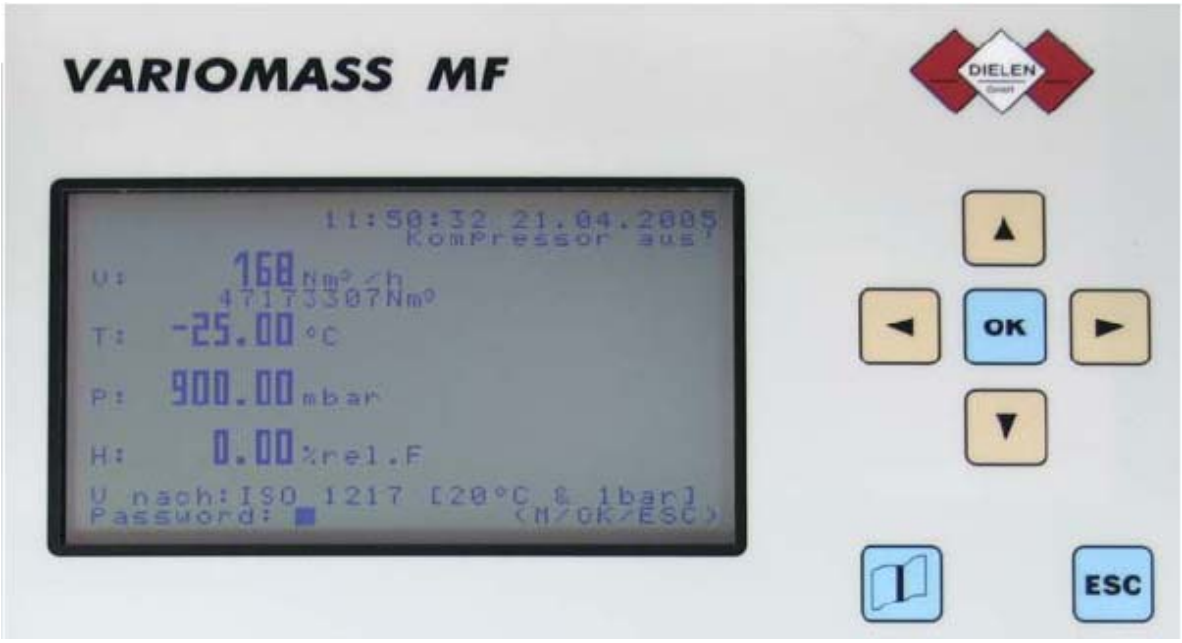
Instruction Manual

for

mass flow meter for compressed air

Druckluftbilanzierungssystem

VARIOMASS MF



Version: MF 10/2011

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0. Introduction

This manual is for all *VARIOMASS MF* Insertion thermal mass flow meter for standard pipe sizes from 2 ½" (DN 65) up to 20" (DN 500) and the In-Line thermal mass flow meter from ½" up to 2" (Dn 50) pipe sizes.

Included in the delivery are:

The meter with separate electronic reader MF and a connection cable from sensor to electronic reader. The insertion meters have an additional shaft mounted tube fitting which is bored through and/or as an option: ball valve retractor assembly (BVR ½").

Please make sure that the serial number of the sensor is conclusive with the serial number on the MF electronic.

Please handle all parts with care.

1. Technical Data

1.1 Electronic

Power supply of the electronic:	85 -260 VAC with 50 Hz. or 60 Hz. (Standard)
Ambient temperature range:	-10°C to + 45°C
Protection class:	IP 65 (NEMA 4 X)
Options (electrical):	- USB - Digital input (for e.g. compressor ON/OFF) - Programmable pulse output for external counter - 2 outputs for Relay - Data logger - 3 additional sensors for e.g. temperature, pressure and humidity or additional flow

1.2. Sensor (flow meter)

The insertion flow meter are designed for flow ranges and pipe sizes listed in table 1.1

Model Nr.	pipe size (mm)	Max. flow range:	min. flow range:
M-0	DN 65	0 - 900 Nm³/h	0 - 90 Nm³/h
M-0	DN 80	0 - 1.400 Nm³/h	0 - 140 Nm³/h
M-0	DN 100	0 - 2.300 Nm³/h	0 - 230 Nm³/h
M-0	DN 125	0 - 3.500 Nm³/h	0 - 350 Nm³/h
M-1	DN 150	0 - 5.000 Nm³/h	0 - 500 Nm³/h
M-1	DN 200	0 - 9.000 Nm³/h	0 - 900 Nm³/h
M-1	DN 250	0 - 14.000 Nm³/h	0 – 1.400 Nm³/h
M-1	DN 300	0 - 20.000 Nm³/h	0 – 2.000 Nm³/h
M-1	DN 350	0 - 27.000 Nm³/h	0 – 2.700 Nm³/h
M-1	DN 400	0 - 36.000 Nm³/h	0 – 3.600 Nm³/h
M-1	DN 450	0 - 45.000 Nm³/h	0 – 4.500 Nm³/h
M-1	DN 500	0 - 55.000 Nm³/h	0 – 5.500 Nm³/h

Table 1.1. Flow range as a function of the pipe size

The In-Line flow meter are designed for flow ranges and pipe sizes listed in table 1.2

Model No	Pipe size:	inside pipe diameter"dI":	flow body length "L"	end pipe thread "N"	max.	flow range
M-2	½" (12,7 mm)	15,8 mm	178 mm (7,0")	½ " NPT	0 to	20 Nm³/h
M-3	¾" (19,0 mm)	20,9 mm	300 mm (11,8")	R ¾"	0 to	100 Nm³/h
M-4	1" (25,4 mm)	26,6 mm	400 mm (15,8")	R 1"	0 to	150 Nm³/h
M-5	1 ¼" (31,8 mm)	35,0 mm	254 mm (10,0")	1 ¼ " NPT	0 to	250 Nm³/h
M-6	1 ½" (38,1 mm)	40,9 mm	600 mm (23,6")	R 1 ½"	0 to	350 Nm³/h
M-7	2" (50,8 mm)	52,5 mm	750 mm (29,5")	R 2"	0 to	600 Nm³/h

Table 1.2. Maximum flow ranges as a function of the pipe size

Medium temperature:	25°C +/- 25°C
Ambience temperature:	- 10° to + 45°C
Positive operating pressure:	8 bar g +/- 4 bar (Optional: 0 – 3 bar g or maximum 40 bar g)
Sensor material:	Stainless steel (316 SS Ti / 1.4571)

for In-LINE meter:

Sensor pipe:	Stainless steel (316 SS Ti / 1.4571)
Process connection:	R or NPT male thread (optional DIN or ANSI flange)

for Insertion meter:

Process connection:	R ½ external thread (optional DIN or ANSI flange)

Accuracy: +/- 2% of measured value with sufficient straight measuring section
Response time: τ 63 approx. 1 second

Special calibration:

With a special calibration with higher flow rate (e.g. 0 – 200 Nm/sec.) the upper range values can be multiplied with 2.5. This way the maximum range value of e.g. 0 – 5750 Nm³/h with a DN 100 pipe can be achieved.

With the special calibration with higher medium temperature (temperature ranges between 60°C and 200°C), the range values will be corrected and compensated to this temperature.

With the special calibration with lower or higher process pressure (pressure range between 0 and 3 bar to max. 40 bar), the range values will be corrected and compensated to this pressure.

Standard Conditions:

All flow rate specifications in the device are according to the Standard Conditions “N”. This Standard Conditions are defined as:

a) ISO 1217: 20°C, 1 bar abs. & 0% rel. humidity
b) DIN 1343: 0°C, 1013 mbar abs. & 0% rel. humidity
c) DIN 2533: 15°C, 1013 mbar abs. & 0% rel. humidity
d) and others.

In the device the standard conditions are shown in the buttom line of the MF LCD display.

