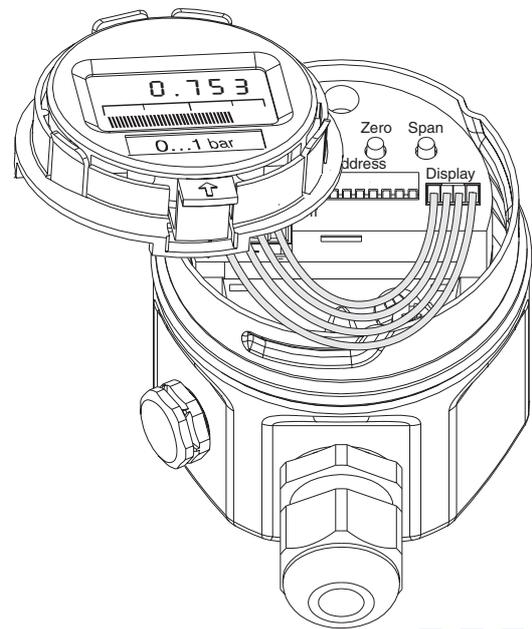
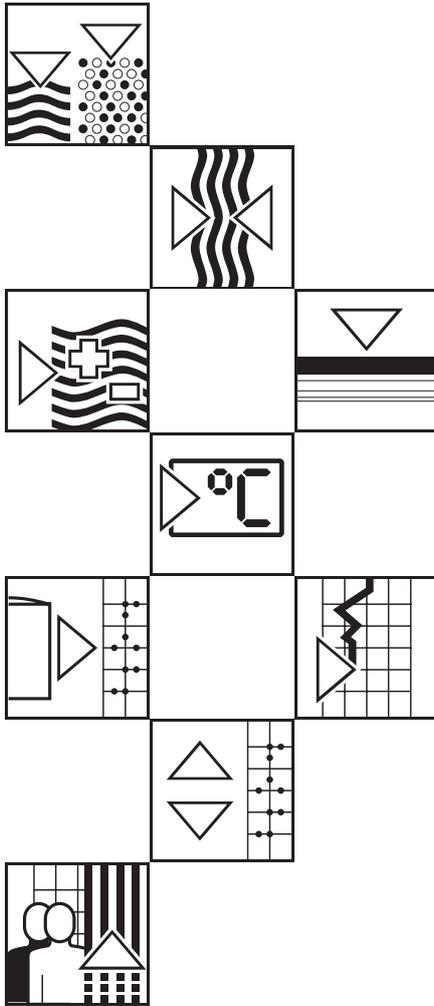


cerabar M PROFIBUS-PA Pressure Transmitter

Operating Instructions



Endress + Hauser

The Power of Know How



Brief Operating Instructions

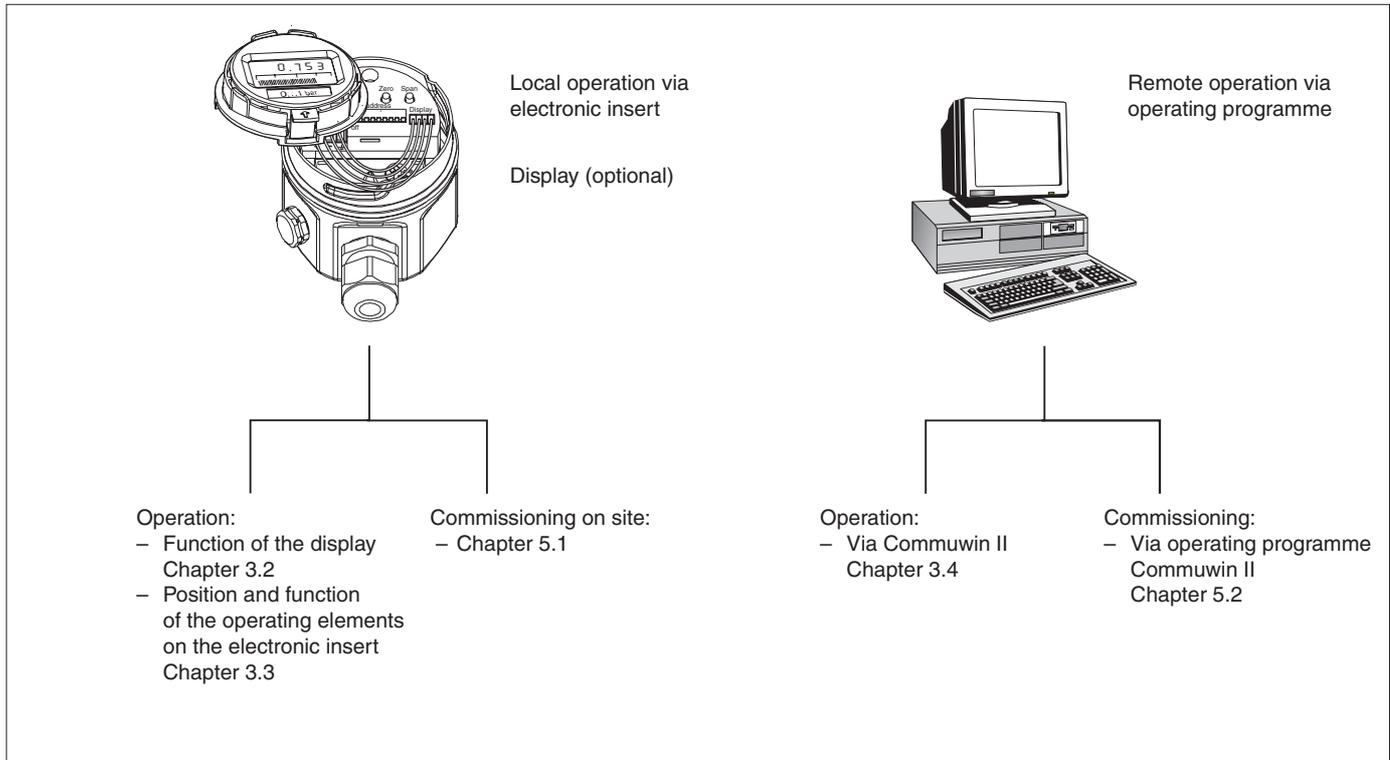


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Software History

Software version	Device and software no.	Changes	Remarks
1.0	8210	–	Profile 3.0
1.1	8211	–	–
1.2	8212	–	–

Safety Conventions and Symbols

In order to highlight safety-relevant or alternative operating procedures in the manual, the following conventions have been used, each indicated by a corresponding icon in the margin.

Safety conventions

Symbol	Meaning
 Note!	Note! A note highlights actions or procedures which, if not performed correctly, may indirectly affect operation or may lead to an instrument response which is not planned.
 Caution!	Caution! Caution highlights actions or procedures which, if not performed correctly, may lead to personal injury or incorrect functioning of the instrument.
 Warning!	Warning! A warning highlights actions or procedures which, if not performed correctly, will lead to personal injury, a safety hazard or destruction of the instrument.

Explosion protection

	Device certified for use in explosion hazardous area If the device has this symbol embossed on its name plate it can be installed in an explosion hazardous area.
	Explosion hazardous area Symbol used in drawings to indicate explosion hazardous areas. – Devices located in and wiring entering areas with the designation "explosion hazardous areas" must conform with the stated type of protection.
	Safe area (non-explosion hazardous area) Symbol used in drawings to indicate, if necessary, non-explosion hazardous areas. – Devices located in safe areas still require a certificate if their outputs run into explosion hazardous areas.

Electrical symbols

	Direct voltage A terminal to which or from which a direct current or voltage may be applied or supplied.
	Alternating voltage A terminal to which or from which an alternating (sine-wave) current or voltage may be applied or supplied.
	Grounded terminal A grounded terminal, which as far as the operator is concerned, is already grounded by means of an earth grounding system.
	Protective grounding (earth) terminal A terminal which must be connected to earth ground prior to making any other connection to the equipment.
	Equipotential connection (earth bonding) A connection made to the plant grounding system which may be of type e.g. neutral star or equipotential line according to national or company practice.

1 Introduction

The Cerabar M pressure transmitters measure the pressure of gases, vapours, liquids and dusts and are used in all areas of chemical and process engineering.

Application

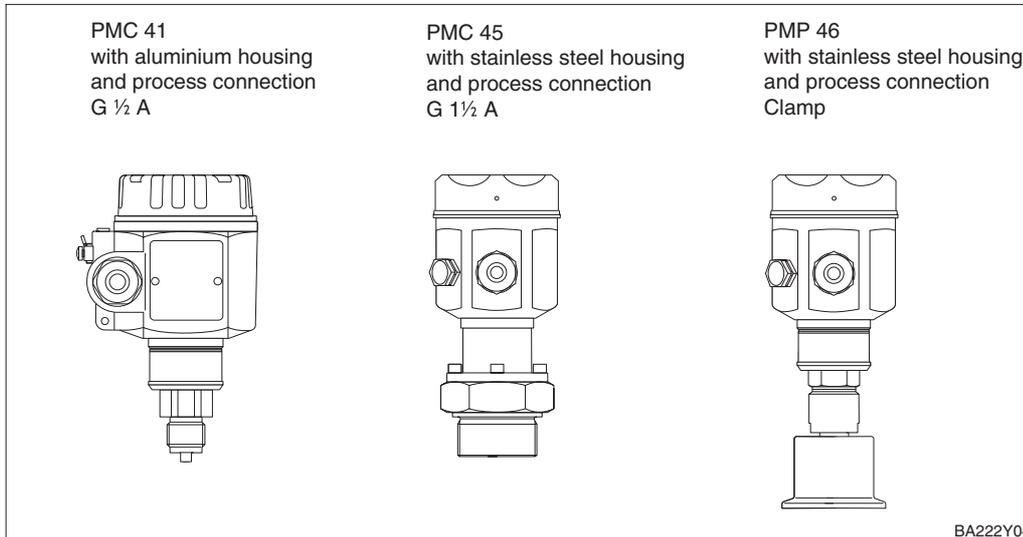


Figure 1.1
Examples for pressure transmitter Cerabar M

Ceramic measuring cell

The system pressure acts directly on the rugged ceramic diaphragm of the pressure sensor deflecting it by a maximum of 0.025 mm (0.0098 in). A pressure-proportional change in the capacitance is measured at the electrodes of the ceramic substrate and diaphragm. The measuring range is determined by the thickness of the ceramic diaphragm.

Metal measuring cell

The process pressure deflects the separating diaphragm with a filling liquid transmitting the pressure to a resistance bridge. The bridge output voltage, which is proportional to pressure, is then measured and processed.

Operating principle

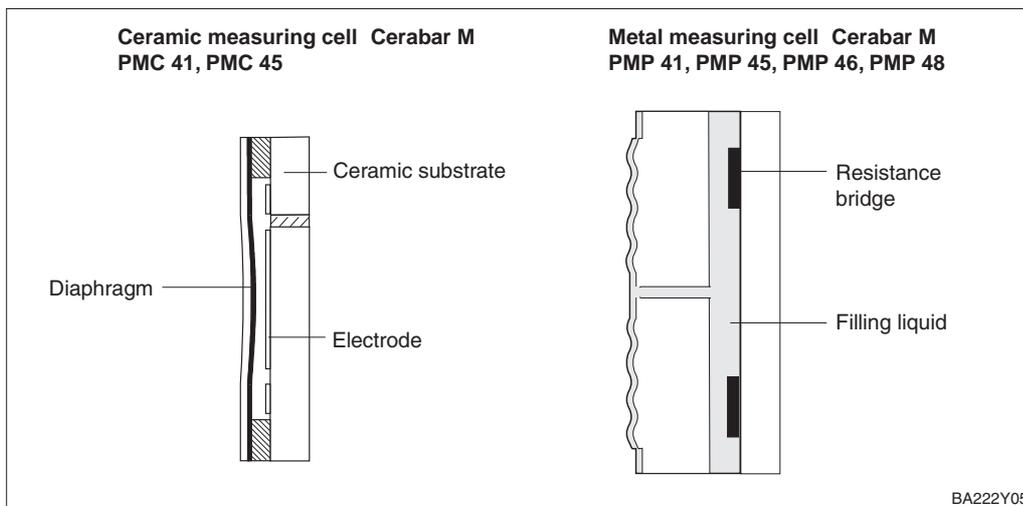


Figure 1.2
Structure of the measuring cells

1.1 Measuring system

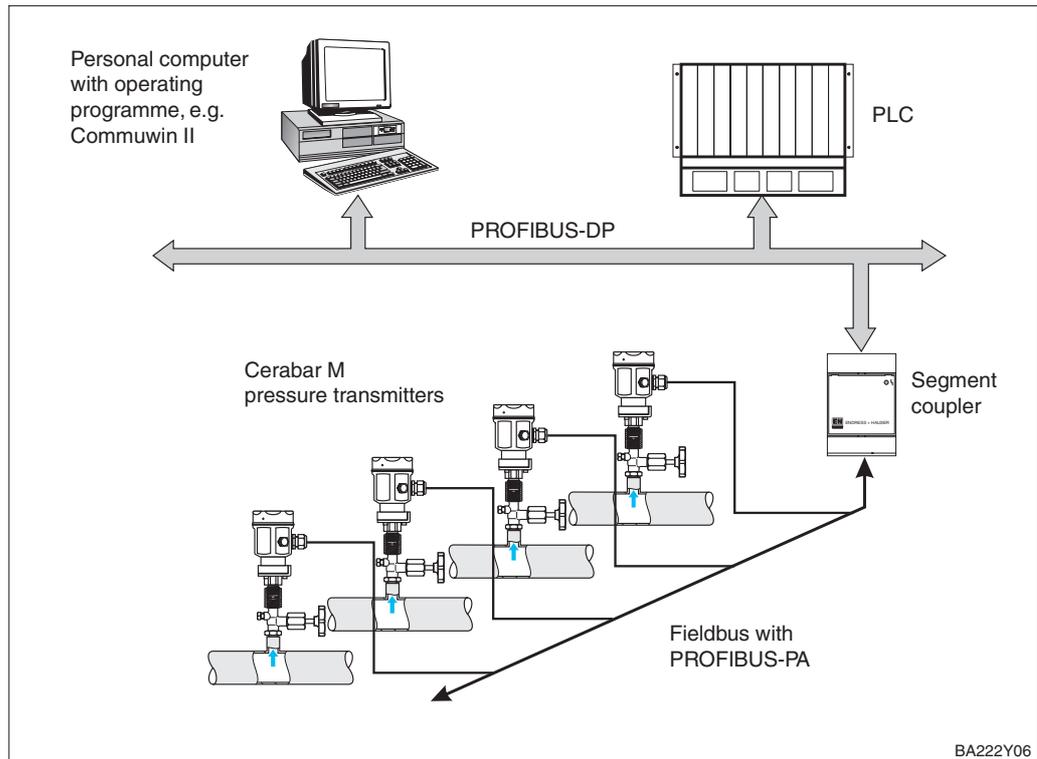


Figure 1.3
Measuring system Cerabar M
with PROFIBUS-PA protocol

Measuring system

In the simplest case, the complete measuring system comprises:

- Cerabar M transmitter with PROFIBUS-PA protocol
- PLC or personal computer with an operating programme, e.g. Commuwin II
- Segment coupler
- PROFIBUS-PA terminating resistor

Number of transmitters

The maximum number of transmitters on one bus segment is determined by their current consumption, the power of the bus coupler and the required bus length, see Operating Instructions BA 198F/00/en. In general, however, the maximum number of transmitters that can be operated on one bus segment is as follows:

- Max. 9 Cerabar M for hazardous area applications
- Max. 32 Cerabar M for non-hazardous area applications

Cerabar M consumes max. $11 \text{ mA} \pm 1 \text{ mA}$ per device.

Refer also to PROFIBUS-PA Specification EN 50170 (DIN 19245), for hazardous areas: EN 50 020, FISCO model or visit the Internet address <http://www.PROFIBUS.com>.

2 Installation

This chapter describes:

- The mechanical installation of Cerabar M with and without a diaphragm seal
- The electrical connection.

2.1 Installation instructions for PMC 41, PMC 45, PMP 41 and PMP 45

The Cerabar M without a diaphragm seal is mounted in the same way as a manometer (DIN EN 839-2). The use of shut-off valves and pigtails is recommended. The orientation depends upon the application.

**PMC 41, PMC 45,
PMP 41, PMP 45
without diaphragm seal**

- Measurement in gases:
Mount on the shut-off valve above the tapping point.

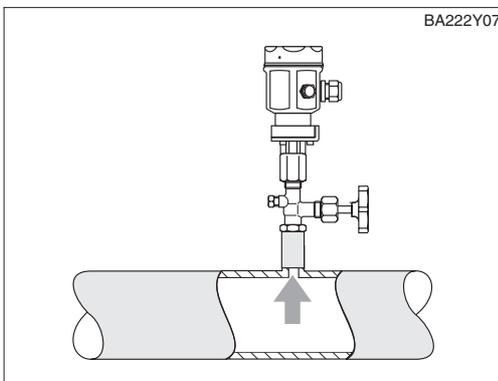


Figure 2.1
Mounting on shut-off valve for
measuring in gases

- Measurement in vapour:
Mount with pigtail below the tapping point.
The pigtail reduces the temperature in front of the diaphragm to almost ambient temperature. Before start-up, the pigtail must be filled with a filling liquid (e.g. water).

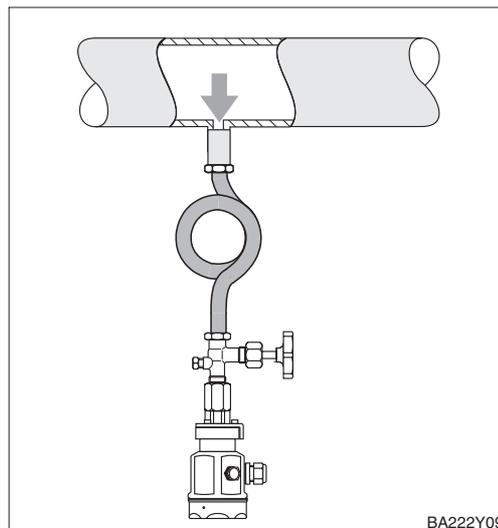
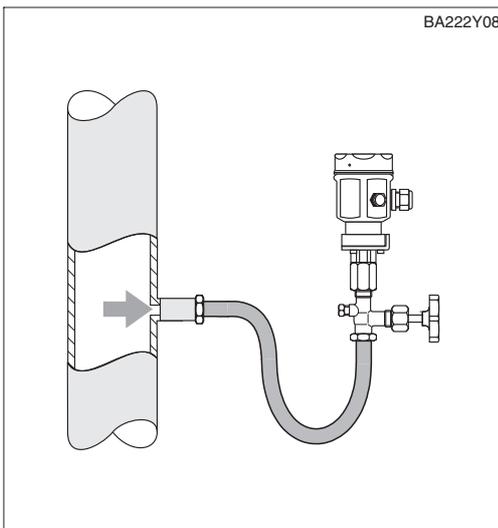


Figure 2.2
Left:
Mounting with U-shaped pigtail
for measuring in vapour
Right:
Mounting with circular pigtail
for measuring in vapour

- Measurement in liquids:
Mount on the shut-off valve below the tapping point or at the same height.

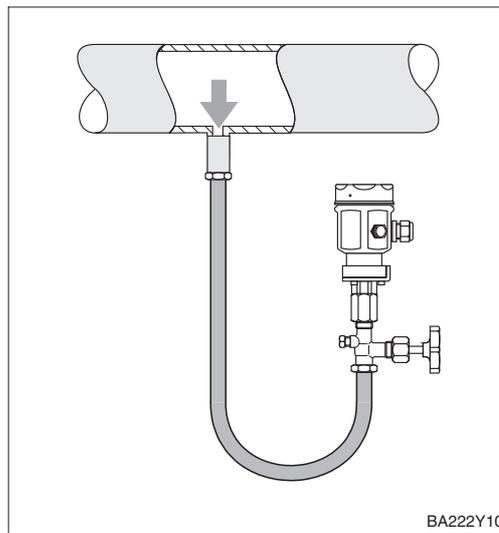


Figure 2.3
Mounting on shut-off valve for
measuring in liquids

2.2 Installation instructions for PMP 46 and PMP 48

PMP 46, PMP 48 with diaphragm seal

The Cerabar M with diaphragm seal is screwed in, flanged or clamped, depending on the type of diaphragm seal.

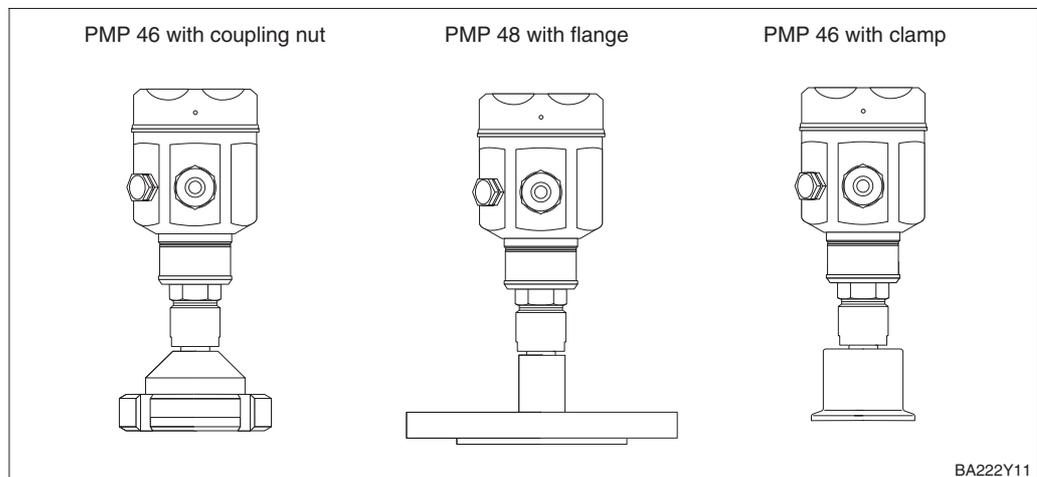


Figure 2.4
Diaphragm seal versions

- The protective cap of the diaphragm seal should only be removed just before installation in order to protect the diaphragm.
- The diaphragm of the diaphragm seal must not be dented or cleaned with pointed or hard objects.
- The diaphragm seal and the pressure sensor together form a closed, oil-filled calibrated system. The following rules should be observed:
 - The filling hole is sealed and is not to be opened.
 - The instrument should only be turned by the diaphragm seal at the point provided and not by the housing.

