PULSAFEEDER
MODEL B3410

MICROPROCESSOR-BASED
MULTI-BIOLER CONDUCTIVITY CONTROLLER

INSTALLATION & OPERATION MANUAL

SERIAL #:_____

Table of Contents

1 Quick Installation Sheet

1. Attach the four (4) supplied mounting feet to the back of the controller and NRLY enclosure either vertically or horizontally. Install the controller and NRLY 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. Install the conductivity nodes (NCON), water meters, chemical pumps, plumbing assemblies, valves, and the conductivity sensors (see drawing on back for Boilers).

3. Install the provided strain reliefs with nuts, if necessary, by removing the attached black plugs and inserting strain relief through hole. Wire the conductivity sensor, and water meters; if applicable (see drawing on back). Ensure wiring connections are correct or damage may occur.

4. Wire pumps and/or valves directly to the terminals. If using a motorized ball valve, wire as per wiring instructions. Refer to the instruction manual for more details.

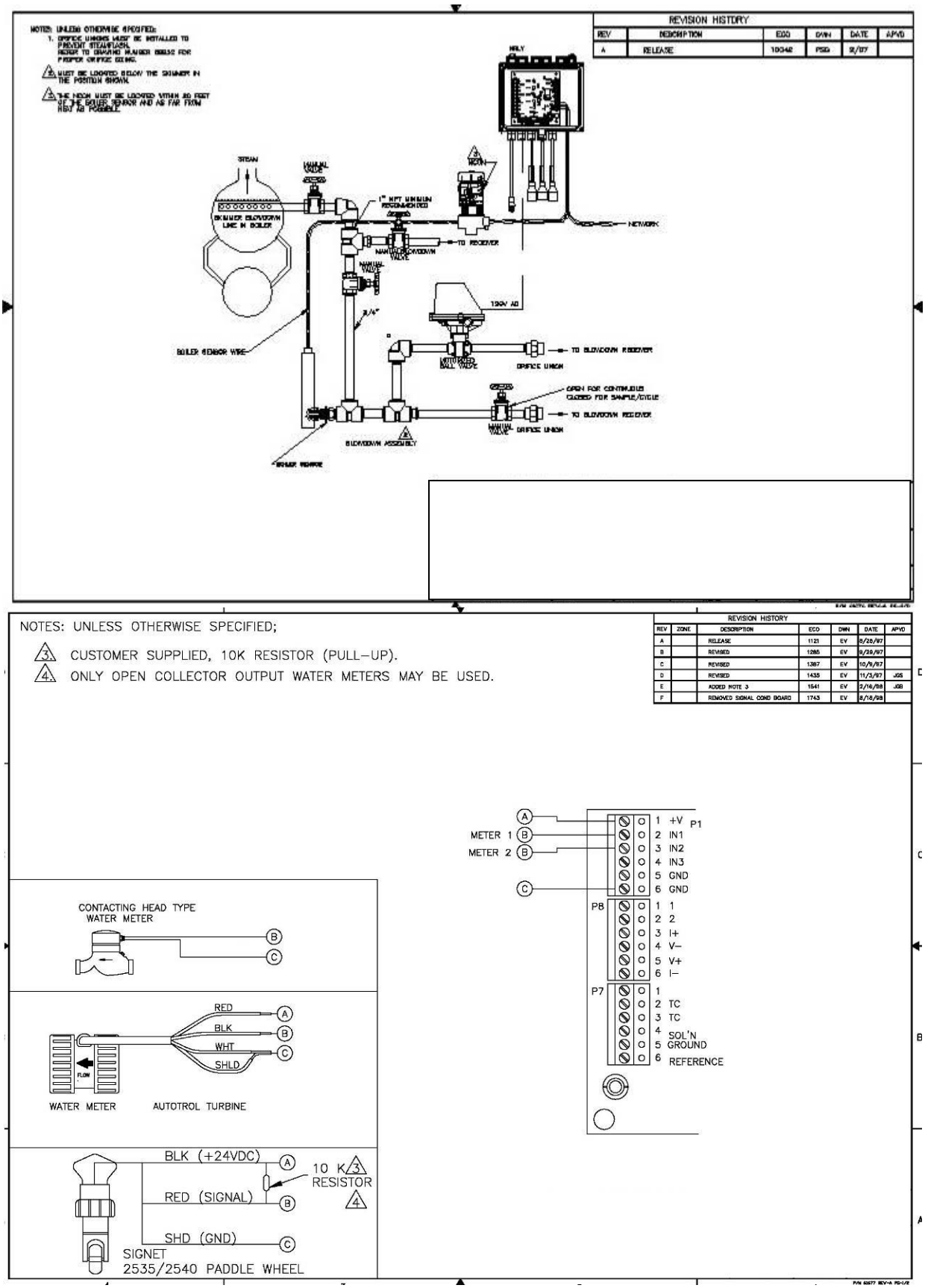
5. Apply power to the model B3410 controller, press "**BACK"** twice, press "**5"** System Setup, press "**2"** Initialization, press "**2"** Whole controller, press "**1"** Yes. After initialization, press the "**BACK"** key several times until you get to the main menu.

6. Install the conductivity nodes (NCON) in the software. Press "**5"** System Setup, press "**7**" Node Installation. See instruction manual for more details.

7. From the main menu press "**1**" Process, Press "**ENT"**. This screen allows manual control of the relay outputs to test the chemical pumps and valves. Press "**BACK"** to return to the Process screen.

8. To calibrate the conductivity take a sample with a handheld conductivity meter, press the "**CAL"** button and type in the conductivity value, press "**ENT"**. If the sample/cycle method is used, energize the blow relay, if necessary. See instruction manual for more details.

9. Program the model B3410 relays for conductivity control and chemical feed schemes. See instruction manual for more details.


REVISION HISTORY
REV DESCRIPTION ECO DWN DATE APVD
A RELEASE 10342 PSG 9/97
NOTES: UNLESS OTHERWISE SPECIFIED:
1. ORIFICE UNIONS MUST BE INSTALLED TO PREVENT STEAM FLASH. REFER TO DRAWING NUMBER 68832 FOR PROPER ORIFICE SIZING.
2. MUST BE LOCATED BELOW THE SKIMMER IN THE POSITION SHOWN.
3. THE NEON MUST BE LOCATED WITHIN 20 FEET OF THE BOILER SENSOR AND AS FAR FROM HEAT AS POSSIBLE.
STEAM
SKIMMER BLOWDOWN LINE IN BOILER
MANUAL VALVE
1" NPT MINIMUM RECOMMENDED
NEON
NETWORK
TO RECEIVER
MANUAL BLOWDOWN VALVE
MANUAL VALVE
120V AC
BOILER SENSOR WIRE
WITH ROD BALL VALVE
TO BLOWDOWN RECEIVER
ORIFICE UNION
OPEN FOR CONTINUOUS CLOSED FOR SAMPLE/CYCLE
TO BLOWDOWN RECEIVER
MANUAL VALVE
ORIFICE UNION
BLOWDOWN ASSEMBLY
BOILER SENSOR

REVISION HISTORY
REV ZONE DESCRIPTION ECO DWN DATE APVD
A RELEASE 1121 EV 8/28/97
B REVISED 1285 EV 9/28/97
C REVISED 1367 EV 10/9/97
D REVISED 1435 EV 11/3/97 JGS
E ADDED NOTE 3 1641 EV 2/16/98 JGS
F REMOVED SIGNAL COND BOARD 1743 EV 8/18/98
NOTES: UNLESS OTHERWISE SPECIFIED;
3. CUSTOMER SUPPLIED, 10K RESISTOR (PULL-UP).
4. ONLY OPEN COLLECTOR OUTPUT WATER METERS MAY BE USED.
METER 1
METER 2
P1
1 +V
2 IN1
3 IN2
4 IN3
5 GND
6 GND
P8
1 1
2 2
3 I+
4 V-
5 V+
6 I-
P7
1
2 TC
3 TC
4 SOL'N
5 GROUND
6 REFERENCE
CONTACTING HEAD TYPE WATER METER
RED
BLK
WHT
SHLD
FLOW
WATER METER
AUTOTROL TURBINE
BLK (+24VDC)
10 K RESISTOR
RED (SIGNAL)
SHD (GND)
SIGNET
2535/2540 PADDLE WHEEL

FIGURE A

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 Model B3410 is a LONWORKS Technology, microprocessor based, menu driven, multiple conductivity water treatment controller designed for use in boilers. The Model B3410 provides for conductivity tracking and control, flow monitoring and chemical injection for up to eight boilers. The Model B3410 is CSA and ANSI/UL approved.

The Model B3410 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.

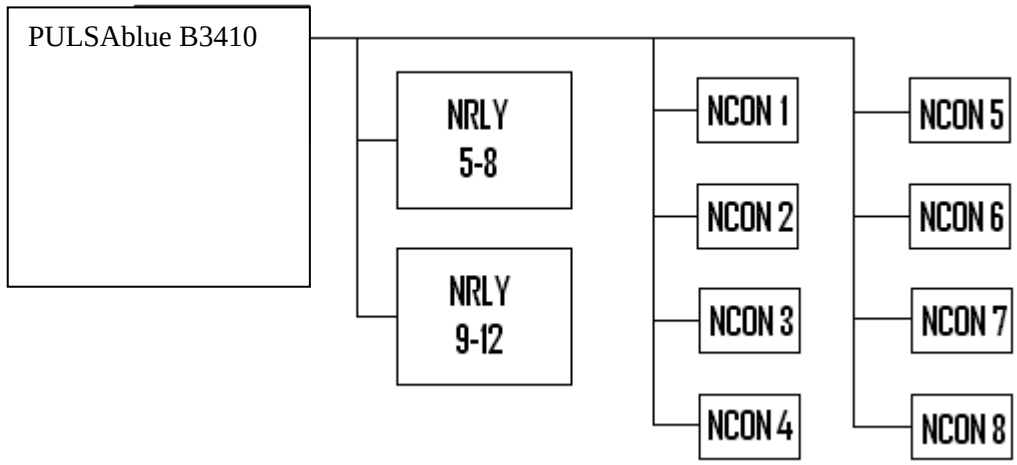
The Model B3410 is user-friendly with a graphical screen and 16-key numeric keypad. It accepts multiple inputs and is easily configured. This controller can easily be upgraded in the field. It's a combination of reliability, accuracy, security and simplicity.

LONWORKS Technology gives you a high level of flexibility with the capability of adding nodes, additional inputs and outputs, for monitoring and control. These nodes have functions such as extra relay outputs, and conductivity inputs.

Nodes are added, using the –NIN option, according to a mapped network. The mapped network shows the full node addition capability of the LonWorks based B3410 series controllers.

The mapped network for the model B3410 shows that two relay nodes and eight conductivity sensor nodes can be used.

The complete mapped network is shown below.



5 Features, Benefits, Specifications

5.1 Features

- Enclosure is NEMA 4X rated.
- Sample/cycle or continuous conductivity control of blowdown.
- Control and monitor 1 to 8 boilers.
- Future boilers can be added to an existing system.
- Boiler input(s) can be substituted to monitor condensate.
- Steam flashing detector and compensation.
- Two (2) water meter inputs. Records both makeup (**MTR1**) and Blowdown (**MTR2**) water meter total gallons.
- Configure Blowdown water meter (**MTR2**) as second makeup meter.
- Four user configurable relays for chemical addition and alarms. These relays can be configured based on water meter input, percent of time, or by selectable alarms.
- Four additional (eight with NRLY) relays for conductivity control, chemical feed and alarms.
- Three security levels: View only, operator, technician
- Remote communications available as an option.
- 16-key numeric keypad and illuminated graphical display allow for quick and easy programming.
- The Model B3410 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 B3410 includes a battery backup device to retain information such as water meter totals, and clock and calendar information. Battery life is approximately 3 months if no power is applied to the controller.

5.2 Benefits

- Multiple control options in a single economical package.
- One controller can monitor and datalog up to 8 Boilers.
- Very accurate control of chemical feed and boiler conductivity.
- Control results in fuel savings by preventing excessive blowdown.
- Prevents carryover due to excessive conductivity.
- Very low maintenance.
- Tolerant to power surges and brownouts.
- There is plenty of protected room inside the enclosure for electrician wiring.
- Two water meter inputs provided.

5.3 Specifications

Conductivity range
0-8000 µS

Conductivity Accuracy
± 40 µS

Conductivity Resolution
10 µS

Accuracy & Repeatability
± 1.0% of scale

Deadband/Setpoint
User programmable

Auto/Manual outputs
Menu selectable

Keypad
16 - key push buttons

Display
Illuminated 128 x 64
pixel LCD

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

Timer
Relay run time exceeded.

Output relays (8 -12)
4 User selectable
4 Blowdown control or selectable use
4 Additional relays possible

Relay ratings
3A each, 12A total

Power
120/240 VAC 50/60 Hz 6W

Ambiant temp
32° - 158°F (0 - 70°C)

Storage temp
32° - 158°F (0 - 70°C)

SR2 Boiler Sensor Ratings
Pressure - 600 psi
Max. Temperature - 486°F
Body - Carbon Steel
Electrodes – 416 S.S.
Insulator - PEEK

Languages
Selectable:
English, plus one of:
- Spanish
- German
- French

Enclosure
NEMA 4X

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.

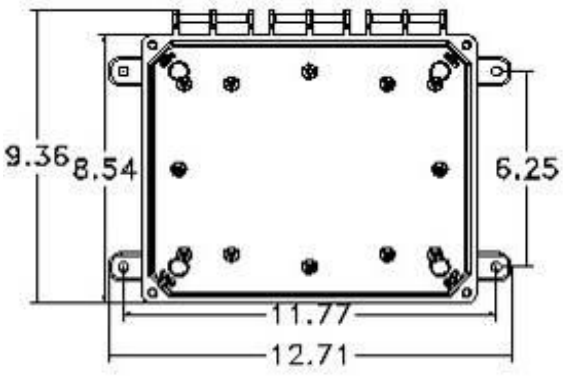
☎ **If shipping damage has occurred, call the Pulsafeeder Customer Service Department at (800) 333-6677 and return the controller to the factory in the original carton.**

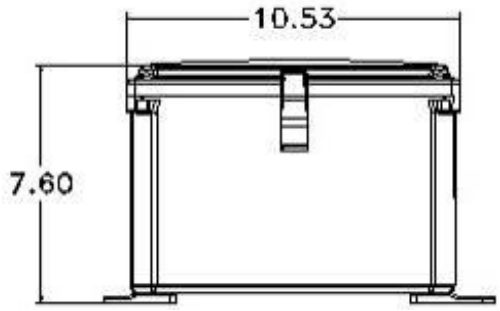
6.2 Mounting

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.
- 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 about 8 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

There are two methods of automatic control of the conductivity in a boiler; sample/cycle and continuous sample. In the continuous sample method, boiler water is continuously being blown down past the boiler sensor. In the sample/cycle method, boiler water is periodically blown down past the sensor based on time.

It is critically important that the blowdown piping is plumbed appropriately for the type of control method that you will use. If the piping is not plumbed correctly the controller will not be able to control conductivity.

The boiler blowdown rate requirement is used to determine the method of control (continuous sample or sample/cycle) you should use. If your boiler requires greater than 1000 pounds per hour of blowdown to maintain conductivity then the continuous sample method should be used. If your blowdown requirement is less than 1000 pounds per hour, the sample/cycle method is appropriate. If your blowdown rate requirement changes above and below 1000 pounds per hour based on steam load then you may have to switch between sample/cycle control and continuous sample control.

