DDM-200 Series Conductivity Transmitter
User Manual

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DDM-200 / DDM-200C Series Conductivity / Concentration Transmitter User Manual

1. Typical applications

- Pure water / drinking water / surface water / variety of water supply / industrial sewage.
- Acid, alkali and salt solution / chemical reaction process / industrial manufacturing process.
- Soilless cultivation / flower greenhouses / aquatic farming / swimming pool.
- DDM-200C: concentration measurement for acid alkali and salt solution.

2. Instrument characteristics

- Easy connect to PLC, industrial computer, controller, data logger or touch screen for online monitor and control.
- Strong anti interference, fast response.
- The probe use gold plate VP header for plug connection. Threaded fastening, very easy to replace the probe.
- Easy mounting. The 3/4” NPT thread is easy for pipe and tank mounting. The probe can be also separated with the display header, connect by cable.

3. Product shape

DDM-200

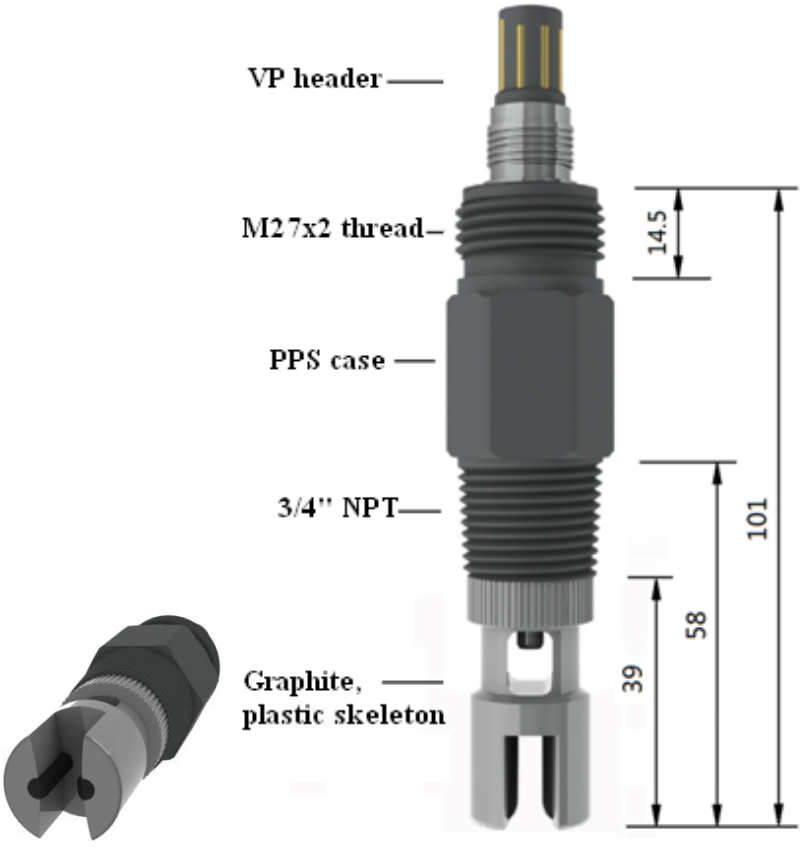
4. Technical Specifications

	DDM-200	DDM-200C (Percentage concentration)
Output signal (All isolated)	4-20mA (2 wire); 0-2V(option); Rs485(Modbus/RTU) (Option)	
Display	LED model: 4 bits LED display. Just display conductivity / concentration value. LCD model: show conductivity / concentration value and temperature.	
Operation	2 button for operation (LED model) 3 buttons for operation (LCD model)	
Calibration	2 point calibration.	
Protection	IP65	
Scale (Other scale can be ordered)	0.01~20μS/cm(0.01cm^{-1}), 0.1~200μS/cm(0.1cm^{-1}), 0~5000μS/cm(1.0cm^{-1}), 0.1~400mS/cm(4-electrode sensor) 0~2000mS/cm(Inductive sensor)	0~15% NaOH, 0~15% HCL, 0~15% HNO3, 0~30% NaCL, 0~25%H2SO4, 0~20% Acetic. (Inductive sensor)
Resolution	0.01μS/cm(0.01cm^{-1}),	0.01%

