

PH/DO Controller



6000 Series



800 Series

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Safe operation procedures

Read the following instructions before using the instrument.

1. After unpacking the instrument please check for damage due to shipping.
2. The instrument must be operated by trained professional and technical personnel.
3. Read the manual carefully to avoid incorrect wiring connection that can cause equipment damage and safe problem.
4. After wiring carefully check all are correct then can power on and make sure the others equipments are correct.
5. Please avoid installing in a high humidity, high temperature, corrosive and in a direct sunlight environment.
6. Please separate the power lines of instrument from other machines that produces high noise in the power lines.

Instrument use

Instruments are used in industrial wastewater treatment, aquaculture, environmental monitoring, food process etc.

The instrument can be panel, wall or pipe mounted.

The instrument provides two current outputs. The maximum load is 500 Ohm.

The instrument provides 3 relays. It can pass though a maximum of 5 Amps at 250 VAC or 5 Amps at 30VDC.

Product content

For 6000 series, the product package contains 1 instrument, the printed manual, 4 sets of holder.(fixed block, fixed bar, screw)

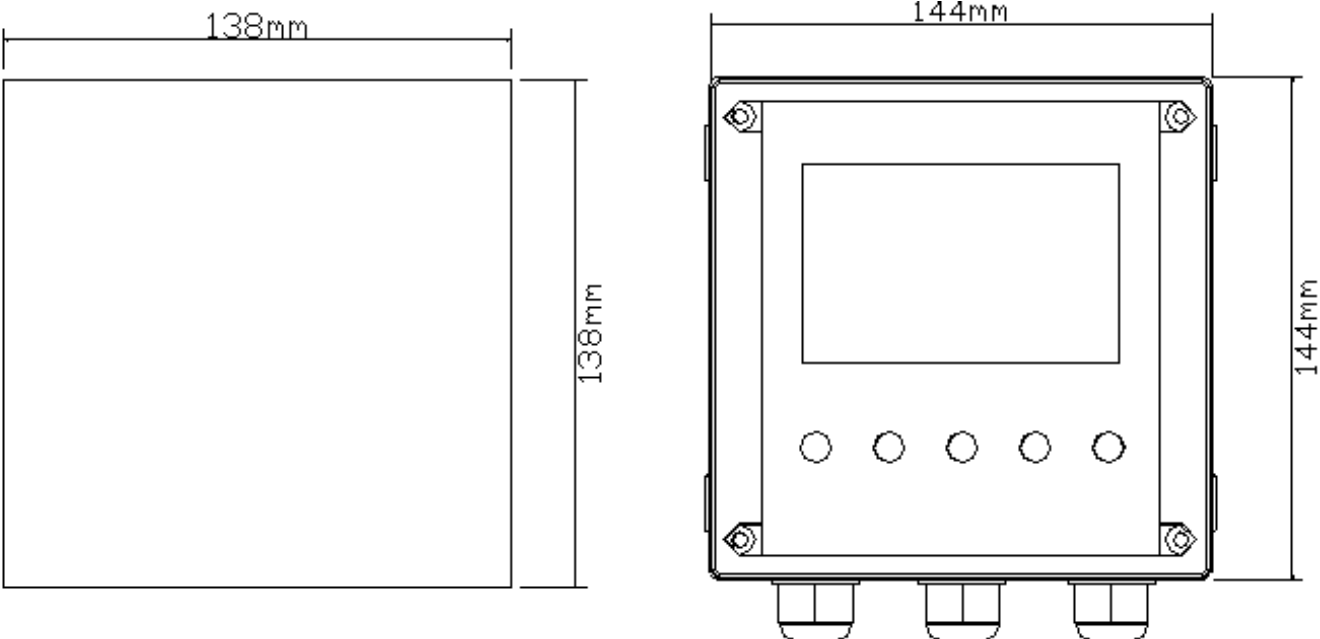
For 800 series, the product package contains 1 instrument, the printed manual, 2 holders

Specifications

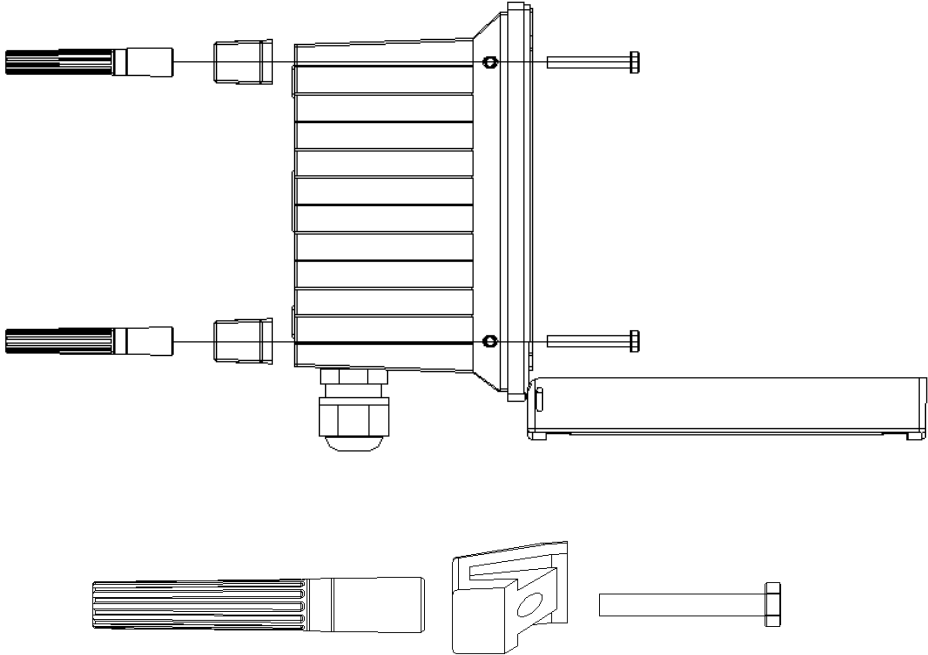
| | | |
|---------------------------------|---|------------------------------|
| Functions | pH | DO |
| Measuring range | -2.00pH to +16.00 pH | 0.00 to 30.00ppm(0.0-300.0%) |
| Resolution | 0.01pH | 0.01ppm/ 0.1% |
| Accuracy | ±0.01pH | ±0.02ppm/±0.2% |
| Temp. compensation | 6000 series:NTC22K 800 Series: Pt1000 / NTC22K | |
| Temp. range | -10.0 to +130.0°C | |
| Temp. compensation range | -10.0 to +130.0°C | |
| Temp. resolution | 0.1°C | |
| Temp. accuracy | ±0.2°C | |
| Ambient temperature range | 0 to +70°C | |
| Storage temp. | -20 to +70°C | |
| Input impedance | >10 ¹² Ω | |
| Display | Back light, dot matrix | |
| pH current output | Isolated, 4 to 20mA output , max. load 500Ω | |
| DO current output | Isolated, 4 to 20mA output , max. load 500Ω | |
| Current output accuracy | ±0.05 mA | |
| RS485 | Mod bus RTU protocol | |
| Baud rate | 9600/19200/38400 | |
| Maximum relay contacts capacity | 5A/250VAC,5A/30VDC | |
| Cleaning setting | ON: 1 to 1000 seconds, OFF: 0.1 to 1000.0 hours | |
| One multi function relay | clean/period alarm/error alarm | |
| Relay delay | 0-120 seconds | |
| Data logging capacity | 500,000 | |
| Language selection | English/traditional Chinese/simplified Chinese | |
| Waterproof grade | IP65 | |
| Power supply | From 90 to 260 VAC, power consumption < 5 watts | |
| Installation | panel/wall/pipe installation | |
| Weight | 6000 series:0.85Kg/ 800 series:0.55Kg | |

