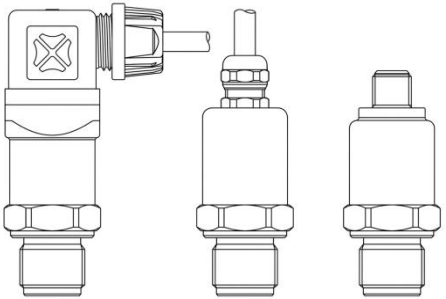
Compact Pressure Transmitter



Headquarters

5th floor,Building 4,Singapore Hangzhou Science Technology Park,No. 6 street, Hangzhou Economic Development Area,Hangzhou 310018,China

Singapore

2 Venture Drive #11-30 Vision Exchange Singapore

info@supmea.com
www.supmea.com
Supmea Automation Co.,Ltd.

U-SUP-PE100-EN1.1

Preface

Thank you for purchasing the temperature transmitter. Please read this manual carefully before operating and using it correctly to avoid unnecessary losses caused by incorrect operation.

Note

- Modification of this manual's contents will not be notified as a result of some factors, such as function upgrading.
- We try our best to guarantee that the manual content is accurate. If you find something wrong or incorrect, please contact us.
- This product is forbidden to use in explosion-proof occasions.

Version

U-SUP-PE100-EN1.1

Disclaimer

- The company does not make any guarantees for terms outside the scope of this product warranty.
- This company is not responsible for damage to the instrument or loss of parts or unpredictable damage caused directly or indirectly by improper operation of the user.

Package contents

No.	Name	Quantity	Remarks
1	Compact pressure transmitter	1	
2	User manual	1	
3	Certificate	1	

Package contents

After opening the box, please confirm the package contents before starting the operation. If you find that the model and quantity are incorrect or there is physical damage in appearance, please contact us.

Contents

1 Introduction

1.1. Overview

The compact pressure transmitter adopts an imported, highly stable diffused silicon sensing element. With a dedicated conditioning circuit, the measured electrical signal is converted into standard output signals such as current, voltage, or RS485 communication signals.

It is widely used in industrial sectors, including petroleum, chemical processing, metallurgy, power generation, light industry, and environmental protection, enabling the measurement and control of gauge pressure, absolute pressure, or sealed reference pressure of various fluids.

1.2. Measurement Principle

The diffused silicon pressure sensor operates based on the piezoresistive effect. According to this principle, the pressure of the measured medium is transmitted to the sensing diaphragm of the silicon piezoresistive chip through an isolation diaphragm and filled with silicon oil. This brings a minute displacement of the sensing diaphragm proportional to the applied pressure. This resistance of the integrated Wheatstone bridge on the diaphragm changes accordingly. The electronic circuit detects this change and converts it into a corresponding standard output signal representing the measured pressure.

1.3. Features

- Compact structure with a small and aesthetic design.
- Advanced diaphragm and oil-filled isolation technology
- High stability and reliability
- Vibration-resistant and resistant to radio-frequency interference
- 316L stainless steel isolation diaphragm structure
- All-stainless-steel construction
- Supports voltage, current, and RS485 signal outputs
- Strong anti-interference capability with excellent long-term stability.
- Wide measuring range, supporting absolute, gauge, and sealed reference pressure.

1.4. Technical Parameters

Table 1 Technical parameters

<table>
<tr><th colspan="3">Input</th></tr>
<tr><td>Measured variables</td><td colspan="2">Gauge, absolute, and sealing pressure</td></tr>
<tr><td>Measuring range</td><td colspan="2">-100kPa...0kPa~35kPa...20MPa</td></tr>
<tr><th colspan="3">Output and load resistors</th></tr>
<tr><td rowspan="6">Transmitter output</td><td>Output type</td><td>Load resistor R_L</td></tr>
<tr><td>(4~20) mA</td><td>$R_L \leq (U-10V)/0.02A$</td></tr>
<tr><td>(1 ~5)V</td><td rowspan="4">$R_L \geq 5k\Omega$</td></tr>
<tr><td>(0~5)V</td></tr>
<tr><td>(0 ~ 10)V</td></tr>
<tr><td>(0.5 ~ 4.5)V</td></tr>
<tr><td colspan="2">Note: U is the supply voltage, in volts (V).</td></tr>
<tr><td>Communication</td><td colspan="2">RS485 interface, Modbus</td></tr>
<tr><th colspan="3">Power supply</th></tr>
<tr><td rowspan="6">Power supply</td><td>Output type</td><td>Power supply range</td></tr>
<tr><td>(4~20) mA</td><td>(10~32) V</td></tr>
<tr><td>(0~5) V, (1~5) V</td><td>(8~32) V</td></tr>
<tr><td>(0~10) V</td><td>(12~32) V</td></tr>
<tr><td>(0.5 ~ 4.5) V</td><td>(4.75 ~ 5.25) V</td></tr>
<tr><td>RS485 output</td><td>(8 ~ 32)V</td></tr>
<tr><td>Electrical interface</td><td colspan="2">See Chapter 4 Electrical Connection</td></tr>
<tr><th colspan="3">Performance parameters</th></tr>
</table>

