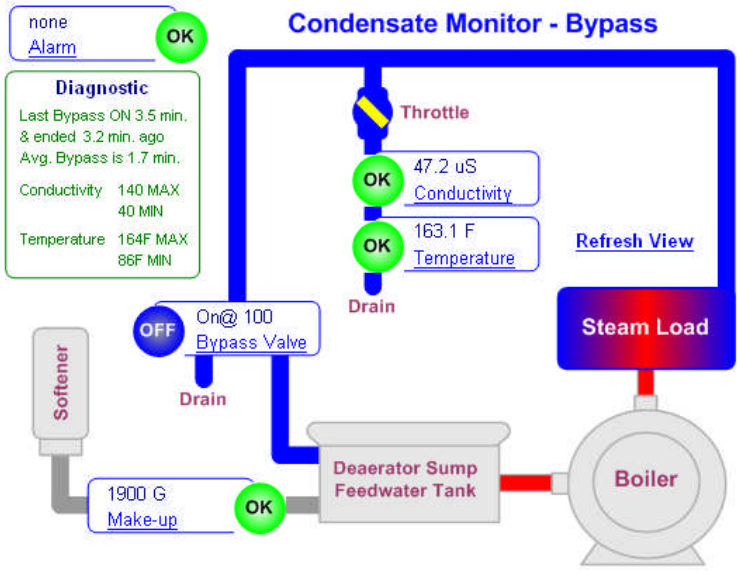
AQUATRAC™
INSTRUMENTS, INC.
SYSTEM DESIGN & ENGINEERING

microFlex

Water Treatment Controller for Condensate Monitoring



Measures Conductivity, Temperature,
Make-up Water Meter and Operating Interlock

Controls Bypass Valve
and Alarm Relay

Part No. CM-AH

CONTENTS

Safety

Electrical Shock Hazard

Opening the enclosure door with the controller plugged in, exposes the user to AC line voltage.

Unplug the controller before opening the enclosure door.

USER WARNING : CAUTION

This Condensate Monitoring Controller operates a bypass valve and a 120VAC alarm relay.

Opening the controller enclosure exposes user to the risk of electrical shock at power line voltages.

Understand fully the implications of the control setpoints that you select. Harm to personnel and damage to equipment may result from mis-application.

Unplug or turn OFF the AC power to the controller if you have any concerns regarding safety or incorrect controller operation and notify supervisory staff.

YOUR CONTROLLER

Controllers are supplied with default bypass valve setpoints unlikely applicable to your condensate dump valve control.

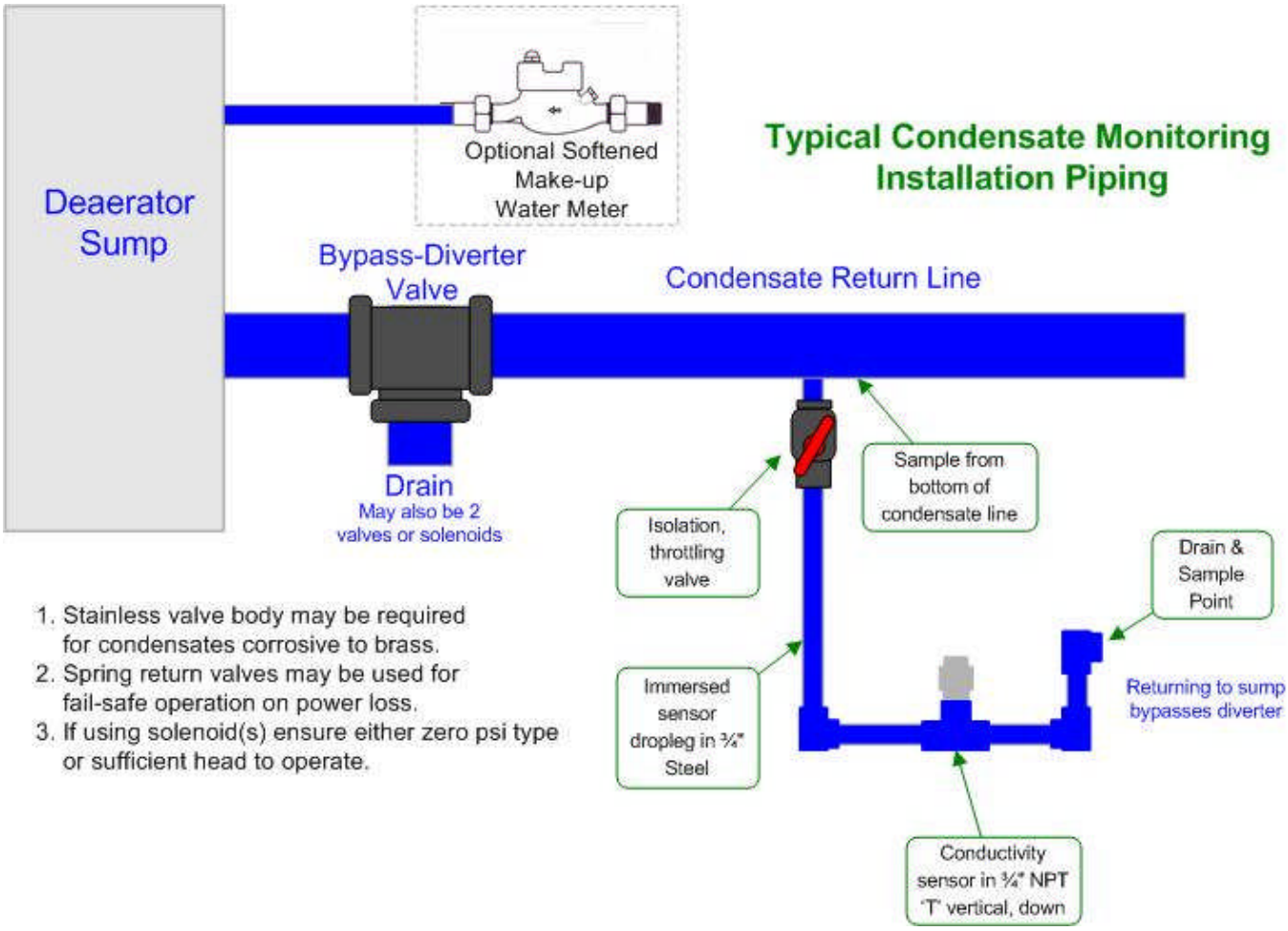
Adjust setpoints and set alarms for your site's condensate monitor.

1. INSTALLATION

1.1 Sample Piping

The **CM-AH** Controller includes a ¾" NPT conductivity- temperature sensor.

If you have not previously installed this type of controller, read **Appendix A: INSTALL** for plumbing and wiring guidelines.



Note: Isolation-servicing valves for bypass-diverter valve not shown.

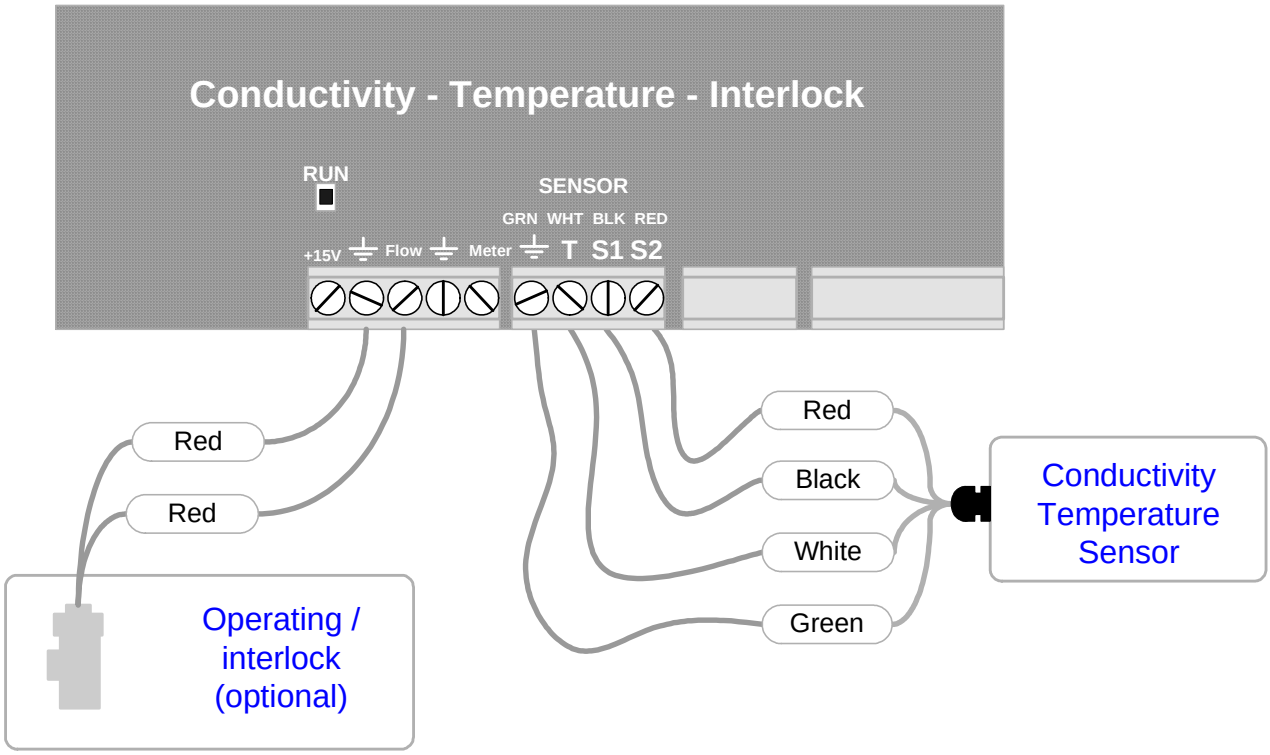
Install the controller enclosure corner mounting hardware, available in the parts bag taped to back of enclosure.

