P360

pH / REDOX MONITOR

OPERATION GUIDE

CONTENTS

P360 Intelligent On-line PH / REDOX(ORP) Monitor

1. INTRODUCTION

The P360 is a microprocessor controlled pH and Redox measurement instrument. The unit utilizes a multifunction LCD to display readings and provide feedback to the user. It is available with different option to provide fully configurable control, alarm and feedback with up to four relays and two 4-20mA current output sources. It can be used to detect the pH, ORP value of the solution in chemical, petroleum, rubber, paper, tobacco, alcohol, sugar, food, mining, smelting, iron and steel, power generation, pharmaceuticals, water treatment and other industries.

2. FEATURES AND TECHNICAL SPECIFICATIONS

2.1 Features

(1) Large back-lit multifunction LCD display
(2) Wall or Panel mounting is available
(3) Man-machine interface is friendly
(4) Measured process pH, Redox, temperature
(5) Accepts pH glass or antimony and Redox sensors
(6) 0 ~ 100℃ automatic/manual temperature compensation
(7) Manual or Automatic buffer adjustment
(8) Restore factory setting function is available
(9) ROM inside, measurements and time can be programmed store
(10) Galvanic separation between inputs and outputs and supply voltage
(11) Different input for excellent noise rejection
(12) High and low programmable alarm, 250V/10A relay output

2.2 Technical Specifications

(1) Ranges of measurement：0.00~14.00PH / 0~±2000mV / 0~100℃
(2) Accuracy：±0.1 % PH / ±0.1 % mV / ±0.2℃

(3) Linearity：±0.1% of range

(4) Repeatability：±0.1% of range

(5) Temperature compensation type：Auto / manual 0℃ to 100℃

(6) Alarm Output：Four relays outputs (250V/10A)，full range with hysteresis adjustable

(7) Current output：Two DC 4~20mA，Opto-isolated outputs，(750Ω Max. load)

(8) Ambient Operating temperature：-10~+55℃

(9) Humidity：≤95%

(10) Power supply：AC100~240V，50~60Hz

3. INSTALLATION

Depending on the installation position, use the attached mounting bracket and fastened it horizontally or vertically on the rear of the instrument with screws, then fixed on the wall or panel as *figure 1*.

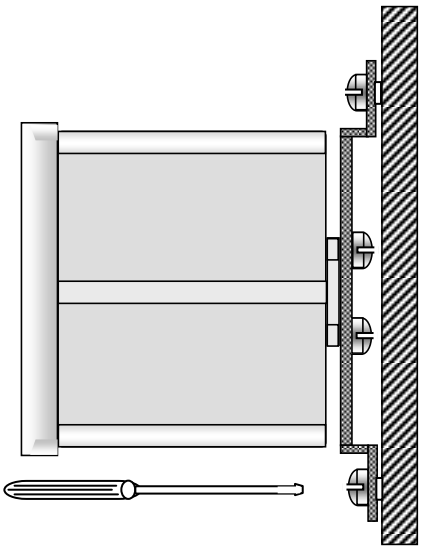


Figure 1 : installation diagram

3.1 Dimensions

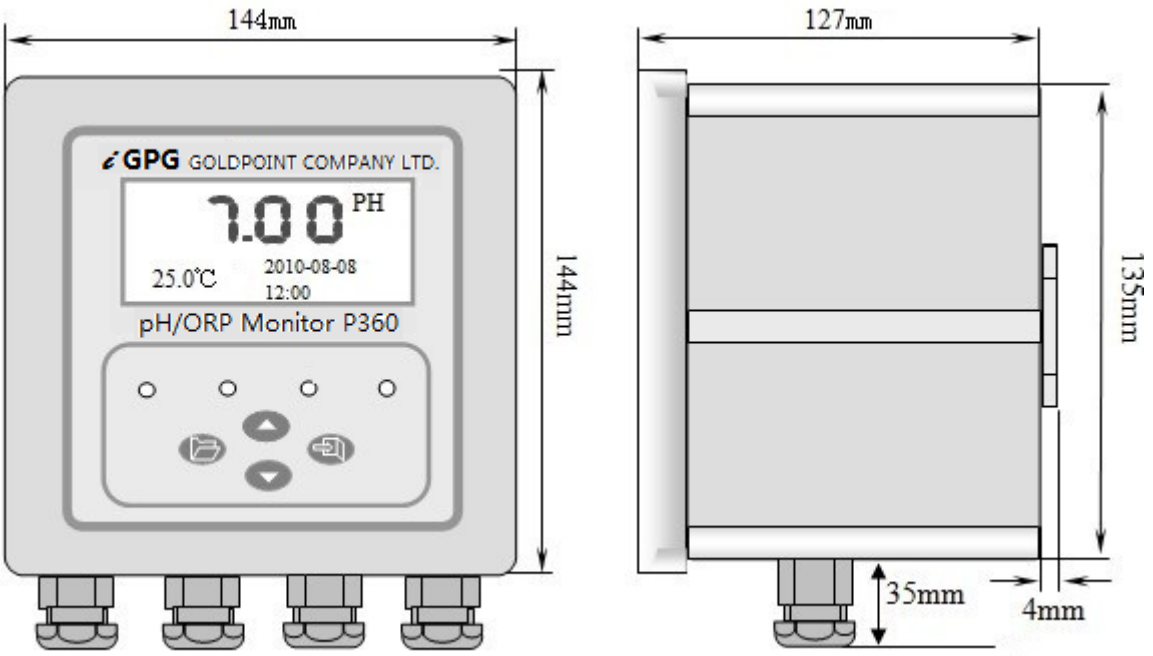


Figure 2 : overall dimensions panel-mounting

3.2 Connection

Remove the four bolts on the front of the instrument, open the case gently, you can see a row of terminals shown in *Figure 3*, please wiring follow the directions.

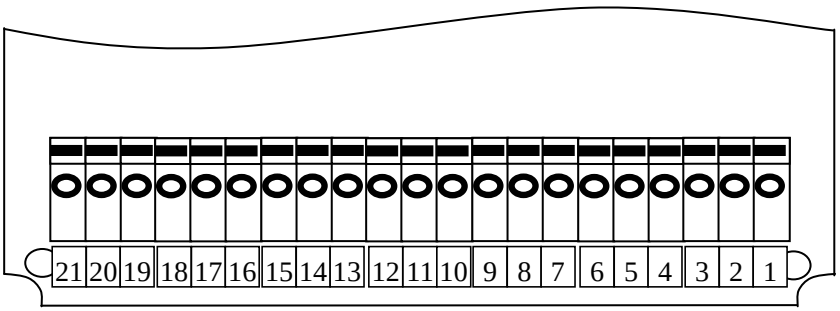


Figure 3 : connection terminals diagram

Connection terminals wiring directions：

1. Power supply terminal: Connect AC100 ~ 240V
2. Power supply terminal: Connect the power supply phase

3. G, Ground
4. PH1, pH high alarm relay output (N/O, normally open)
5. PH2, pH high alarm relay output(Common)
6. PL1, pH low alarm relay output (N/O, normally open)
7. PL2, pH low alarm relay output (Common)
8. TH1, Temperature high alarm relay output (N/O, normally open)
9. TH2, Temperature high alarm relay output (Common)
10. TL1, Temperature low alarm relay output / Cleaning relay output (N/O, normally open)
11. TL2, Temperature low alarm relay output / Cleaning relay output (Common)
12. PI+, 4~20mA current output for pH (+)
13. PI-, 4~20mA current output for pH (-)
14. TI+, 4~20mA current output for temperature (+)
15. TI-, 4~20mA current output for temperature (-)
16. MA, RS485(+)
17. MB, RS485(-)
18. T2, Pt 100 temperature sensor(2)
19. T1, Pt 100 temperature sensor(1)
20. pH-, pH or redox sensor shield (-)
21. pH+, pH or redox sensor central line (+)

★ CAUTION ! :

The specified performance of the P360 is entirely dependent on correct installation. For this reason, the installer should thoroughly read the instructions before attempting to make any electrical connections to the unit.

