



Fig 1 Magneto-electrical measuring transducer MEM-PPA

### Introduction

This operating manual serves as a guide for the correct installation as well as operation and maintenance of the magneto-electrical measuring transducer (MEM-PPA).

Read the instructions carefully before installing the device and put it into operation.

Specially-designed or customised models are not included in the manual.

All instruments are carefully checked for order conformity and functional capability prior to despatch. On receiving the equipment please carry out a visual inspection to detect any damage that could have arisen during shipment. Please contact your responsible sales field service if you should discover any defects. In such cases we require the description of the defect, the type and the serial number of the device. MECON GmbH can assume no guarantee for repair work carried out by the customer without prior notification and consultation. In case of complaint, the rejected parts must be returned to us, if no other provisions have been made.

### Application

The transducer MEM-PPA is designed for the integration in the flow meter FVA 250 within the scope of volume flow measurement.

The MEM-PPA has to be installed in a housing which offers a degree of protection of at least IP20.

### Mode of operation /system structure

#### Measuring principle

The position of the float is transmitted to the pointer axis by means of a magnetic system. The measuring transducer MEM-PPA measures the field of a magnet mounted to the pointer axis (sensor signals A, B) and generates a digitalized measured value. The scale, which is generally non linear, is linearised with a maximum of 16 interpolation points in the process.

#### System structure

A display prepared for the integration of a measuring transducer MEM-PPA consists of a base plate, special bearing unit with pointer and magnet mounted on it as well as stud bolts for mounting of the MEM-PPA.

### Technical Data MEM-PPA

#### Output

Interface	Profibus-PA-Interface for digital output of the measured value.
Baud rate	31,25 kBaud

#### Electrical connection

Supply voltage $U_B$	10V...25V DC
Basic current	< 16,5 mA
Fault current	< 18 mA

#### Operating conditions

Installation conditions	Installation in housing which offers a degree of protection of at least IP20 External magnetic fields (e.g. due to adjacent valves) must be avoided.
Ambient temperature	from -20 °C to + 70 °C (due to safety regulations) A pulled-forward display has to be used when the fluid temperature is high.
Storage temperature	-40 °C to + 70 °C

#### Accuracy

• in the interpolation points	< ±0.2% of URV (upper range value)
• Influence of power supply	< 0.1 % of measured value
• Influence of ambient temperature	< ±0.5% of URV/10°K

Reproducibility typically < 0.1 % of URV

Resolution typically 0.05 % of URV

#### Conformity

<u>Electromagnetic compatibility (EMC)</u>	<ul style="list-style-type: none"> <li>• EN61000-6-2:1999</li> <li>• EN50081-1</li> <li>• EN55011:1998+A1:1999 Group1, Class B</li> <li>• NAMUR NE21</li> </ul>
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#### Safety data

EEX ia IIC T6 (-40°C ... +70°C)
$U_i$ = 25 V DC
$I_i$ = 280 mA
$P_i$ = 2 W
$L_i$ < 10 µH
$C_i$ < 5 nF
BVS 07 ATEX E 033

## Installation and operating instructions

The shield must be connected on both sides (Fig 2).

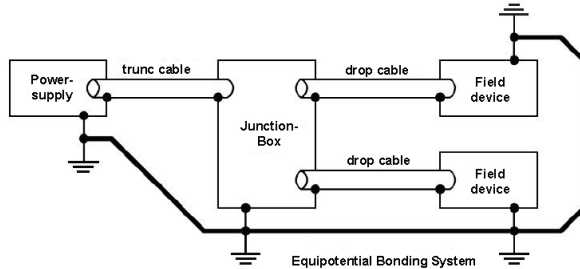


Fig 2 Combination of shielding and grounding  
(Source: PNO Profibus-PA user and Installation Guideline Version 1.1 9/96)

Equipotential bonding in accordance with the explosion protection guidelines must be ensured in this case. The shield is connected in the special EMC cable gland (Fig 3).

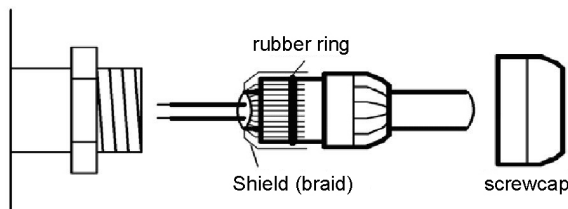


Fig 3 Connecting the cable shield in the cable gland

## Installation procedure

Remove the cover.

Connect the signal lines and shield. The outer shield (braid) is connected in the cable gland. The signal cores are connected to terminals 7 and 8. There is no need to observe polarity when making these connections.

The unmarked terminals do not have an electrical function (Fig 4).

Remount cover.

