PULSAblue
Model 3212 & 3213

WATER TREATMENT SYSTEM CONDUCTIVITY and pH/ORP CONTROLLER

INSTALLATION & OPERATION MANUAL

SERIAL #: _____

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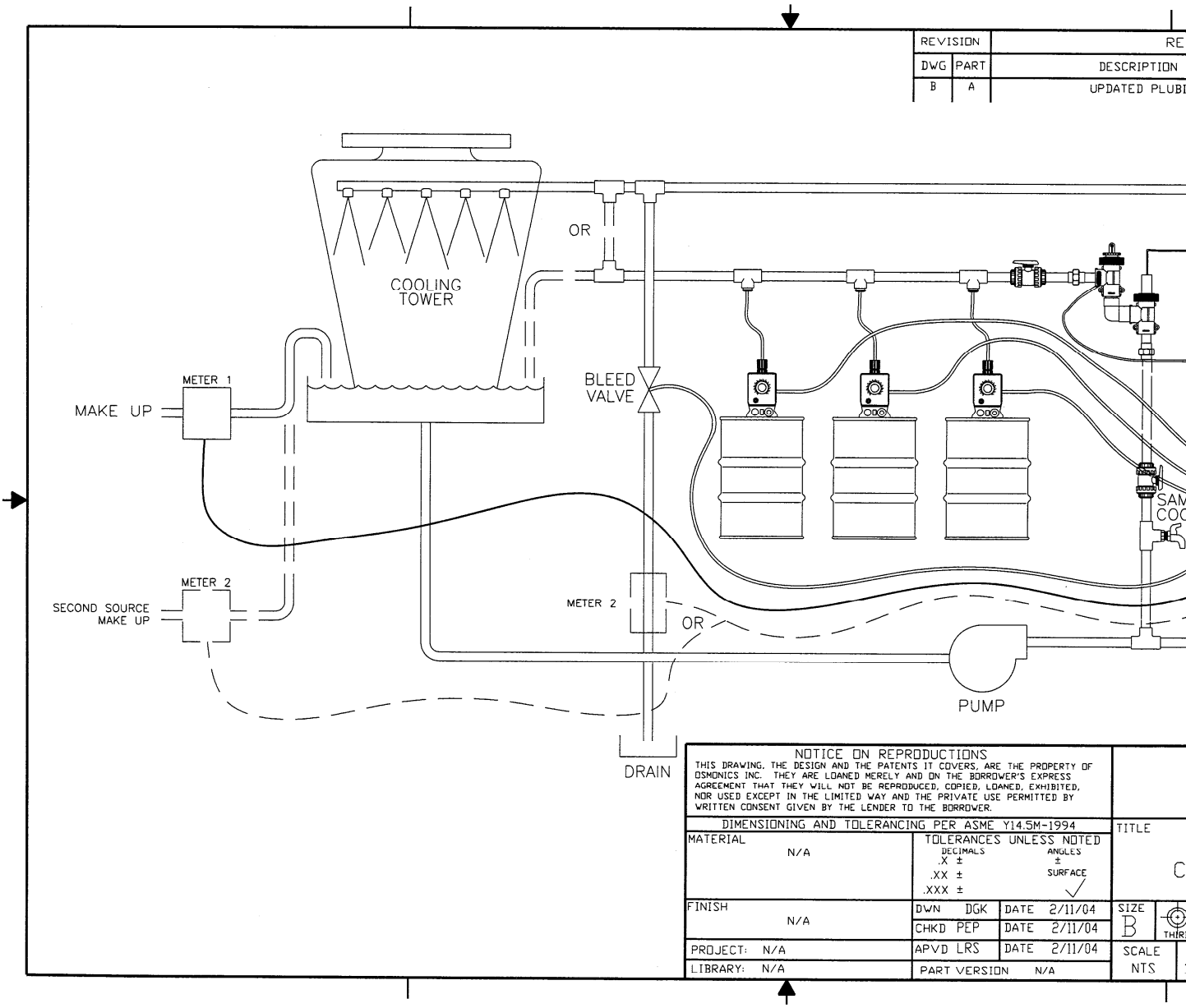
REVISION
RE
DWG
PART
DESCRIPTION
B
A
UPDATED PLUBI
COOLING TOWER
OR
METER 1
MAKE UP
BLEED VALVE
METER 2
SECOND SOURCE MAKE UP
METER 2
OR
PUMP
DRAIN
SAM
COC
NOTICE ON REPRODUCTIONS
THIS DRAWING, THE DESIGN AND THE PATENTS IT COVERS, ARE THE PROPERTY OF OSMONICS INC. THEY ARE LOANED MERELY AND ON THE BORROWER'S EXPRESS AGREEMENT THAT THEY WILL NOT BE REPRODUCED, COPIED, LOANED, EXHIBITED, NOR USED EXCEPT IN THE LIMITED WAY AND THE PRIVATE USE PERMITTED BY WRITTEN CONSENT GIVEN BY THE LENDER TO THE BORROWER.
DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
TITLE
MATERIAL
N/A
TOLERANCES UNLESS NOTED
DECIMALS
.X ±
.XX ±
.XXX ±
ANGLES
±
SURFACE
FINISH
N/A
DWN DGK
DATE 2/11/04
CHKD PEP
DATE 2/11/04
SIZE
B
PROJECT: N/A
APVD LRS
DATE 2/11/04
SCALE
NTS
LIBRARY: N/A
PART VERSION N/A

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1 Quick Installation Sheet

1. **ATTACH CONTROLLER TO WALL**: Attach the four (4) supplied mounting feet to the back of the controller enclosure either vertically or horizontally. Install the controller on a flat, non-vibrating surface. Do not mount the controller to a steel object that has a large temperature change (side of cooling tower, etc). This can cause water to condense inside the enclosure.

2. **PLUMB SENSORS, VALVES, AND CHEMICAL PUMPS**: Install water meters, chemical pumps, plumbing assemblies, the pH or ORP sensor, and the conductivity sensor (see drawing on back for cooling tower). Initiate flow, Check for leaks.

3. **CONNECT INPUT/OUTPUT WIRING**: Wire the flow switch **(use jumper wire for no flow switch)**, conductivity sensor, pH or ORP sensor, water meters, and 4-20 mA outputs/inputs, if applicable (see drawings in manual). **Ensure wiring connections are correct or damage may occur.** Configure the H1 jumpers for either pH or ORP and configure the H2 jumpers for your sensor.

4. **CONNECT POWER WIRING**: Plug in chemical pumps and bleed valve to controller. If doing a conduit installation, remove receptacles and power cord. Wire the incoming power, the pumps, and the bleed valve directly to the terminals. **Motorized valves must be hardwired**. Refer to the instruction manual for more details.

5. **INITIALIZE THE WHOLE CONTROLLER**: Apply power to the controller, press "**BACK**" twice, press "**7**" System setup, press "**2**" Initialization, press "**2**" Whole controller, press "**1**" Yes. After initialization, press any key to get to the process screen.

6. **TEST THE RELAY OUTPUTS**: From the Process screen, Press "**ENT**" to get to the manual relay control screen. Use the number keys (1-7) to manually operate the relays to test your chemical pumps and bleed valve. Press "**BACK**" to return to the Process screen.

7. **CONFIGURE FOR pH OR ORP**: Press "**BACK**" to get to the main menu. Press "**7**" System Setup, press "**1**" Process Parameters, press "**2**" pH/ORP, press **"4"** to configure the controller for either pH or ORP. Press **"1"** for **pH** or press **"2"** for **ORP**. The parameters screen will change to the selected process. Press **"BACK"** several times to get to the main menu then press **"1"** to return to the process screen.

8. **CALIBRATE THE CONTROLLER**: To calibrate the controller, take a sample with a handheld conductivity/pH/ORP meter, press the "**CAL**" button, select the process to calibrate, type in the value, press "**ENT**"

PROGRAM THE CONTROLLER: Set up the digital inputs, water meters, and program the controller relays for bleed and chemical feed schemes. See instruction manual for more details..

2 Cautions and Warnings

IMPORTANT NOTICE

WARNING: CHEMICAL FEED

All electromechanical devices are subject to failure from a variety of causes. These include mechanical stress, component degradation, electromagnetic fields, mishandling, improper setup, physical abuse, chemical abuse, improper installation, improper power feeds, and exposure.

While every precaution is taken to insure proper functioning, extra precautions should be taken to limit the ability of over-feeding by limiting chemical quantities available, secondary shut-downs, alarms, and redundancy or other available methods.

CAUTION: POWER SOURCE AND WIRING

Low voltage wiring and high voltage (110 plus) should not be run in the same conduit. Always run separately. Even shielded low voltage is not a guarantee of isolation.

Every precaution should be taken to insure proper grounding and elimination of shorting or Electromagnetic field (EMF) interference.

WARNING: ELECTRICAL SHOCK

To reduce the risk of electrical shock, this equipment has a grounding-type plug that has a third (grounding) pin. This plug will only fit into a grounding -type outlet. If the plug does not fit into the outlet, contact a qualified electrician to install the proper outlet. ***DO NOT*** change the plug in any way.

3 Contact Information

We thank you for your selection and purchase of a Pulsafeeder product.

With proper care and maintenance, this device should give you many years of trouble-free service. Please take the time to read and understand this Installation and Operation Manual, paying special attention to the sections on **OPERATION** and **MAINTENANCE**.

If, in the future, any parts or repairs are required, we strongly recommend that only original replacement parts be used. Our Customer Service Department is happy to assist you with your parts or service requests.

☎ **Pulsafeeder Customer Service and Technical Support Departments can be reached by calling (800) 333-6677 or faxing (941) 575-4085, Monday through Friday, 8:00 a.m. - 5:00 p.m. EST.**

4 Introduction

The controller is a microprocessor based, menu driven, water treatment controller designed for use in cooling towers. The Controller provides for pH or ORP tracking and control, flow monitoring and chemical injection. The Controller is NTL/CSA approved.

The Controller uses the latest in microprocessor capability, giving the user a high level of application flexibility. A large illuminated graphics screen, multiple inputs, and an intuitive menu characterize this new technology. Security features allow full access to programming features or restrict access to viewing only. An operator password can help ensure that only authorized personnel will operate the system.

Security features allow full access to programming features or restrict access to viewing only. An operator password can help ensure that only authorized personnel will operate the system.

The 3200 series is user-friendly with a graphical screen, numeric keypad, LEDs for power, alarm and relay status. It accepts multiple inputs and is easily configured. It's a combination of reliability, accuracy, security and simplicity.

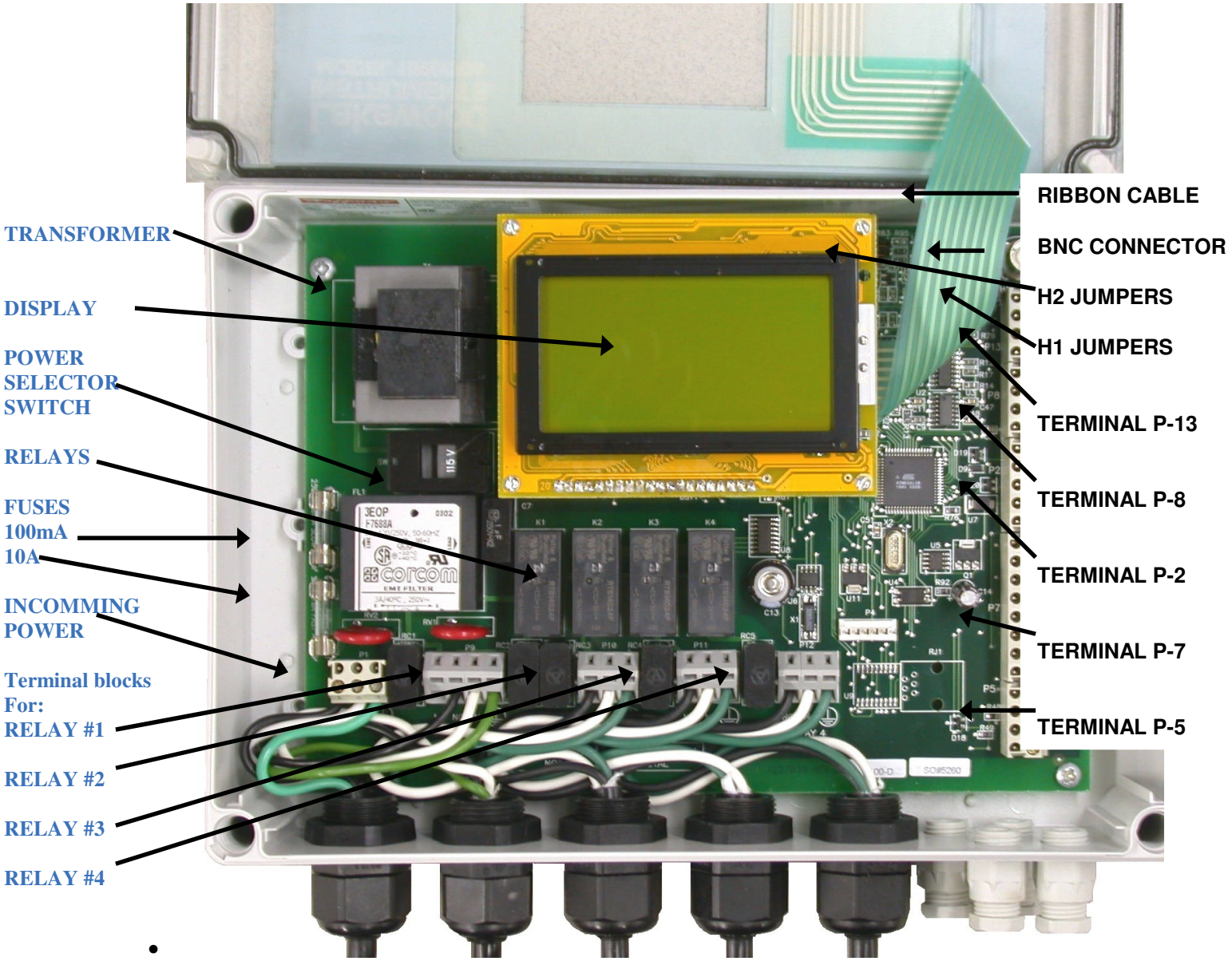
5 Features, Benefits, Specifications

5.1 Features

- Controller can be used for Cooling Towers.
- Removable power cord and receptacles for conduit installations. Enclosure is rated NEMA 4X
- Four user configurable relays for pH/ORP control and chemical addition. These relays can be configured in multiple ways including scheduled feed for biocide addition
- Two (2) water meter inputs, two drum switch, pH or ORP input, flow switch input, one 4-20 mA output, and pH or ORP input via 4-20 mA are all standard features.
- Designed with a single circuit board for high reliability and lower cost.
- Large open shallow enclosure for easy wiring.
- Ball valve delay feature allows accurate control of motorized ball valves.
- Heavy-duty stainless steel domed numeric keypad and illuminated graphical display allow for quick and easy programming. Steel domed switches improve the tactile sensing and life expectancy of the keypad.
- The Controller controller stores all setpoints, calibration values, and relay configurations in an EEPROM. An EEPROM does not require a battery to retain information, so if power is lost these values will be retained for years. The controller includes a capacitive backup device to retain information such as water meter totals, and clock and calendar information. The capacitive backup device will never need to be replaced and will hold data approximately 1 day after each power failure.