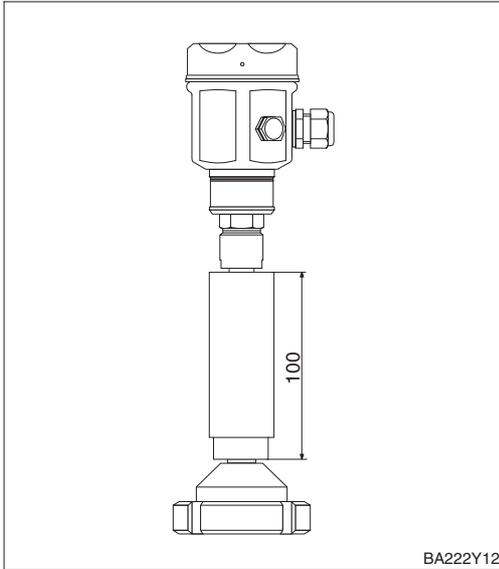


Figure 2.5
Cerabar M with temperature spacer

The use of temperature spacers is recommended for constant extreme medium temperatures of more than +150°C (+302°F) that can cause the maximum permissible ambient temperature of +85°C (+185°F) to be exceeded.

- Note when installing that the temperature spacer increases the maximum height by 100 mm (3.94 in).
- Due to the water column in the temperature spacer, the increased height also causes a zero point shift of approx. 10 mbar (0.15 psi). For position calibration (only display) or zero offset please see Chapter 5.2.

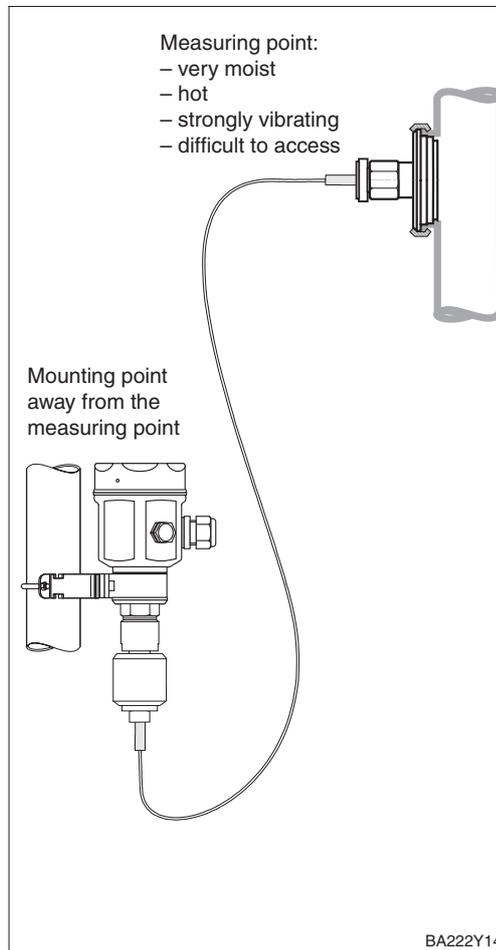
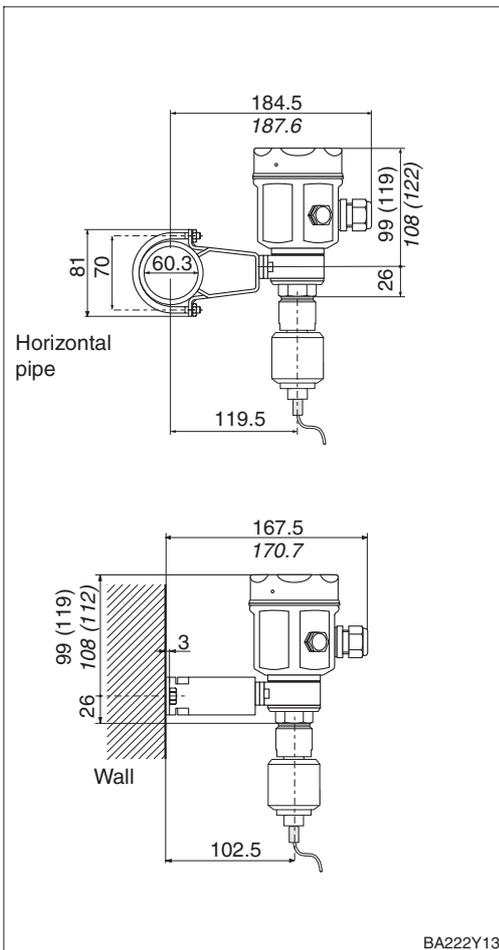
**PMP 46, PMP 48
Mounting with
temperature spacers**

To protect from high temperatures (up to +350°C/+662°F medium temperature), moisture or vibration, or where the mounting location is not easily accessible, the housing of the Cerabar M can be mounted with a capillary tube to one side of the measuring point.

A bracket for mounting on a wall or pipe is available for this.

- Material: 1.4301 (AISI 304)
- Order no.: 52001402

**PMP 46, PMP 48
Mounting with capillary
tubing**



Conversion factors

- 1 mm = 0.039 in
- 1 in = 25.4 mm

Figure 2.6
Left:
Mounting with bracket
Right:
Mounting with capillary tubing
and bracket away from the
measuring point.

Values in brackets apply to instruments with a raised cover. Values in italics apply to instruments with an aluminium housing. All dimensions are in mm.

2.3 Housing versions

- Stainless steel housing
Type F 15, material 1.4404 (AISI 316L), surface roughness $R_a < 0.8 \mu\text{m}$.
- Aluminium housing
Type F 18, material die-cast aluminium with powder coating on polyester base.

Conversion factors

1 mm = 0.039 in
1 in = 25.4 mm

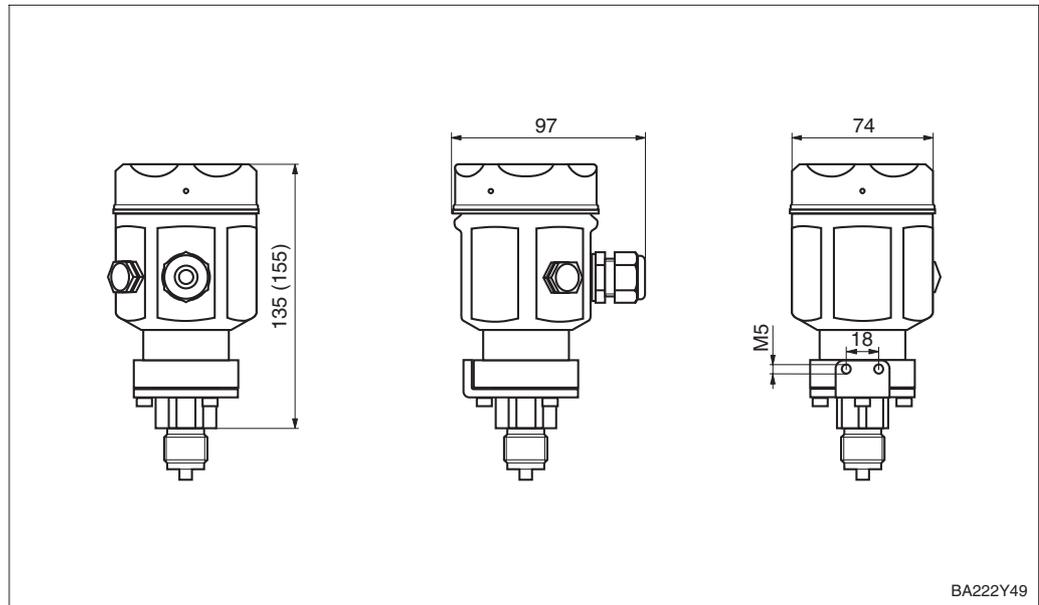


Figure 2.7
Cerabar M
with stainless steel housing.
Values in brackets apply to
instruments with a raised cover.
All dimensions are in mm.

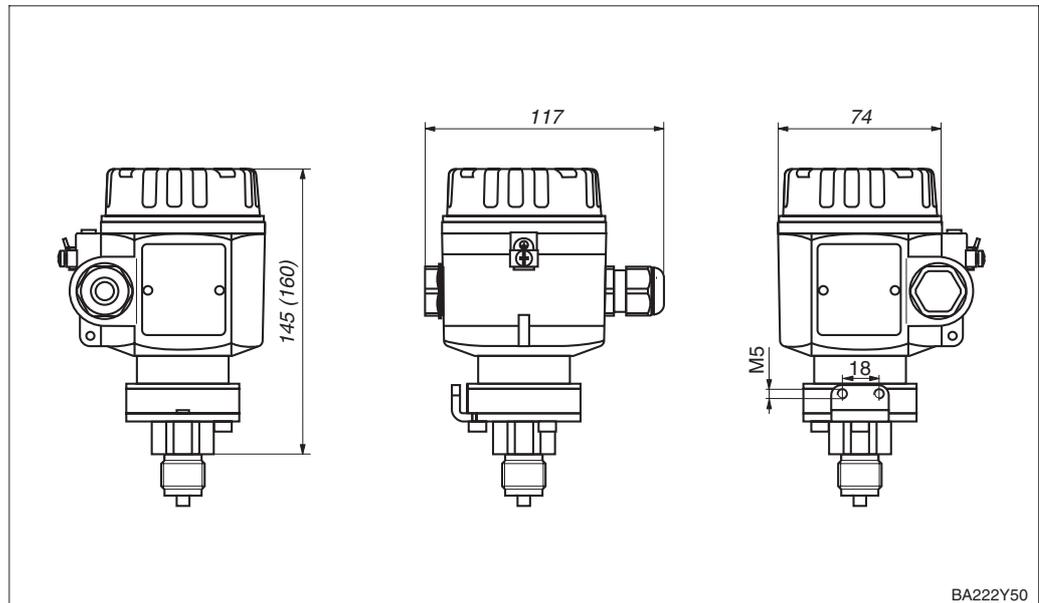


Figure 2.8
Cerabar M with
aluminium housing.
Values in brackets apply to
instruments with a raised cover.
All dimensions are in mm.

2.5 Electrical connection

General notes

Cerabar M is a two-wire transmitter with PROFIBUS-PA output. Note the following before connecting up:

- Turn off the power supply.
- Ground the device using the external ground terminal.

Power supply

The Cerabar M has the following power requirements:

$I = 11 \text{ mA} \pm 1 \text{ mA}$

Non-Ex area: $U = 9 \dots 32 \text{ V DC}$

Ex-area: $U = 9 \dots 24 \text{ V DC}$

Bus cable

Endress+Hauser recommends you use a twisted, screened twin-core cable. The following values must be observed for installation in Ex areas (EN 50020, FISCO model):

Loop-resistance (DC): $15 \dots 150 \ \Omega/\text{km}$,

Inductance per unit length: $0.4 \dots 1 \text{ mH}/\text{km}$,

Capacitance per unit length: $80 \dots 200 \text{ nF}/\text{km}$

The following are examples of suitable cable types:

Non-Ex area:

- Siemens 6XV1 830-5BH10 (grey)
- Kerpen CEL-PE/OSCR/PVC/FRLA FB-02YS(ST)YFL (grey)
- Belden 3076F (orange)

Ex area:

- Siemens 6XV1 830-5AH10 (blue)
- Kerpen CEL-PE/OSCR/PVC/FRLA FB-02YS(ST)YFL (blue)

Screening

For maximum EMC protection, e.g. near frequency convertors, it is advisable to connect the housing and cable screening using a potential matching line (PML). (Max. wire cross-section area: 2.5 mm^2 , fixed conductor).

Please pay attention to the following points:

- Ground the device using the external ground terminal.
- The bus cable screen may not be interrupted.
- Ground the screen at each end of the cable, and always try to keep the connecting cable between the screening and ground as short as possible.
- If there are large potential differences between the individual grounding points, you only need to connect one point to the reference ground. Connect all the other ends of the screen using a high frequency-capable capacitor with reference potential, (e. g. ceramic capacitor $10 \text{ nF}/250 \text{ V}\sim$).



Caution!

Caution!

The multiple grounding of the protective screen in hazardous areas is permissible only under specific conditions, see EN 60079-14.

Further information on the structure and grounding of the network are given in Operating Instructions BA 198F "PROFIBUS-PA: Guidelines for planning and commissioning" and the PROFIBUS-PA Specification EN 50170 (DIN 19245).

Connect the bus cable as follows:

- Turn off the power supply.
- If necessary, connect the external ground terminal to the potential matching line.
- Unscrew the cover.
- If present, remove the retaining ring with digital display. To do so:
 - Push up the latch with the arrow until the grip of the retaining ring is audibly released.
 - Release the retaining ring carefully to prevent the display cables from breaking. The plug of the display can remain plugged in.
- Insert the cable through the cable entry.
- Connect cable cores to terminals 1 and 2. See Figure 2.11. Reversed polarity has no effect on operation.
- Connect the screen to the internal ground terminal.
- Where appropriate, re-mount the retaining ring with digital display. The grip of the retaining ring clips in with an audible click.
- Screw down the cover.

Cable connection

Note!

Terminal 3 on the electronic insert is for grounding and is already wired internally. If the connection cable has a screening cable or earth lead within it, then this may only be connected to the internal grounding terminal of the housing and not to terminal 3. The terminals are designed to take one wire each.



Note!

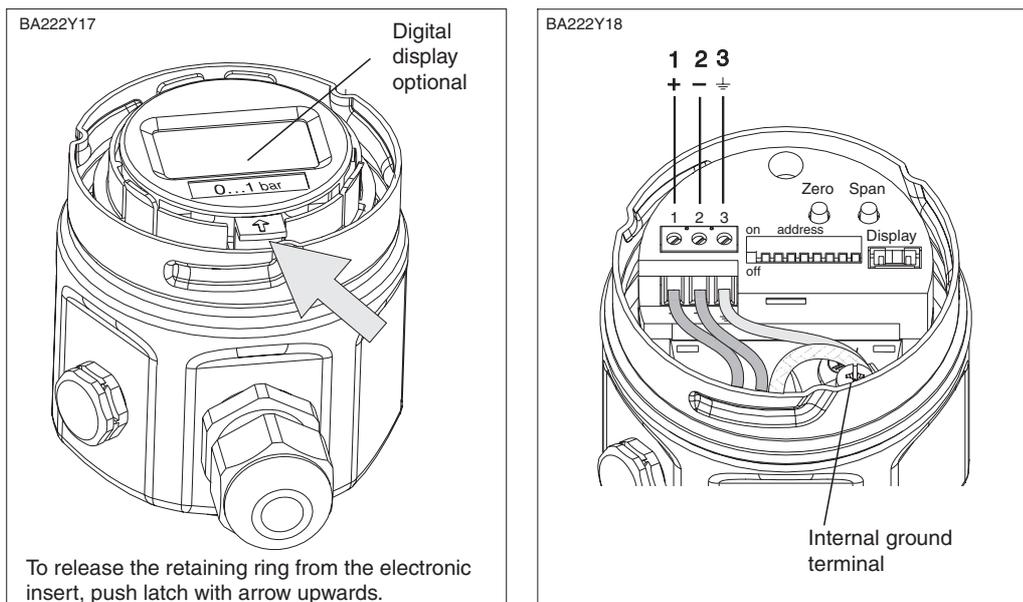


Figure 2.11
Left:
Removing cover and retaining ring with digital display
Right:
Connection

Note!

The cover of the stainless steel housing is slightly greased at the factory to make sure that it is easily screwed on and off. Endress+Hauser recommends you regrease the sealing surfaces occasionally. When doing so, however, make sure that the grease does not penetrate the sealing groove of the housing.



Note!

M12 plug

The Cerabar M PROFIBUS-PA version with M12 plug is supplied ready wired and need only be connected to the bus by means of a prefabricated cable.

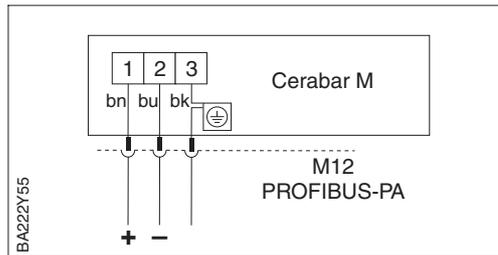
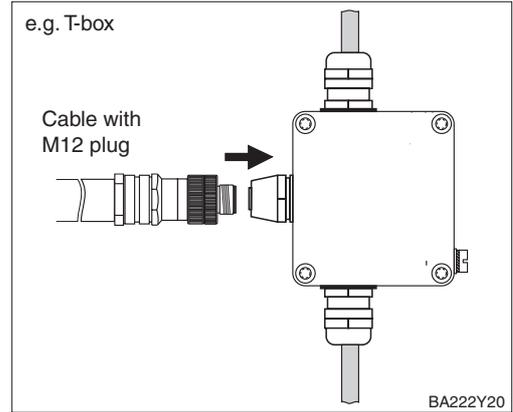
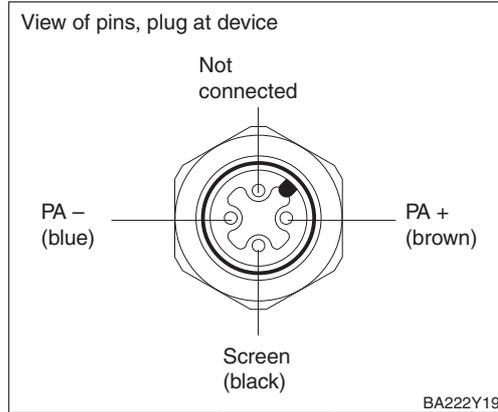


Note!

Note!

To avoid the effects of vibration, always connect the Cerabar M to the T-box using a cable.

- Push connector into the socket.
- Securely tighten the knurled screw.
- Ground the device and T-box as per the grounding system selected, see Operating Instructions BA 198F.

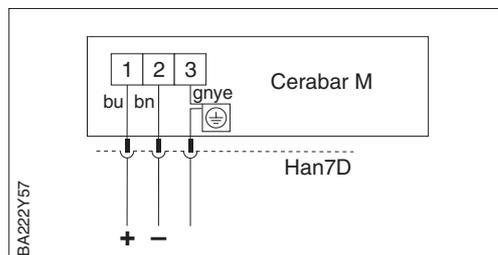
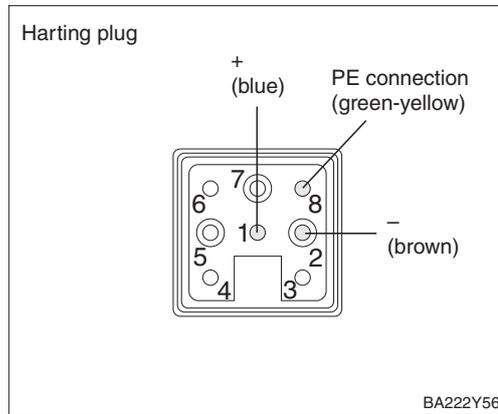


Versions:

- PM □ 4□ - □ L1 □ □ □ P □ □ □ □
- PM □ 4□ - □ L1 □ □ □ R □ □ □ □
- PM □ 4□ - □ L2 □ □ □ P □ □ □ □
- PM □ 4□ - □ L2 □ □ □ R □ □ □ □

Harting plug

Electrical connection Cerabar M PROFIBUS-PA with Harting plug Han7D:



Versions:

- PM □ 4□ - □ H1 □ □ □ P □ □ □ □
- PM □ 4□ - □ H1 □ □ □ R □ □ □ □
- PM □ 4□ - □ H2 □ □ □ P □ □ □ □
- PM □ 4□ - □ H2 □ □ □ R □ □ □ □

3 Operation

This chapter describes:

- Mounting the digital display (optional)
- Function of the digital display (optional)
- Position and function of the operating elements on the electronic insert
- Operating via Commuwin II

Contents

3.1 Access to the operating elements

The digital display is delivered already mounted when it is ordered with the instrument. In this case the digital display must be released from the electronic insert with the retaining ring before operating.

If you want to order a digital display (order no. 52008930) at a later date, then please observe the instructions in Chapter 7.6 "Mounting the digital display".

Releasing the display:

- Push up the latch with the arrow until the grip of the retaining ring on the electronic insert is audibly released.
- Release the retaining ring and lift off carefully to prevent the display cables from breaking.
- For reading the display value during operation, attach the digital display to the edge of the housing or let it hang down loosely by its cable next to the housing.

Lifting digital display (optional)

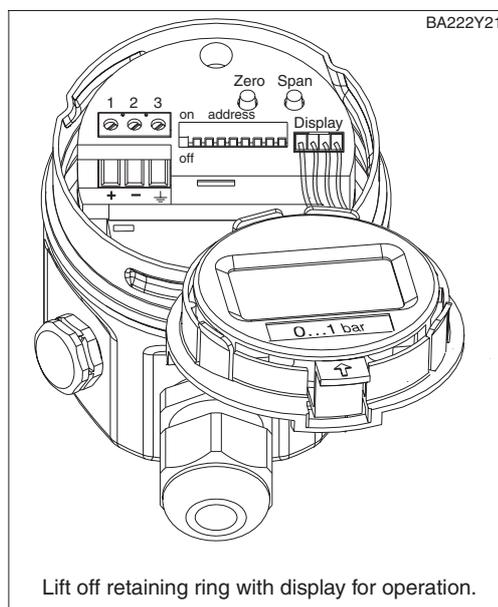
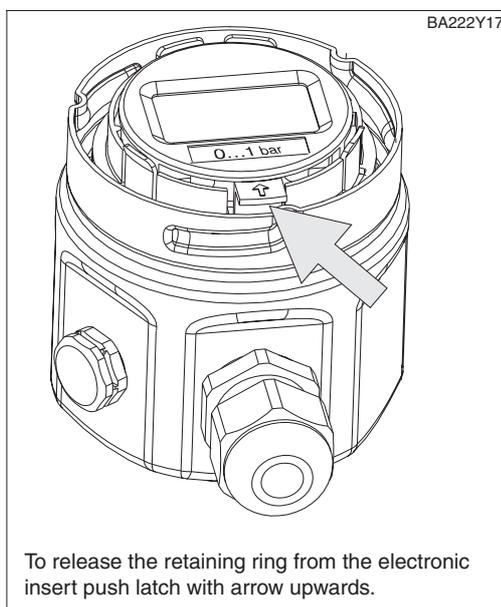


Figure 3.1
Left:
 Releasing the retaining ring
Right:
 Lifting off display with retaining ring for operation

3.2 Function of the display

The digital display (optional) has two display modes:

- Display in measurement mode: This is shown as standard
- Display in calibration mode: This is shown after pressing the Zero or Span key once. It returns automatically to measurement mode display after 2 seconds.

