after installation are free of leaks.
- All fittings must be tested on seal tightness.
- Observe the required length of inlet and outlet pipe section.
- The recess for the alignment pin must be at the side of the outlet.



3.5.2. Assembly without flow meter, but with screw cap instead (blind cap)



In order to use the measurement section without the flow meter, the blind screw cap (in the scope of supply) must be screwed tight onto the opening of the measurement ball valve. If not needed the screw cap can be screwed and stored on the handle of the measurement valve with shut-off function.

3.5.3. Shut off the measurement ball valve

The measurement ball valve allows for the installation and removal of the flow meter within seconds, with only a very short interruption of the flow.



OPEN



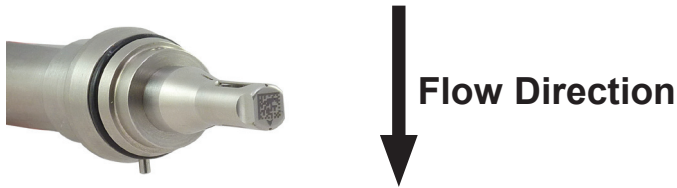
CLOSED



Never remove the flow meter or the blind screw cap while the measurement ball valve is open. That is extremely dangerous!

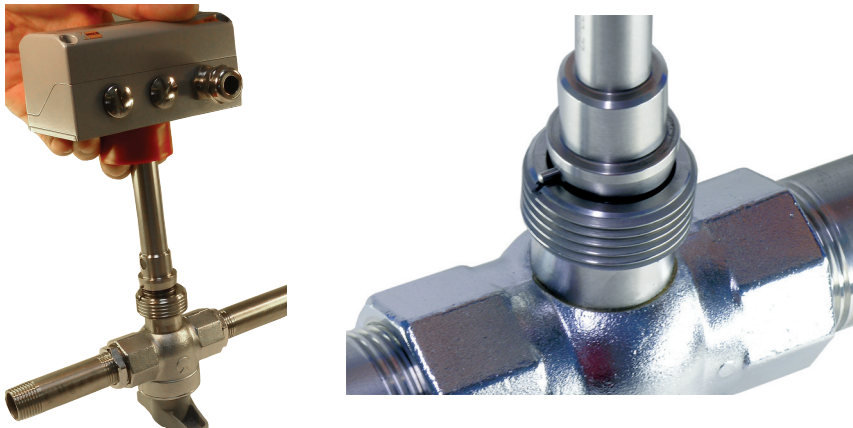
3.5.4. Installation of the flow meter sensing probe

The flow direction is indicated with an arrow on the tip of the probe. Due to the alignment pin in the installation of the sensing probe in the measurement ball valve only possible in the direction of the flow. After a removal, the sensing probe will be re-installed in the measurement section in exactly the same position as done at the factory. Hence, the highest reproducibility is guaranteed.

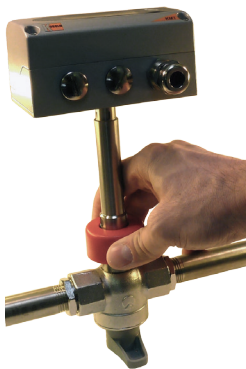


Make sure that the measurement ball valve is shut off.

- Remove transport protection cap of the head of the sensing probe.
- Mount the sensing probe in the measurement valve with shut-off function in such a way that the alignment pin fits in the recess on the measurement ball valve.



- Screw the retainer nut by hand so far that a certain resistance is noticeable.
- Check the correct installation position of the flow meter. The alignment pin must fit in the recess on the measurement ball valve.
- Tighten the red coloured retainer nut by hand. Tightening by hand should be sufficient. However, if the seal is not leak tight carefully tighten the nut with an appropriate tool a bit further.
- The mechanical installation of the flowmeter is therewith completed.



3.5.5. Removal of the sensing probe of the flowmeter

- Shut off the measurement ball valve (see page 11).
- Turn off the power supply, remove the cover and disconnect the power wires on the screw terminal.
- Loose the retainer nut and pull the sensor probe from the measurement section.
- Operation without the flowmeter installed page 11.



**Never remove the flow meter while the measurement ball valve is open.
That is extremely dangerous!**

3.6. Installation KMT-4 in the pipe line

The patented non-return protection device for reliable installation combines three functions in one unit:

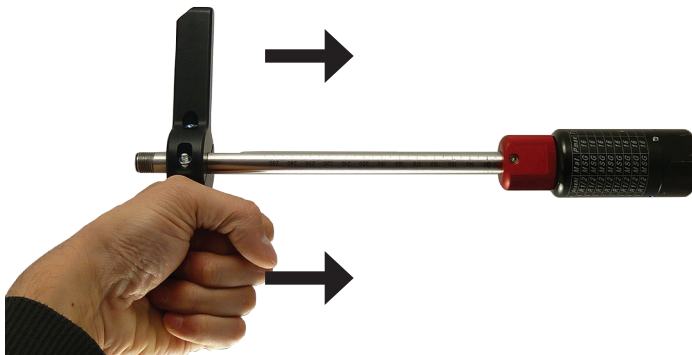
- **Non-return protection device**
The sensor can only be pushed in one direction during installation. The sensor will not move back at all, even when it is released.
- **Seal**
Thanks to an encapsulated O-ring, no compressed air can escape under pressure during assembly.
- **Precise positioning**
The precise positioning with respect to immersion depth and orientation is easy to perform, guaranteeing accurate measurement results.

An example installation is described below using the weld-on nipple in combination with the 1/2" ball valve. The same basic principles apply to installation with the tapping sleeve.

- Pull the measurement sensor back into the non-return protection device as far as it will go.
- Screw the non-return protection device into the ball valve using suitable sealants for a fully sealed connection.
- Screw knurled nut in by approx. one thread turn.

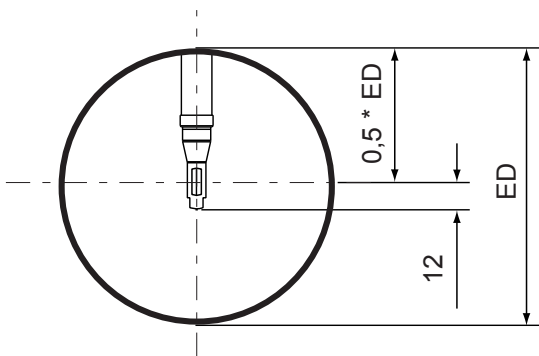


- Open the ball valve and dip the measurement sensor into the pipe line.

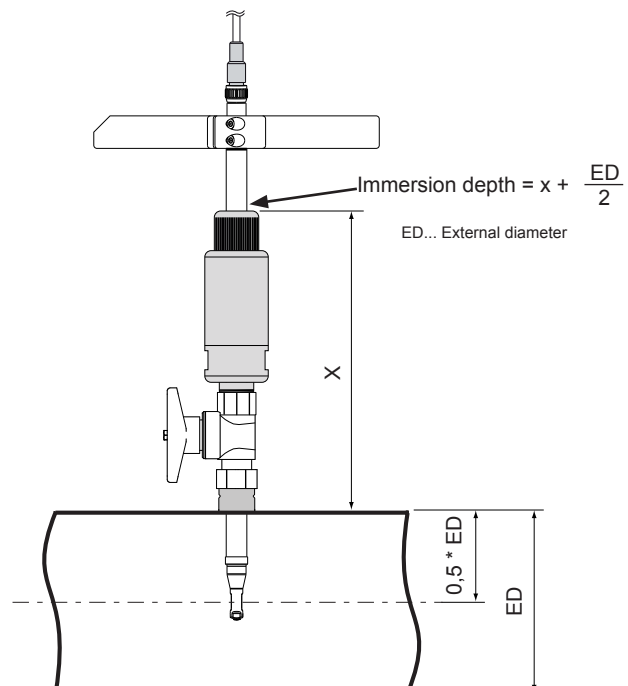


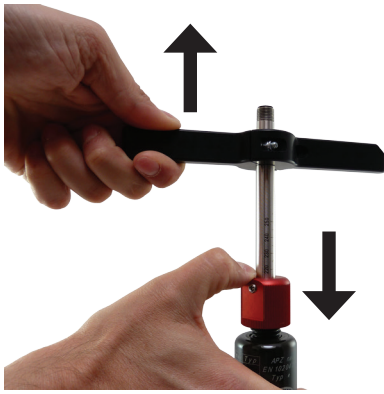
• Positioning in the pipe line

To ensure that the accuracy level specified on the data sheet is observed, the sensor head must be positioned in the centre of the pipe. The scale on the sensor pipe for the immersion depth relates to the centre of the sensor head.