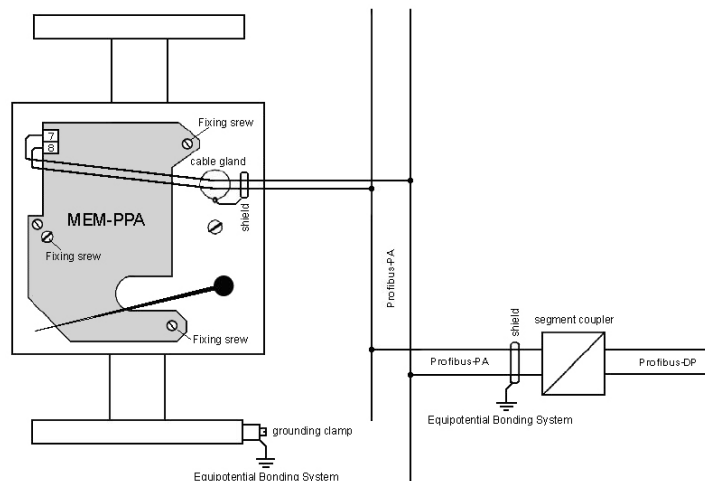


Fig 4 Connecting the MEM-PPA to the PROFIBUS-PA

## Checking the function

The measured value can be read out shortly after the supply voltage has been switched on.

Due to the influence of the float magnet, the MEM-PPA transmitter will only output the correct value if the pointer position is brought about by moving the float. Turning the pointer will cause deviating values, but makes possible checking of the tendency.

## Retrofitting MEM-PPA

A MEM-PPA can only be retrofit on an already installed fitting under certain circumstances. If the fitting has been calibrated with a pointer axle that does not carry a measuring magnet, then the scale must be recalibrated. The reason for this is the effect of the additional measuring magnet on the float magnet.

## Certificates and Approvals

### Explosion protection

EC-Type Examination Certificate BVS 07 ATEX E 033

### CE:

The MEM-PPA Transmitter complies with the **EC Directives 94/9/EG (Explosion Protection) 89/336/EWG (Electromagnetic Compatibility)** including all changes and/or supplements published up until 21.04.01.

### PROFIBUS

The MEM-PPA transducer is checked by the test instructions according to PROFIBUS-PA Profile for Process Control Devices Version 2.0 issue status 9/1998 of IFAK, Magdeburg successfully tested.

Certificate of PNO: Z00630

Conformity with the tested prototype is confirmed by applying the CE Mark.

## PROFIBUS-PA-interface

PROFIBUS-PA divides the parameters that are important for configuring the device in the system into function blocks. These parameters can only be accessed acyclically. The function and assignment of these blocks was defined by the PROFIBUS User Organization (PNO) in the "Profile" for process control devices Rev. 2.0, Class B".

The transmitter MEM-PPA uses exclusively only Profile 3 area flowmeters, because Profile 2 doesn't know area flowmeters.

The **"physical block"** includes information about the device (e.g. type, profile or manufacturer, ...).

The **"transducer block"** contains transmitter-specific parameters (e.g. calibration factor, zero point or nominal size, ...).

The **"analog input" function block** contains the parameters for forming the output value (e.g. limit values, measuring range or time constant). The output value of this block (OUT) can also be accessed cyclically (Fig 5).

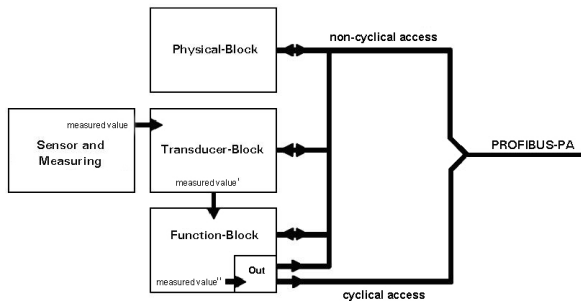


Bild 5 Block model of the MEM with PROFIBUS-PA

### GSD File

This file is shipped together with every device on a diskette or can be accessed from the PNO. It contains information for the master (e.g. baud rate or response, ...).

This file is needed for the integration of the device into the PROFIBUS-PA network and will be copied into the subdirectory defined by the programmable controller software.

Name of file: **PA139700.GSD**

### Device address

The device address is used for selecting the device in the system.

This address may only be assigned once. Note that devices with an identical address will collide during bus access.

The device address can only be set via the bus. When the device is shipped from the factory, the preset address is **126**.

Before commissioning the system, every new device must be assigned a new, unassigned address (<126).

## Cyclic communication

The master can cyclically read out the "OUT" measured value from the MEM-PPA transmitter. The measured value is represented as a 32-bit floating-point number in accordance with IEEE-754; the corresponding status is represented as an 8-bit word. The unit of the measured value can be selected (see Acyclic communication/unit of measured value).

## Assigning a meaning to the status word

The meaning of the status messages has been defined by the PROFIBUS User Organization (PNO).

