WALCHEM

IWAKI America Inc.

WPH/WDP Series
pH & ORP Controllers
Instruction Manual

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Notice

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1.0 INTRODUCTION

The Walchem WPH Series single sensor input and WDP Series dual sensor input controllers are wall mount pH/ORP controllers that are available in on/off or modulated pulse proportional versions. They are available with four on/off control relays (WPH410 or WDP410) with two modulated pulse proportional output and two dry contact relays (WPH420 or WDP420) or four modulated pulse proportional outputs (WDP440). A fifth output is used as a diagnostic alarm. One or two isolated 4-20 mA outputs are optional.

They are compatible with any amplified electrode. The choice of pH or ORP operation is selected through the keypad. Use of Antimony pH electrodes is acceptable. Automatic temperature compensation may be used via a Pt1000 or Pt100 input if pH operation is selected. The controller will prompt you to calibrate the electrode at the desired frequency. Automatic buffer recognition may be used in the calibration routine.

Our unique USB feature provides the ability to upgrade the software in the controller to the latest version.

An advanced USB capability option is available. The Configuration file feature allows you to save all the set points from a controller onto a USB flash disk, and then import them into another controller, making the programming of multiple controllers fast and easy. The data logging feature allows you to save the last 2 month's readings and events to a USB flash disk.

2.0 SPECIFICATIONS

2.1 Measurement Performance

pH Range	-2 to 16 pH units
pH Resolution	0.0015 pH units (0.01 pH displayed)
pH Accuracy (Calibrated):	± .01 pH
ORP Range	-1500 to 1500 mV
ORP Resolution	92 µV (1mV displayed)
ORP Accuracy	±1 mV
Temp Comp (optional):	100 or 1000 ohm platinum RTD
Temperature Range	32-212°F (0-100°C)
Temperature Resolution	±0.09°F (0.05°C)
Temperature Accuracy	± 0.9°F (± 0.5°C)

2.2 Electrical: Input/Output

Input Power 100-240 VAC, 50/60 Hz, 8A
Fuse: 1.0 ampere, 5 x 20 mm

Input Signals

pH/ORP	±1500 mV
Temp Comp (optional)	Pt100 or Pt1000
Interlock (optional)	Isolated, dry contact closure required (i.e., flow, level, etc.)

Outputs

Powered Relays	Internally powered relays switching line voltage 6 A (resistive), 1/8 HP All relays are fused together as one group, total current for this group must not exceed 6A
Pulse Outputs	Opto-isolated, Solid State Relay 150mA, 40 VDC Max. VLOWMAX = .13V @ 18 mA
Dry contact relays	6 A (resistive), 1/8 HP Dry contact relays are not fuse protected

	CTRL 1	CTRL2	CTRL 3	CTRL 4	ALARM
WPH410	Powered	Powered	Dry	Dry	Dry
WPH420	Pulse	Pulse	Dry	Dry	Dry
WDP410	Powered	Powered	Powered	Powered	Powered
WDP420	Pulse	Pulse	Dry	Dry	Dry
WDP440	Pulse	Pulse	Pulse	Pulse	Dry

Note: The Alarm relay is non-programmable. Refer to the Main Menu diagram for the list of error conditions that trigger the alarm relay.

4 - 20 mA 1 or 2 (optional)	Internally powered Fully isolated 600 Ohm max resistive load Resolution .001% of span Accuracy ± 1% of reading
pH/ORP Preamp Power	±5 VDC, 5 mA

Agency Approvals

Safety	UL 61010-1:2012 3rd Ed. CSA C22.2 No. 61010-1:2012 3rd Ed. IEC 61010-1:2010 3rd Ed. EN 61010-1:2010 3rd Ed.
EMC	IEC 61326-1:2005 EN 61326-1:2006

Note: For EN61000-4-6, EN61000-4-3 the controller met performance criteria B.
*Class A equipment: Equipment suitable for use in establishments other than domestic, and those directly connected to a low voltage (100-240 VAC) power supply network which supplies buildings used for domestic purposes.

2.3 Mechanical

Enclosure Material	Polycarbonate
NEMA Rating	NEMA 4X
Dimensions	8.5" x 6.5" x 5.5"
Display	2 x 16 character backlit liquid crystal
Operating Ambient Temp	32 – 122°F (0 – 50°C)
Storage Temperature	-20 – 180°F (-29 – 80°C)
Flow switch manifold temperature rating	140°F (60°C) max
Flow switch manifold pressure rating	150 psi
Flow switch manifold connections	¾" NPTF

2.4 WPH/WDP Variables and their Limits

		Low Limit	High Limit
Sensor menu			
	Days Between Calibration	0 days (no reminder)	59 days
Temperature Menu		No variables	
Control 1 -4 Menus			
	High or Low Set Point	-2 pH, -1500 mV	16 pH, 1500 mV
	High or Low Alarm Point	-2 pH, -1500 mV	16 pH, 1500 mV
	Dead Band (Relay Outputs only)	0 pH, 0 mV	1.99 pH, 199 mV
	Proportional Band	0 pH, 0 mV	6.99 pH, 999 mV
	Minimum SPM Rate (Pulse Outputs only)	0 strokes/minute	99 strokes/min
	Maximum SPM Rate (Pulse Outputs only)	10 strokes/minute	360 strokes/min
	Sample Period (Relay Outputs only)	0:01 min:sec	30:00 min:sec
	Time Limit (Relay Outputs only)	0:01 min:sec	499:59 min:sec (enabled) 0=unlimited (disabled)
	Hold Time (Probe Wash)	0 seconds	99 seconds
	On Time (Probe Wash)	1 second	99 seconds
4-20 mA 1 and 2 Menus	4 & 20 mA Settings	-2 pH, -1500 mV	16 pH, 1500 mV
Access Code Menu	New Value	0	9999
Datalog Menu (Optional)		No variables	
Config Menu (Optional)		No variables	
Upgrade Menu		No variables	

*Note: The Alarm relay is non-programmable. Refer to the Main Menu diagram for the list of error conditions that trigger the alarm relay.

3.0 UNPACKING & INSTALLATION

3.1 Unpacking the unit

Inspect the contents of the carton. Please notify the carrier immediately if there are any signs of damage to the controller or its parts. Contact your distributor if any of the parts are missing. The carton should contain: a WPH/WDP series controller and instruction manual. Any options or accessories will be incorporated as ordered.

3.2 Mounting the electronic enclosure

The WPH/WDP series controller is supplied with mounting holes on the enclosure. It should be wall mounted with the display at eye level, on a vibration-free surface, utilizing all four mounting holes for maximum stability. Use M6 (1/4" diameter) fasteners that are appropriate for the substrate material of the wall. The enclosure is NEMA 4X rated. The maximum operating ambient temperature is 122°F (50°C); this should be considered if installation is in a high temperature location. The enclosure requires the following clearances:

Top:	2" (50 mm)
Left:	8" (203 mm)
Right:	4" (102 mm)
Bottom:	7" (178 mm)

3.3 Installation

Once the enclosure is mounted, the metering pumps or other control devices may be located at any distance from the controller. The electrode, once amplified, may be placed up to 1000 feet from the controller. Shielded cable with twisted pairs is required. Always route AC voltage wiring in conduit that is separated by 6 inches from low voltage DC signal lines (such as the electrode signal).

Electrode Installation

The WPH/WDP controllers are designed to work with most AMPLIFIED pH, ORP or ISE electrodes. When in doubt, follow the electrode manufacturer's instructions for installation.

If you have ordered your controller with an external preamplifier pre-wired to the controller, simply attach the electrode to the BNC connector on the preamplifier. If you are using automatic temperature compensation, wire the ATC element to the preamplifier as shown in figure 3.

If you have ordered the external preamplifier separately, see figure 3 for wiring instructions.

NOTE: The cable between the electrode and the preamplifier is carrying an extremely sensitive high impedance voltage signal. Never cut, splice or otherwise destroy the integrity of the cable or unstable readings and susceptibility to electrical noise will result.

Instructions for physically mounting the electrode into the process solution will vary greatly with the type of electrode and circumstances involved in your application. Here are some general guidelines to assist you. Refer to figure 1, Typical Installation.

The electrode should be installed such that the measuring surfaces will always stay wet. Many electrodes have to be installed vertically, with the measuring surfaces pointing down. Follow the manufacturer's recommendations if this is the case. If the electrode dries out, a slow response and short life will result.

For submersion applications, mount the electrode below the minimum solution level. If the tank will be completely emptied, plan on removing the electrode and storing it in tap water (NOT DI water) or pH 4 buffer solution while the tank is empty. If this is not desirable, a recirculation loop may be installed with the electrode mounted in-line. The WEL electrode cable is not waterproof and must be protected from moisture by connecting a pipe to the top of the electrode housing. The opposite end of the pipe should also be protected from moisture using a cable gland. When submerging the electrode, make sure the cable is protected by a length of pipe, sealed at the top using a cable gland.

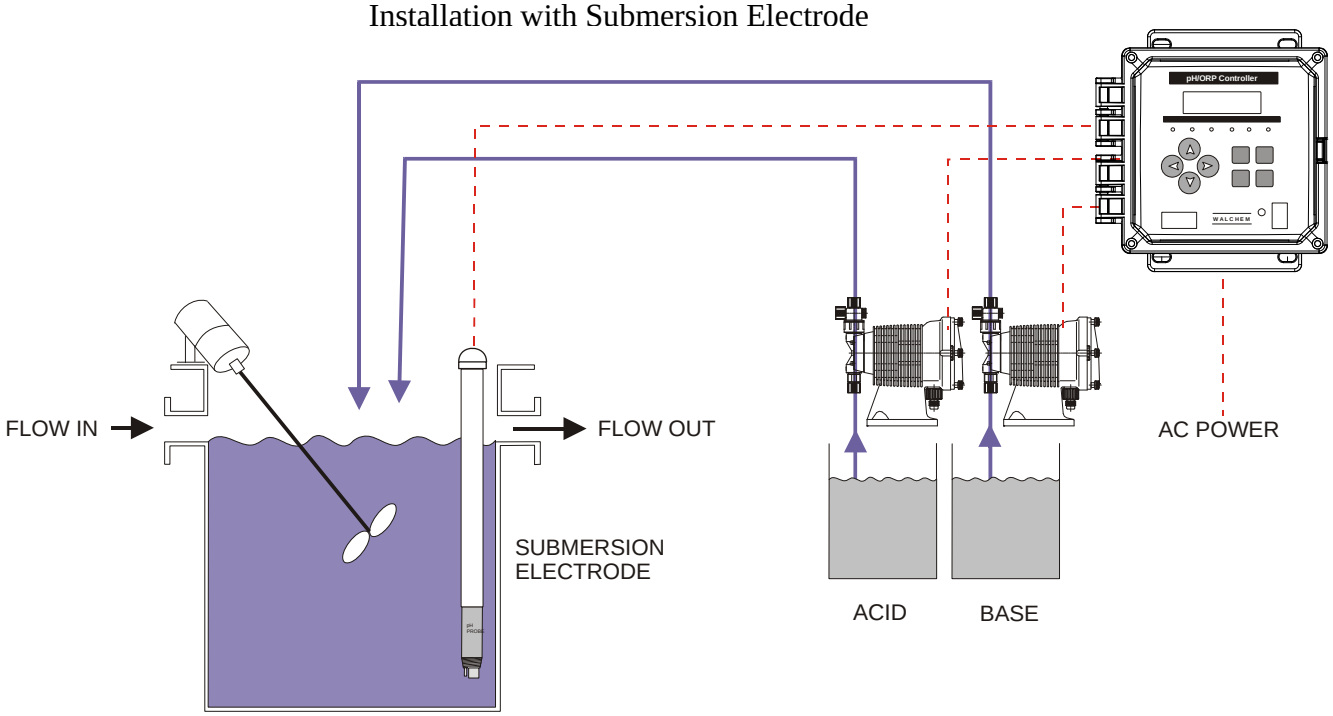
For in-line applications, where the electrode is installed in a pipe, the electrode should be placed on the discharge side of the pump (under positive pressure). A "U" trap should be included so that if flow stops, the electrode is still immersed in the solution. If the flow through the pipe can not be shut down for cleaning and calibrating the electrode, install the electrode in a by-pass line with isolation valves to allow for electrode removal. The electrode should be installed in an area where there is good solution movement and where it will respond rapidly to chemical additions. The placement of the electrode relative to the placement of chemical replenishment, along with the quality of the mixing and replenishment flow rate, is critical to accurate control.

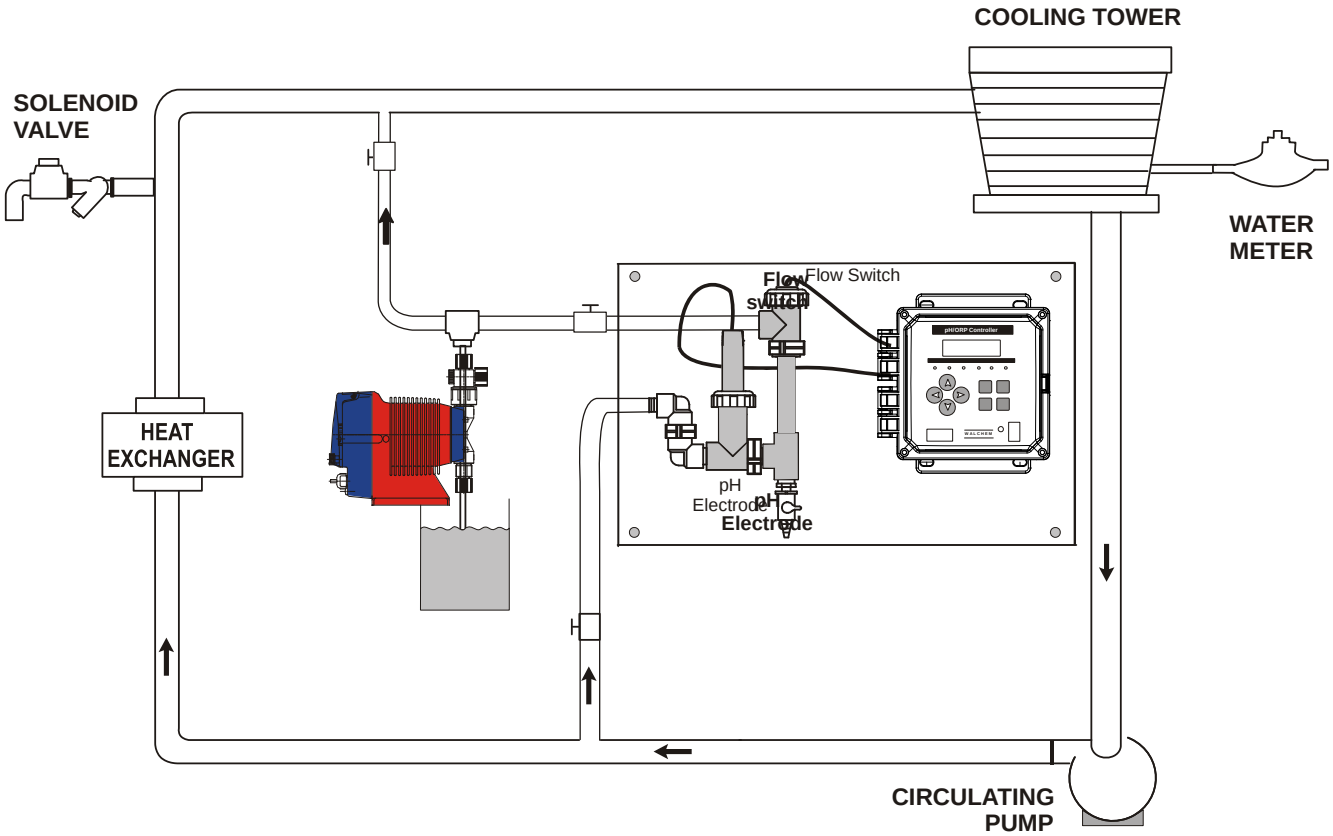
IMPORTANT: To avoid cracking the female pipe threads on the supplied plumbing parts, use no more than 3 wraps of Teflon tape and thread in the pipe FINGER tight plus 1/2 turn! ***Do not use pipe dope to seal the threads of the flow switch because the clear plastic will crack!***

3.4 Icon Definitions

Symbol	Publication	Description
	IEC 417, No.5019	Protective Conductor Terminal
	IEC 417, No. 5007	On (Supply)
	IEC 417, No. 5008	Off (Supply)
	ISO 3864, No. B.3.6	Caution, risk of electric shock
	ISO 3864, No. B.3.1	Caution

Installation with Submersion Electrode





Installation with In-line electrode

Figure 1 Typical Installation

3.5 Electrical installation

The various standard wiring options are shown in figure 2. Your WPH/WDP series controller will arrive from the factory prewired or ready for hardwiring. Depending on your configuration of controller options, you may be required to hardwire some or all of the input/output devices. Refer to figures 3 and 4 for circuit board layout and wiring.

Note: when wiring the optional 4-20 mA output or a remote interlock switch, it is advisable to use stranded, twisted, shield pair wire between 22-26 AWG. Shield should be terminated at the controller ground stud (see figures 3 and 4).

CAUTION

1. There are live circuits inside the controller even when the power switch on the front panel is in the OFF position! The front panel must never be opened before power to the controller is REMOVED!
   If your controller is prewired, it is supplied with a 8 foot, 18 AWG power cord with USA style plug. A tool (#1 Phillips driver) is required to open the front panel.
2. When mounting the controller, make sure there is clear access to the disconnecting device!
3. The electrical installation of the controller must be done by trained personnel only and conform to all applicable National, State and Local codes!
4. Proper grounding of this product is required. Any attempt to bypass the grounding will compromise the safety of persons and property.
5. Operating this product in a manner not specified by Walchem may impair the protection provided by the equipment.

