

An instruction manual

SGS ISO (E

CYW18 gas collector type input level transmitter



Typical applications

- ▲ High temperature liquid measurement
- ▲ Corrosive liquid measurement
- ▲ Sewage measurement



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 usery stallized or solidified measure medium, to avoid damaging of the $\!\!$

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

The copyright of this operational manual is protected. This version of The copyright of this operational manual is protected. This version of operational manual was edited according to the functions of corresponding products, the product functions and operation procedures are described as complete as possible. If there is any error, please don't hesitate to contact us. The company is not responsible, in regard of any fault description or its possible consequences.

- 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

The input level transmitter is designed to continuously measure the The input level transmitter is designed to continuously measure the change of liquid level. Operators have the responsibility to check whether the equipment is suitable for the working conditions. If you have any questions, please contact our sales department to ensure the correct application of the transmitter. The Company shall not bear any responsibility for the influence caused by improper selection.

Users should ensure that the medium under test is compatible with the contact material of the transmitter.

▲ Warning! Inappropriate use may lead to danger!

2. Product overview

CYW 18 series gas collector liquid level transmitters adopt gas pressure conduction method to measure high temperature, corrosive liquid, sewage, etc. The transmitter consists of stainless steel gas collector, stainless steel capillary and junction box. The sensor part and signal processing circuit are inside the junction box, and the gas and medium in the gas collector put into the liquid are connected. The pressure is transmitted to the sensor through the air duct, which avoids the direct contact between the sensor and the measured medium. It is suitable for the measurement of high temperature corrosive liquids and other occasions, and effectively solves the problem of high temperature corrosive liquids and sewage level measurement.

3. Working principle

The pressure formula of the sensor facing the liquid surface is as follows: P = p gh + Po:

P : Pressure on the liquid surface of the sensor (hereinafter referred to as pressure for ease of understanding)

 ρ : Measured liquid density (debugging defaults tolg/cm³)

g : Gravity acceleration (9.8m/s 2 for debugging)

Po: Atmospheric pressure on liquid surface

h : Depth of sensor input into liquid

When the sensor is put into a certain depth of the liquid under test, the pressure of the medium under test is introduced into the positive pressure chamber of the sensor. The pressure P o on the liquid surface is connected with the negative pressure chamber of the sensor through the cable guide pipe to offset the positive pressure of the sensor, so that the pressure measured by the sensor is Rho gh. Obviously, the liquid level depth can be obtained by measuring the pressure P.

4. Product characteristics

a) Diffusion Silicon Pressure Sensor and Diaphragm Isolation Technology

b) Stainless steel capillary connection, directly put into the field, easy to install

- c) Amplifier circuit uses integrated chip, wide voltage supply
- d) Anti-clogging, anti-scaling and high temperature resistance
- e) Strong anti-lightning, frequency-cut jamming design and anti-jamming ability
- f) Connection Reverse and Overvoltage Protection, Current Limiting Protection (Current Limiting Output)

5. technical parameter

Source State of Sta

Response frequency: Analog signal output\sounts. Digital signal output\sounts.
Stability performance: ±0.1% PS/year temperature drift: ±0.01%S/C (Temperature Compensation Range)
Overall weight: ≈1300g
Protection Level: probe 1P68
Connection box Standard type 1P65
Intrinsically safe 1P65
Dust intrinsically safe explosion-proof 1P66
Note: The above protection level refers to the level achieved after the electrical connection is complete.
Power range: Current mode≤0.02Us(W)
Digital type≤0.01SUs(W)
Woltage type≤0.00SUs(W)
Voltage type≤0.00SUs(S)
Note: Us = supply voltage
Load characteristics: Current-mode load≤(Us-7.5) ÷0.02 (Us=Power supply voltage) } Q Voltage type load≥100kQ

Load resistance $(4 \sim 20)$ mA DC $RL(\Omega)$ 1200 1000 800 600 work area 400 200 7.5 10 15 20 25 30 36 working voltage

Figure 5-1

6. Shape size

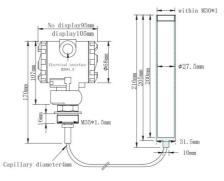
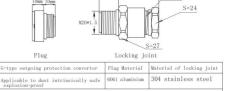


Figure 6-1



1 Tug	LOCKING JOINE			
P-type Out-line Protection Converter	Plug Material	Material of locking joint		
Applicable standard type and intrinsically safe type	6061 aluminium	nylon		
Note: Lock line	diameter 5-9 m	m		



Note: Lock line diameter 5-6 mm

7, Explosion-proof instructions

7.1 Explosion-proof Types and Marks

The transmitter is divided into intrinsic safety type and dust explosion-proof intrinsic safety type.

