WDT300 Dual Cooling Tower Conductivity Controller

Instruction Manual

Notice

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Proprietary Material

Statement of Limited Warranty

WALCHEM Corporation warrants equipment of its manufacture, and bearing its identification to be free from defects in workmanship and material for a period of 24 months for electronics and 12 months for mechanical parts and electrodes from date of delivery from the factory or authorized distributor under normal use and service and otherwise when such equipment is used in accordance with instructions furnished by WALCHEM Corporation and for the purposes disclosed in writing at the time of purchase, if any. WALCHEM Corporation's liability under this warranty shall be limited to replacement or repair, F.O.B. Holliston, MA U.S.A. of any defective equipment or part which, having been returned to WALCHEM Corporation, transportation charges prepaid, has been inspected and determined by WALCHEM Corporation to be defective. Replaceable elastomeric parts and glass components are expendable and are not covered by any warranty.

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1.0 INTRODUCTION

The Walchem WDT300 Series controllers offer conductivity control of cooling tower water and control of corrosion/scale inhibitor feed . The inhibitor pump may be selected to operate in one of the following modes:

Feed and Bleed
Feed and Bleed with Lockout
Feed as a percent of Bleed
Feed as a percent of Time
Feed based on a Water Contactor input

The WDT series cooling tower controllers are supplied with temperature compensated electrodes with a cell constant of 1.0. The controllers are microprocessor driven industrial type with on/off control outputs. A timed sample mode may be selected, and on small towers can reduce installation costs by eliminating the need for a sampling bypass line. One or two optional isolated 4-20 mA outputs that are proportional to the conductivity reading are available for all models.

Any set point may be viewed without interrupting control. Each set point change will take effect as soon as it is entered. An access code is available to protect set point parameters, while still allowing settings to be viewed.

All outputs are interlocked with a flow switch input.

An alarm relay is provided with WDT300 models. It is triggered by:

Temp A or B Error
Cond A or B Error
No Flow Tower A or B
Bleed A or B Timeout
Feed A or B Timeout
Tower A or B Hi Alarm
Tower A or B Lo Alarm

2.0 SPECIFICATIONS

2.1 Measurement Performance

Conductivity Range:	0 - 10,000 uS/cm (microSiemens/centimeter)
Conductivity Resolution:	1 uS /cm
Conductivity Accuracy:	10 - 10,000 uS /cm ± 1% of reading
	0 - 10 uS /cm ± 20% of reading
Temperature Range:	32 – 158°F (0 – 70°C)
Temperature Resolution:	0.1°C
Temperature Accuracy:	± 1% of reading

2.2 Electrical: Input/Output

Input Power

110-120 VAC	or	220-240 VAC
50/60 Hz, 10A		50/60 Hz, 5A

Input Signals

Cond electrode:	1.0 cell factor
	10K thermistor
Flow Meter (0,1 or 2 optional):	Isolated, dry contact closure required (i.e. relay, reed switch)
Flow Switch (0,1 or 2 optional):	Isolated, dry contact closure required (i.e. reed switch)

Outputs

Mechanical Relays (5):	@ 120 VAC	@ 240 VAC
	10 A resistive	6 A resistive
	1/8 HP	1/8 HP

4 - 20 mA (0,1 or 2 optional):	Internally powered
	Fully isolated
	600 Ohm max resistive load
	Resolution .001% of span
	Accuracy ± 1% of reading

Agency Approvals

UL	ANSI/UL 61010-1:2004, 2nd Edition*
CAN/CSA	C22,2 No.61010-1:2004 2nd Edition*
CE Safety	EN 61010-1 2nd Edition (2001)*
CE EMC	EN 61326 :1998 Annex A*

Note: For EN61000-4-6,-3 the controller met performance criteria B.

*Class A equipment: Equipment suitable for use in establishments other than domestic, and those directly connected to a low voltage (100-240 VAC) power supply network which supplies buildings used for domestic purposes.

2.3 Mechanical

Enclosure Material:	Thermoplastic
NEMA Rating:	NEMA 4X
Dimensions:	8.5" x 6.5" x 5.5"
Display:	2 x 16 character backlit liquid crystal
Operating Ambient Temp:	32 – 122°F (0 – 50°C)
Storage Temperature:	-20 – 180°F (-29 – 80°C)
Graphite electrode pressure rating	150 psi
Flow switch manifold pressure rating	150 psi
Flow switch manifold connections	3/4 " NPTF

2.4 WDT Variables and their Limits

	Low Limit	High Limit
Conductivity menu		
PPM Conversion Factor (ppm/ uS /cm)	0.200	1.000
Interval Time (sampling)	5 minutes	24:00 hours
Duration Time (sampling)	1 minute	59 min:59 sec
% Calibration range	-50	+50
Temperature Menu		
No variables		
Bleed Menu		
Set Point	0 µS/cm	10,000 µS/cm
Dead Band	5 µS/cm	500 µS/cm
Bleed Time Limit (set in hrs/minutes)	1 minute	8 hrs:20 min (enabled) unlimited (disabled)
Feed Menu		
Feed Lockout Timer (Mode A)	1 second	99 min: 59 sec
Percent of Bleed (Mode B)	5 %	99 %
Feed Time Limit (Mode B)	1 minute	99 min: 59 sec
Percent of Time (Mode C)	5 %	99 %
Feed Cycle Time (Mode C)	10 minutes	59 min: 59 sec
Time per Contact (Mode D)	1 second	59 min: 59 sec
Divider Count (Mode D)	1contact	100 contacts
Feed Time Accumulate (Mode D)	1 minute	99 min: 59 sec
mA		
4 & 20 mA Settings	0 µS/cm	10,000 µS/cm
Access Code		
New Value	0	9999
Alarms		
High & Low (set to zero to disable)	1 %	50 %

3.0 UNPACKING & INSTALLATION

3.1 Unpacking the unit

Inspect the contents of the carton. Please notify the carrier immediately if there are any signs of damage to the controller or its parts. Contact your distributor if any of the parts are missing. The carton should contain: a WDT300 series controller and instruction manual. Any options or accessories will be incorporated as ordered.

3.2 Mounting the electronic enclosure

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

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

3.3 Installation

Once the WDT series controller is mounted, the metering pumps may be located at any distance from the controller. The conductivity electrodes should be placed as close to the controller as possible, to a maximum distance of 250 ft. Under 25 ft is recommended. The cable must be shielded from background electrical noise. Always route low voltage (sensor) signals with at least a 6” separation from AC voltage wiring.

Locate the electrode tees where an active sample of cooling tower water is available and where the electrode can easily be removed for cleaning. They must be situated so that the tee is always full and the probe is never subjected to a drop in water level resulting in dryness. Refer to Figure 1 for typical installation.

IMPORTANT: To avoid cracking the female pipe threads on the supplied plumbing parts, use no more than 3 wraps of Teflon® tape and thread in the pipe FINGER tight plus ½ turn! Do not use pipe dope to seal the threads of the flow switch because the clear plastic will crack!

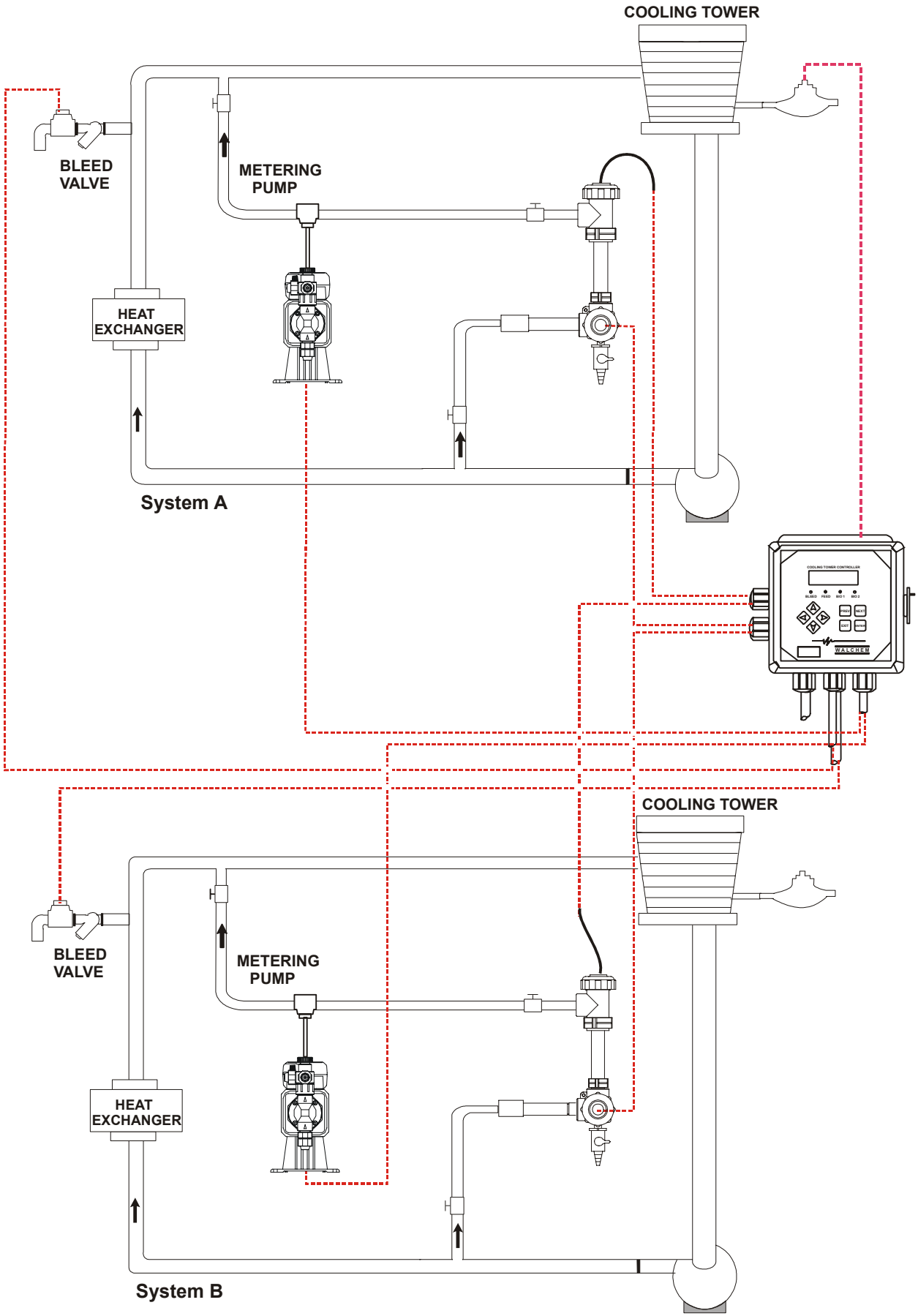


Figure 1 Typical Installation

3.4 Icon Definitions

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

3.5 Electrical installation

Based on the model number, the following voltages are required:

WDT300-1xx	120 VAC, 50/60 Hz
WDT300-4xx	120 VAC, 50/60 Hz
WDT300-5xx	240 VAC, 50/60 Hz

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

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

CAUTION! There are live circuits inside the controller even when the power switch on the front panel is in the OFF position! The front panel must never be opened before power to the controller is REMOVED!
If your controller is prewired, it is supplied with a 8 foot, 18 AWG power cord with USA style plug. A tool (#1 phillips driver) is required to open the front panel.