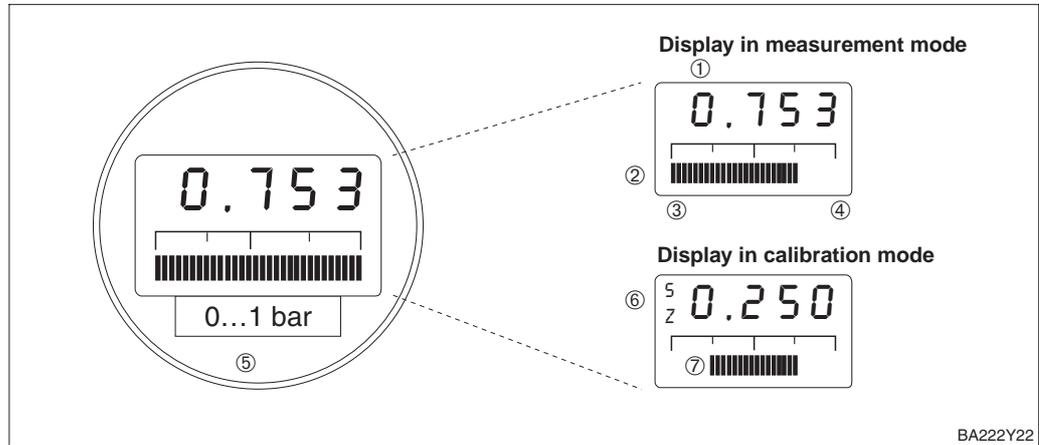
Figure 3.2
Function of the display

Display in measurement mode

- ① 4-digit display of measured values and input parameters
- ② Bar graph of measured value
- ③ Lower range value
- ④ Upper range value
- ⑤ Nominal measuring range

Additional display in calibration mode

- ⑥ Display of the calibration point (Z=Zero or S=Span)
- ⑦ Set measuring range within the limits of the measuring cell



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3.3 Position and function of the operating elements on the electronic insert

Position of the operating elements

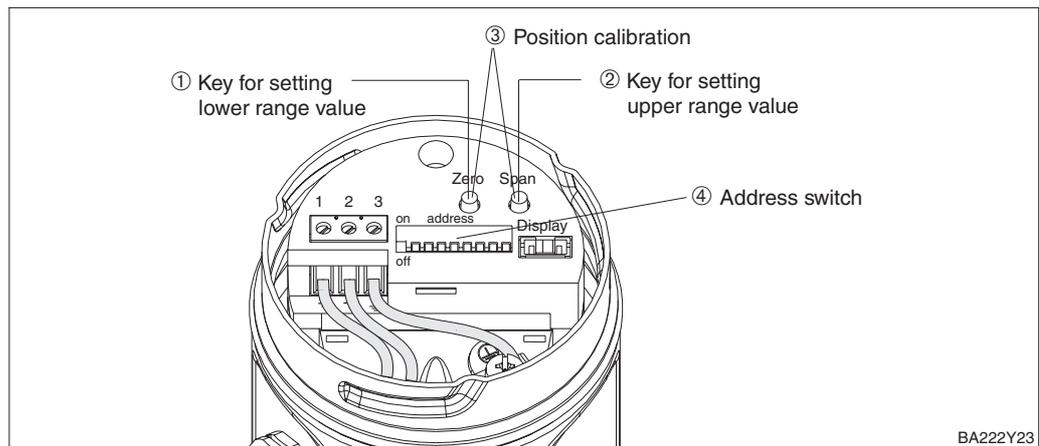


Figure 3.3
Position of the operating elements

BA222Y23

Function of the operating elements

Use the “Zero” and “Span” keys to set the lower range value and upper range value of the bar graph in the display module. These settings do not have any effect on the digital output value (OUT Value) and the “measured value” in the matrix field VOH0.

No.	Operating element	Function
①	Key for lower range value	The value currently saved for the lower range value (zero point) is displayed and the acting pressure is taken as the lower range value.
②	Key for upper range value	The value currently saved for the upper range value is displayed and the acting pressure is taken as the upper range value.
③	Bias key combination: Key for lower range value and key for upper range value	The value currently saved for the bias pressure is displayed and the acting pressure is taken as the bias pressure.
④	Address switch	Set device address in the bus (see Chapter 4.2)

If, after calibrating the lower range value, the display does not show zero at process pressure zero (dependent on position), then it can be corrected to zero by adopting a bias pressure.

3.4 Operating via Commuwin II

With the Commuwin II display and operating programme, Cerabar M can be calibrated and operated as follows:

- Via matrix operation or
- Via graphic operation.

The Cerabar M PROFIBUS-PA with software version 1.1/1.2 is contained in Commuwin II at version 2.07.01 and higher. The server PA-DPV1 must be activated via the “Connect/open connection” menu. For a description of the Commuwin II operating programme, please refer to the Operating Instructions BA 124F.

You can access the extended functions of the Cerabar M using the “Device parameter/matrix operation” menu.

- Each row is assigned to a function group.
- Every field represents a parameter.

Enter the setting parameters in the appropriate fields and confirm by pressing ↵. You can use the matrix field “Device Profile” (VAH9) to switch between the block circuit diagrams: Standard, Physical Block, Press Block and AI Transmitter.

Matrix operation (Device parameter menu)

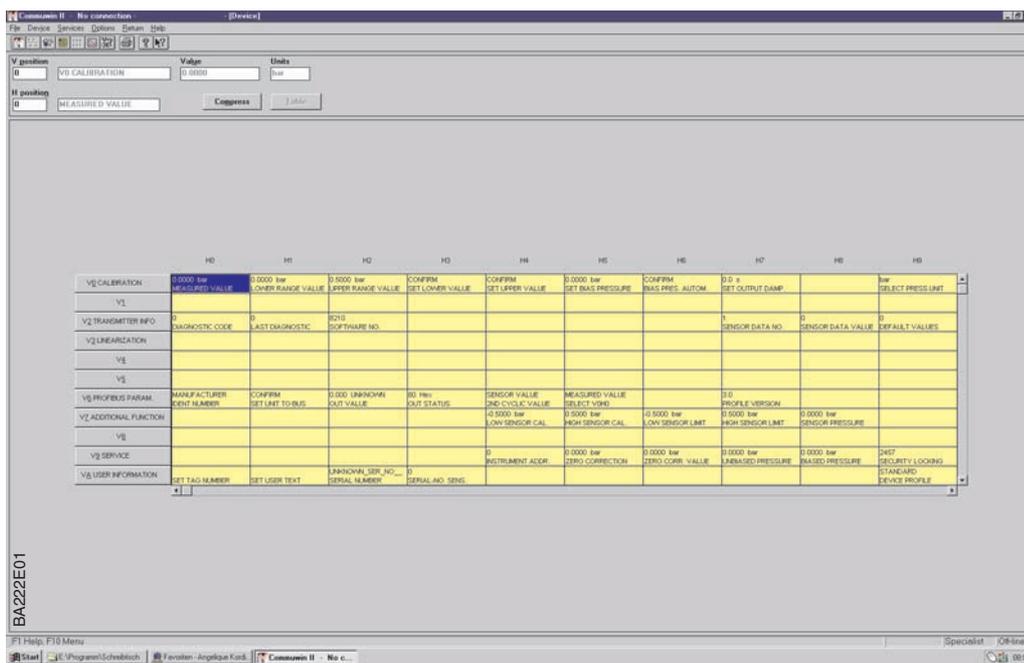


Figure 3.4 Menu “Device parameter/matrix operation” in Commuwin II

**Graphic operation
(Device parameter menu)**

Commuwin II offers graphic examples of certain configuration procedures which you can access via the “Device parameter/graphic operation” menu. There you can directly modify parameters and confirm by pressing ↵. The block profile parameters are also accessible using the graphic operation, see Chapter 4.7.

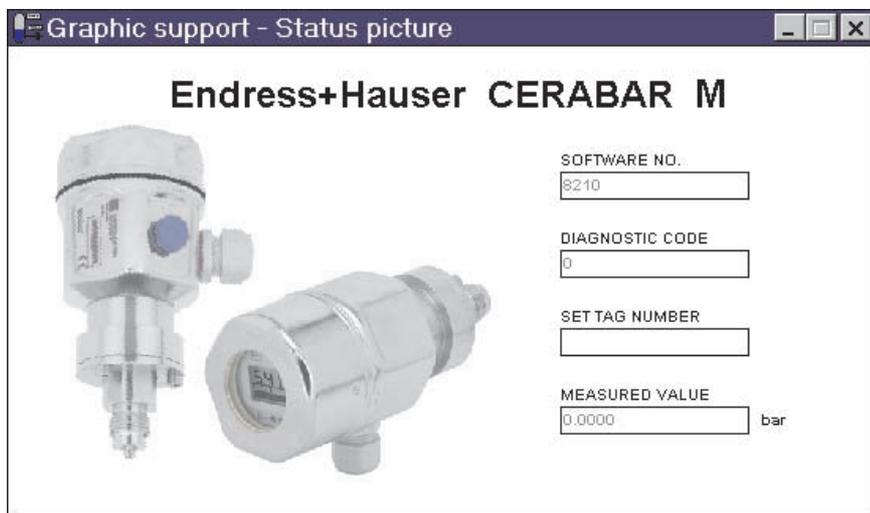


Figure 3.5
Menu “Device parameter/graphic
operation” in Commuwin II

4 PROFIBUS-PA Interface

4.1 Overview

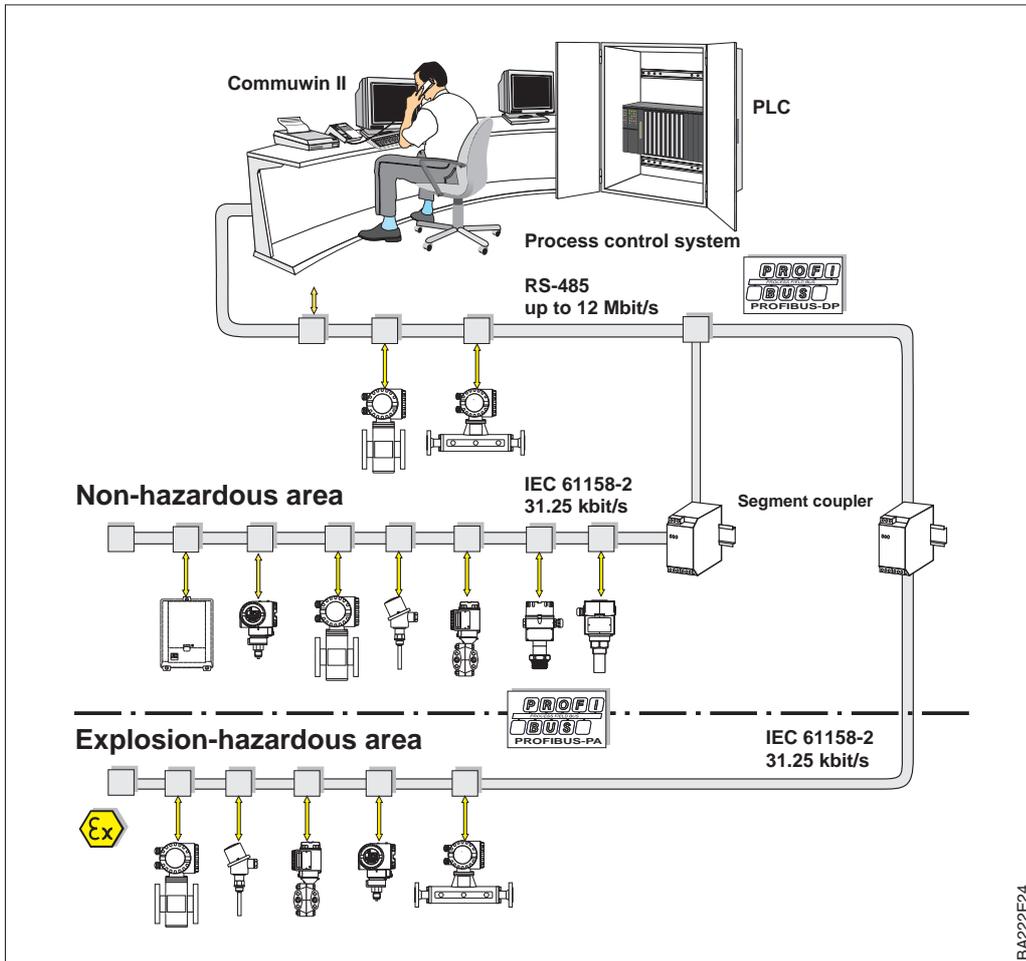


Figure 4.1
PROFIBUS-PA principle of operation

Note!

Additional planning information for PROFIBUS-PA can be found in the Operating Instructions BA 198F/00/en.



Note!

4.2 Setting the device address

Every PROFIBUS-PA device must be given an address. If the address is not set correctly, the device will not be recognised by the process control system.

- Valid device addresses are in the range from 0 to 126. All devices are delivered from the factory with the software address 126.
- A device address may appear only once within a particular PROFIBUS-PA network. Please refer also to the Operating Instructions BA 198F for further information.

The default address 126 can be used to check the function of the device and connect it to an operating PROFIBUS-PA network. Afterwards the address should be changed to allow other devices to be connected to the network.

There are two possibilities to assign an address to a Cerabar M:

- With software using an operating programme, (DP class 2 master e.g. Commuwin II) or
- Locally via DIP switches. The DIP switches are located on the electronic insert.

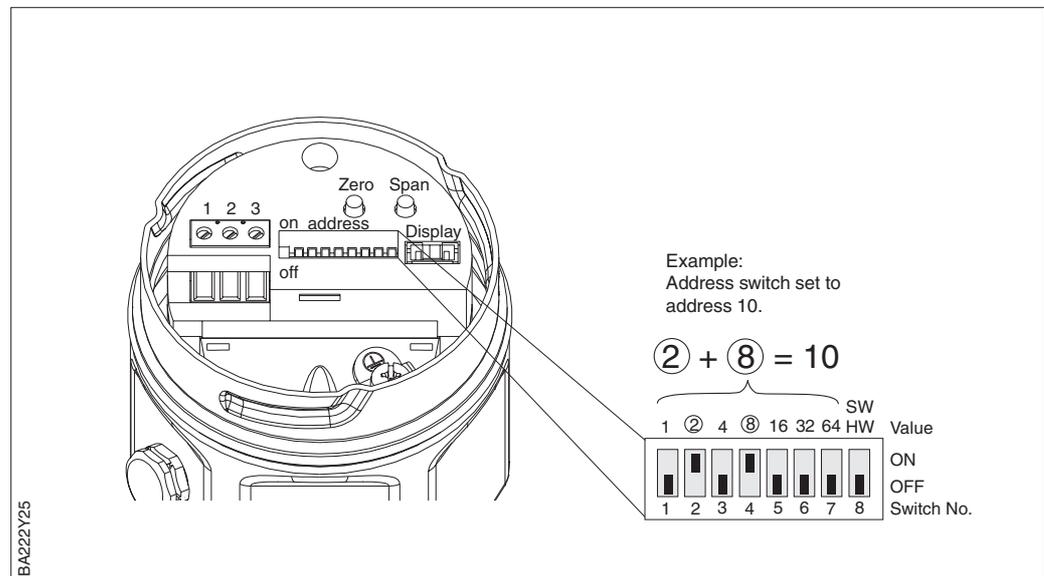


Figure 4.2
Setting device address via
address switch

Setting the addressing mode

Set the addressing mode at switch 8:

- ON = Software addressing via the bus system (default setting) (SW).
- OFF = Hardware addressing, the device address must then be set via DIP switches 1...7.

Hardware addressing

Proceed as follows to set a hardware address:

1. Set DIP switch 8 to OFF.
2. Set address using DIP switches 1 to 7 according to the table below.
3. The address change becomes effective after 10 s.

Switch no.	1	2	3	4	5	6	7
Value in position "ON"	1	2	4	8	16	32	64
Value in position "OFF"	0	0	0	0	0	0	0

Software addressing

Please refer to the Operating Instructions BA 198F for the procedure for addressing devices via software.

4.3 Device database and type files (GSD)

A device data base (GSD) contains a description of the properties of the PROFIBUS-PA device, e.g. the supported transmission rates and the type and format of the digital information output to the PLC. Bitmap files also belong to the GSD files. These allow the measuring points to be represented as a graphic. The device data base and corresponding bitmaps are required by the network design tool of the PROFIBUS-DP network.

Every device is allocated an ID number by the PROFIBUS User Organisation (PNO). This appears in the device data base file name (GSD). For Endress+Hauser, this ID number always starts with "15XX" where "XX" stands for the device name.

Name of device	ID no.:	GSD	Type file	Bitmaps
Cerabar M	151C (hex)	EH3x151C.gsd	EH3151Cx.200	EH151C_d.bmp EH151C_n.bmp EH151C_s.bmp

The full set of GSD files for Endress+Hauser devices can be obtained as follows:

- INTERNET:
Endress+Hauser → <http://www.endress.com>
then: → Products → Product Portfolios → Process Solutions
→ PROFIBUS → GSD files
PNO → <http://www.PROFIBUS.com> (GSD library)
- As CD-ROM directly from Endress+Hauser: order no. 56003894

Note!

The PNO also provides a universal database file with the designation PA_x9700.gsd for devices with one Analog Output Block. This file supports the transmission of the primary measured value. This data base file does not support the transmission of a secondary measured value (2nd Cyclic Value) or a display value (Display Value). The universal profile must be selected via matrix field V6H0 in Commuwin II.



Note!

The GSD files must be loaded into a specific subdirectory in the PROFIBUS-DP network design software of your PLC.

Working with GSD files

- GSD files and bitmaps that are located in the directory "Extended" are used for the planning software STEP7 of the Siemens S7-300/400 PLC family, for example.
- x.200 files and bitmaps that are located in the directory "Typdat5x" are used for the planning software COM ET200 with Siemens S5.
- GSD files that are located in the directory "Standard" are for PLCs that support the "identifier byte" (0x94) but not the "identifier format". These are for use with the Allen-Bradley PLC5, for example.

More details about the directories used for storing the GSD files can be found in the Operating Instructions BA 198F.

4.4 Cyclic data exchange

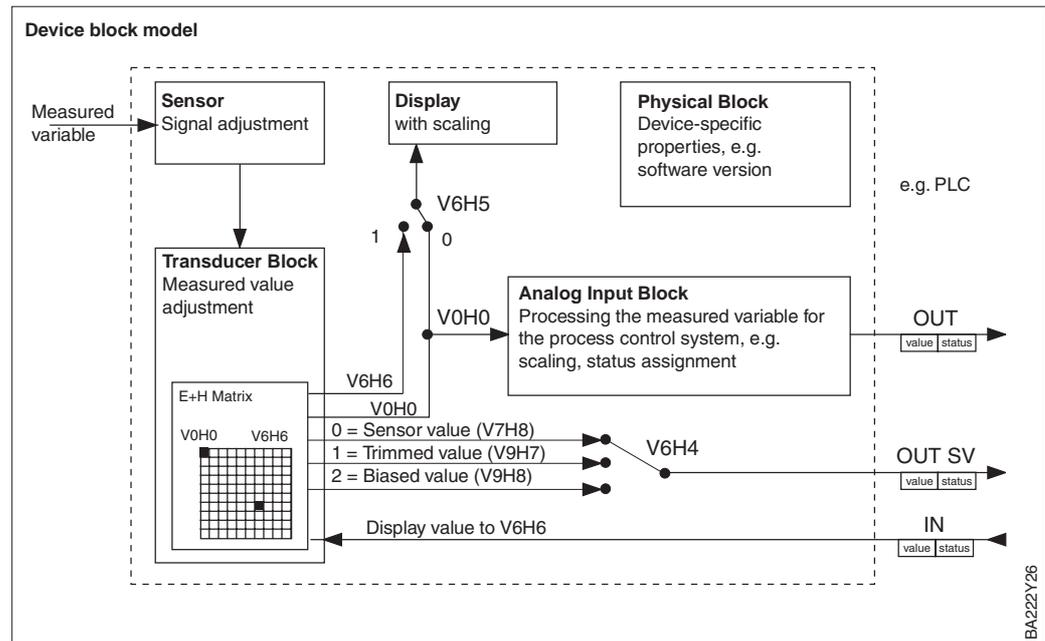


Figure 4.3
Block model for Cerabar M with
PROFIBUS-PA Profile 3.0

Values in brackets indicate the
matrix position in Commuwin II

Block model

Fig. 4.3 shows the block model of a Cerabar M. The primary measured value V0H0 is transferred from the Transducer Block to the Analog Input Block. Here, the measured value is scaled and limit values added before being output as cyclic data to the PLC as the variable OUT. A value and the related status is transmitted with the variable OUT.

The on-site display and the matrix field V0H0 normally show the same value. However, a cyclic output value (Display Value) can also be made available to the on-site display via a PLC. For this, the matrix field V6H5 in Commuwin II must be set to "Display Value" (or "1"). Example: Two Cerabar M transmitters measure the pressure drop across a filter. The differential pressure is registered in the PLC and then allocated to the matrix field V6H6.

A Cerabar M can output a secondary value to the PLC. The field V6H4 in Commuwin II allows a value to be selected.

Configuration

The data exchange is configured via a network design tool and Commuwin II.

- 1) Use the network design tool for your PLC and add the Cerabar M to the network. Ensure that the address assigned corresponds to the set device address.
- 2) Select Cerabar M and start the configuration programme. Four options appear: "Main Process Value", "2nd Cyclic Value", "Display Value" and "FREE PLACE"
- 3) Select "Main Process Value".
If no other values are required, close the configuration window, otherwise
- 4) Select "2nd Cyclic Value" or "FREE PLACE" (= function deactivated) and select "Display Value" or "FREE PLACE" (= function deactivated).
Then close the configuration window.
- 5) Start Commuwin II and open the connection to the bus using the PA-DPV1 server. Then generate a live list, locate the device address and click on "Cerabar M".
- 6) Open the device menu and select the operating matrix.
- 7) If required, select a secondary measured value via the matrix field V6H4:
0 = Sensor value, 1 = Trimmed value, 2 = Biased value.
- 8) To display a cyclic output value (Display Value) on the on-site display, set V6H5 = "Display Value" (or "1").
- 9) The data exchange is now configured for this Cerabar M.