Locate the controller at eye level, nominally 60", 150cm. above the floor

1.2 Sensors: Conductivity-Operating Interlock

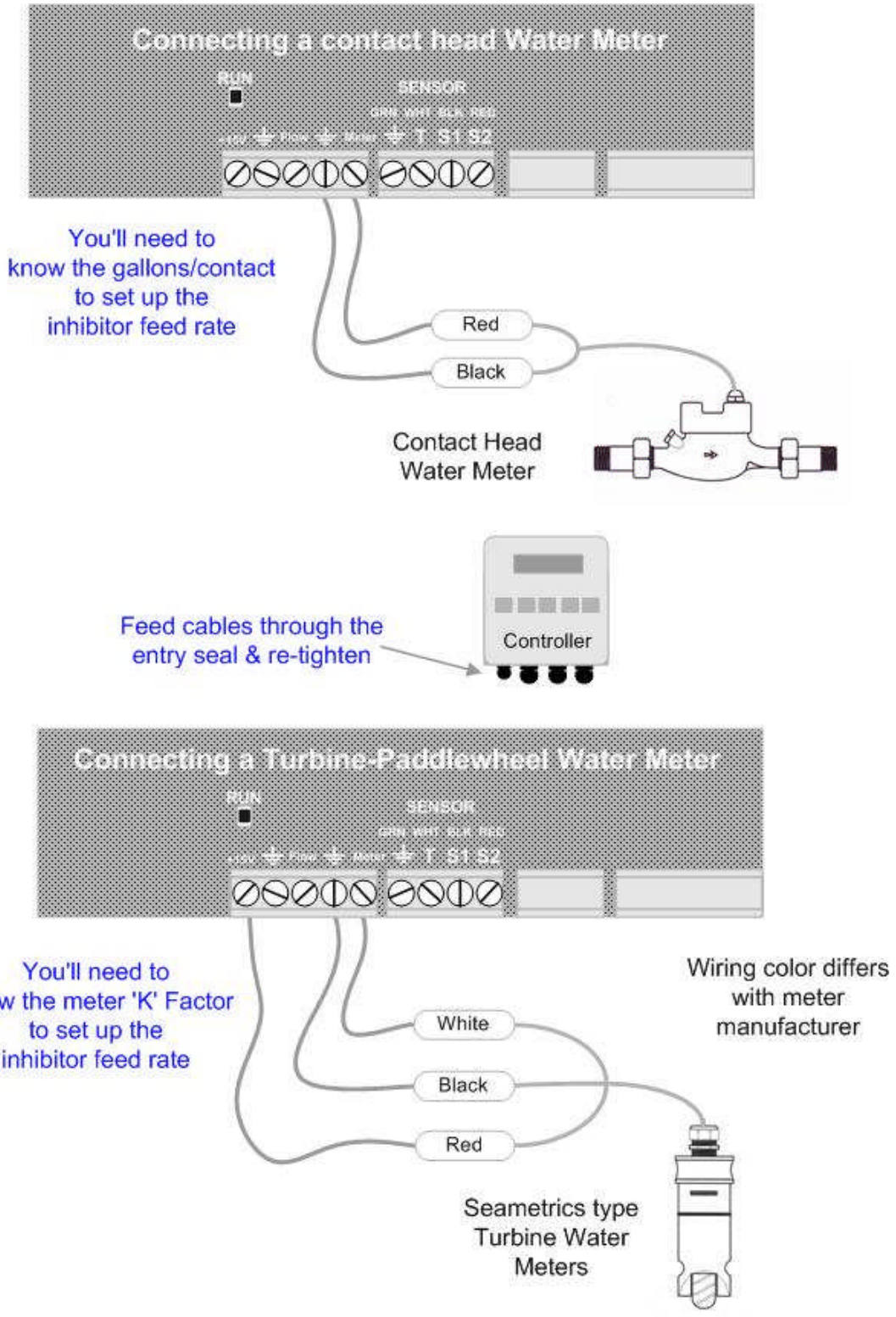
After installing the conductivity sensor, open the sample piping upstream valve and adjust for an immersed sensor conductivity at a flow rate that is representative of the condensate Verify that the sensor entry seals, leak and drip free

The controller is shipped with the **Operating** interlock jumpered.
If you are not using the **Operating** interlock, leave the jumper installed.



1.3 Sensors: Water Meter

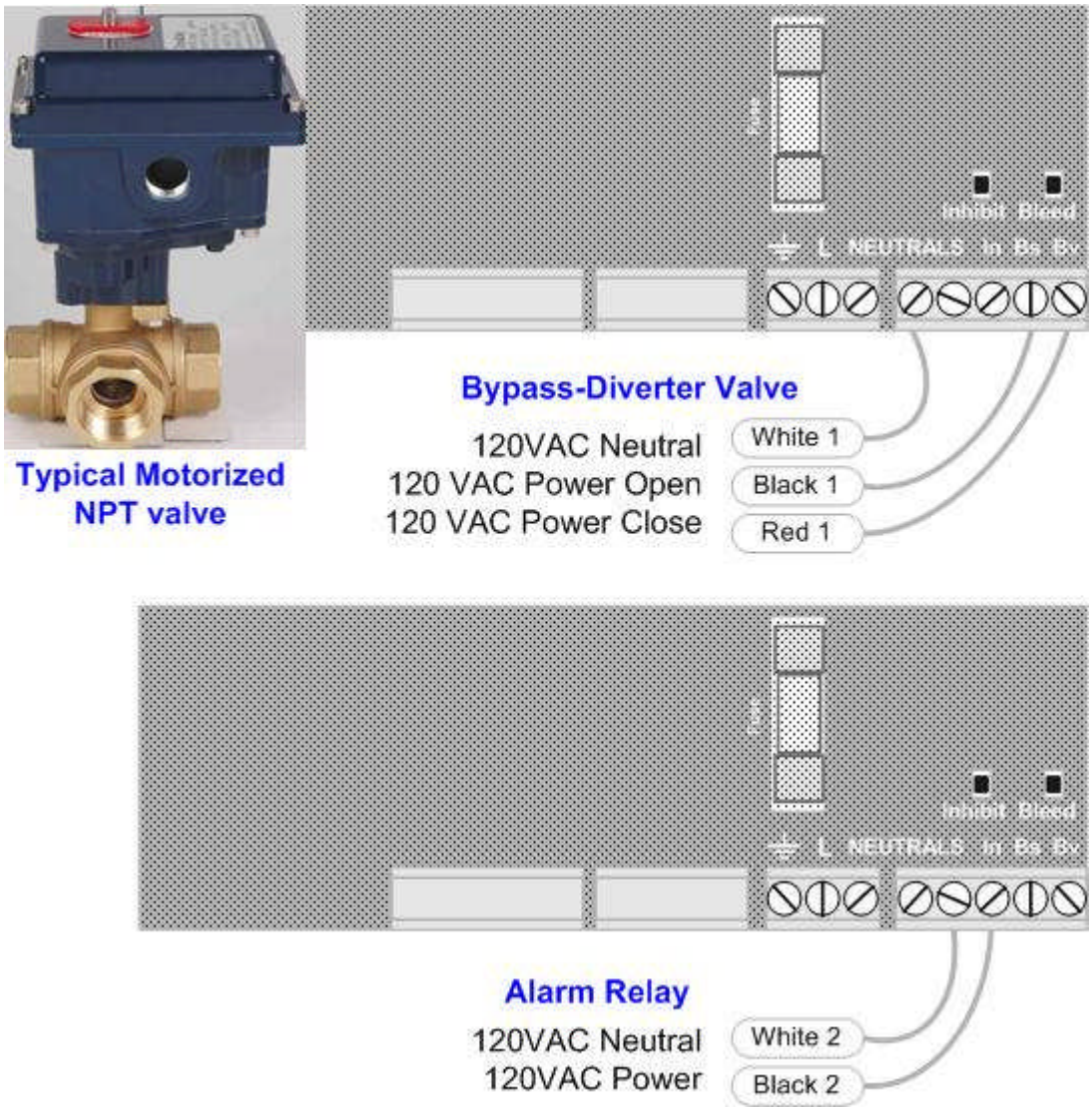
Refer to manufacturer's recommendations on meter orientation and upstream and downstream piping. Extend meter cables with AWG22, 2 or 3 conductor.



Do not install meter cabling in the same conduit at AC power wiring.

1.4 Bypass Valve – Alarm Relay

The controller supplies the AC power for the condensate bypass-diverter valve and alarm relay.
Controller relays switch power to the valve and alarm, fused at a maximum of 5 Amps.



START-UP
BEFORE you connect the bypass valve.

Plug-in the controller.
Set **Conden.Bypass** setpoints.
Verify that the sensor is reading correctly and set the alarms.

If you are using the operating interlock, verify that it's working by having the automation system providing the interlock contact set, turn OFF the interlock.

2. START-UP
2.1 Power-up Display & Keypad

UP & **DOWN** to view options or to EDIT numbers

Move **RIGHT** to select next field when EDITing

ENTER to select an option & to execute EDITing

EXIT to escape option, info display or EDITing

Enclosure keypad Response

UP or DOWN to the display you wish to view or EDIT & press ENTER

Unique Controller Serial Number

Press **ENTER** for Controller Diagnostic, US-Metric select & to Turn ON Password.

```
Condensate        ↵
S/N: DB08CM214
```

Press **ENTER** to clear Alarms, to Configure the Alarm Relay and to select the faults that control the Alarm Relay.

```
Alarms            ↵
none
```

Current condensate Conductivity sensor value. Press **ENTER** for Conductivity Calibrate & Alarms.

```
Conductivity      ↵
     56.4 uS
```

Diverter valve ON or OFF and ON time in the current 24 hours. Press **ENTER** for Setpoints, Test Bypass, Limit Timer and Current State.

```
Conden.Bypass     ↵
ON  18.4 min/day
```

Water meter measured volume in the current24 hour period. Press **ENTER** to Install, Select type, View on-line total & days on-line and View-Adjust Rate Alarm.

```
12.4hr Make-up    ↵
     1525 G
```

Condensate water temperature. Press **ENTER** to Calibrate & View-Adjust alarms.

```
Temperature       ↵
   198.2 F
```

2.1 Power-up Display & Keypad
continued

Interlock ON or OFF and ON time in most recent 24 hours.
Reset to zero on POWER OFF/ON.

```
Operating
ON   9.4 hrs/day
```

Diagnostics over the most recent 24 hours.
Reset to zero on POWER OFF/ON
Last Bypass, average Bypass ON time,
max-min conductivity & temperature….

```
Diagnostics on
 12.4 hrs
```

If there is no option card installed,
you'll view the serial number power-up display.

```
Comdensate      ↵
S/N: DB08CM214
```

Option Displays

LAN –Browser, '**LB**' Option
Displays current IP – see Appendix F, for User Manual link.

```
LAN: Static     ↵
192.168.002.101
```

OR

4-20mA Output, '**CL**' Option
Displays loop current – see Appendix D,
'4-20mA OUTPUT' for User Manual

```
4-20mA Output   ↵
15.4mA
```

OR

Dry Contact Alarm Relay, '**AR**' Option
Displays relay state – see Appendix E,
'ALARM RELAY' for User Manual

```
Alarm Relay     ↵
Closed
```

Note: The controller alarm relay is hot, not dry.
It either turns ON or turns OFF 120VAC on alarm

Sidebar:
Cycling the controller power OFF/ON resets all of the hrs/day displays to zero.

