Operating manual

Plug-On Display PA 430 for Pi600DD Pressure Sensor

Important notes:

☞ Please read this operating manual carefully before installation and start-up of the plug-on display.

☞ This operating manual must be kept at an accessible location for further use.

⚠ The device may only be installed, used and serviced by persons who are familiar with this operating manual as well as with the applicable regulations on occupational safety and accident prevention.

Table of contents

1. General

1.1 Information on the intended use

- The plug-on display PA 430 is suitable for all transmitters with output signal 4 … 20 mA / 2-wire or 0 … 10 V / 3-wire. The plug- on display is installed between male and female plug and ready for work immediately.
- The device can be freely programmed via two push-buttons located on the display. The set parameters are being stored in an EEPROM and, thus, are being kept also in case of power breakdown.
- Limit exceeding in both directions can be displayed as a message. The integrated smart electronics permanently monitors all functions of the display.
- The device shall be used according to the area of application specified above!
- No liability is assumed and warranty claims are excluded in case of improper application, modification or damage to the device.

1.2 Target group

This operating manual is intended for qualified technical personnel.

1.3 Symbols used

⚠ : Caution ☞ : Note

1.4 Safety notes

The following notes must be observed to avoid hazards for the operator and his environment:

⚠ The device may only be installed, used and serviced by persons familiar with this operating manual!

⚠ Applicable regulations regarding occupational safety, accident prevention and national installation standards must be complied with!

⚠ For devices with ATEX approval, which are used in IS-areas additional the manual "Installation of plug-on displays PA 430 and electronic pressure switches DS 2XX / DS 4XX in intrinsic safe areas" also must be regarded. Therefore both manuals are only valid when used together.

⚠ The device must only be used within the specifications! (compare the technical data under "Appendix")

⚠ Mount the device in the currentless condition!

1.5 Package contents

Please verify that all listed parts are included in the delivery:

- Plug-on display PA 430
- Profile seal
- Fastening screw M3x87
- Sheet of stickers
- Operating manual "PA 430"
- For devices with ATEX-approval additionally the manual:
  "Installation of plug-on displays PA 430 and electronic pressure switches DS 2XX / DS 4XX in intrinsic safe areas"

2. Product identification

The device can be identified by its type plate. It provides the most important data. By the ordering code the product can be clearly identified.

3. Installation

3.1 General notes

- Do not use any force when installing the devices!
- Keep in mind that this device is an electronic precision measuring device. Handle the device carefully and properly to avoid any damages.
- The display and the plastic housing are equipped with a rotational limiter. Please do not try to turn the display or the housing further than it should go by force.

3.2 Installation steps

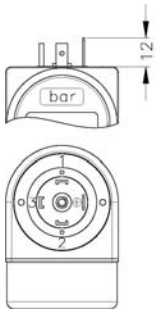
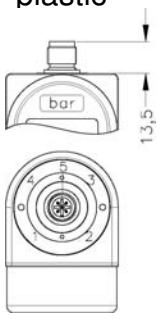
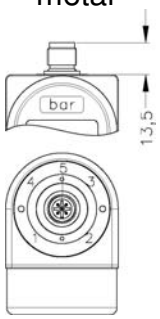
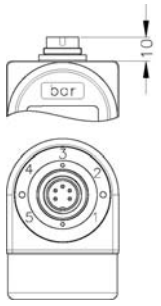
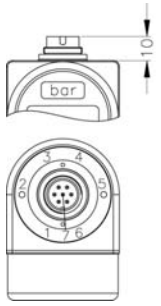
- Remove the plug-on display carefully from the packaging.
- Remove the cable socket from the pressure transmitter.
- Plug the display onto the pressure transmitter taking care to correctly fit of the pre-mounted seal on the underside.
- Remove the fastening screw from the cable socket.
- Replace the pre-assembled profile seal of the cable socket by the delivered seal. This is necessary, because the pre-assembled seal does probably not guarantee an ingress protection of IP 65.
- Plug the cable socket on the plug-on display.
- Place the delivered stainless steel screw M3x87 through cable socket and plug-on display and tighten it to the pressure transmitter with a screwdriver.