5.2 Benefits

- Easy to program, the Controller uses an intuitive menu.
- No add-on options. 4-20mA output, 4-20mA input, and biocide features are standard.



5.3 Specifications

PH or ORP range
0-14 pH, -2000 to +2000 mV

PH or ORP sensor
Solution ground, Single ended, or Signal

differential

PH or ORP Resolution
.01 pH
1 mV for ORP

Temperature comp.
Automatic

Accuracy & repeatability
± 1.0% of scale

Deadband/Setpoint
User programmable

Auto/Manual outputs
Menu selectable

Keypad
16 tactile steel-dome push buttons

Display
Illuminated 128 x 64 pixel LCD

Enclosure
NEMA 4x

Drum Switch Inputs
2 digital contact inputs

Water meter inputs (2)
Contact head, paddle wheel or turbine

Timer
Relay run time exceeded.

Input Signal
One 4-20 mA, non-isolated, internally powered Input.

Output Signal
One 4 – 20 mA, isolated or non-isolated optionally powered output for pH or ORP.

Output relays
4 selectable use

Relay ratings
3A each, 10A total

Power
120/240 VAC 50/60 Hz 6W

Ambient temp
32° - 140°F (0 - 60°C)

Storage temp
-4° - 150°F (-20 - 65°C)

Sensors/Plumbing	Cooling Tower	Process	Condensate
Max Pressure	140 psi (9.65 bar) @100°F	150 psi (10.3 bar)	70 psi (4.8 bar)
Max Temp	140°F (60°C)	230°F (110°C)	230°F (110°C)
Min flow	1 gpm (3.785 Lpm), 5 gpm max	Varies w/pipe size	1 gpm (3.785 Lpm)

6 Unpacking, Mounting and Installation

6.1 Unpacking

Inspect the shipping carton for obvious external damage. Note on the carrier's bill-of-lading the extent of the damage, if any, and ***notify the carrier***. Save the shipping carton until your controller is started up.

☎ **If shipping damage has occurred, call the Pulsafeeder Customer Service Department at (800) 333-6677 and return the controller to the factory in the original carton.**

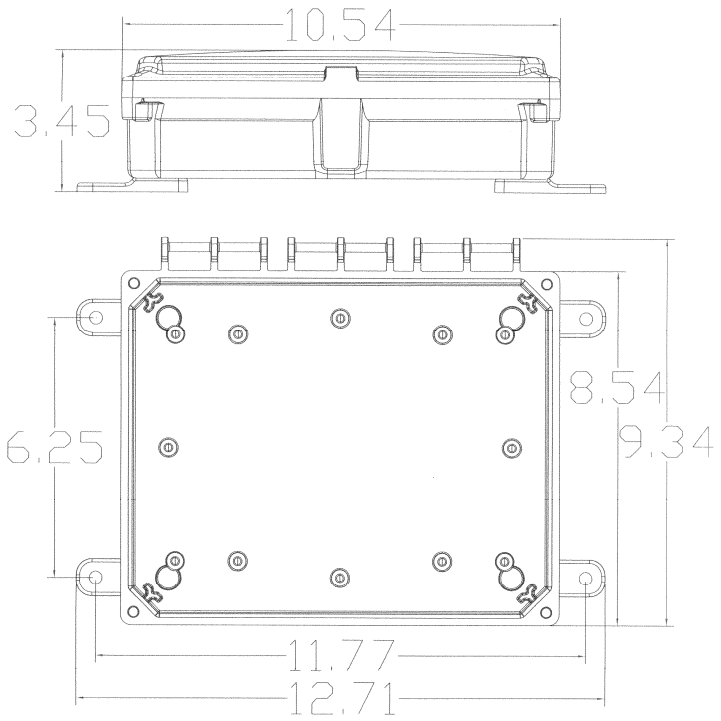
6.2 Mounting

The controller is supplied with four mounting feet, and can be mounted to a panel or to a flat non-vibrating wall.

- Attach the four mounting feet to the back of the controller enclosure. The feet can be installed either vertically or horizontally.
- Install on smooth surface to prevent stress on the mounting feet.
- Do not install on vibrating wall.
- If enclosure is installed in corrosive environments, consider purging.
- Dimensions indicated as inches (millimeters).
- The enclosure material is PVC.
- Use #10 mounting screws (4).

Avoid drilling or punching additional holes in the controller enclosure. Damage incurred as a result of any alteration to the enclosure is not covered under the Pulsafeeder product warranty.

The dimensions of the enclosure in inches are:



The controller has a shipping weight of less than 5 lbs.

NOTE: EXCESSIVE HEAT AND/OR DIRECT SUNLIGHT EXPOSURE WILL DARKEN THE LCD DISPLAY SCREEN, MAKING IT DIFFICULT TO READ, AND MAY SHORTEN THE LIFE OF OTHER ELECTRONIC COMPONENTS.

7 Plumbing Installation

PLUMBING MATERIALS

- Inlet plumbing can be ¾ inch (1.9 cm) PVC, CPVC, or iron pipe.
- Provide at least 1 gpm (3.79 Lpm) to the sensor. A 4-psi (0.3 bar) differential pressure from take-off to injection is sufficient. If flow is marginal, consult your Pulsafeeder Factory Representative. The maximum recommended flow is 5 gpm (18.93Lpm).
- Outlet plumbing can be ¾ inch (1.9 cm) PVC, CPVC, or iron pipe. PVC, CPVC Schedule 80 is recommended for strength and sunlight protection.
- If iron pipe is used, install a PVC union to relieve the stress on the plumbing.
- The sample line inlet should be plumbed downstream of the recirculating pump and upstream of the heat exchanger. This line brings the sample water into the sensor plumbing for conductivity AND pH/ORP measurement. If the Pulsafeeder flow switch plumbing assembly is used, this flow of water also pushes the flow switch float up to activate the relay outputs of the controller.

NOTE: FOR YOUR CONVENIENCE, INCLUDE A PULSAFEEDER MODEL 9102 SAMPLE LINE SHUT-OFF VALVE AND A SAMPLE VALVE SPOUT (AS SHOWN) IN THE INLET FLOW PLUMBING.

Figure 1:

Model 9102 Valve & Spout

- The sample line outlet flow (solution/sample line) should be plumbed to the tower return line or the tower basin, where you can insert your chemical feed system. Refer to the suggested installation drawing in the back of this manual for an example of a typical installation.
- Remember to install isolation and bypass valves so that maintenance can be performed.

WARNING: NEVER INJECT CHEMICALS UPSTREAM OF THE CONTROLLER FLOW CELLS!

☎ **If you have questions or need assistance, call Pulsafeeder Technical Service Department at (800) 333-6677, Monday-Friday, 8:00 a.m. - 5:00 p.m. EST.**

WARNING: SOME CHEMICALS MAY HAVE TO BE INJECTED DIRECTLY INTO THE COOLING SYSTEM WATER LINE AND NOT INTO THE SAMPLE LINE. CONTACT YOUR WATER TREATMENT SPECIALIST FOR SPECIFIC RECOMMENDATIONS.

NOTE: IF THE SOLUTION/SAMPLE LINE IS RETURNED TO THE COOLING TOWER RETURN LINE, USE A CORPORATION STOP (PULSAFEEDER MODEL 9160), A SOLUTION LINE INJECTOR OR A DISPERSING PIPE. THIS AIDS CHEMICAL-WATER MIXING AND ENHANCES WATER TREATMENT CONTROL CAPABILITIES.

8 Electrical Installation

8.1 Incoming Power 115/230 VAC

This model can be powered from either 115 VAC or 230 VAC at 50/60 Hz. There is a power selector switch located in the upper left-hand corner of the control board. To select the appropriate voltage, slide the switch from one position to the other with a small screwdriver. **CAUTION: Do not power the controller with 230 VAC with the slide selector switch set to the 115VAC position. Damage will occur.**

The controller comes with a power cord and female molded receptacles for the blowdown valve and chemical pumps. The power cord and receptacles are rated for 115VAC. If the controller will be powered by 230 VAC, the power cord and receptacles will need to be removed and the incoming power and the relay outputs will need to be hard-wired.

The incoming power is connected to terminal block P1 at the bottom left corner of the control board. There is a hot or line input (L1), a neutral input (N) and an earth ground input (⏚). Refer to the drawing in the back of this manual for wiring instructions.

8.2 Relay Outputs

The relay outputs are of the same voltage as the power input. Ensure that the devices that are to be connected to the relay outputs are of the same voltage rating or damage will occur.

The relay outputs are wired to the female molded receptacles. The molded receptacle on the far left is relay #1 and the molded receptacle on the far right is relay #4. If 115 VAC is used simply plug your devices into the molded receptacles. If 230 VAC is used, remove the receptacles and hard-wire your devices to the relay outputs.

Relay #1 has both a normally open and normally closed contact. This is designed for use with any device that requires either or both types of contacts for operation, such as a motorized blowdown valve. The normally open (NO) contact energizes when the relay turns on and the normally closed (NC) contact is energized when the relay turns off. The other three relays only have a normally open contact. Each relay output has a neutral (N) connection and an earth ground connection (⏚) connection.

To operate the terminal blocks to remove or add wiring, insert a small screwdriver into the slot above each wiring connection and pry upward while removing or inserting the wire.

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Refer to the drawing in the back of this manual for wiring instructions.

8.3 Flow Switch Wiring

The 3200 has a flow switch input. The purpose of the flow switch input is to disable the relay outputs on a loss of flow in the system. The flow switch input requires a digital contact. Any digital contact rated for 24 VDC and 500 mA may be used, such as a relay driven by the recirculating pump. The flow switch is wired to terminal block P7 terminals 1 and 2.

If a flow switch is not used then a jumper must be installed across the flow switch connections. Refer to the drawings in the back of this manual for wiring instructions.

8.4 pH/ORP Sensor Wiring

The controller uses the Pulsafeeder pH or ORP sensors. For wiring lengths of less than 15 feet between the controller and the sensor, these sensors are wired directly to the controller. For wiring lengths of greater than 15 feet between the sensor and the controller, a 4-20 mA transmitter should be used. The maximum recommended wiring distance for sensors without a 4-20 mA transmitter is 15 feet.

Sensors that are directly wired to the controller are wired to terminal block P13 and BNC connector BNC1 on the upper right corner of the control board. Refer to the drawing in the back of this manual for wiring instructions for each of the available Pulsafeeder pH and ORP sensors.

4-20 mA transmitters that are used for the pH or ORP sensor input are wired to terminal block P13 and BNC1. The controller provides power to the 4-20 mA transmitter loop. Refer to the drawings in the back of this manual for wiring instructions for the 4-20 mA input.

8.5 pH/ORP Sensor Jumper Configuration

The controller uses jumper blocks to configure the sensor input for pH or ORP when the pH or ORP sensor is wired directly to the controller without the use of a 4-20 mA transmitter. Jumper blocks H1 and H2 must be configured for proper operation of the sensor input. Refer to drawing 1252534-22a for ORP configuration and drawing 1252534-21a for pH configuration.

Water Meter

The controller will accept two water meter inputs. These inputs can be configured for make-up, make-up Second Source, Bleed, or Chill Loop make-up. Refer to the water meter manufacturer's manual for plumbing information.

The controllers will work directly with the following types of meters: dry contacting head meters, Seametrics open collector output meters, Signet 2535 and 2540 paddle wheel meters, and the Autotrol 1 inch and 2 inch meters. Contact Pulsafeeder for other types of water meters. The water meters are wired to terminal block P7 Refer to the drawing in the back of this manual for wiring instructions.

8.6 Digital Inputs Wiring

The controller has two digital inputs that are intended to be used to give an alarm indication of a low drum level. The controller will display the words "DRUM LEVEL #1" for digital input #1 activation and "DRUM LEVEL #2" for digital input #2 activation.

The digital inputs require a dry contact input. The alarm is triggered when the contact is closed and the alarm is reset when the contact is opened. Any dry digital contact rated for 24 VDC and 500 mA may be used. The inputs are not polarity sensitive; either of the two wires can be connected to either of the two input terminals.

The digital inputs are wired to terminal block P5. Terminals 1 and 2 are used for digital input #1, and terminals 3 and 4 are used for digital input #2. Refer to the drawing in the back of this manual for wiring instructions.

8.7 4-20 mA Output Wiring

The controller has one 4-20 mA output for pH or ORP. This output can be isolated or non-isolated, externally powered or internally powered. If the 4-20 mA output is internally powered then it is non-isolated. If the 4-20 mA output is externally powered then it is isolated.

The 4-20 mA output is wired to terminal block P2 on the right-hand side of the control board. Refer to the drawing in the back of this manual for wiring instructions.

8.8 4-20mA Input Wiring

The controller can accept a 4-20 mA input as the pH or ORP input. The pH or ORP sensor is wired to a 4-20 device and the device is wired to terminal block P2 on the right-hand side of the control board. This input is a non-isolated input and the controller powers it. Refer to the manufacturer instructions for wiring of the sensor to the 4-20 mA input device.

Refer to the drawing in the back of this manual for wiring instructions.

9 Functional Overview

Front Panel

Figure 2: *Front Panel with Display*

LCD
A large, 128x64-pixel graphic display makes it easy to read the menu-driven program

ENCLOSURE
A sturdy NEMA 4X enclosure protects your controller. Make sure it is properly mounted on a flat, non-vibrating wall.

16-BUTTON KEYPAD
ENT = for Menu selection and/or acceptance of selected values.
BACK = to exit a Menu selection and/or skip input options.
CAL = to program a Menu selection.
LANG = Not used.