Correct position in the pipe line

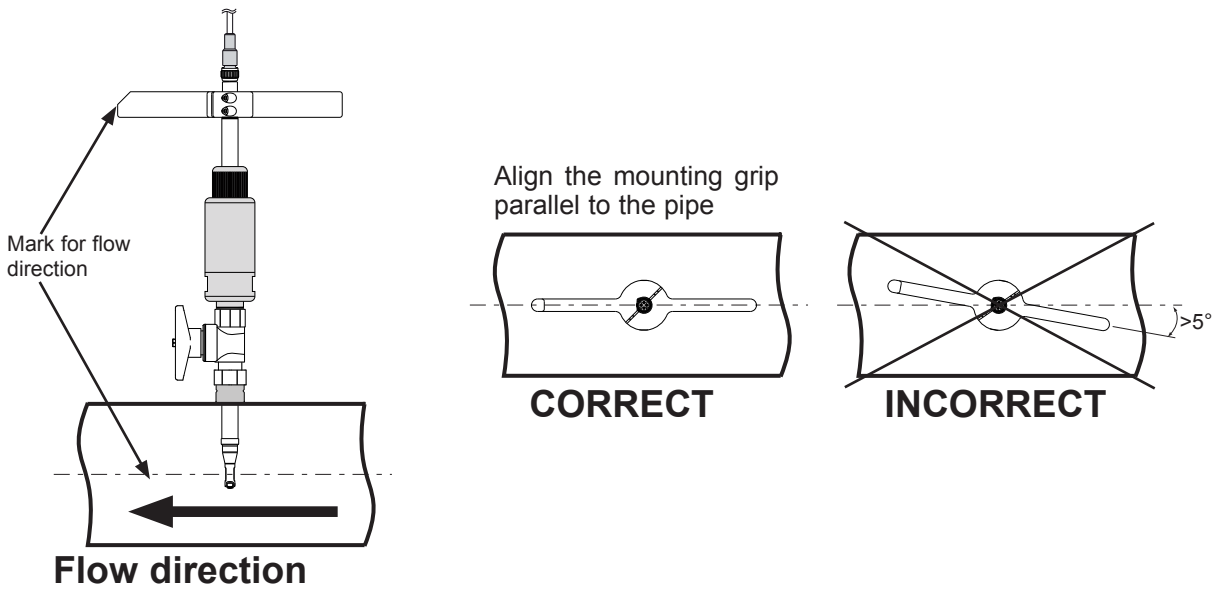




- If the measurement sensor is immersed too far into the pipe line, it can be retracted by unlocking the non-return protection device. To do this, slowly press the knurled nut inwards. As with a pressure point in a car clutch, this permits the immersion depth to be set to the precise millimetre.

- **Align the measurement sensor with the flow direction.**

The flowmeter has a set flow direction. Ensure that the direction arrow on the sensor head or the mark on the mounting handle is pointing in the media flow direction. The measurement sensor is aligned with precision in the flow direction using the mounting handle. An angle deviation must not be greater than $\pm 5^\circ$ from the ideal position.



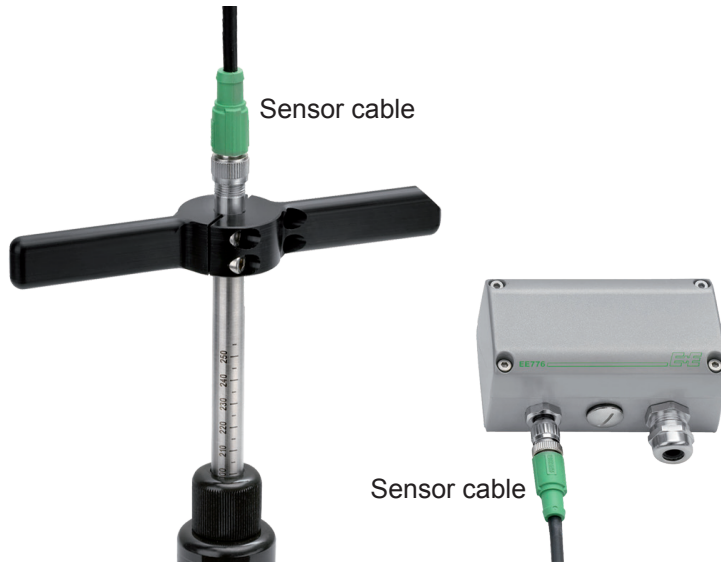
- When the measurement sensor is correctly positioned in terms of immersion depth and alignment, tighten the knurled nut with a screw-wrench (AF 27).



- To prevent inadvertent twisting of the probe in use, tighten the grub screw.



- Connect the measurement sensor and the evaluation unit to the sensor cable.




3.7. Setting the pipe diameter

The flowmeter is factory-set so that the average corrected flow speed is measured in the pipe. The standardized volumetric flow is calculated by the flowmeter as follows:

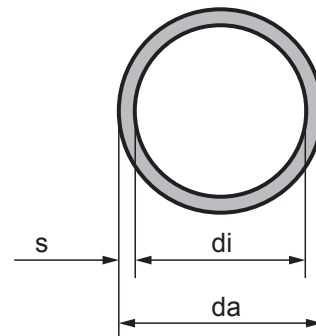
$$\dot{V}_0 = v_0 \cdot id^2 \cdot \pi / 4 \cdot 3600$$

\dot{V}_0 ... Standardized volumetric flow [m³/h]
 v_0 ... Standardized flow [m/s]
 id ... Internal diameter of pipe [m]
 π ... 3,1415

 The internal diameter is factory-set to the value acc. table 1. Because the inner diameter of a pipe is not standardized and varies depending on wall thickness, the actual inner diameter of the pipe must be set with the Configurator Software! (see page 35)

Nominal diameter		External diameter	wall thickness	internal diameter
<i>DN</i>	<i>Inch</i>	<i>da (mm/inch)</i>	<i>s (mm/inch)</i>	<i>di (mm/inch)</i>
50	2"	60.3 / 2.37	2.9 / 0.11	54.5 / 2.15
65	2 1/2"	76.1 / 3.0	2.9 / 0.11	70.3 / 2.77
80	3"	88.9 / 3.5	3.2 / 0.13	82.5 / 3.25
100	4"	114.3 / 4.5	3.6 / 0.14	107.1 / 4.22
125	5"	139.7 / 5.5	4.0 / 0.16	131.7 / 5.19
150	6"	168.3 / 6.63	4.5 / 0.18	159.3 / 6.27
200	8"	219.1 / 8.63	6.3 / 0.25	206.5 / 8.13
250	10"	273.0 / 10.75	6.3 / 0.25	260.4 / 10.25
300	12"	323.9 / 12.75	7.1 / 0.28	309.7 / 12.19
350	14"	355,6 / 14.00	8 / 0.31	339,6 / 13.37
400	16"	406,4 / 16.00	8,8 / 0.35	388,8 / 15.31
500	20"	508 / 20.00	11 / 0.43	486 / 19.13
600	24"	610 / 24.00	12,5 / 0.49	585 / 23.03
700	28"	711 / 28.00	14,2 / 0.56	682.6 / 26.87

Table 1: Factory setting for pipe diameter



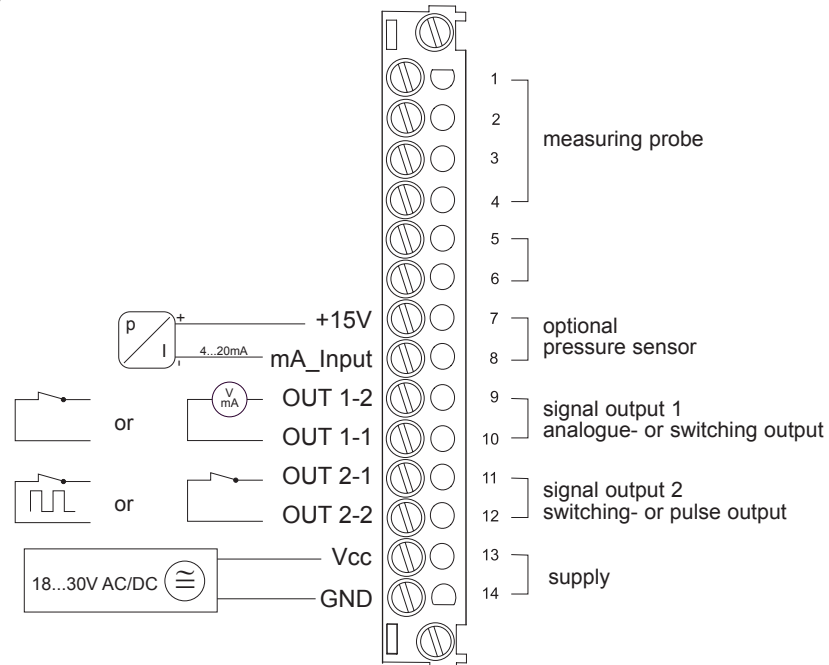
4. ELECTRICAL CONNECTIONS

Before electrical connections are made turn off the power supply first. If not observed the electronics can be damaged as a result.

Only a qualified electrotechnical engineer may install the device.

- Unscrew the four screws and remove the cover of the housing.
- The screw terminals are located in the bottom part of the housing.
- For the electrical connection of the flowmeter a six-wire cable is needed (e.g. 6 x 1 mm² (AWG 17))

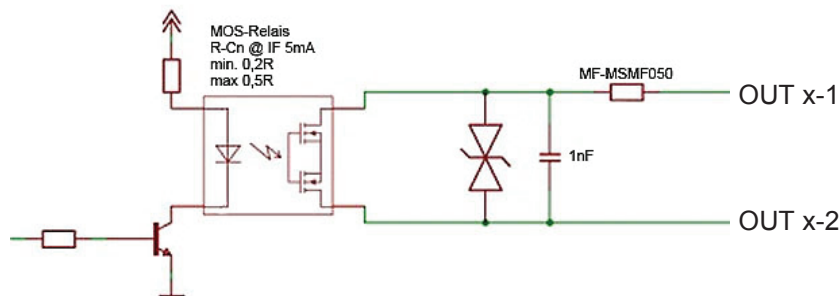
4.1. Connection diagram



- Screw terminal OUT 1 -1 for the analogue output is internally connected with GND.
- The housing should be grounded to achieve optimal electromagnetic compliance.

4.1.1. Relay and pulse output, internal switching

The relay switch and pulse outputs are both potential free.