2. Mounting

2.1 Checking sensor probe length

2.1.1 Insertion meters

The probe length of the shaft "L" is adequate to the inside diameter of the pipe.

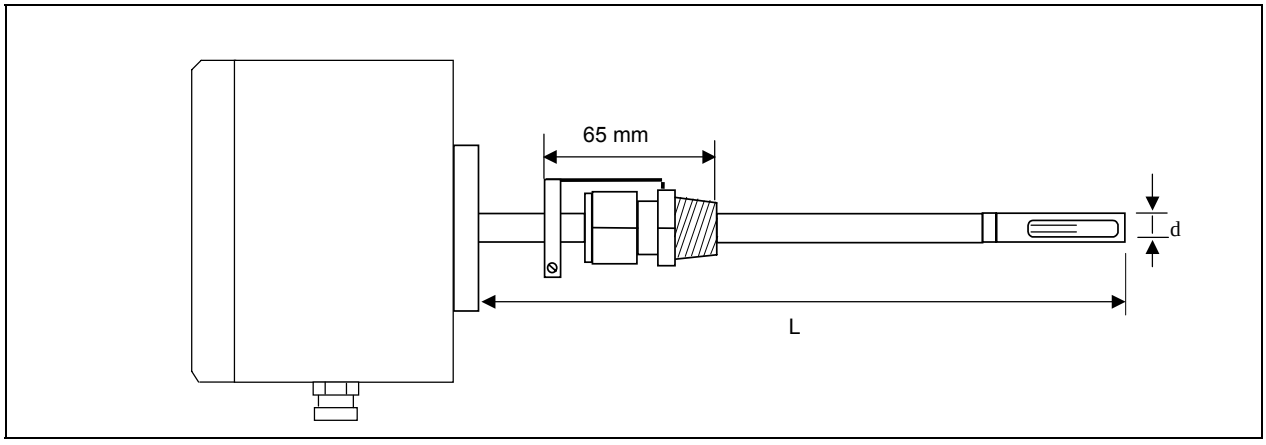


Table 1a) dimensions of an Insertion meter

The probe shaft length "L" are 12“ (300 mm) or 16" (400 mm), depending on the pipe size diameter from 2 ½ (65 mm) up to 20” (500 mm).

The probe shaft diameter "d" is ½ " (12.7 mm) (see table 1a). By using the option BVR ½” (Ball valve retractor assembly) the max. pipe size is from 2 ½ ” (65 mm) up to 5” (125 mm) for a sensor shaft length L = 300 mm (12”) and for the 2 ½” (65 mm) up to 12” (300 mm) for a sensor shaft length L = 400 mm (16”).

2.1.2 In-Line Meter

The flow body length "L" for the IN-LINE Meter depends on the ordered pipe size (see Table 1b). The pipe sizes are from ½" up to 2" (50 mm) (s. table 1.2).

The flow body length of the In-Line meters with a flow conditioner (GL = flow straightener) are different (see Table 1.2.1). Also the thread of the flow body is always NPT.

Model No	Pipe size:	inside pipe diameter"dI":	flow body length "L"	end pipe thread "N"	max.	flow range
M-3 (GL)	¾" (19,0 mm)	20,9 mm	7" (178 mm)	¾" NPT	0 to	100 Nm³/h
M-4 (GL)	1" (25,4 mm)	26,6 mm	8" (203 mm)	1" NPT	0 to	150 Nm³/h
M-5 (GL)	1 ¼" (31,8 mm)	35,0 mm	10" (254 mm)	1 ¼ " NPT	0 to	250 Nm³/h
M-6 (GL)	1 ½" (38,1 mm)	40,9 mm	15" (381 mm)	1 ½ " NPT	0 to	350 Nm³/h
M-7 (GL)	2" (50,8 mm)	52,5 mm	20" (508 mm)	2" NPT	0 to	600 Nm³/h

Table 1.2.1. IN-LINE Meter **with** flow straightener

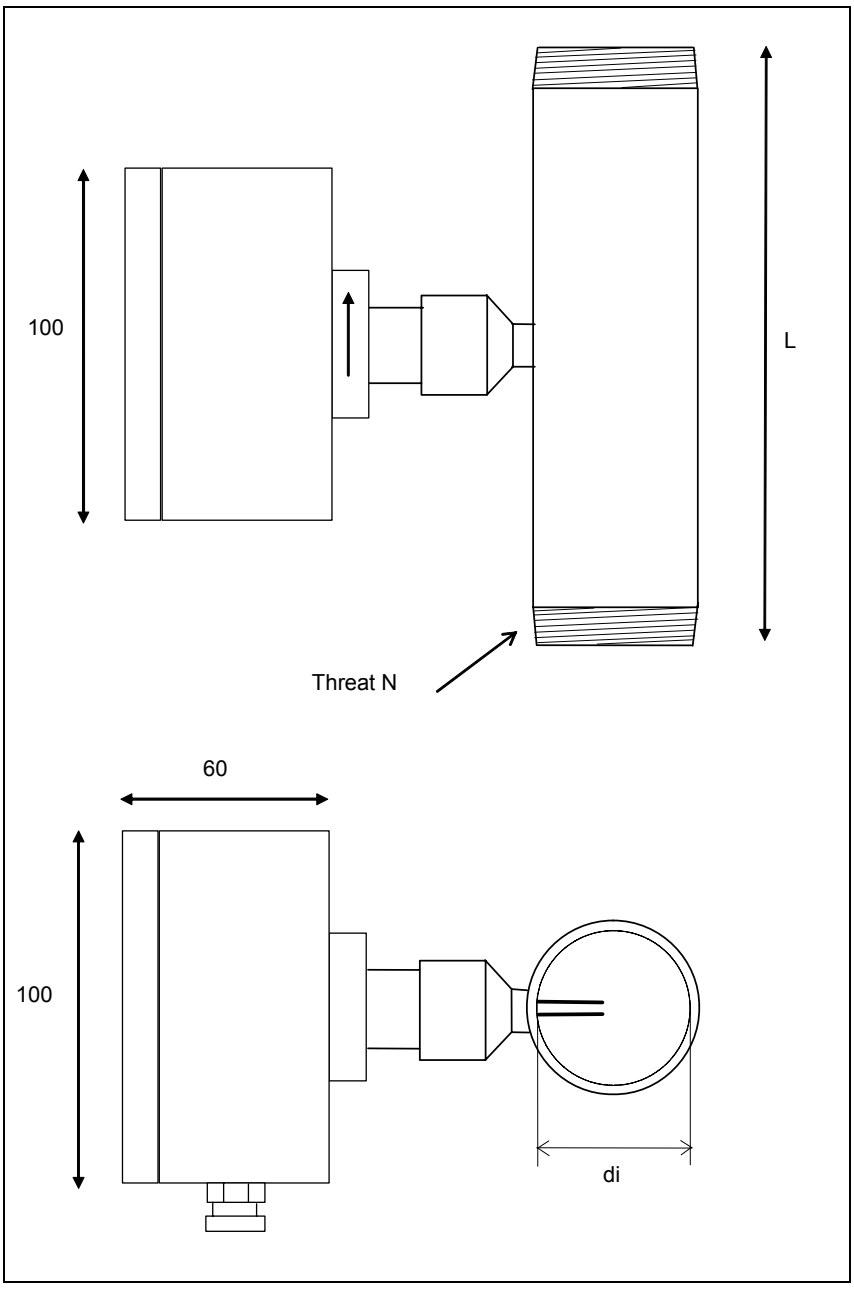


Table 1b) dimensions of the In-Line meter

2.2 Installation of the sensor

2.2.1 Installation of the sensor without flow straightener

Proper installation of the flow section assembly is of great importance. It is important to install the flow meter at a position where the gas is dry or above the dew point temperature. Condensate will affect the flow reading and lead to higher values.