4. USER INTERFACE AND DESCRIPTION

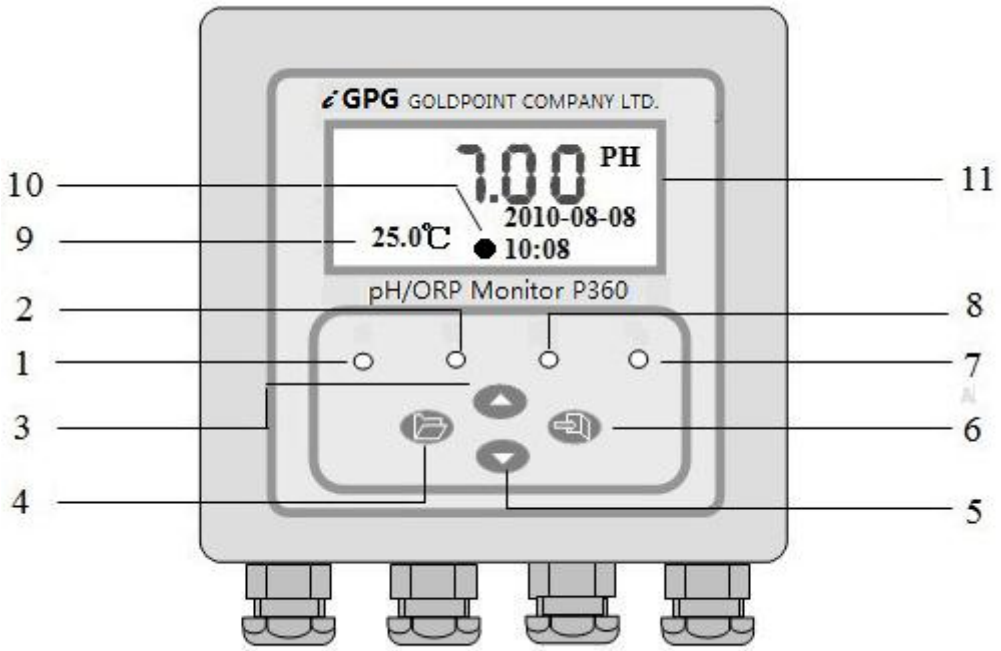


Figure 4: front panel diagram

Front panel description:

(1) **Hi** alarm light，Under the conditions of setting high alarm, when the measured Ph/ORP value of the solution is higher than the value of High alarm, the **Hi** alarm light will be turned on and the high relay (N/O) close; When the measured Ph/ORP value of the solution is lower than the value of High alarm, furthermore lower than the hysteresis, the **Hi** alarm light will be turned off and the high relay (N/O) open.

(2) **Lo** alarm light，Under the conditions of setting low alarm, when the measured pH/ORP value of the solution is lower than the value of low alarm, the **Lo** alarm light will be turned on and the low relay (N/O) close; When the measured Ph/ORP value of the solution is higher than the value of low alarm, furthermore higher than the hysteresis, the **Lo** alarm light will be turned off and the low relay (N/O) open.

(3) **UP** key. In the setting state, using the **UP** key the user can cycle through the front menu. To adjust a value, the **UP** key is used to increment the digit.

(4) **MENU** switch. Press this key to enter or exit the setting state.

(5) **DOWN** key，In the setting state, using the **DOWN** key the user can cycle through the next menu. To adjust a value, the **DOWN** key is used to select a digit.

(6) **ENTER** key is the enter button to confirm enter the menu and store the setting parameters.

(7) **Meas** indicator light, the light will be turned on when entering the measuring state.

(8) **SET** indicator light, the light will be turned on when entering the setting state.

(9) **Temperature** display temperature and the high or low alarm indicator of temperature.

(10) **Cleaning** indicator. If the cleaning function is opened, there is a "●" mark, and when it is in working, the "●" mark will flash; If the cleaning function is closed, there is no mark.

(11) **LCD digital Monitor**，displayed the measured values (pH、mV、℃)，and can also be displayed prompt function, parameter values and error codes in interactive

5. PARAMETER SETTING AND OPERATION

When the instrument is powered security, after a brief self-test program, **Meas** indicator lights and display the pH value, example "7.00" as *Figure 5*. Indicates that the instrument is working in the measurement state.

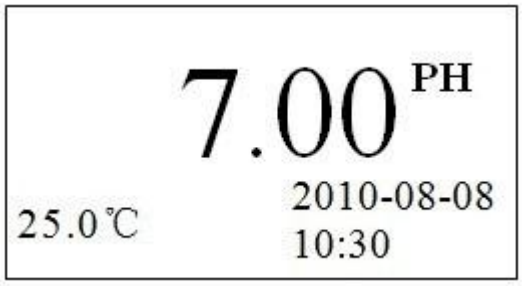


Figure 5 measurement state 1

Instrument has two kinds of operating states: "Measuring" state and "Setting" state. In the measuring state, there are two kinds of display: “pH” and “ORP” display status. Generally，when the instrument is powered on, it enter into the measuring state. Use the **MENU** key to switch the "Measuring" state or "Setting" state. Press **MENU** key in the measuring state, it will enter the setting state, and the SET indicator light will be turned on. At this point press the **UP** or **DOWN** keys to select various setting functions, press the **MENU** key to return to measuring state.

If there is an error code “ER02” display on the position of measurement reading as *Figure 6*, indicated the pH/ORP sensor has not been connected correctly, or out of measuring range. If there is an error code “ER03” display on the position of temperature reading, indicated the temperature compensation sets to “Auto” and the temperature sensor has not been connected correctly, or out of temperature range.

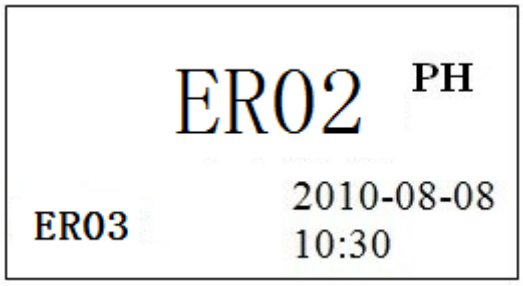


Figure 6 measurement state 2 (error code)

Instrument has the indication of cleaning function and temperature alarm on the screen. When the cleaning function is opened, there is a "●" mark on the screen as *Figure 7.* At this point the indication of temperature alarm is disabled. And now terminals 10, 11 are the cleaning relay output. (Cleaning equipment is an optional configuration)

Figure 7 measurement state 3 (cleaning state)

When the cleaning function is closed, the indication of temperature alarm can be displayed on the screen as *Figure 8*. And now terminals 10, 11 are the temperature low alarm relay output, terminals 8, 9 are the temperature high alarm relay output. (Specific settings see 4.2.3 Set Alarm)

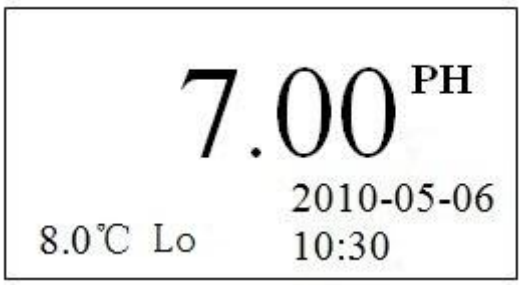
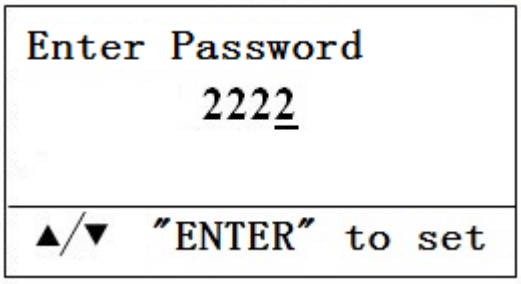


Figure 8 measurement state 4 (temp alarm state)

5.1 Password

The P360 Monitor is locked to prevent unauthorised access to the configuration menu's by using a password. If you want to enter the setting menu, you must enter correct password.

The user password is a 4 digit number that can be set to any value the user chooses. When press the **MENU** key, the screen will display:



When supplied new, the user password is set to **2223**, we recommend that this is changed when the instrument is installed. Use **UP** and **DOWN** to modify it, then press **ENTER** to enter the main setting menu.

***Note:** The factory default password is **2223**, if the password has been forgotten please contact Goldpoint technical support.