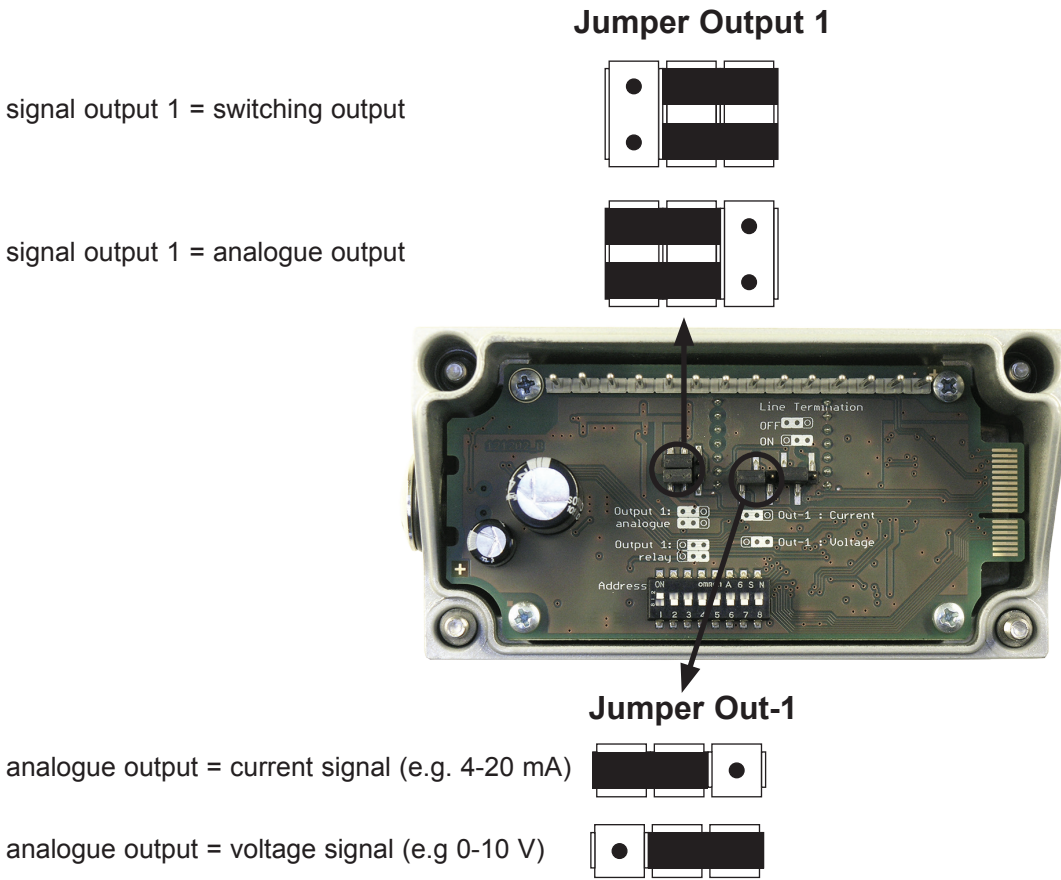


5. CONTROL COMPONENTS

5.1. Jumper for Output

If the signal output is altered from relay to analogue output or vice versa, Jumper **Output 1** has to be relocated.

If the analogue output is altered from a current to a voltage output or vice versa, Jumper **Out-1** has to be relocated.



5.2. Digital interface USB (for configuration)

The USB connector is behind the blind screw cap, at the side of the housing.

- remove the blind screw cap with a screwdriver
- plug in the USB connector

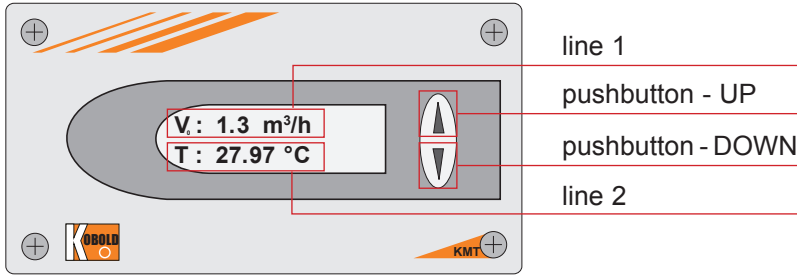


Install the configuration software, which is in the scope of supply.

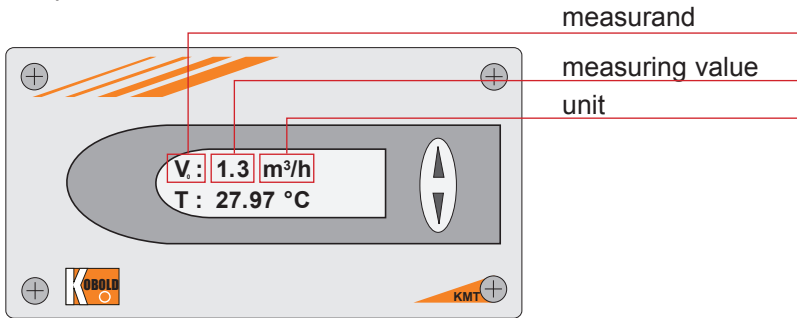


5.3. Display / Indicator with keypad (optional)

An optional two-line display is available for the flowmeter KMT. The display is an integral part of the cover of the housing and has two soft-keys for the control of the indicator.



Depending on the configuration of the outputs either the measured values, the status of the relay or the consumption is indicated.



Measurand		SI Unit	US Unit
v_0	Standardized Flow	m/s	SFPM
T	Temperature	°C	°F
\dot{V}_0	Standardized Volumetric Flow	m ³ /h; m ³ /min; l/min	SCFM; SLPM
\dot{m}	Massflow	kg/h; kg/min; kg/s	kg/h; kg/min; kg/s
Q	Consumption	m ³	ft ³
p	Pressure	bar	psi

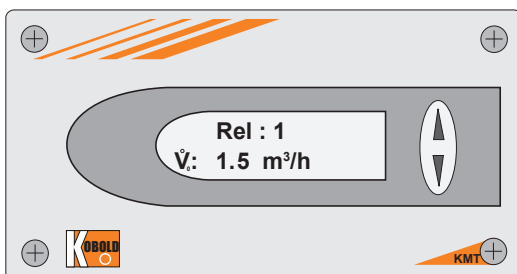
5.3.1. Indication of the analogue and pulse output

Line 1 indicates always the configured measurand at output 1. In line 2 the desired measurement value can be indicated using the UP and DOWN keys.

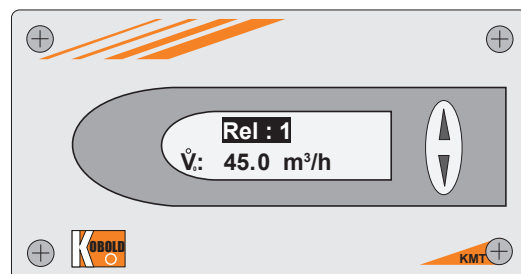
5.3.2. Indication of the switch output

Line 1 indicates the status of the switch output. In line 2 the desired measurement value can be indicated using the UP and DOWN keys.

The display shows an inverse image if the relay output is active (relay has switched).



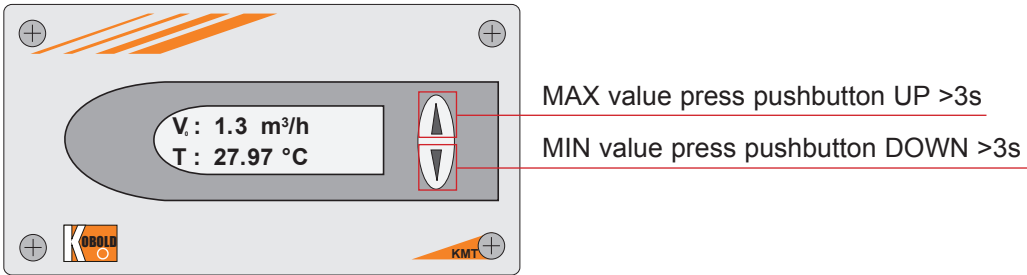
Switch output inactive (relay has not switched)



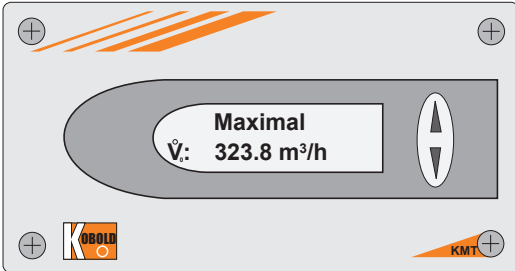
Switch output active (relay has switched)

5.3.3. Indication of the MIN / MAX values

Keep the DOWN key pressed for > 3 sec to indicate the MIN value.
Keep the UP key pressed for > 3 sec to indicate the MAX value.

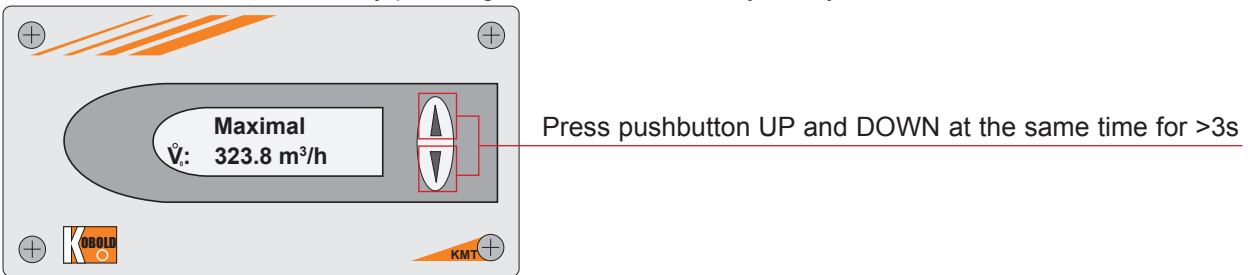


After that the several different measurement values can be indicated using the UP or DOWN keys.
Keep the DOWN or UP key pressed for > 3 sec to exit the MIN / MAX mode.

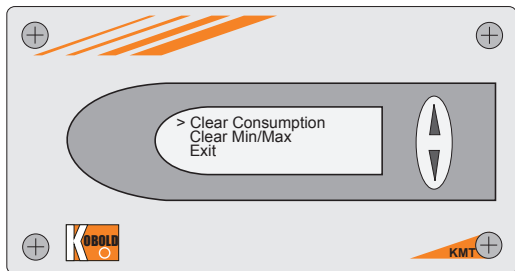


5.3.4. Reset of the consumption counter or the MIN / MAX value

Keep both the UP and DOWN key pressed for > 3 sec to enter the menu for resetting the consumption counter or the MIN / MAX value.
Select the desired menu item by pressing the UP or DOWN key briefly.