A minimum of 10 x diameter up- and 5 x diameter downstream area without any equipment which disturb the flow profile is necessary. We recommend using 20 x D upstream area if possible.

The total straight flow section of the pipe should be divided into 2/3 as up- and 1/3 as downstream area (s. Table 2).

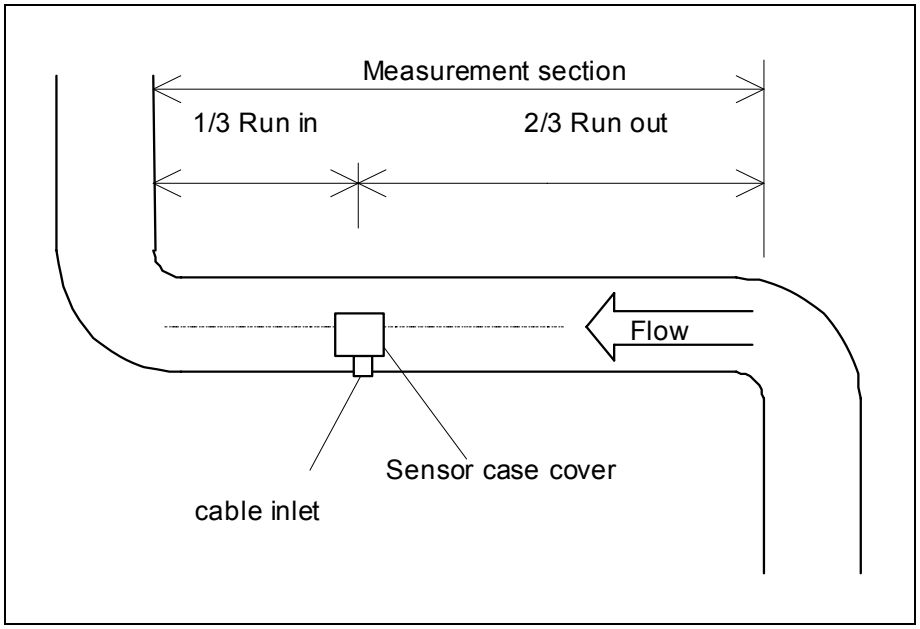


Table 2: Insertion meter with flow conditioner and two 90°-elbow

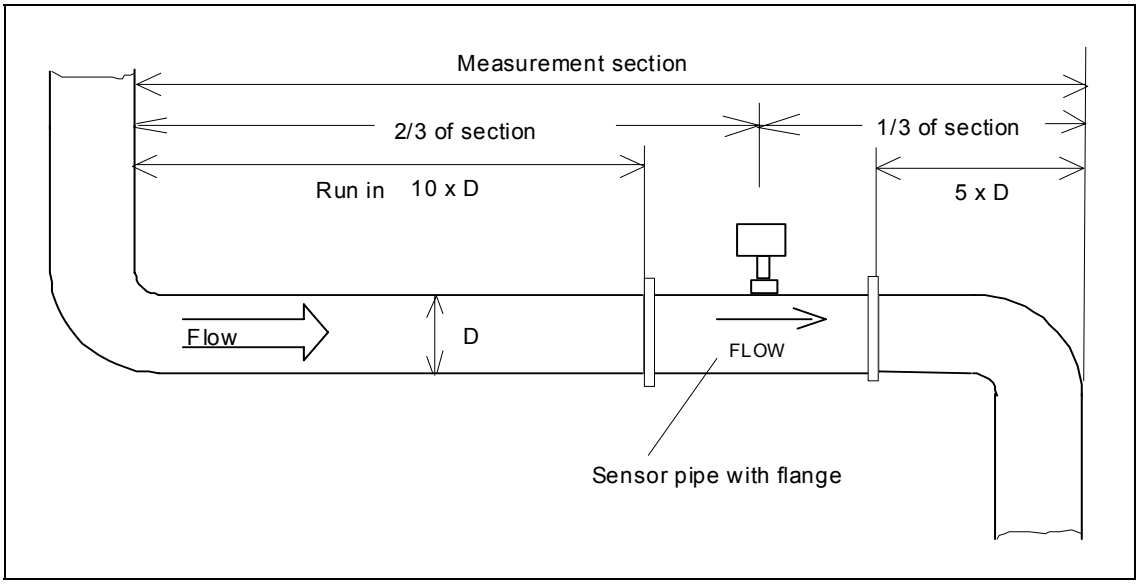


Table 2b: In – Line meter without flow conditioner and two 90°-elbow

The pipe installation can be horizontal or vertical without any effect on the accuracy of the flow meter.

The device shouldn't be installed in a closed circular pipeline where a backwards flow can't be eliminated, seeing that the sensor measures flow in both directions.In order to secure a measurement of a constant pressure amount we recommend the installation behind the drier or pressure tank.

2.2.2 Installation of the sensor with flow straightener

2.2.2.1 In – Line meter

Proper installation of the flow section assembly is of great importance. It is important to install the flow meter at a position where the gas is dry or above the dew point temperature. Condensate will affect the flow reading and lead to higher values.

A minimum of 3 x diameter up- and 2 x diameter downstream area without any equipment which disturb the flow profile are necessary. We recommend using 10 x D upstream and 5 x D downstream area if possible.

The total straight flow section of the pipe should be divided into 2/3 as up- and 1/3 as downstream area (s. Table 2c).

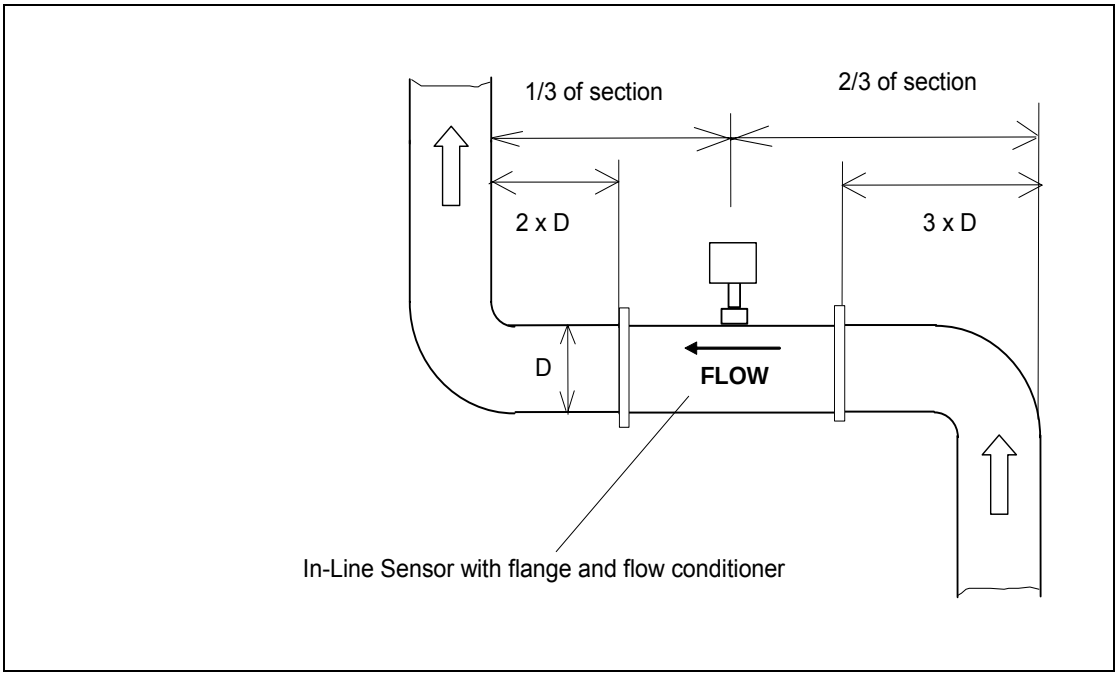


Table 2c: In- Line sensor with flow conditioner and two 90°-elbows

2.2.2.2 Insertion meter

Proper installation of the flow section assembly is of great importance.

