



Read these operating instructions without fail before installing and starting the pressure transmitter.

1. Important details for your information

Keep the operating instructions in a place that is accessible to all users at any time.

The following installation and operating instructions have been compiled by us with great care but it is not feasible to take all possible applications into consideration. These installation and operation instructions should meet the needs of most pressure measurement applications.

With special models, please note specifications in the delivery note.

If the serial number gets illegible (e.g. by mechanical damage or repainting), the retraceability of the instrument is not possible any more

SICK pressure transmitters are carefully designed and manufactured using state-of-the-art technology. Every component undergoes strict quality and environmental inspection before assembly and each instrument is fully tested prior to shipment. Our environmental management system is certified to DIN EN ISO 14001.

Use of the product in accordance with the intended use:

Use the pressure transmitter to transform the pressure into an electrical signal.

Knowledge required

Install and start the pressure transmitter only if you are familiar with the relevant regulations and directives of your country and if you have the qualification required. You have to be acquainted with the rules and regulations on measurement and control technology and electric circuits, since this pressure transmitter is „electrical equipment“ as defined by EN 50178. Depending on the operating conditions of your application you have to have the corresponding knowledge, e.g. of aggressive media.

2. A quick overview

If you want to get a quick overview, read Chapters 3, 5, 7 and 10. There you will get some short safety instructions and important information on your product and its starting. Read these chapters in any case.

3. Signs, symbols and abbreviations



Warning

Potential danger of life or of severe injuries.



Warning

Potential danger of life or of severe injuries due to catapulting parts.



Caution

Potential danger of burns due to hot surfaces.



Notice, important information, malfunction.



V DC Direct voltage



The product complies with the applicable European directives.



cULus, Underwriters Inc.®
The instrument was inspected in accordance with the applicable US standards and certified by UL.

2-wire

Two connection lines are intended for the voltage supply.
The supply current is the measurement signal.

3-wire

Two connection lines are intended for the voltage supply.
One connection line is intended for the measurement signal.

4. Function

The pressure prevailing within the application is transformed into a standardised electrical signal through the deflection of the diaphragm, which acts on the sensor element with the power supply fed to the transmitter. This electric signal changes in proportion to the pressure and can be evaluated correspondingly.

5. For your safety



Warning

- Select the appropriate pressure transmitter with regard to scale range, performance and specific measurement conditions prior to installing and starting the instrument.
- Observe the relevant national regulations (e.g.: EN 50178) and observe the applicable standards and directives for special applications (e.g. with dangerous media such as acetylene, flammable gases or liquids and toxic gases or liquids and with refrigeration plants or compressors). **If you do not observe the appropriate regulations, serious injuries and/or damage can occur!**
- Open pressure connections only after the system is without pressure!
- Please make sure that the pressure transmitter is only used within the overload threshold limit all the time!
- Observe the ambient and working conditions outlined in section 8 „Technical data“.
- Observe the technical data for the use of the pressure transmitter in connection with aggressive / corrosive media and for the avoidance of mechanical hazards.
- Ensure that the pressure transmitter is only operated in accordance with the provisions i.e. as described in the following instructions.
- Do not interfere with or change the pressure transmitter in any other way than described in these operating instructions.
- Remove the pressure transmitter from service and mark it to prevent it from being used again accidentally, if it becomes damaged or unsafe for operation
- **Take precautions with regard to remaining media in removed pressure transmitter. Remaining media in the pressure port may be hazardous or toxic!**
- Have repairs performed by the manufacturer only.
- Open circuit before removing connector / cover.

6. Packaging

Has everything been supplied?



Check the scope of supply:

- Completely assembled pressure transmitters
- Ordered accessories
- Inspect the pressure transmitter for possible damage during transportation. Should there be any obvious damage, inform the transport company and SICK without delay.
- Keep the packaging, as it offers optimal protection during transportation (e.g. changing installation location, shipment for repair).
- Ensure that the pressure connection thread and the connection contacts will not be damaged.