Main Setting Menu Directory

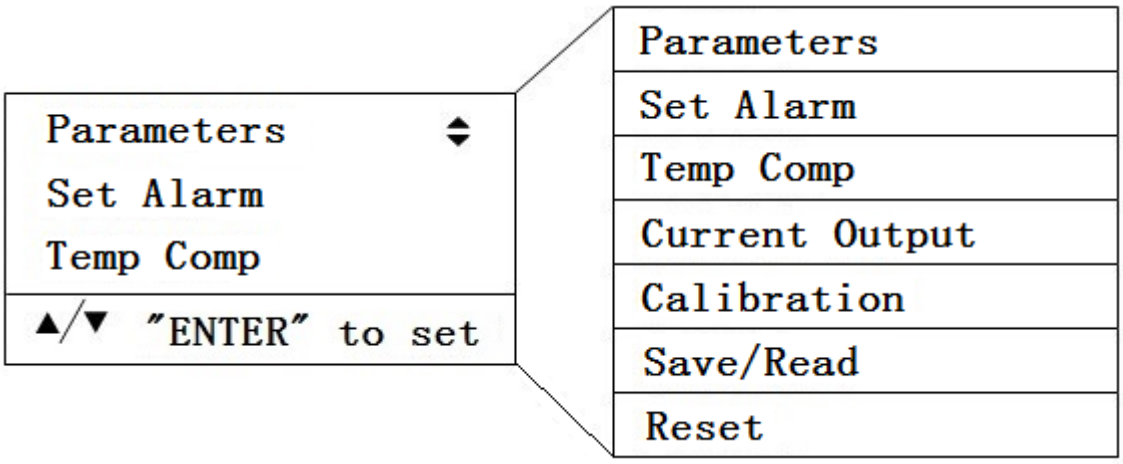
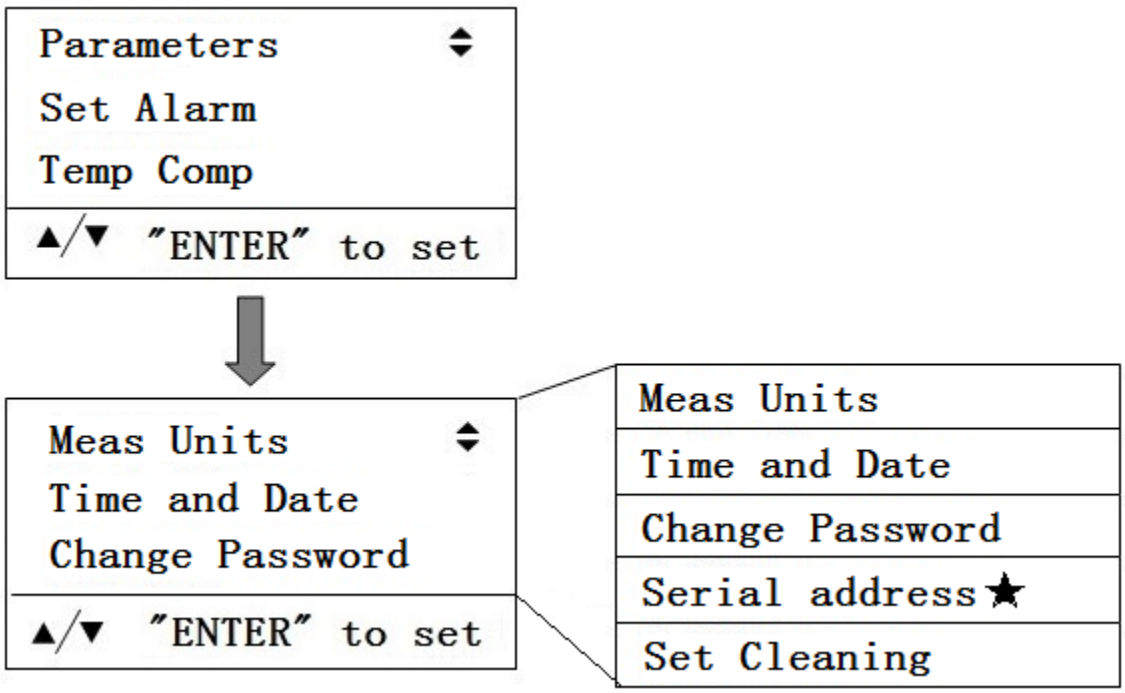


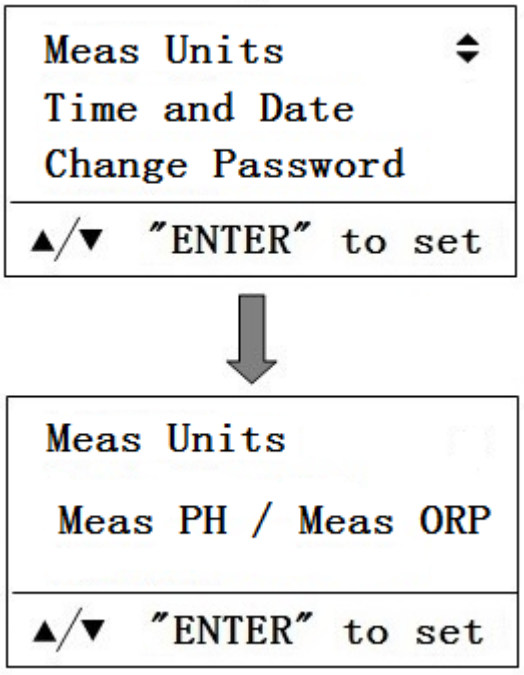
Figure 9 main setting menu directory

After entering into the setting menu, the main menu is displayed on the screen as *Figure 9*. By pressing the **UP** and **DOWN** keys to select menu option, then press the **ENTER** key to enter this menu subdirectory.

5.2 Set Parameter



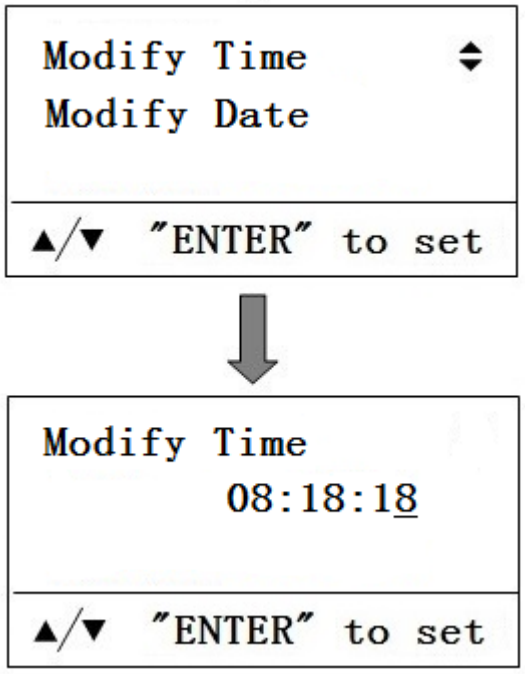
5.2.1 Select Meas Units



Select “Meas Units”, press **ENTER** key to enter the next menu level.

Press **UP** and **DOWN** keys to select “Meas PH” or “Meas ORP”, press **ENTER** key to confirm.

5.2.2 Modify Time and Date of Instrument

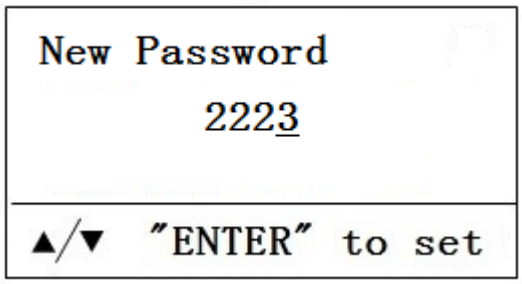


When the character starts flashing, press **DOWN** key to select the digit, the **UP** key is to modify the selected digit. After modifying the value, press **ENTER** key to save and return to the previous menu.

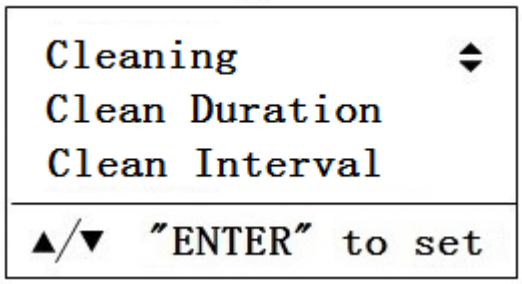
Method of modify date is similar to modify time.

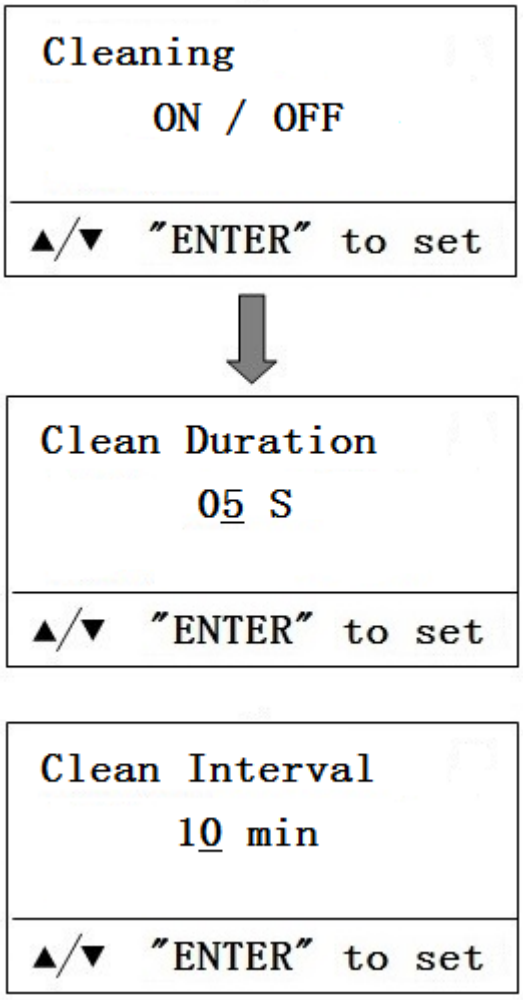
5.2.3 Change Password

When the character starts flashing, press **DOWN** key to select the digit, the **UP** key is to modify the selected digit. After enter a new password, press **ENTER** key to save and return to the previous menu.