The optinal flow conditioner for pipe sizes from 2 ½" (65 mm) up to 12" (300 mm) is delivered with perforated board as intermediate flange mounting and has to be placed at 3 x D upstream (D = pipe inside diameter).

A minimum of 3 x diameter up- and 2 x diameter downstream area without any equipment which disturb the flow profile are necessary with the insertion meter with flow conditioner. We recommend using 10 x D upstream area if possible.

The total straight flow section of the pipe should be divided into 2/3 as up- and 1/3 as downstream area.

2.3 Mounting of sensor

2.3.1 Mounting of Insertion Meters

2.3.1.1 Process connection

The process connection should be a welding socket with a R ½" inside thread. The welding socket length “M” should be from 20 mm up to 60 mm long. The inside diameter at the process connection should be about 15 mm (minimum 13.5 mm) in order to insert the sensor probe without any problems. The welding process connection should be in a right angle to the pipe and should match the centre of the pipe (s. Table 3).

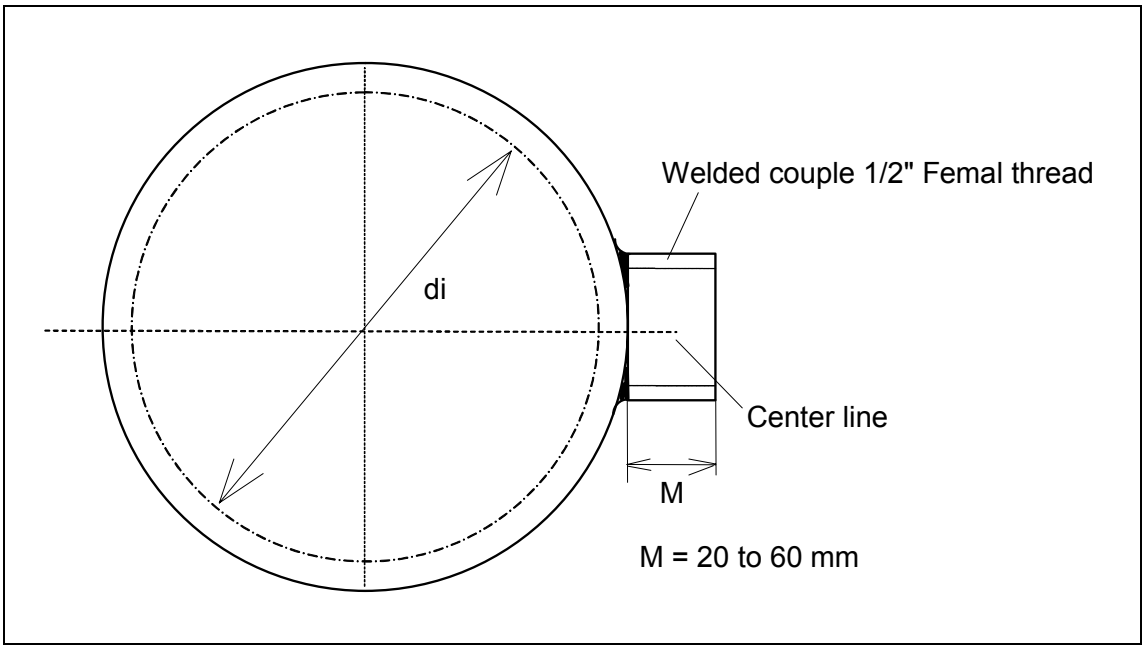


Table 3) Process connection welded on a pipe

2.3.1.2 Tube fitting

The standard process connection for the insertion flow meter is a shaft mounted tube fitting "SWAGELOK“ which is bored through. This fitting has a thread for R 1/2" for the process connection. Use Teflon band to fix the SWAGELOK fitting with the pipe welding socket.

This SWAGELOK fitting has a Teflon ferrules which allows retracting the probe shaft without any deformation on the stainless steel probe shaft. For low pressure the nut can be hand tight and for higher pressure turn the nut an additional 1/2 round clockwise.

Use an „Inbus“ screw driver on the external adjustment for proper tight (s. Table 4).The demounting of the mounted tube has to be undertaken with a pressure free process connection.

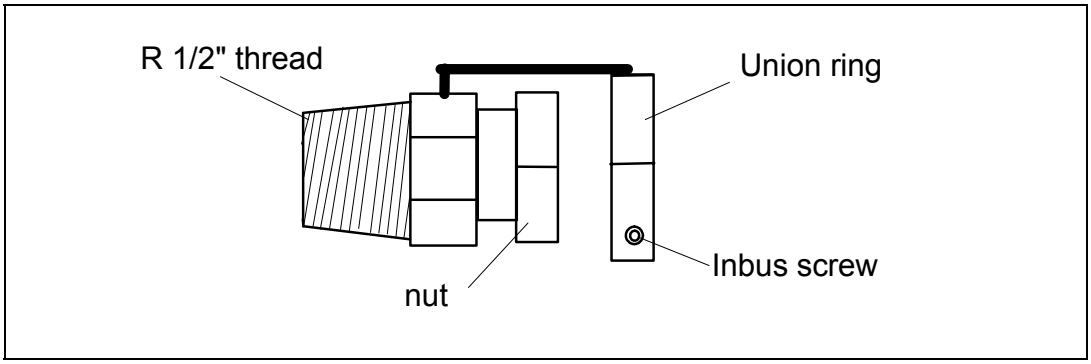


Table 4) Swagelok bored through fitting

2.3.1.3 Flow direction specification

An important point when directing the sensor is that the flow has to be equal to the direction to the direction of the time when the device was calibrated. The window of the sensor has to be open in the flow direction. The UPSTRAM mark on the probe shaft must be located correctly. It faces the direction of the flow. The additional arrow mark on the the sensor enclosure defines the correct flow direction ("Flow"). The normal flow direction is from right to left looking from behind of the sensor enclosure (s. Table 5) and the cable gland is in an angle of 90° to the flow direction.

When using a reversed flow direction, please make sure to turn the sensor an angle of 180°.

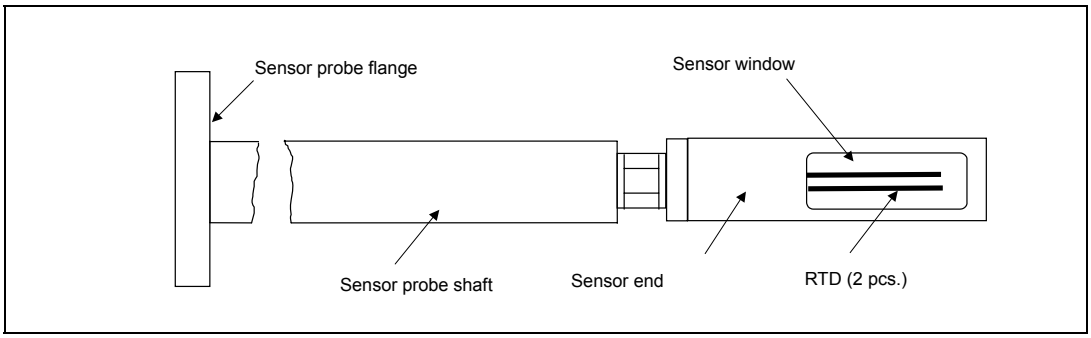


Table 5) Sensor window of an insertion meter

2.3.4 Position of flow

The middle of the sensor window has to be installed to the point of the maximum flow velocity. The point of maximum velocity should be in the centre of the pipe when using the necessary up- and downstream area (s. Table 6a and b).