Instrument installation

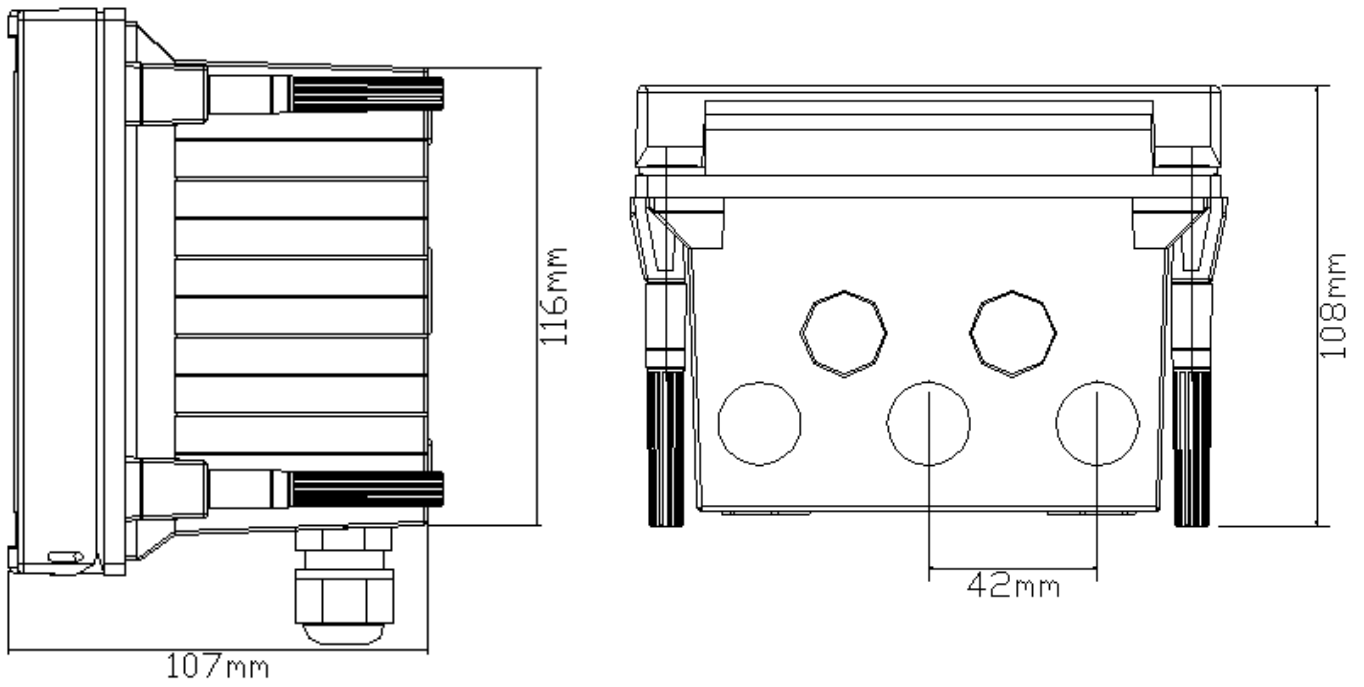
6000 series : The instrument can be panel, wall or pipe mounted installation.
Panel Installation: Make a 138x138 mm square cutout and insert the instrument. Screw in the fixed block with the screws and fixed bar.



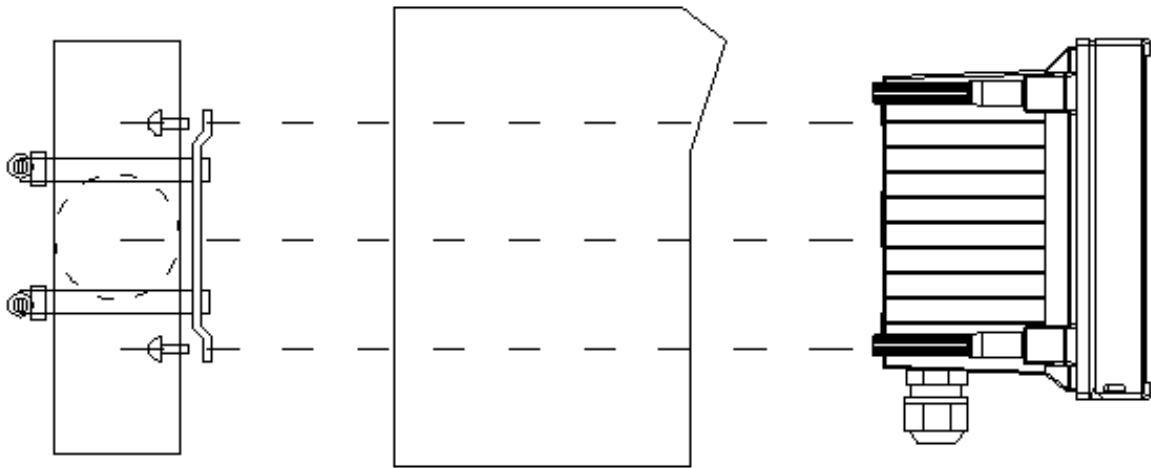
6000 series cutout size



6000 series installation figure



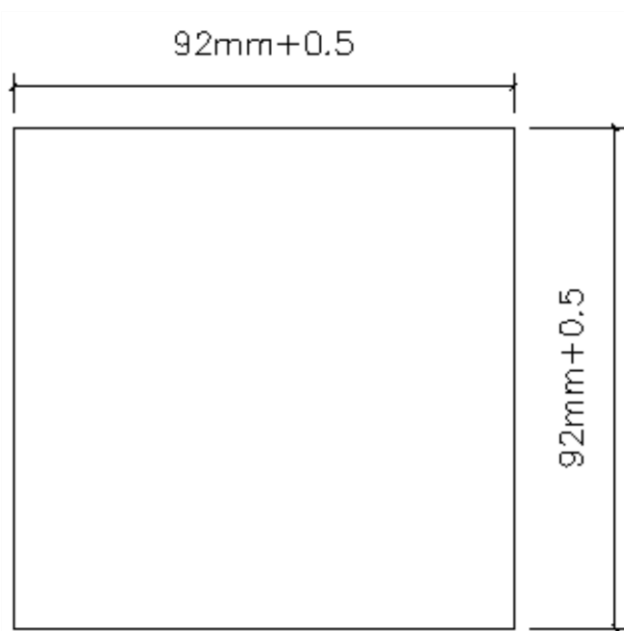
6000 series dimension



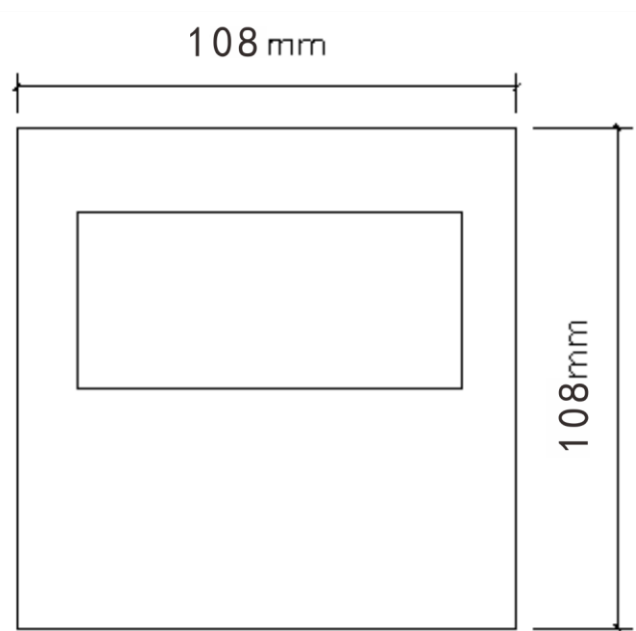
6000 series wall and pipe installation

800 series : The instrument can be panel, wall or pipe mounted installation.

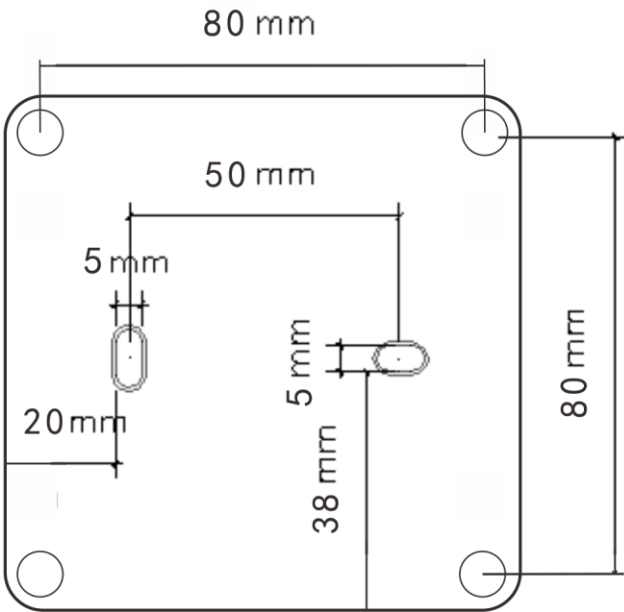
Panel Installation: Make a 92x92 mm square cutout and insert the instrument then screw in the fixed HOLDER.



