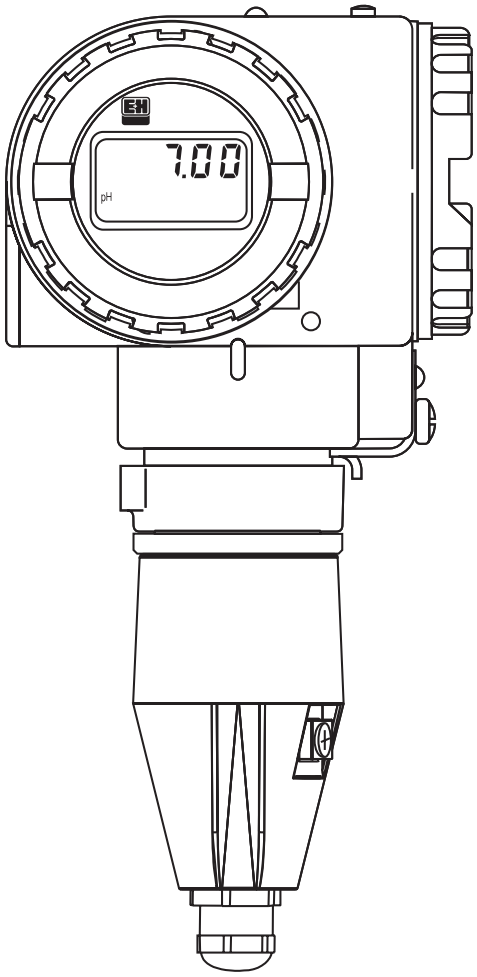
BA 173 C/07/en/02.00
No. 50088305
Software version 1.00 or later

mypro
CPM 431
Two-wire Transmitter for pH and Redox

Operating Instructions



Quality made by
Endress+Hauser

ISO 9001

Endress+Hauser

The Power of Know How

Please familiarise yourself with the instrument before you take any other steps:

General Information

Safety

Description of Instrument

You wish to install and start up the instrument. The required steps are described in these chapters:

Installation

First start-up

You wish to operate or reconfigure the instrument. The operating concept is explained in these chapters:

On-site Operation

Functional Description

Interfaces

- **Operation via hand-held HART® terminal**
- **Operation via Commuwin II**

When you encounter problems or when the instrument requires maintenance, refer to these chapters for help:

Troubleshooting

Service and Maintenance

Table of contents

1 General Information

1.1 Symbols used

Warning:

This symbol alerts to hazards which may cause serious injuries as well as damage to equipment if ignored.

Caution:

This symbol alerts to possible malfunction due to operator error.

Note:

This symbol indicates important items of information.

1.2 Conformity statement

The pH and redox measuring transmitter Mypro CPM 431 has been developed and manufactured in accordance with the applicable European standards and directives.

Note:

The instrument variants CPM 431-G/H for installation in explosive atmospheres are supplied with an EC certificate of conformity. The variant CPM 431-H is supplied with additional safety instructions (XA 173C/07/en).

2 Safety

2.1 Intended use

The MyPro CPM 431 is a field-tested and reliable measuring transmitter for determining the pH value or redox potential of liquid media.

Caution

This instrument may only be installed, commissioned and serviced by properly trained specialists.

Warning

Operation of the equipment in a manner other than as described in these operating instructions can lead to unsafe and improper functioning of the measuring system.

Damaged equipment that may be hazardous to operate must not be used and must be identified as defective.

Repair work may only be carried out by the manufacturer or by the Endress+Hauser Service Organization.

It is the operator's responsibility to assure that the following safety regulations are observed:

- Regulations for explosion protection
- Regulations for installation
- Operating conditions for the instrument and its materials
- Local standards and regulations

2.2 Monitoring and safety features

The MyPro CPM 431 is protected against interference by the following measures:

1. Protective filter on supply side
2. Protective filter on sensor side
3. Massive metal encapsulation

If a problem ever occurs, an alarm symbol flashes on the display, and, if set accordingly, a defined error current (22 +/– 0.5 mA) is output via the current interface (also see chapter 9, Troubleshooting).

2.3 Safety devices

- **Access codes/key combinations for field operation and communication interface:**
  Unintentional access to the calibration and configuration data of the measuring transmitter is effectively prevented by access codes/key combinations.
- **Alarm function:**
  In the event of system errors, temperature sensor failure and severe defects, a defined error current is output (if set accordingly).
- **Data protection:**
  The instrument configuration is retained even after a power failure.
- **Immunity to interference:**
  This instrument is protected against interference, such as pulse-shaped transients, high frequency and electrostatic discharges, according to the applicable European standards. This is only valid, however, for an instrument connected according to the notes in these installation and operating instructions.

3 Description

3.1 Areas of application

The measuring transmitter MyPro CPM 431 is suitable for measuring tasks in the following areas of application:

- Chemical industry
- Pharmaceutical industry
- Water treatment / water monitoring
- Foodstuffs industry
- Drinking water
- Waste water treatment
- Sewage treatment plants

3.2 Measuring system

A typical measuring system comprises:

- a measuring electrode with or without an integrated Pt 100 temperature sensor
- an immersion, flow or retractable assembly with or without potential matching pin suitable for the electrode
- an appropriate measuring cable
- the measuring transmitter MyPro CPM 431
- a transmitter power supply unit (MUS)

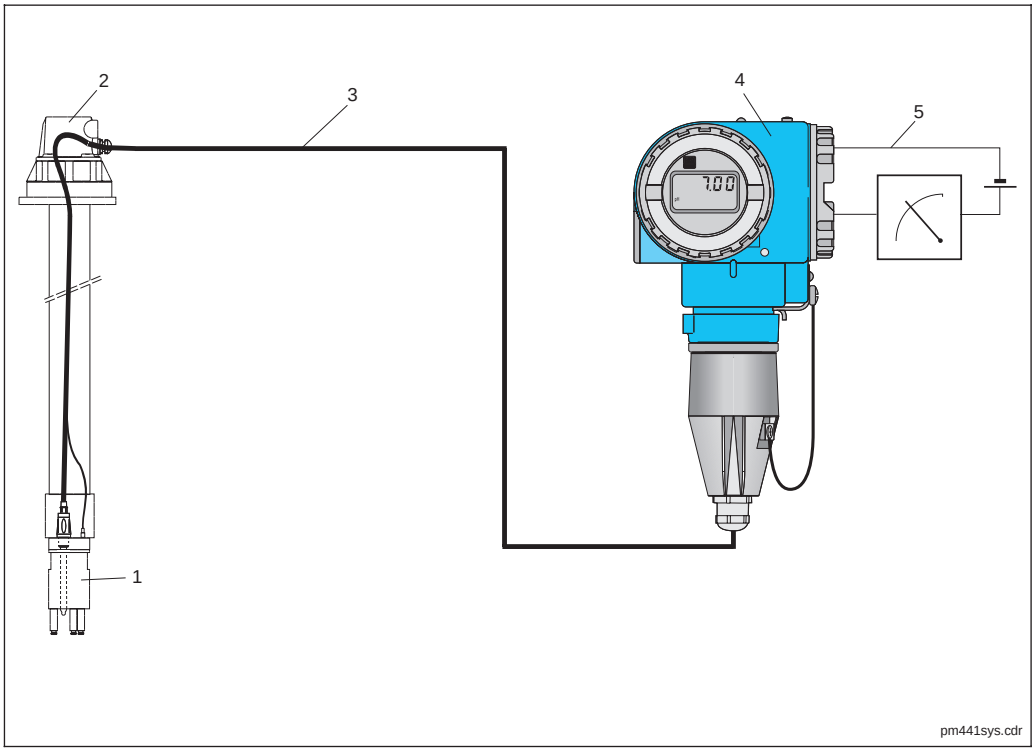


Fig. 3.1 Example of a measuring system
1 Sensor
2 Immersion assembly
3 Measuring cable
4 MyPro 431
5 Two-wire line for power supply and signal

3.3 Performance features

- The instrument can be switched between pH and redox measurement in the field or via its interface
- Display range –2 ... 16 pH or –1500 ... +1500 mV
- Display can be removed (without impairing function)
- Simple operation via four pushbuttons
- Preset configuration suitable for most applications
- 2-wire measuring transmitter with 4 ... 20 mA interface also serving as communication interface for HART protocol
- Can be supplied with power via commercially available measuring transmitter power supply units

3.4 Instrument variants

The device variant can be identified by the order code on the nameplate of the instrument.

Order code

Certificate type
A Variant for non-Ex area
H Cenelec EEx ia/ib IIC T4 (dir. 76/117/EEC; dir. 94/9/EC)

Cable entry for power supply
1 Cable gland PG 13.5
3 Cable entry M 20 x 1.5
5 Cable entry NPT ½ “
7 Cable entry G ½ ”
9 Special version

Electronics, communication, display
A 4 ... 20 mA, HART, without display
B 4 ... 20 mA, HART, LCD display
Y Special version

Accessories
1 No accessories
2 For wall and post installation (DIN 60)
3 For wall and post installation DN 30 ... 200
4 With flange mounting brackets
9 Special version

Parameter configuration
P pH, measuring range pH –2 ... 16
R Redox, measuring range ± 1500 mV
Y Special version

Cable, sensor connection
A Without cable
B With 1 m cable, GSA connector
C With 1 m cable, TSA connector (pH only)
D With 2 m cable, GSA connector
E With 2 m cable, TSA connector (pH only)

CPM 431- ☐☐☐☐☐☐ ⇐ **complete order code**

3.5 Accessories

Transmitter power supply units

- NX 9120 (non-Ex instruments)
- NY 9270Z (Ex instruments)
- 1-channel transmitter power supply units with galvanically separated output power

Output voltage: typ. 24 V DC ±1 V
Output current: max 33 mA
Current limiting: 38 mA ±5 mA

Hand-held HART® terminal DXR 275

The hand-held terminal communicates with any HART®-compatible unit via the 4 ... 20 mA line.
The digital communication signal is superimposed on the 4 ... 20 mA signal without altering it. The simple, straightforward design of the user interface provides convenient access to the entire functionality of the instrument.

Commuwin II with Commubox

Commuwin II is a graphical, PC-based operating program for intelligent measuring instruments. The Commubox serves as the required interface module between the HART® interface and the PC's serial interface (see chapter 8).

pH measuring cable CPK 1

Measuring cable with a fully assembled electrode plug GSA for one pH or redox electrode and a potential matching pin connector.
CPK 1-100 A 10 m, non-Ex
CPK 1-100 Z 10 m, Ex

pH measuring cable CPK 7

Special measuring cable for electrodes with an integrated temperature sensor, potential matching pin connection and a fully assembled electrode plug TSA.
CPK 7-10 A 10 m, non-Ex
CPK 7-10 Z 10 m, Ex

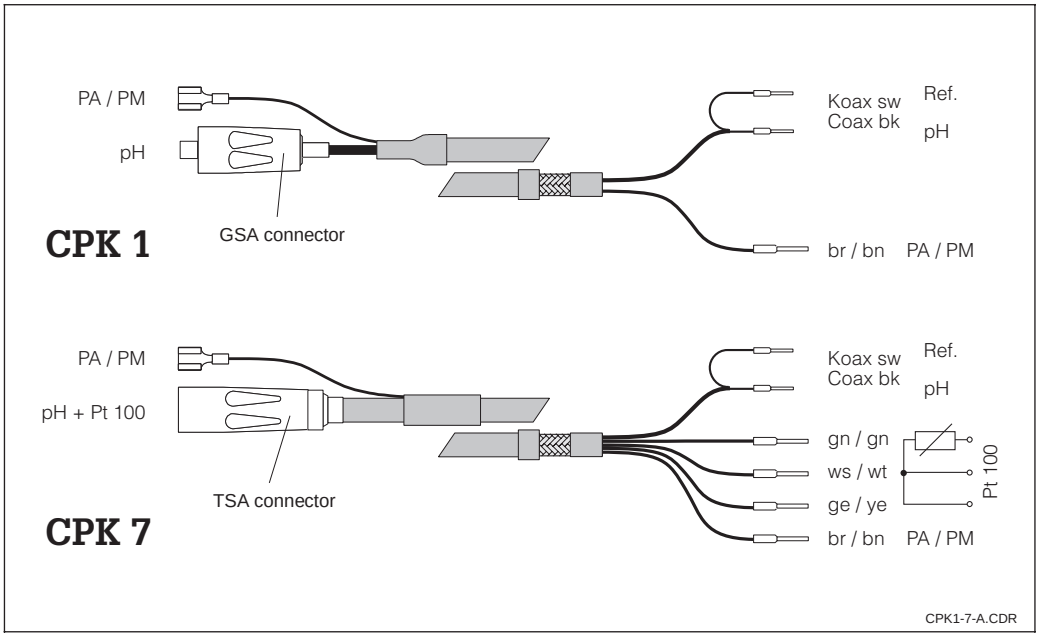


Fig. 3.2 Measuring cables: CPK 1 and CPK 7

4 Installation

4.1 Scope of delivery

The scope of delivery of the MyPro CPM 431 comprises:

- 1 housing fastening element (depending on version)
- 1 fully assembled cable (depending on version)
- Installation and operating instructions

4.2 Storage and transport

The packaging material used to store or transport the instrument must provide shock and moisture protection. Optimal protection is provided by the original packaging materials.

Conformance with the ambient conditions (see chapter 11.1, Technical data) must be assured.

4.3 Unpacking

Verify that the contents are undamaged. Inform the post office or freight carrier as well as the supplier of any damage.

Check that the delivery is complete and agrees with the shipping documents and your order:

- Quantity delivered
- Instrument type and version according to nameplate
- Accessories
- Installation and operating instructions

Save the original packaging in case the device must be stored or shipped at a later point in time.

If you have any questions, please consult your supplier or the Endress+Hauser sales office in your area (see back cover of these operating instructions for addresses).

4.4 Mounting

The measuring transmitter MyPro CPM 431 can be installed on a wall or pipe using the holder (depending on version) supplied with the instrument.

The holder is attached to the MyPro housing with two screws.
The housing can be rotated 90° thanks to four boreholes.

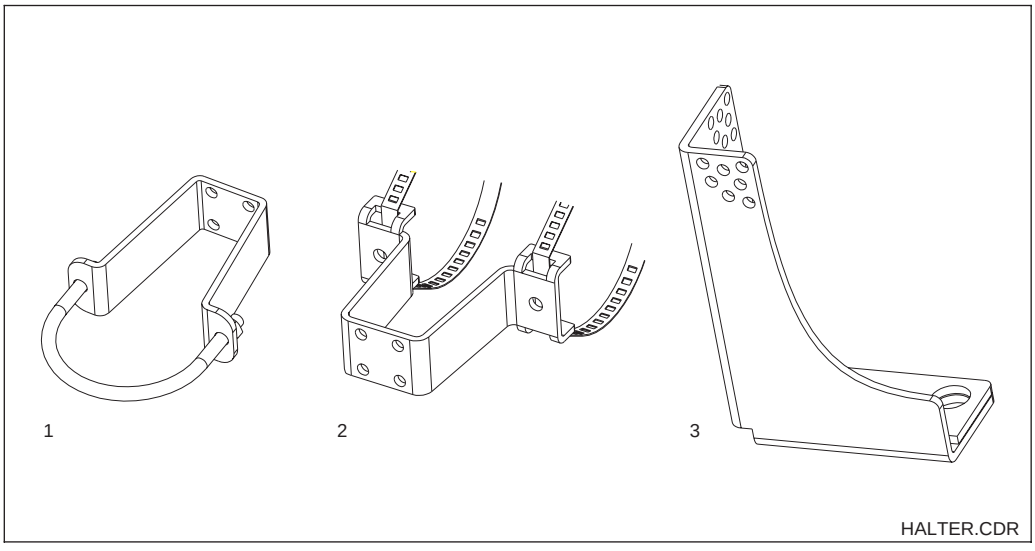
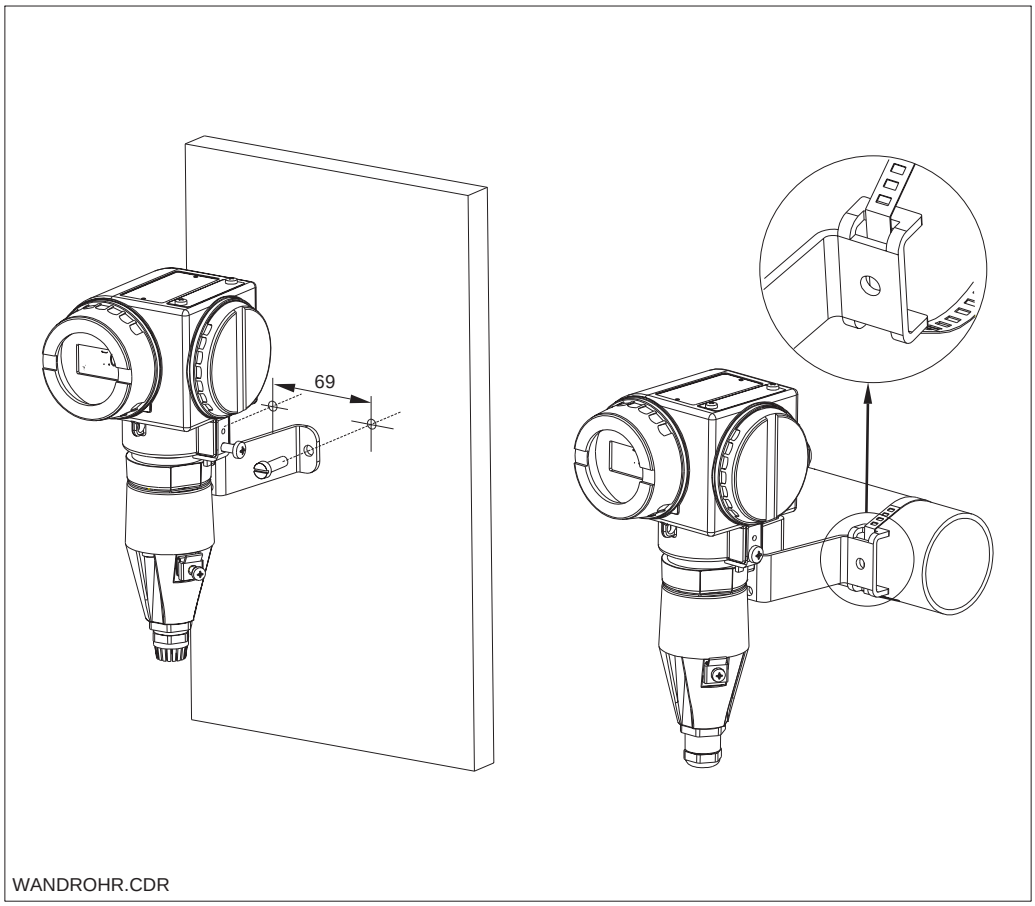


Fig. 4.1
1 Wall or pipe mounting DN 60
2 Pipe mounting DN 30...200
3 Flange mounting brackets



left:
Wall installation with mounting bracket

right:
Pipe installation

Fig. 4.2 DN 30...200

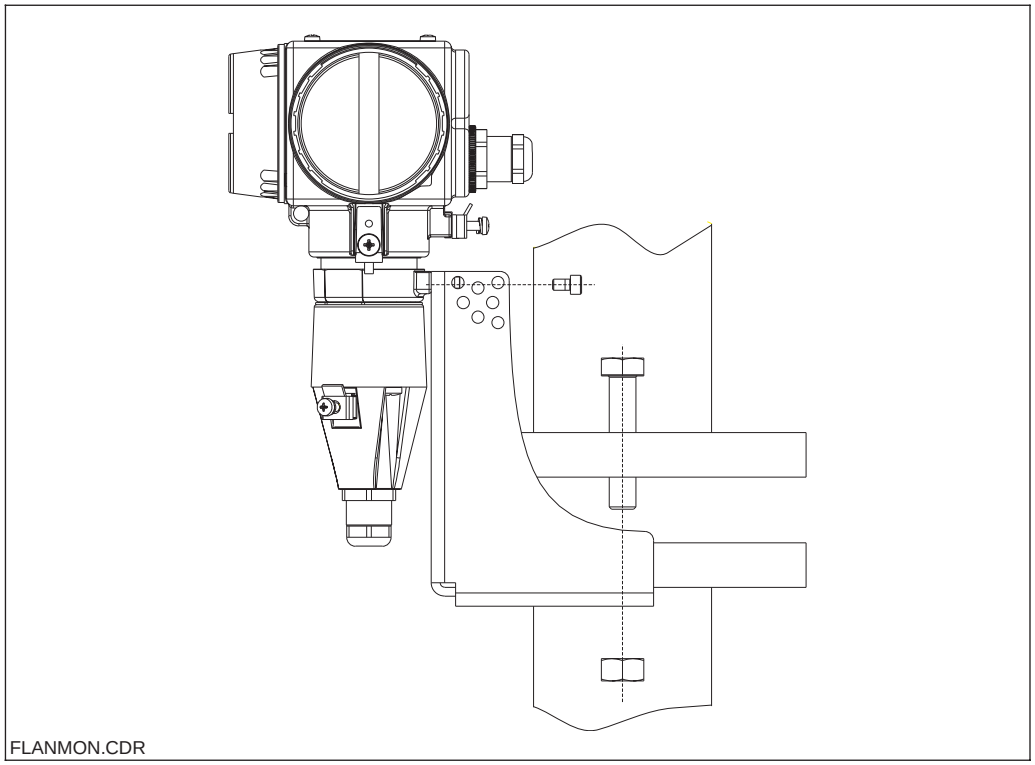


Fig. 4.3 Flange mounting

4.4.1 Instrument orientation

Following horizontal or vertical attachment to a wall or pipe, the orientation of the housing can be changed to provide optimal accessibility.