Accuracy	Level 0.2 / 0.25 / 0.5
Long-term stability	±0.2%FS/year Note: Pressure ranges below 35kPa are increased proportionally.
Response time	Current and voltage output type: T_{90} ≤10ms RS485 output type: T_{90} ≤100ms
Temperature drift	Temperature drift coefficient: ±0.3%FS/℃ (typical value); 10kPa ≤ range ≤ 60kPa: total deviation≤ 2%FS (within the temperature compensation range) 6kPa < range ≤ 60MPa: total deviation≤ 1.5%FS (within the temperature compensation range)
Compensation temperature	10kPa ≤ range < 25kPa: (0 ~ 60)℃ 25kPa ≤ range ≤ 60kPa: (0 ~ 70)℃ 60kPa < range ≤ 60MPa: (-10 ~ 70)℃
Insulation resistance	20MΩ , 500VDC
Insulation strength	50Hz, 500VAC
Protection level	IP65
Process conditions	
Overload pressure	(0.035 ~ 10) MPa: 150%FS (10 ~ 60) MPa: 125 %FS
Medium temperature	(-20~85) ℃
Environmental conditions	
Operating temperature	(-20 ~85) ℃
Storage temperature	(-40 ~85) ℃

2 Structure and Dimensions

2.1. Hirschmann Connector

(1) Upper limit of range ＜ 1MPa

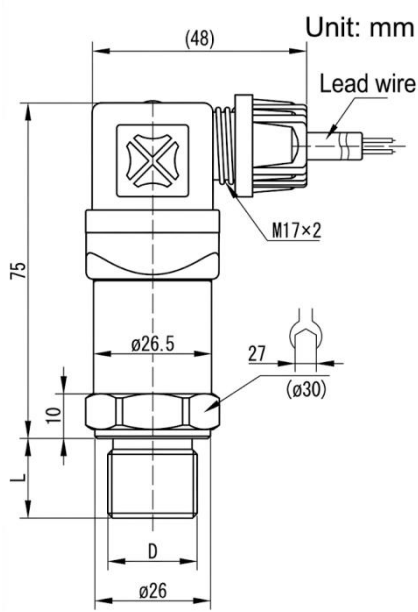


Fig.1 Dimensions of Hirschmann Connector Type

(2) 1MPa ≤ Upper limit of range ≤ 20MPa

Unit: mm