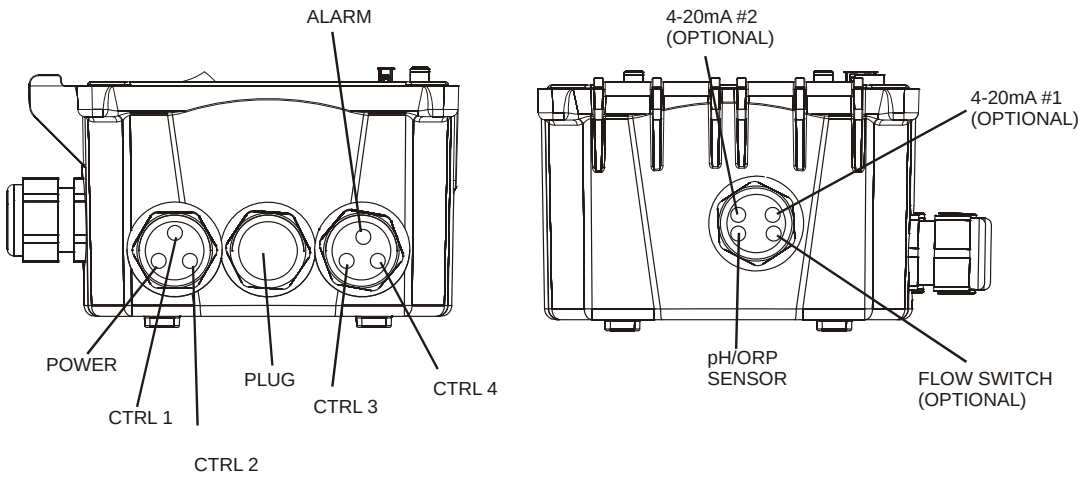


Figure 2a WPH410 Conduit Wiring

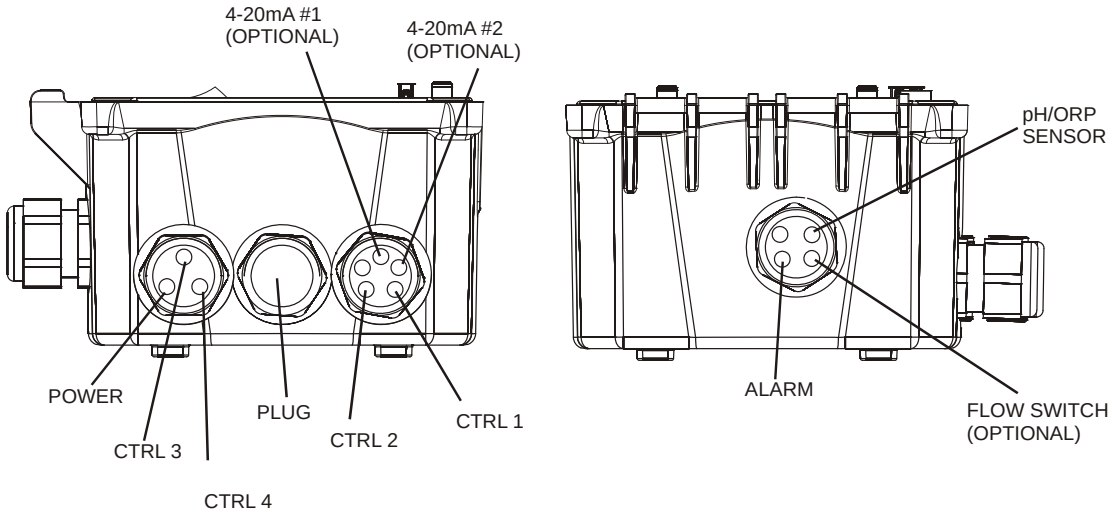


Figure 2b WPH420 Conduit Wiring

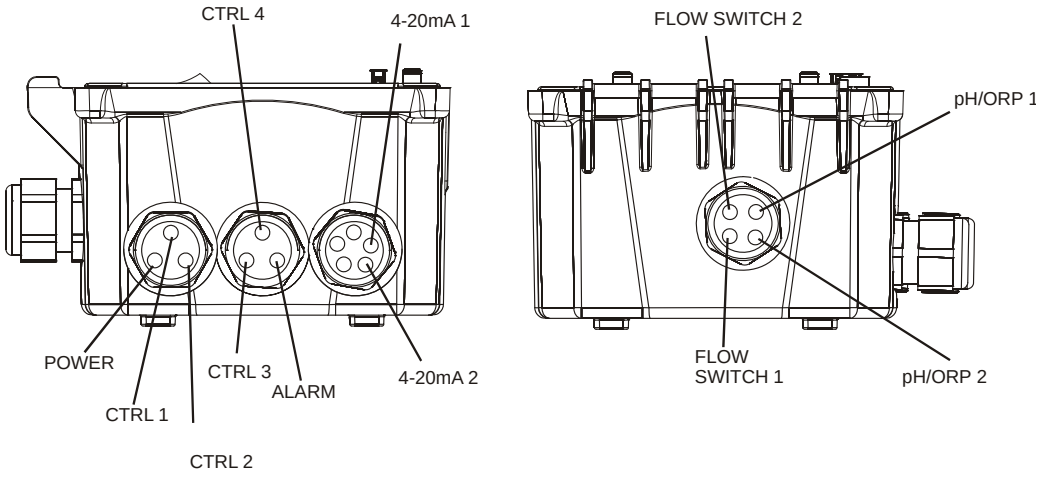


Figure 2c WDP410 Conduit Wiring

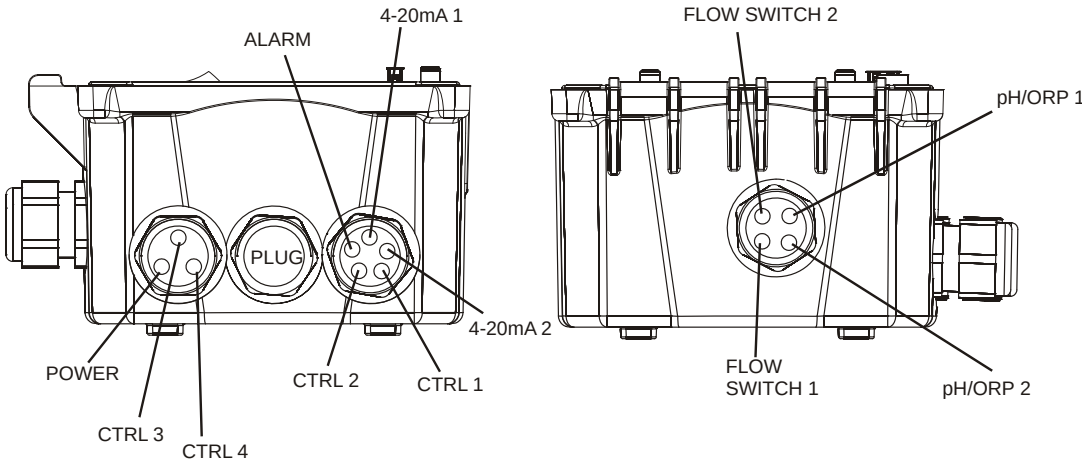


Figure 2d WDP420 Conduit Wiring

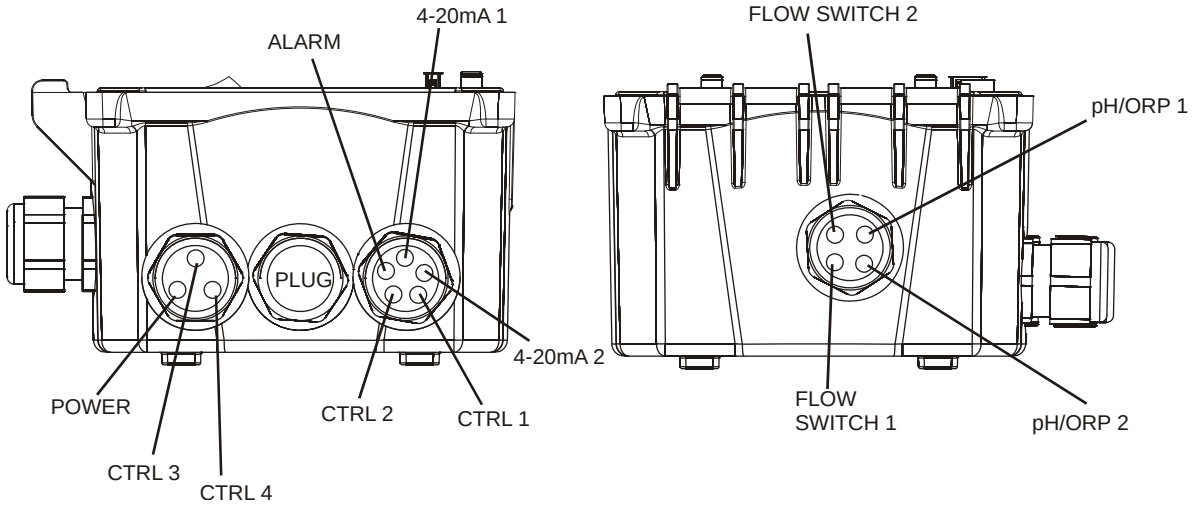


Figure 2e WDP440 Conduit Wiring

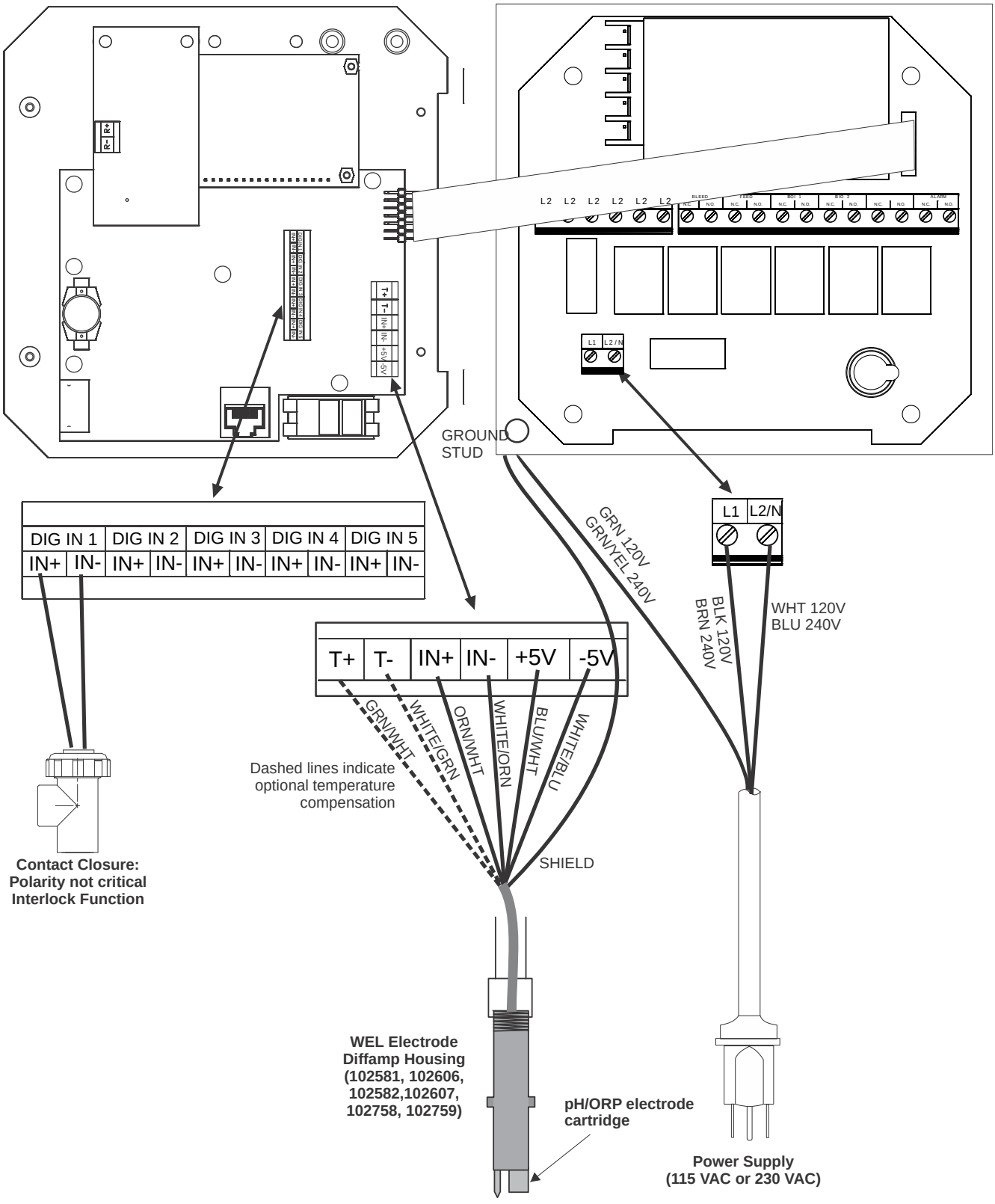


Figure 3a WPH Inputs using WEL pH/ORP Electrode Housings

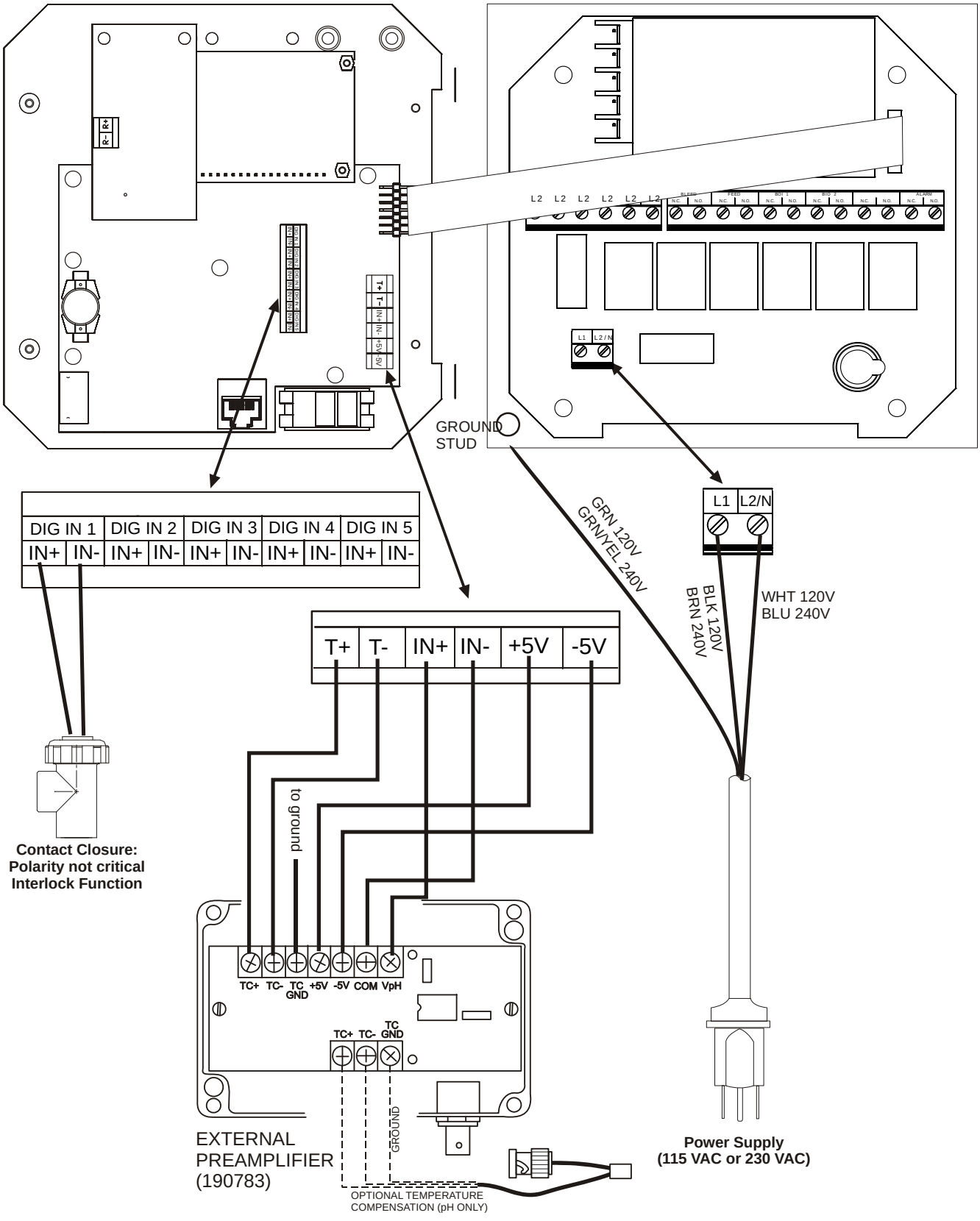


Figure 3b WPH Inputs using pH/ORP Electrode/External Preamplifiers

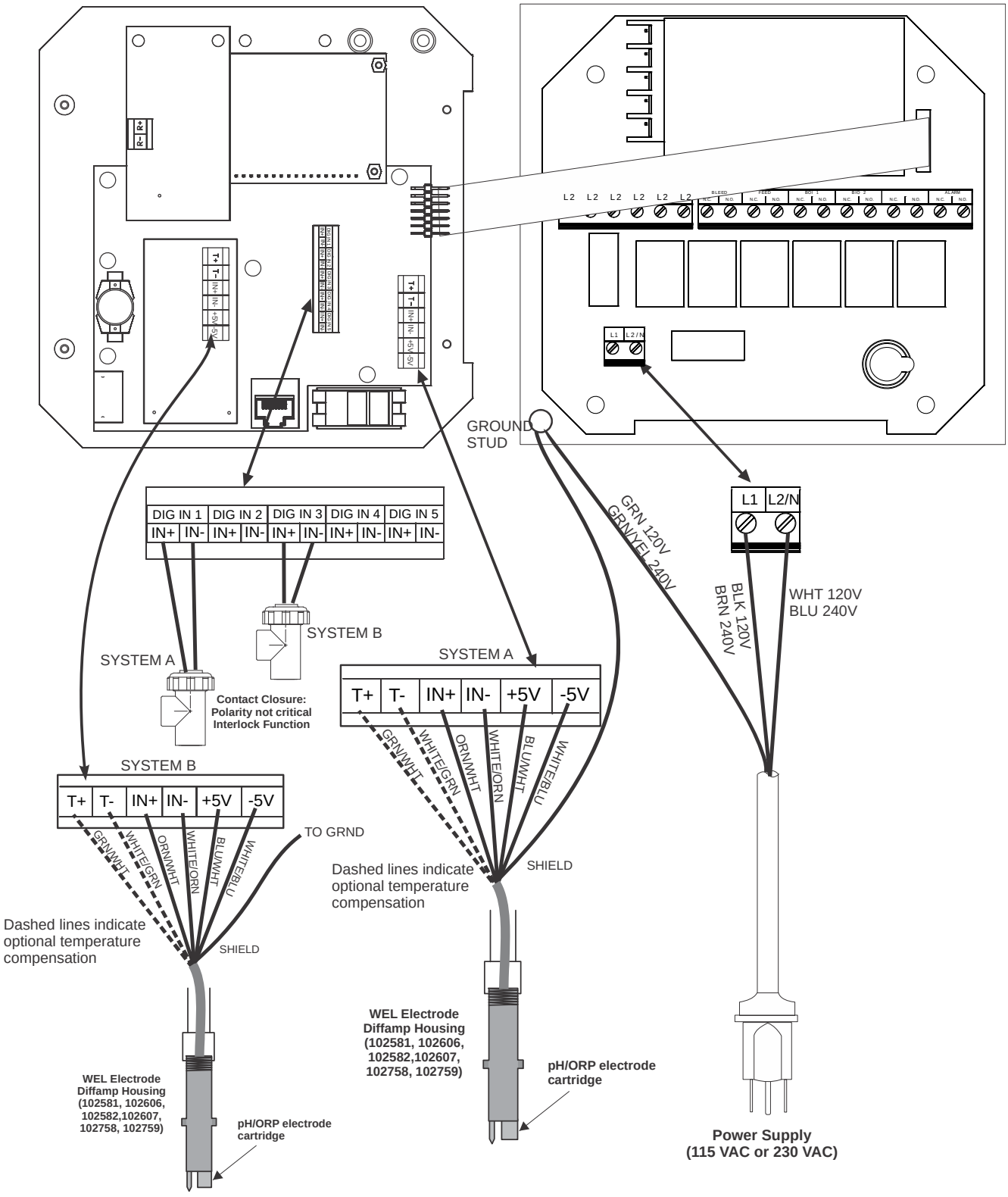


Figure 3c WDP Inputs using WEL pH/ORP Electrode Housings

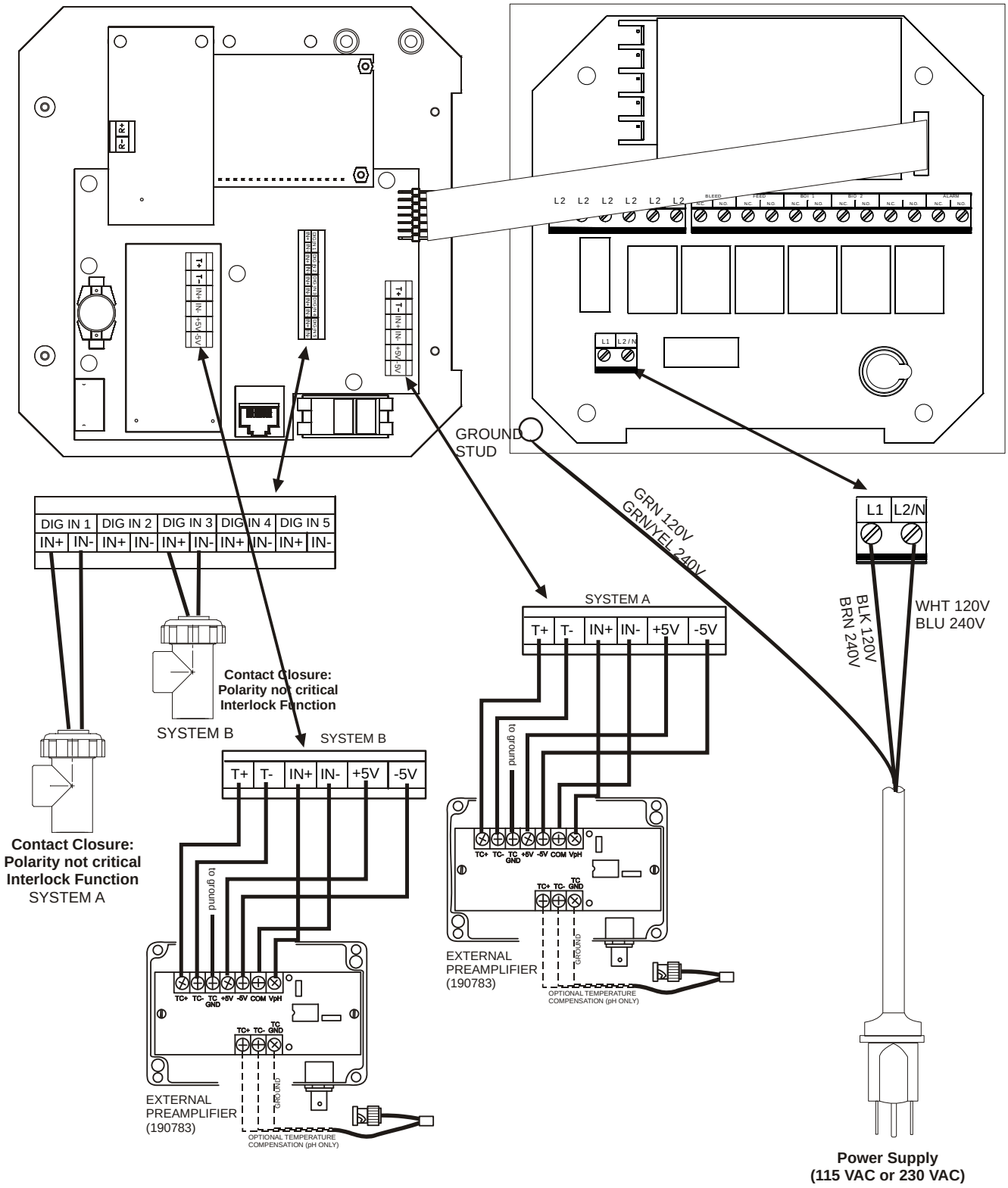


