An instruction manual

CYYZ31Waterproof pressure transmitter

Typical application

▲ dely used
in various
industrial fieldsfields

1. Overview

1.1 Safety guidance

This operational manual contains important information on how to use the transmitter correctly. The installation personnel of the transmitter should read this manual carefully before operation. In case of further explanation or special questions, which cannot be addressed in this manual, please contact our company for assistance on necessary information.

Please pay attention to the warning signs on the manual! Do not use crystallized or solidified measure medium, to avoid damaging of the sensor.

The operator must strictly follow the safety instructions and user's manual during operation. Furthermore, the operator should comply with the occupational safety rules, the accident prevention guidelines, the national standards and engineering specifications as well.

Please keep this manual in a safe place near the transmitter for easy access.

-The right to modify the technical parameters is retained-

1.2 Icon description

⚠ Danger! - Hazard that may result in death or serious injury.

⚠ Warning!- Potential hazard that may result in death orserious injury.

⚠ Cautious!-Potential hazard that may cause minor injury.

! Reminder!-Potential hazard that may result in personal injury.

☞Tips!-Tips and information for smooth operation of the equipment.

1.3 Manual user

Warning! This manual is suitable for technicians.

1.4 Limit of liability

⚠The company will not be held responsible nor provide any warranty service, in case of transmitter damages caused by failure to follow the instruction manual, inappropriate use, self-modification or destruction.

1.5 Instructions for use

CYYZ31 series of pressure transmitter can be used to measure absolute pressure, negative pressure and gauge pressure depending on specific model.Its suitable for pressure measurement in liquid, gas and process industries. The operator is responsible of verifying whether the equipment is suitable for the application working condition. If there is any question, please feel free to contact our sales department in order to ensure correct use of the transmitter. The company is not liable of any impact resulted from inappropriate section of the product.

The purchased model is suitable for certain gas or liquid medium as described in the measurement samples. The user must ensure the compatibility of contact media and transmitter.

⚠Warning!
Inappropriate use may lead to danger!

2. Product overview

CYYZ31 series pressure transmitter products use the OEM pressure sensor which adopts stainless steel isolation diaphragm as the signal measuring component, and are automatically measured by computer. The zero temperature and sensitivity temperature compensation in a wide temperature range is achieved through the laser resistor trimming process.The amplifier circuit is fitted in a stainless casing, to convert the sensor signal into standard output signal, which fully utilizes the technical advantages of the sensor. As a result, the CYYZ31 series pressure transmitters have excellent performances, which are strong anti-interference, overload protection and shock resistance, low temperature drift, high stability, and high measurement accuracy. It is the ideal pressure measuring device in industrial automation field.

3. Working principle

The pressure sensors diffuses a wheatstone electric bridge on mono-crystalline silicon, and stressed by the measuring media (liquid or gas)to cause change of the bridge wall resistance value(piezoresistive effect). In result, a differential voltage signal will be generated, which converts the signal corresponding to the range into standard analog signal(as shown in Figure 3-1)or digital signal.

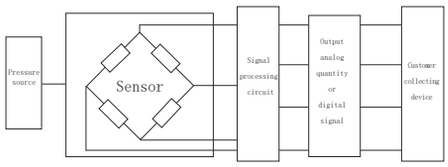


Figure 3-1

4. Product Features

a) Using diaphragm isolation technology

b) integrated chip, wide range of supplied voltage

c) Integral waterproofing, easy installation

d) Frequency cutoff design, strong anti-interference ability, lightning protection

e) Current limiting, voltage limiting, reverse connection protection(limiting current output)