5.2.4 Set Cleaning for the Sensor





Press **UP** and **DOWN** keys to switch "ON / OFF", press **ENTER** to confirm. Only when it sets to "ON", in order to proceed to the next setup menu.

Set Clean Duration, the unit is “S” (second).

Set Clean Interval, the unit is “min” (minute).

***Note:** " Clean Duration " and " Clean Interval " can not both be set to 0. Sensor cleaning equipment is the optional configuration, please confirm the device are connected correctly before set cleaning to “ON”.

5.3 Set Alarm

The P360 monitor has four alarm outputs designated high alarms(**H**) and low alarms(**L**). The alarm value and alarm hysteresis can be set within the currently selected measuring range.

Alarm Relay

During normal operation when the alarm is not active, the alarm output will be in its NORMAL condition, the N/O (normal open) contact will be open. When the alarm is active, the alarm output will be in its ALARM condition and therefore the N/O contact will be closed.

Alarm Hysterisis

In a normal condition an alarm turns on and off at the same value. For example, if a high alarm turns on at 10.00pH the alarm occurs when the reading increases to 10.00pH. When it decreases through 10.00pH the alarm turns off.

Some applications may demand that the alarm turns off at a different value, for a high alarm this would be value lower than the alarm value, and for a low alarm this would be a value higher than the alarm value.
The hysterisis value determines the difference between the alarm switch on point and the alarm switch off point. In the case of a high alarm, hysterisis causes the alarm to turn off at a value that is less than the alarm value. For a low alarm, hysterisis causes the alarm to turn off at a value greater than the alarm value.

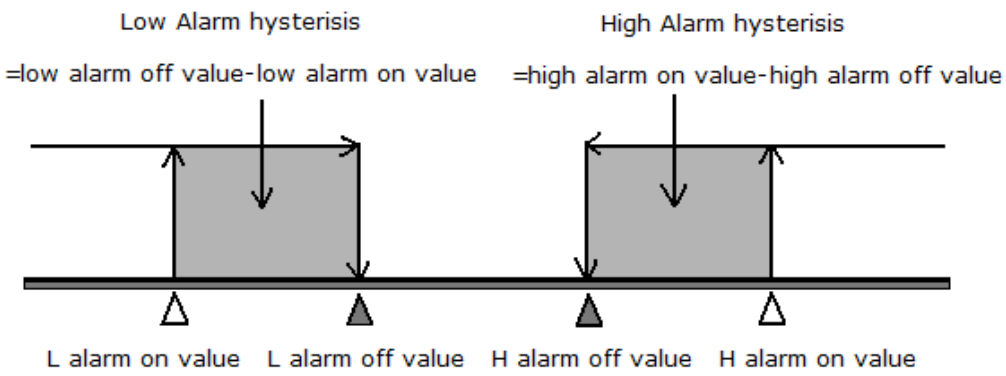
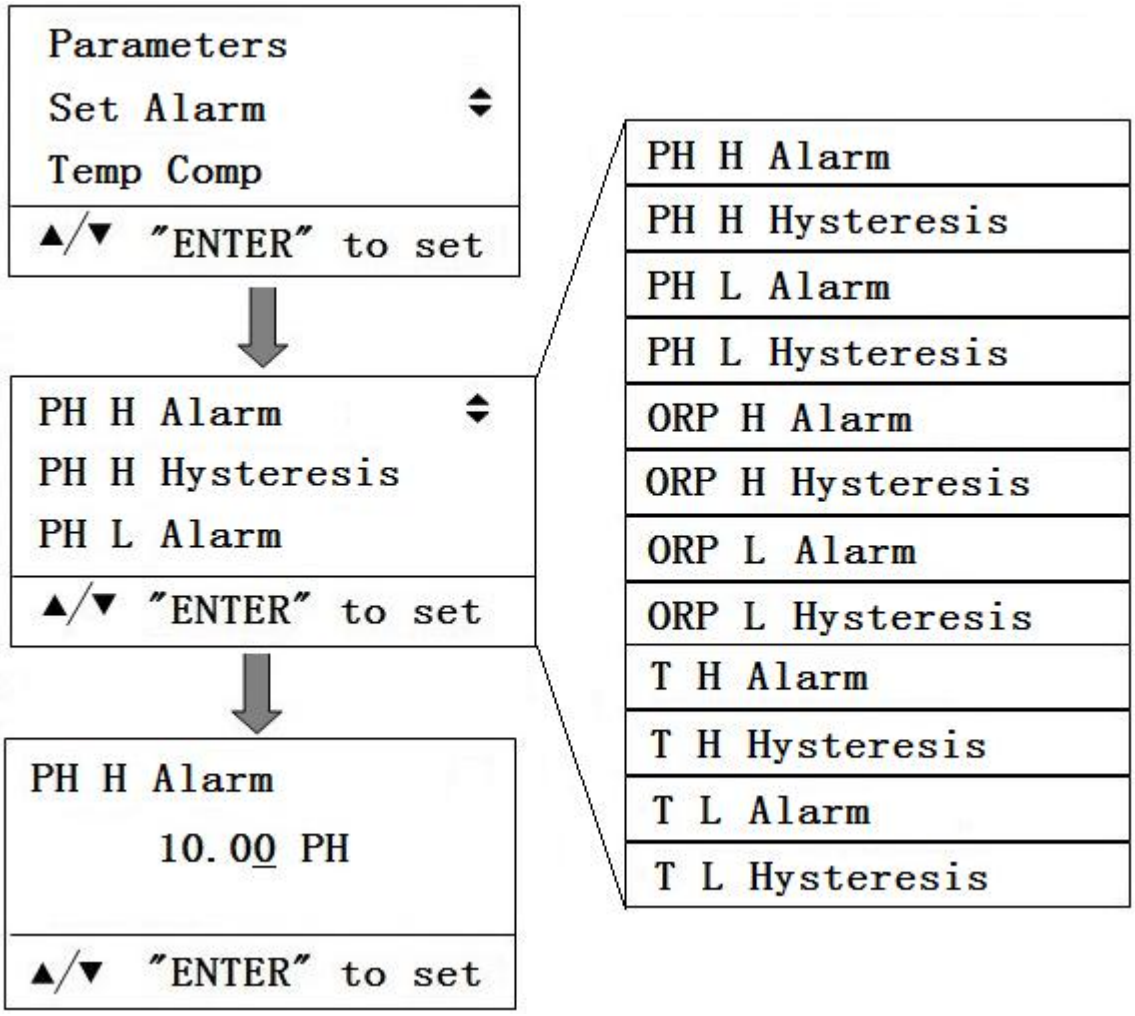


Figure 10 alarm with hysterisis

Select “Set Alarm”, press **ENTER** key to enter the next menu level.



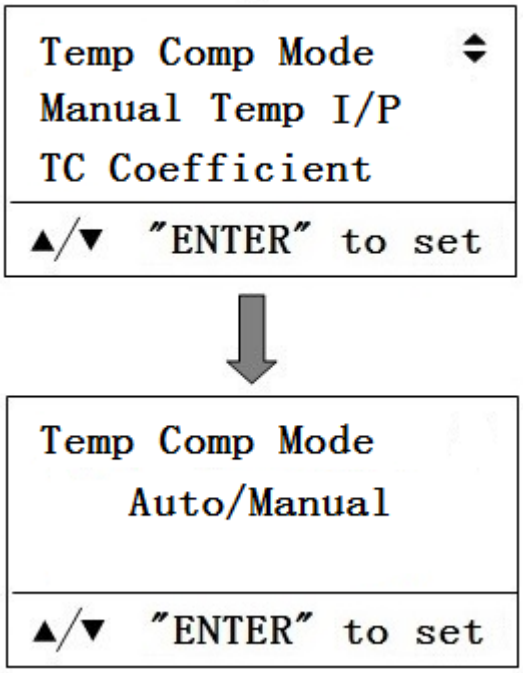
Press **UP** and **DOWN** keys to select the item you want to modify, then press **ENTER** to enter into. When the character starts flashing, press **DOWN** key to select the digit, the **UP** key is to modify the selected digit. After modifying the value, press **ENTER** key to save and return to the previous menu. The factory default alarm value as below:

PH H Alarm	13.00 pH	ORP L Alarm	- 800 mV
PH H Hysteresis	0.10 pH	ORP L Hysteresis	10 mV
PH L Alarm	1.00 pH	T H Alarm	60.0 ℃
PH L Hysteresis	0.10 pH	T H Hysteresis	1.0 ℃
ORP H Alarm	800 mV	T L Alarm	10.0 ℃
ORP H Hysteresis	10 mV	T L Hysteresis	1.0 ℃

***Note:** The setting should meet (high alarm - high hysteresis)≥(low alarm + low hysteresis)

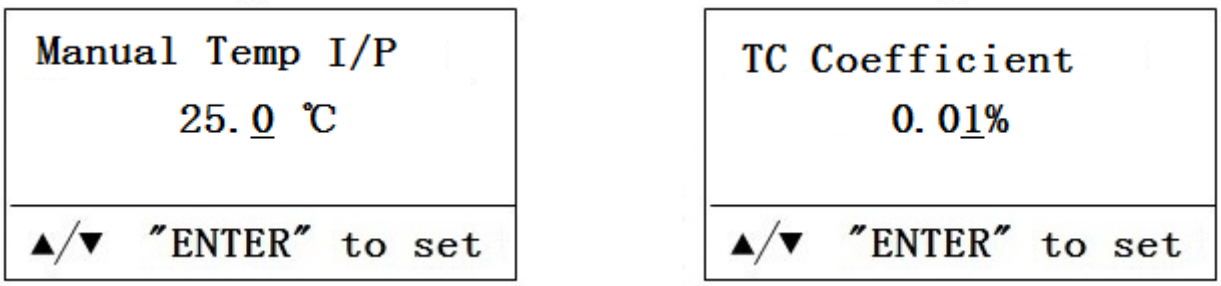
5.4 Temperature Compensation

P360 has Auto and manual temperature compensation function. Use manual temperature compensation, according to the manual input temperature value to compensate. Use automatic temperature compensation, according to the measuring temperature value by the temperature sensor to compensate.



Press **UP** and **DOWN** keys to select “Auto” or “Manual”, press **ENTER** key to confirm.

When selected temperatureRange is 0~100℃, and the factory compensation mode to manual, youdefault is 25.0℃.
need to enter the temperature value.



The temperature compensation coefficient is different for each type of solution, so the temperature compensation coefficient is designed to be adjustable(25 ℃ as the reference), and the range is -2~+2%/℃. The temperature compensation coefficient works both in automatic and manual temperature compensation.

The Calculation Method of coefficient

$$\varepsilon = \frac{\text{pH35-pH25}}{\text{pH25*(35-25)}} \times 100\%$$

***Remark**：pH25=the pH value at t=25℃； pH35=the pH value at t=35℃

5.5 Set Current Output

P360 has two 4~20mA current outputs. One input source is pH or ORP and the other is temperature. The current output can be set work over the whole range of the input source.

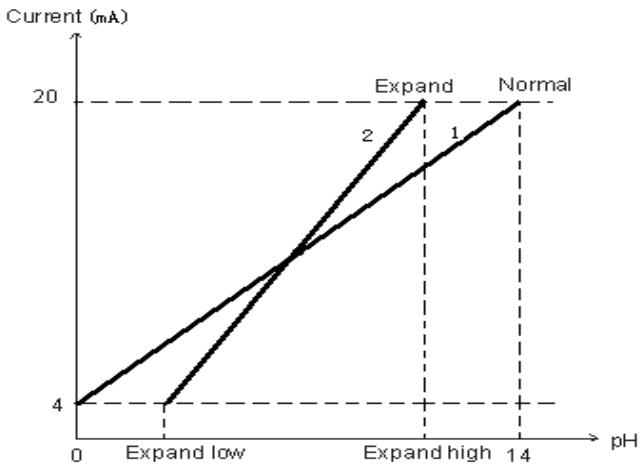
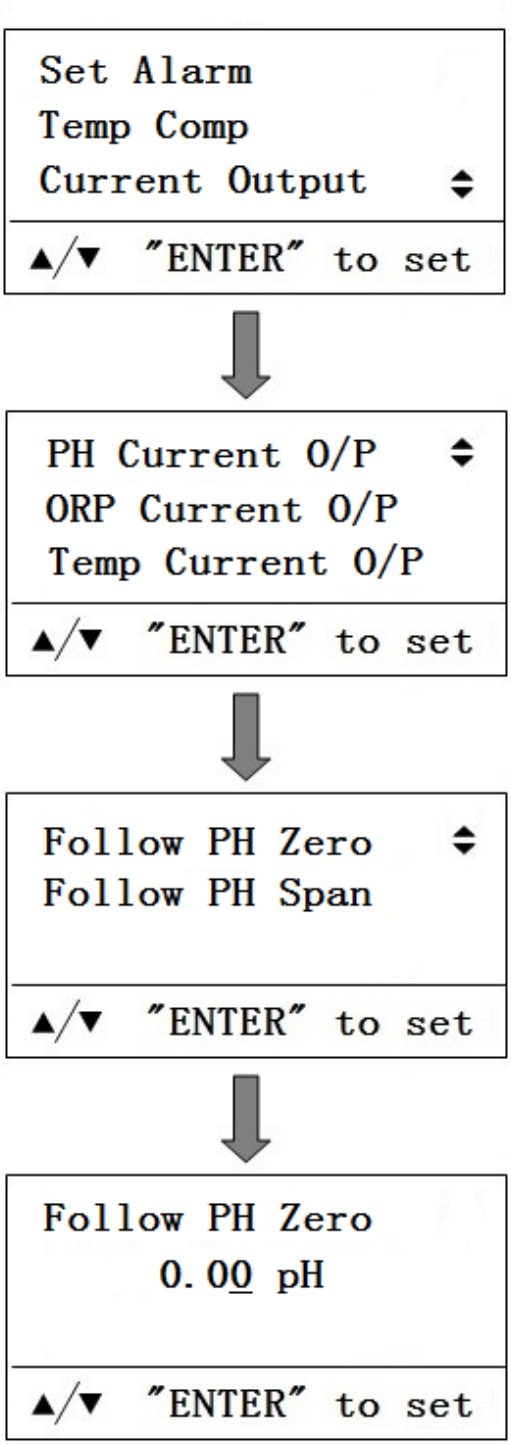


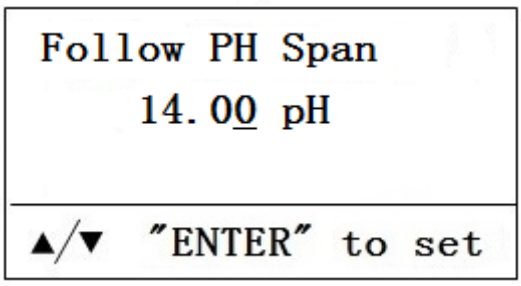
Figure 11　Current span curve

The output can be set work over the whole of selected measurement range (curve1) or a portion of it by setting of the output start and end values (curve2).



Press **UP** and **DOWN** keys to select menu option, press **ENTER** key to enter the next menu level.

Press **UP** and **DOWN** keys to modify, then press **ENTER** key to save and return to the previous menu.



The factory default zero and span of the input source as below:

Input source	Zero	Span
pH	0.00 pH	14.00 pH
ORP	-1000 mV	1000 mV
Temperature	0.0 ℃	60.0 ℃