To confirm the selected choice of the menu keep the DOWN or UP key pressed for > 3 sec.
Select menu item "NO" or "EXIT" to cancel without resetting.



5.3.5. Maximum consumption counter

The maximum consumption counter readout on the display is 999,999,999.0 m³ or 99,999,999.0 ft³. Then it shows "LCD maximum". The internal memory continues counting. The maximum counter reading is 3.4 * 10³⁸ m³. It is possible to read-out the counter reading with the configuration software.

6. ERROR MESSAGES

In case the flowmeter is equipped with the optional display, the following error message can be indicated.

ERROR 01: sensing probe is not detected

- Cause: the sensing probe is not connect or is defect
 Effect: the display indicates "0" for all measurand. The analogue output defaults to the lowest configured value.
 Action: check the head of the sensing probe for visual damage.
 check the sensor cable from the sensing probe to the electronics of the signal conditioning.

ERROR 02: the EEPROM is defect

- Cause: the EEPROM for the storing of the consumption counter and MIN /MAX value is defect.
 Effect: the consumption counter and MIN / MAX values are no longer available. All measurement values though are still indicated. The analogue, relay and pulse output are still functional.
 Action: return the flowmeter to the manufacturer.

7. MAINTENANCE

Regular cleaning of the sensor is necessary is used in applications with wet or filthy gases. Cleaning of the sensor is necessary prior to calibration or evaluation.

7.1. Cleaning of the sensor of the flowmeter

Do not use an abrasive cleaning agent, an organic solvent containing halogen or acetone.

- i**
- Clean the head of the sensor probe by carefully swirling in warm water or isopropyl alcohol. It is recommended to use isopropyl alcohol if the pollution is crease or oil.

The sensor should not be touch by fingers or solid objects like screwdrivers or brushes!

- i**
- Leave the sensor to dry in ambient air.

8. REPLACEMENT PARTS / ACCESSORIES

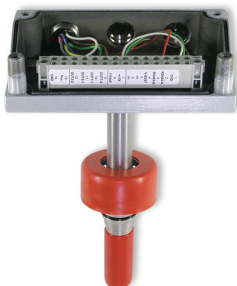
8.1. Order Code Replacement Sensor

Model	Design	Measuring range	Measuring section pipe diameter	Mounting
ERS-KMT-S	1 = Sensor compact (direction of flow right to left)	1 = low 2 = high	4 = DN15 5 = DN20 6 = DN25 7 = DN32 8 = DN40 9 = DN50	K = for ball valve
	2 = Sensor compact (direction of flow left to right)		C = DN65...DN100 H = DN125...DN300	F = R1/2" male at immersion probe
	3 = remote probe KMT-3 (≤DN50)			
	4 = remote probe KMT-4 (DN65...DN300)			

Order Example

ERS-KMT-S-116K

Type: Compact ri-le
 Working range: 0,90...176 m³/h for pipe DN 25 (1")



Order Example

ERS-KMT-S-316K

Type: remote probe
 Working range: 0,90...176 m³/h for pipe DN 25 (1")

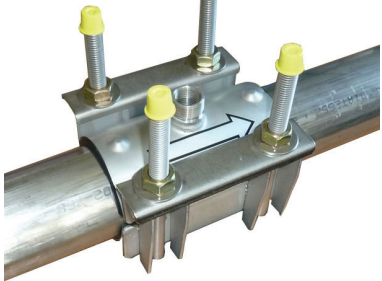
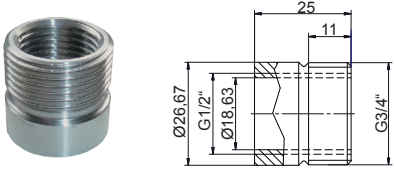
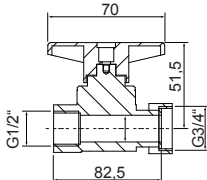
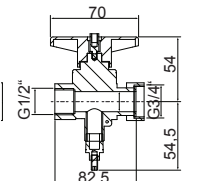
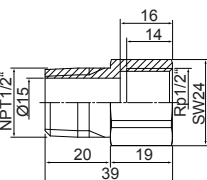


8.2. Order Code Replacement sensor cable

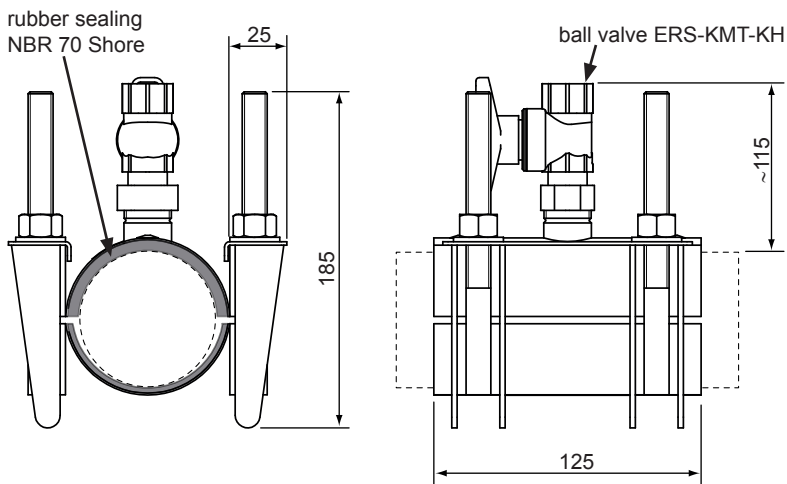
only for KMT-3 and KMT-4 (Example: **ERS-KMT-K 2**)

Model	Cable length
ERS-KMT-K	2 = 2 m with plug M12, 4-pin
	5 = 5 m with plug M12, 4-pin
	Z = 10 m with plug M12, 4-pin

8.3. Order Code Accessories for KMT-4

Model	Description	Picture / Drawing
ERS-KMT-AS65 ERS-KMT-AS80 ERS-KMT-AS1H ERS-KMT-AS1Z ERS-KMT-AS1F ERS-KMT-AS2H ERS-KMT-AS2F ERS-KMT-AS3H	tapping sleeve DN65 tapping sleeve DN80 tapping sleeve DN100 tapping sleeve DN125 tapping sleeve DN150 tapping sleeve DN200 tapping sleeve DN250 tapping sleeve DN300	
ERS-KMT-AN	welding nipple (stainless steel 1.4301) to be weld at the pipe	
ERS-KMT-KH	ball valve R $\frac{1}{2}$ " (brass) mounting and demounting under pressure without process interruption	
ERS-KMT-KP	ball valve $\frac{1}{2}$ " (brass) for parallel measurement of pressure or dew point	
ERS-KMT-AR15	adapter Rp $\frac{1}{2}$ " (brass) female to $\frac{1}{2}$ " NPT male for process connection	

Dimensions tapping sleeve (delivery without ball valve)



Material: stainless steel 1.4301

9. TECHNICAL DATA KMT-1, KMT-2 and KMT-3

Measuring value

Flow

Measurand

Volumetric flow at standard conditions acc. DIN 1343

$P_0 = 1013.25 \text{ mbar}$; $t_0 = 0 \text{ °C}$ (273.15 K)

Measuring range	KMT-x1xx		KMT-x2xx		
standardized volumetric flow in air	DN15:	0.32...63 Nm ³ /h	0.19...37.1 SCFM	0.32...126 Nm ³ /h	0.19...74.1 SCFM
	DN20:	0.57...113 Nm ³ /h	0.34...66.5 SCFM	0.57...226 Nm ³ /h	0.34...133 SCFM
	DN25:	0.90...176 Nm ³ /h	0.53...103.5 SCFM	0.90...352 Nm ³ /h	0.53...207.1 SCFM
	DN32:	1.45...289 Nm ³ /h	0.85...170.0 SCFM	1.45...578 Nm ³ /h	0.85...340 SCFM
	DN40:	2.26...452 Nm ³ /h	1.33...265.9 SCFM	2.26...904 Nm ³ /h	1.33...531.8 SCFM
	DN50:	3.50...700 Nm ³ /h	2.06...411.8 SCFM	3.50...1400 Nm ³ /h	2.06...823.6 SCFM
standardized flow in air, nitrogen, argon, CO ₂ , oxygen	≤DN50:	0.5...100 Nm/s	100...19685 SFPM	0.5...200 Nm/s	100...39370 SFPM
	≤DN25:	0.5...100 Nm/s	100...19685 SFPM	0.5...200 Nm/s	100...39370 SFPM
Accuracy in air at 7 bar (abs.) and 23 °C (73 °F) ¹⁾	± (1.5% of measuring value + 0.5% of full scale)				
Accuracy of temperature compensation	± (0.1% of measuring value/°C)				
Response time t_{90}	typ. 1 sec.				
Sample rate	0.5 sec.				
Temperature					
Measuring range	-20...80 °C (-4...176 °F)				
Accuracy at 20 °C (68 °F)	± 0.7 °C (1.26 °F)				

Outputs


Output signal and display ranges are freely scalable

Analogue output	voltage	0 - 10 V	max. 1 mA
	current (3-wire)	0 - 20 mA and 4 - 20 mA	$R_L < 500 \text{ Ohm}$
Switching output	potential-free max. 44 VDC, 500 mA switching capacity		
Pulse output	Totalizator, pulse length: 0.02...2 sec.		
Digital interface	USB (for configuration)		