	0.1μS/cm(0.1cm^{-1}), 1μS/cm (1.0cm^{-1}), 0.1mS/cm(4-electrode sensor) 1mS/cm(Inductive sensor)	
Accuracy	±1%F.S.	
Thread	3/4" NPT thread	
Power supply	5VDC, 24VDC(DC10~28V)	
Temperature	0~65℃ （The highest temperature conductivity constant 0.01cm^{-1}, 0.1cm^{-1} can be custom-made 0 ~ 140℃） （The highest temperature conductivity constant 1.0cm^{-1}, Electromagnetic electrode can be custom-made 0 ~ 100℃）	
Auto temperature compensation	PT1000 (NTC 10K / PT100 is optional)	
Pressure	<0.6MPa. < 2.5Mpa (Optional)	
Case	NYLON / PPS	NYLON / PPS

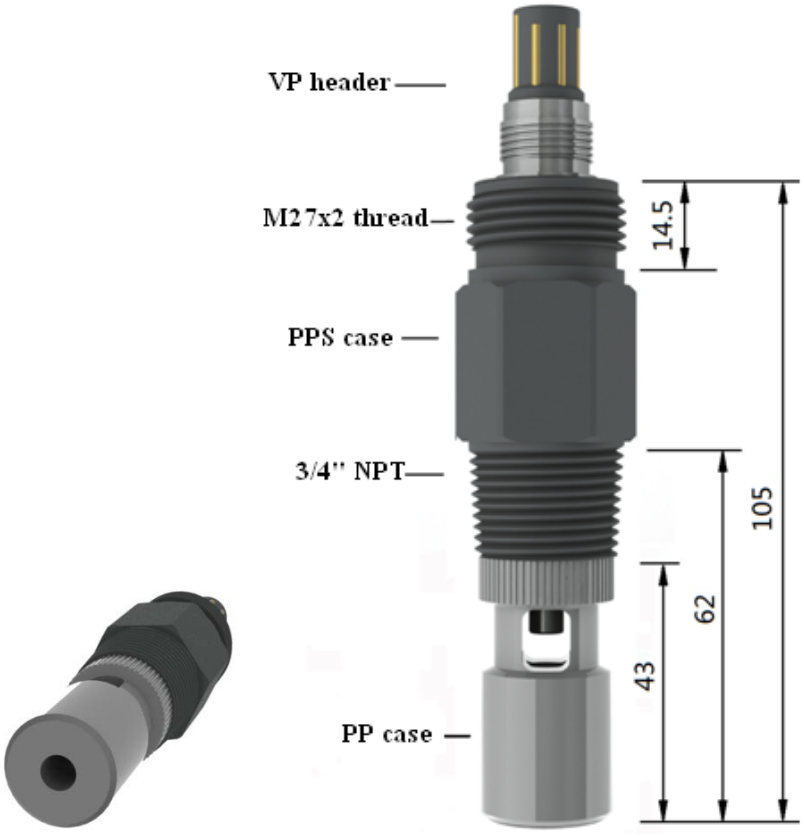
Conductivity electrode: 0.01cm^{-1}
2-electrode model
PT1000
< 0.6Mpa
0 ~ 65 ℃
Optional connection:
5m cable / VP header / aviation plug.

Conductivity electrode: 0.1cm^{-1}
2-electrode model
PT1000
< 0.6Mpa
0 ~ 65 ℃
Optional connection:
5m cable / VP header / aviation plug.



Conductivity electrode: 1.0cm^{-1}
2-electrode model
NTC 10K (PT1000 is optional)
< 0.6Mpa
0 ~ 65 ℃
Optional connection:
5m cable / VP header / aviation plug.