f) High accuracy, good stability, fast response and impact resistance

5. Technical parameters

Measuring media : Liquid or gas(compatible with contact media)
Overall material: Diaphragm 316L stainless(contacted)
Process connection 304 stainless(contacted)
Casing 304 stainless
Seal component Nitrile rubber(contacted)
Cable: The range of less than 1.6 MPa and 7.2 mm is polyurethane.
Air Conduction Shielded Cable (Ultraviolet Protection)
The range > 1.6MPa 5mm is polyurethane
Shielded cable (anti-ultraviolet)
Pressure range: -100kPa～0～60MPa (read the range selection form for details)
Pressure mode: Gauge pressure, Absolute pressure, Negative pressure
Output signal: 4～20mA、RS485 (Standard Modbus-RTU protocol),
(0～5VDC、1～5VDC、0.5～2.5VDC customized)
Supply voltage: 12～36VDC Normal
15～36VDC (with display or output 0～10VDC)
3～5VDC Customized (Output 0.5～2.5VDC/RS485)
Accuracy class: 0.1%FS (range≧100kPa customized)
0.25%FS (range≧100kPa customized)
0.5%FS (10kPa≦range＜100kPa default)
1%FS (range＜10kPa default)
Working conditions: contact media temperature -40～85℃
Ambient temperature-40～85℃
Seismic performance : 10g(20...2000Hz)
Overload capacity: 200% full scale
Response frequency: analog signal output≦500Hz, digital signal output ≦5Hz
Stability : ±0.1% FS/year
Temperature Compensation:-10-70 ℃ (accuracy of 0.25% FS, 0.5% FS, 1% FS)
-40-80 ℃ (accuracy of 0.1% FS)
Temperature drift: ±0.01%FS/℃(within the temperature compensate range)
Overall weight : ≈500g (Containing 4m connecting wire)
Protection lever: IP68
Power range : Current type≦0.02Us(W)
Digital type≦0.015Us(W)
Voltage type≦0.008Us (W)
Voltage type (output 0.5～2.5) ≦0.001Us (W)
Note:Us=Supplied voltage
Load characteristics : Current type load ≦{(Us-7.5)÷0.02 (Us=supply voltage)}Ω voltae type load ≧100kΩ

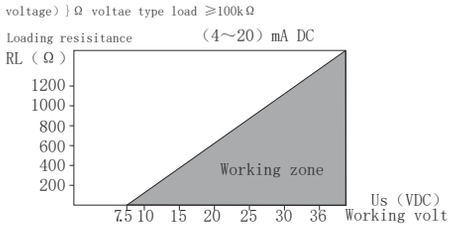


Figure5-1

6. Dimensions

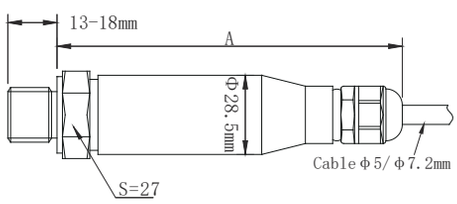


Figure6-1

Difference / Length	Analog quantity output	Digital quantity output
A	118mm	138mm

7. Installation and precautions

⚠ Warning!
a) Installed without pressure nor power supply.

⚠ Warning!
b) Transmitter should be installed by technician who read and understood this operational manual.

⚠ Danger!
c) The transmitter uses diffused silicon oil-filled core, which may cause explosions if in-properly handled. Do not measure oxygen for sake of he safety.

⚠ Danger!
d) This product is not explosion-proof, using in explosive area may cause serious injury and significant loss.

⚠ Warning!
e) It is prohibited to measure media that is not compatible with the transmitter.

☞ f) Please check if the package is in good order when receiving the product, confirm the transmitter model and specifications.

! g) No modification or change can be made to the device.

! h)Handle with care, do not throw, do not force during installation of transmitter.

☞ i)Vertical installation is applicable when pressure is below 0.03MPa (except for gas),to avoid affecting themeasurement accuracy. Others can be installed at any angle. In case the interface size does not match, it is allowed to make connecting adaptor.

☞ j)The pressure interface should be installed upward (for gas discharge), in hydraulic system.

☞ k)When installing extension wires on site, please ensure that the wiring part is kept dry and ventilated. It is strictly forbidden to soak and avoid dampness and dirt blocking the atmospheric connecting pipe in the cable center. Otherwise, the transmitter will be damaged or the measurement will be inaccurate.

☞ l) It is recommended to install at minor temperature gradient variations zone.

☞ m) It is recommended to adopt lightning protection and over voltage protection facility between power distribution box or power supply and the transmitter, for the fact that there will be danger if the transmitter is installed in a harsh area.

☞ n)While measuring steam or other high temperature media, please ensure the media temperature is not higher than the maximum work temperature of transmitter. If necessary, it is required to install a cooling device.

☞ o)Install a pressure cutoff valve between the transmitter and media, to inspect and avoid interference with measurement accuracy caused by pressure port clogging.

☞ p)During the installation, use a wrench to tighten the transmitter from the hexagonal nut at the bottom, to avoid wire disconnection caused by direct rotation of the upper part of the device.

! q) This product is a light current device, it must be laid separately from high current cables during wiring, and comply with relevant national wiring standard (GB/T50312-2016).

