



Installation / Operation Manual





PRODUCT SPECIFICATIONS

All specifications and descriptions contained in this document are verified to be accurate at the time of printing. However, because continuous improvement is a primary goal of WCC, we reserve the right to make product modifications at any time. Revised editions are found on the manufacturer's website: www.watercontrolinc.com. To communicate any inaccuracies or omissions in this manual, please email techsupport@watercontrolinc.com.

SAFETY INFORMATION

This guide contains important instructions for the LENS system that should be used for installation, basic setup and maintenance. The manufacturer is not responsible for any damages due to misapplication or misuse of this product, including, without limitation, direct, incidental and consequential damages, and disclaims such damages to the full extend permitted under applicable law. The user is solely responsible for identifying critical application risks and installing appropriate mechanisms to protect processes during a possible equipment malfunction.

Please read this entire manual before unpacking, setting up or operating this equipment. Pay attention to all danger and caution statements. Failure to do so could result in serious injury to the operator or damage to the equipment. Make sure that all protection provided by this equipment is not impaired. Do not use or install this equipment in any manner other than specified in this manual.

PRECAUTIONARY LABELS

Read all labels and tags attached to the instrument. Personal injury or damage to the instrument could occur if not observed. A symbol on the instrument is referenced in the manual with precautionary statement.



Safety alert: Indicates a hazardous situation that could result in injury or death. If on the instrument, refer to the instruction manual for operation of safety information.



Risk of electric shock: Indicates components or a procedure that risks electric shock, electrocution, injury or death.

WARNINGS



- RISK OF ELECTRICL SHACK AND ARC FLASH: System control panel and other ancillary equipment may utilize HIGH VOLTAGE electricity. Exercise EXTREME CAUTION when servicing this equipment. High voltage connections must only be made by a licensed electrician. System power supply must be DISENGAGED (turned OFF) prior to any maintenance work on electrical components. Proper personal protective equipment shall be used at all times.
- 2. <u>PIPING MATERIALS:</u> Verify compatibility of all new/existing piping materials in the facility, prior to the installation of a LENS system. Disinfectants, such as sodium hypochlorite and ozone, may be detrimental to certain piping materials and materials of construction used as part of the LENS system.

^{**}Contact WCC for more information

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1.1 System Description

The LENS water quality monitoring system includes a single, multi-parameter sensor probe which can be installed in a water main, a plumbing riser, a recirculation return line (up to 139°F), or a storage tank. The sensor probe provides continuous monitoring of free chlorine / monochloramine, pH, ORP, conductivity and temperature. It transmits data to an included PLC control panel which data logs 6 months worth of information and also has the ability to monitor up to 4 additional, external auxiliary analog sensors. The control panel also has 4 programmable relays which can be tied to any of the parameters that are being monitored.

1.2 How It Works

The single, multi-parameter sensor installs into a pipe or water main via an included saddle or flanged tee kit (per specification). In-tank sensors are installed in a FNPT PVC or CPVC adaptor affixed to the end of a section of pipe which must be sized to ensure they remain submerged in water at all times. The sensor's integral recirculation pump provides a continuous flow of water across the sensor electrodes, with no water waste and no pipe flow required. Polymeric cleaning beads ensure the electrodes do not foul with debris or minerals. The sensor uses a Modbus data communication protocol to transmit free chlorine / monochloramine, pH, ORP, conductivity and temperature data to the PLC via a 10' (unless otherwise specified) shielded low-voltage cable.

The PLC control panel monitors, displays and data logs this information. Users are able to toggle between the different data parameters to view daily min/max values, program low/high level alarms and display graphical trending diagrams. The PLC control panel is also able to accept up to four (4) additional analog (4-20 mA) or digital (open/closed) signals from eternal sensors such as flow meters, temperature sensors, turbidimeters, pressure sensors, and more. These extra parameters are also displayed on the panel screen and allow for high/low alarms, data logging, trend graphing, etc.

The controller includes four (4) programmable relays, which can be configured through the PLC to linked to the low/high value alarms for any of the parameters being monitored. These relays can be used to actuate external alarms as well as external equipment such as chlorinators, filters, solenoid valves, and more. SCADA output of all data to Building Automation Systems is available in native Modbus or BACnet protocols.

