TSA
TRANSDUCER SENSORS AUSTRALIA



Submersible Level Transmitter

TSA-PT480

Features of the TSA-PT480

- **Output: RS485 bus, Modbus protocol**
- Accuracy: ±0.25% F.S or ±0.5% F.S
- Diffused silicon pressure transmitter
- Several special structures for different usage
- Submersible digital level transmitter
- Measuring range: 0~1 m to 0~350 mH2O
- Power supply: 12~30 Vdc (3.1~4.2 Vdc option)
- Operating temperature: -40°C~85°C
- Electrical connector: IP68
- Approvals: CE, UKCA

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Specifications

Product Description

The TSA-PT480 submersible level transmitter is a high-accuracy, compact-structure product with long term stability and high resistance to abrasion, oil, acid and alkali cables. It is widely used in potable water supply and in reservoir, lake and river water monitoring. The TSA-PT480 complies with CE and UKCA certifications.

Applications

- Deepwater level measurement
- Hydrological monitoring
- Water tank level monitoring
- Water-saving irrigation
- Circulating fluid monitoring
- Water extraction project

Technical Parameters

Parameter	Value	Note
Measure range	0~1 ... 350 mH2O	Customized
Output signal	RS485	
Overload pressure	1.5 × RP (rated pressure)	
Broken pressure	3.0 × RP (rated pressure)	
Accuracy	(±0.5% F.S, ±0.25% F.S) @ 25°C	
Resolution	1 cm	
Long term stability	±0.25% F.S / year	
Operating temperature	-40°C ~ 85°C	According to O-ring and cable
Compensation temperature	-10°C ~ 80°C	
Media compatibility	304 stainless steel default; 316L stainless steel and titanium optional	
Seal material	NBR O-ring default; FKM optional	
Power supply	12~30 Vdc | 3.1~4.2 Vdc	
Over voltage	32 Vdc | 7 Vdc	
Reverse voltage	-32 Vdc | -7 Vdc	
Supply current	<10 mA | <7 mA	
Insulation	>100 MΩ @ 50 V	
Electrical connector	IP68	
Pressure port	Embedded type	Customized
Cable material	PE default; PUR and FEP optional	
Weight (excluding cable)	~250 g	
Response time	10 ms	
Pressure form	Gauge G, Absolute A	
Compliant	CE, UKCA	
EMC	EN 61326-1	
Random vibration	10 g, 5~2000 Hz	
Shock	X/Y/Z, 20 g, sine 11 ms	

Ordering & Connection

Type Selection Guide

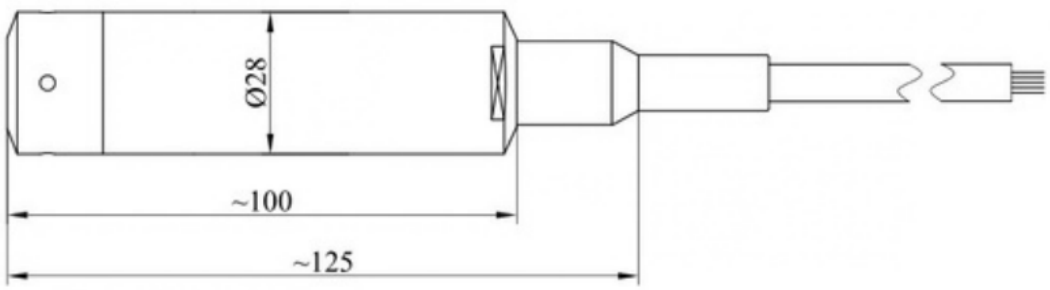
Item	Code	Description
Measurement range	001Y / 002Y / 005Y / 006Y / 010Y / 050Y / 100Y / 200Y / 350Y	0~1 m / 0~2 m / 0~5 m / 0~6 m / 0~10 m / 0~50 m / 0~100 m / 0~200 m / 0~350 m
Accuracy	2 / 5	±0.25% F.S / ±0.5% F.S
Output signal	S	RS485
Power supply	13 / 24	12~30 VDC / 3.1~4.2 VDC
Seal material	N / H / C / F / W	NBR / HNBR / CR / FKM / Welded structure
Cable material	PE / PU / F4	PE / PUR / FEP
Cable length	01 / 02 / 04 / 05 / XX	1 m / 2 m / 4 m / 5 m / custom length

