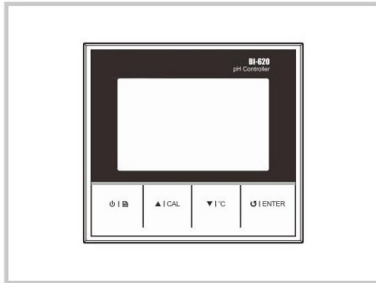BI-620 Online pH Controller
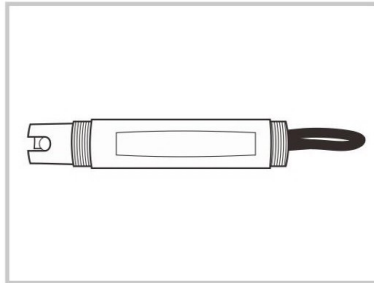# Instruction Manual

Introduction
Thank you for selecting the BI-620 online pH controller. This manual provides a step-by-step guide to help you operate the meter, please carefully read the following instructions before use.
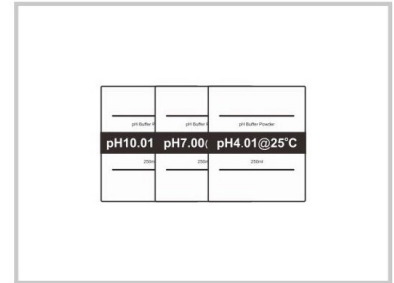
Unpacking
The following list describes the standard components of the controller. After the unpacking, please check all components are complete. If any are damaged or missing, please contact nearest distributor.

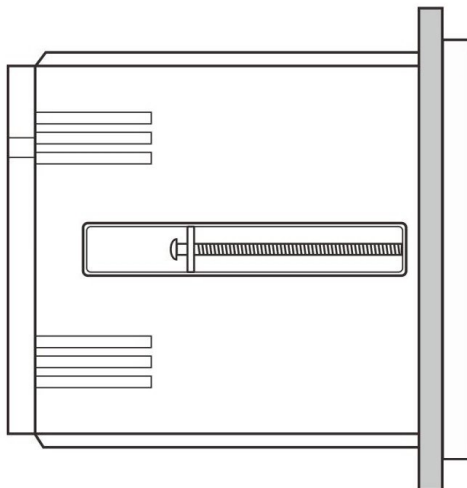BI-620 Online pH Controller

IE-20T Industrial pH Electrode

pH4.01/7.00/10.01 Buffer Pouches

Safety Warning
• The controller shall be installed and operated only in the manner specified in this instruction manual.
• Only skilled, trained or authorized person should carry out installation, setup and operation of the controller.
• Do not install the controller in the following environmental conditions: relative humidity is greater than 80%, ambient temperature is higher than 60°C or strong magnetic fields around controller.
• The rear panel of the controller has two screw terminals that used for connecting the DC24V power supply. Make sure to cut off the main power before installation or maintenance.
• Once the power supply cables are connected to controller, do not touch any screw terminals on the rear panel of the controller.

Installation
• Cut out a square hole approximately 91(W) × 91(H)mm in the mounting panel.
• Remove the mounting bracket from controller, place the controller into the square hole.
• Replace the mounting bracket and push the controller forward until it is fully seated on the mounting plate.

Display

The BI-620 online pH controller is equipped with an easy-read LCD display that used to show measured values and mode icons. The following table describes the function of each icon.
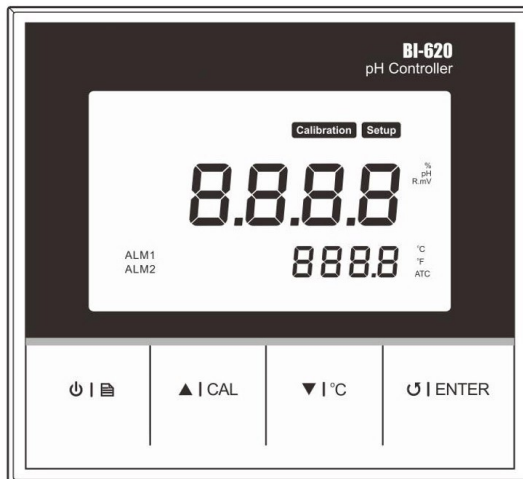
ICON	DESCRIPTION
Calibration	Indicates the meter is in the calibration mode.
Setup	Indicates the meter is in the setting mode.
ATC	Indicates the temperature compensation is enabled.
ALM1	Indicates the measurement exceeded the specified high limit.
ALM2	Indicates the measurement exceeded the specified low limit.

