



This manual covers mounting and operation of ALZ level transmitters (hereinafter referred to as "transmitter" or "device"); it contains technical specifications, connection instructions and other information necessary for proper operation and maintenance.

See datasheets at <http://piezus.ru> for complete specifications.

Production regulated by TOR 0131-001-16585379-2014

1 Design and operation

1.1 ALZ level transmitters are submersible devices designed to measure level of media non-aggressive to stainless steel and standard seals. They are an optimal solution for tanks, water towers, wells and natural water bodies.

1.2 Transmitters continuously convert hydrostatic (fluid column) pressure into a normalized unified analog or digital (HART, Modbus RTU) output signal. Optionally, they can carry a Pt100 thermometer to control medium temperature.

1.3 Applications: control, automated regulation and metering systems in industrial environments and public utilities.

Note: Maritime versions of pressure transmitters (which have "k" as the first symbol of their code) comply with Part XV of Rules for the Classification and Construction of Sea-Going Ships and Section 12, Part IV of the Rules for Technical Supervision During Construction of Ships and Manufacture of Materials and Products for Ships. Avoid mounting such transmitters on open decks; they are designed to work in switchboards, casings or reservoirs.

2 Technical specifications

2.1 Basic specifications

2.1.1 See the transmitter's passport and label (sticker) for its upper range limit (url) and accuracy info.

2.1.2 See Tables 1 and 2 for output signal options (factory set to order).

2.1.3 RS-485 digital interface parameters: bitrate - 4800, 9600, 19200, 38400 bps; Modbus RTU protocol (8 data bits + 1 stop bit); Factory settings (unless otherwise ordered by the customer): address: 1; bitrate: 9600 bod; data: 8 bit; parity check: parity check bit.

2.1.4 Consumed power, max - 1 W.

Table 1 - Analog output signals

Ordering code	Output signal	Power supply (U _{power})	Load impedance	Power consumption
A	4...20 mA / 2 wire	12...36 V	≤1000 Ohm	<26 mA
V	4...20 mA / 3 wire	12...36 V	≤ 500 Ohm	
C	0...20 mA / 3 wire	12...36 V	≤ 500 Ohm	
D	0...10 V / 3 wire	12...36 V	> 10 kOhm	<7 mA
E	0...5 V / 3 wire	12...36 V	> 5 kOhm	
R	0.5...4.5 V / 3-wire	5 V / 6...15 V	> 5 kOhm	<2 mA
Q*	4...20 mA / 2 wire	12...28 V	≤1000 Ohm	<26 mA

* Intrinsically safe design (Ex version).

Table 2 - Digital output signals

Ordering code	Output signal	Power supply (U _{power})	Load impedance	Power consumption
M	RS-485/ Modbus RTU	12...36 V	-	<7 mA
H	4...20 mA / HART	12...36 V	≥250 Ohm	<26 mA

2.1.5 Overall dimensions, max:

- with analog output:

- ALZ 3720, ALZ 3720a, ALZ 3721 - Ø27 mm, length 122 mm;
- ALZ 3740, ALZ 3742 - Ø40 mm, length 133 mm;
- ALZ 3820, ALZ 3821 - Ø27 mm, length 168 mm;
- ALZ 3822, ALZ 3824 - Ø35 mm, length 186 mm;
- ALZ 3920 - Ø21 mm, length 125.6 mm;
- ALZ 3925 - Ø17 mm, length 131 mm.

- with digital output (Modbus RTU, HART):

- ALZ 3720, ALZ 3721 - Ø27 mm, length 135 mm;
- ALZ 3740, ALZ 3742 - Ø40 mm, length 133 mm;
- ALZ 3820, ALZ 3821 - Ø27 mm, length 186 mm;
- ALZ 3822, ALZ 3824 - Ø35 mm, length 209 mm.

2.1.6 Weight (without cable, cable weighs 70 grams max per meter of length), max:

- ALZ 3720, ALZ 3720a, ALZ 3721 - 0.3 kg; ALZ 3740 - 0.5 kg;
- ALZ 3742, ALZ 3820, ALZ 3821, ALZ 3822, ALZ 3824 - 0.4 kg;
- ALZ 3920 - 0.17 kg, ALZ 3925 - 0.1 kg.

2.2 Operating conditions:

- reservoirs, closed and open vessels filled with liquid medium non-aggressive to housing and seal materials;
- intrinsically safe design (Ex versions): hazardous environments (see explosion protection markings);
- atmospheric pressure from 84 to 106.7 kPa (group R1 under GOST R 52931);
- ambient air temperature from -20 to +75 °C;
- medium temperature from -20 to +75 °C (for ALZ 3742, ALZ 3822, ALZ 3824 - from -20 to +50 °C).

