Operating Instructions

Pressure Transmitter Model LZAT

Contents

LENZ

1. General information

The pressure transmitter described in the operating instructions has been designed and manufactured using state-of-the-art technology.
All components are subject to stringent quality and environmental criteria during production. Our management systems are certified to ISO 9001 and ISO 14001.

These operating instructions contain important information on handling the pressure transmitter. Working safely requires that all safety instructions and work instructions are observed.

Observe the relevant local accident prevention regulations and general safety regulations for the pressure transmitter's range of use.

The operating instructions are part of the instrument and must be kept in the immediate vicinity of the pressure transmitter and readily accessible to skilled personnel at any time.

Skilled personnel must have carefully read and understood the operating instructions, prior to beginning any work.

The manufacturer's liability is void in the case of any damage caused by using the product contrary to its intended use, non-compliance with these operating instructions, assignment of insufficiently qualiffied skilled personnel or unauthorized modifications to the pressure transmitter.

The general terms and conditions, contained in the sales documentation, shall apply.

Subject to technical modifications.

Further information:

- Internet address: www.lenzinc.com
- Relevant data sheet: Catalog Page
- Application consultant: Tel.: 937-277-9364 E-Mail: sales@lenzinc.com

1. General information

Explanation of symbols

WARNING!
... indicates a potentially dangerous situation that can result in serious injury or death, if not avoided.

CAUTION!
... indicates a potentially dangerous situation that can result in light injuries or damage to equipment or the environment, if not avoided.

Information
... points out useful tips, recommendations and information for efficient and trouble-free operation.

WARNING!
... indicates a potentially dangerous situation that can result in burns, caused by hot surfaces or liquids, if not avoided.

Abbreviations

2-wire	The two connection lines are used for the power supply. The measurement signal also provides the supply current.
3-wire	Two of the connection lines are used for the power supply. One connection line is used for the measurement signal.
UB	Positive power terminal
0V	Negative power terminal
S+	Positive measurement terminal

2. Safety

WARNING!
Before installation, commissioning and operation, ensure that the appropriate pressure transmitter has been selected in terms of measuring range, design and specific measuring conditions.
Non-observance can result in serious injury and/or damage to equipment.
Open pressure connections only after the system is without pressure!
Open circuit before removing connector / cover.

Further important safety instructions can be found in the individual chapters of these operating instructions.

2.1 Intended use

This pressure transmitter is used fortransforming the pressure into an electrical signal.

The pressure transmitter has been designed and built solely for the intended use described here, and may only be used accordingly.

The technical specifications contained in these operating instructions must be observed. Should the instrument be improperly handled or operated outside of its technical specifications, it has to be taken out of service immediately and inspected by an authorised LENZ Factory personell.

The manufacturer shall not be liable for claims of any type based on operation contrary to the intended use.

2.2 Personnel qualification

WARNING!
Risk of injury should qualification be insufficient!
Improper handling can result in considerable injury and damage to equipment.

2. Safety

The activities described in these operating instructions may only be carried out by skilled personnel who have the qualifications described below.
Keep unqualified personnel away from hazardous areas.

Skilled personnel
Skilled personnel are understood to be personnel who, based on their technical training, knowledge of measurement and control technology and on their experience and knowledge of country-specific regulations, current standards and directives, are capable of carrying out the work described and independently recognising potential hazards.
Special operating conditions require further appropriate knowledge, e.g. of aggressive media.

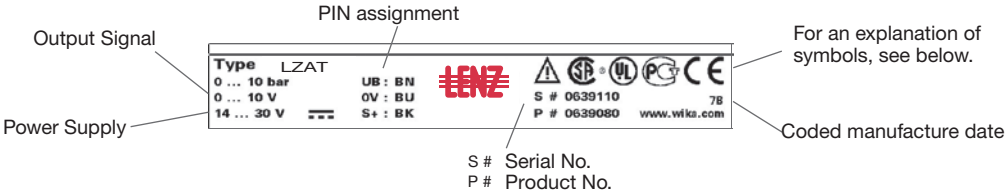
2.3 Special hazards

WARNING!
For hazardous media such as oxygen, acetylene, flammable or toxic gases or liquids, and refrigeration plants, compressors, etc., in addition to all standard regulations, the appropriate existing codes or regulations must also be followed.