CAUTION! When mounting the controller, make sure there is clear access to the disconnecting device!

CAUTION! The electrical installation of the controller must be done by trained personnel only and conform to all applicable National, State and Local codes!

CAUTION! Proper grounding of this product is required. Any attempt to bypass the grounding will compromise the safety of persons and property.

CAUTION! Operating this product in a manner not specified by Walchem may impair the protection provided by the equipment.

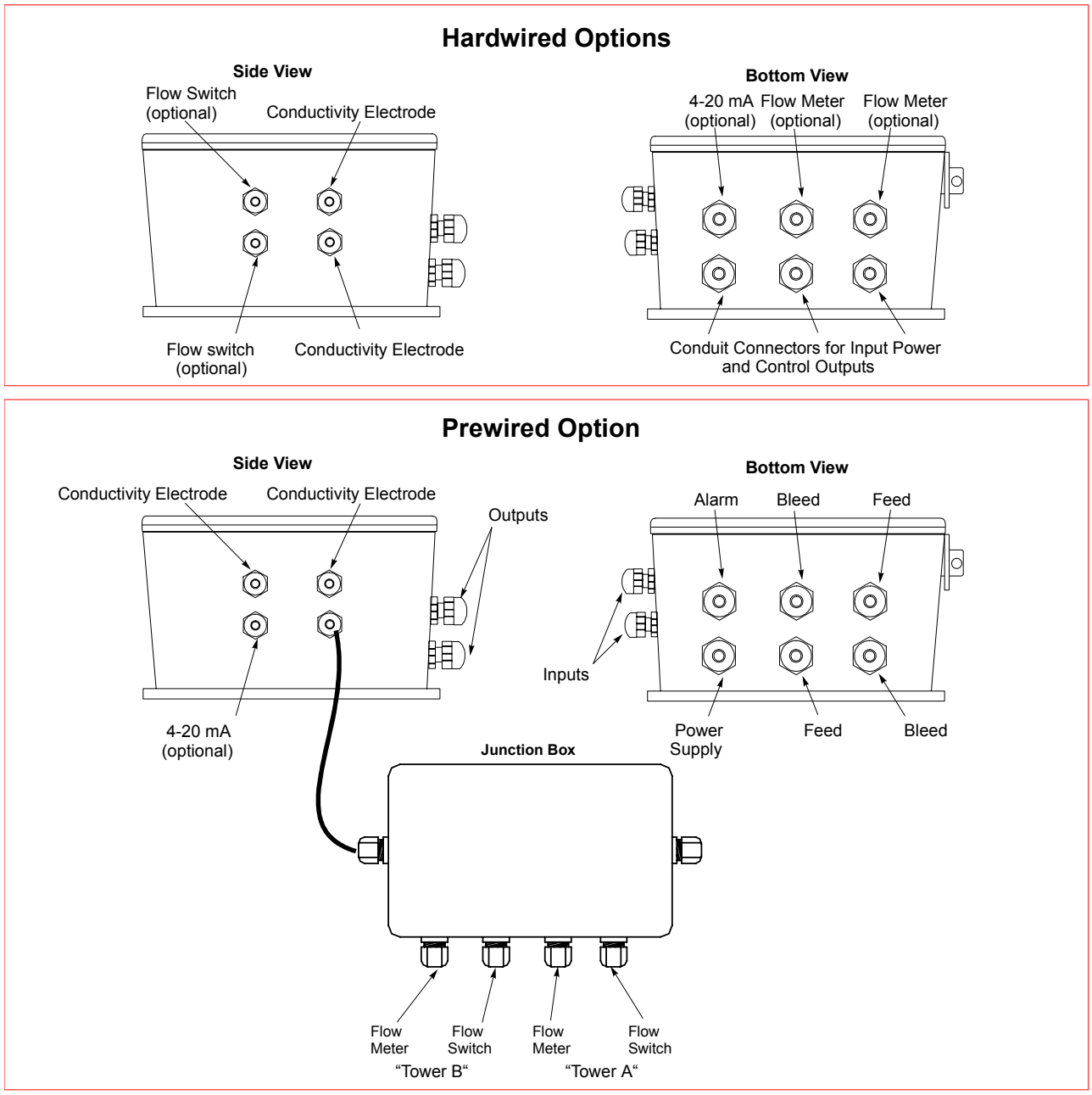


Figure 2 Conduit/Wiring Configuration

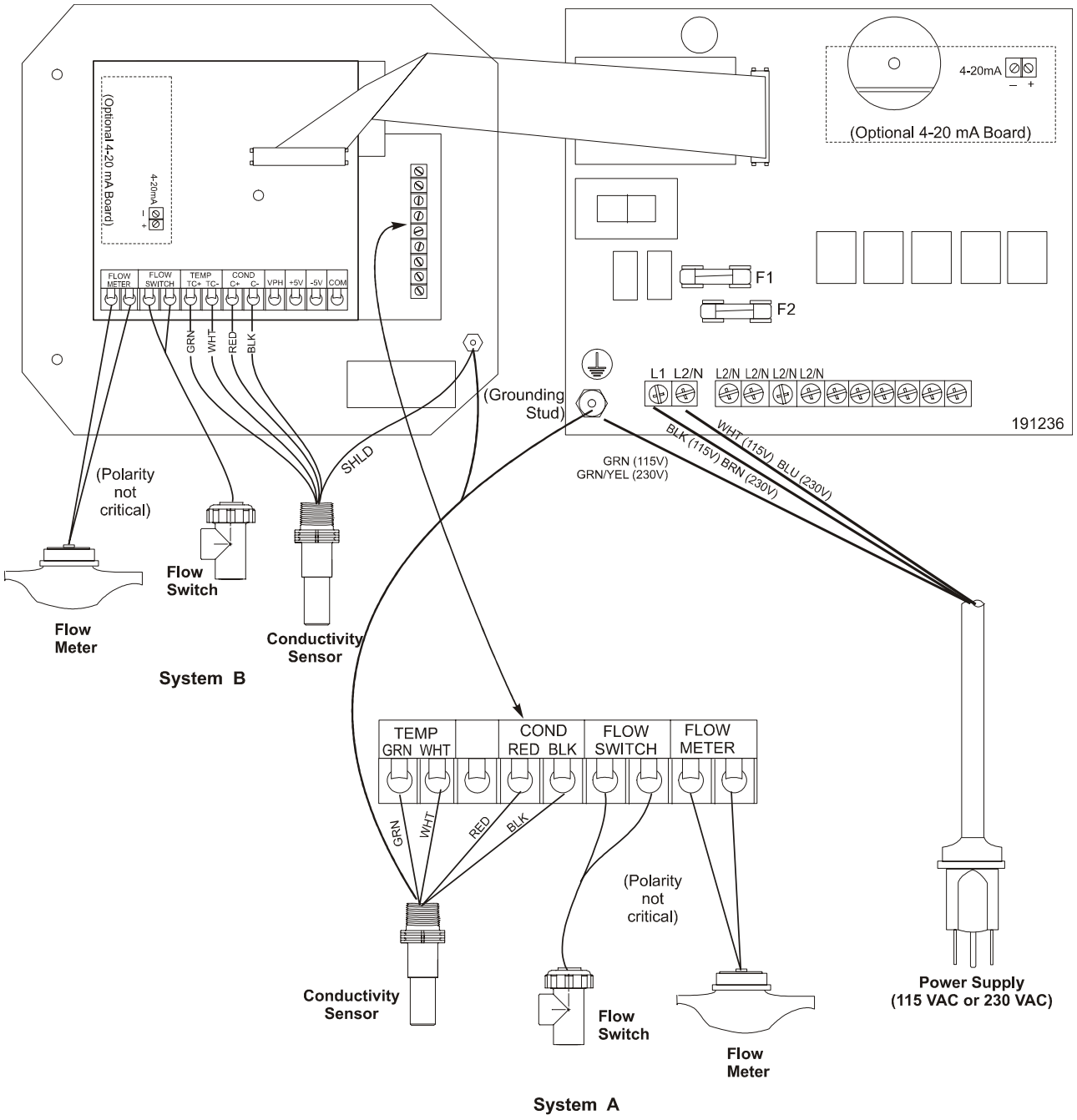


Figure 3 Inputs (for power relay board #191236)