Run times and volumes, conductivity & temperature minimum & maximums are set to zero every 24 hours and are intended to give you a summary of the most recent 24 hours of control.

2.2 Conductivity Setpoints

Press **UP** or **DOWN** until you see '**Conden.Bypass** & press **ENTER**.

Press **ENTER** to view or adjust **Setpoints**.

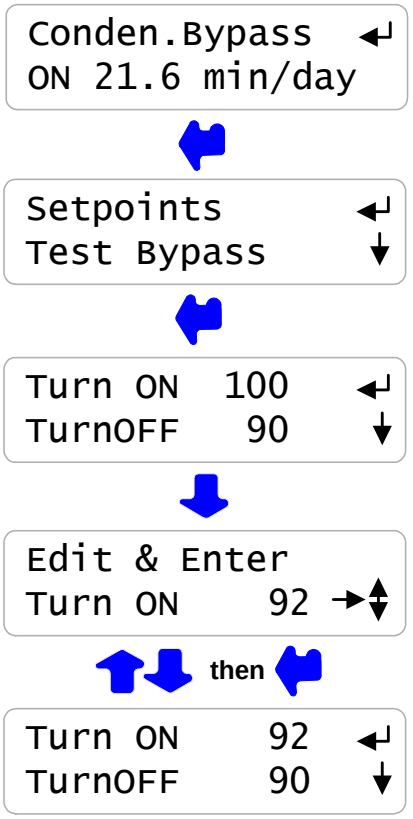
Displays current Feed setpoints

Press **ENTER** adjust **Turn ON**, or **DOWN** & **ENTER** for **TurnOFF**.

Press **UP-DOWN** to adjust and **RIGHT** to move the cursor. Press **ENTER** to execute or **EXIT** to leave the Setpoints unchanged

Press **ENTER**, displays current setpoints.

If you make **Turn OFF** greater than **TurnON**, the setpoints will be switched.



Sidebar:
The difference between Turn ON & TurnOFF, the 'deadband', is usually set to 5 to 10uS.

Condensate monitors are typically set to divert returning condensate on a large increase in conductivity caused when the condensate is contaminated.
Dumping or diverting the condensate prevents contaminating the boiler feedwater.

CAUTION:
1. Feedwater maximum feed rate may assume an expected % condensate return.
Ensure that you won't run out of feedwater if you divert condensate.

2. Promptly locate and correct the cause of contaminated condensate.
You are dumping energy and the cost of softening and treating the feedwater-condensate.

3. Ensure that the drain can handle the volume from the bypass-diverter valve.

2.3 Verify Conductivity Sensor

Open the upstream sample line isolation valve, immersing the conductivity sensor

Verify Temperature

Press **EXIT** until you see **Condensate**.
Press **UP** or **DOWN** to **Temperature**.

```
Condensate        ↵
S/N: DB08CM214
```

If the GREEN & WHITE wires are connected to the controller terminals, you'll view the current temperature.

Temperature is used to compensate the **Conductivity** measurement and may be used to alarm.

```
Temperature       ↵
   198.2 F
```

Calibrate Conductivity

Press **UP** until you see **Conductivity**.
Sample the condensate & verify that the displayed conductivity matches the measured conductivity.

```
Conductivity      ↵
    31.1 uS
```

Adjust the displayed conductivity by pressing **ENTER** twice.

```
Calibrate         ↵
Alarms            ↓
```

Press **UP-DOWN** to adjust and **RIGHT** to move the cursor.
Press **ENTER** to execute or
EXIT to leave **Conductivity** unchanged.

```
Edit & ENTER
    36.1 uS       →↕
```

then

You'll see this screen if the sensor is fouled, miswired, not immersed or you keyed incorrectly.
Press **ENTER** to ignore or **EXIT** to return to Factory Default.

```
Advice        ?141
Fails Calibrate↵
```

?141 indexes more explanation @ www.aquatrac.com

Displays the current, calibrated conductivity.

```
Conductivity      ↵
    36.1 uS
```

2.4 Check Operating Interlock & Install Water Meter

The **Operating** interlock is shipped jumpered, always ON.

Press **UP - DOWN** until you see **Operating**.
Displays **ON** or **OFF** and the total minutes ON in the current 24 period.

NOTE: An **OFF** Operating interlock stops the **Conden.Bypass**, diverter valve from operating.

A optional softened make-up meter may be used for a make-up rate alarm.
The factory default water meter is a 100 Gallons/contact contact head meter.

Press **UP - DOWN** until you see 0 to 24hr Make-up.
Displays make-up volume during the current 24 hour period.

Make-up volume resets every 24 hours and every power OFF/ON to 0.0 hours

Press **ENTER** twice to view or change meter type.

Press **ENTER** to view or change the gallons/contact.
Metric users will view volumes in 'L'iters & L/Contact

Press **UP-DOWN** to adjust and **RIGHT** to move the cursor.
Press **ENTER** to execute or **EXIT** to leave Gallons/contact unchanged.

ENTER or **EXIT** displays the current meter type.

Operting Interlock

```
Operating
ON  22.6 hrs/day
```

Contact Head Watermeter

```
23.2 hr Make-up↵
   10450  G
```

```
Meter Type      ↵
Year-to-Date    ↓
```

```
Contact Head    ↵
Paddlewheel     ↓
```

```
 G/Contact
  100           ↵
```

```
Edit & ENTER
  50            →↕
```

then

```
Contact Head    ↵
Paddlewheel     ↓
```

Sidebar: 2 wire meters are usually **Contact Head** type & 3 wire meters are typically Turbine or **Paddlewheel** water meters.
Few condensate monitor installs use the **Operating** interlock.

Typically only those sites with condensate blocks requiring a make-up rate alarm, include a softened make-up meter.

2.4 Check Operating Interlock & Install Water Meter
continued

Turbine-Paddlewheel type water meters provide pulses per Gallon or Liter.
The number of Pulses/Unit Volume is the **'K' factor**.

Turbine –Paddlewheel Watermeter

Press **UP - DOWN** until you see 0-24hr Make-up.
Displays make-up volume during the current 24 hour period.

```
6.4hr Make-up  ↵
   31450  G
```

Press **ENTER** twice to view or change meter type.

```
Meter Type     ↵
Year-to-Date   ↓
```

Press **DOWN** to select **Paddlewheel** type meter

```
Paddlewheel    ↵
Contact Head   ↓
```

Press **ENTER** to view or change the pulses per Gallon.
Metric users view pulses per Liter.

```
'K'Factor
   100.0       ↵
```

Press **UP-DOWN** to adjust and **RIGHT** to move the cursor.
Press **ENTER** to execute or
EXIT to leave **'K' Factor** unchanged.

```
Edit & ENTER
   104.5       →↕
```

then

ENTER or EXIT displays the current meter type.

```
Paddlewheel    ↵
Contact Head   ↓
```

Sidebar:
Verify that the make-up meter displays an increasing volume as the boiler operates and % condensate return is less than 100%.

WARNING: Verify paddlewheel meters immediately and disconnect if not verified. Mis-wired paddlewheel meters will fail the meter Hall Effect sensor.

2.5 Verify Bypass Valve

Sections 2.1 to 2.4 adjust setpoints and verify sensor.
Unplug the monitor, connect the bypass-diverter valve & plug in the controller.

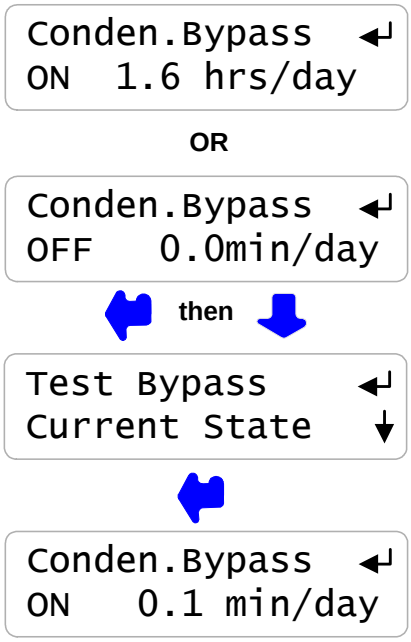
Press **UP** or **DOWN** to view **Conden.Bypass**.

If **ON**, verify that the green **Bleed** light on the inside of the enclosure is ON.

Verify that the valve is diverting, routing condensate to drain.

If **OFF**, press **ENTER** & **DOWN** to **Test Bypass**.

Press **ENTER** and the **Conden.Bypass** valve & **Bleed** light will turn ON for 1 minute



Sidebar:
The **Conden.Bypass** valve will not turn ON unless Operating is ON.
The internal **Bleed light** will not turn ON unless **Operating** is ON.

If the **Operating** jumper in not installed, then the controller requires a dry contact set from either a flowswitch or from a DCS or Energy Management System to operate the bypass valve.

If **Operating** is OFF, **Conden.Bypass** will display **No Flow!**

3. OPERATION
3.1 Conductivity Sensor

Sensor calibration and temperature verify is detailed in Section **2.3 Verify Conductivity Sensor**

Press **UP - DOWN** until you see **Conductivity**.

Press **ENTER** & then **DOWN** to **Alarms**.

Press **ENTER** to view or adjust **Alarms**.