Keypad Information

| KEY	FUNCTION
⏻ | 🖹	• Power the meter ON/OFF. • Enters the setup menu (Press and hold the key for 3 seconds). • Exits the calibration or setting and returns to measurement.
▲ | CAL	• Starts calibration. • Increase the setting value.
▼ | ℃	• Sets the temperature. • Decrease the setting value.
↻ | ENTER	• Toggles between pH and mV measurement modes. • Confirms the calibration, settings or displayed options.

Connecting the Cables

- Before proceeding, ensure the power supply cables are disconnected from the power source.
- The following list describes the definition of the each screw terminal on rear of the controller.

INDEX:

NO.	TERMINAL	DESCRIPTION
1	pH (-)	pH/mV input (Reference)
2	pH (+)	pH/mV input (Measure)
3	---	No connection
4	---	No connection
5	TC (-)	Temperature input (-)
6	TC (+)	Temperature input (+)
7	485 (B)	RS485 signal output (B)
8	485 (A)	RS485 signal output (A)
9	DC24 (+)	DC24V (+), linear power supply #1
10	DC24 (-), 4~20mA	DC24V (-), linear power supply #1, 4~20mA analog output
11	GND	Earth ground
12	DC24 (+)	DC24V (+), linear power supply #2
13	DC24 (-)	DC24V (-), linear power supply #2
14	NC2	Relay resting position (NC2)
15	NO2	Relay working position (NO2)
16	COM2	Relay Common (COM2)
17	NC1	Relay resting position (NC1)
18	NO1	Relay working position (NO1)
19	COM1	Relay Common (COM1)
20	---	No connection
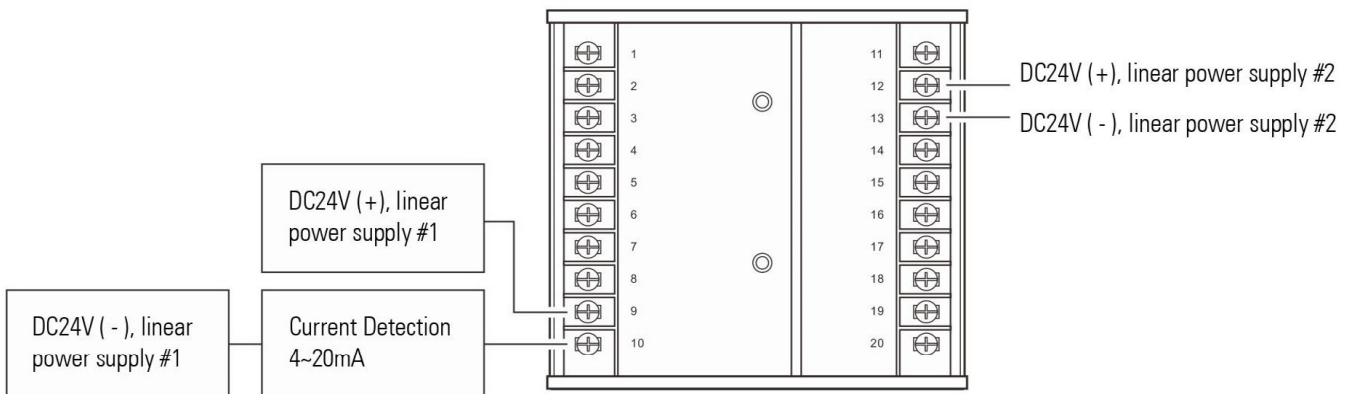
Preparing the pH Buffer Solutions

- Open the pH7.00 buffer packet, place the reagent into a 250ml volumetric flask. Pour the distilled water 250ml to scale line, mix the solution until the reagent is completely dissolved.
- Preparation of pH4.01 and 10.01 standard buffer solutions are the same as above. Prepared standard buffer solutions should be stored in hermetically sealed glass containers.
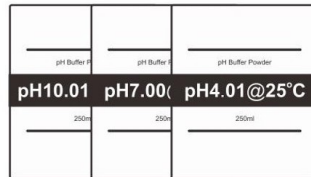
Setup Menu

The BI-620 online pH controller contains an integrated setup menu that is used to customize the displayed option to meet measurement requirements.