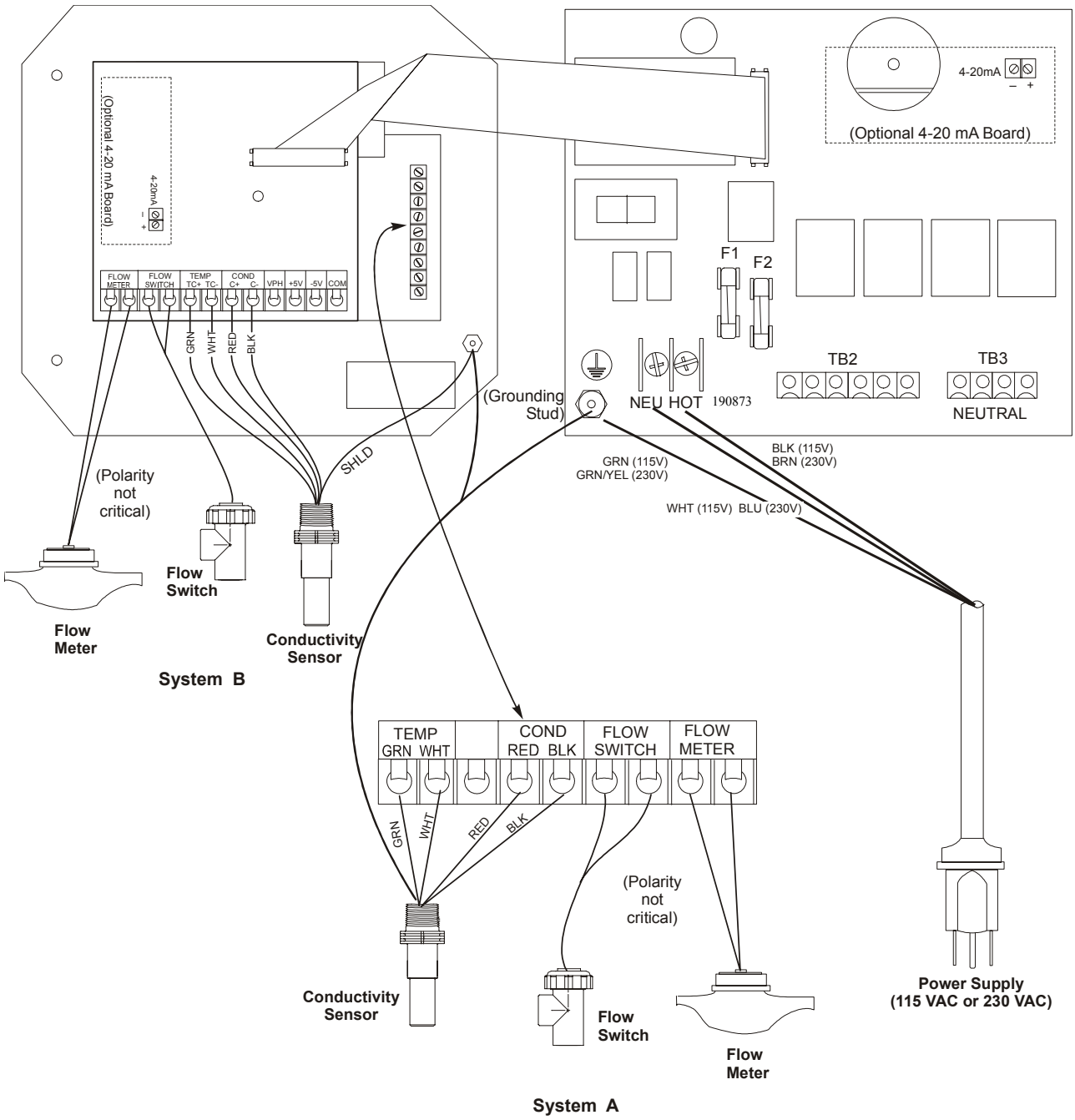


Figure 3a Inputs (for power relay board #190873)

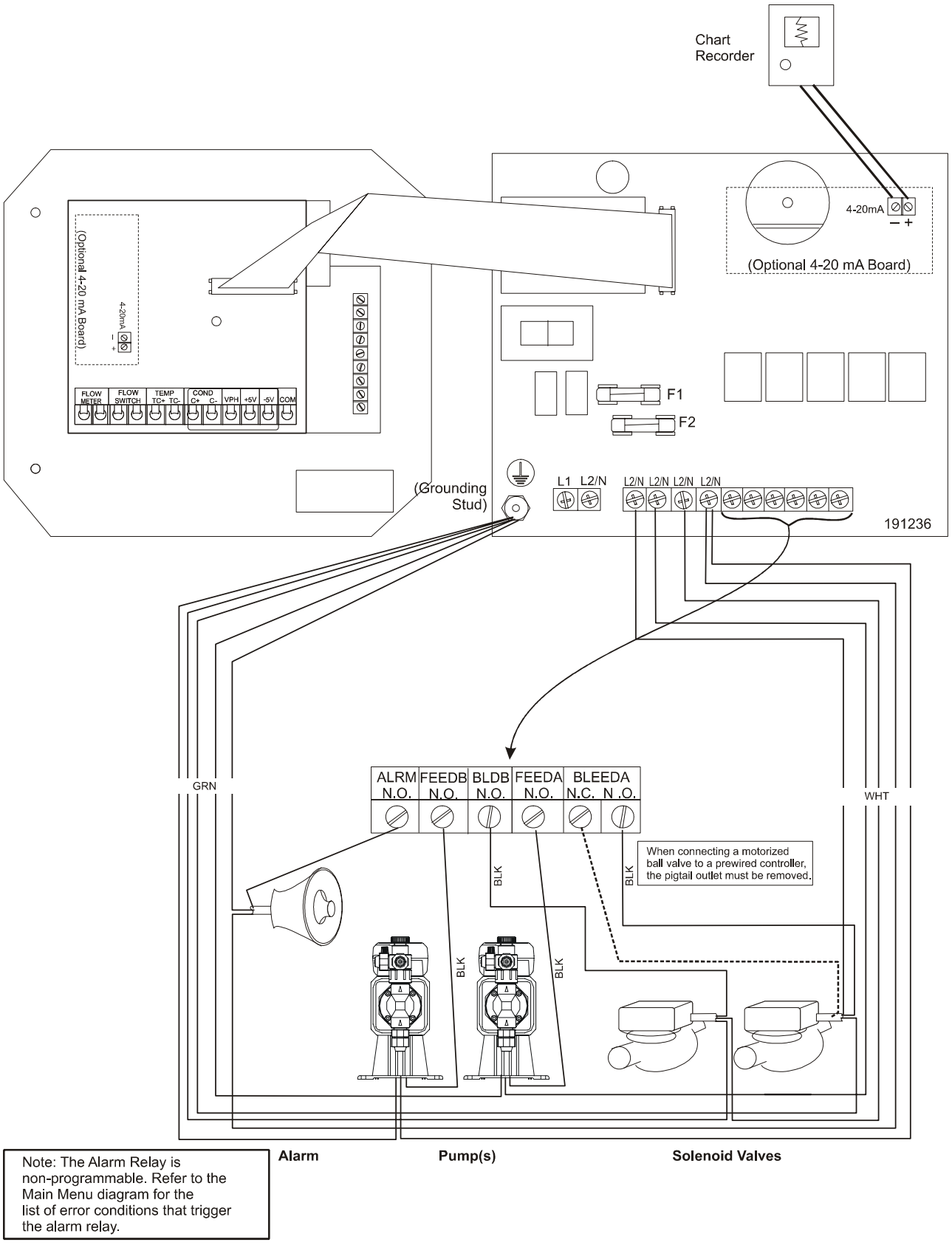


Figure 4 Outputs (for power relay board #191236)

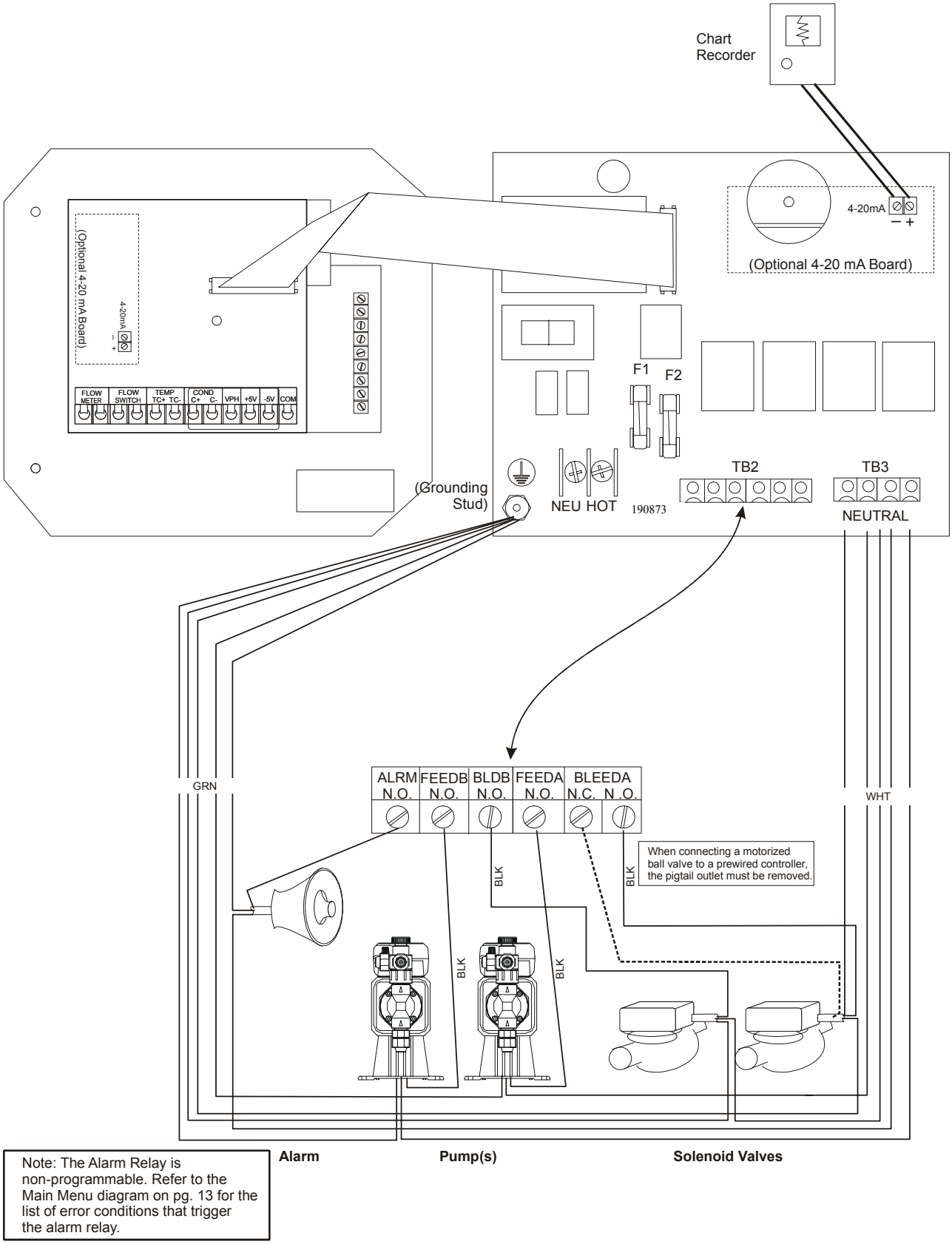


Figure 4a Outputs (for power relay board #190873)

