OPERATING INSTRUCTIONS PRESSURE TRANSMITTER MODULES

CIO PRESSURE TRANSMITTER CAPSULES IN THE SERIES
4LC, 7LC, 6LHPC, 7LHPC, 8LC, 9FLC, 9LC, 10LC
4LD, 7LD, 6LHPD, 7LHPD, 9FLD, 9LD, 10LD

PRESSURE TRANSMITTER CAPSULES IN THE SERIES
7LY, 7LHPY, 8LY, 9FLY, 9LY, 10LY
7LX, 7LHPX, 8LX, 9FLX, 9LX, 10LX, 10LHPX

PRESSURE TRANSMITTER HEAD (WITH PRESSURE CONNECTION) IN THE SERIES
20C, 20D, 20PC, 20PD, 20PY, 20SC, 20SD, 20SY, 20SX, 20Y

as well as various other customer-specific and application-specific series

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1. GENERAL INFORMATION AND SAFETY INSTRUCTIONS

These operating instructions contain important information about using the product correctly. Please read these operating instructions carefully for a detailed explanation of how to install the measuring instrument and put it into operation. Follow the safety and installation information in these operating instructions. You must also comply with national legislation, standards and regulations. These operating instructions form an integral part of the measuring instrument and must always be accessible to the relevant staff.

Disclaimer
KELLER Pressure accepts no liability in the event of improper use, damage or modification of the measuring instrument or failure to observe these operating instructions.

SUBJECT TO TECHNICAL ALTERATIONS!

1.1. SYMBOLS USED

SYMBOL	WARNING	NATURE AND SOURCE OF THE DANGER
⚠	DANGER	Danger of death or injury to staff.
⚠	WARNING	Potentially hazardous situation that could result in serious injuries or even death.
✓	NOTE	Tips and information for users.

1.2. PROPER USE

- Pressure transmitters are used to convert pressure into a standardised electrical signal.
- The pressure transmitters in the various series referred to have been developed for applications for relative or absolute pressure measurement depending on their type.
- Make sure that the measuring instrument is suitable for your chosen location. Please get in touch with your direct sales contact if you are unsure of anything.
- Please refer to the relevant data sheet and agreed specifications for information about the pressure transmitter's features.
- The technical specifications listed in the data sheet are only binding if no differing agreements have been made.
- The gases or liquids used as measuring media must be compatible with the materials that come into contact with the media as specified in the data sheet.

⚠	DANGER	In the event of incorrect use!

1.3. STAFF QUALIFICATIONS

The product must only be assembled, installed, put into operation, operated, maintained, taken out of operation and disposed of by technically trained staff.

2. PRODUCT IDENTIFICATION

The laser engraving on the pressure transmitter is used to identify the product.

This unique identifier provides context to the specifications that are found on the calibration sheet supplied or in myCalibration.

3. INSTALLATION

⚠	DANGER	**Danger of death from electrocution, pressure discharge or leaking media!** The measuring instrument must only be installed on systems when they are not pressurised or connected to a power supply.
⚠	WARNING	**Danger of death in the event of incorrect installation!** The device must only be installed by specialist personnel who have read and understood these operating instructions. Follow the national standards and safety regulations during the assembly and installation of the device.
⚠	DANGER	**Danger of death in the event of incorrect use!** When used with oxygen, only pressure transmitters intended for this may be used.

3.1. ASSEMBLY AND SAFETY INFORMATION

- ✓ Only operate the pressure transmitter within its technical performance limits. You can find these in the data sheet or in the specifications. The measuring instrument must not be operated for long periods in its overload range as this can damage it.
- ✓ The measuring medium must not be allowed to ice up.
- ✓ Make sure that the material used for the selected pressure transmitter, including the associated seals, is suitable for the medium to be measured.
- ✓ Avoid electrochemical voltage potentials.
- ✓ Do NOT use the measuring instrument to perform safety functions.
- ✓ To avoid damaging the diaphragm and the thread, do not remove the packaging and protective cap until immediately before installation.
- ✓ The output signal may be dependent on the installation position. The maximum force exerted by the installation position is described in the technical data sheet.
- ✓ When installing the device onto hydraulic systems, ensure that the system is adequately ventilated.