MENU	DESCRIPTION	OPTIONS	DESCRIPTION	DEFAULT
buF	Set the pH buffer group for calibration and auto-recognition	USA	USA (pH4.01/7.00/10.01)	USA
		NISt	NIST (pH4.01/6.86/9.18)	
CAL	Set the number of calibration points	1	1 point	2 points
		2	2 points	
		3	3 points	
UNIt	Set the default temperature unit	℃	Degrees Celsius	℃
		℉	Degrees Fahrenheit	
AL-L	Set the Low Alarm Limit	4.00	Range: 0.00~14.00pH	4.00pH
AL-H	Set the High Alarm Limit	10.00	Range: 14.00~0.00pH	10.00pH
HYS	Set the hysteresis value	0.01	Range: 0.01~1.00pH	0.01pH
AO-L	Set the analog output (Low)	0.00	Range: 0.00~14.00pH	0.00pH
AO-H	Set the analog output (High)	14.00	Range: 14.00~0.00pH	14.00pH
rSt	Reset	YES	Restores the controller back to factory default settings	Disable
		NO	Disable	

Additional information

- Select a High/Low limit setting value will activate the controller when the pH value goes above or below the setting value. Note, both setting values cannot input the same value.
- Hysteresis prevents rapid contact switching if the measuring value is fluctuating near the set point. Example: You have set the high alarm point at 14.00pH and hysteresis value at 0.1pH. If the measuring value overshoots the 14.1pH, the controller will activate an external device. When the measuring value drops to 13.9pH, the external device will switch off.
- The controller has RS485 communication function, the default is 0.00~14.00pH corresponds to 4.00~20.00mA.
- Reset function will restore the controller back to factory default settings, all calibration values and selected parameters will be reset.

Setting the default option

1.   Press and hold the 🗐 key for 3 seconds to enter the setup menu, the display shows the menu item and page number.
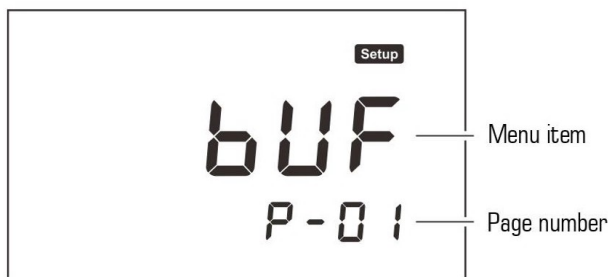
2.   Press the ▲ or ▼ key to scroll through menu, select the parameter you want to set (Refer to Setup Menu).
3.   Press the **Enter** key, the display shows an option in the submenu.
4.   Press the ▲ or ▼ key to set the value or select an option.
5.   Press the **Enter** key to confirm, the controller returns to the measurement mode. Setting is completed.

ⓘ   If you want to exit the setting, press the ⏻ | 🗐 key.

Temperature Compensation and Calibration

The BI-620 online pH controller supplied with an industrial pH electrode with a built-in temperature sensor. When the wires of the sensor are connected to controller, the display will immediately show "ATC" icon. The controller is now switched to the automatic temperature compensation mode.

Temperature calibration

During the measurement process, if the temperature reading displayed differs from that of an accurate thermometer, the controller needs to be calibrated.

1.   Press the **℃** key to enter the temperature setting mode, the display shows current temperature reading.
2.   Press the ▲ or ▼ key to set the value.
3.   Press the **Enter** key confirm. Calibration is completed.

pH Calibration

The BI-620 online pH controller allows up to 3 points calibration in the pH mode. We recommend that you perform at least 2 points calibration for high accuracy measurement. The controller will automatically recognize and calibrate to following standard buffer values.

USA Standard Buffers	pH4.01, 7.00, 10.01
NIST Standard Buffers	pH4.01, 6.86, 9.18

Single point calibration should only be carried out with pH7.00 or 6.86, otherwise calibration will not be accepted.