4.0 FUNCTION OVERVIEW

4.1 Front Panel

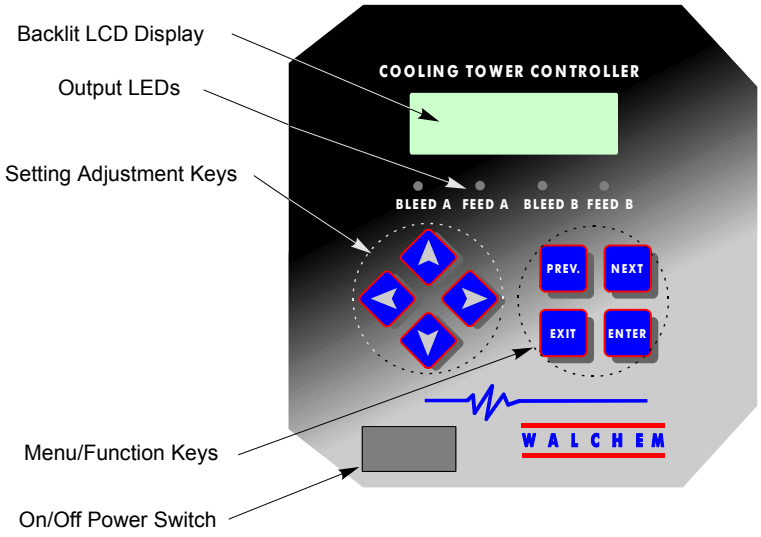


Figure 5 Front Panel

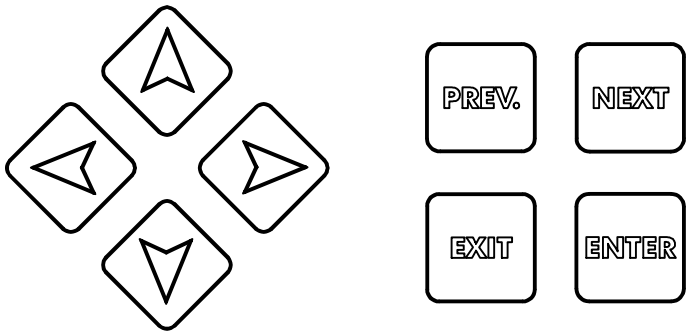
4.2 Display

A summary screen is displayed while the WDT controller is on. This display shows the conductivity of tower A on the upper left side, tower B on the upper right side and current operating conditions. The operating conditions that are displayed on the bottom line of this display are Temp Err A, Temp Err B, Cond Err A, Cond Err B, No Flow A, No Flow B, Bleed Timeout A, Bleed Timeout B, Feed Timeout A, Feed Timeout B, Hi Alarm A, Hi Alarm B, Lo Alarm A, Lo Alarm B, Bleed A, Bleed B, Feed A, Feed B, Waiting A/B, Sample A/B, Extend A/B and Normal. Normal just means there is nothing unusual to report.

Figure 6 Summary Screen

4.3 Keypad

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



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

4.4 Access Code

The WDT series controller is shipped with the access code disabled. If you wish to enable it, see Section 5.11 for operation. With the access code enabled, any user can view parameter settings, but not change them. Note that this provides protection only against casual tampering. Use a lock on the cover latch if you need more protection.

4.5 Startup

Initial Startup

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

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

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

Normal Startup

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

4.6 Shut Down

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

5.0 OPERATION

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

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

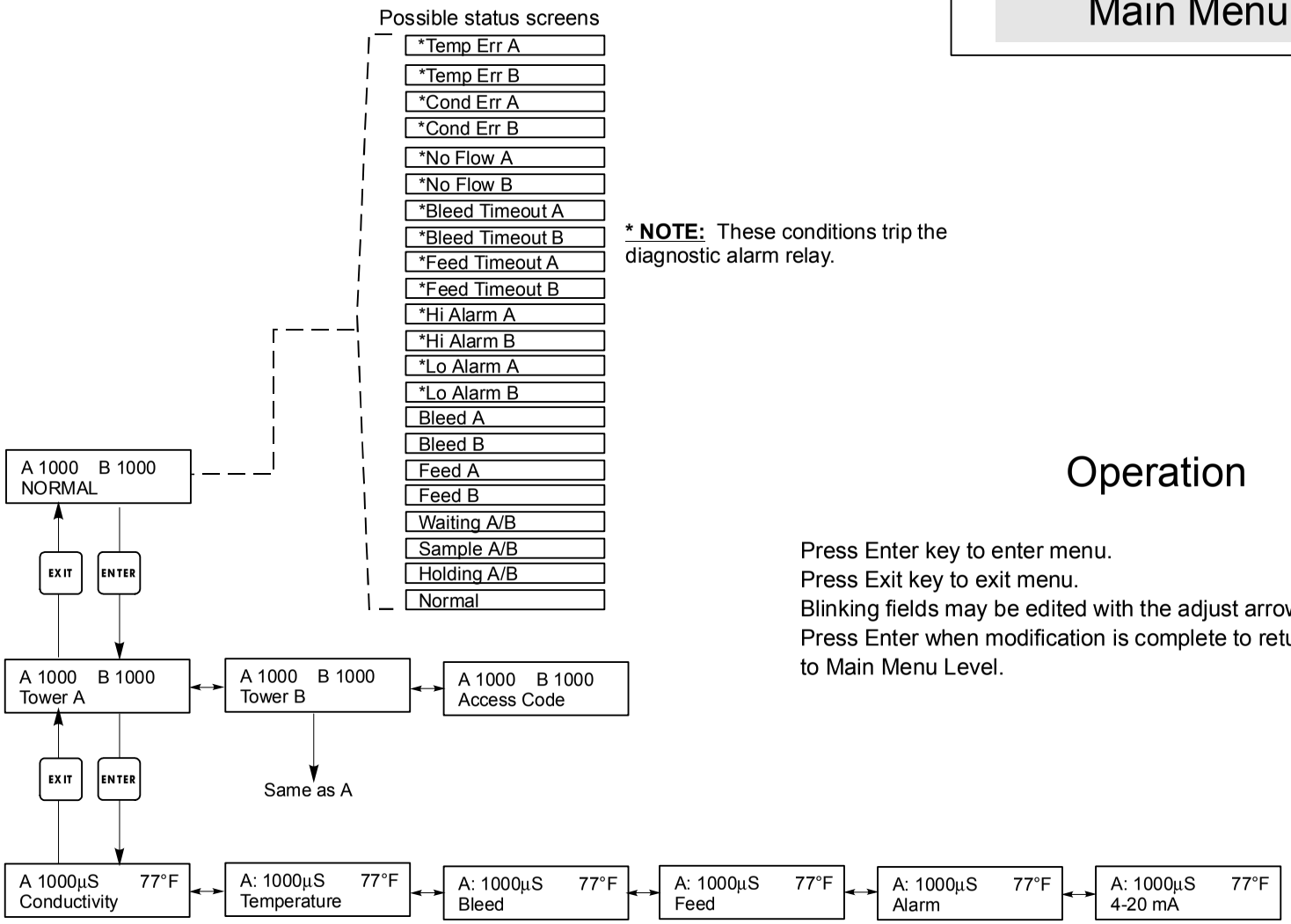
5.1 Main Menu

The exact configuration of your WDT controller determines which menus are available as you scroll through the settings. Certain menus are only available if you select certain options. All settings are grouped under the following main menu items: Cooling Tower A, Cooling Tower B and Access Code. Within the menu for each cooling tower, the following menus are found:

Conductivity
Temperature
Bleed
Feed
Alarm
4-20mA Only if 4-20mA option installed
Access Code

The **NEXT** key travels forward through this list while the **PREV** key travels backwards through the list. Pressing **ENTER** will Enter the lower level menu that is currently displayed.
The following menu descriptions work exactly the same way for cooling tower A as for cooling tower B.

Main Menu



*** NOTE:** These conditions trip the diagnostic alarm relay.

Figure 7 Main Menu

Operation

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

5.2 Conductivity (A or B) Menu

The conductivity menu provides the following settings: Calibration, Self Test, Unit selection, and sampling mode setup. Additional settings are also discussed below. Refer to figure 8, Conductivity Menu Chart.

Calibrate

To Calibrate the conductivity, use either a hand held meter, or a buffer solution, and adjust the WDT controller to match. Once Calibrate is entered, the unit continuously displays conductivity readings. Press an arrow key to change the value displayed to match the hand held meter or the buffer solution. You must press **ENTER** to activate the new calibration. You must press the **EXIT** key to exit calibration. The Bleed output is unaffected until the calibration menu is exited, so if it was ON when you entered calibration it will stay on until you exit.

Self Test

Press **ENTER** to begin self test. Press any key to stop. Self Test internally simulates a conductivity sensor and should always give the reading 1000 µS/cm ± 20 µS. If it does not, disconnect the sensor and repeat the self test. If the reading is still not in the 1000 ±20 range, there is a problem with the electronics and the unit should be serviced. If the self test is in the expected range, and there is a problem calibrating, then the sensor or its wiring is at fault.

Units

You may choose to display conductivity in µS/cm or in ppm. Press **ENTER** and then use the Up and Down arrows to change the units. If you change the units, you will be warned to check your settings. This is important. Set points are not automatically translated from µS/cm to ppm. If you change the units you will need to change your Bleed settings.

ppm C.F.

This is the ppm Conversion Factor (or multiplier). This is typically 0.666 but can be changed to accommodate various requirements.

Sample Mode C / I

Press **ENTER** to choose Continuous sampling or Intermittent sampling. A 'C' at the end of the display means that sampling is continuous, while an 'I' indicates intermittent sampling. Use Continuous sampling with a traditional bypass line installation of the conductivity sensor. Choose Intermittent sampling to use the bleed solenoid valve for timed sampling of the conductivity. If Intermittent sampling is chosen, the Flow Switch input will be ignored, and the following two settings will become available:

Interval

This sets the amount of time between samples. This is set in Hours:Minutes.
The minimum is 5 minutes. The maximum is 24 hours.

Duration

This is the length of each sample. This is set in Minutes:Seconds.
The minimum is 1 minute. The maximum is 59 minutes; 59 seconds.

