PH/ORP Controller

Content

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 measuring of the temperature and PH/ORP, such as wastewater treatment, environmental monitoring, fermentation, pharmacy, food process agriculture production, 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

The product package contains 1 instrument, the printed manual, 4 sets of brackets.(fixed block, fixed bar, screw)
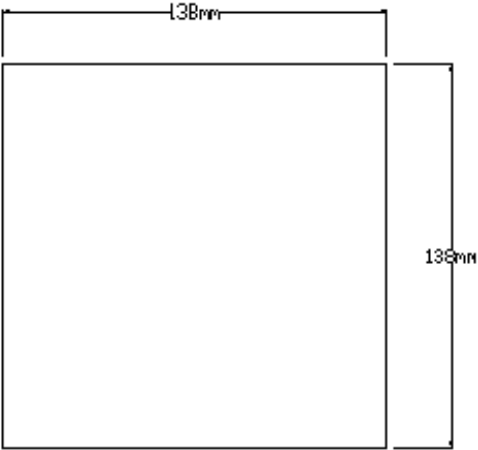
Specifications

Functions	pH	ORP
Measuring range	-2.00pH to +16.00 pH	-2000mV to +2000mV
Resolution	0.01pH	1mV
Accuracy	±0.01pH	±1mV
Temp. compensation	Pt 1000/NTC10K	
Temp. range	-10.0 to +130.0℃	
Temp. compensation range	-10.0 to +130.0℃	
Temp. resolution	0.1℃	
Temp. accuracy	±0.2℃	
Ambient temperature range	0 to +70℃	
Storage temp.	-20 to +70℃	
Input impedance	$>10^{12}\Omega$	
Display	Back light, dot matrix	
pH/ORP current output1	Isolated, 4 to 20mA output , max. load 500Ω	
Temp. current output 2	Isolated, 4 to 20mA output , max. load 500Ω	
Current output accuracy	±0.05 mA	
RS485	Modbus 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	
Instrument size	144mm X 144mm X 105mm (H/W/D)	
Cutout size	138mm X 138mm	
Weight	0.85Kg	

Instrument installation

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.

Cutout size
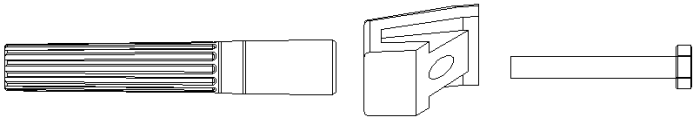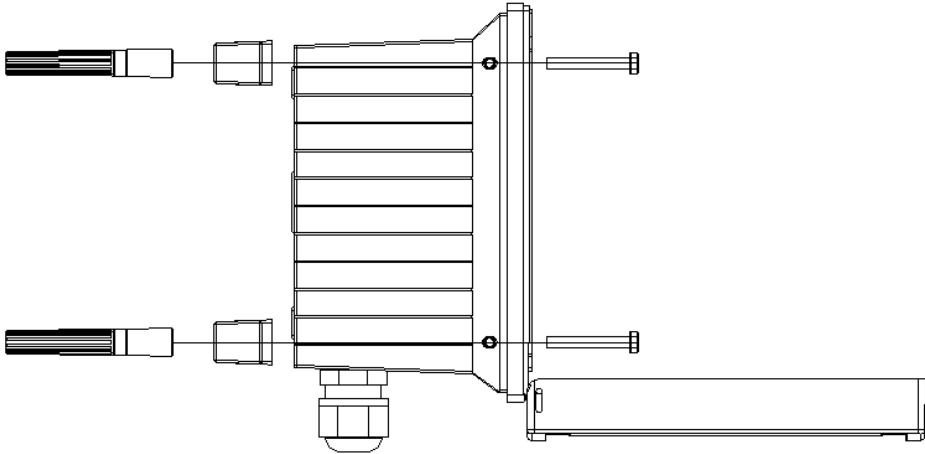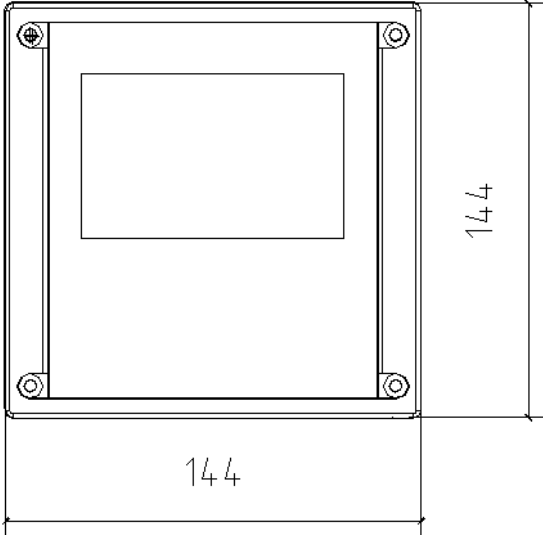
Installation figure