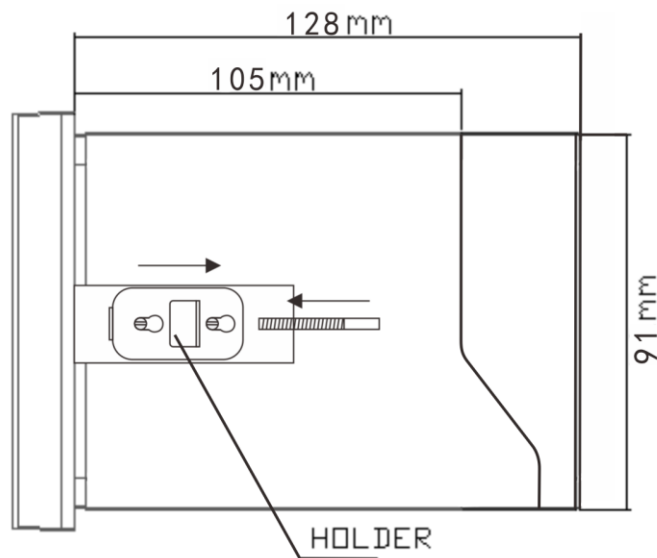
800 series panel cutout size



800 series front



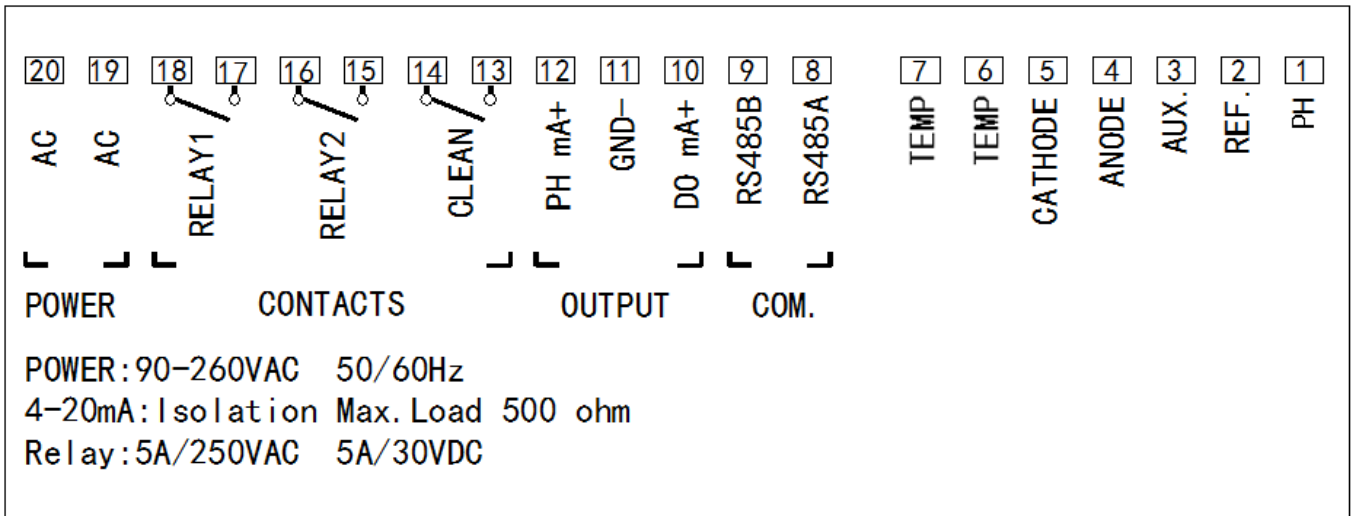
800 series back (for wall/pipe mounting)



800 series dimension

Connection label

6000 Series



Notice

1. User must strip the pH wire to remove the black rubber conductor.

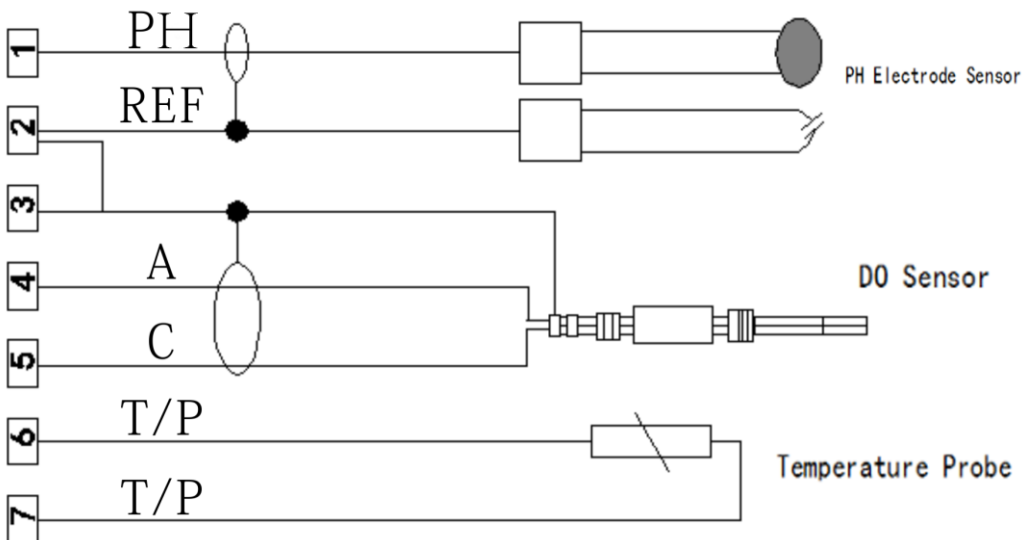


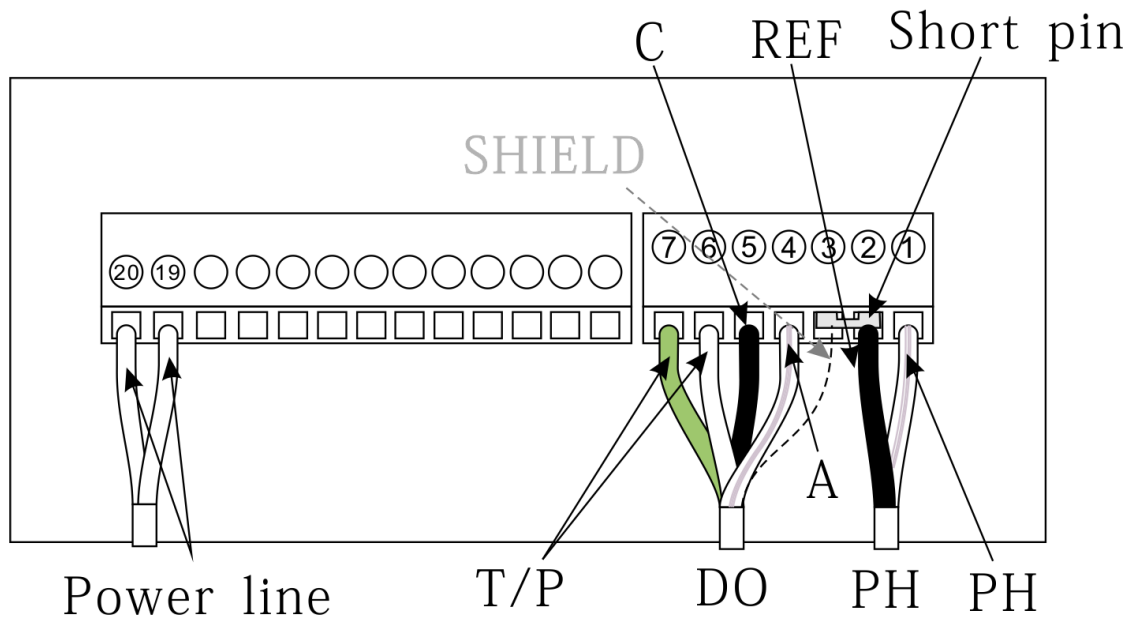
Rubber conductor not removed

Rubber conductor removed

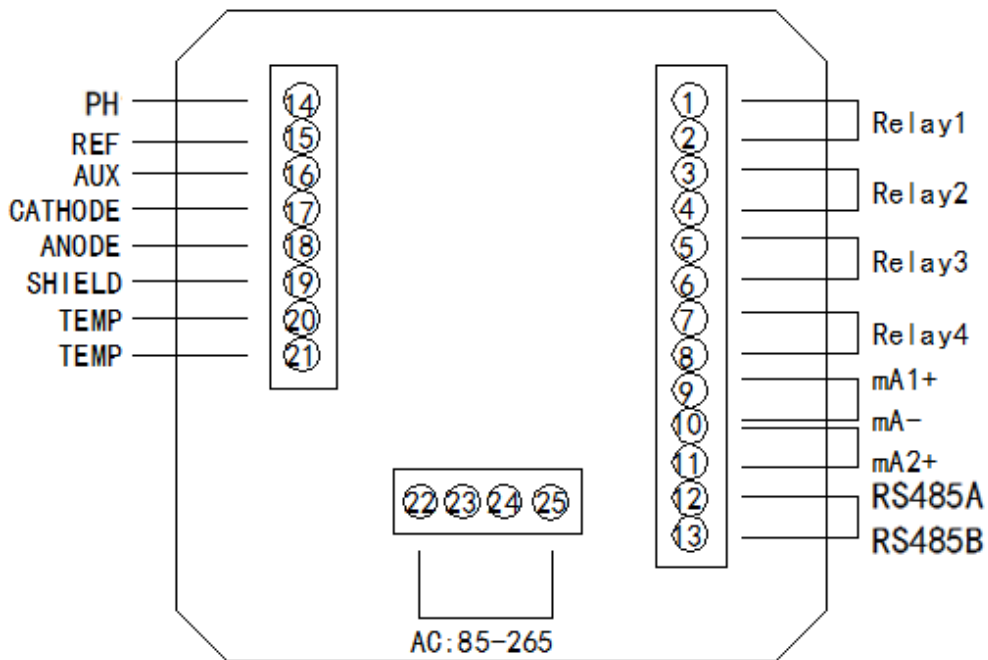
2. Different connection of 2-wire electrode (short pin 2 and 3) and 3-wire electrode (ground pin), Please see the connect label.