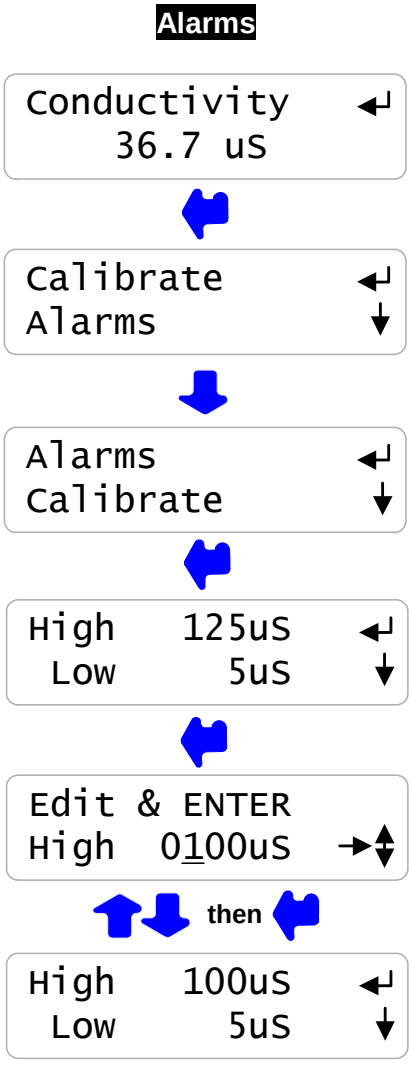
Press **ENTER** to adjust the **High** Alarm or **DOWN** & **ENTER** to adjust the **Low** Alarm

Press **UP-DOWN** to adjust and **RIGHT** to move the cursor. Press **ENTER** to execute or **EXIT** to leave **Alarm** unchanged.

ENTER updates the alarms & displays the current **High** & **Low** Alarms.

'**Alarms**' displays **Conductivity** on fault and resets automatically if the measured conductivity is between the **High** & **Low** alarm levels.

'**Clear Alarms**' does not reset a conductivity alarm above the **High** or less than the **Low** Alarm level.



Sidebar:
A Conductivity alarm will display if a failure to calibrate is ignored and it will alarm until the sensor is returned to factory default or calibrated correctly.

If the sensor line is not immersed, you may get a conductivity alarm depending on where you have set the **Low** alarm.

3.2 Bypass Controls

Press **UP - DOWN** until you see **Conden.Bypass**.
Displays **ON** or **OFF** and ON time
in the current 24 hour period.

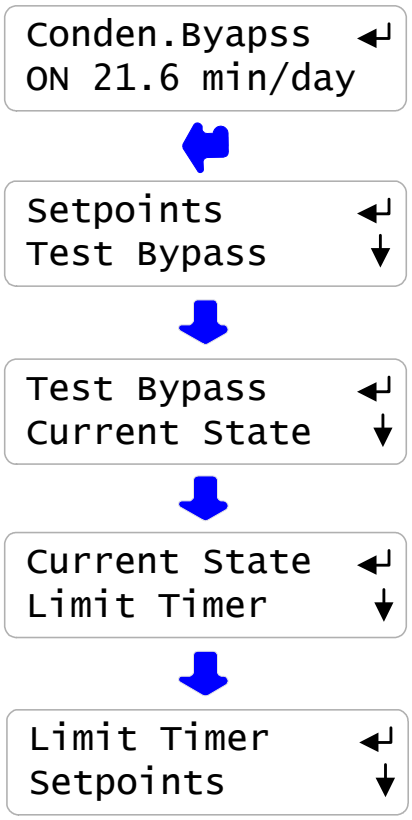
Press **ENTER** to view or adjust **Setpoints**.

Press **ENTER** @ **Test Bypass** to turn ON
the **Conden.Bypass** for 1 minute.

'**Alarms**', **ENTER** and '**Clear Alarms**',
ENTER ends **Test Bypass**.

Press **ENTER** @ **Current State** to view control status.
Test Bypass can be ended by keying
ENTER @ **Current State**.

Press **ENTER** @ **Limit Timer** to view or adjust the maximum
bypass ON time in any bypass-divert cycle.



Sidebar:
Test Bypass will not turn ON the **Conden.Bypass** valve if the **Operate** interlock is OFF.

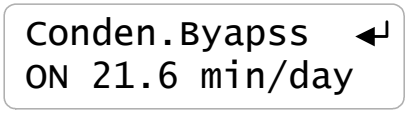
Limit Timer alarms reset automatically every 24 hours
or when controller power is turned OFF/ON.

Note: The **Limit Timer** does not turn OFF the diverter valve or prevent it from operating.
The **Limit Timer** is used to alert you that the bypass valve has been ON
for more than the limit time.

3.2 Bypass Controls
Continued

Current State of the Conden.Bypass Control

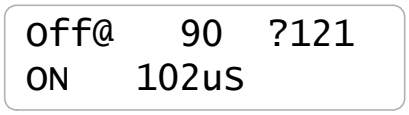
Press **ENTER** then **UP** @ **Conden.Bypass**.



then

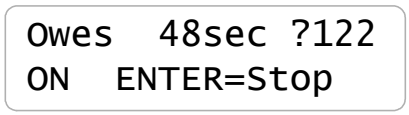
Press **ENTER** @ **Current State**.

Conductivity Control
If **ON**, displays TurnOFF setpoint, **90.**
& current conductivity, **102.**
If **OFF**, displays TurnON setpoint, **100.**
& current conductivity, **96.**



Conductivity Control

Testing
If **ON**, displays **Owes 48 sec ?122**
& **ON ENTER=Stop**



Test Bypass

HELP: ?121 & **?122** and other help numbers display wherever more explanation is available at www.aquatrac.com.

The **ON ENTER=Stop** option ends the current bleed cycle or %Time ON period. Control resumes when Make-up volume is measured if Water Meter Control or within 5 minutes if Percentage Time Control.

3.2 Bypass Controls: Time Limit continued

The **Limit Timer** is used to flag an extended bypass-diverter valve ON time
The factory default limit is 60 Minutes in a divert, ON-OFF cycle.

Press **UP** or **DOWN** until you see '**Conden.Bypass** & press **ENTER**.

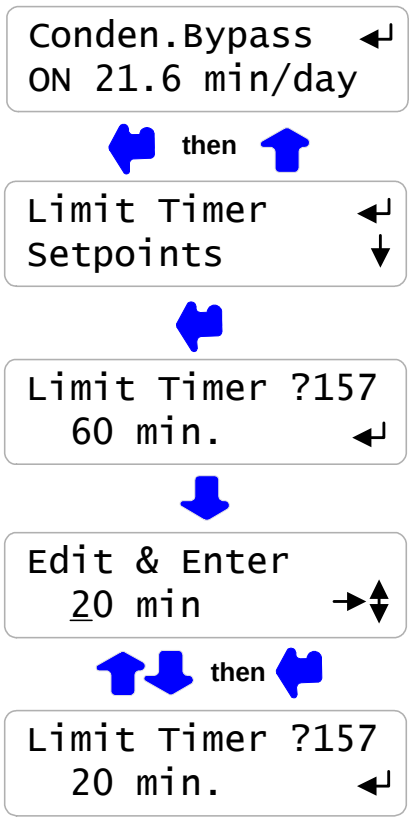
Press **UP** to **Limit Timer**.
Press **ENTER** to view or adjust **Limit Timer.**

Displays limit time in minutes,
?157 indexes more explanation @ www.Aquatrac.com

Press **ENTER** adjust **Limit Timer**,

Press **UP-DOWN** to adjust and **RIGHT** to move the cursor.
Press **ENTER** to execute or
EXIT to leave the **Limit Timer** unchanged

Press **ENTER**, displays the current limit,
20 minutes for any one bypass-divert cycle.

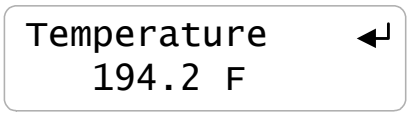


HELP: ?157 and other help numbers display wherever more explanation is available at www.aquatrac.com

If you are using water treatment controls for the first time, the language and application of some of the controller options and settings requires more detail than the controller 2 line display can deliver.

3.3 Temperature

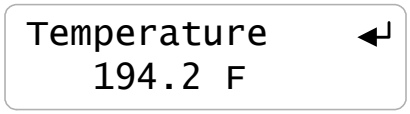
Press **EXIT** until you see **Condensate**.
Press **UP** or **DOWN** to **Temperature**.



Press **ENTER** twice to **Calibrate Temperature**.

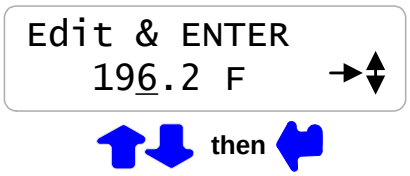
Press **ENTER**, **DOWN** & **ENTER** to set view or adjust **Temperature Alarms**.

Temperature Calibrate
Press **UP** until you see **Temperature**.



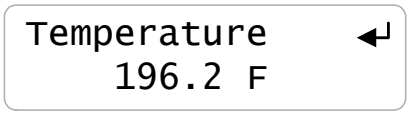
Adjust the displayed **Temperature** by pressing **ENTER** twice.

Press **UP-DOWN** to adjust and **RIGHT** to move the cursor.
Press **ENTER** to execute or
EXIT to leave **Temperature** unchanged.



You'll see this screen if the sensor is miswired or you keyed incorrectly.
Press **ENTER** to ignore or **EXIT** to return to Factory Default.

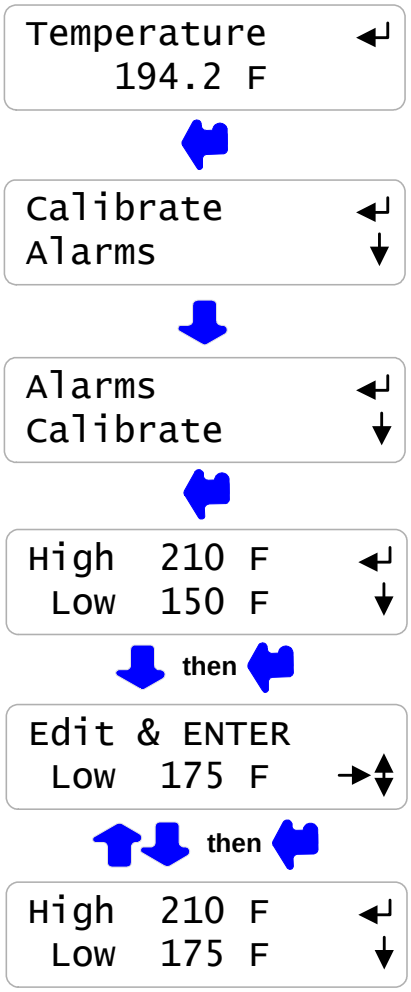
In this example, we've adjusted the **Temperature** from **194.2 F** to **196.2 F**.



Sidebar:
If you elect to ignore the **Fails Calibrate** warning, the controller sets the Temperature Alarm to remind you of an uncorrected problem.

3.3 Temperature continued

Temperature Alarms
Press **EXIT** until you see **Condensate**.
Press **UP** or **DOWN** to **Temperature**.



Press **ENTER** & then **DOWN** to **Alarms**.