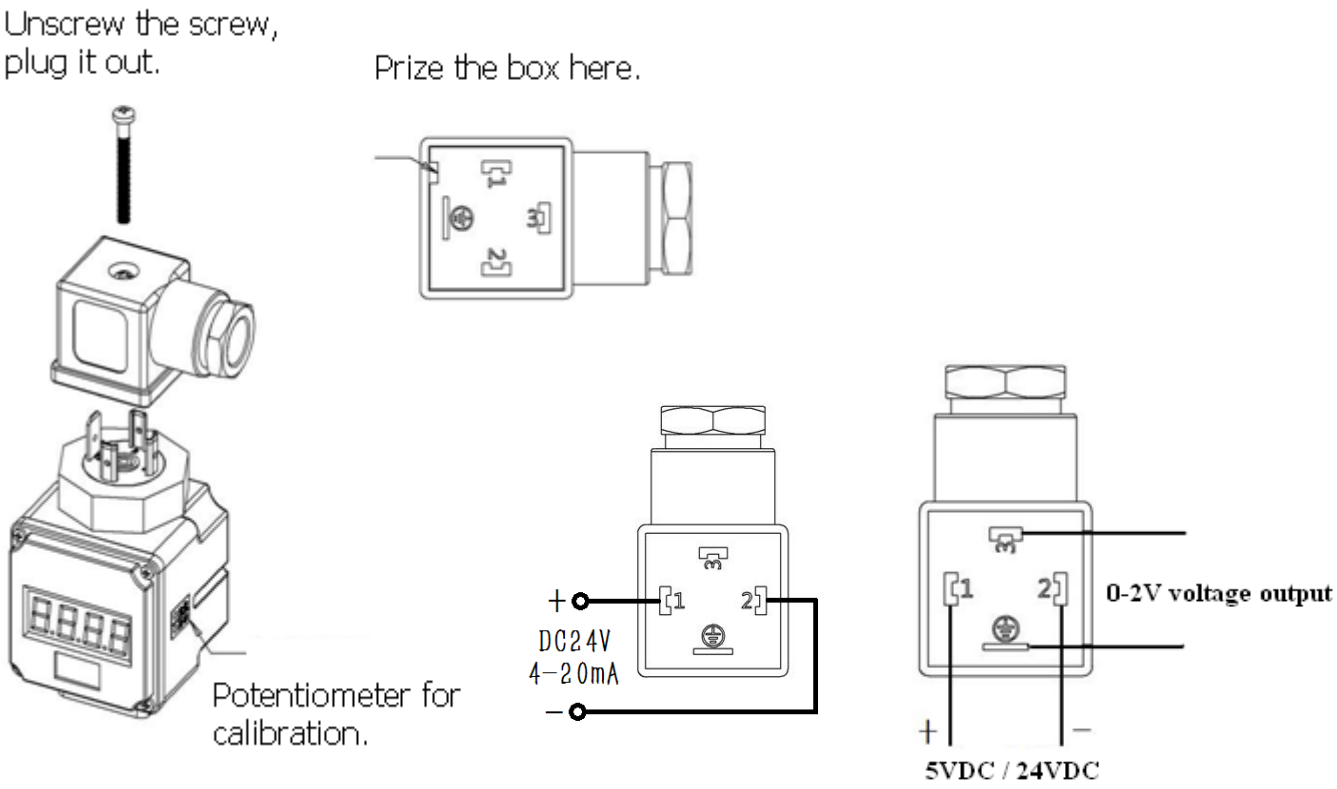
Conductivity electrode: 0.4cm^{-1}
4-electrode model
PT1000
< 0.6Mpa
0 ~ 65 ℃
Optional connection:
5m cable / VP header / aviation plug.



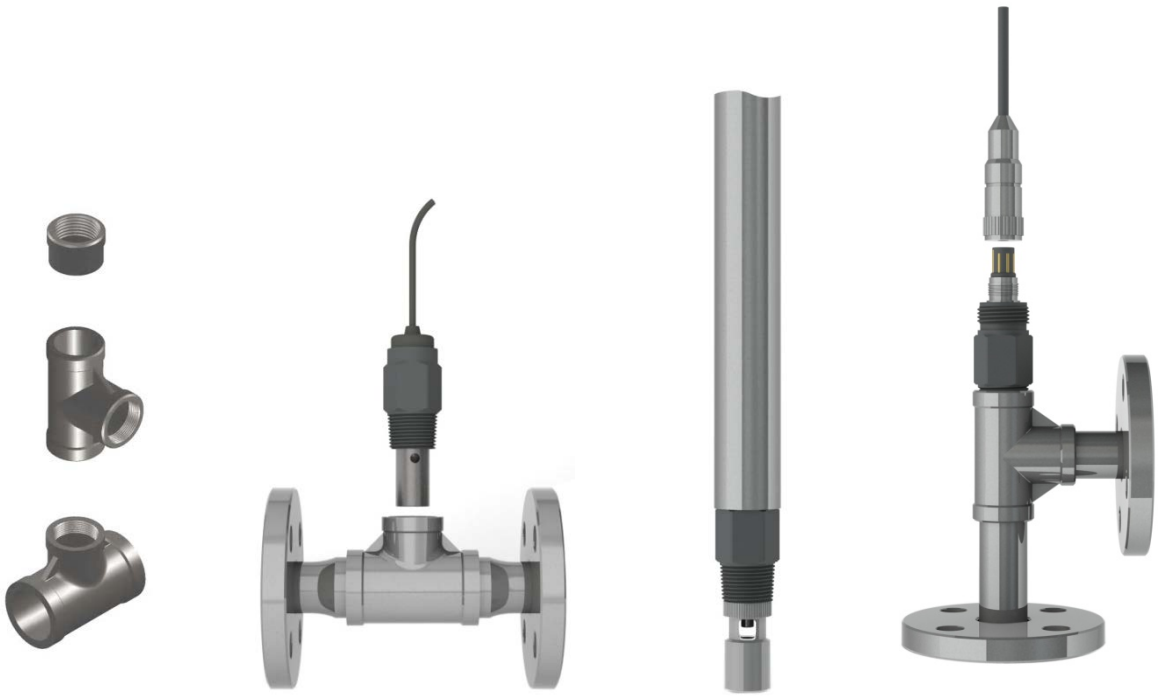
Conductivity / concentration electrode
Inductive model
PT1000
< 0.6Mpa
0 ~ 65℃
Optional connection:
5m cable / VP header / aviation plug.

