

Operating instructions for pressure transmitter PASCAL CV 4...20 mA, Type Series CV3... with display, HART and switching module



Features

- Modular pressure transmitter
Output signal:
 - 4...20 mA
 - HART® protocol
- Function modules
 - Multifunctional display with 5-segment digital display and bar graph
 - Switching module with 2 floating channels, maximum 0.5 A switching current, electrically isolated at all sides, without additional auxiliary power
- Function module replacement on site without recalibration "plug and measure"
- Watchdog for electronics modules and measuring cell
- Classification per SIL 2
- Accuracy: $\leq 0.15\%$
- Turndown 5:1
- Degree of protection IP 66
- Piezoresistive measuring cell directly aerated, fully welded, without inside gasket

Basic modules

4...20 mA

Function modules

switching module

HART® module



PROFIBUS PA



Display module



Various modules can easily be added to PASCAL CV (see table page 7).

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General

These operating instructions refer to installation, commissioning, servicing and adjustment. Statutory regulations, valid standards, additional technical details in the relevant data sheet, details of the type plate and any additional certificates are to be observed along with these operating instructions.



Safety instructions

- Installation, operation and maintenance of the instrument may be executed by authorized personnel, only, using suitable equipment.
- Warning: If the instrument is used incorrectly it is possible that serious injuries or damage can occur!
- Prior to the disassembly of the pressure transmitter the impulse ducts between the measuring transmitter and the process have to be locked and relieved from pressure.
- The standard nominal pressure rating and the permissible operating temperature of the gasket should be observed for all process connections. Operation outside the allowed nominal pressure rating, especially with clamp connections, is only possible with suitable clamps. In this case, note DIN 32676 for stipulations on heat resistance.
- Pressure transmitters that are mechanically defective can cause injuries or give rise to process faults. Suitable precautions should be taken to avoid this.

CE marking

The CE marking on the instruments certifies compliance with valid EU directives for bringing products to market within the European Union. The following directives are met:

EMC directives	EMC	2004/108/EG
Pressure Equipment Directive	PED	97/23/EG

Connection to Zone 0

The pressure transmitter is suitable for Zone 0-connection. Zone 0 is allowed with pressure from 0.8 to 1.1 bar and temperatures from -20 °C to +60 °C.

Mounting and operating

- Before mounting the instrument ensure that pressure range, overpressure resistance, media compatibility, thermostability and pressure port are suitable for the process at hand.
 - Conduct process installation before electrical installation.
 - Measuring instruments that should not have any oil or grease residues in the pressure port are marked „Free of oil and grease“.
 - Gaskets must be chosen that are suited to the process connection and resistant to the measured medium.
 - Check for pressure tightness when commissioning the transmitter.
 - Do not insulate the temperature decoupler, as this would reduce the decoupling effect. Follow DIN 32676.
 - Wire up the instrument with power switched off.
 - The housing in protection class IP66 consists of a two chamber system in which the measuring cell is aerated directly in relation to the environment by means of a PTFE filter system.
-
- The instrument can only be protected against electromagnetic interference (EMC) when the conditions for screening, earthing, wiring and potential isolation are met during installation.
 - The mounting position should be taken into consideration when checking the zero output. Standard transmitters are adjusted at the factory for vertical mounting. Changes to the mounting position can cause zero shifts at pressure ranges ≤ 2 bar. These drifts can be corrected by adjustment on site.
-
- When the instrument is opened any contact with the electrical connections can affect the signals. This situation can be avoided by switching off the supply voltage or by disconnecting the signal circuit.

- The types of protection IP66 are only achieved, when the threaded ring has been screwed tight after electrical connection/parameterization.
- The instrument requires no maintenance.

Instructions for the operation with diaphragm seal

- To avoid soiling and damage remove protective cap or wrapping in front of the separating diaphragm before mounting.
- Do not touch the flush mounted separating diaphragm, as there is a danger of deformation at measuring ranges to 10 bar / 150 psi. Instrument zero point and measuring characteristics could also be affected.
- Measuring instrument and diaphragm seal are a closed system and should not be separated.
- Avoid overtightening the process screw joints as this can result in zero displacements at the pressure transmitter (fixing error).
- When using systems with capillary for vacuum measurements always mount the pressure transmitter underneath the diaphragm seal. The instruments are set at the factory with pressure transmitter and diaphragm seal at the same height. Correct any differences in height between diaphragm seal and pressure transmitter arising from conditions on site on the pressure transmitter when placing the instrument into operation (see "Setting the measuring range"). When correcting for elevation be aware of the adjustment limits.
- Be sure to install and securely fasten the capillary to avoid vibrations. Roll up overlengths with a minimum radius of 50 cm. Shock and changes in temperature can impact on measurements.
- Process and ambient temperatures can cause zero displacements at the pressure transmitter with some system designs. We can supply you with an error analysis.

HART® protocol

The HART® module enables the use of the HART protocol. Use only power supply amplifiers and isolation amplifiers that are suitable for operation with HART® HART Version V6.0, user interface compatible with Siemens PDM and Emerson AMS.

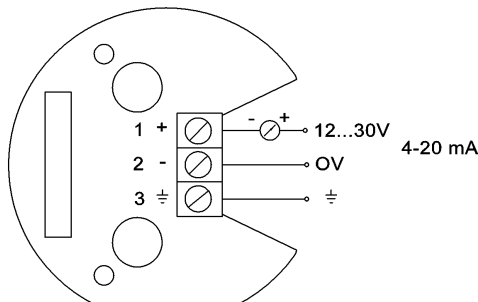
Functional safety

as per IEC 61508 SIL 2

Connection diagram

Basic module 4...20 mA

Internal terminals with cable gland design

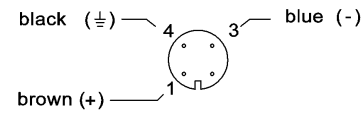


Modules may only be exchanged/added when the power supply has been switched off!

Cable gland design: remove switching module to connect basic module

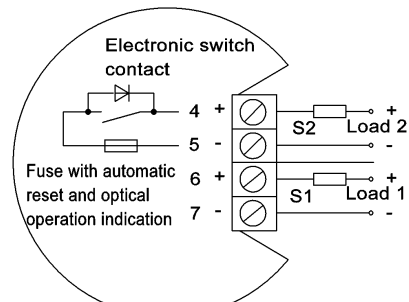
circular connector

color code as Binder series 763



Switching module

Internal terminals with cable gland design

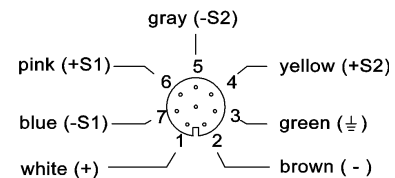


Modules may only be exchanged/added when the power supply has been switched off!

Cable gland design: remove display module to connect switching module

circular connector

color code as Binder series 763



Note on the electrical connection of the switching module

Two terminals (+ and -) are available for connecting the two direct current switching outputs.

The switching outputs are galvanically isolated from each other and from the other transmitter (500 VAC).

The switching output can never be destroyed if the maximum switching voltage 30 VDC is observed.

The internal resistance of the switching output is approx. 0.3 Ohm (when $I_S = 0.5$ A) in switched status.

In the event of reversed voltage, the switching output is switched (internal diode).

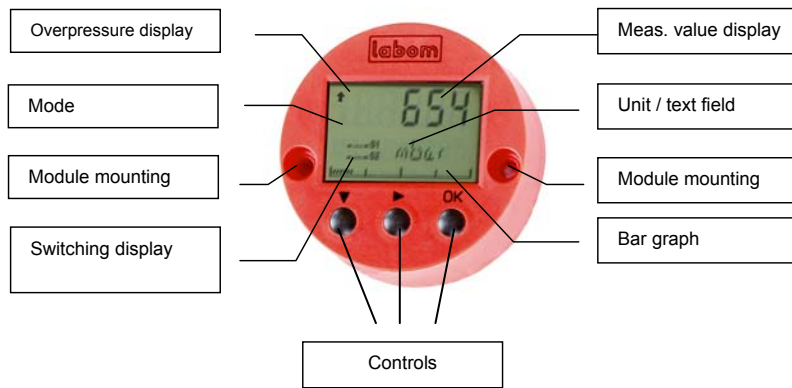
If the switched current exceeds the nominal current 500 mA then an automatically resetting thermal fuse is activated. A holding current establishes itself which depends on the level of the voltage applied.

The fuse only resumes its low Ohmic state when the current drops dramatically below the holding current because the switching output has been switched off/ disconnected or the power supply on the switched circuit has been switched off/ reduced.


If the switching output is correctly connected (not reversed) the "FUSE S1" and "FUSE S2" LEDs indicate that the fuse has been activated (only viewable when display module disassembled). This requires a minimum power supply of 3 V on the switched circuit.

Operation of pressure transmitter PASCAL CV with display module SW Rev. 3.0

The standard ex-works setting for the display module can be found in the table on page 7.



Overpressure display

If the pressure applying to the MU exceeds the sensor limits, then the measurement display begins to flash and an upward-pointing arrow  appears on the display.

Mode



C = Change (input mode when changing a parameter)
 I = Info (the ACTUAL value specified by the user)
 W = Warnings (Warning of critical states)
 E = Error (error messages)

Module mounting

When mounting the modules, the screws should not be over-tightened
 Modules may only be exchanged/ replaced when the power supply has been switched off!

Switching display

Two switch symbols show the status of the switching contacts.

Example: Switch contact 1 opened 
 Switch contact 2 closed 

Meas. value display

Display of the current measuring value (see page 7)

Unit/ text field

Shows the physical unit or displays a text field

Bar graph

The bar graph shows the current pressure in all menus, based on the set measuring range
 If the level drops below the set measuring range, the zero point of the bar graph shifts to the right end of the scale and the progression of numbers moves to the left.
 After the set measuring range is exceeded, no further changes are made.