WARNING!
Residual media in dismounted instruments can result in a risk to persons, the environment and the equipment. Take sufficient precautionary measures.

2.4 Labelling / safety marks

Product label (example)



2. Safety

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

Explanation of symbols

Before mounting and commissioning the pressure transmitter, ensure you read the operating instructions!

CSA, Canadian Standard Association®
The pressure transmitter was inspected and certified by CSA International. Pressure transmitters bearing this mark comply with the applicable Canadian standards on safety.

UL, Underwriters Laboratories Inc.®
The pressure transmitter was inspected in accordance with the applicable US standards and certified by UL.

GOST, Gossudarstwenny Standart (Государственный Стандарт)
GOST-R (mark)
Pressure transmitters bearing this mark comply with the applicable Russian national safety regulations (Russian Federation).

CE, Communauté Européenne
Pressure transmitters bearing this mark comply with the relevant European directives.

DC V Direct voltage

3. Specifications

Specifications	Model LZAT								
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; compound ranges: -1 ... 0 bar up to -1 ... 24 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	10000	
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		As of 0 ... 10 bar							
Fatigue life		10 Mio. cycles							
Materials									
④ Wetted parts									
» Pressure connection		316 L							
» Pressure sensor		316 L (as of 0 ... 10 bar rel 13-8 PH)							
④ Internal transmission fluid		Silicone oil (only with pressure ranges < 0 ... 10 bar and ≤ 0 ... 25 bar abs)							
Case		316 L							

3. Specifications

Specifications		Model LZAT	
Power supply U_B		DC 8 ... 30 V {DC 8 ... 35 V[1)]}	
		DC 14 ... 30 V {DC 14 ... 35 V} with signal output 0 ... 10 V	
		5 ± 10 % with signal output 0,5 ... 4,5 ratiometric	
	[1)] not with non-linearity 0.25 % BFSL and 4 ... 20 mA		
Signal output and		4 ... 20 mA, 2-wire	$R_A \leq (U_B - 8\ V) / 0.02\ A$
maximum ohmic load R_A	R_A in Ohm	0 ... 10 V, 3-wire	$R_A > 10$ k
		0 ... 5 V, 3-wire	$R_A > 5$ k
		1 ... 5 V, 3-wire	$R_A > 5$ k
		0.5 ... 4.5 V, 3-wire	$R_A > 4.5$ k
		0.5 ... 4.5 V ratiometric	$R_A > 4.5$ 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		DC 500 V [2)]	
		[2)] For power supply, use a circuit with energy limitation (EN/UL/IEC 61010-1, section 9.3) with the following maximum values for the current: with U_B = DC 30 V: 5 A / U_B = DC 35 V: 4.2 A. Provide a separate switch for the external power supply. Alternative for North America: The connection may also be made to „Class 2 Circuits“ or „Class 2 Power Units“ according to CEC (Canadian Electrical Code) or NEC (National Electrical Code).	
Non-linearity	% of span	≤ ± 0.25	(BFSL) according to IEC 61298-2
		≤ ± 0.5	(BFSL) according to IEC 61298-2
	Adjusted in vertical mounting position with lower pressure connection.		
Accuracy [3)]	% of span	≤ ± 0.5	(with non-linearity 0.25 %)
		≤ ± 0.6	(with non-linearity 0.25 % and with signal output 0 ... 5 V)
		≤ ± 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).		