  ☞ The screw length was determined for a Hirschmann cable socket, Type GDM 3009. If other cable sockets are used, the customer must ensure that the appropriate screw is used.

3.3 Electrical installation

Establish the electrical connection of the device according to the pin configuration shown in the following table and in the respective wiring diagram.

Pin configuration

	Electrical connection				
	DIN 43650 	M12x1 (5-pin) plastic 	M12x1 (5-pin) metal 	Binder 723 (5-pin) 	Binder 723 (7-pin) [1] 
2-wire-system					
Supply +	1	1	1	3	3
Supply -	2	3	3	4	1
Contact 1	3	4	4	2	-
Contact 2	-	5	5	1	-
Ground	Ground contact	Housing	Plug housing	5	2
3-wire-system					
Supply +	1	1	1	3	-
Supply -	2	3	3	4	-
Signal +	3	2	2	1	-
Contact 1	-	4	4	2	-
Contact 2	-	5	5	-	-
Ground	Ground contact	Housing	Plug housing	5	-

[1] Pins 4, 5, 6, 7 are wired through 1:1

3.4 Supply of 2-wire-systems

The supply created by the electronics of the plug-on display is approx. 6 V_{DC}. Please take this into consideration when planning your power supply. The tolerances for the power supply can be calculated as follows:

minimum supply: $V_{S\min} = V_{\min TR} + 6V$

maximum supply: $V_{S\max} = V_{\max TR} + 6V$

$V_{min\ TR}$ = minimal supply of the used 2-wire transmitter

$V_{max\ TR}$ = maximal supply of the used 2-wire transmitter

⚠ With Ex-protection the max. supply for combination of transmitter and PA 430 is 28 V_{DC}.

3.5 Supply of 3-wire-systems

minimum supply:

The minimal supply of the plug-on display ($V_{S\ min}$) is 8 V. The connected transmitter is supplied by the PA 430 so the minimal supply of the transmitter must be used for the total appliance if it is higher than 8 V. Following formulas are valid:

if $V_{TR\min} \geq 8\,V$: $V_{S\min} = V_{TR\min}$

if $V_{TR\min} < 8\,V$: $V_{S\min} = 8\,V$

$U_{TR\ min}$ = minimal supply of the used 3-wire transmitter

maximum supply:

The maximal supply of the plug-on display ($V_{S\ max}$) is 36 V. Cause by the fact that the connected transmitter is also supplied by the plug-on display the maximal supply does not only depend on the supply of the PA 430. Is the minimal supply of the transmitter lower than 36 V than the maximal supply of the total appliance is given by the transmitter. Following formulas are valid:

if $V_{TR\max} \geq 36\,V$: $V_{S\max} = 36\,V$

if $V_{TR\max} < 36\,V$: $V_{S\max} = U_{TR\max}$

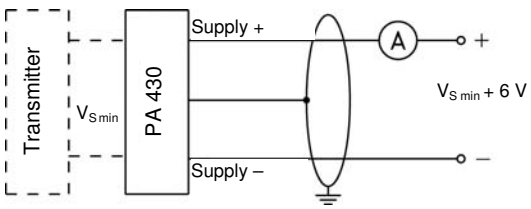
$U_{TR\ max}$ = maximal supply of the used 3-wire transmitter

3.6 Wiring diagrams

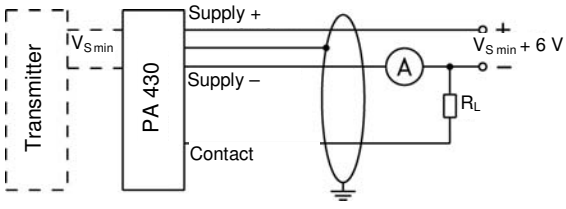
2-wire-system (current)

⚠ With Ex-protection the max. supply for combination of transmitter and PA 430 is 28 V_{DC}.