(1) Intrinsically safe type: GB3836.1-2021, GB3836.4-2021

Explosion-proof sign: Ex IA II C T6 Ga

Intrinsic safety parameters: Ui=D28.0V Ii=93mA Ci=50nF Pi=0.65W Related device parameters: Uo < Ui Io < Ii Po < Pi Co = Cc + Ci Lo =

Lc + Li Uo, Io, Po, Co and Lo are the parameters of safety grids, while Cc and Lc are the distribution parameters of connecting cables.

Explosion-proof certificate number: CMExC22.41002X

(2) Essential safety type of dust: GB3836.1-2021, GB3836.4-2021 Explosion-proof sign: Ex IA II C T6 Ga, Ex ia IIIC T85°C Da Intrinsic safety parameters:Ui=D28.0V Ii=93mA Ci=50nF Pi=0.65W Related device parameters: Uo < Ui Io < Ii Po < Pi Co = Cc + Ci Lo =

Uo, Io, Po, Co and Lo are the parameters of safety grids, while Cc and Lc are the distribution parameters of connecting cables.

Explosion-proof certificate number: CMExC22.41002X

7.2 Cautions for Use of Explosion-proof Transmitter

Lc + Li

(a) Transmitters shall be installed strictly in accordance with the relevant provisions of GB3836.15-2017 "Electrical equipment for explosive gas environment Part 15: Electrical installation in dangerous places (except coal mines)"

C) The shell of the product is made of aluminium alloy. The ignition hazard caused by impact or friction must be prevented.

↑ Warning!

D) When the internal parts of the transmitter are damaged and need to be repaired or replaced, they need to be replaced or repair at the factory.

Warning!

E) When flameproof and dust intrinsically safe transducers are used in dangerous places, the shell cover of the transducer must be tightened. In order to ensure the safety of the transducer, safety regulations should be strictly observed and the cover of the transducer should never be opened when the power is on. When installing the transmitter, the lead-in and exit of the cable should be well sealed.

DANGER! F) Essentially safe transmitters must be equipped with safety grids to be used in dangerous places with explosive mixtures. Safety grate shall comply with GB3836.4-2010 Tessential Safety Type I' of Electrical Equipment for Explosive Gas Environment Part 4, and shall be tested by relevant explosion-proof departments and obtained explosion-proof certificate. Installation shall be carried out in accordance with the requirements of the instructions. The system wiring is shown in Figure 7-1.



Awarning!

(i) For the sake of safety, intrinsic safety loop and non-intrinsic safety loop should be distinguished, and the connection of intrinsic safety loop should be separated from that of other electrical circuits. Power transformers supplying power to safety grids shall meet the requirements of Article 8.1 of GB3836.4-2010 Standard.

provisions of the State.

8. Installation and precautions

A Warning!

b) Prohibit measurement of media incompatible with transmitter contact material.

(Spc) When receiving the product, please check whether the package is in good condition, and check whether the transmitter model and specifications are in conformity with the products you choose.

- ! d)No modifications or changes can be made to the equipment.
- $!\ e\rangle Do$ not throw the transmitter at will. Do not use brute force when installing the transmitter.

(F) If the transmitter is installed in a bad site and will encounter dangerous damage such as lightning strike or overvoltage, we recommend that the user protect against lightning strike and overvoltage between the distribution box or power supply and the transmitter.

(g g) The gas collecting cylinder of the transmitter shall be installed vertically. It shall be ensured that impurities such as sediment are not buried or blocked in the probe part of the transmitter. The capillary should avoid sharp bending and be installed vertically as far as possible to prevent the capillary from being blocked or broken.

(S) When the medium fluctuates greatly, measures should be taken to fix the probe part of the transmitter, such as adding a fixed tube sleeve to the transmitter, inserting or installing a steel pipe or PVC pipe larger than the diameter of the probe in water, and opening a number of small holes about 5 mm at different reverse heights of the pipe in the direction of water flow, so that water enters the pipe. As shown in Figure 7-1



(30) This product belongs to weak current equipment. It should be separated from strong power cables when wiring. It should be wired in accordance with the relevant national wiring standards (GB/T50312-2016).

(P) Ensure that the supply voltage of the power supply meets the requirements of the power supply of the transmitter.

 (\mathbf{p}^-) k) The sensor is a precise device. Users should not disassemble it by themselves, let alone touch the diaphragm, so as to avoid damage to the product.