Order example: TSA-PT480 005Y 2 S 13 F PU 05 = 0~5 m range, ±0.25% F.S, RS485, 12~30 VDC, FKM seal, PUR cable, 5 m cable.

Electrical Connection

Line colour	Line definition
Red	Supply power
Green / Blue	RS485+
White	RS485-
Black	GND
Yellow	Shield (PE)

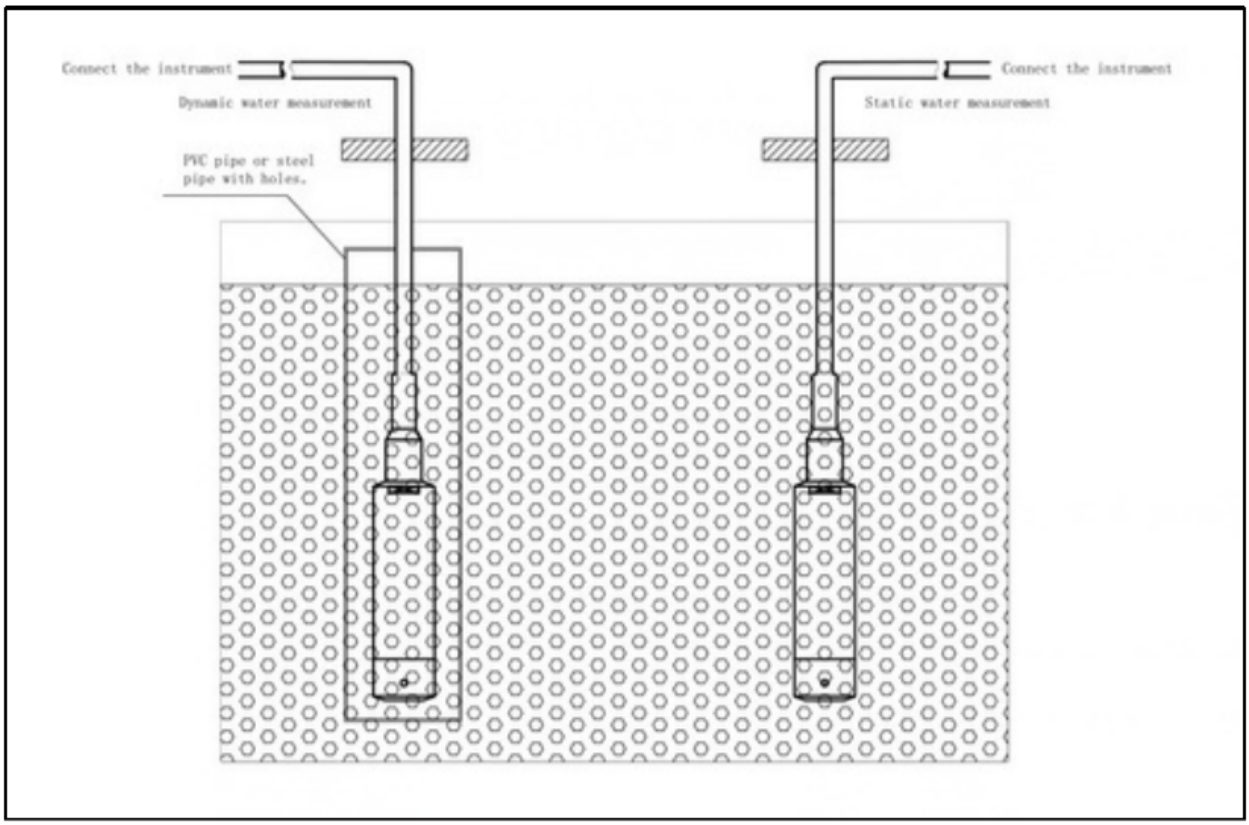
Structure and Dimensions (mm)