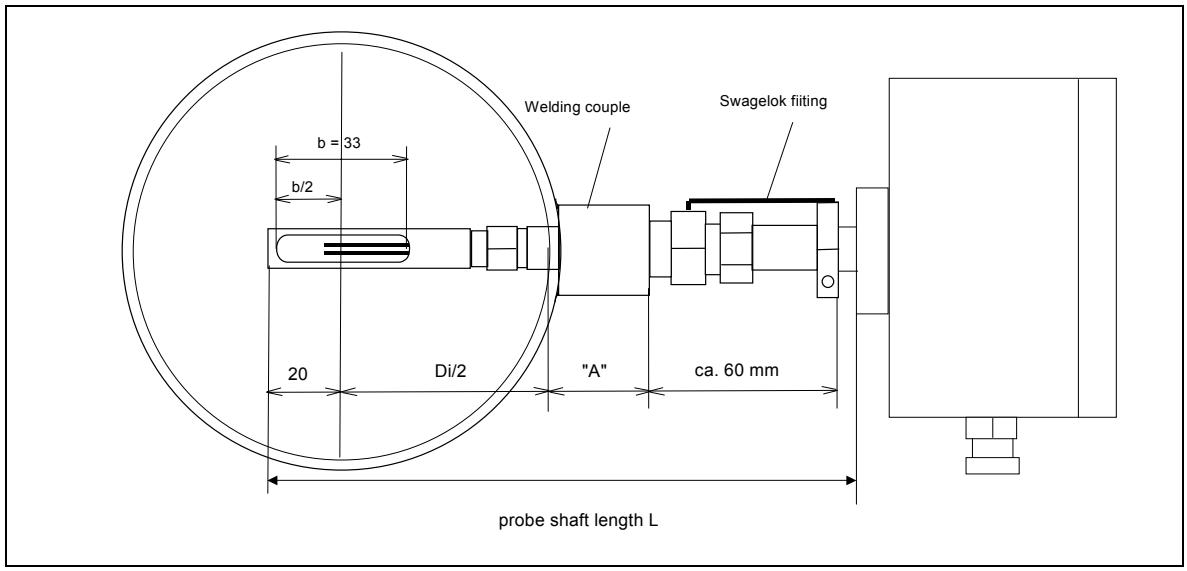


Table 6 a) correct position of the sensor window in the pipe

Die minimum probe length (L_{min}) for a standard process connection (without option BVR) is (s.Table 6b):

$$L_{min} = 20\ mm + D_i / 2 + A + 60\ mm$$

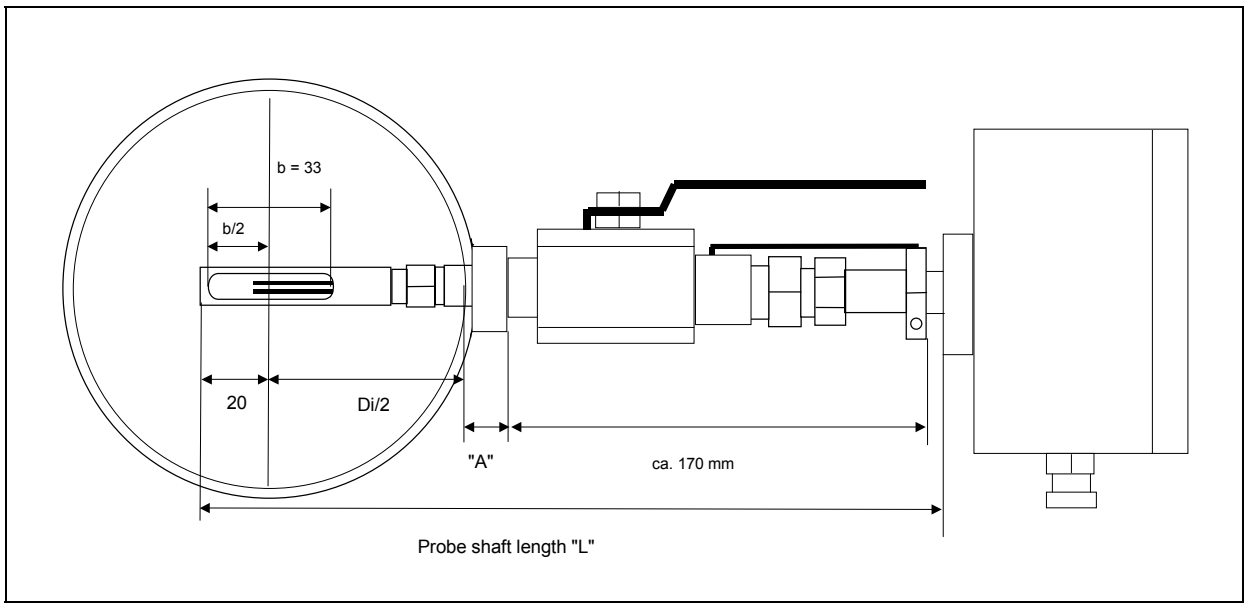


Table 6b) Insertion meter with Option BVR

Die minimum probe length (L_{min}) with the option BVR ½" is (s. Table 6b):

$$L_{min} = 20\ mm + D_i / 2 + A + 170\ mm$$

The middle position for the sensor window is as easy to find:

Please insert the probe shaft to the other side of the pipe and retract it for the length:

$$D_i/2 - 20\ mm$$

Example:

The pipe inside diameter (D_i) is 100 mm and the probe shaft was inserted up to the other side of the pipe, so the middle position for the sensor window you have to retract the probe for 30 mm (100/2 mm - 20 mm).

Important: Do not open the screws of the standard fitting under line pressure. Make sure that the pipe is pressure less when opening the screws of the Swagelok Standard fitting.

2.3.2 Mounting of In-Line Meters

The standard process connection for the In-Line Meters is a R or NPT male thread and the thread size is depending on the pipe size of the flow body from ½" up to 2".

Note:
No elbow or reduction is allowed within the flow section area. As an option DIN or ANSI flanges are available.

The flow direction (example from left to right or right to left) on the flow body (see the arrow) must be the same as the flow direction of the gas (s. Table 7).

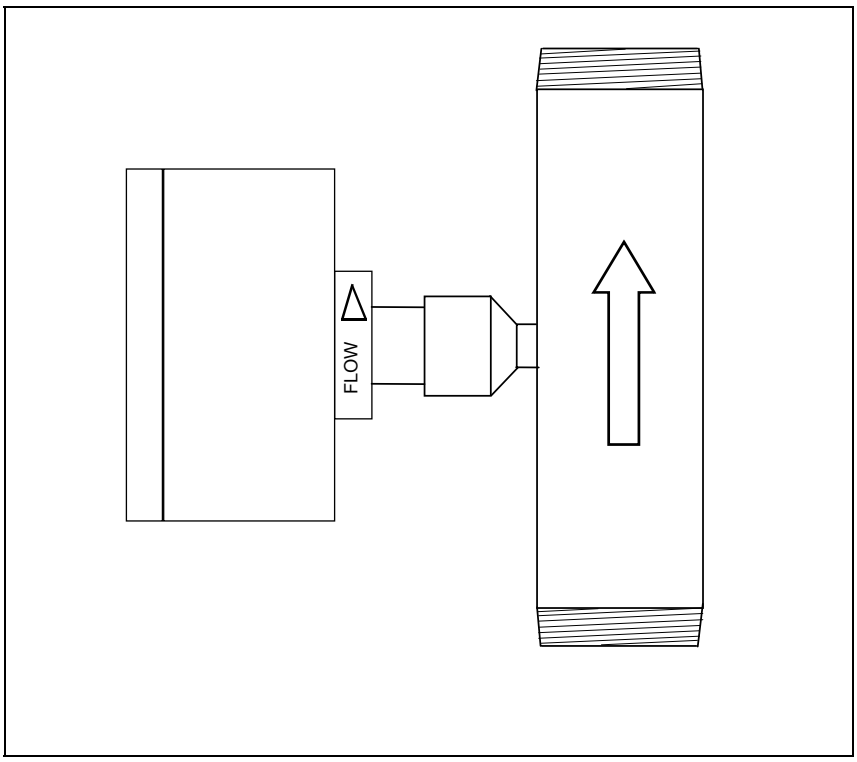
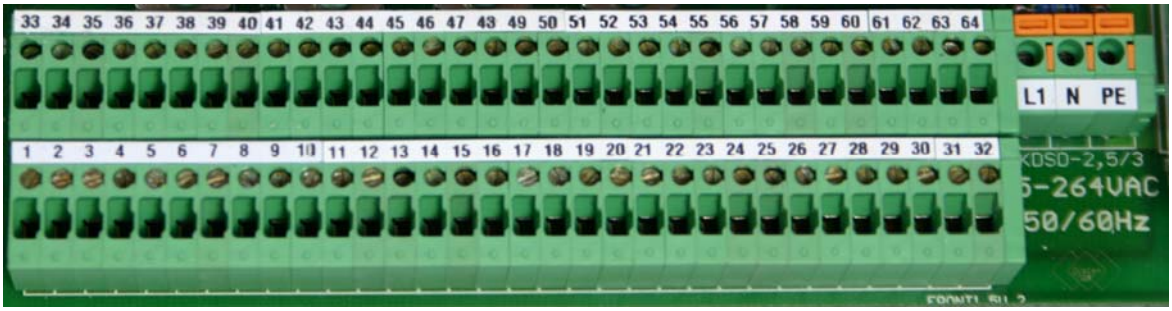