5.6 Calibration

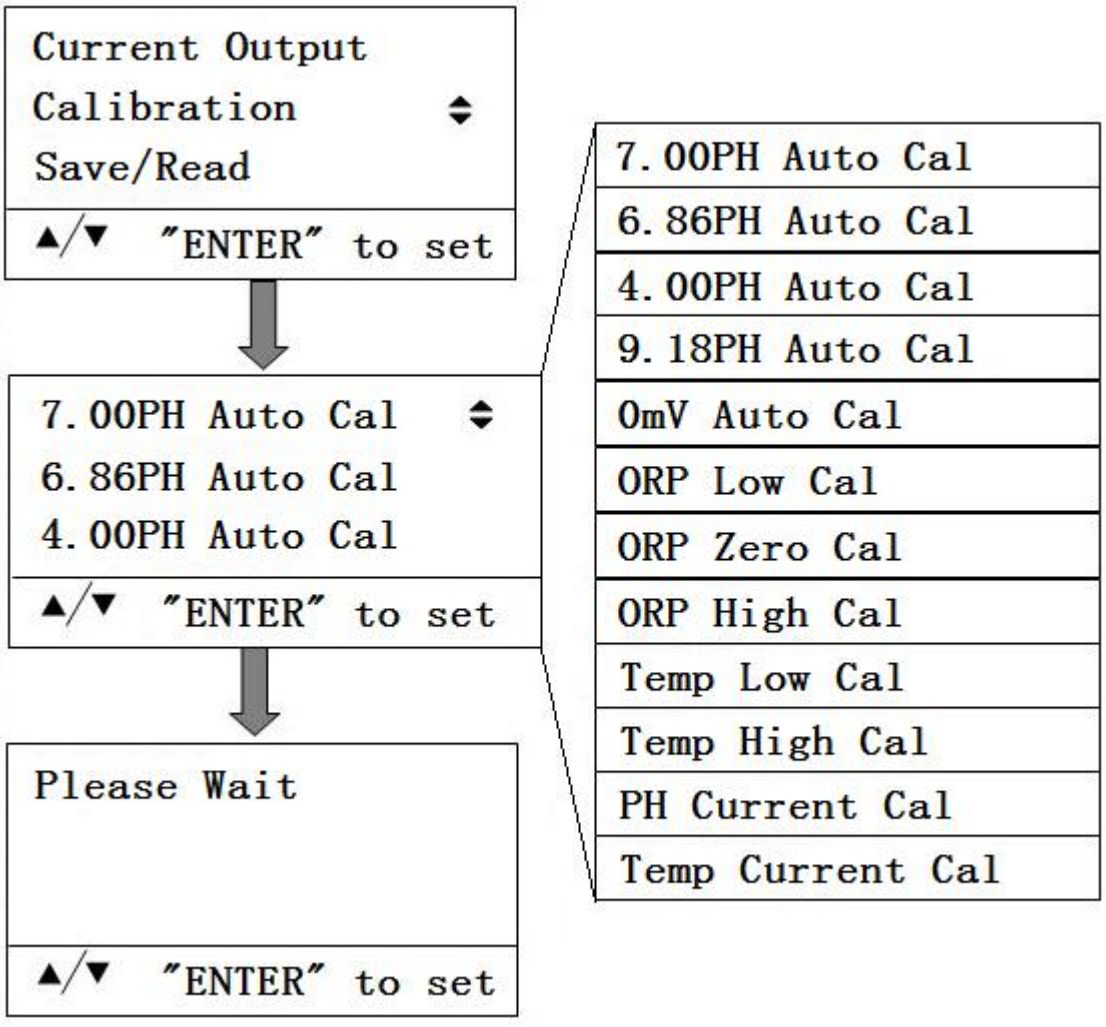
Calibration Intervals

The P360 Monitor and Sensor combination once calibrated will require calibration checking/recalibration at 3-6 monthly intervals, however this does depend on the application.

5.6.1 pH sensor auto calibration

Preparing For Calibration：

- ◆ pH buffer pH=4.00,100ml (t=25℃);
- ◆ pH buffer pH=6.86 or pH=7.00,100ml (t=25℃);
- ◆ pH buffer pH=9.18,100ml (t=25℃);
- ◆ pure water 300~500ml and several absorbent paper.



Specific operations: First wash and dry the pH sensor, put into the corresponding pH standard buffer solution, then press **ENTER** key to enter the corresponding calibration item. Waiting for the flashes display value is stable, press **ENTER** key again. Each automatic calibration process will return to setting mode automatically when it completed.

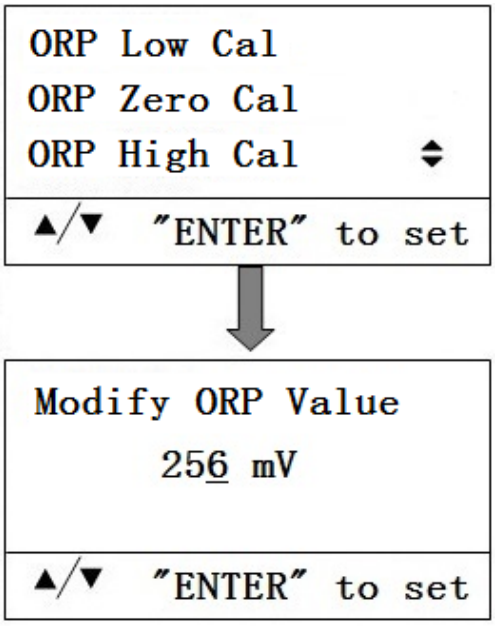
General sensor calibration, two-point calibration method and three-point calibration method can be use as needed. In the use of two or three points calibration method should be the zero calibration first (pH = 7 or 6.86)

5.6.2 ORP manual calibration

Preparing For Calibration：

- ◆ ORP buffer ORP =86 mV, 100ml (t=25℃);
- ◆ ORP buffer ORP =256 mV, 100ml (t=25℃);
- ◆ pure water 300~500ml and several absorbent paper.

Specific operations: First wash and dry the ORP sensor, put into the corresponding ORP standard buffer solution, then press **ENTER** key to enter the corresponding calibration item.



ORP low cal range:-1000~-100mV

ORP zero cal range:-100~100mV

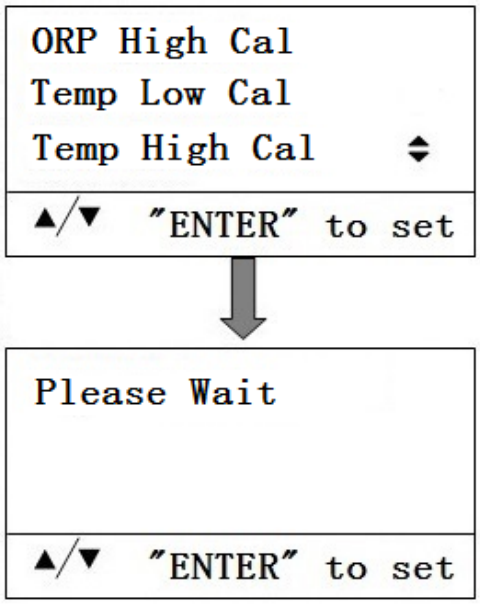
ORP high cal range:-100~100mV

Press **UP** and **DOWN** keys to modify, enter the current ORP value of the standard solution, then press **ENTER** key to save and return to the previous menu.

5.6.3 temperature auto calibration

P360 has temperature measurement function, for the automatic temperature compensation, and also can be displayed on the monitor. Temperature auto calibration requires a high and a low constant temperature environment. Such as ice water mixture (0℃) and boiling distilled water (100℃).

Specific operations: Temp Low Cal is used to calibrate 0℃. Select Temp Low Cal in the menu and put the sensor into 0℃ environment, press **ENTER** to store the calibration data, and return to the previous menu. The Method of calibrate 100℃ is as same as calibrate 0℃.



Temp low cal: 0℃

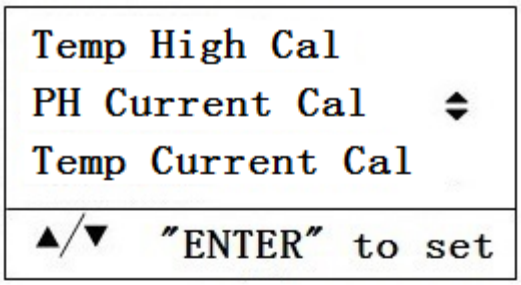
Temp high cal: 100℃

Press **UP** and **DOWN** keys to select menu option, press **ENTER** key to enter the calibration and then save and return automatically

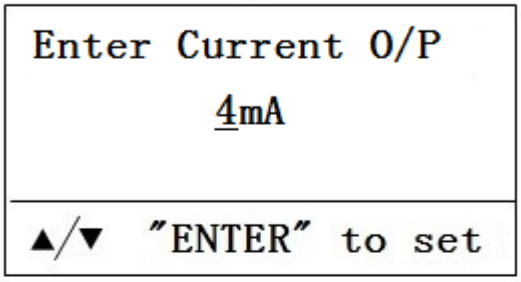
5.6.4 current output calibration

When there is a deviation of current output, it can be calibrated. The operation of pH current output calibration and temperature current output calibration is the same.

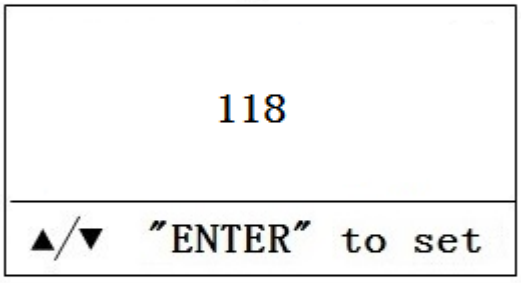
Specific operations: Select PH Current Cal (Temp Current Cal) in the menu, properly connected the Current Meter to the terminals 12, 13 (14,15) of P360. Observe the reading of Current Meter, adjust the output value to be equaled to the value of your setting.