Recommended maintenance includes operation verification and calibration every 6 months, with a replacement of the sensor probe electrode tip every 12 months.

2. TECHNICAL INFORMATION

2.1 System Specifications

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Measurement method Reagent less amperometric, three electrodes, no membrane or electrolyte

Chlorine measurement range 0 to 20 ppm

- Limit of detection (LOD) 10 ppb (0.01 ppm)

- Limit of quantitation (LOQ) 40 ppb (0.04 ppm)

Monochloramine measurement range 0 to 10 ppm

- Limit of detection (LOD) 30 ppb (0.03 ppm)

Resolution 0.001 ppm (1 ppb)

Chlorine accuracy ± 5% of the calibrated value 1 (DPD) at any pH between 6.5 and 8.75

 \pm 4% of the calibrated value 1 (DPD) at any temperature between 15 $^{\circ}$ C and 35 $^{\circ}$ C

 \pm 4% of the calibrated value 1 (DPD) at any conductivity between 200 and 10,000 μS

± 10% underflow changes between 0 to 4 meters/second velocity

Monochloramine accuracy ± 7% or ± 0.06 ppm, whichever is greater for 0 to 5 ppm NH₂Cl for 5 to 40°C

 \pm 12% for >5 to 10 ppm NH₂Cl for 5 to 40°C

± 12% or 0.06 ppm, whichever is greater for 0 to 10 ppm NH₂Cl for >40 to 50°C

Turbidity interference No effect up to 3,000 ppm (Arizona test dust fine, 50-micron size)

Calibration stability 6 months (typical)

Chlorine measurement interval 60 seconds

Monochloramine measurement interval 120 seconds

pH range (chlorine) 6.5 to 8.75

Conductivity 50 to 10,000 μ S Pressure limit 10 bar (145 psi)

Temperature 1 to 55°C (34 to 131°F)

Sample compensation Automatic

Factory calibration Yes

Ambient data

Storage temperature -20 to 60°C (-4 to 140°F)

Operating temperature 1 to 50°C (33 to 122°F)

Maximum flow velocity 0 to 5 meters/second velocity

Maximum immersion depth/pressure 30 feet, 145 psi

Cleaning method Continuous mechanical cleaning, electrochemical cleaning

Cable length 10 feet standard, configurations up to 100 feet available

Electrical Information

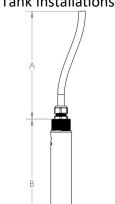
Power Requirements 120VAC / 1PH / 1.8A

Available Power for External Devices 1A @ 24VDC

2.2 Component Dimensions

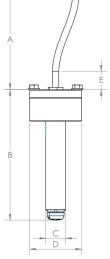
Immersion Sensor

(Tank Installations)



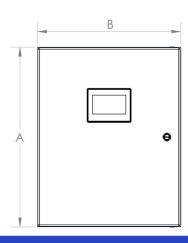
Wet Tap Sensor

(Pipe Installations)



Sensor Dimensions			
Α	Cable length	10', or to spec	
В	Overall sensor length	11" (Immersion), 11.5" (Wet tap)	
С	Diameter	1.72"	
D	Wet tap removal tool diameter	4.5" (Wet tap only)	
E	Required clearance for wet tap removal tool	13" (Wet tap only)	

Note: The panel shall be supplied with mounting feet (not shown) to aid in ease of installation.

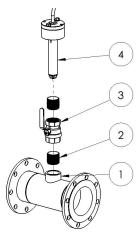




Panel Dimensions			
Α	Panel height	20"	
В	Panel width	16"	
С	Panel depth	8"	

3.1 Sensor Installation Fittings

Installation fitting packages are offered by WCC as an option to aid in ease of installation onsite. Figure 1 details the components included as part of the installation kit for an application where a flanged connection is desired. Figure 2 details the components included as part of the installation kit for an application where a saddle connection is desired.



