Digital PH Controller

USER'S GUIDE

PPH-1000

HM DIGITAL®

TABLE OF CONTENTS

1. Operations Instructions

A. Preface

Read the manual before setting up and operating the equipment.
Warning: Failure to do so may cause personal injurie or material damages.

B. Safety Overview

- Install an electric surge protector to prevent the possibility of shock or electrocution.
- Do not handle the equipment with a wet hands as it may result in shock or electrocution.
- If the controller is installed inside an electric control panel, it must be a safe distance from other components installed in the panel.
- Use authorized parts only. Usage of unauthorized parts may cause the controller to malfunction.

2. What's Included

A. Opening the Package

Check to make sure if the following parts are enclosed. If there is any discrepancy, contact the party you purchased the controller from.

B. Parts Provided

- 1 PH Controller
- 2 Equipment fastening brackets
- 1 Panel supporting frame
- 1 Electrical cord
- 1 Electrical cord conversion jack
- 2 Spark killeres
- 1 Operation manual
- pH Probe (HM SP-P10 NPT)

3. Features and Specifications

A. Special Features

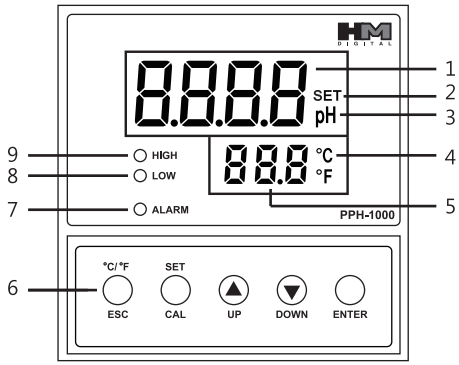
- Two separate relays allow for control of pH within a defined range.
- Alarm points and relay points can be set separately.
- Built-in S.A (Sensitivity) function allows for precision control.
- Built-in standard 4- 20 mA output.

B. Specification

Operation Range	: 0.01 – 14.00 pH / 0 – 60°C (32.0 – 176°F)
Resolution	: 0.01 pH / 0.1°C (0.1°F)
Accuracy	: Within ±0.5% F.S.
S.A (Sensitivity)	: 0.01 – 4.00 pH (±2.00 pH)
Calibration	: Automatic or manual calibration to 4.00, 7.00, 10.00 pH with each Pointer
ATC	: Automatic temperature compensation (0 – 60 °C)
Control Points	: 2 separate relays. (***CP.L:*** *Control Point Low* / ***CP.H:*** *Control Point High*)
Relays	: 2 ea. Isolated. 5A, Max 220V resistive load 100,000 strokes
Alarm	: To sound when either one of the 2 preset Points is breached. (***AP.L:*** *Alarm Point Low* / ***AP.H:*** *Alarm Point High*)
Power Output	: 4-20 mA DC Insulated output (Load Resistance: 500 Ω)
Sensor	: Glass Electrode (3/4" threaded NPT)
Sensor cord	: 3m cable
Operation Environment	: -5° C - 50° C/ max. RH 85% non-condensing
Power Supply	: 110V/220V, ±10% VAC. 50/60 Hz
Dimension	: 72 x 72 x 111 mm (2.8 x 2.8 x 4.4 in)
Net Weight	: 235 g

4. Screen Display and Switch Control

A. Display Festures



1. pH Measurement Readings
2. Setting Icon
3. pH Icon
4. Temp Icon
5. Temperature Readings
6. Function Buttons
7. LED light for Alarm
8. LED light for Upper Relay
9. LED light for Lower Relay

B. Instruction of the function Buttons

°C/°F
ESC

[°C/°F] Switch for temperature mode.
[ESC] Exits to the pH measurment readings from settings or calibration mode.

SET
CAL

[SET] Settings mode.
S.A (Sensitivity) --> Relay Lower(C.P.L) --> Relay Upper(C.P.H) --> Alarm Lower(A.P.L) --> Alarm Upper(A.P.H)
[CAL] Push 3 sconds to Calibration mode.

UP

[ON/OFF] Turns the Alarm or Relay ON/OFF.
[UP] Moves selection cursor up when in settings or calibration mode.

DOWN

[ON/OFF] Turns the Alarm or Relay ON/OFF.
[DOWN] Moves selection cursor down when in settings or calibration mode.

ENTER

[ENTER] Push to save device settings and calibrations.
[ON/OFF] Use to mute alarm.