INDICATOR LIGHTS
LEDs for Power, Alarm, Relay status, and Flow

9.1 Display

The controller uses an illuminated 128x64-pixel LCD digital display for ease of viewing. It has multiple lines to display information such as the pH/ORP reading, alarms, relay status, relay configuration, clock, flow rates and total flow for both water meter inputs, and menu selections.

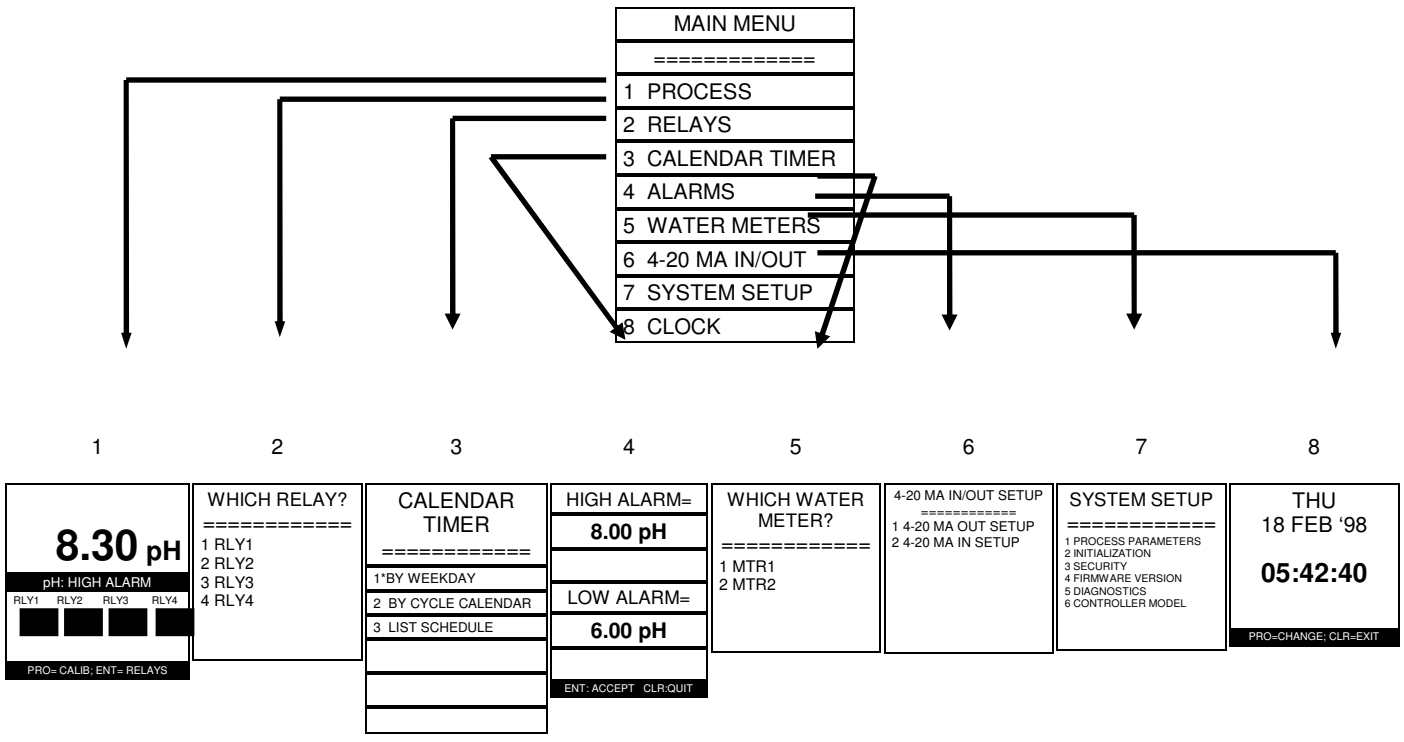
9.2 Keypad

The controller uses a 16-key steel-domed numeric keypad for ease of programming. The keys have the following functions:

ENT	To accept a setting or to enter a screen.
BACK	To exit a screen or to access the main menu.
CAL	To calibrate the controller.
LANG	Not used.
UP arrow	To move about in the menu.
DOWN arrow	To move about in a menu.
Number keys	To input a value or to select a menu item.

9.3 Menu

The controller is programmed and calibrated by the use of a menu. The complete **Main Menu** has 8 available options that can be accessed in the **Technician Level**. However, a list of only six options can be viewed at one time. Use the ↑ and ↓ keys to scroll through the options. As an introduction, here is a graphic overview of the first level of each option in the **Main Menu** to see how it operates. Complete details of each option are provided later in this manual.



9.4 Security Levels

The controller has a security feature to lock out the menu to prevent tampering of the controller.

In normal operation the controller is in the TECHNICIAN security level. This level allows the user full access to the entire menu.

To prevent tampering of the controller, the controller can be placed into the View Only security level. When the controller is in the View Only security level, the menu is completely locked out; access is limited to manual operation of the relays, and viewing of the process screens.

A password is required to change from the VIEW ONLY security level to the TECHNICIAN security level. If the controller is in the View Only security level just press the password on the keypad to change to the TECHNICIAN security level.

The TECHNICIAN security level password is factory-preset to **2222**. This password can be changed to a different 4-digit password in the main menu. To change the password, refer to section 18.1.

10 Starting Up the Controller

Once the Installation is complete it is time to start up the controller.

Initiate sample flow to the controller by opening the sample line isolation valves. Check for leakage.

Power up the controller by turning on the circuit breaker or plugging the power cord into a 120 VAC receptacle.

It is best to initialize the whole controller to remove any settings that may be in the memory before programming the controller. Refer to section 18 of this manual to initialize the controller.

Configure the controller for the appropriate model; 3212 for pH or 3213 for ORP. Refer to section 24

If the pH or ORP input will be coming from a 4-20 mA device enable the 4-20 mA input by following section 16.

If pH or ORP is not coming from a 4-20 mA device set up the temperature compensation for the sensor. Follow section 17.3.

Set the clock by following section 19.

Set the high and low pH or ORP alarms by following section 14.

Configure the relays for operation by following section 13.1.

Calibrate the pH or ORP by following section 12.

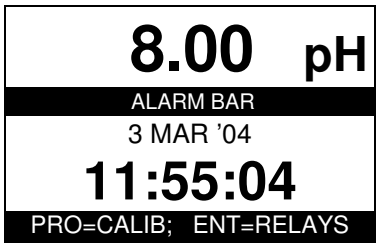
Verify operation of the controller before leaving the area.

11 Operation of the Controller

11.1 Process Screen

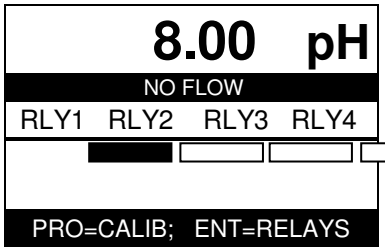
The screens that are used the most in the controller are the Process Screens. Below are the process screen views. The process screen has three sections. The top section shows the pH or ORP reading. The alarm bar is the middle section and appears between the top and bottom sections. It is solid in appearance and flashes showing the current active alarms in sequence if there are multiple alarms. The bottom section has user selectable readings as shown below.

1 - DATE SCREEN

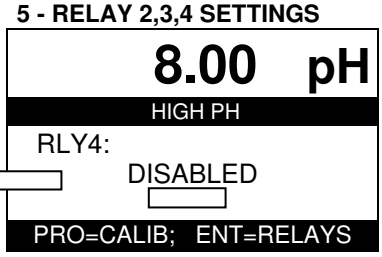


* There are many different screens available in the **PROCESS** screen. These screens allow you to view the units settings (incl. time setting, relay set-ups, flow rates, total flow, etc.) without the danger of altering them. Access these screens by using the ↑ and ↓ keys to scroll through the available screens.
* Press "**ENT**" to manually enable a relay for testing or troubleshooting purposes.
* Press "**PRO**" to calibrate the pH or ORP.

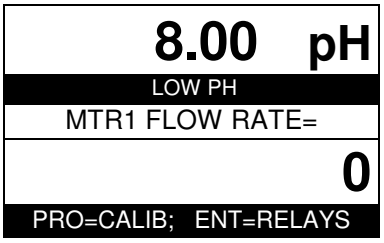
2 - ALL RELAY SCREEN



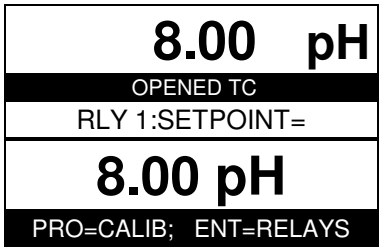
5 - RELAY 2,3,4 SETTINGS



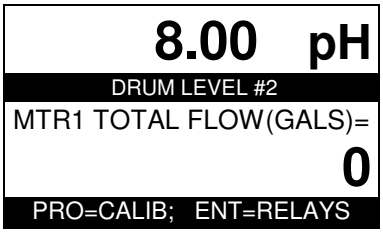
8 – MTR1 FLOW RATE



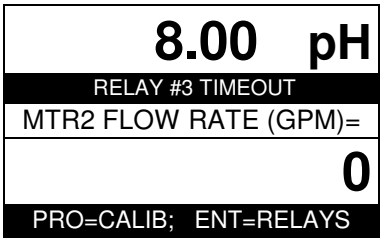
3 - BLOW SETPOINT SCREEN



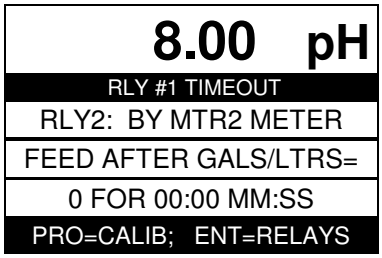
6 – MTR1 TOTAL FLOW



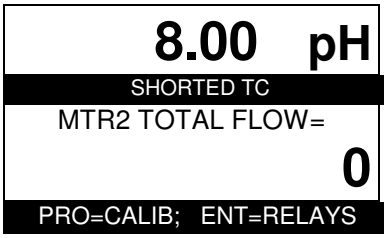
9 – MTR2 FLOW RATE



4 - RELAY 2 SETTINGS



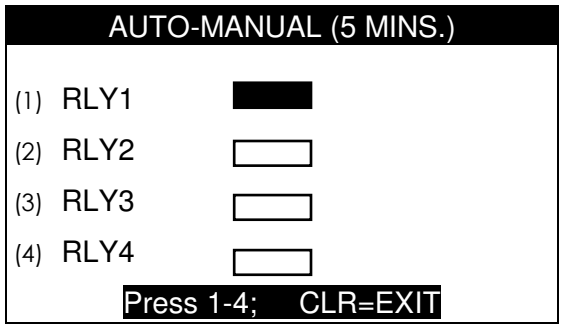
7 – MTR2 TOTAL FLOW



11.2 Manual Operation of the Relays

All four of the relays can be operated manually. To manually operate the relays:

Go to the **Process** screen. Press "**ENT**". You will be taken to a screen that looks like:



Press **"1-4 "** to manually change the state of a particular relay. If the relay is already on, pressing that number will turn it off. A five-minute countdown timer will start. After five minutes has expired the relay will return to automatic control. A relay that is in manual control will stay in manual control until the five minutes expires even if this screen is exited. The five-minute timer helps to prevent damage to the system if a relay is left in manual.

WARNING: Manual control overrides everything including the flow switch lockout. Use care when operating relays manually with no flow in the system.

12 Calibration of the Controller

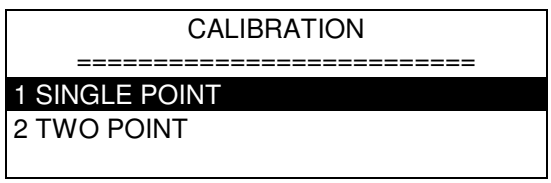
The pH or ORP requires periodic calibration. Calibration is usually required after cleaning the sensor.

A single point calibration should always be performed with the sensor in the piping assembly with good flow past the sensor. It is necessary to have an accurate reading of the system water to properly calibrate the controller. A hand-held pH or ORP meter that tests the sample works well for this purpose.

If the pH or ORP sensor is connected to a 4-20 mA device, follow the manufacturer instructions for calibrating that device.

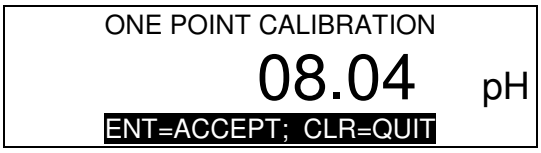
If the pH or ORP sensor is directly wired to the controller follow these instructions for calibration.

- Ensure that the controller is operating with good flow past the sensor.
- Take a sample of the water and measure with a hand-held pH or ORP tester.
- From the **PROCESS** screen, press "**PRO**" to enter the calibration screen.



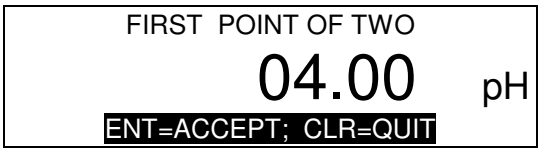
For a Single Point Calibration

- Press **"1" SINGLE POINT**
- Use the keypad to input the pH or ORP reading from the hand-held. Press "**ENT**".
- The controller will respond with **"CALIBRATION COMPLETE".**
- Take another hand-held sample to verify calibration.



For a Two Point Calibration

- For a two point calibration, two separate buffer solutions at least two pH units apart are required.
- Press **"2" TWO POINT.**
- Place the sensor and solution ground wire, if required, in the first buffer solution, allow the reading to stabilize.
- Use the keypad to input the pH or ORP value of the first buffer. Press "**ENT**".
- Place the sensor and solution ground wire, if required, in the second buffer solution, allow the reading to stabilize.
- Use the keypad to input the pH or ORP value of the second buffer. Press "**ENT**".
- Return the sensor to the system and reattach the solution ground wire, if required.
- Check the calibration vs. actual and perform a single point calibration if required.



A two point calibration is not required for proper operation of the controller. There is a factory default two point calibration in the programming.

Calibration Errors.

The controller will **not** be able to complete a calibration if any of the following alarms are present: **Opened T.C., Shorted T.C., High Reference Impedance, or Open P.T. Band**.

In addition, the following errors may be received during the calibrations:

Deviation > 1.5 pH from default / **Deviation >300 mV from default** This means that the input to the controller does not agree with the value that is being inputted by at least 1.5 pH units for pH or 300 mV for ORP. The most common cause of this error is a bad or dirty sensor.

Calibration Points Less Than 2 pH Apart / **Calibration Points less than 200 mV Apart**. The two buffer solutions used during a two point calibration must be at least two pH units apart for pH or 200 mV apart for ORP for a good calibration.