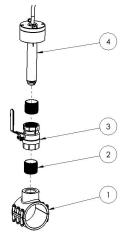
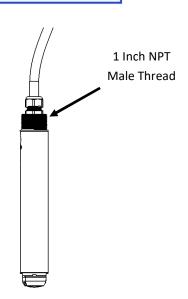


Figure 1

Figure 2

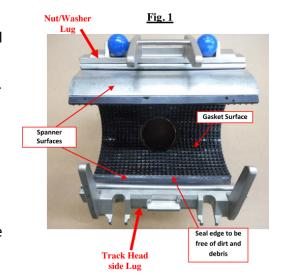
Item Number	Description	Included?
1	Saddle or flanged spoolpiece	Yes, with Install Kit
2	Adaptor nipple	Yes, with Install Kit
3	Ball valve	Yes, with Install Kit
4	Water quality sensor	Yes, with Sensor/ Control Package

The tank immersion sensor is supplied with a 1 inch NPT male connection as part of the sensor. This may be used with any 1 inch NPT female fitting to immerse the sensor into potable water. One example would be to use a 1 inch Schedule 40 PVC female adapter installed onto the sensor.

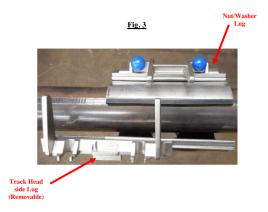


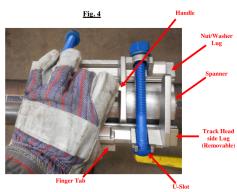
3.1.1 Saddle Installation

- Prepare the pipe surface by thoroughly cleaning the surface of all rust, dirt, scale and debris. Verify that the fitting is the proper diameter for the main pipe on which the saddle is to be installed. Use a pipe outside diameter (OD) tape to confirm main pipe diameter. Installer shall confirm that pipe to be tapped has structural integrity sufficient for the tapping saddle. Please consult a piping engineer or the MFG if there is any doubt in this matter.
- Inspect the pipe sealing surface for damage. Do not mount the
 fitting on any pipe surface that is damaged. Damage may include
 gauges, holes, cuts, pits, cracks or other surface imperfections
 that could impede gasket sealing performance.
- 3. The saddle may be installed in a depressurized or pressurized pipe. If installing in a depressurized pipe, use a 1-7/8" holt saw to cut a hole in the pipe in the desired location. Remove any burrs or sharp edges that may have formed. If installing in a pressurized pipe (Hot tap), the hole will be cut in later steps. Special tools are required for a hot tap installation (not included).
- 4. Lubricate the pipe surface, all fitting sealing and spanner surfaces (see Fig. 1), with a mixture of soapy water. Verify seal edge is free of debris and dirt prior to installation. Do not use grease or pipe lubricant except when otherwise specifically instructed to do so.
- 5. Mount the fitting to the pipe. If needed, remove the track head side lug from the bank to aid in installation (See Fig. 2). Light tapping with a non-metallic hammer may be utilized. Once the saddle is mounted, slide the track head lug (See Fig. 3) back onto the band (Light tapping with a non-metallic hammer may be utilized). Using the handle and finger tab (See Fig. 4), close the clamp together allowing one of the track head bolts to drop into the Uslot on the track head side lug. Verify the spanner slides under the band when closing the saddle.
- 6. Insert the remaining bolt into the corresponding U-slot. Ensure nut sides of the bolts are secured through the closed holes on nut/washer side lug. The track head should nest securely behind the two bolt head retaining tips on the track head U-slot. Once the bolts are secured in the bolt slots, but not yet tightened, rotate the saddle to the desired orientation.

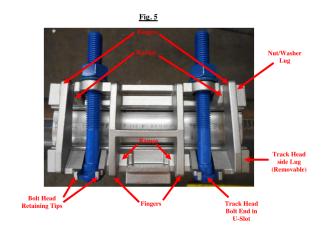








- 6. Insert the remaining bolt into the corresponding U-slot. Ensure nut sides of the bolts are secured through the closed holes on nut/washer side lug. The track head should nest securely behind the two bolt head retaining tips on the track head U-slot (See Fig. 5). Once the bolts are secured in the bolt slots, but not yet tightened, rotate the saddle to the desired orientation.
- 7. Tighten the nuts evenly (maintaining an even gap) to correct torque per the requirements below. As the fitting is tightened, verify that the lug fingers travel along their corresponding/mating ramps (See Fig. 5).
- 8. (Hot tap only) After the fitting is installed to the main conductor pipe, and the tapping valve is installed but prior to performing the line tap, hydrostatically test the assembly seals. Apply a hydraulic pressure test in accordance with the working line pressure plus an appropriate safety factor but not exceeding the pressure rating of the fitting. Do not use compressed gases to perform the pressure test.
- 9. (Hot tap only) Continue with the installation of the tapping equipment per the manufacturer's instructions.
- 10. Install the lens sensor into the pipe and pressurize the assembly.
- 11. Verify that no leaks are present. If leaks are present, retighten the nuts if required.