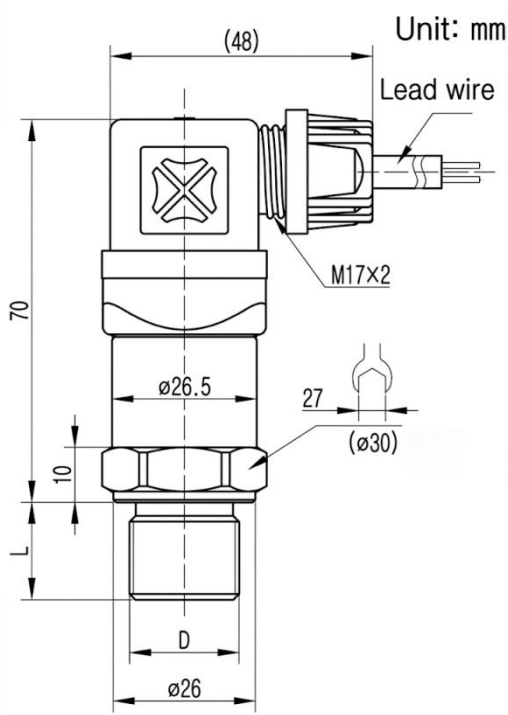


Fig.2 Dimensions of Hirschmann Connector Type

(3) 20MPa < Upper limit of range ≤ 60MPa

Unit: mm

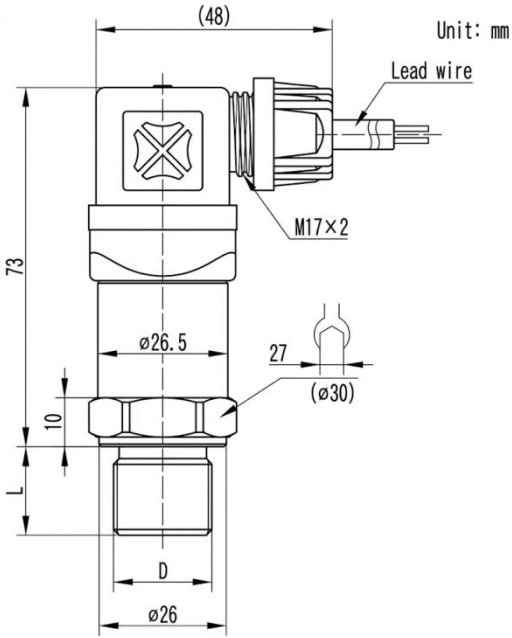


Fig.3 Dimensions of Hirschmann Connector Type

2.2. Aviation Connector

(1) Upper limit of range ＜1MPa

Unit: mm

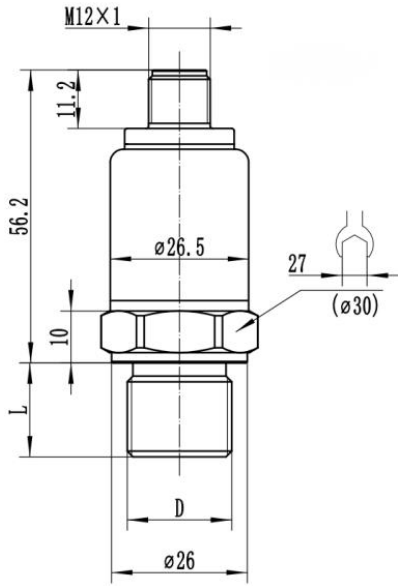


Fig.4 Dimensions of Aviation Connector Type

(2) 1MPa ≤ Upper limit of range ≤ 20MPa

Unit: mm

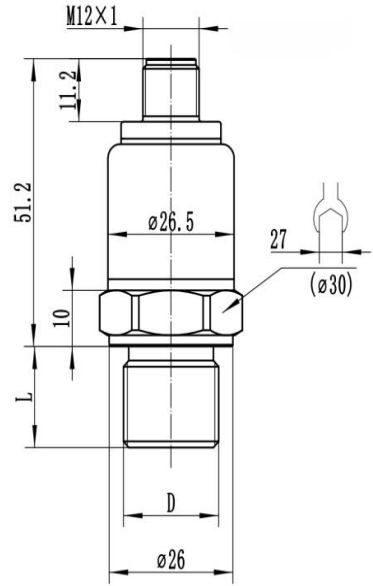


Fig.5 Dimensions of Aviation Connector Type

(3) 20MPa < Upper limit of range ≤ 60MPa

Unit: mm

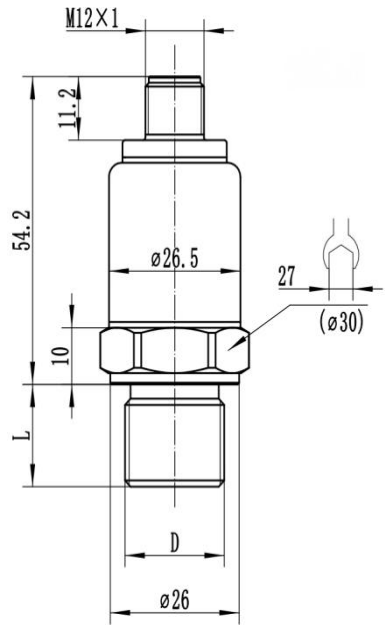


Fig.6 Dimensions of Aviation Connector Type

2.3. Lead Wire

(1) Upper limit of range < 1MPa

Unit: mm

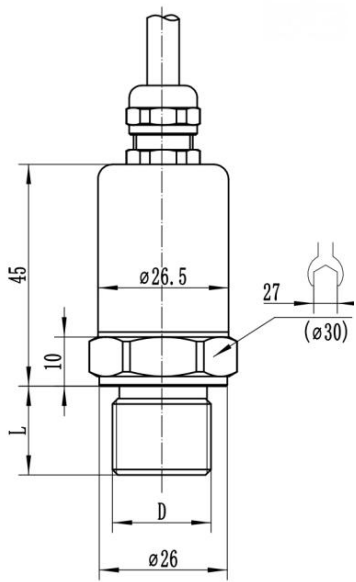


Fig.7 Dimensions of Lead Wire Type

(2) 1MPa ≤ Upper limit of range ≤ 20MPa

Unit: mm

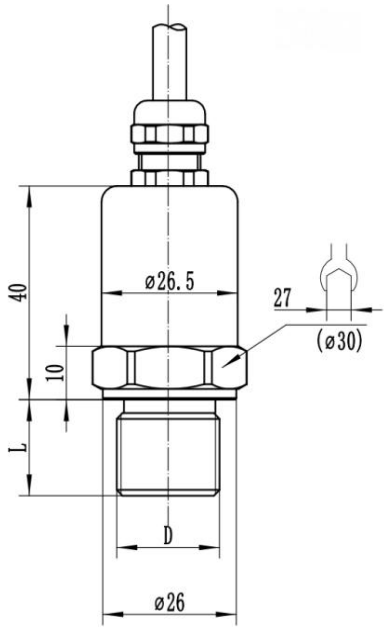


Fig.8 Dimensions of Lead Wire Type

(3) 20MPa＜ Upper limit of range ≤ 60MPa

Unit: mm

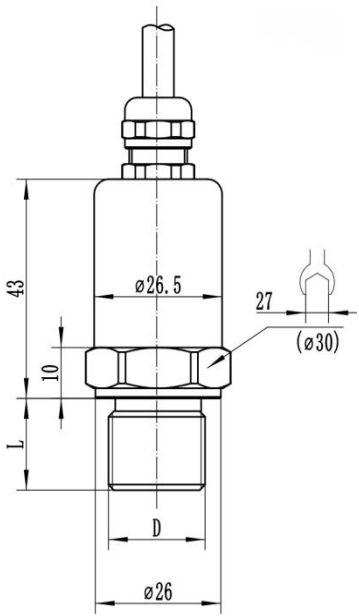


Fig.9 Dimensions of Lead Wire Type

2.4. Packard Connector

(1) Upper limit of range＜1MPa

Unit: mm

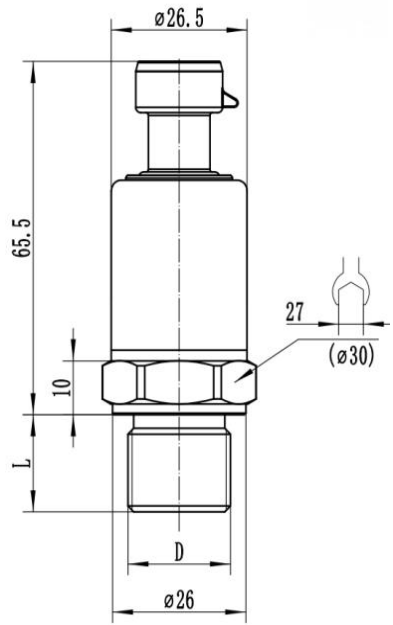