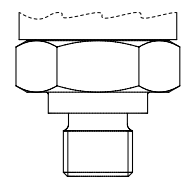
3.2. APPLICATIONS WITH OXYGEN

Note the following points:

- The pressure transmitter must be suitable for use with oxygen.
- Make sure that the permitted pressure and temperature thresholds are not exceeded.
- Do not unpack the measuring instrument until immediately before its installation.
- Avoid skin contact with the measuring instrument to prevent fingerprints and grease residues from forming.
- We recommend wearing suitable safety gloves.

3.3. INSTALLATION INFORMATION

- ✓ Take care when handling the metal diaphragm and protect it from being damaged! Even minor distortions can have an effect on the pressure signal.
- ✓ Use the protective cap supplied to guard the metal diaphragm on the measuring instrument up until installation.
- ✓ Do not bend the connector pins and do not exert any axial force on the connector pins during installation.
- ✓ When installing the device outdoors or in another damp environment, do not allow liquid to accumulate on the seal surface or near the connector pins.



Pressure connection example

3.4 MECHANICAL INSTALLATION OF THE PRESSURE TRANSMITTER HEAD

- ✓ Before installation, make sure that the seal surfaces on the measuring instrument and on the measuring point are clean and undamaged.
- ✓ Make sure that the seal is intact and sitting correctly in its groove. Check that the seal specifications correspond with the environment in which it will be used.
- ✓ Use suitable tools for installing the device.
- ✓ Screw the pressure transmitter in with an appropriate amount of torque.

Follow the instructions below to ensure optimum installation:
1. Make sure that the seal surface is sealing correctly.
2. Screw the measuring instrument into the corresponding thread **by hand**.
3. Tighten the device in place using a suitable torque wrench on the spanner flats.

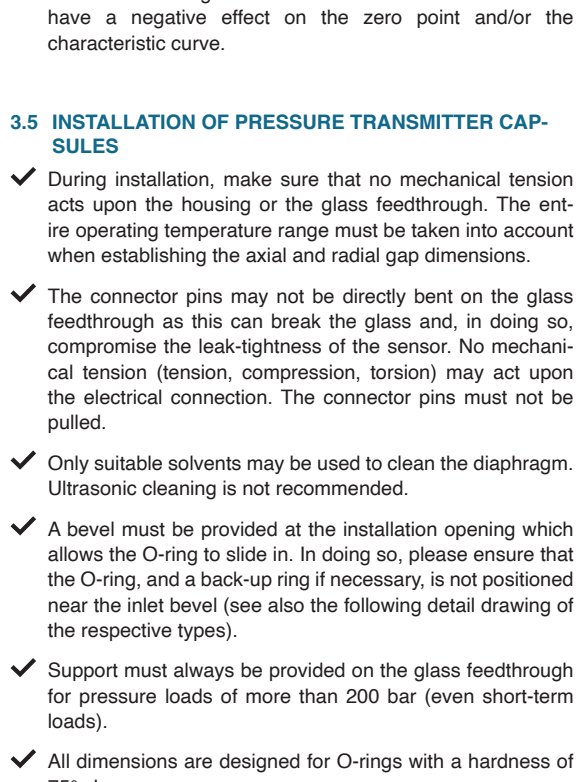
- ✓ Install the measuring instrument without exposing it to an undue degree of mechanical tension. This could have a negative effect on the zero point and/or the characteristic curve.

3.5 INSTALLATION OF PRESSURE TRANSMITTER CAPSULES

- ✓ During installation, make sure that no mechanical tension acts upon the housing or the glass feedthrough. The entire operating temperature range must be taken into account when establishing the axial and radial gap dimensions.
- ✓ The connector pins may not be directly bent on the glass feedthrough as this can break the glass and, in doing so, compromise the leak-tightness of the sensor. No mechanical tension (tension, compression, torsion) may act upon the electrical connection. The connector pins must not be pulled.
- ✓ Only suitable solvents may be used to clean the diaphragm. Ultrasonic cleaning is not recommended.
- ✓ A bevel must be provided at the installation opening which allows the O-ring to slide in. In doing so, please ensure that the O-ring, and a back-up ring if necessary, is not positioned near the inlet bevel (see also the following detail drawing of the respective types).
- ✓ Support must always be provided on the glass feedthrough for pressure loads of more than 200 bar (even short-term loads).
- ✓ All dimensions are designed for O-rings with a hardness of 75° shore.
- ✓ For non-tolerated dimensions, +/-0.1 applies.