A PLC can read the input data of Cerabar M from the response telegram of the Data_Exchange service. The cyclic data telegram has the following structure:

Cerabar M → PLC (input data)

Index input data	Data	Access	Data format/remarks
0, 1, 2, 3	Primary value, pressure	read	32-bit floating point number (IEEE-754)
4	Status code for primary value	read	See status codes
5, 6, 7, 8	Secondary value, Sensor Value, Trimmed Value or Biased Value	read	32-bit floating point number (IEEE-754)
9	Status code for secondary value	read	See status codes

The output data from the PLC to the local display are structured as follows:

PLC → Cerabar M (output data)

Index output data	Data	Access	Data format/remarks
0, 1, 2, 3	Display value	write	32-bit floating point number (IEEE-754) 4
4	Status code	write	See status codes for secondary value

The following status codes are supported by the Cerabar M for the measured value and secondary measured value:

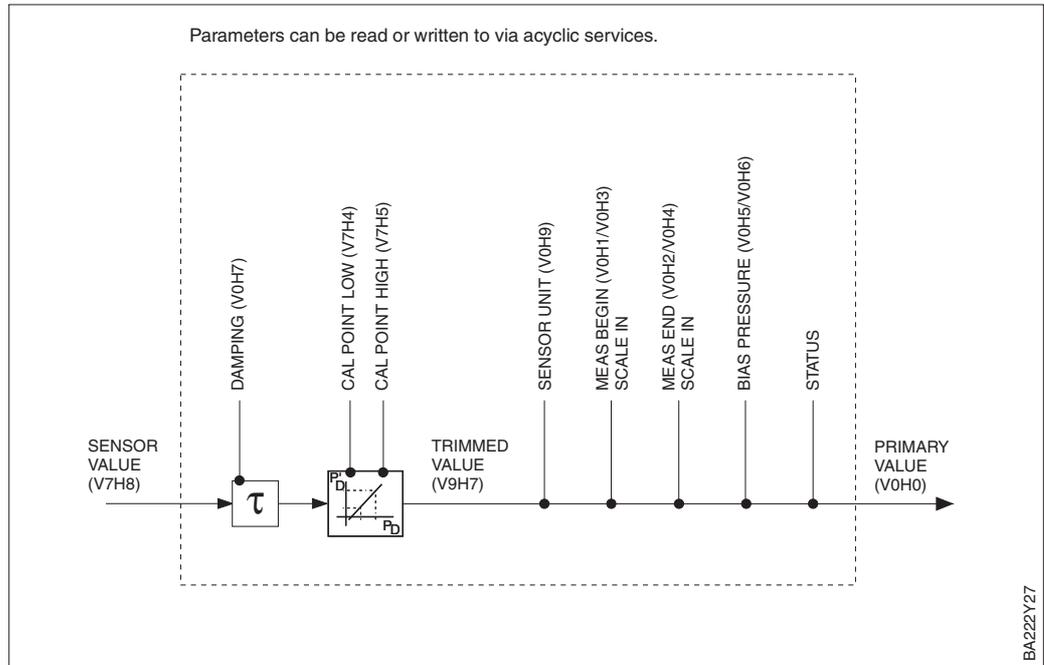
Status codes

Status code	Device status	Remarks	Primary value	Secondary value
0F Hex	BAD	Non-specific	x	x
1F Hex	BAD	Out-of-service (target mode)	x	
47 Hex	UNCERTAIN	Last usable value (fail-safe mode active)	x	
4B Hex	UNCERTAIN	Ersatzmenge (fail-Safe-Mode aktiv)	x	
4F Hex	UNCERTAIN	Initial value (fail-safe mode active)	x	
5C Hex	UNCERTAIN	Configuration error (limits not set correctly)	x	
80 Hex	GOOD	OK	x	x
84 Hex	GOOD	Active block alarm (static revision incremented)	x	
89 Hex	GOOD	LOW_LIM (alarm active)	x	
8A Hex	GOOD	HI_LIM (alarm active)	x	
8D Hex	GOOD	LOW_LOW_LIM (alarm active)	x	
8E Hex	GOOD	HI_HI_LIM (alarm active)	x	

4.5 Acyclic data exchange

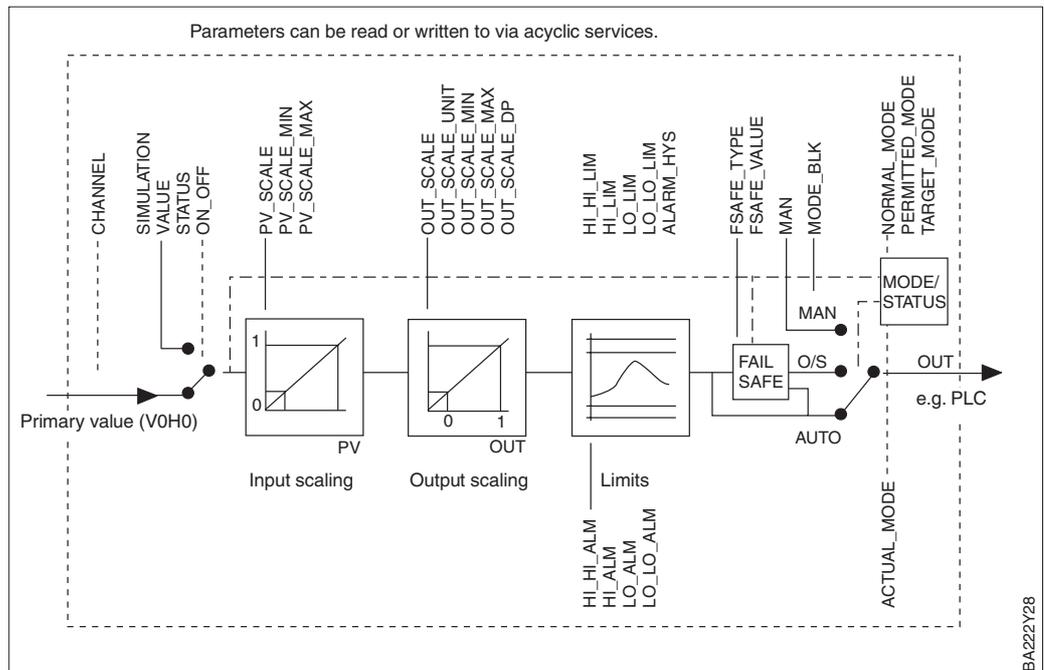
The device parameters in the Physical Block, Transducer Block and Analog Input Block, see Fig. 4.3, and in the device management PROFIBUS-DP class 2 master can be accessed using the acyclic service. Figs. 4.4 and 4.5 show block models of the Transducer Block and Analog Input Block. A full description of the device management, standard parameters and the Physical Block can be found in the Operating Instructions BA 198F.

Figure 4.4
Schematic diagram of the Cerabar M Transducer Block. Parameters with information on a matrix field (in brackets) can also be accessed using Commuwin II.



Note!
As standard, the OUT Value is transmitted in the unit indicated on the nameplate.

Figure 4.5
Schematic diagram of the Cerabar M Analog Input Block



The device parameters are listed in the following tables. The parameters are accessed via the slot and index number. The Analog Input Block, Transducer Block and Physical Block contain standard parameters, block parameters and manufacturer-specific parameters.

Slot/index table

If Commuwin II is the operating programme used, then the matrix field and the graphic operation are available as the user interface. As soon as the standard operating parameters are made available to a device block, then every parameter change is automatically displayed in the block parameters. The dependencies are indicated in the “E+H matrix” column. See also Figs. 4.4 and 4.5.

Parameter	E+H matrix	Slot	Index	Size (bytes)	Type	Read	Write	Storage class
Directory object header		1	0	12	Array of UNSIGNED16	X		C
Composite list directory entries		1	1	24	Array of UNSIGNED16	X		C
GAP directory continuous		1	2-8					
GAP reserved		1	9-15					

Device management

Parameter	E+H matrix	Slot	Index	Size (bytes)	Type	Read	Write	Storage class
Standard parameters								
AI Block data		1	16	20	DS-32*	X		C
Static revision		1	17	2	UNSIGNED16	X		N
Device tag	VAH0	1	18	32	OSTRING	X	X	S
Strategy		1	19	2	UNSIGNED16	X	X	S
Alert key		1	20	1	UNSIGNED8	X	X	S
AI Target mode		1	21	1	UNSIGNED8	X	X	S
AI Mode block		1	22	3	DS-37*	X		D/N/C
AI Alarm summary		1	23	8	DS-42*	X		D
Batch		1	24	10	DS-67*	X	X	S
Gap		1	25					
Block parameters								
OUT	V6H2/3	1	26	5	DS-33*	X		D
PV scale		1	27	8	Array of FLOAT	X	X	S
OUT scale		1	28	11	DS-36*	X	X	S
Linearisation type		1	29	1	UNSIGNED8	X	X	S
Channel		1	30	2	UNSIGNED16	X	X	S
Gap		1	31					
PV fail safe time		1	32	4	FLOAT	X	X	S
Fail safe type		1	33	1	UNSIGNED8	X	X	S
Fail safe value		1	34	4	FLOAT	X	X	S
Alarm Hysteresis		1	35	4	FLOAT	X	X	S
Gap		1	36					
HI HI Limit		1	37	4	FLOAT	X	X	S
Gap		1	38					
HI Limit		1	39	4	FLOAT	X	X	S
Gap		1	40					
LO Limit		1	41	4	FLOAT	X	X	S
Gap		1	42					
LO LO Limit		1	43	4	FLOAT	X	X	S
Gap		1	44-45					
HI HI Alarm		1	46	16	DS-39*	X		D
HI Alarm		1	47	16	DS-39*	X		D
LO Alarm		1	48	16	DS-39*	X		D
LO LO Alarm		1	49	16	DS-39*	X		D
Simulate		1	50	6	DS-50*	X	X	S
OUT unit text		1	51	16	OSTRING	X	X	S
Gap reserved		1	52-60					
Gap		1	61-65					

Analog Input Block

* See Chapter 4.6, Section “Data strings” or PROFIBUS-PA Specification Part 1.
 C = constant, N = non-volatile (remains stored), S = static (revision counter incremented by 1), D = dynamic

Physical Block

Parameter	E+H matrix	Slot	Index	Size (bytes)	Type	Read	Write	Storage class
Standard parameters								
PB Block data		1	66	20	DS-32*	X		C
Static revision		1	67	2	UNSIGNED16	X		N
Device tag	VAH0	1	68	32	OSTRING	X	X	S
Strategy		1	69	2	UNSIGNED16	X	X	S
Alert key		1	70	1	UNSIGNED8	X	X	S
PB Target mode		1	71	1	UNSIGNED8	X	X	S
PB Mode block		1	72	3	DS-37*	X		D/N/C
PB Alarm summary		1	73	8	DS-42*	X		D
Block parameters								
Software revision		1	74	16	OSTRING	X		C
Hardware revision		1	75	16	OSTRING	X		C
Device manufacturer identity		1	76	2	UNSIGNED16	X		C
Device identity		1	77	16	OSTRING	X		C
Device serial number	VAH2	1	78	16	OSTRING	X		C
Diagnosis		1	79	4	OSTRING	X		D
Diagnosis extension		1	80	6	OSTRING	X		D
Diagnosis mask		1	81	4	OSTRING	X		C
Diagnosis mask extension		1	82	6	OSTRING	X		C
Device certification		1	83	32	OSTRING	X		N
Security locking	V9H9	1	84	2	UNSIGNED16	X	X	N
Factory reset	V9H2	1	85	2	UNSIGNED16		X	S
Descriptor		1	86	32	OSTRING	X	X	S
Device message	VAH1	1	87	32	OSTRING	X	X	S
Device installation date		1	88	16	OSTRING	X	X	S
Gap reserved		1	89					
Identification number	V6H0	1	90	1	UNSIGNED 8	x	x	S
HW write protection		1	91	1	UNSIGNED 8	x		D
Gap reserved		1	92-98					
Gap		1	99-103					
Matrix error code	V2H0	1	104	2	UNSIGNED16	X		D
Matrix last error code	V2H1	1	105	2	UNSIGNED16	X	X	D
UpDown features supported		1	106	1	OSTRING	X		C
UpDown control		1	107	1	UNSIGNED8		X	D
UpDown data		1	108	20	OSTRING	X	X	D
Bus address	V9H4	1	109	1	UNSIGNED8	X		D
Matrix device software number	V2H2	1	110	2	UNSIGNED16	X		C
PA set unit to bus	V6H1	1	111	1	UNSIGNED 8	x	x	S
PA input value	V6H6	1	112	6	FLOAT+U8+U8	x		D
PA select V0H0	V6H5	1	113	1	UNSIGNED8	x	x	S
PA profile revision	V6H7	1	114	16	OSTRING	x		C
Gap		1	115-119					
PA select second cyclic value	V6H4	1	120	1	UNSIGNED8	x	x	S
PA identity number		1	121	2	UNSIGNED16	x		D
PA identity string		1	122	32	OSTRING	x		C
PA DP status		1	123	1	UNSIGNED8	x		D
Gap		1	124-128					

* See Chapter 4.6, Section "Data strings" or PROFIBUS-PA Specification Part 1.

C = constant, N = non-volatile (remains stored), S = static (revision counter incremented by 1), D = dynamic

View_1 parameters

Parameter	E+H matrix	Slot	Index	Size (bytes)	Type	Read	Write	Storage class
View 1 Physical block		1	205	17	OSTRING	X		D/N/C
Gap reserved		1	206-210					
View 1 Transducer block		1	211	22	OSTRING	X		D/N/C
Gap reserved		1	212-216					
View 1 Analog Input block		1	217	18	OSTRING	X		D/N/C
Gap reserved		1	218-222					

Transducer Block

Parameter	E+H matrix	Slot	Index	Size (bytes)	Type	Read	Write	Storage class
Standard parameters								
TB Block data		1	129	20	DS-32*	X		C
Static revision		1	130	2	UNSIGNED16	X		N
Device tag	VAH0	1	131	32	OSTRING	X	X	S
Strategy		1	132	2	UNSIGNED16	X	X	S
Alert key		1	133	1	UNSIGNED8	X	X	S
TB Target mode		1	134	1	UNSIGNED8	X	X	S
TB Mode		1	135	3	DS-37*	X		D/N/C
TB Alarm summary		1	136	8	DS-42*	X		D
Block parameters								
Sensor value	V7H8	1	137	4	FLOAT	X		D
Sensor high limit	V7H7	1	138	4	FLOAT	X		N
Sensor low limit	V7H6	1	139	4	FLOAT	X		N
Calibration point high	V7H5	1	140	4	FLOAT	X	X	S
Calibration point low	V7H4	1	141	4	FLOAT	X	X	S
Calibration minimum span		1	142	4	FLOAT	X		N
Sensor unit	V0H9	1	143	2	UNSIGNED16	X	X	N
Trimmed value	V9H7	1	144	5	DS-33*	X		D
Sensor type		1	145	2	UNSIGNED16	X		N
Sensor serial number	VAH3	1	146	4	UNSIGNED32	X		N
Primary value	V0H0	1	147	5	DS-33*	X		D
Primary value unit	V0H9	1	148	2	UNSIGNED16	X	X	S
Primary value type		1	149	2	UNSIGNED16	X	X	S
Gap		1	150-157					
Secondary value 1		1	158	5	DS-33*	X		D
Secondary value 1 unit	V0H9	1	159	2	UNSIGNED16	X	X	S
Secondary value 2		1	160	5	DS-33*	X		D
Secondary value 2 unit	V0H9	1	161	2	UNSIGNED16	X	X	S
Linearisation type		1	162	1	UNSIGNED8	X	X	S
Scale in	V0H1/2	1	163	2*4	Array of FLOAT	X	X	S
Gap		1	164-177					
Gap reserved		1	178-187					
Endress+Hauser parameters								
Measure begin	V0H1	1	188	4	FLOAT	X	X	S
Measure end	V0H2	1	189	4	FLOAT	X	X	S
Automatically measure begin	V0H3	1	190	1	UNSIGNED8	X	X	S
Automatically measure end	V0H4	1	191	1	UNSIGNED8	X	X	S
Bias pressure	V0H5	1	192	4	FLOAT	X	X	S
Automatically bias pressure	V0H6	1	193	1	UNSIGNED8	X	X	S
Damping	V0H7	1	194	4	FLOAT	X	X	S
Sensor tab index	V2H7	1	195	1	UNSIGNED8	X	X	S
Sensor tab value	V2H8	1	196	4	FLOAT	X	X	S
Sensor trim off	V9H5	1	197	4	FLOAT	X		S
Sensor trim off value	V9H6	1	198	4	FLOAT	X		S
Biased pressure	V9H8	1	199	4	FLOAT	X	X	S
Gap	VAH6	1	200-204					

* See Chapter 4.6, Section "Data strings" or PROFIBUS-PA Specification Part 1.
 C = constant,
 N = non-volatile (remains stored),
 S = static
 (revision counter incremented by 1),
 D = dynamic

4.6 Data format

IEEE 754 format

The measured value is transmitted as an IEEE 754 floating point number, whereby:

$$\text{Measured value} = (-1)^{\text{Sign}} \times 2^{(E - 127)} \times (1 + F)$$

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
Sign	Exponent (E)								Fraction (F)						
	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0	2^{-1}	2^{-2}	2^{-3}	2^{-4}	2^{-5}	2^{-6}	2^{-7}
Fraction (F)															
2^{-8}	2^{-9}	2^{-10}	2^{-11}	2^{-12}	2^{-13}	2^{-14}	2^{-15}	2^{-16}	2^{-17}	2^{-18}	2^{-19}	2^{-20}	2^{-21}	2^{-22}	2^{-23}

Figure 4.6
IEEE-754 floating point number

Example

40 F0 00 00 hex = 0100 0000 1111 0000 0000 0000 0000 0000 binär

$$\begin{aligned} \text{Value} &= (-1)^0 \times 2^{(129 - 127)} \times (1 + 2^{-1} + 2^{-2} + 2^{-3}) \\ &= 1 \times 2^2 \times (1 + 0.5 + 0.25 + 0.125) \\ &= 1 \times 4 \times 1.875 \\ &= 7.5 \end{aligned}$$

Note!



Note!

- Not all PLCs support the IEEE 754 format. For this reason a conversion module must often be used or written.
- Depending on how the data are stored in the PLC (MSB or LSB), it might be necessary to use a byte swapping routine in the PLC.

Data strings

Some data types, e.g. DS-36, are marked with an asterisk in the slot/index table, (pages 25 to 27). These data types are data strings that are structured according to the PROFIBUS-PA Specification Part 1, Version 3.0. They comprise several elements that are addressed via the slot, index and sub-indices, as shown in the following two examples:

Parameter type	Slot	Index	Element	Sub-index	Type	Size
DS-33	1	26	OUT Value	1	FLOAT	4
			OUT Status	5	UNSIGNED8	1

Parameter type	Slot	Index	Element	Sub-index	Type	Size
DS-36		27	OUT Scale Max.	1	FLOAT	4
			OUT Scale Min.	5	FLOAT	4
			OUT Scale Unit.	9	UNSIGNED16	2
			OUT Scale DP (decimal point).	11	INTEGER8	1

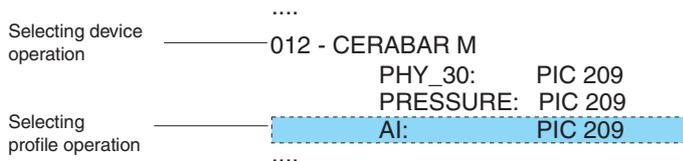
4.7 Configuration of parameter profiles

You can access the block parameters via a PROFIBUS-DP class 2 master, such as Commuwin II. Commuwin II runs on an IBM-compatible computer or laptop. The computer must be equipped with a PROFIBUS interface, i.e. PROFIBOARD for PCs and PROFICARD for laptops. During the system integration, the computer is registered as a class 2 master.

The PA-DPV1 server must be installed for operation. The connection to Commuwin II is opened from the PA-DPV1 server.

Operation

- Generate a live list with “tags”.



- Select the E+H device operation by clicking on the device name, e.g. Cerabar M.
- Select the profile operation by clicking on the appropriate tag, e.g. AI: PIC 209 = Analog Input Block Cerabar M, or by selecting the appropriate device profile in the graphic operation.
- The settings are then entered in the device parameter menu.

The device parameter menu in Communwin II allows “matrix operation” or “graphic operation” to be selected.

Device parameter menu

- In the case of matrix operation, the device or profile parameters are displayed in a matrix. A parameter can be changed when the corresponding matrix field is selected.
- In the case of graphic operation, the operating sequence is shown in a series of graphics with parameters. For profile operation, the graphics *Diagnosis*, *Scaling*, *Simulation and Block* are of interest.

Output scaling

The Cerabar M on-site display and the digital output operate completely independently of each other. As standard, the output value (OUT Value) is transmitted in the unit specified on the nameplate.

Digital output value (OUT Value) = Display value of the on-site display

So that the display and the digital output produce the same value, the following operating options are available:

- Set as equal the values for the lower and upper limits of PV Scale and OUT Scale in the Analog Input Block; PV Scale min. = OUT Scale min. and PV Scale max. = OUT Scale max. Please refer also to this Chapter, “Slot/index table” and Chapter 9.2 “Matrix Analog Input Block”,
- Scale the limits of PV Scale and OUT Scale in Commuwin II in graphic mode, refer to figure below or
- Confirm “Set Unit to Bus” parameter according to Chapter 5.2, Section “Selecting pressure unit”. Confirming this parameter automatically sets the PV Scale and OUT Scale limits to the same level.

Digital output value (OUT Value) ≠ Display value of the on-site display

If you require a differently scaled output value for your PLC than the display value on the on-site display, the following operating options are available:

- Set the upper and lower limit values for PV Scale and OUT Scale in the Analog Input Block according to the requirements. Please refer also to this Chapter, “Slot/index table” and Chapter 9.2 “Matrix Analog Input Block” or
- Scale the limits for PV Scale and OUT Scale in Commuwin II in graphic mode, refer to figure below.



Note!

Note!

If you wish to make a position calibration for the value indicated on the on-site display using bias pressure (see Chapter 5.2, Section “Position calibration”), this must be done before changing the values for OUT Scale min. and OUT Scale max.