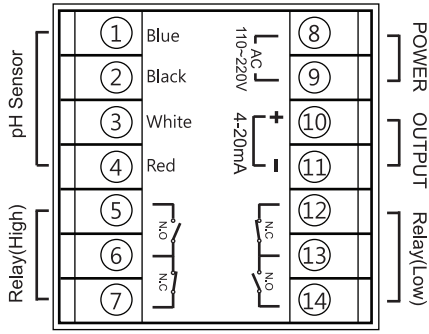
Factory Reset (UP) + (DOWN) Simultaneously push [UP]+[DOWN] buttons for 3 seconds in calibration mode. This will reset the controllers to factory settings.

5. Installation

A. Rear Connector Panel

① Blue wire of the pH Sensor Cable
② Black wire of the pH Sensor Cable
③ White wire of the pH Sensor Cable
④ Red wire of the pH Sensor Cable
⑤,⑥,⑦ Upper Relay (High)
- ⑤+⑥ N.O
- ⑥+⑦ N.C

⑧,⑨ 110V~220V POWER
⑩,⑪ OUTPUT, 4~20mA(MAX 500ohm)
⑫,⑬,⑭ Lower Relay (Low)
- ⑫+⑬ N.C
- ⑬+⑭ N.O

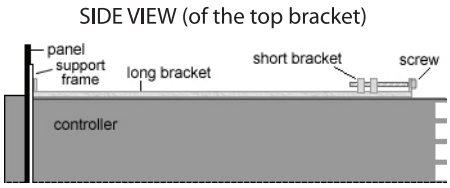


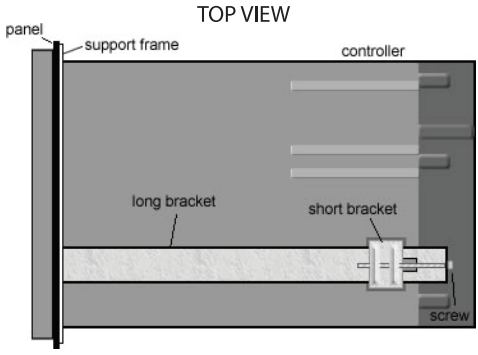
B. Panel CUT-OUT Diagram

Cut the hole in the panel to the precise dimensions of the cut-out.

67mm x 67 mm - see page 19.

C. Bracket Installation View

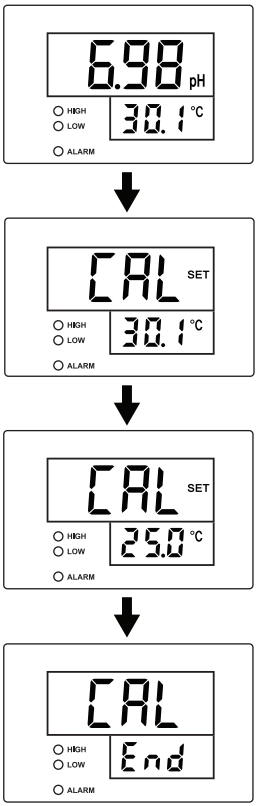




6. Temperature Calibration

A. Reference solution:

Prepare a reference solution with a known temperature as a reference point.



1) Dip the sensor in the reference solution and wait until a temperature reading has stabilized. Press [ESC] and [CAL] buttons simultaneously for 3 seconds.

2) Top screen will show “CAL” and bottom screen will show temperature.

3) Use the [UP] or [DOWN] button to adjust the temperature.

4) Once calibration is complete, press the [ENTER] button. Then the upper screen shows “C – CA- CAL”, and the bottom screen shows “END” blinking. The information will be stored and the controller will return to operating mode.

7. pH Calibration

A. Preparation of the Sensor

- Before using, saturate the sensor probe in the 3 mol. KCl solution (included) for one hour.
- Before a calibration, rinse the sensor with distilled water.

Caution: Distilled water should be used to clean the sensor probe but not for storage.

B. Automatic and Manual Calibration

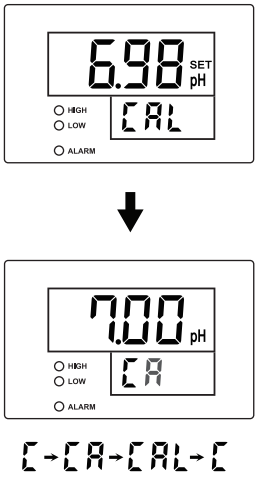
- Automatic calibration is applicable only when the buffer solution is exactly 4.00pH, 7.00pH, 10.00pH.
- Manual calibration is applicable when the reference solution is not exactly 4.00pH, 7.00pH, 10.00pH.