7. Starting, operation



Required tools: wrench (flats 27), screw driver

Diaphragm test for your safety

It is necessary that before starting the pressure transmitter you test the instrument visually, as the diaphragm is a safety-relevant component.



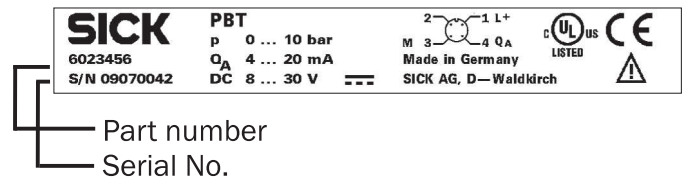
Warning

- Pay attention to any liquid leaking out, for this points to a diaphragm damage.
- Use the pressure transmitter only if the diaphragm is undamaged.
- Use the pressure transmitter only if it is in a faultless condition as far as the safety-relevant features are concerned.

Mechanical connection

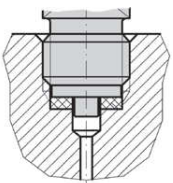


Product label (example)

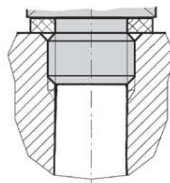


- When mounting the instrument, ensure that the sealing faces of the instrument and the measuring point are clean and undamaged.
- Screw in or unscrew the instrument only via the flats using a suitable tool and the prescribed torque. The appropriate torque depends on the dimension of the pressure connection and on the sealing element used (form/material). Do not use the case as working surface for screwing in or unscrewing the instrument.
- When screwing the transmitter in, ensure that the threads are not jammed.

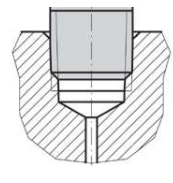
Types of sealings
according to EN 837



according to DIN 3852-E



according to NPT

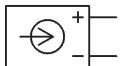


NPT, R and PT are self-sealing thread types.

Electrical connection



- Connect the instrument to ground via the pressure connection.
- The power supply for the pressure transmitter must be made via an energy-limited electrical circuit per section 9.3 of UL / EN / IEC 61010-1, or an LPS to UL / EN / IEC 60950-1, or Class 2 per UL1310/UL1585 (NEC or CEC). The power supply must be suitable for operation above 2,000 m should the pressure transmitter be used at this altitude.
- Ingress protection per IEC 60529 (The ingress protection classes specified only apply while the pressure transmitter is connected with female connectors that provide the corresponding ingress protection).
- Ensure that the cable diameter you select fits to the cable gland of the connector. Ensure that the cable gland of the mounted connector is positioned correctly and that the sealings are available and undamaged. Tighten the threaded connection and check the correct position of the sealings in order to ensure the ingress protection.
- Please make sure that the ends of cables with flying leads do not allow any ingress of moisture.



Power supply



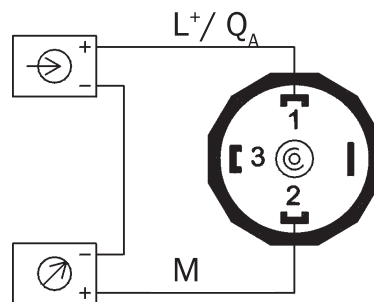
Load (e.g. display)

L⁺/Q_A Positive supply / measurement connection

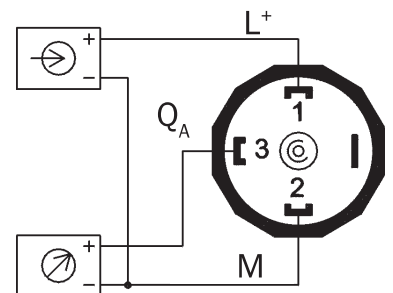
M Negative supply / measurement connection