We generally recommend these three installation methods:

"Countersunk" installation



Installation method 1 – "countersunk" Support on the housing

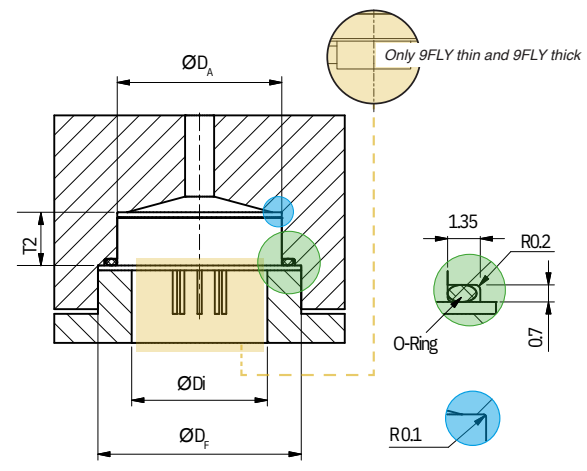
Installation method 1 – "countersunk" Support on the glass feedthrough

DIMENSIONS FOR INSTALLATION METHOD 1 – "COUNTERSUNK"

KELLER PRESSURE		HOLES TO BE DRILLED BY THE CUSTOMER					
	ø D_A	ø D_A	Hole tolerance up to 100 bar	Hole tolerance from 100 bar	ø Di (housing)	ø Di (glass feedthrough)	T1	W1
Series/type \ Unit	[mm]	[mm]			[mm]	[mm]	[mm]	[°]
Low pressure								
4LC/4LD	11	11	F8	G7	–	6.6 *	2	15
7LC/7LD/7LX	15	15	F8	G7	12	6.6 *	2	15
7LY	15	15	F8	G7	12	–	2	15
9LC/9LD/9LX	19	19	F8	G7	12	6.6 *	2	15
9LY	19	19	F8	G7	15	–	2	15
10LC/10LD/10LX	19	19	F8	G7	6.6 *	–	2	15
10LY	19	19	F8	G7	15	–	2	15
High pressure								
6LHPC/6LHPD	13	13	–	G7	7.5	–	1.5	30
7LHPC/7LHPD	15	15	–	G7	7.5	–	1.5	30
7LHPX	15	15	–	G7	12	–	1.5	30
7LHPY	15	15	–	G7	12	–	1.5	30
10LHPX	19	19	–	G7	7.5	–	2	15
10LHPY	19	19	–	G7	15	–	2	15

*) for versions with soldered wires, increase the minimum diameter to 7.5

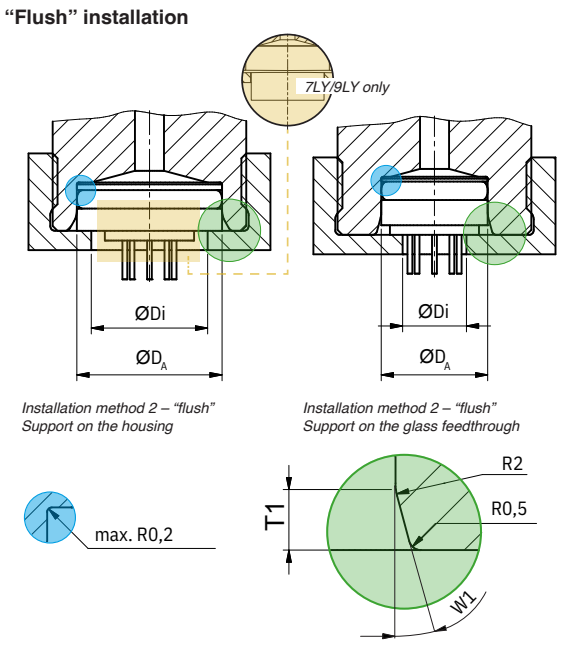
"Countersunk" installation – flange



DIMENSIONS FOR INSTALLATION METHOD 1 – "COUNTERSUNK"

KELLER PRESSURE		HOLES TO BE DRILLED BY THE CUSTOMER					
	ø D_A	ø D_F	ø D_A	Hole tolerance	ø D_F	ø Di	T2
Series/type \ Unit	[mm]	[mm]	[mm]		[mm]	[mm]	[mm]
9FLC/9FLD/9FLX thin	17	21.2	17	F8	21.2	14	5.5
9FLC/9FLD/9FLX thick	17	21.2	17	F8	21.2	14	4
9FLY thin	17	21.2	17	F8	21.2	15	5.5
9FLY thick	17	21.2	17	F8	21.2	15	4