Electrode connection figure

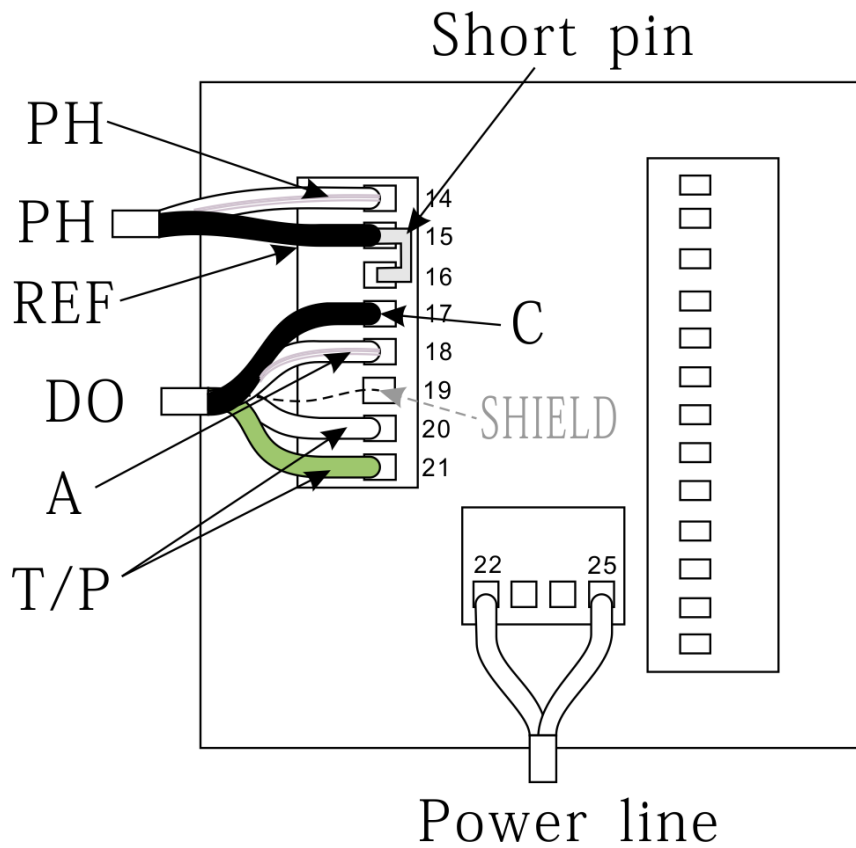
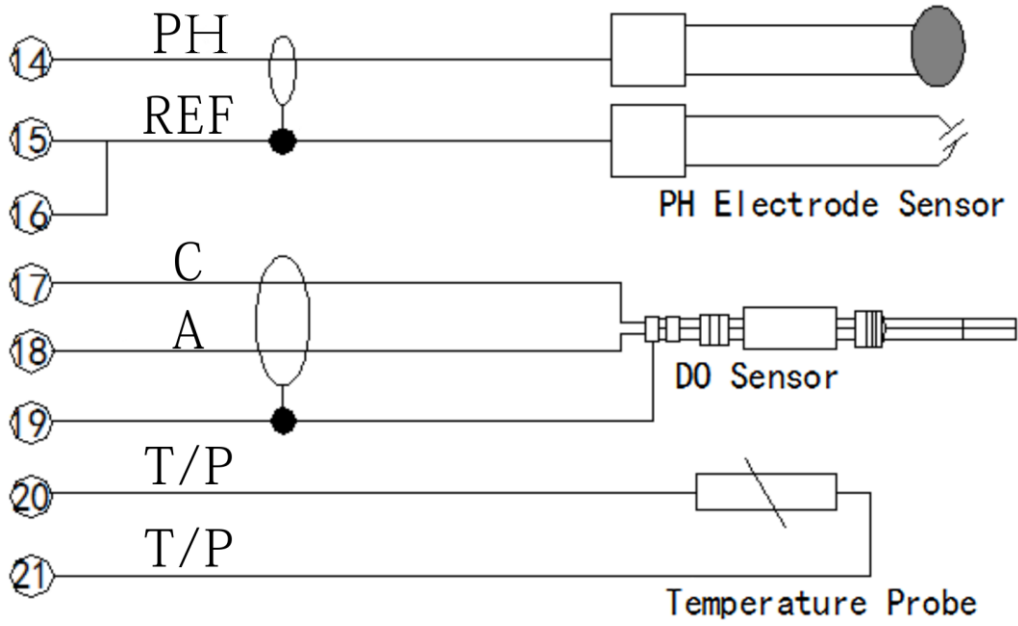




800 Series

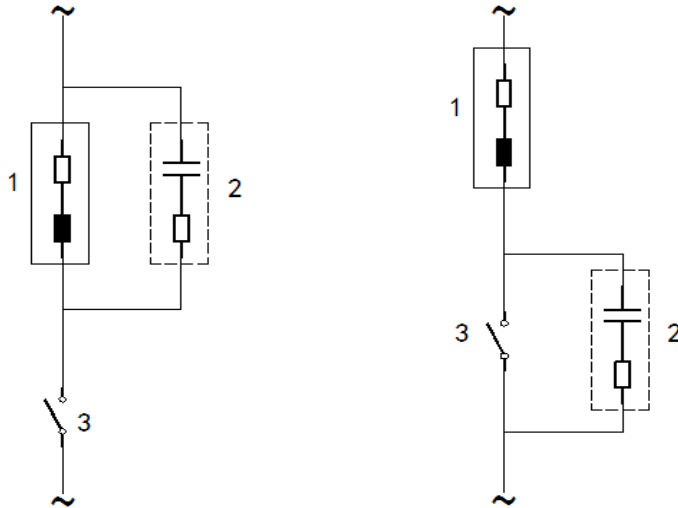


Electrode connection figure



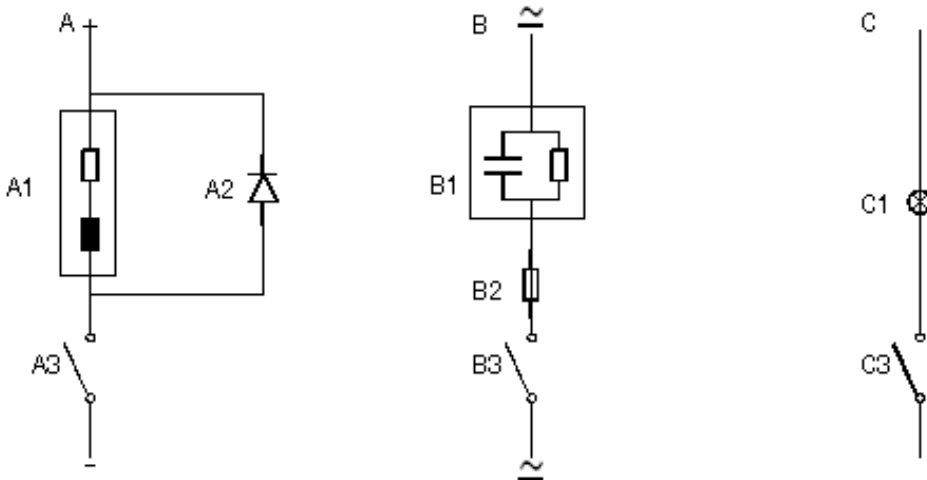
Relay contact protection

Electrical spark at the relay contact may affect the life of the relay, especially in an inductive and capacitive load. In order to inhibit the spark and arc, user should use an RC circuit to extend the life of the relay.