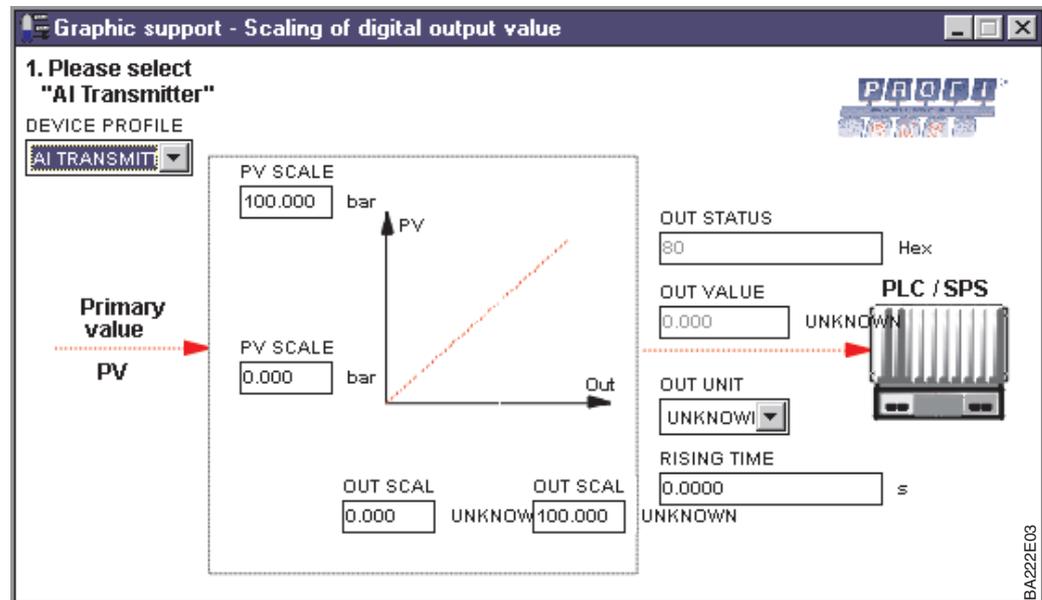


Figure 4.7
Scaling of the Out Value via
graphic support in Commuwin

5 Commissioning

The Cerabar M is ready for measurement. The measuring range corresponds to the information on the nameplate. As standard, the pressure applied is transferred via PROFIBUS-PA in the unit specified on the nameplate. After a “5140” reset in the matrix field V2H9, the measured value is transferred in the unit “bar”, see also Chapter 6.3 “Reset”).

There is no turndown in the conventional sense for PROFIBUS-PA digital signal transmission. The measured value is transferred with a resolution corresponding to an accuracy of 0.2 %.

This chapter contains the following information:

- On-site commissioning using keys on the electronic insert
- Commissioning and operation using communication (Commuwin II)
- Locking and unlocking the measuring point
- Measuring point information

5.1 On-site commissioning

- Connect the Cerabar M, see Chapter 2.5 “Electrical connection”.
- Ensure that a pressure can be generated within the required measuring range.

Contents

Preparatory work

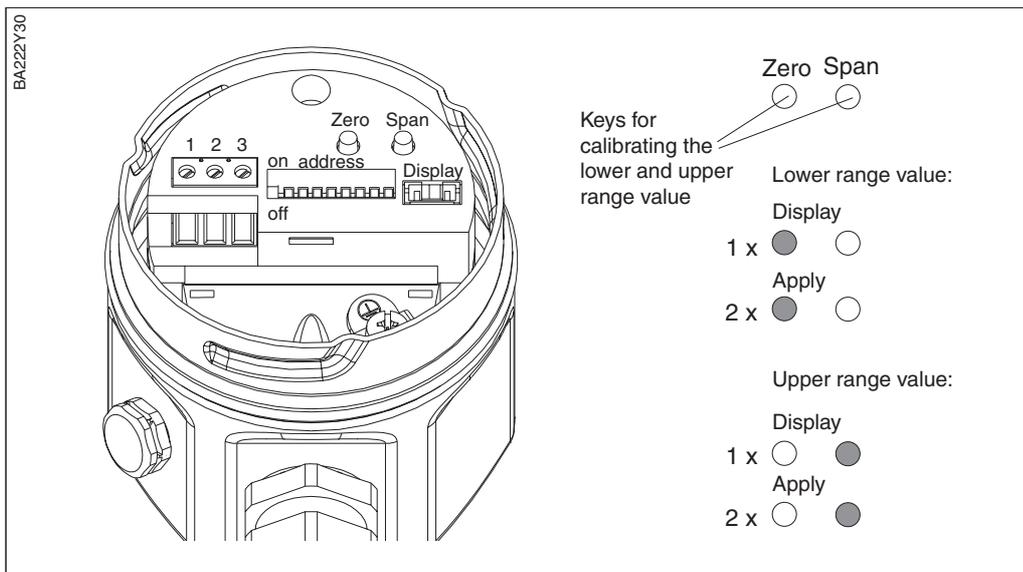


Figure 5.1
Position of keys for calibrating lower and upper range value

Note!

Use the “Zero” and “Span” keys to set the lower range value and upper range value of the bar graph of the display module. These settings do not have any effect on the digital output value (OUT Value) and on the “measured value” in the matrix field V0H0.



Note!

Calibration of the lower range value is carried out using the “Zero” key. Proceed as follows when calibrating the lower range value:

- Specify exactly the pressure for the lower range value.
- Press the Zero key twice.

The acting pressure is adopted as the lower range value.

By pressing the Zero key once the value saved as the lower range value can be output on the digital display.

Calibrating lower range value

Calibrating upper range value

Calibration of the upper range value is carried out using the “Span” key. Proceed as follows when calibrating the upper range value:

- Specify exactly the pressure for the upper range value.
- Press the Span key twice.

The acting pressure is adopted as the upper range value.

By pressing the Span key once the value saved as the upper range value can be output on the digital display.

5.2 Commissioning and operation via Commuwin II**Preparatory work**

Connect the Cerabar M, see Chapter 2.5 “Electrical connection”.

Operating matrix

The calibration is made via operating matrix (remote operation) using Commuwin II:

Matrix field	Remarks
V0H1	Entry of pressure for lower range value – (only affects the bar graph in the display module)
V0H2	Entry of pressure for upper range value – (only affects the bar graph in the display module)
V0H3	Acting pressure is taken as lower range value (only affects the bar graph in the display module)
V0H4	Acting pressure is taken as upper range value, (only affects the bar graph in the display module)
V0H5	Entry of bias pressure (only affects the display module and the matrix fields V0H0, V0H1 and V0H2)
V0H6	Acting pressure is taken as bias pressure (only affects display module and the matrix fields V0H0, V0H1 and V0H2)
V0H7	Entry of damping τ (0...40 s)
V0H9	Options for pressure unit: mbar, bar, Pa, hPa, kPa, MPa, mm H ₂ O, m H ₂ O, in H ₂ O, ft H ₂ O, psi, g/cm ² , kg/cm ² , kgf/cm ² , atm, lb/ft ² , torr, mm Hg, in Hg
V6H1	Various pressure units can be selected via V0H9. The pressure-specific parameters are converted and displayed with the selected unit in Commuwin II. V6H1 must be confirmed to transfer the converted values on the bus, see this Chapter, Section “Selecting pressure unit”.
V9H5	Position calibration, see this Chapter, Section “Zero offset”

Resetting to factory settings (reset)

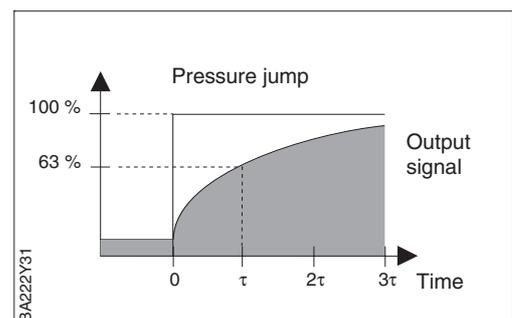
By entering a certain code, the entries in the matrix are reset partially or completely to the factory settings. Further information on the various types of reset and their effects is given in Chapter 6.3 “Reset”.

#	VH	Entry	Remarks
1	V2H0	e.g. 2380	Reset to factory settings

Damping τ (output damping)

The damping τ affects the speed with which the output signal and the digital display react to changes in pressure.

#	VH	Entry	Remarks
1	V0H7	e.g. 30	Damping (s) (0...40 s)



You can select a pressure unit using the “Select pressure unit” parameter (V0H9), (see table below). If you select a new pressure unit in V0H9, all pressure-specific parameters are converted and displayed in Commuwin II with the new pressure unit.

Selecting pressure unit

#	VH	Entry	Remarks
1			All pressure-specific parameters are given in pressure unit “bar”. e. g. measured value (V0H0) = 1 bar
2	V0H9	e.g. psi	Select new pressure unit
3			All pressure-specific parameters are given in pressure unit “psi”. e. g. measured value (V0H0) = 14.5 psi

Units	Units	Units	Units	Units
mbar	kPa	in H ₂ O	kg / cm ²	Torr
bar	MPa	ft H ₂ O	kgf / cm ²	mm Hg
Pa	mm H ₂ O	psi	atm	in Hg
hPa	m H ₂ O	g / cm ²	lb / ft ²	

Note!

As standard, the measured value is transferred over the bus in the pressure unit given on the nameplate. So that the digital output value and the measured value in the matrix field V0H0 display the same value, even after selecting a new pressure unit, you must confirm the “Set Unit to Bus” parameter in V6H1 once. Note that a change of the digital output value can influence the controller.



Note!

#	VH	Entry	Remarks
1			e.g. Measured value V0H0 = 1 bar
2	V0H9	e.g. psi	Select new pressure unit
3			Display measured value V0H0 = 14.5 psi The value 1 is still transmitted via the bus. V6H2 shows: 1.0 UNKNOWN
4	V6H1	Confirm “Set Unit to Bus” with Enter	V6H2 shows: 14.5 psi
5			The value 14.5 is now transmitted via the bus.



Note!

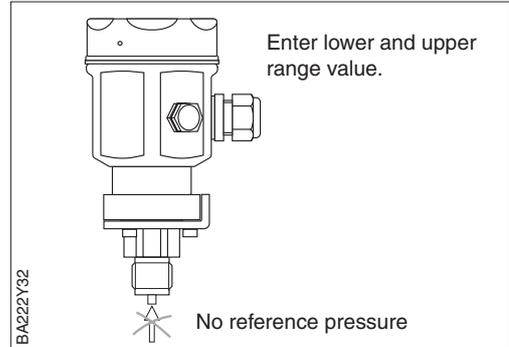
Note!

The parameters “Lower Range Value” (V0H1/V0H3) and “Upper Range Value” (V0H2/V0H4) set the bar graph in the display module. These settings do not have any effect on the digital output value (OUT Value) or on the “measured value” in the matrix field V0H0.

Calibration without reference pressure

A pressure is entered for the lower range value and upper range value. No particular pressure must be acting.

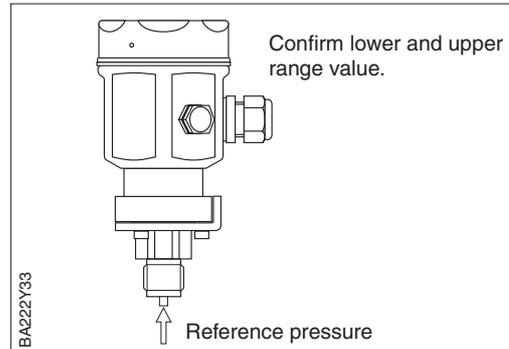
#	VH	Entry	Remarks
1	V0H9	e.g. bar	Select pressure unit
2	V3H0	“Pressure”	Select “Pressure” operating mode
3	V0H1	e.g. 0.0	Lower Range Value
4	V0H2	e.g. 1.0	Upper Range Value
5	e.g. current measured value (V0H0) = 0.7 bar		



Calibration with reference pressure

An acting reference or process pressure is taken as the upper or lower range value.

#	VH	Entry	Remarks
1	V0H9	e.g. bar	Select Pressure Unit
2	V3H0	“Pressure”	Select “Pressure” operating mode
3	Specify exactly the pressure for the lower range value.		
4	V0H3	Confirm with “Enter”	Acting pressure is taken for lower range value
5	Specify exactly the pressure for the upper range value.		
6	V0H4	Confirm with “Enter”	Acting pressure is taken for upper range value
7	e.g. current measured value (V0H0) = 0.7 bar		



Position calibration of the display (bias pressure)

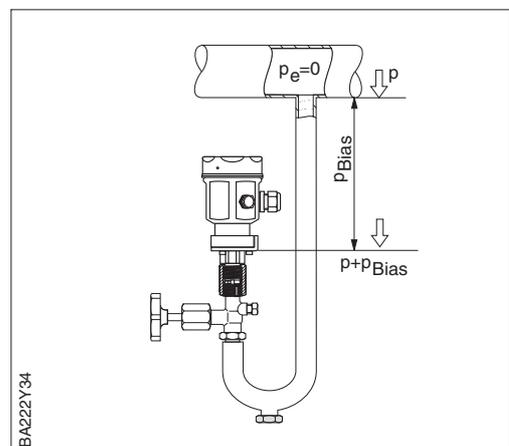
If, after calibration, the display does not show zero at process pressure zero (dependent on position), then the display value can be corrected to zero by entering or adopting a bias pressure (position calibration).

Entry of a bias pressure

#	VH	Entry	Remarks
1	V0H5	e.g. 0.1	Enter bias pressure
2	If necessary set the display value and output value (OUT Value) as equal		
	V6H1	Confirm with “Enter”	Set display value and output value as equal

Adopting an acting bias pressure

#	VH	Entry	Remarks
1	V0H6	Confirm with “Enter”	Adopt applied pressure as bias pressure
2	If necessary set the display value and output value (OUT Value) as equal		
	V6H1	Confirm with “Enter”	Set display value and output value as equal



Note!

The position calibration via a bias pressure has no influence on the digital output value (OUT Value) which is transferred over the bus. So that the display module and OUT Value display the same value, you must confirm the “Set Unit to Bus” parameter in matrix field V6H1. Note that a change of the digital output value can influence the controller.



Note!

The “Zero Offset” (V9H5) parameter offers a further possibility of carrying out position calibration. In contrast to position calibration using bias pressure (V0H5/V0H6), the digital output value (OUT Value) is also corrected in addition to the display value on the on-site display (measured value (V0H0)).

Zero offset

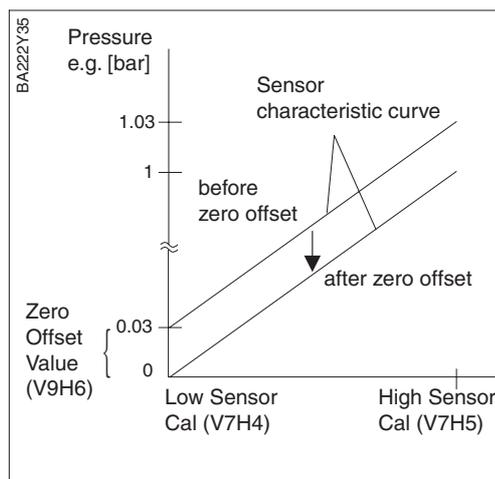
When carrying out a zero offset, an applied pressure is assigned a correction value via “Zero offset” (V9H5). This shifts the sensor characteristic curve according to the diagram and the “Low Sensor Cal” (V7H4) and “High Sensor Cal” (V7H5) values are recalculated. The “Zero Offset Value” (V9H6) matrix field indicates the value by which the sensor characteristic curve was shifted.

The value is calculated as follows for “Zero offset value” (V9H6):

- Zero offset value (V9H6) = Sensor pressure (V7H8) – Zero offset (V9H5)

The “Sensor pressure” (V7H8) displays the pressure currently applied.

#	VH	Entry	Remarks
1			– Display measured value (V0H0) = 0.03 bar (position-dependent pressure) – OUT Value (V6H2) = 0.03 – Lower range value (V0H1) is set to 0.0 bar
2			Pressure for zero offset is acting: Sensor pressure (V7H8) = 0.03 bar (corresponds to the position-dependent pressure)
3	V9H5	0.0	The value 0.0 is assigned to the applied pressure.
4			After making entries for the “Zero Offset” (V9H5) parameter the parameters display the following values: – Zero Offset Value (V9H6): $V9H6 = V7H8 - V9H5$ $V9H6 = 0.03 \text{ bar} - 0.0 \text{ bar}$ $V9H6 = 0.03 \text{ bar}$ – Measured Value (V0H0) = 0.0 bar $V6H2 = 0.0$



5.3 Locking/unlocking the operation

After calibrating or entering all parameters, the operation can be locked by entering a code. As the code, enter any number from 1 to 9998, (except 130 and 2457).

#	VH	Entry	Remarks
1	V9H9	e.g. 131	Operation locked
2	V9H9	130 or 2457	Operation unlocked

5.4 Measuring point information

The following information about the measuring point can be read via Commuwin II:

Matrix field	Display or entry
Measured values	
V0H0	Primary measured value: pressure
V6H2/V6H3	OUT Value, OUT Status (Analog Input Block)
V7H8	Sensor pressure (unit selectable in V0H9)
V9H7	Current damped pressure without bias correction
Sensor data	
V7H4	Low Sensor Calibration Lower calibration pressure (unit selectable in V0H9)
V7H5	High Sensor Calibration Upper calibration pressure (unit selectable in V0H9)
V7H6	Lower range limit of sensor (unit selectable in V0H9)
V7H7	Upper range limit of sensor (unit selectable in V0H9)
Information on transmitter	
V2H2	Software number
V2H7	Sensor data no.: Number of entry in the sensor table (1...11). Please take from sensor pass.
V2H8	Sensor data value: Entry in sensor table, contains all sensor-specific data. Please take from sensor pass.
Error response	
V2H0	Diagnostic code
V2H1	Last diagnostic code

User information

The VAH0 and VAH1 fields give you the option of saving additional information on the measuring point and measuring device. The serial number of the device and that of the sensor are saved in the matrix fields VAH2 and VAH3.

Matrix field	Display
VAH0*	Tag name
VAH1*	User text (Physical Block)
VAH2	Device serial number
VAH3	Sensor serial number

* Entry up to 32 (ASCII) characters

6 Diagnosis and Trouble-Shooting

6.1 Diagnosis of errors and warnings

If the Cerabar M detects an error, the following occurs:

- An error code is transmitted with the measured value.
- If the display module is present, the error code is displayed and flashes.
- The current error code is displayed in V2H0, the last one in V2H1.

Errors

If the Cerabar M detects a warning, the following occurs:

- An error code is transmitted along the measured value – the Cerabar M continues measuring.
- The current error code is displayed in the V2H0, the last one in V2H1.

Warnings

If several errors occur simultaneously, the sequence in which they are displayed corresponds to their order of priority.

Error codes in V2H0 and V2H1

Code	Type	Reason and remedial measures	Priority
E 101	Error	Sensor table check sum error <ul style="list-style-type: none"> – Is shown when sensor data are being entered. <i>The error message disappears when the sensor data are entered correctly and in full.</i> – Check sum is not correct. <i>Check sensor data see parameters "Sensor Data No. " (V2H7) and "Sensor Data Value" (V2H8). See also Chapter 7.7, Section "Entering sensor data"</i> 	4
E 102	Warning	Electronic device error at maximum indicator display <ul style="list-style-type: none"> – <i>Perform reset (code 5140) recalibrate sensor.</i> – Electronic insert defective. <i>Replace electronic insert.</i> 	12
E 103	Warning	Initialisation in progress <ul style="list-style-type: none"> – The electronics are initialised when the instrument is connected. <i>Wait until the procedure has been completed.</i> 	10
E 104	Warning	Sensor calibration <ul style="list-style-type: none"> – Values in V7H4 and V7H5 (Low Sensor Cal and High Sensor Cal) are too close to each other, e.g. after recalibrating the sensor. <i>Perform reset (code 2509), recalibrate sensor. See Chapter 7.10.</i> 	11
E 106	Error	Download active <ul style="list-style-type: none"> – <i>Wait until the download-procedure has been completed.</i> 	7
E 110	Error	Check sum error <ul style="list-style-type: none"> – The power supply is interrupted while writing to the processor. <i>Re-establish power supply.</i> – <i>Perform reset (code 5140), recalibrate sensor, see Chapter 7.10.</i> – EMC interference greater than the specifications in Chapter 8, "Technical data" <i>Block off EMC effects.</i> – Electronic insert defective. <i>Replace electronic insert, Re-enter sensor data. See Chapter 7.7.</i> 	9
E 111	Error	No connection to sensor EEPROM <ul style="list-style-type: none"> – Cable connections between sensor electronics - main electronics - display (internal bus) interrupted or sensor electronics defective. <i>Check plug for sensor.</i> – <i>Check cable connection. Replace sensor.</i> 	1
E 114	Error	Electronics error <ul style="list-style-type: none"> – Electronic insert defective. <i>Replace electronic insert, see Chapter 7.7.</i> 	2
E 115	Error	Sensor gauge pressure <ul style="list-style-type: none"> – Gauge pressure present. <i>Decrease pressure until message disappears.</i> – Sensor - electronic insert cable connection interrupted. <i>Check cable connection.</i> – Sensor defective. <i>Replace sensor.</i> 	5

Code	Type	Reason and <i>remedial measures</i>	Priority
E 116	Error	Download error (PC - transmitter) <ul style="list-style-type: none"> – Data are not correctly sent to the processor during a download, e.g. due to unplugged cable connection, voltage peaks (ripple) in the supply voltage, EMC interference. <i>Check the PC - transmitter cable connection.</i> <i>Perform reset (code 5140), restart the download.</i>	8
E 120	Error	Sensor underpressure <ul style="list-style-type: none"> – Pressure too low. <i>Increase pressure until message disappears.</i> – Sensor - electronic insert cable connection interrupted. <i>Check cable connection.</i> – Sensor defective. <i>Replace sensor.</i> – For small ranges screwing down the cover may cause "E120" to be shown for a short while. <i>The error message disappears as soon as the gauge pressure in the housing is reduced.</i> 	6
E 121	Error	Check sum error <ul style="list-style-type: none"> – Main electronics defective. <i>Replace main electronics.</i> 	3

6.2 Simulation

You have the option of simulating either the output value (OUT Value) or the function of the Analog Input Block. In the following sections, the matrix fields in brackets indicate the matrix position in the Analog Input Block diagram in Commuwin II. See also Chapter 9.2 "Matrix Analog Input Block".

Simulation OUT Value

You can simulate the output value (OUT Value) as follows:

1. If necessary unlock the matrix using code 130 or 2457 in matrix field V9H9.
2. Using matrix field V9H9, switch from the standard to the Analog Input Block diagram.
3. Set the "Target Mode" parameter (V8H0) to "on".
 - You can now enter a simulation value directly for the "OUT Value" (V0H0).
 - Afterwards, check the change to the OUT Value, e.g. at the PLC.
4. Set the "Target Mode" parameter back to "off".



Note!

Note!

Commuwin II offers the further option of specifying an OUT Value using the graphic operation in the "Simulation AI-Block" menu.

Simulation Analog Input Block

You can simulate the function of the Analog Input Block as follows:

1. If necessary unlock the matrix using code 130 or 2457 in matrix field V9H9.
2. Using matrix field V9H9, switch from the standard to the Analog Input Block diagram.
3. Set the "Simulation" parameter in the Analog Input Block (V7H2) to "on".
 - You can now enter a simulation value directly for "Simulation Value" (V7H0) or change the value for OUT Scale min. and OUT Scale max. (V1H3/V1H2).
 - Afterwards, check the change to the OUT Value (V0H0) and at the PLC.
4. Set the "Simulation" parameter back to "off".