The model B3410 can be used for either sample/cycle control or continuous sample control of the conductivity in the boilers. The blowdown piping is the limiting factor. The installation drawings in the back of this manual show how to plumb the boiler sample line for sample/cycle, continuous sample, and a method that covers both methods of control.

For each method of blowdown control, the controller can use either the model SR2N boiler sensor for hot (>200°F) samples or the model SR4N temperature compensated boiler sensor for cooled (<200°F) samples.

To prevent steam flashing and damage to the controller refer to the installation drawing in the back of the manual and notes below.

- Use piping from the boiler skimmer line as the sample and blowdown line.

NOTE: DO NOT USE THE BOTTOM BLOWDOWN OUTLET AS THE SAMPLE OR AUTOMATIC BLOWDOWN LINE.

- The maximum allowed wire distance between the NCON and the sensor is 20 ft. The maximum distance between the NCON and the controller is 400 meters.

NOTE: DO NOT RUN THE SENSOR WIRING IN THE SAME CONDUIT AS THE MOTORIZED VALVE WIRING.

- If using conduit between the sensor and controller, allow a place for water to escape if the sensor leaks. This will help prevent water damage to the controller.

- Use orifice plates or globe valves down stream of the sensor to prevent steam flash. The orifice plates or the globe valve should be mounted within 5 feet of the sensor. Orifice plates (or globe valve) and the sensor must be installed horizontally (as shown in the drawing).

- The sensor should be located at least two feet **below** the water level in the boiler.
- Ensure that there are no restrictions between the skimmer line and the orifice plates (or globe valve) and all valves upstream of the boiler sensor are fully open.
- Be sure to provide isolation valves in the sample line to allow for maintenance of the sensor.

Refer to section 7.6 for the orifice sizing chart

7.1 Sample/Cycle Plumbing Installation with the SR2N Sensor

To use the model B3410 boiler controller in the sample/cycle mode, the plumbing installation must be done in accordance with the suggested installation drawing in the back of this manual. It is very important to complete the plumbing installation exactly as it is shown in the drawing because improper installation can cause steam flash to occur which will cause erratic conductivity readings. It is recommended that the Pulsafeeder model PL5 or PL575 plumbing assembly be used.

Note: Do not use the SR2N boiler sensor with a sample cooler. The SR2N does not have temperature compensation and requires a temperature >200°F for proper operation.

Description of sample/cycle plumbing installation (refer to drawing at the back of this manual):

The sample line should come out of the surface blowdown line and drop straight down to at least 2 to 3 feet below the water level of the boiler. At the bottom of that line the sensor should be mounted horizontally. Down stream of the sensor on a horizontal pipe should be mounted the blowdown valve and then the flow restriction device (orifice union and plate, or globe valve). The flow restriction device should be mounted within 5 feet of the sensor. Down stream of the flow restriction device is the blowdown receiver or drain.

7.2 Sample/Cycle Plumbing Installation with the SR4N Sensor

The model B3410 can be used with the model SR4N temperature compensated boiler sensor. The SR4N sensor should be mounted down stream of a sample cooler. The temperature compensation is limited to about 200°F.

Note: For proper operation, the sample cooler should have adequate flow to ensure a constant output temperature of <200°F.

Description of sample/cycle plumbing installation:

The sample line should come out of the surface blowdown line and go to the sample cooler and then the boiler sensor. The sensor should be mounted horizontally. Down stream of the sensor on a horizontal pipe should be mounted the blowdown valve and then the flow restriction device (orifice union and plate, or globe valve). The flow restriction device should be mounted within 5 feet of the sensor. Down stream of the flow restriction device is the blowdown receiver or drain.

7.3 Continuous Sample Plumbing Installation with the SR2N Sensor

To use the model B3410 boiler controller in the continuous sample mode, the plumbing installation must be done in accordance with the suggested installation drawing in the back of this manual. It is very important to complete the plumbing installation exactly as it is shown in the drawing because improper

installation can cause steam flash to occur which will cause erratic conductivity readings. It is recommended that the Pulsafeeder model PL6 or PL675 plumbing assembly be used.

Description of continuous sample plumbing installation (refer to drawing at the back of this manual):

The sample line should come out of the surface blowdown line and drop straight down to at least 2 to 3 feet below the water level of the boiler. At the bottom of that line the sensor should be mounted horizontally. Down stream of the sensor on a horizontal pipe should be mounted the flow restriction device (orifice union and plate, or globe valve). The flow restriction device should be mounted within 5 feet of the sensor. Down stream of the flow restriction device is the blowdown receiver or drain. A second line should tap off of the sample line either before or after the sensor but before the flow restriction device in the sample line. This second line is used for the automatic blowdown valve. The line with the blowdown valve must have a flow restriction device.

7.4 Continous Sample Pluming Installation with the SR4N Sensor

The model B3410 can be used with the model SR4N temperature compensated boiler sensor. The SR4N sensor should be mounted down stream of a sample cooler. The temperature compensation is limited to about 200°F.

Note: For proper operation, the sample cooler should have adequate flow to ensure a constant output temperature of <200°F.

Description of continuous sample plumbing installation:

The sample line should come out of the surface blowdown line and go to the sample cooler and then the boiler sensor. The sensor should be mounted horizontally. Down stream of the sensor on a horizontal pipe should be mounted the flow restriction device (orifice union and plate, or globe valve). The flow restriction device should be mounted within 5 feet of the sensor. Down stream of the flow restriction device is the blowdown receiver or drain. A second line should tap off of the sample line either before or after the sensor but before the flow restriction device in the sample line. This second line is used for the automatic blowdown valve. The line with the blowdown valve must have a flow restriction device.

7.5 Plumbing Installation for Sample/Cycle and Continuous Sample

Sometimes it is necessary to switch the controller from sample/cycle to continuous sample mode or vice versa due to steaming loads. This method of plumbing allows the operator to change modes of operation by changing the position of just one valve and setting up the controller for the appropriate mode of operation. The description below is for use with the SR2N boiler sensor but, it can be modified for use with the SR4N boiler sensor.

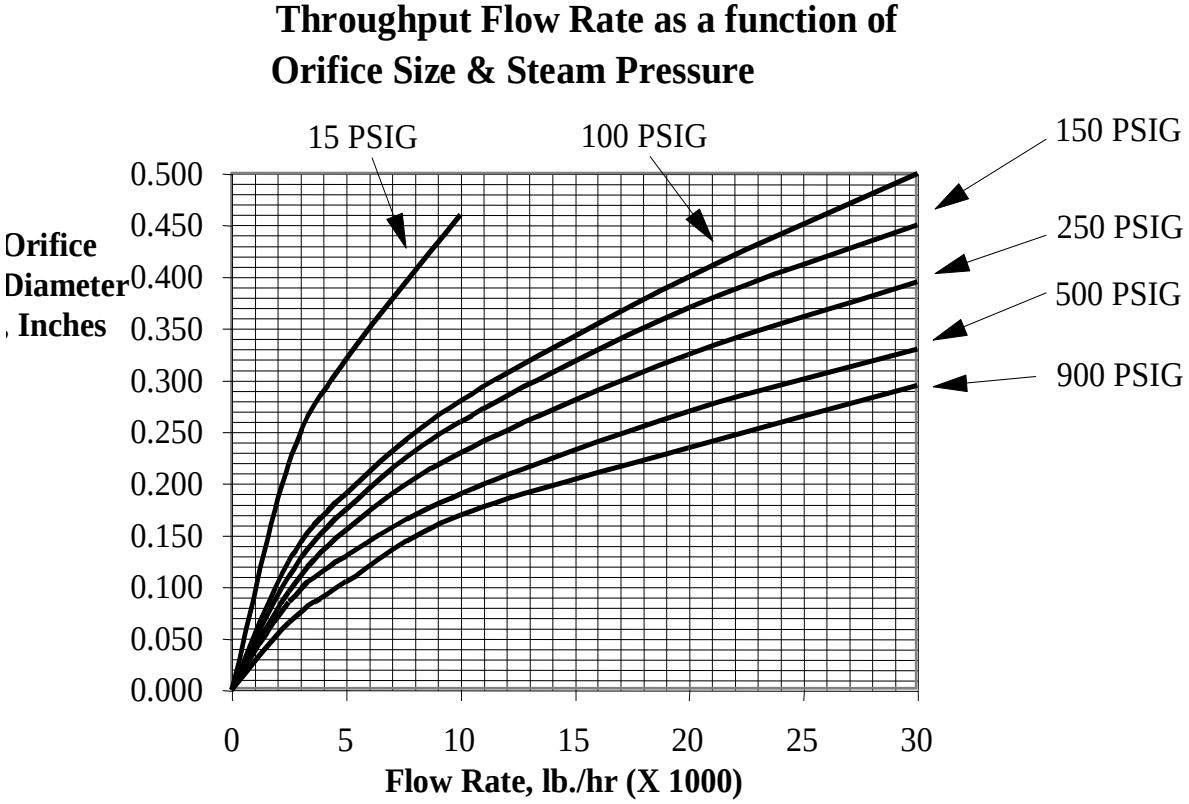
Description of plumbing (refer to drawing at the back of this manual):

The sample line should come out of the surface blowdown line and drop straight down to at least 2 to 3 feet below the water level of the boiler. At the bottom of that line the sensor should be mounted horizontally. Down stream of the sensor on a horizontal pipe should be mounted an isolation valve and a flow restriction device (orifice union and plate, or globe valve). The flow restriction device should be mounted within 5 feet of the sensor. Down stream of the flow restriction device is the blowdown receiver or drain. A second line should tap off of the sample line after the sensor but before the isolation valve in

the sample line. This second line will have an automatic blowdown valve and a flow restriction device. Down stream of the flow restriction device is the blowdown receiver or drain.

7.6 Orifice Union Sizing Chart

Refer to the chart below to determine the orifice size that is required for a specific flow rate.



8 Electrical Installation

8.1 Incoming Power 115/230 VAC

The Model B3410 and NRLY can be powered from either 115 VAC at 50/60 Hz. The Model B3410 and NRLY come with a power cord and receptacles. The power cord and receptacles are rated for 115VAC.

The incoming power is connected to terminal block TA1 at the bottom left corner of the power supply board. There is a hot or line input (terminal 8), 4 neutral inputs (terminals 4, 5, 6, and 7) and 3 earth ground inputs (terminals 1, 2, and 3). The hot is wired to the fuse holder located on the bottom of the enclosure. The neutrals are wired directly to terminals 4-7 of terminal block TA1. 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 receptacles. The receptacle on the far left is relay #1 and the receptacle on the far right is relay #7.

Relay #1 and #2, and #5 through #8 have both a normally open and normally closed contacts. This is designed for use with motorized valves. The normally open (NO) contact is connected to the open connection of the valve and the normally closed (NC) contact is connected to the close connection of the valve. Relays #3 and #4 only have a normally open contact. Each relay output requires a neutral connection and an earth ground connection for proper operation.

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

NOTE: DO NOT RUN THE SENSOR WIRING IN THE SAME CONDUIT AS THE MOTORIZED VALVE WIRING.

WARNING! DO NOT **CONNECT CHEMICAL PUMPS THAT ARE LARGER THAN 1/6 HORSEPOWER. THE CONTROL RELAYS ARE INTENDED FOR ELECTRONIC OR SMALL MOTOR-DRIVEN CHEMICAL PUMPS. LARGER PUMPS REQUIRE THE -HR OPTION WITH 25-AMP-RATED INTERPOSING RELAYS. CONTACT PULSAFEEDER FOR SPECIAL INSTUCTIONS.**

8.3 Water Meters

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 controller 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 P1 which is the top terminal block on the I/O board.

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

8.4 Sensor Wiring

The model B3410 can be used with the 2-electrode boiler sensor for hot (>200°F) samples, or with the 4-electrode boiler sensor for cooled (<200°F) samples.

The 2-electode boiler sensor uses four wires between the sensor and the conductivity node (NCON). Two wires are connected to each electrode. The sensor electrode wires are connected to the 8-section terminal block on the NCON terminals 2, 3, 4, and 5. Refer to the drawing in the back of this manual for specific wiring instructions.

The 4-electrode boiler sensor uses six wires between the sensor and the conductivity node (NCON). One wire is connected to each electrode and two wires are used for the temperature compensation. The

sensor electrode wires are connected to the 8-section terminal block on the NCON terminals 2, 3, 4, 5, 6, and 7. The temperature compensation wires are connected to terminal P7 terminals 2 and 3. Refer to the drawing in the back of this manual for specific wiring instructions.

NOTE: DO NOT RUN THE SENSOR WIRING IN THE SAME CONDUIT AS THE MOTORIZED VALVE WIRING.

NOTE: THE MAXIMUM ALLOWED WIRE DISTANCE BETWEEN THE CONTROLLER AND THE SENSOR IS 20 FT.

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8.5 Node Wiring

The conductivity nodes (NCON) and relay nodes (NRLY) must be wired to the controller before installation and programming can take place. Nodes require +24 VDC for operation and twisted pair wire for data transmission. The NIN option card can provide the +24 VDC for up to two nodes using non-twisted pair wire. If using three or more nodes an external +24 VDC power supply run in parallel is recommended.

Recommended twisted pair for data specifications are:

Beldon 85102, single twisted pair, stranded 9/29, unshielded, plenum.
Beldon 8471, single twisted pair, stranded 9/29, unshielded, nonplenum.
JY (ST) Y 2 X 2 X .8, UL Level IV 22 AWG, twisted pair, typically solid and unshielded.
Four wire helical twist, solid, shielded.
If shielded cable is used, the shield should be connected to earth ground via a 470K ohm, .25 watt, metal film resistor to prevent static charge buildup.

Normally, the conductivity nodes are wired directly to the relay node and the relay node is wired to the NIN card inside the controller enclosure. However, due to the advantages of LonWorks technology, the nodes can be daisy-chained together in multiple configurations (refer to drawing in back of manual).

Please refer to the diagram in the back of this manual for wiring instructions.

9 Functional Overview

9.1 Front Panel

Figure 1: *Model 3400 Front Panel with Display*

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.
LANG = to change languages.
CAL = to program a Menu selection.