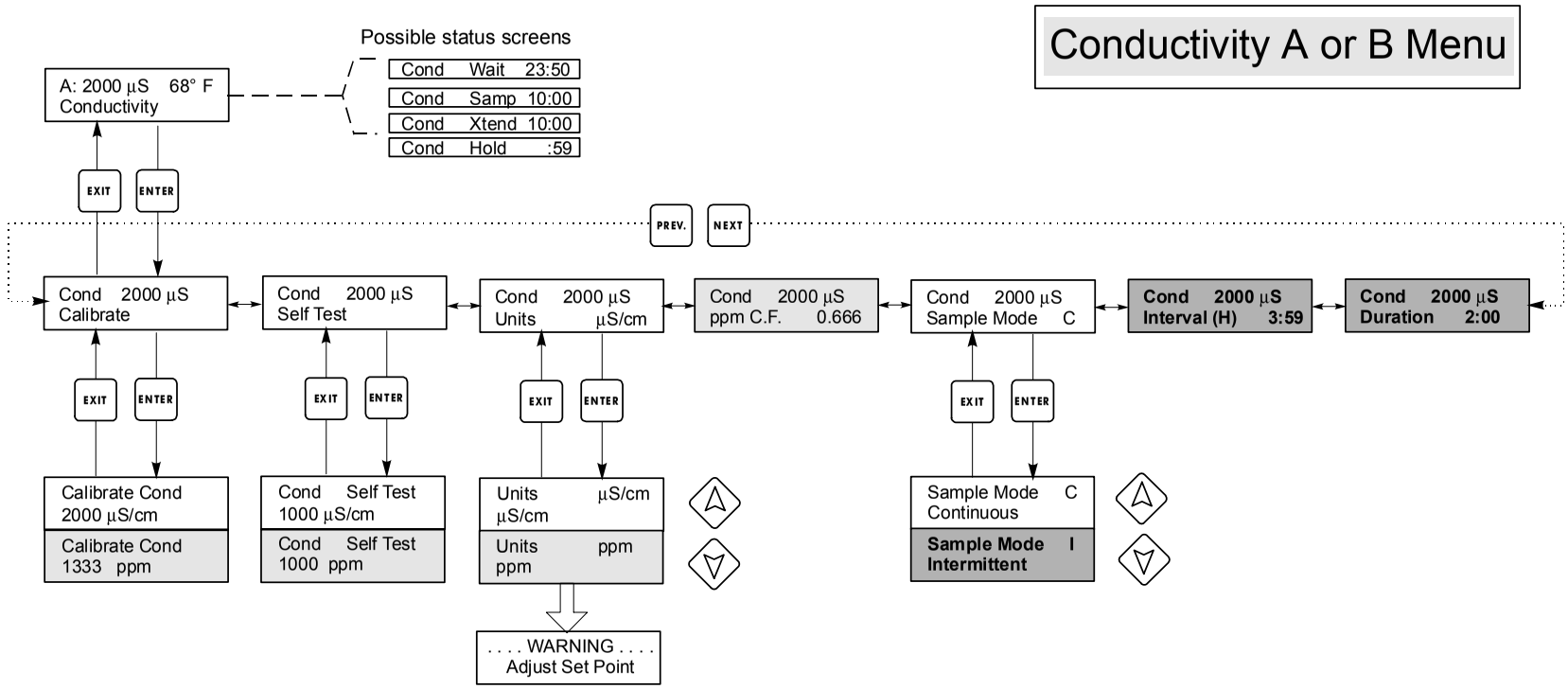


Figure 8 Conductivity (A or B) Menu

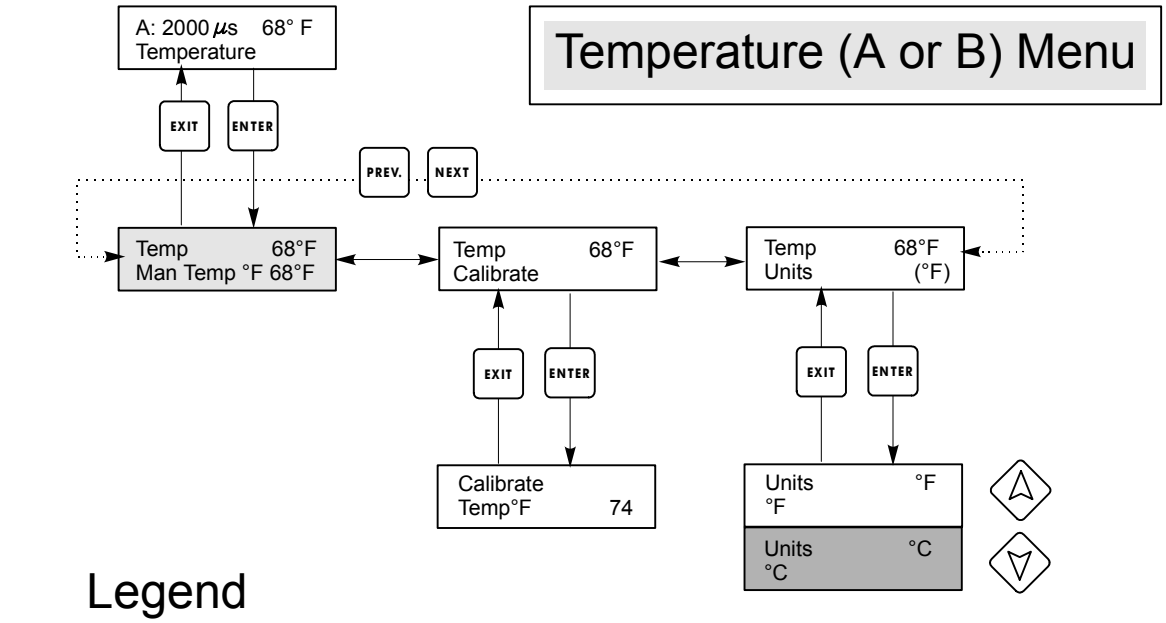
Legend

Menu choices that appear when ppm units are selected.

Menu choices that appear when intermittent sampling is selected.

Operation

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



Legend

Only appears if no temperature element is connected at power-up.

Menu wording that appears when C units are selected.

Figure 9 Temperature (A or B) Menu

5.3 Temperature (A or B) Menu

The Temperature menu provides the following settings: Calibration, Unit selection. The Temperature menu will be indicated on the display by one of the following:

Temperature Temp 70°F Temp Error

The first two displays are "normal" operation. The third display indicates that there is a problem with the temperature input. See figure 9.

Calibrate

To Calibrate the Temperature, use a thermometer to measure the fluid temperature and adjust the WDT controller to match. Once Calibrate is entered, the unit continuously displays temperature readings. Press the Up or Down arrow key to change the value displayed to match the thermometer. You must press **ENTER** to activate the new calibration. You must press the **EXIT** key to exit calibration.

Units

You may choose to display temperature in °C or °F. Press **ENTER** and the Up or Down Arrow keys to change the temperature units for display.

5.4 Bleed (A or B) Menu

The Bleed Menu provides the following settings: Set Point, Dead Band, Control Direction, HOA. The Bleed menu will be indicated on the display by one of the following:

Bleed A OFF
Bleed A 10:00
Bleed A NO FLOW
Bleed A LOCKOUT
Bleed A TIMEOUT

The first display indicates that the bleed output is currently OFF. The second display indicates the length of time that the Bleed output has been ON. The third indicates that bleed control has been suspended because there is presently no flow past the flow switch. The fourth display indicates that the output is currently locked out due to a biocide add or biocide lockout.
The 'A' indicates that the output is being controlled automatically.

Set Point

This is the conductivity value at which the bleed solenoid valve is turned ON. The factory default setting for the WDT controller is for the Bleed output to turn on when the conductivity is higher than the set point. This may be changed at the Control Direction screen.

Dead Band

This is the conductivity value that when combined with the set point determines when the bleed output turns OFF. Assuming that the control direction is set for normal operation (High Set Point) the bleed output will turn off when the conductivity drops below the set point minus the Dead Band. For example: The set point is 1500 µS/cm and the Dead Band is 200 µS/cm. The bleed output turns ON when the conductivity reading is greater than 1500 but does not turn OFF until the conductivity drops below 1300.

Time Limit

This menu allows you to set a maximum amount of time for the bleed. The limit time is programmed in hours and minutes and can be set between 1 minute and 10 hours. If the time limit is set to zero, then the valve may be open indefinitely. If the maximum time is exceeded, the bleed valve will close and will not re-open until the "Reset Timer" menu is reset by an operator.

Reset Timer

Only appears if the time limit above has been exceeded. Use the up or down arrow to change "N" to "Y", then press **ENTER**.