The controller must be calibrated prior to first use or new electrode replaced. To ensure accuracy, regular calibration is recommended. DO NOT reuse the pH buffer solution after calibration, contaminants in solution will affect the calibration and eventually the accuracy of the measurement.

Single point calibration
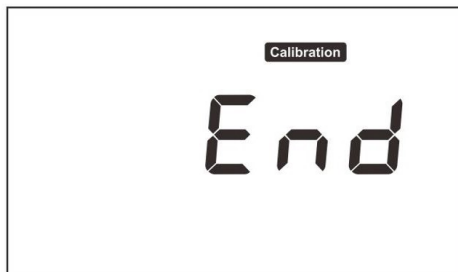
1.1   Make sure that you have selected 1 point calibration in the setup menu.

1.2   Rinse the pH electrode with distilled water. Press the **Cal** key, the controller shows "CAL1/pH7.00" (or "CAL1/pH6.86").

1.3   Place the electrode into the pH7.00 (or pH6.86) standard buffer solution. Stir the electrode gently.

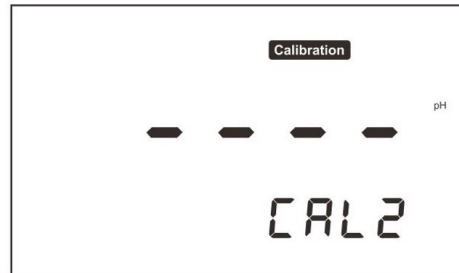1.4   Press the **Enter** key, the controller begins the calibration.

Wait for the reading to stabilize, the display automatically shows "END". Single point calibration is completed.
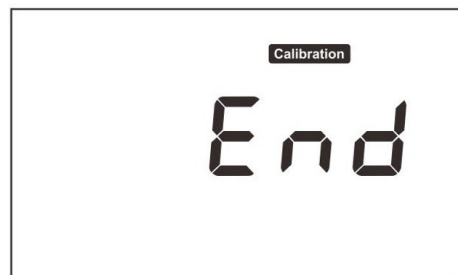
2 points calibration

2.1   Make sure that you have selected 2 points calibration in the setup menu.

2.2   Repeat steps 1.2 to 1.4 above. When the first calibration point is done, the display will show "CAL2". The controller prompts you to continue with second point calibration.

2.3   Rinse the pH electrode with distilled water. Place the electrode into the pH4.01 or 10.01 (pH4.01 or 9.18) standard buffer solution. Stir the electrode gently.

2.4   Press the **Enter** key, the controller automatically recognizes the pH buffer solution and begins the calibration (e.g., pH4.01).

Wait for the reading to stabilize, the display automatically shows the electrode slope and "END". Second point calibration is completed.

3 points calibration

3.1   Make sure that you have selected 3 points calibration in the setup menu.

3.2   Repeat steps 1.2 to 1.4 above. When the first calibration point is done, the display will show "CAL2/pH4.01". The controller prompts you to continue with second point calibration.

Calibration

4.01 pH

CAL2

3.3   Rinse the pH electrode with distilled water. Place the electrode into the pH4.01 standard buffer solution. Stir the electrode gently.

3.4   Press the **Enter** key, the controller begins the calibration. Wait for the reading to stabilize, the display automatically shows electrode slope and "CAL3/pH10.01" (or "CAL3/pH9.18").

Calibration

10.01 pH

CAL3

3.5   Rinse the pH electrode with distilled water. Place the electrode into the pH10.01 (or pH9.18) standard buffer solution. Stir the electrode gently.

3.6   Press the **Enter** key. Wait for the reading to stabilize, the display shows the electrode slope and "END". The controller returns to the measurement mode automatically. Calibration is completed.

ⓘ

•   During the calibration process, if the display shows "Err", please check the pH electrode and ensure the pH buffer solutions are fresh and uncontaminated.

•   If you want to exit the calibration, press the ⏻ | ▤ key.

pH Measurement

1.1   Rinse the pH electrode with distilled water to remove any impurities adhering to the probe body.

1.2   Place the electrode into the sample solution.

1.3   Record the measured value when the reading is stable.

mV Measurement

2.1   Press ↻ | ENTER key until the display shows measurement unit "mV", the controller is now switch to mV measurement mode.