Figure 3d WDP Inputs using pH/ORP Electrode/External Preamplifiers

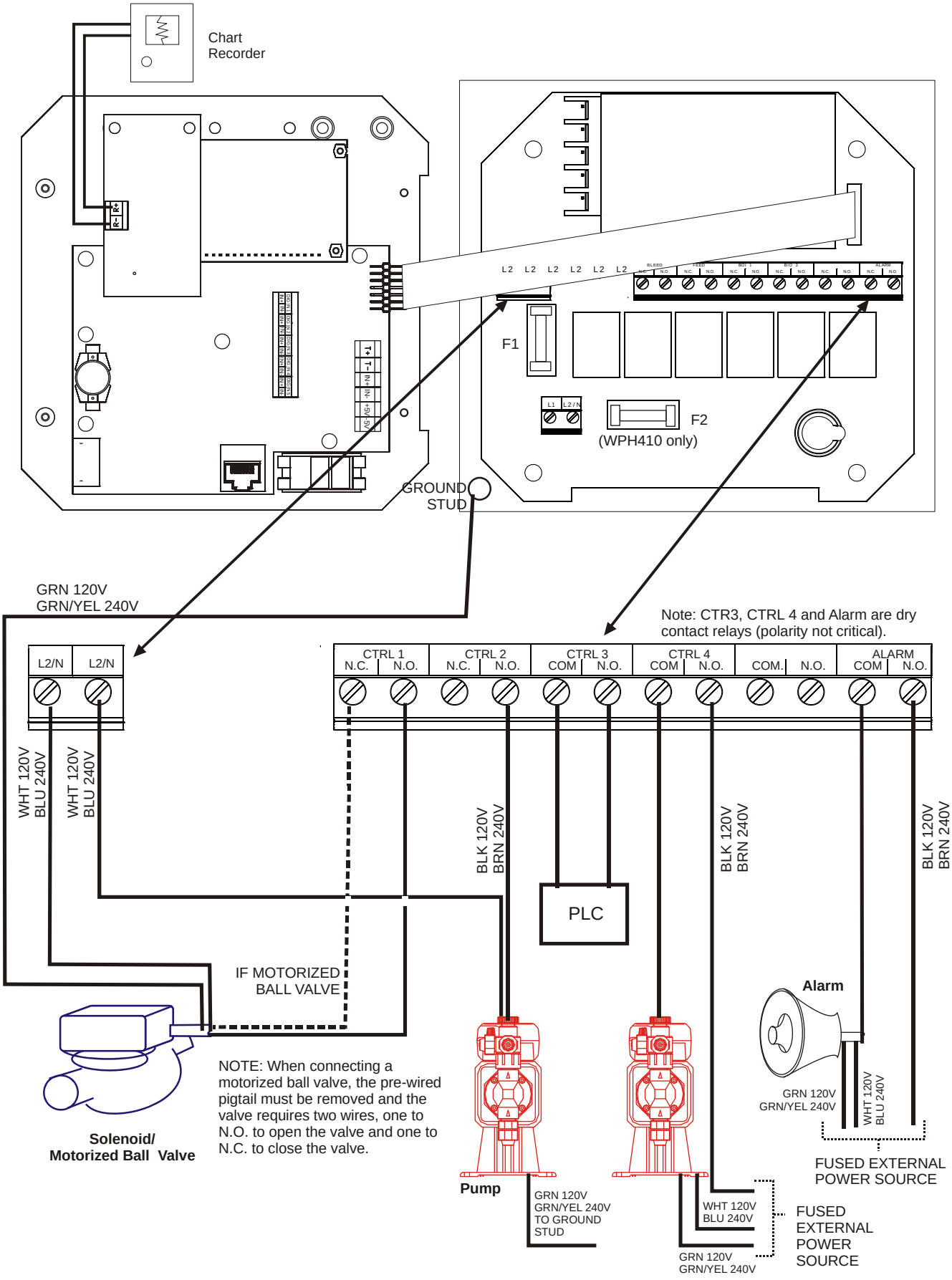
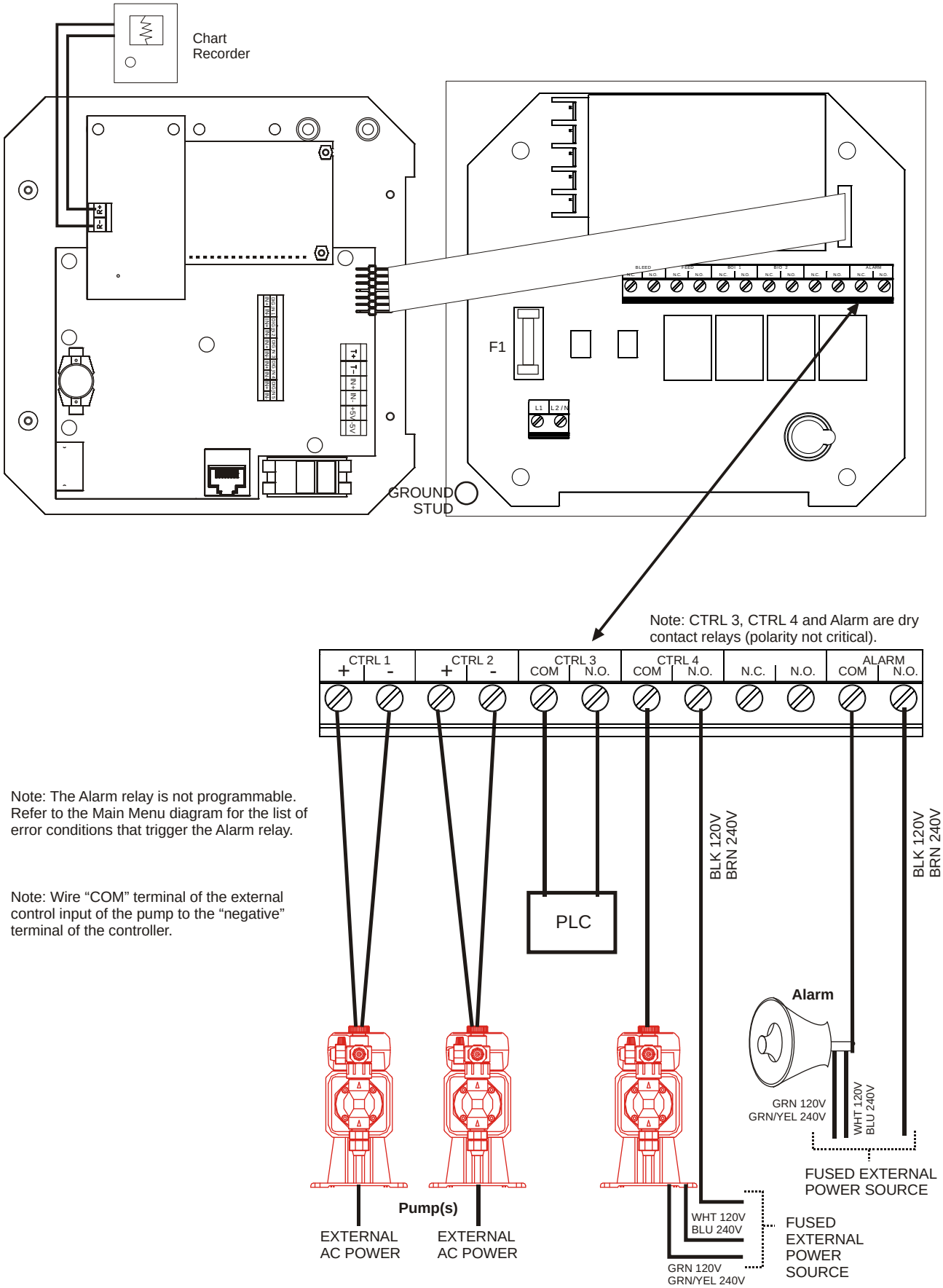


Figure 4a WPH410 Outputs



Note: The Alarm relay is not programmable. Refer to the Main Menu diagram for the list of error conditions that trigger the Alarm relay.

Note: Wire “COM” terminal of the external control input of the pump to the “negative” terminal of the controller.

Figure 4b WPH/WDP420 Outputs

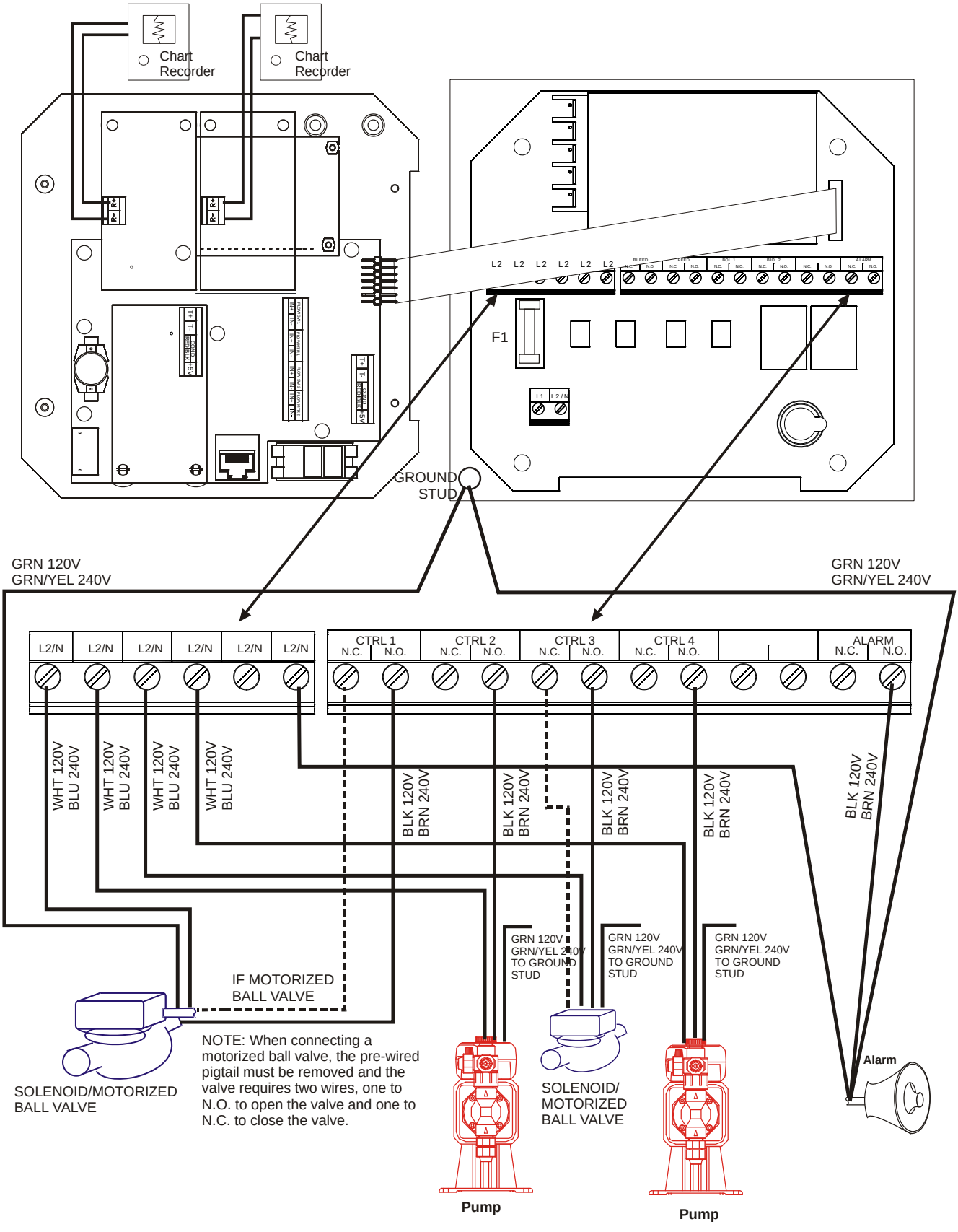
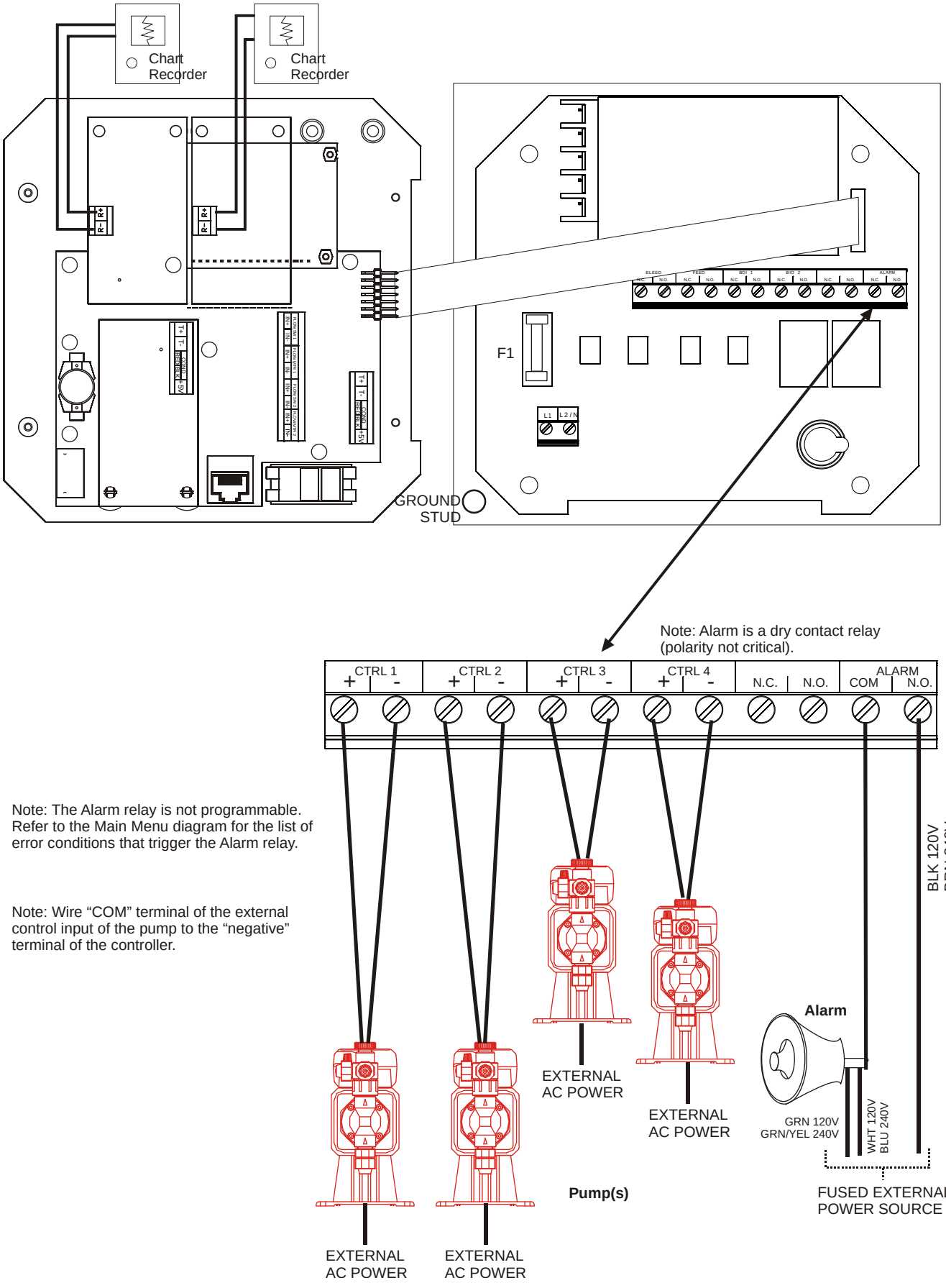


Figure 4c WDP410 Outputs



Note: The Alarm relay is not programmable. Refer to the Main Menu diagram for the list of error conditions that trigger the Alarm relay.