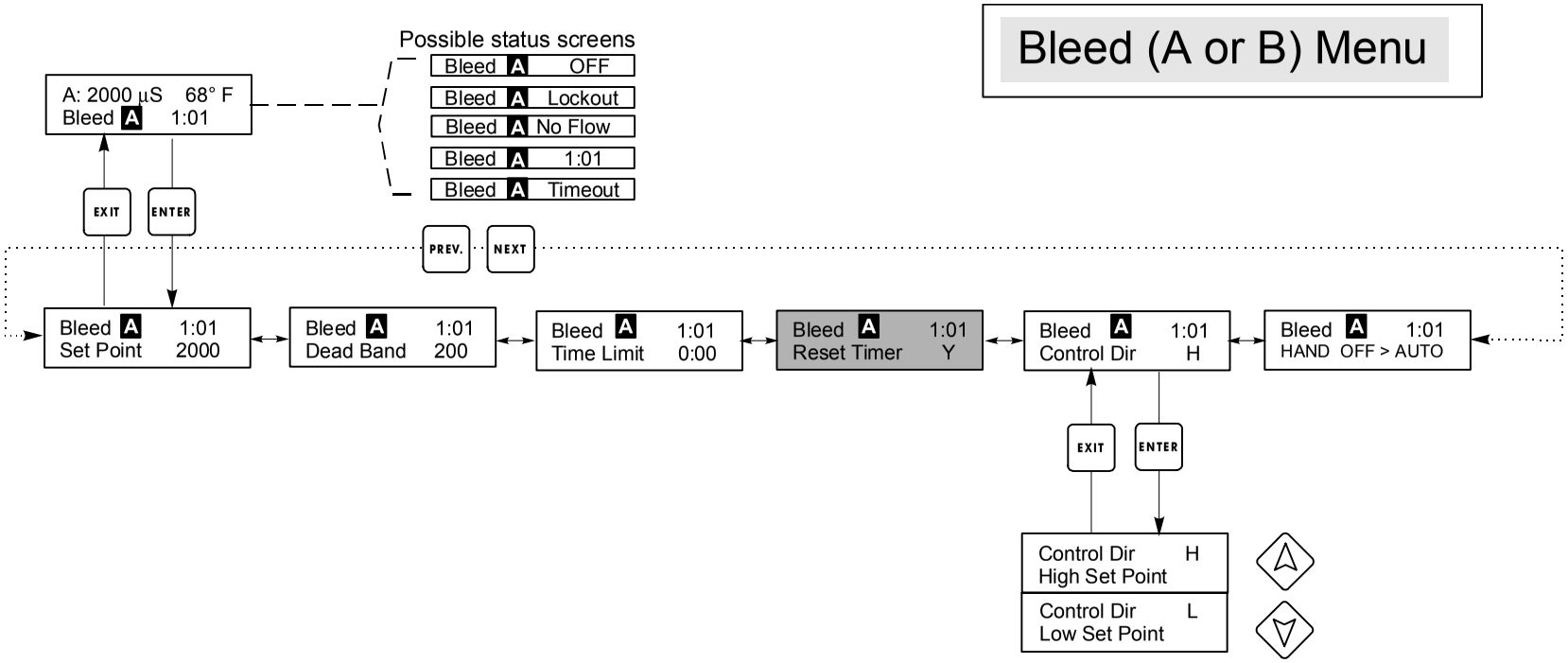


Figure 10 Bleed (A or B) Menu

Legend

Appears only if limit timer has expired.

Operation

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

Control Dir H / L

This allows you to set the Normal (High Set Point) or Inverse (Low Set Point) operation of the bleed output. When set to High, the output turns on when the conductivity is higher than the set point. When set to Low, the output turns on when the conductivity is lower than the set point.

H O A

The "Hand Off Auto" screen allows you to select the operating mode of the bleed output. In Hand (manual) mode, the output is turned on immediately for a maximum of 10 minutes. If you walk away the output will return to Auto mode at the end of that time. In Off mode the output will stay Off indefinitely. In Auto mode the bleed output will respond to changes in conductivity based on the set point. The HOA mode of the bleed output is indicated on the bleed status lines.

5.5 Feed (A or B) Menu

The Feed Menu adapts to the selected Feed output mode. The modes are defined as follows:

A Bleed and Feed with optional Lockout
B Feed % of Bleed
C Feed % of Time
D Feed based on Water Contactor input

Bleed and Feed Mode turns the Feed output On and Off at the same time as the Bleed output. The lockout setting determines the maximum allowable time for the Feed output. If this time is exceeded the Feed output is turned off and Locked out until the Bleed output turns off.

Feed % of Bleed Mode tracks the length of time that the Bleed output is on. When the bleed turns off the feed output is energized for a user defined proportion of the bleed time.

Feed % of Time Mode turns on the Feed output for a user definable % of a timed cycle. The time cycle length is adjustable from 10 to 60 minutes.

Feed based on Water Contactor Input Mode turns on the Feed output for a user definable time each time a water contactor pulse is detected. This contactor input can be divided to accommodate a large variety of water meters. Contacts will accumulate feed time so that all contacts are accounted for.

The Feed menu will be indicated on the display by one of the following:

Feed	A	OFF	
Feed	A	10:00	Hint: For easiest programming,
Feed	A	NO FLOW	program Feed Mode first, then
Feed	A	TIMEOUT	step through the rest of the feed
Feed	A	LOCKOUT	parameters.

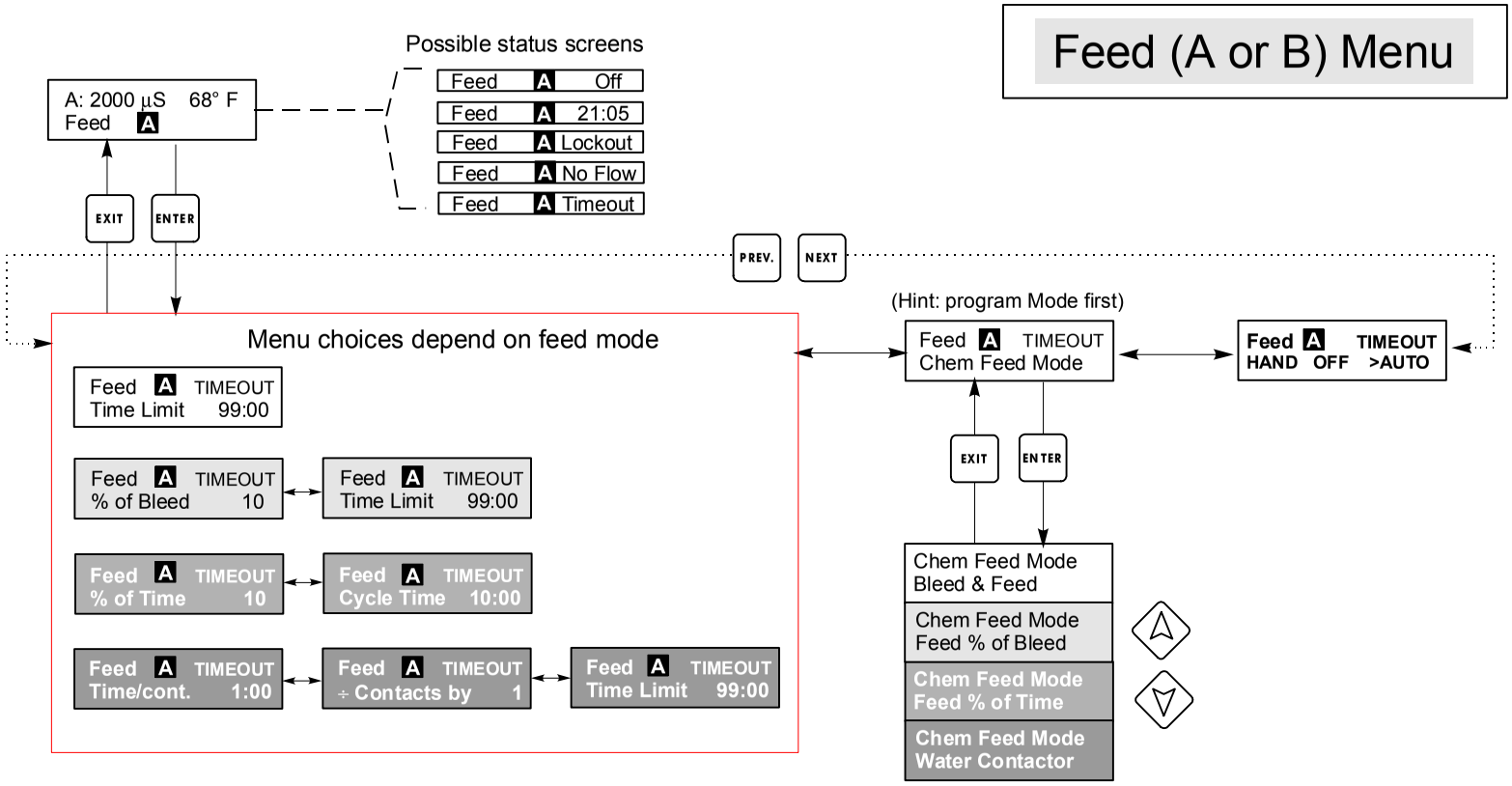


Figure 11 Feed (A or B) Menu

Legend

Menu choices that appear when Feed as % of Bleed mode is selected.

Menu choices that appear when Feed as % of Time mode is selected.

Menu choices that appear when Feed based on water contactor input is selected.

Operation

Press Enter key to enter menu.
Press Exit key to exit menu.
Blinking fields may be edited with the adjust arrows.
Press Enter when modification is complete to return to Feed Menu Level.
Press Enter or Adjust arrow to turn on/off output at Hand menu.

The first display indicates that the Feed output is currently OFF. The second display indicates the length of time that the Feed output has been ON, or the length of time that the Feed output will be ON. The third indicates that Feed control has been suspended because there is presently no flow past the flow switch. The fourth display indicates that the feed lockout timer in the Bleed and Feed mode has expired. The fifth display indicates that the output is currently locked out due to a biocide add or biocide lockout.
The 'A' indicates that the feed is being controlled automatically.

Bleed and Feed Mode

Lockout

Set this for the Feed Lockout Time. The lockout time is the maximum length of time that the feed output can be on. If the lockout time is set to 0:00, the lockout timer is no longer used and the feed output will be on for as long as the bleed is on.

Feed % of Bleed Mode

% of Bleed

This is the % value that is multiplied times the accumulated bleed time to determine how long the feed will be. For example, if the bleed was on for 10 minutes and this setting was 50%, the feed output would be on for 5 minutes.

Max Time

This is similar to the lockout time above in that the feed output will not exceed this maximum length.

Feed % of Time Mode

% of Time

This is the % value that is multiplied times the cycle length to determine the length of time that the feed output is ON. If the cycle length were 10 minutes and this setting was 40%, the feed output would be on for 4 minutes, then off for 6 minutes and then repeat the cycle.

Cycle Time

This determines the length of the cycle to be used.

Feed Based on Water Contactor Mode

Time/Cont.

(Time per contact.) This determines the length of time that the feed pump should be on for each contact that is received.

÷ *Contacts By*

This setting allows a divider to be entered. The divider will count actual contacts from the meter until the setting is reached before a contact is considered to be received. For example, if the divider is set to 10 and the Time/Cont is set to 5:00, then the feed output would turn on for 5:00 minutes after 10 contacts were received.

Time Limit

This setting puts a limit on the amount of time that can be accumulated by the water contactor input. Once this setting has been reached, all contacts will be ignored until the accumulated feed time expires. By setting Time Limit = Time/Cont., the accumulation of contacts can be disabled.

The following settings are for all feed modes.

Chem Feed Mode A / B / C / D

This allows the user to select the chemical feed mode as described above.

H O A

This sets the Hand Off Auto for the feed output. This was explained in the Bleed Menu section and functions similarly. In Off position, the output will not turn ON regardless of the feed mode selected.

