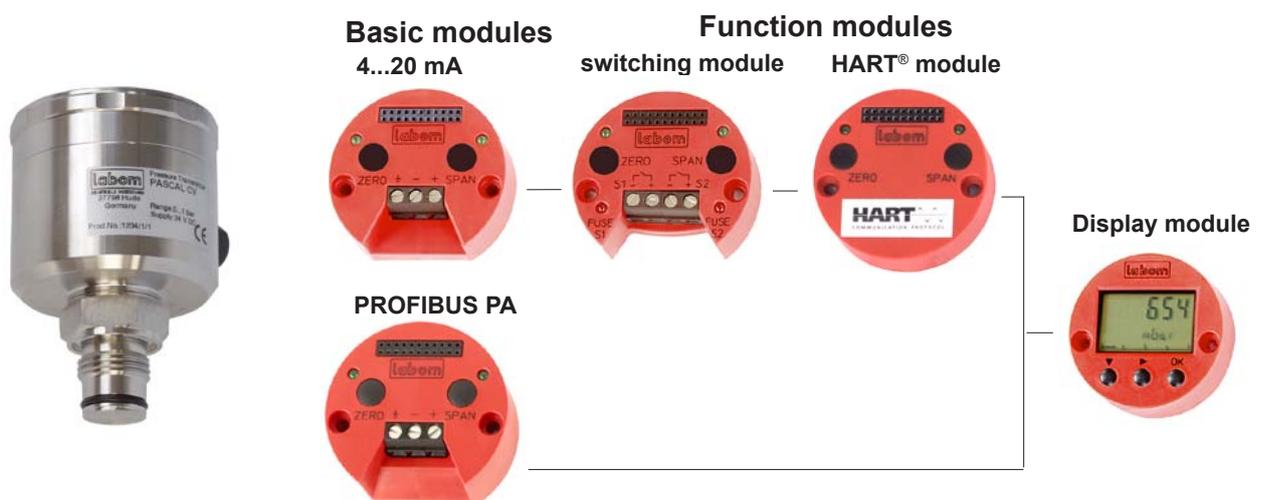


Operating instruction for pressure transmitter PASCAL CV4 4...20 mA, Type series CV3... with switching module



Features

- Modular pressure transmitter
Output signal:
4...20 mA, optional with 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



Various modules can easily be added to PASCAL CV (see table page 5).

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/EC |
| Pressure Equipment Directive | PED | 97/23/EC |

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 IP 66 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.

Switched outputs

- When connecting circuits to the contacts be sure the polarity (+ and - as indicated) is correct.
- To avoid high electrical currents only connect the circuits when the supply voltage is switched off.
- Do not exceed the specified maximum voltage 30 V DC!
- When the installation is properly carried out the contacts cannot be damaged by overloading. (Thermal fuses)
- The thermal fuses will automatically reset themselves when fault-free operations have been reinstated.
- Be sure to follow the instructions on page 4 of this manual!

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.

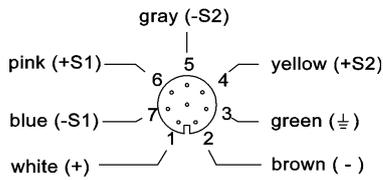
Functional safety

per IEC 61508 SIL 2

Connection diagram

Circular plug connector

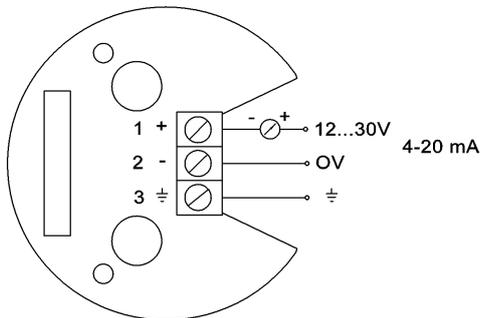
color code as Binder series 763



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

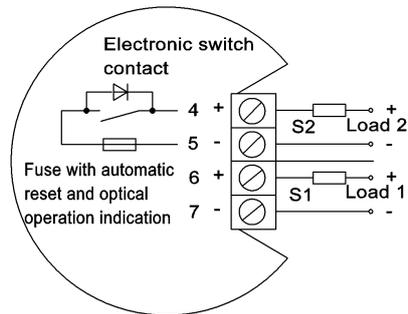
Basic module 4...20 mA

Internal terminals with cable gland design



Switching module

Internal terminals with cable gland design



cable gland design: remove switching module to connect basic module!

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 $I_S = 0.5 \text{ A}$) in switched status.