Fig.10 Dimensions of Packard Connector Type

(2) 1MPa ≤ Upper limit of range ≤ 20MPa

Unit: mm

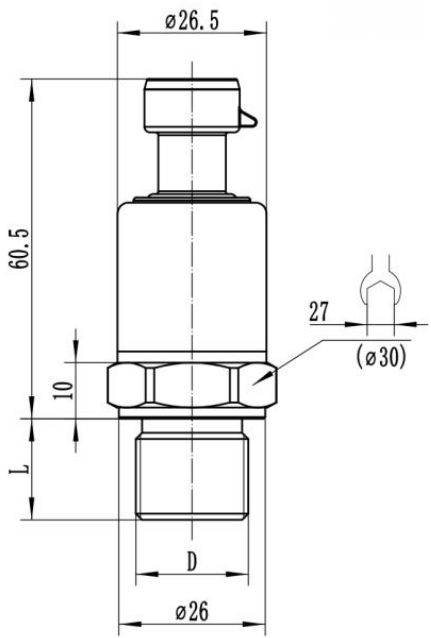


Fig.11 Dimensions of Packard Connector Type

(3) 20MPa ＜ Upper limit of measuring range ≤ 60MPa

Unit: mm

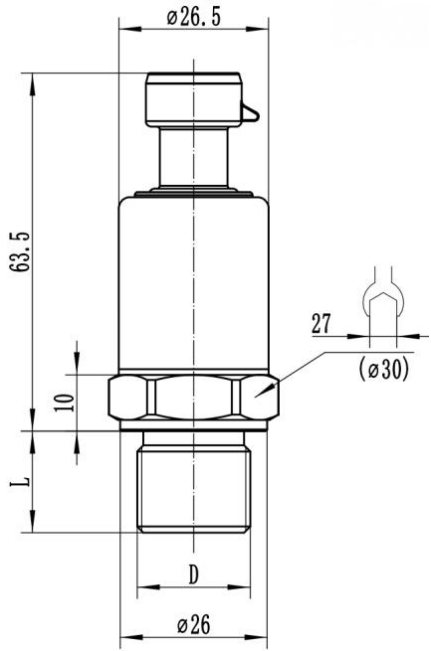
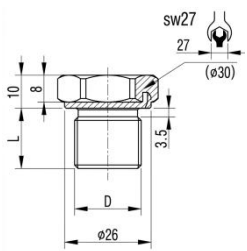


Fig.12 Dimensions of Packard Connector Type

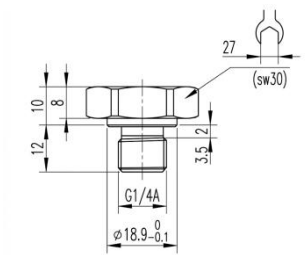
2.5. Process Connection

Process connections: standard M20×1.5 thread, G1/4 B thread, G1/2 B thread, NPT 1/4 thread, NPT 1/2 thread, M14×1.5 thread, 7/16-20UNF thread, etc. Special threads need to be customized.

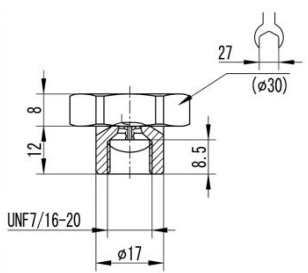
Table 2 Thread size



Thread type D	Thread length L （mm）
M20×1.5	18
G1/4	15
G1/2	18
NPT 1/4	15
NPT 1/2	18
M14×1.5	15



G1/4A thread



7/16-20UNF thread

2.6. Material

Shell material: 304SS or 316LSS

Membrane material: 316LSS

Process connection material: 304SS or 316LSS

3 Installation

3.1. Installation Notes

(1) Handle and install the transmitter with care to avoid collisions that could affect the circuit performance.

(2) There is an isolation diaphragm inside the transmitter pressure inlet. Do not touch it with foreign objects to prevent deformation and damage to the internal chip.

(3) Ensure that the external thread of the transmitter is sealed, the pressure will be inaccurate and unstable.

(4) When installing outdoors, the transmitter should be placed in a well-ventilated and dry place to protect it from sunlight and rain, which otherwise may compromise its measurement performance and even worse wrought malfunction.

3.2. Installation Conditions

(1) The pressure transmitter can be directly installed at the measurement point.

(2) Pressure transmitters should be installed in locations with minimal temperature fluctuations, and vibration and impact should be avoided.

(3) Signals should not be run through conduits or exposed cable trays along with other power lines, nor should they pass near high-power equipment.

(4) For steam measurement, the condensate loop shall be installed in accordance with relevant standards to form an effective water seal, preventing high-temperature steam from directly contacting the sensing diaphragm and damaging the sensor.