13 Main Menu

The **MAIN MENU** of the controller looks like this:

MAIN MENU
==========
1 PROCESS
2 RELAYS
3 CALENDAR TIMER
4 ALARMS
5 WATER METERS
6 4-20 MA IN/OUT
7 SYSTEM SETUP
8 CLOCK

The **MAIN MENU** can be accessed from any PROCESS screen by pressing "**BACK**". If "BACK" is pressed and the MAIN MENU does not appear, the controller is probably in the VIEW ONLY security mode. If the controller is in the VIEW ONLY security mode, enter the TECHNICIAN security password to be able to access the MAIN MEN**U**.

There are eight different selections in the **MAIN MENU** but only six can be shown at a time. To see the other selections and to move about in the menu screen, use the ↑ and ↓ keys to highlight the desired option and press "**ENT**" or simply press the number key for the desired option.

Use the "**ENT**" key to accept a setting or to enter a screen. Use the "**BACK**" key to reject a setting or to exit a screen. From anywhere in the menu, pressing "**BACK**" will take you one step closer to the **MAIN MENU**.

Each of the MAIN MENU options is discussed in detail later in this manual.

13.1 Configuring the Relays

All four relays can be configured to operate based on: Disabled, Setpoint, Water Meter, Percent of Time, CALENDAR TIMER, or by Alarm. In addition to the above, Relay #1 can be configured to Blowdown by Volume. When a relay is selected for programming the following screen will appear. This is the **RELAY OPTIONS** screen. The asterisk (*) next to one of the options tells you how that relay is configured to feed.

RELAY OPTIONS
==========
1*DISABLED
2 SETPOINT
3 WATER METER
4 PERCENT OF TIME
5 CALENDAR TIMER
6 ALARM RELAY
7 BLOWDOWN BY VOLUME

NOTE: ITEM 7 WILL ONLY APPEAR IN THE RELAY OPTIONS SCREEN FOR RELAY #1.

13.1.1 Disabled

Relay #1 can be disabled. When a relay is disabled, it will not energize.

- From the **RELAY OPTIONS** screen press "**1**" **Disabled** to disable the relay.

13.1.2 Based On Setpoint

To set up a relay to operate based on a setpoint:

- Press or select **"2" SETPOINT**. The following screen will appear.

```
BASED ON SETPOINT
============
1 SETPOINT VALUES
2 WHEN TO FEED
```

SETPOINT

In the **SETPOINT VALUES** screen you will set the **SETPOINT**, the **DEADBAND** and the amount of time for the **TIMEOUT** alarm.

The **SETPOINT** is the pH or ORP value that you are trying to maintain. Check with your water treatment engineer to determine the pH or ORP setpoint for your system needs.

Follow these instructions to establish the controller's setpoint:

- Press "**1**" or highlight **SETPOINT VALUES** and press "**ENT**".
- Use the keypad numbers to enter the proper pH or ORP setpoint and press "**ENT**". When finished, you will automatically be prompted to set the deadband.

DEADBAND

After the setpoint is established, the controller's deadband must also be set. "**Deadband**" refers to the amount of pH or ORP above and below the setpoint—a range within which the controller will not react. Due to continuous fluctuations in the pH or ORP level, it is necessary to have this deadband range or stable readings will be difficult to obtain. The Deadband should be a small percentage of the setpoint. Half the deadband amount will be automatically put above the setpoint, and the other half below it.

For example, a pH setpoint of 7.50 pH with a deadband of 0.20 pH would result in the relay turning on at 7.60 pH and turning off at 7.40 pH.

- Use the keypad numbers to enter the proper deadband setpoint and press "**ENT**". When finished, you will automatically be switched to the **TIMEOUT** alarm screen.

TIMEOUT

The **TIMEOUT** alarm is designed to notify the operator of a problem in the system such as a failed pump, an empty chemical drum, or a problem with the controller. The relay timeout function is an alarm feature that is displayed on the display process screen and **it will turn off the pump**. If a relay is configured as an alarm relay, the **TIMEOUT** alarm will energize the alarm relay. To disable this function, simply program 0 hours, 0 minutes.

- Use the keypad numbers to enter the time in hours and minutes before this alarm will appear and press "**ENT**".

WHEN TO FEED

The relay can be configured to operate either **above the setpoint** or **below the setpoint**. When the relay is configured to operate **above the setpoint**, the relay will turn on when the pH or ORP

rise above the setpoint plus one-half of the deadband. When configured to operate **below the setpoint**, the relay will turn on when the pH or ORP falls below the setpoint minus one-half of the deadband.

- In the **WHEN TO FEED** screen, select either "**1**" **ABOVE SETPOINT** or "**2**" **BELOW SETPOINT**.

13.1.3 By Water Meter

All four relays can be configured to operate for a specified amount of time based on a specified amount of flow through the water meter inputs. MTR1, MTR2 or the sum of BOTH water meter inputs can activate the relay.

- From the **RELAY OPTIONS** screen press "**3**" **WATER METER**.
- Select either **MTR1** or **MTR2** or **BOTH** as the trigger for the relay.
- Use the keypad to enter the amount of flow before the relay is activated. Press "**ENT**".
- Enter the amount of time that the relay will be activated. This time is in minutes and seconds. Press "**ENT**".

13.1.4 By Percent of Time

The Percent of Time feature allows you to feed chemical strictly based by a percent of time. This relay control scheme works in patterns of 20-second time blocks. A relay is on for some multiple of 20 seconds and off for some multiple of 20 seconds. Below is a chart showing some of the operation times for Percent of Time.

Percent	On Time	Off Time
1%	20 Sec	**1980 Sec (33m)**
5%	20 Sec	**380 Sec (6m20S)**
10%	20 Sec	**180 Sec (3 m)**
25%	20 Sec	**60 Sec**
33%	20 Sec	**40 Sec**
50%	20 Sec	20 Sec
66%	**40 Sec**	20 Sec
75%	**60 Sec**	20 Sec
90%	**180 Sec (3 m)**	20 Sec
95%	**380 Sec (6m20S)**	20 Sec
99%	**1980 Sec (33m)**	20 Sec

Note: In the case of "33%", once every 66 minutes, the "off" time would extend an extra 20 seconds to make up for the accumulation of the odd % value vs. a 24 hour clock, since the percent of time is based on a 24HR clock in 20 second increments. The same could be said for the "66%" timer, except it will remain "ON" for the additional 20 seconds every 66 minutes.

To determine the total amount of chemical fed over a 24 hour period, multiply the percent of time by the number of hours a day that your controller is operating, then multiply by your chemical pump flow rate per hour.

For example:

We select 10% of the time, our controller operates 24 hours a day and our chemical pump flow rate is 1 gallon per hour.

$$10\% \times 24 \frac{\text{hours}}{\text{Day}} \times \frac{1\text{gallon}}{\text{Hour}} = \frac{2.4 \text{ Gallons}}{\text{Day}}$$

- From the **RELAY OPTIONS** screen press "**5**" **PERCENT OF TIME**.
- Use the keypad to enter the percentage of time desired. Press "**ENT**".

13.1.5 By CALENDAR TIMER

The CALENDAR TIMER is used to feed chemicals such as biocides on a time of day basis. Setting up the CALENDAR TIMER is a two-part process. The first part is to configure the relay so that it will operate by CALENDAR TIMER. The second part of the process is to configure the CALENDAR TIMER.

- From the **RELAY OPTIONS** screen press "**6**" **CALENDAR TIMER**.

The controller will respond with the following screen.

The relay has been configured to operate based on a CALENDAR TIMER but the relay will not activate because the CALENDAR TIMER has not been programmed yet.

13.1.6 As an Alarm Relay

All four relays can be configured as alarm relays. Any alarm will cause the relay to activate. These alarms include: HIGH PH or ORP, LOW PH or ORP, OPENED TC, SHORTED TC, DRUM LEVEL #1, DRUM LEVEL #2, RELAY #1 TIMEOUT, RELAY #2 TIMEOUT, RELAY #3 TIMEOUT, RELAY #4 TIMEOUT, and the NO FLOW alarm.

- From the **RELAY OPTIONS** screen press "**7**" **ALARM RELAY.** The controller will respond with the following screen.

NOTE: A relay that is configured as an alarm relay will be activated any time any alarm including the "NO FLOW" alarm is present.

13.2 Blowdown by Volume

Relay #1 can be configured to Blowdown based on Volume. When configured based on volume**,** the relay will turn on after a specified amount of makeup volume occurs and will turn off after a specified amount of blowdown is met. This relay configuration requires two water meters and the use of both water meter inputs one for makeup and one for blowdown.

To program RELAY #1 for **BLOWDOWN by VOLUME**,

- Select "**7**" **BLOWDOWN BY VOLUME** in the RELAY #1 **RELAY OPTIONS** screen. The following screen will appear.

```
MAKEUP WATER METER?
=======================
1*MTR1
2  MTR2
```

- Select the meter to which your makeup meter is wired and press "**ENT**". The controller automatically uses the other water meter input as the blowdown water meter.

- Use the keypad to enter the volume of makeup after which you want to blowdown then press "**ENT**"

- Input the amount of blowdown that you want to blow down then press "**ENT**".

- The next screen is the **EXCESS BLOWDOWN TIME ALARM** screen. This alarm occurs if the specified amount of blowdown is not reached within the specified amount of time for this alarm. Enter the amount of blowdown time before the **EXCESS BLOWDOWN TIME ALARM** will occur then press "**ENT**". **This alarm will close the blowdown valve** and it will give an alarm indication on the display. The alarm time is set in hours and minutes. To disable this feature, enter "**00:00**".

- The relay will activate again when the specified amount of makeup volume is achieved even though the **EXCESS BLOWDOWN TIME ALARM** has occurred**,** however**, the alarm will still be present until the specified blowdown volume is reached.** This will provide the operator with an indication that there is a problem with the blowdown system.

13.3 Setting up the CALENDAR TIMER

Refer to section 13.1 to configure a relay to feed based on the CALENDAR TIMER <u>before</u> continuing with this section.

To get to the CALENDAR TIMER menu:

- From the **MAIN MENU** press "**3**" **CALENDAR TIMER**. You will see the following screen:

```
CALENDAR TIMER
============
1*BY WEEKDAY
2 BY CYCLE CALENDAR
3 LIST  SCHEDULE
```

The CALENDAR TIMER can be programmed to feed chemicals by either **WEEKDAY** or by a **CYCLE CALENDAR** basis. NOTE: All scheduled feeds will be by the method selected.

BY WEEKDAY is used to feed chemicals by the weekday name, i.e. Monday, Tuesday, Wednesday etc.. This is a seven-day schedule. At the end of the week, the schedule starts over again. To configure the CALENDAR TIMER to feed by weekday:

- From the **CALENDAR TIMER** screen, press "**1**" **BY WEEKDAY.**

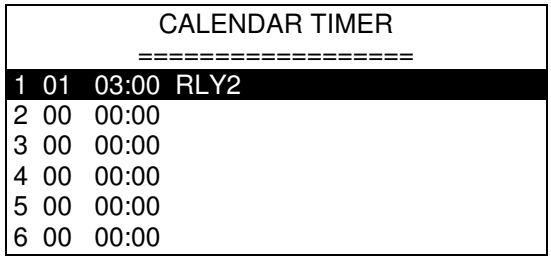
BY CYCLE CALENDAR is used to feed chemicals by a schedule other than one that is seven days long. **BY CYCLE CALENDAR** can be used to feed the same chemical every day or up to 28 days between feedings. The operator specifies the number of days in the cycle calendar. After the cycle calendar is completed, the schedule starts over again. This method of feeding is particularly useful when feeding two biocides on an alternating weekly basis. To configure the CALENDAR TIMER to feed by cycle calendar:

- From the **CALENDAR TIMER** screen, press "**2**" **BY CYCLE CALENDAR.**
- Use the keypad to enter the number of days in your cycle then press "**ENT**". Remember the maximum number of days allowed is 28.
- Use the keypad to enter which day today is in your cycle; e.g. today is day number 5 in my 14-day cycle. Then press "**ENT**".

After selecting whether the CALENDAR TIMER will be fed by **WEEKDAY** or by **CYCLE CALENDAR** it is time to actually program the CALENDAR TIMER. To enter the actual CALENDAR TIMER or to edit the CALENDAR TIMER from the CALENDAR TIMER screen above:

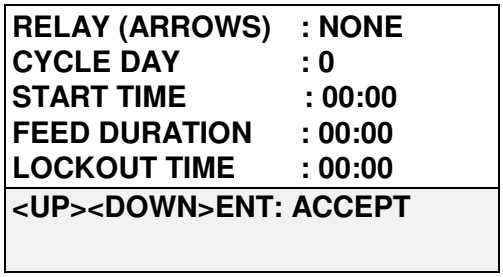
- Press "**3**" **LIST SCHEDULE**. This will take you to a list of all scheduled feeds as shown in the screen on the next page.

NOTE: A maximum of 12 scheduled feeds may be programmed into the controller.



- If there are no scheduled feeds, select the first schedule and press "**ENT**". If you are editing the schedule, select the schedule that you want to edit and press "**ENT**".

Below is an example screen for programming a chemical feed. Before programming a chemical feed, you need to configure the relay to be a CALENDAR TIMER relay as per section 13.1.



- To program the schedule use the keypad to enter the values in the above screen. Press "**ENT**" to move to the next item.

RELAY is which relay you want to program (you must configure a relay to be a CALENDAR TIMER relay first). Use the arrow keys to select the available relays.

CYCLE DAY or **DAY** is the day you wish to actuate the CALENDAR TIMER relay.

START TIME is the time of day you want to start the CALENDAR TIMER sequence. This time is based on a 24 hour clock; i.e. 10p.m is 22:00.

FEED DURATION is the amount of time the CALENDAR TIMER relay will be on.

LOCKOUT TIME after the CALENDAR TIMER relay is done, an additional lockout time for relays **1, 2, 3,** and **4** can be programmed. The lockout time prevents the other relays from operating until this time expires. Setting this time to **0:00** will disable this feature.