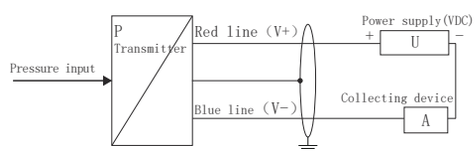
☞ r) Ensure that the power supply voltage meets the requirement of the transmitter. And make sure the maximum voltage of the pressure source is within the range of the transmitter.

☞ s)Increase pressure and reduce pressure very slowly during the pressure measurement, to avoid instantaneous high voltage or low voltage.

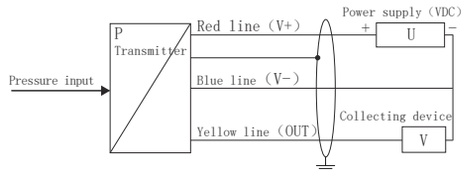
⚠ Warning!
t) Make sure the pressure source and power are disconnected before disassembling the transmitter, to avoid accidents in result of media ejection.

☞ u) Do not disassemble during usage, and do not touch the diaphragm, to avoid damage of the product.

8.接线安装



Current output wiring diagram 8-1 (two-wire system)



Voltage output wiring figure 8-2 (three-wire system)

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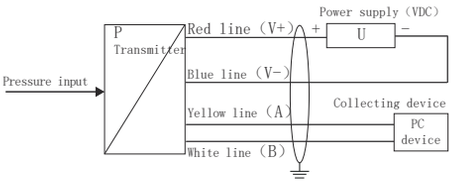

RS485 (digital signal) 8-6 output wiring diagram (four-wire system)

☞ Representing the shielded wire, all marked grounding points must be effectively grounded.

☞ The transmitter casing defaults to be ground, all field devices are required to be effectively grounded.

☞ Only the current output has reverse connection protection (no damage but does not work), current limiting and voltage limiting protection. Reversed connection of all other output signals can cause damage to the transmitter.

☞ If you need to install extension wires, please ensure that the wiring part is kept dry and ventilated.

9. Specification selection

CYZ31 Waterproof Pressure Transmitter selection table

CYYZ	Pressure transmitter						
	Code	Transmitter type					
	31	Waterproof type (default 4 m connecting cable)					
		Code	Range				
			See range selection table attached				
			Code	Signal output			
			A1	4-20mA Two-wire systme			
			RS	RS485 communication interface(standard Modbus-RTU protocol) four-wire system			
			DZ	Custom			
				Code	Connection type		
				14	M20*1.5 External thread (standard)		
				17	G1/4 External thread (common)		
				19	G1/2 External thread (common)		
				44	Custom		
					Code	Accuracy level	
					S	0.1%FS Customization (range ≥100KPa)	
					B	0.25%FS Regular (range ≥100KPa)	
					C	0.5%FS Regular (10kPa ≤ range <100kPa)	
					D	1%FS Regular (range <10kPa)	
						Code	Supply voltage
						G	12-36VDC
						G2	15-36VDC
						G3	3-5VDC Custom (Note 1)
						DZ	Custom
							Code	Custom
							D	Other custom requirements
							No	Regular
CYYZ	31	12	A1	14	B	G	Example of selection

For example,: CYYZ31-12-A1-14-B-G (Waterproof Pressure Transmitter, Range 0-1 MPa, Output 4-20 mA, Connection M20*1.5, Accuracy 0.25, Power Supply 12-36 VDC)
Note 1: Output 0.5~2.5VDC/RS485.

Range Selection Schedule

Code	Range	Code	Range	Code	Range	Code	Range
01	★0~1kPa	02	★0~2kPa	03	★0~5kPa	04	▲0~10kPa
05	▲0~20kPa	06	▲0~50kPa	07	0~100kPa	08	0~200kPa
09	0~0.4MPa	10	0~0.5MPa	11	0~0.6MPa	12	0~1MPa
13	0~1.6MPa	14	0~2.5MPa	15	0~4MPa	16	0~6MPa
17	0~10MPa	18	0~16MPa	19	0~20MPa	20	0~25MPa
21	0~30MPa	22	0~35MPa	23	0~40MPa	24	0~60MPa
31	100kPa (A)	32	200kPa (A)	33	0.5MPa (A)	34	1MPa (A)
35	2MPa (A)	36	★±1kPa	37	★±2kPa	38	▲±5kPa
39	▲±10kPa	40	▲±20kPa	41	▲±30kPa	42	▲±40kPa
43	±50kPa	44	±100kPa	45	-100~200kPa	46	-0.1~0.5MPa
47	-0.1~1MPa	48	★0~-1kPa	49	★0~-2kPa	50	★0~-3kPa
51	★0~-5kPa	52	▲0~-10kPa	53	▲0~-20kPa	54	▲0~-30kPa
55	▲0~-50kPa	56	0~-100kPa	57	★-1kPa~0	58	★-2kPa~0
59	★-3kPa~0	60	★-5kPa~0	61	▲-10kPa~0	62	▲-20kPa~0
63	▲-30kPa~0	64	▲-40kPa~0	65	▲-50kPa~0	66	-100kPa~0
67	Custom						