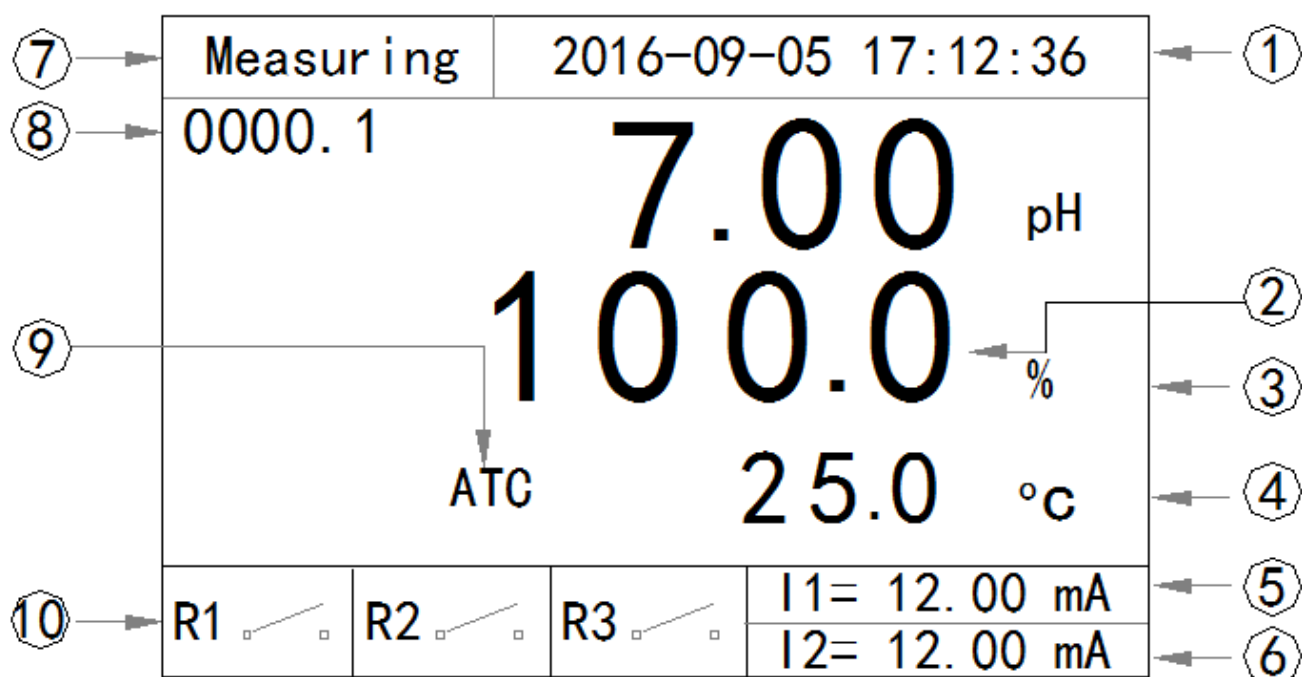
AC protection, use for inductive load

1. load
2. RC eliminate spark, using in 220VAC, $R=100\ \text{ohm}1\text{W}$,
3. Relay contact



- A. DC protection ,A1: inductive load A2: 1N4007, A3: relay contact
- B. AC/DC protection ,B1: capacitive load ,B2: $0.8\ \text{Ohm}/1\text{W}$ (DC24V) ,B3: relay contact
- C. Resistive load ,C1:lamp bulb ,C3:relay contact

Display



1. Date and time
2. Main display
3. Unit
4. Temperature and unit
5. PH current output
6. EC current output
7. Measurement status and Error indicator, there is no display if meter is in keeping mode
8. Count down timer: cycle time/clean time, it also displays the “delay” when relay3 has a delay enabled.
9. Temp. compensation: auto(ATC) or manual(MTC)
10. Relay indicator

Note:

If the pH readings are under or over the range, it will display -9.99/99.99.

If the DO readings are under or over the range, it will display 0.0/999.9%.

If the temperature readings are under or over the range, it will display -99.9/999.9.

Key



MODE



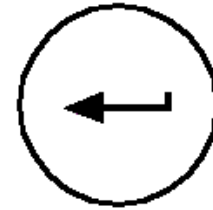
SHIFT



UP



DOWN



ENTER

| Key name | Meas. status | Setting status | Cal. status | Record status |
|----------|-------------------|----------------|-------------|---------------|
| MODE | Enter password | Exit | Exit | Exit |
| SHIFT | none | Move digit | Mode digit | Mode digit |
| UP | Enter record | Inc | Inc | Inc |
| DOWN | None | Dec | Dec | Dec |
| ENTER | ON/OFF back light | Enter | Enter | Enter |

Keeping mode

Keeping mode is a safe mode. It is for Calibration, Setting, Record and Clean. In this mode all the relays are open(inactive), current output follows the setting by user(last current or fixed current).

The instrument will enter keeping mode when user presses into Calibration, Setting, Record or the instrument works in clean mode.

It will in keeping mode around 10 seconds when it goes back to measurement mode form the above mentioned 4 modes then left keeping mode.

The instrument will go into the keeping mode when turn on the power.

Current output in keeping mode:

User has two choices: fixed current output or last current output.

Fixed current: User can set the output current from 4.00 to 20.00mA when instrument goes into keeping mode.

Last current: User can set the output current keep at the last current when instrument goes into keeping mode.

Relays in keeping mode: All relays are opened.(inactive)

Setting

Press MODE key to enter the password menu and then press UP/DOWN/SHIFT key to input password 1200 then press ENTER will enter to setting mode or press MODE key to exit. If no key is be pressed and over 10 minutes then it will go back to measurement mode.

| PASSWORD |
|----------|
| 0 0 0 0 |

| PASSWORD |
|----------|
| 1 2 0 0 |

Main display

Press UP/DOWN key to choose functions, press ENTER key enter the function.

| CONF I G U R A T I O N |
|---|
| <input checked="" type="checkbox"/> PH Current Settings |
| <input type="checkbox"/> DO Current Settings |
| <input type="checkbox"/> Relay1 Settings |
| <input type="checkbox"/> Relay2 Settings |
| <input type="checkbox"/> Relay3 Settings |
| <input type="checkbox"/> Measurement Settings |
| <input type="checkbox"/> Temperature Settings |
| <input type="checkbox"/> RS485 Settings |

Page1

| CONF I G U R A T I O N |
|---|
| <input checked="" type="checkbox"/> Date Settings |
| <input type="checkbox"/> Data Log Settings |
| <input type="checkbox"/> Output Test |
| <input type="checkbox"/> Language Settings |
| <input type="checkbox"/> Reset Parameters |

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Notices:

1. When the input data is not in correct range then it will display ERROR on the top of LCD
2. After input data user needs to press ENTER to save the data.
3. Press MODE to exit.
4. No key is be pressed in 10 minutes then it will go back to measurement mode.

PH Current settings

| PH CURRENT SETTINGS | |
|---------------------|---|
| 4.00 mA | = + 0 0 . 0 0 pH |
| 20.00 mA | = + 1 4 . 0 0 pH |
| Offset | = + 0 . 0 0 mA |
| Filter Time | = 0 0 0 SEC |
| HOLD Type | = <input type="checkbox"/> Fixed 0 4 . 0 0 mA <input type="checkbox"/> Last |

1. Set the corresponding 4.00mA to pH.
2. Set the corresponding 20.00mA to pH, the difference between 4.00mA and 20.00 mA at least is 1.00pH.
3. Set the offset current, the range is \pm 1.00mA.
4. The filter time range is 0-120 seconds, the low pass filter of software will active when the current from one point to another point if user sets the filter time.

5. Set the PH current output mode(fixed / last) when instrument enter into keeping mode.

DO Current settings

| DO CURRENT SETTINGS | |
|---------------------|---|
| 4.00 mA | = 0 0 0 . 0 % |
| 20.00 mA | = 1 0 0 . 0 % |
| Offset | = + 0 . 0 0 mA |
| Filter Time | = 0 0 0 SEC |
| HOLD Type | = <input type="checkbox"/> Fixed 0 4 . 0 0 mA <input type="checkbox"/> Last |

1. Set the corresponding 4.00mA to %, ppm, mg/L.
2. Set the corresponding 20.00mA to %, ppm, mg/L, the difference between 4.00mA and 20.00 mA at least for % is 10.0, for ppm, mg/L is 1.00.
3. Set the offset current, the range is \pm 1.00mA.
4. The filter time range is 0-120 seconds, the low pass filter of software will active when the current from one point to another point if user sets the filter time.

5. Set the DO current output mode(fixed / last) when instrument enter into keeping mode.

Relay 1 settings

| RELAY 1 SETTINGS | |
|------------------|---|
| Mode | = <input checked="" type="checkbox"/> PH <input type="checkbox"/> DO |
| ON/OFF | = <input type="checkbox"/> ON <input type="checkbox"/> OFF |
| Close S. P. | = + 1 0 . 0 0 pH |
| Open S. P. | = + 0 4 . 0 0 pH |
| Delay Time | = 0 0 0 SEC |

1. Press UP/DOWN key to choose relay 1 works for PH or DO
2. Press UP/DOWN key to ON/OFF (enable/disable) relay1.
3. Close set point: active point.
4. Open set point: inactive point.
5. Delay time: the range is 0-120 seconds. Relay needs to delay first then active if the measuring data is reach to close set point.

Ex: If user wants turn on the pump at pH10.00

and turn off it at pH4.00, then the close S.P. needs to set to pH10.00, Open S.P. sets to pH4.00.