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

ed for ease of viewing. It has multiple lines to display information such as lay status, relay configuration, clock, flow totals for both water meters, a

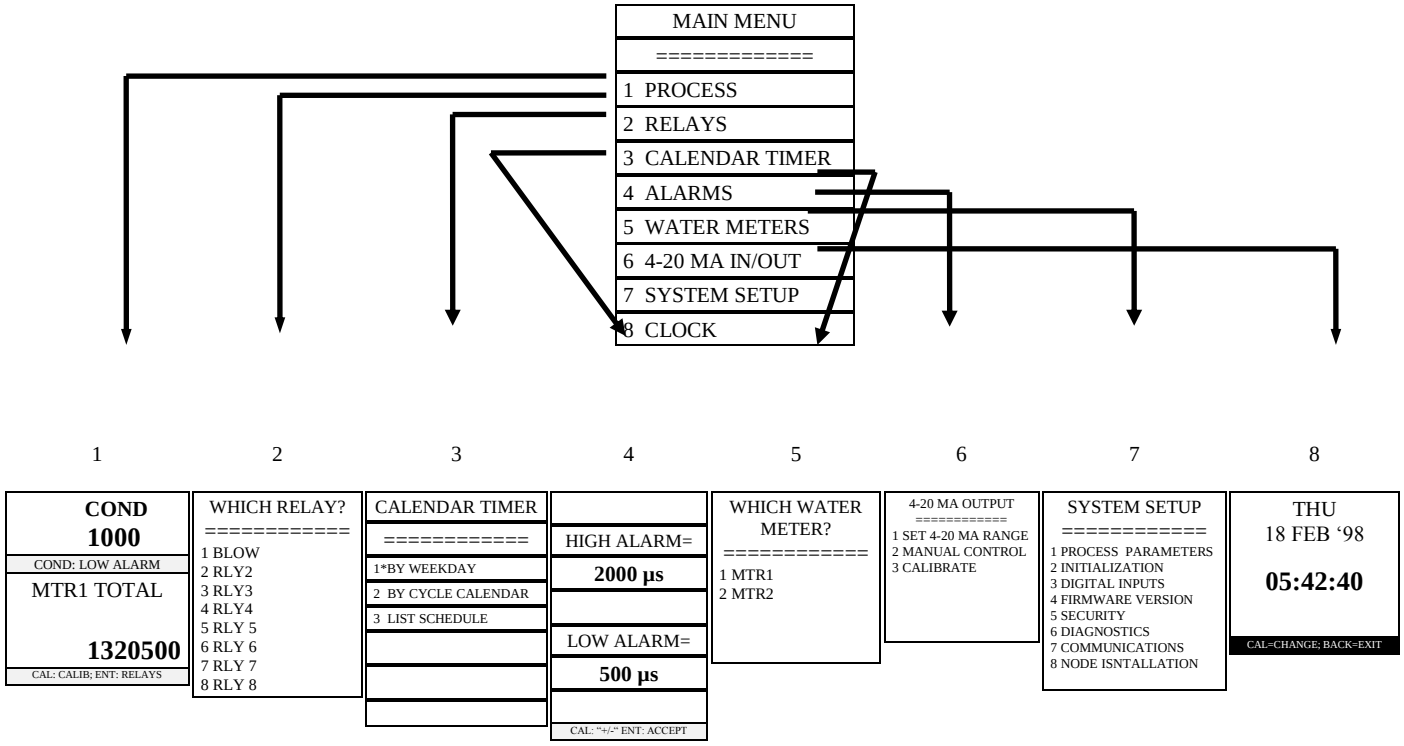
9.3 Keypad

The unit uses a 16-key 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	To change languages.
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.

9.4 Menu

The model B3410 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.



9.5 Security Levels

The controller has a security levels to prevent tampering of the controller. There are three (3) security levels: 1) **View Only**, 2) **Operator** and 3) **Technician**. When the controller is in the **View Only** or **Operator** security level, the menu is locked out. In **View Only,** access is limited to manual operation of the relays, and viewing all of the process screens. In the **Operator** mode the user can operate the relays manually, view the process screens, and calibrate the controller. He cannot change any other settings. In the **Technician** mode the operator has full access to all of the menus.

A password is required to change from a tight security level to a less restrictive security level. Each level has its own factory-preset password (2222 for Technician, 1111 for Operator). If the controller is in the

View Only or **Operator** mode just press the appropriate password on the keypad to change to a less restrictive security mode.

The passwords can be changed to personalized passwords from the **Technician Level Menu**.

NOTE: IF YOU USE PERSONALIZED PASSWORDS, MAKE SURE THEY ARE RECORDED IN A SAFE AND SECURE PLACE.

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 either 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 14.7 of this manual to initialize the controller.

If applicable, install each node in software.

Set the clock by following section 15

Set the high and alarms by following section 13.4.17

Calibrate the sensor by following section 12

Configure the relays for operation by following section 13.1

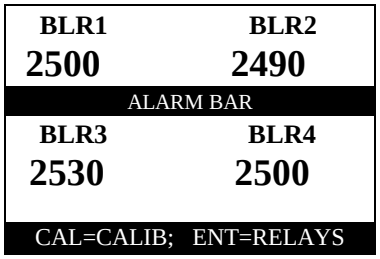
Verify operation of the controller before leaving the area.

11 Operation of the Controller

11.1 Process Screen

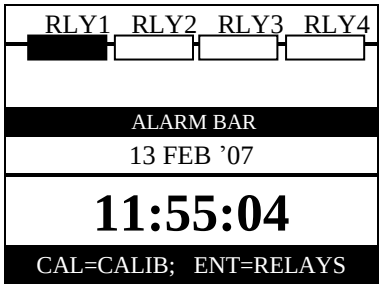
The screen that is used the most in the B3410 controller is the Operation Screen. Below are the Operation screen views. The Operation screen is used to display the conductivity readings, relay configurations and status, water meter readings, the date and time, and alarms. The alarm bar is displayed in the middle of each Operation screen. It is solid in appearance and flashes showing the current active alarms in sequence if there are multiple alarms.

1 - CONDUCTIVITY SCREEN

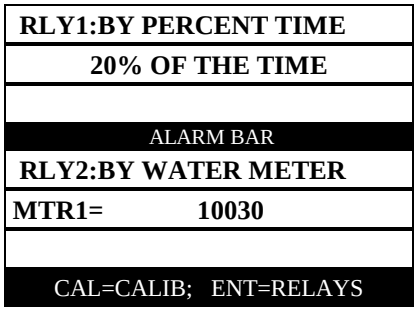


- There are many different screens available in the **OPERATION** screen. These screens allow you to view the unit's settings (incl. time setting, relay set-ups, total flow, etc.) without the danger of altering them. Access these screens by using the ↑ and ↓ keys to scroll through the available screens.
- Press "**ENT"** to manually enable a relay for testing or troubleshooting purposes.
- Press "**CAL**" to calibrate the conductivity.
- Press "**BACK**" to access the main menu.

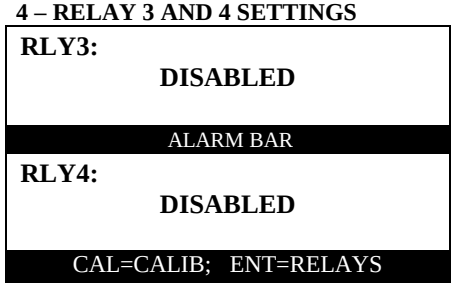
2 -TIME AND DATE SCREEN



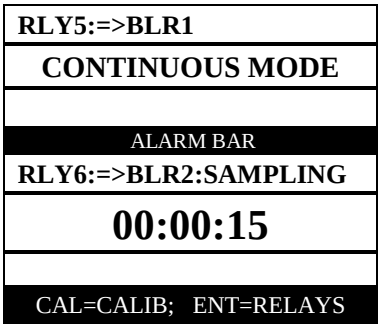
3 – RELAY 1 AND 2 SETTINGS



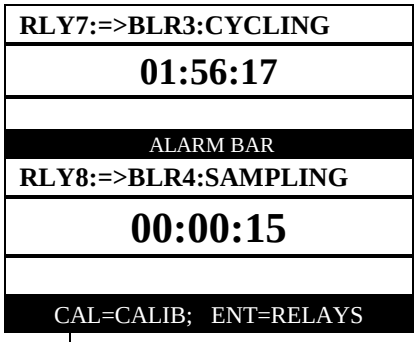
4 – RELAY 3 AND 4 SETTINGS



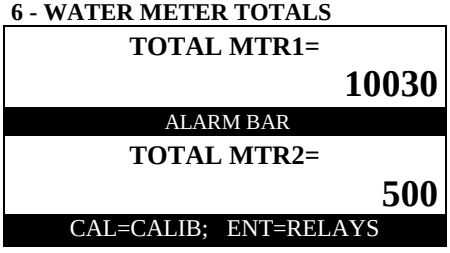
4 – RELAY 5 AND 6 SETTINGS



5 – RELAY 7 AND 8 SETTINGS



6 - WATER METER TOTALS

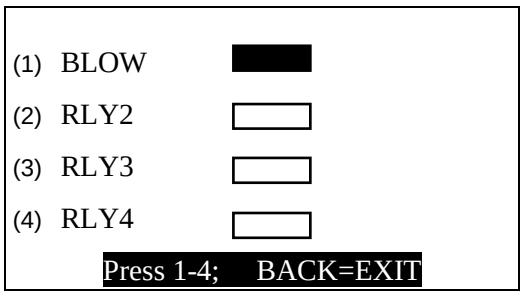


There will be additional screens for the additional inputs or outputs. Please see your specific node for more information.

11.2 Manual Operation of the Relays

All eight 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 the number keys to manually change the state of that particular relay. To access relays 5 - 8 or relays 9 - 12 press the down arrow key. 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. Use care when operating relays manually with no flow in the system.**

12 Calibration of Conductivity

12.1 Calibration of Conductivity

The conductivity requires periodic calibration. Calibration is usually required after cleaning the sensor.

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 blowdown water to properly calibrate the controller. A hand-held conductivity meter that tests the sample works well for this purpose. If a meter that measures ppm is used, refer to the conductivity vs. ppm chart in section 12.3 and convert the ppm to an approximate conductivity value.

The model B3410 controller uses a single point calibration. A two point calibration is not necessary if using a Pulsafeeder conductivity sensor.

12.1.1 Continuous Mode

In the continuous sample mode, the boiler is continuously being blown down.

- Ensure that the controller is operating with good flow past the sensor.
- Take an un-neutralized sample of the water and measure with a hand-held conductivity tester.
- From the **OPERATION** screen, press "**CAL**" to enter the **WHICH CONDUCTIVITY?** screen.
- Use the keypad to select the appropriate boiler conductivity. Use the keypad to input the conductivity reading from the hand-held. Press "**ENT**".
- Take another hand-held sample to verify calibration.

12.1.2 Sample/Cycle Mode

In the continuous sample mode, the boiler is continuously being blown down.

- Ensure that the controller is operating with good flow past the sensor.

- Take an un-neutralized sample of the water and measure with a hand-held conductivity tester.
- From the **OPERATION** screen, press "**CAL**" to enter the **WHICH CONDUCTIVITY?** screen.
- Use the keypad to select the appropriate boiler conductivity. Use the keypad to input the conductivity reading from the hand-held. Press "**ENT**".

Take another hand-held sample to verify calibration

12.2 Calibration check of conductivity in buffer solutions

This check can be performed with the 4-electrode (SR4) boiler sensor only. This check is not valid with the 2-electrode boiler sensor (SR2) because the SR2 requires a hot sample (>200°F) to read properly.

To check the calibration of the sensor in buffer solutions, the sensor is placed in a container of the buffer solution. Ensure that the sensor tips are centered in the container away from the edges and the bottom of the container. The conductivity values displayed can vary depending on the position of the conductivity sensor in the container of buffer solution.

Perform the calibration check as follows:

- Shut the isolation valves in the boiler blow down line.
- Remove the conductivity sensor and place it in the buffer solutions.
- Verify calibrations in at least two buffer solutions.
- Re-install the sensor into the plumbing.
- Open the isolation valves to the blow down line.
- Verify operation before leaving area.

12.3 Conductivity vs. ppm

The unit measures the conductivity of the water. The ppm of the water may be measured instead of conductivity. If ppm is measured, use the following chart for an approximation of the conductivity level and calibrate to the conductivity level that is closest to the ppm level that is measured. Remember this is just an approximation because the ions that make up the conductivity may be different than the particles that make up the ppm reading.

Conductivity vs. PPM Table

µS/cm	ppm	µS/cm	ppm	µS/cm	ppm

2	**1**	**120**	**68**	**900**	**560**
4	**2.1**	**140**	**80**	**950**	**600**
6	**3.2**	**160**	**91**	**1000**	**630**
8	**4.2**	**180**	**100**	**1575**	**970**
10	**5.2**	**200**	**115**	**1575**	**1300**
12	**6.4**	**220**	**127**	**2500**	**1700**
14	**7.4**	**240**	**139**	**3000**	**1575**
16	**8.5**	**260**	**150**	**3400**	**2400**
18	**9.6**	**280**	**164**	**4000**	**2750**
20	**11.0**	**300**	**176**	**4500**	**3150**
25	**13.5**	**350**	**210**	**5000**	**3500**
30	**16.0**	**400**	**240**	**5500**	**3900**
35	**19.0**	**450**	**270**	**6000**	**4300**
40	**22.0**	**500**	**300**	**6500**	**4700**
45	**24.5**	**550**	**335**	**7000**	**5000**
50	**27.5**	**600**	**370**	**7500**	**5400**
60	**33.0**	**650**	**400**	**8000**	**5800**
70	**39.0**	**700**	**435**	**8500**	**6200**
80	**45.0**	**750**	**470**	**9000**	**6600**
90	**51.0**	**800**	**500**	**9500**	**7000**
100	**56.0**	**850**	**530**	**10,000**	**7400**

13 Main Menu

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

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**.

Certain menu items are only visible if certain conditions apply, such as: nodes are installed, or other parameters are configured. If a menu item does not appear in the menu it most likely means that the option is not installed or configured.

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

13.1 Configuring the Relays

To access the relay configuration screen from the **MAIN MENU,** press "**2**" or highlight **RELAYS** and press "**ENT**". The following screen will appear.

```
RELAY OPTIONS
=========================
1*DISABLED
2 WATER METER
3 PERCENT OF TIME
4 BY SELECTED ALARMS
5 CHANGE MY NAME
```

Select the relay that you want to program.

Relays 1-4 are used for chemical feeds and alarms. Relays 5-12 are used for blowdown control and chemical feeds and alarms. Because there are different configurations available for relays 5-12 will be covered separately from relays 1-4.

13.1.1 Disabled

The blowdown relay can be disabled. When a relay is disabled, it will not energize automatically.

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

13.1.2 By Water Meter

Relays 1, 2, 3, and 4 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. Press "**ENT**".

13.1.3 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.

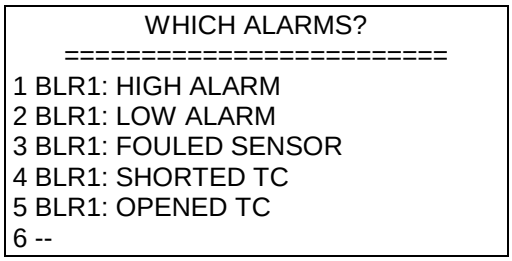
$$10\% \times 24\ \frac{\text{hours}}{\text{Day}} \times \frac{1\text{gallon}}{\text{Hour}} = \frac{2.4\ \text{Gallons}}{\text{Day}}$$

From the **RELAY OPTIONS** screen press"**3**" **BY PERCENT TIME**.
Use the keypad to enter the percentage of time desired. Press "**ENT**".

13.1.4 By Selected Alarms

Relays 1, 2, 3, and 4 can be configured as alarm relays. The alarms that will cause the relay to activate are selectable from the conductivity inputs. The selectable alarms include: **HIGH CONDUCTIVITY, LOW CONDUCTIVITY, FOULED CONDUCTIVITY SENSOR, SHORTED TC, and OPENED TC**.

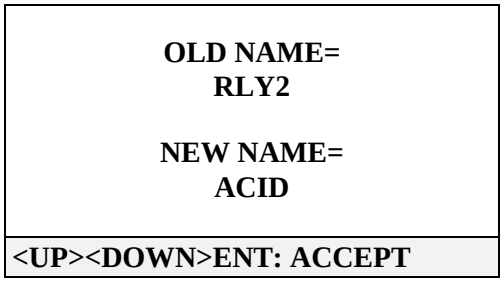
From the **RELAY OPTIONS** screen press"**4**" **BY SELECTED ALARMS.** The controller will respond with the following screen.



Select the alarms from this menu that you want to activate the relay. An asterisk (*) will appear next to each selection to indicate that it has been selected.

13.2 Change a Relay Name

The name of each individual relay can be changed to any 4-character name. This is useful to designate the chemical name for each relay. Use the arrow keys to change the character and the ENT key to move to the next character.