Mechanical attack resistance when in use - F3 group under GOST R 52931.

2.3 Operating limitations:

- never allow freezing or crystallization of the medium;
- connect the device where the medium is still or almost still and produces no vortices;
- never allow contamination of the diaphragm with silt, sand etc when installing the transmitter.

3 Safety precautions

3.1 Circuits of the device carry no dangerous voltage (class III under GOST 12.2.007.0).

3.2 Always cut off power when connecting sensor circuits.

4 Installation instructions

4.1 The transmitter is a metal cylinder with built-in hydrometric cable (ALZ 3720, ALZ 3720a, ALZ 3721, ALZ 3740, ALZ 3742, ALZ 3920, ALZ 3925) or detachable cable connection (ALZ 3820, ALZ 3821, ALZ 3822, ALZ 3824). It can be mounted to a signal cable.

4.2 Install the transmitter with maintenance convenience (incl. mounting, dismantling) in mind. We recommend mounting the transmitter with its diaphragm pointing downwards.

4.5 Connect transmitter's circuits as shown in Figure 1; see Table 3 for connections options for cable running from the transmitter.

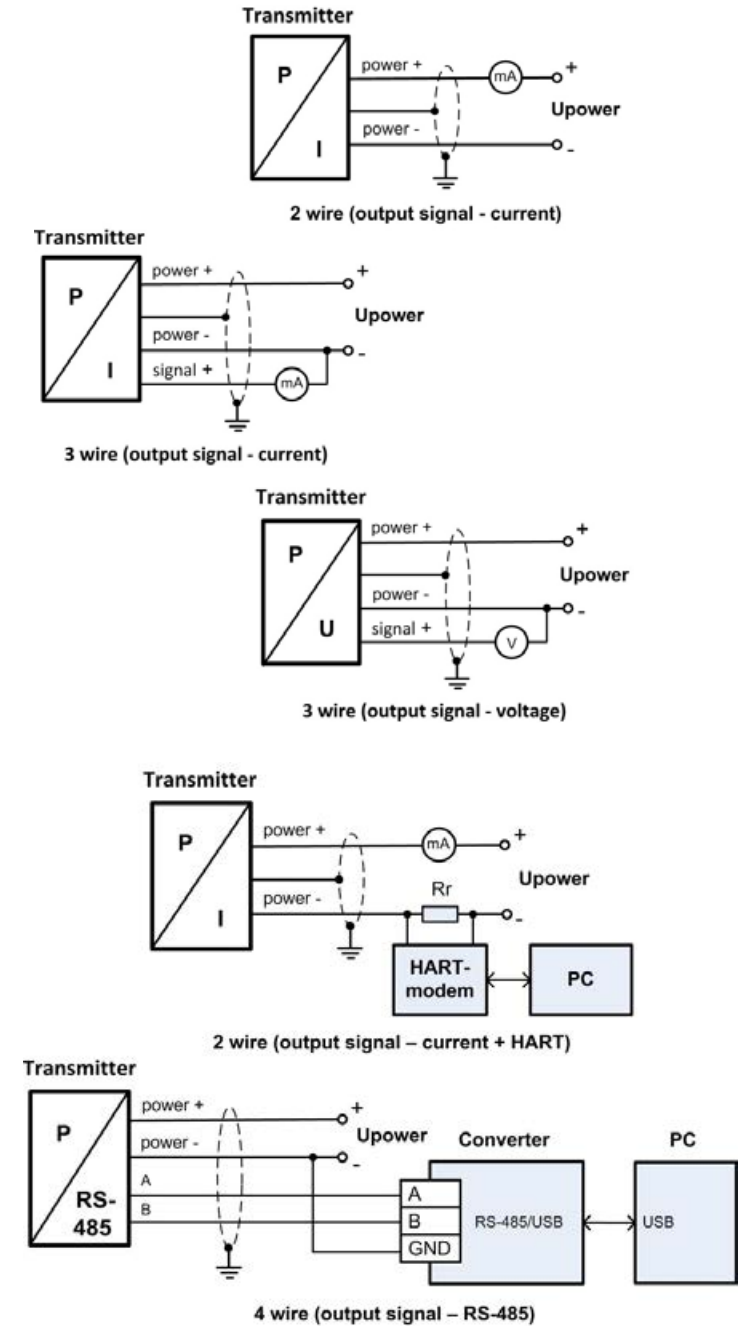


Figure 1 - Circuits connection diagrams

Table 3 - Circuits connection

Transmitter circuits		Wire inlet
2-wire line	power +	white
	power -	brown
	ground	yellow-green
3-wire line	power +	white
	power -	brown
	signal +	green
	ground	yellow-green
Pt100 (optional)	T+	yellow
	T-	pink
	T-	gray
RS-485	power +	white
	power -	brown
	A	yellow
	V	green
	ground	yellow-green
HART	power +	white
	power -	brown
	ground	yellow-green

Observe polarity when connecting the circuits; transmitters come with reverse polarity protection.