DIN 175301-803 A
L-Connector,
for conductor cross section up
to max. 1.5 mm²,
conductor outer diameter 6-8 mm,
IP 65

2-wire

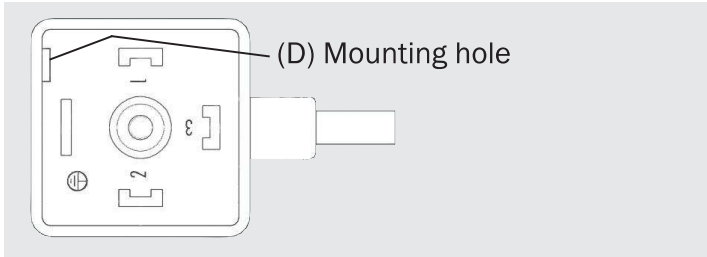


3-wire

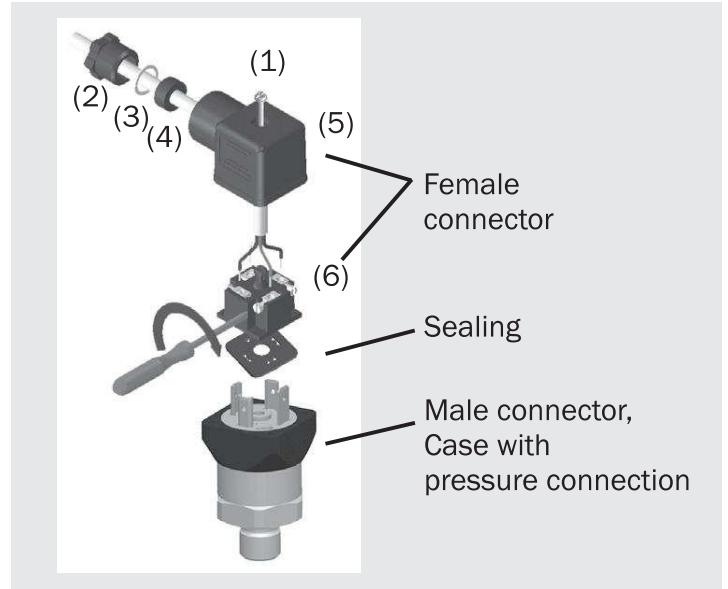


	2-wire	3-wire
<p>M 12x1, 4-pin, without angle socket or female cable connectors, IP 67</p>		
<p>Flying leads, conductor cross section 3x 0.34 mm², conductor outer diameter 6.6 mm, PUR cable - unshielded, IP 67</p>		

Assembly of DIN EN 175301-803 L-connector



1. Using the head of a small screwdriver in the mounting hole (D), lever the terminal block (6) out of the angle housing (5). In order not to damage the sealing of the angle housing, do not try to push the terminal block (6) out using the screw hole (1) or the cable gland (2).
2. Ensure that the conductor outer diameter you select is matched to the angle housing's cable gland. Slide the cable through the cable gland nut (2), washer (3), gland seal (4) and angle housing (5).
3. Connect the flying leads to the screw terminals on the terminal block (6) in accordance with the pin-assignment drawing.
4. Press the terminal block (6) back into the angle housing (5).
5. Tighten the cable gland (2) around the cable. Make sure that the sealing isn't damaged and that the cable gland and seals are assembled correctly in order to ensure ingress protection.
6. Place the flat, square gasket over the connection pins on the top of the instrument housing.
7. Slide the terminal block (6) onto the connection pins.
8. Secure the angle housing (5) and terminal block (6) to the instrument with the screw (1).