(**Example:** 4.01pH, 7.01pH, 9.01pH, or 4.01 pH, 6.86pH, 9.18pH)

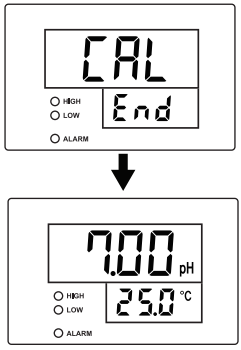
- Calibration should be completed at the Offset point (7pH) first, then Slop points (4pH or 10pH).

C. Calibration to Offset (7pH)

Note: Change to manual calibration mode by pressing [UP] or [DOWN] buttons within 10 seconds of starting the calibration process.



1. Dip the sensor in a 7.00pH buffer solution for 1-2 minutes until the reading stabilizes
2. Press the [CAL] button for 3 seconds. The bottom screen will show “CAL” blinking.
3. Leave the sensor dipped for 10 seconds until the reading on the top screen changes to “7.00pH” and consecutively changes to “C – CA – CAL”. (If calibrating to a value other than 7.00pH value, press [UP] or [DOWN] button, within 10 seconds to change the pH reading on the top screen to the desired pH value and press [ENTER] button.)



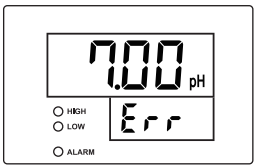
4. Wait 5 – 30 seconds until the screen "C – CA – CAL" stabilizes.
5. Bottom screen shows "END" blinking.
6. The calibration information is stored and the controller returns to operating mode.

Note: If [ESC] button is pressed while the screen shows "C – CA – CAL", calibration is canceled.

D. Calibration for Slope (4pH or 10 pH).

Following calibration to the Offset point, continue to calibrate to 4.00pH and/ or 10.00pH repeating the same process above.

8. Additional Instruction for pH Calibration



- During the calibration process, if the top screen shows "C – CA – CAL", then "Err" instead of "End", calibration was not completed for one of the following reasons:
  - The Sensor may be damaged or aged.
  - Buffer solution may have pH value outside of the calibration range.

- During the calibration to the Offset point, if the top screen shows "4.00pH" or "10.00pH" instead of "7.00pH", the previous calibration was not completed properly and the calibration process needs to be reinitiated.

  - If "Err" still shows after recalibration, the sensor may need to be replaced.

Note:

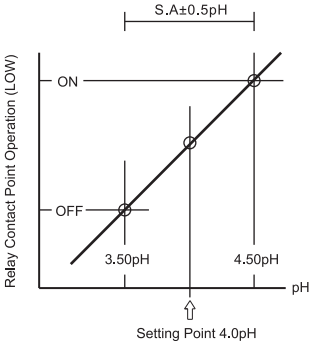
- For 1 point calibration, calibrate at 7.00pH (Offset) only.
- For 2 points calibration, calibrate at 7.00pH first and 4.00pH, or 7.00pH and 10.00pH.
- For 3 points calibration, calibrate at 7.00pH first, then 4.00pH and 10.00pH.

9. S.A Function

A. What is S.A function?

The S. A function adjusts the sensitivity of the Relay Contact Points to ± a margin above and below the Control Points.

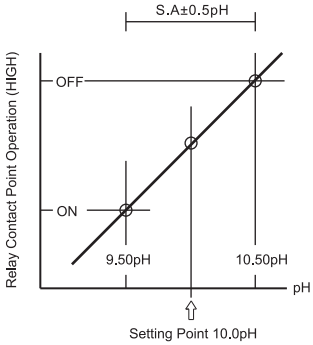
B. Examples of S.A Operation



Example of Low Relay Contact Point
CP.L Setting : 4.00pH
S.A Setting : ±0.50pH

As the diagram illustrates, the Relay will be turned "off", if the pH value descends below 3.50pH and the Relay will be turned "on" if it rises above 4.50pH.

Diagram
Vertical: Control power output (Low)
Horizontal: CP.L setting: 4.00pH



Example of High Relay Contact Point
CP.H Setting : 10.00pH
S.A Setting : ±0.50pH

As the diagram illustrates, the Relay Contact Point will be turned "off", if the pH value rises above 10.50pH and the Relay will be turned "on" if it descends below 9.50pH.