Relay 2 settings

| RELAY 2 SETTINGS | |
|------------------|---|
| Mode | = <input type="checkbox"/> PH = <input checked="" type="checkbox"/> DO |
| ON/OFF | = <input type="checkbox"/> ON = <input type="checkbox"/> OFF |
| Close S.P. | = 0 2 . 0 0 mg/L |
| Open S.P. | = 0 8 . 0 0 mg/L |
| Delay Time | = 0 0 0 SEC |

1. Press UP/DOWN key to choose relay 2 works for PH or DO
2. Press UP/DOWN key to ON/OFF (enable/disable) relay2.
3. Close set point: active point
4. Open set point: inactive point
5. Delay time: the range is 0-120 seconds. Relay needs to delay first then active if the measuring data is reach to close set point.

Ex: If user wants turn on the pump at

2.00mg/L and turn off it at 8.00mg/L, then the close S.P. needs to set to 2.00mg/L, Open S.P. sets to 8.00mg/L.

Relay 3 settings

| RELAY 3 SETTINGS | |
|------------------|---|
| ON/OFF | = <input checked="" type="checkbox"/> ON = <input type="checkbox"/> OFF |
| Period Time | = 0 0 0 1 . 0 HOUR |
| Clean Time | = 0 0 1 0 SEC |
| Delay Time | = 0 0 0 SEC |
| Function | = <input type="checkbox"/> Rinsing = <input type="checkbox"/> Interval Alarm = <input type="checkbox"/> Error Alarm |

1. Press UP/DOWN key to ON/OFF (enable/disable) relay3.
2. Period time: The period for Rinsing or interval function.
3. Clean time: When period is timeout then relay active.
4. Delay time: the range is 0-120 seconds. Relay needs to delay first then active if the period is timeout.

5. Function: press UP/DOWN key to choose Rinsing/Interval/Error.

Notice:

1. Rinsing: when period timeout then clean-relay will active, when clean time is timeout the repeat count for the period.
2. Interval alarm: When period timeout then clean-relay active until user resets the interval then the clean-relay inactive and repeat count for the period.
3. Error alarm: The clean-relay active when there is a error produce. No delay time function in this mode.

Measurement settings

| MEASUREMENT SETTINGS | |
|----------------------|--|
| Mode | = <input checked="" type="checkbox"/> % <input type="checkbox"/> ppm <input type="checkbox"/> mg/L |
| PH Offset | = + 0 . 0 0 pH |
| DO Offset | = + 0 0 . 0 % |
| Filter | = 0 1 |

1. Choose the mode for DO measuring unit (for DO only), press UP/DOWN key to choose.
2. Input PH offset, the range is ± 1.00 pH.
3. Input DO offset, the range for % is ± 10.0 ,for ppm and mg/L is ± 1.00 .
4. Filter: Range 0-10.

Notice:

If the reading is not stable then user can set the filter to average the readings.

Temperature settings(6000 Series)

| TEMPERATURE SETTINGS | |
|----------------------|---|
| Automatic | = <input checked="" type="checkbox"/> Auto <input type="checkbox"/> Manual |
| Offset | = + 0 . 0 °C |
| Manual Meas. | = + 0 2 5 . 0 °C |
| Manual Cal. | = 2 5 . 0 °C |
| Display | = <input type="checkbox"/> YES <input type="checkbox"/> NO |

1. Temperature compensation setting, press UP/DOWN key to choose.
2. Temperature offset ,the range is ± 5.0 °C.
3. Temperature for measurement, the range is -10.0 to +130.0°C.
4. Temperature for calibration , the range is 0.0 to 60.0°C.
5. Temperature display: display the temperature on measurement mode or not.

Temperature settings(800 Series)

| TEMPERATURE SETTINGS | |
|----------------------|---|
| Automatic | = <input checked="" type="checkbox"/> Auto <input type="checkbox"/> Manual |
| Probe | = <input type="checkbox"/> Pt 1000 <input type="checkbox"/> NTC 22K |
| Offset | = + 0 . 0 °C |
| Manual Meas. | = + 0 2 5 . 0 °C |
| Manual Cal. | = 2 5 . 0 °C |

1. Temperature compensation setting, press UP/DOWN key to choose.
2. Choose probe type.
3. Temperature offset ,the range is ± 5.0 °C.
4. Temperature for measurement, the range is -10.0 to +130.0°C.
5. Temperature for calibration , the range is 0.0 to 60.0°C.

| TEMPERATURE SETTINGS | |
|----------------------|--|
| Display | = <input checked="" type="checkbox"/> YES = <input type="checkbox"/> NO |

6. Temperature display: display the temperature on measurement mode or not.

Notice:

1. When user chooses AUTO and doesn't connect temperature probe then the display will not correct.
2. When select the probe needs to make sure the probe type is correct.

3. Manual measurement: the instrument will use this temperature for compensation in measurement mode when user chooses Manual.
4. Manual calibration: the instrument will use this temperature for compensation in calibration mode when user chooses Manual.

RS485 settings

| RS485 SETTINGS | |
|----------------|---|
| ID Address | = 0 0 1 |
| Baud Rate | = <input type="checkbox"/> 9600 = <input type="checkbox"/> 19200 = <input type="checkbox"/> 38400 |

1. ID address:1-255.
2. Baud rate ,press UP/DOWN key to choose.

Date settings

| DATE SETTINGS | |
|---------------|-----------|
| Year | = 2 0 1 5 |
| Month | = 0 8 |
| Day | = 1 5 |
| Hour | = 1 3 |
| Minute | = 3 6 |
| Second | = 0 4 |

Press UP/DOWN key to set the date. When power off the date will be kept for around 2 days.

Data log settings

| DATA LOG SETTINGS | |
|-------------------|--|
| ON/OFF | = <input checked="" type="checkbox"/> ON <input type="checkbox"/> OFF |
| Reset Record | = <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Save Period | = 0 6 0 SEC |

1. Press UP/DOWN key to ON/OFF (enable/disable) this function.
2. Erase all the records.
3. Saving period from 5 to 120 second.

Notice:

1. When user chooses ON, then it will save measuring data follow the saving period time.
2. When reset the records, it will spend around 10 seconds.

Output test

| OUTPUT TEST | |
|-------------|---|
| PH Current | = 0 4 . 0 0 mA |
| DO Current | = 0 4 . 0 0 mA |
| Relay 1 | = <input type="checkbox"/> CLOSE <input type="checkbox"/> OPEN |
| Relay 2 | = <input type="checkbox"/> CLOSE <input type="checkbox"/> OPEN |
| Relay 3 | = <input type="checkbox"/> CLOSE <input type="checkbox"/> OPEN |

1. PH current output: 4.00-20.00mA, press UP/DOWN to set.
2. DO current output: 4.00-20.00mA, press UP/DOWN to set.
3. Relay 1 output, press UP/DOWN to choose.
4. Relay 2 output, press UP/DOWN to choose.
5. Relay 3 output, press UP/DOWN to choose.

Notice: This function for testing the output only.

Language settings

| LANGUAGE SETTINGS | |
|-------------------|---|
| Language | = <input checked="" type="checkbox"/> English <input type="checkbox"/> 繁體中文 <input type="checkbox"/> 简体中文 |

Press UP/DOWN key to choose the language.

Reset parameters

| RESET PARAMETERS | |
|------------------|---|
| Reset Type | = <input checked="" type="checkbox"/> Current |
| | <input type="checkbox"/> Relay1 |
| | <input type="checkbox"/> Relay2 |
| | <input type="checkbox"/> Relay3 |
| | <input type="checkbox"/> All |

Press UP/DOWN key to choose the reset.

Notice: The reset will not affect the calibrated parameters.

Record query

Press UP key at the measurement mode to enter record query mode.

| INPUT RECORD START NUMBER |
|---------------------------|
| 0 1 0 3 0 0 |

Press UP/DOWN and SHIFT key to input record number then press ENTER key enter or press MODE key exit.

Display PH/DO record

| RECORD 020300 | | |
|---------------|-------|----|
| 15-08-14 | 07.00 | pH |
| 21:20:59 | 99.8 | % |
| 15-08-14 | 07.00 | pH |
| 21:21:04 | 99.8 | % |
| 15-08-14 | 07.00 | pH |
| 21:21:09 | 99.8 | % |
| 15-08-14 | 07.00 | pH |
| 21:21:14 | 99.8 | % |
| 15-08-14 | 07.00 | pH |
| 21:21:19 | 99.8 | % |

Calibration

Press MODE key to enter the password menu and then press UP/DOWN/SHIFT key to input password 1100 then press ENTER will enter to calibration mode or press MODE key to exit. If no key is be pressed and over 10 minutes then it will go back to measurement mode.

| PASSWORD |
|----------|
| 1 1 0 0 |

| PASSWORD |
|----------|
| 0 1 0 0 |

Manu

Press UP/DOWN key to select the functions and then press ENTER key to enter.

| CALIBRATION |
|--|
| <ul style="list-style-type: none"><input checked="" type="checkbox"/> PH Automatic CAL.<input type="checkbox"/> PH Manual CAL.<input type="checkbox"/> PH Reset Parameters<input type="checkbox"/> DO Parameters Settings<input type="checkbox"/> DO Zero CAL.<input type="checkbox"/> DO Saturation CAL.<input type="checkbox"/> DO Concentration CAL.<input type="checkbox"/> DO Reset Parameters |

- 1.PH Automatic calibration: follow the indication to select standard buffer.
- 2.PH Manual input calibration: manual input standard buffer.
- 3.PH Reset parameters: reset all of the calibrated parameters to default.
- 4.DO Parameters setting: set the parameters
- 5.DO Zero calibration: calibrate the zero point
- 6.DO Saturation calibration: calibrate the

saturation point

7. DO Concentration calibration: calibrate the concentration

8. DO Reset parameters: reset all of the calibrated parameters to default.

Notice:

If the PH electrode efficiency is lower than 80% or the waiting time is too long and can not locked, user should check the electrode if aged, user should Replace the new electrode.