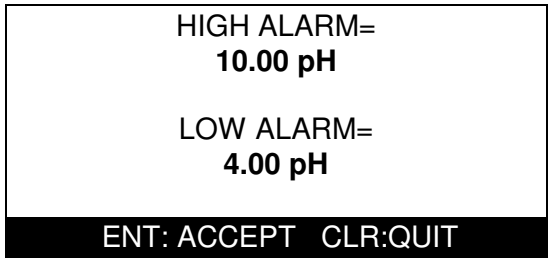
NOTE: All Times are in Hours and Minutes

14 Alarms

The controller is equipped with both high and low pH or ORP alarms. This menu option allows you to program the specific values for these alarms. When a pH or ORP alarm is received, it will appear as a flashing message in the middle of the display and any configured alarm relays will be activated. Consult your water treatment specialist when determining the proper High and Low Alarm values for your system.

To get to the alarm settings:

- From the **MAIN MENU** press "**4**" **ALARMS**. Use the keypad to enter a value for the high alarm. Press "**ENT**".
- Use the keypad to enter a value for the low alarm and press "**ENT**".



15 Water Meter

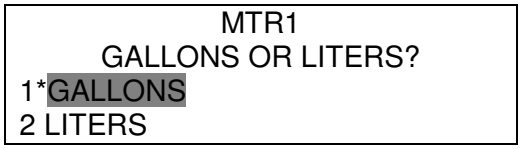
The controllers will work directly with the following types of meters: dry contacting head meters, Seametrics open collector output meters, Signet 2535 and 2540 paddle wheel meters, and the Autotrol 1 inch and 2 inch meters. Contact Pulsafeeder for other types of water meters.

Both water meter inputs are programmed in the same manner.

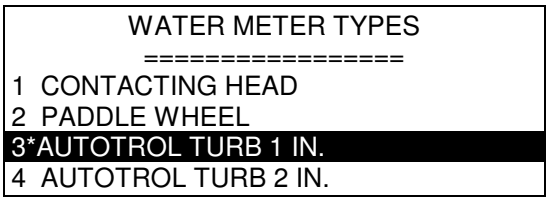
To configure the water meter inputs:

- From the **main menu**, press "**5**" **WATER METERS**. This will take you to the **WHICH WATER METER SCREEN.**

- Press "**1**" for **MTR1** or press "**2**" for **MTR2**.



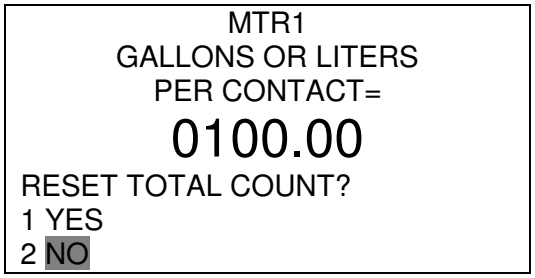
- The water meters can be configured for gallons or liters. Press "**1**" for **GALLONS** or press "**2**" for **LITERS**. The asterisk (*) indicates current configuration.
- This will take you to the **WATER METER TYPES** screen as shown below.



- Use the keypad to select the type of water meter that you are using. The asterisk (*) indicates current configuration.

If **CONTACTING HEAD** is selected:

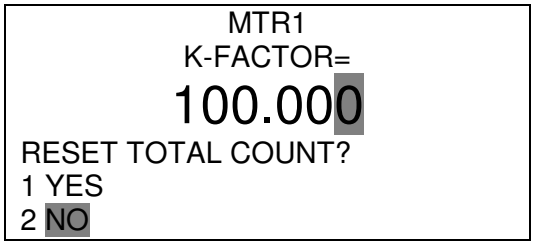
- You will be taken to the **GALLONS OR LITERS PER CONTACT** screen.



- Use the keypad to enter the number of gallons or liters per contact for your specific meter then press "**ENT**". You will then be asked if you want to reset the total count for that meter to zero. Press "**1**" for **YES** or press "**2**" for **NO**.

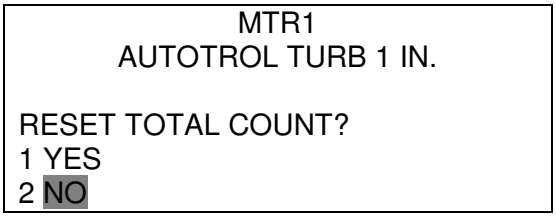
If **PADDLE WHEEL** is selected:

- You will be taken to the **K-FACTOR** screen.



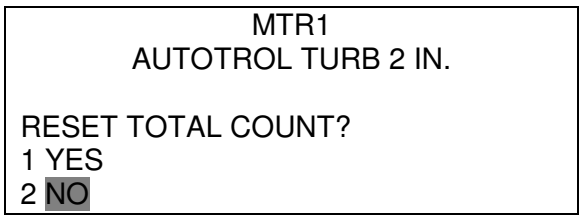
- Use the keypad to enter the K-factor for your particular water meter then press "**ENT**". You will then be asked if you want to reset the total count for that meter to zero. Press "**1**" for **YES** or press "**2**" for **NO**.

If **AUTOTROL TURB 1 IN.** is selected**:**



- The controller will confirm that the **AUTOTROL TURB 1 IN.** has been selected and you will be asked if you want to reset the total count for that meter to zero. Press "**1**" for **YES** or press "**2**" for **NO**.

If the **AUTOTROL TURB 2 IN.** is selected:



The controller will confirm that the **AUTOTROL TURB 2 IN.** has been selected and you will be asked if you want to reset the total count for that meter to zero. Press "**1**" for **YES** or press "**2**" for **NO**.

16 4-20mA Input & Output

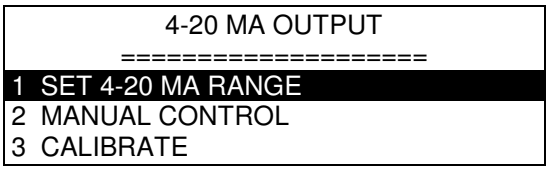
The controller has one 4-20 mA output that is configured for pH or ORP, and one 4-20 mA input that is used for a remote pH or ORP input to the controller.

16.1 Set Up of the 4-20 mA Output

To set up the 4-20 mA output:

- From the **Main Menu**, press "**6**" **4-20 mA IN/OUT**.
- Press "**1**" **4-20 mA OUT SETUP**.

There are three things that can be done from the **4-20 mA Out Setup** screen; set the 4-20 mA range, take manual control of the 4-20 mA output and calibrate the 4-20 mA output. Below is the **4-20 mA Setup** screen.



Set the 4-20 mA Range

The 4-20 mA output range must be set for the output to be useful.

- From the **4-20 mA Setup** screen, press "**1**" **Set the 4-20 mA RANGE.**
- Use the keypad to enter a pH or ORP value for the 4-mA point. Press "**ENT**".
- Use the keypad to enter a pH or ORP value for the 20-mA point. Press "**ENT**".

Manual Control

Manual control is used to temporarily change the 4-20 mA output.

- From the **4-20 mA Setup** screen, press "**2**" **MANUAL CONTROL**.
- Use the up and down arrow keys to raise or lower the 4-20 mA output. To exit this screen and restore automatic control of the 4-20 mA output press "**CLR**".

Calibrate

The 4-20 mA needs to be calibrated to the actual output to be accurate. A milliamp meter is necessary to calibrate the 4-20 mA output. Connect the milliamp meter in-line with one leg of the 4-20 mA output. Refer to the drawing in the back of this manual for wiring instructions.

- From the **4-20 mA Setup** screen, press "**3**" **CALIBRATE.**
- Use the keypad to enter the milliamp reading from the milliamp meter for the **4**-mA point. Press "**ENT**".

Use the keypad to enter the milliamp reading from the milliamp meter for the **20**-mA point. Press "**ENT**".

16.2 Setup of the 4-20 mA Input

The 4-20 mA input is used for a remote pH or ORP application where the pH or ORP sensor will be mounted greater than 15 feet from the controller. An external 4-20 mA device is required.

To set up the 4-20 mA input:

- From the Main Menu press "**6**" **4-20 mA IN/OUT.**
- Press "**2**" **4-20 mA IN SETUP.**

There are three things that can be done from the **4-20 mA IN Setup** screen; set the 4-20 mA range, enable or disable the 4-20 mA input and calibrate the 4-20 mA input. Below is the **4-20 mA INPUT** setup screen.

```
4-20 MA INPUT
====================
1  SET 4-20 MA RANGE
2  ENABLE/DISABLE
3  CALIBRATE
```

Set the 4-20 mA Range

The 4-20 mA input range must be set to the same range as the 4-20 mA input device to be useful.

- From the **4-20 mA IN** setup screen, press "**1**" **Set 4-20 mA RANGE.**
- Use the keypad to enter a pH or ORP value for the 4-mA point. Press "**ENT**".
- Use the keypad to enter a pH or ORP value for the 20-mA point. Press "**ENT**".

Enable/disable

To use the 4-20 mA input, it must be enabled.

- From the **4-20 mA IN** setup screen, press "**2**" **ENABLE/DISABLE.**
- Press "**1**" to enable the 4-20 mA input or press "**2**" to disable the 4-20 mA input.

Calibrate

The 4-20 mA input needs to be calibrated to the actual milliamp input to be accurate. A milliamp meter is necessary to calibrate the 4-20 mA input. Connect the milliamp meter in-line with one leg of the 4-20 mA input. Refer to the drawing in the back of this manual for wiring instructions.

- From the **4-20 mA Setup** screen, press "**3**" **CALIBRATE.**

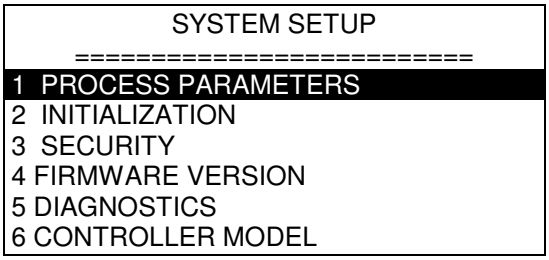
Use the keypad to enter the milliamp reading from the milliamp meter. Press "**ENT**".

17 System Set-up Menu

The system setup menu is used to set up the temperature compensation, damping, initialize the controller, change the security password, check the firmware version, check the diagnostics, and select the controller model.

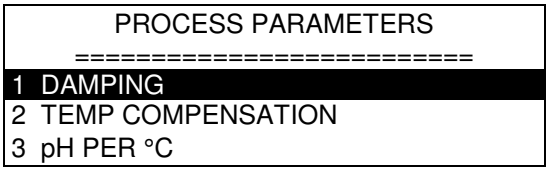
To reach the **SYSTEM SETUP MENU:**

- From the **MAIN MENU** press **"7" SYSTEM SETUP.** The following screen will appear.



17.1 Process Parameters

The process parameters screen is used to set up the damping, temperature compensator, and set the amount of temperature compensation. The **PROCESS PARAMETER** screen is shown below.



17.2 Damping

Damping is used to slow down the rate of change of the pH or ORP reading in cases where the reading is changing rapidly. The default setting is 0.5 seconds. The larger the time, the slower the readings will change.

To change the damping value.

- From the **PROCESS PARAMETERS** screen, press **"1" DAMPING**.
- Use the keypad to change the damping time and press **"ENT"**.

17.3 Temperature Compensation

The controller can accept a 10K PTC or 3K PTC temperature compensated or non-temperature compensated pH or ORP input. The temperature compensation for your sensor must be set in the controller. Refer to the manufacturers information for the temperature compensation values for your pH or ORP sensor.

To set up the temperature compensation:

- From the Main Menu press "**7**" **SYSTEM SETUP.**
- Press "**1**" **PROCESS PARAMETERS.**
- Press "**2**" **TEMP COMPENSATION**
- Press "**1**" for **NONE**. Press "**2**" for **3k PTC**. Press **"3"** for **10K PTC**.

TEMPERATURE COMPENSATION
==========
1* NONE
2 3K PTC
3 10K PTC

17.4 pH per 10°C

The controller has the ability to change the amount of temperature compensation for each °C temperature change.

To change the amount of temperature compensation:

- From the Main Menu press "**7**" **SYSTEM SETUP.**
- Press "**1**" **PROCESS PARAMETERS.**
- Press "**3**" **pH per 10°C**
- Use the keypad to enter a value for the amount of temperature compensation. Press **"ENT".**

18 Initialization

Initialization restores the factory default settings to the controller. The whole controller can be initialized or just the calibration. It is suggested that you initialize the whole controller before you program the controller. This will clear any random settings that may be in the controller. To do so, follow these instructions:

- From the **Main Menu**, press "**7**" **SYSTEM SETUP**.
- Press "**2**" **INITIALIZATION**.
- Press "**2**" **WHOLE CONTROLLER** and press "**ENT**". A warning will appear on the screen (see below). Press "**1**" to proceed, "**2**" to cancel.

WARNING:
THIS OPTION MAY REQUIRE YOU TO RE-CALIBRATE THE CONTROLLER.
ARE YOU SURE?
1 YES
2 NO

To initialize just the calibration:

- Press "**1**" **CALIBRATIONS** instead of "**2**" **WHOLE CONTROLLER** in the procedure above. The same warning screen will appear.

18.1 Change the Security Password

The security password can be changed from the factory default setting of **2222** to any four-digit value that you desire.

To change the security password:

- From the **Main Menu**, press "**7**" **SYSTEM SETUP**.
- Press "**3**" **SECURITY**.

PASSWORDS ARE 4 KEYS
ENTER A NEW PASSWORD
OLD PASSWORD = ****
NEW PASSWORD= ****
VERIFY =
BACK=EXIT

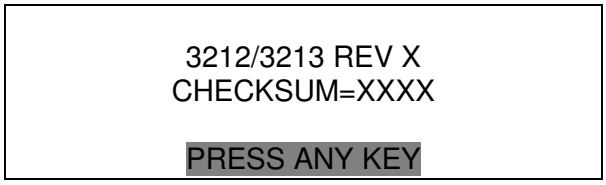
- Use the keypad to enter the old password. If the password has not been changed before, the old password is **2222**.
- Use the keypad to enter the new password.
- Use the keypad to enter the new password a second time for verification

If you lose your password, contact Pulsafeeder for assistance.

18.2 Firmware Version

Sometimes it is necessary to verify the firmware version of the controller for troubleshooting purposes. To get to the firmware version:

- From the **Main Menu**, press "**7**" **SYSTEM SETUP**.
- Press "**4**" **FIRMWARE VERSION**.



The firmware version will be displayed along with a checksum value. The checksum value is used to verify that the program has not been corrupted. To exit this screen, press any key.