Wall and pipe installation

Connection label

POWER: 90-260VAC   50/60Hz
4-20mA: Isolation Max.Load 500 ohm
Relay: 5A/250VAC   5A/30VDC
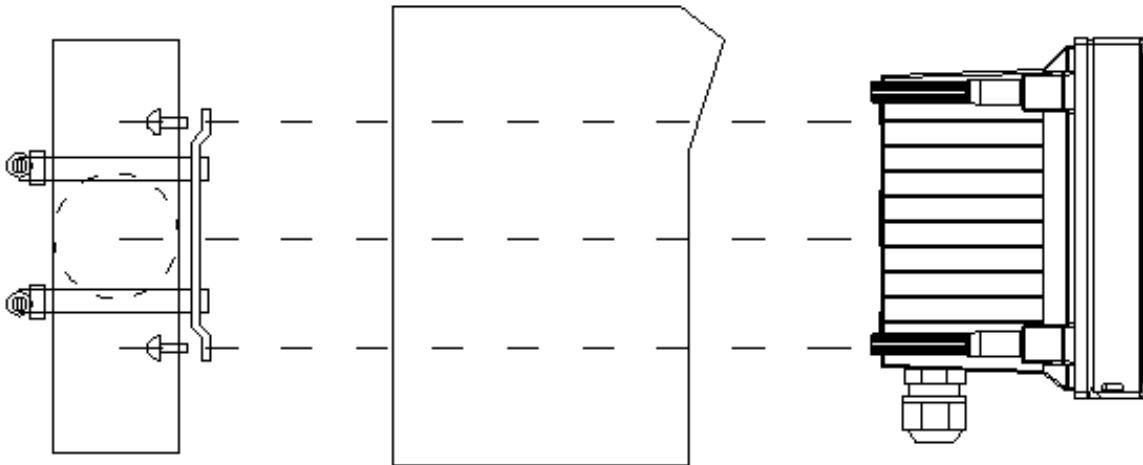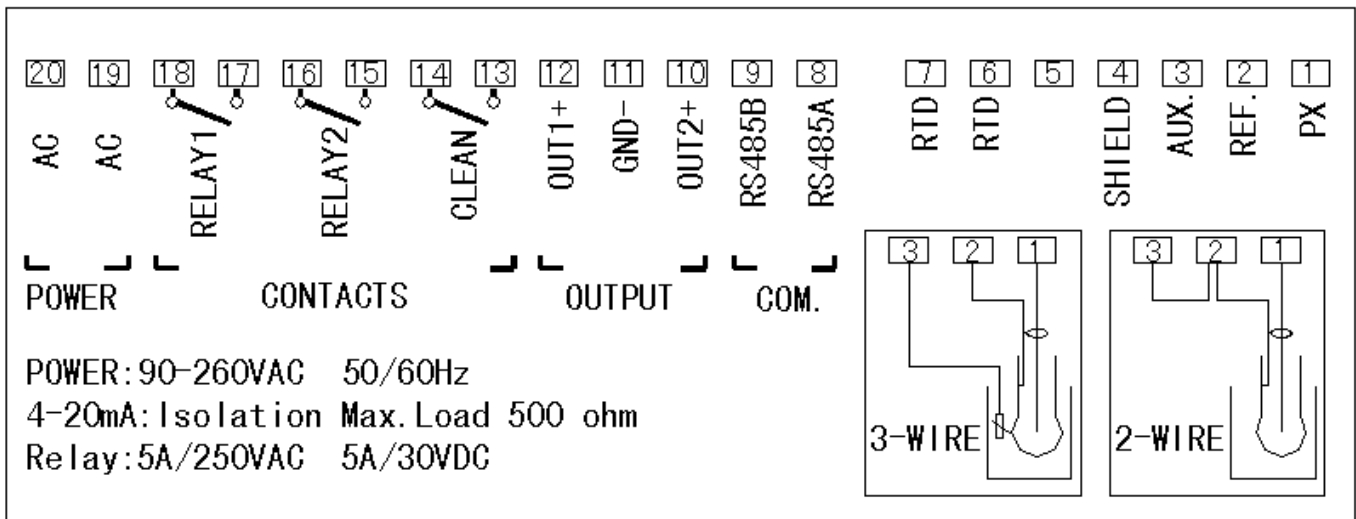
N**otice**