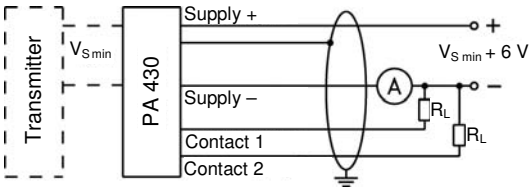
without contact



1 contact



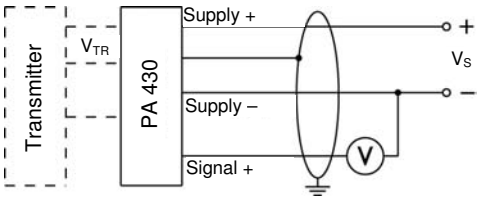
2 contacts



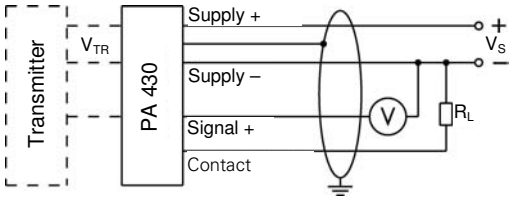
$V_{S\,min}$: Minimal supply of the used 2-wire transmitter

3-wire-system (voltage)

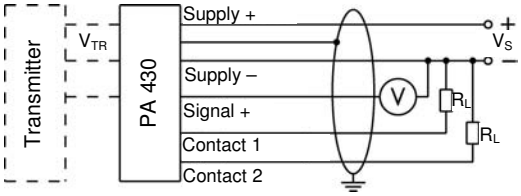
without contact



1 contact



2 switching outputs



V_{TR}: Supply of the used 3-wire transmitter

☞ For electrical connection a sheathed and twisted multicore cable is recommended.

4. Operation

4.1 Operating and display elements

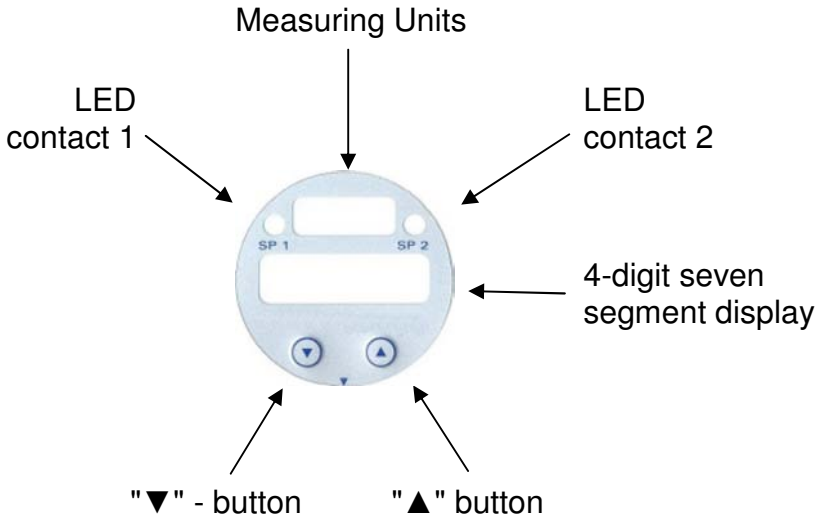


Fig. 3 Touchpad

The device has a green LED for displaying the active contact of set point 1 and a yellow LED for displaying the active contact of set point 2. The LEDs lights when the respective set point has been reached and the contact is active.

The display of the measured value as well as the configuration of the individual parameters occurs through a menu via a 4-digt seven segment display. The individual functions can be set with the help of two miniature push buttons located in the front.

- **"▲" button:** with this button you move forward in the menu system or increase the displayed value
- **"▼" button:** with this button you move back in the menu system or decrease the displayed value
- **both button simultaneously:** if both buttons are pushed simultaneously, the device changes between display and configuration mode; you also confirm the menu items and the set values with them

☞ **When setting the values, you can increase the counting speed by keeping the respective button ("▲" or "▼") pushed for more than 5 seconds.**

4.2 Menu operation

The menu system is a closed system allowing you to scroll, both, forward and backward through the individual set-up menus to navigate to the desired setting item. All settings are permanently stored in a EPROM and therefore available again even after disconnecting from the supply voltage. The menu system and the menu items have been designed as simply as possible. Following, each individual menu item is described in detail allowing for a straightforward and quick configuration of your device. The structures of the menu systems for devices with or without contacts are identical. The device with contact deviates from the other by additional menus (marked with gray background for clear identification). Devices with one contact do not have the menus 9, 10, 12, 15 and 16.