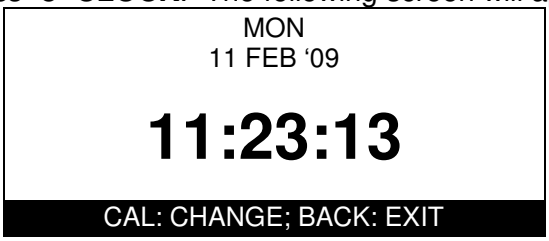
18.3 Diagnostics

The diagnostics screen is used for troubleshooting purposes. Contact Pulsafeeder for assistance.

19 Setting the Clock

The clock uses the 24 hour or military time. 06:00:00 is 6 a.m. 18:00:00 is 6 p.m. To set the clock:

- From the **Main Menu** press "**8**" **CLOCK**. The following screen will appear:



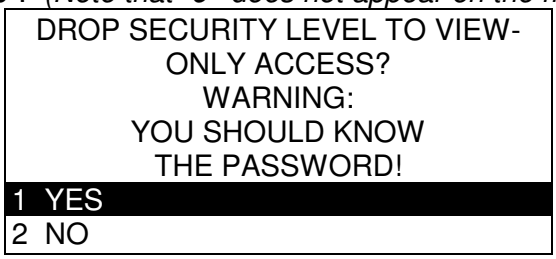
- Press "**CAL**" to change the clock settings. The day will start to flash.
- Use the up and down arrow keys to change the day of the week. Press "**ENT**".
- Use the number keys to change the date. Press "**ENT**".
- Use the arrow keys to change the month. Press "**ENT**".
- Use the number keys to change the year. Press "**ENT**".
- Use the number keys to change the hour. Press "**ENT**".
- Use the number keys to change the minutes. Press "**ENT**".
- Use the number keys to change the seconds. Press "**ENT**".
- Press "**BACK**" to exit this screen.

You must press "**ENT**" all the way through this menu for the settings to take affect.

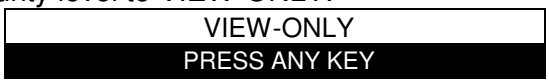
20 Changing the Security Levels

The security level can be changed to prevent any unwanted tampering of the controller. To change the security level from **Technician** to **View-Only**:

- From the **Main Menu**, press "**0**". *(Note that "**0**" does not appear on the menu screen.)*



- Select **YES** to change the security level to VIEW-ONLY.



The controller menu now functions at the VIEW-ONLY security level.

To return to the **Technician** security level:

- In the VIEW-ONLY mode, the controller will be in the **Process** screen. Use the keypad to type in the 4-digit password to enter the TECHNICIAN mode:

NOTE: The default Technician password is **2222**. You may change the password in the SYSTEM SETUP menu under SECURITY.

21 Maintenance

Periodic maintenance is required to ensure trouble free operation of the controller. The following sections cover the required maintenance.

21.1 Sensor Maintenance

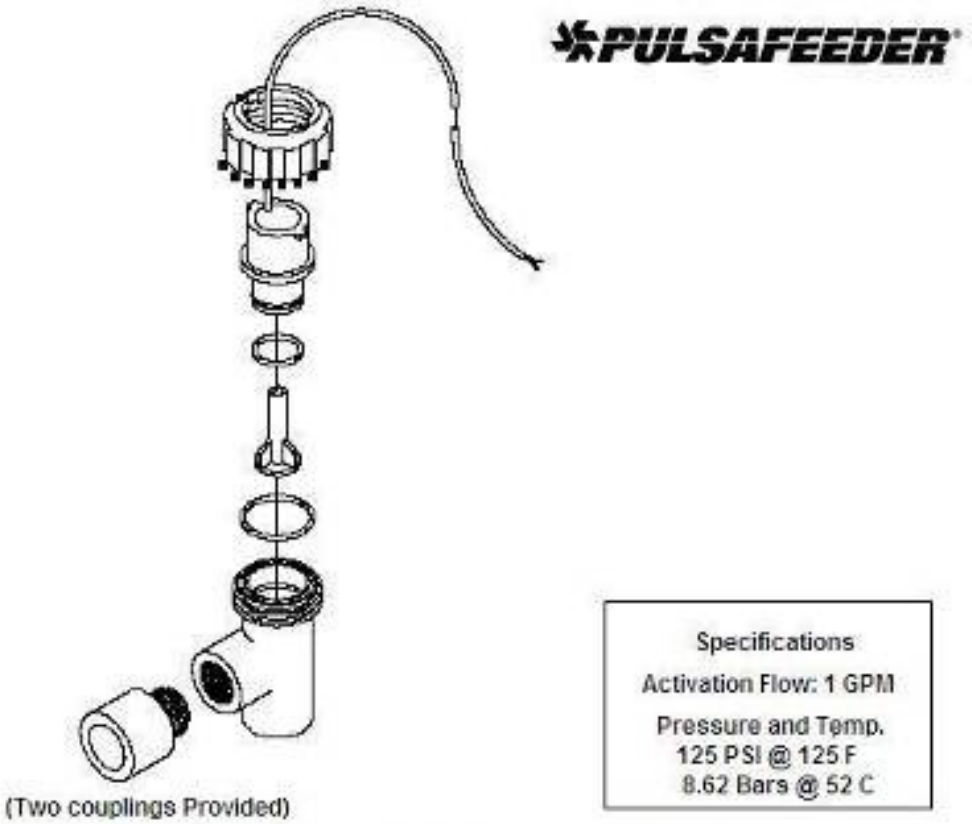
Routine maintenance is necessary in order to maximize the efficiency and accuracy of your sensor. Clean the electrode end of the pH/ORP sensors at least once per month. Cleaning of the sensors may need to be performed more frequently if it is in a high fouling environment.

- Remove power from the controller and shut off the sample flow.
- Remove the sensor from its plumbing.
- Flush the sensor tip with tap water. Do not use cloth to clean the sensor tip. Cloth has oils that will foul the sensor.
- If there is oil on the sensor tip, use isopropyl alcohol to clean the tip. If necessary determine the source of oil contamination and correct.
- If necessary, use a 10% Muriatic or HCL acid to remove scale from the sensor.
- If necessary, a cotton swab can be used to clean the reference junction of the sensor. Avoid contact with the glass as much as possible.
- Wash the sensor off with tap water.
- Clean and lubricate the "O" ring with a silicone-based lubricant (petroleum-based lubricants will cause the O-ring to swell).
- Install the sensor in its plumbing.
- Restore sample flow and check for leaks.
- Restore power to the controller and allow the reading to stabilize.
- Perform a calibration of the pH or ORP.
- Verify operation before leaving the area.

21.2 Flow Switch Maintenance

If you have the flow switch plumbing assembly, you may need to periodically clean the wetted parts in this assembly.

* Shut off the inlet flow and the power to the controller.
* Turn the coupling nut for the flow switch counterclockwise.
* Pull out the red shuttle with your fingers.
* Use a bottlebrush on the shuttle, flow sight and the flow switch assembly to remove any residue.
* Clean and lubricate the “O” ring with a silicone-based lubricant (petroleum-based lubricants will cause the O-ring to swell).
* Tighten down the coupling nut after you replace the components.
* Turn the inlet flow back on and check for leaks.



P/N 04-350-90-1 Flow Switch Assembly

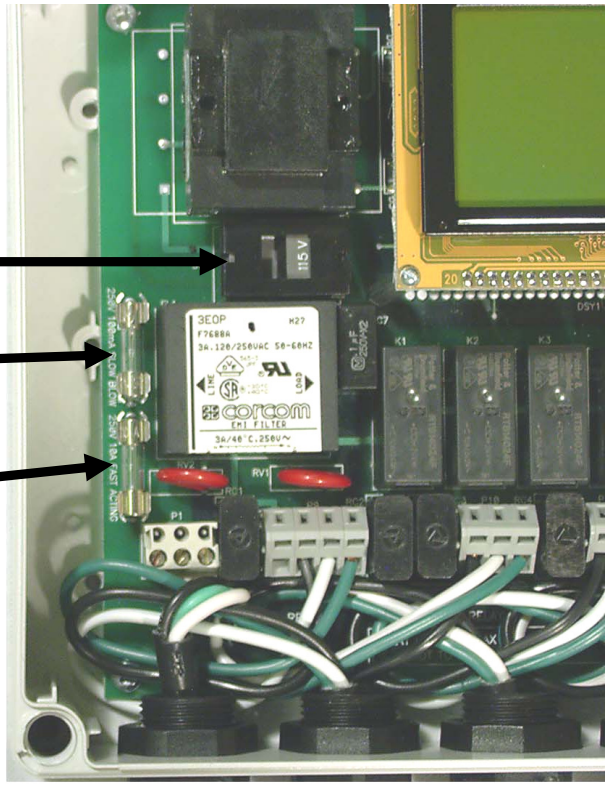
22 Replacing the Fuses

The controller contains a two 5 x 20 mm, European-style fuses. Replacement fuses must be a Schurter 0034.1526, Littlefuse 217.010, or equivalent 10A, 250V, fast blow type for Fuse F1 and a Littlefuse 218.100, Schurter 0034.3107, or equivalent 100mA, slow blow for Fuse F2. If a fuse is blown, the display will be blank when the unit is connected to power. Refer to the troubleshooting section of this manual for more information about blank displays.

115/230VAC power selector switch

100mA, 250V, slow blow fuse

10A, 250V, fast blow fuse



23 Troubleshooting

23.1 Error Messages

This section discusses some of the more common questions with the Controller. These notes are not intended to be all-inclusive—only to cover the most common situations. If you have other questions or are in need of support, contact the Pulsafeeder Technical Service Department toll free at (800) 333-6677.

PROBLEM	WHAT THIS MEANS	CORRECTIVE ACTION
{Alarm Flashing} "PH OR ORP HIGH" OR "PH OR ORP LOW"	PH or ORP is too high or low with respect to the high or low alarm setpoint.	1. See problem "RELAY TIMEOUT". 2. Check the chemical pump operation. 3. The chemical drum is empty. 4. Check the High or Low Alarm Value. 5. Check relay setpoints and deadbands. 6. Insure the system is not overflowing.
Water meters not accumulating.	There may be a problem with the wiring or the reed switch in the meter may be bad. For water meters other than the contacting head type, check the manufacturer's user manual for that particular water meter.	1. Approximately 5 volts DC should be present at the input terminal when the water meter contact is closed. That should change to zero VDC when the contact opens. Check these voltages and for correct wiring. 2. Is the controller configured for your type of water meter?
{Alarm Flashing} "FEED SEQUENCE ACTIVE".	This simply indicates that a CALENDAR TIMER relay is active.	No action necessary.
Display is blank.	There may be a problem with the incoming power, the fuses or the circuit board. Open the front panel to troubleshoot.	1. Check the fuse F1. Replace with 5 x 20 mm, 10A, 250V, fast blow fuse. 2. Check the fuse F2. Replace with 5 x 20 mm, 100mA, 250V, slow blow fuse. 3. Does the unit have power? 4. If there is power to terminals AC and ACC on P1, Technical Service for more information.
"NO FLOW" alarm.	Flow input switch is not closed.	1. The flow switch float may be stuck or no flow is present. 2. Flow switch may be bad. Replace reed switch in plumbing assembly. If no flow switch is used, a jumper wire should be installed across the flow switch input. Removing the jumper disables all relay outputs.

PROBLEM	WHAT THIS MEANS	CORRECTIVE ACTION
{Alarm Flashing} "RELAY TIMEOUT".	This indicates that the controller has been trying to operate a relay for longer than the user-programmed time and is unable to reach the setpoint.	1. Check for proper operation of the pump or valve. Use the manual relay control to help. 2. Check the relay configuration and verify settings. 3. Check chemical levels in the drums or totes. 4. Verify operation of water meters. 5. Momentarily shut off system flow to reset alarms.
{Alarm Flashing} "OPENED TC".	Temperature compensator not being properly read.	1. Check sensor wiring. 2. Verify Temperature Compensation setting in the Process Parameters screen. 2. Replace pH or ORP sensor.
{Alarm Flashing} "SHORTED TC".	Temperature compensator not being properly read.	1. Check sensor wiring. 2. Verify Temperature Compensation setting in the Process Parameters screen. 3. Replace pH or ORP sensor.
Motorized ball valve functions, but will not remain "open" or "closed" as expected.	The motorized ball valve is not indicating to the controller that it has actually reached the open or closed position.	Adjust the limit switch for the motorized ball valve.
Deviation >1.5 pH from default or Deviation >200mV from default	You are trying to calibrate the controller to a value that is too far from the value the controller expects based on the input from the sensor.	1. Initialize the calibrations and try again. 2. Check sensor operation in a cup of the system water or buffer. 3. Clean sensor.
Calibration points less than 2 pH (200 mV) apart	You are trying to perform a two point calibration with two solutions that are too close to the same reading to allow a good calibration to occur.	1. For a pH two point calibration, the two solutions must be at least two pH apart. 2. For an ORP two point calibration, the two solutions must be at least 200 mV apart.

23.2 Factory Service

☎ **Technical Support for Pulsafeeder can be reached by calling (800) 333-6677 or faxing (941) 575-4085, Monday through Friday, 8:00 a.m. - 5:00 p.m. EST.**

NOTE: IF YOU CALL FOR TROUBLESHOOTING HELP, PLEASE HAVE THE MODEL NUMBER, SERIAL NUMBER, AND ANY OPTIONS PERTAINING TO YOUR UNIT AVAILABLE FOR REFERENCE.

When any merchandise is to be returned to the factory, please call and obtain a Return Goods Authorization (RGA) number and have the following information available:

* Customer's name, address, telephone and fax numbers (shipping and billing).
* A hard copy purchase order number for cases where repairs or parts are required that are not under warranty.
* A contact person's name and telephone number to call if the equipment is beyond repair or to discuss any other warranty matter.
* Equipment model and serial numbers.
* Reason for return, e.g., repair, warranty, incorrect part, etc.

We will then fax to your attention an RGA form that must accompany the returned item.

NOTE: THE RGA NUMBER MUST BE CLEARLY WRITTEN ON THE OUTSIDE OF THE PACKAGE(S) BEING RETURNED.

ANY ITEMS SENT BACK TO THE FACTORY WITHOUT AN RGA NUMBER WILL BE REFUSED AND RETURNED TO SENDER

Service Guide

When calling Pulsafeeder, please have your controller's complete model number and serial number available, together with the firmware version so that the Technician can better assist you.

Refer to the Ordering Information section of this manual for part numbered replacement parts.

Write your controller's complete model number, serial number, and firmware version here so that you will have them available if you wish to contact a Pulsafeeder technician.