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

2-wire pH electrode

Temperature sensor
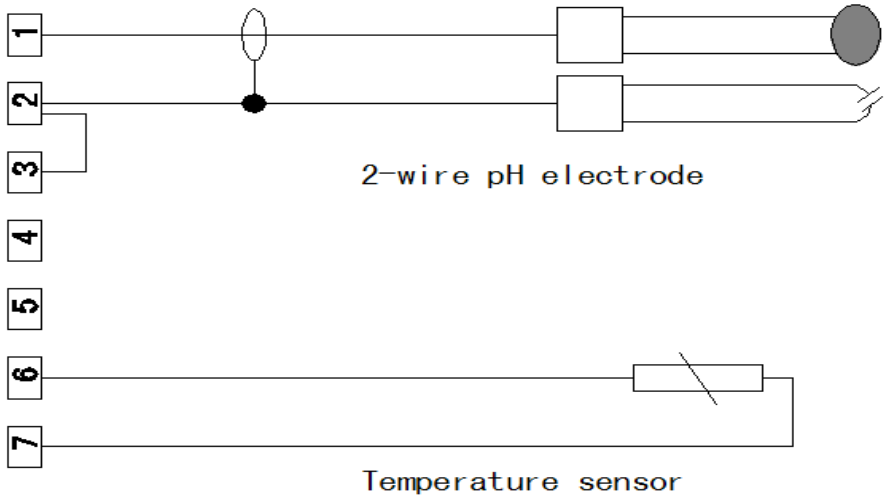
2-wire connection figure

3-wire pH electrode

Temperature sensor
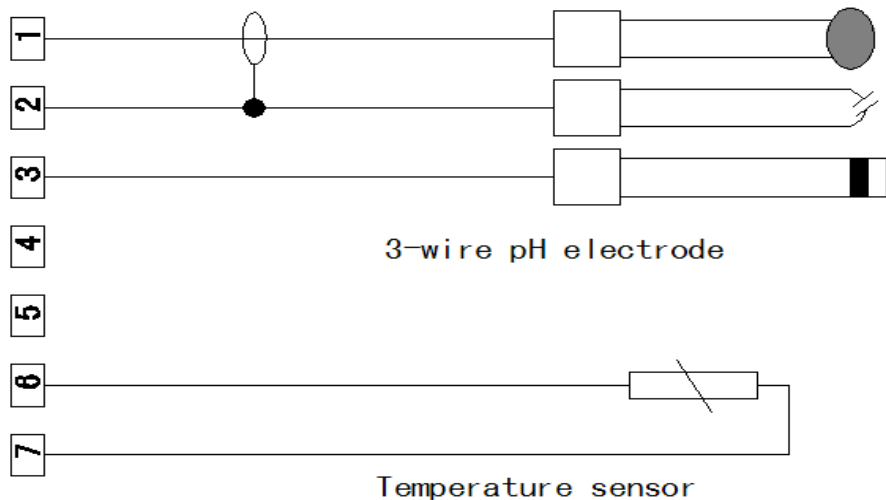
3-wire connection figure

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.
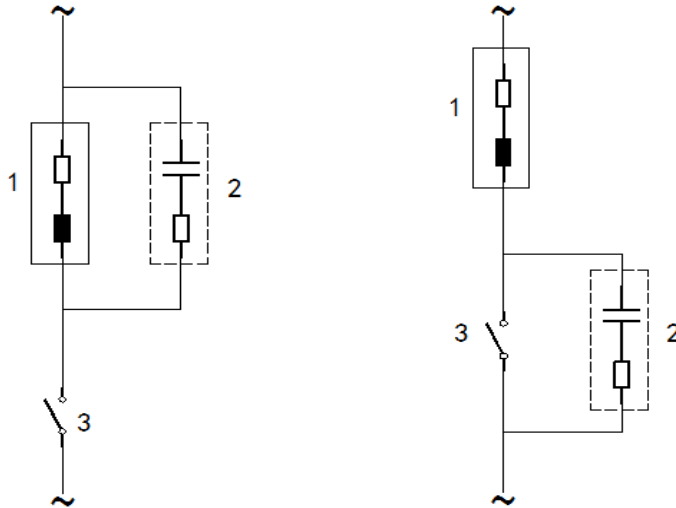
AC protection, use for inductive load
1. load
2. RC eliminate spark, using in 220VAC, R=100 ohm1W,
3. Relay contact
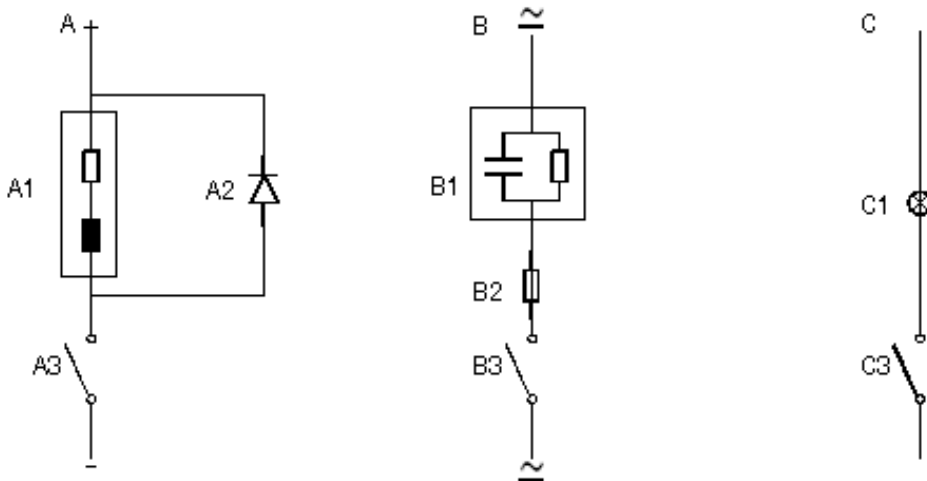
A. DC protection ,A1: inductive load   A2: 1N4007, A3: relay contact
B. AC/DC protection ,B1: capacitive load ,B2: 0.8 Ohm/1W（DC24V）,B3: relay contact
C. Resistive load ,C1:lamp bulb ,C3:relay contact