Note:
S.A settings apply to Relay operation, i.e. CP..L (Control Point Low) or CP.H (Control Point High) only. They don't affect alarm operation, i.e. AP.L or AP.H.

10. S.A Setting

A. Before Setting the S.A

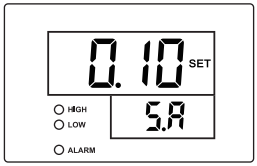
S.A setting can be done in intervals of 0.01pH within the range of min. -2.00pH and max. +2.00pH. When setting the S.A, + or – sign does not appear on the screen.

Note: The S.A. settings applies to a range so a setting of 0.5 has a range of 1.0 around the set point.

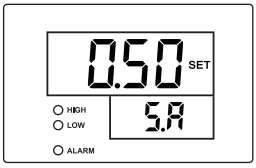
B. Notes

The factory setting of the S.A value is 0.10pH.
Caution If [SET] button is pressed during the S.A setting procedure, the process is skipped and the screen moves to normal operation mode.
If [ESC] button is pressed at any time the controller returns to operating mode automatically.

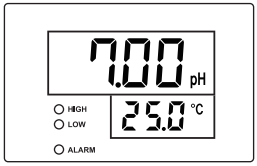
C. S.A Setting Procedure



Press [SET] button to enter the S.A setting mode.
Bottom screen will show “S.A”.
Top screen will show “0.10pH” blinking.



Adjust the screen value to the desired setting by pressing [UP] or [DOWN] button.



Set the S.A range to the desired value and press [ENTER] button. The information is stored and the screen will move to the pH Relay Setting Mode.

11. pH Relay Setting

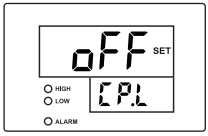
A. Before Setting the Relays

The Relays for CP.L (Control Point Low) and CP.H (Control Point High) are set independently. The factory setting are "off" and 4.00pH for CP.L and 10.00pH for CP.H.

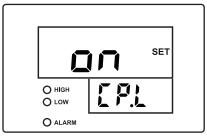
Note: *If you don't want to change the factory settings press [SET] button and the default setting will be saved. The Relay setting process is the same for CP.L (Control Point Low) and CP.H (Control Point High).*

Caution: If [ESC] button is pressed during the *Relay Setting process, the* controller will return to normal operation mode.

B. Relay Setting Procedure

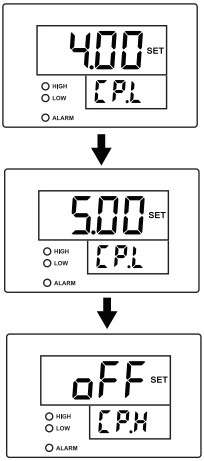


1. The CP.L Setting Mode is entered following completion of S.A setting. Top screen shows "off" and bottom screen shows "CP.L"



2. Select "off" or "on" position by pressing [UP] or [DOWN] button and press [ENTER] to move to the next mode.

C. Relay Setting Procedure (Set the operating range of the Relays)



1. If "on" is selected the top screen will show "4.00pH" and the bottom CP.L.
   Note: *The factory setting is 4.00pH for CP.L.*
2. Press [UP] or [DOWN] button to adjust the value on the screen to the desired value of the Relay operation range.
3. When the desired pH value has been reached press [ENTER] button to store the value and move to the next mode.
   Note: *Setting of CP.H (Control Point High) follows the same procedure as setting of CP.L.*
   After the setting CP.H press the [ENTER} to enter the Alarm setting mode.

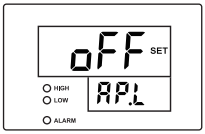
12. Alarm Setting

A. Before Setting the Alarms

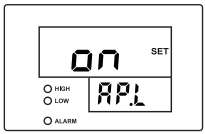
Alarms are set and operated separately and independently for AP.L (Alarm Point Low) and AP.H (Alarm Point High). Initial factory settings are “off” with 4.00pH for AP.L, and 10.00pH for AP.L.

Note: *If you don’t want to change the settings press [SET] button to move to the next mode.*
If [ESC] button is pressed during any setting mode, the controller will return to normal operating mode.

B. Alarm Setting Procedure (Selecting “on” or “off”)



1. The Alarm Setting Mode is entered after completing CP.H setting. Top screen will show “off” and bottom screen will show “AP.L”.