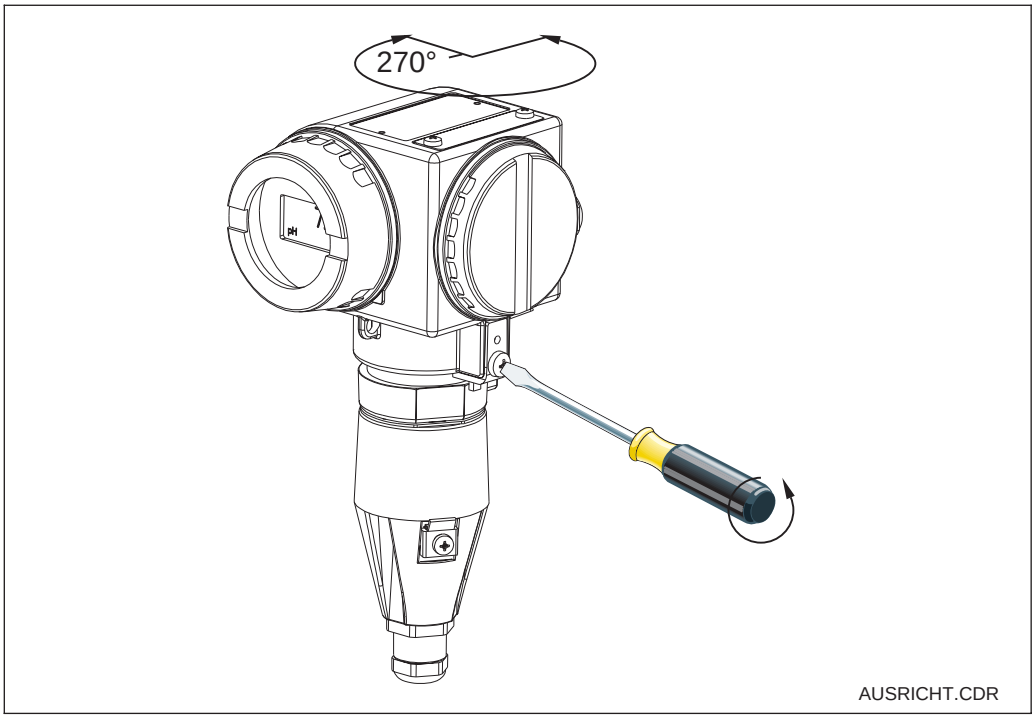


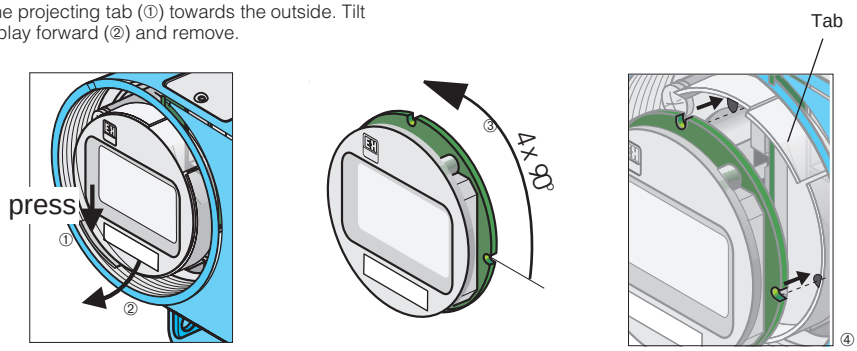
Fig. 4.4 MyPro orientation adjustment

Note

Pay attention to the keypad position during installation. The keys should be easily accaccessible.

The display can be rotated to permit perfect reading in different mounting positions. It can be rotated in four 90° steps. Refer to the figure above for the procedure to follow.

Removing the display:
Unscrew the lid over the display.
Push the projecting tab (①) towards the outside. Tilt the display forward (②) and remove.



Turning and installing the display:
Turn the removed display in 90° steps (③).
Reinstall in the desired orientation.
To reinstall, latch the display back into the guide (④).

EINBAU.CDR

Fig. 4.5 Removal and installation of display

4.5 Dimensions

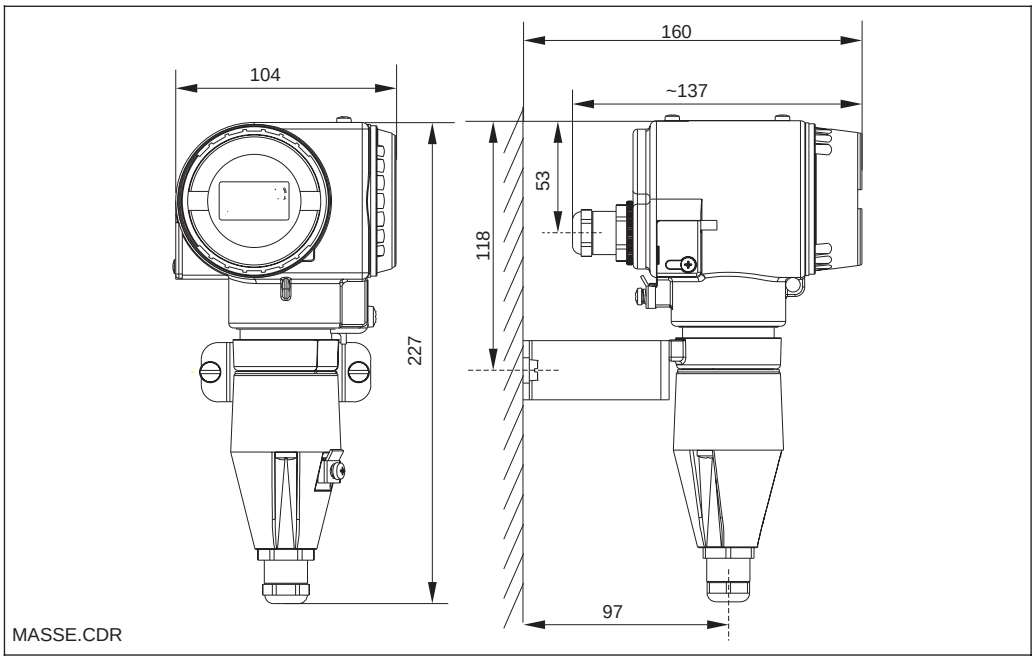
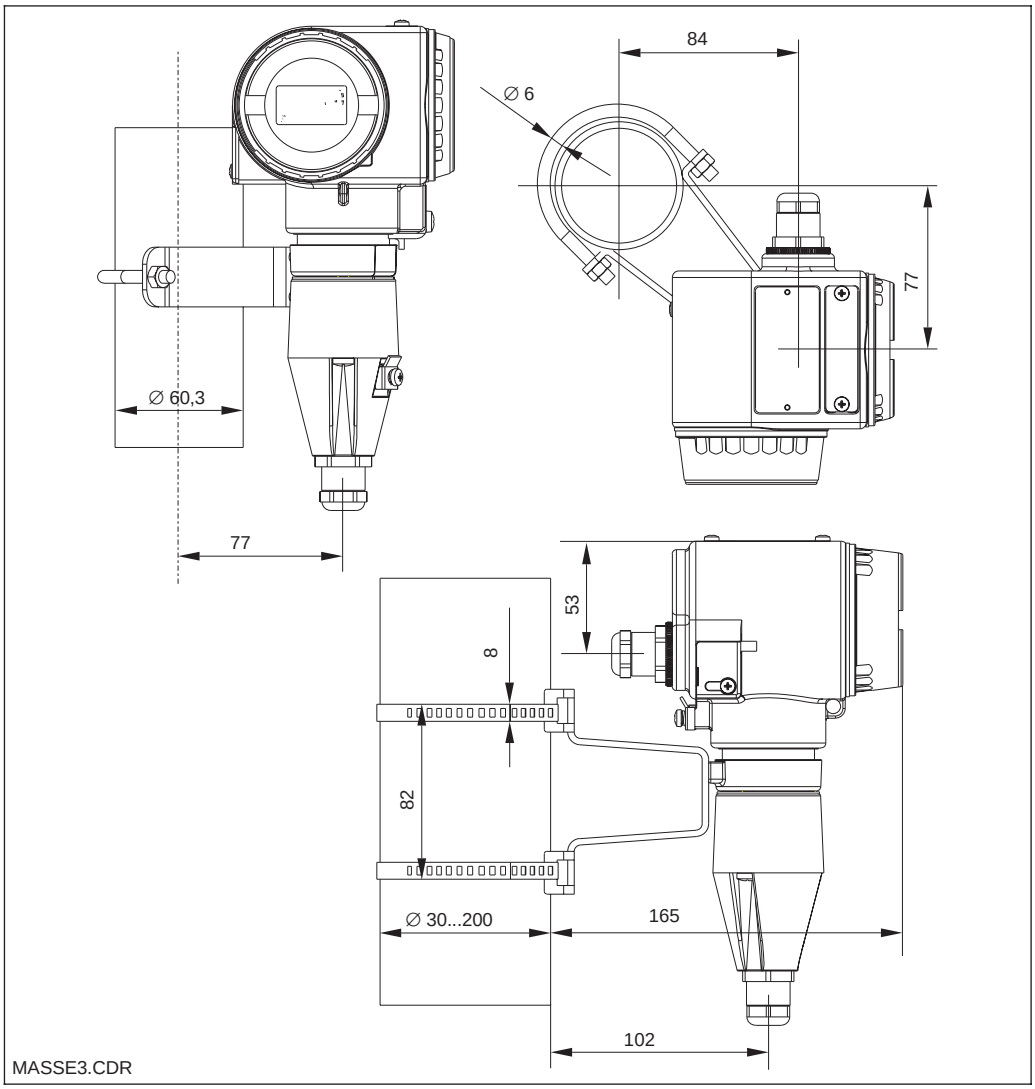


Fig. 4.6 Dimensions for wall mounting



1 Pipe mounting DN 60
2 Pipe mounting DN 30...200

Fig. 4.7

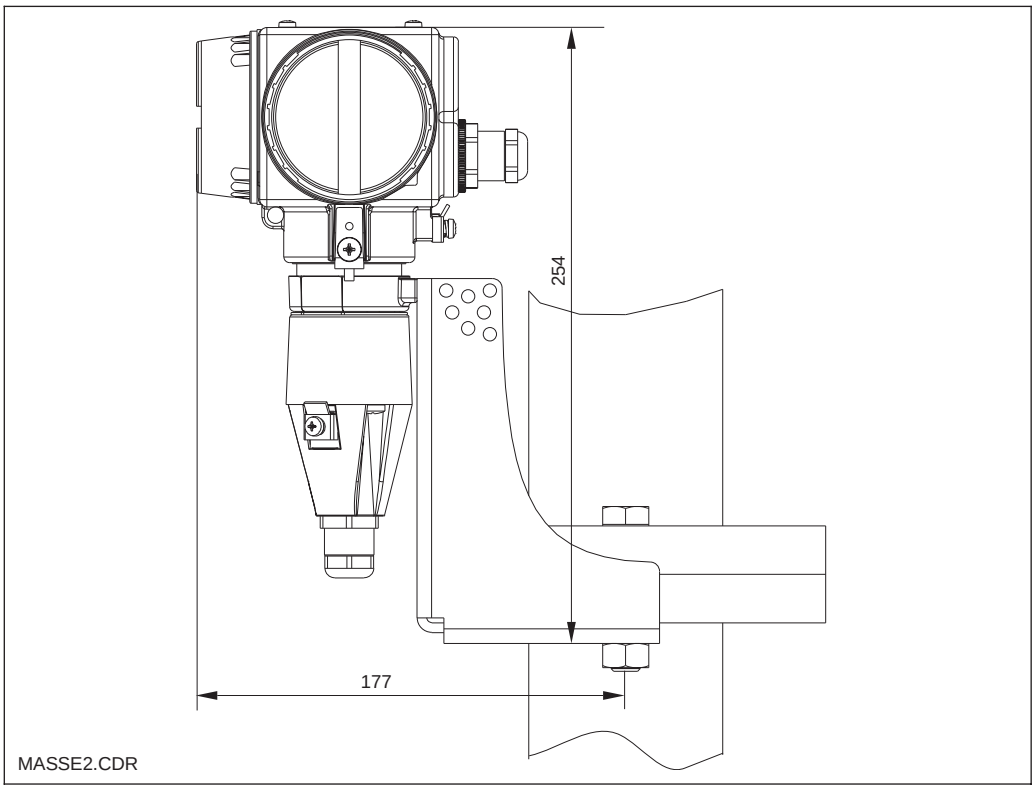


Fig. 4.9 Flange installation with mounting bracket

4.6 Connection of pH and redox electrodes

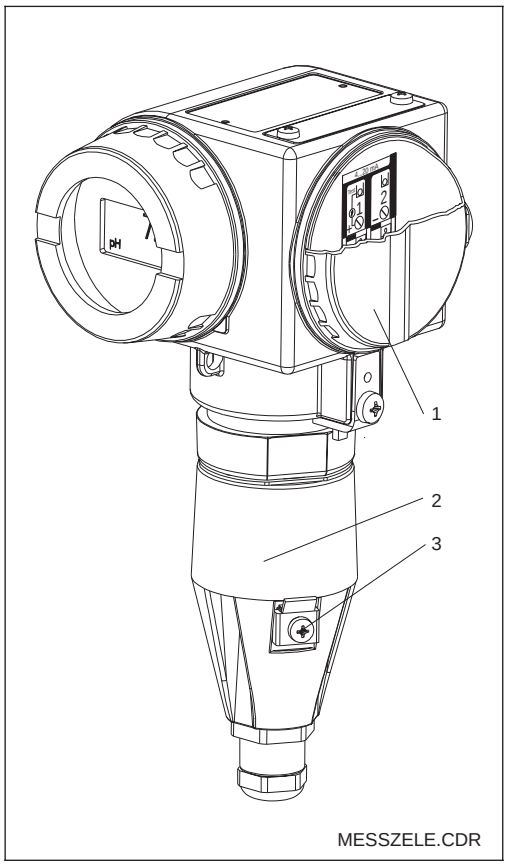
Measuring cable

The pH and redox electrodes are connected to the MyPro CPM 431 by means of preassembled, shielded, multi-core measuring cable types CPK 1 or CPK 7. Should an extension be necessary, use junction box VBA and non-assembled measuring cables of the same type.

- Extension for CPK 1 and 7:
  CYK 71 cable, order no. 50085333
- Extension for CPK 1 and 7 for Ex:
  CYK 71 cable, blue, order no. 50085673

Warning

Protect connectors and terminals from moisture to prevent inaccurate measurement!



Measuring transmitter MyPro CPM 431:

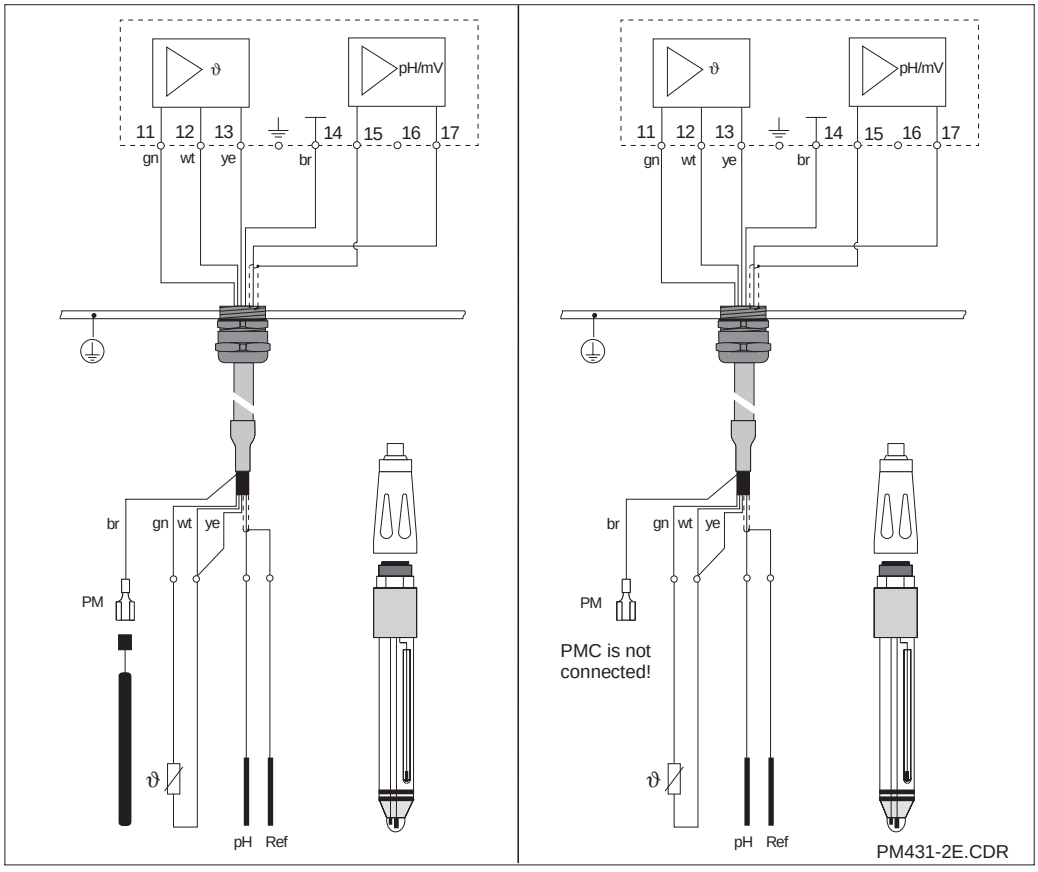
1 Connection space for power supply
2 Connection space for sensor
3 Ground terminal

Fig. 4.8

4.6.1 Symmetrical or asymmetrical electrode connection?

Caution:

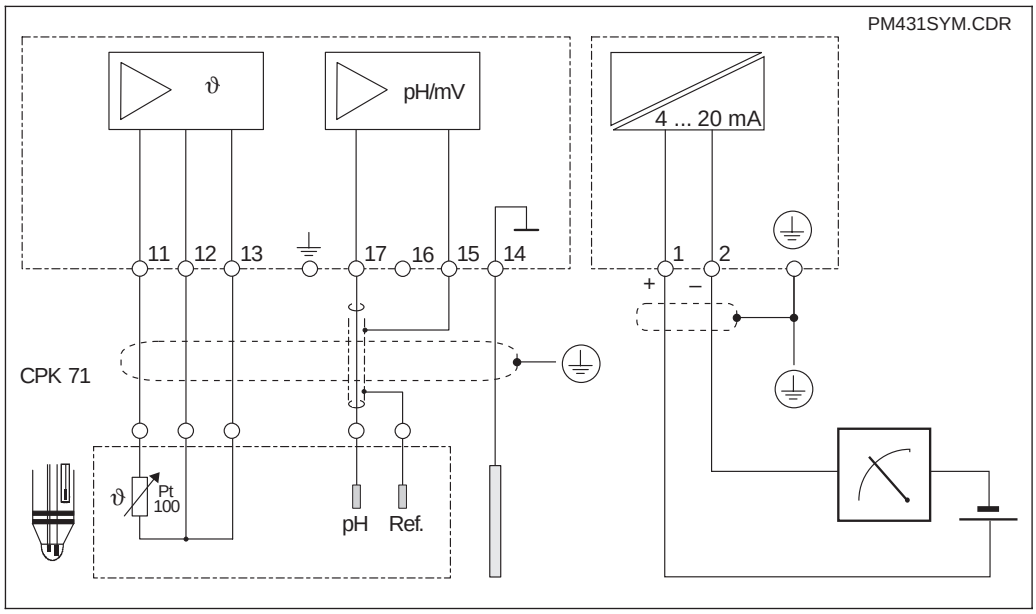
- The instrument is preconfigured for symmetrical measurement with potential matching.
- The configuration must be changed for asymmetrical measurement (see chapter 7, Functional description, „Basic functions“).