2.2   Rinse the electrode thoroughly with distilled water.

2.3   Place the electrode into the sample solution.

2.4   Record the measured value when the reading is stable.

pH Electrode Care and Maintenance

Since pH electrode is susceptible to dirt and contamination, clean as necessary depending on the extent and condition of use.

*   After measuring: rinse the electrode in distilled water, store the electrode into the 3M KCL solution.
*   Salt deposits: soak the electrode in warm tap water to dissolve deposits, then thoroughly rinse with distilled water.
*   Oil or Grease film: wash the glass sensitive membrane of electrode gently in some detergents and water. If necessary, using the alcohol to clean the sensitive membrane, then rinse with distilled water. Place the electrode in the 3M KCL solution for at least 30 minutes.
*   Clogged reference junction: heat a diluted KCl solution to 60°C to 80°C. Place the electrode into the heated solution for about 10 minutes. Allow the electrode to cool in some unheated KCl solution.
*   Protein deposits: prepare a 1% pepsin solution in 0.1M of HCL. Place the electrode in the solution for 10 minutes. Rinse the electrod with distilled water.
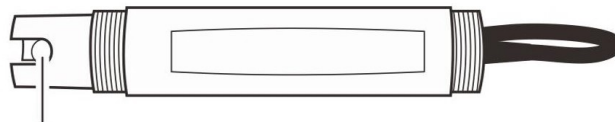
Glass Sensitive Membrane

Rectivating the pH Electrode:

If stored and cleaned properly, the electrode should be ready for immediate use. However, a dehydrated sensitive membrane may cause sluggish response. To rehydrate the sensitive membrane, immerse the electrode in a pH4.01 buffer solution for 10 to 30 minutes. If this fails, the electrode requires activation.

1. Soak the electrode in 0.1M HCl for 5 minutes.
2. Remove and rinse with deionized water, then place in 0.1M NaOH for 5 minutes.
3. Remove and rinse again, and soak in 3M KCL solution for at least 30 minutes.

Troubleshooting

LCD DISPLAY	CAUSE	CORRECTIVE ACTION
- - -	Electrode dried out	Soak the pH electrode in 3M KCL solution at least 30 minutes.
	Measured value is out of range	Check the electrode whether clogged, dirty or broken.
Err	Incorrect pH buffer solutions	Using the fresh pH buffer solutions for calibration.
	Electrode has expired	Replace the pH electrode.

Specifications

pH	Model	BI-620
	Range	-1.00~15.00pH
	Accuracy	±0.01pH
	Resolution	0.01pH
	Calibration Points	1 to 3 points
	pH Buffer Options	USA (pH4.01/7.00/10.01) or NIST (pH4.01/6.86/9.18)
	Temperature Compensation	0~100°C, 32~212°F, Automatic
mV	Range	-1000~1000mV
	Accuracy	±1mV
	Resolution	1mV
Temperature	Range	0~105°C, 32~221°F
	Accuracy	±1°C
	Resolution	0.1°C
	Calibration Points	1 point
Transmitter Function	Signal Output	4~20mA
	Low and high alarm limits	0.00~14.00pH, Selectable
	Load	500Ω
	Communication Interface	RS485
General	Power Requirements	DC24V
	Ambient Temperature	< 60°C
	Relative Humidity	< 80%
	Dimensions	96 (L) × 96 (W) × 75 (H)mm
	Weight	350g

Hazardous Substance Statement

Instruments is committed to the reduction and eventual elimination of all hazardous substances in both the manufacturing process and finished products we supply. We have an active manufacturing and procurement program to minimize and eliminate the use of harmful heavy metals such as cadmium, lead, mercury and the like. New technologies and design parameters are also promoting these efforts and we expect to have little or no such materials in our product in the coming years. We welcome our customer suggestions on how to speed up these efforts.

Warranty

The warranty period for controller is one year from the date of shipment. Above warranty does not cover the sensor and calibration solutions. Out of warranty products will be repaired on a charged basis. The warranty on your controller shall not apply to defects resulting from:

- Improper or inadequate maintenance by customer.
- Unauthorized modification or misuse.
- Operation outside of the environment specifications of the products.

For more information, please contact the nearest authorized distributor.