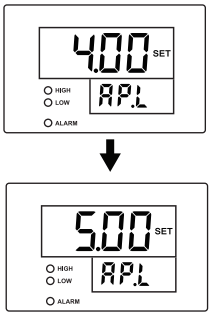


2. Select “off” or “on” position by pressing [UP] or [DOWN] button and press [ENTER] to move to the next mode

C. Alarm Setting Procedure (After “on” position is selected)

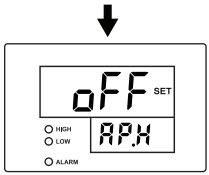
Press [ENTER] button after selecting “on” position，the information will be stored and the screen will change to the Alarm Operation Range settings.

D. Alarm Setting Procedure (Setting the Alarm Operation Range)



1. If “on” is selected the top screen will show screen will show “4.00pH”
   Note: *The initial factory setting for AP.L is 4.00pH.*

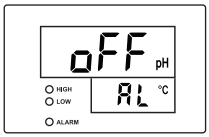
2. Press [UP] or [DOWN] button to adjust the value on the screen to the desired alarm operating range.



3. After selecting the desired alarm operating range, push [ENTER] button.

   Note: *Setting of AP.H (Alarm Point High) will follow the same procedure as setting of AP.L (Alarm Point Low). After the setting of AP.H press the [ENTER} to enter operating mode*

E. Turning the audible alarm on or off



Pressing [ENTER] button while the alarm is on will mute the sound temporarily. The top screen will show “off”. If [ENTER] button is pressed again, the alarm will sound a gain with the screen showing “on”.

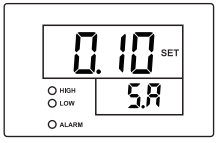
13. Default to Factory Relay and Alarm Settings

Relay and Alarm settings will be changed to “off” position, and Relay and Alarm setting value will be changed to the factory defaults:

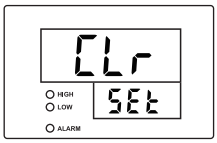
CP.L (Control Point Low) and AP.L (Alarm Point Low): 4.00pH

CP.H (Control Point High) and AP.H (Alarm Point High): 10.00pH.

S.A setting also will be changed to the factory setting of 0.10pH.



1. Press [SET] button and then press [UP] and [Down] buttons simultaneously for 3 seconds.

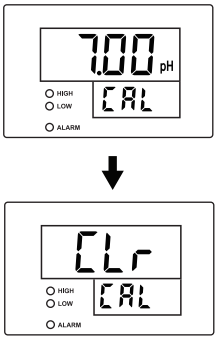


2. Upper screen will show “CLr” and lower screen will show “SEt” and both screens will blink three times simultaneously. The Factory Reset is complete and the controller returns to normal operation mode.

14. Default to Factory Calibration Settings

pH and Temperature calibration setting will be changed to factory defaults.

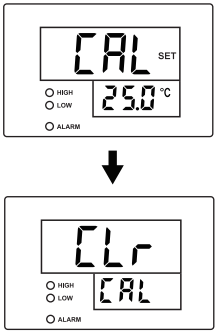
A. Default to pH calibration Setting



1. Press [CAL] button for 3 seconds to select pH calibration mode and then in 10 seconds, press [UP] and [Down] buttons simultaneously for 3 seconds.

2. Upper screen will show “CLr” and lower screen will show “CAL” and both screens will blink three times simultaneously.
   The Factory Reset is complete and the controller return to normal operation mode.

B. Default to Factory Temperature calibration Setting



1. Press [ESC] and [CAL] buttons for 3 seconds to select temperature calibration mode and then press [UP] and [Down] buttons simultaneously for 3 seconds.

2. Upper screen will show “CLr” and lower screen will show “CLr” and both screens will blink three times simultaneously.
   The Factory Reset is complete and the controller return to normal operation mode.

15. 4-20mA OUTPUT DATA

To check the 4-20mA output signal value, connect your multimeter to the 10, 11 terminals to test the output.

A. Set-Up

Ensure the power is **OFF** prior to any wiring!
To transmit pH data to a PLC via the output signal, connect your cable (not include) from contacts #10 (+) & #11 (-) to your (+) and (-) contacts on a PLC or other device.