Remark 1: A represents absolute pressure; no mark represents gauge pressure;
Remark 2: Dry gas can only be measured when the range is less than 5 Kpa;
Remark 3: ★ Accuracy level 1; ▲ accuracy level 0.5; no mark accuracy level default 0.25, level 0.1 can be customized.
Remark 4: If range ≥ 60Mpa, the thread can only be chosen M20*1.5

10. Protocol Description

(limited to RS485 signal output 485 all product addresses default to 01)

10.1. Basic technical parameters of the transmitter

(This protocol complies with the Modbus communication protocol, and uses a subset of the Modbus protocol which is RTU mode. RS485 half-duplex working mode)

a) Output signal: RS485 (Maximum distance can be up to 1000 meters. Maximum connection 32 channels)
b) Standard Modbus-RTU protocol
(03 function reads data, 06 function inputs setting data)
c) Data format: 9600, N, 8, 1 (9600bps, no parity, 8 data bits, 1 stop)
d) Measurement range: 0-X (MPa, kPa....)
e) Resolution: 0.05%
f) Output data: 0...2000 (other range customize)
g) Response frequency: ≤ 5Hz
h) Response speed: ≥10ms

10.2. Modbus-RTU Read Data 03 Command Description (Data is hexadecimal)

Protocol format description					
	Device address	Function code	Data address	Number of read data	16CRC code(low before high after)
Host command	Address	03	00 00	CN	CRC0 CRC1
	Device address	Function code	Data byte	Sensor data	16CRC code(low before high after)
Return from machine	Address	03	02*CN	S_HN ,S_LN	CRC0 CRC1

Communication example (reading a sensor signal):

The sensor communication device address of 0-1.6 MPa is set to 01, ie [Address]=01 (Address range 01-254);
And, CRC0=84, CRC1=0a. Then send and return data should be as follows:

Send: 01 03 00 00 00 01 84 0A
Back: 01 03 02 02 AC B9 59

02AC is hexadecimal, converted to decimal 684;
Data output: 0-2000 corresponds to 0-1.6 MPa, so the current pressure is P=1.6*684/2000=0.5472MPa

Calculation formula: (range upper limit - range lower limit) ÷ 2000 * current data + range lower limit = current pressure value

Query example (read the current device address, only to be completed independently by a single sensor)

Send:FF 03 00 0F 00 01 A1 D7
Back:FF 03 02 00 01 50 50
Then: the address of this device is 01 (hexadecimal)

10.3. Modbus-RTU input 06 command detailed description (data is hexadecimal)

Protocol format description					
	Device address	Function code	Data address	New address	16CRC code (low before high after)
Host command	Address	06	00 0F	H L	CRC0 CRC1
	Device address	Function code	Data address	New address	16CRC code (low before high after)
从机返回	Address	06	00 0F	H L	CRC0 CRC1

Example of modification

For example, change 01 address to 09 address:
Send 01 06 00 0F 00 09 79 CF
Retun 01 06 00 0F 00 09 79 CF
Then the original address 01 is modified to 09 successfully, and the modification of address can be done offline or online. It can work directly without re-powering at completion.

10.4. Precautions for use

☞a) Single RS485 bus must adopt a "hand-to-hand" bus structure. Do not use a star connection or a fork connection. The address code is set from near to far, that is, the management computer is connected to the No. 1 controller, No. 2 is connected to No. 1, No. 3 is connected to No. 2, and so on...

⚠ Warning!

b) The AC power supply and the case of the equipment must be grounded properly and well. There are many places where there are triangular sockets which in fact, have no grounding at all. Be alerted. When the grounded properly, the equipment to release the energy by combining with the lightning protection design when struck by the lightning surge and the static electricity, to protect the RS485 bus equipment and related chips from damage. Do not use the RS485 bus if there is no grounding or not properly grounded, to avoid equipment burnout and casualties.

☞c) Wire must use multi-strand shielded twisted pair cable with diameter of more than 0.3 mm2 (multiple strands are for spare). Use PVC pipe separately to avoid lining with strong current to avoid interference from strong current.