6.3 Reset

By entering a certain code, the entries in the matrix are reset partially or completely to the factory settings. Please note that in the event of a reset, customer-specific calibration carried out by the factory is also reset to the default values.

#	VH	Entry	Text
1	V2H9	e.g. 5140	Reset to factory setting

The Cerabar M differentiates between different reset codes with different effects. To find out which parameters are reset with the 5140 or 1, 2380 and 731 reset codes, refer to the table below.

Other reset codes have the following effects:

- 2506: Device warm start
- 2509: This reset sets the lower and upper sensor calibration limits and the zero offset value to the factory setting. In other words:
Low Sensor Cal = Lower Range Limit (V7H4 = V7H6),
High Sensor Cal = Upper Range Limit (V7H5 = V7H7).
Zero Offset Value (V9H6) = 0.0
- 2712: The device address set via the bus is reset to the default value 126.

Reset codes		H0	H1	H2	H3	H4	H5	H6	H7	H8	H9
1 / 5140 2380 731	V0	Measured Value	Lower Range Value 0.0 0.0 0.0	Upper Range Value = V7H7 = V7H7 = V7H7	Set Lower Value	Set Upper Value	Set Bias Pressure 0.0 0.0 0.0	Bias Pressure Autom.	Set Output Damping 0.0 0.0 0.0		Select Pressure Unit bar
1 / 5140 2380 731	V1 V2	Diagnostic Code	Last Diagnostic Code 0 0 0	Software No.					Sensor Data No.	Sensor Data Value	Default Values
1 / 5140 2380 731	V3...V5 V6	Manufact. Ident Number	Set Unit to Bus	OUT Value 1) 1)	OUT Status	Assign Display	Select V0H0 prim. value prim. value	OUT Value PLC	Profile Version		
1 or 5140 2380 731	V7					Low Sensor Cal = V7H6 = V7H6	High Sensor Cal = V7H7 = V7H7	Lower Range Limit	Upper Range Limit	Sensor Pressure	
1 / 5140 2380 731	V8 V9						Zero Offset	Zero Offset Value 0.0 0.0	Unbiased Pressure = V7H8 ²⁾ = V7H8 ²⁾	Biased pressure = V7H8 ²⁾ = V7H8 ²⁾	Security Locking
1 or 5140 2380 731	VA	Set Tag Number deleted deleted	Set User Text deleted deleted								

1) After a "5140" or "2380" reset, field V6H2 displays the current digital output value.
As the unit is unknown, UNKNOWN is displayed.

2) After a reset, the matrix fields V9H7 and V9H8 show the pressure currently applied.

7 Maintenance and Repair

7.1 Maintenance

In general, no special maintenance is required on the Cerabar M.

Cleaning

In general, the pressure measuring cell must neither be cleaned nor cleared of material build-up. Build-up has no effect on the measurement result as long as it is porous and does not present a mechanical load on the diaphragm of the pressure measuring cell.

The cleaning agent used should not corrode the surfaces and seals. Avoid mechanical damage to the diaphragm.



Note!

Note!

Measuring errors may occur over a short period within the framework of cleaning processes with strong temperature deviations.

7.2 Repair

The Endress+Hauser repairs concept provides for measuring devices to have a modular design and the customer may carry out repairs.

Chapter 7.5 contains all the spare parts listed with their order numbers. You can order them from Endress+Hauser for repairs on your Cerabar M. As far as necessary, the spare parts also include replacement instructions.



Note!

Note!

For Ex-certified devices, please refer to Chapter 7.4 "Repair of Ex-certified devices". For more information on service and spare parts contact the Endress+Hauser Service.

7.3 Returning for repair

If you have to return the Cerabar M to Endress+Hauser for repair, please fill in the "Declaration of Contamination" on Page 67 so that we have the following information:

- A description of the application.
- The chemical and physical properties of the product with which the device came into contact.
- A brief description of the error.

Before sending in the Cerabar M to Endress+Hauser for repair, please take the following protective measures:

- Remove all traces of the product.
This is particularly important if the product is dangerous to health.
- We request that no instrument be returned to Endress+Hauser without all dangerous material having first been completely removed.



Caution!

Caution!

Instruments with certificates of conformity or design approval must be sent in for repair as complete units only.

7.4 Repair of Ex-certified devices

When repairing Ex-certified devices, please note the following:

- Only specialist personnel or Endress+Hauser may undertake repairs to certified devices.
- Relevant standards, national hazardous area regulations and Safety Instructions (XA...) and Certificates must be observed.
- Only genuine Endress+Hauser spare parts may be used.
- When ordering spare parts, please check the device designation on the nameplate. Identical parts may only be used as replacements.
- Electronic inserts or measuring cells already in use in a standard instrument may not be used as spare parts for a certified device.
- Carry out repairs according to the instructions. After repairs, the device must fulfill the requirements of the specified individual tests.
- A certified device may only be converted into another certified variant by Endress+Hauser.
- All repairs and modifications must be documented.

Note!

For more information on service and spare parts contact the Endress+Hauser Service.



Note!

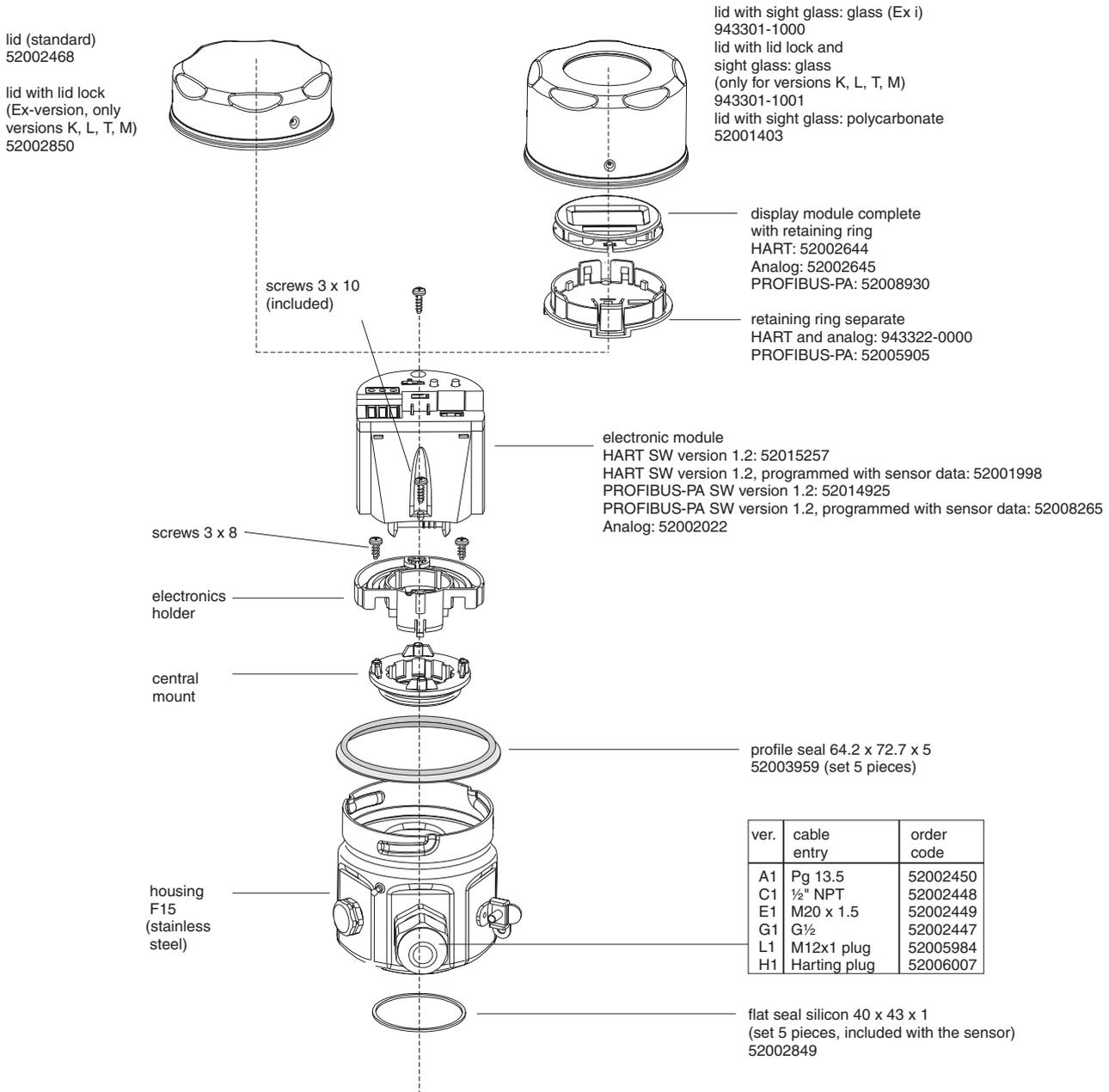
7.5 Spare parts

The diagrams on the following pages show all the Cerabar M spare parts which can be ordered from Endress+Hauser.

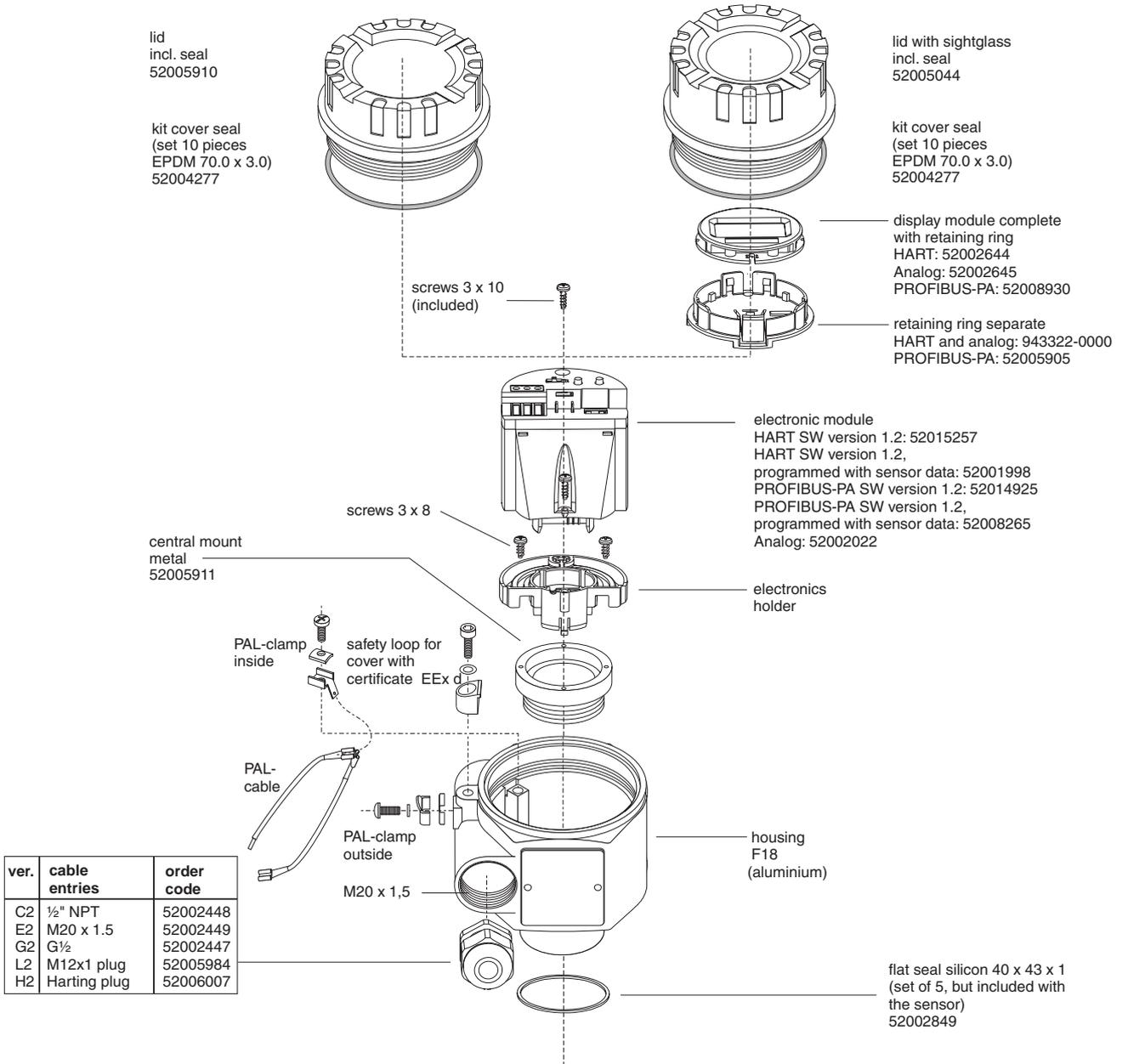
When ordering spare parts, please note the following:

- If parts are replaced which are determined by the device order code, (e.g. PM□ 4□ - □ □□ □□ □ R □ □□ □ = Cerabar M with PROFIBUS-PA electronics and digital display), you must check whether the device designation on the nameplate still applies.
- Only the process connection of the PMC 41, PMP 41 and PMC 45 models can be exchanged by the customer. For all other versions, the process connection ordered is supplied with the complete housing, but without the electronic insert.
- If a new measuring cell is ordered as a spare part, the completely mounted device is generally supplied with housing and process connection, but without the electronic insert.
- If the device designation on the nameplate changes due to a spare part, then a modified nameplate must be ordered. Information on the new device must be entered on the modified nameplate and the nameplate must then be secured to the device housing.
- An Ex-certified device may not be modified or converted. The device code specified on the nameplate must still be applicable after a repair.
- It is not possible to convert a standard instrument into an Ex system by replacing its parts. The appropriate regulations are to be observed when certified instruments are being repaired.

Electronics spare parts for Cerabar M with stainless steel housing



Electronics spare parts for Cerabar M with aluminium housing



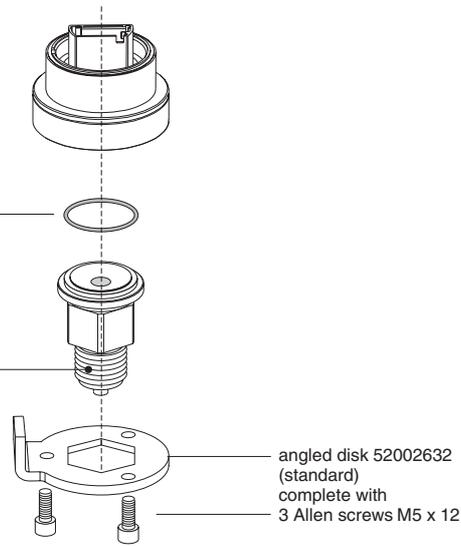
Spare parts PMC 41

O-ring 26.7 x 1.78	order code
FKM	52009856 *
FKM, oxygen use	52010137 *
NBR	52009855 *
EPDM	52017989 *
FFKM, Kalrez	010561-0006
FFKM, Chemraz	52005749

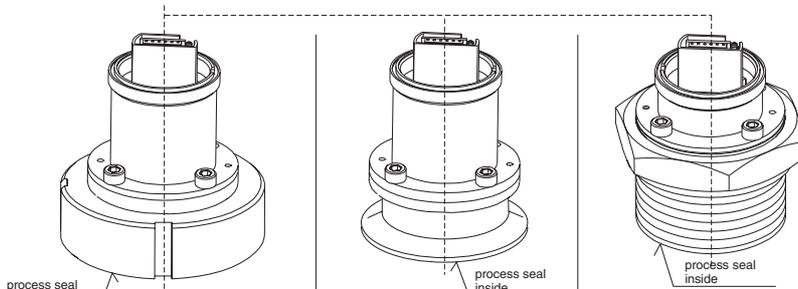
* set of 5

exchangeable thread

ver.	thread	order code
1M	G½ external	52009786
1T	M20 x 1.5 external	52009787
1N	½" NPT external, ¼" internal	52009788
1A	½" NPT external, 11.4 mm internal	52009789
1K	PT½ external	52009790
1R	G½ external, 11.4 mm internal	52009791
1P	G½ external, G¾ internal	52009792
1S	PF½ external	52009793
2M	G½ external, Alloy	52000604
2N	½" NPT ext., ¼" internal, Alloy	52000603



Spare parts PMC 45



measuring cells with sanitary couplings 1.4435

DIN 11851, DN 50 (version AL)	Clamp DN 2 (ver. DL)
DIN 11851, DN 40 (version AH)	Varivent 68 mm (ver. LL)
DIN 11864-1-A DN 40 (version AS)	DRD D=65 mm (ver. KL)
DIN 11864-1-A DN 50 (version AT)	APV Inline PN 40 (ver. HL)
SMS DN1½ (version EG)	
SMS DN2 (version EL)	

threaded boss 1.4435

G 2 (ver. AR)
2" NPT (ver. BR)

process seals at the membrane		
O-rings 26.7 x 1.78		52009856 *
		010561-0006
		52010137 *
		52005749
FDA listed	for oxygene only	52017989 *
	Kalrez	52010155 *
	FKM	
	Chemraz	
	EPM, EPDM	
	NBR	

* set of 5

Spare parts PMP 41

process connection
G $\frac{1}{2}$ flush membrane

process connection
welded with cell
(no spare part)

exchangeable thread 1.4435

versions	thread	order code
1M	G $\frac{1}{2}$ external	52011825
1G	$\frac{1}{2}$ " NPT external	52011827
1X	$\frac{1}{2}$ " NPT internal	52007530
1S	PF $\frac{1}{2}$ external	52007524
1K	PT $\frac{1}{2}$ external	52007523
1T	M20 x 1.5 ext.	52011826

seal	order code
FKM Viton (set of 5)	52009800
PTFE + Alloy C (two-piece, resp. 1 piece)	52010118

Spare parts PMP 45

measuring cells type PMP 45

threaded boss G1 with metallic cone seal and weld-in adapter (version CD)

sanitary couplings 1.4435

- DIN 11851 DN 25 (version AB)
- Clamp DN 1 (version DB)
- Miniclamp DN 20 (version DA)
- Varivent 50 mm (version LB)

threaded boss
 $\frac{3}{4}$ " NPT (version BB)

Spare parts PMP 46 and PMP 48

Diaphragm seals can be filled with different liquids and can feature a multitude of flange versions and sanitary couplings.

process connection and cell welded together

7.6 Mounting the digital display

The digital display is delivered already mounted when it is ordered with the instrument. In case of damage, it can be ordered as a spare part (order no. 52008930).

Releasing the display

- Push up the latch with the arrow until the grip of the retaining ring on the electronic insert is audibly released.
- Release the retaining ring and lift off carefully to prevent the display cables from breaking.
- Remove the plug of the display from the electronic insert.

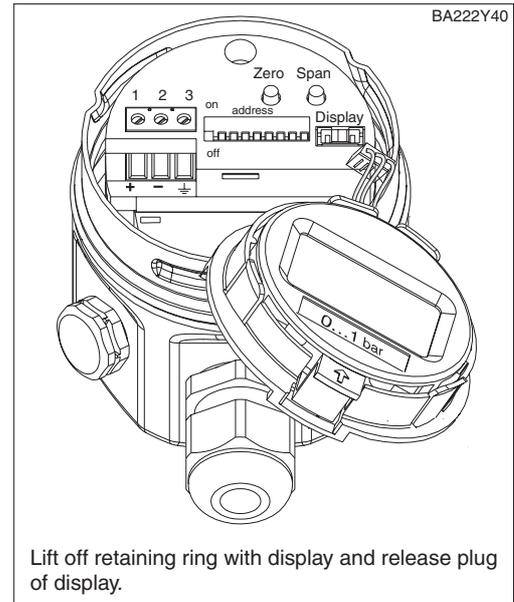
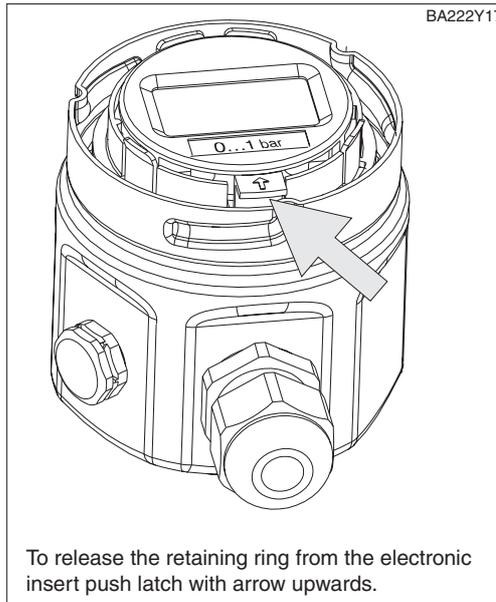


Figure 7.1
Left:
Releasing the retaining ring
Right:
Lifting off display

Mounting the display

- Insert the plug of the display into the jack provided in the electronic insert and clip in ①.
- Insert the pin on the retaining ring into the hole provided in the electronic insert ②.
- Firmly press down the retaining ring with the display on the electronic insert. The grip clips in with an audible click.

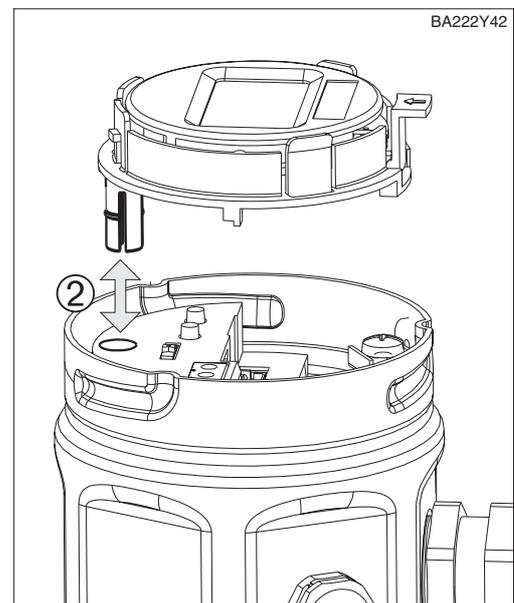
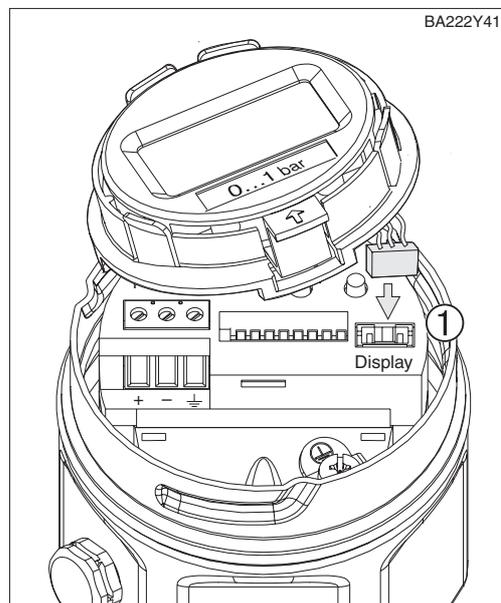


Figure 7.2
Mounting the display

7.7 Changing the electronic insert

An electronic insert, ordered as a spare part, is programmed with a default set of data. The instrument will function, but with less accuracy. In order to restore the defined accuracy, the sensor parameters should be re-entered after exchanging the electronic insert. All information on this topic is provided in the Section “Entering sensor data” in this chapter.