BOLT TORQUE REQUIREMENTS				
PVC OR STE	PVC OR STEEL (IPS) PIPE		R PIPE	
NOM SIZE	TORQUE (FT-LBS)	NOM SIZE	TORQUE (FT-LBS)	
2"	40	2"	40	
3"	40-60	3″	40	
4"	40-60	4"	40	

Note: In all installations, wait 10 minutes after applying torque to bolts and reapply torque. Refer to individual product label for additional information.

3.2 Sensor Installation - Wet Tap

1. Locate the outlet port of the sensor. The outlet port is responsible for ejecting the process water back into the system. The orientation of the outlet port within a pipe must be carefully considered. Instructions for the alignment of the outlet port are detailed in subsequent steps. Figure 3 below displays how to identify the sensor outlet port. A sticker is also applied to the sensor with an arrow indicating the position of the sensor outlet port detailed in figure 4.



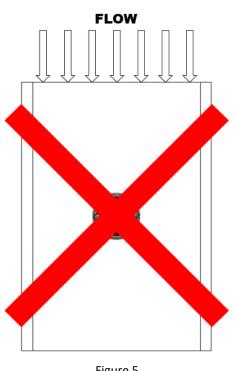




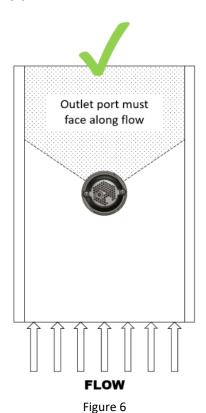
Figure 4

3.2.1 Vertical Pipe Installations

For vertical installations, whare a pipe is installed along a vertical wall, the sensor must not be inserted into a segment of pipe where the water flows down Figure 5. Water flow must always flow upwards, and the wet tap sensor must align with the direction of flow as shown below Figure 6



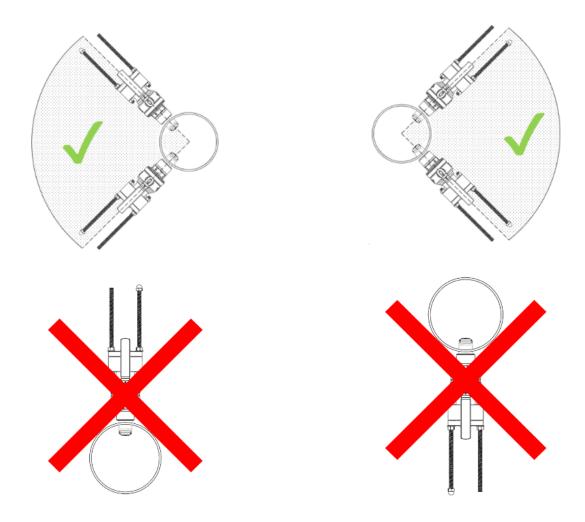




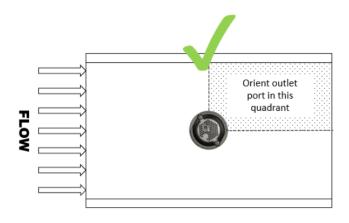
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3.2.2 Horizontal Pipe Installations

For horizontal installations, the wet tap sensor must not be installed vertically as shown in flow-facing views below. The sensor must be installed within $\pm 45^{\circ}$ from horizontal as shown below.



Additionally, the outlet port must align with the direction of water flow and positioned upwards, given the direct of flow as detailed below. This will allow any air to be easily purged from the sensor.