Controls

The key function depends on the length of time the key is pressed

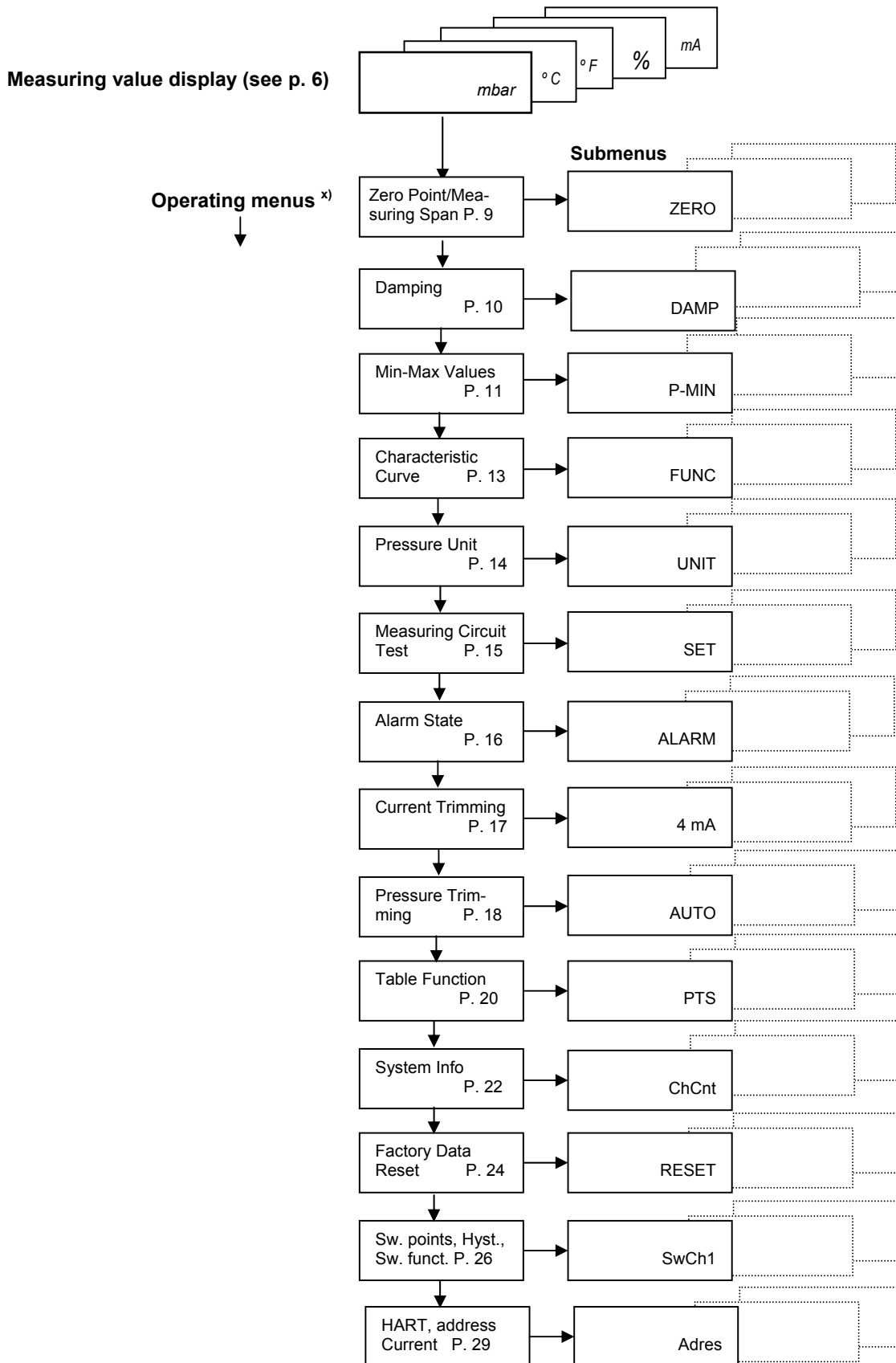
"Short" function : approx. 1 sec.
 "Long" function : approx. 10 sec.

Special key functions (irrespective of the position in the menu) :

- Left key => allows you to switch from the current operating menu to the Next operating menu
- Left **and** middle key "short" => Return to measuring value display (also takes place if the keys are not pressed after 5 minutes)
- Left **and** right key "long" => Activate/ deactivate write protection (input locked / input active)

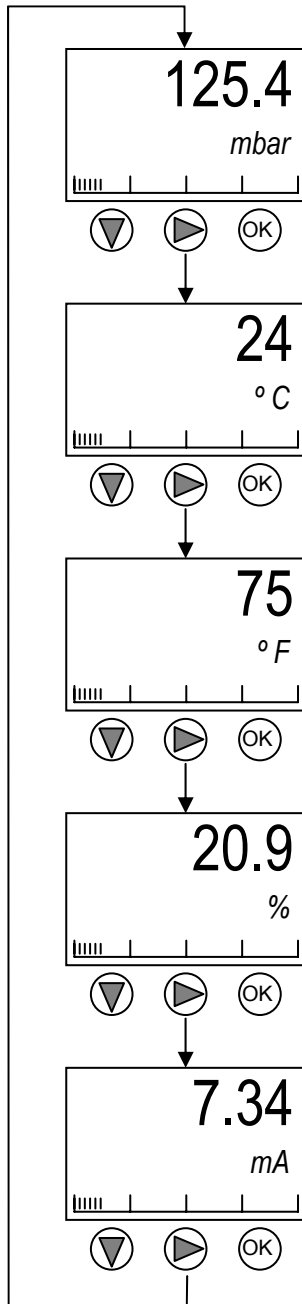
Menu structure

The transmitter is configured by means of an input menu with the following structure:



x) the left button allows you to switch from the current operating menu to the next operating menu.

1. Measuring value display



Pressure display

Numerical display : Current pressure
 Text field : mbar (selected physical unit)
 Bar graph : Pressure (display in the set range)

Temperature display (°C)

Numerical display : Temperature at the pressure sensor
 Text field: : °C (degrees Celsius)
 Bar graph : Pressure (display in the set range)
 Note : The temperature indicator shows the temperature at the sensor; the process temperature can vary from this.

Temperature display (°F)

Numerical display : Temperature at the pressure sensor
 Text field : °F (degrees Fahrenheit)
 Bar graph : Pressure (display in the set range)
 Note : The temperature indicator shows the temperature at the sensor; the process temperature can vary from this.

Percentage display


Numerical display : Current pressure based on the measuring range
 Text field : % (percentage of the set range)
 Bar graph : Pressure (display in the set range)


Initial current display


Numerical display : Initial current in mA, based on the set range
 Text field : mA
 Bar graph : Pressure (display in the set range)

Selecting Measuring value display as standard display

One of these displays can be selected as the standard display.

1. Select with the middle button 

2. Confirm with the right button 

Note: The left button  takes you to the operating menu level (see following pages).

2. Operating menus

Operating menus and parameterizing Description of further function modules

Please check the following table for further information concerning the operating menu of the display module and switching module (grey marked).

Various function modules can easily be added to PASCAL CV (see table).

These modules can be exchanged or extended with ease on site without having to recalibrate or remove the device from the process ("plug and measure"). Automatic module detection renders programming redundant.

Note: Modules may only be exchanged/added when the power supply has been switched off!

operating menus	display of display module	parameter		basic module		function modules		
		variability	standard	4...20 mA	PROFIBUS	switching module	display module	HART®-module
zero point	RANGE / Zero	see instrument ranges	nominal range	x	x	x	x	x
measuring span	RANGE / Span	see instrument ranges	nominal range	x	x	x	x	x
damping	DAMP	0.0...120.0 sec.	0.0 sec.	w	x	—	x	x
min-max-values	HI / LO	pressure and temperature resettable	—	—	x	—	x	x
characteristic	FUNC	linear, table	linear	w	—	—	x	x
pressure unit	UNIT	bar, mbar, kPa, MPa, mmH2O, mH2O, kg/cm ² , psi	bar	w	x	—	x	x
measuring circuit test	LOOP	3.55...22 mA	—	—	—	—	x	x
alarm state	ALARM	< 3.6 mA, > 21.0 mA	< 3.6 mA	w	—	—	x	x
current trimming	I-CAL	-2 %...+ 5 %	—	—	—	—	x	x
pressure trimming	P-CAL	zero point -50...+50% o.n.range span -10...+10 % of nom. range	—	—	x	—	x	x
table function	TABLE	2...31 points in table	0 % = 4 mA 100 % = 20 mA	—	—	—	x	x
system info	INFO	software, serial number revision level	—	—	x	—	x	x
factory data reset	RESET	—	—	—	x	—	x	x
switch points	SWCH1(2)	0.0...100.0 % of nominal range	50 %	—	x	x	x	x
hysteresis	SWCH1(2)/Hyst.	0.0...100.0 % of nominal range	0.1 % hyster.falling	—	x	w	x	x
switching function	SWCH1(2)/SwTyp	breaker, maker	breaker	—	x	w	x	x
HART Address	HART/Adres	0...63	0	—	—	—	x	x
HART Current	HART/CUrr	Fixed/Float	FLOAT	—	—	—	x	x
write protection	—	ON, OFF	OFF	x	x	x	x	—

x = configurable

w = factory setting

Error code description

System Errors	
W-DOG ERROR	Device software not running correctly.
FLASH ERROR	Device parameters invalid.
BrdGE ERROR	Bridge is faulty.
SnSr nmbR	Error in sensor module or this basic module cannot access the sensor.
bASE ChkEr	The sensor module has been replaced or there is an error in the basic module.
SnSr ChkEr	Error in sensor module (compensation table/ set-up data)

Error code description

Four-Digit Error Code Display

0 0 0 0

Fourth Digit in Error Code in PASCAL CV Display Module

0	No error.
1	Pressure outside nominal measuring range.
2	Temperature outside specified range.
3	Pressure outside nominal measuring range and temperature outside specified range.
4	Analog output limited to current value.
5	Pressure outside nominal measuring range and analog output limited to current value.
6	Temperature outside specified range and analog output limited to current value.
7	Pressure outside nominal measuring range; temperature outside specified range; and analog output limited to current value.