- From the **BLOWDOWN RELAY OPTIONS** screen press "**7**" **CHANGE MY NAME.**

13.3 Configuring Relays 5 to 12

Relays 5 through 12 are used to control the conductivity in the boilers by either the Continuous Sample method or by the Sample/Cycle method. Any spare relays can also be used for chemical feeds and alarms.

Below is the **RELAY OPTIONS** screen for relays 5 through 12. The asterisk (*) next to one of the options tells you how that relay is configured. Relays 5 through 12 can be programmed in each of the methods shown on the **RELAY OPTIONS** screen.

```
RELAY OPTIONS
=========================
1*DISABLED
2 CONTINUOUS
3 SAMPLE/CYCLE
4 WATER METER
5 PERCENT OF TIME
6 BY SELECTED ALARMS
7 CHANGE MY NAME
```

13.3.1 Disabled

Relays 5 to 12 can be disabled. When a relay is disabled, it will not energize automatically.

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

13.4 Continuous Mode

In continuous sample control, there is continuous blowdown occurring. The controller will activate the blowdown valve based on setpoint to increase the blowdown rate to maintain conductivity. This is the typical method of control for large (>600 hp) boilers.

The set up of a relay for the continuous sample method of conductivity control involves a 5-step process.

1. Select the relay you wish to configure as a continuous sample relay
2. Select the boiler conductivity that the relay will be based on
3. Set the setpoint and deadband
4. Set the timeout function
5. Set the ball valve delay

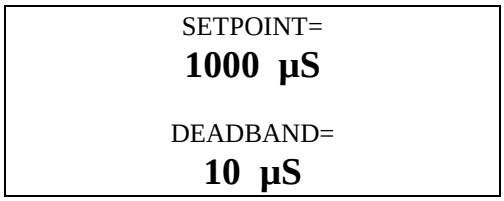
When **CONTINUOUS** is selected in the Relay Options screen, a screen will appear to select the boiler conductivity that the relay will control. (There are 8 choices but only the boilers that have a conductivity node installed will show up.)

```
WHICH CONDUCTIVITY?
=========================
1* BLR1
2  BLR2
3  BLR3
4  BLR4
5
6
7
8
```

Use the keypad number keys to configure the relay to a specific boiler's conductivity. The asterisk (*) indicates the current configuration. After selecting a boiler's conductivity, the menu will move to the Setpoint screens.

13.4.1 Setpoint

The Setpoint screen looks like this:



In the **SETPOINT** screen you will set the **SETPOINT**, the **DEADBAND** and the **OVERFEED TIME** alarm.

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

Follow these instructions to establish the controller's setpoint:

- Use the keypad numbers to enter the proper or conductivity setpoint and press ”**ENT**”. When finished, you will automatically be moved down to the deadband.

13.4.2 Deadband

After the setpoint is established, the relay's deadband must also be set. "**Deadband**" refers to the amount of conductivity above and below the setpoint—a range within which the controller will not react. Due to continuous fluctuations in the conductivity 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 Conductivity setpoint of 1000 µS with a deadband of 20 µS would result in the relay turning on at 1010 uS and turning off at 990 µS.

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

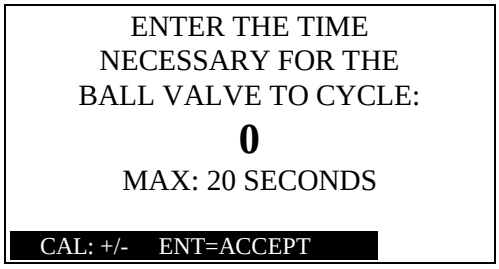
13.4.3 Timeout

The **TIMEOUT** alarm is designed to notify the operator of a problem in the blowdown system such as, a clogged orifice, or the blowdown valve failed to open. The **TIMEOUT** function will display a visual alarm on the display, but **it will <u>NOT</u> turn off the relay**. To disable this function set the **TIMEOUT** time to **0:00**.

Use the keypad numbers to enter the time in hours and minutes before this alarm will appear and press ”**ENT**”. Maximum setting is 17 hours and 59 minutes. After pressing ENT you will be taken to the “**BALL VALVE DELAY**” screen.

13.4.4 Ball Valve Delay

The BALL VALVE DELAY screen is used to input a delay time for ball valve operation. This delay time is used to prevent the ball valve from getting stuck in partially open state due to a change of state of the controlling relay. It functions by preventing the relay from changing states until the amount of time set in the BALL VALVE DELAY screen has elapsed since the relay last changed states.



Use the keypad numbers to enter the time it takes the ball valve to fully cycle open or closed. A typical value is around 8 seconds. The maximum setting is 20 seconds.

13.4.5 Sample/Cycle

In sample/cycle control, the controller only reads conductivity while it is blowing down in the Sample mode. The controller will open the blowdown valve for a specified amount of time (**Sample Time**) to periodically blow down the boiler; once the sample time expires the controller compares the conductivity reading to the **Setpoint**. If the reading is greater than the setpoint the controller will keep the blowdown valve open until the conductivity drops below the setpoint. If the reading is less than the setpoint the controller will immediately shut the blowdown valve and go into a waiting period (**Cycle Time**). The **Sample Time** is the amount of time that the blowdown valve is open. **Cycle Time** is the amount of time in between samples when the blowdown valve is shut. This is the typical method of control for small (<400 hp) boilers.

The **Sample Time** should be set to a small amount of time because the controller will be blowing down for the entire Sample Time. If a long amount of time is set, the controller will blow down longer than is necessary and will result in wasted heat and water. A longer period of time is not required because if the conductivity is greater than the setpoint, the valve will stay open until the setpoint is satisfied. The sample time should be long enough to allow the sensor to warm up to operating temperature before basing control on the conductivity setpoint.

The **Cycle Time** will need to be set for your specific system. The Cycle Time is the amount of time in between samples when the blowdown valve is shut. While the blowdown valve is shut the conductivity will rise in the boiler. If the cycle time is too long, the conductivity will rise much higher than the setpoint and this could cause problems for the boiler. Conversely, if the cycle time is set too short, the conductivity will never raise high enough to hit the setpoint. This will result is a waste of heat and water because the controller is blowing down when it is not necessary.

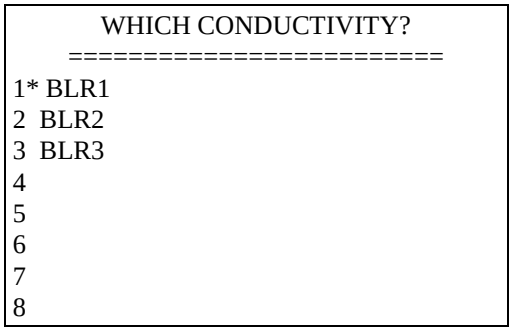
Once the Sample Time is set it should never have to be adjusted again. The Cycle Time is the one that will need to be adjusted to the specifics of the application. If the steaming load or the make-up water quality changes the cycle time may need to be adjusted. If the conductivity is always too low the cycle

time should be set to a longer period of time. If the conductivity is always too high the cycle time should be set to a shorter period of time.

The set up of a relay for the sample/cycle method of conductivity control involves a 6-step process.

1. Select the relay you wish to configure as a SAMPLE/CYCLE relay
2. Select the boiler conductivity that the relay will be based on
3. Set the setpoint and deadband
4. Set the timeout function
5. Set the sample and cycle times
6. Set the ball valve delay

When **SAMPLE/CYCLE** is selected in the Relay Options screen, a screen will appear to select the boiler conductivity that the relay will control. (There are 8 choices but only the boilers that have a conductivity node installed will show up.)



Use the keypad number keys to configure the relay to a specific boiler conductivity. The asterisk (*) indicates the current configuration. After selecting a boiler conductivity, the menu will move to the SAMPLE/CYCLE screens.

13.4.6 SAMPLE/CYCLE

In sample/cycle control, the controller only reads conductivity while it is blowing down in the Sample mode. The controller will open the blowdown valve for a specified amount of time (**Sample Time**) to periodically blow down the boiler; once the sample time expires the controller compares the conductivity reading to the **Setpoint**. If the reading is greater than the setpoint the controller will keep the blowdown valve open until the conductivity drops below the setpoint. If the reading is less than the setpoint the controller will immediately shut the blowdown valve and go into a waiting period (**Cycle Time**). The **Sample Time** is the amount of time that the blowdown valve is open. **Cycle Time** is the amount of time in between samples when the blowdown valve is shut. This is the typical method of control for small (<400 hp) boilers.

The **Sample Time** should be set to a small amount of time because the controller will be blowing down for the entire Sample Time. If a long amount of time is set, the controller will blow down longer than is necessary and will result in wasted heat and water. A longer period of time is not required because if the conductivity is greater than the setpoint, the valve will stay open until the setpoint is satisfied. The sample time should be long enough to allow the sensor to warm up to operating temperature before basing control on the conductivity setpoint.

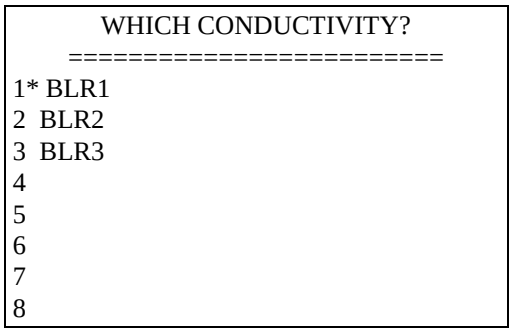
The **Cycle Time** will need to be set for your specific system. The Cycle Time is the amount of time in between samples when the blowdown valve is shut. While the blowdown valve is shut the conductivity will rise in the boiler. If the cycle time is too long, the conductivity will rise much higher than the setpoint and this could cause problems for the boiler. Conversely, if the cycle time is set too short, the conductivity will never raise high enough to hit the setpoint. This will result is a waste of heat and water because the controller is blowing down when it is not necessary.

Once the Sample Time is set it should never have to be adjusted again. The Cycle Time is the one that will need to be adjusted to the specifics of the application. If the steaming load or the make-up water quality changes the cycle time may need to be adjusted. If the conductivity is always too low the cycle time should be set to a longer period of time. If the conductivity is always too high the cycle time should be set to a shorter period of time.

The set up of a relay for the sample/cycle method of conductivity control involves a 6-step process.

1. Select the relay you wish to configure as a SAMPLE/CYCLE relay
2. Select the boiler conductivity that the relay will be based on
3. Set the setpoint and deadband
4. Set the timeout function
5. Set the sample and cycle times
6. Set the ball valve delay

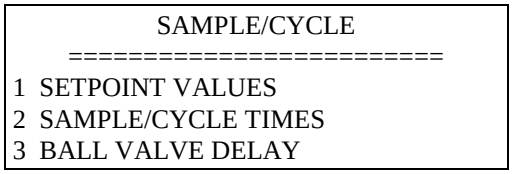
When **SAMPLE/CYCLE** is selected in the Relay Options screen, a screen will appear to select the boiler conductivity that the relay will control. (There are 8 choices but only the boilers that have a conductivity node installed will show up.)



- Use the keypad number keys to configure the relay to a specific boiler conductivity. The asterisk (*) indicates the current configuration. After selecting a boiler conductivity, the menu will move to the SAMPLE/CYCLE screens.

13.4.7 SAMPLE/CYCLE SCREENS

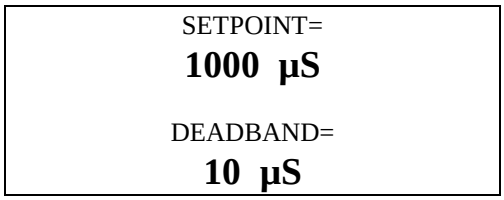
There are 3 selections in the SAMPLE/CYCLE screens.



In the **SETPOINT VALUE**S screen, you will set the SETPOINT, the DEADBAND, and the TIMEOUT.
In the **SAMPLE/CYCLE TIMES** screen, you will set the SAMPLE TIME and the CYCLE TIME.
In the **BALL VALVE DELAY** screen, you will set the BALL VALVE DELAY TIME.

13.4.8 SETPOINT VALUES

The Setpoint screen looks like this:



In the **SETPOINT** screen you will set the **SETPOINT**, the **DEADBAND,** and the **TIMEOUT** alarm.

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

Follow these instructions to establish the controller's setpoint:

Use the keypad numbers to enter the proper conductivity setpoint and press ”**ENT**”. When finished, you will automatically be moved down to the deadband.

13.4.9 DEADBAND

After the setpoint is established, the controller's deadband must also be set. "**Deadband**" refers to the amount of conductivity above and below the setpoint—a range within which the controller will not react. Due to continuous fluctuations in the conductivity level, it is necessary to have this deadband range or stable readings will be difficult to maintain. 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 conductivity setpoint of 1000 µS with a deadband of 20 µS would result in the relay turning on at 1010 µS and turning off at 990 µS.

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.

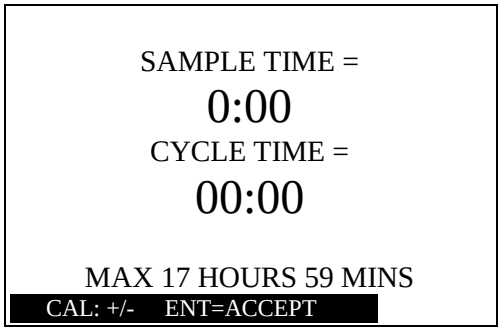
13.4.10 TIMEOUT

The **TIMEOUT** alarm is designed to notify the operator of a problem in the blowdown system such as, a clogged orifice, or the blowdown valve failed to open. The **TIMEOUT** function will display a visual alarm on the display, but **it will NOT turn off the relay**. To disable this function set the **TIMEOUT** time to **0:00**.

Use the keypad numbers to enter the time in hours and minutes before this alarm will appear and press "**ENT**". Maximum setting is 17 hours and 59 minutes. After pressing ENT you will be taken to the "**BALL VALVE DELAY**" screen.

13.4.11 SAMPLE/CYCLE TIMES

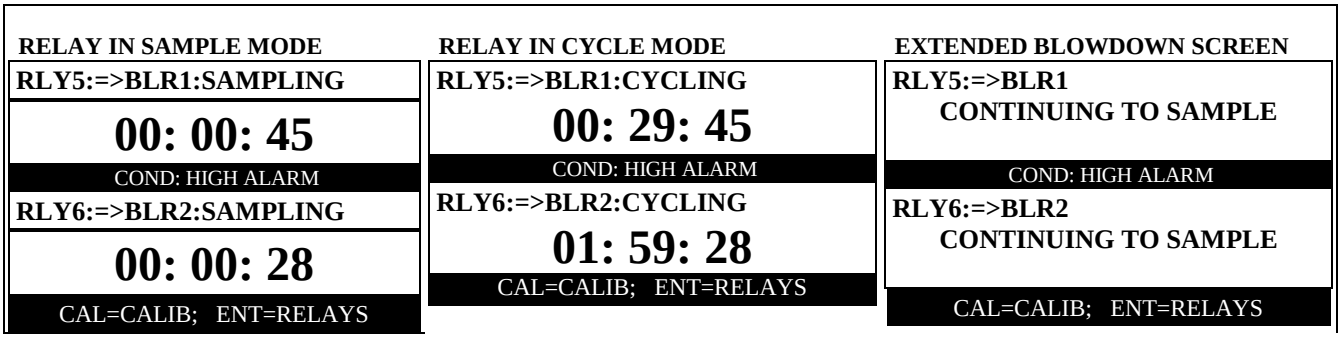
The SAMPLE/CYCLE TIMES screen looks like:



The SAMPLE TIME is the amount of time the blowdown valve is open. The CYCLE TIME is the amount of time the blowdown valve is closed. All times are in hours and minutes.