☞ Please follow the manual meticulously and remember that changes of the adjustable parameters (switch-on point, switch-off point, etc.) become only effective after pushing both buttons simultaneously and after leaving the menu item.

4.3 Password system

The device is equipped with an access protection to permit operation of the complete menu system only to authorized persons.

- Activating the access protection with the password will lock the complete menu.
- The deactivation of the access protection by the password will unlock the complete menu.

☞ The password can be activated and deactivated through menu "PAon" resp."PAof".

☞ It can be changed according to special menu "0835"

☞ In case the password has been lost there is a possibility to reset the password. You can do this by loading the defaults as described the special menu "0729".

4.4 Unit

The units of the values to be measured are determined on ordering. But it is also possible to change the unit later by using one of the enclosed unit stickers.

4.5 Structure of the menu system

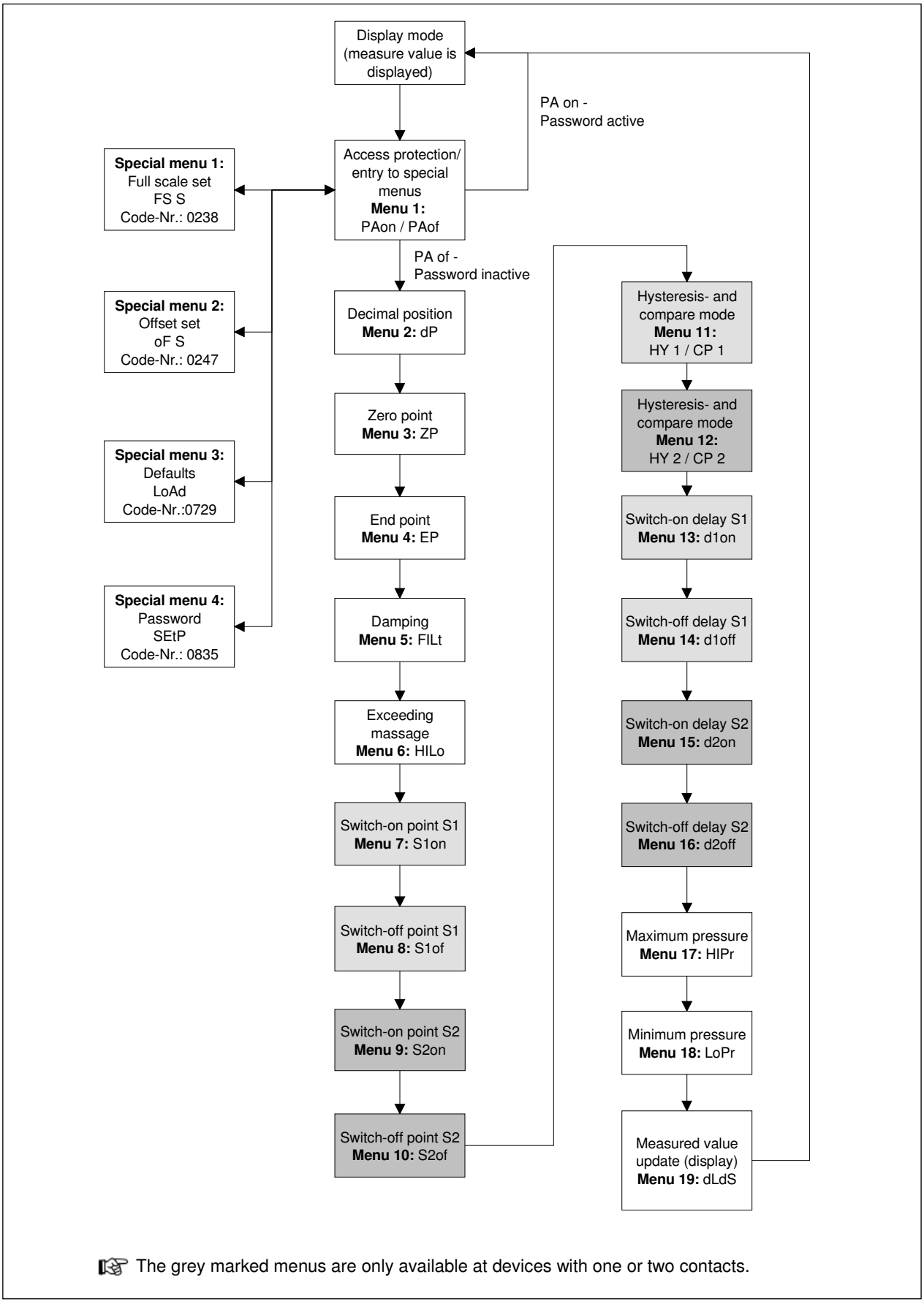


Fig. 5 Menu system Rev. P07

4.6 Menu list

Menu 1 – Access protection

If the **password is active**, the menu **"PAon"** appears. Before being able to perform settings in the menu system, you must first enter the password. Proceed as follows for deactivation: Press both buttons simultaneously to confirm the menu item "PAon". Next, set a password using the "▲" or "▼" buttons and confirm it by pushing both buttons together. The menu system is now unlocked and "PAof" appears in the display. You can now proceed as desired.

If the **password is inactive**, the menu **"PAof"** appears. To activate the access protection press both buttons simultaneously. Next, set your password using the "▲" or "▼" buttons. Confirm the password with both buttons. The menu system is now locked completely and "PAon" appears in the display.

The default setting for the password is "0005".

☞ Modification of the password is described in the special menu 4.

Menu 2 - Setting the decimal point position

After confirming "dP" by pushing both buttons, the position of decimal point can be select. Set the desired position by using the "▲" or "▼" button. To complete the setting push both buttons simultaneously.

Menu 3 - Setting the zero point

After confirming "ZP" by pushing both buttons, the zero point can be set. The value set is shown when the output signal of the pressure transmitter is 4 mA (zero point). To complete the setting push both buttons simultaneously.