3.2.3 Initial Installation

This installation assumes that a saddle or sensor installation fitting has been installed in the desired location in the pipe. Any 2 inch full port ball valve and appropriate saddle/installation fitting may be used. WCC offers various saddles or installation packages that may be purchased to aid in sensor installation.

Note: If the line is pressurized, ensure that the 2 inch valve remains closed until instructed to open the valve.

1. Remove the tape from the end cap.



2. Install the end cap onto the 2 inch valve.

Note: Use an appropriate thread sealant to ensure a leak free joint.

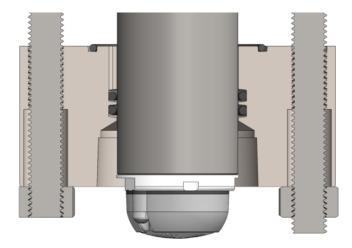
3. Install the two all-threaded rods into the end cap until both rods are protruding from the end cap by approximately 1/2 inch. Thread hex nuts onto the protruding rod ends.



- 4. Lubricate the O-rings located in the end cap assembly with an appropriate lubricate rated for potable water.
- 5. Insert the sensor assembly into the end cap using the threaded rods as a guide.

Note: Verify the sensor outlet port is orientated in the correct position based on the application.

6. Ensure that the sensor is slid far enough into the end cap so that the sensor sleeve is pushed past the two O-rings located inside the end cap.



7. Place washers and nuts onto the threaded rod protruding from the sensor cap until they are touching the sensor cap. This will ensure that the sensor assembly does not push back once the valve is opened.

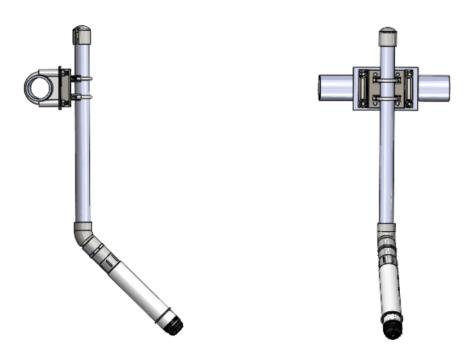


- 8. Slowly open the valve to allow the sensor to come into contact with the water. If the pipe is pressurized, verify there are no leaks. If a leak is present, close the valve and dis-assemble the sensor from the saddle and inspect any O-rings/sealing surfaces for damage or debris. Reassemble the sensor assembly in the same steps.
- 9. Insert the sensor assembly into the pipe/water. Tighten (clockwise rotation) the nuts evenly to push the sensor assembly into the pipe/water. The sensor cap should be flush with the end cap when fully inserted into the pipe.
- 10. Install a cap nut to one threaded rod to prevent the sensor from accidentally being removed too far when removing it from the pipe when maintenance is required.

3.3 Sensor Installation - Immersion

The sensor may be installed in an immersion application such as installed in a tank. Piping, such as 1 inch PVC is recommended for these applications. Verify that the sensor cable is long enough for the application prior to beginning the installation process. It is recommended to use unions or other means to allow the installation piping to be easily removed for sensor maintenance

- 1. Apply an appropriate thread sealant to the male threads located on the sensor.
- 2. Install the sensor using a 45° elbow and thread x socket adapter to attach the sensor to the piping.
- 3. Position the sensor so that the outlet port is orientated vertically to purge air from the sensor.
- 4. Run the sensor cable through the pipe of sufficient length to immerse the sensor at the desired depth without allowing water to enter the pipe.
- 5. If using socket style fittings, ensure that all joints are glued with the appropriate solvent to ensure a leak free installation.
- 6. Mount/secure the sensor using a boom or rail mount installation as shown below. Alternative methods can be used to secure the sensor/pipe assembly in the desired location.
- 7. Route the cable and secure it outside the tank and away from any water.
- 8. Connect the sensor plug into the controller.