Left: Symmetrical high-impedance electrode connection

Right: Asymmetrical high-impedance electrode connection

Fig. 4.10



Electrical connection for symmetrical high-impedance measurement with PMC

Bild 4.11

Symmetrical high-impedance (with PMC):

Caution:

In the case of the symmetrical high-impedance connection, the line for the potential matching pin (PMC) must be connected to the PM terminal on the instrument.

The potential matching conductor must always contact the medium, i.e. it must be immersed in the buffer solution during calibration.

Advantages of symmetrical connection:
The reference system of the pH measuring chain is connected to a high-impedance input just like the pH electrode itself. This eliminates any leakage current load.
Measurement is less problematic even under difficult environmental conditions (e.g., high media flow rates, high-resistance media or partially soiled diaphragm).

Asymmetrical high-impedance (w/o PMC):

Disadvantages of asymmetrical connection:
There is more of a load on the measuring chain reference system, which increases the possibility of inaccuracy in limit operating ranges (see symmetrical high-impedance input). Asymmetrical measurement does not permit reference electrode monitoring via the SCS system (see chapter 7, function group „SCS“).

When using an asymmetrical instrument input, pH measuring chains can be connected in conjunction with assemblies that do not have a potential matching pin.

Connecting the measuring cable to the instrument

Connect the measuring cable to the MyPro CPM 431 measuring cell as follows:

- Pull the cable through the open Pg gland and connection hood.
- Connect the cable ends to the measuring cell.
- Install the hood and tighten the 3 fastening screws.
- Prepare the screen according to figure 4.12.
- Thread the cable through until the Pg cable gland can grasp the cable insulation.
- Tighten the Pg cable gland.

Note:

- The screen can also be connected to the screen terminal on the terminal block.
- Use reverse connection sequence when disconnecting the instrument.

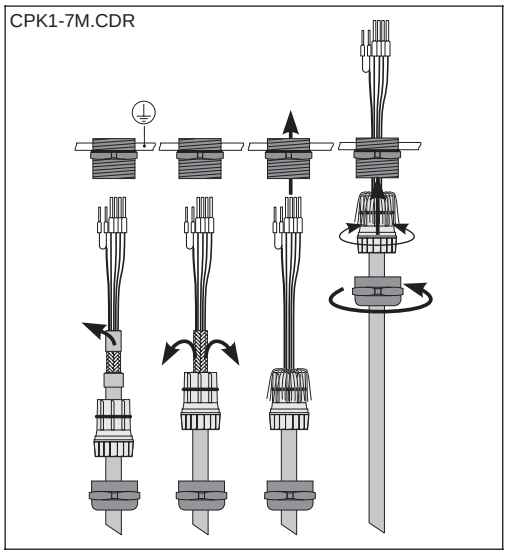


Fig. 4.12 Measuring cable entry and screen connection:
Metal cable gland in sensor connection space

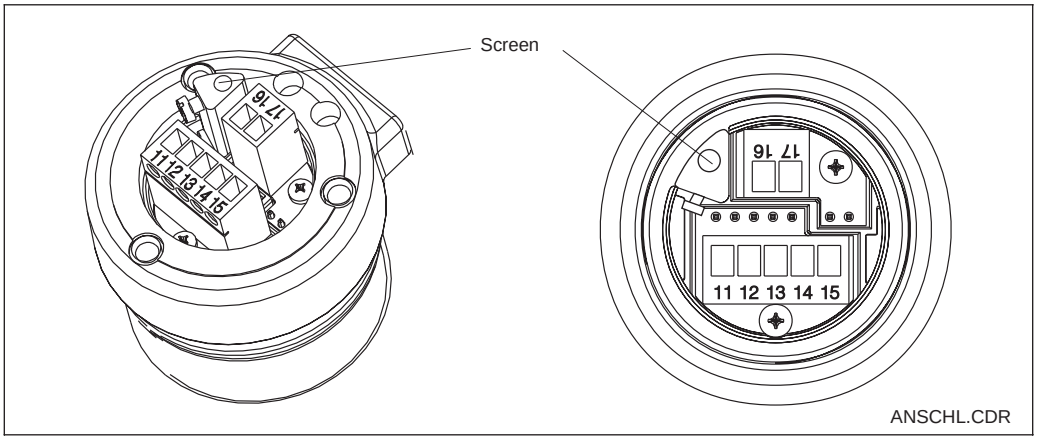


Fig. 4.13 Measuring cable connection space

4.7 Connection of two-wire line

The electrical terminals for the two-wire line are located under the screwed cover on the right side of the instrument (see figures 4.8 and 4.14).
Connect the MyPro CPM 431 to a 12 ... 30 V DC power source and connect a current measuring instrument in series according to the figure below.
Ground the instrument via the outside ground terminal and connect the potential matching line screen (power supply line) to the inside ground terminal (see figure 4.14).

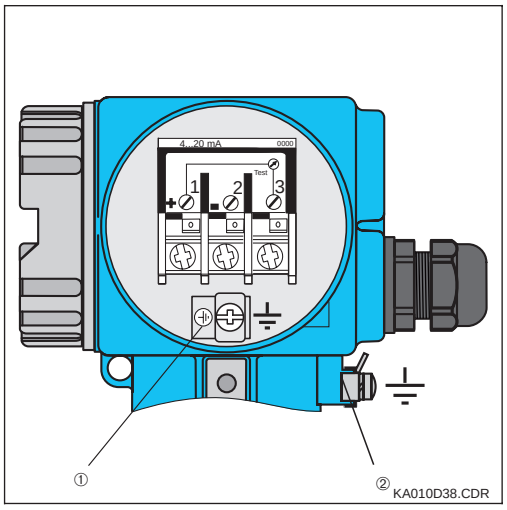
Note:

This instrument has been tested for electromagnetic compatibility in industrial environments according to EN 50081-1 and EN 50082-2.
This is only valid, however, for a properly grounded instrument with a screened measured value output line.
This instrument has been designed and manufactured according to EN 61010-1 and left the manufacturer's works in perfect condition.

Caution:

Keep the screen ground line as short as possible.
Do not solder an extension onto the screen! Connect the screen directly to the internal ground terminal!

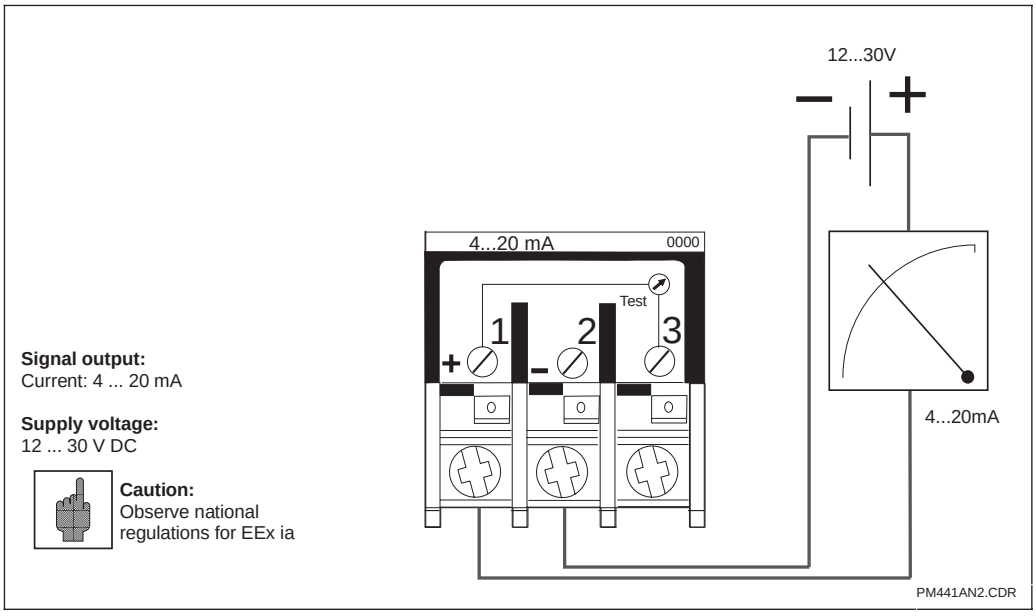
If the instrument is mounted on a post, ground the post to increase immunity to interference. Running the cable in the post will improve interference suppression.



Current interface

1 Inside ground terminal
2 Outside ground terminal

Fig. 4.14



Signal output:
Current: 4 ... 20 mA

Supply voltage:
12 ... 30 V DC

Caution:
Observe national regulations for EEx ia

Fig. 4.15 Electrical connection

4.7.1 Connection of the MyPro CPM 431 in the Ex area

General notes on installation in areas subject to explosion hazard

The measuring transmitter MyPro CPM 431-G has been designed to meet Ex requirements and may be installed in Ex zones 1 and 2.

The instrument is supplied with a certificate of conformity.
The electrode may be installed in Ex zone 1.

Electrodes (measuring chains) suitable for the instrument may also be operated without requiring a separate certificate. Other than that, only devices with an intrinsically safe input circuit may be connected to the Ex version of the MyPro measuring transmitter.

Warning:

All covers must be closed during continuous operation.

Note:

Helpful information on the installation and operation of electrical equipment in hazardous areas can be found in the Endress+Hauser fundamental information booklet GI 003/11/de, „Explosionsschutz von elektrischen Betriebsmitteln und Anlagen" („Explosion protection of electrical equipment and systems"). This brochure can be obtained from the Endress+Hauser sales offices.

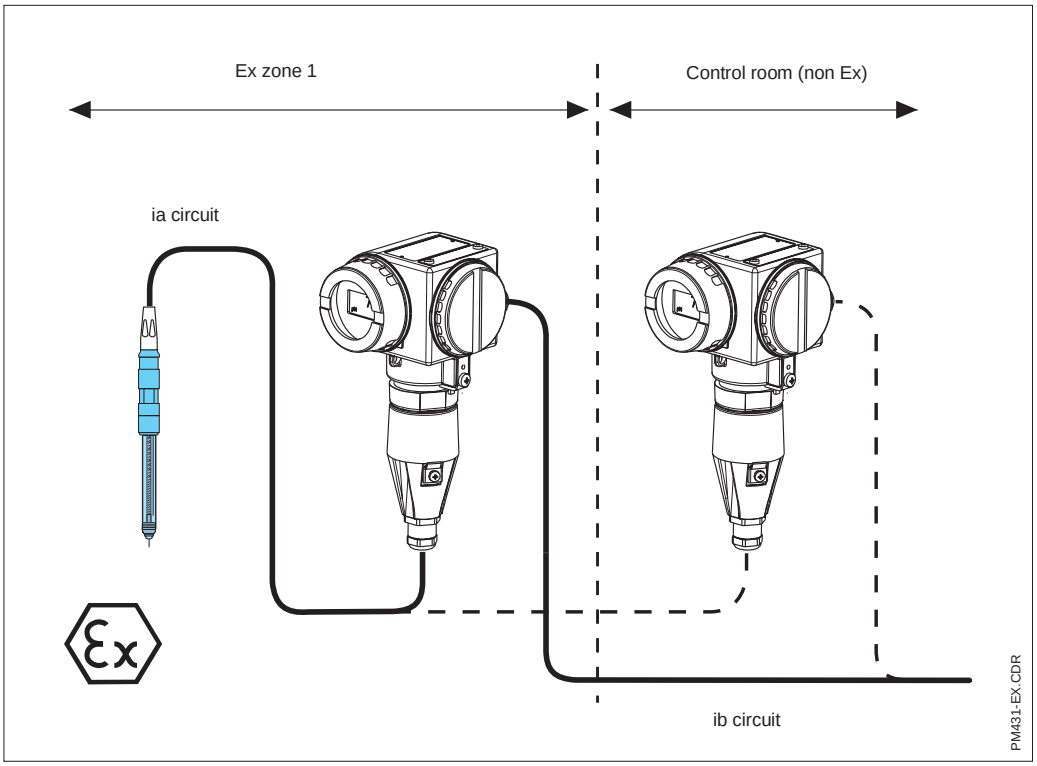


Fig. 4.16 Electrode and transmitter in Ex area

4.8 Packaging and disposal

For later reuse the instrument packaging must provide shock and moisture protection. Optimal protection is provided by the original packaging materials.

Disposal

Note:

Electronic components to be disposed of are to be considered special waste! Please observe local regulations for disposal!

5 First Start-up

5.1 Measures before first power-up

Familiarise yourself with the operation of the measuring instrument before switching it on for the first time!

- Before power-up, check that all connections have been properly made!
- Make sure that the measuring electrode is in the medium to be measured or a buffer solution. This ensures that a plausible value will be displayed.
- In the case of configurations with potential matching, make sure that the pin contacts the medium or buffer solution.

5.2 Power-up, factory settings

The MyPro CPM 431 measuring transmitter is configured either as a pH measuring instrument or as a redox measuring instrument. Please refer to the order code (see chapter 3.4) for information on the measuring mode your transmitter is configured for.

The MyPro CPM 431 does not have an “ON switch”. When power is applied, the instrument performs a self-test and then starts up in the measuring mode using the parameters last set.

The display should be similar to one of the figures below (of course, the display value may be different; “pH” on the display stands for pH measurement, ”mV” stands for redox measurement).
If the instrument appears to be functioning properly, you can proceed to perform the first calibration to make sure that the transmitter displays the measured values correctly.

Refer to chapter 6 and chapter 7 for notes on calibration.

Fig. 5.1 pH measurement

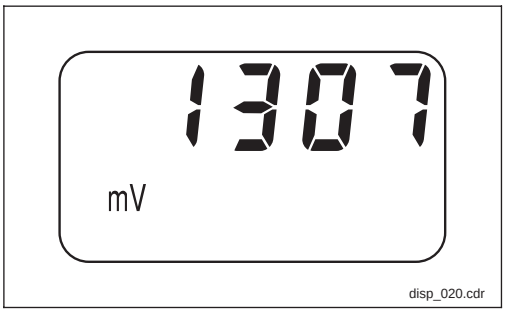


Fig. 5.2 Redox measurement

6 On-site Operation

6.1 Operating concept / operating elements

The intelligent MyPro CPM 431 transmitter can be operated in the field with 4 keys or via the HART interface.
The following functions can be accessed in the field via the keypad:

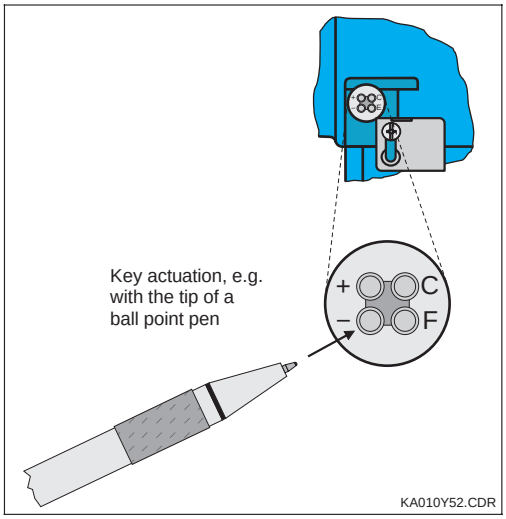


Fig. 6.1 Keypad

Operating level 1
- Verification of active settings (secondary parameters)
- Error diagnosis (diagnostic parameters)
- Current interface settings (instrument parameters)
- Calibration

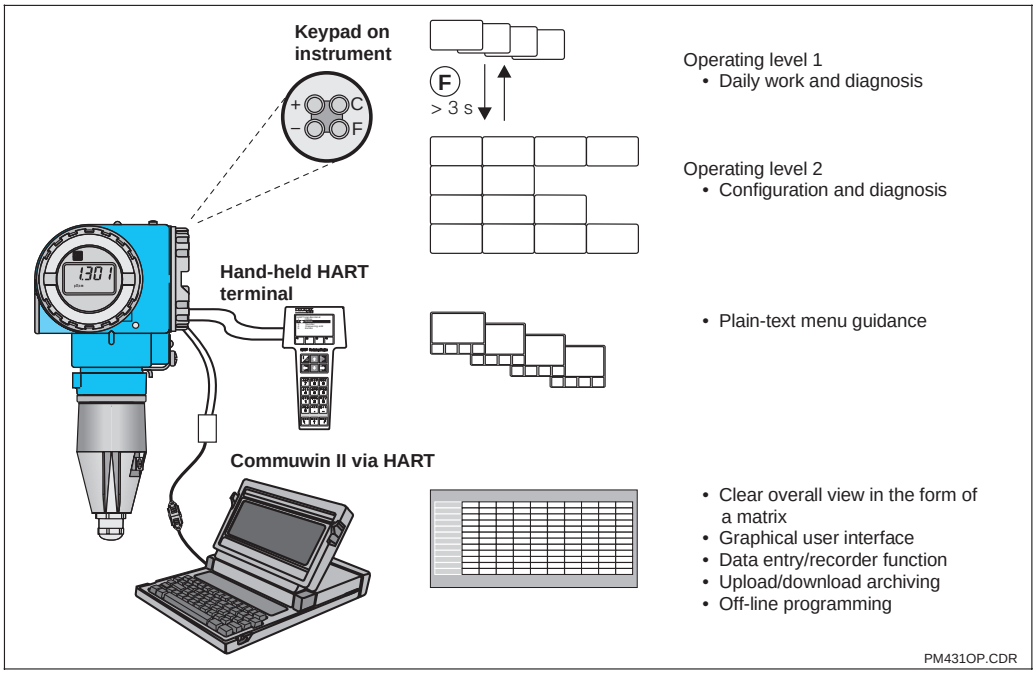
Operating level 2
This level comprises all other settings (e.g., switching from pH to redox measurement; press F key for more than 3 seconds).

The 4 keys are located on the side of the instrument under a hinged cover and can be actuated with a pointed object, such as, for example, the tip of a ball point pen.

Key functions in normal mode:

\+ Select secondary parameters / set values
– Select diagnostic parameters / set values
F Instrument configuration
C Sensor calibration

The key arrangement is shown on the cover (visible when cover is closed).



Operation of MyPro CPM 431 via:
– keys on instrument
– hand-held HART® terminal
Fig. 6.2 – Commuwin II

6.2 Display

Figure 6.3 shows the complete MyPro display. Various symbols are displayed depending on the instrument settings.

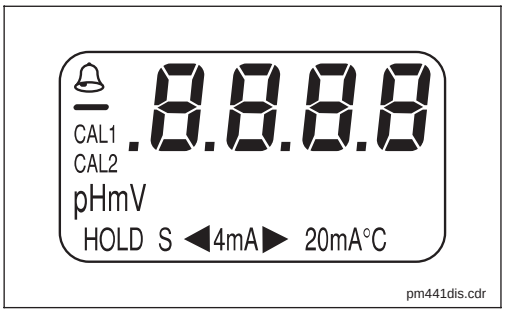


Fig. 6.3 Display

6.3 Locking concept

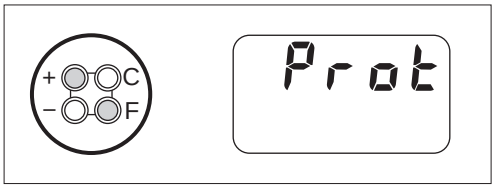
Access to instrument operation and write protection for field operation can be disabled via the keypad or the communication interface. The keypad has priority over the interface, i.e. an instrument which has been locked in the field cannot be unlocked via the communication interface.

The previous locking status is retained after a power failure or reset.

The factory setting (status at time of delivery) is 'unlocked'.