Note: Wire “COM” terminal of the external control input of the pump to the “negative” terminal of the controller.

Figure 4d WDP440 Outputs

4.0 FUNCTION OVERVIEW

4.1 Front Panel

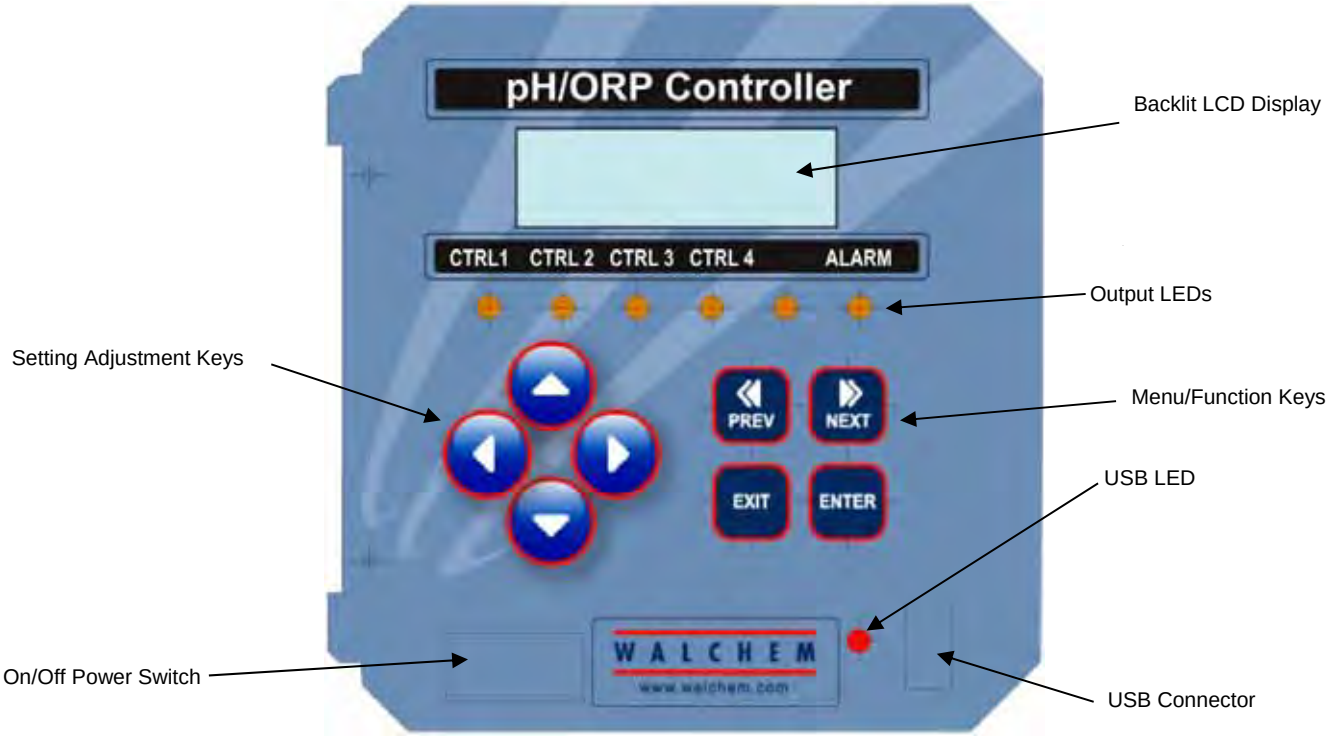


Figure 5 Front Panel

4.2 Display

A summary screen is displayed while the WPH/WDP controller is on. If you have a single sensor (WPH), this display will show a bar graph of the pH/ORP relative to the set point, the numeric sensor reading, and current operating conditions. If you have two sensors (WDP), the bar graph will be replaced by the other sensor's reading.

Towards the center of the bar graph are the (S)'s, which represent the set points. The bar graph grows from the left hand side, and the point furthest to the right indicates where the process value is relative to the set points.

The bottom line of the summary screen displays the following potential status messages: Probe Error, Temp Sensor Err, Calibration Time, Output Timeout, High/Low Alarm, Range Alarm, In Range Output, Output On, Probe Wash, Probe Wash Hold, Normal and Interlock

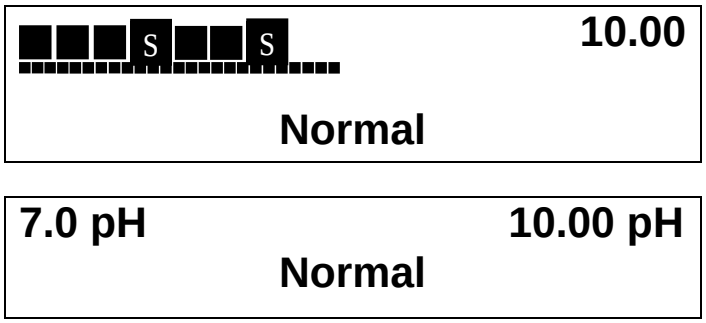


Figure 6 Summary Screens

4.3 Keypad

The keypad consists of 4 directional arrow keys and 4 function keys. The arrows are used to move the adjustment cursor and change settings, while the function keys are used to enter values, and navigate the various menu screens. The function keys are **ENTER, EXIT, NEXT,** and **PREV** (previous). **NEXT** and **PREV** scroll through the various menu choices. **ENTER** is used to enter a submenu and to enter a value. **EXIT** is used to back up one menu level. If you are at the main menu level, **EXIT** will return you to the Summary Display.

To change a value in a submenu, the left/right arrow keys move the cursor left and right to each digit or option that can be changed. The up/down arrows will change numeric values up or down, or scroll through option choices. Press **ENTER** only when you have finished making all of the changes for that menu screen.

4.4 Access Code

The WPH/WDP series controller is shipped with the access code disabled. If you wish to enable it, see Section 5.9 for operation. With the access code enabled, any user can view parameter settings, but not change them. Note that this provides protection only against casual tampering. Use a lock on the cover latch if you need more protection.

4.5 Startup

Initial Startup

After having mounted the enclosure and wired the unit, the controller is ready to be started.

Plug in the controller and turn on the power switch to supply power to the unit. The display will briefly show the model number and then revert to the normal summary display. Scroll through the menus and calibrate the pH/ORP reading, optional temperature, and set the control parameters detailed in Section 5, Operation.

To return to the summary display, press the **EXIT** key until you return to this screen. The controller will automatically return to this screen after 10 minutes.

Normal Startup

Startup is a simple process once your set points are in memory. Simply check your supply of chemicals, turn on the controller, calibrate it if necessary and it will start controlling.

4.6 Shut Down

To shut the controller down, simply turn off the power. Programming remains in memory.

The electrode must be stored with the measuring surfaces wet. If an extended shutdown will result in the electrode dehydrating, it must be removed from its position in the process and stored in pH 4 buffer solution.

5.0 OPERATION

These units control continuously while power is applied. Programming is accomplished via the local keypad and display.

To view the top level menu, press any key. The menu structure is grouped by inputs and outputs. Each input has its own menu for calibration and unit selection as needed. Each output has its own setup menu including set points, timer values, direction of control, etc. as needed. After ten minutes of inactivity in the menu, the display will return to the summary display. Keep in mind that even while browsing through menus, the unit is still controlling.

5.1 Main Menu

The exact configuration of your WPH/WDP controller determines which menus are available as you scroll through the settings. Certain menus are only available if you purchase certain options. All settings are grouped under the following main menu items.

Sensor	Sensor A and Sensor B menus appear if the 2nd sensor input card is installed (WDP models)
Temperature	Temperature A and Temperature B menus appear if the 2nd sensor input card is installed (WDP models)
Control 1	
Control 2	
Control 3	
Control 4	
Interlock A	Only appears if the 2nd sensor input card is installed (WDP models)
Time	
4-20mA 1	Only if 4-20mA option installed
4-20mA 2	Only if 2nd 4-20mA option installed
Access Code	
Datalog	Only if advanced USB feature is in model code
Config	Only if advanced USB feature is in model code
Upgrade	

The **NEXT** key travels forward through this list while the **PREV** key travels backwards through the list. Pressing **ENTER** will Enter the lower level menu that is currently displayed.

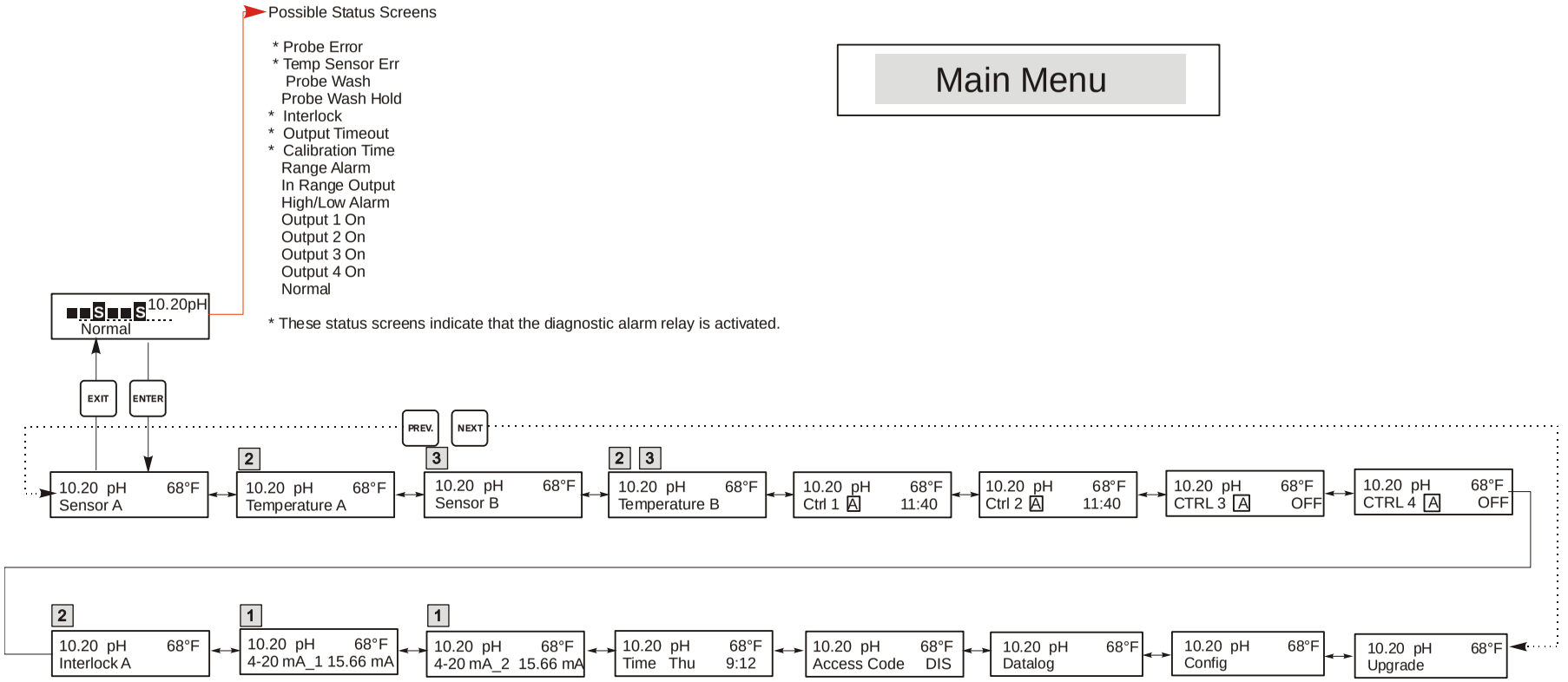


Figure 7 Main Menu

Legend

1 4-20mA menu is only present if 4-20mA option is installed.

2 Only appears if Sensor Type is pH.

3 Only present in WDP models.

Operation

Press Enter key to enter menu or submenu.
Press Exit key to exit menu.
After 10 minutes of inactivity the controller will automatically return to the summary screen.

5.2 Sensor Menu

The sensor menu provides the following settings: Calibration history (informational only), 2 point calibration, 1 point calibration, pH/ORP selection, and other calibration menus. Each is discussed in detail below. Refer to the Sensor Menu chart on the next page.

Note: If you are programming the unit for the first time, press the **PREV** key once, and set the "Sensor Type" menu first to choose standard pH, antimony pH, or ORP. Then press **PREV** three times to get to the "Use Buffer Rec" menu and choose whether you want to use automatic buffer recognition or not. Then press **ENTER**.

Cal'd	Displays the date of the last electrode calibration.
2 Pt Calibration	Press the **ENTER** key to perform a 2 point calibration of the electrode. Note: 2 point calibration instructions are given in the following order: pH electrodes, using Auto Buffer Recognition, pH electrodes, not using Auto Buffer Recognition, ORP electrodes (Auto Buffer Recognition not available)
2 Pt Calibration for pH electrodes, using Auto Buffer Recognition	If using manual temperature compensation, the first display will be:
	Cal Temp °F/C 68 Use the arrow keys to enter the actual temperature of the buffer solutions. If using automatic temperature compensation, this display will not appear. Press **ENTER** to continue.
	Rinse Electrode Remove the electrode from the process and rinse it off. Press **ENTER** to go to the next step.
	First Buffer This is a prompt to place the electrode in the first buffer. In a few seconds the controller will automatically go to the next step.
	1st Buffer 7.00 The top line will show the temperature and the mV output from the electrode. The bottom line will read "1st Buffer" on the left hand side and either "??.??" or a pH value on the right hand side. If it reads a pH value, that means that it has recognized the buffer solution. Once the buffer value is recognized, it will stop flashing and the mV value will begin flashing. Once this has stabilized, it will stop flashing and go on to the next step. If it reads "??.??", that means it hasn't recognized the buffer solution because the mV output of the electrode is too far away from a standard buffer solution's theoretical mV value. If it can't recognize the buffer solution, the controller will beep and display "Unknown Buffer", and then display its best guess. Press **ENTER** to accept that guess, or change the value to the correct one using the arrow keys. If you press ENTER when it reads “??.??”, the display will switch to “Buffer Override” and allow you to manually enter the buffer value.
	Rinse Electrode Remove the electrode from the first buffer solution and rinse it off with water. Press **ENTER** to continue.
	Second Buffer Place the electrode in the second buffer solution. The controller automatically advances.
	2nd Buffer 4.00 The top line will display the temperature and mV readings, which will blink until they become stable. The bottom line will say "2nd Buffer" on the left hand side, either display the pH of the buffer solution or "??.??" on the right hand side and will go to the next step or display "Unknown Buffer" as in 1st Buffer above.
	Cal Successful/Cal Failed If the electrode response is good, then the display will read "Cal Successful". If the mV output of the electrode did not change enough between the two buffer solutions, it will read "Cal Failed". A failure usually means that the electrode needs to be cleaned, or replaced. It will also display the % difference from the theoretical slope. A failure occurs if the slope is more than 80% different than theoretical. See Troubleshooting Section for “Probe Error” if calibration failed.

	Continue Y The controller will hold this display until you have replaced the electrode in the process, and press **ENTER**. Control will not begin until **ENTER** is pressed, or 10 minutes go by. If calibration failed, control will begin using old calibration setpoints.
2 Pt Calibration for pH electrodes, not using Auto Buffer Recognition	If using manual temperature compensation, the first display will be:
	Cal Temp °F/C 68 Use the arrow keys to enter the actual temperature of the buffer solutions. If using automatic temperature compensation, this display will not appear. Press **ENTER** to continue.
	Rinse Electrode Remove the electrode from the process and rinse it off. Press **ENTER** to go to the next step.
	First Buffer This is a prompt to place the electrode in the first buffer. In a few seconds the controller will automatically go to the next step.
	1st Buffer 7.00 The bottom line will display "1st Buffer" on the left hand side and "7.00" on the right hand side. Use the arrow keys to set the pH value of the 1st buffer, then press **ENTER**. The top line will now show the temperature and the mV input from the electrode. The mV will blink until the value is stable. The controller will automatically go onto the next step or you may press **ENTER** to go to the next step.
	Rinse Electrode Remove the electrode from the buffer and rinse it off. Press **ENTER** to go to the next step.
	Second Buffer This is a prompt to place the electrode in the second buffer. Again, in a few seconds the controller will automatically go to the next step.
	2nd Buffer 4.00 The bottom line will display "2nd Buffer" on the left hand side and "4.00" on the right hand side. Use the arrow keys to set the pH value of the 2nd buffer, then press **ENTER**. The top line will now show the temperature and the mV input from the electrode. The mV will blink until the value is stable. The controller will automatically go onto the next step or you may press **ENTER** to go to the next step. The controller will go on to the next step once the mV signal is stable.
	Cal Successful/Cal Failed If the electrode response is good, then the display will read "Cal Successful". If the mV output of the electrode did not change enough between the two buffer solutions, it will read "Cal Failed". A failure usually means that the electrode needs to be cleaned, or replaced. It will also display the % difference from theoretical slope. A failure occurs if the slope is more than 80% different than theoretical.
	Continue Y The controller will hold this display until you replace the electrode in the process and press **ENTER**. Control will not begin until **ENTER** is pressed or 10 minutes go by.
2 Pt Calibration for ORP electrodes (no Auto Buffer Recognition available)	Rinse Electrode Remove the electrode from the process and rinse it off. Press **ENTER** to go to the next step.
	First Buffer This is a prompt to place the electrode in the first buffer. In a few seconds the controller will automatically go to the next step.
	Input XX mV The display will show the mV reading from the electrode. The entire number will blink until the reading is stable, then the display will change to:
	Buffer XX Now you can change the mV value of the buffer, by using the arrow keys and pressing **ENTER.**
	Rinse Electrode Remove the electrode from the buffer and rinse it off. Press **ENTER** to go to the next step.