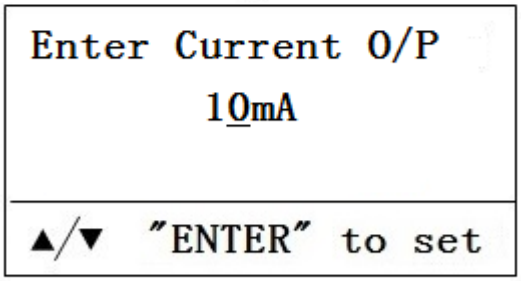
For example, calibrate 4mA to 10mA in pH current output. Select PH OUTPUT CAL, press **ENTER** key to enter.



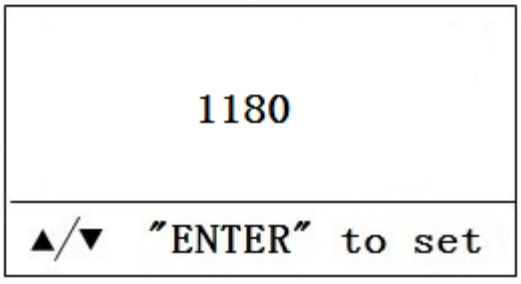
First enter “4mA”, press ENTER key.



Use **UP** and **DOWN** keys to adjust until the reading of Current Meter is “4mA”, then press **ENTER** key to save and continue.



Enter the second point “10mA”, press ENTER key.



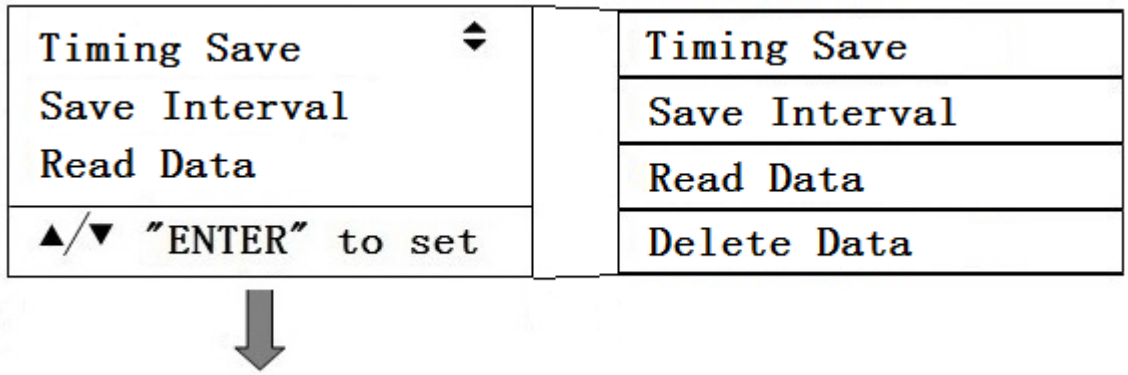
Use **UP** and **DOWN** keys to adjust until the reading of Current Meter is “10mA”, then press **ENTER** key to save and return to the previous menu.

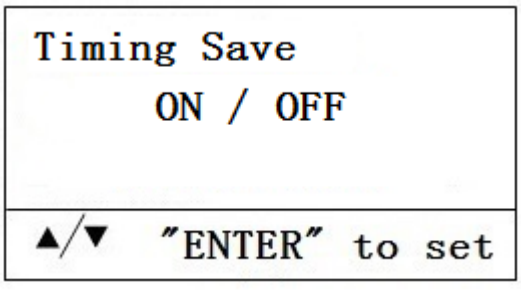
***Note:** The second enter current output value can not smaller than the first enter. If they are equal, the calibration is the one-point calibration.

5.7 Save and Read Data

P360 has measurement data storage function, the data can be saved by timer or manual. The saved content is including pH or ORP measurements, temperature, date and time. Total 2432 groups of data can be saved, for the user inquiry at any time.

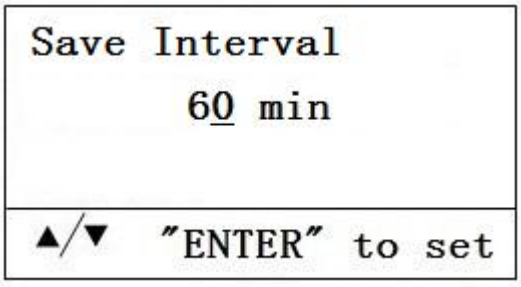
5.7.1 switch timing save





Press **UP** and **DOWN** keys to switch "ON / OFF", press **ENTER** to confirm. Only when it sets to "ON", in order to proceed to set save interval.

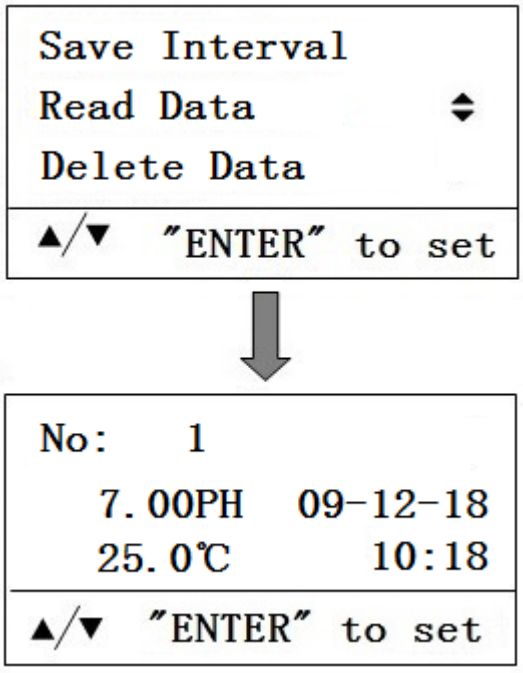
5.7.2 set save interval



Press **UP** and **DOWN** keys to modify the save interval (Unit is min), press **ENTER** key to confirm. Thus, a data will be saved at the time you set intervals.

5.7.3 read data

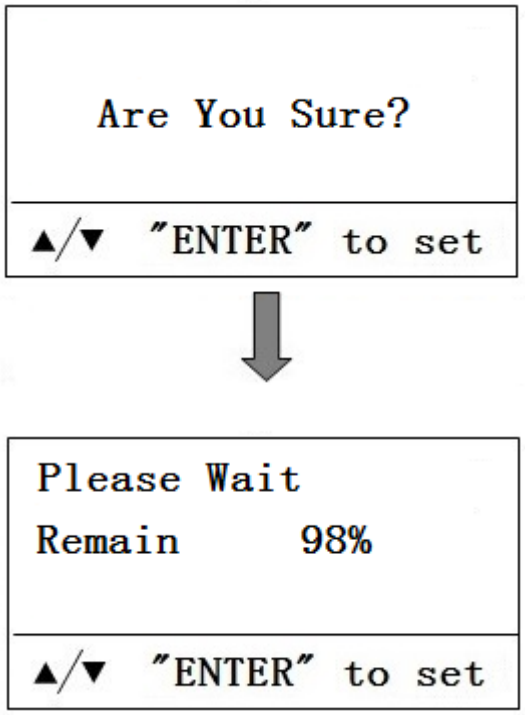
Access this menu, you can view the stored measurement data records, including the PH or ORP, temperature, time, date



Select “READ DATE”, press **ENTER** key to enter the next menu level.

Press **UP** and **DOWN** keys to view the previous data or the next data. Press **MENU** key to exit.

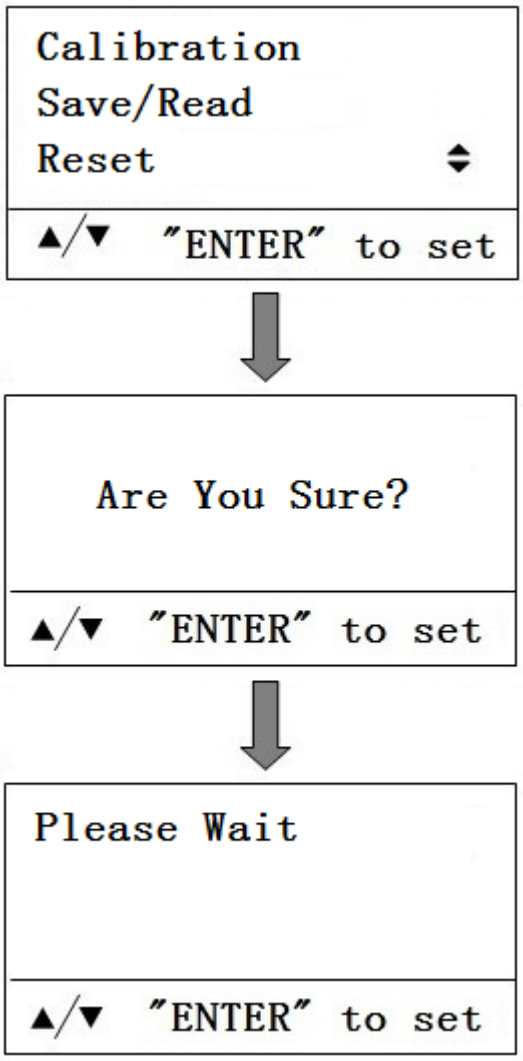
5.7.4 delete all data



Select “DELETE DATE”.
Press **ENTER** key to delete all data.
Press **MENU** key to exit.