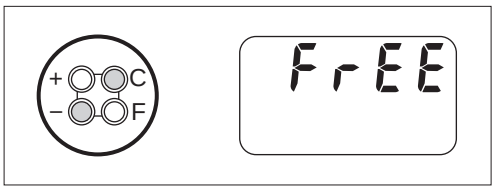
Unlocking / locking via keypad:

Press „+" and „F" once at the same time



- Instrument is locked
- Parameters can only be read in the field and via communication („Prot" is displayed when operation is attempted)

Press „–" and „C" once at the same time



- Instrument is unlocked

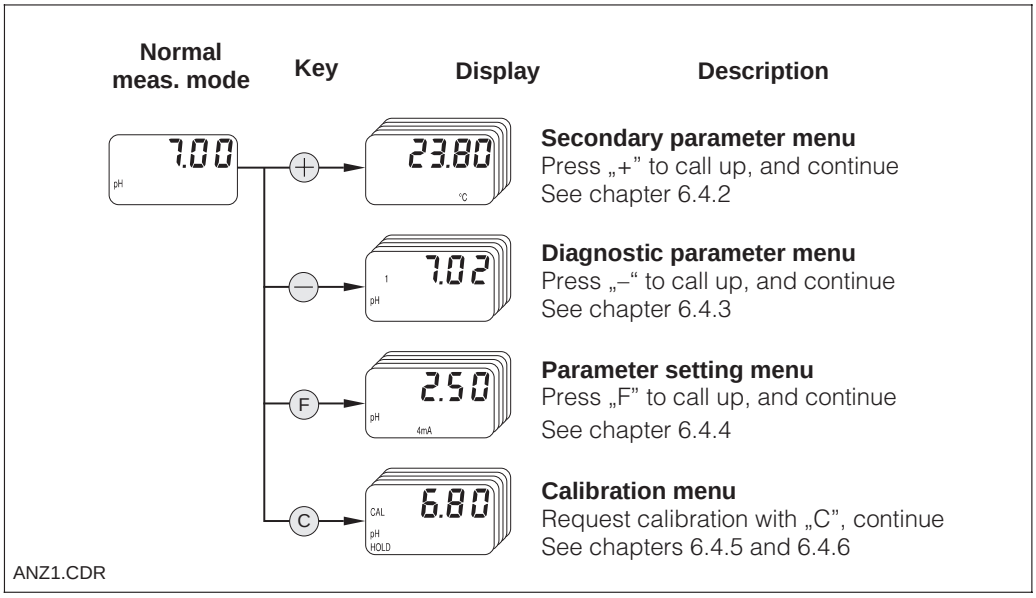
Unlocking / locking via interface and field operation (operating level 2):

See chapter 7 and page 37, Description of functions.

6.4 pH measurement

6.4.1 Display mode selection (pH)

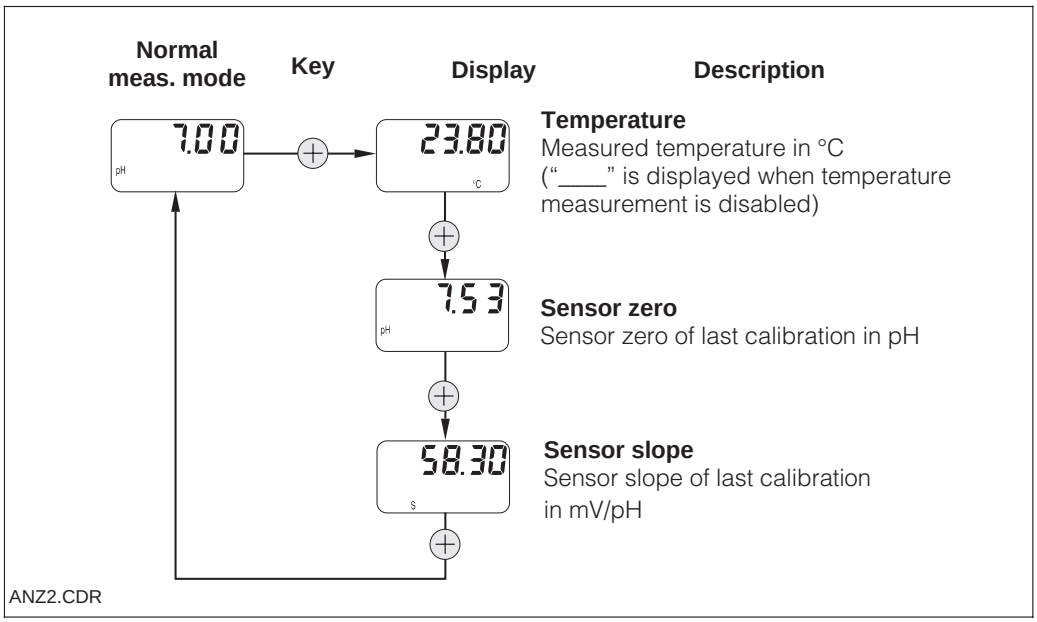
The display normally shows the currently measured pH value. The four operating keys are used to access the various display modes explained on the pages to follow.



6.4.2 Secondary parameter menu (pH)

The secondary parameter menu is used to display parameters that influence the currently displayed measured value.

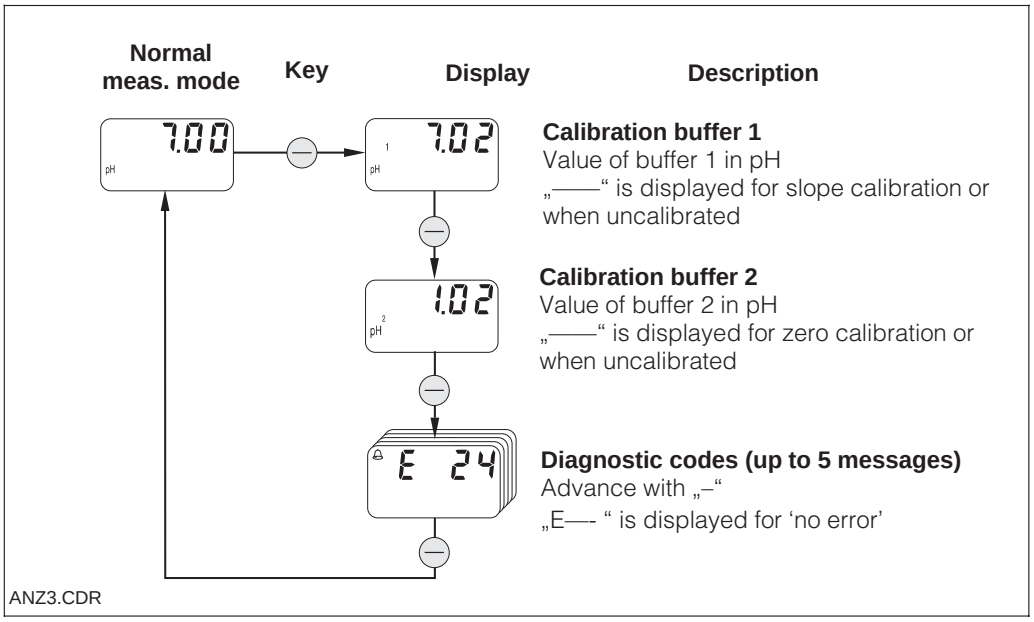
If no other key is pressed for 30 s, the instrument automatically switches back to the pH value display.



6.4.3 Diagnostic parameter menu (pH)

The diagnostic parameters display the values of the buffers set or detected (depending on the type of calibration performed, see chapters 6.4.5 and 6.4.6) and the diagnostic codes (error messages) that are active.

If no other key is pressed for 30 s, the instrument automatically switches back to the pH value display.

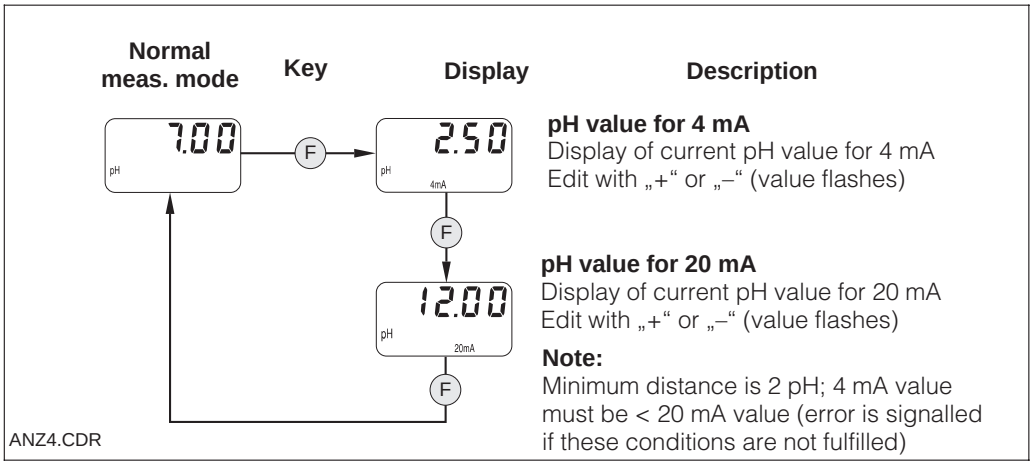


6.4.4 Parameter settings (pH)

This function can be used to set the current interface to defined pH values and thus determine the measuring range.
When the instrument is switched from the normal mode to the parameter setting mode (with the „F” key), the current current output setting of the pH value for 4 mA is displayed. You can edit this value with the „+” or „–” key (decade editing).

The value flashes on the display to indicate that it is being edited. When the desired value has been entered, it is accepted with „F”, and the instrument goes on to the next parameter setting step.

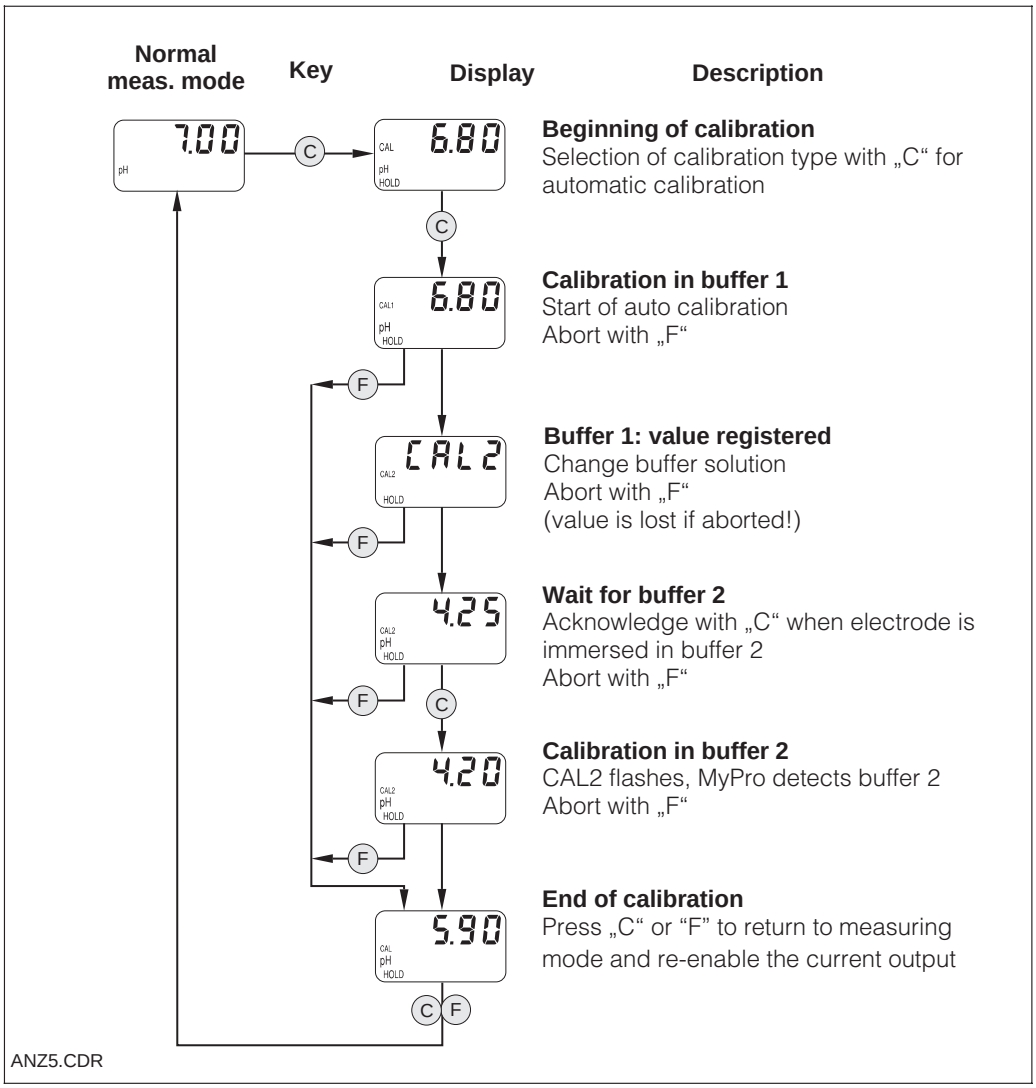
Adjustment range for 4 mA point:
–2.00 ... 14.00 pH
Adjustment range for 20 mA point:
0.00 ... 16.00 pH



6.4.5 Automatic calibration with buffer detection (pH)

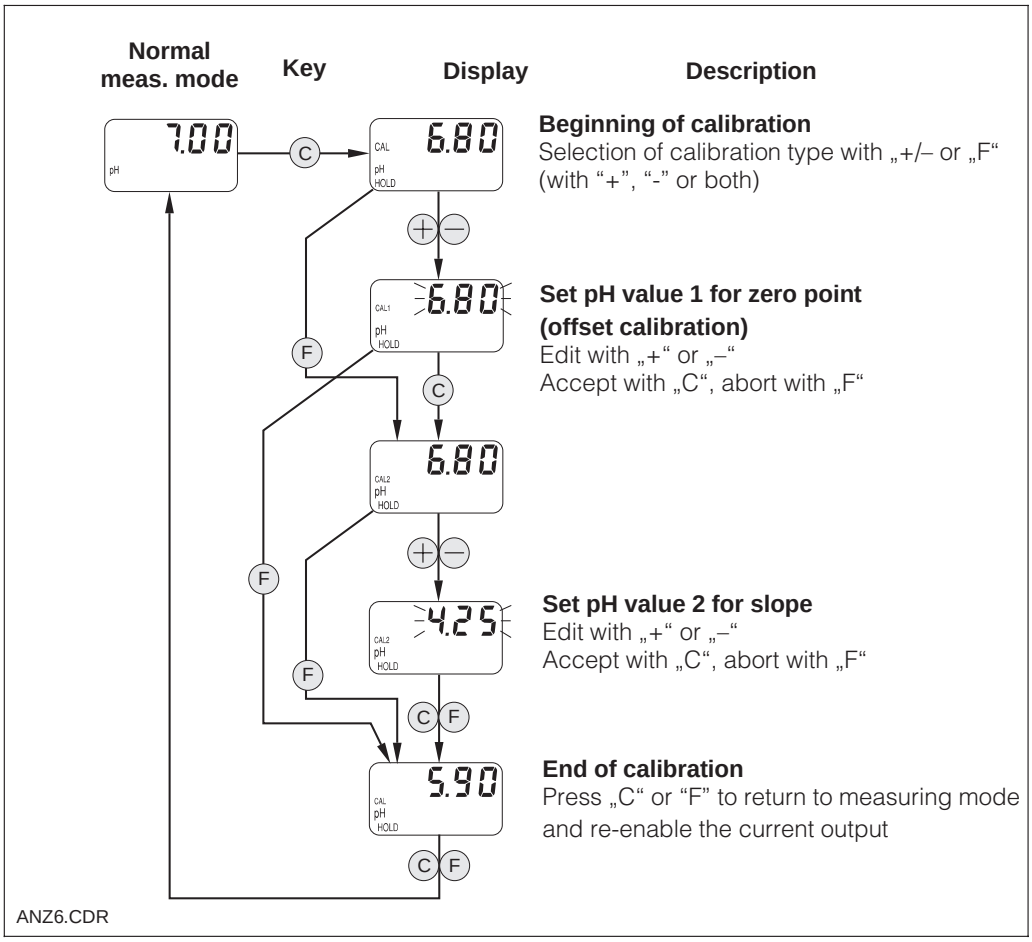
The automatic 2-point calibration is started with the „C" in the „beginning of calibration" state (press C key). If necessary, the current output can be frozen („HOLD"). Following buffer detection, the MyPro CPM 431 automatically continues.

You only need to acknowledge immersion of the measuring electrode in buffer solution 2 with „C".
You can press „F" any time to abort the sequence.



6.4.6 Manual calibration (pH)

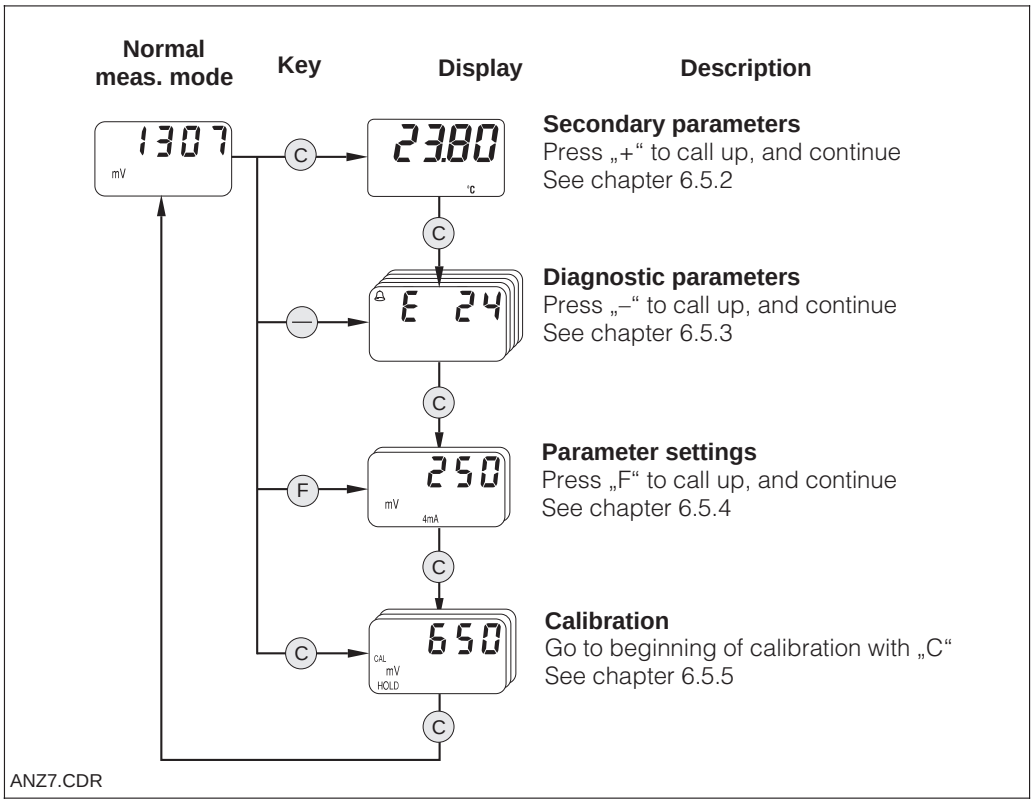
The calibration type is selected in the „beginning of calibration" state.
If you select manual calibration, you can choose among manual 2-point calibration („+/ –"), manual zero calibration („+/–") and manual slope calibration („F"). The current output can be frozen („HOLD") if necessary. Ongoing processes can be aborted with „F". The new setting is then discarded, and the previous value is retained.



6.5 Redox measurement

6.5.1 Display mode selection (redox)

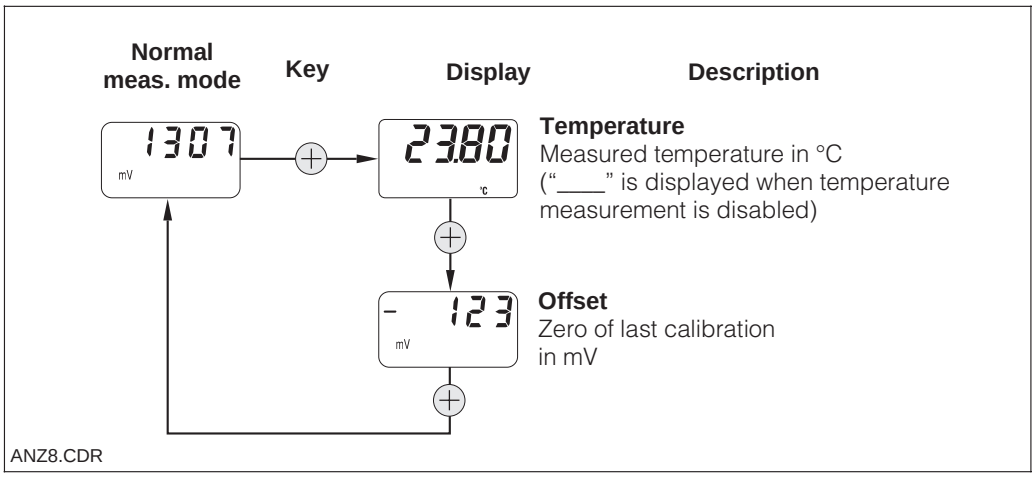
The standard display shows the measured redox value in mV. The four control keys are used to access various display modes explained on the pages to follow.