Third Digit in Error Code in PASCAL CV Display Module

0	No error.
8	General device error (always shown with other errors)

Second Digit in Error Code in PASCAL CV Display Module

0	No error.
2	A memory cell in the microprocessor is faulty.

First Digit in Error Code in PASCAL CV Display Module

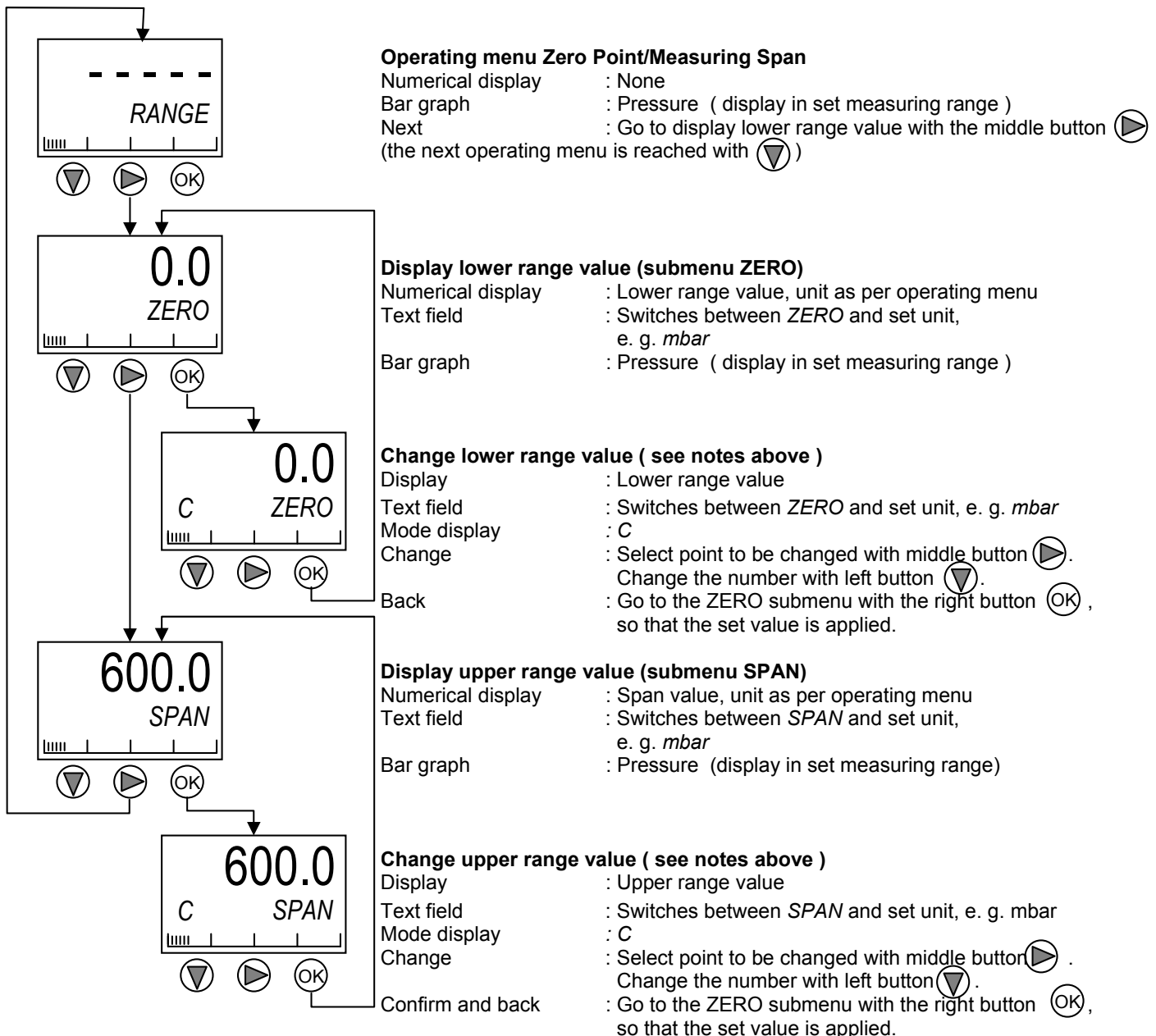
0	No error.
1	Data in sensor module invalid.
2	Data in basic module invalid.
3	Data in sensor and basic module invalid or do not match.
4	Connected sensor not detected by basic module.
8	Measuring bridge / pressure sensor faulty.

Digits on a gray background indicate errors that can only be remedied by the manufacturer. All other issues can be remedied by the customer.

2.1 Setting the measuring range (operating menu: Zero Point/Measuring Span)

Notes:

- Changing the zero point and/or span value affects the bar graph, output signal and signal display as a percentage of the measuring range.
- Changes to the zero point (Zero) are also reflected in the span value, i.e. the actual measuring span remains unchanged. For example : Zero=0mbar , Span=600mbar ; changing zero to 100mbar yields a span of=700mbar
- If the pressure transmitter is set outside the permitted measuring range limits (nominal range $\pm 5\%$, smallest measuring span), then the values are not applied.
- Negative values are entered by setting the minus character at the point marked \downarrow during position selection.
- An inverse characteristic curve can be obtained by entering the upper pressure as zero and the lower pressure as the span value (e.g. 0 mbar => 20 mA , 600 mbar => 4 mA)

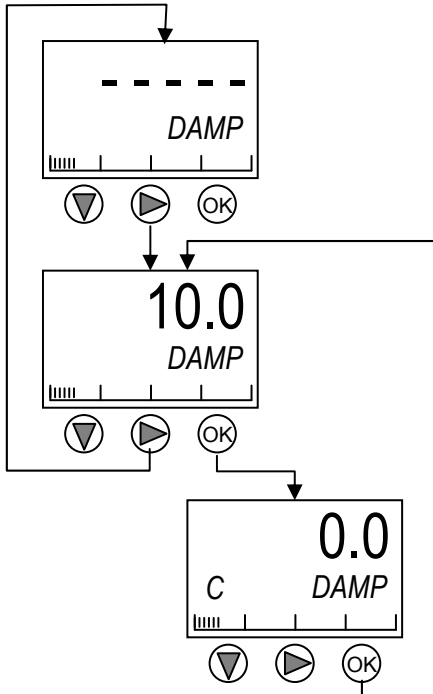


Skip back to the measuring value display: Press the left and middle buttons briefly

2.2 Setting damping (operating menu: Damping)

Notes:

- Changing the damping affects the bar graph, output signal and signal display as a percentage of the measuring range.
- Possible values for damping lie between 0 and 120 sec , if the input is >120 then the value 120 is applied.
- To ensure the immediate following of display and output signal during adjustment, the damping must be set to 0 seconds during these settings.



Operating menu Damping

Numerical display : None
 Bar graph : Pressure (display in set measuring range)
 Next : Go to display dumping with the middle button (▶)
 (the next operating menu is reached with left button (◀).)

Display damping (submenu DAMP)

Numerical display : Current value for the damping in seconds
 Text field : Switches between *DAMP* and *SEC*
 Bar graph : Pressure (display in set measuring range)
 Back : Go to the operating menu Damping with the middle button (▶)

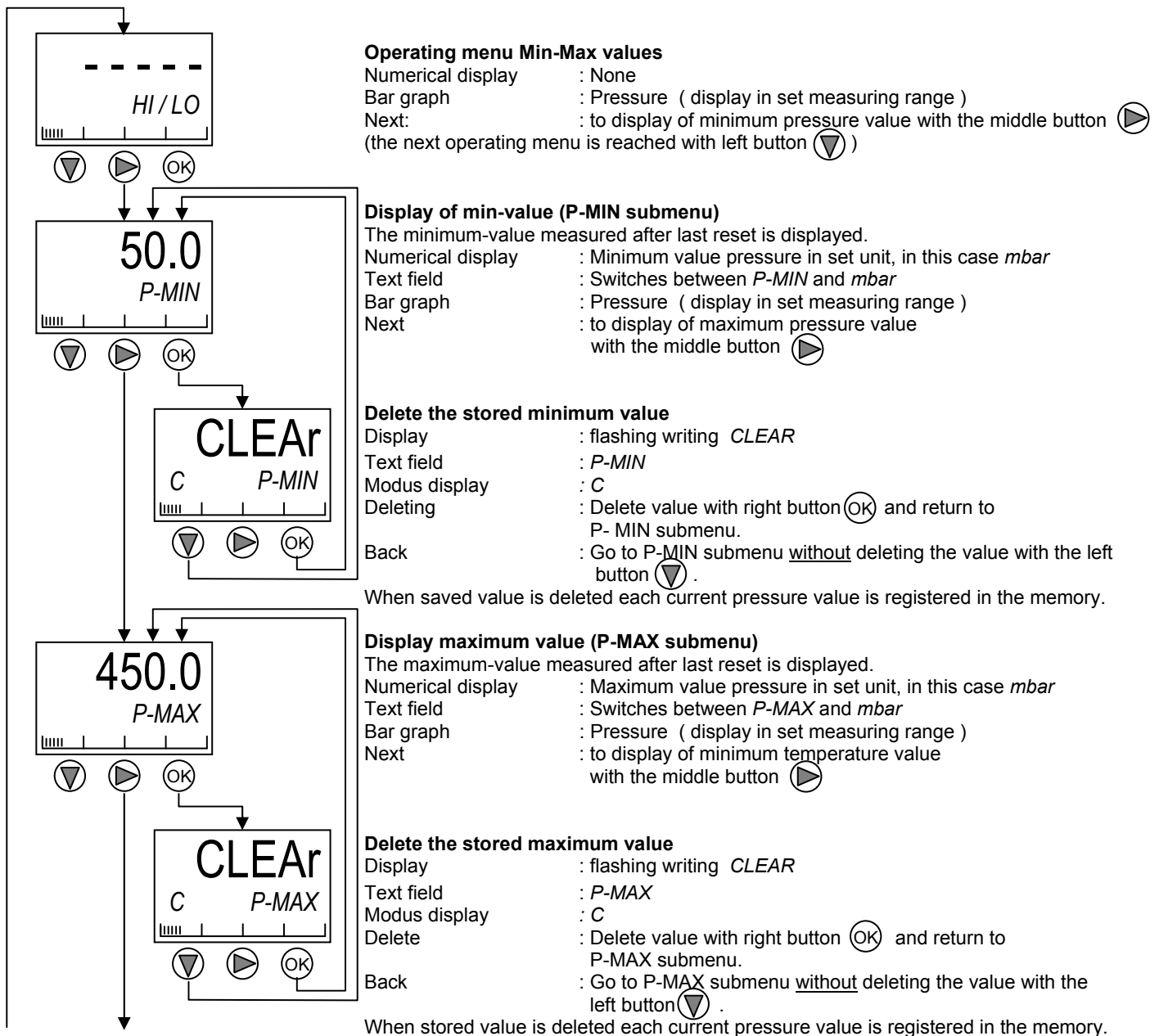
Change damping (see notes above)

Display : Current value for the damping in seconds
 Text field : Switches between *DAMP* and *SEC*
 Mode display : C
 Change : Select point to be changed with middle button (▶).
 Change the number with left button (◀).
 Confirm and back : Go to the DAMP submenu with the right button (▶), so that the set value is applied.

Skip back to the measuring value display: Press the left and middle buttons briefly

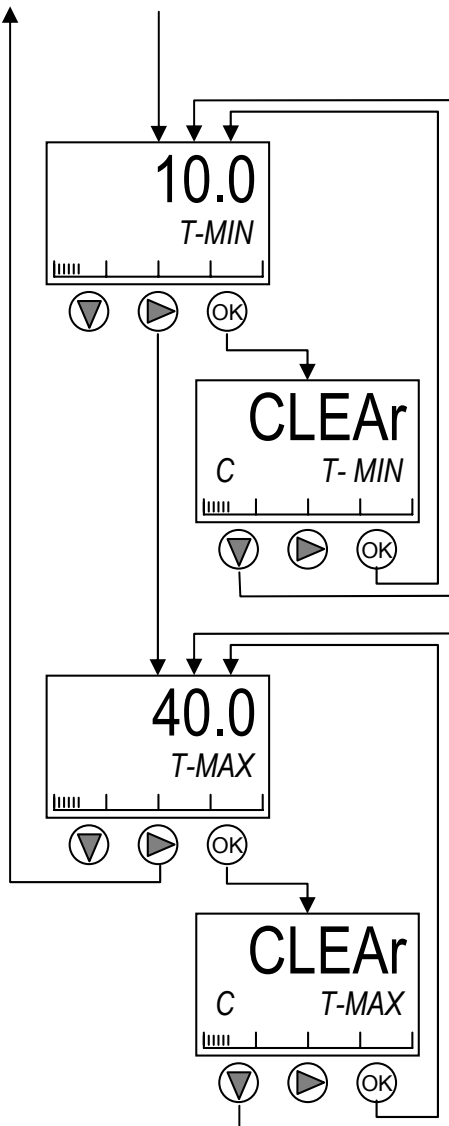
2.3 Reading out / resetting Min-Max values (operating menu: Min-Max Values)

The minimum and maximum pressure values (in the set unit, in this case *mbar*) and sensor temperature (in °C) can be read out and/or reset at this point.