Display
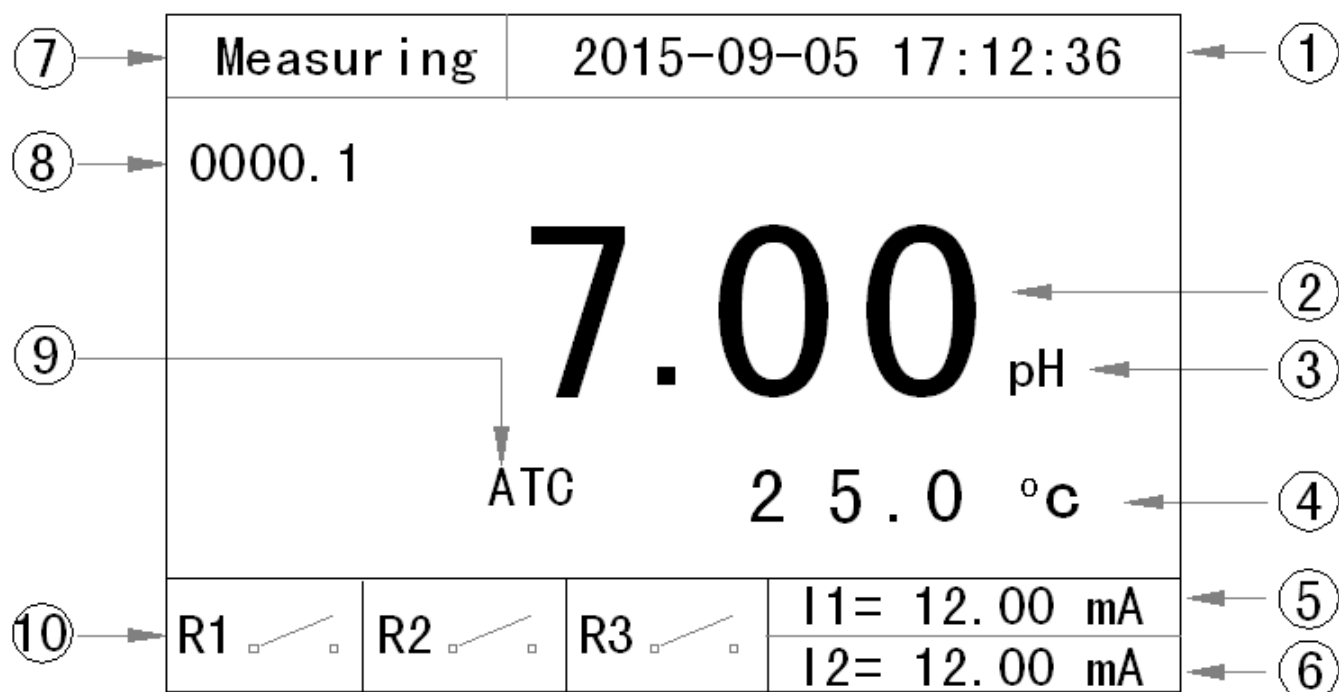
1. Date and time
2. Main display
3. Unit
4. Temperature and unit
5. First current output
6. Second current output
7. Measurement status and Error indicator, there is no display if meter is in keeping mode
8. Count down timer: cycle time/clean time, it also displays the "delay" when relay3 has a delay 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 ORP readings are under or over the range, it will display -9999/9999.
If the temperature readings are under or over the range, it will display -99.9/999.9.

Key
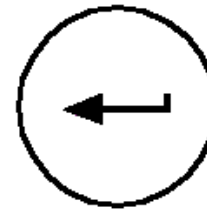
MODE   SHIFT   UP   DOWN   ENTER

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 mode 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: Relay1 and Relay2 open.(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	PASSWORD
0 0 0 0	1 2 0 0

Main display

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

CONFIGURATION	CONFIGURATION
■ Current1 Settings	■ Date Settings
□ Current2 Settings	□ Data Log Settings
□ Relay1 Settings	□ Output Test
□ Relay2 Settings	□ Language Settings
□ Relay3 Settings	□ Reset Parameters
□ Measurement Settings	
□ Temperature Settings	
□ RS485 Settings	

Page1   Page2

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.