PH Automatic calibration

Stand calibration

| CALIBRATION | |
|---|--------------------|
| <input checked="" type="checkbox"/> 6.86 <input type="checkbox"/> 7.00 | 7.00 pH 25.0 °C |
| Select buffer and press ENTER | |

1. Put the electrode to the first buffer.
2. Press UP/DOWN key to select the correct buffer and then press ENTER to start calibration.
3. User can press ENTER to go to next or wait for it auto lock.
4. Display the idea pH on the right side.
5. If the offset is over +/-1.5 pH or temperature is over 0.0-60.0°C then it will display error message on the button of LCD.

Slope calibration

| CALIBRATION | |
|--|--------------------|
| <input type="checkbox"/> 1.68 <input checked="" type="checkbox"/> 4.01 <input type="checkbox"/> 9.18 <input type="checkbox"/> 10.01 <input type="checkbox"/> 12.45 | 4.00 pH 25.0 °C |
| Select buffer and press ENTER | |

1. Put the electrode to the second buffer.
2. Press UP/DOWN key to select the correct buffer and then press ENTER to start calibration.
3. User can press ENTER to go to next or wait for it auto lock.
4. Display the idea pH on the right side.
5. If the offset is over 30% or temperature is over 0.0-60.0°C then it will display error message on the button of LCD.

Display efficiency

| CALIBRATION | |
|--|--------------------|
| <input type="checkbox"/> 1.68 <input checked="" type="checkbox"/> 4.01 <input type="checkbox"/> 9.18 <input type="checkbox"/> 10.01 <input type="checkbox"/> 12.45 | 4.00 pH 25.0 °C |
| EFFICIENCY = 98.0 % | |

If the efficiency is lower than 80%, that means the electrode is aged, user should Replace the new electrode.

PH Manual calibration

Stand calibration

| CALIBRATION | |
|------------------------------|---------------------|
| 7.0 0 | 7.0 0 pH 25.0 °C |
| Input buffer and press ENTER | |

1. Put the electrode to the first buffer.
2. Press UP/DOWN key input the standard buffer and then press ENTER key to start calibration. User can press ENTER to go to next or wait for it auto lock.
3. Display the idea pH on the right side.
4. If the idea pH is over 7.00+/-1.5 pH or temperature is over 0.0-60.0°C then it will display error message on the button of LCD.

Slope calibration

| CALIBRATION | |
|------------------------------|---------------------|
| 4.0 1 | 4.0 0 pH 25.0 °C |
| Input buffer and press ENTER | |

1. Put the electrode to the second buffer.
2. Press UP/DOWN key input the standard buffer and then press ENTER key to start calibration. User can press ENTER to go to next or wait for it auto lock.
3. Display the idea pH on the right side.
4. If the input is over 0.00-14.00 pH, or temperature is over 0.0-60.0°C then it will display error message on the button of LCD.

Display efficiency

| CALIBRATION | |
|---------------------|---------------------|
| 04.0 1 | 4.0 0 pH 25.0 °C |
| EFFICIENCY = 98.0 % | |

If the efficiency is lower than 80%, that means the electrode is aged user should Replace the new electrode.

PH Reset parameters

| RESET PARAMETERS |
|------------------|
| RESET |

This will reset all of the calibrated parameters to default.

DO Parameters setting

| PARAMETERS | SETTINGS |
|------------|----------------|
| Pressure | = 1 0 1 3 mBAR |
| Salinity | = 0 0 . 0 ppt |
| Membrane | = 3 . 0 6 % |

1. Pressure range is from 500 to 9999 mbar.
Ex: if DO sensor is be used with 1KG pressure in fermentation. User should modify the pressure to 2026 mBar
2. Press UP/DOWN key to input the salinity.
The range is from 0.0 to 50.0 ppt
3. Press UP/DOWN key to input the coefficient of membrane. The range is from 0.01% to 9.99%. It depends on the

Membrane type.

DO Zero calibration

| ZERO CALIBRATION |
|---------------------------------------|
| + 0 1 . 1 nA (25. 0 °C) 2 5 . 0 °C |
| Wait stable and press ENTER |

1. Put the DO electrode into the nitrogen or saturated solution of anhydrous sodium sulfite.
2. Waiting for the current is stable then press ENTER to finish the calibration.

Notice:

1. The zero point current range is from -2nA to +10nA, if the current is over the range then make sure the DO electrode is good.
2. If the temperature is over 0.0-60.0°C then it will display error message on the button of LCD.

DO Saturation calibration

| |
|---------------------------------|
| SATURATION CALIBRATION |
| + 0066.1 nA (25.0°C) 25.2 °C |
| Wait stable and press ENTER |

1. Use the calibration bottle(with sponge and water) to calibrate DO in 100%. You can also calibrate in air as your 100% calibration.
2. Waiting for the current is stable then press ENTER to go to next or press MODE to exit

| |
|--|
| SATURATION CALIBRATION |
| + 0066.1 nA (25.0°C) 25.2 °C 100.0 % |
| Input standard data |

1. Input standard data, the range is form 50% to 200%.
2. Press ENTER to finish the calibration or press the MODE to exit.

Notice:

1. The saturation current is from +25nA to +200nA,if the current is over the range, please make sure the DO electrode is good.

2. If the temperature is over 0.0-60.0°C then it will display error message on the button of LCD.

DO Concentration calibration

| |
|---------------------------------|
| CONCENTRATION CALIBRATION |
| + 0066.1 nA (25.0°C) 25.2 °C |
| Wait stable and press ENTER |

1. Use the calibration bottle(with sponge and water) to calibrate DO in concentration. You can also calibrate in air as your concentration calibration.
2. Waiting for the current is stable then press ENTER to go to next or press MODE to exit

| |
|--|
| CONCENTRATION CALIBRATION |
| + 0066.1 nA (25.0 °C) 25.2 °C 08.2 0 ppm |
| Input standard data |

1. Input standard data, the range is form 4.00 to 20.00 ppm.
2. Press ENTER to finish the calibration or press the MODE to exit.

Notice:

1. The saturation current is from +25nA to +200nA,if the current is over the range, please make sure the DO electrode is good.
2. If the temperature is over 0.0-60.0°C then it will display error message on the button of LCD.

Reset parameters

| |
|------------------|
| RESET PARAMETERS |
| RESET |

This will reset all of the calibrated parameters to default.

Default

| | | | | |
|-------------|---------------|-------|-----|----------------------|
| pH 20.00mA | corresponding | 14.00 | pH | range: -1.00 - 16.00 |
| pH 4.00mA | corresponding | 0.00 | pH | range: -2.00 - 15.00 |
| | | | | difference : 1.00 |
| DO 20.00mA | corresponding | 200.0 | % | range: 10.0 - 200.0 |
| DO 4.00mA | corresponding | 0.0 | % | range: 0.0 - 190.0 |
| | | | | difference : 10.0 |
| ppm 20.00mA | corresponding | 10.00 | ppm | range: 1.00 - 20.00 |
| ppm 4.00mA | corresponding | 0.00 | ppm | range:0.00 - 19.00 |
| | | | | difference : 1.00 |