Continued on next page

Reading out / resetting Min-Max values (operating menu: Min-Max Values) continued



Display min-value (T-MIN submenu)

The minimum-value measured after last reset is displayed.

Numerical display : Minimum value temperature in °C
 Text field : Switches between *T-MIN* and °C
 Bar graph : Pressure (Display in set measuring range)
 Next: : to display of maximum temperature value with the middle button (▶)

Delete the stored minimum value

Display : Flashing writing *CLEAR*
 Text field : *T-MIN*
 Mode display : C
 Delete : Delete value with the right button (OK) and return to T-MIN submenu.
 Back : Go to T-MIN submenu without deleting the value with the left button (◂).

When stored value is deleted each current temperature value is registered in the memory.

Display of maximum value (T-MAX submenu)

The maximum-value measured after last reset is displayed.

Numerical display : Maximum value temperature in °C
 Text field : Switches between *T-MAX* and °C
 Bar graph : Pressure (display in set measuring range)
 Back : Go to the operating menu Min-Max Values with the middle button (▶)

Delete the stored maximum value

Display : Flashing writing *CLEAR*
 Text field : *T-MAX*
 Mode display : C
 Delete : Delete value with right button (OK) and return to T-MAX submenu.
 Back : Go to T-MAX submenu without deleting the value with the left button (◂).

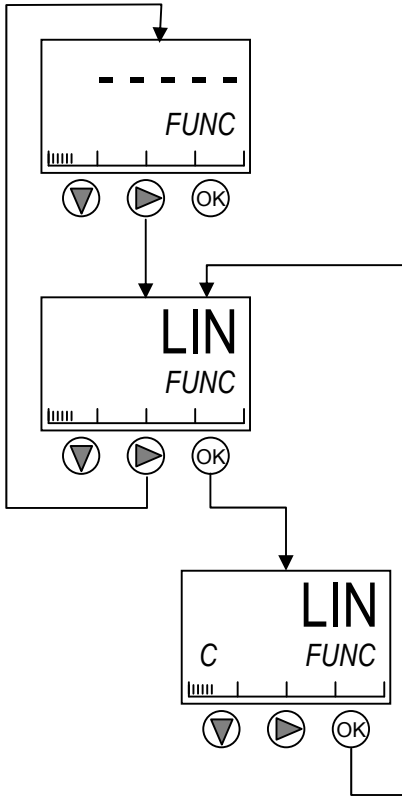
When stored value is deleted each current temperature value is registered in the memory.

Skip back to the measuring value display: Press the left and middle buttons briefly

2.4 Selecting the transmission function (operating menu: Characteristic Curve)

Notes:

- The assignment of the output signal to the pressure range (set range) can be defined here.
- Possible settings : [LIN] linear assignment
[Tab] assignment via table with 2 to 31 points (see operating menu "Table Function")
- The setting tab should only be selected if the required table has been entered in full under the Table Function operating menu.



Operating menu Characteristic curve

Numerical display : None
 Bargraph : Pressure (display in set measuring range)
 Next : Go to display of transmission function with the middle button (▶)
 (the next operating menu is reached with left button ◀.)

Display of present transmission function (FUNC submenu)

Numerical display : e. g. *LIN* (current setting)
 Text field : *FUNC*
 Bar graph : Pressure (display in set measuring range)
 Back : Go to the operating menu Characteristic Curve with the middle button (▶)

Change of transmission function (see notes above)

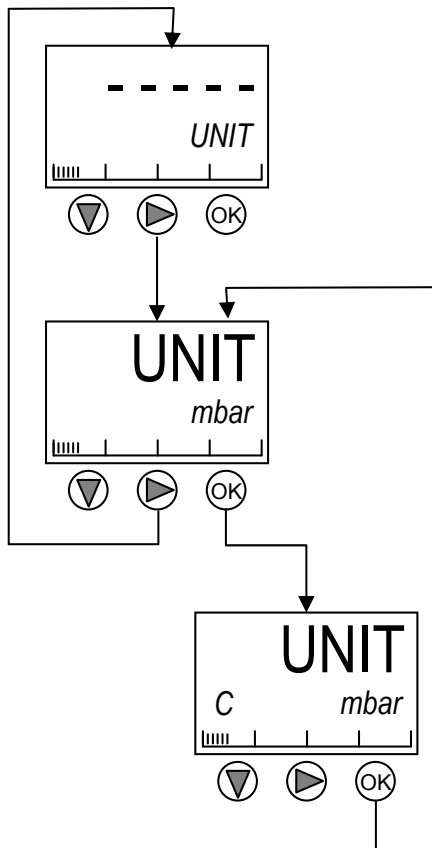
Display : Flashing display of current setting
 Text field : *FUNC*
 Mode display : *C*
 Change : Select function with the left button (◀)
 Confirm and back : Application of set function and back to FUNC submenu with the right button (▶)

Skip back to the measuring value display: Press the left and middle buttons briefly

2.5 Selecting the physical unit (operating menu: Pressure Unit)

Notes:

- The following physical units are available for display :
mmH2O , psi , bar , mbar , kg/cm² , KPa , MPa , mH2O
- The following menus use the set unit :
- Measuring value display
Range, Min/Max values [HI/LO], pressure adjustment [P-CAL]



Operating menu Physical unit

Numerical display : None
 Bar graph : Pressure (display in set measuring range)
 Next : Go to display of set unit with the middle button (▶)
 (the next operating menu is reached with left button (◀).)

Display of set unit (UNIT submenu)

Numerical display : *UNIT*
 Text field : *mbar* or as set last time
 Bar graph : Pressure (display in set measuring range)
 Back : Go to the operating menu physical unit with the middle button (▶)

Change of physical unit (see notes above)

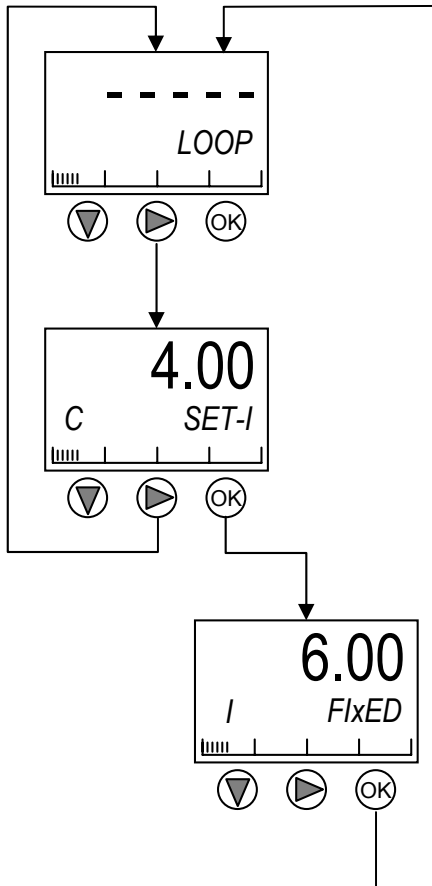
Display : *UNIT*
 Text field : Flashing display *mbar* or as set last time
 Mode display : *C*
 Change : Select unit with the left button (◀).
 Confirm and back : Application of set function and back to UNIT submenu with the right button (▶).

Skip back to the measuring value display: Press the left and middle buttons briefly

2.6 Setting a fixed current signal (operating menu: Measuring Circuit Test)

Notes:

- A fixed value for the current signal can be set in the Measuring Circuit Test operating menu, so that a simple device test can be carried out on the following devices. The setting range is 3.6 to 22.0 mA
- Values of less than 3.6 mA are corrected to 3.6 mA at transfer.
- Values of over 22.0 mA are corrected to 22.0 mA at transfer.
- The current signal does not affect the switching channels. In order to test the switching points, appropriate pressure must be applied to the transmitter.
- The FIXED operating state does not end after five minutes but remains active until it is ended using the right hand button.
- This operation menu is not displayed when the HART-address is not 0 and the current mode is fixed.



Operating menu Measuring circuit test

Numerical display : None
 Text field : *LOOP*
 Bar graph : Pressure (display in set measuring range)
 Next : To Preselection of current signal with the middle button (▶)

(the next operating menu is reached with left button (◀).)

Preselection of current signal (see notes above)

Numerical display : Last current pressure proportional current signal
 Text field : Switches between *SET-I* and *mA*
 Mode display : *C*
 Change : Select point to be changed with middle button (▶).
 Change the number with left button (◀).

Confirm and next : Application of set value and go on with the right button (OK)

Display of set current signal

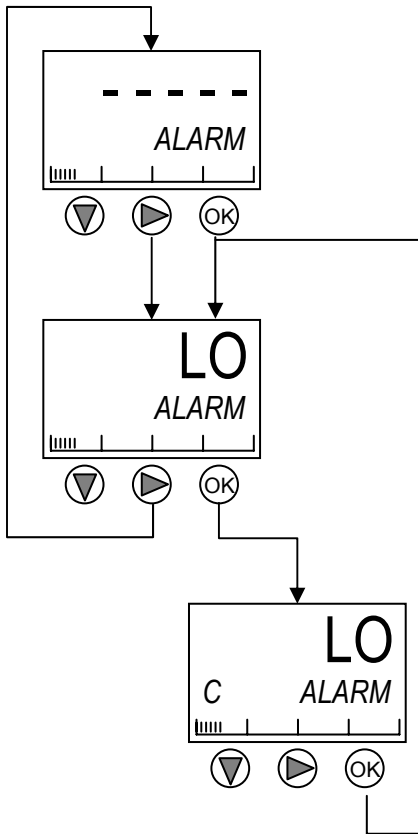
Numerical display : Set current value
 Text field : switches between *FIXED* and *mA*
 Mode display : *I*
 Back : Go to operating menu Measuring circuit test with the right button (OK), so that the actual pressure proportional current is applied.

Skip back to the measuring value display: Press the left and middle buttons briefly

2.7 Setting the current value for the alarm status (operating menu: Alarm State)

Notes :

- The following errors trigger alarms : Under/overtemperature/ under/overpressure, faulty sensor, data storage error, program sequence error, error in the parameter data
- The alarm status is to be selected in the Alarm State operating menu, i.e.. :
 Alarm HI = Current in error/ alarm status greater than 21.0 mA
 Alarm LO = Current in error/ alarm status less than 3.6 mA



Operating menu Alarm state

Numerical display : None
 Text field : *ALARM*
 Bar graph : Pressure (display in set measuring range)
 Next : Go to ALARM submenu with the middle button (▶)
 (the next operating menu is reached with left button (◀).)

Display of set alarm state (ALARM submenu)

Numerical display : *LO* or *HI* depending on last setting
 Text field : *ALARM*
 Next : Got to Change alarm state with the right button (▶) (OK)
 Back : Go to ALARM submenu with the middle button (▶)

Change of alarm state (see notes above)

Display : Flashing display *LO* or *HI*
 Text field : *ALARM*
 Mode display : *C*
 Change : Select kind of alarm with the left button (◀).
 Confirm and back : Application of selected kind of alarm and back to operating menu Alarm state with the right button (▶) (OK).