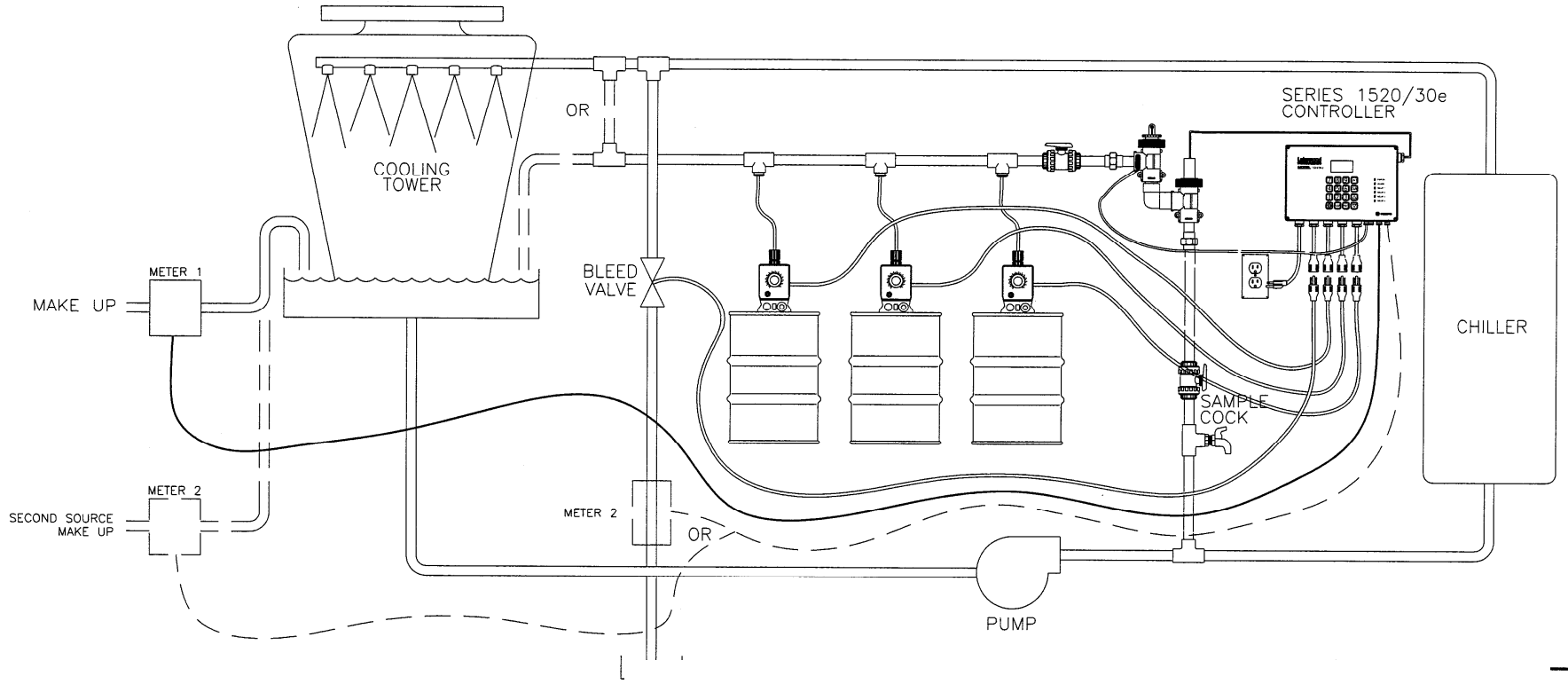
Model Number:

Serial Number:

Firmware Version:

24 Drawings

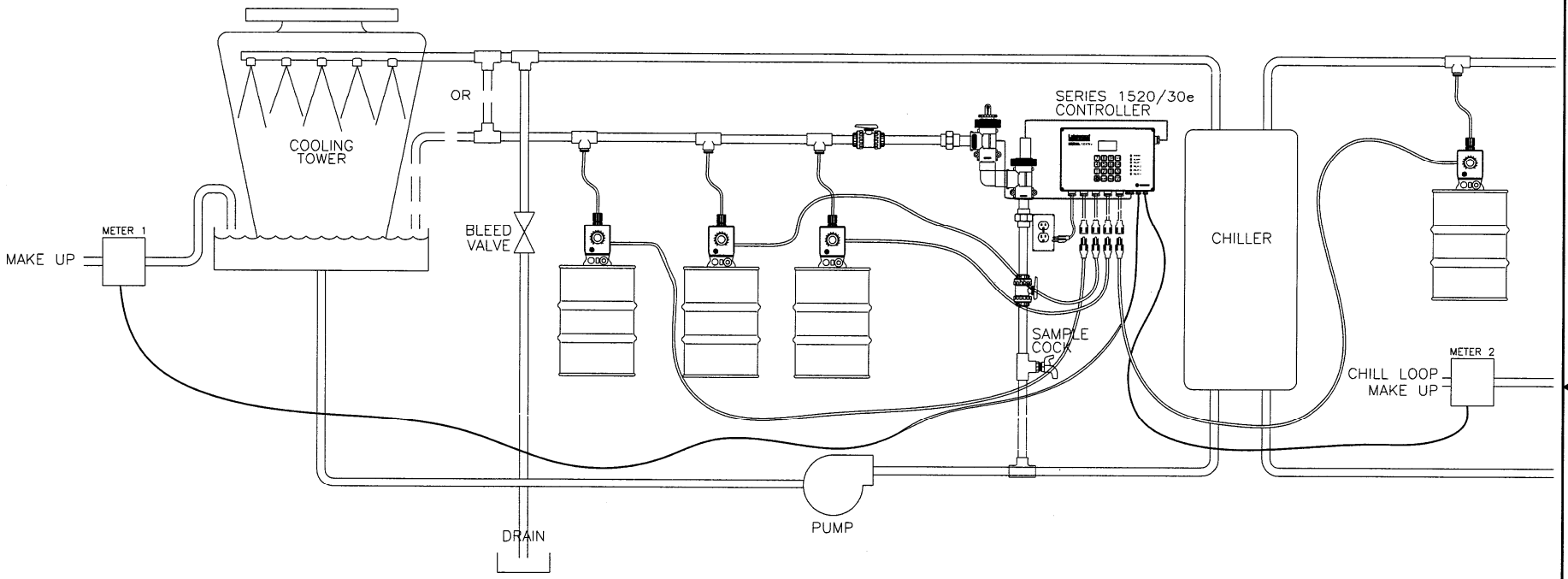
REVISION		REVISION HISTORY			
DWG	PART	DESCRIPTION	ECO	DWN/DATE	APVD/DATE
B	A	UPDATED PLUBING	8452	DGK/2/11/04	LRS/2/11/04



REV
A
B

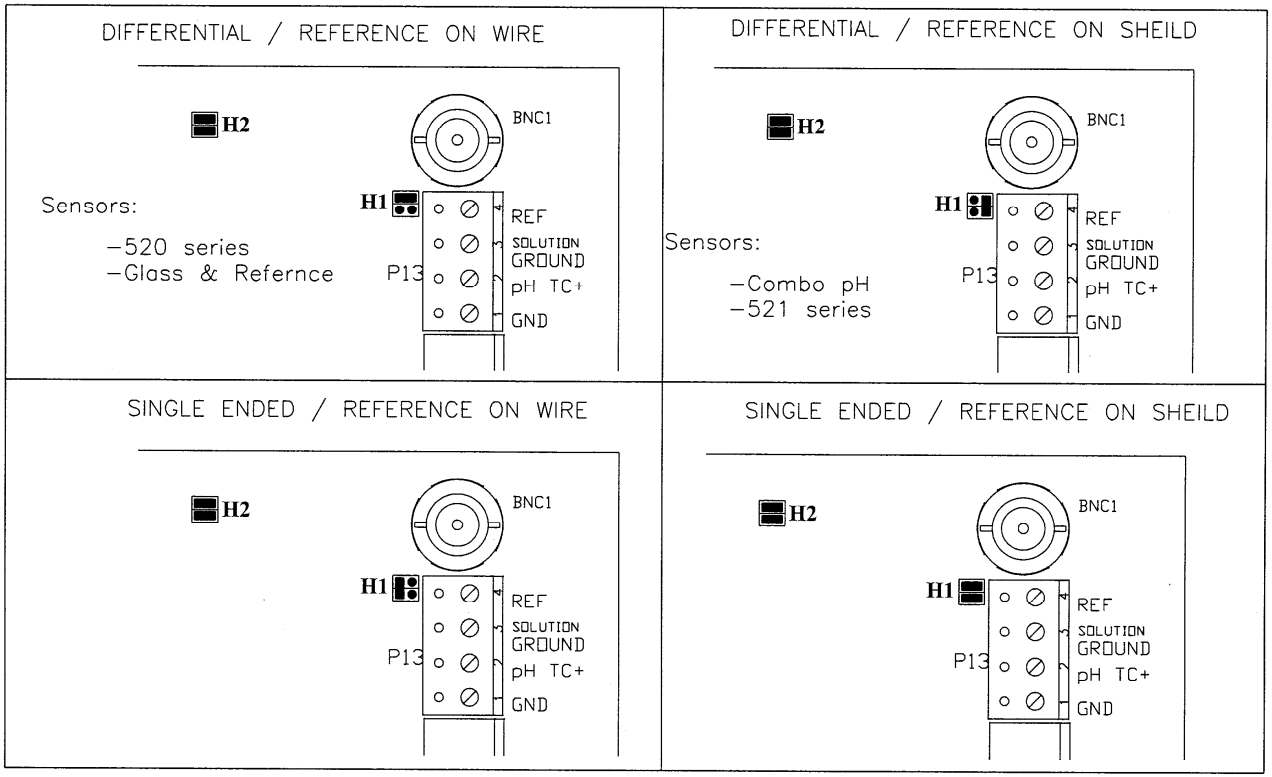
P/N 1038130 REV B

REVISION		REVISION HISTORY			
DWG	PART	DESCRIPTION	ECO	DWN/DATE	APVD/DATE
B	A	Update Plumbing	8452	DGK/2/11/04	LRS/2/11/04



P/N 1038130 REV B

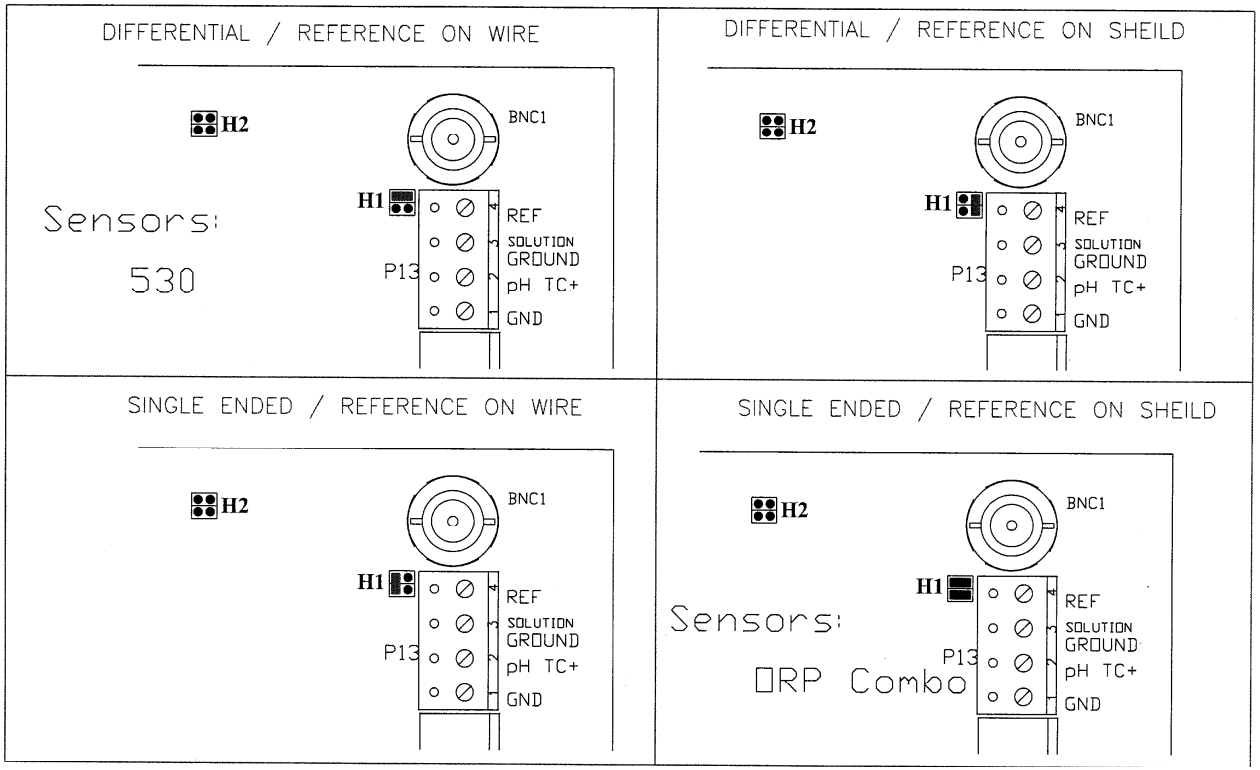
REVISION		REVISION HISTORY			
DWG	PART	DESCRIPTION	ECO	DWN/DATE	APVD/DATE
B	A	RELEASE	8452	DGK/2/11/04	LRS/2/11/04



pH JUMPER CONFIGURATIONS

P/N 1038130 REV B

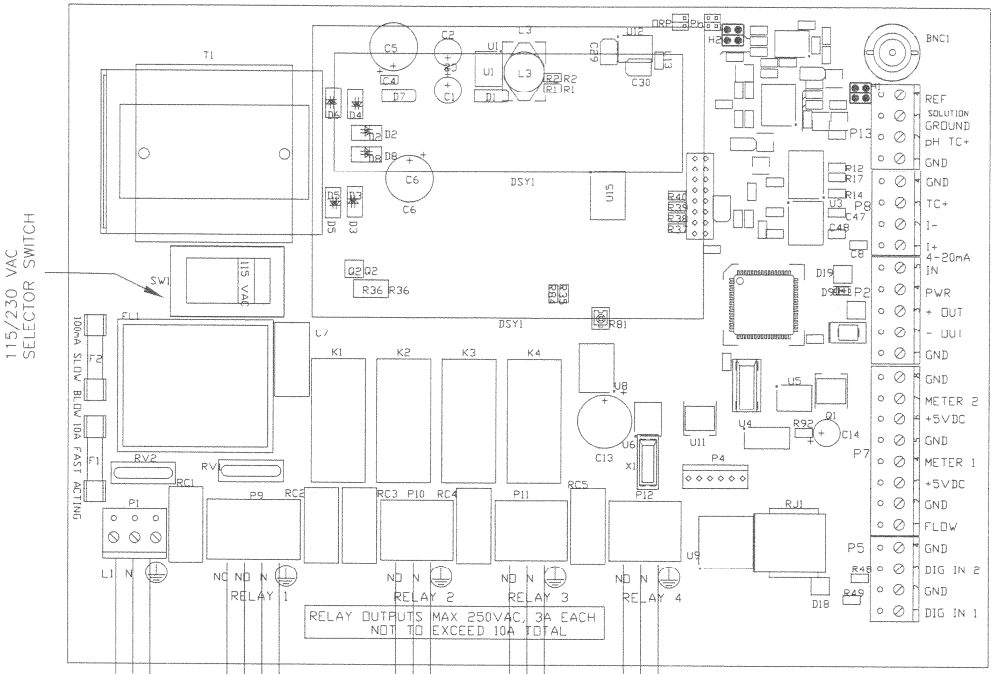
REVISION		REVISION HISTORY			
DWG	PART	DESCRIPTION	ECO	DWN/DATE	APVD/DATE
B	A	RELEASE	8452	DGK/2/11/04	LRS/2/11/04