5. Installation instruction

Wiring



Other installation



Sanitary model

6. Configuration and settings

A. Calibration of conductivity meter

Take two-wire 4-20mA output as example, the wiring connection as below.

Zero point calibration

Discharge the solution in the cell of the electrode, wash the electrode by distilled water. Expose electrode to the air. Theory of conductivity at this time should be zero, the transmitter output should be 4mA, otherwise, adjust the zero potentiometer, calibrate error. If it can't calibrate that means the electrode was serious contamination, electrode should be cleaned.

Slope calibration

Calibrate the full-scale firstly:

There are two ways for full-scale calibration. One way is immerge the sensor into target solution which is the maxim scale, adjust the full-scale potentiometer, making the output current to be 20mA. The second way is use a resistance, the resistance value = electrode constant ÷ maxim conductance of the target solution. e.g.: suppose electrode constant is 1.0, then 1,000,000 Ohms to 1μS/cm, 100,000 Ohms to 10μS/cm, 1000 Ohms to 1mS/cm. Connect the resistance(end to end connection, make it to be a ring) to the terminals of the transmitter, the transmitter should display 20mA after power on, otherwise adjust full-scale potentiometer to 20mA.

Calibrate more points:

Prepare a standard conductivity solution, clean the electrode with some standard solution firstly, then calibrate. For example, if the scale is 0-100 μs/cm, prepare 50 μs/cm conductivity solution, the theoretical value on the ammeter should be 16mA × 0.5 +4 mA = 12mA. The error can be calculated according to the measured current and theoretical current.

(Can also use standard electrodes to measure actual value firstly, then measure the solution by the new transmitter, the error can be also calculated).

B. Calibration of concentration meter

Use multiple point calibration, prepare several sample which in target concentration range. The operation is similar to up description.