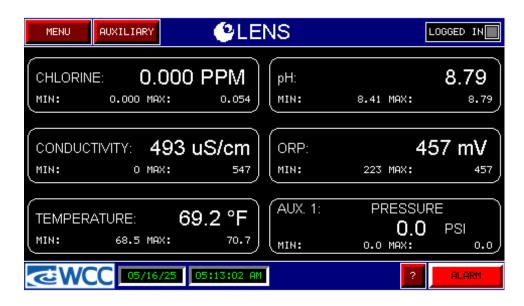
3.4 Control Panel Installation

- 1. Locate the desired installation location for the LENS control panel. The LENS control panel is designed to be mounted to a wall but could also be mounted to a ridged structure such as Uni-Strut. Ensure that the LENS sensor cable is long enough to reach the desired panel installation location.
- 2. Panel mounting clips have been supplied with the LENS control panel to aid in wall mounting of the enclosure.
- 3. Secure the mounting clips to the back of the enclosure using the supplied hardware.
- 4. Optional mounting method: Threaded inserts have been provided on the back of the enclosure for convenient mounting directly to the enclosure. Attach enclosure to wall or other structure using customer supplied fastener, flat washer and nuts.
- 5. Secure the mounting clips to the wall or rigid structure using the appropriate fastener (not included) type for the application.
- 6. If the surface on which the enclosure is mounted is not flat, the door may not open and close properly. If the top of the door strikes the lip which extends around the body opening, place metal shims behind the mounting foot which is located at the bottom of the enclosure and closest to the door hinge. Place the shims between the mounting clip and the wall/mounting surface. Be sure all mounting screws are tightened securely.
- 7. Plug in the LENS sensor cable to the appropriate port located on the bottom of the panel.

4.1 Overview

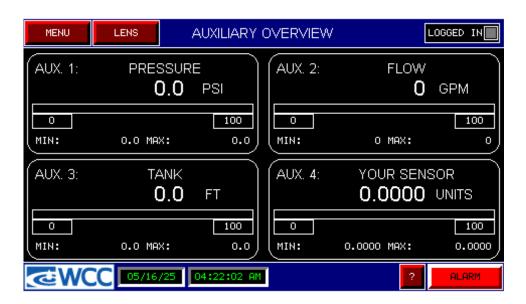
LENS Overview

The LENS overview screen provides the process information at a quick glance. If configured, external auxiliary Channel 1 will also be displayed in the bottom right corner of this screen. Touching each parameter window will navigate to the detail screen.



External Auxiliary Analog Input Overview

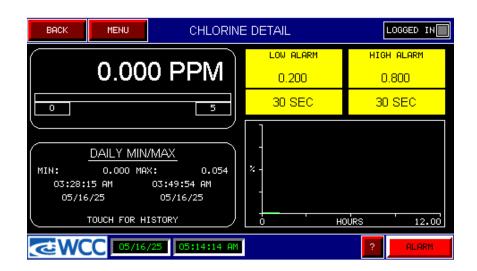
The external auxiliary analog overview screen provides process information at a quick glance. If configured, channel variable and percentage bar will flash red with an unacknowledged alarm, and solid red with acknowledge alarm. Touching each parameter window will navigate to the detail screen. Each parameter name, units, etc. may be configured as part of the channel configuration process.



4.2 Channel Detail

LENS Channel Detail

The LENS detail screen (accessed by touching any of the channels on the overview screen) provides an instantaneous value for the measured parameter. Low/high setpoints can be set/adjusted from this screen. The current day's minimum and maximum values are displayed, touching this area will navigate to that parameter's min/max history screen.

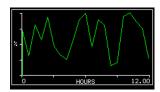




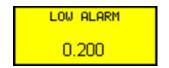
This window displays the current, instantaneous parameter value. The trend bar is displayed below the value to show where the current value falls within the low/high setpoints.



This window displays the daily min/max parameter value for the current day. The min and max value at the end of each day will be recorded with a time stamp for when the value occurred.



This window displays the trend graph for the parameter value. The window displays a visual graphic of the last 12 hours.



The low alarm setpoint button will be displayed. The low alarm value may be adjusted from this screen by touching the button.



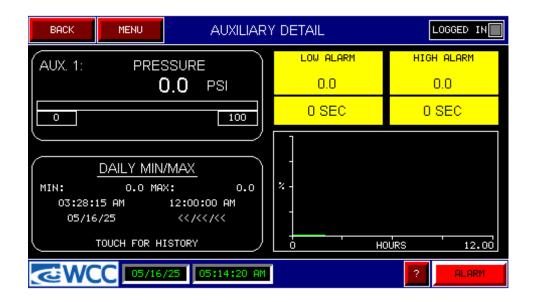
The high alarm setpoint button will be displayed. The high value may be adjusted from this screen by touching the button.