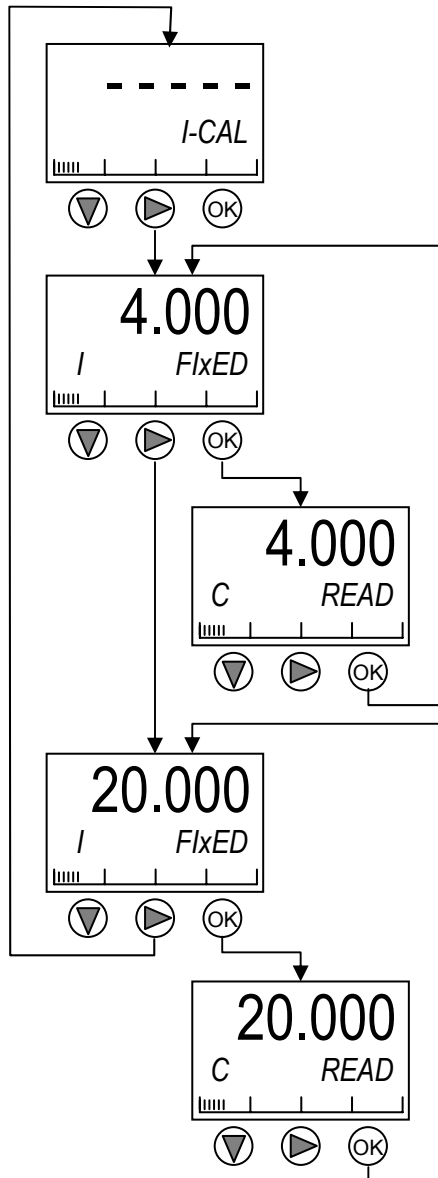
Skip back to the measuring value display: Press the left and middle buttons briefly

2.8 Adjusting the current output (operating menu: Current Trimming)

Notes :

- Adjustment of the output current circuit
- The value read from a measuring device contained in the circuit is used as the input value.
- The correction to the current signal is derived from this value and the set value (4 or 20 mA).

Example: The current signal in the zero point is to be adjusted. If the **4.000 FIXED** submenu is reached, the current signal is set to a value that should be 4 mA. For example you might read 4.023 mA on the measuring device. This value is entered in the "Change 4mA current signal" submenu. The transmitter then changes its signal by the differential amount so that when the **4.000 FIXED** submenu is reached, 4.000 mA can be read on the measuring device. A corresponding change is also made in the range value, so that this must also be checked and corrected as follows.



Operating menu Current trimming

Numerical display : None
 Text field : I-CAL
 Bar graph : Pressure (display in set measuring range)
 Next : Go to 4.000 FIXED submenu with the middle button (▶)
 (the next operating menu is reached with left button (◀).)

Display of current signal 4 mA (4.000 FIXED submenu)

Numerical display : 4.000 (lower current value)
 Text field : Switches between FIXED and mA
 Mode display : I
 Next : Go to 20.000 FIXED submenu with the middle button (▶)
 Next : Got to change the current signal with the right button (OK)

Change current signal 4 mA (see notes above)

Anzeige : 4.000 (lower current value as presetting)
 Text field : Switches between READ and mA
 Mode display : C
 Change : Select point to be changed with middle button (▶).
 Change the number with left button (◀).
 Confirm and back : Got to 4.000 FIXED submenu with the right button (OK),
 so that current output is corrected.

Display of current signal 20 mA (20.000 FIXED submenu)

Numerical display : 20.000 (upper current value)
 Text field : Switches between FIXED and mA
 Mode display : I
 Back : Go to operating menu Current trimming with the middle button (▶)
 Next : Go to Change of current signal with the right button (OK).

Change of current signal 20 mA (see notes above)

Display : 20.000 (upper current value as pre-setting)
 Text field : Switches between READ and mA
 Mode display : C
 Change : Select point to be changed with middle button (▶).
 Change the number with left button (◀).
 Confirm and back : Go to 20.000 FIXED submenu with the right button (OK),
 so that current output is corrected.

Skip back to the measuring value display: Press the left and middle buttons briefly

It might be necessary to repeat the procedure in order to achieve the required accuracy.

2.9 Adjusting the measuring range limits (operating menu: Pressure Trimming)

Notes:

The lower range value and the upper range value can be adjusted in this operating menu. In addition, it is also possible to correct errors caused by the installation position.

Notes:

The damping for this setting is always 0 sec. (→ damping delayed display)

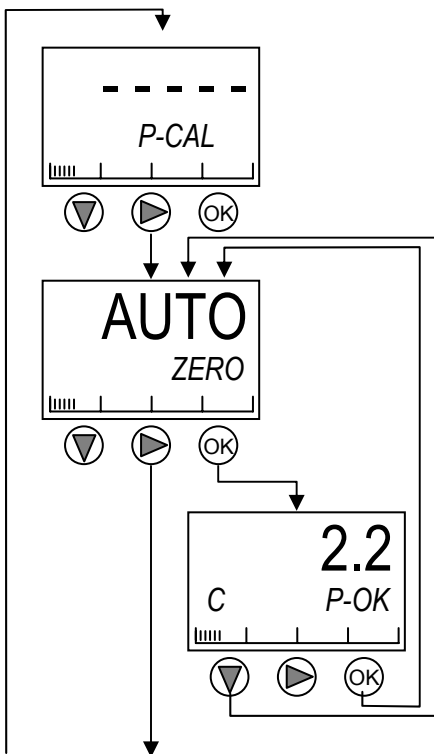
Negative values are entered by setting the minus character at the point indicated by ↓

Return to measuring value display: ◀ + ▶ Press both buttons briefly at the same time

In the case of absolute measuring ranges, the AUTO ZERO submenu is not available.

The AUTO ZERO submenu is used to correct errors caused by the installation position.

Requirement: Ambient pressure at the pressure transmitter.



Operating menu Pressure trimming

Numerical display : None
 Text field : P-CAL
 Bar graph : Pressure (display in set measuring range)
 Next : Go to correct the mounting error (AUTO ZERO submenu) with the middle button ▶
 (the next operating menu is reached with left button ◀)

Correction of the mounting error (AUTO ZERO submenu)

Numerical display : AUTO
 Text field : ZERO
 Next : Go to adjust the lower limit of nominal range with pressure default (ZERO submenu) with the middle button ▶
 Next : Go to correction mode with the right button OK

Execute correction

Numerical display : Current pressure value display, e. g. . 2.2 (see notes above)
 Text field : switches between P-OK and selected unit
 Mode display : C
 Application and back : Go to AUTO ZERO submenu with the right button OK, so that the display is set to zero.
 Back : Go to AUTO ZERO submenu without correction with the left button ◀.

Continued on next page

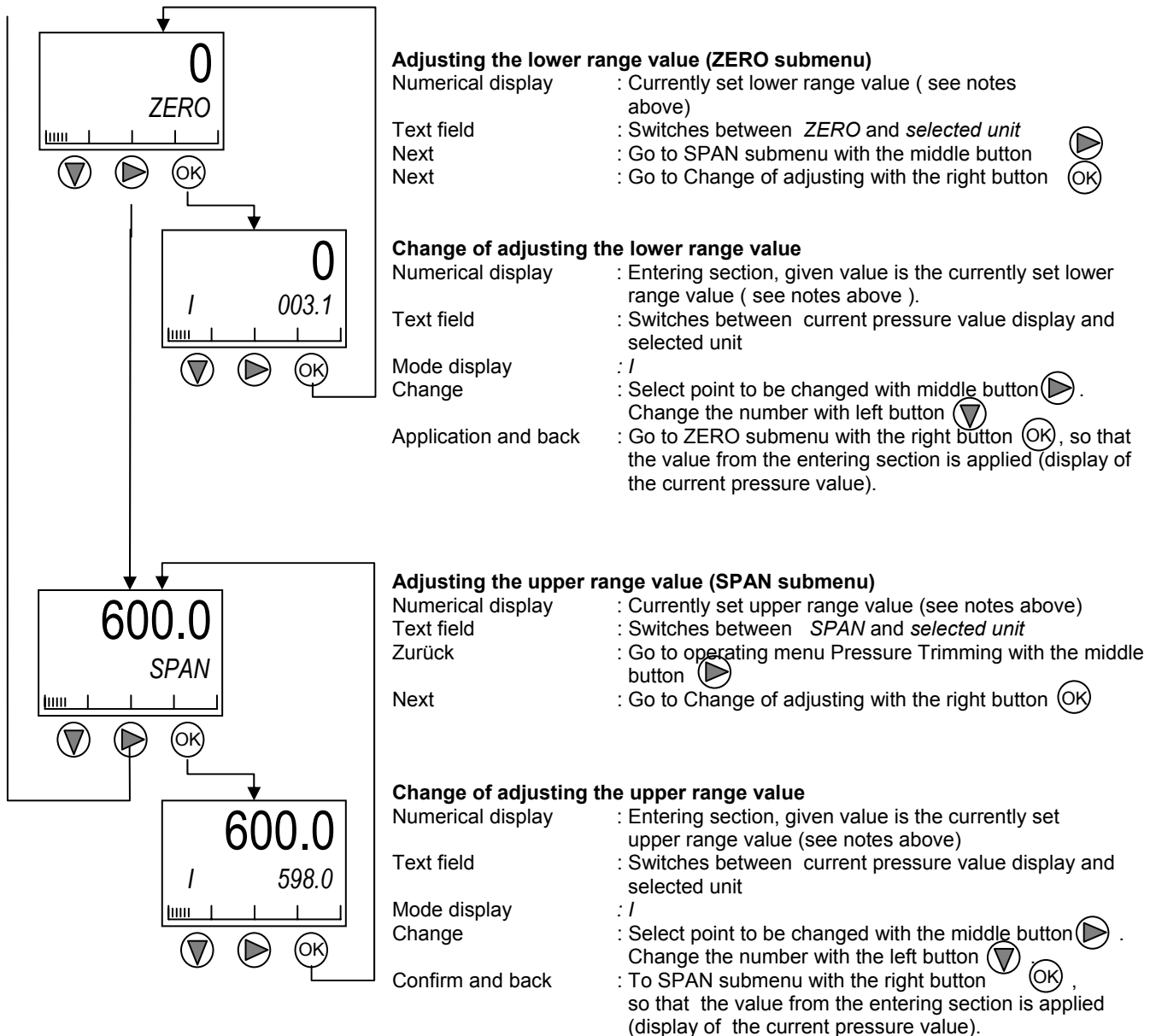
Adjusting the measuring range limits (operating menu: Pressure Trimming)

continued

Notes:

The beginning and end of measurement do not have to be adjusted at the lower range value or upper range value. Pressure specifications near these points can be approached and adjusted (example: containers that cannot be completely emptied).

The suggested values for ZERO and SPAN are set values in the Zero Point/Measuring Span operating menu; these can be changed to the actual pressure applied.