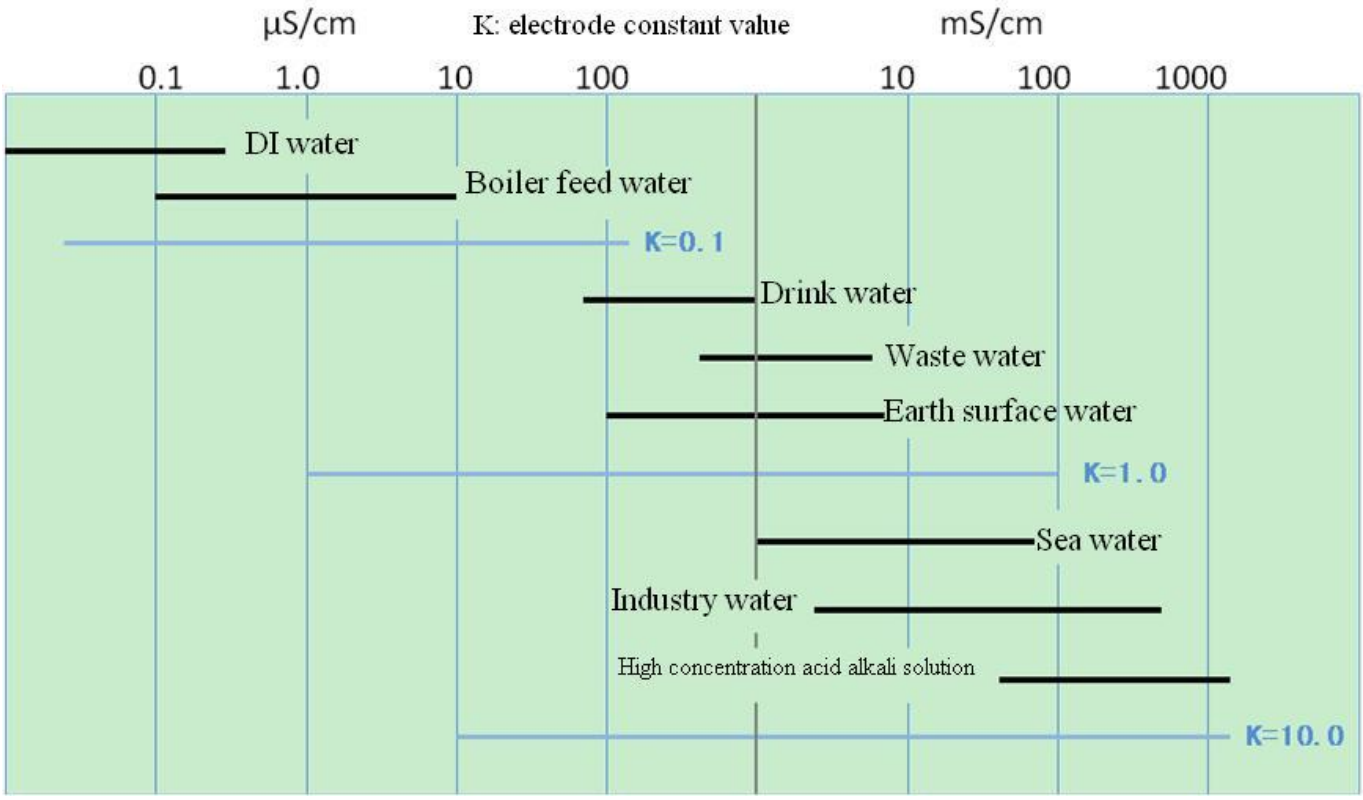
C. Mounting

When mount the transmitter, avoid too much force and sharp collision, so as not to damage the electrode. After wiring connection, should check carefully to prevent the wrong connection before power on. During the operation of the instrument, make sure the cell of the sensor must be filled with solution. The main reason of the measurement error always caused by jammed air which because of unreasonable pipe mounting..

7. Maintenance

Electrode replacement is easy as below picture:

Plug in the probe,
Tighten the upper screw cap.



8. Packing list and accessories

Packing list:

- Instrument which include sensor.
- Calibration buffer or powder.
- 1 copy of user manual.

- Thredolet (optional)

pH buffer is a consumable item, not in warranty.

9. Quality Assurance

This product is one-year warranty, from date of delivery. Product warranty does not cover damage caused by improper usage. If need repair, please return and take the freight cost. Good packaging is required to avoid transportation damage.

RS485 (Modbus/RTU) protocol

This meter/transmitter adopts ModBus-RTU communication protocol. The communication baud rate is 9600bps.

1. **Word Format:** 1 Start bit +8 bit Data + 1 Even Parity Check bit +1 Stop bit, totally11bit.
2. **Frame Structure:** Address Code (1Byte) + Function Code (1Byte) + Data segment (n Byte,) + CRC Check Code (2Byte).

   The transmission of message frame start at least a pause interval of 3.5 bytes' time. The entire message frame must be transmitted as a continuous stream. If there is more than pause of 3.5 bytes' time, the receiving device will treat the transmission of the current message frame is end, and assume that the next received byte is the start of the new frame byte.

   Address Code: The address of slave device, ranging from 0 to 255. It can be set through the menu, the factory default is 6.

   Function Code: The standard ModBus communication protocol defined function codes 1-127. This meter / transmitter only use the 03 (read the data of register) function code to read the data of register.

   Data segment: The host use function code 03 to inform the slave send back the specified length data from the specified register (Message frame contains the length of the start address of the register, and the length of data of the register). The returned data from the slave includes the data length and data content. The address, length and data are all hexadecimal, the high byte first and the low byte last.

   CRC Check Code: hexadecimal, low byte first and high byte last.

3. Communication example (the slave address is 6):

3.1 Reading main measured values (the start address of register is 0x0101)

The sent frame of Host device				
Address Code	Function Code	Start address of the register	Quantity of the register	CRC16

06	03	High	Low	High	Low	Low	High
		01	01	00	02	95	80
The response frame of Slave device							
Address Code	Function Code	Length of data byte	Data				CRC16
06	03	04	XX	XX	00	0X	XX	XX

3.2 Reading temperature value (the start address of register is 0X0103)

The sent frame of Host Device							
Address Code	Function Code	Start address of the register		Quantity of the register		CRC16	
06	03	High	Low	High	Low	Low	High
		01	03	00	02	34	40
The response frame of Slave Device							
Address Code	Function Code	Length of data byte	Data				CRC16
06	03	04	XX	XX	00	01	XX	XX

Note: The host should read the values of two registers each time. The returned 4 bytes from the slave is as complete instrument data. The first 2 bytes representing the data (in the form of complement, the highest bit is sign bit), the last 2 bytes indicating the position of decimal point or the number of decimal (the decimal of temperature is fixed to 1, means temperature shows like 20.1).