Press **ENTER** to view or adjust **Alarms**.

Press **ENTER** to adjust the **High** Alarm
or **DOWN** & **ENTER** to adjust the **Low** Alarm

Press **UP-DOWN** to adjust and **RIGHT** to move the cursor.
Press **ENTER** to execute or
EXIT to leave **Alarm** unchanged.

ENTER updates the alarms & displays the current **High** & **Low** Alarms.

'**Alarms**' displays **Temperature** on fault and resets automatically if the measured temperature is between the **High** & **Low** alarm levels.

'**Clear Alarms**' does not reset a temperature alarm above the High or less than the Low Alarm level.

Sidebar:
The **Low Temperature** is the most useful since it likely flags a failure to deliver a fresh, representative condensate sample to the conductivity sensor.
There's no diverter-bypass valve control without a representative condensate sample.

3.4 Make-up Meter

Press **UP - DOWN** until you see **'Make-up'** & press **ENTER**.

Press **ENTER** to view current type or to select **Contact Head** or **Paddlewheel** water meter.

Press **DOWN** & **ENTER** for volume during the most recent 365 days. Resets to zero every 365 days.

Press **DOWN** & **ENTER** for the number of 24 hour periods of powered up time in the current year

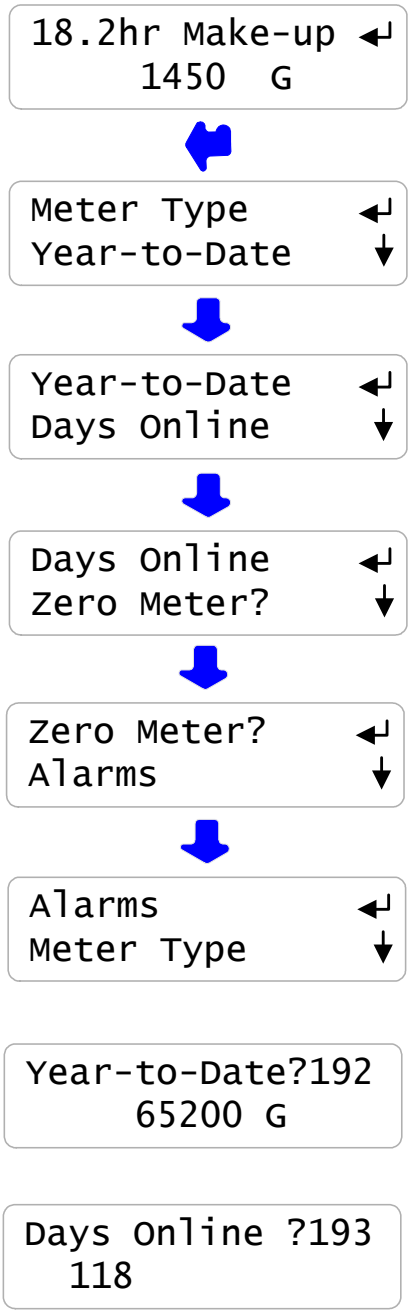
Press **ENTER** to reset **Year-to-date**, **Days OnLine** and 24 hr Make-up to zero.
Warning: Cannot Undo

Press **DOWN** & **ENTER** to view or adjust the make-up rate alarm settings.

Year-to-Date is updated every 24 hours of power ON. Displays in 'L'iters if metric selected.

Days water meter ON in current year. Resets to zero every 365 days.

Press **EXIT** to return to previous display

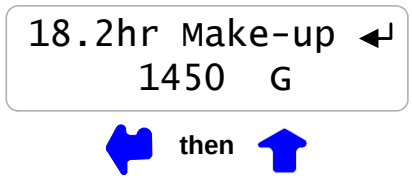


Sidebar:
HELP: ?192 & **?193** and other help numbers display wherever more explanation is available at www.aquatrac.com

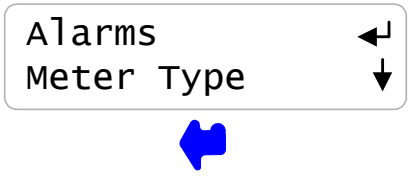
3.4 Make-up Meter continued

Make-up Rate Alarm

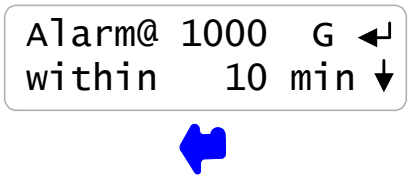
Press **UP - DOWN** until you see **'Make-up'** & press **ENTE**R .



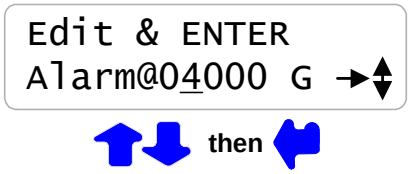
Press **ENTER** & then **UP** to **Alarms**.



Press **ENTER** to view or adjust **Alarms**.
If the water meter measures more than **1000** Gallons of make-up in **10** minutes, it will alarm.



Press **ENTER** to adjust the alarm volume or **DOWN** & **ENTER** to adjust the alarm time



Press **UP-DOWN** to adjust and **RIGHT** to move the cursor.
Press **ENTER** to execute or **EXIT** to leave **Alarm** unchanged.

ENTER updates the alarms & displays the Current volume and time setpoints.

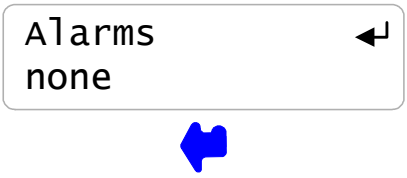
Sidebar:
Time may be set from 1 to 120 minutes, the controller rounds to the nearest 5 minutes.
Volume may be any value up to 99,999.
Clear Alarms zeroes each 5 minute block's volume record, resetting the rate alarm calculation and clearing the Make-up alarm.

Use this alarm if you have a fault that diverts condensate prior to the monitoring sensor.

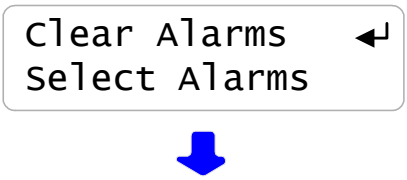
Operational Note:
The controller records the meter measured volume during each 5 minutes of controller operation over the most recent 2 hours.
Rate is alarmed based on the sum of volumes logged within the selected set of 5 minute periods.

3.5 Alarms

Press **UP - DOWN** until you see **'Alarms'** & press **ENTER** .



Press **ENTER** to **Clear Alarms**, reset the **Conden.Bypass Limit Timer**, end **Bypass Test** and reset the **Make-up** meter rate alarm. Does not clear calibration faults.



Press **ENTER** to view or **Select Alarms**. which control the 120VAC, hot alarm relay.

Press **ENTER** to view or modify hot alarm relay response on alarm.

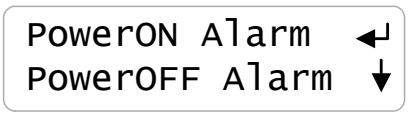
Alarm Response

Press **UP - DOWN** until you see **'Alarms'** & press **ENTER**.

and

Press **UP** to **Alarm Response** and **ENTER** to view current setting or to modify.

In this example, the Alarm relay will turn ON on alarm, supplying 120VAC.



Press **DOWN** & **ENTER** to select **PowerOFF on Alarm**. This setting would also alarm if the controller was unplugged or lost 120VAC power.

Key EXIT to return to **Alarm Response** or to leave the current setting unchanged.

3.5 Alarms continued

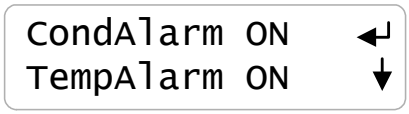
Select Alarms

Press **UP - DOWN** until you see **'Alarms'** & press **ENTER**.

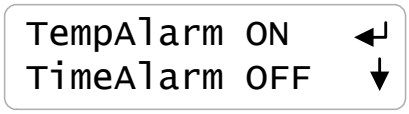
and

Press **ENTER** & then **DOWN** to **Select Alarms**. Press **ENTER** to view or modify selection.

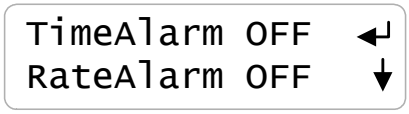
A high or low conductivity alarm will operate the alarm relay. Key **ENTER** to switch **OFF** or **DOWN** for next selection.



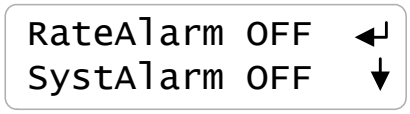
A high or low temperature alarm will operate the alarm relay. Key **ENTER** to switch **OFF** or **DOWN** for next selection.



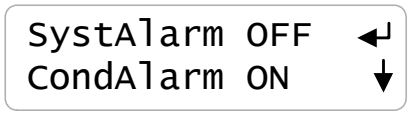
A time limited bypass-diverter will NOT operate the alarm relay. Key **ENTER** to switch **ON** or **DOWN** for next selection.



A make-up water meter rate alarm will NOT operate the alarm relay. Key **ENTER** to switch **ON** or **DOWN** for next selection.



A System alarm will NOT operate the alarm relay. Key **ENTER** to switch **ON** or **DOWN** for next selection. System Alarms: refer to Section Alarms 3.7.



Sidebar:
Note: These alarm settings only control the built-in hot alarm relay that switches 120VAC. They have not effect on the dry contact 'AR' Alarm Relay option.

The controller is defaulted to both Conductivity and Temperature alarms since these faults are highest priority for condensate monitors.

3.6 Diagnostics

Diagnostics displays operating information from the last controller power OFF/ON. This controller has been operating for **17.4** hours from the last power OFF/ON

The time that the **Conden.Bypass** is ON depends on conductivity setpoints and the time required to correct or isolate the source of condensate contamination.