3. Specifications

Specifications	Model LZAT		
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	
Permissible temperature of			
④ Medium		0 ... +80 °C {-30 ... +100 °C}	32 ... +176 °F {-22 ... +212 °F}
④ Ambience		0 ... +80 °C {-30 ... +100 °C}	32 ... +176 °F {-22 ... +212 °F}
④ Storage		-20 ... +80 °C {-30 ... +100 °C}	-4 ... +176 °F {-22 ... +212 °F}
Rated temperature range		0 ... +80 °C	+32 ... +176 °F
Temperature error in rated temperature range	% of span	≤ 1.0 typ., ≤ 2.5 max.	
Approvals		UL, CSA, GOST	
RoHS- conformity		Yes	
CE-conformity			
④ Pressure equipment directive		This instrument is a pressure accessory as defined by the directive 97/23/EC	
④ EMC directive		2004/108/EC, EN 61 326 Emission (Group 1, Class B) and Immunity (industrial locations)	
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			
④ Overvoltage protection		DC 32 V; DC 36 V with 4 ... 20 mA	
④ Short-circuit proofness		S+ towards 0V	
④ Reverse polarity protection		U_B towards 0V	
Reference conditions		According to IEC 61298-1	
Relative humidity	%	45 ... 75	
Weight	g	Approx. 80	

For special model numers, e.g. LZAT please note the specifications stated on the delivery note

For further specifications see LENZ catalog page and the order documentation.

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.

4. Design and function

4.1 Description

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.

4.2 Scope of delivery

Completely assembled pressure transmitters and ordered accessories.
Cross-check scope of delivery with delivery note.

5. Transport, packaging and storage

5.1 Transport

Check the pressure transmitter for any damage that may have been caused by transport.
Obvious damage must be reported immediately.

5. Transport, packaging and storage / 6. Installation, operation

5.2 Packaging

Do not remove packaging until just before mounting.
Keep the packaging as it will provide optimum protection during transport (e.g. change in installation site, sending for repair).
Ensure that the pressure connection thread and the connection contacts will not be damaged.

5.3 Storage

Permissible conditions at the place of storage:

Storage temperature: -20 ... +80 °C
Humidity: 45 ... 75 % relative humidity (no condensation)

WARNING!
Before storing the instrument (following operation), remove any residual media. This is of particular importance if the medium is hazardous to health, e.g. caustic, toxic, carcinogenic, radioactive, etc.

6. Commissioning, 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 visual, as the diaphragm is a **safety-relevant component.**

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.

6. Installation, operation

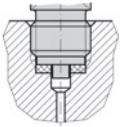
Mechanical connection

- For Model LZAT with straight thread the sealing ring is included in delivery.
- Please refer to our data sheet “Pressure gauge sealing washers” in LENZ’s product catalog Pressure Gauges or our website www.lenzinc.com for details about sealing washers.
- 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.
- For tapped holes and welding sockets please see Technical Information download at www.lenzinc.com

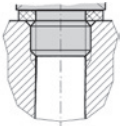
6. Installation, operation

Types of sealings

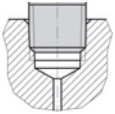
according to EN 837



according to DIN 3852-E



according to NPT



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

Electrical connection

Connect the instrument to earth via the pressure connection.
For power supply, use a circuit with energy limitation (EN/UL/IEC 61010-1, section 9.3) with the following maximum values for the current:
with UB = DC 30 V: 5 A / UB = DC 35 V: 4.2 A.
Provide a separate switch for the external power supply.
The power supply shall be suitable for operation above 2,000 m, if the transmitter is used above this altitude.
Alternative for North America: The connection may also be made to "Class 2 Circuits" or "Class 2 Power Units" according to CEC (Canadian Electrical Code) or NEC (National Electrical Code).
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.

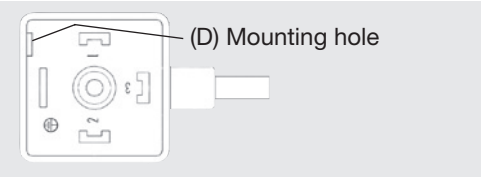
6. Installation, Operation

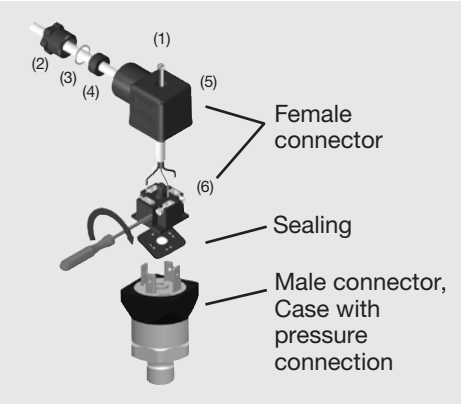
Electrical connections

	L-connector DIN 175301-803 A	L-connector DIN 175301-803 C	Circular connector M12x1, 4-pin	Flying leads (PUR cable - unshielded)
				