Note!

After replacing the electronic insert the instrument must be recalibrated. Information on calibration is provided in Section 5 “Commissioning”.



Note!

- Where appropriate, loosen and remove the retaining ring with the display and release the plug of the display from the electronic insert.
- Release the connecting cable from the electronic insert.
- Loosen screws ① and ② on the electronic insert.
- Lift out the electronic insert.

Removing the electronic insert

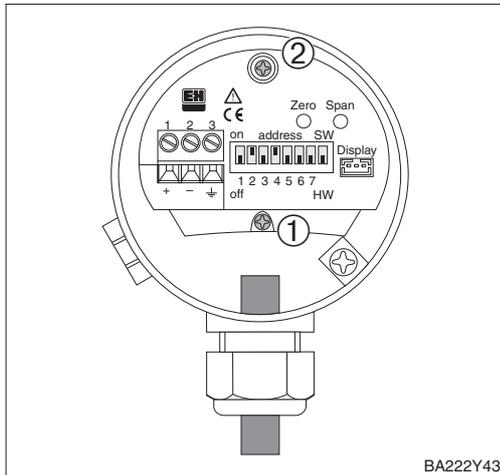


Figure 7.3
Position of the screws ① and ②
for releasing the electronic insert

- Plug in the new electronic insert and tighten screws ① and ②.
- Connect the connecting cable as shown in Chapter 2.5 “Electrical connection”.
- Carry out a calibration as explained in Chapter 5 “Commissioning”.
- Where appropriate, mount the display.

Mounting the electronic insert

Entering sensor data

A sensor pass with sensor data is located in the housing of each device. These data must be re-entered if the electronics are replaced.

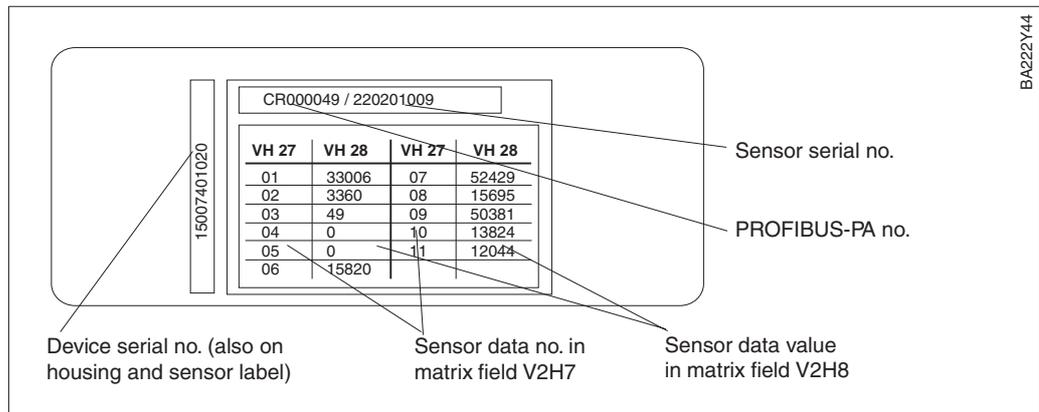


Figure 7.4
Example: Sensor pass

Before entering the sensor parameters, the matrix fields V2H7 and V2H8 are released by the code 333. All other matrix fields are then blocked against unauthorised operation. After entering, unlock the matrix fields again and perform a reset with code 2380.

Carry out the entry procedure as follows:

#	VH	Entry	Remarks
1	V9H9	333	Lock matrix operation except V2H7 and V2H8
2	V2H7	01	Sensor data no.
3	V2H8	e.g. 33006	Sensor data value
4	V2H7	02	Sensor data no.
5	Enter all other pairs of values.		
6	V2H7	11	Sensor data no.
7	V2H8	e.g. 12044	Sensor coefficient A1
8	V9H9	e.g. 130	Unlock matrix operation
9	V2H9	Code 2380	Accept sensor data



Note!

Note!

When entering the sensor parameters, the error code E101 "Sensor table check sum error" is shown. The error message disappears when the sensor parameters are entered completely and correctly.

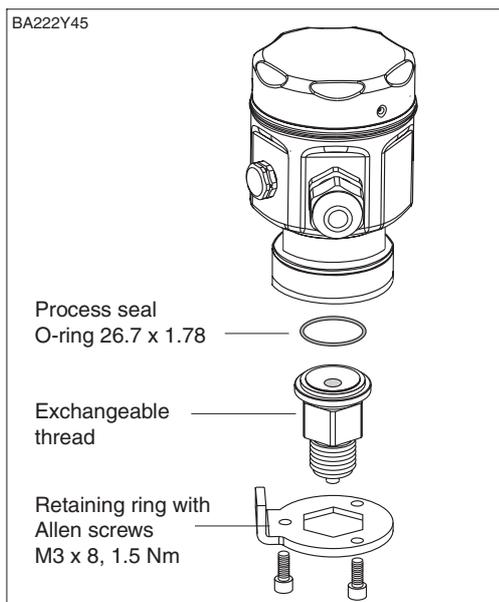
7.8 Changing the measuring cell

If the measuring cell has to be changed, Endress+Hauser offers a complete housing with the new measuring cell and process connection required but without an electronic insert. Therefore, when changing the measuring cell, simply remove the electronic insert from the old housing and install it in the new one. After changing the measuring cell, the sensor parameters of the new measuring cell and the Cerabar M must be recalibrated.

- Ordering a housing with measuring cell and process connection:
PM 4 – W
- For instructions on mounting the electronic insert and entering sensor parameters see Chapter 7.7 “Changing the electronic insert.”
- For instructions on calibration see Chapter 5 “Commissioning”.

7.9 Changing the process seal

The process seal of the Cerabar M PMC 41, PMP 41 and PMC 45 can be replaced. All process seals can be interchanged as required. When doing so, however, please pay particular attention to the different temperature limits of the individual materials, see Chapter 8 “Technical data”, Section “Material”).



Changing the process seal for
PMC 41:

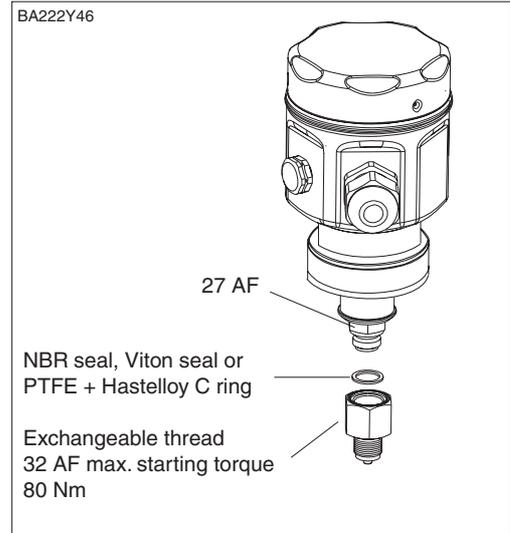
PMC 41

- Loosen the screws on the retaining ring of the exchangeable thread.
- Remove the retaining ring and exchangeable thread.
- Clean the sealing surfaces and diaphragm carefully.
- Replace process seal.
- Secure the exchangeable thread with the retaining ring and screws.

PMP 41

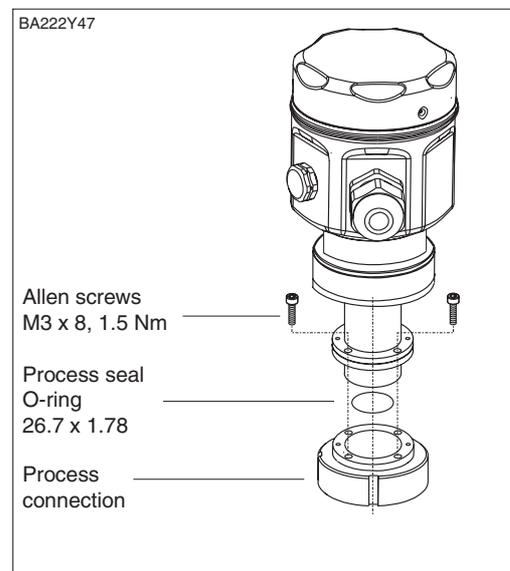
Changing the process seal for PMP 41:
(only versions with exchangeable thread)

- Loosen the exchangeable thread.
- Clean the sealing surfaces and diaphragm carefully.
- Replace process seal.
- Tighten the exchangeable thread.

**PMC 45**

Changing the process seal for PMC 45:
(The process seal for a PMC 45 with threaded connection G 1½, 1½ NPT or M 44x1.25 cannot be changed).

- Loosen the screws of the process connection.
- Clean the sealing surfaces and diaphragm carefully.
- Replace process seal.
- Secure the process connection with the screws.



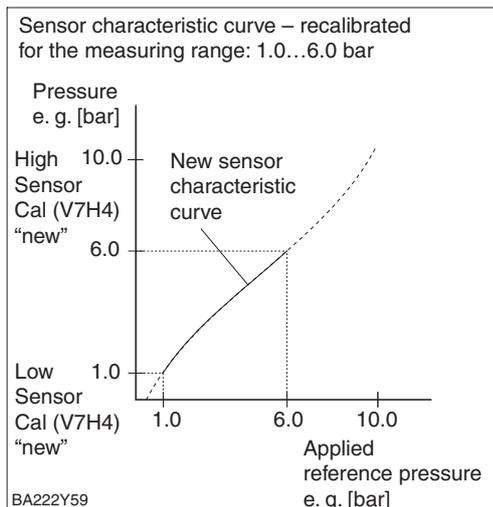
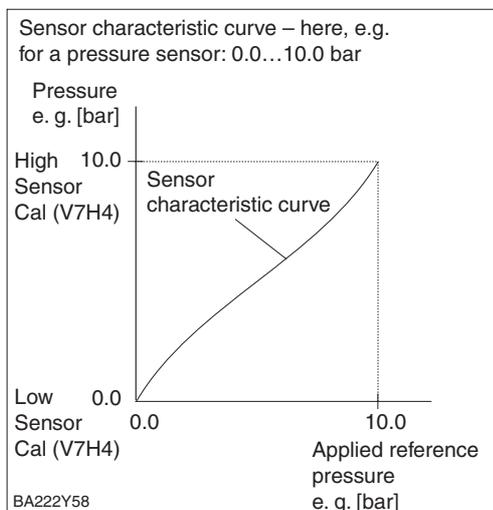
7.10 Sensor calibration

You can use the “Low Sensor Cal” (V7H4) and “High Sensor Cal” (V7H5) parameters to recalibrate a sensor if you want to calibrate your sensor exactly to a measuring range or want to mount a diaphragm seal, for example.

The highest accuracy of the pressure transmitter is obtained when the value for the “Low Sensor Cal” (V7H4) parameter corresponds to the lower range value (V0H1/V0H3) and the value for the “High Sensor Cal” (V7H5) parameter corresponds to the upper range value (V0H2/V0H4).

There must be a known reference pressure for the new lower or upper value of the sensor characteristic curve. The more accurate the reference pressure during sensor calibration, the higher the accuracy of the pressure transmitter later. A new value is then assigned to the applied pressure using the “Low Sensor Cal” (V7H4) and “High Sensor Cal” (V7H5) parameters.

#	VH	Entry	Remarks
1			A device with a sensor: 0.0...10.0 bar should be recalibrated for the range 1.0...6.0 bar.
2			Reference pressure acting for value “Low Sensor Cal” (V7H4) = 1.0 bar.
3	V7H4	1.0	The value 1.0 is assigned to the acting pressure.
4			Reference pressure acting for value “High Sensor Cal” (V7H5) = 6.0 bar.
5	V7H5	6.0	The value 6.0 is assigned to the acting pressure.
6			The sensor is now calibrated for 1.0...6.0 bar. The matrix fields V7H4 and V7H5 display: Low Sensor Cal (V7H4) = 1.0 bar High Sensor Cal (V7H5) = 6.0 bar



Note!

- By entering the reset code “2509” in the matrix field V2H9, you return the following parameters to the factory setting:
 - Low Sensor Cal = Lower Range Limit (V7H4 = V7H6),
 - High Sensor Cal = Upper Range Limit (V7H5 = V7H7),
 - Zero Offset Value (V9H6) = 0.0
- If the “Low Sensor Cal” (V7H4) and “High Sensor Cal” (V7H5) values are too close together, the device outputs the error message “E 104”.



Note!

8 Technical Data

General information

Manufacturer	Endress+Hauser
Device	Pressure transmitter
Device designation	PMC 41, PMP 41, PMC 45, PMP 45, PMP 46, PMP 48
Technical documentation Version Technical data	BA222P/00/en 03.05 DIN 19259

Application

Measurement of absolute and gauge pressure in gases, vapours, liquids and dusts

Function and system design

Measuring principle

PMC 41, PMC 45 with ceramic sensor	The pressure causes a slight deflection of the ceramic diaphragm of the sensor. The change in capacitance is proportional to the pressure and is measured at the electrodes of the ceramic sensor. Volume of chamber: approx. 2 mm ³
PMP 41, PMP 45, PMP 46, PMP 48 with metal sensor	The process pressure acts on the metallic separating diaphragm of the sensor and is transmitted via a filling liquid to the resistance bridge. The bridge output voltage, which is proportional to pressure, is then measured. Volume of chamber: smaller than 1 mm ³

Measuring system

PROFIBUS-PA	Connection via segment coupler to PLC or PC e.g. with operating programme Commuwin II. Digital display for measured value display optional
Design	Stainless steel or aluminium housing, process connections to European, American or Japanese standards and many flush-mounted connections.
Signal transmission	PROFIBUS-PA: digital communication signal, 2-wire.

Input

Measured variable	Absolute or gauge pressure
-------------------	----------------------------

Measuring range

PMC 41, PMC 45				PMP 41, PMP 45, PMP 46 ¹⁾ , PMP 48 ¹⁾			
Type of pressure	Measurement limits	Min. span (TD10:1)	Overload	Type of pressure	Measurement limits	Min. span (TD 10:1)	Overload
	bar	bar	bar		bar	bar	bar
gauge	0...+0.1	0.01	4	gauge	0...+1	0.1	4
gauge	0...+0.4	0.04	7	gauge	0...+4	0.4	16
gauge	0...+1	0.1	10	gauge	0...+10	1	40
gauge	0...+4	0.4	25	gauge	0...+40 ²⁾	4	160
gauge	0...+10	1	40	gauge	0...+100 ²⁾	10	400
gauge	0...+40	4	60	gauge	0...+400 ²⁾	40	600
gauge	-0.1...+0.1	0.02	4	gauge	-1...+1	0.2	4
gauge	-0.4...+0.4	0.08	7	gauge	-1...+4	0.5	16
gauge	-1...+1	0.2	10	gauge	-1...+10	1.0	40
gauge	-1...+4	0.5	25				
gauge	-1...+10	1.0	40				
absolute	0...+0.4	0.04	6	absolute	0...+1	0.1	4
absolute	0...+1	0.1	9	absolute	0...+4	0.4	16
absolute	0...+4	0.4	25	absolute	0...+10	1	40
absolute	0...+10	1	40	absolute	0...40	4	160
absolute	0...40	4	60	absolute	0...100	10	400
				absolute	0...400	40	600

1) The overload indicated applies to the sensor. Please also note the maximum permissible gauge pressures of the diaphragm seals.

2) Absolute pressure sensors

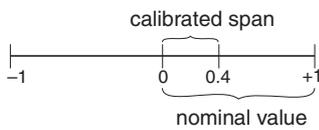


Figure 8.1 Turndown

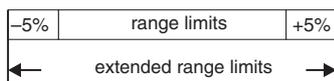


Figure 8.2 Extended range limits

Resistance to low pressure (vacuum resistance)	PMC 41, PMC 45 PMP 41, PMP 45 PMP 46, PMP 48	- Sensors with nominal value 0.1 bar: to 0.7 bar _{abs} all other sensors: to 0 bar _{abs} - To 10 mbar _{abs} - Depends on diaphragm seal filling liquid, see Technical Information TI 322P
Adjusting the span (turndown)	TD 10:1 Turndown (TD) = nominal value/calibrated span - Example (see adjacent figure 8.1): Nominal value = 1 bar Set span = 0.4 bar TD = 1:0.4	
Zero point increase and decrease	Within the extended range limits, see table above for range limits. - Example (see adjacent figure 8.2): Gauge pressure sensor: 0...+4 bar Extended range limits: -0.2...+4.2 bar Absolute pressure sensor: 0...10 bar Extended range limit: 0...10.5 bar _{abs}	

PROFIBUS-PA

Output

Output signal	Digital communication signal PROFIBUS-PA
PA function	Slave
Transmission rate	31.25 kBit/s
Response time	Slave: approx. 20 ms PLC: 300...600 ms (depending on segment coupler) for approx. 30 devices
Signal on alarm	Signal: status bit is set, last measured value is held dependent on the error message. Display module: error code
Damping (output damping)	0...40 s via communication
Communication resistor	None, PROFIBUS-PA termination-resistor
Physical layer	IEC 61158-2

Accuracy

Reference operating conditions	To DIN IEC 60770 $T_U=25^{\circ}\text{C}$ (+77°F) Accuracy data apply after entering "Low sensor calibration" and "High sensor calibration" for lower range value and upper range value.
Linearity including hysteresis and repeatability (based on the limit point method to DIN IEC 60770)	$\pm 0.2\%$ of calibrated span
Special specifications are required for linearity at low absolute pressure measuring ranges, (due to smallest possible measuring uncertainty which may be transferred by the DKD calibration point).	PMC 41, PMC 45: for $\geq 40 \text{ mbar}_{\text{abs}}$ to $< 100 \text{ mbar}_{\text{abs}}$: $\pm 0.3\%$ of the calibrated span
Use of absolute pressure sensors with measuring ranges smaller than 10 bar for gauge pressure measurement	Accuracy can be influenced by fluctuating ambient air pressure.
Warm-up period	1 s
Rise time	220 ms
Settling time	600 ms
Long-term drift (with reference to calibrated span)	$\pm 0.1\%$ (FS) per year $\pm 0.25\%$ per 3 years
Thermal effects: – With reference to calibrated span – Applies to transmitter without diaphragm seal and capillary tubes.	For $-10\dots+60^{\circ}\text{C}$ ($+14\dots+140^{\circ}\text{F}$): $\pm(0.2\% \times \text{TD} + 0.2\%)$ For $-40\dots-10^{\circ}\text{C}$ ($-40\dots+14^{\circ}\text{F}$); $+60\dots+85^{\circ}\text{C}$ ($+140\dots+185^{\circ}\text{F}$): $\pm(0.4\% \times \text{TD} + 0.4\%)$ For medium temp. $+85\dots+125^{\circ}\text{C}$ ($+185\dots+257^{\circ}\text{F}$) (PMC 45, PMP 45): $\pm(0.6\% \times \text{TD} + 0.6\%)$
Temperature coefficient (maximum TK) – If the value of the temperature coefficient exceeds the value of the thermal effects then the thermal effects automatically apply. – Applies to transmitter without diaphragm seal and capillary tubes.	Zero output and output span: For $-10\dots+60^{\circ}\text{C}$ ($+14\dots+140^{\circ}\text{F}$): $\pm 0.8\%$ of nominal value/10 K For $-40\dots-10^{\circ}\text{C}$ ($-40\dots+14^{\circ}\text{F}$) and $+60\dots+85^{\circ}\text{C}$ ($+140\dots+185^{\circ}\text{F}$): $\pm 0.1\%$ of nominal value/10 K For medium temp. $+85\dots+125^{\circ}\text{C}$ ($+185\dots+257^{\circ}\text{F}$) (PMC 45, PMP 45): $\pm 0.12\%$ of nominal value/10K
Vibration effects	None (4 mm in path peak-to-peak: 5 Hz... 15 Hz, 2 g: 15 Hz... 150 Hz, 1 g: 150 Hz... 2000 Hz)

Operating conditions

Installation	Any orientation, zero point shift due to position can be corrected
--------------	--

Environment

Ambient temperature range	$-40\dots+85^{\circ}\text{C}$ ($-40\dots+185^{\circ}\text{F}$) For Ex-devices see safety instructions XA (ATEX) or Control Drawing ZD (CSA or FM)
Ambient temperature limits (short-term)	$-40\dots+100^{\circ}\text{C}$ ($-40\dots+212^{\circ}\text{F}$)
Storage temperature	$-40\dots+85^{\circ}\text{C}$ ($-40\dots+185^{\circ}\text{F}$)
Climate class	4K4H to DIN EN 60721-3
Degree of protection	– IP 65 with Harting plug (Han7D) – IP 66/Nema 4X: with cable gland or cable entry or M12 plug (with gauge pressure sensors) – IP 68 (1 m water over 24 h) and Nema 6P (1.8 m water over 30 min): with assembled cable with reference air feed or M 12 plug (with absolute pressure sensors)
Electromagnetic compatibility	Interference emission to EN 61326, electrical equipment B; interference immunity to EN 61326 Annex A (industrial) and NAMUR Recommendation EMC (NE 21). Interference influence to EMC: 0.5% Twin-core, twisted and screened cable recommended.

Medium conditions

Medium temperature range	PMC 41, PMP 41: -40...+100°C (-40...+212°F) PMC 45, PMP 45: -40...+125°C (-40...+257°F) PMP 46, PMP 48: depends on maximum permissible temperature of diaphragm seal filling liquid and on diaphragm diameter, see TI 322P. For Ex-devices see Safety Instructions XA (ATEX) or Control Drawing ZD (CSA or FM). PMC 41, PMC 45, PMP 41: Please note the temperature limits of the seals used.
Medium temperature limits	PMC 45, PMP 45: Cleaning temperature Cerabar M flush-mounted +150°C (+302°F) for max. 1 hour; Diaphragm seal with temperature spacer and high-temperature oil: to +350°C (+662°F); PMC 41, PMC 45, PMP 41: Please note the temperature limits of the seals used, see adjacent table.
Pressure specifications	See nameplate. Observe pressure-temperature derating.