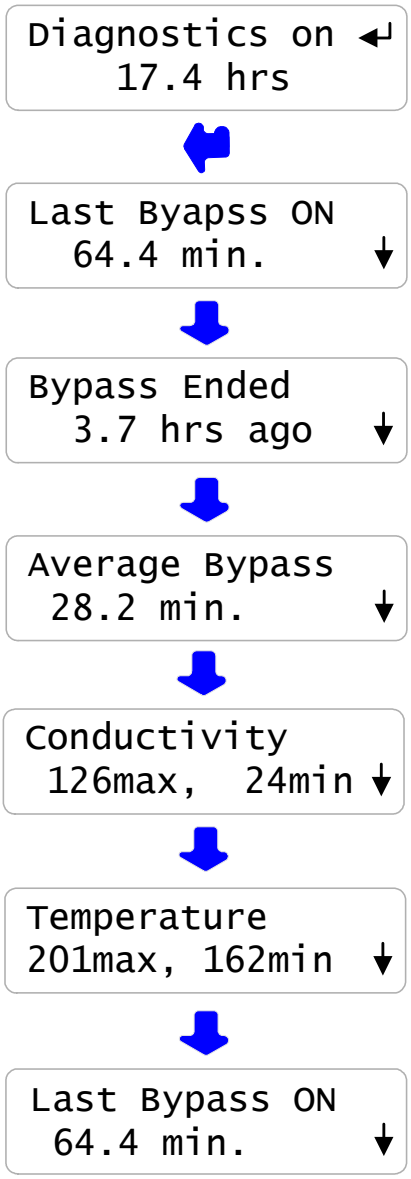
If you are losing or rejecting condensate frequently or continuously then you either know why or you have an operating problem.

Average Bypass ON time is calculated over a maximum of the most recent 24 hours.

If the condensate **Conductivity** is moving this much in the last 24 hours, you either know why or you need to find out why.

Temperature max and **Temperature min** may vary on a condensate line with varying load or one that has offline periods.

The usefulness of **Diagnostic** information varies with each site's steam-production load.



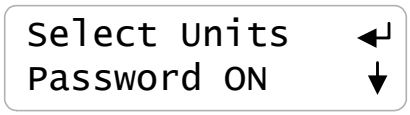
3.7 System

System Menu Options

Press **EXIT** until you see the **Condensate**.
Press **ENTER** view System options.

Press **ENTER** to view **Current State**
Controller diagnostics

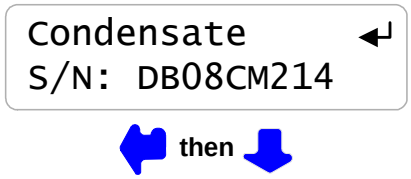
Press **ENTER** to view or change
US or Metric units.



Press **ENTER** to turn ON the controller **Password**.
For **Edit Password**, turning OFF the **Password** and entering a **Password** refer to Section **3.7 Password**

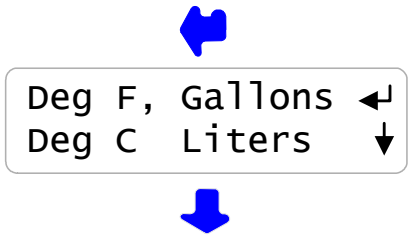
System: Select Units

Press **EXIT** until you see the '**Condensate**'.
Press **ENTER** & **DOWN** to **Select Units**.



Press **ENTER** to view or adjust current **Select Units**.

Press **EXIT** to leave changed
or **DOWN** to change.



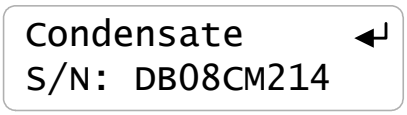
Key **ENTER** to:
Set to U.S. units, degrees Fahrenheit & Gallons
or
Set to Metric, degrees Centigrade & Liters

Sidebar:
Select Units changes make-up meter units, total volume units and volume per contact units. Temperature compensation of conductivity, switches automatically between C & F as does the System:**Current State** display of temperature.

3.7 System- continued

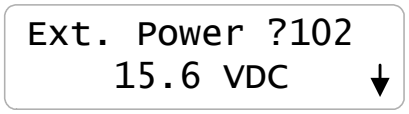
System : Current State

Press **EXIT** until you see '**Condensate**.
Press **ENTER, ENTER** view **Current State**.

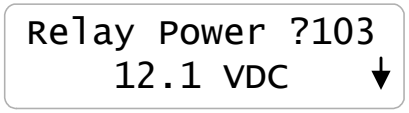


Current State displays Controller internal diagnostics

External **Power** used for paddlewheel water meters and to power 4-20mA current loops
Alarms on short circuits, recovers automatically when wiring corrected.

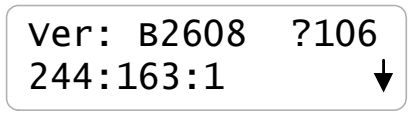


Internal power used for **Conden.Bypass** and **Alarm** relays.
Always displays 11.8 to 12.2. Alarms on fault.

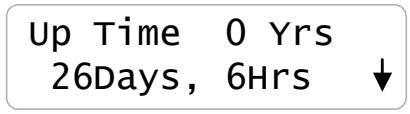


Conductivity sensor **Drive** displays, 72-76mV or 990 – 1020mV as the sensor drive auto-ranges.
Alarms and cannot measure conductivity if out of range.

Firmware Version.
Checks that user setpoints & options being saved & that the internal Clocks are operating,
The last digit tracks the 24 hour resets of the '**LB**' web server.



Time from most recent power OFF-ON
If **Up Time** is always less than 24 hours then controller AC power is being turned OFF daily.



Controller operating time from installation updated every hour.
If **Powered** time increases by 7 days every week, then the controller is continuously operating.

Sidebar: System: Diagnostics verifies the controller operation & alerts you to wiring problems with conductivity temperature, paddlewheel water meters and controller powered 4-20mA current loops.

3.8 Password

Password is turned OFF in new controllers

Press **EXIT** until you see **Condensate**.

Press **ENTER** & **DOWN** to select **Password ON**

If you press **ENTER** you'll be prompted for a password then next time you press **ENTER**.

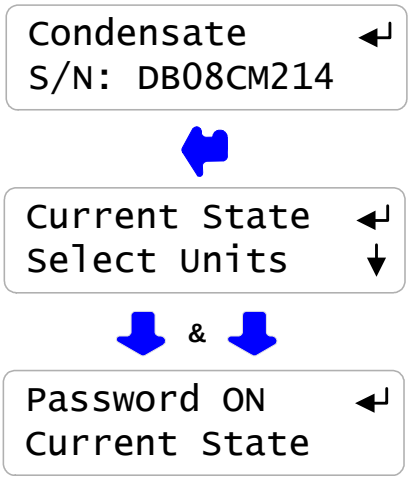
Press **UP** or **DOWN** to view the current state of the controller. Any **ENTER** key will prompt for the password, displaying the default password **123**.

Use the **UP**, **DOWN** & **RIGHT** keys to enter a password then key **ENTER**.

A correct password displays, **Password OK**. Press any key to start operating the controller.

Press **ENTER** to re-key an incorrect password

Turning ON Password



Password ON

Sidebar: When you first select **Password ON**, the default password is **123**.

Whenever you **Enter Password** the controller displays the default password.
If you have not changed the default password, press **ENTER** to log in.

3.8 Password
continued

Modifying the Password

Press **EXIT** until you see **Condensate**.
Then press **ENTER** & **UP** to view **Password** tools.

Password tools are available when **Password** is **ON** and you are logged in. Press **ENTER** to view the tools:

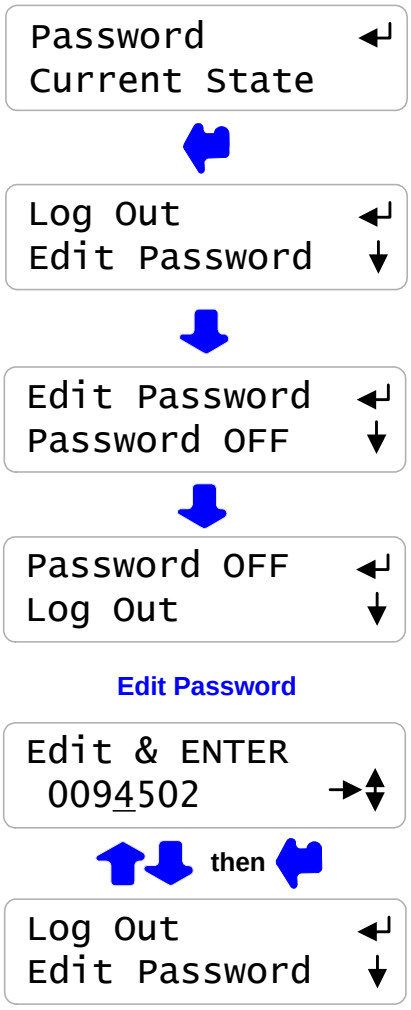
Press **ENTER** to **Log Out**.
If you forget to **Log Out**, the controller logs you out 30 minutes after the last key press and on controller power OFF/ON.

Press **DOWN** & then **ENTER** to view & change the current password

Press **DOWN** to **Password OFF**.
Pressing **ENTER** turns OFF **Password**.

Press **RIGHT** & **UP** – **DOWN** to change the current password.

ENTER changes the password.
Press **EXIT** to leave the password unchanged



Sidebar: If your controller is password protected. Select Edit **Password** and change the password from the '**123**' factory default.

Passwords may be from 1 to 6 numbers. Leading zeros are ignored.

If you forget your password, you'll require the controller serial number to get a **Reset Password** from Aquatrac.
The controller password is '**123**' after you key in the **Reset Password**.

4. MAINTENANCE

4.1 Guidelines

Modify the maintenance guidelines to reflect both the site priorities and the site water treatment program.

Guidelines are for controller function only. Water treatment program maintenance requirements are provided by the site water treatment provider.

Frequency	Activity	Method
Daily	Check for Alarms.	Identify and correct the cause of alarms on **Conductivity** and **Conden.Bypass**. A high conductivity usually indicates contaminated condensate, typically a perforated exchanger tube but also due an open crossover valve or a transient start-up or shutdown condition. A low conductivity may indicate a sensor that's not immersed or fouled.
	Scan Sensors, Bypass-Diverter Valve ON time and Make-up Meter Volume	A low temperature may indicate a closed sample line valve. If there's an installed softened make-up meter, you'd expect 24 hour volume to reflect load and % condensate return. You would expect zero Bypass valve ON time for most condensate monitoring installations. **Alarm Relay Monitored?** If you have connected the controller powered alarm relay into your site DCS (Distributed Control System) or EMS (Energy Management System), and configured the alarm setpoints for likely or common loop faults, there's little need for a daily check. Ensure you've configured the alarm relay to flag a loss of controller power.