	Second Buffer This is a prompt to place the electrode in the second buffer. Again, in a few seconds the controller will automatically go to the next step.
	Input XXX mV The display will show the mV reading from the electrode. The entire number will blink until the reading is stable, then the display will change to:
	Buffer XXX Now you can change the mV value of the buffer, by using the arrow keys and pressing **ENTER.**
	Cal Successful/Cal Failed If the electrode response is good, then the display will read "Cal Successful". If the mV output of the electrode did not change enough between the two buffer solutions, it will read "Cal Failed". A failure usually means that the electrode needs to be cleaned, or replaced.
	Continue Y The controller will hold this display until you replace the electrode in the process and press **ENTER**. Control will not begin until **ENTER** is pressed or 10 minutes go by.
1 Pt Calibration	Press **ENTER** to perform a 1 point calibration of the electrode. Note: 1 point calibration instructions are given in the following order: pH electrodes, using Auto Buffer Recognition pH electrodes, not using Auto Buffer Recognition ORP electrodes (Auto Buffer Recognition not available)
1 Pt Calibration for pH Electrodes, using Auto Buffer Recognition	If using manual temperature compensation, the first display will be:
	Cal Temp °F/C 68 Use the arrow keys to enter the actual temperature of the buffer solutions. If using automatic temperature compensation, this display will not appear.
	Rinse Electrode Remove the electrode from the process and rinse it off. Press **ENTER** to go to the next step.
	First Buffer This is a prompt to place the electrode in the first buffer. In a few seconds the controller will automatically go to the next step.
	1st Buffer 4.00 The top line will show the temperature and the mV output from the electrode. These values will blink until they become stable. The bottom line will read "1st Buffer" on the left hand side and either "??.??" or a pH value on the right hand side. If it reads a pH value, that means that it has recognized the buffer solution. The controller will then go on to the next step. If it reads "??.??", that means it hasn't recognized the buffer solution because the mV output of the electrode is too far away from a standard buffer solution's theoretical mV value. If it can't recognize the buffer solution, the controller will beep and display "Unknown Buffer", and then display its best guess. Press **ENTER** to accept that guess, or change the value to the correct one using the arrow keys. If you press **ENTER** when it reads “??.??”, the display will switch to “Buffer Override” and allow you to manually enter the buffer value.
	Cal Successful/Cal Failed If the electrode response is good, then the display will read "Cal Successful". If the controller can not calculate an acceptable slope from that mV reading, it will read "Cal Failed". A failure usually means that the electrode needs to be cleaned or replaced.
	Continue Y The controller will hold this display until you replace the electrode in the process and press **ENTER**. Control will not begin until **ENTER** is pressed or 10 minutes go by.

1 Pt Calibration for pH electrodes, not using Auto Buffer Recognition	If using manual temperature compensation, the first display will be:
	Cal Temp °F/C 68 Use the arrow keys to enter the actual temperature of the buffer solutions. Press **ENTER** to go on to the next step. If using automatic temperature compensation, this display will not appear.
	Rinse Electrode Remove the electrode from the process and rinse it off. Press **ENTER** to go to the next step.
	First Buffer This is a prompt to place the electrode in the first buffer. In a few seconds the controller will automatically go to the next step.
	Buffer 4.00 Use the arrow keys to change the value of the buffer being used, then press ENTER.
	1st Buffer 4.00 The bottom line will display "1st Buffer" on the left hand side and "4.00" on the right hand side. Use the arrow keys to set the pH value of the 1st buffer, then press **ENTER**. The top line will now show the temperature and the mV input from the electrode. The mV will blink until the value is stable. The controller will automatically go onto the next step or you may press **ENTER** to go to the next step.
	Cal Successful/Cal Failed If the electrode response is good, then the display will read "Cal Successful". If the controller can not calculate an acceptable slope from that mV reading, it will read "Cal Failed". A failure usually means that the electrode needs to be cleaned or replaced.
	Continue Y The controller will hold this display until you replace the electrode in the process and press **ENTER**. Control will not begin until **ENTER** is pressed or 10 minutes go by.
1 Pt Calibration for ORP electrodes (no Auto Buffer Recognition available)	Rinse Electrode Remove the electrode from the process and rinse it off. Press **ENTER** to go to the next step.
	First Buffer This is a prompt to place the electrode in the first buffer. In a few seconds the controller will automatically go to the next step.
	Input 96 mV The display will show the mV reading from the electrode. The entire number will blink until the reading is stable, then the display will change to:
	Buffer 96 Now you can change the mV value displayed to the known value of the buffer, by using the arrow keys and pressing **ENTER.**
	Cal Successful/Cal Failed If the electrode response is good, then the display will read "Cal Successful". If the controller can not calculate an acceptable slope from that mV reading, it will read "Cal Failed". A failure usually means that the electrode needs to be cleaned or replaced.
	Continue Y. The controller will hold this display until you replace the electrode in the process and press **ENTER**. Control will not begin until **ENTER** is pressed or 10 minutes go by.
Days Btwn Cal	Use the arrow keys to set the number of days that you would like to go by before recalibrating the electrode. The controller will prompt you to recalibrate when that time has expired. Setting the number of days to zero will disable this feature.
Use Buffer Rec	Use the Up and Down arrows to toggle between Y (yes) and N (no). If you choose to use automatic buffer recognition, then the controller will recognize which buffer solution the electrode has been placed in. If you choose not to, then you will have to enter the information manually during the 1 or 2 point calibration procedures. Press **ENTER** to accept the choice displayed.
Buffer Set	This menu will only appear if you have decided to use automatic buffer recognition. Press **ENTER** to change the type of buffers that will be used. Use the Up and Down arrows to toggle between US buffers (pH 4, 7 and 10) or DIN standard buffers (pH 1.09, 4.65, 6.79, 9.23 and 12.75.) then press **ENTER** to make your selection.

Sensor mV	This menu displays the mV from the electrode. It is useful for troubleshooting.
Self Test	Press **ENTER** to perform a self-test. If it says "FAIL" in the upper right hand corner, this indicates a problem with the controller which should be returned for repair. If it passes, and you have a problem calibrating, it is an electrode or preamp problem.
Sensor Type	Press **ENTER** to set up the controller to match the type of electrode to be used. Use the Up and Down arrows to toggle between standard pH, antimony pH, and ORP, then press **ENTER** to make your selection. The controller will warn you to check your set points because the units of measure have changed. Press any key to clear the warning messages.

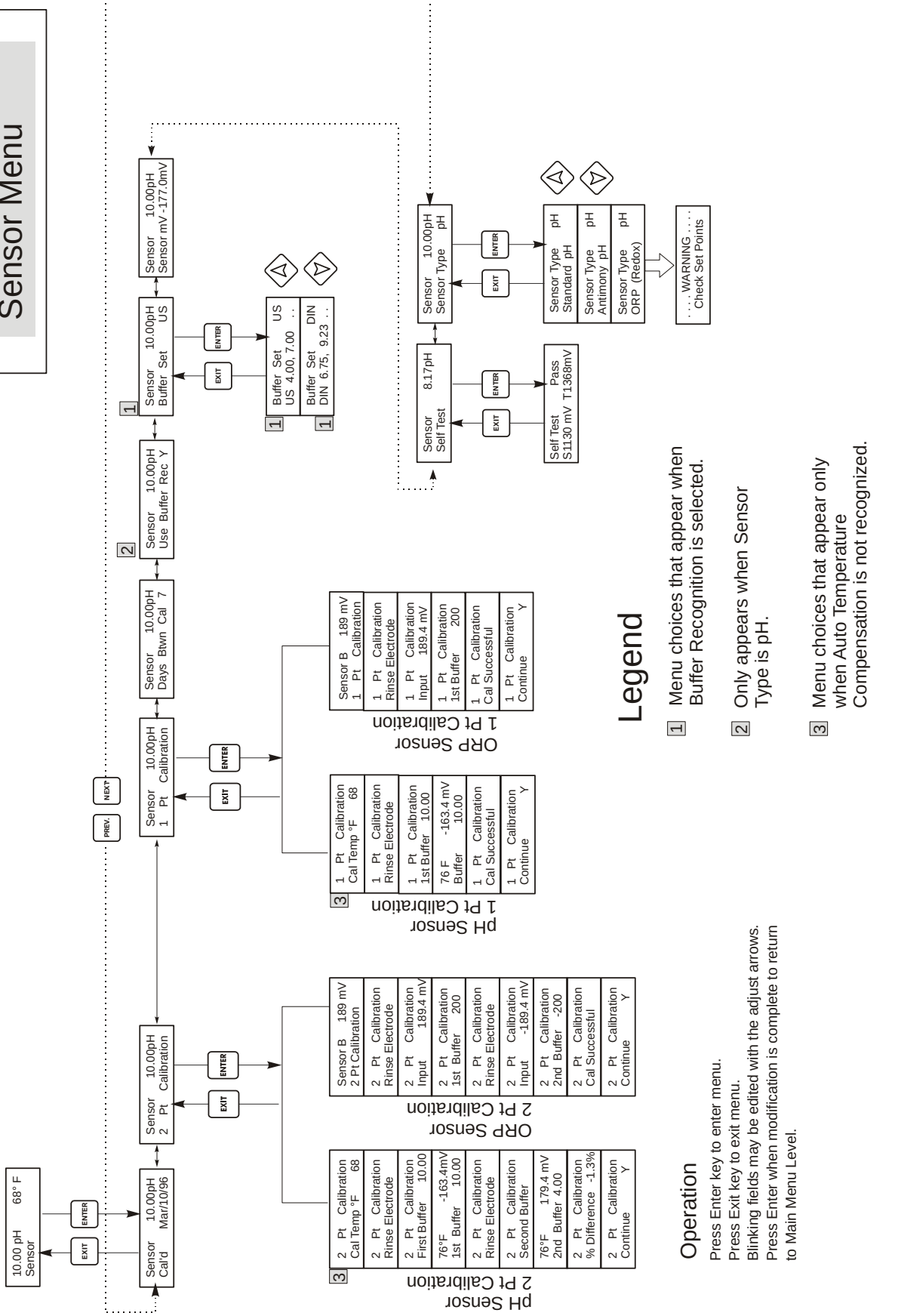


Figure 8 Sensor Menu

5.3 Temperature Menu (this menu does not appear if an ORP sensor has been selected)

The temperature menu contains the following settings: Calibrate and Units (if the Pt100 or Pt1000 sensor is detected when the unit is powered on) or Manual Temp and Units (if no Pt100 or Pt1000 sensor is detected at power-up). Refer to the Temperature Menu chart below.

Calibrate	To Calibrate the Temperature, use a thermometer to measure the fluid temperature and adjust the WPH controller to match. Once Calibrate is entered, the unit continuously displays temperature readings. Press the Up or Down arrow key to change the value displayed to match the thermometer. You must press ENTER to activate the new calibration. You must press the EXIT key to exit calibration.
Man Temp	This menu appears only if no temperature element is connected at power-up. Use the arrow keys to adjust the temperature displayed to match that of the water.
Units	You may choose to display temperature in °C or °F. Press ENTER and the Up or Down Arrow keys to change the temperature units for display.

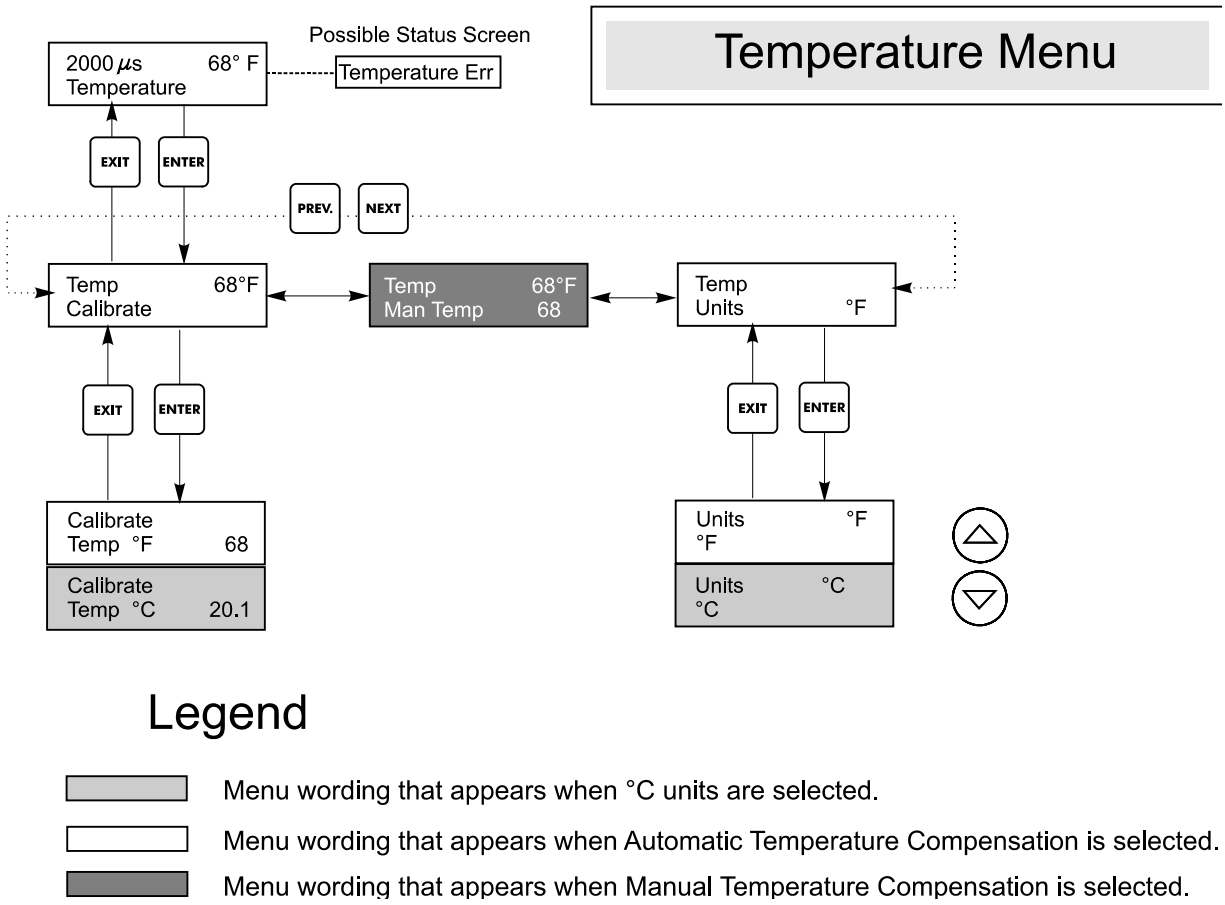


Figure 9 Temperature Menu

5.4 Control 1 - 4 Menus (FOR ON/OFF CONTROLLERS)

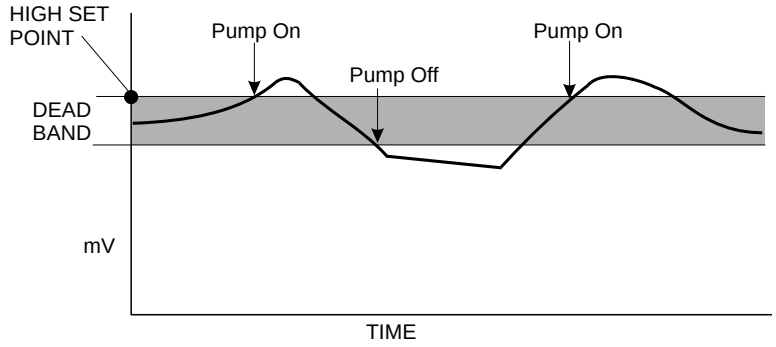
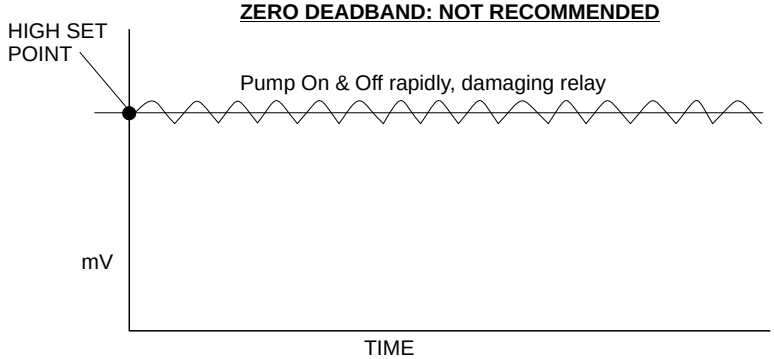
The description of the menus for relay outputs will apply to Control 1 2, 3, and 4 for WPH410 and WDP410 models, and to control 3 and 4 for WPH420 and WDP420 models.

The Control 1 - 4 menus are separate from each other but operate in exactly the same way. Each menu provides the following independent settings: Set Point, Dead Band, Time Limit, Interlock, Output Mode, Assign Input, HOA, Set Point, Dead Band, and Time Limit. The Control menu will be indicated on the display by one of the following: (The 'A' indicates that the output is being controlled automatically.)

NOTE: When programming the unit for the first time, go to the "Mode" menu to select how that output will operate. Making this assignment first will bring up the correct menus for the Mode you are using.

Ctrl 1 A	**OFF**	Indicates that the output is currently OFF.
Ctrl 1 A	**10:00**	Indicates the length of time that the output has been ON. In MIN:SEC until 99:59, then becomes HR:MIN.
Ctrl 1 A	**Intrlck**	Indicates that control has been suspended because the Interlock switch is Open
Ctrl 1 A	**TIMEOUT**	Indicates that the output has been on longer than the Time Limit.

Mode	Press the **ENTER** key to change the mode in which the output will operate. The relays may be a low set point, a high set point, a low alarm, a high alarm, an out-of-range alarm, an in-range output, a probe wash or a high or low set point time proportional output. Use the arrow keys to scroll through the choices.
	Low Set Point Press **ENTER** when this is displayed to select a low set point. The relay will close when the process value goes below the set point value. The summary screen will display that the output is on. A time limit menu will be available, to prevent runaway control. An Interlock menu will be available to allow you to stop control.
	High Set Point Press **ENTER** when this is displayed to select a high set point. The relay will close when the process value goes above the set point value. The summary screen will display that the output is on. A time limit menu will be available, to prevent runaway control. An Interlock menu will be available to allow you to stop control.
	Low Alarm Press **ENTER** when this is displayed to select a low alarm. The relay will close when the process value goes below the set point value. The summary screen will display "Low Alarm". A time limit menu will be available, to prevent runaway control. An Interlock menu will be available to allow you to stop control.
	High Alarm Press **ENTER** when this is displayed to select a high alarm. The relay will close when the process value goes above the set point value. The summary screen will display "High Alarm". A time limit menu will be available, to prevent runaway control. An Interlock menu will be available to allow you to stop control.
	Out Range Alarm Press **ENTER** when this is displayed to select an out-of-range alarm. The relay will close when the process value is either above or below the two set point values. The summary screen will display "Range Alarm". A time limit menu will be available, to prevent runaway control. An Interlock menu will be available to allow you to stop control.
	In Range Output Press ENTER when this is displayed to select an in-range output. The relay will close when the process value is between the two set point values. The summary screen will display "In Range Output". A time limit menu will be available, to prevent runaway control. An Interlock menu will be available to allow you to stop control.
	Probe Wash Press ENTER when this is displayed if you want to use the relay to interrupt control and activate a pump or valve to wash down the electrode. The summary screen will display "Probe Wash". A time limit menu will be available, to prevent runaway control. An Interlock menu will be available to allow you to stop control.