"Flush" installation



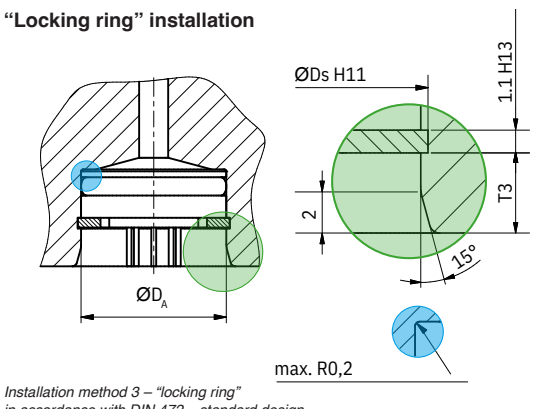
Installation method 2 – "flush" Support on the housing

Installation method 2 – "flush" Support on the glass feedthrough

DIMENSIONS FOR INSTALLATION METHOD 2 – "FLUSH"

KELLER PRESSURE	HOLES TO BE DRILLED BY THE CUSTOMER							
	ø D_A	ø D_A	Hole tolerance up to 100 bar	Hole tolerance from 100 bar	ø Di (housing)	ø Di (glass feedthrough)	T1	W1
Series/type \ Unit	[mm]	[mm]			[mm]	[mm]	[mm]	[°]
Low pressure								
4LC/4LD	11	11	F8	G7	–	6.6 *	2	15
7LC/7LD/7LX	15	15	F8	G7	12	6.6 *	2	15
7LY	15	15	F8	G7	12	–	2	15
9LC/9LD/9LX	19	19	F8	G7	12	6.6 *	2	15
9LY	19	19	F8	G7	15	–	2	15
10LC/10LD/10LX	19	19	F8	G7	6.6 *	–	2	15
10LY	19	19	F8	G7	15	–	2	15
High pressure								
6LHPC/6LHPD	13	13	–	G7	7.5	–	1.5	30
7LHPC/7LHPD	15	15	–	G7	7.5	–	1.5	30
7LHPX	15	15	–	G7	12	–	1.5	30
7LHPY	15	15	–	G7	12	–	1.5	30
10LHPX	19	19	–	G7	7.5	–	2	15
10LHPY	19	19	–	G7	15	–	2	15

"Locking ring" installation



Installation method 3 – "locking ring" in accordance with DIN 472 – standard design.

Design of the installation situation and permissible load in accordance with DIN 472.

DIMENSIONS FOR INSTALLATION METHOD 3 – "LOCKING RING"

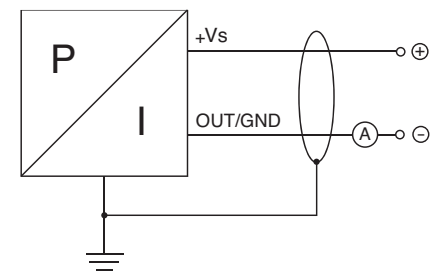
KELLER PRESSURE	HOLES TO BE DRILLED BY THE CUSTOMER						
	ø D_A	ø D_A	Hole tolerance up to 100 bar	Hole tolerance from 100 bar	P max.	ø Ds	T3 (min)
Series/type \ Unit	[mm]				[bar]	[mm]	[mm]
4LC/4LD	11	11	F8	G7	120	11.4	3.4
7LC/7LD/7LX	15	15	F8	G7	160	15.7	3.9
9LC/9LD/9LX	19	19	F8	G7	180	20	4.3
10LC/10LD/10LX	19	19	F8	G7	180	20	4.3

ELECTRICAL INSTALLATION

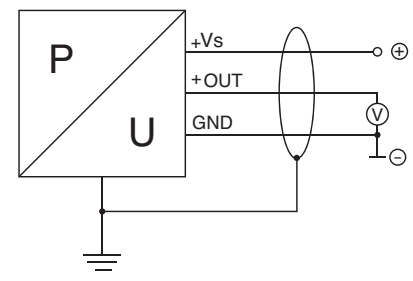
- ✓ Connect the measuring instrument in accordance with the electrical connections on the electrical connections chart delivered with the measuring instrument or the following connection circuit diagrams.
- ✓ Make sure that reference measuring instruments (PR versions) have adequate ventilation for the capillary.
- ✓ Pressure transmitter modules only meet the current EMC standards under certain circumstances. The user/customer is responsible for ensuring comprehensive EMC protection.