9. Wiring installation

9.1 Installation indication

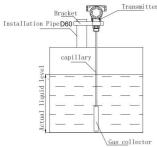


Figure 9-1 Bracket Installation Diagram

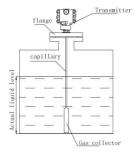


Figure 9-2 Flange Installation Diagram

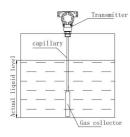
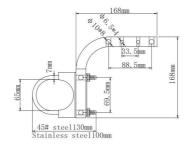


Figure 9-3 Thread Installation Diagram



Texture of material	Galvanizing 304 Stainless Steel or 45# Steel
weight	≈500g

Figure 9-4 Dimension Diagram of Installation Bracket

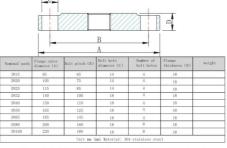
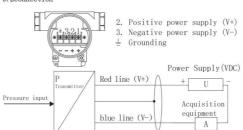


Fig. 9-5 Dimension Diagram of Installation Flange Note: Installation bracket and flange should be selected separately.

9. 2connection



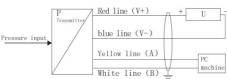
Current output wiring diagram (two-wire system)



Pressure inpu blue line (V-) Acquisition equipment Yellow line (OUT V

Voltage output wiring diagram (three-wire system)





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

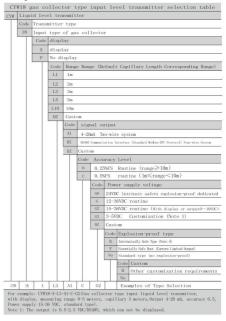
Represents the shielding line, all the marked grounding points shall be effectively grounded.

Polly the current output has reverse protection (no damage but no we current limiting and voltage limiting protection. Reverse connection of other output signals will cause damage to the transmitter.

Users should ensure that the diameter of the cable used is within the allowable range of the jacket. In addition, it is necessary to ensure that the cable is firmly and seamless installed in the jacket.

Be sure to tighten the thread lock mother to ensure the protection level.

10. Specification Selection



11. Protocol Description

485 all product addresses default to 01)

11.1. 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: O-X (MPa, kPa...)
- e) Resolution: 0.05%
- f) Output data: 0...2000 (other range customize) g) Response frequency: ≤ 5Hz
- h) Response speed: ≥10ms

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

		Protoc	ol forma	t description	
	Device address	Function code	Data address	Number of read data	16CBC code(low before high after)
Host command	Address	03	00 00	CN	CRC0 CRC1
	Device address	Function code	Data byte	Sensor data	16CBC code(low before high after)
Beturn from	Address	03	02*CN	S_HN , S_LN	CRCO CRC1

Communication example (reading a sensor signal):

The sensor communication device address of O-5m 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 0-5m, so the current pressure is P=5*684/2000=1.71m

Calculating formula; upper limit of range 2000*current data = current liquid level value

 ${\tt Query\ example}({\tt read\ the\ current\ device\ address,\ only\ to\ be\ completed}$ 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)

11.3. Modbus-RTU input 06 command detailed description $({\rm data\ is\ hexadecimal})$

		Protoco	ol forma	t descrip	otion	
	Device address	Function code	Data address	New address	16CRC code	(low before high after)
Host command /	Address	06	00 OF	H L		CRCO CRC1
	Device address	Function code	Data address	New address	16CRC code	(low before high after)
Return from machine	Address	06	00 OF	H L		CRCO 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.

11.4. Precautions for use

(Pa) 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.

⚠ 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.

 (\mathcal{F}_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.

(a) 485 (b) 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.

(\$Pe) Connect the RS485 converter and the reference ground GND (power (S = Q)Connect the KS48S converter and the reference ground GAD (power supply negative) of all access controllers, and use the remaining one or all of the multiple twisted pair cables for the series GAD; 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.

(Must be 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

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.

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

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

12. 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.

 $b)\,\mbox{The transmitter}$ 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!

13. 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 ar 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;

13.1Common 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.	
• Irregular output jump at constant liquid level	• Strong RF interference on site • No shielded cable applied	Use shielded cable and ground the shield	
• TWhen the transmitter does not sense the liquid level, the corresponding output value is incorrect.	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 level 	• 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.

13.2 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 sen the transmitter back to us for calibration to ensure high accuracy.

14. 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:

(pa) Protect from rain and moisture.

(\$\mathbb{F}\) Free from mechanical shock or shock.

 $\mbox{\em \em c}$) Temperature range -20 $^{\sim}$ 55 $^{\circ}$ C.

(3°d) The relative humidity is not more than 80%.

(Fe) No corrosive gas in the environment.

15. Unpacking precautions

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

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!

16. 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