Menu 4 - Setting the end point

After confirming "EP" by pushing both buttons, the end point can be set. The value programmed will be shown when the electrical output signal of the transmitter is 20 mA (End point). To complete the setting push both buttons simultaneously.

Menu 5 – Setting the damping

After confirming "FILE" by pushing both buttons, the time constant for a simulated low-pass filter can be set. This function allows getting a constant display value although the measuring values changes very often. The permissible range reaches from 0.3 till 30 seconds. To complete the setting push both buttons simultaneously

Menu 6 – Activation of the exceeding message

After confirming "HILo" by pushing both buttons, the alarm for exceeding the range of the display can be activated. The status can be set on "on" or "off". To complete the setting push both

buttons simultaneously.

Menu 7 - Setting the switch-on point for contact 1

After confirming "S1on" by pushing both buttons, the value can be set at which contact 1 is activated. To complete the setting push both buttons simultaneously.

☞ Please take further information from the figures in menu 11.

Menu 8 - Setting the switch-off point for contact 1

After confirming "S1of" by pushing both buttons, the value can be set at which the switching point 1 is deactivated. To complete the setting push both buttons simultaneously.

☞ Please take further information from the figures in menu 11.

Menu 9 - Setting the switch-on point for contact 2

After confirming "S2on" by pushing both buttons, the value can be set at which contact 2 is activated. To complete the setting push both buttons simultaneously.

☞ Please take further information from the figures in menu 11.

Menu 10 - Setting the switch-off point for contact 2

After confirming "S2of" by pushing both buttons, the value can be set at which the contact 2 is deactivated. To complete the setting push both buttons simultaneously.

☞ Please take further information from the figures in menu 11.

Menu 11 – Hysteresis and compare mode of set point 1

After confirming "HY 1 " resp. "CP 1" by pushing both buttons, the hysteresis or compare modes for contact 1 can be switched over. To complete the setting push both buttons simultaneously.

☞ The following figure shows the difference between hysteresis and compare mode as well as its inverting. To invert the respective modes, you must exchange the values for switch-on point and switch-off point.