Note: see PIEZUS Explosion Protection Guidelines for additional components connection diagrams for intrinsically safe versions.

4.4 We recommend connecting the hydrometric cable to a standard instrumentation cable through the special termination box (BZ 05 or BZ 10). There is an air filter in the box through which the hydrostatic cable's capillary tube receives atmospheric pressure.



ATTENTION! Never allow moisture into capillary cable when mounting the transmitter.

5 Operation and maintenance

Routinely examine exterior of the devices in use. Check integrity of the housing, look for signs of damage and corrosion.

Routinely check diaphragm (it should be clean) and reliability of electrical connections. You can remove the plastic cap to access diaphragm.

Never apply high pressure to the transmitter when cleaning it.

Routine checkups of the device in use follow data specified in its passport.

See the device's passport for its calibration interval and manufacturer's warranty.



DO NOT:

- 1 allow voltage exceeding maximum specified for the transmitter;
- 2 use any objects to touch or otherwise apply mechanical force to the diaphragm;
- 3 use transmitters bearing visible signs of mechanical damage;
- 4 use transmitters in inappropriate climatic conditions;
- 5 allow medium temperatures above or below the limits specified for the transmitter; temperature above the limit may lead to medium seeping into the transmitter, temperature below the limit may render the transmitter inoperative.

Manufacturer refuses all claims, reclamations, complaints related to transmitters with damaged manufacturer seals and showing signs of damage resulting from inappropriate operation, transportation or storage.

All and any repairs are done by the manufacturer exclusively.

6 Transportation and storage

6.1 Use roofed transport to deliver transmitters to any destination needed; place individual packages into shipping containers if required.

6.2 Protect devices from impacts and vibrations while in transit; permissible temperature for transportation in shipping containers ranges from -50 to +85 °C.

6.3 Store transmitters in shipping containers:
- in a heated (+5 to 40 °C) ventilated space;
- on racks.

7 Package contents

See Table 4 for package contents details.

Table 4 - Package contents

Name	Quantity
ALZ level transmitter	1 pc
Passport	1 copy
User manual (this paper)	1 copy*
Calibration leaflet (CM 62292-15)	1 copy**
PIEZUS Explosion Protection Guidelines (Ex versions only)	1 copy **
Optional accessories	1 set**

* 1 copy per 10 transmitters for batch supplies to the same address.

** Supplied by special order.

8 Resource and service life

8.1 Operating mode - 24/7.

8.2 Mean time between failures, min – 100,000 h.

8.3 Average service life - 12 years (normal working conditions: non-aggressive medium, temperature at +23 ± 3 °C, no vibrations and shaking).

9 Disposal

9.1 Transmitter contains no precious metals.

9.2 Dispose of as prescribed by regulations adopted by the operator.

Supplement

Level transmitters exterior



ALZ 3720(a), ALZ 3721

ALZ 3820, ALZ 3821



ALZ 3740

ALZ 3742



ALZ 3822, ALZ 3824

ALZ 3920, ALZ 3925

Note: appearance may vary depending on the transmitter's configuration. Housing of Ex version is 30 mm longer.

PIEZUS

Made in Russia

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APZ PRESSURE TRANSMITTERS
(1110, 1120, 3020, 3230, 3410, 3420, 3421)
ALZ LEVEL TRANSMITTERS
(3720, 3721, 3820, 3821)



Explosion Protection Guidelines
Version 01

This instruction sheet applies to explosion-proof (Ex) versions of pressure transmitters. It contains technical information necessary for their correct mounting and operation in hazardous areas.

This instruction sheet is a supplement to the relevant Operation Manual; it offers typical connection diagrams for transmitters and their explosion protection components.

Explosion-proof versions have intrinsically safe circuits, level "ia", which allows bearing markings 0Ex ia IIC T4 Ga and 0Ex ia IIC T4 Ga X. X after Ex marking means there are special requirements to connection of pressure transmitters: integral communication cable must run outside of the hazardous area or in a box meeting the requirements of TP 012/2011.