Input

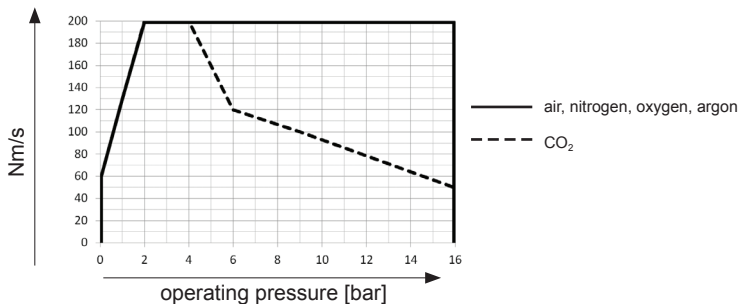
Optional pressure compensation	4 - 20 mA (2-wire; 15 V) for pressure sensor
--------------------------------	--

General

Supply voltage	18 - 30 V AC/DC	
Current consumption	max. 200 mA (with display)	
Temperature range	ambient temperature:	-20...60 °C (-4...140 °F)
	medium temperature:	-20...80 °C (-4...176 °F)
	storage temperature:	-20...60 °C (-4...140 °F)
Nominal pressure	up to 16 bar (232 Psi)	
Humidity	no condensation	
Medium	compressed air or none corrosive gases	
Connection	cable gland M16x1.5 (optional connector M12x1 8pol.)	
Electromagnetic compatibility	EN61326-1	EN61326-2-3
	Industrial Environment 	
Material	housing	metal (AlSi3Cu)
	probe	stainless steel
	sensor head	stainless steel / glass
	measurement ball valve	brass
Housing protection class	IP65 / Nema 4	

1) The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor $k=2$ (2-times standard deviation). The accuracy was calculated in accordance with EA-4/02 and with regard to GUM (Guide to the Expression of Uncertainty in Measurement).

Flow measuring range in dependence on operating pressure



Formula for calculating the standardized volumetric flow:

$$Q_N = V_N * id^2 * \pi/4 * 3600$$

Q_N ... standardized volumetric flow [m³/h]

V_N ... standardized flow [m/s]

id ... inner pipe diameter [m]

π ... 3.1415

Factory setting of outputs KMT-1, KMT-2 and KMT-3

SI-Unit

Analogue output [0...10 V / 0(4)...20 mA]		from	to		unit
			KMT-x1...	KMT-x2...	
standardized volumetric flow	DN15:	0	60	120	Nm ³ /h
	DN20:	0	110	220	Nm ³ /h
	DN25:	0	175	350	Nm ³ /h
	DN32:	0	285	570	Nm ³ /h
	DN40:	0	450	900	Nm ³ /h
	DN50:	0	700	1400	Nm ³ /h
mass flow	DN15:	0	75	150	kg/h
	DN20:	0	140	280	kg/h
	DN25:	0	220	440	kg/h
	DN32:	0	360	720	kg/h
	DN40:	0	570	1140	kg/h
	DN50:	0	890	1780	kg/h
standardized flow	≤DN50	0	100	200	Nm/s
temperature	all ø	-20	80	80	°C
Switching output		[switching point/hysteresis]			
standardized volumetric flow	DN15		50/5	100/10	Nm ³ /h
	DN20		90/9	180/18	Nm ³ /h
	DN25:		150/15	300/30	Nm ³ /h
	DN32:		230/23	460/46	Nm ³ /h
	DN40:		360/36	720/72	Nm ³ /h
	DN50:		560/56	1120/112	Nm ³ /h
mass flow	DN15:		60/6	120/12	kg/h
	DN20:		110/11	220/22	kg/h
	DN25:		200/20	400/40	kg/h
	DN32:		290/29	580/58	kg/h
	DN40:		460/46	920/92	kg/h
	DN50:		700/70	1400/140	kg/h
standardized flow	≤DN50		80/8	180/18	Nm/s
temperature	all ø		30/3	70/7	°C

US-Unit

Analogue output [0...10 V / 0(4)...20 mA]		from	to		unit
			KMT-x1...	KMT-x2...	
standardized volumetric flow	DN15:	0	35	70	SCFM
	DN20:	0	60	120	SCFM
	DN25:	0	100	200	SCFM
	DN32:	0	165	330	SCFM
	DN40:	0	260	520	SCFM
	DN50:	0	410	820	SCFM
mass flow	DN15:	0	75	150	kg/h
	DN20:	0	140	280	kg/h
	DN25:	0	220	440	kg/h
	DN32:	0	360	720	kg/h
	DN40:	0	570	1140	kg/h
	DN50:	0	890	1780	kg/h
standardized flow	≤DN50	0	20000	40000	SFPM
Temperatur	alle ø	-4	176	176	°F
Switching output		[switching point/hysteresis]			
standardized volumetric flow	DN15		30/3	60/6	SCFM
	DN20		50/5	100/10	SCFM
	DN25:		80/8	160/16	SCFM
	DN32:		130/13	260/26	SCFM
	DN40:		210/21	420/42	SCFM
	DN50:		330/33	660/66	SCFM
mass flow	DN15:		60/6	120/12	kg/h
	DN20:		110/11	220/22	kg/h
	DN25:		200/20	400/40	kg/h
	DN32:		290/29	580/58	kg/h
	DN40:		460/46	920/92	kg/h
	DN50:		700/70	1400/140	kg/h
standardized flow	≤DN50		15000/1500	30000/3000	SFPM
temperature	all ø		90/9	150/15	°F

10. TECHNICAL DATA KMT-4

Measuring value

Flow

Measurand Volumetric flow at standard conditions acc. DIN 1343
 $P_0 = 1013.25 \text{ mbar (14.7 PSI); } t_0 = 0 \text{ }^\circ\text{C (32 }^\circ\text{F)}$

Measuring range 0.2...100 Nm/s (40...19685 SFPM) or 0.2...200 Nm/s (40...39370 SFPM)

Accuracy in air at 9 bar (130.5 psi) (abs) and 23 °C (73 °F)¹⁾ ± (1.5 % of measuring value + 0.8 % of full scale)

Temperature coefficient ± (0.1 % of measuring value / °C)

Pressure coefficient²⁾ + 0.5 % of measuring value / bar

Response time t_{90} < 1 sec.

Sample rate 0.5 sec.

Temperature

Measuring range -20...80 °C (-4...176 °F)

Accuracy at 20 °C (68 °F) ± 0.7 °C (1.26 °F)

Outputs

Output signal and display ranges are freely scalable

Analogue output voltage 0 - 10 V max. 1 mA
 current (3-wire) 0 - 20 mA and 4 - 20 mA $R_L < 500 \text{ Ohm}$

Switching output potential-free max. 44 VDC, 500 mA switching capacity

Pulse output Totalizer, pulse length: 0.02...2 sec.

Digital interface USB (for configuration)

Input

Optional pressure compensation 4 - 20 mA (2-wire; 15 V) for pressure sensor

General

Supply voltage 18 - 30 V AC/DC

Current consumption max. 200 mA

Temperature range ambient temperature: -20...60 °C (-4...140 °F)

medium temperature: -20...80 °C (-4...176 °F)

storage temperature: -20...60 °C (-4...140 °F)

Humidity working range 0...99 %RH no condensation

max. working pressure 16 bar (232 psi)

Medium compressed air or Non-Corrosive gases

Electrical connection cable gland M16x1.5

Electromagnetic compatibility EN61326-1 EN61326-2-3

Industrial Environment



Material housing metal (AlSi3Cu)
 probe stainless steel
 sensor head stainless steel / galss
 non-return protection brass

Housing protection class IP65 / Nema 4

1) The accuracy statement includes the uncertainty of the factory calibration with an enhancement factor k=2 (2-times standard deviation). The accuracy was calculated in accordance with EA-4/02 and with regard to GUM (Guide to the Expression of Uncertainty in Measurement).

2) The flow meter is calibrated at 9 bar (abs) 130.5 psi. If the working pressure is different from 9 bar (130.5 psi) you can compensate the error by setting the actual pressure with the configuration software.

Flow measuring range in dependence on pipe diameter

pipe	inner Ø	measuring range	
		mm (inch)	
		0.2...100 Nm/s (40...19685 SFPM)	0.2...200 Nm/s (40...39370 SFPM)
DN50 / 2"	54.5 (2.15")	1.7...839 Nm ³ /h 1.0...493.8 SCFM	1.7...1679 Nm ³ /h 1.0...987.6 SCFM
DN65 / 2 1/2"	70.3 (2.77")	2.8...1397 Nm ³ /h 1.6...821.6 SCFM	2.8...2793 Nm ³ /h 1.6...1643.2 SCFM
DN80 / 3"	82.5 (3.25")	3.8...1923 Nm ³ /h 2.3...1131.5 SCFM	3.8...3847 Nm ³ /h 2.3...2263.0 SCFM
DN100 / 4"	107.1 (4.22")	6.5...3242 Nm ³ /h 3.8...1906.9 SCFM	6.5...6483 Nm ³ /h 3.8...3813.8 SCFM
DN125 / 5"	131.7 (5.19")	9.8...4902 Nm ³ /h 5.8...2883.5 SCFM	9.8...9803 Nm ³ /h 5.8...5766.9 SCFM
DN150 / 6"	159.3 (6.27")	14.3...7171 Nm ³ /h 8.4...4218.7 SCFM	14.3...14343 Nm ³ /h 8.4...8437.3 SCFM
DN200 / 8"	206.5 (8.13")	24.1...12051 Nm ³ /h 14.2...7089.0 SCFM	24.1...24101 Nm ³ /h 14.2...14178.0 SCFM
DN250 / 10"	260.4 (10.25")	38.3...19163 Nm ³ /h 22.5...11272.6 SCFM	38.3...38325 Nm ³ /h 22.5...22545.3 SCFM
DN300 / 12"	309.7 (12.19")	54.2...27105 Nm ³ /h 31.9...15945.1 SCFM	54.2...54211 Nm ³ /h 31.9...31890.1 SCFM
DN350 / 14"	339.6 (13.37")	65.2...32591 Nm ³ /h 38.3...19172.5 SCFM	65.2...65183 Nm ³ /h 38.3...38345.0 SCFM
DN400 / 16"	388.8 (15.31")	85.4...42719 Nm ³ /h 50.3...25130.2 SCFM	85.4...85438 Nm ³ /h 50.3...50260.0 SCFM
DN500 / 20"	486 (19.13")	133.5...66749 Nm ³ /h 78.5...39266.0 SCFM	133.5...133498 Nm ³ /h 78.5...78531.9 SCFM
DN600 / 24"	585 (23.03")	193.4...96712 Nm ³ /h 113.8...56892.6 SCFM	193.4...193425 Nm ³ /h 113.8...113785.1 SCFM
DN700 / 28"	682.6 (26.87")	263.4...131675 Nm ³ /h 154.9...77459.8 SCFM	263.4...263350 Nm ³ /h 154.9...154919.6 SCFM