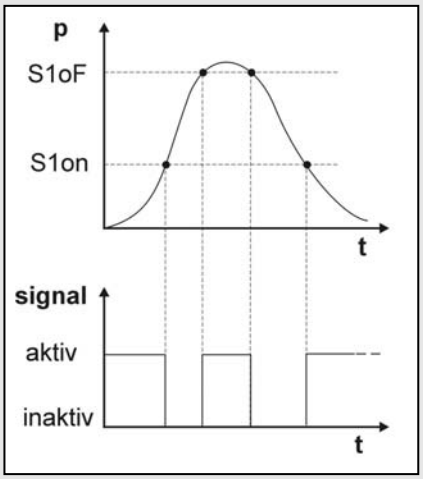


Fig. 6 compare mode

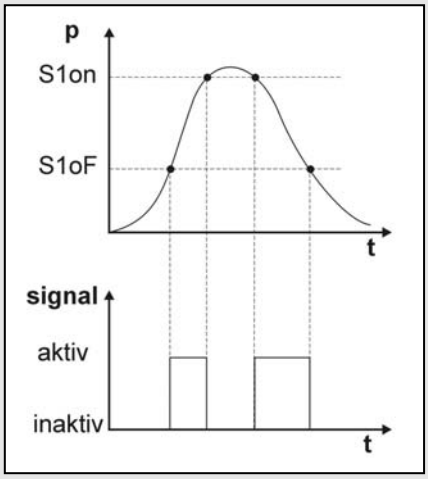


Fig. 7 compare mode inverted

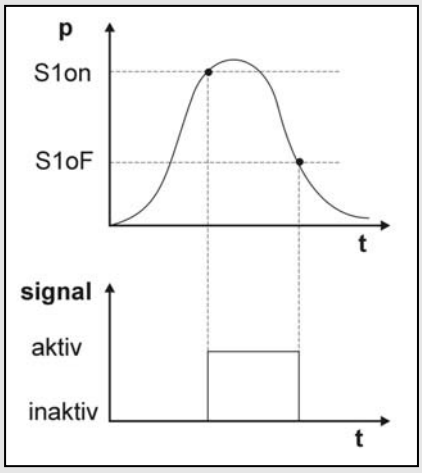


Fig. 8 Hysteresis mode

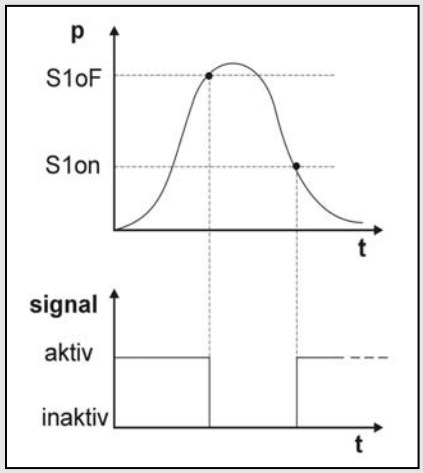


Fig. 9 Hysteresis mode inverted

Menu 12 – Hysteresis and compare mode of set point 2

After confirming "HY 2 " resp. "CP 2" by pushing both buttons, the hysteresis or compare modes for contact 2 can be switched over. To complete the setting push both buttons simultaneously.

☞ Please take further information from the figures in menu 11

Menu 13 – Setting the switch-on delay for set point 1

After confirming "d1on" by pushing both buttons, the switch-on delay after reaching switching point 1 can be set. The time can be set from 0 to 100 seconds. To complete the setting push both buttons simultaneously.

Menu 14 – Setting the switch-off delay for set point 1

After confirming "d1of" by pushing both buttons, the switch-off delay after reaching switching point 1 can be set. The time can be set from 0 to 100 seconds. To complete the setting push both buttons simultaneously.

Menu 15 – Setting the switch-on delay for set point 2

After confirming "d2on" by pushing both buttons, the switch-on delay after reaching switching point 2 can be set. The time can be set from 0 to 100 seconds. To complete the setting push both buttons simultaneously.

Menu 16 – Setting the switch-off delay for set point 2

After confirming "d2of" by pushing both buttons, the switch-off delay after reaching switching point 2 can be set. The time can be set from 0 to 100 seconds. To complete the setting push both buttons simultaneously.

Menu 17 – Maximum pressure display (High Pressure)

After confirming "HIPr" by pushing both buttons, the maximum pressure during the measuring process will be shown. If both buttons are activated again within one second, the stored value will be erased. Please note that the value will not remain stored if the power supply is interrupted (current loop).