 **Please pay special attention to paragraphs accompanied by this mark.**

1 General Information

1.1 Only specialists trained in handling explosion-proof equipment can mount the transmitters; before mounting, they must read this instruction sheet and Operation Manual.

1.2 Following documents regulate mounting of explosion-proof transmitters:

- Electrical Installations Code, Chapter 7.3 "Electrical Installations in Explosion Hazard Zones";
- Electrical Equipment Operation Rules, Chapter 3.4 "Electrical Installations in Explosion Hazard Zones";
- GOST R IEC 60079-0-2011 Explosive atmospheres. Part 0. Equipment. General Requirements;
- GOST R IEC 60079-11-2010 Explosive atmospheres. Part 11. Intrinsically safe electrical circuit "i";
- GOST IEC 60079-14-2013 Explosive atmospheres. Part 14. Design, Selection and Installation of Electrical Units;
- VSN332-74 Installation of Electrical Equipment, Power and Lighting Lines in Explosion Hazard Zones: Instructions.

2 Safety Precautions

2.1 The source of danger associated with pressure transmitters, their mounting and/or operation, is the medium, which is typically under pressure. Always close the valve up the medium line when mounting or disconnecting pressure transmitters.

Unplug the transmitter only after medium pressure equalizes with atmospheric pressure.

2.2 GOST 12.3.019, "Consumer Electrical Installations Operation Rules" and "Safety Rules For Consumer Electrical Installations Operation" must be observed when operating, servicing and calibrating the devices.

2.3 The electric shock hazard class of the devices is III (no dangerous voltage); see GOST 12.2.007.0 for full classification.

2.4 Always cut off power when connecting circuits.

 **NEVER use the device with aggressive media, i.e. media containing acids, alkalis, oils etc.**

3 Mounting

3.1 Ex versions of transmitters can be used in explosion hazard zones IIA, IIB, IIC, temperature classes T1 ... T4, as prescribed by regulations setting framework for application of electrical equipment in explosion hazard conditions.

3.2 Always check the exterior of the transmitter before mounting it. Check for visible mechanical damage and see if the Ex markings match the zone's category and class. The transmitter's surface must be dry and clean.

3.3 Connect or disconnect the transmitter to/from the medium only when its pressure equalizes with atmospheric pressure; alternatively, close valve up the medium line. Valves simplify routine control and maintenance operations.

3.4 See the Manual for additional recommendations pertaining to mounting.

4 Power Connection

4.1 General

4.1.1 Depending on the version, transmitters can have two- or three-wire connection circuits. Ordering code contains information about the transmitter's communication link type, which must be taken into account when connecting the transmitter.

4.1.2 To ensure compliance with explosion safety rules applicable to transmitters in specific locations:

- connect circuits as described in Supplement A;
- use additional equipment compliant with the requirements provided in clause 4.2;
- disconnect transmitter from power source when connecting communication cable.

4.1.3 We recommend using a circular cross-section wire (see transmitter's Specifications for its diameter) to ensure a reliable seal of the cable gland. Sealing cable gland with standard rings and gaskets is MANDATORY.

4.1.4 Do not run signal cables through a conduit/channel together with power cables; avoid running signal cables next to powerful electrical equipment.

4.1.5 Ensure compliance with requirements provided below when mounting transmitters in explosion hazard zones.

NOTE: You may use a DC power source (see Manual for voltage) for an intrinsically safe transmitter mounted outside of explosion hazard zones; in such a setup, the transmitter is no longer explosion-proof.

4.2. ia Explosion Protection

4.2.1 ia versions of transmitters are designed following guidelines provided in GOST 22782.5 and have their current and voltage limited to intrinsically safe values.

Transmitters receive power from intrinsically safe circuits of barriers (power supply units) located outside of the hazardous zones. These devices must have "Ex ia" certification good for the explosive mixtures they can come into contact with.

4.2.2 Electrical parameters of pressure transmitters (input, intrinsically safe):

- current signal 4...20 mA (2 wire):

$U_i \leq 28 \text{ V}$, $I_i \leq 93 \text{ mA}$, $P_i \leq 0.66 \text{ W}$; $C_i \leq 0,015 \mu\text{F}$, $L_i \leq 10 \mu\text{H}$;

- voltage signal 0.5...4.5 V (3 wire):

$U_i \leq 6 \text{ V}$, $I_i \leq 60 \text{ mA}$, $P_i \leq 0.1 \text{ W}$; $C_i \leq 0.5 \mu\text{F}$, $L_i \leq 10 \mu\text{H}$.