5.6 Alarm (A or B) Menu

The Alarm menu screen will appear as follows:

Alarm OFF
Alarm LOW ALRM
Alarm HI ALRM

Set % Low

This is the % below the bleed set point that the LOW ALARM will activate. If the set point is 1000 and the % Low setting is 20 then the Low alarm will activate at 800.

Set % High

This is the % above the bleed set point that the HIGH ALARM will activate. If the set point is 1000 and the % Low setting is 20 then the High alarm will activate at 1200.

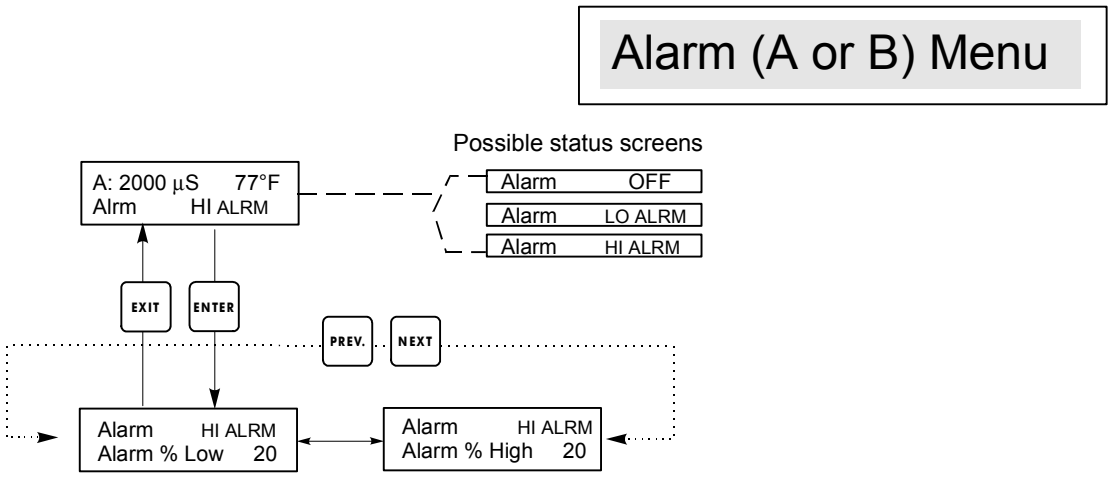


Figure 12 Alarms (A or B) Menu

5.7 4-20mA (A or B) Menu

This menu is only available if the 4-20mA output is installed in the controller. Installing this option board on the lower power supply board in the controller will assign it to Tower A. Installing a 4-20mA option board on the top front panel assembly assigns the output to Tower B. The 4-20mA output is available for either the WDT300 or WDT310 series controllers. This menu provides for scaling and calibrating the output. The 4-20mA menu screen appears as follows:

4-20mA 9.20mA

This indicates that the current output of the 4-20mA card is 9.20 mA.

Set 4mA Pt

This conductivity setting will correspond to a 4 mA output from the controller.

Set 20mA Pt

This conductivity setting will correspond to a 20mA output from the controller.

Calibrate

This will provide fixed 4mA and fixed 20mA outputs to allow you to calibrate connected equipment.

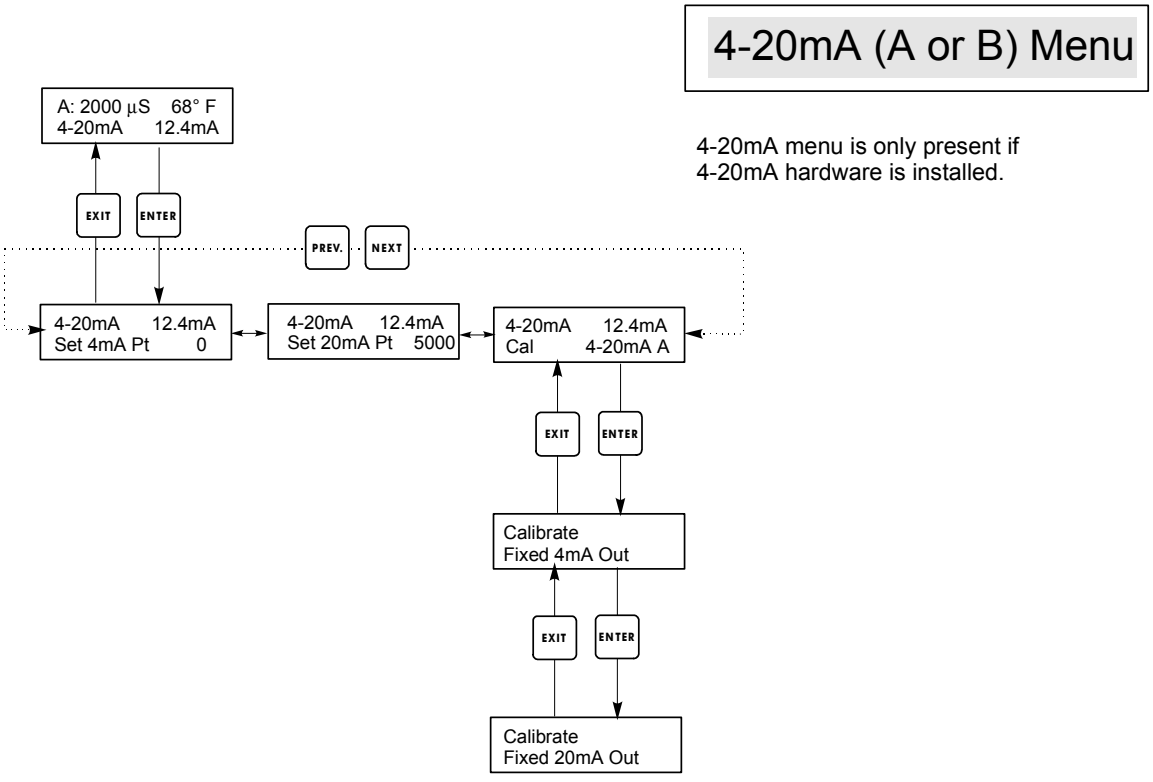


Figure 13 4-20 mA (A or B) Menu

5.8 Access Code Menu

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

Access Code DIS
Access Code REQ
Access Code OK

The first display indicates that the access code is disabled. No access code is required to change any setting. The second display indicates that the access code is required to alter settings. The last display indicates that the access code is required and has been entered correctly.

Enable N / Y

Press the Up or Down arrow key to change the N to Y and press **ENTER** to enable the access code feature. If the access code is enabled you must first enter the access code to disable it.

New Value

Press **ENTER** to display the current access code value and use the arrow keys to change it to any value between 0 and 9999. If the access code has been enabled, you will be prompted to enter the current access code before being allowed to change it. You must remember the access code if you enable it.

The Factory default Access code is 1995.

If you change the access code and can't remember it follow this procedure:
1. Turn off power to the controller.
2. Wait 10 seconds.
3. Press and Hold the UP and DOWN arrow keys while turning on the power.
4. Read the access code on the display.
5. Release the keys, and the access code will disappear.

Access Code Menu

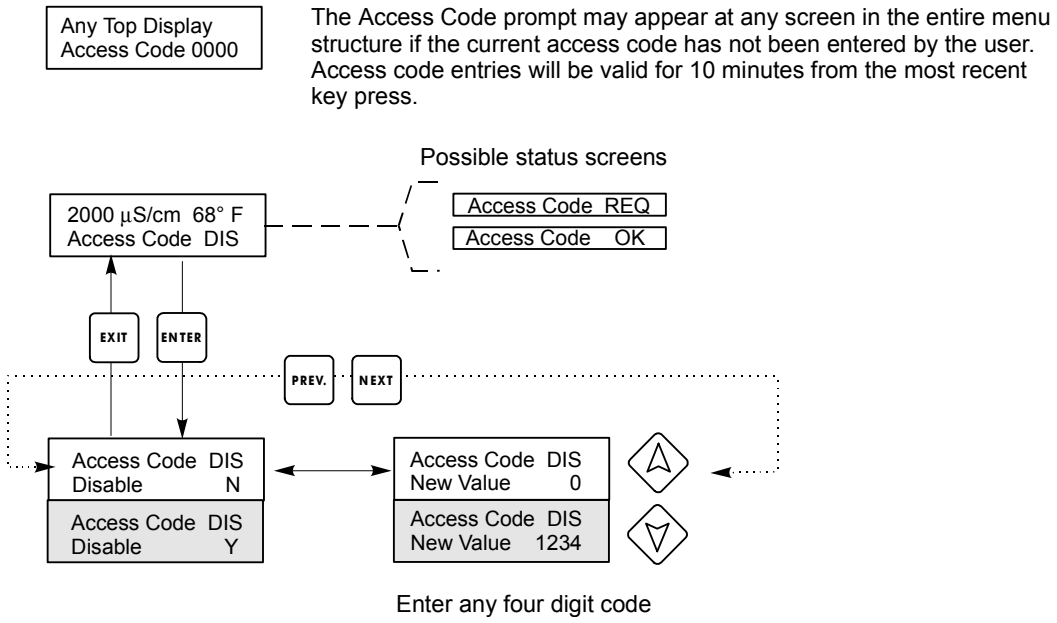


Figure 14 Access Code Menu

6.0 MAINTENANCE

The WDT controller itself requires very little maintenance. Wipe with a damp cloth. Do not spray down the controller unless the enclosure door is closed and latched.

6.1 Electrode Cleaning

NOTE: The controller must be recalibrated after cleaning the electrodes.

Frequency

The electrodes should be cleaned periodically. The frequency required will vary by installation. In a new installation, it is recommended that the electrodes be cleaned after two weeks of service. To determine how often the electrodes must be cleaned, follow the procedure below.

1. Read and record the conductivity.
2. Remove, clean and replace the conductivity electrode.
3. Read conductivity and compare with the reading in step 1 above.

If the variance in readings is greater than 5%, increase the frequency of electrode cleaning. If there is less than 5% change in the reading, the probe was not dirty and can be cleaned less often.

Cleaning Procedure

The electrodes can normally be cleaned using a cloth or paper towel and a mild detergent. If coated with scale, clean with a dilute (5%) hydrochloric acid solution. Occasionally an electrode may become coated with various substances which require a more vigorous cleaning procedure, such as immersion in dilute muriatic acid. Usually the coating will be visible, but not always. To clean a coated electrode, use a fine grit abrasive, such as emery paper. Lay the paper on a flat surface and move the electrode in a back and forth motion. The electrode should be cleaned parallel to the carbon electrodes, not perpendicular.