This value is also used to determine when the high or low alarm setpoint alarm will be activated.

External Auxiliary Analog Channel Detail

The channel detail screen provides an instantaneous value, low/high setpoints (if configured) and the current day's min/max values.











0.800

LOW ALARM



This window displays the current, instantaneous parameter value. The trend bar is displayed below the value to show where the current value falls within the low/high setpoints.

This window displays the daily min/max parameter value for the current day. The min and max value at the end of each day will be recorded with a time stamp for when the value occurred.

This window displays the trend graph for the parameter value. The window displays a visual graphic of the last 12 hours.

If configured, the low alarm setpoint button will be displayed. The low alarm value may be adjusted from this screen by touching the button.

If configured, the high alarm setpoint button will be displayed. The high value may be adjusted from this screen by touching the button.

If configured, this value is also used to determine when the high or low alarm setpoint alarm will be activated.

4.3 History

LENS History Detail

This screen shows record of the previous seven days minimum/maximum values with corresponding time and date stamp. These values are also logged to the micro SD card at the end of the day.



External Analog Channel History Detail

This screen shows record of the previous seven days minimum/maximum values with corresponding time and date stamp. These values are also logged to the micro SD card at the end of the day.



4.4 Navigation

Main Menu

The main menu screen provides navigation to all sub screens within the program. Selecting one of the buttons will bring you to the corresponding screen.



Setup Menu

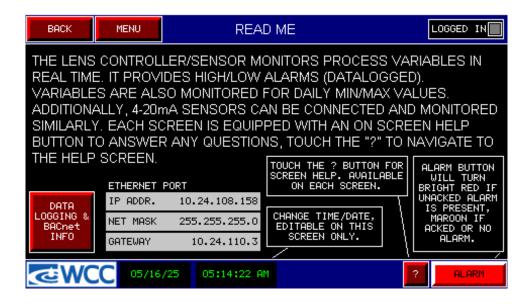
The setup menu screen provides navigation to all sub screens within the program. Selecting one of the buttons will bring you to the corresponding screen.



4.5 System Information

Read Me

This screen summarizes the controller, provides the user with general functionality and how to navigate to the onscreen help.



About Water Read Me

This screen provides some basic information about water quality. Use the next/previous button to scroll through the information provided on chlorine, conductivity, temperature to learn more about the specific parameters.



4.6 Security

Security

Log into the system to change setpoints. There are (2) configured users with differing security clearances. OPER (operator) can access alarm setpoints. SUPER (supervisor) can access channel configuration settings. The default password for both OPER is 1234 and SUPER is 5555. These can be changed on the security configuration page. Contact WCC for assistance if you forget or loose your password.





This icon will indicate if a user is logged in or not. When not logged in, the indicator box will be grayed out. When logged in at any user level, the box will illuminate green.



Press this button to log out.



Press this button to configure the security settings. From the supervisor level, the password for the operator and supervisor levels may be changed.

Security Configuration

This screen is used to configure the security settings. From the supervisor level, the password for the operator and supervisor levels may be changed. The auto log off function may also be activated from this screen. If set to zero, the user will remain logged in. Enter a value in the minute button to enable the auto logoff feature. The default password for the operator is 1234 and supervisor security level is 5555, but may be adjusted to any 4 digit code. If you forget the supervisor password, you will not be allowed back into this screen to edit/change it. Contact WCC if you forget your password.

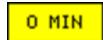




This icon is used to set the password for the operator security level. The default password is 1234, but can be changed to any 4 digit code that is desired.



This icon is used to set the password for the supervisor security level. The default password is 5555, but can be changed to any 4 digit code that is desired.