Current 1 settings

```
      CURRENT 1 SETTINGS              CURRENT 1 SETTING
 4.00 mA      =+00.00 pH         4.00 mA      = +0000 mV
 20.00 mA     =+14.00 pH         20.00 mA     = +1000 mV
 Offset       = +0.00 mA         Offset       = +0.00 mA
 Filter Time  =   000 SEC        Filter Time  =   000 SEC
 HOLD Type    =☐Fixed            HOLD Type    =☐Fixed
                04.00 mA                        04.00 mA
              ☐Last                           ☐Last
```

1. Set the corresponding 4.00mA to pH/ORP.
2. Set the corresponding 20.00mA to pH/ORP, the difference between 4.00mA and 20.00 mA at least for pH is 1.00, for ORP is 100 mV.
3. Set the offset current of pH/ORP, the range is ±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 current 1 output mode(fixed / last) when instrument enter into keeping mode.

Current 2 settings

```
      CURRENT 2 SETTINGS
 4.00 mA      =+000.0 ℃
 20.00 mA     =+100.0 ℃
 Offset       = +0.00 mA
 Filter Time  =   000 SEC
 HOLD Type    =☐Fixed
                04.00 mA
              ☐Last
```

1. Set the corresponding 4.00mA to temperature.
2. Set the corresponding 20.00mA to temperature, the difference at least between 4.00mA and 20.00 mA is 10.0℃.
3. Set the offset current of temperature, the range is ±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 current 2 output mode(fixed / last) when instrument enter into keeping mode.

Relay 1 settings

```
┌─────────────────────────────────┐   ┌─────────────────────────────────┐
│       RELAY 1 SETTINGS          │   │       RELAY 1 SETTINGS          │
├─────────────────────────────────┤   ├─────────────────────────────────┤
│  ON/OFF        = ■ ON           │   │  ON/OFF        = ■ ON           │
│                = □ OFF          │   │                = □ OFF          │
│                                 │   │                                 │
│  Close S.P.   = + 1 0 . 0 0 pH │   │  Close S.P.   = + 1 0 0 0 mV   │
│  Open  S.P.   = + 0 4 . 0 0 pH │   │  Open  S.P.   = + 0 4 0 0 mV   │
│  Delay Time   =       0 0 0 SEC│   │  Delay Time   =       0 0 0 SEC│
│                                 │   │                                 │
│                                 │   │                                 │
└─────────────────────────────────┘   └─────────────────────────────────┘
```

1. Press UP/DOWN key to ON/OFF (enable/disable) relay1.
2. Close set point: active point for pH/ORP.
3. Open set point: inactive point for pH/ORP.
4. 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          │   │       RELAY 2 SETTINGS          │
├─────────────────────────────────┤   ├─────────────────────────────────┤
│  ON/OFF        = ■ ON           │   │  ON/OFF        = ■ ON           │
│                = □ OFF          │   │                = □ OFF          │
│                                 │   │                                 │
│  Close S.P.   = + 0 4 . 0 0 pH │   │  Close S.P.   = + 0 4 0 0 mV   │
│  Open  S.P.   = + 1 0 . 0 0 pH │   │  Open  S.P.   = + 1 0 0 0 mV   │
│  Delay Time   =       0 0 0 SEC│   │  Delay Time   =       0 0 0 SEC│
│                                 │   │                                 │
│                                 │   │                                 │
└─────────────────────────────────┘   └─────────────────────────────────┘
```

1. Press UP/DOWN key to ON/OFF (enable/disable) relay2.
2. Close set point: active point for pH/ORP.
3. Open set point: inactive point for pH/ORP.
4. 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 pH4.00 and turn off it at pH10.00, then the close S.P. needs to set to pH4.00, Open S.P. sets to pH10.00.

Relay 3 settings

```
        RELAY 3 SETTINGS

  ON/OFF          = ■ ON
                  = □ OFF
  Period Time   = 0 0 0 1 . 0 HOUR
  Clean Time    =       0 0 1 0 SEC
  Delay Time    =         0 0 0 SEC
  Function        = □ Rinsing
                    □ Interval Alarm
                    □ 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            = ■ pH
                    □ ORP
  Electrode     = □ Glass
                    □ Antimony
  Offset        =   + 0 . 0 0 pH
  Filter        =         0 0
```

```
     MEASUREMENT SETTINGS

  Mode            = □ pH
                    ■ ORP
  Eclectrode    = □ Glass
                    □ Antimony
  Offset        =   + 0 0 0 mV
  Filter        =         0 0
```

1. Choose the mode for measuring, press UP/DOWN key to choose.
2. Electrode selection, press UP/DOWN key to choose.(for pH only)
3. Offset , range for pH is ±1.00pH ,for ORP is ±100mV.
4. Filter: Range 0-10.
Notice:
If the reading is not stable then user can set the filter to average the readings.

Temperature settings

```
      TEMPERATURE SETTINGS

   Automatic      = ■ Auto
                  = □ Manual
   Probe          = □ Pt 1000
                  = □ NTC 10K
   Offset         =     + 0 . 0  ℃
   Manual Meas.   = + 0 2 5 . 0  ℃
   Manual Cal.    =     2 5 . 0  ℃
```

1. Temperature compensation setting, press UP/DOWN key to choose.
2. Temperature probe, press UP/DOWN key to choose.
3. Temperature offset ,the range is ±5.00℃.
4. Temperature for measuring when user set the temperature to manual.
5. Temperature for calibration mode when user sets the temperature to manual.