Mode (Continued)	**Time Prop Hi** Press ENTER when this is displayed to use time proportional control with a high set point. In Time Proportional Mode, the farther away from the set point the system is, the longer the ON time. Refer to the drawings below for an illustration of Time Proportional Mode. A time limit menu will be available, to prevent runaway control. An Interlock menu will be available to allow you to stop control.
	Time Prop Lo Press ENTER when this is displayed to use time proportional control with a low set point. In Time Proportional Mode, the farther away from the set point the system is, the longer the ON time. Refer to the drawings below for an illustration of Time Proportional Mode. A time limit menu will be available, to prevent runaway control. An Interlock menu will be available to allow you to stop control.
Assign Input	Press **ENTER** to change the sensor signal which will be used to control the output. Use the arrow keys to toggle between "Sensor A" and "Sensor B". Press **ENTER** to accept the change.
Low Set Point	Only appears if the Mode is Low Set Point or Time Prop Lo Press **ENTER** if you want the Control relay to close if the process goes below a certain value. The status screen message will be Output ON. This denotes a normal correction of the process value. If you want the status message to be Low Alarm, indicating a problem, choose an Output Mode of Low Alarm as described below.
High Set Point	Only appears if the Mode is High Set Point or Time Prop Hi Press **ENTER** if you want the Control relay to close if the process above a certain value. The status screen message will be Output ON. This denotes a normal correction of the process value. If you want the status message to be High Alarm, indicating a problem, choose an Output Mode of High Alarm as described below.
Low Alarm	Only appears if the Mode is Low Alarm, In Range or Out of Range Press **ENTER** if you want the Control relay to close if the process goes below a certain value. The status screen message will be Output ON. This denotes a normal correction of the process value. If you want the status message to be Low Alarm, indicating a problem, choose an Output Mode of Low Alarm as described below.
High Alarm	Only appears if the Mode is High Alarm, In Range or Out of Range Press **ENTER** if you want the Control relay to close if the process above a certain value. The status screen message will be Output ON. This denotes a normal correction of the process value. If you want the status message to be High Alarm, indicating a problem, choose an Output Mode of High Alarm as described below.
Dead Band	Use the arrow keys to set the desired dead band, then press **ENTER.** If the set point is pH 7.00, and the dead band is 0.05 pH units, then the relay will close at pH 7.00 and open 0.05 pH units away from 7.00.  **ZERO DEADBAND: NOT RECOMMENDED** 

Proportional Band

This menu only appears if Time Proportional control mode is selected.

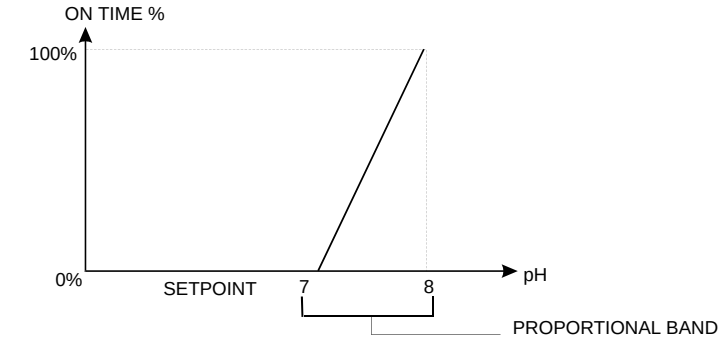
The proportional band menu sets the deviation from set point at which the control output will be on for the entire sampling period.

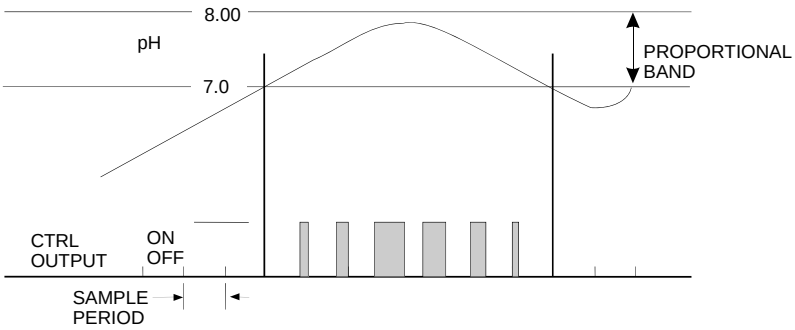
The volume added at the worst case deviation can be calculated by multiplying the pump flow rate by the sample period time (for example, 1 gal per minute flow rate x 2 min sample period = 2 gal of chemical added). Then calculate the effect on the concentration of this addition (for example, if a 2 gal addition will raise the pH by 0.5 then the proportional band should be set to 0.5).

If the proportional band is set too low, then the controller could overshoot the set point. If it is set too high, then the controller may never be able to reach the set point.

Figures below show an example of Time Proportional Mode with the following program parameters:

Control Mode	Time Prop Hi
Sample Period	10 minutes
High Set Point	7.00 pH
Proportional Band	1.00 pH





In the example figures, the set point is 7.00 and the Proportional Band is 1.00. Note that when the pH goes above the set point, the control relay is ON for a short period of time. As the pH increases, the control relay is ON for a longer period of time. When the acid starts to affect the bath concentration and the pH is reduced, the control relay is ON for a shorter period of time. When the pH drops below the set point of 7.00, the control relay is OFF all the time.

Sample Period

This menu only appears if Time Proportional control mode is selected.

It allows setting the sampling period from 0 to 30:00 minutes. This is the time that will elapse between checking the sensor input reading for deviation from set point. The Proportional Band setting and how far the current reading is from the set point will determine the amount of time that the relay remains on.

The sample period should be set to approximately 1½ times the amount of time that it takes for the sensor to react to an addition of chemical. This can be determined by making a manual addition of chemical using the HOA menu and timing how long it takes for the controller to react.

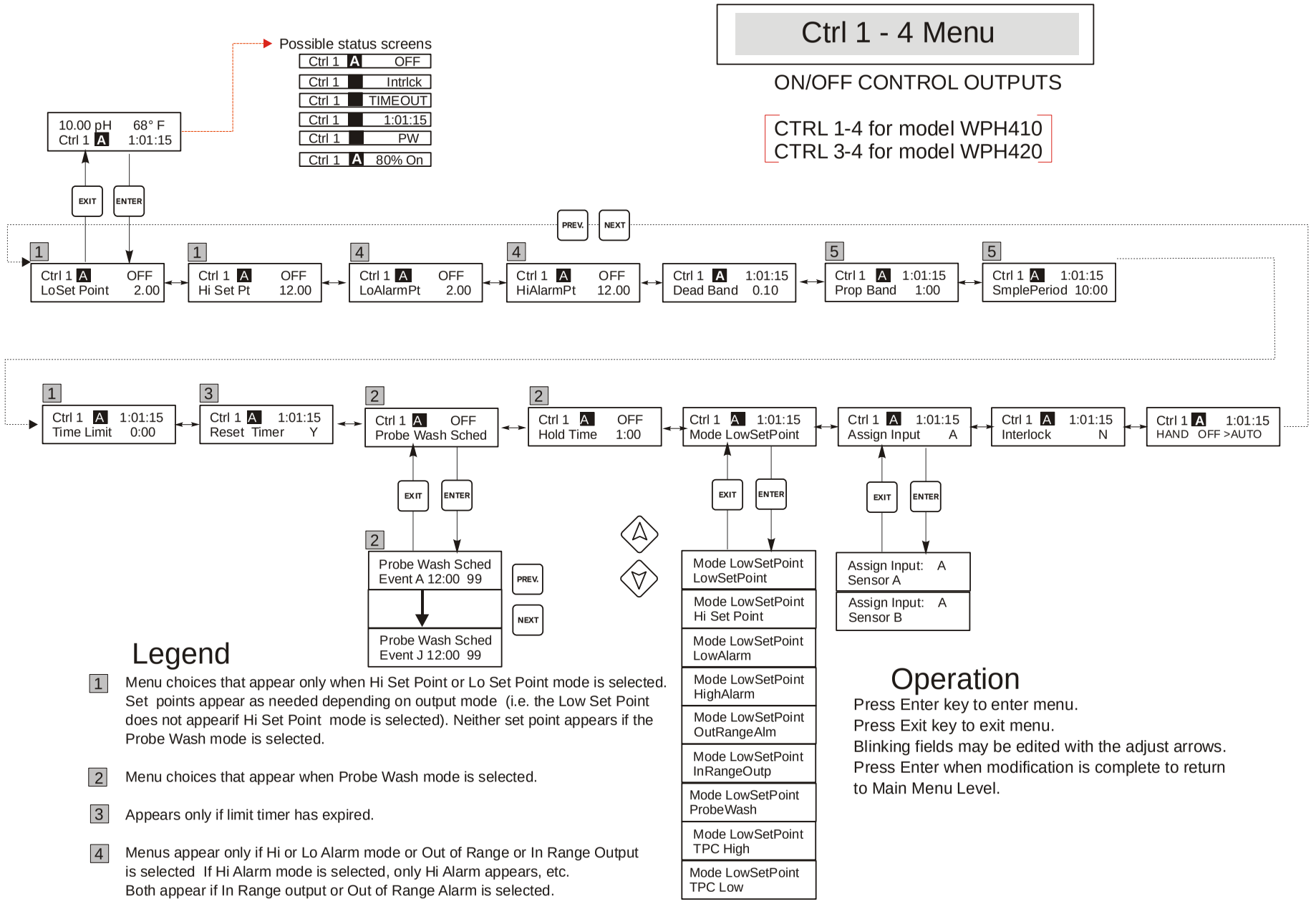
Setting the sample period too low will result in a second addition being made before the first is detected and you will overshoot the set point. Setting too high will delay the next addition to the point that the set point may never be reached.

Time Limit

This menu only appears if the output mode has been selected as a Low Set Point, or a High Set Point.

Use the arrow keys to set the time limit (min:sec) for the output to be active, then press **ENTER**. If it is set for "0:00", no limit will be imposed, and the output could stay on forever.

Reset Timer	This menu only appears if the output mode has been selected as a Low Set Point, or a High Set Point and the time limit has expired. Determine the reason that the output stayed on too long, and once the problem has been solved, press **ENTER** to reset the timer.
Probe Wash Sched	This menu only appears if the output mode has been selected as a Probe Wash. Press **ENTER** to program the probe wash schedule. The display will be "Event A 00:00 00". The first numbers are the time of day, in military time, when the probe wash will take place. The last two numbers are the time, in seconds, that the relay will be closed and the pump or valve attached to the relay will clean the probe. Use the arrow keys to change the time of day and the duration of the cleaning. When both values are set, press **ENTER**. If the electrode needs to be washed more than once a day, additional events may be accessed by pressing the NEXT key. Once all events are programmed, press **EXIT** to return to the top level menus.
Hold Time	This menu only appears if the output mode has been selected as a Probe Wash. Use the arrow keys to select the time delay in seconds between the probe wash ending and control beginning again. The hold time can be a maximum of 99 seconds. During the hold time, the summary display will indicate "Probe Wash Hold".
Interlock	Use the Up and Down arrows to toggle between Y(Yes) and N(No). Choosing Y means that the output will deactivate if the device attached to the controller is open. For example, if the electrode is installed in a recirculating pipe line, a flow switch that is closed if flow is sufficient and open if flow is insufficient may be installed in the line, so that if flow past the electrode stops, the controller will not pump in chemicals based on a stagnant sample. Similarly, a level switch may be attached to prevent control of an empty batch tank.
HOA	Use the Left and Right arrows to move between Hand, Off and Auto. In Hand (Manual) mode, the output will be turned on immediately for a maximum of 10 minutes. In the Off mode, the output will be turned off indefinitely. In the Auto mode, the output turns on and off in response to changes in the process value relative to the set point. The letter inside the block on the status screen indicates which mode the output is in.



Legend

1 Menu choices that appear only when Hi Set Point or Lo Set Point mode is selected. Set points appear as needed depending on output mode (i.e. the Low Set Point does not appearif Hi Set Point mode is selected). Neither set point appears if the Probe Wash mode is selected.

2 Menu choices that appear when Probe Wash mode is selected.

3 Appears only if limit timer has expired.

4 Menus appear only if Hi or Lo Alarm mode or Out of Range or In Range Output is selected If Hi Alarm mode is selected, only Hi Alarm appears, etc. Both appear if In Range output or Out of Range Alarm is selected.

5 Menus appear only when Time Proportional Mode is selected.

Operation

Press Enter key to enter menu.
Press Exit key to exit menu.
Blinking fields may be edited with the adjust arrows.
Press Enter when modification is complete to return to Main Menu Level.

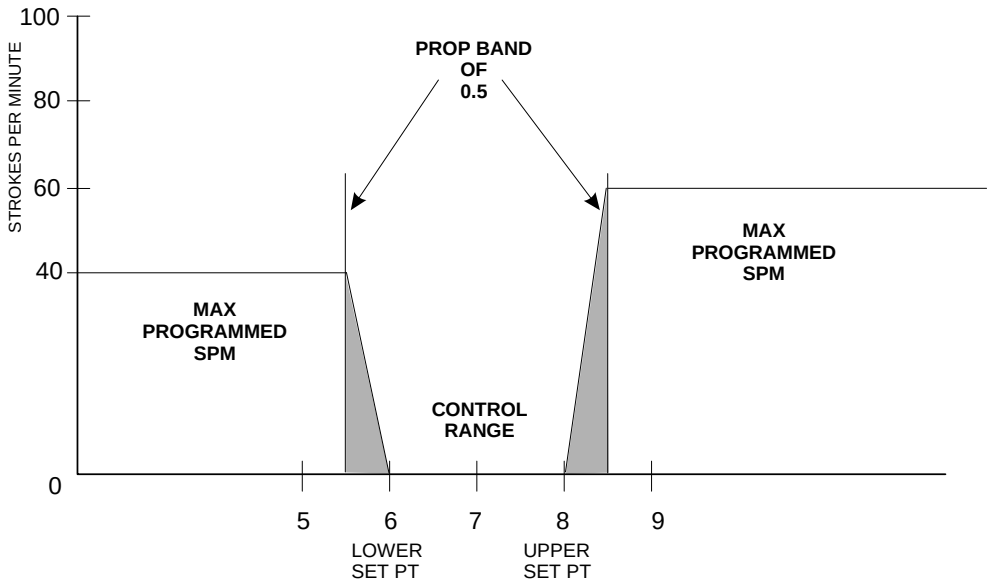
Figure 10 Control 1 - 4 (On/Off) Menu

5.5 Control 1 - 4 Menu (FOR PROPORTIONAL CONTROLLERS)

The description of the menus for pulse outputs will apply to Control 1 2, 3, and 4 for WDP440 models, and to control 1 and 2 for WPH420 and WDP420 models.

The Control menus are separate from each other but operate in exactly the same way. Each menu provides the following independent settings: Set Point, Prop Band, Control Direction, Min SPM Rate, Max SPM Rate, Time Limit, Interlock and HOA. The top level menu status line may display the following messages: Off, Intrlck, Timeout or SPM. "Off" indicates that the output is off.

Ctrl 1 A	**Intrlck**	Indicates that the output would be on but is not because of a signal from a flow switch or level switch is stopping control.
Ctrl 1 A	**Timeout**	Indicates that the output has been on for longer than the maximum time programmed by the user.
Ctrl 1 A	**SPM**	Shows the stroke rate of the pump

Hi/LoSet Point	Use the arrow keys to adjust the display to read the desired set point value. Press **ENTER** to accept the change.
Prop Band	Use the arrow keys to adjust how far away from the set point the process value must get before the pump is stroking at the maximum rate. For example, if the lower set point is 6.00 pH, and the proportional band is 0.5, then the pump will stroke at its maximum rate when the pH is 0.5 units away from the set point (at pH 5.5).
	The following graph shows the effect of the various settings:  If the controller overshoots the set point, make the prop band larger. If the controller can't keep up with the additions, make the prop band value smaller, or increase the Max SPM rate value, or source a pump with a higher flow output.
Control Dir	Press **ENTER** to change the direction of control, then use the Up and Down arrows to toggle between High Set Point and Low Set Point, and press **ENTER** to make your choice. A high set point will turn on the relay when the process value goes over the set point value (to add an acid, or reducing agent, or as a high alarm). A low set point will turn on the relay when the process value goes below the set point value (to add an alkali, or oxidizer, or as a low alarm). The further away from the set point the process value gets, the faster the pump will stroke.
Min SPM Rate	Use the arrow keys to set the minimum stroke rate of the pump. If you want to stop when the set point has been reached, enter 0. If you need the pump to run at a certain rate regardless of the set point, enter that stroke rate. This may be useful in once-through control schemes.
Max SPM Rate	Use the arrow keys to enter the maximum stroke rate of the pump. This may be the maximum that the pump is capable of, or it may be less if the pump is oversized for your application, but it can NOT be higher than the pump is capable of, or the pump will not stroke at all.

Reset Timer	This menu only appears if the output mode has been selected as a Low Set Point, or a High Set Point and the time limit has expired. Determine the reason that the output stayed on too long, and once the problem has been solved, press **ENTER** to reset the timer.
Assign Input	Press **ENTER** to change the sensor signal which will be used to control the output. Use the arrow keys to toggle between “Sensor A” and “Sensor B”. Press **ENTER** to accept the change.
Time Limit	Use the arrow keys to set the time limit (min:sec) for the output to be active, then press **ENTER**. If it is set for "0:00", no limit will be imposed, and the output could stay on forever.
Interlock	Use the Up and Down arrows to toggle between Y(Yes) and N(No). Choosing Y means that the output will deactivate if the device attached to the controller is open. For example, if the electrode is installed in a recirculating pipe line, a flow switch that is closed if flow is sufficient and open if flow is insufficient may be installed in the line, so that if flow past the electrode stops, the controller will not pump in chemicals based on a stagnant sample. Similarly, a level switch may be attached to prevent control of an empty batch tank.
HOA	Use the Left and Right arrows to move between Hand, Off and Auto. In Hand (Manual) mode, the output will be turned on immediately at the maximum programmed rate for a maximum of 10 minutes. In the Off mode, the output will be turned off indefinitely. In the Auto mode, the output turns on and off in response to changes in the process value relative to the set point. The letter inside the block on the status screen indicates which mode the output is in.