6.5.2 Secondary parameters (temperature, redox)

The secondary parameter menu is used to display parameters that influence the currently displayed measured value.

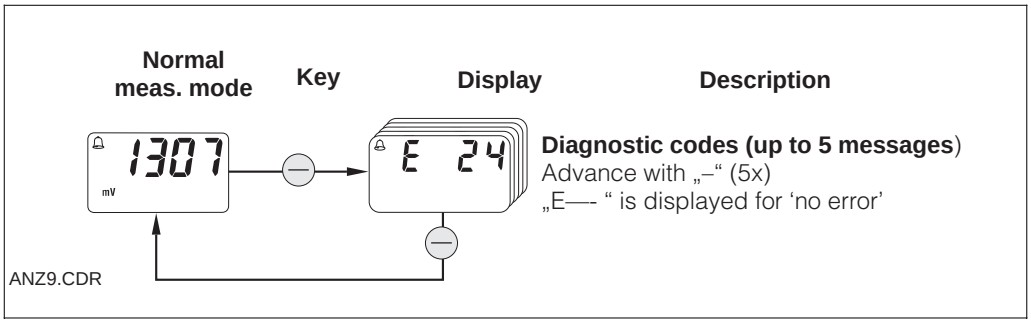
If no other key is pressed for 30 s, the instrument automatically switches back to the redox value display.



6.5.3 Diagnostic parameters (redox)

The diagnostic parameters for redox measurement show the active diagnostic codes (error messages).

If no other key is pressed within 30 s, the instrument automatically returns to the redox value display.

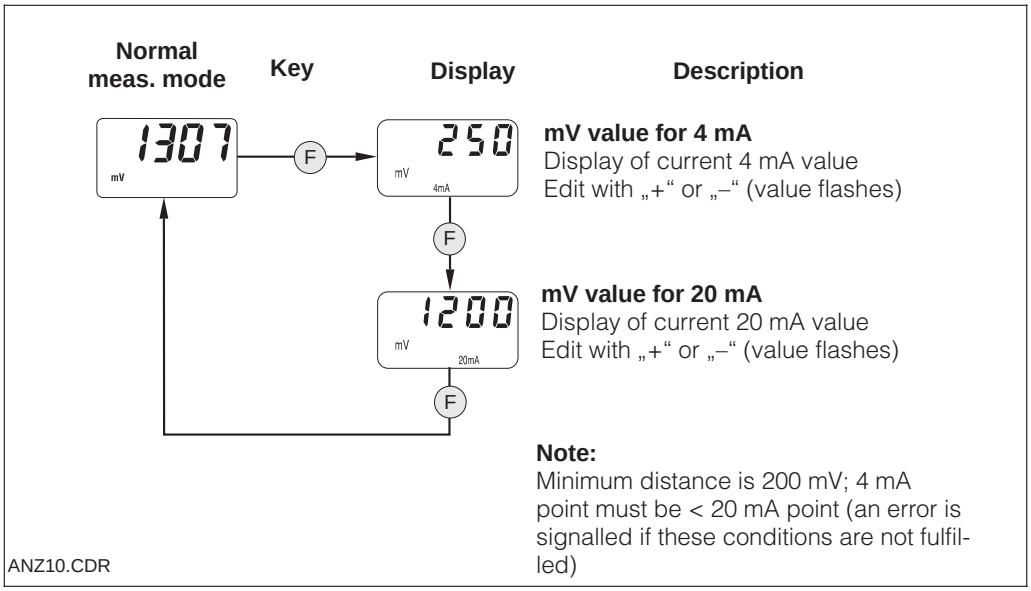


6.5.4 Parameter settings (redox)

This function is used to set the current interface to defined redox mV values and thus determine the measuring range. When the parameter setting mode is called up from the normal mode (with the „F” key), the current redox mV setting for a current output of 4 mA is displayed.

You can edit this value with the „+” or „–” key (decade editing). The value flashes on the display to indicate that it is being edited. When the desired value has been entered, it is accepted with „F”, and the system goes on to the next parameter setting step.

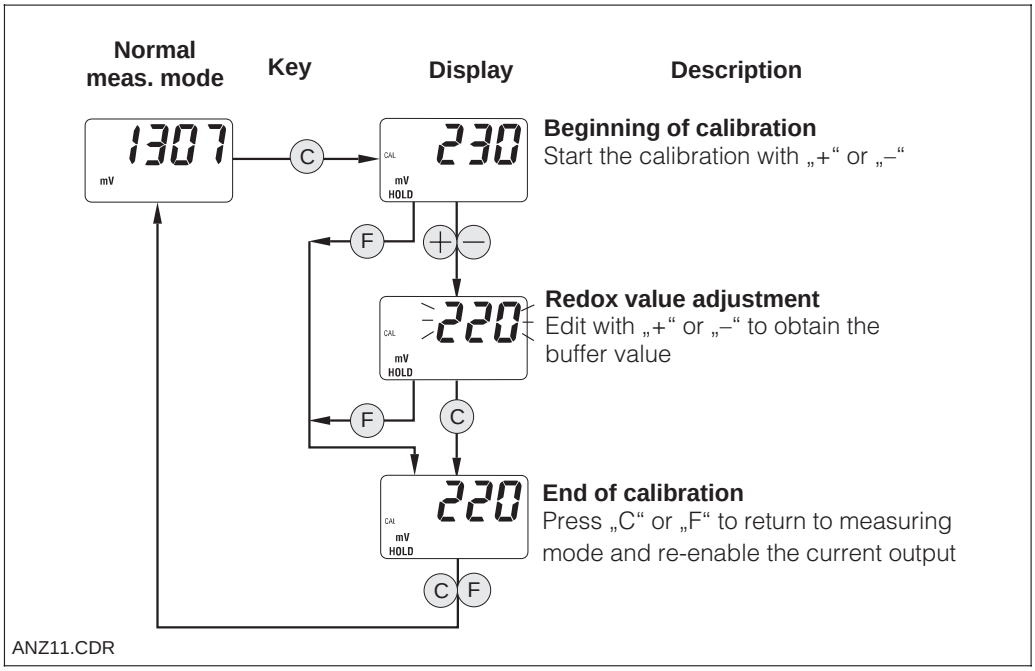
Adjustment range for 4 mA point:
–1500 ... +1300
Adjustment range for 20 mA point:
–1300 ... +1500 mV



6.5.5 Calibration (redox)

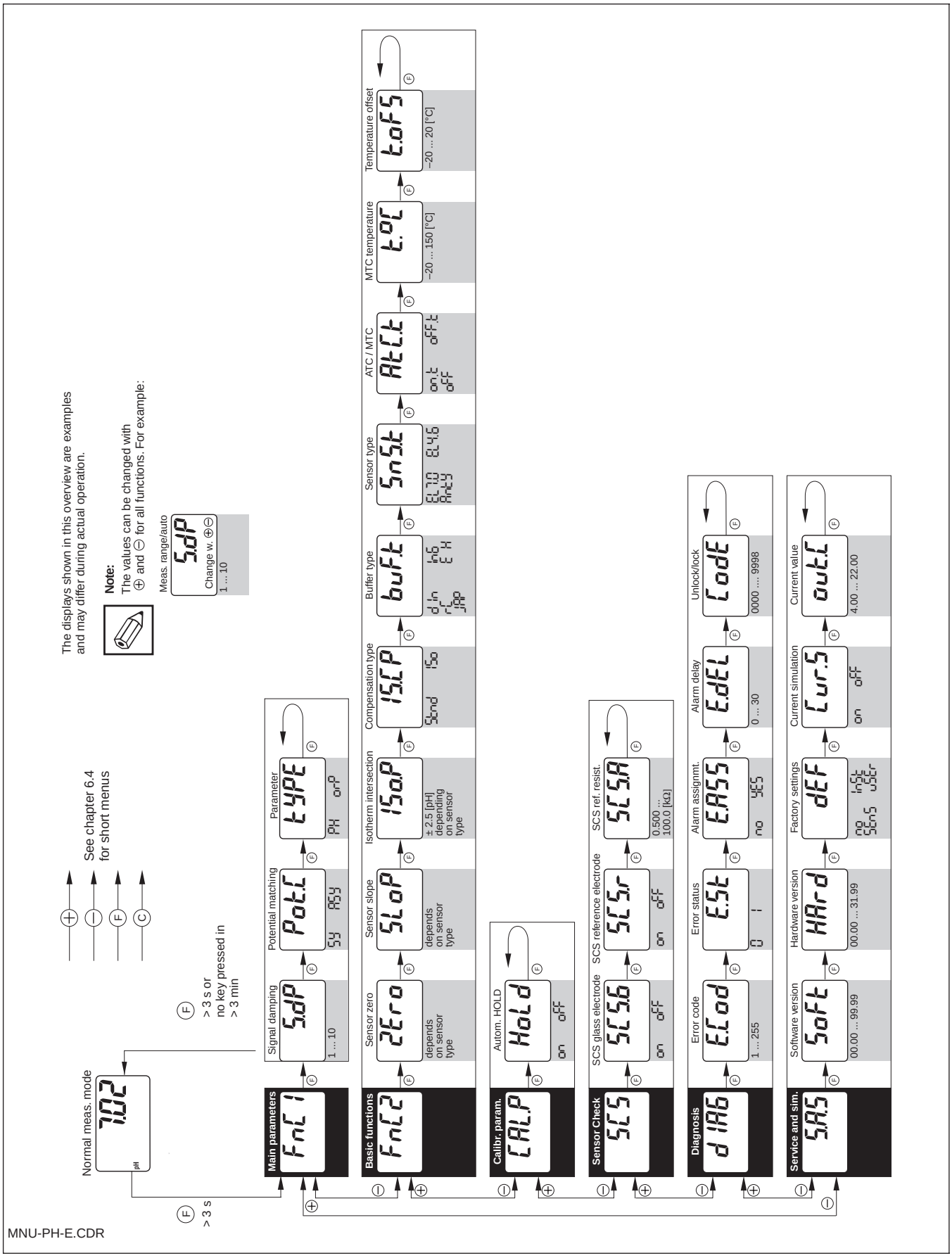
Press the „C" key in the normal mode (meas. value in mV) to access the „beginning of calibration" state. The current output can be frozen („HOLD") if required. Once the sensor has been immersed in the buffer solution, start the manual calibration procedure with „+" or „-".

The measured value now shown can be edited with the „+" or „-" key to match the buffer. Press „C" to accept the value entered and complete calibration. The calibration procedure can be aborted any time by pressing the „F" key.



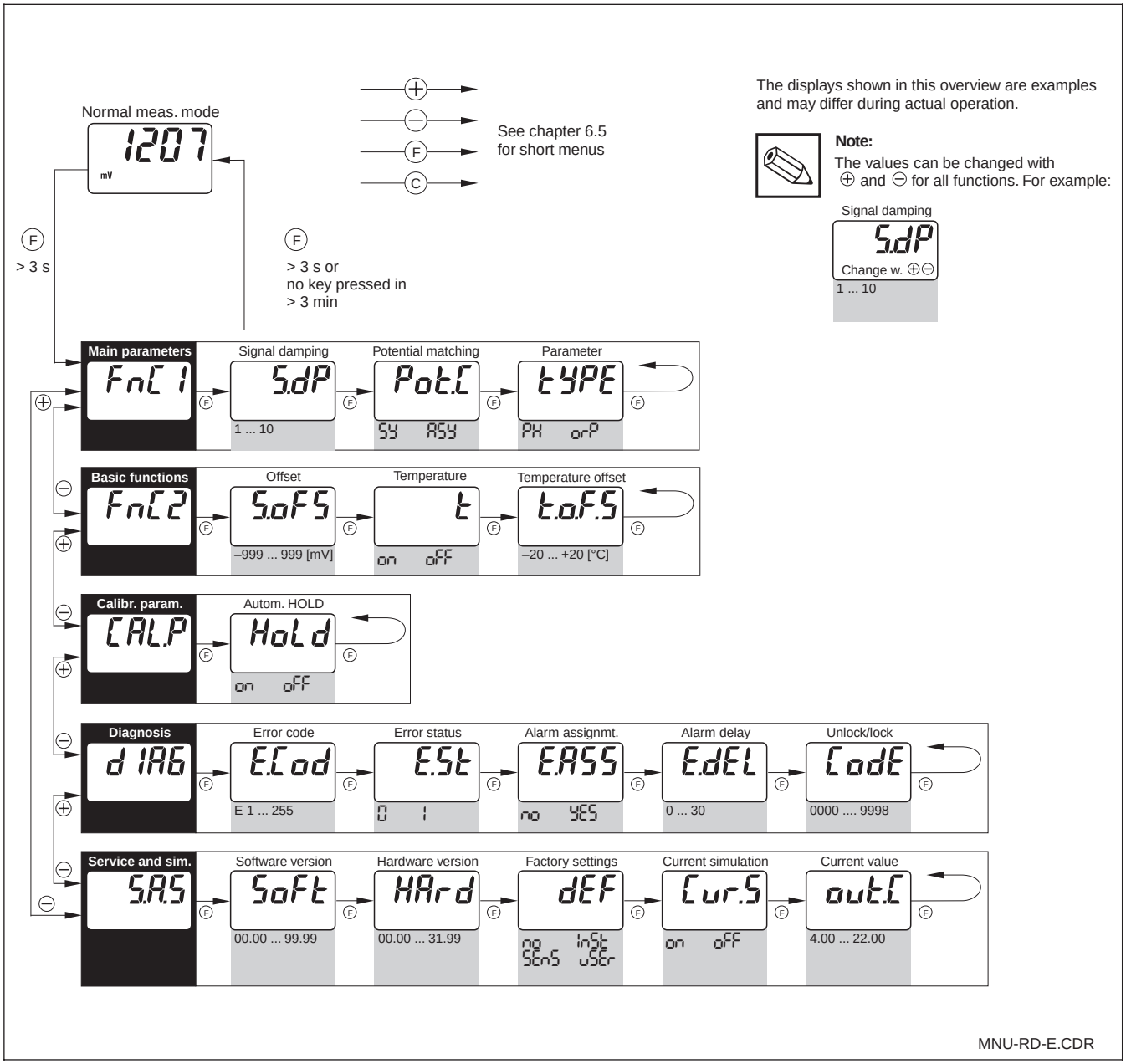
6.6 Operating level 2

6.6.1 Operating level 2 for pH



MNU-PH-E.CDR

6.6.2 Operating level 2 for redox



7 Functional Description

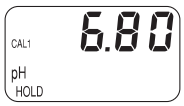
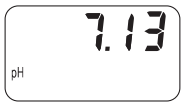
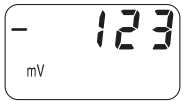
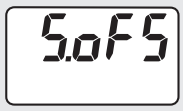
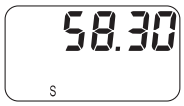
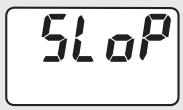
This chapter contains detailed descriptions of and information on the individual functions of the MyPro. The matrix positions refer to the CommuWin matrix display.

Function group **MAIN PARAMETERS**				
Function/ parameter	**Matrix VH[1)]**	**Description**	**Setting**	
			Factory	**Customer**
Measured value 	VH 00	Display of currently measured pH or redox value. **Value range:** –2.00 ... 16.00 pH or –1500 ... 1500 mV	–	
Temperature 	VH 01	Display of currently measured temperature value (see chapter 6.4.2 or 6.5.2). **Value range:** –20.0 ... 150.0 °C	–	
Operating state	VH 02	Output of current operating state, e.g. indicates when field calibration is currently being performed. **Note:** This function is intended for operation with the Commuwin II user interface or via the hand-held terminal. **Value range:** 0 ... 255	–	
Input damping 	VH 04	This function describes the transmitter's response to the input signal. The value entered here corresponds to the number of samples used for averaging. **Value range:** 1 ... 10	**1**	
Set 4 mA value 	VH 05	Entry of pH or redox value for a current value of 4 mA (see chapter 6.4.4 or 6.5.4). **Value range:** –2.00 ... 14.00 pH or –1500 ... 1300 mV	**pH 2.00 or –500 mV**	
Set 20 mA value 	VH 06	Entry of pH or redox value for a current value of 20 mA (see chapter 6.4.4 or 6.5.4). **Value range:** 0.00 ... 16.00 pH or –1300 ... 1500 mV	**pH 12.00 or 500 mV**	

[1)] Depends on electrode type used ■ Operating level 2

Function group **MAIN PARAMETERS**				
Function/ parameter	**Matrix VH[1)]**	**Description**	**Setting**	
			Factory	**Customer**
Switch pH input PotC	VH 08	Switches the pH input for symmetrical high-impedance or asymmetrical operation.  **Caution:** When the pH input is switched, the pH electrode connection must also be changed accordingly (see chapter 4.6.1).  **Note:** When „asymmetrical“ is selected, the Sensor Check System (SCS) for the reference electrode is automatically switched off. **Value range:** SY = symmetrical ASY = asymmetrical	**symmetrical** SY	
Operating mode pH/redox tYPE	VH 09	Selects pH or redox measurement as the operating mode of the transmitter.  **Caution:** When this setting is changed, the instrument is reset, and all user settings are overwritten with the default factory settings. **Value range:** PH = pH orP = redox	**pH** PH	

[1)] Depends on electrode type used ■ Operating level 2

Function/ parameter	Matrix VH[1)]	Description	Setting: Factory	Setting: Customer
Function group **BASIC FUNCTIONS**				
Remote calibr. control 	VH 10	This function controls the calibration sequence (see chapter 6.4.5 or 6.5.5). **Note:** The measuring system can be calibrated in the field or via the interface (hand-held HART® terminal or Commuwin II).	–	
pH sensor zero  	VH 11	Display (operating level 1) or setting (operating level 2) of sensor zero in pH (see chapter 6.4.2) **Note:** This function is only available in the „pH“ mode of operation. **Value range:** pH 5.70 ... 8.30 for glass electrode 7.0 pH 3.32 ... 5.92 for glass electrode 4.62 pH –1.00 ... 3.00 for antimony electrode	**pH 7.00 pH 4.62 pH 1.0[1)]**	
Electrode offset  	VH 11	Display (operating level 1) or setting (operating level 2) of electrode offset (see chapter 6.5.2) **Note:** This function is only available in the „redox“ mode of operation. **Value range:** Perm. range is ± 200 mV; other values produce an error.	**0 mV**	
pH sensor slope  	VH 12	Display (operating level 1) or setting (operating level 2) of sensor slope in mV/pH (see chapter 6.4.2) **Note:** This function is only available in the „pH“ mode of operation. **Value range:** 45 ... 65 mV/pH for glass electrodes 7.0 und 4.62 25 ... 65 mV/pH for antimony electrode	**59.16 mV/pH**	
Isotherm intersection pHis 	VH 13	Entry of isotherm intersection (= point where the electrode characteristics recorded at two different temperatures intersect). **Note:** When E+H electrodes are used, it is not necessary to change the isotherm intersection. This function is only available in the „pH“ mode of operation. **Value range:** pH 4.50 ... 9.50 for glass electrode 7.0 pH 2.12 ... 7.12 for glass electrode 4.62 There is no isotherm compensation for antimony electr.	**pH 7.00 pH 4.62[1)]**	

[1)] Depends on electrode type used ■ Operating level 2

Function group: BASIC FUNCTIONS				
Function/ parameter	**Matrix VH[1)]**	**Description**	**Setting**	
			Factory	**Customer**
Switching of compensation type 15.CP	VH 14	This function is used to determine the compensation type. **Note:** When „1“ is selected, the isotherm intersection setting is used for calibration. This function is only available in the „pH“ mode of operation. **Value range:** Stnd = standard Iso = isotherm intersection compensation	**Standard** Stnd	
Selection of buffer set buFt	VH 15	Selection of buffer tables used for automatic calibration with fixed buffer detection. **Note:** This function is only available in the „pH“ mode of operation. **Value range:** din = DIN ind = Ingold nC = Merck E+H = E+H JAP = Japan	**E+H** E+H	
Sensor type SnSt	VH 16	Selection of electrode type. **Caution:** Whenever this setting is changed, the factory settings for sensor zero and slope are retrieved. Recalibration is therefore mandatory! **Note:** This function is only available in the „pH“ mode of operation. **Value range:** GL7.0 = glass electrode 7.0 GL4.6 = glass electrode 4.62 Anty = antimony electrode	**glass electrode 7.0** GL7.0	