```
      TEMPERATURE SETTINGS

   Display        = ■ YES
                  = □ NO
```

1. 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
   Baudrate     = □   9600
                = □ 19200
                = □ 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        = ■ ON
                  □ OFF
  Display Type  = □ Record
                  □ XY Chart
  Reset Record  = □ Yes
                = □ No
  Save Period   = 0 6 0 SEC
```

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

Notice:
1. When user chooses ON, then it will save measuring data follow the save period time.
2. Display type: Record, display the detail of record(5 records in one page), XY chart, display a chart.(150 records in one page)
3. When reset the records, it will spend around 10 seconds.

Output test

```
        OUTPUT TEST

  Current1   = 0 4 . 0 0 mA
  Current2   = 0 4 . 0 0 mA
  Relay1     = □ CLOSE
               □ OPEN
  Relay2     = □ CLOSE
             = □ OPEN
  Relay3     = □ CLOSE
             = □ OPEN
```

1. Current 1 output: 4.00-20.00mA, press UP/DOWN to set.
2. Current 2 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      =■ English       │
│                =□ 繁體中文       │
│                =□ 简体中文       │
│                                 │
│                                 │
│                                 │
│                                 │
└─────────────────────────────────┘
```

Press UP/DOWN key to choose the language.

Reset parameters

```
┌─────────────────────────────────┐
│        RESET PARAMETERS         │
├─────────────────────────────────┤
│  Reset Type    =■ Current       │
│                =□ Relay1        │
│                =□ Relay2        │
│                =□ Relay3        │
│                =□ 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 record at record

RECORD	020300	
15-08-14	07.00	pH
21:20:49	025.0	°C
15-08-14	07.00	pH
21:20:59	025.0	°C
15-08-14	07.00	pH
21:21:09	025.0	°C
15-08-14	07.00	pH
21:21:19	025.0	°C
15-08-14	07.00	pH
21:21:29	025.0	°C

Display pH record at XY chart

RECORD 020300

14.00

07.00

00.00   15-07-14   21:20:49
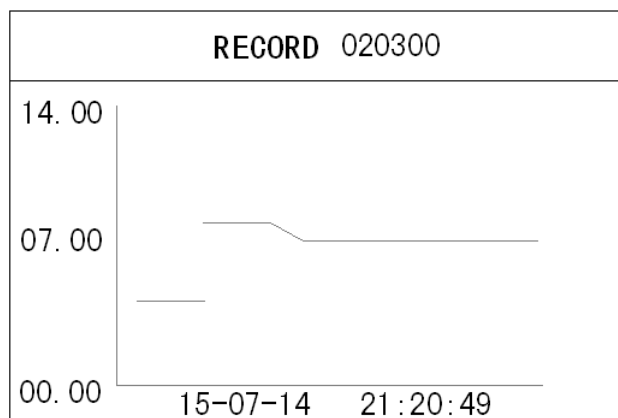
Display ORP record at record

RECORD	020300	
15-08-14	0560	mV
21:20:49		
15-08-14	0560	mV
21:20:59		
15-08-14	0560	mV
21:21:09		
15-08-14	0560	mV
21:21:19		
15-08-14	0560	mV
21:21:29		

Display ORP record at XY chart

RECORD 020300

2000

0000

-2000   15-07-14   21:20:49
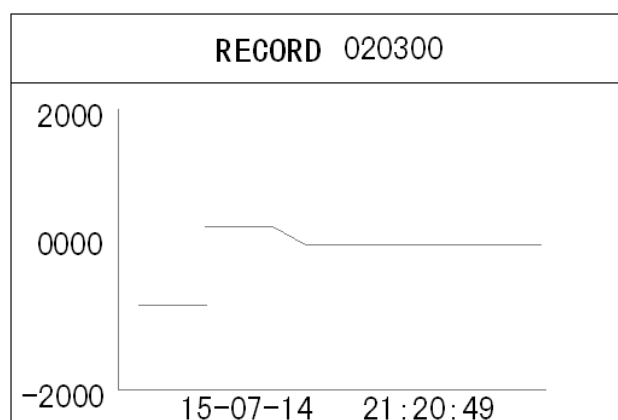
pH Calibration

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         │        │        PASSWORD         │
├─────────────────────────┤        ├─────────────────────────┤
│                         │        │                         │
│                         │        │                         │
│        1 1 [0] 0        │        │        0 1 [0] 0        │
│                         │        │                         │
│                         │        │                         │
│                         │        │                         │
└─────────────────────────┘        └─────────────────────────┘
```

Manu