The device reports the following states:

Hex	Meaning	Quality of the measuring value	Condition
0x8A	Exceeding HI-LIM	Good	Warning value exceeded
0x89	Falling below LO-LIM	Good	Measured value is falling below warnig value
0x8E	Exceeding HI-HI-LIM	Good	Alarm value exceeded
0x8D	Falling below LO-LO-LIM	Good	Alarm value exceeded
0x52	Exceeding upper	Uncertain, measured value is inaccurate	Sensor limit exceeding limit value
0x51	Falling below lower	Uncertain, measured value is inaccurate	Sensor limit falling below limit value

## Non-cyclic communication

### Parameters of the transducer block

#### Set Zero

The zero point can be shifted manually. The **"zero point"** parameter is set in the unit of flow/level/density and is continuously subtracted from the uncorrected measured value.

#### Calibration factor

The measured value is multiplied by the calibration factor. This factor is 1 when the device is shipped from the factory. The following formula is used:

$$\text{Flow rate} = (\text{uncorr. flow rate} - \text{zero point}) \cdot \text{calibration factor}$$

#### Low-flow cutoff

The unit of the low-flow cutoff is identical to the unit of the flow rate. At level/density applications this parameter should be set to zero. If the flow drops below the low-flow cutoff, the measured value will be set to zero. Hysteresis is 3%, with an unilateral effect.

## Flow direction

The flow can be assigned a sign. If the sign is negative, reverse flow turns into forward flow.

## Device mode

The MEM-PPA measures unidirectional (only forward flow).

## Filter type (Information field)

Normal, strong.

## Nominal size

This parameter can be set via the bus. When shipping the device MEM-PPA, the nominal size is factoryset.

The unit is inch. The nominal diameter must not be chosen bigger than 100 inch, because by bigger values the parameter has a special function for troubleshooting.

## The upper and the lower sensor limit

define the range for the upper-range value. The unit is identical to flow/level/density. If these limits are exceeded, an alarm will be generated.

## Self test

The MEM-PPA self test can be activated (=1) or switched off (=0). The existence of an error is displayed in the OUT state.

## Units of measured value:

The measured value for the flow rate/level/density can be acyclically read from the transducer block. The following units are available::

m <sup>3</sup>	/h,	/min,	/s,
l	/h,	/min,	/s,
USGal	/h,	/min,	/s,
IMPGal	/h,	/min,	/s,
t	/h,		
kg	/h,		
g	/h,		

Changing the unit doesn't cause calculation of measuring value or the end value.


## Parameter of Analogous Input Function Block

### Filter time constant

0 to 60 seconds, is used for damping the measured value. Damping is carried out during measured-value acquisition.

### Simulation

Instead of the measured value and the status from the transducer block, a simulation value and a simulation status can be defined. Simulation can be switched on or off (1 = ON, 0 = OFF).



**Caution!**  
The simulation must be manually switched off. The simulation will be terminated when the device is switched off and on.

### PVScale

Based on the measured value for the flow rate (see transducer block), the relative value is calculated first. *PVScale* parameter (consisting of 100% = URV, 0% = LRV, unit of the measured value (PVScale))

The measured value unit must be identical to the unit of the transducer block. Measured value, URV and LRV e.g. in l/h

$$(Q \text{ in } \%) = \frac{(\text{meas.value } Q) - PVScale_{0\%}}{PVScale_{100\%} - PVScale_{0\%}}$$

In this block are all parameters summarized, which concern the recording of the measuring value of the MEM-PPA.

### OUTScale

In the next step the absolute value for the output is calculated on the relative value. *OUTScale* parameter (consisting of 100%=URV = end value, 0% = beginning value, output unit):

$$OUT = (Q \text{ in } \%) \cdot (OUTScale_{100\%} - OUTScale_{0\%}) + OUTScale_{0\%}$$

The units for the parameter block *OUTScale* are identical to the Transducer block/Measuring unit.

### HI-LIM / HI-ALM (upper warning limit)

If the limit is exceeded, a warning will be issued.

### HI-HI-LIM / HI-HI-ALM (upper alarm limit)

If the limit is exceeded, an alarm will be issued.

### LO-LIM / LO-ALM (lower warning limit)

If the measured value falls below this limit, a warning will be issued.

### LO-LO-LIM / LO-LO-ALM (lower alarm limit)

If the measured value falls below this limit, an alarm will be issued.

### Hysteresis

Of limit values has a one-sided effect.

### OUT

Here the value „OUT“ can be read acyclically.

### Factory Reset (acyclic communication)

The „factory reset“ command resets several parameters to their default values.

- Device address: 129
- Filter time constant: 3 seconds
- Low-flow cutoff: 0
- Reset of *TAG*, *Descriptor*, *Date*

A factory reset causes that the parameter blocks PV-Scale, OUT-Scale and Limit values are reseted to the basic unit m<sup>3</sup>/h.

## Maintenance

The MEM-PPA is maintenance-free. In the case of a malfunction the MEM-PPA can be replaced. A malfunction has, for example, occurred when the output current supplied by the device differs considerably from the expected value (e.g. difference cannot be explained with a temperature drift).

If there is a justified doubt as to the operation of the device, the device must be returned to the manufacturer. The device must not be repaired by the user.