Note - Ex pressure transmitters bear the following data:


- explosion protection type;
- electrical parameters of explosion protection;
- number of the certificate of conformity.

5 Explosion protection in operation

5.1 Using Ex versions of pressure transmitters, you need to follow guidelines provided in this sheet, relevant Manual, chapter 3.4 of the Electrical Equipment Operation Rules, chapter 7.3 of the Electrical Installations Code, as well as other regulations covering operation of electrical equipment in hazardous areas.

5.2 The devices need maintenance; the routine includes external inspection that aims at checking:

- reliability of transmitter's connection to the medium line, its seals;
- its mechanical integrity, contamination with dust and dirt;
- integrity of the communication cable and its insulation.

 **Use of malfunctioning or damaged transmitters is strictly prohibited.**

5.3 Maximum period between maintenance checkups is one year; depending on the operating conditions, you may need to perform them more often.

5.4 Maximum medium pressure (in line, etc) should not exceed the transmitter's URL (upper range limit).

5.5. Never adjust ZERO and RANGE if the atmosphere around the transmitter is explosive.

Supplement A

Analog Output Connection

See figures A.1 and A.2 for typical transmitter circuits connection diagrams (Ex version).

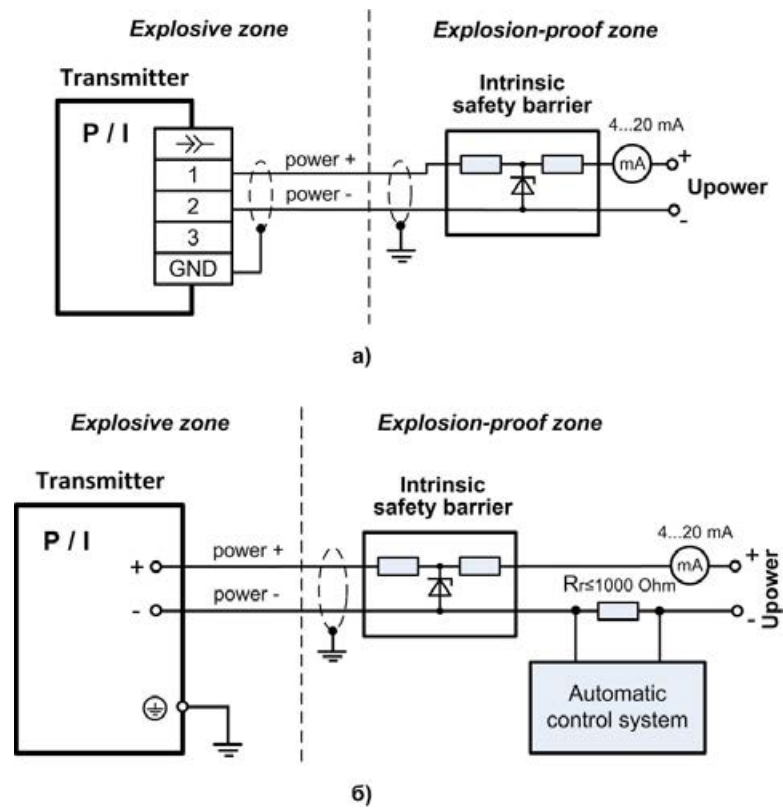


Figure A.1. Variant of analog output connection diagram, current signal: a) DIN 43650A connector; b) cable gland

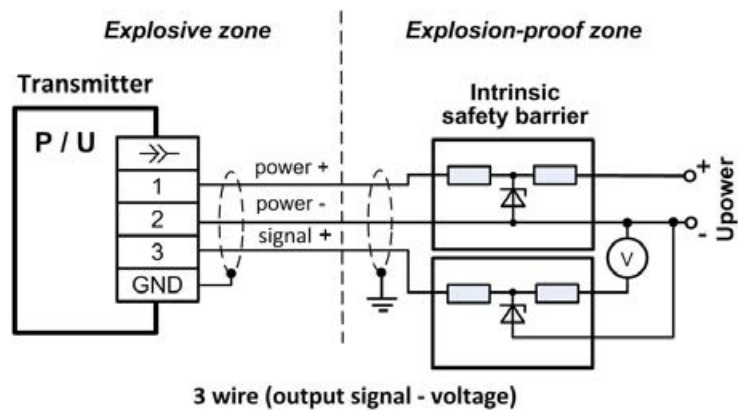


Figure A.2. Variant of analog output connection diagram, voltage signal, DIN 43650A connector