8. Specifications

Specifications	Model PBT								
Pressure ranges	bar	1	1.6	2.5	4	6	10	16	25
Over pressure safety	bar	2	3.2	5	8	12	20	32	50
Burst pressure	bar	5	10	10	17	34	34	100	100
Pressure ranges	bar	40	60	100	160	250	400	600	
Over pressure safety	bar	80	120	200	320	500	800	1200	
Burst pressure	bar	400	550	800	1000	1200	1700	2400	
	MPa and kg/cm ² are available {Absolute pressure: 0 ... 1 bar up to 0 ... 25 bar}								
Pressure ranges	psi	15	25	30	50	100	160	200	300
Over pressure safety	psi	30	60	60	100	200	290	400	600
Burst pressure	psi	75	150	150	250	500	500	1500	1500
Pressure ranges	psi	500	1000	1500	2000	3000	5000	8000	
Over pressure safety	psi	1000	1740	2900	4000	6000	10000	17400	
Burst pressure	psi	2500	7975	11600	14500	17400	24650	34800	
	{Absolute pressure: 0 ... 15 psi up to 0 ... 300 psi}								
Vacuum resistance		Yes							
Fatigue life		10 Mio. cycles							
Materials		<ul style="list-style-type: none"> ■ Wetted parts <ul style="list-style-type: none"> » Pressure connection » Pressure sensor ■ Internal transmission fluid ■ Case 							
Power supply L ⁺	L ⁺ in VDC	8 ... 30 14 ... 30 with signal output 0 ... 10 V							

Specifications	Model PBT	
Signal output and maximum ohmic load R_A	R_A in Ohm	4 ... 20 mA, 2-wire $R_A \leq (L^+ - 8 \text{ V}) / 0.02 \text{ A}$ 0 ... 10 V, 3-wire $R_A > 10 \text{ k}$ 0 ... 5 V, 3-wire $R_A > 5 \text{ k}$ {Other signal output on request}
Response time	ms	< 4
Current consumption	mA	Signal current (max. 25) for current output Max. 8 for voltage output signal
Insulation voltage	VDC	500 ²⁾ ²⁾ The power supply for the pressure transmitter must be made via an energy-limited electrical circuit per section 9.3 of UL / EN / IEC 61010-1, or an LPS to UL / EN / IEC 60950-1, or Class 2 per UL1310/UL1585 (NEC or CEC). The power supply must be suitable for operation above 2,000 m should the pressure transmitter be used at this altitude.
Non-linearity	% of span	$\leq \pm 0.25$ optional (BFSL) according to IEC 61298-2 $\leq \pm 0.5$ (BFSL) according to IEC 61298-2 Adjusted in vertical mounting position with lower pressure connection.
Accuracy ³⁾	% of span	$\leq \pm 0.5$ (with non-linearity 0.25 %) $\leq \pm 0.6$ (with non-linearity 0.25 % and with signal output 0 ... 5 V) $\leq \pm 1.0$ (with non-linearity 0.5 %) ³⁾ Including non-linearity, hysteresis, zero point and full scale error (corresponds to error of measurement per IEC 61298-2).
Zero offset	% of span	≤ 0.15 typ., ≤ 0.4 max., (with non-linearity 0.25 %) ≤ 0.5 typ., ≤ 0.8 max., (with non-linearity 0.5 %)
Hysteresis	% of span	≤ 0.16
Non-repeatability	% of span	≤ 0.1
Long-term drift	% of span	≤ 0.1 according to IEC 61298-2
Signal noise	% of span	≤ 0.3

Specifications		Model PBT	
Permissible temperature of			
■ Medium		0 ... +80 °C	-30 ... +100 °C optional
■ Ambience		0 ... +80 °C	-30 ... +100 °C optional
■ Storage		-20 ... +80 °C	-30 ... +100 °C optional
Operating temperature range		0 ... +80 °C	
Temperature error in operating temperature range	% of span	≤ 1.0 typ., ≤ 2.5 max.	
RoHS- conformity		Yes	
Approvals		cULus, GOST	
CE-conformity			
■ Pressure equipment directive		97/23/EC	
■ EMC directive		2004/108/EC EN 61 326-2-3	
Shock resistance	g	500 according to IEC 60068-2-27 (mechanical shock)	
Vibration resistance	g	10 according to IEC 60068-2-6 (vibration under resonance) {20 g on request}	
Wiring protection			
■ Overvoltage protection	VDC	32; 36 with 4 ... 20 mA	
■ Short-circuit proofness		Q _A towards M	
■ Reverse polarity protection		L ⁺ towards M	
Reference conditions		According to IEC 61298-1	
■ Relative humidity	%	45 ... 75	
Weight	g	Approx. 80	

{ } Items in curved brackets are optional extras for additional price.