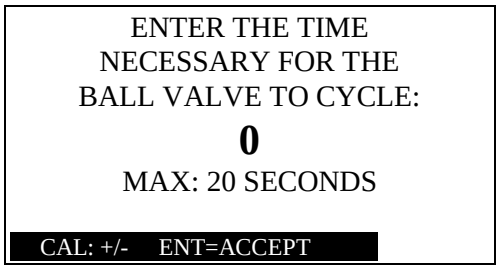
Use the number keys to input a sample time. The minimum amount of time is one minute. Press "**ENT**". Use the number keys to input a cycle time. The minimum amount of time is one minute. Press "**ENT**".

When the controller is set up for sample/cycle control, the process screen will show one of the three screens shown below when the blowdown relay is selected. The screen will count down the amount of sample time or cycle time, and will display "CONTINUING TO SAMPLE" after the sample time has expired and the conductivity is still above the conductivity setpoint.



13.4.12 BALL VALVE DELAY

The BALL VALVE DELAY screen is used to input a delay time for ball valve operation. This delay time is used to prevent the ball valve from getting stuck in partially open state due to a change of state of the controlling relay. It functions by preventing the relay from changing states until the amount of time set in the BALL VALVE DELAY screen has elapsed since the relay last changed states.



Use the keypad numbers to enter the time it takes the ball valve to fully cycle open or closed. A typical value is around 8 seconds. The maximum setting is 20 seconds.

13.4.13 By Water Meter

Relays 1, 2, 3, and 4 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"**4**" **BY 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. Press "**ENT**".

13.4.14 By Percent 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**” **BY PERCENT TIME**.
Use the keypad to enter the percentage of time desired. Press ”**ENT**”.

13.4.15 By Selected Alarms

Relays 1, 2, 3, and 4 can be configured as alarm relays. The alarms that will cause the relay to activate are selectable from the controller alarms or from any node input alarms. The controller alarms include: **HIGH CONDUCTIVITY, LOW CONDUCTIVITY, FOULED CONDUCTIVITY SENSOR, SHORTED TC, and OPENED TC**.

- From the **RELAY OPTIONS** screen press"**6**" **BY SELECTED ALARMS.** The controller will respond with the following screen.

```
WHICH ALARMS?
=======================
1 BLR1: HIGH ALARM
2 BLR1: LOW ALARM
3 BLR1: FOULED SENSOR
4 BLR1: SHORTED TC
5 BLR1: OPENED TC
6 --
```

Select the alarms from this menu that you want to activate the relay.

13.4.16 Change a Relay Name

The name of each individual relay can be changed to any 4-character name. This is useful to designate the chemical name for each relay.

```
OLD NAME=
RLY5

NEW NAME=
BLR1

<UP><DOWN>ENT: ACCEPT
```

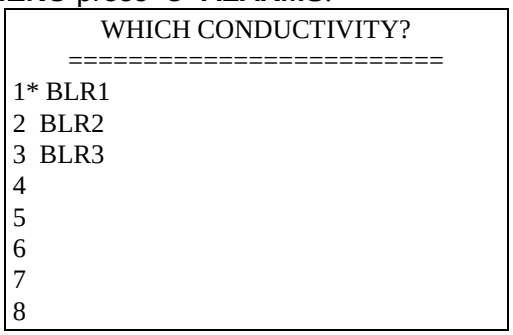
From the **RELAY OPTIONS** screen press"**7**" **CHANGE MY NAME.**
Use the arrow keys to change the character and the ENT key to move to the next character.

13.4.17 Alarms

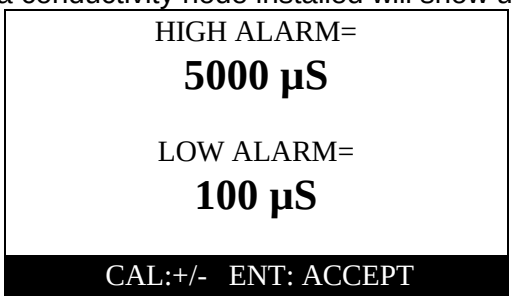
The Model B3410 is equipped with both high and low conductivity alarms. This menu option allows you to program the speciic values for these alarms. When a conductivity alarm is received, it will appear as a flashing message in the middle of the display and any configured alarm relays will be activated. Consult your water treatment specialist when determining the proper High and Low Alarm values for your system.

To set the alarm setpoints:

- From the **MAIN MENU** press "**3**" **ALARMS**.



- Select which boiler's conductivity alarms you want to set. (There are 8 choices but only the boilers that have a conductivity node installed will show up.)



- 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**".

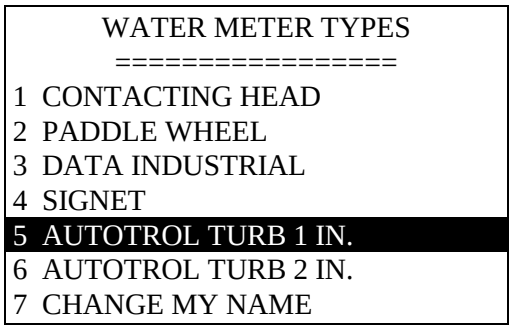
13.4.18 Water Meters

The B3410 series 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 get to the water meter configuration screen:

From the **main menu**, press"**4**" **WATER METERS**. This will take you to the **WHICH WATER METER SCREEN.**
Press"**1**" for **MTR1** or press"**2**" for **MTR2**.
This will take you to the **WATER METER TYPES** screen as shown.



Use the keypad to select the type of water meter that you are using.

The next screen is the **UNITS OF VOLUME** screen.

The water meters can be configured for gallons or liters. Press"**1**" for **GALLONS** or press"**2**" for **LITERS**.

If **CONTACTING HEAD** was 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** was selected:

You will be taken to the **PULSES PER GAL/LITER** screen. Use the keypad to enter the pulses per gal/liter 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 **DATA INDUSTRIAL** was selected:

You will be taken to the **SLOPE VALUE** screen. Use the keypad to enter the K factor and offset values 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 **SIGNET** was 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.** was 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**.

The **name** of the water meter input can be changed form MTR1 and MTR2:

To change the name of the water meter input use the arrow keys to change the character and the ENT key to move to the next character.

14 System Set-up Menu

The system setup menu is used to set up the name of the process, damping, initialize the controller, digital inputs, check the firmware version, change the security passwords, check the diagnostics, set up the communications, and node installation.

14.1 Process Parameters

The process parameters screen is used to change the name of the process, and set the damping.

14.2 Change the Process Name

The name of the process can be changed from **COND** to a different 4-character name.

To change the name of the process:

From the Main Menu press "**5**" **SYSTEM SETUP.**
Press "**1**" **PROCESS PARAMETERS.**
Press "**1**" **CHANGE MY NAME**
Use the arrow keys to change the characters, use the ENT key to move the cursor to the next character.

14.3 ANTI-FLASHING TIME

The anti-steam flash menu item is used to dampen out fluctuations in conductivity due to the occurrence of steam flash.

To set up anti-steam flash:

From the Main Menu press "**5**" **SYSTEM SETUP.**
Press "**1**" **PROCESS PARAMETERS.**
Press "**2**" **ANTI-FLASHING TIME.**

Use the keypad to change the anti-flashing time. The larger the time the greater amount of anti-steam flash. Press "**ENT**" to accept.

14.4 CELL CONSTANT

The cell constant is used to set the default calibration readings close to actual for the sensor that is used.

The cell constant for the 2-electrode boiler sensor is **0.108.**

The sensor for the 4-electrode boiler sensor is **0.300.**

Use the keypad to input the cell constant for your sensor. Press "**ENT**".

14.5 TEMP COMPENSATION

The model B3410 has the ability to use temperature compensated conductivity sensors. The 2-electrode boiler sensor is **not** temperature compensated. The 4-electrode **is** temperature compensated up to about 200°F.

For the 2-electrode boiler sensor, select "**NONE**" for the temperature compensation.

For the 4-electrode boiler sensor, select "**4k NTC**" for the temperature compensation.

14.6 Percent per ˚C

Conductivity values are temperature dependent. The degree to which temperature affects the conductivity value is based on the many different ions that may be present. This menu item allows the user to adjust the compensation value to more closely match the different ions that may be present in the process. The default value is 2 percent per °C (the approximate compensation value for NaCl).

The degree to which temperature affects conductivity can be calculated using the following formula:
$Gt = Gt_{cal} \{1 + \alpha(T-T_{cal})\}$

where: Gt = conductivity at any temperature T in °C, Gt_{cal} = conductivity at calibration temperature T_{cal} in °C, α = temperature coefficient of solution at T_{cal} in °C.
To determine that α of other solutions, simply measure conductivity at a range of temperatures and graph the change in conductivity versus the change in temperature. Divide the slope of the graph by Gt_{cal} to get α.
To set up the Percent per °C:

From the Main Menu press "**5**" **SYSTEM SETUP.**
Press "**1**" **PROCESS PARAMETERS.**
Press "**5**" **PERCENT PER °C**.
Use the keypad to enter the **PERCENT PER °C** value and press the **ENT** key

14.7 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 REQUIRES RE-CALIBRATION AND RE- PROGRAMMING!
PROCEED?
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.

14.8 Software Version

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

From the **Main Menu**, press "**7**" **SYSTEM SETUP**.
Press "**4**" **SOFTWARE VERSIONS**.

The firmware versions will be displayed. Use the arrow keys to see all firmware versions. To exit this screen, press "**BACK**".

14.9 Change the Security Passwords

The security password can be changed from the factory default settings to any four-digit value of your choice.

To change the security passwords:

From the **Main Menu**, press "**7**" **SYSTEM SETUP**.
Press "**5**" **SECURITY**.

```
CHANGE PASSWORD
======================
1  OPERATOR
2  TECHNICIAN
```

Press "**1**" **OPERATOR** to change the operator password or Press "**2**" **TECHNICIAN** to change the technician password.

Use the keypad to enter the old password. If the password has not been changed before, the old password for **OPERATOR** is **1111** and the password for **TECHNICIAN** 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.

14.10 Diagnostics

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

14.11 Communications

The controller has an option for remote communications, the RS-232 option. If this option is installed the communications option is configured from this screen. This screen is used to set up the com port, initialize the modem, and set the remote password.

To set up the communications option:

From the **Main Menu**, press "**7**" **SYSTEM SETUP**.
Press "**7**" **COMMUNICATIONS**.

```
COMMUNICATIONS
======================
1  COM PORT SETUP
2  INITIALIZE MODEM
3  REMOTE PASSWORD
```

14.12 Com Port Set-up

Com port setup is used to set up the com port for use with a modem or direct connect.

To set up the com port press "**1**" **COM PORT SETUP**

```
COM PORT PARAMETERS
======================
BAUD RATE:    19200
DATA  BITS:   8
STOP  BITS:   1
PARITY    :   NONE

<UP><DOWN>  ENT: ACCEPT
```

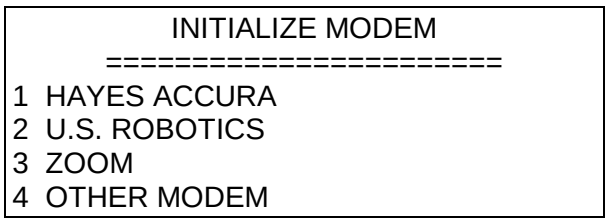
Use the arrow keys to change the baud rate. If using the direct connect method of communicating, ensure that the baud rate at the controller and the baud rate in the LRWS software match.

The standard values for the **DATA BITS** is 8, **STOP BITS** is 1, and **PARITY** is NONE. Normally these will not need to be changed.

14.13 Initialize Modem

Before a modem can be used by the controller it must be initialized. The initialization screen gives four choices of modems.
To initialize the modem:

- From the Communications menu, press "**2**" **INITIALIZE MODEM**



Select your modem from the list. If your modem is not listed and you select **OTHER MODEM** use the keypad to enter the initialization string for your modem.
If the modem fails to initialize, check the 25-pin connector, the phone cable, the modem, and the RS-232 option card.

14.14 Remote Password

Remote communications to the Pulsafeeder 3400 series controllers is protected with an 8-digit password. The remote password is required to make changes to the controller using the communications option card.

The remote password screen in the communications menu is used to change the remote password. The remote password can only be changed at the controller.

To change the remote password:

- From the communications menu, press "**3**" **REMOTE PASSWORD**.
- Use the keypad to enter the old password. Enter the new password. Repeat the new password again for verification. **NOTE: The default password is 12345678.**
- Set the remote password in the LRWS program to match the new password for this controller.

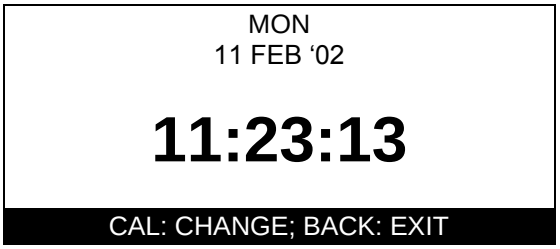
14.15 Node Installation

The node installation menus is used to install new nodes and to de-install installed nodes. Please refer to your node manual for information on node installation.

15 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.
- 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**".

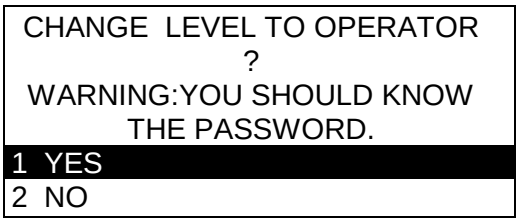
- Use the number keys to change the seconds. Press ”**ENT**”.
- Press ”**BACK**” to exit this screen.

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

16 Changing the Security Levels

The security level can be change to prevent any unwanted tampering of the controller. To change the security level from **Technician** to **Operator** or **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 a more restrictive level.

The controller menu now functions at the new security level.

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

- Press the numeric password from the **Process** screen:

Remember that following the first power-up the Technician password is 2222 and the Operator password is 1111. You may change the passwords in the SYSTEM SETUP menu.

17 Maintenance

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

17.1.1 Conductivity sensor

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

- Remove power from the controller and shut the isolation valves to the sensor.
- Remove the sensor from its plumbing.
- Clean the electrodes with a wire brush. A soft steel brush is preferable to a brass brush. Do not use cloth to clean the electrodes. Cloth has oils that will foul the sensor.
- If there is oil on the sensor tips, use isopropyl alcohol to clean the electrode.
- It is recommended that you use a 10% Muriatic or HCL acid to clean the sensor if necessary.
- Wash the sensor off with tap water.
- Install the sensor in its plumbing.
- Restore sample flow and check for leaks.
- Restore power to the controller.
- Perform a calibration of the conductivity.

18 Replacing the Fuses

The controller contains two 10A, 250V fuse. The fuse holder is located on the bottom of the enclosure. It is accessible from the outside of the box. Replacement fuses must be a fast blow type. If the fuse is blown, the display will be blank and the four power supply lights inside the controller enclosure will be dark when the unit is connected to power. Refer to the troubleshooting section of this manual for more information about blank displays.