CONNECTION CIRCUIT DIAGRAMS

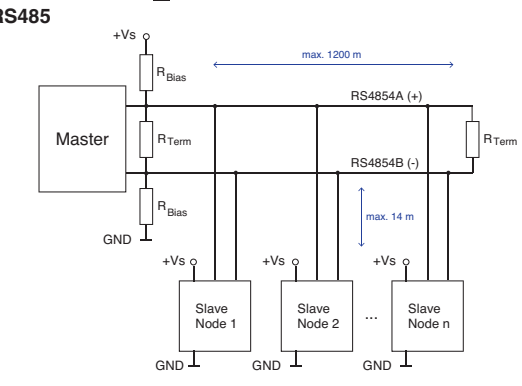
2-wire / 4…20 mA



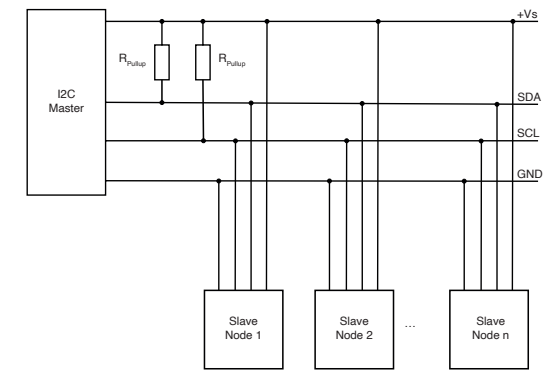
3-wire / 0…10 V / 0,5…4,5 V / etc.



RS485



I2C



Please see the relevant communication protocol for additional connection circuit diagrams.

COMMUNICATION PROTOCOLS

- ✓ You can find links to these by the relevant product on the KELLER Pressure website at keller-pressure.com.

4. COMMISSIONING

⚠	WARNING	Before operating the measuring instrument for the first time, check whether it has been installed properly.
⚠	WARNING	The measuring instrument must only be put into operation by qualified specialists who have read and understood the operating instructions.
⚠	WARNING	The measuring instrument must only be operated within the specifications. See the technical data in the data sheet or the agreed specifications.

5. TROUBLESHOOTING

Common installation errors:

DIFFERENT ZERO POINT SIGNAL

Possible cause:
- Metal diaphragm damaged
- Ambient temperature too high/low

Action:
- Contact the manufacturer and, if necessary, replace the measuring instrument
- Keep to the permitted temperatures given in the data sheet

CONSISTENT OUTPUT SIGNAL WHEN THE PRESSURE CHANGES

Possible cause:
- Mechanical overload caused by overpressure
- Electrical fault

Action:
- Replace the device; if the fault occurs again, contact the manufacturer

SIGNAL SPAN DECLINES/LOAD RESISTANCE IS TOO HIGH OR TOO LOW

Possible cause:
- Mechanical overload caused by overpressure
- Abrasive/aggressive medium; corrosion on the diaphragm/pressure connection

Action:
- Contact the manufacturer

NO OUTPUT SIGNAL

Possible cause:
- No power supply
- Pressure transmitters connected incorrectly
- Broken cable

Action:
- Check the power supply
- Check that the connection corresponds to the specifications for the electrical connections
- Check the cable continuity

SIGNAL SPAN FLUCTUATING

Possible cause:
- Source of EMC interference in close proximity(e.g. pump, frequency converter, etc.)

Action:
- Remove the source of interference
- Shield the source of interference properly

6. SERVICING AND REPAIRS

6.1. MAINTENANCE

KELLER Pressure products require no maintenance and, if used in accordance with the specifications, are free of faults.

6.2. RETURNS

Before returning a measuring instrument for recalibration or repair, it must be thoroughly cleaned and securely packaged.

For faulty measuring instruments, use the KELLER Pressure returns form and describe the fault in as much detail as possible.

If your measuring instrument has come into contact with harmful substances, you must state this on the returns form.

If you return a measuring instrument without mentioning contact with harmful substances and our repair department suspects that this is the case, the measuring instrument will not be repaired until the facts have been established.

7. DISPOSAL

To dispose of the measuring instrument, either return it to the supplier or dispose of it properly in accordance with Directive 2012/19/EU. Never allow the measuring instrument to enter household waste.

8. WARRANTY TERMS

The warranty is limited to 12 months from the date of delivery. KELLER Pressure guarantees that the products are free of manufacturing and material defects and that they comply with the specifications confirmed in writing.

Subject to technical alterations.
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