Table 7) In-Line Sensor with R or NPT thread and flow arrow

3. Electrical connection

Please keep the electronic dry and clean and install all wiring by switched off power supply. Failures due to wrong handling do not hold account for warranty. Therefore the MF evaluation unit should be closed with the protection IP 65 / NEMA 4 at all times and all necessary PG screws should be tightened. All wire connection should be executed with powerless electronics.



Picture Connecting terminal in the VARIOMASS MF case

Clamps name:

Clamps No. 11-16:	Signal Input of sensor No. 1, 2, 3 and 4
Clamps No. 17-24	Analog Output of sensor No. 1, 2, 3 and 4
Clamps No. 25-30	Pulse output of sensor No. 1 and 2
Clamps No. 31-32	Alarm (FAULT) contact output
Clamps No. 33-38	Pulse output of sensor No 3 and 4
Clamps No. 39-62	2 Relay contact output of each sensor No. 1, 2, 3 and 4
Clamps No. 63-64	Digital Input (compressor on/off)
Clamps No. 70-72	RS 485 BUS Output (Not shown)
Clamps No. 73-76	M-BUS Output (Not shown)

The power supply for the transmitter electronic is from 85 VAC to 250 VAC/ 50 or 60 Hz with a maximum current of 0.2 to 0.8 Ampere. Only the terminal description "L1" and "N" is for the power supply and PE is for ground wire. Please proof the tight fitting of the cable.

There is an optional 24 VDC power supply, which can be mounted at the same clamps. There is a note on the device, if applicable. Do **NOT** supply 110 V or 230 V on power supply to a unit with a 24 VDC power supply label inside.

The sensor cable of the sensor No. 1 is delivered with a 5 – Pin circular plug, which has to be plugged in at the 5 – Pin nut with the name “1” on the forefront of the evaluation unit.

If the plug has to be disconnected from the sensor cable the following configuration has to be adhered to:

Sensor No.1:

PIN 1: (+24V)	24 VDC power supply	Cable color: GREEN
PIN 2: (0 V)	Mass (-) power supply	Cable color: YELLOW
PIN 3: (I in +)	Output sensor signal	Cable color: BROWN
PIN 4: (I in -)	Mass (-) output sensor signal	Cable color: WHITE
Earth screw	sensor cable shield	Cable color: green/yellow

3.1 Analog output

The analogue output (power) is to be gripped at the 32 – pin terminal strip, with the following allocation:

PIN 17: (+I)	Analog output (0/4..20 mA) Plus
PIN 18: (-I)	Analog output (0/4..20 mA) Minus

The cable is to be inserted in the openings and the screws are to be tightened. An analog output for e.g. 0 - 10 VDC is not available. It can be done with a 250 Ohm resistor on a 0-20 mA output.

3.2. Sensor

The sensor has to be attached to the electronics with the delivered sensor cable and is therewith supplied with the necessary power. In order to secure the IP 65 / NEMA 4, please make sure to close the case cover properly. The opening of the case cover should solemnly be done with switched off power supply. The ambience temperature of the sensor electronic in the sensor head should be between -10 °C and +50°C.

If in any case the sensor cable should have to be detached from the sensor use the following allocation. First switch off power, then loosen the screws, before opening the lit. The circuit points of the connection cable on the circuit board of the sensor are only allowed in TB1. The cables in TB2 are not supposed to be removed. The setting on the potentiometer can't be changed.

Terminal Strip at SAP1-1:

PIN 1: (P)	24 VDC power supply	Cable color: GREEN
PIN 2: (R)	Mass (-) power supply	Cable color: YELLOW
PIN 3: (I)	Output sensor signal	Cable color: BROWN
PIN 4: (G)	Mass (-) output signal signal	Cable color: WHITE

Do not touch any of the sealt Potentiometer and do not remove the internal white and red sensor cable.

4. Power up

Before powering up the system make sure that you have the right power supply of 80 – 250 VAC or optional 24 VDC to a 24 VDC unit with a special label inside. A power supply of 110 V or 230 V to a 24 VDC option causes serial damages.

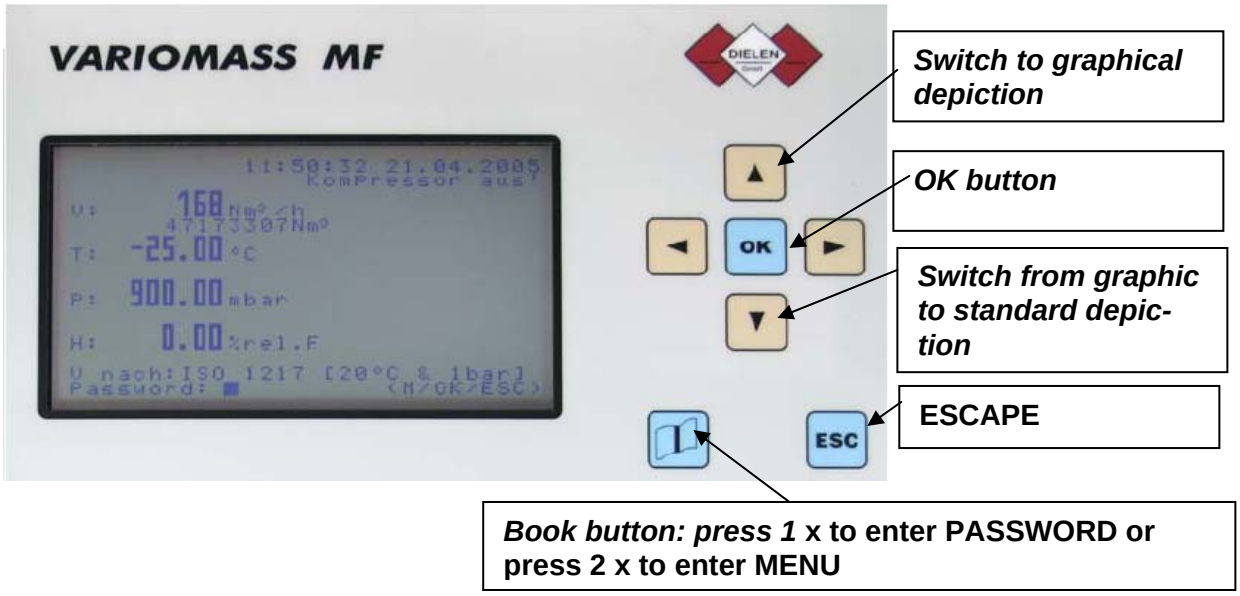
After powering up wait 20 sec. for a Hardware and Software test.