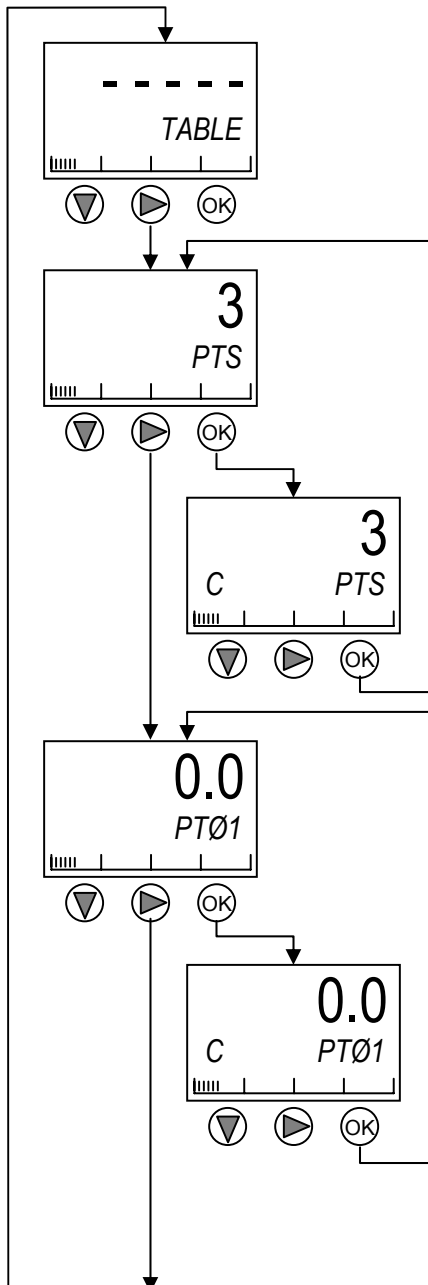


Skip back to the measuring value display: Press the left and middle buttons briefly

2.10 Entering/changing the characteristic curve table (operating menu: Table Function)

Notes :

- It is possible to assign pressure and output signals via a table function in the "Characteristic Curve" operating menu. The associated table must be defined here.
- Tables with 2 to 31 support points are possible; if larger values are entered, the value is set to 31.
- The assignments are to be made in ascending order; at n table points, n entries are expected for % and mA value.
- A number between 0 and 105 is expected as the % entry. Larger values are set to 105 %.
- A number between 3.8 and 20.8 is expected as the mA entry. Smaller values are set to 3.8 mA, while larger values are set to 20.8 mA.
- First the complete table is to be entered and then switched to the table function in the "FUNC" menu, as otherwise unexpected skips in the output signal can occur.



Operating menu Table function

Numerical display : None
 Text field : TABLE
 Bar graph : Pressure (display in set measuring range)
 Next : Go to display number of table points (PTS submenu) with the middle button (▶)
 (the next operating menu is reached with left button (◀))

Display number of table points (PTS submenu)

Numerical display : e. g. 3 (number of table points)
 Text field : PTS
 Next : Go to display first table point with the middle button (▶)
 Next : Go to change number of table points with the right button (OK)

Change number of table points (see notes above)

Display : 3
 Text field : PTS
 Mode display : C
 Change : Select point to be changed with middle button (▶).
 Change the number with left button (◀).
 Back : Go to PTS submenu with the right button (OK), so that the set value is applied.

Display first table point (PT01 submenu)

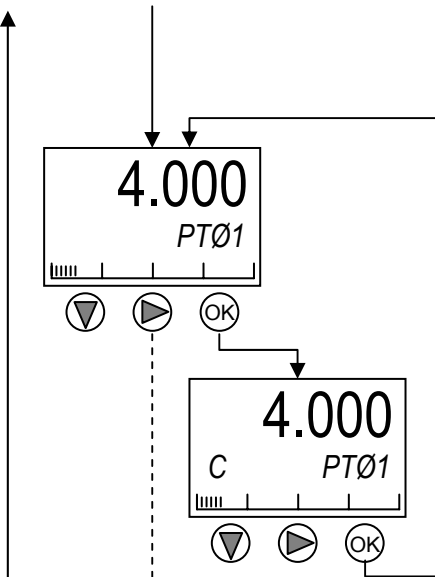
Numerical display : 0.0 (1st table point in %)
 Text field : Switches between PT01 and %
 Next : Go to display power value of first table point with the middle button (▶)
 Next : Go to change percent value with the right button (OK)

Change percent value of first table point (see notes above)

Display : 0.0
 Text field : Switches between PT01 and %
 Mode display : C
 Change : Select point to be changed with the middle button (▶).
 Change the number with the left button (◀).
 Confirm and back : Got to PT01 submenu with the right button (OK), so that the set value is applied.

Continued next page

Entering/ changing the characteristic curve table (operating menu: Table Function) continued



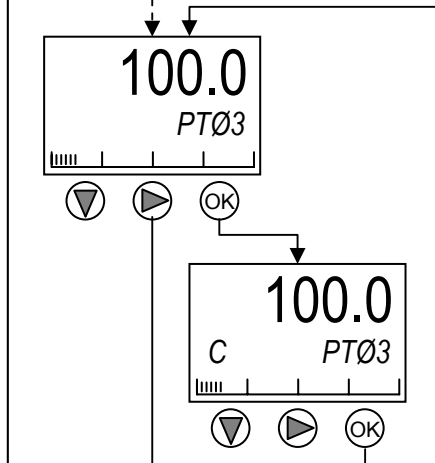
Display current value of first table point

- Numerical display : 4.000 (1st table point in mA)
- Text field : Switches between *PT01* and *mA*
- Next : Display 2nd table point with the middle button
- Next : Change current value of first table point with the right button

Change current value of 1st table point (see notes above)

- Display : 4.000
- Text field : Switches between *PT01* and *mA*
- Mode display : C
- Change : Select point to be changed with middle button . Change the number with left button .
- Confirm and back : with the right button , so that the set value is applied.

Enter/display of further table points as per PTS submenu

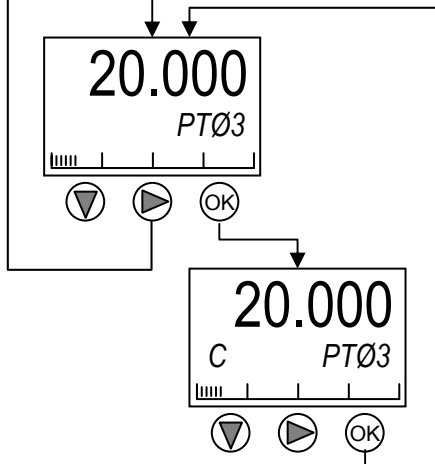


Display *n* (here: 3rd) table point

- Numerical display : 100.0 (3rd table point in %)
- Text field : Switches between *PT03* and %
- Next : Go to display current value of third table point with the middle button
- Next : Go to change percent value of third table point with the right button

Change percent value of third table point (see notes above)

- Display : 100.0
- Text field : Switches between *PT03* and %
- Mode display : C
- Change : Select point to be changed with middle button . Change the number with left button .
- Confirm and back : Go to display third table point with the right button so that the set value is applied.



Display current value of *n* table point

- Numerical display : 20.000 (3rd table point in mA)
- Text field : Switches between *PT03* and *mA*
- Back : Go to operating menu Table function with the middle button
- Next : Go to Change current value of third table point with the right button

Change current value of third table point (see notes above)

- Display : 20.000
- Text field : Switches between *PT03* and *mA*
- Mode display : C
- Change : Select point to be changed with middle button . Change the number with left button .
- Confirm and back : Go to display current value of third table point, with the right button , so that the set value is applied

Skip back to the measuring value display: Press the left and middle buttons briefly

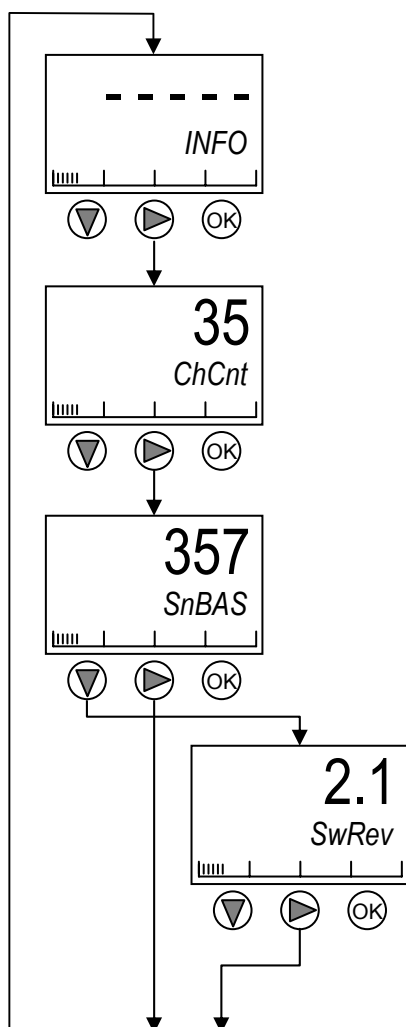
2.11 Testing module compatibility (operating menu: System Info)

Notes :

This menu can be used to test the hardware and software compatibility of the modules used.

In addition, it entails an option for checking whether changes have been made on the basis of the parameter change number. Submenus are only displayed if the relevant module has been found.

- ChCnt : Total number of parameter changes
- SnBAS : Serial number of the basic module
- SnLCD : Serial number of the display module
- SnSw : Serial number of the switching module
- SnHRT : Serial number for HART mode
- "O-K-" : Modules can work with each other
- "ERROR" : Module has been found but is incompatible
- "HwRev" : Hardware version of the corresponding module
- "SwRev" : Software version of the corresponding module
- SnSEN : Serial number of the sensor module



Operating menu System-Info

Numeric display : None
 Text field : INFO
 Bar graph : Pressure (display in set measuring range)
 Next : Go to number of all parameter changes (ChCnt submenu) with the middle button (▶)
 (the next operating menu is reached with left button (◀))

Numer of all parameter changes (ChCnt submenu)

Numeric display : 35 (example)
 Text field : ChCnt
 Next : Go to display serial number of basic module (SnBAS submenu) display with the middle button (▶)

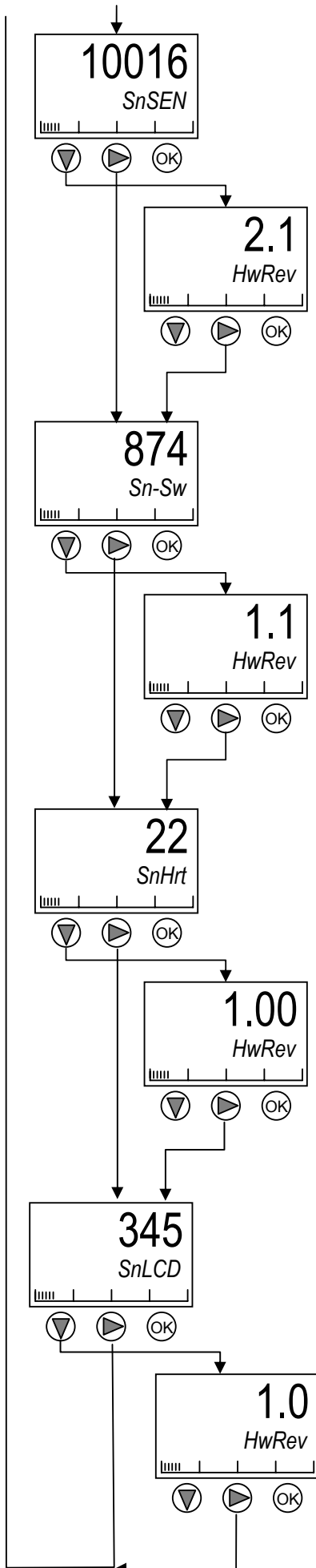
Serial number of basic module (SnBAS submenu)