Factory setting analogue output

Analogue output [0...10 V / 0(4)...20 mA]

pipe		inner Ø	from	standardized volumetric flow			standardized volumetric flow			mass flow		
DN	Zoll	di (mm)		up to		unit	up to		unit	up to		unit
				low (L1)	high (H2)		low (L1)	high (H2)		low (L1)	high (H2)	
50	2"	54,5	0	800	1600	Nm ³ /h	450	900	SCFM	1035	2070	kg/h
65	2 1/2"	70,3	0	1300	2600	Nm ³ /h	800	1600	SCFM	1682	3364	kg/h
80	3"	82,5	0	1900	3800	Nm ³ /h	1100	2200	SCFM	2458	4916	kg/h
100	4"	107,1	0	3200	6400	Nm ³ /h	1900	3800	SCFM	4140	8280	kg/h
125	5"	131,7	0	4900	9800	Nm ³ /h	2800	5600	SCFM	6339	12678	kg/h
150	6"	159,3	0	7100	14200	Nm ³ /h	4200	8400	SCFM	9185	18371	kg/h
200	8"	206,5	0	12000	24000	Nm ³ /h	7000	14000	SCFM	15524	31049	kg/h
250	10"	260,4	0	19000	38000	Nm ³ /h	11000	22000	SCFM	24580	49161	kg/h
300	12"	309,7	0	27000	54000	Nm ³ /h	15000	30000	SCFM	34930	69860	kg/h
350	14"	339,6	0	32000	64000	Nm ³ /h	19000	38000	SCFM	41398	82797	kg/h
400	16"	388,8	0	42000	84000	Nm ³ /h	25000	50000	SCFM	54335	108671	kg/h
500	20"	486	0	66000	132000	Nm ³ /h	39000	78000	SCFM	85384	170768	kg/h
600	24"	585	0	96000	192000	Nm ³ /h	56000	112000	SCFM	124195	248390	kg/h
700	28"	682,6	0	130000	260000	Nm ³ /h	77000	154000	SCFM	168181	336362	kg/h

CONFIGURATION SOFTWARE

LIMITED LIABILITY

KOBOLD shall not be held liable for any damages or consequential damages (for example, but not restricted to, loss of earnings, interruption of business, loss of information and data or any other financial losses) resulting from the installation, use or impossibility of use of an KOBOLD software product and any associated support services or non-performance of support services.

1. General

The configuration software, in the scope of supply, allows for a user-friendly adaptation of the flowmeter to the application. In addition, the measurement values for flow and temperature can be calibrated / adjusted.

The system requirements for the installation and execution of the software are:

- Windows XP with SP3, Windows Vista or Windows 7
- .NET framework 3.5 with SP1
- USB 2.0 interface

i During setup there will be no installation of .NET Framework 3.5 SP1 – if the required version is not already installed on the computer the following error message will appear at the start of the configuration software.



.NET Framework 3.5 SP1 can be installed using Windows Update.

2. Installation

In order to set up a smooth installation of the configuration software of the KMT, admin authorization for the personal computer is required.

- Place the CD-ROM in the drive tray of the computer.
- At this moment the KMT should NOT be connected with the USB cable to the computer.
- The setup program will start automatically with the Auto Run-function – in case the program does not start automatically, one can start the setup software manually by starting Setup.exe directly.
- The InstallShield-Wizard for the KMT configurator will be started.
- Follow the instructions on the screen to install the software.

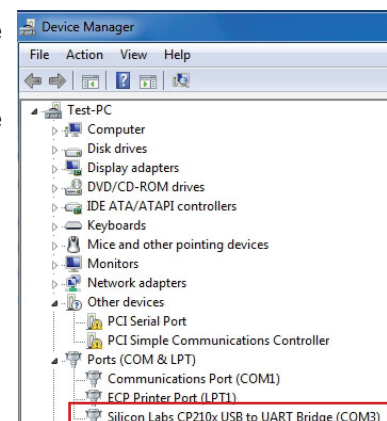
i At first, the configuration software will be installed and then the installation of the USB driver activated – except if the user has defined that USB setup is disabled.

The USB driver will be automatically installed the moment the first connection is made with the KMT.

The appearing dialog boxes can be dealt with the settings “No. do not download driver from the internet” and “Install the hardware automatically”.

If the KMT configuration software and the USB driver are installed correctly, and the KMT is connected via the USB interface with the personal computer, a connection “Silicon Labs CP210x USB to UART Bridge” should have been created in the device manager.

See: Start => Settings => Control Panel => System => Hardware => Device Manager

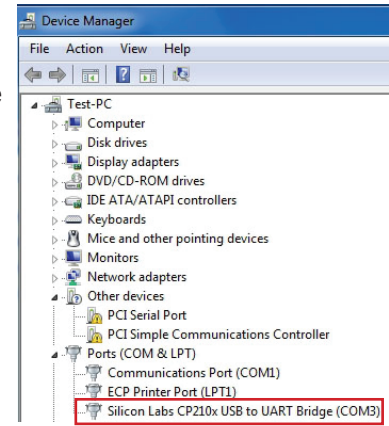


2.1. Configuration of the USB Interface (VirtualCOM)

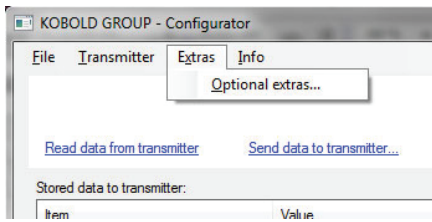
After the startup of the software, the correct VirtualCOM interface for the USB driver must be configured

The number for the used USB interface can be found under:

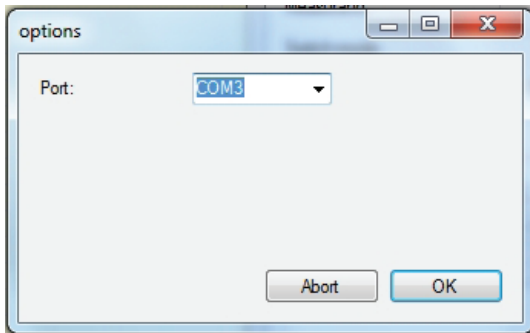
Start => Settings => Control Panel => System => Hardware => Device Manager



The setting is done under menu “Extras” and menu item “Optional extras.....”

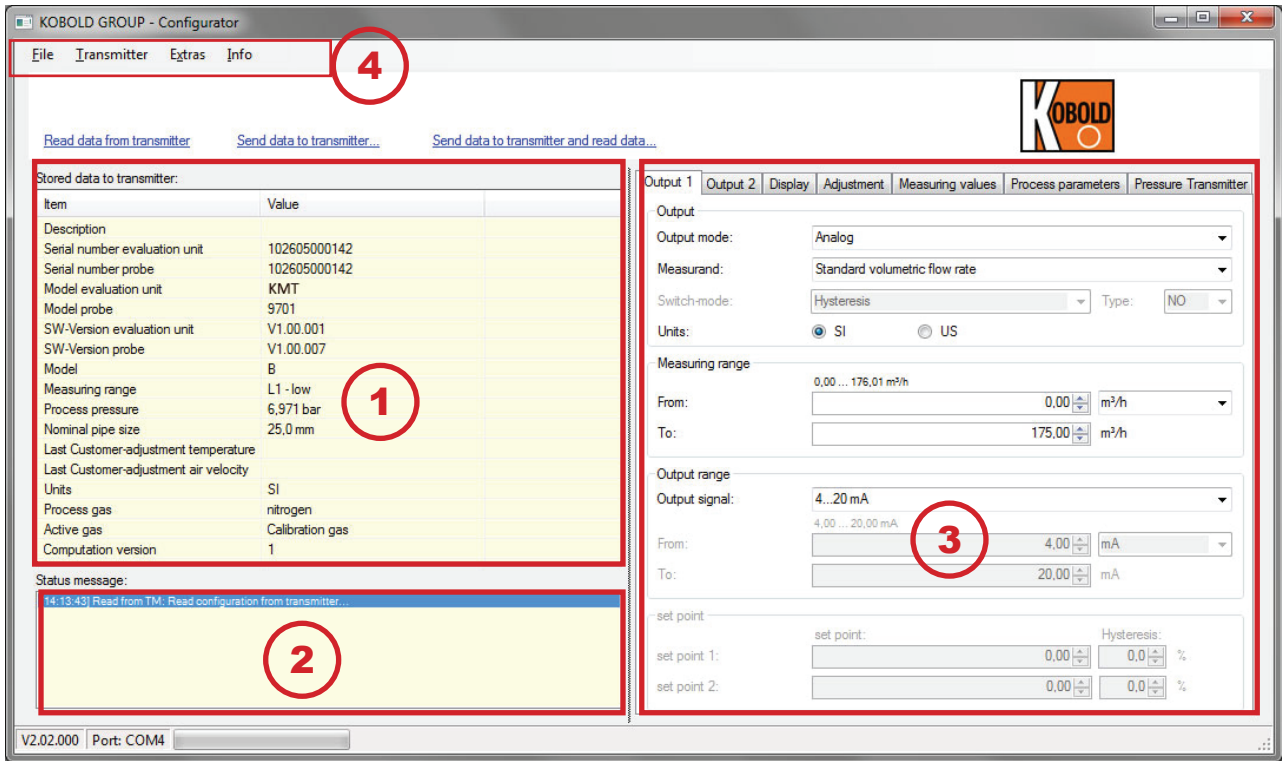


Select the COM-port number as shown in the device manager.



i These settings are done only once and at the first start of the configuration software. The settings are stored for future use.