2-wire	UB = 1 | 0V = 2	UB = 1 | 0V = 2	UB = 1 | 0V = 3	UB = brown | 0V = blue
3-wire	UB = 1 | 0V = 2 | S+ = 3	UB = 1 | 0V = 2 | S+ = 3	UB = 1 | 0V = 3 | S+ = 4	UB = brown | 0V = blue | S+ = black
Wire gauge	up to max. 1.5 mm^2	up to max. 0.75 mm^2	-	3 x 0.34 mm^2
Diameter of cable	6-8 mm	4.5-6 mm	-	4 mm
Ingress protection per IEC 60 529	IP 65	IP 65	IP 67	IP 67
	The ingress protection classes specified only apply while the pressure transmitter is connected with female connectors that provide the corresponding ingress protection.			

6. Installation, Operation

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).

Functional test

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“.

Open pressure connections only after the system is without pressure!
Observe the ambient and working conditions outlined in section 7 „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.

7. Maintenance and Cleaning

7.1 Maintenance

This instrument is maintenance-free.
Repairs must only be carried out by the manufacturer.

7.2 Cleaning

CAUTION!

Before cleaning, correctly disconnect the pressure transmitter from the pressure supply, switch it off and disconnect it from the mains.
Clean the pressure transmitter with a moist cloth.
Wash or clean the dismounted pressure transmitter before returning it, in order to protect persons and the environment from exposure to residual media.
Residual media in dismounted pressure transmitter can result in a risk to persons, the environment and equipment. Take sufficient precautionary measures.

7. Maintenance and cleaning / 8. Faults

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

For information on returning the pressure transmitter see chapter "9.2 Return".

8. Faults

Open pressure connections only after the system is without pressure!

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?

Faults	Causes	Measures
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

8. Faults / 9. Disconnect, return and disposal

Faults	Causes	Measures
Signal span dropping off/too small	Diaphragm is damaged, e.g. through impact, abrasive/agressive media; corrosion of diaphragm/pressure connector; transmission fluid missing.	Contact the manufacturer and replace the instrument

In case of unjustified reclamation we charge the reclamation handling expenses.

CAUTION!
If faults cannot be eliminated by means of the measures listed above, the pressure transmitter must be shut down immediately, and it must be ensured that pressure and/or signal are no longer present, and it must be prevented from being inadvertently put back into service.
In this case, contact the manufacturer.
If a return is needed, please follow the instructions given in chapter "9.2 Return".

9. Dismounting, return and disposal

WARNING!
Residual media in dismounted pressure transmitters can result in a risk to persons, the environent and equipment. Take sufficient precautionary measures

9.1 Disconnect

Only disconnect the pressure transmitter once the system has been depressurised!

9. Disconnect, return and disposal / 10. Accessories

9.2 Return

WARNING!
Strictly observe when shipping the pressure transmitter:
All pressure transmitters delivered to LENZ must be free from any kind of hazardous substances (acids, bases, solutions, etc.).

When returning the pressure transmitter, use the original packaging or a suitable transport package. Enclose the completed return form with the instrument.

The return form is available on the internet:
www.lenzinc.com

9.3 Disposal

Incorrect disposal can put the environment at risk.
Dispose of instrument components and packaging materials in an environmentally compatible way and in accordance with the country-specific waste disposal regulations.

10. Accessories

For details about the accessories (e. g. connectors), please refer to LENZ's price list or contact our sales department.

Operating Instructions

Pressure Transmitter Model LZAT

Further information:

- Internet address:
- Relevant data sheet:
- Application consultant:

www.lenzinc.com
Catalog Page
Tel.: 937-277-9364 E-Mail: sales@lenzinc.com