[1)] Depends on electrode type used

Operating level 2

Function group: BASIC FUNCTIONS				
Function/ parameter	**Matrix VH[1)]**	**Description**	**Setting**	
			Factory	**Customer**
Type of temperature compensation AtC.t	VH 17	Switches temperature measurement on or off. Toggles between manual/automatic temperature compensation (MTC/ATC). **Note:** When set to „off + MTC“, the preset MTC temperature is used for compensation. If „on + MTC“ is selected, the temperature is additionally measured via a temp. sensor. If set to „on + ATC", the value measured with the temperature sensor is used for comp. This function is only available in the „pH“ mode of operation. **Value range:** oFF = off + MTC oFF.t = on + MTC on.t = on + ATC	**on + ATC** on.t	
Temperature measurement on/off t	VH 17	Switches the temperature measurement on or off. **Note:** This function is only available in the „redox“ mode of operation. **Value range:** oFF = off on = on	**off** oFF	
Entry of MTC temperature t.mC	VH 18	Entry of reference temperature for manual temperature compensation. **Note:** This function is only available in the „pH“ mode of operation. **Value range:** –20.0 ... 150 °C	**25.0 °C**	
Temperature offset t.oFS	VH 19	Adapts the signal from the temperature sensor using an offset value. **Value range:** –20.0 ... 20.0 K	**0.0 °C**	

[1)] Depends on electrode type used ■ Operating level 2

Function group CALIBRATION				
Function/ parameter	**Matrix VH[1)]**	**Description**	**Setting**	
			Factory	**Customer**
Calibration buffer 1 	VH 20	Display of value entered or detected for calibration buffer 1 (see chapter 6.4.3)  **Note:** This function is only available in the „pH“ mode of operation. When operated in the field, the buffer value can only be displayed; operation via an interface also permits entry of buffer values for remote calibration. **Value range:** pH –2.00 ... 16.00	**pH 7.00**	
Calibration buffer 2 	VH 21	Display of value entered or detected for calibration buffer 2 (see chapter 6.4.3).  **Note:** This function is only available in the „pH“ mode of operation. When operated in the field, the buffer value can only be displayed; operation via an interface also permits entry of buffer values for remote calibration. **Value range:** pH –2.00 ... 16.00	**pH 4.00**	
Automatic HOLD during calibration 	VH 29	This parameter is used to activate or deactivate the automatic HOLD function for the current output during calibration. **Value range:** oFF = autom. HOLD during calibration off on = autom. HOLD during calibration on	**autom. HOLD during calibr. on** on	

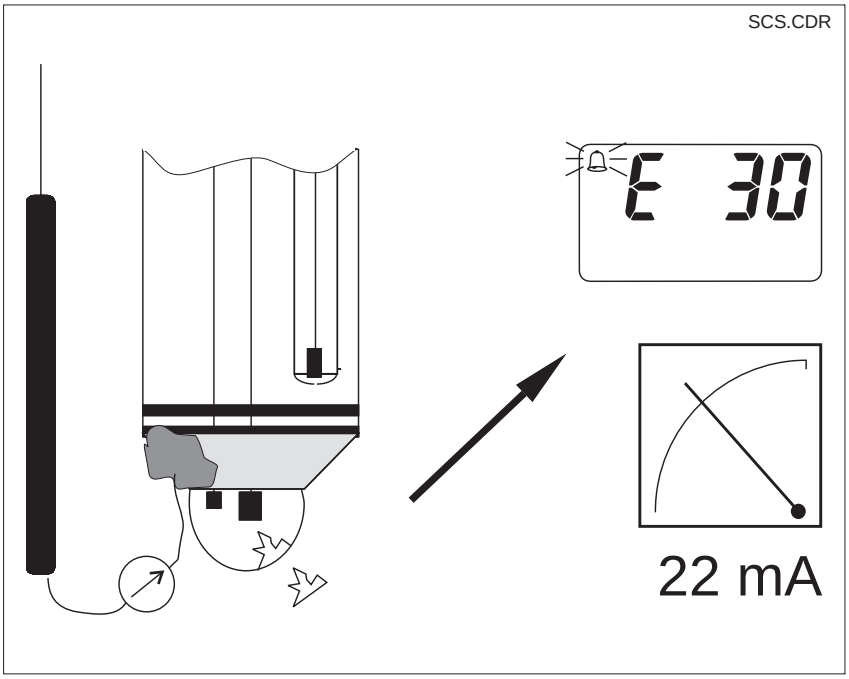
[1)] Depends on electrode type used ■ Operating level 2

Function/ parameter	Matrix VH[1)]	Description	Setting: Factory	Setting: Customer
Function group: SENSOR MONITORING				
SCS glass SCS.G	VH 60	Switches the pH sensor glass breakage monitoring function on or off. A glass breakage error is set if glass breakage is detected. **Note:** This function is only available in the „pH“ mode of operation. **Value range:** oFF = off on = on	**off** oFF	
SCS reference SCS.r	VH 61	Switches reference monitoring on or off. **Note:** This function is only available in the „pH“ mode of operation with symmetrical measurement. **Value range:** oFF = off on = on	**off** oFF	
SCS reference alarm SCS.A	VH 62	Sets the alarm threshold for reference monitoring. An error is set if the defined impedance is exceeded. **Note:** This function is only available in the „pH“ mode of operation with symmetrical measurement. **Value range:** 0.500 ... 100.0 KΩ	**5.000 KΩ**	

SCS electrode monitoring

The Sensor Check System SCS monitors the pH and reference electrodes for inaccurate measurement and total failure.
The SCS detects the following conditions:
- Electrode glass breakage
- Fine short circuits in the pH measuring circuit and, for example, bridges at terminals due to moisture or soiling
- Soiling or blocking of the reference electrode

Two methods are used for monitoring:
- Monitoring for high pH electrode resistance (an alarm is signalled if below a minimum impedance)
- Monitoring of reference electrode impedance (an alarm is signalled if the defined threshold is exceeded)



[1)] Depends on electrode type used

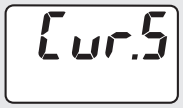
Operating level 2

Function group: DIAGNOSIS				
Function/ parameter	**Matrix VH[1)]**	**Description**	**Setting**	
			Factory	**Customer**
Selection of diagnostic code E.Cod	VH 80	Selects a diagnostic code (see chapter 8.2). **Note:** This function group can be used to change the error current assignment for each individual error. **Value range:** 1 ... 255	**1**	
Status of diagnostic code E.St	VH 81	Displays the status of the selected error code. **Note:** The error status can be evaluated with the hand-held HART® terminal or with the Commuwin II user interface. **Value range:** 0 = inactive 1 = active	—	
Error current assignment E.ASS	VH 82	This function is used to define whether or not an error current is output for the selected error code on the current output. **Note:** If set to „yes“ (effective), an error current is output for an error set by the MyPro. A diagnostic code with the setting „no“ (not effective) has no effect on the current output. **Note:** The error current is 22 mA. **Value range:** no = not effective YES = effective	**no code**	
Error current delay E.dEL	VH 83	Sets the delay for a diagnostic code for which the error current assignment „yes“ (effective) has been set. If such a diagnostic code is set by the MyPro, this error becomes effective as an error current after the delay defined here. **Note:** This delay applies to all diagnostic codes. **Value range:** 0 ... 30 sec	**2 sec**	

[1)] Depends on electrode type used ■ Operating level 2

Function group DIAGNOSIS				
Function/ parameter	**Matrix VH[1)]**	**Description**	**Setting**	
			Factory	**Customer**
Unlock/lock Prot	VH 89	Unlocks/locks field operation (see chapter 6.3) **Note:** Field operation can be locked and unlocked with the hand-HART® terminal, with the Commuwin II user interface or in the field. **Note:** 0097 = instrument unlocked (any other entry locks the instrument) 9999 = instrument locked in the field (unlocking via HART® interface and 2nd operating level in field is not possible) **Value range:** 0000 ... 9998 (via HART® interface)	**0097**	
CodE				

[1)] Depends on electrode type used ■ Operating level 2

Function group: SERVICE / SIMULATION				
Function/ parameter	**Matrix VH[1)]**	**Description**	**Setting**	
			Factory	**Customer**
Diagnostic code 	VH 90	Display of active diagnostic codes (see chapters 6.4.3 and 8.2)	–	
Software Version 	VH 93	Display of software version of instrument.	–	
Hardware Version 	VH 94	Display of hardware version of instrument.	–	
Factory settings (set default) 	VH 95	This function is used to selectively reset the data areas of the instrument to the factory settings. **Value range:** no = none inSt = instrument (data specific to instrument) SEnS = sensor (data specific to sensor) uSEr = user (combination of 1 + 2)	**none** no	
Current simulation 	VH 98	This function is used to switch the current simulation on or off. **Caution:** Reset back to „0“ (simulation off) after simulation. **Value range:** oFF = off on = on	**off** oFF	
Simulation output current 	VH 99	Entry of a current value (independent of the measurement) to be output at the current output when the current simulation function is enabled. **Value range:** 4.00 ... 22.00 mA	**10.00 mA**	

[1)] Depends on electrode type used ■ Operating level 2

Function group **USER INFO**				
Function/ parameter	**Matrix VH[1)]**	**Description**	**Setting**	
			Factory	**Customer**
Tag number	VH A0	Entry of a measuring point designation (assignment). **Note:** This function can only be controlled via the HART® interface. **Value range:** Any sequence of 8 alphanumeric characters	**„ “ (8 spaces)**	

[1)] Depends on electrode type used ■ Operating level 2

8 Interfaces

8.1 HART®

In addition to field operation, the MyPro CPM 431 transmitter can also be accessed via the universal hand-held terminal DXR 275 or a PC with a modem using the HART® protocol in order to query or change parameter settings.

This chapter contains essential information on:
- electrical connection
- operation of HART Communicator
- E+H operating matrix for HART®

Caution:

Refer to the DXR 275 operating instructions for details on the hand-held terminal.

Connection of hand-held terminal DXR 275

There are two alternatives for connecting the hand-held terminal (see figure 8.1):
- Direct connection to the measuring transmitter via terminals 1 and 2
- Connection via the 4 ... 20 mA analogue signal line (if a junction box is installed between the transmitter power supply and the MyPro)

In both cases, the measuring circuit must have a resistance of at least 250 Ω between the power source and the hand-held terminal. The max. load at the current output depends on the supply voltage.

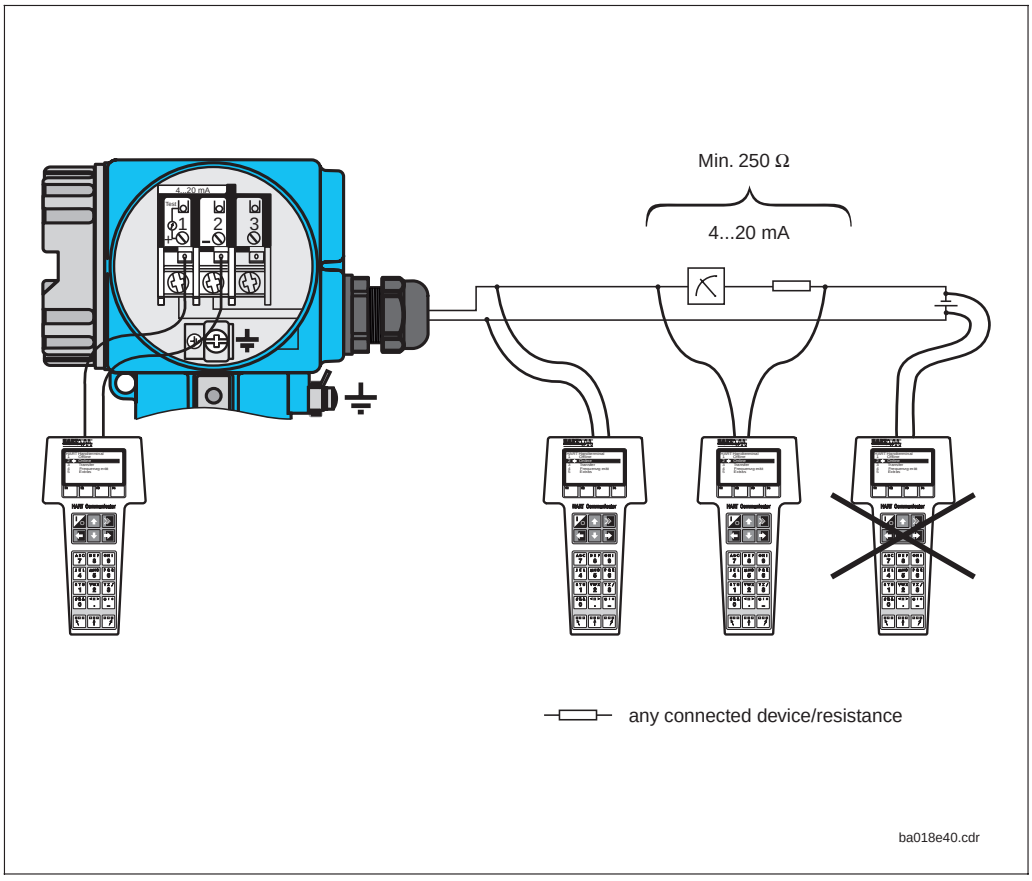


Fig. 8.1 Electrical connection of hand-held HART terminal (schematic)

Operation of MyPro CPM 431 with the HART® Communicator

Operating the MyPro CPM 431 measuring system via the hand-held terminal is quite different from field operation via the pushbuttons on the keypad. When using the HART® Communicator, all MyPro CPM 431 functions are selected at different menu levels (see figure 8.2) and with the aid of a special E+H operating menu (see figure 8.3 or 8.4).

Note:

- The Mypro CPM 431 measuring instrument can only be controlled with a HART® Communicator if the proper software (DDL = device description language of MyPro CPM 431) is installed in the Communicator. If this is not the case, the memory module may have to be replaced, or the software may have to be adapted. Contact E+H Service if you have any questions.
- All Mypro CPM 431 functions are described in detail in chapter 7.

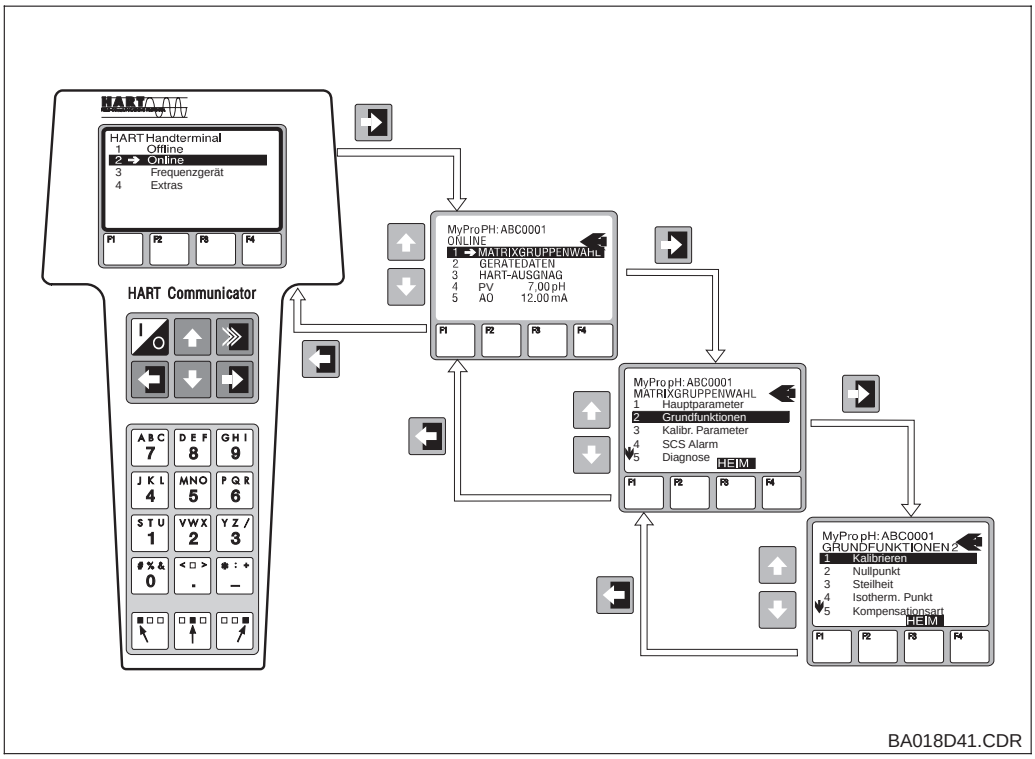


Fig. 8.2 Example for operation of hand-held terminal: „analogue output“

Procedure:

1. Switch on the hand-held terminal:
   a) Measuring instrument not connected
   ➜ The HART® main menu appears. This menu level appears for any HART® programming, i.e. independent of the instrument type. Refer to the „Communicator DXR 275“ operating instructions for further information.
   b) Measuring instrument is connected ➜ The programme goes directly to the „Online“ menu level.

The „Online“ menu level is used to display the current data measured, such as pH value, temperature, etc., and also allows you to access the MyPro CPM431 operating matrix (see fig. 8.3) via the „matrix group selection“ line (see figure 8.3). All function groups and functions accessible through HART are displayed in this matrix in a systematic arrangement.

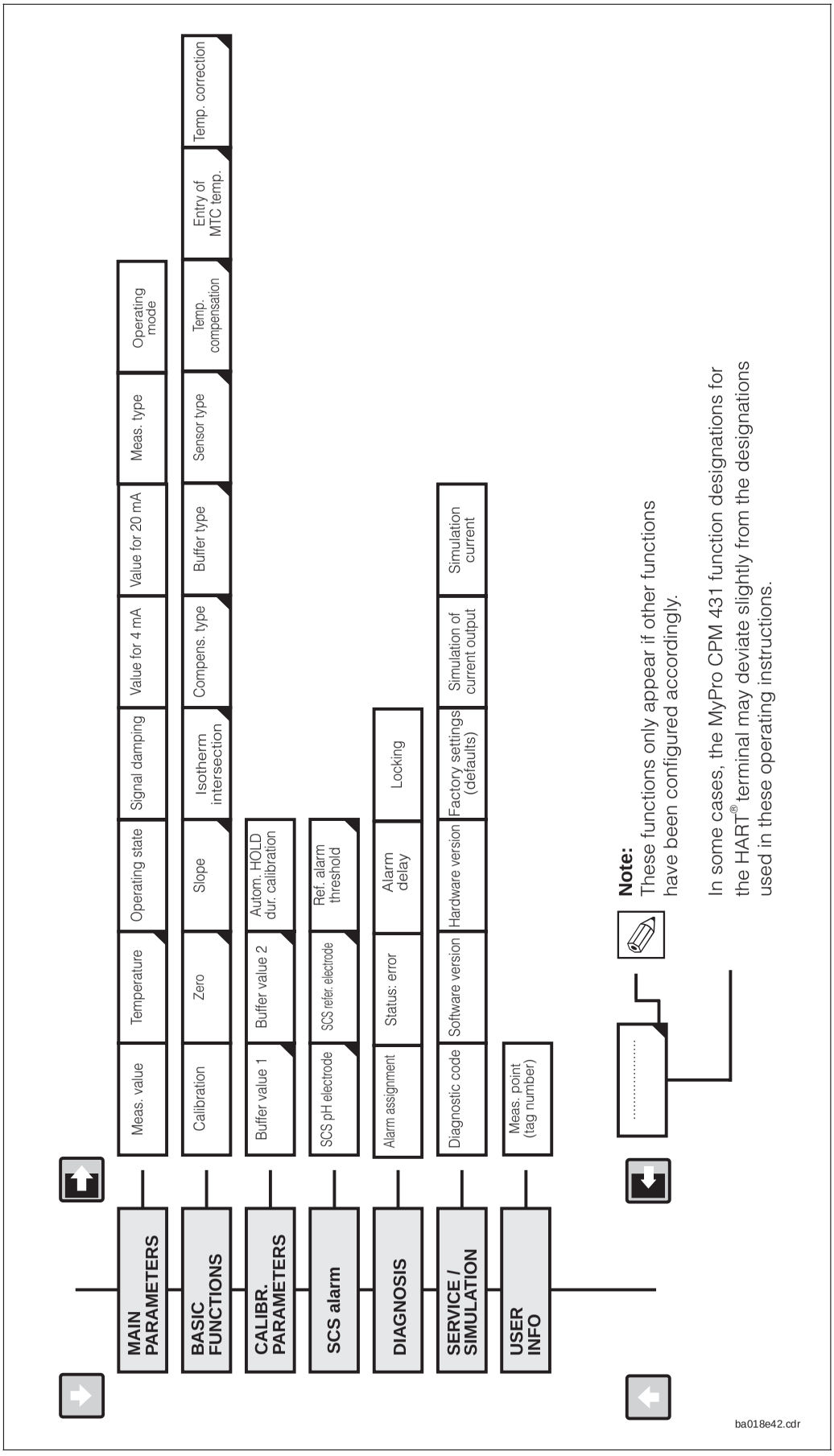
2. The function group is selected using „matrix group selection“ (e.g. analog output), and then the desired function, e.g. remote calibration. All settings or numeric values relating to the function are immediately displayed.