19 Troubleshooting

19.1 Error Messages

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

PROBLEM	WHAT THIS MEANS	CORRECTIVE ACTION
{Alarm Flashing} "Conductivity: HIGH ALARM".	Conductivity is too high with respect to the high alarm setpoint.	1. Check the High Alarm Value. 2. Check relay setpoints and deadbands. 3. Check operation of bleed-off valve. Use the manual relay control to help. 4. Check blowdown valve is not stuck closed or the line is restricted.
{Alarm Flashing} "Conductivity: LOW ALARM".	Conductivity is too low with respect to the low alarm setpoint.	1. Check the Low Alarm Value. 2. Check relay setpoints and deadbands. 3. Check blowdown valve is not stuck open. 4. Check that 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	1. Approximately 24 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.

	contacting head type, check the manufacturer's user manual for that particular water meter.	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 fuse or the circuit board. Open the front panel to troubleshoot.	1. Check the fuse. Replace if blown. 2. Does the unit have power? Verify with volt meter. 3. If there is power to terminals LINE and NEUTRAL on TA, call Pulsafeeder Technical Service for more information.

PROBLEM	WHAT THIS MEANS	CORRECTIVE ACTION
{ALARM FLASHING} "COND:Fouled SENSOR"	Conductivity sensor is not reading properly.	1. Clean sensor. 2. Check wiring. Verify that all connectors are fully mated. 3. Replace conductivity sensor.

PROBLEM	WHAT THIS MEANS	CORRECTIVE ACTION
{Alarm Flashing} "RLY: TIME EXCEEDED".	This indicates that the controller has been trying to feed chemical for longer than the user-programmed time and is unable to reach the setpoint.	1. Check for proper operation of pump or valve. Use the manual relay control to help. 2. Check that the chemical drum is not empty. 3. Check for power to the chemical pump. 4. Verify the relay timeout time is properly set for your application (see RELAYS in MAIN menu). 5. To reset this alarm, momentarily turn off flow to the controller to get the no flow alarm.
Bleed valve relay is open below setpoint.	The controller may be in the sample mode if using sample/cycle control.	1. No action is necessary if sample time is correct.
"SENSOR READS ZERO"	You are trying to perform a span calibration of the conductivity and the conductivity sensor reads zero.	1. Check wiring. 2. Ensure sensor is full immersed in water. 3. The model B3410 will not accept a span calibration below about 200 µS. Cycle conductivity higher and re-calibrate.

{ALARM FLASHING} "COND:Fouled SENSOR"	Conductivity sensor is not reading properly.	1. Clean sensor. 2. Check wiring. Verify that all connectors are fully mated. 3. Replace conductivity sensor.

19.2 Factory Service

Your PULSAblue is a state of the art microprocessor based controller. If you are experiencing a problem with your process control instrument, first consult the troubleshooting guide in this manual. If the problem is not covered or cannot be solved, contact Technical Services for assistance:

PULSAFEEDER INC. (SPO)

27101 AIRPORT ROAD

PUNTA GORDA, FL 33982

941-575-3800

Trained technicians are available to diagnose your problem and arrange a solution. Solutions may include purchase of replacement parts or returning the controller to the factory for inspection and repair. All returns require a Return Authorization number to be issued by Pulsafeeder. Parts purchased to correct a warranty issue may be credited after an examination of original parts by Pulsafeeder. Warranty parts returned as defective which test good will be sent back freight collect. No credit will be issued on any replacement electronic parts.

Any modifications or out-of-warranty repairs will be subject to bench fees and costs associated with replacement parts.

Warranty

Pulsafeeder, Inc. warrants control systems of its manufacture to be free of defects in material or workmanship. Liability under this policy extends for 24 months from date of shipment. Electrodes/probes are considered maintenance items and as such are warranted for six (6) months from the date of shipment of the controller. Electrodes/probes purchased as spare parts are warranted for 90 days from date of shipment. The manufacturer's liability is limited to repair or replacement of any failed equipment or part, which is proven defective in material or workmanship upon completion of the manufacturer's examination. This warranty does not include removal or installation costs and in no event shall the manufacturer's liability exceed the selling price of such equipment or part.

The manufacturer disclaims all liability for damage to its products through improper installation, maintenance, use, or attempts to operate such products beyond their functional capacity, intentionally or otherwise, or any unauthorized repair. The manufacturer is not responsible for consequential or other damages, injuries, or expense incurred through the use of its products.

The above warranty is in lieu of any other warranty, whether expressed or implied. The manufacturer makes no warranty of fitness or merchantability. No agent of ours is authorized to provide any warranty other than the above.

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.

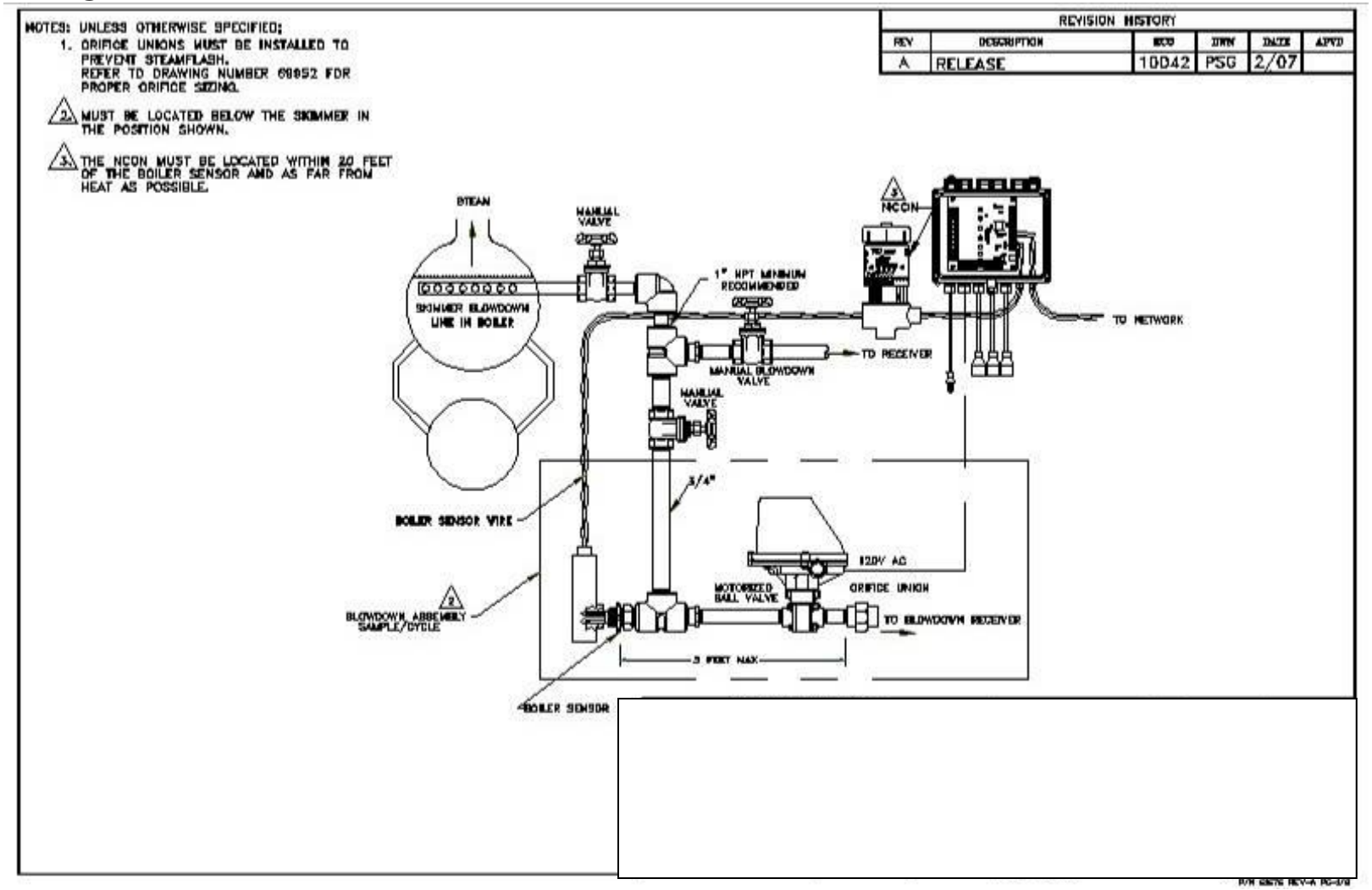
Write your controller's complete model number, serial number, and firmware version here so that you will have them available if you wish to contact a Pulsafeeder technician.

Model Number:

Serial Number:

Firmware Version:

20 Drawings


NOTES: UNLESS OTHERWISE SPECIFIED:
1. ORIFICE UNIONS MUST BE INSTALLED TO PREVENT STEAMFLASH. REFER TO DRAWING NUMBER 60852 FOR PROPER ORIFICE SIZING.
2. MUST BE LOCATED BELOW THE SKIMMER IN THE POSITION SHOWN.
3. THE NCON MUST BE LOCATED WITHIN 20 FEET OF THE BOILER SENSOR AND AS FAR FROM HEAT AS POSSIBLE.
REVISION HISTORY
REV | DESCRIPTION | ECO | DWN | DATE | APVD
A | RELEASE | 10042 | PSG | 2/07
STEAM
MANUAL VALVE
SKIMMER BLOWDOWN LINE IN BOILER
1" NPT MINIMUM RECOMMENDED
NCON
TO NETWORK
TO RECEIVER
MANUAL BLOWDOWN VALVE
MANUAL VALVE
3/4"
BOILER SENSOR WIRE
120V AC
MOTORIZED BALL VALVE
ORIFICE UNION
BLOWDOWN ASSEMBLY SAMPLE/CYCLE
TO BLOWDOWN RECEIVER
3 FEET MAX
BOILER SENSOR

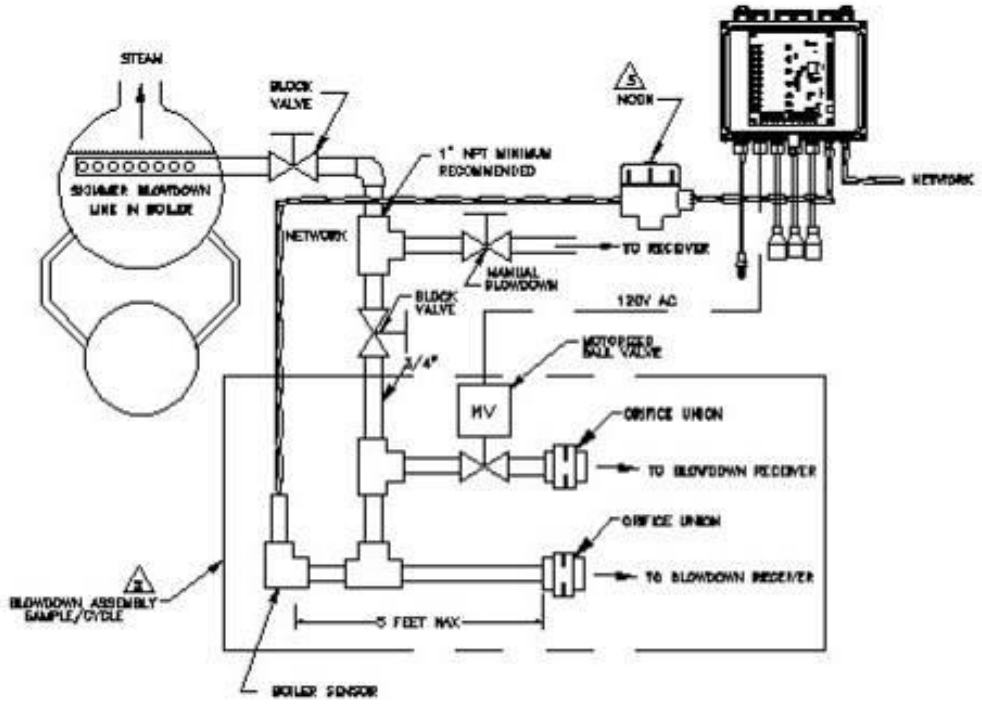
NOTES: UNLESS OTHERWISE SPECIFIED;

1. ORIFICE UNIONS MUST BE INSTALLED TO PREVENT STEAMFLASH. REFER TO DRAWING NUMBER 69852 FOR PROPER ORIFICE SIZING.

2. MUST BE LOCATED BELOW THE SKIMMER IN THE POSITION SHOWN.

3. THE NCON MUST BE LOCATED WITHIN 20 FEET OF THE SENSOR AND AS FAR FROM HEAT AS POSSIBLE.

REVISION HISTORY					
REV	DESCRIPTION	ECO	DRW	DATE	APVD
A	RELEASE	10042	PSG	2/07	



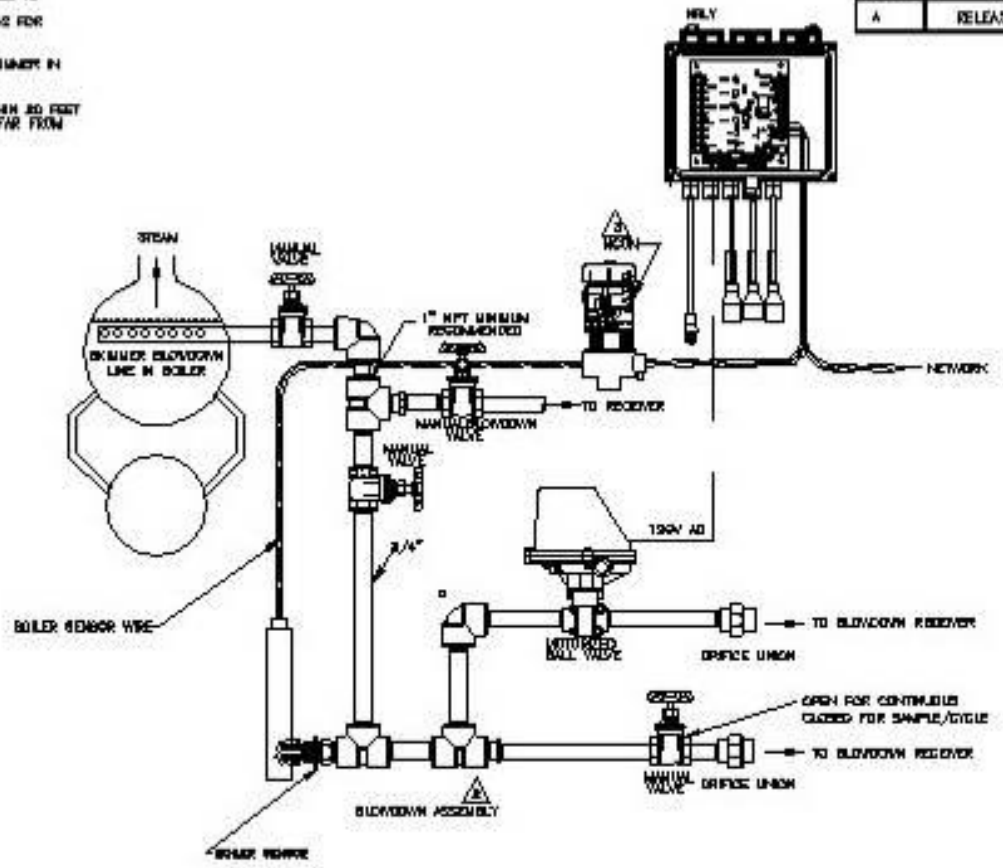
NOTES: UNLESS OTHERWISE SPECIFIED:

1. ORIFICE UNIONS MUST BE INSTALLED TO PREVENT STEAMFLASH. REFER TO DRAWING NUMBER 69832 FOR PROPER ORIFICE SIZING.

⚠ MUST BE LOCATED BELOW THE SKIMMER IN THE POSITION SHOWN.

⚠ THE MOON MUST BE LOCATED WITHIN 20 FEET OF THE BOILER SENSOR AND AS FAR FROM HEAT AS POSSIBLE.