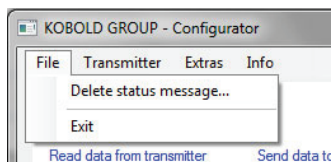
3. User Interface



- 1 Basic information:
After retrieving the data from the transmitter, the basic information of the device is shown here.
- 2 Status message:
Here are the messages shown about the status and other information.
- 3 Input screen:
Input screen for the configuration or adjustment of the flow meter.
- 4 Menu tool bar:
Selection of menu items.

4. Menu toolbar

4.1. File



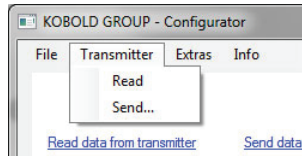
Delete status message

deletes the status messages.

Exit

closes the configuration software.

4.2. Transmitter



Read reads the actual configuration of the transmitter.

Send uploads the 'new' configuration to the transmitter. The following settings are uploaded to the transmitter

- Units
- Output 1
- Output 2
- Display mode
- Pressure transmitter

Prior to uploading the 'new' configuration to the transmitter, a dialog box will show a summary of the changes. Click on the button 'OK' and the configuration will be uploaded to the transmitter; click 'Cancel' to cancel the operation.

4.3. Extras

Configurations of the VirtualCOM- interface (see page 27).

5. Input Screen

5.1. Output 1, Output 2

In this screen the actual settings of the transmitter for the output 1 and 2, resp. relay 1 and 2 are shown. The user can alter and upload these settings to the transmitter, together with other changes of the configuration.

5.1.1. Output mode

Here the mode of signal output can be determined.

Output 1: analogue or switch (relay) output
Output 2: switch (relay) or pulse output

i NOTE:
In case the mode of output 1 is changed, the Jumper J1 on the board of the signal conditioning electronics has to be relocated as well (see page 29)

5.1.2. Measurand

Here is determined which measurand will be represented at the particular output.

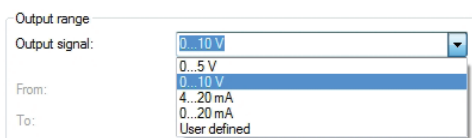
5.1.3. Units

Choice of the engineering units of the selected measurand in either SI- (m/s; °C; m³/h) or US-units (SFPM; °F; SCFM).

i NOTE:
The setting "Units" on the tabs for Output 1 and Output 2 are in sync with each other. If the units are changed on one of the output tabs, automatically the units on the other output tab are changed accordingly.

5.1.4. Output mode – analogue

Within the limits of measurement range and the scaling of the output, the analogue output can be freely configured and scaled. Either a standard output signal (0 – 5 V, 0 – 10 V, 0 – 20 mA, 4 – 20 mA) can be selected or a user defined range for the current / voltage output (e.g. 1 – 9 V).



i NOTE:
In case the analogue output is changed (from current to voltage or vice versa), the Jumper J2 on the board of the signal conditioning electronics has to be relocated as well (see page 29).

5.1.5. Output mode – switch (relay)

In the field for the “Switch-mode”, one can select “Hysteresis” or “Window”.

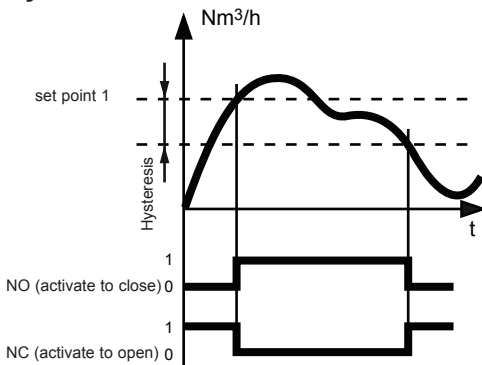
The field for “Type” is to determine the switch action of the relay, NO = Normally Open (activate to close), NC = Normally Close (activate to open).

Under “Measuring range” in the field “From” the low value of the measuring range can be entered and in the field “To” the high value.

The hysteresis of the set point is entered as a percentage of the measuring range.
[measuring range] = high measuring value – low measuring value

e.g. hysteresis
set point = 500 Nm³/h and reset point is 450 Nm³/h
Hysteresis = 50 Nm³/h = 0.5 % of measuring range

Hysteresis

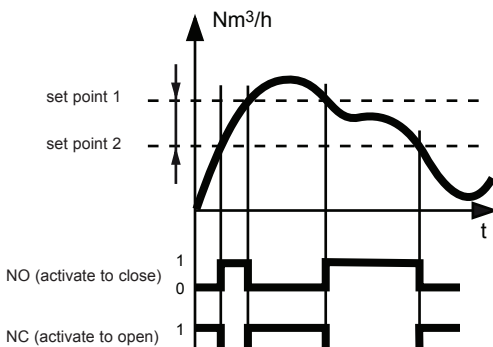


When the measurement value reaches **set point 1**, the relay will be activated. The value at the reset point is the value at set point 1 minus the hysteresis.

e.g. set point 1 = 100 Nm³/h and the hysteresis 5 Nm³/h.
the relay switches at 100 Nm³/h. The reset point is at 96 Nm³/h.

Hysteresis = 5 Nm³/h = 5% of the measuring range

Window



The relay is activated as long as the measuring value is between the values of **set point 1** and **set point 2**.
The hysteresis of each set point is fixed at 0.2% of the measuring range.

e.g.: set point 1 = 100 Nm³/h; set point 2 = 80 Nm³/h;
hysteresis of each set point is 1 Nm³/h (0.2% of 500 Nm³/h)

- ① 80 Nm³/h = set point 2
- ② 100 Nm³/h = set point 1
- ③ 99 Nm³/h = set point 1 - hysteresis
- ④ 79 Nm³/h = set point 2 - hysteresis

5.1.6. Output mode – pulse

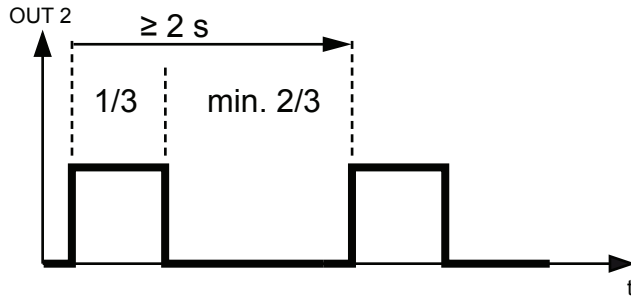
If output 2 is configured for pulse, the measurand can be consumption only. Under “Pulse”, the duration of the pulse and the pulse value (Significance level of pulse) can be freely configured.

$$\frac{\text{Volume Flow [m}^3\text{/h]}}{\text{Pulse Value [m}^3\text{/Pulse]}} = \frac{\text{Number of Pulses}}{\text{Hour}}$$

The duration of the pulse can be set between 0.02 and 2 seconds.

e.g. Duration of pulse = 100ms; one pulse for each Nm³ consumed

The pulse – interval – ratio must be at least 1 : 2, meaning that the duration of the pulse interval must be at least twice the duration of the pulse itself.



Calculation of the minimum “pulse value” or the maximum “pulse duration”.

$$\text{IMPW_MIN} = \text{NORMV_MAX [m}^3\text{/h]} * \text{IMPL [s]} / 1200$$

$$\text{IMPL_MAX} = \text{IMPW [m}^3\text{]} * 1200 / \text{NORMV_MAX [m}^3\text{/h]}$$

IMPW	pulse value [m ³]
IMPL	pulse length (duration) [s]
IMPW_MIN	minimum pulse value [m ³]
IMPL_MAX	maximum pulse length (duration)
NORMV_MAX	expected maximum volume flow (NM ³ /h)

5.2. Minimum flow shutdown

The minimum flow shutdown is switched on and off using the “active” checkbox. If the output signal is ≤ than the set “Shutdown value”, the flowmeter issues 0 on the analogue output.

5.3. Display

If an optional display is installed, at the tab Display the following items can be entered:

Drop-down input field “Display-Mode”

- Single spaced
- Double spaced (default)

Checkbox “Backlight”

- Checked = ON
- Unchecked = OFF

In the input field “Description (free text), a user specific name (max. 16 characters) for the transmitter can be entered.

e.g.: HALL 1

With the button “send” only the description will be uploaded to the transmitter.

5.4. Adjustment

The user can perform an adjustment for the measurands **normflow** and **temperature** in air. The configuration software distinguishes between a 1-point and a 2-point adjustment automatically, depending on how many reference points for adjustments are entered.

The values entered for the customer's adjustment are stored in the electronics of the sensing probe and are therefore not lost if the electronics of the signal conditioning are replaced (see page 6)

If the checkbox "Performing customer-adjustment" is checked, the adjustment mode will be activated and the actual measuring value in the set interval automatically retrieved from the flowmeter (transmitter).

i NOTE: While the customer-adjustment is active all other pages, functions and commands are deactivated.

In the field "Adjustment" the measurand to be adjusted is selected.
 In the field "Measuring value" the actual measurement value of the transmitter is indicated.
 The update-interval can be set.

In the field "Reference value" the measurement value of the standard is entered. After clicking the button "send" a control dialog box appears in which the values can be corrected if needed. Then the reference value will be uploaded to the flowmeter (transmitter) and is the adjustment procedure complete.