When designing your plant, take into account that the stated values (e.g. burst pressure, over pressure safety) apply depending on the material, thread and sealing element used.

Functional test

i The output signal must be proportional to the pressure. If not, this might point to a damage of the diaphragm. In that case refer to chapter 9 „Troubleshooting“.



Warning



Caution

- Open pressure connections only after the system is without pressure!
 - Observe the ambient and working conditions outlined in section 8 „Technical data.“
 - Please make sure that the pressure transmitter is only used within the overload threshold limit at all times!
- When touching the pressure transmitter, keep in mind that the surfaces of the instrument components might get hot during operation.

9. Maintenance

- i**
- SICK pressure transmitters require no maintenance.
 - Have repairs performed by the manufacturer only.

10. Trouble shooting



Warning



Warning

- Open pressure connections only after the system is without pressure!
- Take precautions with regard to remaining media in removed pressure transmitters. Remaining media in the pressure port may be hazardous or toxic!
 - Remove the pressure transmitter from service and mark it to prevent it from being used again accidentally, if it becomes damaged or unsafe for operation.
 - Have repairs performed by the manufacturer only.

i Do not insert any pointed or hard objects into the pressure port for cleaning to prevent damage to the diaphragm of the pressure connection.

Please verify in advance if pressure is being applied (valves/ ball valve etc. open) and if the right voltage supply and the right type of wiring (2-wire/ 3-wire) has been chosen?

Failure	Possible cause	Procedure
No output signal	Cable break	Check connections and cable
Abnormal zero point signal	Overload limits exceeded	Ensure permissible overload limits are observed (see Operating Instructions)
Abnormal zero point signal	Working temperature too high/too low	Ensure permissible temperatures as per the Operating Instructions
Output signal unchanged after change in pressure	Mechanical overload through overpressure	Replace instrument; if failure reoccurs, consult the manufacturer
Signal span too small	Mechanical overload through overpressure	Replace instrument; if failure reoccurs, consult the manufacturer
Signal span erratic	Electromagnetic interference source in the vicinity, e.g. inverter drive	Shield the device; shield the cables; remove the interference source.
Signal span erratic / incorrect	Working temperature too high/too low	Ensure permissible temperatures as per the Operating Instructions
Signal span dropping off/too small	Diaphragm is damaged, e.g. through impact, abrasive/aggressive media; corrosion of diaphragm/pressure connector; transmission fluid missing.	Contact the manufacturer and replace the instrument

If the problem persists, contact our sales department.

Return shipments / non-risk declaration form

Purge / clean dismounted instruments before returning them in order to protect our employees and the environment from any hazard caused by adherent remaining media.

Service of instruments can only take place safely when a completed and signed-off non-risk declaration form has been submitted and fully filled-in. This non-risk declaration form contains information on all materials with which the instrument has come into contact, either through installation, test purposes, or cleaning. You can find the non-risk declaration form on our internet site (www.sick.com).

11. Storage, disposal



Warning

When storing or disposing of the pressure transmitter, take precautions with regard to remaining media in removed pressure transmitters. We recommend cleaning the transmitter properly and carefully. Remaining media in the pressure port may be hazardous or toxic!

Disposal



Dispose of instrument components and packaging materials in accordance with the respective waste treatment and disposal regulations of the region or country to which the instrument is supplied.

SICK reserves the right to alter these technical specifications.