| | | | |
|--------------------------|-------------|--------|---|
| PH current output offset | 0.00 | mA | range: +/- 1.00 |
| DO current output offset | 0.00 | mA | range: +/- 1.00 |
| PH current filter | 0 | second | range: 0 - 120 |
| DO current filter | 0 | second | range: 0 - 120 |
| PH fixed current output | 4.00 | mA | range: 4.00 - 20.00 |
| DO fixed current output | 4.00 | mA | range: 4.00 - 20.00 |
| PH HOLD type | last | | range: fixed/last |
| DO HOLD type | last | | range: fixed/last |
| Relay 1 PH close S.P. | 10.00 | pH | range: -2.00 - 16.00 |
| Relay 1 PH open S.P. | 4.00 | pH | range: -2.00 - 16.00 difference : 0.01 |
| Relay 1 DO close S.P. | 20.0 | % | range: 0.0 - 200.0 |
| Relay 1 DO open S.P. | 80.0 | % | range: 0.0 - 200.0 difference : 0.1 |
| Relay 1 ppm close S.P. | 2.00 | ppm | range: 0.00 - 20.00 |
| Relay 1 ppm open S.P. | 8.00 | ppm | range: 0.00 - 20.00 difference : 0.01 |
| Relay 1 delay time | 0 | second | range: 0-120 |
| Relay 2 PH close S.P. | 10.00 | pH | range: -2.00 - 16.00 |
| Relay 2 PH open S.P. | 4.00 | pH | range: -2.00 - 16.00 difference : 0.01 |
| Relay 2 DO close S.P. | 20.0 | % | range: 0.0 - 200.0 |
| Relay 2 DO open S.P. | 80.0 | % | range: 0.0 - 200.0 difference : 0.1 |
| Relay 2 ppm close S.P. | 2.00 | ppm | range: 0.00 - 20.00 |
| Relay 2 ppm open S.P. | 8.00 | ppm | range: 0.00 - 20.00 difference : 0.01 |
| Relay 2 delay time | 0 | second | range: 0-120 |
| Relay 3 period time | 1.0 | hour | range: 0 - 1000.0 |
| Relay 3 clean time | 10 | second | range: 0 - 1000 |
| Relay 3 delay time | 0 | | range: 0 - 120 |
| Relay 3 function | error alarm | | range: clean/period alarm/ error alarm |
| Save time | 60 | second | range: 5 - 120 |
| ID address | 1 | | range: 1 - 255 |
| Baud rate | 9600 | | range: 9600,19200,38400 |
| PH offset | 0.00 | pH | range: +/- 1.00 |
| DO offset | 0.0 | % | range: +/- 10.0 |
| ppm offset | 0.00 | ppm | range: +/-1.00 |
| DO Mode | % | | range: %, ppm, mg/L |
| Temp. Offset | 0.0 | °C | range: +/- 5.0 |

| | | |
|------------------------------|-----------|--|
| Manual Temp. for measurement | 25.0 °C | range: -10.0 - 130.0 |
| Manual Temp. for calibration | 25.0 °C | range: 0.0 - 60.0 |
| Language | English | range: English/ traditional Chinese /simple Chinese |
| Filter | 1 | range: 0 - 10 |
| Temp. probe | NTC22K | range: NTC22K |
| Pressure | 1013 mBar | range: 500 - 9999 |
| Salinity | 0.0 ppt | range: 0.00 - 50.00 |
| Membrane coefficient | 3.06 % | range: 0.01% - 9.99% |

Password

Press MODE key

1100:Calibration mode

1200:Setting mode

If no key is be pressed and over 10 minutes then it will go back to measurement mode.

Error code

| | |
|----------|---|
| Error 01 | memory error |
| Error 02 | reading is over maximum |
| Error 03 | reading is under minimum |
| Error 04 | temperature is over maximum |
| Error 05 | temperature is under minimum |
| Error 06 | current 1 output is over 20.5 mA,the maximum is 22.00mA |
| Error 07 | current 1 output is under 3.8 mA, the minimum is 3.5mA |
| Error 08 | current 2 output is over 20.5 mA,the maximum is 22.00mA |
| Error 09 | current 2 output is under 3.8 mA, the minimum is 3.5mA |
| Error 10 | record error |
| Error 11 | ADC damage |
| Error 99 | default parameters lost |

RS485 command

The instrument use the standard Mod bus-RTU protocol, all of the data are word type(2 bytes), the range is -32767~32767 ,16 system.

PC command:

| | ID address | command | Start address | Data number | CRC16 |
|--------|------------|---------|---------------|-------------|--------|
| length | 1 byte | 1byte | 2 byte | 2 byte | 2 byte |
| Ex. | 0x01 | 0x03 | 0x0001 | 0x0001 | 0xD5CA |

Instrument response:

| | ID address | command | Data number | data | CRC16 |
|--------|------------|---------|-------------|-----------|--------|
| length | 1 byte | 1 byte | 1byte | N byte | 2 byte |
| Ex. | 0x01 | 0x03 | 0x02 | 0x02 0xBC | 0xB895 |

If response is 01,the command is wrong.

If response is 02,the address is not correct.

If response is 03,data number is not correct.

command 03: read the settings

command 04: read the readings

04:definition

address

| | | | |
|------|------|---------------|-----------------------------|
| (00) | 0x00 | pH reading | reading : pH X 0.01 |
| (01) | 0x01 | %/ppm reading | reading : % X 0.1, ppmX0.01 |
| (02) | 0x02 | PH current | reading : X 0.01 |
| (03) | 0x03 | %/ppm current | reading : X 0.01 |
| (04) | 0x04 | Temperature | reading : X 0.1 |
| (05) | 0x05 | Error code | reading : X 1 |
| (06) | 0x06 | | |
| (07) | 0x07 | | |
| (08) | 0x08 | | |
| (09) | 0x09 | Model type | fix to 14 |

03:definition

Address

| | | | |
|------|------|---------------------------|-------------------------------|
| (00) | 0x00 | pH 20.00mA corresponding | reading:X 0.01 |
| (01) | 0x01 | pH 4.00mA corresponding | reading:X 0.01 |
| (02) | 0x02 | DO 20.00mA corresponding | reading:X 0.1 |
| (03) | 0x03 | DO 4.00mA corresponding | reading:X 0.1 |
| (04) | 0x04 | ppm 20.00mA corresponding | reading:X 0.01 |
| (05) | 0x05 | ppm 4.00mA corresponding | reading:X 0.01 |
| (06) | 0x06 | PH Current offset | reading:X 0.01 |
| (07) | 0x07 | DO Current offset | reading:X 0.01 |
| (08) | 0x08 | PH Current filter | reading:X 1 |
| (09) | 0x09 | DO Current filter | reading:X 1 |
| (10) | 0x0A | PH Current fixed current | reading:X 0.01 |
| (11) | 0x0B | DO Current fixed current | reading:X 0.01 |
| (12) | 0x0C | PH Current HOLD type | reading:X 1 0=fixed,1=last |
| (13) | 0x0D | DO Current HOLD type | reading:X 1 0=fixed,1=last |

| | | | | |
|------|------|------------------------------|----------------|--|
| (14) | 0x0E | Relay 1 PH close S.P. | reading:X 0.01 | |
| (15) | 0x0F | Relay 1 PH open S.P. | reading:X 0.01 | |
| (16) | 0x11 | Relay 1 DO close S.P. | reading:X 0.1 | |
| (17) | 0x12 | Relay 1 DO open S.P. | reading:X 0.1 | |
| (18) | 0x13 | Relay 1 ppm close S.P. | reading:X 0.01 | |
| (19) | 0x14 | Relay 1 ppm open S.P. | reading:X 0.01 | |
| (20) | 0x15 | Relay 1 delay time | reading:X 1 | |
| (21) | 0x16 | Relay 2 PH close S.P. | reading:X 0.01 | |
| (22) | 0x17 | Relay 2 PH open S.P. | reading:X 0.01 | |
| (23) | 0x18 | Relay 2 DO close S.P. | reading:X 0.1 | |
| (24) | 0x19 | Relay 2 DO open S.P. | reading:X 0.1 | |
| (25) | 0x1A | Relay 2 ppm close S.P. | reading:X 0.01 | |
| (26) | 0x1B | Relay 2 ppm open S.P. | reading:X 0.01 | |
| (27) | 0x1C | Relay 2 delay time | reading:X 1 | |
| (28) | 0x1D | Relay 3 clean period | reading:X 0.1 | |
| (29) | 0x1E | Relay 3 clean time | reading:X 1 | |
| (30) | 0x1F | Relay 3 delay time | reading:X 1 | |
| (31) | 0x20 | Relay 3 function | reading:X 1 | 0:clean,1:period alarm ,2:Error alarm |
| (32) | 0x21 | Record storage time | reading:X 1 | |
| (33) | 0x22 | Mode | reading:X 1 | 0=%,1=ppm,2=mg/L |
| (34) | 0x23 | pH offset | reading:X 0.01 | |
| (35) | 0x24 | DO offset | reading:X 0.1 | |
| (36) | 0x25 | ppm offset | reading:X 0.01 | |
| (37) | 0x26 | Temp. offset | reading:X 0.1 | |
| (38) | 0x27 | Manual temp. for measurement | reading:X 0.1 | |
| (39) | 0x28 | Manual temp. for calibration | reading:X 0.1 | |
| (40) | 0x29 | Temp. compensation | reading:X 1 | 0=Auto,1=manual |
| (41) | 0x2A | Language | reading:X 1 | 0=English ,1=traditional Chinese,2=simple Chinese |
| (42) | 0x2B | Filter | reading:X 1 | |