Menu 18 – Minimum pressure display (Low Pressure)

After confirming "LoPr" by pushing both buttons, the minimum pressure during the measurement process will be shown in the display. If both buttons are activated again within one second, the stored value will be erased. Please note that the value will not remain stored if the power supply is interrupted (current loop).

Menu 19 – Measured value update (Display)

To set the measured value update in the display, select the menu item "dLdS" using the "▲" or "▼" button. Confirm by pushing both buttons simultaneously. The time can be set in which cycles the update in the display should occur. The permissible range reaches from 0.0 till 10 seconds. To complete the setting push both buttons simultaneously.

4.7 Special menu

To access the special menus, you must be in menu 1 "PAof".
Select the menu item "PAof" with the "▲" or "▼" buttons and confirm it by pushing both button simultaneously. "1" appears in the display. To navigate to the special menus, proceed as described below.

Special menu 1 – Correction of the display on deviation of full scale

For correction of the display on deviation of the full scale select "0238" by using the "▲" and "▼" buttons. Confirm by pushing both buttons simultaneously. "FS S" appears in the display. Now it is necessary to place the transmitter under pressure using a known pressure reference. This pressure must correspond to the end point of the pressure measuring range. If you then activate both buttons the signal being emitted from the transmitter will be stored as the full scale signal. The display will then show the end point although the sensor signal in the full scale is displaced.

☞ Please note that the output signal is not affected by this change.

Special menu 2 – Resetting the display on deviation of offset

For resetting the display on deviation of the offset set the number "0247" using the "▲" and "▼" buttons. Confirm by pushing both buttons simultaneously. "of S" appears in the display. Differs the offset from the ambient pressure, it is necessary to place the device under pressure. This pressure must correspond to the zero point of the pressure measuring range. If you then confirm with both buttons, the signal being emitted from the transmitter will be stored as offset. The display will then show the zero point although the sensor signal in the offset is displaced.

☞ Please note that the output signal is not affected by this change. Simultaneously with the displacement of the offset the full scale will be also displaced.

Special menu 3 –Load Defaults

The plug-on display software can switch the device back to the defaults. This can be used to cancel any changes to the offset and range that had been carried out.

To load the defaults set the number "0729". Confirm by pushing both buttons simultaneously. "LoAd" appears in the display. Pressing the two buttons again loads the defaults.

☞ Please note that also the password will be set on its default.

Special menu 4 – Set new password

To change the password, set the number "0835" using the "▲" and "▼" buttons. When confirmed with both buttons "SEtP" appears in the display. Next, set your password using the "▲" or "▼" buttons. It can be freely chosen (0 … 9999). However, it must not be identical with the code numbers of the special functions. (That means the numbers 0238, 0247, 0729 and 0835 are exempt.) Finally, confirm the password by pressing both buttons. The new password is now set. To activate the password, proceed as described in menu PAon.

5. Placing out of service

⚠ **Mount the device in the currentless condition!**

6. Service

This device is maintenance-free.

If desired, the device can be cleaned using non-aggressive cleaning solutions.

10. Appendix

10.1 Technical Data

Output signal

2-wire-system:	4 … 20 mA
3-wire-system:	0 … 10 V

Contact

Number, type:	0, 1, or 2 independent PNP outputs
Switching performance:	standard: max. 125 mA, short-circuit resistant Ex-protection: max. switching current[2]: 70 mA; max. permissible inductivity: 4.7 mH
Repeatability:	≤ ± 0.1 % FSO
Switching frequency:	max. 10 Hz
Switching cycles:	> 100 x 10^6
Delay time:	0 ... 100 s

Short-circuit protection

Short-circuit protection:	permanent
Reverse polarity protection:	no damage, but also no function
Electromagnetic compatibility	emission and immunity according to EN 61326
Option Ex protection AX11-PA 430	zone (0) 1: II (1) 2 G EEx ia IIC T4 (only with 4 ... 20 mA / 2-wire); safety technical maximum values: U_i = 28 V, ΣI_i = 93 mA, ΣP_i = 660 mW