Frequency	Activity	Method
Monthly or Quarterly	Verify Conductivity	Sample the condensate water conductivity. Verify controller matches the sample +/-10uS Conductivity sensors should not drift or require cleaning. Condensate conductivity sensors are not usually subject to fouling unless the process that contaminates the condensate coats piping surfaces with an inorganic like oil. Adjust your maintenance interval to target those Condensate monitors that have demonstrated operational problems/
	Note Make-up Volume	Softened make-up volumes will vary widely depending on both steam production & % condensate return & understandably, if you have a meter installed.
	Verify Bypass-Diverter	Use the **Conden.Bypass**, **Test Bypass** option to operate the diverter valve. Use **Clear Alarms** to end test.
	Verify Interlock	If you are using the interlock, have the DCS switch open the interlocking contact set & verify that the controller **Operating** display shows OFF.

Sidebar: Maintenance Guidelines for water treatment are set by the chemical treatment program vendor.

4.2 Spare Parts

4.2.1 Line Fuse

Protects	Rating / Type	Manufacturer – Vendor
Controller, Diverter-Bypass valve & Alarm Relay	5 Amps @ 115VAC 5mm x 20mm, Fast Acting	Littlelfuse, Type 217, 250VAC Digikey Part# F953-ND www.digikey.com 1-800-344-4539

4.2.2 Controller Parts

Part#	Description
Fuses-T	120VAC Fuse Kit, 10 x 5A Controller Fuses,
A261016	Conductivity-Temperature sensor

On-Line Help

Browse to **www.aquatrac.com** with the 3 digit HELP#' from the controller LCD display.
LCD display HELP numbers are preceded by '?'

Users Manual

Download **microCM_User** from www.aquatac.com

Appendix A: INSTALL

A.1 PLUMBING

Typical condensate monitoring piping operates at low pressure and is plumbed in either SCH40 or SCH80 carbon steel.
Ensure that the sample piping flow rate gets a fresh, representative condensate sample to the monitoring conductivity sensor.

If you are able to plumb so that the sample stream returns to the feedwater tank – deaerator sump, then a high sample flow rate does not cost energy & chemicals.
If you are sending the sample to drain, set the flow rate so that you can detect contaminated condensate before a significant volume of contaminated condensate returns to the feedwater tank – deaerator sump.

A.2 SENSOR

Conductivity sensors may be installed in any orientation, which keeps them immersed allows them to be serviced.
Vertical, down orientation on a drop leg is recommended, because it keeps the sensor immersed while preventing debris and corrosion products from blocking the sensing surface.

Water meter and sensor wiring cannot be installed in the same conduit as 120VAC power, bypass-diverter wiring. Even a short section of shared conduit may cause operational problems.
Sensor wires may be extended up to several hundred feet using multiple pair AWG22 cable.
Always splice sensor wires in an electrical fitting to allow both inspection and sensor replacement.
Extend the conductivity sensor using the same colors as the sensor to avoid wiring errors at the controller terminals.
Contact head water meters and interlocks are not polarized, simplifying cable extension.

CAUTION: Three wire turbine-paddlewheel meters are polarity sensitive and can be permanently damaged by miswiring. Wait until you are ready to start-up the controller before connecting this type of meter to the controller. Meter wiring errors are easily detected and corrected at start-up.

A.3 BYPASS-DIVERTER VALVE

Install the valve so that it can be serviced without blocking the condensate return piping.
Installation may involve upstream and downstream isolation valves and perhaps a bypass line.

A.4 MAKE-UP METER

Ensure that the meter manufacturer's recommendations for orientation and upstream and downstream piping are observed.
Orientation may be limited for contact head meters, while straight upstream and downstream piping is required to prevent errors in turbine-paddlewheel meters.
Contact head meters have a Gallon/Contact or Liter/Contact rating. In some meters this value can be altered by moving magnets or gears. Typical meters are rated 10, 50 & 100 Gallons/contact.
Turbine-Paddlewheel meters have a 'K' Factor which is the number of pulses / Gallon or pulses/Liter. Some manufacturers have both nominal values listed by meter size and calibration values on the meter body.
Take the time to get the meter volume/contact or 'K' factor correct, since most meters are used to control inhibitor feed and inhibitor ppm errors result when meters are incorrectly configured.

A.6 CONTROLLER ENCLOSURE

The optimum location for sensor, controller and bypass diverter valve allow an operator to see the bypass-diverter valve from the controller.
You'll be able to watch the valve turn ON as you test operation @ the controller keypad.

Wall mount the controller enclosure at eye height for a 5' to 5'6" person so that an operator does not have to reach over valves, piping or pumps to use the controller key pad.

Do not punch conduit access holes in the top of the enclosure to avoid condensation damage to the controller electronics.
Plug the controller into an 'Always ON' utility outlet.
Maximum controller current @ 120VAC is 5 Amps.

Appendix B: SPECIFICATIONS

Each controller includes an option card slot.
Auto re-configuration occurs on installation of one of LAN -Browser, 4-20mA Output OR Alarm Relay option card.

Analog – Digital I/O	Rating - Detail	Notes
Conductivity	1 Temperature Compensated steel-Teflon conductivity sensor. ¾" NPT Displays 1uS resolution. Steam Rated, 125C max.	Autoranging from 1uS to 1000uS.
Water Meter Operating / Interlock	Dry Contacts, 250mS response. Water Meter, 400 Hz max 0.5mA @ 5VDC measurement current	Contact head meter, software debounced. Turbine-Paddle wheel rating = Seametrics max pulse rate.
Relay Outputs	1 SPDT, for Motorized Valve 1 SPST, Hot Alarm Relay	Relays rated 10A, 120VAC Controller fused @ 5 Amps
4-20 ma Output on conductivity (**CL**: optional card)	1, DC isolated, loop powered. Nominal 0.1% resolution. Auto polarity correction field wiring.	Alarms on open 4-20mA loop. Auto-configure on Driver installation and removal Software calibration of span & zero
Alarm Relay (**AR**: optional card)	Dry contact set. Rated 500mA @ 24VDC	Closed in the non-alarmed state. Contact set opens on alarm or loss of controller power.

Communications User Interface	Rating – Detail	Notes
Keypad - LCD	5 Key Tactile feedback: UP / DOWN / ENTER / EXIT / RIGHT 2 Line x 16 Character, Backlit	Scan rate 100mS nominal User adjustable LCD contrast
Browser (**LB**: optional card)	10BaseT Ethernet RJ45 Jack Full command & control via Internet Explorer & Mozilla Firefox browsers. XML real time controller data	User set Static IP, defaulted to 10.10.6.101. Fixed, viewable MAC.

Condensate Monitor: Water Treatment Controller

Controls	Rating – Detail	Notes
Bypass-Diverter Valve	Conductivity control. Limit timer alarm, auto-reset every 24 hours.	SPDT for motorized valve. Limit Timer does not stop valve operation.
Hot Alarm Relay	Alarms on: Conductivity, Temperature, High Make-up Rate, Limit Timer, System fault. User Selects which faults trip relay.	Default: alarm on conductivity & temperature User selects action of hot alarm relay on Alarm. OFF on Alarm OR 120VAC on Alarm
Operating / Interlock	Diverter-Bypass OFF when operating contact set opens.	Default: Jumpered ON

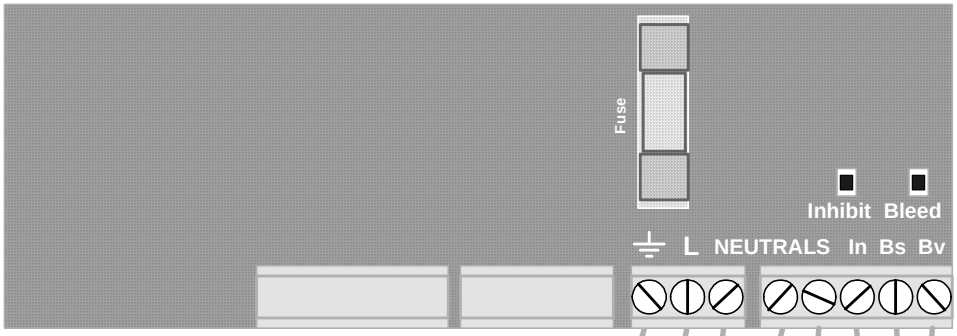
System	Rating - Detail	Notes
Controller Configuration	User settings and configuration written on silicon.	Makes user configuration the factory default.

Electrical	Rating - Detail	Notes
AC Input	115 VAC, 50/60Hz,	
Fusing	5 Amps @ 115VAC	5x20mm, 120VAC fusing:
Surge-Spike Suppression	N.O., power open bypass control relay contacts snubbed 0.1uF, 150R Varistor on AC power input	Controller electronics transformer isolated from AC line
AC Terminals	AC Input & Output : maximum. Stranded AWG 14, 150mm^2	
Sensor, Digital Input Terminals	AWG 22, 0.25 – 0.50mm^2	
Paddlewheel Meter Power 4-20mA output loop power	14 – 20 VDC, unregulated Thermally fused @ 50mA	4-20mA output option can be powered by load or by controller

Mechanical	Rating	Notes
Enclosure	Non-metallic, NEMA4X, ”5.9W x ”5.9H x 3.5”D 150mmW x150mm H x 90mm D	Nominal dimensions, excluding entry fittings and flexible conduit. Enclosure door hinged left. Allow 8”, right for door opening Allow 18”, below for cable access.

Appendix C: HARDWIRING

Controllers are shipped with pre-wired AC power cord.



Ground
Line
Neutral

120VAC Service Power from a dedicated 15A GFI circuit breaker (awg14 stranded)

Green
Black
White
White 2
White 1
Red 1
Black 1
Black 2

Ground
Green
Green 1
Green 2

Connect grounds in a common wire nut

Bypass Valve

Ground	Green 1
Power Open	Black 1
Power Close	Red 1
Neutral	White 1

Alarm Relay

Cabled to DCS or EMS 120VAC input	Green 2
	White 2
	Black 2

WARNING:
1. Use multiple strand, copper AC power wiring. Do not use solid conductors.