```
┌─────────────────────────┐
│       CALIBRATION       │
├─────────────────────────┤
│                         │
│  ■ Automatic Calibration│
│  □ Manual Calibration   │
│  □ Reset Parameters     │
│                         │
│                         │
│                         │
└─────────────────────────┘
```

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

1. Automatic calibration: follow the indication to select standard buffer.
2. Manual input calibration: manual input standard buffer.
3. Reset parameters: reset all of the calibrated parameters to default.

Notice:
If the 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.

Automatic calibration

Stand calibration

```
         CALIBRATION
    ┌──────────────┬──────────────┐
    │              │              │
    │  ▪ 6.86      │   7.00 pH    │
    │  □ 7.00      │  25.0 ℃      │
    │              │              │
    ├──────────────┴──────────────┤
    │ 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℃ then it will display error message on the button of LCD.

Slope calibration

```
         CALIBRATION
    ┌──────────────┬──────────────┐
    │  □ 1.68      │              │
    │  ▪ 4.01      │              │
    │  □ 9.18      │   4.00 pH    │
    │  □ 10.01     │  25.0 ℃      │
    │  □ 12.45     │              │
    ├──────────────┴──────────────┤
    │ 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℃ then it will display error message on the button of LCD.

Display efficiency

```
         CALIBRATION
    ┌──────────────┬──────────────┐
    │              │              │
    │              │              │
    │  04.01       │   4.00 pH    │
    │              │  25.0 ℃      │
    │              │              │
    ├──────────────┴──────────────┤
    │   EFFICIENCY = 98.0 %       │
    └─────────────────────────────┘
```

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

Manual calibration

Stand calibration

```
┌─────────────────────────────────┐
│          CALIBRATION            │
├──────────────────┬──────────────┤
│                  │              │
│                  │   7. 0 0  pH │
│     7. 0 [0]     │   2 5. 0  ℃  │
│                  │              │
├──────────────────┴──────────────┤
│  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. If the input is over 7.00+/-1.5pH then it will display ERROR on the top of LCD.
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℃ then it will display error message on the button of LCD.

Slope calibration

```
┌─────────────────────────────────┐
│          CALIBRATION            │
├──────────────────┬──────────────┤
│                  │              │
│                  │   4. 0 0  pH │
│     4. 0 [1]     │   2 5. 0  ℃  │
│                  │              │
├──────────────────┴──────────────┤
│  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. If the input is over 0.00 to 14.00pH then it will display "ERROR" on the top of LCD.
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℃ then it will display error message on the button of LCD.

Display efficiency

```
┌─────────────────────────────────┐
│          CALIBRATION            │
├──────────────────┬──────────────┤
│                  │              │
│                  │   4. 0 0  pH │
│     0 4. 0 1     │   2 5. 0  ℃  │
│                  │              │
├──────────────────┴──────────────┤
│    EFFICIENCY = 98. 0 %         │
└─────────────────────────────────┘
```

If the efficiency is lower than 80%, that means the electrode is aged user should Replace the new electrode.
If the efficiency is lower than 50%, it will not accept this calibration

Reset parameters

```
RESET PARAMETERS


        RESET
```

This will reset all of the calibrated parameters to default.

ORP 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



   0 0 0 0
```

```
PASSWORD



   1 1 0 0
```

Menu

```
CALIBRATION

 ■ Manual Calibration
 □ Reset Parameters
```

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

1. Manual input standard buffer.
2. Reset parameters: reset all of the calibrated parameters to default.

Manual calibration

```
┌─────────────────────────────────────┐
│          CALIBRATION                │
├──────────────────┬──────────────────┤
│                  │                  │
│                  │                  │
│   0 8 6 mV       │    0 8 8 mV      │
│                  │                  │
│                  │                  │
├──────────────────┴──────────────────┤
│   Input buffer and press ENTER       │
└─────────────────────────────────────┘
```

1. Put the electrode to the standard 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 ORP on the right side.

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 to 16.00
pH 4.00mA corresponding	0.00	pH	range: -2.00 to 15.00
			difference : 1.00
ORP 20.00mA corresponding	1000	mV	range: -1900 to +2000
ORP 4.00mA corresponding	0	mV	range: -2000 to +1900
			difference : 100
Temp. 20.00mA corresponding	100.0	℃	range: 0.0 to 130
Temp. 4.00mA corresponding	0.0	℃	range:- 10.0 to 120.0
			difference : 10.0
Current 1 output offset	0.00	mA	range: +/- 1.00
Current 2 output offset	0.00	mA	range: +/- 1.00
Current 1 filter	0	second	range: 0 to 120