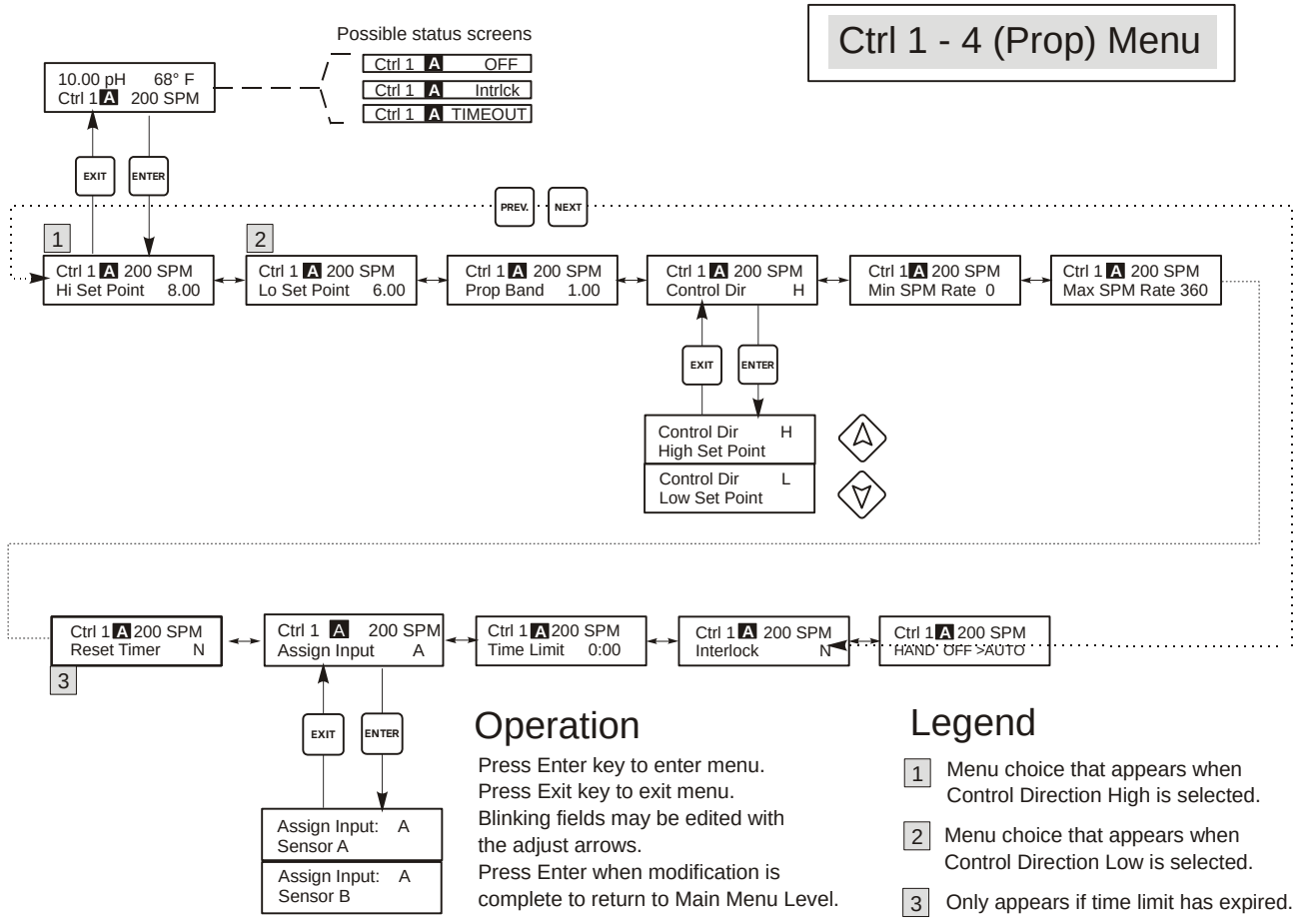


Figure 11 Control 1 - 4 (Proportional) Menu

5.6 Interlock A Menu

This menu only appears in WDP models.
The Interlock A menu is used to assign an interlock device to the appropriate sensor. An interlock device is an external monitoring sensor like a flow or level switch that serves to deactivate control outputs when activated. For example, this could be used to prevent the controller from pumping chemicals based on a stagnant sample.

The WDP controller can support up to two interlock devices. Refer to Figure 3c and d for a wiring illustration. A typical setup would use one flow switch for sensor A and one for sensor B and they would function independently. This is the default setting and describes operation when **Sensor A Only** is selected in this menu.

However, in some applications it is desirable to have one interlock device assigned to both sensor A and B. For example, if you have both sensors mounted in the same sample stream, then a flow switch input could be used to disable control for both sensors. This describes the operation when **Sensor A and B** is selected in this menu. ***Note**: If this type of operation is desirable, the single interlock device must be connected to the Sensor A input as illustrated in Figures 3c and d.*

To make a selection, press **ENTER** at the Interlock A menu. Use the UP or Down keys to toggle between **Sensor A Only** and **Sensor A + B**. Press **ENTER** again when the desired choice is displayed to change the selection. Press **EXIT** to return to the higher level menu.

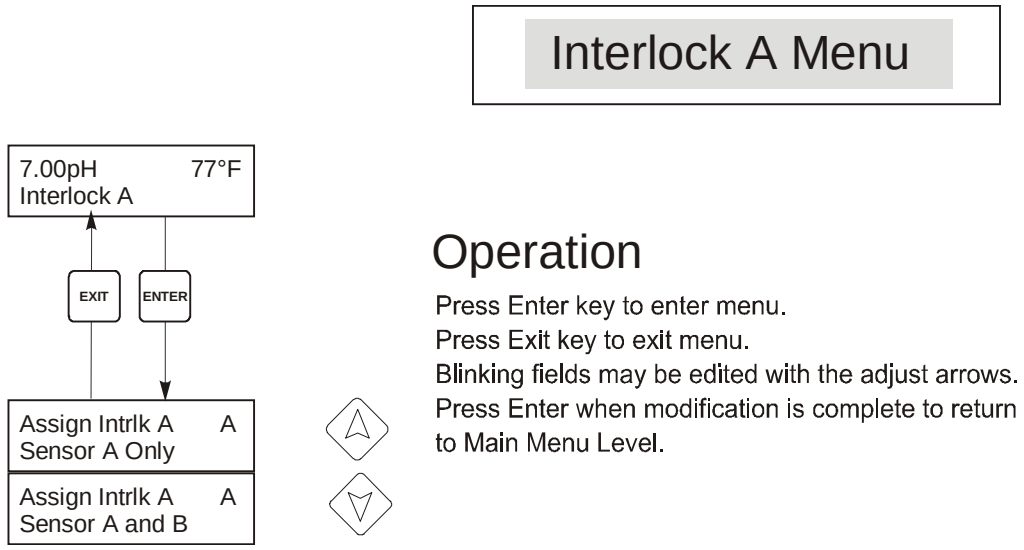


Figure 12 Interlock A Menu

5.7 4-20 mA 1 and 2 Menus (Optional)

These menus will only appear if the optional 4-20 mA output board(s) is installed. They are used to set the scale of the 4-20 mA output. It contains the following menu selections: Assign Inputs, 4 mA Point, 20 mA Point, and Calibrate.

Note: When programming the controller for the first time, first go to the Assign Inputs Menu, then program the other menus.

Assign Inputs	Press **ENTER** to assign the 4-20 mA output to a sensor input. Use the arrow keys to toggle between "pH/ORP" and "Temp." Press **ENTER** when the desired choice is displayed.
4 mA Pt	Use the arrow keys to enter the process value (in either pH units, or mV if ORP) that you want to correspond to a 4 mA output from the controller.
20 mA Pt	Use the arrow keys to enter the process value that you want to correspond to a 20 mA output from the controller.
Calibrate	This menu is used to calibrate instruments connected to the mA output. The 4-20 mA output is extremely accurate and stable and therefore will never need calibration. This feature allows other devices to be calibrated at the 4 and 20 mA points. Press **ENTER** to start the calibration.
Fixed 4 mA Out	The controller will output 4.00 mA. Adjust the chart recorder or data logger per its instruction so that the process value displayed is what is expected for a 4.00 mA input.
Fixed 20 mA Out	As above, except that the controller will output 20.00 mA. The design of the 4-20 mA output is such that it should never need calibration. If the mA signal is not what it should be, call the factory for service.

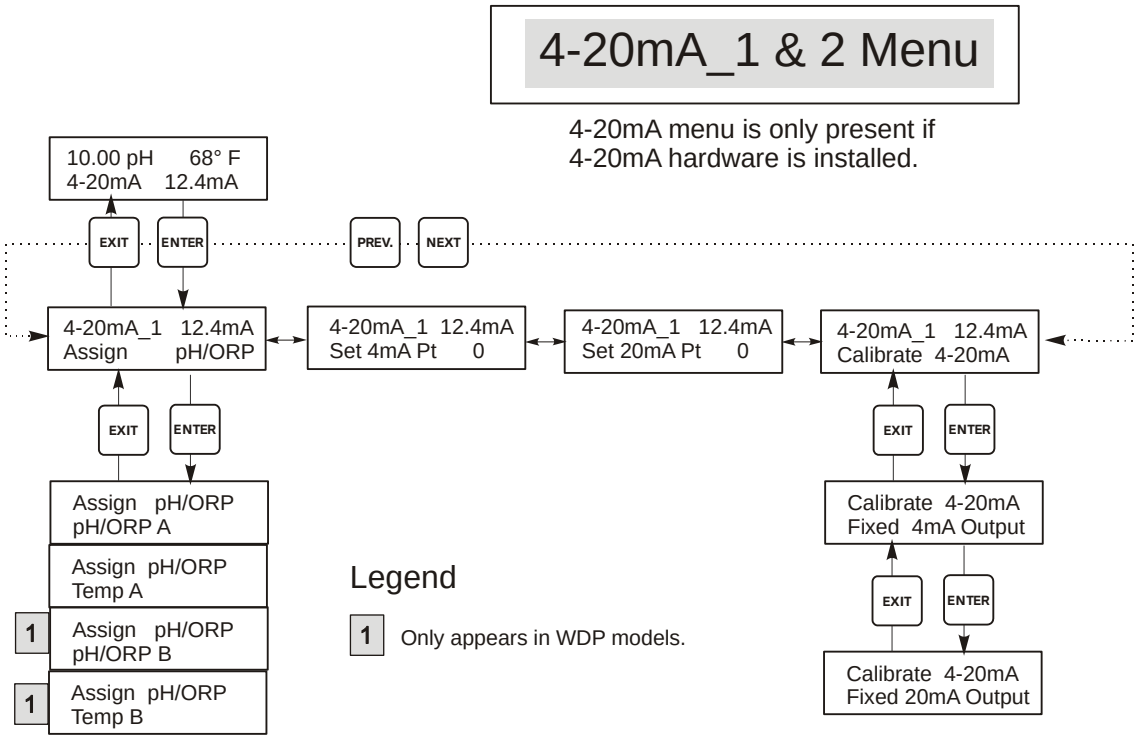


Figure 13 4-20 mA 1 and 2 Menus

5.8 Time Menu

The time menu is used to set the date and time that the controller uses to schedule probe washing and calibration prompts. There is only one menu selection: Set Clock.

Set Clock	Press **ENTER** to set the clock. Use the arrow keys to change the year, date, and month, then press **ENTER**. Use the arrow keys again to set the day of the week and the time. Use military time (for example, 1:00 PM is 13:00). Press **ENTER** to return to the top level clock menu.

Figure 14 Time Menu

5.9 Access Code Menu

This menu determines whether the access code feature of the controller is enabled or disabled and allows you to customize the access code to your own value. The access code controls whether or not you are allowed to change the parameters in the controller. With the access code disabled, any user may change any parameter. With the access code enabled, any user can view any parameter, but cannot change them. Once an attempt is made to change a parameter, the display will prompt the user to enter the access code. If the correct access code is entered, the parameters can be changed. If the wrong access code is entered the parameters cannot be changed. Once the access code has been correctly entered, it will remain valid until there is a period of 10 minutes without a key being pressed.
The access code menu will appear as shown below:

Access Code	**DIS**	Indicates that the access code is disabled. No access code is required to change any setting.
Access Code	**REQ**	Indicates that the access code is required to alter settings.
Access Code	**OK**	Indicates that the access code is required and has been entered correctly.

Enable N / Y	Press the Up or Down arrow key to change the N to Y and press ENTER to enable the access code feature. If the access code is enabled you must first enter the access code to disable it.
New Value	Press ENTER to display the current access code value and use the arrow keys to change it to any value between 0 and 9999. If the access code has been enabled, you will be prompted to enter the current access code before being allowed to change it. You must remember the access code if you enable it. The Factory default Access code is 1995. If you change the access code and can't remember it follow this procedure: 1. Turn off power to the controller. 2. Wait 10 seconds. 3. Press and Hold the UP and DOWN arrow keys while turning on the power. 4. Read the access code on the display. 5. Release the keys, and the access code will disappear.

Access Code Menu

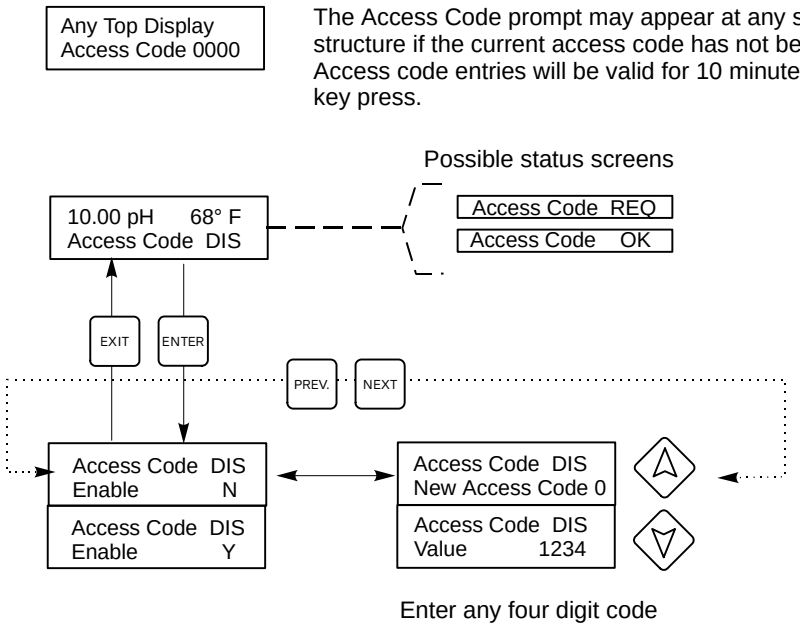


Figure 15 Access Code Menu

5.10 Datalog Menu

This menu is available if the data logging option has been purchased. This is indicated in the model code by the letter U at the end of the model code. This menu allows you to save data from the controller to a USB flash drive.

The controller has four logs, the Current Datalog, the Backup Datalog, the Event Log, and the Reset Log. All files are in a CSV format that may be opened in a spreadsheet such as Microsoft Excel.

Current Datalog	Contains the following data taken at 10 minute intervals: pH or ORP Temperature (only for pH sensor types) When the current datalog is downloaded to a USB stick, it is erased and a new log file is started. If the current datalog is not downloaded before it reaches its maximum size (at least 60 days of data) the oldest data is overwritten by the newest data.
Backup Datalog	Contains the same data as the current log but it is never erased. When the backup log reaches its maximum size (at least 60 days of data), the oldest data is overwritten by the newest data.
Event Log	Contains columns for each relay and flow switch input, as well as the date and time. Each time any of these change state, the date and time is updated and it will show a 1 if the relay is on and 0 if it is off, and a 1 if the flow switch indicates no flow, 0 if there is flow. Tens of thousands of events will be recorded before the oldest data is overwritten by the newest, the number varying with the controller's configuration.
Reset Log	Consists of time stamps of when power was lost, when it was returned, and the cause of the reset.

Current or Backup Datalog	Place a USB flash drive with at least 10 MB capacity into the USB port on the front panel of the controller. Press the Enter key to download the file from the controller to the disk. The file name for the Current Datalog will be Datalog<serial number><date><time>.csv using the date and time it was downloaded. The file name for the Backup Datalog will be Datalog<serial number><date><time> .csv using the date and time it was created. The controller will display the progress of the file download process. If the file was successfully copied to the USB disk the controller will display Transfer Success.	
Copy Event Log	Place a USB flash drive with at least 10 MB capacity into the USB port on the front panel of the controller. Press the Enter key to download the file from the controller to the stick. The file name will be Eventlog<serial number><date><time>.csv. The controller will display the progress of the file download process. If the file was successfully copied to the USB disk the controller will display Transfer Success, otherwise Transfer Fail 1.	
	Transfer Success	Transfer Fail 1
Copy Reset Log	Place a USB flash drive with at least 10 MB capacity into the USB port on the front panel of the controller. Press the Enter key to download the file from the controller to the stick. The file name will be Resetlog<serial number><date><time>.csv. The controller will display the progress of the file download process. If the file was successfully copied to the USB disk the controller will display Transfer Success.	
	Transfer Success	Transfer Fail 1

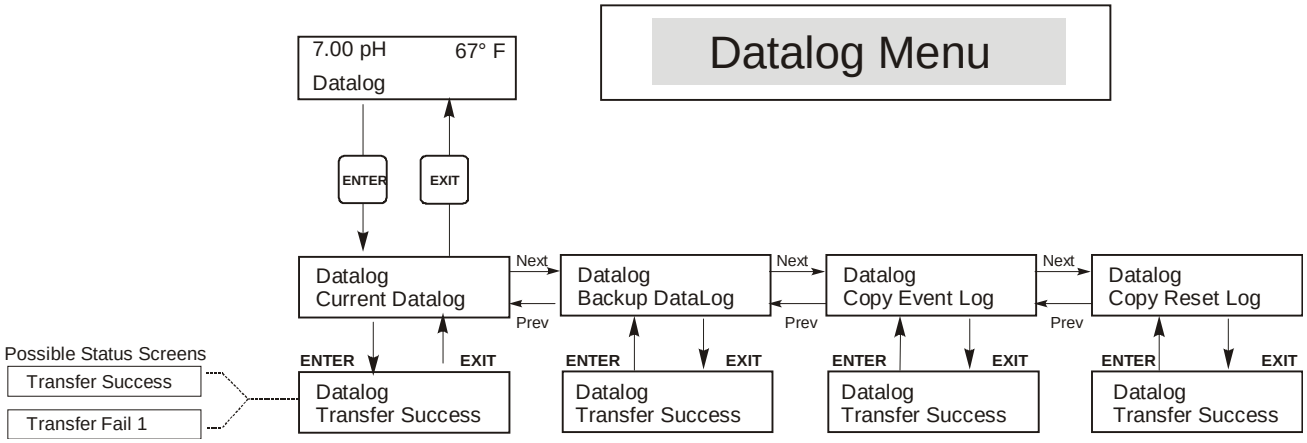


Figure 16 Datalog Menu

5.11 Config Menu

This menu allows you to export a file that contains all of the set points in the controller to a USB flash disk drive, and then later import the set points into another controller.