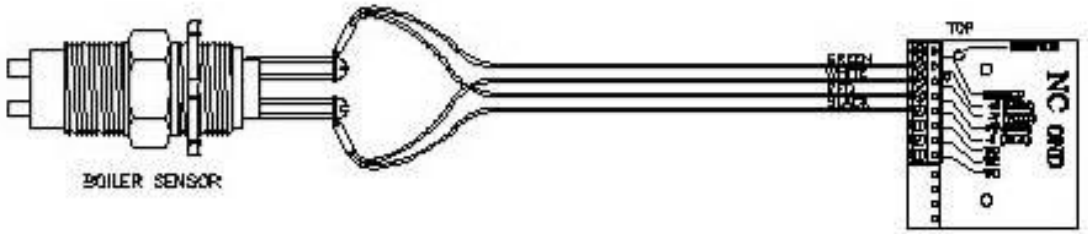
REVISION HISTORY					
REV	DESCRIPTION	ECO	DWN	DATE	APVD
A	RELEASE	10342	PSD	9/07	

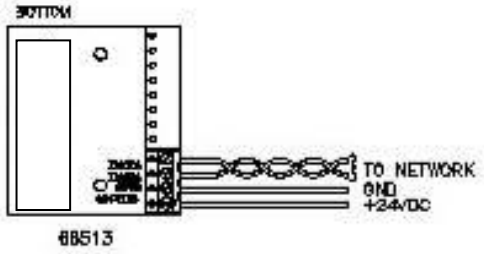


NOTES: UNLESS OTHERWISE SPECIFIED

1. DATA TWISTED PAIR SPECIFICATIONS:
   BELDEN #9501, SINGLE TWISTED PAIR, STRANDED 9/24, UNSHIELDED, PLENUM.
   BELDEN #9471, SINGLE TWISTED PAIR, STRANDED 8/30, UNSHIELDED, NON-PLENUM.
   AY (AST), 7 X 2 X 24 AWG, UL LEVEL IV 22 AWG, TWISTED PAIR, TYPICALLY SOLID AND UNSHIELDED, FOUR WIRE HELICAL TWIST, SOLID, SHIELDED.
2. IF SHIELDED CABLE IS USED, THE SHIELD SHOULD BE CONNECTED TO EARTH GROUND VIA A 470K OHMS, .25 WATT, METAL FILM RESISTOR TO PREVENT STATIC CHARGE BUILD-UP.
3. MAXIMUM POWER REQUIREMENT 23 MA @ 24 VDC.

REVISION HISTORY					
REV	DESCRIPTION	ECO	DWN	DATE	APVD
A	RELEASE	0867	NLM	8/98	
B	REVISED	1073	EV	8/98	

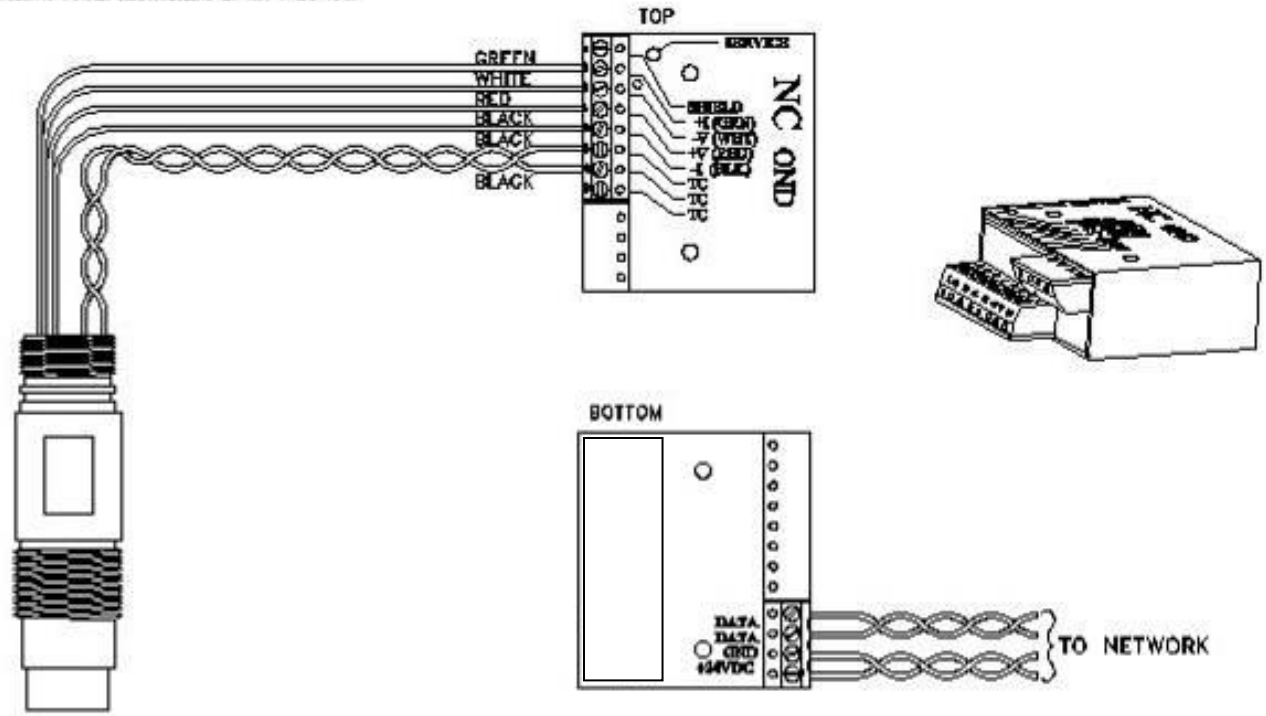


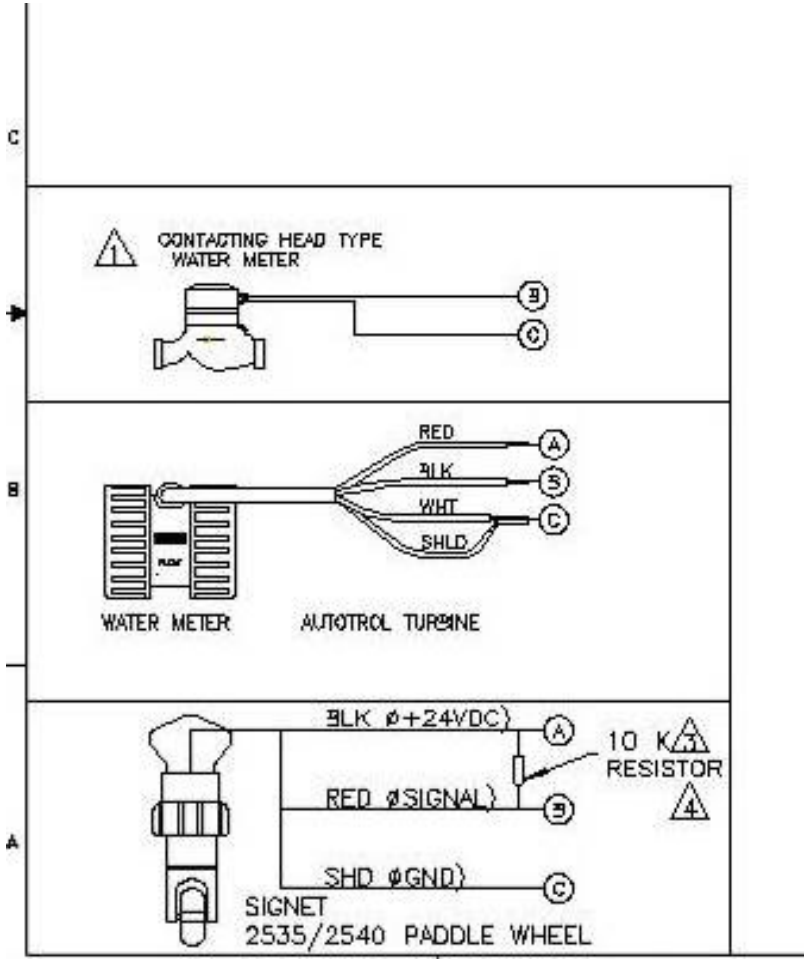


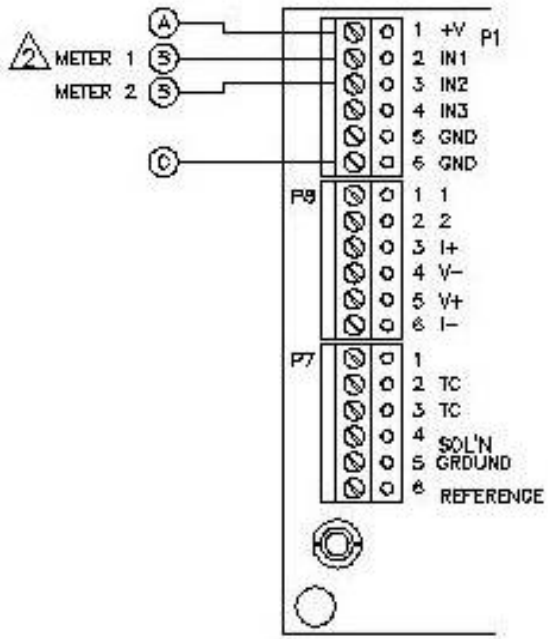
NOTES: UNLESS OTHERWISE SPECIFIED;

1. DATA TWISTED PAIR SPECIFICATIONS:
   BELDON 84102, SINGLE TWISTED PAIR, STRANDED #/28, UNSHIELDED, PLENUM.
   BELDON 8471, SINGLE TWISTED PAIR, STRANDED 9/29, UNSHIELDED, NONPLENUM.
   JT #ST) T 2 X 1 X JA UL LEVEL IV 22 AWG. TWISTED PAIR. TYPICALLY SOLID AND UNSHIELDED.
   FOUR WIRE HELICAL TWIST, SOLID, SHIELDED.
2. IF SHIELDED CABLE IS USED, THE SHIELD SHOULD BE CONNECTED TO EARTH GROUND VIA A 470K OHMS, .25 WATT, METAL FILM RESISTOR TO PREVENT STATIC CHARGE BUILD-UP.
3. MAXIMUM POWER REQUIREMENT 25 MA @ 24 VDC.