Mechanical construction

Design

Housing	Stainless steel (type F 15) or aluminium (type F18) Options for electrical connection: – Cable gland M 20x1.5 – Cable entry G ½, ½ NPT, – Harting plug (Han7D) or plug M 12x1 – Permanently attached cable with reference air feed
Process connections	All common thread versions, flush-mounted connections, flanges and diaphragm seal variants

Material

Housing	Stainless steel 1.4404 (AISI 316L), Ra < 0,8 µm or die-cast aluminium housing with protective polyester-based powder coat
O-ring for cover seal	stainless steel housing – Silicone aluminium housing – NBR
Nameplate	stainless steel housing – Engraved on housing with laser aluminium housing – 1.4301 (AISI 304)
Process connections	PMP 41 – 1.4435 (AISI 316L), adapter 1.4435 (AISI 316L) PMC 41 – 1.4435 (AISI 316L) or 2.4819 (Alloy C216) PMP 45, PMC 45, PMP 46, PMP 48 – 1.4435 (AISI 316L)
Process diaphragm	PMC 41, PMC 45 – Al ₂ O ₃ aluminium oxide ceramic (FDA-conform) (PMC 41: 96%, PMC 45: high-purity 99.9%) PMP 41, PMP 45, PMP 46 – 1.4435 (AISI 316L) PMP 48 – 1.4435 (AISI 316L), 2.4819 (Alloy C216), Tantalum, PTFE film on 1.4435 (AISI 316L)
Coupling nut	1.4307 (AISI 304L)
Seals	See adjacent table
Mounting accessories	Mounting bracket for pipe and wall mounting 1.4301 (AISI 304)
Filling liquid in diaphragm seals (PMP 46, PMP 48)	Silicone oil, vegetable oil (FDA-conform), glycerine, high-temperature oil, Fluorolube

Measuring cell

PMC 41, PMC 45 PMP 41, PMP 46, PMP 48 PMP 45	– No oil filling, dry sensor – Option of mineral oil, inert oil (Voltalef) for oxygen use or vegetable oil (FDA-conform) – Vegetable oil (FDA-conform)
--	--

1)	Seal	Temperat. limits
1	FKM, Viton	-20°C (-4°F)
6	FKM, Viton grease-free	-10°C (+14°F)
A	FKM, Viton oil and grease-free for oxygen	-10°C (+14°F) to ²⁾
2	NBR (FDA)	-20°C...+80°C (-4°F...+176°F)
7	FFKM, Kalrez compound 4079	+5°C (+41°F)
C	FFKM Chemraz	-10°C (+14°F)
4	EPDM (FDA)	-40°C (-40°F)

¹⁾ from Cerabar order code
²⁾ Note the application limits for oxygen (as per BAM list of non-metallic materials)

Human interface

Display	Pluggable digital display with four-digit pressure display and bar graph with 28 segments.
On-site operation	<ul style="list-style-type: none"> – Device address set at bus via DIP switch – Calibration of lower range value and upper range value for the bar graph via two keys
Communication interface	PROFIBUS-PA

Power supply

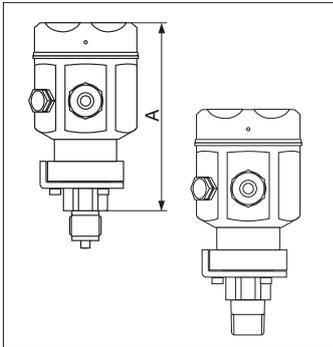
Supply voltage	9...32 VDC Ex ia: 9...24 VDC
Current consumption	11 mA ± 1 mA
Power up current	Corresponds to table 4, IEC 61158-2

Certificates and approvals

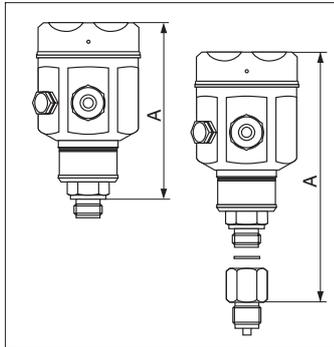
Type of protection	See Chapter "Safety instructions"
CE approval	The device meets the legal requirements of the EC directives. Endress+Hauser confirms that the device has been tested successfully by attaching the CE mark.
Pressure Equipment Directive	<ul style="list-style-type: none"> – This measuring device corresponds to Article 3 (3) of the EC directive 97/23/EC (Pressure Equipment Directive) and has been designed and manufactured according to good engineering practice – PMP 46 with pipe diaphragm seal ≥ DN 40/PN 40: Suitable for Group 1 gases (Category II of the Pressure Equipment Directive)

8.1 Maximum mounting space

Dimension A indicates the maximum installation height of Cerabar M (with high housing cover for the digital display).

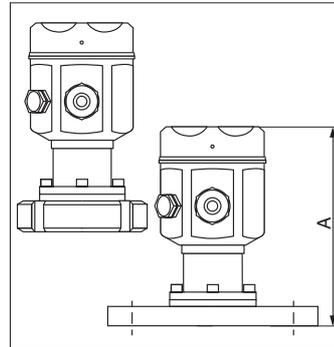


PMC 41
 Dimension A
 Stainless steel housing: 155 mm
 Aluminium housing: 160 mm
 (see also TI 321P)

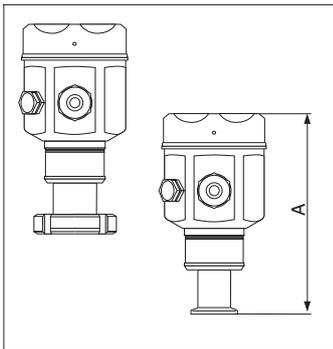


PMP 41
 Dimension A, diaphragm flush-mounted
 Stainless steel housing: 145 mm
 Aluminium housing: 150 mm

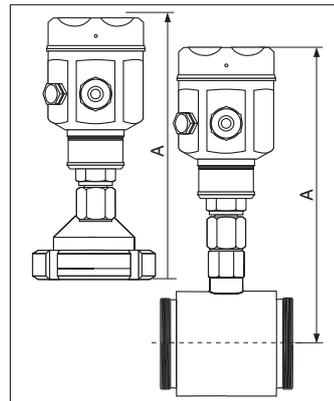
 Dimension A, diaphragm internal
 Stainless steel housing: 185 mm
 Aluminium housing: 174 mm
 (see also TI 321P)



PMC 45
 Dimension A
 Stainless steel housing: 174 mm
 Aluminium housing: 180 mm
 (see also TI 321P)

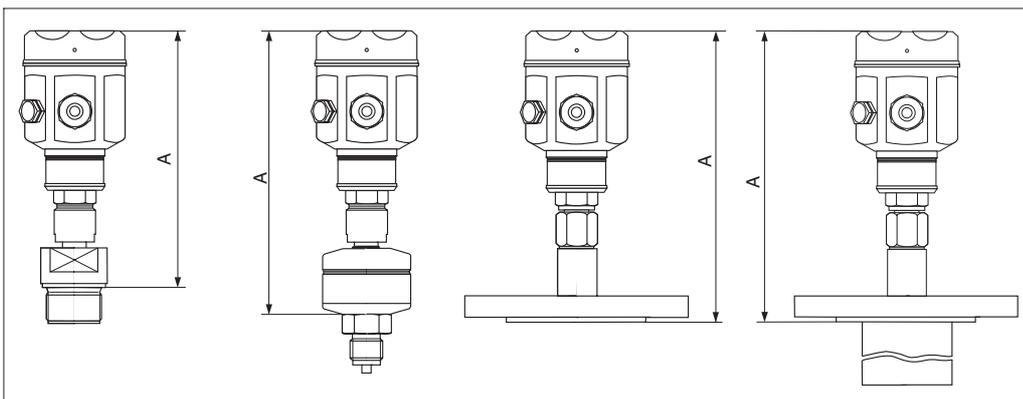


PMP 45
 Dimension A
 Stainless steel housing: 167 mm
 aluminium housing: 172 mm
 (see also TI 321P)



PMP 46
 Dimension A: Diaphragm seal
 Stainless steel housing: 268 mm
 Aluminium housing: 273 mm

 Dimension A: Pipe diaphragm seal
 Stainless steel housing: 289 mm
 Aluminium housing: 294 mm
 (see also TI 322P)



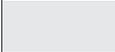
PMP 48
 Dimension A
 Stainless steel housing: 287 mm
 Aluminium housing: 300 mm
 (see also TI 322P)

Conversion factors
 1 mm = 0.039 in
 1 in = 25.4 mm

9 Operating Matrix

9.1 Matrix Commuwin II

	H0	H1	H2	H3	H4	H5	H6	H7	H8	H9
V0 Basic calibration	Measured Value	Lower Range Value	Upper Range Value	Set Lower Value	Set Upper Value	Set Bias Pressure	Bias Pressure Autom.	Set Output Damping		Select Pressure Unit
V1										
V2 Transmitter information	Diagnostic Code	Last Diagnostic Code	Software No.					Sensor Data No.	Sensor Data Value	Default Values
V3...V5										
V6 PROFIBUS parameter	Manufacturer Ident Number	Set Unit to Bus	Out Value	Out Status	2nd Cyclic Value	Select V0H0		Profile Version		
V7 Sensor data					Low Sensor Calibration	High Sensor Calibration	Lower Range Limit	Upper Range Limit	Sensor Pressure	
V8										
V9 Service					Instrument address	Zero offset	Zero offset value	Unbiased pressure	Bias pressure	Security locking ¹⁾
VA Communica- tion	Set Tag Number	Set User Text	Serial Number	Serial No. Sensor						Device Profile

 Display field

¹⁾ Security locking \neq 130/2457, unlocking = 130/2457
Security locking = 333; all parameters, apart from "Sensor Data No." (V2H7) and "Sensor Data Value" (V2H8), are locked

This matrix gives a summary of factory settings.
You can also enter your values here:

	H0	H1	H2	H3	H4	H5	H6	H7	H8	H9
V0	—	0.0	V7H7	—	—	0.0	—	0.0		bar
V1										
V2	0	0	xxxx					1	0	0
V3...V5										
V6	xxxx	—	UNKNOWN	—	—			3.0		
V7					= V7H6	= V7H7	—	—	—	
V8										
V9					xxx	0.0	0.0	—	—	130/2457
VA	—	—	—	—						

9.2 Matrix Analog Input Block (AI Transmitter)

	H0	H1	H2	H3	H4	H5	H6	H7	H8	H9
V0 OUT	OUT Value	OUT Status	OUT Status	OUT Sub Status	OUT Limit		Fail Safe Action	Fail Safe Value		
V1 Scaling	PV Scale Min	PV Scale Max	Type of Linearisation	OUT Scale Min	OUT Scale Max	OUT Unit	User Unit	Decimal Point OUT	Rising Time	
V2 Alarm Limits	Alarm Hysteresis									
V3 HI HI Alarm	HI HI Limit	Value	Alarm State	Switch-on Point	Switch-off Point					
V4 HI Alarm	HI Limit	Value	Alarm State	Switch-on Point	Switch-off Point					
V5 LO Alarm	LO Limit	Value	Alarm State	Switch-on Point	Switch-off Point					
V6 LO LO Alarm	LO LO Limit	Value	Alarm State	Switch-on Point	Switch-off Point					
V7 Simulation	Simulation Value	Simulation Status	Simulation Mode							
V8 Block Mode	Target Mode	Actual	Permitted	Normal		Channel		Unit Mode		
V9 Alarm Config.	Current	Disable				Static Revision				
VA Block Parameter	Set Tag Number	Strategy	Alert Key	Profile Version	Batch ID	Batch Rup	Batch Phase	Batch Operation		Device Profile

9.3 Description of parameters

Parameter	Description
Measured Value (V0H0)	<p>This parameter indicates the value currently measured. The matrix field V0H0 corresponds to the on-site display. Select a pressure unit using the parameter "Select Pressure Unit" (V0H9). The measured value is converted and displayed in the pressure unit you selected.</p> <p>Note: As standard, the measured value is transferred over the bus in the pressure unit given on the nameplate. To transfer the converted measured value over the bus, confirm the parameter "Set Unit to Bus" once in the matrix field V6H1. Refer to the parameter description of "Set Unit to Bus" (V6H1).</p>
Lower Range Value (V0H1)	<p>Enter a pressure value for the lower range value (calibration without reference pressure).</p> <p>This parameter sets the lower range value for the bar graph of the on-site display. This parameter has no effect on the digital output value (OUT Value). Refer to Chapter 5.2, Section "Calibration without reference pressure".</p> <p>Factory setting: 0.0</p>
Upper Range Value (V0H2)	<p>Enter a pressure value for the upper range value (calibration without reference pressure).</p> <p>This parameter sets the upper range value for the bar graph of the on-site display. This parameter has no effect on the digital output value (OUT Value). Refer to Chapter 5.2, Section "Calibration without reference pressure".</p> <p>Factory setting: "Upper Range Limit" (V7H7)</p>
Set Lower Value (V0H3)	<p>If you confirm this parameter, the current pressure value is set as the lower range value (calibration with reference pressure). The lower range value only refers to the bar graph on the on-site display. It has no effect on the digital output value (OUT Value).</p> <p>The value is displayed in the parameter "Lower Range Value" (V0H1). This is equivalent to pressing the Zero key twice in on-site operation.</p>
Set Upper Value (V0H4)	<p>If you confirm this parameter, the current pressure value is set as upper range value (calibration with reference pressure). The lower range value only refers to the bar graph on the on-site display. It has no effect on the digital output value (OUT Value).</p> <p>The value is displayed in the parameter "Upper Range Value" (V0H2). This is equivalent to pressing the Span key twice in on-site operation.</p>
Set Bias Pressure (V0H5)	<p>If, after calibrating the lower range value, the on-site display does not show zero at process pressure zero (dependent on position), then the display value on the on-site display can be corrected to zero by entering a pressure value (bias pressure). The parameters "Measured Value" (V0H0), "Lower Range Value" (V0H1) and "Upper Range Value" (V0H2) are corrected by the bias pressure.</p> <p>Note: In the "Pressure" operating mode, compensation by a bias pressure has no effect on the digital output value (parameter "OUT Value") which is transferred over the bus. Confirm the parameter "Set Unit to Bus" in matrix field V6H1 so that the on-site display and the "OUT Value" (V6H2) indicate the same value. Refer also to Chapter 5.2, Section "Position calibration".</p> <p>Factory setting: 0.0</p>
Bias Pressure Automatic (V0H6)	<p>If you confirm this parameter, the current pressure value is taken over as the bias pressure. The value is displayed in the parameter "Set Bias Pressure" (V0H5). This is equivalent to pressing the Zero and Span keys twice simultaneously in on-site operation. Refer to the parameter description "Set Bias Pressure" (V0H5).</p>
Set Output Damping (V0H7)	<p>Damping (output damping) affects the speed at which the output signal and the display value respond to a change in pressure. Damping is adjustable from 0 to 40 s. Factory setting: 0.0</p>
Select Pressure Unit (V0H9)	<p>Select a pressure unit.</p> <p>When you select a new pressure unit, all pressure-related parameters are converted and displayed in the new pressure unit.</p> <p>Note: As standard, the measured value is transferred over the bus in the pressure unit given on the nameplate. To transfer the converted measured value over the bus, confirm the parameter "Set Unit to Bus" once in the matrix field V6H1. Refer to the parameter description of "Set Unit to Bus" (V6H1). Refer also to Chapter 5.2, Section "Selecting pressure unit".</p> <p>Factory setting: see data on the nameplate</p>
Diagnostic Code (V2H0)	<p>If the pressure transmitter detects an error or a warning, it generates an error code. This parameter indicates the current error code.</p> <p>See Chapter 6.1 for a description of error codes</p>

Parameter	Description
Last Diagnostic Code (V2H1)	Indicates the last error code. See Chapter 6.1 for a description of error codes Factory setting: 0
Software No. (V2H2)	Indicates the device and software number. The first two digits represent the device number and digits 3 and 4 the software version. Example: Cerabar M PROFIBUS-PA SW 1.2 = 8212
Sensor Data No. (V2H7)	A sensor pass with 11 pieces of sensor data is supplied with each instrument. If the electronics are replaced, these data must be re-entered via the parameters "Sensor Data No." (V2H7) and "Sensor Data Value" (V2H8). See Chapter 7.7, Section "Entering sensor data".
Sensor Data Value (V2H8)	See parameter "Sensor Data No." (V2H7) and Chapter 7.7, Section "Entering sensor data".
Default Values (Reset) (V2H9)	Enter a reset code. Possible reset codes include: 5140 or 1, 2380, 731, 2506, 2509 and 2712. Chapter 6.3 lists the parameters which the reset codes reset to the factory settings.
Manufacturer Ident Number (V6H0)	Select the ID number. Options: – Profile: General ID number of the PNO (PROFIBUS User Organisation): "9700 (hex)". To configure the PLC, use the device data base (GSD) of the PNO. – Manufacturer: Device ID number for Cerabar M PROFIBUS-PA: "151C (hex)". To configure the PLC, use the device-specific GSD. Refer to Chapter 4.3 Device database and type files (GSD)
Set Unit to Bus (V6H1)	In the following cases, the digital output value (OUT Value) and the on-site display or the parameter "Measured Value" (V0H0) do not indicate the same value: – If you selected a new pressure unit using the parameter "Select Pressure Unit" (V0H9) and/or – If you carried out a position calibration in the "Pressure" operating mode by entering a bias pressure (V0H5/V0H6). So that the digital output value indicates the same value as the on-site display or V0H0 in these cases, confirm the parameter "Set Unit to Bus" in matrix field V6H1 after calibration. Note that any change in the digital output value could affect control. Refer to Chapter 5.2, Section "Selecting pressure unit" and "Position calibration of the display".
V6H2 OUT Value (V6H2)	This parameter indicates the OUT Value of the Analog Input Block (digital output value transferred over the bus). As long as the matrix field V6H2 still indicates UNKNOWN, the parameter "Set Unit to Bus" has not been confirmed in matrix field V6H1.
OUT Status (V6H3)	This parameter indicates the status of the OUT Value (digital output value). See Chapter 4.4, Section "Status codes" for a description of the status codes.
2nd Cyclic Value (V6H4)	Use this field to select a second parameter, which is output cyclically to the PLC. Options: Sensor value (V7H8), Trimmed value (V9H7) and Biased value (V9H8). Refer to Chapter 4.4, Fig. 4.3. Factory setting: Primary measured value (V0H0)
Select V0H0 (V6H5)	The on-site display and the matrix field V0H0 indicate the same value as standard. However, a cyclic output value can also be made available to the on-site display via a PLC. To do this, set this parameter to "Display value" (or 1). Refer to Chapter 4.4.
OUT Value from PLC (V6H6)	Indicates a cyclic OUT Value of the PLC. Refer to Chapter 4.4, Fig. 4.3.
Profile Version (V6H7)	Indicates the PROFIBUS-PA profile version.
Low Sensor Calibration (V7H4)	Enter the lower point of the sensor characteristic curve for sensor calibration. Use this parameter to assign a new value to a reference pressure applied to the device. The applied pressure value and the value entered for "Low Sensor Cal" are equivalent to the lower point of the sensor characteristic curve. Refer to Chapter 7.10 "Sensor calibration". Factory setting: "Lower Range Limit" (V7H6)
High Sensor Calibration (V7H5)	Enter the upper point of the sensor characteristic curve for sensor calibration. Use this parameter to assign a new value to a reference pressure applied to the device. The applied pressure value and the value entered for "High Sensor Cal" are equivalent to the upper point of the sensor characteristic curve. Refer to Chapter 7.10 "Sensor calibration". Factory setting: "Upper Range Limit" (V7H7)

Parameter	Description
Lower Range Limit (V7H6)	Indicates the lower range limit.
Upper Range Limit (V7H7)	Indicates the upper range limit.
Sensor Pressure (V7H8)	Indicates the pressure currently applied.
Instrument Address (V9H4)	Indicates the device address in the bus. The address can either be set by software or on-site using DIP switches. Refer to Chapter 4.2. Factory setting: 126
Zero Offset (V9H5)	Use this parameter to carry out a calibration (zero offset) for the values indicated on the on-site display ("Measured Value" (V0H0)) and for the digital output value (OUT Value) at the same time. By entering a value for this parameter, you can assign a new value to the pressure applied to the device. The sensor characteristic curve is shifted by this value and the parameters "Low Sensor Cal" (V7H4) and "High Sensor Cal" (V7H5) are recalculated. Refer to Chapter 5.2, Section "Zero offset". Factory setting: 0.0
Zero Offset Value (V9H6)	Indicates the value by which the sensor characteristic curve was shifted for a zero offset. Refer to parameter description "Zero Offset" (V9H5) and Chapter 5.2, Section "Zero offset". Factory setting: 0.0
Unbiased Pressure (V9H7)	This parameter indicates the pressure currently applied and damped without any bias correction. Refer to the parameter description "Set Bias Pressure" (V0H5).
Biased Pressure (V9H8)	This parameter indicates the pressure currently applied and damped with bias correction. Refer to the parameter description "Set Bias Pressure" (V0H5). Calculation: "Biased Pressure" (V9H8) = "Unbiased Pressure" (V9H7) – "Set Bias Pressure" (V0H5) In the "Pressure" operating mode, this parameter and the parameter "Measured Value" (V0H0) indicate the same value.
Security Locking (V9H9)	Enter a code to lock or unlock the operating matrix and on-site operation. Lock operation: – Using the parameter "Security Locking" (V9H9): Enter a number from 1 to 9998, except for numbers 130 and 2457, Unlock operation: – Using the parameter "Security Locking" (V9H9): Enter 130 or 2457 Refer to Chapter 5.3.
Set Tag Number (VAH0)	Enter a text describing the measuring point (up to 32 ASCII characters).
Set User Text (VAH1)	Enter a text for additional information (up to 32 ASCII characters).
Serial Number (VAH2)	Indicates the serial number of the device.
Serial No. Sensor (VAH3)	Indicates the serial number of the sensor.

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Declaration of contamination

Dear customer,

Because of legal determinations and for the safety of our employees and operating equipment we need this "Declaration of contamination" with your signature before your order can be handled. Please put the completely filled in declaration to the instrument and to the shipping documents in any case. Add also safety sheets and/or specific handling instructions if necessary.

type of instrument / sensor: _____ serial number: _____
medium / concentration: _____ temperature: _____ pressure: _____
cleaned with: _____ conductivity: _____ viscosity: _____

Warning hints for medium used:



radioactive



explosive



caustic



poisonous



harmful to health



biologically hazardous



inflammable



safe

Please mark the appropriate warning hints.

Reason for return:

Company data:

company: _____	contact person: _____
_____	_____
_____	department: _____
address: _____	phone number: _____
_____	fax / e-mail: _____
_____	your order no.: _____

I hereby certify that the returned equipment has been cleaned and decontaminated acc. to good industrial practices and is in compliance with all regulations. This equipment poses no health or safety risks due to contamination.

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