The reference point of the customer-adjustment must be within the determined measuring range.

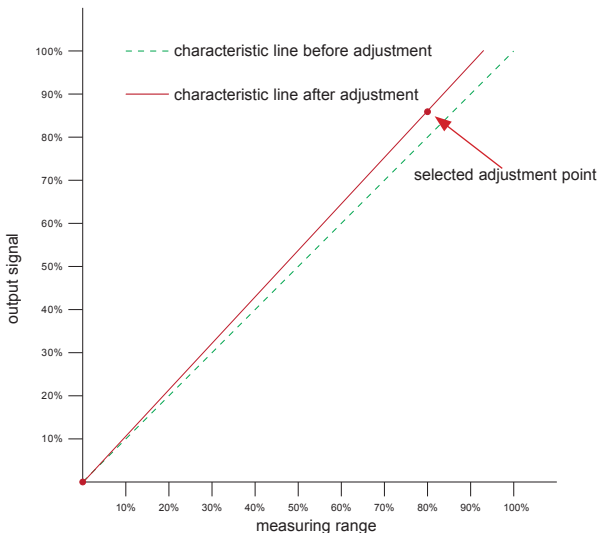
The customer-adjustment results in a slight rotation of the characteristic line, in such a way that the measurement deviation at the upper and lower adjustment points equals zero. The configuration software determines, depending on its position, if it is an upper or lower adjustment point.

5.4.1. 1-point adjustment

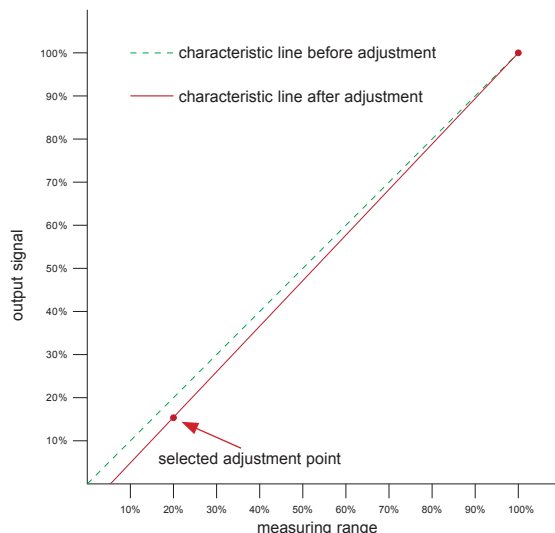
	lower adjustment point	upper adjustment point
possibility 1	0 - 50% of measuring range	100% of measuring range
possibility 2	0% of measuring range	>50 - 100% of m.r.

m.r. ... measuring range

upper adjustment point at 80% of measuring range
 lower adjustment point automatically at 0% of m.r.



lower adjustment point at 20% of measuring range
 upper adjustment point automatically at 100% of m.r.

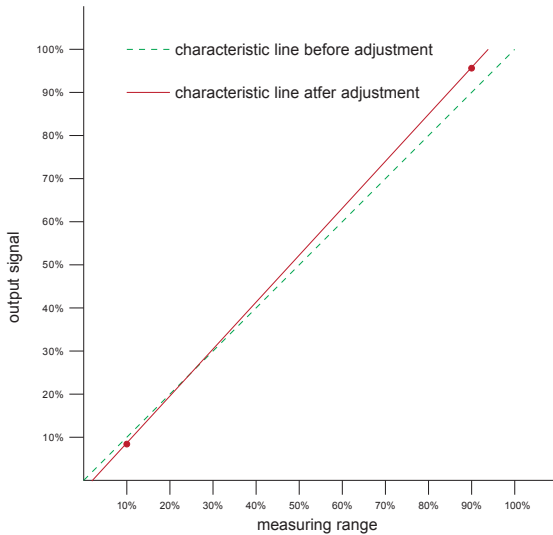


5.4.2. 2-point adjustment

With a 2-point adjustment procedure the lower adjustment point must be between 0 and 40% of the measuring range, and the upper adjustment point between 60 and 100% of the measuring range. If the adjustment point is between 40 and 60% of the measuring range, automatically a 1-point adjustment procedure will be executed instead.

	lower adjustment point	upper adjustment point
possibility 1	0 - <40% of m.r.	60 - 100% of m.r.
possibility 2	40 - <50% of m.r.	100% of m.r.
possibility 3	0% of m.r.	50 - <60% of m.r.

**lower adjustment point at 10% of measuring range
upper adjustment point at 90% of measuring range**



5.4.3. Reset to factory settings

Customer-adjustment can be reset to the factory settings by checking the appropriate checkbox and subsequently clicking the “reset” button.

Reset to factory adjustment

Temperature customer-adjustment

Air velocity customer-adjustment

reset

5.5. Measuring values overview

The tab **measuring values** provides an overview of the retrieved actual measurement values of the flowmeter (transmitter). Clicking on “Fetch values” will retrieve the actual measurement and MIN / MAX values for flow, volume flow, temperature, mass flow and pressure (only if a pressure transmitter is connected) from the transmitter – additionally the reading of the consumption meter is retrieved as well. Checking the “Polling” checkbox will retrieve the measuring data from the transmitter at the selected interval.

Measurand	Actual	Min	Max	Unit
Air velocity	1,279	0,500	1,412	m/sec
Volumetric flow rate	9,006	0,247	9,939	m³/h
Temperature	23,58	16,05	26,66	°C
Mass flow	11,483	0,315	12,672	kg/h
Pressure	2,029	0,000	2,047	bar

5.5.1. Reset of the MIN / MAX values

The MIN/ MAX values of each measurand, as stored in the flowmeter (transmitter), can be reset by checking the appropriate checkbox and subsequently clicking the “Clear MIN / MAX” button.

5.5.2. Reset of the consumption counter (totalizer)

The reading of the consumption meter can be reset by clicking the “Reset meter” button.

5.6. Setting up Process Parameters

In the tab **Process Parameters** you can change the Process gas (medium) and set the pressure compensation

5.6.1. Change the Process Gas

i *NOTE: This function is only active if the flow meter for a medium different from air has been ordered (see order code Medium in the data sheet)*

Calibration-Gas: Is the gas (medium) in which the flow meter was calibrated in the factory. Unless otherwise specified, the flowmeter is calibrated at the factory always in air.

Process-Gas: Is the gas (medium) in the measured process. The adjustable process gases are set at the factory and can be selected from a list.

The flow meter is factory set to the ordered gas (medium).

If the setting for the process-gas modified or changed between calibration- and process gas, the changed setting has to be sent to the transmitter. Use “send data to the transmitter and read ...” button.

The “active gas” to which the flow meter is set, you can see in the field basic information.

Units	US
Process gas	CO2
Active gas	Calibration gas
Computation version	1

5.6.2. Changing the standard conditions

The flowmeter is factory-set to standard conditions conforming to DIN 1343.

Factory setting: $P_0 = 1013.25 \text{ mbar}$, $t_0 = 0^\circ\text{C}$ (273.15 K)

The corrected volume flow measured value is calculated in line with the standard conditions set.

System values

Standard conditions:	<input type="text" value="0,00"/>	°C	<input type="button" value="send"/>
	<input type="text" value="1.013.250"/>	mbar	<input type="button" value="send"/>

5.6.3. Pressure compensation

In order to achieve the highest accuracy the actual process pressure can be entered in the field "process pressure". Clicking the button "send" only the value of the process pressure will be uploaded to the flowmeter (transmitter).

Cycle pressure (absolute)

<input type="text" value="9,00"/>	bar	<input type="button" value="send"/>
-----------------------------------	-----	-------------------------------------

5.6.4. Setting the pipe diameter

The actual **inner diameter** of the pipe must be set here. The "Send" button is used only to send the pipe diameter to the transmitter.

i Nominal pipe size:

<input type="text" value="100,00"/>	mm	<input type="button" value="send"/>
-------------------------------------	----	-------------------------------------

5.7. External pressure transmitter for pressure compensation

In order to achieve the highest accuracy, the input from an external pressure transmitter will be very useful if the pressure fluctuates strongly (e.g. 3 to 10 bar (45 to 150 psi)). An absolute pressure transmitter with a 2-wire loop powered 4 – 20 mA output should be used.

On the tab "Pressure transmitter" the measuring range can be entered.

Measuring range

Transmitter type:	<input type="text" value="Absolut"/>	
From:	<input type="text" value="0,00 ... 40,00 bar"/>	
To:	<input type="text" value="0,00"/>	bar
	<input type="text" value="16,00"/>	

Output range

Output signal:	<input type="text" value="4...20 mA"/>
----------------	--

5.8. Declaration of Conformance

We, KOBOLD Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

Flow Meter for compressed air and gases Model: KMT

to which this declaration relates is in conformity with the standards noted below:

EN 61326-1:2013 Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements

EN 61326-2-3:2013 Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-3: Particular requirements - Test configuration, operational conditions and performance criteria for transducers with integrated or remote signal conditioning

EN 50581:2012 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Also the following EC guidelines are fulfilled:

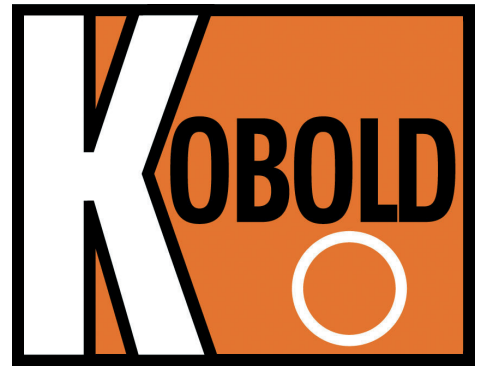
2014/30/EU **EMC Directive**
2011/65/EU **RoHS (category 9)**



Hofheim, 08 March 2018

H. Peters
General Manager

M. Wenzel
Proxy Holder



www.kobold.com