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Installation

Installation



Notes

1. Only use the pressure sensor to test a medium without corrosion to its housing and seal material.
2. Do not use sharp tools to clean the pressure hole when it is blocked. Remove the pressure sensor from the system and put the pressure hole part into a fluid that can dissolve the blocking substance.
3. To protect the transmitter in areas with lightning, add a lightning protection device and reliably connect the shield line to EARTH.
4. Drop the level transmitter into the container without touching the bottom sediment.
5. Please contact the factory if you need anything else.

RS485 / Modbus Protocol

TSA-PT480 digital level transmitter, RS485 bus, Modbus output communication protocol.

1. Explanation. The serial link communication protocol is a master-slave protocol. Only one host can be connected to the bus at a time, and one or more (up to 250) slave nodes can be connected. Communication is normally initiated by the host; a slave responds only when it receives a request from the host. Slaves cannot communicate with each other, and the host can initiate only one data transfer at a time. The protocol follows the standard Modbus specification and uses RTU mode for data transmission.

2. RS485 serial communication format. Default baud rate 9600 bps, 1 start bit, 8 data bits, no parity, 1 stop bit. Default device address 0x01; the device address can be set in the range 0x01~0xF0. Broadcast address 0xFA: when communicating with the broadcast address, make sure only one device is on the bus.

3. Communication command summary

No.	Function	Remark
3.1	Reading level	
3.2	Set level range	Default level range: 30000
3.3	Set address	Factory default address: 0x01
3.4	Set baud rate	Default baud: 9600 bps
3.5	Set update time	Default 0: level value is not updated actively
3.6	Read the device ID	
3.7	Read function exception code response	
3.8	Set the function exception code response	
3.9	Set parity bit	Default none
3.10	Set stop bit	Default 1 stop bit
3.11	Set zero level	User cannot use

Notes: 1. CRC codes are sent and received with the low byte first and the high byte last. 2. Do not use commands 3.2 to 3.11 unless you are well versed in the Modbus protocol. 3. Be careful with broadcast address communication: incorrect operation may lead to unexpected results.

3.1 Reading liquid level value

Field	Host request	Slave response	Notes
Slave address	Current device address	Current device address	1 byte; default 0x01
Function code	0x04	0x04	1 byte
First register address	0x0020	-	2 bytes
Number of registers	0x0001	-	2 bytes
Number of bytes	-	0x02	1 byte
Level data	-	0x xxxx	2 bytes; high byte first, low byte second
CRC check code	0x xx xx (L,H)	0x xx xx (L,H)	2 bytes; changes with the device address

Example: slave address 0x01, host request 01 04 00 20 00 01 30 00. If the transmitter range is 5 m water and the level digital range is the default 30000, a reply of 01 04 02 01 00 B8 A0 gives DATA = 0x0100 = 256, so level H = (DATA / level digital range) × actual range = 256 / 30000 × 5 m = 0.043 m.

3.2 Set level range

Field	Host request	Slave response	Notes
Slave address	Current device address	Current device address	1 byte; default 0x01. With broadcast address 0xFA make sure only one device is on the bus
Function code	0x06	0x06	1 byte
First register address	0x0012	0x0012	2 bytes
Data written to register	0x xxxx (e.g. 0x7530)	0x xxxx	2 bytes; general value 5000~60000, default 30000. Same as written data in the response
CRC check code	0x xx xx (L,H)	0x xx xx (L,H)	2 bytes; changes with the device address

3.3 Set the address

Field	Host request	Slave response	Notes
Slave address	Current device address	Current device address	1 byte; default 0x01
Function code	0x06	0x06	1 byte
First register address	0x0010	0x0010	2 bytes
Data written to register	0x 00xx (e.g. 0x0001)	0x 00xx	2 bytes; new address, only the lower 8 bits are valid
CRC check code	0x xx xx (L,H)	0x xx xx (L,H)	2 bytes; changes with the device address

Note: effective after restart.