4.1. Standard depiction

The standard depiction shows the actual measurements for all channels. The name of the channels stands for (example):

Channel 1) V = Flow rate e.g. in Nm³/h
Channel 2) T = Temperature of connected temperature sensor e.g. in °C
Channel 3) P = Pressure of connected pressure sensor e.g. in mbar
Channel 4) H = Humidity of connected humidity sensor e.g. in % rel. humidity

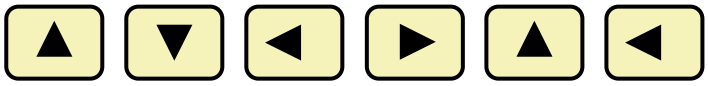
The first row shows the actual time and date. The second row shows the status of the optional fifth digital input. The right, free space shows the state of the relays contact, if activated. The lowest row depicts the actual state N (e.g. ISO 1217) and after pressing the "book" button, the password can be entered in case any changes need to be made.



The graphic depiction of a channel can be called very easily from the standard depiction. Simply press [▲] and choose the sensor with [▼]. Then press **[OK]**. End the graphic depiction by pressing **[ESC]** or [▼].

4.2 Default settings

In order to enter the default settings go into the menu by pressing the “book” button. The cursor blinks behind the word password. Please enter the password as follows (the password is fixed and can’t be changed):



Please confirm the password by pressing **[OK]**.

If a wrong password has been entered you have the possibility to enter the password once more or end with **[ESC].**

After having entered the password successfully, the following screen appears:

```
MENUE  –  Selection

SENSOR – 1  S/No.:
12345678
SENSOR – 2  S/No.:  T-25-
125
SENSOR – 3  S/No.:  H-0-100
SENSOR – 4  S/No.:  P-0,9-1

System

Data logger
Bus-Systems

Error
```

The numbers of sensors are shown. Behind the sensor number is the serial number shown, if available. The cursor blinks at the first sensor, please use the arrow buttons in order to choose the channel. This allows you to set the default settings for every channel. Please use **[OK]** when willing to enter the settings.
You have now entered the settings. Please choose the default settings now. These include: pipe inside diameter, measurement range for the allocation of analog outputs, flow suppression and the switch to another dimension for measurement value.

The lowest row shows the date of the last calibration of the chosen sensor.

4.2.1. Entering pipe inside diameter

Please use the **[OK]** button to enter the real pipe inside diameter for the Insertion meter only. The indication of the pipe inside diameter is compulsory for an accurate measurement. Note: IN-LINE meters do not require the change of the pipe inside diameter.

The cursor is automatically placed in the row where the indication of the value is required. The value can be changed by using the [►] button to reach the right position and then using [▲] and [▼] to change numbers. Use **[OK]** to affirm the right value or use **[ESC]** to end the menu.If the shown value is not the right one, press **[OK]** to enter the value again.

4.2.2. Entering measurement range

Use [▼] to enter the measurement range and press **[OK]**. The cursor is automatically placed in the row where the indication of the value is required. The value can be changed by using the [►] button to reach the right position and then using [▲] and [▼] to change numbers. Use **[OK]** to affirm the right value or use **[ESC]** to end the menu. If the shown value is not the right one, press **[OK]** to enter the value again. If not using the analog outputs, it is not required to enter a measurement range.

4.2.3. Entering flow suppression

Use [▼] to enter the flow suppression and press **[OK]**.

You can enter a 2 – digit number between 01 and 99 as flow suppression. If wanting to enter a 3 – digit number, use [►] to expand the digits. The value can be changed by using the [►] button to reach the right position and then using [▲] and [▼] to change numbers. Use **[OK]** to affirm the right value or use **[ESC]** to end the menu.

4.2.4. Changing dimension

Use [▼] to enter the flow rate dimension and press [**OK**]. The value can be changed by using the [▲] and [▼] to change the number. Use **[OK]** to affirm the right value or use **[ESC]** to end the menu.

4.3. Define Outputs

If using the electrical outputs of the device, these can be changed in the menu. Therefore enter the password as described in chapter 4.2. The cursor blinks at the first sensor, please use the arrow buttons in order to choose the channel 2 to 4. Please use **[OK]** when the right channel is chosen. Use [▼] to place the cursor at the position of outputs. Then use **[OK]** to change the outputs.

4.3.1 Analog output

The blinking cursor is in the row power output. Now it is possible to check or by using **[OK]** to change the power output of channel 1.

All other outputs like relays contacts or pulse outputs are optional.To adopt the shown value press **[OK]** or change e.g. value 1 to 0 by using the [▼] button. Use **[OK]** to attest the inserted value.

4.3.2 Pulse output

The pulse output can be configured by using the hardware.

Choose between internal power supply of 24 VDC with Jumper 1 (s. Table 9) and external (EXT) power supply. Therefore place the jumper on the circuit board on its new position. The Jumper is placed in 24 VDC when the device is delivered.

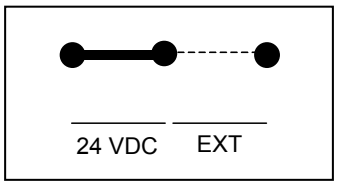
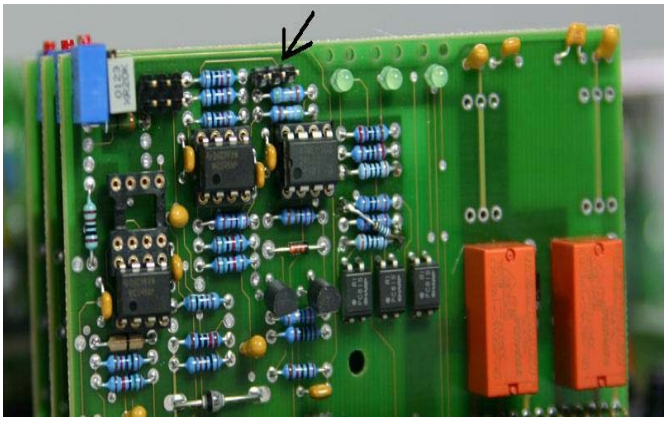


Table 9) Jumper 1 position for 24 VDC internal power supply (Factory set)



Picture: Sensor circuit board without jumper (see arrow)

The pulse duration is factory set to 100ms.
Use [▼] to enter the pulse outputs and press [**OK**].

You can enter a 2 – digit number between 01 (=1 m³/pulse) and 99. If wanting to enter a 3 – digit number, use [►] to expand the digits. The value can be changed by using the [►] button to reach the right position and then using [▲] and [▼] to change numbers. Use **[OK]** to affirm the right value or use **[ESC]** to end the menu.

4.3.3. Relay contact

There are optional relay contacts on the terminal strip. The standard depiction shows the state of the relay contacts (ON/OFF) for every channel. “Rel. 1 ON” means that the connection NO and C for relay 1 is closed and NC and C are open (see table 10).

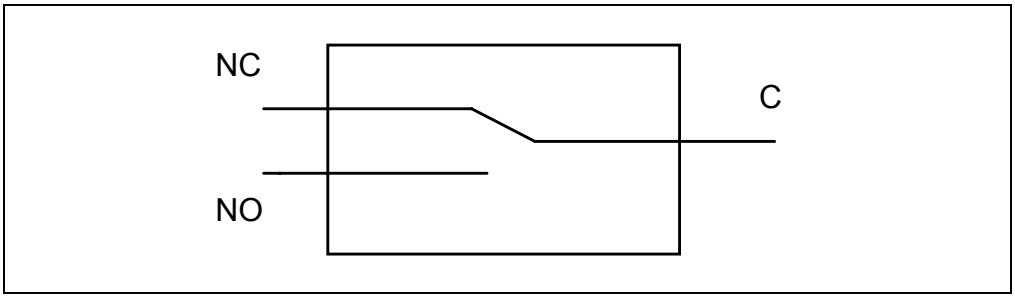


Table 10) Relay in the position OFF

When measuring the flow monitoring both relay contacts can be used simultaneously and therefore monitor two limits.