Began to delete all data, wait for a few seconds, it will return to the previous menu automatically until display remaining 0%.

5.8 Restore Factory Setting



Select “RESET”, press **ENTER** key to enter the next menu level.

Press **ENTER** key to restore factory setting.

Press **MENU** key to exit.

Began to restore the factory settings, wait for a few seconds, it will return to the previous menu automatically.

After this process, all value the user set before becomes the factory calibration value. This function is generally used for replace with new sensor or data confusion. Generally after restored factory setting, it need recalibration before using.

6. SENSOR

We use foreign advance technology to manufacture our pH/ORP combination sensor. The quality of the sensor is excellence and it can be used in industry province with all kind of pH/ORP monitor.
The following will introduce the pH sensor ph102 as an example to know about the features and use specifications of the sensor.

6.1 Sensor Features

- ✧ Easy to use , without added electrolyte
- ✧ pH measurement rang is 0~14pH, temperature is 0~80℃
- ✧ Quickly response(within two seconds) and stability
- ✧ Unique structure preventing the sensor from pollution and blockage
- ✧ To apply all low –conductivity water(⩾0.1us/cm)

6.2 Maintenance and measurement

- ✧ The sensor should be cleaned and inserted into mixture solution of 3.5mol KCL and pH 4.00 buffer (1:1 ratio) when not in use.
- ✧ Storage dry conditions,10~30℃.If temperature is below -5℃, the sensor may fracture due to freezing of buffer and electrolyte.
- ✧ Insert the sensor into distilled water or protein solution for long time should be avoided, and prevent from contact with organic silica grease.
- ✧ Dry stored pH sensors must be immersed in water for 12 hours prior to use.
- ✧ Each new sensor must be calibrated with monitor. For pH sensors, 2 or 3 points calibration is necessary.
- ✧ The frequency of calibration or checking the measuring sensor depends on the application conditions.

6.3 Cleaning

- ✧ If the sensor bead or membrane is contaminated by substances containing grease, surface active agent can be used to rinse it.
- ✧ If the sensor bead or membrane is contaminated by protein content (food industry applications), a mixture of dilute hydrochloric acid(10%) and pepsin(saturated) can be used to rinse it.
- ✧ If the sensor bead or membrane is contaminated calcium deposal and metal hydroxide coating, dilute hydrochloric acid(10%) can be used to rinse it.

6.4 Connections

- ✧ Terminal connection or BNC connection
- ✧ Ensure the black semiconductor layer between the copper wire and the polyethylene insulation is completely insulated.

6.5 Sensor Installation

6.5.1 Dimension (Unit: mm)

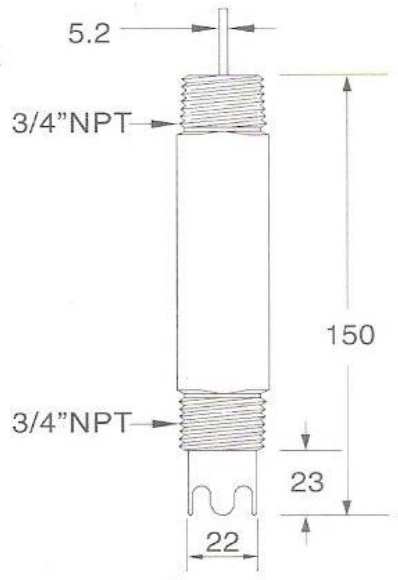


Figure 12 sensor dimension

6.5.2 Installation Diagram

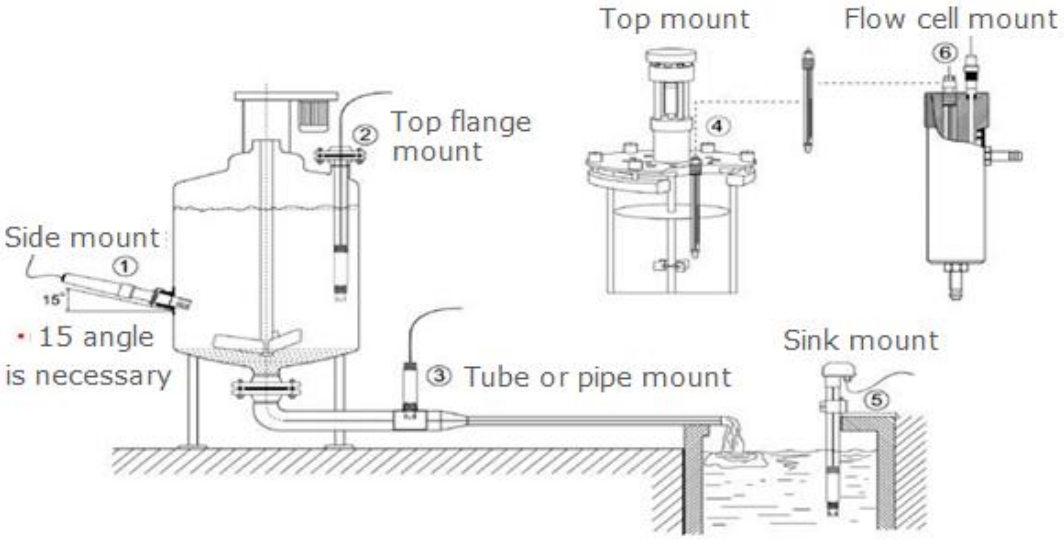


Figure 13 installation diagram

7. WARRANTY

Products manufactured by GOLDPOINT company Ltd. are guaranteed for a period of one year from the date of delivery. Goods for attention under guarantee must be returned to the factory carriage paid and, if accepted for free repair, will be returned to the customer's address free of charge.

All sensors made by GOLDPOINT company Ltd. are thoroughly tested to their published specification before delivery. As we have no control over the conditions in which their sensors are used, no further guarantee is given.

8. STANDARD CONFIGURATION

- P360 monitor
- Mounting fixing of monitor
- Operation guide
- Inspection report

9. OPTIONAL CONFIGURATION

- Combination pH sensor (cable length 10 meters)
- Combination ORP sensor (cable length 10 meters)
- Combination pH with temperature sensor (cable length 10 meters)
- Sink sensor stand
- Flow cell
- pH buffer
- Cable for extend

Appendix: Serial Protocol

RS485 Interface Bus Protocol: Baud rate: 9600bps; Check :None;

Data bits: 8 bits; Stop bits: 1 bit.

Read the meter measurements:

(1) The computer sends the command: [Device Address] [Command No. 04] [Start Register Address High 8] [Low 8] [Read Register High 8] [Low 8] [CRC Low 8 Bit] [CRC High 8 bit]

The instrument format: [Device Address] [04] [00] [00] [00] [02] [CRC Low] [CRC High]

Meaning is as follows:

<1> Device Address Settings: 1-255. **(Input in menu: Serial address★)**

<2> Command Number: 04.

<3> Start address High 8 bits, low 8 bits: Indicates the start address of the analog value to be read (start address is 0).

<4> The number of registers is 8 bits high and 8 bits low: it indicates how many analog values to read from the start address. The instrument is 2 analog. Note that one analogue needs to return two bytes in the returned message.

(2) Device Response: [Device Address] [Command No. 04] [Number of Bytes Returned] [Data 1] [Data 2] [CRC Low] [CRC High]

The instrument format: [Device Address] [04] [04] [Data 1 High] [Data 1 Low] [Data 2 High] [Data 2 Low] [CRC Low] [CRC High]

Meaning is as follows:

<1> Device Address Settings: 1-255.

<2> Number of Bytes Returned: Represents the number of bytes of data, that is, the value of n in data 1, 2 ... n. The instrument returns 2 datas, one needs 2 bytes, so total is 4 bytes.

[Data 1 High] [Data 1 Low]--- pH（ORP）Value

[Data 2 High] [Data 2 Low]--- Temperature Value

All readings are of type int, such as pH is 7.00, the output is 700

ORP is 256, the output is 256

Temperature is 25.00, the output is 2500

<4> CRC check as above.

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