<table>
<tr><td>Export Config</td><td colspan="2">Place a USB flash drive with at least 10 MB capacity into the USB port on the front panel of the controller. Press the Enter key to export the configuration file from the controller to the stick. The file name will be UCF.ini. If you are exporting files with different set points you may rename the file to something that describes it, as long as it has an ini extension.
The controller will display the progress of the file download process. If the file was successfully exported to the USB disk the controller will display Transfer Success, otherwise Transfer Fail 1.</td></tr>
<tr><td></td><td>Transfer Success</td><td>Transfer Fail 1</td></tr>
<tr><td>Import Config</td><td colspan="2">Place a USB flash drive that contains only one configuration file stored on the root directory of the stick into the USB port on the front panel of the controller. Press the Enter key to import the configuration file from the stick to the controller. The file name must have an ini extension in its name.
The controller will display the progress of the file import process. If the file was successfully imported from the USB disk the controller will display one of the messages below:</td></tr>
<tr><td></td><td>Import Failure</td><td>Indicates that there were problems connecting to or accessing the USB stick.</td></tr>
<tr><td></td><td>Import Success:
Any key to reboot</td><td>The configuration file import succeeded and will be ready for use after reboot.</td></tr>
<tr><td></td><td>File Open Failed</td><td>A config file could not be found on the USB stick or the USB stick file system could not be accessed.</td></tr>
<tr><td></td><td>File Read Failed</td><td>The config file is too short (incomplete) or empty.</td></tr>
<tr><td></td><td>Invalid CFG File</td><td>The imported file is not a valid config file.</td></tr>
<tr><td></td><td>Invalid Model</td><td>The imported config file is not for this controller model.</td></tr>
<tr><td></td><td>Wrong SW Version</td><td>The version of the imported config file is not compatible with this controller software version.</td></tr>
<tr><td></td><td>Corrupt CFG File</td><td>The imported config file is corrupt. (The checksum failed.)</td></tr>
<tr><td></td><td>Wrong file Size</td><td>The size of the imported config file is wrong.</td></tr>
</table>

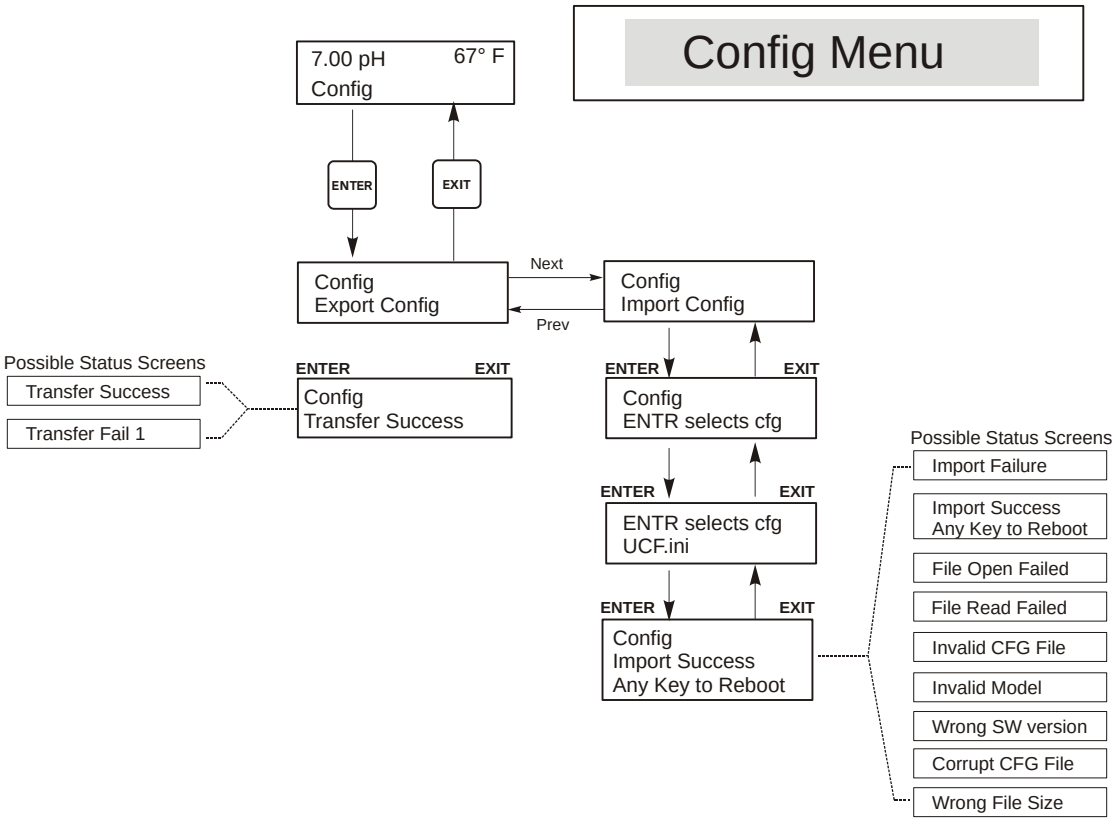


Figure 17 Config Menu

5.12 Upgrade Menu

This menu is used to upgrade the software to a newer version. If a new version of the software is available, an upgrade file will be posted on our web site. Save this file to a USB flash disk drive. It needs to be the only upgrade file stored on the root directory of the stick. Press the Enter key to import the software upgrade file from the stick to the controller.

The controller will display the progress of the file import process. If the file was successfully imported from the USB disk the controller will display Transfer Success. The controller will automatically reboot and come up with the new software installed.

Upgrade	The controller will display the progress of the file import process. If the file was successfully imported from the USB disk the controller will display Transfer Success. The controller will automatically reboot and come up with the new software installed. If the software upgrade fails, you will see one of the following messages:	
	UpgradFileInvald	The file found on the USB stick is for the wrong product, or is corrupt. Try getting the correct upgrade file and make sure it's the only upgrade file on the stick.
	No Upgrade File	There is no upgrade file stored on the stick, or the file is named incorrectly.
	CorrptUpgradFile	Try getting a new copy of the file.
	Flash Failure	The flash memory on the processor board has a problem. Repair or replace the front panel assembly.

To check that it was successful, turn off power to the controller, then press the Enter key while turning power on. The controller will show the software version, which should match the name of the upgrade file that you used.

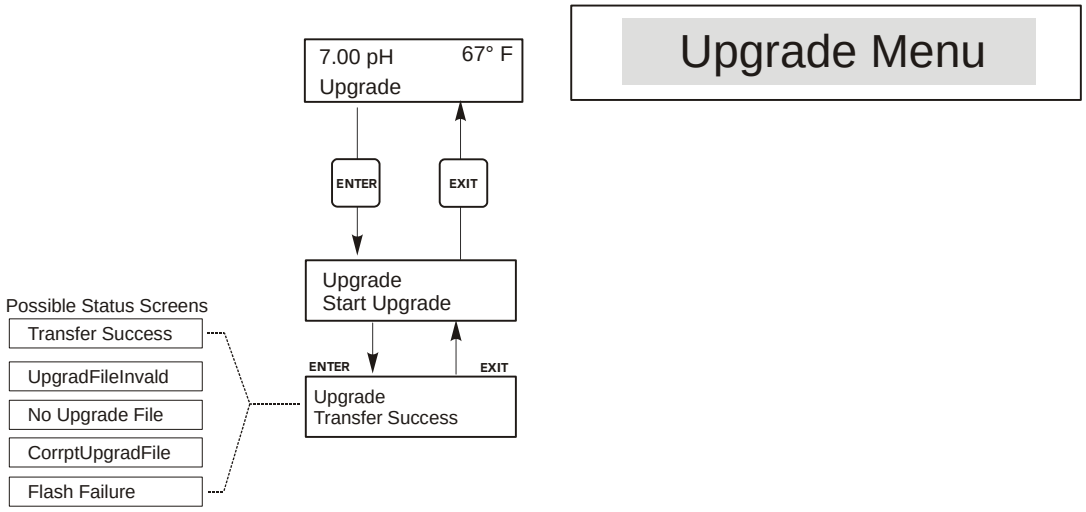


Figure 18 Upgrade Menu

6.0 MAINTENANCE

The WPH/WDP control module itself needs very little maintenance. Clean the outside of the controller enclosure with a damp cloth. Do not spray down the controller unless the enclosure door is closed and latched. "Pigtails" should be protected from spray or wash-down. Check the cords and cables for damage.

6.1 Electrode Maintenance

The pH or ORP electrodes require periodic cleaning and calibration. These electrodes are like batteries and their voltage outputs will change with time even if they are not being used. After installation, the rate of change increases, and factors such as temperature, extremes of pH, abrasion and chemical attack will increase the required frequency of calibration. If the process solution contains oils, scale or other solids, the electrode surfaces will tend to coat, its response time will slow down and cleaning will be required.

The frequency of cleaning and calibrating will vary greatly depending upon the application, the factors listed above, as well as the accuracy of control you require. The best way to determine the optimum number of days between calibrations is to remove the electrode from the process periodically (weekly in clean water applications, daily in dirty or hot applications) and check its accuracy in a buffer solution. If using manual temperature compensation, remember to change the temperature from that of the process to that of the buffer. If the accuracy of the reading is within your required tolerances, and the speed of response is good, replace the electrode in the process. If not, clean the electrode and perform a two point calibration.

The method of cleaning the electrode will depend upon the coating, as well as the materials of construction of the electrode. Do not use a solvent that will attack the electrode! Care must be taken to avoid scratching the pH electrode's glass, as this will shorten its life. An ORP electrode's platinum surface may be cleaned with 600 grit silicon carbide paper, jewelers rouge or very fine steel wool.

Oily coatings should be removed with a mild detergent or isopropyl alcohol. Hard scales such as calcium carbonate can usually be removed with a dilute hydrochloric acid solution. Soft coatings can be removed using a soft cloth or soft toothbrush.

A two point calibration should always be performed after cleaning the electrode.

Because the electrode signal is so sensitive, the condition of the cable and connectors between the electrode, preamplifier and controller is critical. Make sure that all electrical connections stay clean and dry. Never splice the cable prior to preamplification. Replace the cable if there is any sign of damage.

6.2 Replacing the Fuses

CAUTION: Disconnect power to the controller before opening front panel!

Locate the fuses on the circuit board at the back of the controller enclosure. (See figure 4.) Gently remove the old fuse from its retaining clip and discard. Press the new fuse into the clip, secure the front panel of the controller and return power to the unit.

Warning: Use of non-approved fuses can affect product safety approvals. Fuse ratings depend on controller power rating. Specifications are shown below. To insure product safety certifications are maintained, it is recommended that a Walchem fuse be used.

F1 Fuse	Walchem P/N	F2 Fuse (WPH410 & WDP410 only)	Walchem P/N
5 x 20 mm, 1.0A, 250V	103163	5 x 20 mm, 6A, 250V	102834

7.0 TROUBLESHOOTING

CAUTION: Disconnect power to the controller before opening front panel!

Troubleshooting and repair of a malfunctioning controller should only be attempted by qualified personnel using caution to ensure safety and limit unnecessary further damage. Contact the factory.

7.1 Error Messages

Output Timeout

This error message appears if one of the control outputs has been on longer than the maximum amount of time programmed in the "Time Limit" menu found in the Control menus. It is reset by answering "Yes" to the "Reset Timer" prompt that will appear or by cycling power to the controller off and back on. There are a number of possible reasons that the output could go on for longer than normal:

Possible Cause	**Corrective Action**
The process went further out of control than normal.	Increase time limit or reset timer.
The chemical supply has run out.	Replenish the chemical supply.
The pump or valve or supply line is faulty.	Repair or replace the control device.
Wrong chemical is being controlled.	Replace with correct chemical.
The electrode is not responding to changes.	Replace electrode, cable or preamplifier. Evaluate mixing or recirculation.

High Alarm

This error message appears if the pH/ORP reading exceeds the set point for one of the Control outputs that has been configured as a high alarm output. There are a number of possible causes for this condition:

Possible Cause	Corrective Action
The process went further out of control than normal.	May have to increase chemical flow rate.
The chemical supply has run out.	Replenish the chemical supply.
The pump or valve or supply line is faulty.	Repair or replace the control device.
Wrong chemical is being controlled.	Replace with correct chemical.
The electrode is not responding to changes.	Replace electrode, cable or preamplifier. Evaluate mixing or recirculation.
The pump is siphoning, valve leaking.	Repair or replace the control device or re-route tubing.
Control output has been left in "HAND" mode.	Switch back to "AUTO".
It may be a normal part of the process.	None required.

Probe Error

This error message appears if the pH/ORP input signal is outside of the normal range. This usually indicates that the electrode has been disconnected or is faulty. It could appear under normal conditions if the pH is outside of the operating range of -2 to 16pH, or if the ORP is outside of the normal range of ±1500 mV.

Possible Cause	Corrective Action
Controller is faulty; fails self test (see section 5.2)	Re-check pH self test with preamp disconnected. If it still fails, send controller back for repair. If it passes, preamp is faulty.
Preamplifier has no power to it.	If battery powered preamp, replace battery. If preamp is powered by our controller, check +5V, -5V terminals vs COM terminal. Should read +5VDC ±5% and -4.6 VDC ±-5%.
Preamplifier is faulty.	Indicated if ±5VDC power out of spec w/preamp attached, but in spec without preamp attached. Repair or replace preamp.
Electrode is faulty.	Replace electrode.

Interlock

This error message indicates that control has been stopped because the closed contact signal from a flow switch or level switch is now open and one or more control outputs have been programmed to interlock.

Possible Cause	Corrective Action
Flow has stopped, level too low.	May be a normal condition, otherwise restore flow or level.
Flow, level switch disconnected.	Reconnect.
Flow, level switch faulty.	Verify that switch closes using an ohmmeter. If not, repair or replace.
Controller faulty.	Verify that error message disappears if controller flow switch input is shorted. If not, repair controller.

Calibration Time

This message appears to prompt you to perform the routine maintenance of cleaning and calibrating the electrode. It does not appear based upon any analysis of the condition of the electrode. The frequency of calibration is set by the user in the "Days Between Cal" menu found in the "Sensor" menu. If you do not want to be prompted to perform a calibration, set this menu to "0".

Low Alarm

As above for "High Alarm", except that the pH/ORP reading is below the set point of one of the Control outputs that has been set up as a low alarm output. Refer to the possible causes and corrective actions listed above for the "High Alarm" error message.

Out Range Alarm

This error message appears if the pH/ORP reading is outside of the range selected for one of the Control outputs that has been programmed as an "Out of Range Alarm". Refer to the possible causes and corrective actions listed above for the "High Alarm" error message.

In Range Output

This error message appears if the pH/ORP reading is inside of the range selected for one of the Control outputs that has been programmed as an "In Range Alarm". Refer to the possible causes and corrective actions listed above for the "High Alarm" error message.

Temp Sensor Err

This error message appears if the signal from the automatic temperature compensation element disappears during operation. It is usually caused by a failure of the platinum RTD, or by a problem with the cabling or connections of the cable.

The Pt1000 RTD should read 1000 ohms at 0°C and 3.85 ohms/degree C above zero. At 25°C it should read 1096.25 ohms ±1%. A higher reading or open circuit (infinite resistance) may indicate a bad connection. A lower reading may indicate a shorted cable.

Measure the resistance at each connection between the sensor and the controller to determine if the sensor, cabling or connections are faulty.

Check Set Points

This is a normal display if you have changed the choice of sensor from pH to ORP or vice versa. The default set points for each choice is different, and will not match what you need for your application. Always select the sensor type before setting the control output set points.

8.0 SERVICE POLICY

The WPH/WDP Series pH/ORP Controller has a 2-year warranty on electronic components and a 1-year warranty on mechanical parts (keypad, terminal strip and relays).

We stock circuit boards for immediate exchange after we have isolated the cause of the problem.

Factory authorized repairs that are received by next-day-air will be returned within 24 hours. Normal priority for returns is two weeks.

Out of warranty repairs or circuit board exchanges are done on a flat fee basis after the warranty is expired.

Model Code

WPH4
WDP4 | Control | 0 | - | Voltage | Output | Options | USB |

CONTROL
1 = WPH: 2 powered on/off relays & 2 on/off dry contact relays & 1 dry contact dedicated alarm
WDP: 4 powered on/off relays & 1 powered dedicated alarm relay
2 = WPH & WDP: 2 pulse proportional relays & 2 on/off dry contact relays & 1 dry contact dedicated alarm
4 = WDP: 4 pulse proportional outputs & 1 dry contact dedicated alarm

VOLTAGE
1 = WPH/WDP410: 120 VAC, prewired, 6" pigtails to powered relays WPH/WDP420, WDP440: 20 ft. cables for E Class pumps
3 = WPH420: 120 VAC, prewired, 20 ft. cables with connectors for EW pumps
5 = Hardwired, cable glands

OUTPUT
N = No data output
4 = Single isolated 4-20 mA output
2 = Two 4-20 mA outputs

WPH OPTIONS
1 = Prewired preamp with 10 ft. cable (electrode not included. Electrode should have BNC connector)
2 = Submersion flat pH electrode w/integral preamp (WEL-PHF-21)
3 = In-line flat pH electrode w/integral preamp (WEL-PHF-22) includes 3/4" NPTF mounting tee
4 = In-line flat pH electrode w/integral preamp (WEL-PHF-22) includes 3/4" flow switch manifold & 'U' adapter mounted on polypro panel
4T=In-line flat pH electrode with ATC and integral preamp (WEL-PHF-12), 3/4" flow switch manifold & 'U' adapter mounted on polypro panel
5= Submersion ORP electrode w/integral preamp (WEL-MVF-21)
6 = In-line ORP electrode w/integral preamp (WEL-MVF-22), includes 3/4" NPTF mounting tee
6R= In-line rod style ORP electrode w/integral preamp (WEL-MVR-22), includes 3/4" NPTF mounting tee
7 = In-line ORP electrode w/integral preamp (WEL-MVF-22), 3/4" flow switch manifold and 'U' adapter mounted on polypro panel
7R= In-line rod style ORP electrode w / integral preamp (WEL-MVR-22), 3/4" flow switch manifold and 'U' adapter mounted on polypro panel

WDP OPTIONS
2 = 2 WEL submersion style flat pH electrodes (without auto temp comp)
5 = 2 WEL submersion style ORP electrode
6 = 1 WEL submersion style flat pH electrode (without auto temp comp) & 1 WEL submersion ORP electrode
7 = 1 WEL in-line style flat pH electrode (without auto temp comp, tee included) & 1 WEL in-line ORP electrode (tee included)
8 = Flow switch manifold with 2 WEL in-line electrodes; 1 pH (without auto temp comp) & 1 ORP mounted on 19" x 24" polypropylene panel
8T=Identical to option #8 above, with auto temp comp

USB FEATURES
U = Integrated datalogging, event/reset logging, and configuration file import/export

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