Display

Type	4-digit, red LED display, digit height 7 mm, digit width 4.85 mm
Range:	-1999 ... +9999
Accuracy:	0.1 % ± 1 digit
Digital damping:	0.3 … 30 sec (programmable)
Update value:	0.0 … 10 sec (programmable)

Mechanical stability

Vibration:	5 g RMS (20 ... 2,000 Hz)
Shock:	100 g / 11 ms

Permissible temperatures

Electronics / environment:	-25 ... 85° C
Storage:	-40 ... 85° C

Materials

Display housing	PA 6.6, polycarbonate

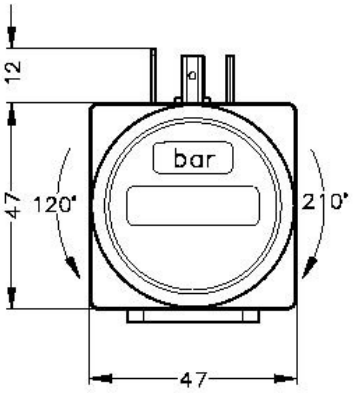
[2] the real switching current in the application depends on the power supply unit

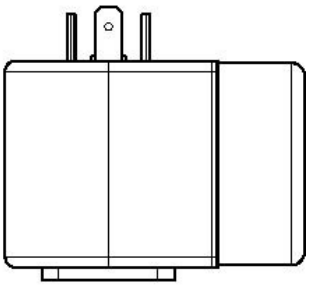
Miscellaneous

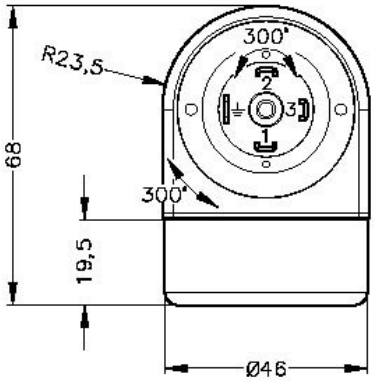
Ground	approx. 100 g
Data memory:	non-volatile EEPROM
Ingress protection	IP 65

Dimensions

Standard

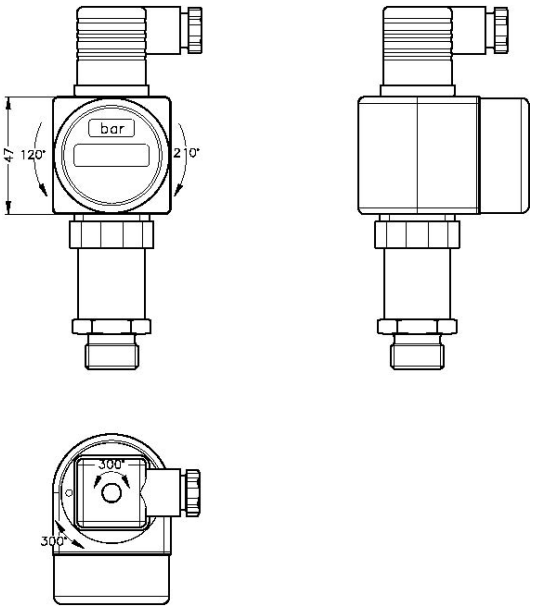




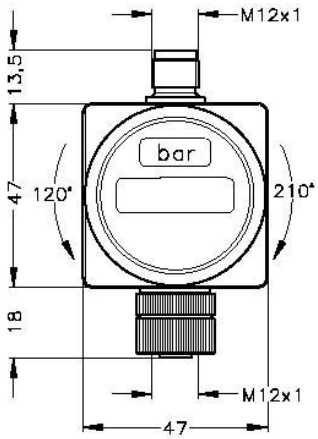


DIN 43650

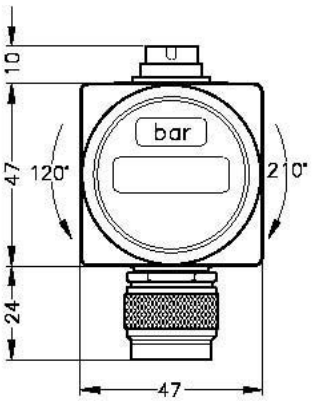
Example for usage with a DIN 43650-connector:



Options



M12 x 1 5-pin



Binder 723
5- or 7-pin