3. Enter numeric value or change setting as required.

4. Press function key „F2“ to call up „SEND“. Press the F2 key to transfer all the values entered/ settings changed with the hand-held terminal to the MyPro CPM 431 measuring system.

5. Press the HOME function key „F3“ to return to the „Online“ menu level. Here, you can read the current values measured by the MyPro CPM 431 instrument with the new settings.

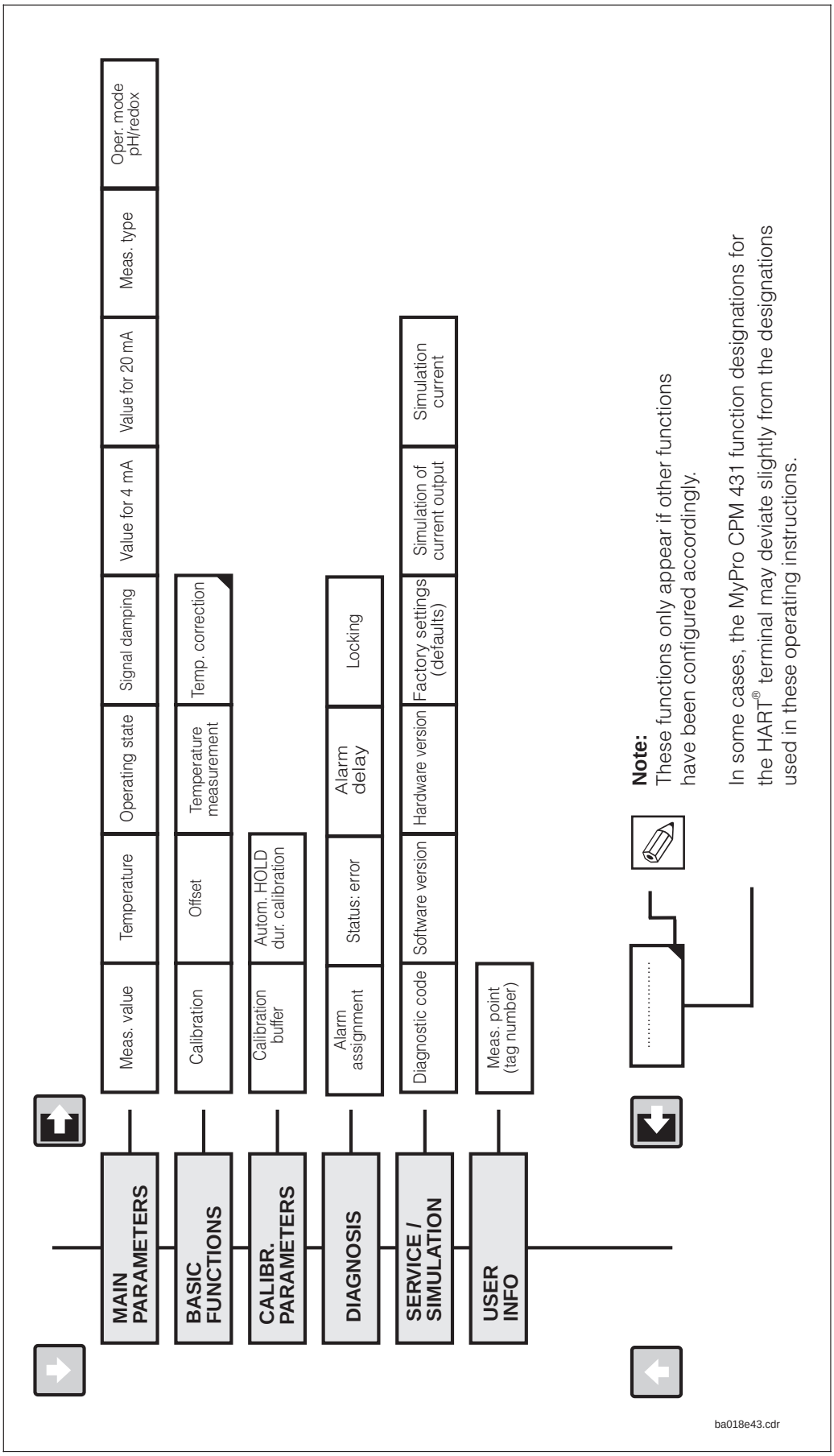
8.1.1 HART® operating matrix for pH



If the instrument has been locked in the field, the parameters cannot be changed via the hand-held terminal (see chapter 6.3)

Fig. 8.3 HART® operating matrix for MyPro CPM 431 (pH)

8.1.2 HART® operating matrix for redox



If the instrument has been locked in the field, the parameters cannot be changed via the hand-held terminal (see chapter 6.4.)

Fig. 8.4 HART® operating matrix for MyPro CPM 431 (redox)

8.2 Commuwin II

Description

The MyPro CPM 431 measuring transmitter can also be operated via its Hart® interface using Commuwin II. Commuwin II is a graphical control programme for intelligent measuring instruments and can handle various communication protocols. The program supports the following functions:

- On-line and off-line measuring transmitter parameter changes
- Loading and saving of instrument data (upload/download)

A programme extension additionally supports recording of measured values on a line recorder.

Commuwin offers two alternatives for operation and parameter changes (**instrument data**) menu:

- **Graphical operation**
- **Matrix operation**

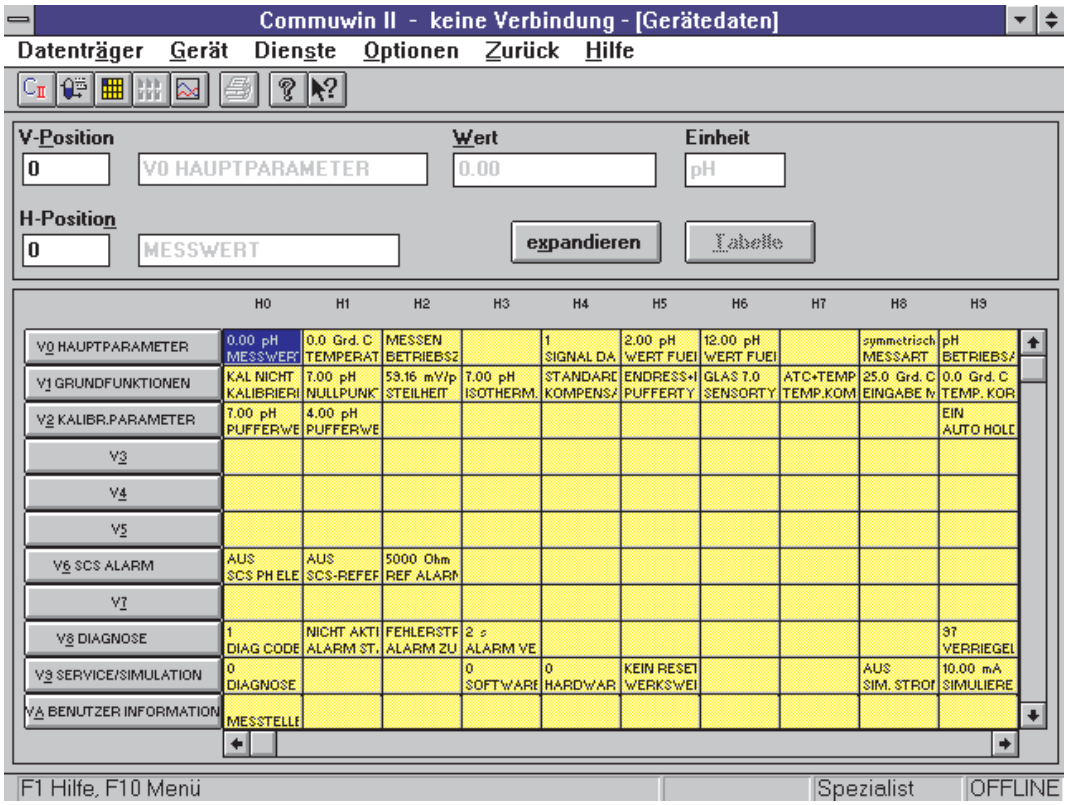


Fig. 8.5 Matrix operation of Communwin II

SCREENPH.TIF

Communication between Commuwin II and measuring transmitters takes place via DDE interfaces (DDE = dynamic data exchange, Windows communication standard). A DDE server (driver) is available for each communication channel.

Depending on the application, either the serial interface built into the personal computer or a special interface (card to be plugged into the PC) is used. The Commubox FXA 191 serves as the communication interface for the MyPro.

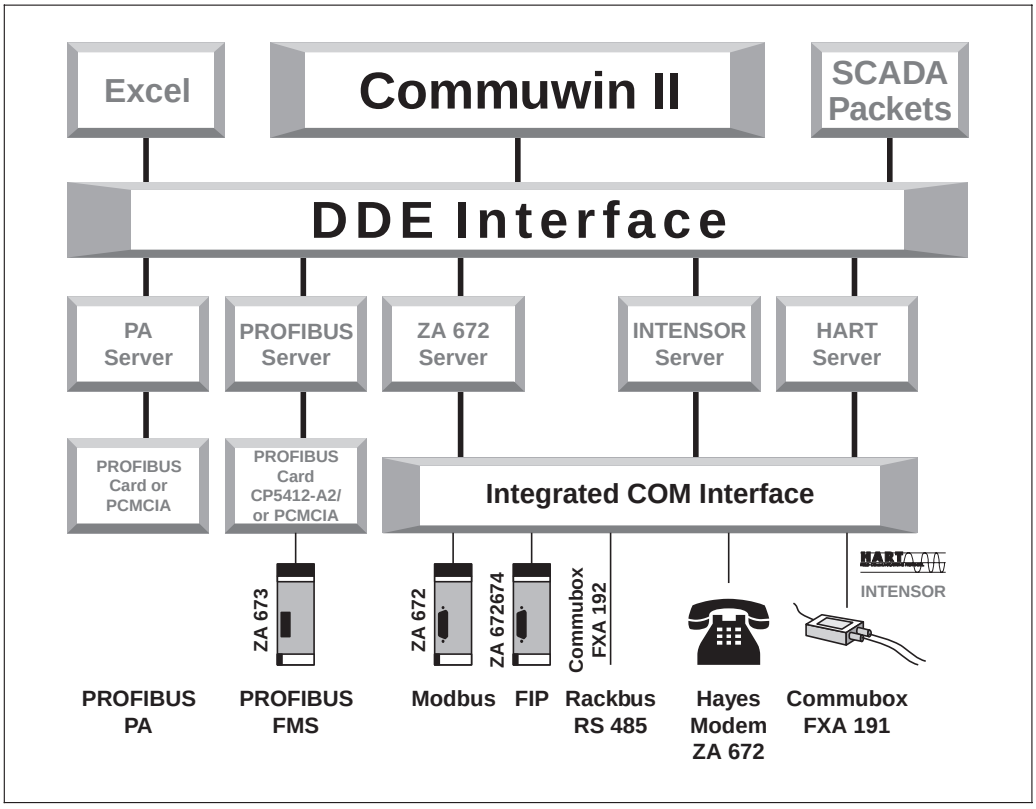


Fig. 8.6 Overview of Commuwin II programme structure

Caution:

Please refer to the corresponding operating instructions (BA 124F/00/en) for a detailed description of Commuwin II.

8.2.1 Commuwin II operating matrix for pH

		H0	H1	H2	H3	H4	H5	H6	H7	H8	H9
V0	MAIN PARAMETERS	Measured pH value	Temperature	Operating state		Input damping	pH at 4 mA	pH at 20 mA		Sym./asym. meas.	Oper. mode pH/redox
V1	BASIC FUNCTIONS	Remote calibration control	pH sensor zero	pH sensor slope	Isotherm intersection pHis	Compensation type switching	Buffer set selection	Sensor type glass 7.0/4.6 antimony	Temperature compen-sation type	MTC-temperature	Temperature offset
V2	CALIBRATION	Calibration buffer 1	Calibration buffer 2								Autom. HOLD dur. calibration
V3											
V4											
V5											
V6	SCS	SCS glass electrode off/on	SCS refer. electrode off/on	SCS refer. alarm threshold							
V7											
V8	DIAGNOSIS	Diagnostic code selection	Diagnostic code status	Error current assignment	Error current delay						Unlock/ Lock
V9	SERVICE / SIMULATION	Diagnostic code			Software version	Hardware version	Factory settings (set default)			Current simulation off/on	Simulation output current
VA	USER INFO	Tag number									

8.2.2 Commuwin II operating matrix for redox

		H0	H1	H2	H3	H4	H5	H6	H7	H8	H9
V0	MAIN PARAMETERS	Measured mV value	Temperature	Operating state		Input damping	mV at 4 mA	mV at 20 mA		Sym./asym. meas.	Oper. mode pH/redox
V1	BASIC FUNCTIONS	Remote calibration control	Electrode offset						Temperature measurement on/off		Temperature offset
V2	CALIBRATION	Calibration buffer entry									Autom. HOLD dur. calibration
V3											
V4											
V5											
V6											
V7											
V8	DIAGNOSIS	Diagnostic code selection	Diagnostic code status	Error current assignment	Error current delay						Unlock/ Lock
V9	SERVICE / SIMULATION	Diagnostic code			Software version	Hardware version	Factory settings (set default)			Current simulation off/on	Simulation output current
VA	USER INFO	Tag number									

9 Troubleshooting

9.1 Error indication

The MyPro CPM 431 indicates errors by means of an alarm symbol flashing on the display. It also outputs an error current of 22 +/- 0.5 mA at the current output if configured accordingly (VH 80 – 83).

The error can then be identified in the diagnostic parameters via the diagnostic code. Up to five entries are listed according to priority.

9.2 Diagnostic codes (error codes)

The following table describes the diagnostic/error codes for both instrument variants (pH and redox).

The default error current assignment (active or not active) for each code is also listed.

Note:

An 'X' in the last two columns indicates the instrument variant (pH and/or redox) for which the diagnostic/error code is available.

Failure no.	Display	Measures	Error current assignment (default)	MyPro pH	MyPro redox
E001	EEPROM memory error	Return instrument to your local Endress+Hauser sales agency for repair or request service	active	X	X
E002	Adjustment data error		active	X	X
E007	Transmitter error		active	X	X
E008	SCS glass breakage error	Check pH electrode for glass breakage; examine plug-in electrode head for moisture and dry if necessary; check medium temperature	active	X	
E010	Temperature sensor defective	Check temperature measurement and connections; check instrument and measuring cable with temperature simulator if necessary	active	X	X
E030	SCS reference electrode error	Check reference electrode for glass breakage and soiling; clean reference electrode; check medium temperature	active	X	
E032	Below slope range or slope range exceeded	Repeat calibration and renew buffer solution; replace electrode if necessary and check instrument and measuring cable with simulator	active	X	
E033	pH zero value too low or too high		active	X	
E034	Below redox offset range or range exceeded		active		X
E041	Calibration parameter computation aborted	Repeat calibration and renew buffer solution; replace electrode if necessary and check instrument and measuring cable with simulator	active	X	
E042	Difference between calibration value of buffer pH2 and zero (pH7) too small (one-point calibration solution)	Use a buffer solution for slope calibration with a minimum difference of ΔpH = 2 from the electrode zero	active	X	

Failure no.	Display	Measures	Error current assignment (default)	MyPro pH	MyPro redox
E043	Distance between pH1 and pH2 calibration values is too small	Use buffer solutions that are at least ΔpH = 2 apart	active	X	
E044	Stability not reached during calibration	Repeat calibration and renew buffer solution; replace electrode if necessary and check instrument and measuring cable with simulator	active	X	
E045	Calibration aborted	Repeat calibration and renew buffer solution; replace electrode if necessary and check instrument and measuring cable with simulator	active	X	
E046	Current output parameter limits interchanged	Repeat adjustment with rising output signal characteristic	active	X	X
E055	Below measuring range of main parameter	Check measurement and connections; check instrument and measuring cable with simulator if necessary	active	X	X
E057	Measuring range of main parameter exceeded		active	X	X
E059	Below temperature measuring range		active	X	X
E061	Temperature measuring range exceeded		active	X	X
E063	Below current output range	Check configuration in „current outputs“ menu; check measurement and connections; check instrument and measuring cable with simulator if necessary	not active	X	X
E064	Current output range exceeded		not active	X	X
E080	Current output parameter range too small	Increase range in „current outputs“ menu	not active	X	X
E100	Current simulation active		not active	X	X
E101	Service function active		not active	X	X
E106	Download active		not active	X	X
E116	Download error	Repeat download; check connections and devices if necessary	active	X	X

10 Service and Maintenance

10.1 Cleaning

We recommend using commercially available cleaning agents to clean the front of the instrument.
The instrument front is resistant to (DIN 42 115 test method):

- alcohol (short-term)
- diluted acids (e.g., 3% HCL)
- diluted lyes (e.g., 3% NaOH)
- household detergents

Note:

We do not guarantee resistance to concentrated mineral acids or concentrated lyes, benzyl alcohol, methylene chloride and high-pressure steam.

10.2 Repairs

Repairs may only be carried out by the manufacturer or through the Endress+Hauser service organization.
An overview of the Endress+Hauser service network can be found on the back cover of these operating instructions.