Numeric display : e. g. 357 serial number basic module
 Text field : Switches between SnBAS and -O-K-
 Next : Go to display serial number of sensor module (Sn SEN submenu) with the middle button (▶)
 Next : Go to display software version of the basic module with the left button (◀)

Display of software version of Basic module

Display : Version-No. of the software of the Basic module
 Text field : Switches between SwRev and -O-K-
 Next : Go to display serial number of the sensor module (SnSEN submenu) with the middle button (▶)

Continued next page



Serial number of sensor module (SnSEN submenu)

Numeric display : e. g. 10016 serial number of sensor module
 Text field : Switches between *SnSEN* and *-O-K-*
 Next : Go to display serial number switching module (SnSw submenu) with the middle button

Next : Go to display hardware version of sensor module with the left button

Hardware version of sensor module

Display : Version-No. of hardware of sensor module
 Text field : Switches between *HwRev* and *-O-K-*
 Next : Go to display serial number of the switching module with the middle button

Serial number of switching module (Sn-Sw submenu)

Numeric display : e. g. 874 serial number of switching module
 Text field : Switches between *SnSw* and *-O-K-*
 Next : go to serial number of display module (SnHrt submenu) with the middle button

Next : go to display hardware version of switching module with the left button

Hardware version of the switching module

Display : Version-No. of hardware of switching module
 Text field : Switches between *HwRev* and *-O-K-*
 Next : go to serial number of HART-module (SnHrt submenu) with the middle button

Serial number of the HART module (Sn-Hrt submenu)

Numeric display : e.g. 22 serial number of the HART module
 Text field : Switches between *SnHrt* and *-O-K-*
 Next : go to serial number of display module (SnLCD submenu) with the middle button

Next : go to display hardware version of HART module with the left button

Hardware version of HART module

Display : Versions-No. of hardware HART module
 Text field : Switches between *HwRev* und *-O-K-*
 Next : go to serial number of display module (SnLCD submenu) with the middle button

Serial number of the display module

Numeric display : e. g. 345 serial number display module
 Text field : Switches between *SnLCD* and *-O-K-*
 Back : Go to operating menu System-info with the middle button
 Next : Go to display hardware version of display module with the left button

Hardware version of the display module (SnLCD submenu)

Display : Version-No. hardware display module
 Text field : Switches between *HwRev* and *-O-K-*
 Back : Go to operating menu System-info with the middle button

Skip back to the measuring value display: Press the left and middle buttons briefly

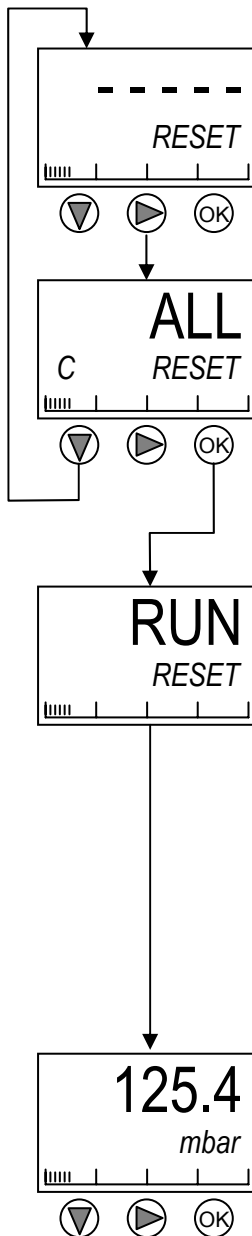
2.12 Restoring the settings according to data sheet (operating menu: Factory Data Reset)

Notes:

In the case of the factory data RESET all entered parameters are reset to the specification sheet data. The adjustment of the transmitter is reset to the factory setting. The transmitter executes a warmstart after the factory data has been restored, i.e. it is in Measuring value display mode.

Attention:

In case of factory data RESET the HART-address and the currentmode will be kept.



Operating menu Factory data RESET

Numeric display : None
 Text field : RESET
 Bar graph : Pressure (display in set measuring range)
 Next : Got to Safety inquiry (RESET submenu) with the middle button (right arrow)
 (the next operating manue is reached with left arrow)

Safety inquiry (RESET submenu)

Numeric display : ALL
 Text field : RESET
 Next : Go to Execution factory data RESET with the right button (OK)
 Back : Go to Operating menu Factory data RESET with the left button (left arrow)

Execution factory data RESET

Numeric display : RUN
 Text field : RESET
 Bar graph : Running / reset progress indication (abt. 10 sec.)

All parameters are reset to the specification sheet data. Also the factory setting is reset.

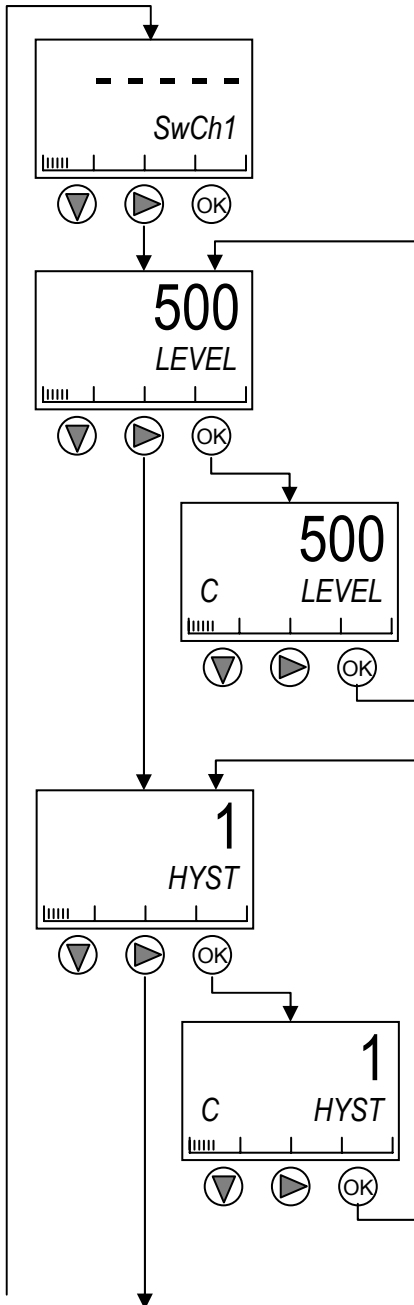
Measuring value display (see page 8)

Numeric display : Pressure in mbar
 Text field : Selected physical unit
 Bar graph : Pressure (display in set measuring range)

2.13 Parameter setting for switching channel 1 (operating menu: Switching points / Hysteresis / Switching function [1])

Notes :

- These settings apply to switching channel 1 only
- The switching points may not be within the measuring range (4...20 mA), but can be in nominal range +5%.
- Set parameters are preserved even when the switching module is removed.
- The switching contacts are opened if the transmitter detects an error.



Operating menu Switching points / Hysteresis / Switching function (1)

Numerical display : None
 Text field : *SwCh1*
 Bar graph : Pressure (display in set measuring range)
 Next : Go to Display switching point 1 (LEVEL submenu) with the middle button (▶)
 (the next operating menu is reached with (▼))

Display switching point 1 (LEVEL submenu)

Numerical display : Limiting value in set unit, in this case *mbar*
 Text field : Switches between *LEVEL* and *mbar*
 Bar graph : Pressure (display in set measuring range)
 Next : Go to Display hysteresis channel 1 (HYST submenu) with middle button (▶)
 Next : Go to Change switching point channel 1 with right button (OK)

Change switching point channel 1

Display : Limiting value in set unit, in this case *mbar*
 Text field : Switches between *LEVEL* and *mbar*
 Mode display : *C*
 Change : Select point to be changed with middle button (▶)
 Change the number with left button (▼)
 Back : Go to the LEVEL submenu with the right button (OK), so that the set value is applied.

Display hysteresis channel 1 (HYST submenu)

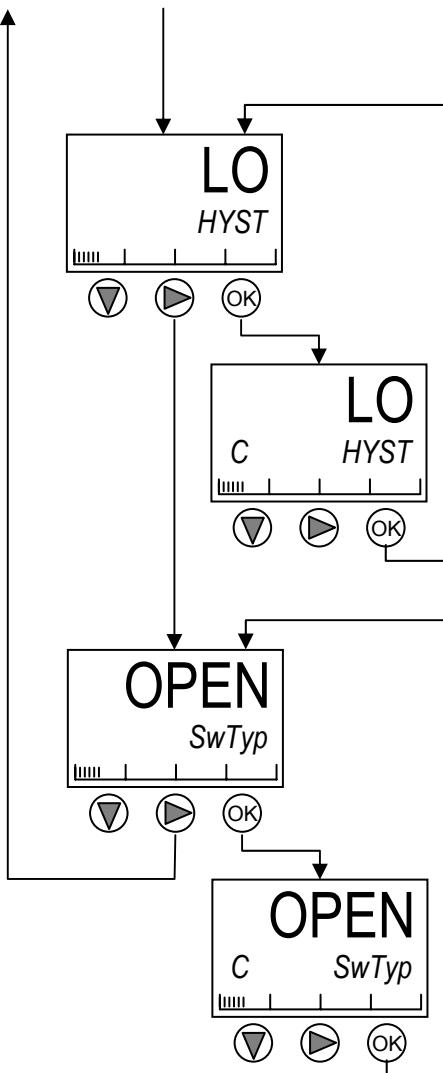
Numerical display : Hysteresis in set unit, in this case *mbar*
 Text field : Switches between *HYST* and *mbar*
 Bar graph : Pressure (display in set measuring range)
 Next : Go to Display hysteresis type channel 1 (HYST submenu) with middle button (▶)
 Next : Go to Change hysteresis 1 with right button (OK)

Change hysteresis channel 1

Display : Hysteresis in set unit, in this case *mbar*
 Text field : Switches between *HYST* and *mbar*
 Mode display : *C*
 Change : Select point to be changed with middle button (▶)
 Change the number with left button (▼)
 Confirm and back : Go to the HYST submenu with the right button (OK), so that the set value is applied

Continued on next page

Parameter setting for switching channel 1 (operating menu: Switching points / Hysteresis / Switching function [1]) continued



Display hysteresis type channel 1 (submenu HYST)

- Numerical display : Hysteresis type, in this case : LO
- Text field : *HYST*
- Bar graph : Pressure (display in set measuring range)
- Next : Go to Display switching type channel 1 (SwTyp submenu) with the middle button (▶)
- Next : Go to Change hysteresis type channel 1 with right button (OK)

Change hysteresis type channel 1

- Display : Flashing display of current setting
- Text field : *HYST*
- Mode display : *C*
- Change : Use the left button (▼) to change the setting.
- Confirm and back : Go to HYST submenu with the right button (OK), so that the set value is applied.