4 Electrical Connection

4.1. Hirschmann Structure Connection

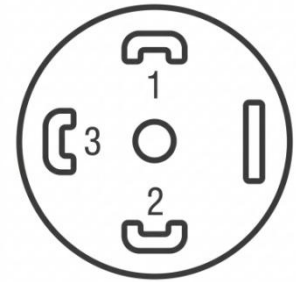


Fig.14 Hirschmann connector (DIN 175301-803 A)

Table 3 Wiring definition

No.	Current output	Voltage output	RS485
1	$V_{supply+}$	$V_{supply+}$	$V_{supply+}$
2	Iout	$V_{supply-}$	$V_{supply-}$
3	-	V_{out}	RS485-A
⏚	-	-	RS485-B

4.2. Aviation Connector Connection

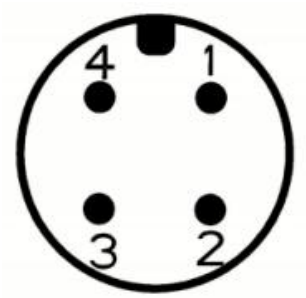


Fig.15 Diagram of aviation connector (M12×1)

Table 4 Wiring definition

No.	Cable color	Current output	Voltage output	RS485
1	Brown	$V_{supply+}$	$V_{supply+}$	$V_{supply+}$
2	Black	-	$V_{supply-}$	$V_{supply-}$
3	Blue	Iout	V_{out}	RS485-A
4	White	-	-	RS485-B

4.3. Direct Lead Connection

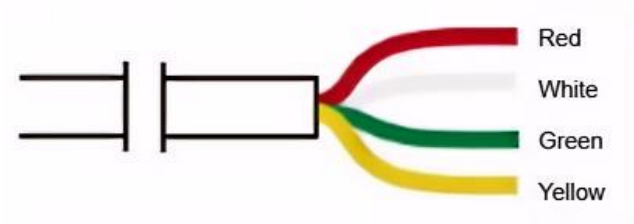


Fig.16 Lead wire diagram

Table 5 Wiring definition

Color	Current output	Voltage output	RS485
red	$V_{supply+}$	$V_{supply+}$	$V_{supply+}$
yellow	-	V_{out}	RS485-B
green	I_{out}	$V_{supply-}$	RS485-A
white	-	-	$V_{supply-}$

4.4. Packard Connector

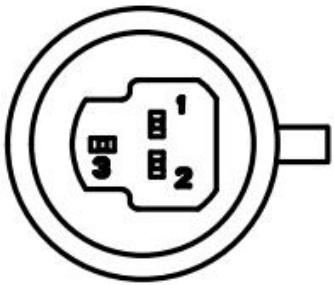


Fig.17 Packard connector wiring

Table 6 Wiring definition

No.	Current output	Voltage output
1	I_{out}	$V_{supply-}$
2	$V_{supply+}$	$V_{supply+}$
3	-	V_{out}

5 Precaution for Use

(1) This transmitter is suggested to be applied in media that are non-corrosive to stainless steel.

(2) The maximum instantaneous pressure of the measured system must not exceed the rated load pressure.

(3) The back end of the pressure transmitter must not come into contact with conductive or corrosive liquids or gases.

(4) Do not insert sharp or hard objects into the pressure input port to avoid damaging the core.

(5) Ensure no water penetrates into the sensor’s rear lead wires.

6 Fault Analysis and Troubleshooting

The table below lists potential problems with pressure transmitters and their solutions. If your problem is not listed or the solution does not address your issue, please contact our company.

Table 7 Common Fault Analysis and Troubleshooting

Troubles	Possible reasons	Solutions
Unstable pressure readings	The pressure source itself is unstable	Check the pressure source
	Pressure transmitter damaged	Contact our company
Pressure remains unchanged	Pressure hole blockage	Check the pressure port
	Zeroing under pressure causes	Reset to zero without applying pressure.
	Pressure transmitter damaged	Contact our company

7 Warranty and After-Sales Service

Our company guarantees that any product quality issues arising during the warranty period will be covered under our unconditional warranty policy, which includes free repair, replacement, or return. All non-customized products are eligible for return or exchange within 7 days (excluding products damaged due to misuse). For customized products, the warranty terms specified in the contract shall apply.

Disclaimer

The following situations are not covered by the warranty policy, even during the warranty period:

(1) Product malfunctions caused by improper use by the customer.

(2) Product malfunctions resulting from unauthorized disassembly, repair, or modification by the customer.

Appendix A Communication Protocol

A.1 Protocol Overview

The pressure transmitter can be equipped with MODBUS RS485 communication functionality. Please refer to the Electrical Connections section for communication wiring instructions. The specific default communication parameters for MODBUS-RTU are shown in the table below.