Current 2 filter	0	second	range: 0 to 120
Current 1 fixed output	4.00	mA	range: 4.00 to 20.00
Current 2 fixed output	4.00	mA	range: 4.00 to 20.00
Current 1 HOLD type	fixed		range: fixed/last
Current 2 HOLD type	fixed		range: fixed/last
Relay 1 pH close S.P.	10.00	pH	range: -2.00 to 16.00
Relay 1 PH open S.P.	4.00	pH	range: -2.00 to 16.00
			difference : 0.01
Relay 1 ORP close S.P.	1000	mV	range: -2000 to +2000
Relay 1 ORP open S.P.	400	mV	range: -2000 to +2000
			difference : 1
Relay 1 delay time	0	second	range: 0-120
Relay 2 pH close S.P.	4.00	pH	range: -2.00 to 16.00
Relay 2 PH open S.P.	10.00	pH	range: -2.00 to 16.00
			difference : 0.01
Relay 2 ORP close S.P.	400	mV	range: -2000 to +2000
Relay 2 ORP open S.P.	1000	mV	range: -2000 to +2000
			difference : 1
Relay 2 delay time	0	second	range: 0 to 120
Relay 3 period time	1.0	hour	range: 0 to 1000.0
Relay 3 clean time	10	second	range: 0 to 1000
Relay 3 delay time	0		range: 0 to 120
Relay 3 function	error alarm		range: clean/period alarm/ error alarm
Save time	60	second	range: 5 to 120
ID address	1		range: 1 to 255
Baudrate	9600		range: 9600,19200,38400
PH offset	0.00	pH	range: +/- 1.00
ORP offset	0	mV	range: +/-100
Mode	pH		range: 0=PH, 1=ORP
Temp. Offset	0.0	℃	range: +/- 5.0
Manual Temp. for measurement	25.0	℃	range: -10.0 to 130.0
Manual Temp. for calibration	25.0	℃	range: 0.0 to 60.0
Language	English		range: English/tranditional Chinese /simple Chinese
Filter	1		range: 0 to 10
Temp. compensation	MTC		range: ATC/MTC
Temp. probe	Pt1000		range: Pt1000, NTC10K
Record type	record		range: record/XY chart

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 Modbus-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/ORP reading	reading:pH X 0.01, ORP X 1
(01)	0x01	pH/ORP current	reading:X 0.01
(02)	0x02	Temperature	reading:X 0.1
(03)	0x03	Temperature current	reading:X 0.01
(04)	0x04	Error code	reading:X 1
(05)	0x05		
(06)	0x06		
(07)	0x07		
(08)	0x08		
(09)	0x09	Model type	fix to 1

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	ORP 20.00mA corresponding	reading:X 1	
(03)	0x03	ORP 4.00mA corresponding	reading:X 1	
(04)	0x04	Temp. 20.00mA corresponding	reading:X 0.1	
(05)	0x05	Temp. 4.00mA corresponding	reading:X 0.1	
(06)	0x06	Current 1 offset	reading:X0.01	
(07)	0x07	Current 2 offset	reading:X0.01	
(08)	0x08	Current 1 filter	reading:X1	
(09)	0x09	Current 2 filter	reading:X1	
(10)	0x0A	Current 1 fixed current	reading:X0.01	
(11)	0x0B	Current 2 fixed current	reading:X0.01	
(12)	0x0C	Current 1 HOLD type	reading:X1	0=fixed,1=last
(13)	0x0D	Current 2 HOLD type	reading:X1	0=fixed,1=last
(14)	0x0E	Relay1 pH close S.P.	reading:X0.01	
(15)	0x0F	Relay1 pH open S.P.	reading:X0.01	
(16)	0x10	Relay1 ORP close S.P.	reading:X1	
(17)	0x11	Relay1 ORP open S.P.	reading:X1	
(18)	0x12	Relay1 delay time	reading:X1	
(19)	0x13	Relay2 pH close S.P.	reading:X0.01	

(20)	0x14	Relay2 pH open S.P.	reading:X0.01	
(21)	0x15	Relay2 ORP close S.P.	reading:X1	
(22)	0x16	Relay2 ORP open S.P.	reading:X1	
(23)	0x17	Relay2 delay time	reading:X1	
(24)	0x18	Relay3 clean period	reading:X0.1	
(25)	0x19	Relay3 clean time	reading:X1	
(26)	0x1A	Relay3 delay time	reading:X1	
(27)	0x1B	Relay3 function	reading:X1	0:clean,1:period alarm ,2:Error alarm
(28)	0x1C	Record saving time	reading:X1	
(29)	0x1D	Mode	reading:X1	0=pH,1=ORP
(30)	0x1E	pH offset	reading:X0.01	
(31)	0x1F	ORP offset	reading:X1	
(32)	0x20	Temp. offset	reading:X0.1	
(33)	0x21	Manual temp. for measurement	reading:X0.1	
(34)	0x22	Manual temp. for calibration	reading:X0.1	
(35)	0x23	Temp. compensation	reading:X1	0=Auto,1=manual
(36)	0x24	Temp. probe	reading:X1	0=Pt1000,1=NTC10K
(37)	0x25	Language	reading:X1	0=English ,1=tranditional Chinese,2=simple Chinese
(38)	0x26	Filter	reading:X1	