☞d) 485 (A) and 485 (B) must be twisted together, because 485 communication uses differential mode communication principle, and twisted pair anti-interference performance is good. It is wrong not to use twisted pairs, and other types of cables.

☞e) Connect the RS485 converter and the reference ground GND (power supply negative) of all access controllers, and use the remaining one or all of the multiple twisted pair cables for the series GND; if the reference ground is not connected, it will also affect the communication time. Nowhere, high frequency radiation, mainly from distributed capacitance and inductance, produces a common mode effect.

☞f) The shield of the network communication line is grounded. It is required for grounding, otherwise the potentially danger of the bus is unknown.

☞g) If multiple machines or cables are too long for communication, add 120 ohm matching resistors between 485 (A) and 485 (B) at the head and end of the 485 bus, to improve the communication performance quality. (Must be pair twisted)

☞h) The transmission rate, number of load nodes and transmission distance should be reasonably arranged, to achieve remote low-node for low-speed, short distance multi-node for high-speed principle.

i) The data communication shall be verified to protect the transmission accuracy. Generally, the Modbus-RTU is verified by the crc-16 verification mode, and the error rate is less than 1/1billion.

j) If necessary, choose the company's isolated type model 485, the price is generally higher.

10.5. 16CRC verify

The 16CRC verification is a standard error check method used by the Modbus protocol. Generally, it has detailed descriptions and procedures, which is not explained here.

11. Initial start

⚠ Warning!

a) Before starting, it is a must to check if the transmitter is installed correctly, and if there is any obvious damage.

⚠ Warning!

b) The transmitter must be operated by professional technicians who read and understood this operating manual.

⚠ Warning!

c) The transmitter is only suitable for working conditions that meet the technical requirements!

12. After sales service

a) The company is responsible for all the maintenance costs during the warranty period, after inspected by the technician of the company and confirmed there is quality failure.

⚠ Warning!

b) Please clean the residual media before returning, especially substances that is harmful to human health, such as corrosive, toxic, carcinogenic or radioactive substances;

c) Please keep the warranty card and certificate in a safe place, and return with the product when there is need of repairing;

d) If there is any faulty with the transmitter, please contact our after-sales service. If you need to send the transmitter back to the company for repair after confirming the problem. Please attach the following information:
Description of the site environment;
Fault phenomenon;
Delivery address and contact information;

12.1Common fault analysis and elimination

Fault phenomenon	Cause analysis	Elimination method
• The transmitter has no output signal.	• The transmitter is not powered. • Fault connection.	• Supply power to transmitter correctly according to the wiring diagram.
• Output irregular jumps when the pressure is constant	• The transmitteris not grounded • Strong RF interference on site • No shielded cable applied	• Use shielded cable and ground the shield • The transmitter is properly connected to the earth
• The corresponding output value is incorrect when transmitter is not connected to pressure media	• The transmitter is not operating in required environment	• Move the transmitter to the specified environment or take action to ensure that the environment meets the requirements
• The transmitter output does not match with the measured pressure	• The supply voltage is incorrect •The external load is too large	• Whether it is within the power supply range • Adjust the external load

If the fault phenomenon does not fall within the above range, please contact our after-sales.

12.2 Calibration

Zero and full-scale drift may occur during the use of the transmitter. If the above phenomenon occurs after long time use, it is recommended to send the transmitter back to us for calibration to ensure high accuracy.

13. Transportation and storage

The transmitter should be kept in a sturdy cardboard box (large device requires a wooden box), free move in the box is not allowed, be careful when handling, do not handle with roughly. Store area .
should meet the following conditions:

☞a) Protect from rain and moisture.

☞b) Free from mechanical shock or shock.

☞c) Temperature range -20 ~ 55 ° C.

☞d) The relative humidity is not more than 80%.

☞e) No corrosive gas in the environment.

14. Unpacking precautions

☞ a) After unpacking, check the packing list to confirm if the documents and accessories are complete.
The packed documents are:

A copy of the instruction manual.

A product certificate.

A warranty card.

☞ b) Observe if there is any damage caused during transportation, for proper following up.

c) We hope that the user can safely keep the "warranty card", please don't misplace it, otherwise you can't return to the factory for free repair!

15. Instructions for ordering

⚠ Warning!

When purchasing the pressure transmitter, the user should select the appropriate model to make sure it meets specifications of the contact media ,such as the pressure , temperature , protection level and environmental conditions

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