3.4 Set baud rate

Field	Host request	Slave response	Notes
Slave address	Current device address	Current device address	1 byte; default 0x01
Function code	0x06	0x06	1 byte
First register address	0x0011	0x0011	2 bytes
Data written to register	0x 00xx (e.g. 0x0003)	0x 00xx	2 bytes; only the lower 8 bits are valid. 0x0003: 1200 bps
CRC check code	0x xx xx (L,H)	0x xx xx (L,H)	2 bytes; changes with the device address

Note: effective after restart.

3.5 Set update time

Field	Host request	Slave response	Notes
Slave address	Current device address	Current device address	1 byte; default 0x01
Function code	0x06	0x06	1 byte
First register address	0x0031	0x0031	2 bytes
Data written to register	0x xxxx	0x xxxx	2 bytes; unit seconds, range 1~65520. 0x0000: cancel timed update (default); 0x0001~0xFFF0: update the level value every set number of seconds
CRC check code	0x xx xx (L,H)	0x xx xx (L,H)	2 bytes; changes with the device address

3.6 Read the device identification code

Field	Host request	Slave response	Notes
Slave address	Current device address	Current device address	1 byte; default 0x01
Function code	0x2B	0x00	1 byte
First register address	0x 00	0x0001	Request 1 byte; response 2 bytes
Data	0x 0100	*****	Request 2 bytes; response 30 bytes
CRC check code	0x xx xx (L,H)	0x xx xx (L,H)	2 bytes; changes with the device address

3.7 Read function exception code response (host request frame)

Field	Value	
Device address	Current device address	
Function code	0x84	
Exception code	0x01 illegal function code; 0x02 illegal register address; 0x03 illegal quantity value	
CRC	0x xx xx (L,H)	

3.8 Set the function exception code response (host request frame)

Field	Value	
Device address	Current device address	
Function code	0x86	
Exception code	0x01 illegal function code; 0x02 illegal register address; 0x03 illegal quantity value	
CRC	0x xx xx (L,H)	

3.9 Set parity bit

Field	Host request	Slave response	Notes
Slave address	Current device address	Current device address	1 byte; default 0x01
Function code	0x06	0x06	1 byte
First register address	0x0007	0x0007	2 bytes
Data written to register	0x xxxx (default 0x0000)	0x xxxx	2 bytes; only the lower 8 bits are valid. 0x0000: none (default); 0x0001: odd; 0x0002: even
CRC check code	0x xx xx (L,H)	0x xx xx (L,H)	2 bytes; changes with the device address

Note: effective after restart.

3.10 Set stop bit

Field	Host request	Slave response	Notes
Slave address	Current device address	Current device address	1 byte; default 0x01
Function code	0x06	0x06	1 byte
First register address	0x0008	0x0008	2 bytes
Data written to register	0x xxxx	0x xxxx	2 bytes; only the lower 8 bits are valid. 0x0001: 1 stop bit; 0x0002: 2 stop bits
CRC check code	0x xx xx (L,H)	0x xx xx (L,H)	2 bytes; changes with the device address

Note: effective after restart.

3.11 Set zero level

Field	Host request	Slave response	Notes
Slave address	Current device address	Current device address	1 byte; default 0x01
Function code	0x06	0x06	1 byte
First register address	0x0020	0x0020	2 bytes
Data written to register	0x 0000	0x xxxx	2 bytes. Not for user use
CRC check code	0x xx xx (L,H)	0x xx xx (L,H)	2 bytes; changes with the device address