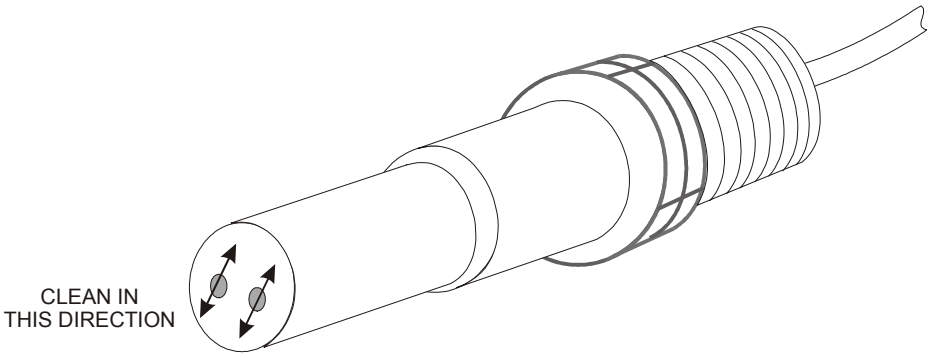


Figure 15 Cleaning the Probe

6.2 Replacing the Fuses

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

Locate the fuses on the circuit board at the back of the controller enclosure. (See figure 3.) Gently remove the old fuse from its retaining clip and discard. Press the new fuse into the clip, secure the front panel of the controller and return power to the unit.

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

Controller Rating	F1	Walchem P/N	F2	Walchem P/N
120VAC	5 x 20 mm, 0.125A, 250V	102369	5 x 20 mm, 10A, 125V	102432
240 VAC	5 x 20 mm, 0.063A, 250V	103363	5 x 20 mm, 5A, 250V	102370

7.0 TROUBLESHOOTING

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

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

7.1 Error Messages

HIGH ALARM

The summary screen will display an H at the right end of the bar graph if the conductivity rises above the high conductivity alarm set point. If your unit is wired for alarm output, the alarm relay will trip. The controller will continue to check the conductivity, and the bleed and/or feed outputs will be allowed to be activated.

	Possible Cause	Corrective Action
1.	Dirty probe	Clean probe (see Sect. 6.1)
2.	Faulty solenoid valve	Repair or replace solenoid valve.
3.	Faulty probe	Evaluate (see Sect. 7.3). Check Temp display.
4.	Improper wiring of valve or controller	Correct wiring. See Section 3.4.
5.	Conductivity rose over alarm limit while biocide lockout occurred.	Allow normal bleed to occur.
6.	Clogged Y-strainer in bleed line	Clean Y-strainer.
7.	Faulty bleed relay	Replace relay. (Consult factory.)

LOW ALARM

The summary screen will display an L at the left end of the bar graph and the alarm relay will trip. The controller will continue to check the conductivity and feed inhibitor as programmed.

	Possible Cause	Corrective Action
1.	Sensor disconnected	Reconnect. Check cable for continuity.
2.	Sensor dry	Check tee for obstruction. Verify flow. Change location of probe.
3.	Pre-bleed set too low	Check pre-bleed setting compared to % low.
4.	Solenoid valve stuck open	Repair or replace solenoid valve. (Consult your distributor).
5.	Faulty probe	Evaluate (see Section 7.3). Replace if necessary.
6.	Improper wiring of probe	Correct wiring. See Section 3.4.
7.	Faulty bleed relay	Replace relay. (Consult factory.)

TEMP ERROR

This error condition will stop both conductivity and pH control. It indicates that the temperature signal from the conductivity electrode is no longer valid. This prevents controlling based upon a bogus pH or conductivity reading.

Possible Cause		Corrective Action
1.	Green or White electrode wire disconnected.	Reconnect.
2.	Faulty electrode	Replace electrode. Revert to manual temperature compensation by cycling power off and on.

COND ERROR

This error condition will stop conductivity control. It indicates that the conductivity signal from the electrode is no longer valid. This prevents controlling based upon a bogus conductivity reading.

	Possible Cause	Corrective Action
1.	Black or red electrode wire shorted	Disconnect short.
2.	Faulty electrode	Replace electrode.
3.	Faulty controller	Verify via failed self test.

NO FLOW

This error condition will stop all control. It indicates that the flow of sample past the electrodes and flow switch is less than ½ gallon per minute. This prevents controlling based upon a stagnant sample.

	Possible Cause	Corrective Action
1.	No flow	Check piping for closed valves, blockage, etc. Check recirculation pump.
2.	Faulty flow switch	Check with ohmmeter.
3.	Faulty controller	Check by shorting flow switch input in controller.

BLEED TIMEOUT

This error condition will stop conductivity control. It is caused by the bleed output being activated for longer than the programmed Bleed Time Limit.

	Possible Cause	Corrective Action
1.	Programmed value too low for normal conditions.	Increase Bleed Time Limit.
2.	Bleed flow rate too low	Check for clogged strainer. Check for insufficient pressure differential.
3.	Bleed valve not opening	Check for faulty bleed valve. Check bleed valve wiring. Check controller relay.

FEED TIMEOUT

This error condition will stop the feed pump for that particular feed cycle. If feed is initiated again, the feed pump will be allowed to activate. The error condition is caused by the feed output being activated for longer than the programmed time limit.

	Possible Cause	**Corrective Action**
1.	Programmed value too low for normal	Increase Feed Time Limit. (May also be called Max Time or Lockout)
2.	Bleed took too long (Bleed & Feed or Feed as % of Bleed only)	See Bleed Timeout Troubleshooting.
3.	Pumping problem	Check chemical supply. Check pump for prime. Check tubing for blockage or leaks.
4.	Controller problem	Check output wiring. Check controller relay.

COND HIGH ALARM

This error message indicates that the conductivity is above the programmed percentage above set point. The conductivity will continue to be monitored, and the bleed and feed outputs will be allowed to be activated.

	Possible Cause	**Corrective Action**
1.	Fouled conductivity electrode	See Conductivity Electrode Troubleshooting section..
2.	Bleed flow rate too low	Check for clogged strainer. Check for insufficient pressure differential.
3.	Bleed valve not opening	Check for faulty bleed valve. Check bleed valve wiring. Check controller relay.
4.	Conductivity rose over alarm limit while biocide lockout occurred	Allow normal bleed to occur.

COND LOW ALARM

This error message indicates that the conductivity is below the programmed percentage below set point. The conductivity will continue to be monitored, and the feed output will be allowed to be activated.

	Possible Cause	Corrective Action
1.	Fouled conductivity electrode	See Conductivity Electrode Troubleshooting section.
2.	Electrode disconnected	Reconnect.
3.	Electrode dry	See "No Flow "Troubleshooting section.
4.	Bleed valve stuck open	Check for faulty bleed valve. Check bleed valve wiring. Check controller relay.
5.	Biocide prebleed set too low	Change prebleed set point to be above low alarm if desired.

7.2 Conductivity Readout Does Not Change

If the readout is stuck at or near zero:

	Possible Causes	Corrective Action
1.	Dry electrode	Check for flow through system.
2.	Electrode is disconnected	Check wiring to electrode. Go to self-test menu, as described in section 5.2 If readout changes to 1000, the problem is with electrode or connections. See section 7.3

If still at zero, problem is with controller. Consult the factory.

If the readout is stuck at another number:

	Possible Causes	Corrective Action
1.	Dirty or faulty electrode	Evaluate electrode (section 7.3).
2.	Stagnant sample	Check system for proper flow.

7.3 Procedure for evaluation of the conductivity electrode

Can be used for troubleshooting a sensor error message, low conductivity, high conductivity, conductivity stuck at 0, cal failure, and/or conductivity stuck at a number other than 0.

Try cleaning the electrode first (refer to Sect. 6.1).

To find out if the electrode or the controller is faulty, step through the Self-Test menu, as described in section 5.2. The display should read 1000 ± 20µS/cm if the electrode cable is 10 feet long. If the cable has been extended, the self test value will drop by 1 for each additional foot of cable. For example, if the cable has benn extended 100 feet, then the self test should read 900 ± 20. This indicates that the controller is OK and the problem is in the probe or its connections. If the conductivity reading is not within this range, remove the electrode wires and repeat the self test. If the self test reading is now 1000 ± 20, replace the electrode. If it is still outside 1000 ± 20, return the control module for repair.

To check the electrode, check the electrode connections to the terminal strip (refer to Figure 3). Make sure that the correct colors go to the correct terminals, and that the connections are tight. Restore power and see if the conductivity is back to normal. If not, replace the electrode.

7.4 Procedure for checking relay outputs

If any prewired output is not activating the device (pump, valve, etc.) attached to it:

Verify that the pump or valve is not faulty by plugging it directly into a wall socket.
In some controllers, certain relays are NOT internally powered. Check the instruction manual to determine if the relay is a dry contact type. If so, make sure that external power (115 VAC) has been connected to the relay. In most cases, this will be a jumper wire from the large screw labeled “HOT” to one of the relay terminals.
Manually activate the relay using the hand-off-auto menu. Verify that the LED on the front panel lights up. If the device turns on, there must be a problem with the set points if the device doesn’t turn on when it should.

With power removed, check the wiring of the pigtail to the terminal strips. Make sure that they are not loose, that they are not connected by the wire’s jacket, and that they are connected to the correct terminal. Also check the removable terminal block where the black (hot) wires attach (TB2) to see if it has pulled loose. Restore power and manually activate the relay.

With power removed, remove the terminal block that has the black (hot) wires from all of the pigtails (TB2). This simply pulls up off some metal pins. Check these pins for corrosion. If they seem coated with anything, scrape off the coating by replacing and removing the terminal block several times. Restore power and manually activate the relay.

With power removed, remove the TB2 terminal block again, and attach one lead of a multimeter to the pin that lines up with the wire for the relay in question, and the other lead on the other side of the relay (this will be an adjacent pin for a dry contact relay, or neutral at TB3 for a powered relay). Set the meter to read resistance. Restore power and verify that the meter reads infinite ohms with the relay off (open) and very low ohms with the relay on (closed). If it always reads infinite ohms, the controller is faulty.

8.0 SERVICE POLICY

The WDT series Cooling Tower Conductivity Controller has a 2-year warranty on electronic components and a 1-year warranty on mechanical parts (keypad, terminal strip and relays).

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

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

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