10.3 Accessories

- Measuring transmitter power supply unit
- Hand-held terminal DXR 275
- Commubox FXA 191

11 Appendix

11.1 Technical data

pH measurement

Measuring range (MR)	pH –2.00 ... +16.00
Measured value resolution	pH 0.01
Deviation of indication[1)]	max. 0.2 % of MR
Reproducibility[1)]	max. 0.1 % of MR
Zero shift range	
Glass electrode 7.0	pH 5.7 ... 8.3
Glass electrode 4.6	pH 3.32 ... 5.82
Antimony electrode	pH -1.0 ... 3.0
Range of automatic temperature compensation	–20 ... +150 °C
Reference temperature	25 °C
Slope adaptation	
Glass electrode 4.6 und 7.0	45 ... 65 mV / pH
Antimony electrode	25 ... 65 mV / pH
pH signal input	
Input resistance with nominal operating conditions	$> 1 \times 10^{12}\ \Omega$
Input current with nominal operating conditions	$< 1.6 \times 10^{-12}$ A
pH signal output	
Current range	4 ... 20 mA
Deviation[1)]	max. 0.5 % of MV ± 4 digits
Load (depending on operating voltage and load)	max. 600 Ω
Output range	adjustable, Δ 2.0 ... Δ 18 pH
	(error message is output if Δ < 2)

Redox measurement

Measuring range (MR)	–1500 ... +1500 mV
Measured value resolution	1 mV
Deviation of indication[1)]	max. 0.2 % of MR
Reproducibility[1)]	max. 0.1 % of MR
Electrode offset	+/– 200 mV
Redox signal input	
Input resistance with nominal operating conditions	$> 1 \times 10^{12}\ \Omega$
Input current with nominal operating conditions	$< 1.6 \times 10^{-12}$ A
Redox signal output	
Current range	4 ... 20 mA
Deviation[1)]	max. 0.5 % of MV ± 4 digits
Load	max. 600 Ω
Output range	adjustable, Δ 200 mV... Δ 3000 mV

Temperature measurement

Temperature sensor	Pt 100 (3-wire connection)
Measuring range (MR)	–20 ... +150 °C
Measured value resolution	0.1 °C
Deviation of indication[1)]	1 °C
Reproducibility[1)]	max. 0.1 % of MR
Temperature offset (Pt 100 calibration)	+/– 20 °C

[1)] Acc. to DIN IEC 746 part 1, for nominal operating conditions

Electrical data and connections

Power supply, DC (without HART transfer) . . . . . +12 ... + 30 V
Power supply, DC (with HART transfer) . . . . . +13.5 ... + 30 V
Power consumption . . . . . max. 700 mW
Signal output . . . . . 4 ... 20 mA, potential separated from sensor circuit
Error current signal output . . . . . 22 mA +/– 0.5 mA
HART transfer
- Load . . . . . 230 ... 1100 Ω
- Signal output . . . . . 0.8 ... 1.2 mA (peak to peak)

Terminals, maximum cable cross section . . . . . 2.5 mm^2, PE 4 mm^2

General technical data

Measured value display . . . . . liquid crystal display (LCD)
Electromagnetic compatibility (EMC)
- Emitted interference . . . . . acc. to EN 50081-1: 1992
- Immunity to interference . . . . . acc. to EN 50082-2: 1995

Nominal operating conditions
- Ambient temperature . . . . . –10 ... +55 °C
- Relative humidity . . . . . 10 ... 95 %, non-condensing

Limit operating conditions
- Ambient temperature . . . . . –20 ... +60 °C (Ex: –20 ... +55 °C)

Storage and transport temperature . . . . . –25 ... +80 °C
Max. cable length . . . . . 50 m without SCS
. . . . . 20 m with SCS

Ex version of instrument

Intrinsically safe power supply and signal circuit, protection type EEx ib IIC T4:
Max. input voltage U_i . . . . . 30 V
Max. input current I_i . . . . . 100 mA
Max. input power P_i . . . . . 750 mW
Max. internal inductance L_i . . . . . 200 µH
Max. internal capacitance C_i . . . . . negligible
Max. internal capacitance C_i . . . . . to PE = 5.3 nF

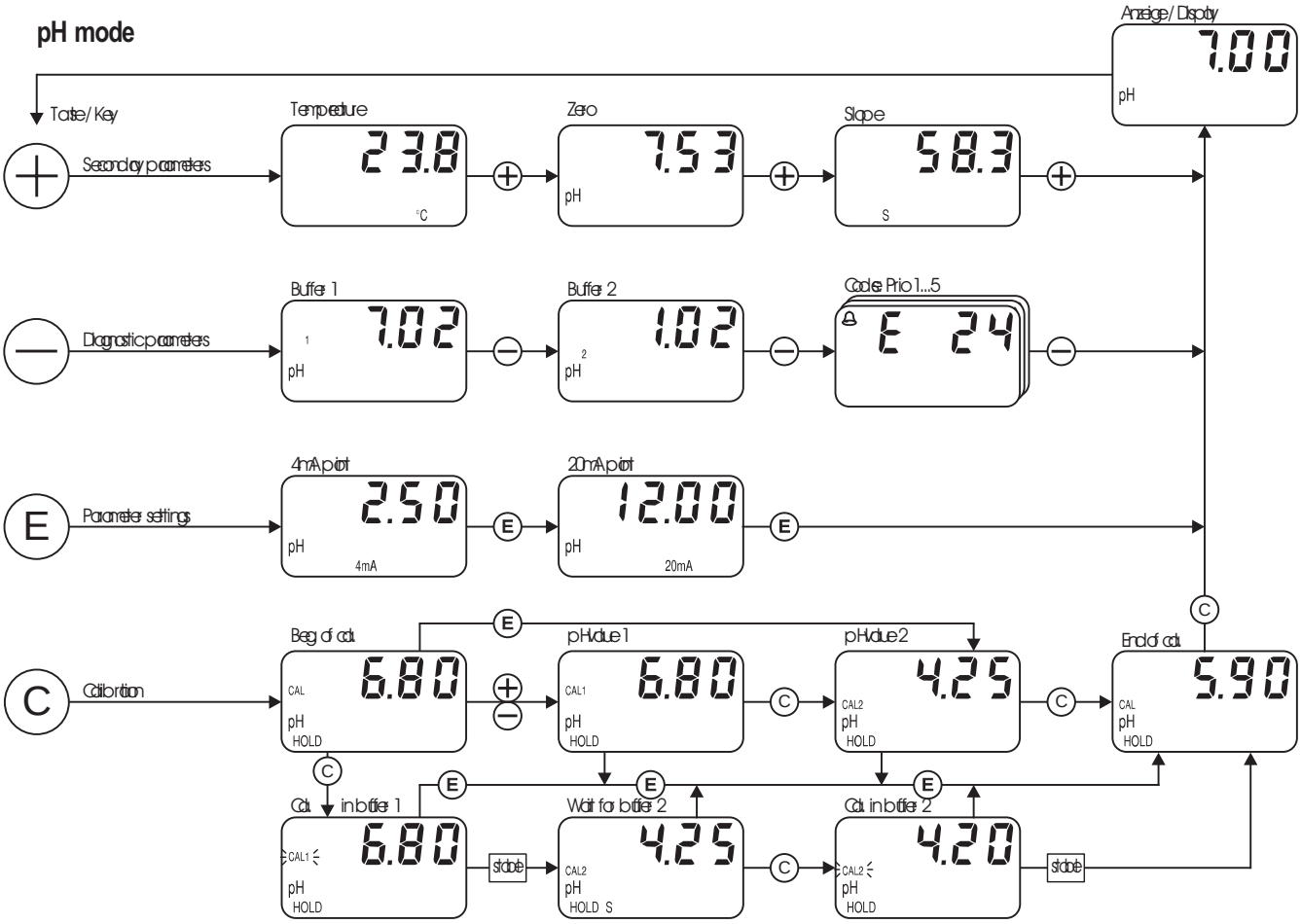
Intrinsically safe sensor circuit, protection type EEx ia IIC T4:
Max. output voltage U_o . . . . . ± 5.4 V (10.8 V)
Max. output current I_o . . . . . 320 mA
Max. output power P_o . . . . . 200 mW
Max. external inductance L_o . . . . . 100 µH
Max. external capacitance C_o . . . . . 100 nF

Physical data

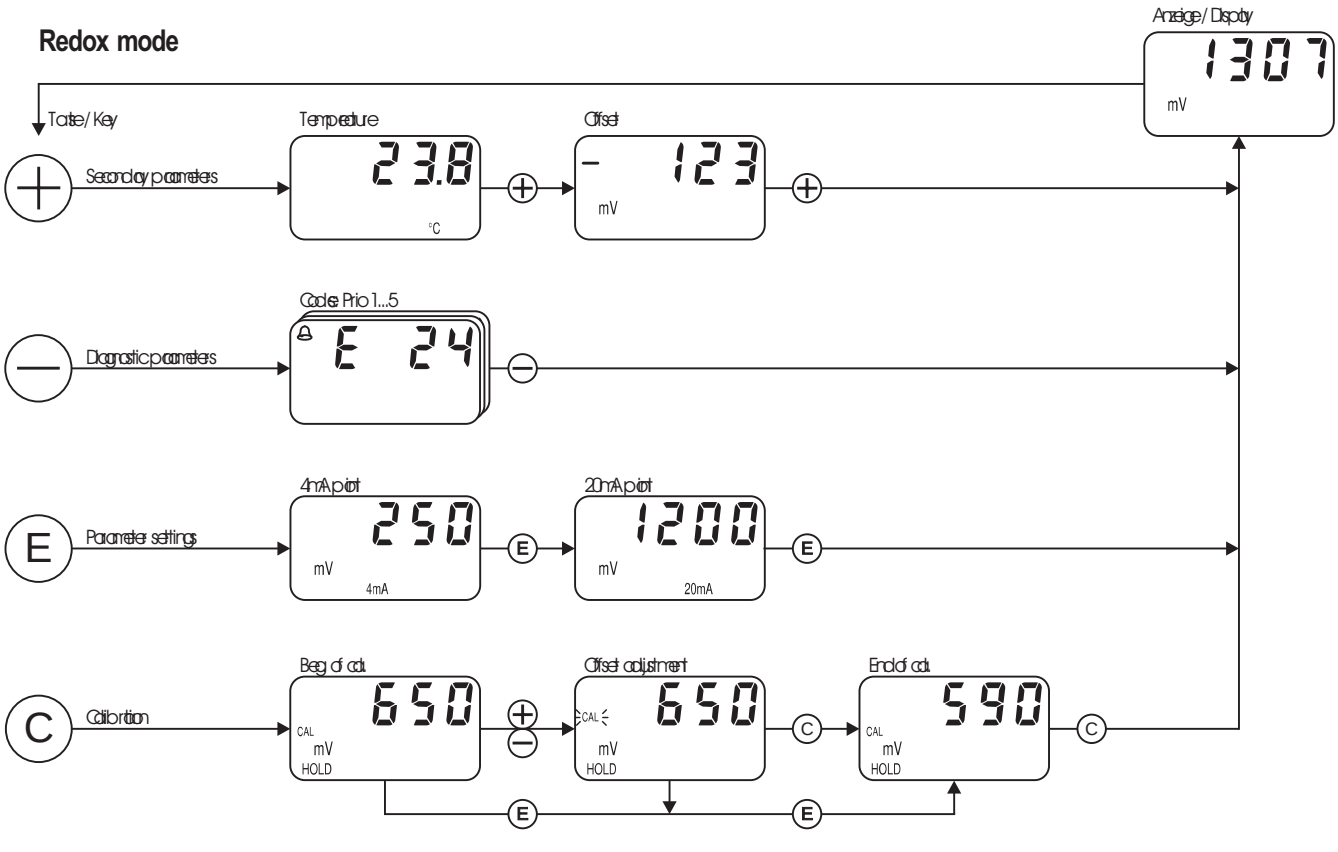
Dimensions (HxWxD) . . . . . 223 x 103 x 137 mm
Weight . . . . . max. 1.25 kg
Ingress protection . . . . . IP 65
Material of housing . . . . . GD-AlSi 10 Mg, plastic-coated

11.2 Index

pH mode



Redox mode



Europe

Austria
❏ Endress+Hauser Ges.m.b.H.
Wien
Tel. ++43 (1) 88056-0, Fax (1) 88056-35

Belarus
Belorgsintez
Minsk
Tel. ++375 (172) 263166, Fax (172) 263111

Belgium / Luxembourg
❏ Endress+Hauser S.A./N.V.
Brussels
Tel. ++32 (2) 2480600, Fax (2) 248053 53

Bulgaria
INTERTECH-AUTOMATION
Sofia
Tel. ++359 (2) 664869, Fax (2) 963 1389

Croatia
❏ Endress+Hauser GmbH+Co.
Zagreb
Tel. ++385 (1) 6637785, Fax (1) 6637823

Cyprus
I+G Electrical Services Co. Ltd.
Nicosia
Tel. ++357 (2) 484788, Fax (2) 484690

Czech Republic
❏ Endress+Hauser GmbH+Co.
Praha
Tel. ++420 (26) 6784200, Fax (26) 6784179

Denmark
❏ Endress+Hauser A/S
Søborg
Tel. ++45 (70) 131132, Fax (70) 132133

Estonia
Elvi-Aqua
Tartu
Tel. ++372 (7) 422726, Fax (7) 422727

Finland
❏ Endress+Hauser Oy
Espoo
Tel. ++358 (9) 8596155, Fax (9) 8596055

France
❏ Endress+Hauser
Huningue
Tel. ++33 (3) 89696768, Fax (3) 89694802

Germany
❏ Endress+Hauser Meßtechnik GmbH+Co.
Weil am Rhein
Tel. ++49 (7621) 97501, Fax (7621) 975555

Great Britain
❏ Endress+Hauser Ltd.
Manchester
Tel. ++44 (161) 2865000,
Fax (161) 9981841

Greece
I & G Building Services Automation S.A.
Athens
Tel. ++30 (1) 9241500, Fax (1) 9221714

Hungary
Mile Ipari-Elektro
Budapest
Tel. ++36 (1) 2615535, Fax (1) 2615535

Iceland
Vatnshreinsun HF
Reykjavik
Tel. ++354 (5) 619616, Fax (5) 619617

Ireland
Flomeaco Company Ltd.
Kildare
Tel. ++353 (45) 868615, Fax (45) 868182

Italy
❏ Endress+Hauser Italia S.p.A.
Cernusco s/N Milano
Tel. ++39 (02) 92106421,
Fax (02) 92107153

Latvia
Raita Ltd.
Riga
Tel. ++371 (7) 312897, Fax (7) 312894

Lithuania
Agava Ltd.
Kaunas
Tel. ++370 (7) 202410, Fax (7) 207414

Netherlands
❏ Endress+Hauser B.V.
Naarden
Tel. ++31 (35) 6958611, Fax (35) 6958825

Norway
❏ Endress+Hauser A/S
Tranby
Tel. ++47 (32) 859850, Fax (32) 859851

Poland
❏ Endress+Hauser Polska Sp. z o.o.
Warszawy
Tel. ++48 (22) 7201090, Fax (22) 7201085

Portugal
Tecnisis - Tecnica de Sistemas Industriais
Linda-a-Velha
Tel. ++351 (1) 4172637, Fax (1) 4185278

Romania
Romconseng SRL
Bucharest
Tel. ++40 (1) 4101634, Fax (1) 4101634

Russia
❏ Endress+Hauser Moscow Office
Moscow
Tel.++709 (5) 158 7571, Fax (5) 158 9864

Slovak Republic
Transcom Technik s.r.o.
Bratislava
Tel. ++421 (74) 4888684, Fax (74) 4887112

Slovenia
❏ Endress+Hauser D.O.O.
Ljubljana
Tel. ++386 (61) 159 2217, Fax (61) 159 2298

Spain
❏ Endress+Hauser S.A.
Barcelona
Tel. ++34 (93) 480 3366, Fax (93) 473 3839

Sweden
❏ Endress+Hauser AB
Sollentuna
Tel. ++46 (8) 555 116 00, Fax (8) 555 116 00

Switzerland
❏ Endress+Hauser AG
Reinach/BL 1
Tel. ++41 (61) 715 75 75, Fax (61) 711 16 50

Turkey
Intek Endüstriyel Ölcü ve Kontrol Sistemleri
Istanbul
Tel. ++90 (212) 275 1355,
Fax (212) 266 2775

Ukraine
Industria Ukraïna
Kiev
Tel. ++380 (44) 268 81, Fax (44) 269 08

Yugoslavia
Meris d.o.o.
Beograd
Tel. ++381 (11) 444 6164, Fax (11) 444 1966

Africa

Egypt
Anasia
Heliopolis/Cairo
Tel. ++20 (2) 417900, Fax (2) 417900

Morocco
Oussama S.A.
Casablanca
Tel. ++212 (2) 241338, Fax (2) 402657

Nigeria
J F Technical Invest. Nig. Ltd.
Lagos
Tel. ++234 (1) 6223 4546, Fax (1) 6223 4548

South Africa
❏ Endress+Hauser Pty. Ltd.
Sandton
Tel. ++27 (11) 444 1386, Fax (11) 444 1977

Tunisia
Controle, Maintenance et Regulation
Tunis
Tel. ++216 (1) 793077, Fax (1) 788595

America

Argentina
❏ Endress+Hauser Argentina S.A.
Buenos Aires
Tel. ++54 (1) 145 227 970,
Fax (1) 145 227 909

Bolivia
Tritec S.R.L.
Cochabamba
Tel. ++591 (42) 569 93, Fax (42) 509 81

Brazil
❏ Samson Endress+Hauser Ltda.
Sao Paulo
Tel. ++55 (11) 5031 3455,
Fax (11) 5031 3067

Canada
❏ Endress+Hauser Ltd.
Burlington, Ontario
Tel. ++1 (905) 681 9292,
Fax (905) 681 9444

Chile
DIN Instrumentos Ltda.
Santiago
Tel. ++56 (2) 205 0100, Fax (2) 225 8139

Colombia
Colsein Ltd.
Bogota D.C.
Tel. ++57 (1) 236 7659, Fax (1) 610 7868

Costa Rica
EURO-TEC S.A.
San Jose
Tel. ++506 (2) 96 15 42, Fax (2) 96 15 42

Ecuador
Insetec Cia. Ltda.
Quito
Tel. ++593 (2) 269 148, Fax (02) 461833

Guatemala
ACISA Automatizacion Y Control Industrial S.A.
Ciudad de Guatemala, C.A.
Tel. ++502 (3) 345985, Fax (2) 327431

Mexico
❏ Endress+Hauser I.I.
Mexico City
Tel. ++52 (5) 568 9965, Fax (5) 568 418

Paraguay
Incoel S.R.L.
Asuncion
Tel. ++595 (21) 213 989, Fax (21) 226 583

Uruguay
Circular S.A.
Montevideo
Tel. ++598 (2) 925 785, Fax (2) 929 151

USA
❏ Endress+Hauser Inc.
Greenwood, Indiana
Tel. ++1 (317) 535 7138,
Fax (317) 535 8489

Venezuela
H. Z. Instrumentos C.A.
Caracas
Tel. ++58 (2) 944 0966, Fax (2) 944 4554

Asia

China
❏ Endress+Hauser Shanghai
Instrumentation Co. Ltd.
Shanghai
Tel. ++86 (21) 5490 2300,
Fax (21) 5490 2303

❏ Endress+Hauser Beijing Office
Beijing
Tel. ++86 (10) 6834 4058,
Fax (10) 6834 4068

❏ Endress+Hauser (H.K.) Ltd.
Hong Kong
Tel. ++852 (2) 528 3120, Fax (2) 865 4171

India
❏ Endress+Hauser India Branch Office
Mumbai
Tel. ++91 (22) 852 1458, Fax (22) 852 1927

Indonesia
PT Grama Bazita
Jakarta
Tel. ++62 (21) 797 5083, Fax (21) 797 5089

Japan
❏ Sakura Endress Co., Ltd.
Tokyo
Tel. ++81 (422) 540 611, Fax (422) 550 275

Malaysia
❏ Endress+Hauser (M) Sdn. Bhd.
Petaling Jaya, Selangor Darul Ehsan
Tel. ++60 (3) 7334 848, Fax (3) 7338 800

Pakistan
Speedy Automation
Karachi
Tel. ++92 (21) 772 2953, Fax (21) 773 6884

Papua New Guinea
SBS Electrical Pty Limited
Port Moresby
Tel. ++675 (3) 251188, Fax (3) 259556

Philippines
Brenton Industries Inc.
Makati Metro Manila
Tel. ++63 (2) 638 8041, Fax (2) 638 8042

Singapore
❏ Endress+Hauser (S.E.A.) Pte., Ltd.
Singapore
Tel.++65 (5) 668222, Fax (2) 666848

South Korea
❏ Endress+Hauser (Korea) Co., Ltd.
Seoul
Tel. ++82 (2) 658 7200, Fax (2) 659 2838

Taiwan
Kingjarl Corporation
Taipei R.O.C.
Tel. ++886 (2) 27 183 938, Fax (2) 27 134 190

Thailand
❏ Endress+Hauser Ltd.
Bangkok
Tel. 66 (2) 996 781 120, Fax (2) 996 7810

Vietnam
Tan Viet Bao Co. Ltd.
Ho Chi Minh City
Tel. ++84 (8) 833 5225, Fax (8) 833 5227

Iran
Telephone Technical Services Co. Ltd.
Tehran
Tel. ++98 (21) 873 6750, Fax (21) 873 7295

Israel
Instrumetrics Industrial Control Ltd.
Tel-Aviv
Tel. ++972 (3) 648 0205, Fax (3) 647 1992

Jordan
A.P. Parpas Engineering S.A.
Amman
Tel. ++962 (6) 464 3246, Fax (6) 464 5707

Kingdom of Saudi Arabia
Anasia
Jeddah
Tel. ++966 (2) 671 0014, Fax (2) 672 5929

Kuwait
Kuwait Maritime & Mercantile Co. K.S.C.
Safat
Tel.++965 (2) 441481, Fax (2) 441486

Lebanon
Nabil Ibrahim
Jbeil
Tel. ++961 (3) 254052, Fax (9) 548038

Sultanate of Oman
Mustafa & Jawad Science & Industry Co.
L.L.C.
Ruwi
Tel. ++968 (60) 2009, Fax (60) 7066

United Arab Emirates
Descon Trading EST.
Dubai
Tel. ++971 (4) 653651, Fax (4) 653264

Yemen
Yemen Company for Ghee and Soap Industry
Taiz
Tel. ++976 (4) 230664, Fax (4) 212338

Australia + New Zealand

Australia
ALSTOM Australia Ltd.
Sydney
Tel. ++61 (2) 9722 4777, Fax (2) 9722 4888

New Zealand
EMC Industrial Instrumentation
Auckland
Tel. ++64 (9) 415 5110, Fax (9) 415 5115

All other countries

❏ Endress+Hauser GmbH+Co.
Instruments International
D-Weil am Rhein
Germany
Tel. ++49 (7621) 9750 2, Fax (7621) 975345

❏ Members of the Endress+Hauser group

50088305

Endress+Hauser
The Power of Know How

BA 173C/07/en/02.00
Printed in Germany / CV5 / Lf