Display switching type channel 1 (submenu SwTyp)

- Numerical display : Switching type, in this case : *OPEN*
- Text field : *SwTyp*
- Bar graph : Pressure (display in set measuring range)
- Back : Go to operating menu Switching points / Hysteresis / Switching function (1) with middle button (▶)
- Next : Go to Change switching type channel 1 with right button (OK)

Change switching type channel 1

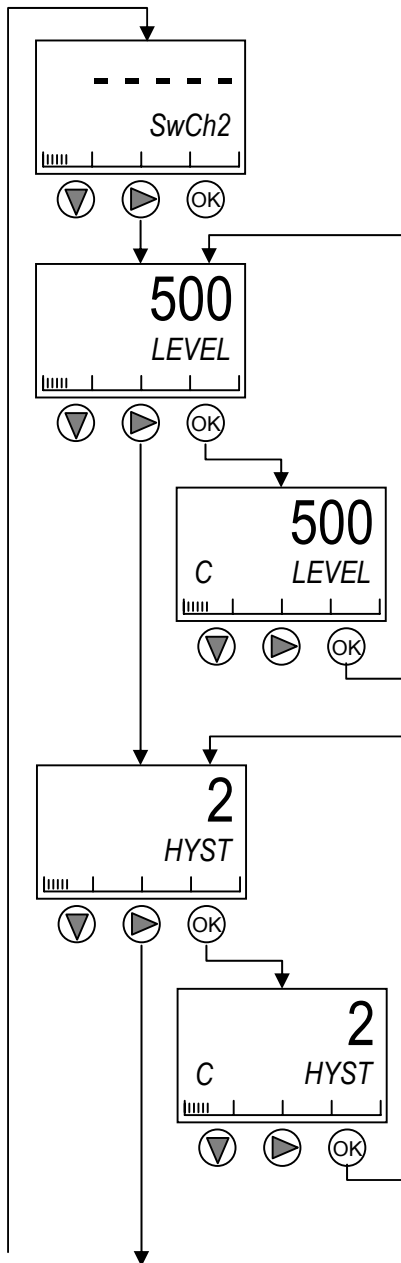
- Display : Flashing display showing current setting
- Text field : *SwTyp*
- Mode display : *C*
- Change : Use the left button (▼) to change the setting.
- Confirm and back : Go to SwTyp submenu with the right button (OK), so that the set value is applied.

Skip back to the measuring value display: Press the left and middle buttons briefly

2.13 Parameter setting for switching channel 2 (operating menu: Switching points / Hysteresis / Switching function [2])

Notes :

- These settings apply to switching channel 2 only
- The switching points may not be within the measuring range (4...20 mA), but can be in nominal range +5%.
- Set parameters are preserved even when the switching module is removed.
- The switching contacts are opened if the transmitter detects an error.



Operating menu Switching points / Hysteresis / Switching function (2)

Numerical display : None
 Text field : SwCh2
 Bar graph : Pressure (display in set measuring range)
 Next : Go to Display switching point 2 (LEVEL submenu) with the middle button (▶)
 (the next operating menu is reached with (▼))

Display switching point 2 (LEVEL submenu)

Numerical display : Limiting value in set unit, in this case *mbar*
 Text field : Switches between *LEVEL* and *mbar*
 Bar graph : Pressure (display in set measuring range)
 Next : Go to Display hysteresis channel 2 (HYST submenu) with middle button (▶)
 Next : Go to Change switching point channel 2 with right button (OK)

Change switching point channel 2

Display : Limiting value in set unit, in this case *mbar*
 Text field : Switches between *LEVEL* and *mbar*
 Mode display : C
 Change : Select point to be changed with middle button (▶)
 Change the number with left button (▼)
 Back : Go to the LEVEL submenu with the right button (OK), so that the set value is applied.

Display hysteresis channel 2 (HYST submenu)

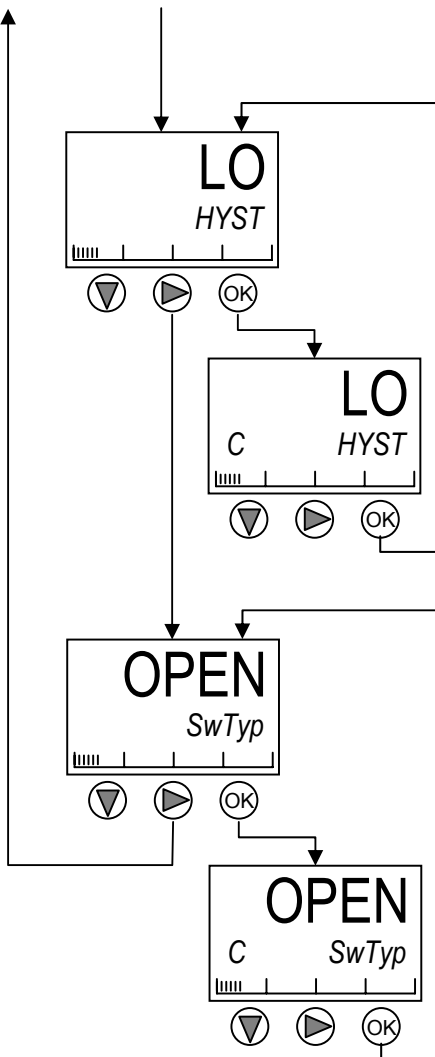
Numerical display : Hysteresis in set unit, in this case *mbar*
 Text field : Switches between *HYST* and *mbar*
 Bar graph : Pressure (display in set measuring range)
 Next : Go to Display hysteresis type channel 2 (HYST submenu) with middle button (▶)
 Next : Go to Change hysteresis 2 with right button (OK)

Change hysteresis channel 2

Display : Hysteresis in set unit, in this case *mbar*
 Text field : Switches between *HYST* and *mbar*
 Mode display : C
 Change : Select point to be changed with middle button (▶)
 Change the number with left button (▼)
 Confirm and back : Go to the HYST submenu with the right button (OK), so that the set value is applied

Continued on next page

Parameter setting for switching channel 2 (operating menu: Switching points / Hysteresis / Switching function [2])continued



Display hysteresis type channel 2 (submenu HYST)

- Numerical display : Hysteresis type, in this case : LO
- Text field : *HYST*
- Bar graph : Pressure (display in set measuring range)
- Next : Go to Display switching type channel 2 (SwTyp submenu) with the middle button (▶)
- Next : Go to Change hysteresis type channel 2 with right button (OK)

Change hysteresis type channel 2

- Display : Flashing display of current setting
- Text field : *HYST*
- Mode display : *C*
- Change : Use the left button (▼) to change the setting
- Confirm and back : Go to HYST submenu with the right button (OK), so that the set value is applied.

Display switching type channel 2 (submenu SwTyp)

- Numerical display : Switching type, in this case : *OPEN*
- Text field : *SwTyp*
- Bar graph : Pressure (display in set measuring range)
- Back : Go to operating menu Switching points / Hysteresis / Switching function (2) with middle button (▶)
- Next : Go to Change switching type channel 2 with right button (OK)

Change switching type channel 2

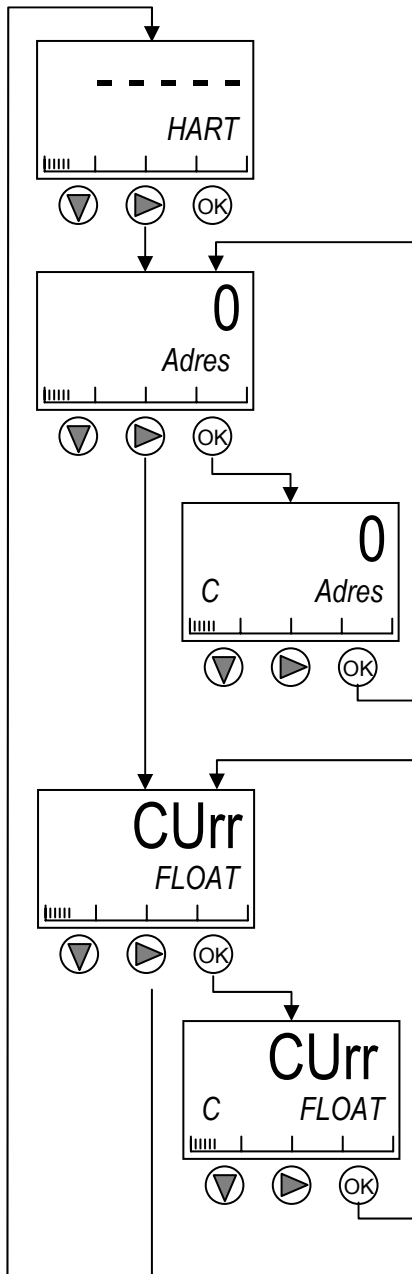
- Display : Flashing display showing current setting
- Text field : *SwTyp*
- Mode display : *C*
- Change : Use the left button (▼) to change the setting
- Confirm and back : Go to SwTyp submenu with the right button (OK), so that the set value is applied.

Skip back to the measuring value display: Press the left and middle buttons briefly

2.14 Parameter setting für die HART-Schnittstelle (operating menu: HART / Adres / Currentmode)

Notes :

- This device complies with the HART 6.5 standard
- The HART addresses are valid in the 0-63 address range.
- No parameter settings are lost when the HART module is disassembled.
- The current output can be programmed in the current mode. The current mode defines whether the current output is fixed at the 4.00-mA current, or whether it tracks the pressure signal proportionally, when the HART address is non-zero.
- If the HART address is non-zero and the current mode is fixed, then the loop test is disabled.
- The HART-address and the currentmode are not influenced by the factory data RESET.



Operating menu HART / Adres / Currentmode

Numerical display : None
 Text field : HART
 Bar graph : Pressure (display in set measuring range)
 Next : Go to HART-Adres (*Adres* submenu) with the middle button (▶)
 (the next measuring value display is reached with (▼))

Display HART Adres (*Adres* submenu)

Numerical display : current setting Adres, in this case *Adres* 0
 Text field : *Adres*
 Bar graph : Pressure (display in set measuring range)
 Next : Go to display Current mode (*CUrr* submenu) with the middle button (▶)
 Next : Go to change Adres with the right button (OK)

Change HART Adres

Display : current setting *Adres*, in this case *Adres* 0
 Text field : *Adres*
 Mode display : *C*
 Change : Select point to be changed with middle button (▶)
 Change the number with left button (▼)
 Back : Go to *Adres* submenu with the right button (OK), so that the set *Adres* is applied.

Display Current mode (*Untermenü CUrr* submenu)

Numerical display : *CUrr*
 Text field : set Current mode, in this case *FLOAT*
 Bar graph : Pressure (display in set measuring range)
 Next : Go to operating menu HART/*Adres*/*Currentmode* with the middle button (▶)
 Next : to change Current mode with the right button (OK)

Change Current mode

Display : *CUrr*
 Text field : shows the selected current mode, in this case *FLOAT*
 Mode display : *C*
 Change : Use the left button (▼) to change the mode
 Confirm and back : Go to change *CUrr* with the right button (OK) so that the set Current mode is applied.

Skip back to the measuring value display: Press the left and middle buttons briefly