B. DATA Formula

Output mA = (1.042857 x pH value) + 4

C. Sample DATA

pH	Output(mA)
0.00	4.000
1.00	5.142
2.00	6.285
3.00	7.428
4.00	8.571
5.00	9.714
6.00	10.857
7.00	11.999
8.00	13.142
9.00	14.285
10.00	15.428
11.00	16.571
12.00	17.714
13.00	18.857
14.00	20.000

16. WARRANTY

1. HM PH Controller (PPH-1000): Two Year Limited Warranty
2. pH Probe (SP-P10): Six Month Limited Warranty

The PH Controller ("PPH-1000"), manufactured by HM Digital, Inc.
("the Company") is warranted to the purchaser against defective materials and workmanship for two (2) years from the date of purchase.
The pH probe (SP-P10) is warranted to the purchaser against defective materials and workmanship for six (6) months from the date of purchase.

What is covered: Repair parts and labor, or replacement at the Company's option. Transportation charges for repaired or new product to be returned to the purchaser.

What is not covered: Transportation charges for the defective product to be sent to the Company. Any consequential damages, incidental damages, or incidental expenses, including damages to property. This includes damages from abuse or improper maintenance such as tampering, wear and tear, water damage, or any other physical damage. The warranty does not cover water damage to the HydroMaster or SP-P5 due to parts not securely closed. Products with any evidence of such damage will not be repaired or replaced.

How to obtain warranty performance: Attach to the product your name, address, description of problem, phone number, and proof of date of purchase, package and return to:

HM Digital, Inc.
ATTN: Returns
5819 Uplander Way
Culver City, CA 90230
U.S.A.

Implied Warranties: Any implied warranties, including implied warranties of merchantability and fitness for a particular purpose, are limited in duration to 3 years from date of purchase. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you. To the extent any provision of this warranty is prohibited by federal and state law and cannot be preempted, it shall not be applicable. This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state.
NOTE: Warranties are product-specific. Third-party products and products deemed by HM Digital as "accessories" are not covered under warranty. Third-party products include, but are not limited to, batteries and fittings. Accessories include, but are not limited to batteries, lanyards and cases.

17. Contact Information

HM Digital, Inc. is a leading manufacturer of professional water testing instruments that tests for EC, TDS, pH, ORP, temperature and volume. Our products include handheld meters, in-line monitors, controllers, sensors, calibration solutions and more.

Commercial/Industrial & Personal Applications:

- Agriculture
- Alternative Health
- Aquariums & Aquaculture
- Car & Window Washing
- Carbon Filtration
- Deionization
- Distillation
- Food & Coffee Services
- Hydroponics
- Pools & Spas
- Pharmaceutical & Medical
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- Water Treatment

Contact us:

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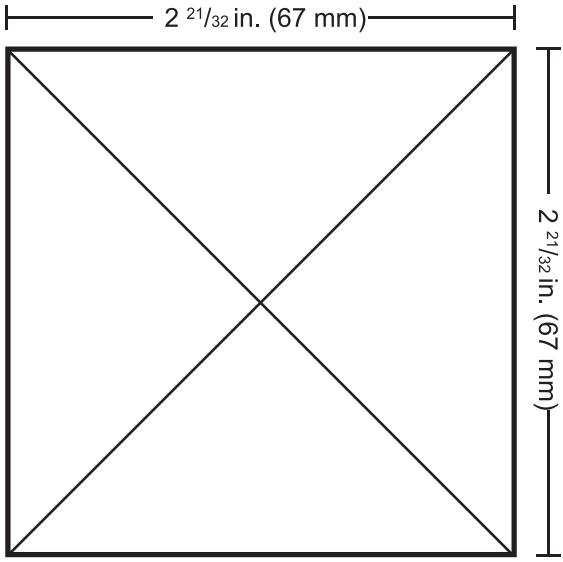
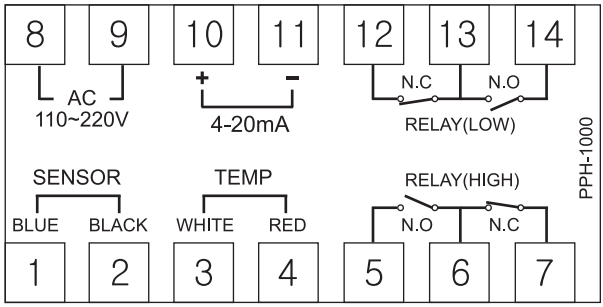
PANEL CUT-OUT DIAGRAM



1. Using a knife, cut the diagram out (cut on the outer part of the lin
2. Align the cut-out to your panel and draw cut marks.
3. Cut the hole in the panel to the precise dimensions of the cut-out
   2-21/32 in. x 2-21/32 in. (67 mm x 67 mm)

–> See the installation section for complete instructions.

CONTACT DIAGRAM

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