Table 8 Default communication parameters

Device address	1
baud rate	9600
Data bits	8-bit
Stop bit	1 person
Parity check	none
Data transmission format	1-0-3-2

A.2 Function Codes

Table 9 Function code

Function code	Description
0x03	Read register data, error return code 0x83
0x06	Writing to a single register resulted in an error return code of 0x86.
0x10	Writing to multiple registers resulted in an error return code of 0x90.

A.3 Register Address

Table 10

Address	Name	Data	Registers	Bytes	RW	Description
0x1100	Device address	uint8_t	1	2	RW	1 ~ 247, default 1
0x1101	Baud rate	uint8_t	1	2	RW	1=2400 2 = 9600 (default) 3=14400 4=19200 5=38400 6=57600 7 = 115200 8=1200 9=4800
0x1102	Serial port format	uint8_t	1	2	RW	1=N81 (default) 2=N82 3=E81 4=O81 N: No verification E: Even parity O: Odd parity 8: Data bits (8 bits) 1: Stop bit 1 2: Stop bit 2
0x1201	Measurement parameter	uint16	1	2	OR	This register is fixed at 0x34xx: The high byte 34 indicates that the parameter type is pressure. The low byte

Address	Name	Data	Registers	Bytes	RW	Description
						represents the unit, see Table 9. The unit can be set via 0x2600.
0x1202	Lower limit	float	2	4	OR	Lower limit of the pressure range
0x1204	upper limit	float	2	4	OR	Upper limit of pressure range
0x2002	Pressure measurement value	float	2	4	OR	Pressure measurement value
0x2100	Original pressure measurement	float	2	4	OR	Original pressure measurement
0x2300	factor	float	2	4	RW	Stress factors
0x2302	deviation	float	2	4	RW	Pressure deviation
0x240b	Filter coefficients	uint16_t	1	2	RW	0~100, 0 has no filtering
0x2410	Factory reset	uint16_t	1	2	OW	Write 1 to restore factory settings.
0x2600	Unit	Uint 16 _t	1	2	RW	0: Pa 1: kPa 2: MPa 3: mmH_2O 4: mH2O 5: bar 6: PSI 7: atm 8: kg f / cm^2 9: mm

Address	Name	Data	Registers	Bytes	RW	Description
						10:m 11:℃ 12:℉ Unit settings greater than or equal to 9 do not enable numerical conversion.
Clear register						
0x3001	Pressure reset	uint8_t	1	2	RW	Write 1 to start clearing.
0x3003	Reset status	uint8_t	1	2	RO	0x0000: Successfully cleared. 0x0001: Zeroing not yet complete 0x0003: Signal is unstable or out of range 0x0004: Out of allowed range
0x3004	Exit and clear	uint8_t	1	2	OW	Write 1, exit, clear, and save.
0x3106	Zero cut value	float	2	4	OR	Measured pressure value A

Table 11 Unit Conversion Table

unit	ID
℃	0x00
℉	0x01
kPa	0x19
MPa	0x1B
PSI	0x1D
bar	0x1E
kgf/cm ^{2}	0x1F
m	0x20
mm	0x22
Pa	0x30
mmH $_2$ o	0x31
mH $_2$ o	0x32
atm	0x33

A.4 Examples of Communication

Example 1: Reading pressure measurement values

Send command: 01 03 20 02 00 02 6E 0B

Analysis: 01: Device address

03: Read the command

20 02: Register address

02: Number of registers

6E 0B: CRC16 checksum

Return command: 01 03 04 8E 52 40 68 40 BD

Analysis : 01: Device address

03: Read the command

04: 4 bytes

8E 52 40 68: Received data, delimited to small endian byte order: 52 8e 68 40, float type data 3.63369

40 BD: CRC16 checksum

Example 2: Zero the pressure and set the current pressure value as the lower limit of the range.

(1) Write 0x01 to 0x3001 to start zeroing the pressure.

Send: 01 06 30 01 00 01 16 CA

Received: 01 06 30 01 00 01 16 CA

(2) Read the 0x3003 calibration status

Send 01 03 30 03 00 01 7B 0A

Received 01 03 02 00 00 B8 44

A read status of 00 00 indicates that calibration is complete.

(3) Exit calibration at 0x3004 and save the corresponding data.

Send: 01 06 30 04 00 01 06 CB

Received: 01 06 30 04 00 01 06 CB