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

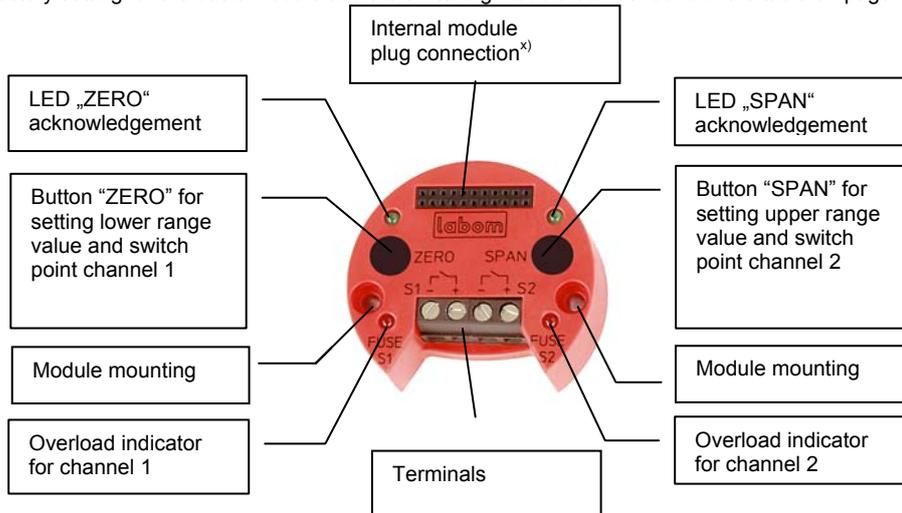
If the switched current exceeds the nominal current 500 mA then an automatically resetting thermal fuse is activated. A holding current establishes itself which depends on the level of the voltage applied.

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. This requires a minimum power supply of 3 V on the switched circuit.

Operation of pressure transmitter PASCAL CV with Switching Module

The standard factory setting for the basic module and the switching module can be found in the table on page 5.



x) Various function modules can easily be added to PASCAL CV for displaying or communicating purposes (see table p. 5).

Setting the measuring range

Setting lower range value (Operating menu: Zero Point)

1. Create a stable pressure at which 4 mA is to be set.
2. Hold down the left button (ZERO) for about 3 seconds.
3. The change to the lower range value is acknowledged after you release the button by a flashing “ZERO” LED.

Note:

The measuring span is always retained when the lower range value is changed if this is permitted by the sensor. A completed change is acknowledged by a flashing “ZERO” LED.

If the pressure transmitter is set outside the permissible measuring range limits (nominal range $\pm 5\%$, smallest measuring span) then the values will not be applied and the LED will not be acknowledged.

Setting upper range value (Operating menu: Measuring Span)

1. Create a stable pressure at which 20 mA is to be set.
2. Hold down the right button (SPAN) for about 3 seconds.
3. The change to upper range value is acknowledged after you release the button by a flashing “SPAN” LED.

Note:

The lower range value is always retained when upper range value is changed. A completed change is acknowledged by a flashing “SPAN” LED.

If the pressure transmitter is set outside the permissible measuring range limits (nominal range $\pm 5\%$, smallest measuring span) then the values will not be applied and the LED will not be acknowledged.

Setting the switch points (Operating Menu: Switch Points)

Channel 1

1. Apply the pressure at which the switch is to be activated.
2. Hold down the left button “ZERO” (for switching channel 1) for about 10 seconds. The “ZERO” LED then lights up continuously.
Abort: press the “ZERO” button again for about 10 seconds. Alternatively, wait for an automatic abort after about 5 minutes.
3. If the pressure is stable, press the “ZERO” button for a short time.
4. The switching point is accepted and the “ZERO” LED stops flashing.

Channel 2

1. Apply the pressure at which the switch is to be activated.
2. Hold down the right button “SPAN” (for switching channel 2) for about 10 seconds. The “SPAN” LED then lights up continuously.
Abort: press the “SPAN” button again for about 10 seconds. Alternatively, wait for an automatic abort after about 5 minutes.
3. If the pressure is stable, press the “SPAN” button for a short time.
4. The switching point is accepted and the “SPAN” LED stops flashing.

Setting and resetting the write protection (Operating menu: Write Protection)

After all parameters have been entered, subsequent operation can be disabled as follows:

- Press the "ZERO" and "SPAN" buttons at the same time (approx. 10 seconds). After write protection has been activated, the "ZERO" and "SPAN" LEDs flash in synchrony four times in succession.

Deactivating write protection:

- Press the "ZERO" and "SPAN" buttons at the same time (approx. 10 seconds). After deactivation, the "ZERO" and "SPAN" LEDs flash in synchrony.

Parameterizing of Switching Module Description of further function modules

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

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

These modules for display and communicating 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 |
| write protection | — | ON, OFF | OFF | x | 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 nmb | 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.