Use [▼] to enter the Relay – 1 and press **[OK].** If this option is not available in your device, this will be blocked. You can now enter the flow rate for the switching state of relay nr. 1. The relay is a switch and closes by the named value. Values between 001 (= 1 Nm³h) up to the value 99999 (= 99999 Nm³/h) can be entered. If the value is 2 – digit you can enter it directly by using the arrow buttons. If wanting to enter a higher digit number, use [►] to expand the digits.
The value can be changed by using the [►] button to reach the right position and then using [▲] and [▼] to change numbers. Use **[OK]** to affirm the right value or use **[ESC]** to end the menu. If the value should be changed again, the leading numbers have to be placed with the number zero (e.g. 0,123 for 123). Use the [▼] button to program Relay – 2 and proceed as described.

4.4. Show maximum value

Use [▼] to enter maximum value and press **[OK]** to review the maximum value for channel 1. The maximum flow rate is always the third value. The time and date shows the date of the measurement of the maximum value. Those values are measured automatically and don’t have to be entered manually.

4.5. Counter

Use [▼] to enter the counter and press **[OK]** to see the 12 counter readings.
It is possible to read the usage of pressure for every past month of the year and the total usage of the last 12 months. The counter functions automatically and will be overwritten after the 12 months period. It is not possible to reset the data.

4.6. Zero point correction

Use [▼] to enter the zero point correction and press **[OK]** to execute one.
The cursor is at the first row, which shows the actual measured zero point value in mV (milli Volt). Should this value be different from the calibrated value, this new value can be chosen by using **[OK]**. The calibrated value can be chosen at any time again by placing the cursor in this row and pressing **[OK]**.

Don’t enter any values manually – this function should only be used by specialised staff.

4.7. System

Please use [▼] to enter “System” after successfully entering the password and then press **[OK]**. This menu allows you the change general settings like time, date, language, measurement digits and the choice of the LCD filter. Please use buttons as described in the preceding chapter to set those values.

4.8. Compressor input

Use [▼] to enter menu point compressor input (if this option is available with your device) and press **[OK]** to activate or deactivate the input.Please enter the value (0 or 1) for the activation or deactivation of the digital input by using the arrow buttons up and down and affirm your choice with **[OK]**.

4.9. BUS system

4.9.1. Serial Output RS 232

The serial output RS 232 can be configured with a personal computer (PC) or a printer with serial input. A configuration of the VARIOMASS and the reception (PC or printer is necessary. The Baudrate is pre-set from 2400 to 57600 baud (Baud = Bits per Second). We recommend a Baudrate of 9600 Baud. A 9 – pin sub D plug is used with IBM standard terminal assignment. The necessary interface cable is not included in delivery.

Signal	Pin-Nr.	Description
RXD	2	Receive Data
TXD	3	Transmit Data
CTS	8	Clear To Send
RTS	7	Request to Send
GND	5	Ground

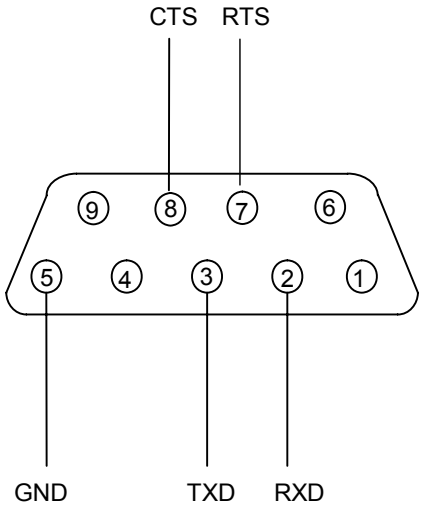


Table 11: RS 232 as 9 – PIN Sub D Plug

Note: The maximum distance between VARIOMASS and receiver is set to 10 meters.

4.9.1.2. Setting up RS 232

The configuration of the serial output is made in the menu. Please enter the menu as described beforehand. Place the cursor over the point BUS – System and press **[OK]**. The cursor will now be placed over the RS 232, press **[OK]** again.
The cursor is placed on “data output every 0 seconds”. Use **[OK]** to change this value. Insert the value (0-9) for the numbers of seconds that the data should be given out over the RS 232 and enter with **[OK].** If wanting to enter a 3 – digit number, use [►] to expand the digits. If the value should be changed again, the leading numbers have to be placed with the number zero (e.g. 0,123 for 123).

Note: In case the value is = 0 there is no interface with the RS 232. The interface is free for the data logger. If the value is >10the RS 232 is blocked for the data logger.

Use [▼] to choose menu point Baudrate. Press **[OK]** to affirm. Insert the value (0-5) by using arrows up and down to choose Baudrate according to instructions given beforehand and confirm with **[OK]** or use escape to end the menu. The pictured values for data bits, stop bits, parity and protocol can't be changed.

4.9.2 USB interface

There is an optional USB interface, instead for a RS 232 available. The plug for the USB-A is at the front of the cover by ordering the option data logger, there is a USB – interface delivered.

4.9.3 RS 485 and M-BUS interfaces

Not available yet

5. Faults reporting

After successfully entering the password, the menu follows. Use [▼] to reach errors and press **[OK]** to see fault reporting for every channel. The cursor is placed at Sensor – 1 “error”, press **[OK]** to see fault reporting for channel 1 or choose a different channel. If the error can’t be taken care of, please send the whole device to the manufacturer.

5.1. Info

Please make use of [▼] to get to the position „Info“ in the menu. Press **[OK]** to get to the information over the manufacturer of the device. The lowest row shows the software revision number with the changing date of the MF electronic.

6. Data logger

If your MF electronic is delivered with a optional data logger, this can be parameterised over the menu. Please enter the menu as described in chapter 4.2. Choose the bullet point data logger. The window that appears will show the actual starting time and starting date of the data logger. The second row shows the stopping time and the third row shows the logging interval. The last row depicts tje free data logger capacity in Bytes and the resulting left time.

Start and Stop time

The blinking cursor is placed above the starting time of the data loger. Press **[OK]** to change the starting time. You can now change the time by using the [▲] and [▼] buttons. Use [►] to change the position of the cursor. It is not possible to change the seconds. Please proceed going right to enter the date. Press **[OK]** when all necessary values have been entered. The blinking cusor is now at the stop time. Press **[OK]** again to change the time as described beforehand. When the starting time is smaller and the stoptime bigger than the actual time, the data logger will be activated directly. When the data logger is active, the only function still available is “stop data logger”.

Direct start of data logger

Use the function “Start data logger now?” to start the data logger without entering a time frame. Use [▼] to select “start data logger now” and confirm with **[OK]** or escape with **[ESC]**.

If the data logger has been started immediately, the only function still available is “stop data logger?” as long as the data logger is active.

Important: As long as the data logger runs, there are no changes that can be made in the device. The data logger has to be stopped first, in order to make any changes.

Stop data logger

In order to stop the data logger, please go into the menu of the data logger. Place the cursor over “stop data logger?” and activate with **[OK]** or escape with **[ESC]**. Now it is possible to enter a new starting and stop point or make any changes.

Delete Data logger

The data logger can only be deleted when deactivated.

Use [▼] to select “delete data logger?” and confirm with **[OK]** in order to delete the contents of the data logger. Press **[OK]** once more to confirm that you really want to delete the saved data or use [ESC] to end the process. Once confirmed the process of deleting can take several minutes. The process can’t be stopped with Escape anymore. A note “data logger deleted” will appear once the process is closed.

7. Model Number