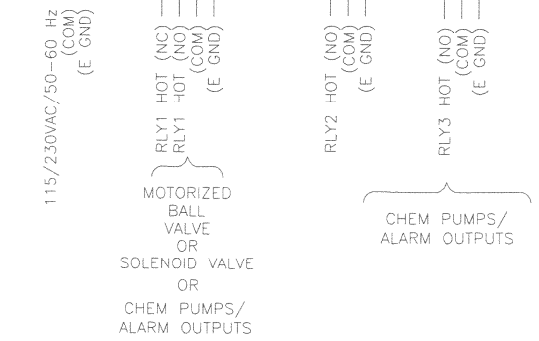


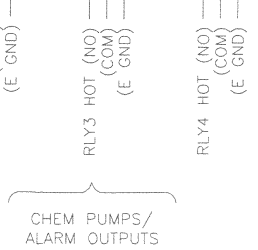
ORP JUMPER CONFIGURATOINS

P/N 1038130 REV B

REVISION		REVISION HISTORY			
DWG	PART	DESCRIPTION	ECO	DWN/DATE	APVD/DATE
A	A	RELEASE	8452	DGK/2/11/04	LRS/2/11/04



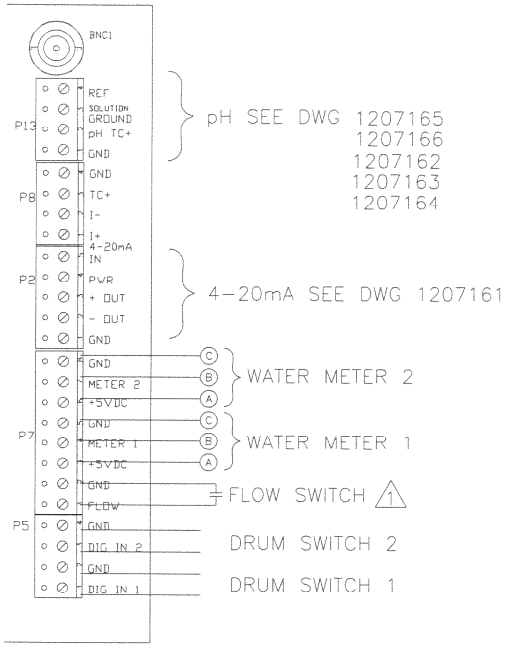


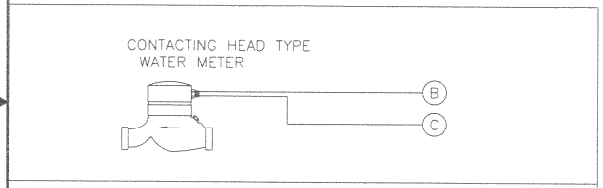


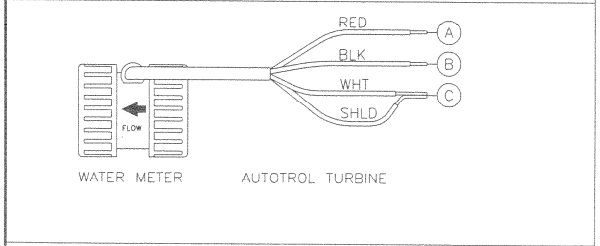
P/N 1038130 REV B

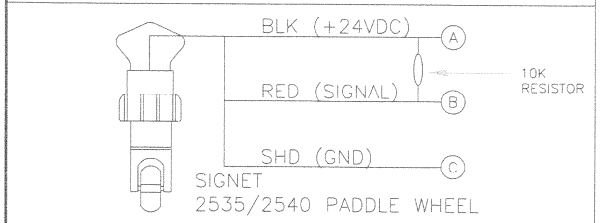
REVISION		REVISION HISTORY			
DWG	PART	DESCRIPTION	ECO	DWN/DATE	APVD/DATE
A	A	RELEASE	8452	DGK/2/11/04	LRS/2/11/04

NOTES: UNLESS OTHERWISE SPECIFIED;
1. IF NO FLOW SWITCH IS USED, SHORT OUT PINS 1 & 2 WITH WIRE.



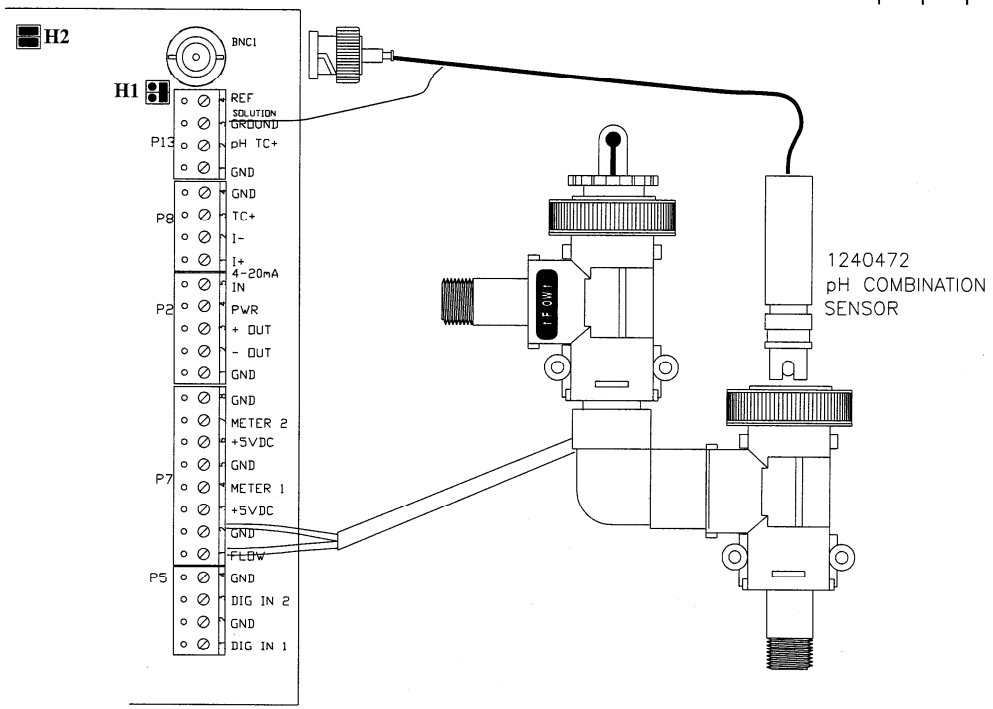






P/N 1038130 REV B

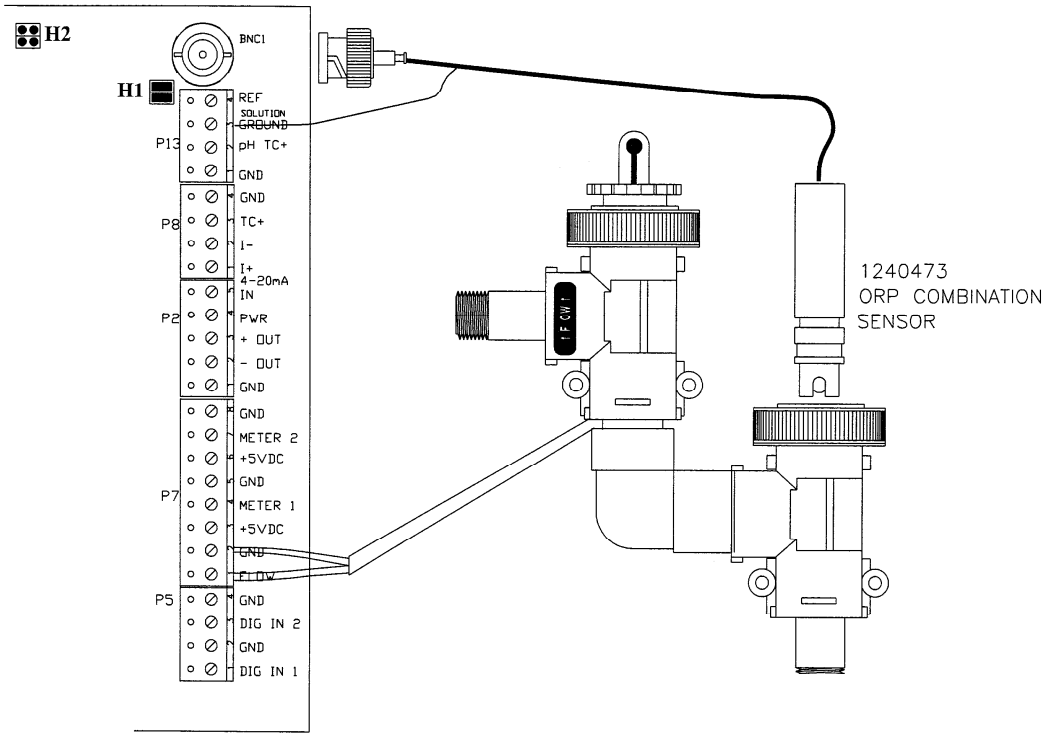
REVISION		REVISION HISTORY			
DWG	PART	DESCRIPTION	ECO	DWN/DATE	APVD/DATE
B	A	RELEASE	8452	DGK/2/11/04	LRS/2/11/04



1240472
pH COMBINATION
SENSOR

P/N 1038130 REV B

REVISION		REVISION HISTORY			
DWG	PART	DESCRIPTION	ECO	DWN/DATE	APVD/DATE
B	A	RELEASE	8452	DGK/2/11/04	LRS/2/11/04

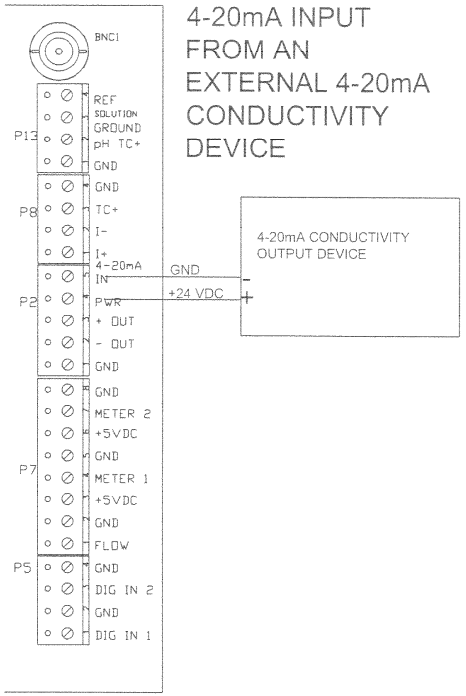


P/N 1038130 REV B

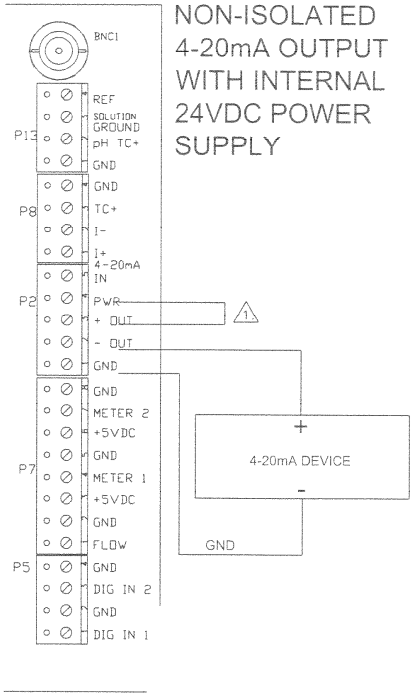
NOTES: UNLESS OTHERWISE SPECIFIED;
1. FOR INTERNAL 24VDC JUMPER WIRE IS REQUIRED.

REVISION		REVISION HISTORY			
DWG	PART	DESCRIPTION	ECO	DWN/DATE	APVD/DATE
A	A	RELEASE	8452	DGK/2/11/04	LRS/2/11/04

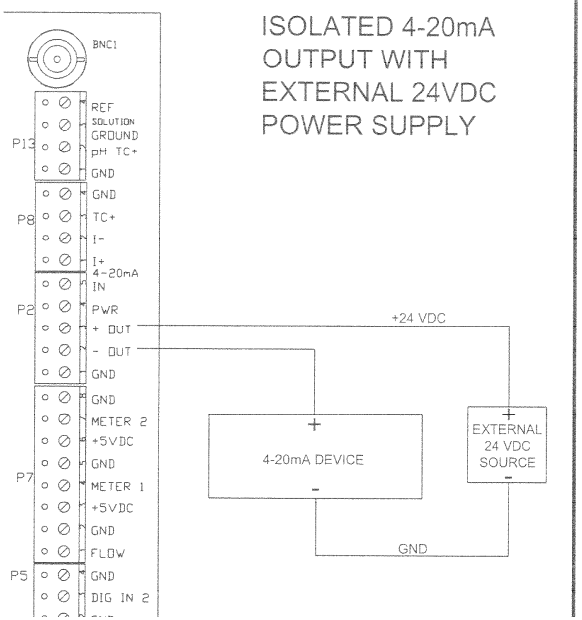
4-20mA INPUT FROM AN EXTERNAL 4-20mA CONDUCTIVITY DEVICE



NON-ISOLATED 4-20mA OUTPUT WITH INTERNAL 24VDC POWER SUPPLY



ISOLATED 4-20mA OUTPUT WITH EXTERNAL 24VDC POWER SUPPLY



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