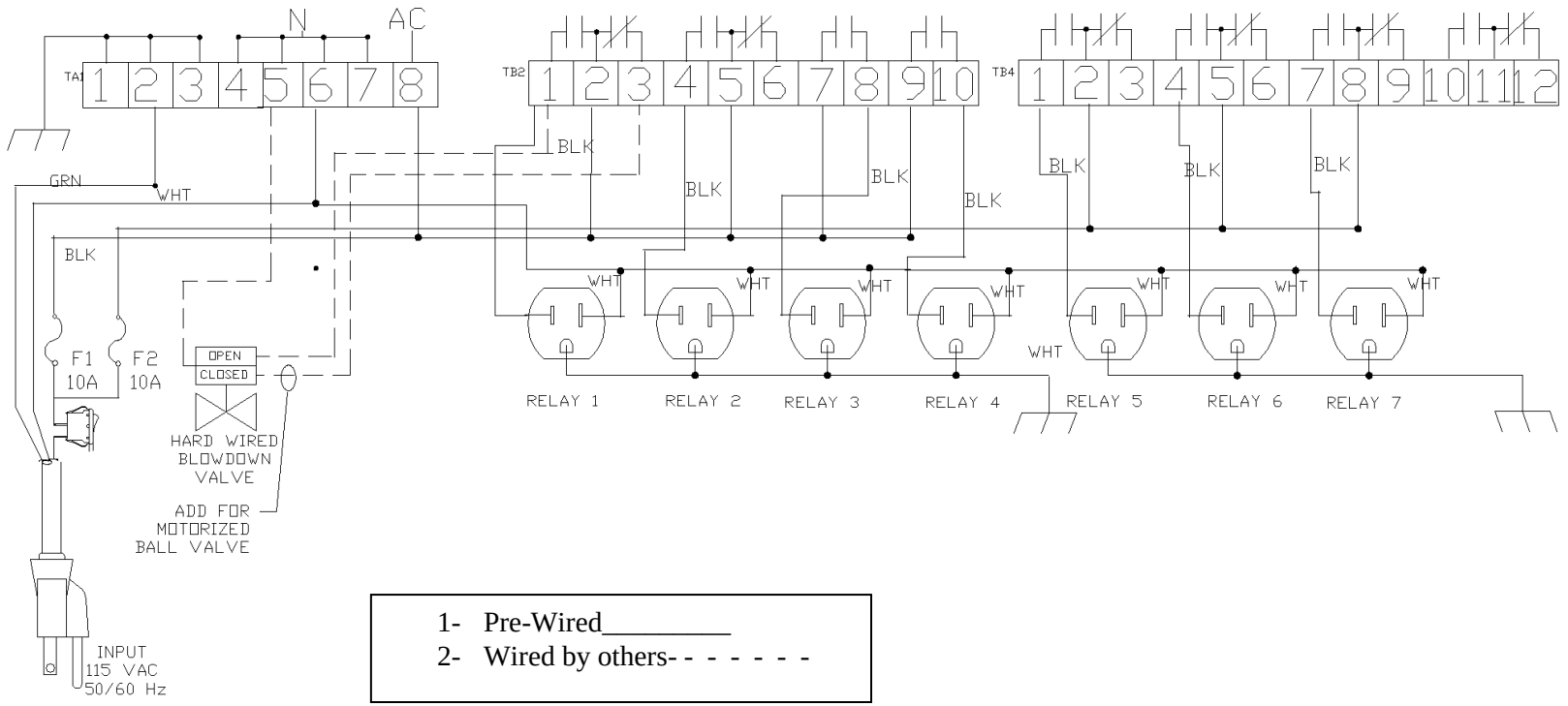
REVISIONS				
REV	DESCRIPTION		DATE	APPROVALS
A	ECO 0234	MLM	10/95	



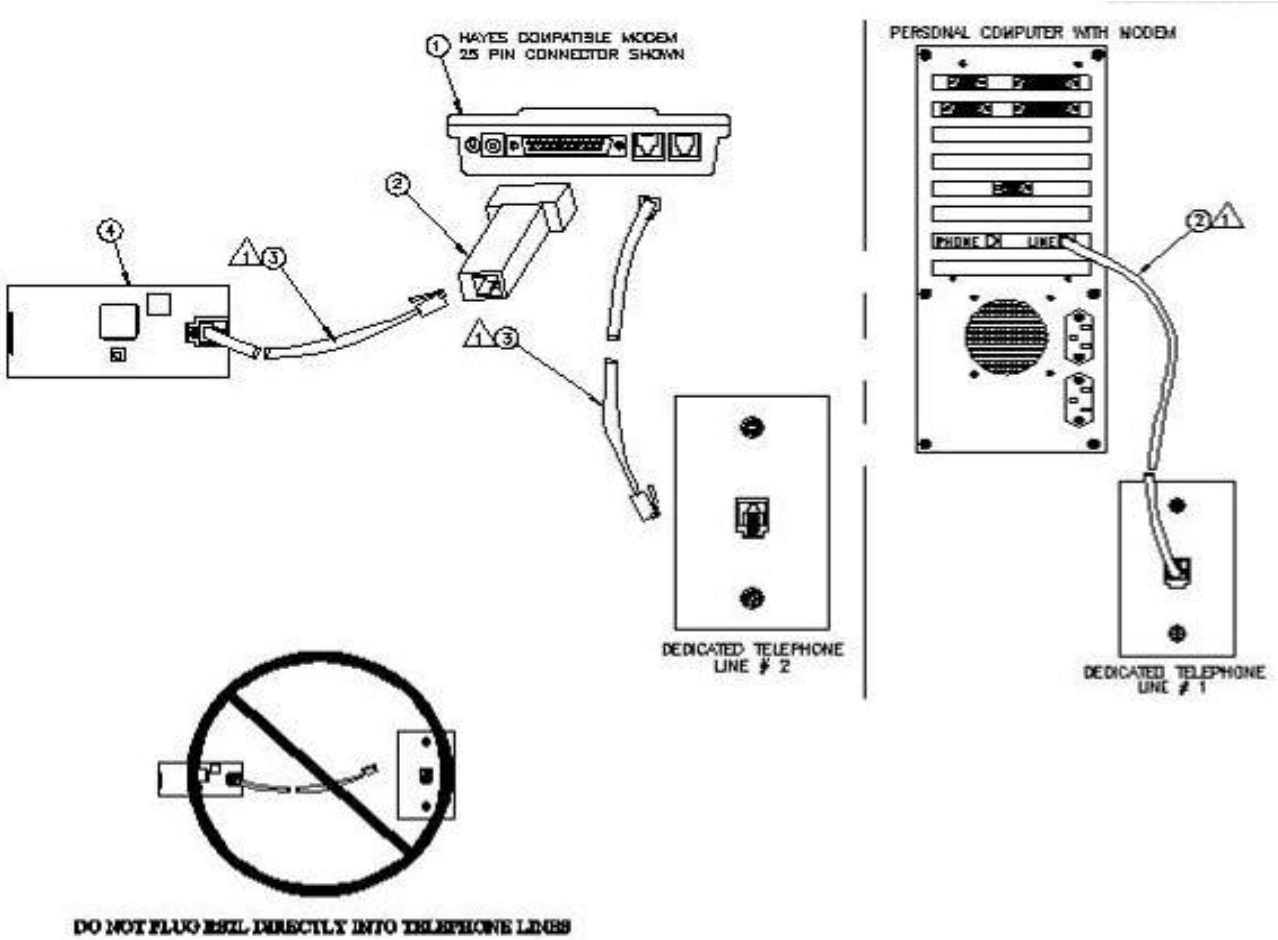

C
B
A
1
CONTACTING HEAD TYPE
WATER METER
B
C
RED
BLK
WHT
SHLD
A
B
C
WATER METER
AUTOTROL TURBINE
BLK ø+24VDC)
RED øSIGNAL)
SHD øGND)
A
B
C
10 K
RESISTOR
3
4
SIGNET
2535/2540 PADDLE WHEEL

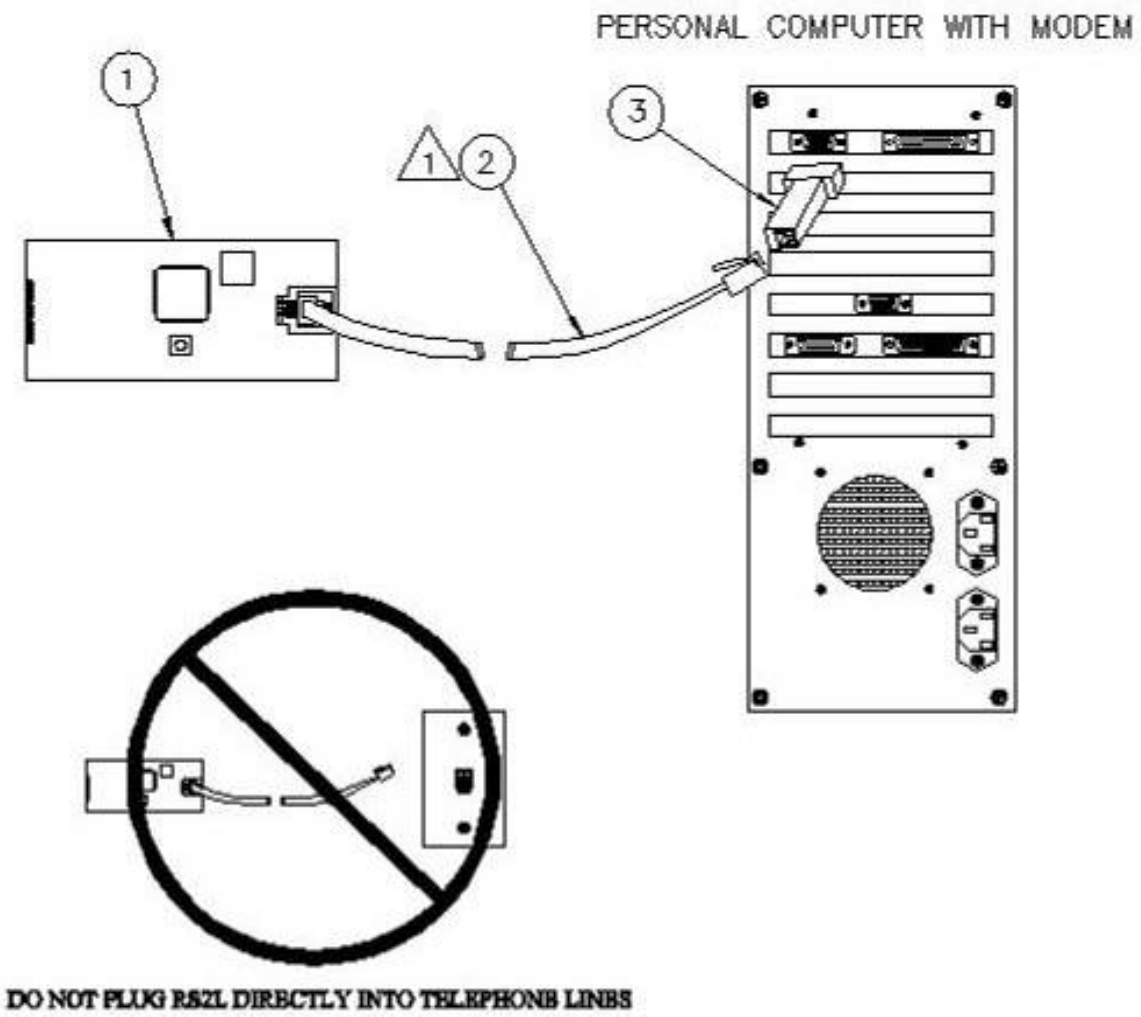

2
METER 1
METER 2
A
B
B
C
P1
1 +V
2 IN1
3 IN2
4 IN3
5 GND
6 GND
P8
1 1
2 2
3 I+
4 V-
5 V+
6 I-
P7
1
2 TC
3 TC
4
5 SOL'N GROUND
6 REFERENCE

REVISION		REVISION HISTORY			
DWG	PART	DESCRIPTION	ECO	DWN/DATE	APVD/DATE
A	A	RELEASE	10116	PSG 10-7-09	



1- Pre-Wired_____
2- Wired by others- - - - - - -

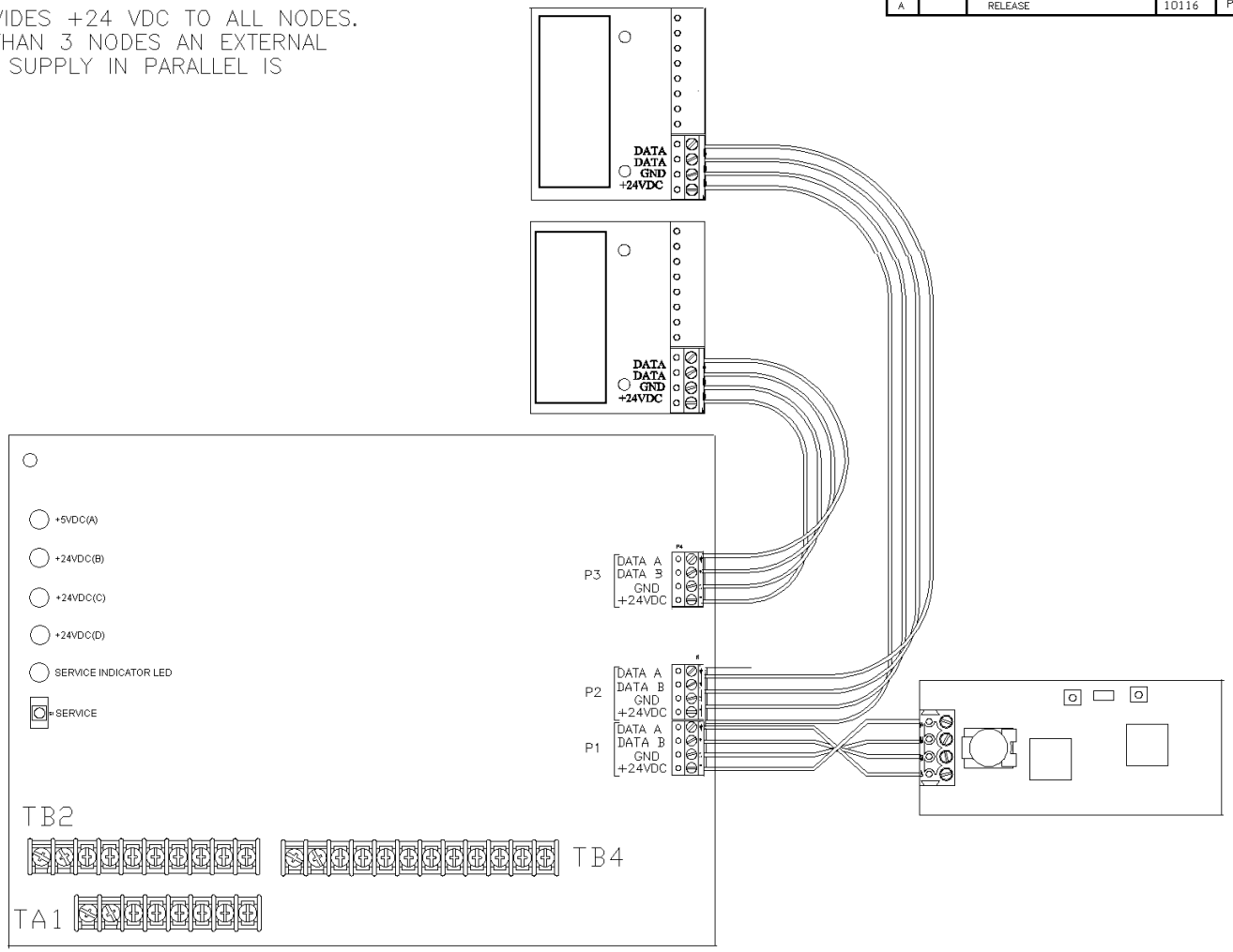

1 HAYES COMPATIBLE MODEM
25 PIN CONNECTOR SHOWN
2
4
1 3
1 3
DEDICATED TELEPHONE
LINE # 2
PERSONAL COMPUTER WITH MODEM
PHONE
LINE
2 1
DEDICATED TELEPHONE
LINE # 1
DO NOT PLUG RSIL DIRECTLY INTO TELEPHONE LINES


PERSONAL COMPUTER WITH MODEM
1
1
2
3
DO NOT PLUG RS2L DIRECTLY INTO TELEPHONE LINES

NOTES: UNLESS OTHERWISE SPECIFIED;

1. NIN OPTION PROVIDES +24 VDC TO ALL NODES. IF USING MORE THAN 3 NODES AN EXTERNAL +24 VDC POWER SUPPLY IN PARALLEL IS RECOMMENDED.

REVISION HISTORY						
REV	ZONE	DESCRIPTION	ECO	DWN	DATE	APVD
A		RELEASE	10116	PSG	10-9-09	



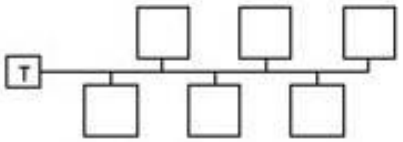
CUSTOMER	CHKD	DATE	SIZE C	THIRD ANGLE	DWG NO/PN 1167855_3a	REV A
CUSTOMER LOC.	APVD	DATE				
DO NOT SCALE	APVD	DATE	SCALE NONE		FILE TYPE .DWG	SHEET 1 OF 1

P/N 61677 REV-A PG-1/2

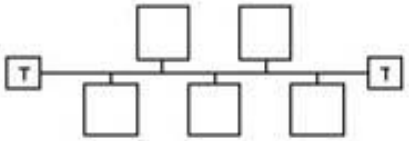
NOTES: UNLESS OTHERWISE SPECIFIED;

1. DATA TWISTED PAIR SPECIFICATIONS:
   BELDON 83102, SINGLE TWISTED PAIR, STRANDED 9/38, UNSHIELDED, PLENUM.
   BELDON 8471, SINGLE TWISTED PAIR, STRANDED 9/28, UNSHIELDED, NONPLENUM.
   UL LEVEL IV 22 AWG, TWISTED PAIR, TYPICALLY SOLID AND UNSHIELDED.
   JY (ST) Y 2 X 2 X, FOUR WIRE HELICAL TWIST, SOLID, SHIELDED.
2. IF SHIELDED CABLE IS USED, THE SHIELD SHOULD BE CONNECTED TO EARTH GROUND VIA A 470K OHMS, .33 WATT, METAL FILM RESISTOR TO PREVENT STATIC CHARGE BUILD-UP.

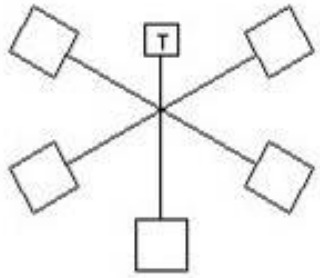
REVISIONS				
REV	DESCRIPTION		DATE	APPROVALS
A	ECO 0234	MLM 9/95		



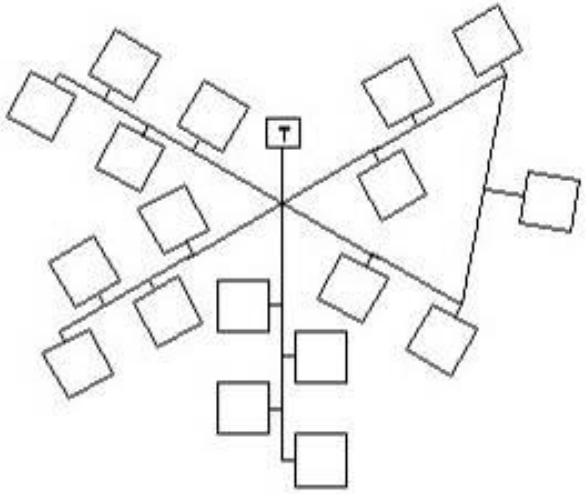
SINGLE TERMINATION BUS TOPOLOGY



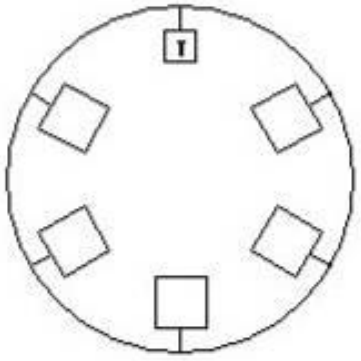
DOUBLE TERMINATION BUS TOPOLOGY
⚠3 MAXIMUM NODE LENGTH 1400 METERS
USING UL LEVEL IV 22AWG



STAR TOPOLOGY



MIXED TOPOLOGY
⚠1 MAXIMUM NODE TO NODE DISTANCE
400 METERS USING UL LEVEL IV 22AWG
MAXIMUM TOTAL WIRE LENGTH 500 METERS



LOOP TOPOLOGY