2. Pump and Solenoid Outputs are fused at 5 Ams total. AC wiring must be minimum AWG18, rated 300V

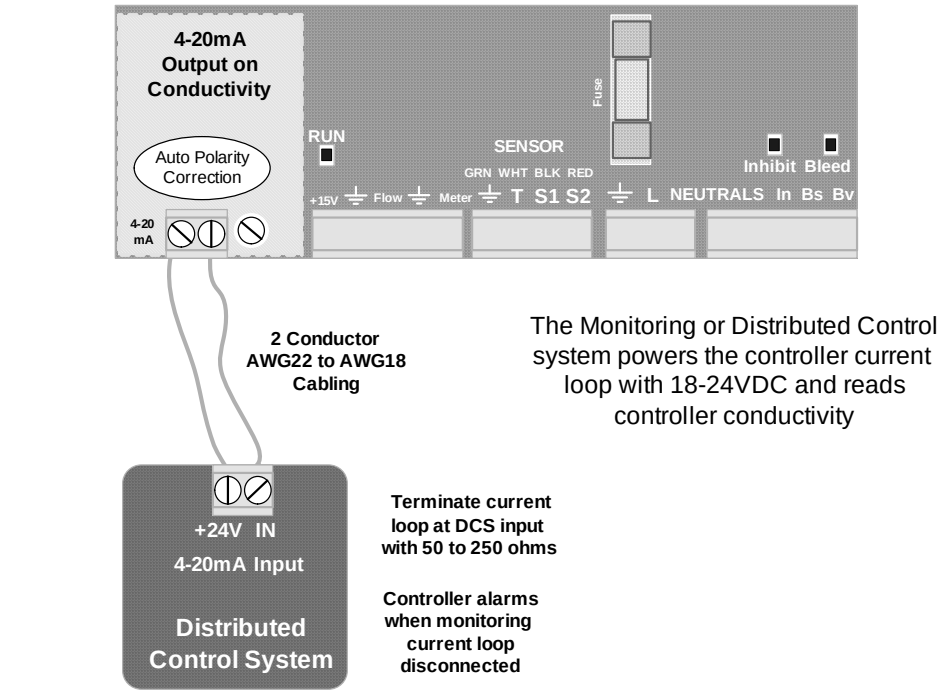
3. Do not exceed AWG14.

Appendix D: 4-20mA Output Option

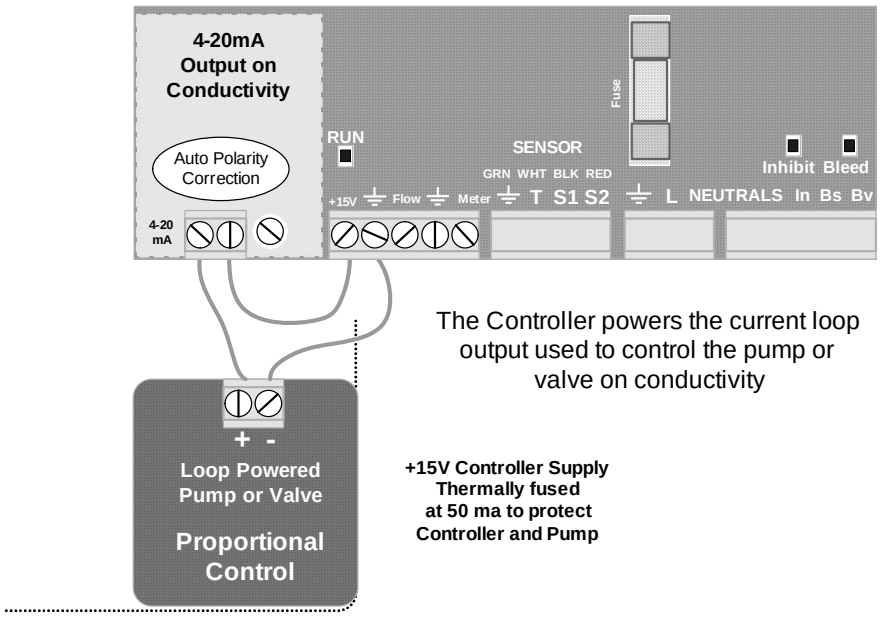
The optional 4-20mA output on conductivity is DC isolated from the controller & may be either powered by the load or by the controller DC supply. The 4-20mA output is auto-polarity correcting.

D1. WIRING

LOAD POWERED 4-20mA Output



CONTROLLER POWERED 4-20mA Output

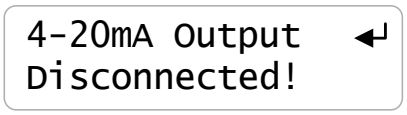


Appendix D: 4-20mA Output Option
D.2 VIEW & ADJUST SPAN

The displayed value of the 4-20mAloop current depends on both the conductivity and the Span

OR

If the current loop output is disconnected you'll see this display in place of the mA level.



Press ENTER @ Select Span to view or adjust the Span
Span sets the conductivity at 4mA & at 20mA

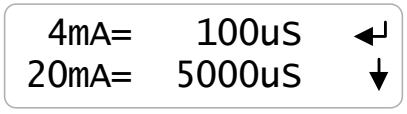
Press ENTER @ Trim Zero to calibrate the 4mA level

Press ENTER @ Trim Span to calibrate the 20mA level

View & Adjust Span

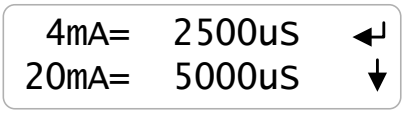
Press ENTER @ 4-20mA Output
& then DOWN to Select Span
Press ENTER.

Displays current Span.
Press ENTER to adjust 4mA level
or DOWN & ENTER to adjust 20mA level.



Press RIGHT to place the underline
under the digit you wish to adjust.
Press UP – DOWN to adjust.

ENTER updates the Span.
EXIT leaves Span unchanged

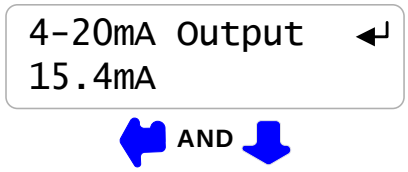


Appendix D: 4-20mA Output Option

D.3 CALIBRATE

Calibration is seldom necessary & is used to correct to offset errors.
The range of Zero & Span adjustment is limited.
If you are not able to calibrate:
A: Verify your milli-ammeter B: If Load Powered, verify you have at least 15VDC available.

Press ENTER & then DOWN at 4-20mA Output



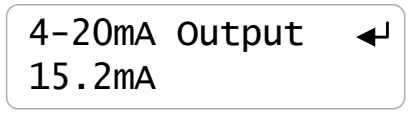
AND

Press ENTER at Trim Zero to adjust the 4mA level.

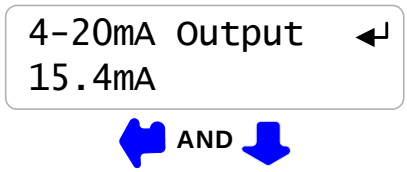
Connect a DC milli-ammeter in series with either of the current loop wires.

Press UP or DOWN until you read 4mA on the milli-ammeter.

Press ENTER to view the output current and verify that the milli-ammeter reads the same current.



Press ENTER & then DOWN at 4-20mA Output

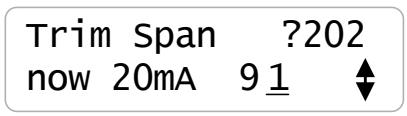


AND

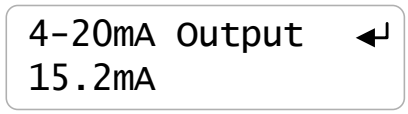
Press ENTER at Trim Span to adjust the 20mA level.

Connect a DC milli-ammeter in series with either of the current loop wires.

Press UP or DOWN until you read 20mA on the milli-ammeter.



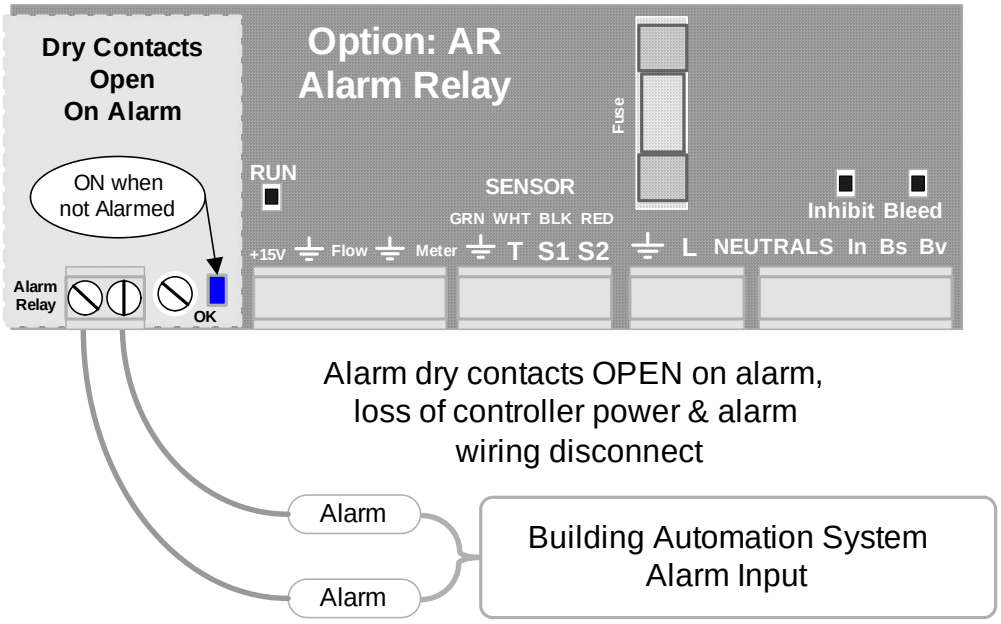
Press ENTER to view the output current and verify that the milli-ammeter reads the same current.



Appendix E: Alarm Relay Option

E.1 WIRING ALARM CONTACTS

Alarm contacts rated 500mA at 24VDC.
Requires optional Alarm Relay Card



Wire alarm contacts AWG22 to AWG18, 2 conductor

E.2 ALARM DISPLAYS

Press UP - DOWN until you see Alarms

If the Alarm Relay Card is installed you'll see one of the following displays.

```
Alarms          ↵
none
```

If Alarms & 'none' then the alarm contacts will be closed

```
Alarm Contacts
CLOSED,No Alarm
```

OR

Alarm contacts open on alarm.

```
Alarm Contacts
OPEN,Alarm
```

This display verifies the contact set state measured at the Building Automation System input terminals.

Appendix F: LAN - Browser Option

Download TACO_LAN manual from www.aquatrac.com

Do not connect the controller to the site LAN without permission from the site IT staff.

The factory default IP is 10.10.6.101.
The controller micro-server uses a static IP. Set the controller IP to the IP assigned by the site IP staff before connecting the controller to the site LAN.

You can use a crossover cable to connect to your notebook PC to view the controller state. Information on browsing controllers is available in the TACO_LAN manual.