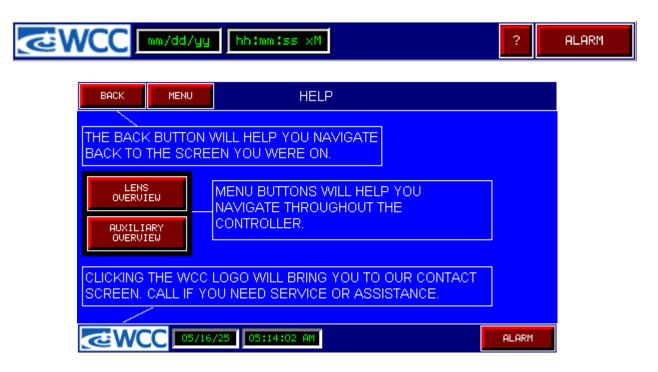


This icon is used to set the auto log off feature. After the user defined/adjustable time period has passed with interaction from the user, the system will automatically be logged off. If a value of 0 is used, the auto log off feature will be disabled.

4.7 Setup

On Screen Help Page

Every controller screen has on screen HELP files to guide you through setup and operation. Touching the "?" icon on the bottom tool bar will navigate to the help files associated with the current screen. The title will say "HELP" and the background will be blue to help differentiate functional screens from help screens.



WCC Contact Page

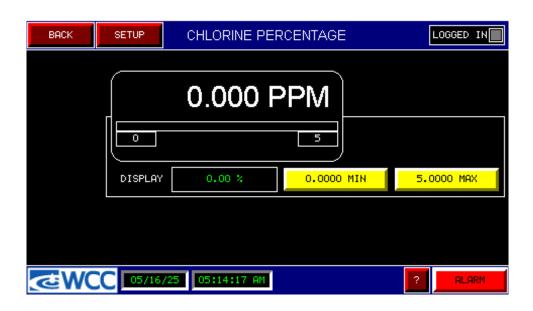
The WCC contact page provides the user with contact information for reaching out directly to WCC for support. The product version is displayed on the bottom of this screen. The page may be displayed by touching the WCC logo located on the bottom bar of any screen.



4.7.1 LENS Display Scaling

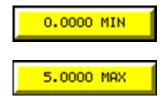
LENS Display Scaling: Chlorine/Monochloramine Concentration

Use the LENS setup screens to set desired graphical scales for the 5 sensor inputs. This determines the range of the percentage value that is displayed on bar graphs and trend screens. See HELP screen for function details.





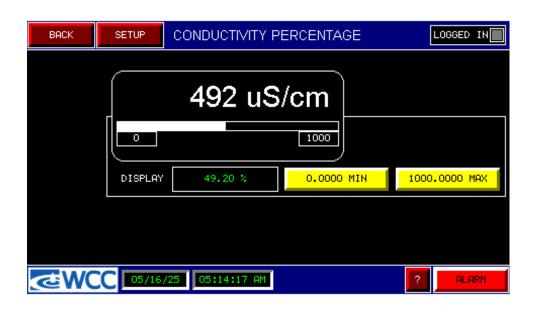
This window will display the actual free chlorine or monochloramine concentration detected in the water measured by the LENS sensor. The measurement will be displayed in parts per million (PPM), which is the same as mg/l. Lower levels of free chlorine/monochloramine are often indicative of lower water quality and higher bacterial levels.



Variables from the LENS sensor are data driven. There is no scaling available with this parameter. If sensor calibration is required, see the calibration section of this manual. The min/max values provide adjustment for on screen trend range and bar graph adjustment located below the actual ppm value.

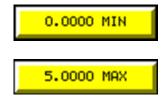
LENS Display Scaling: Conductivity

Use the LENS setup screens to set desired graphical scales for the 5 sensor inputs. This determines the range of the percentage value that is displayed on bar graphs and trend screens. See HELP screen for function details.





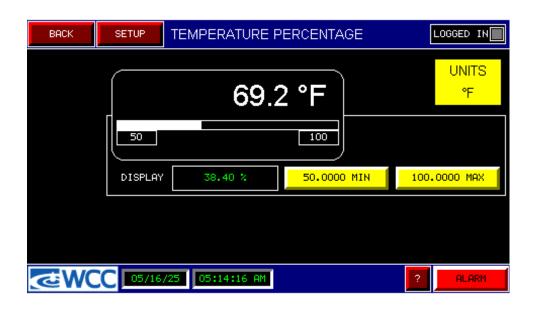
This window will display the conductivity level detected in the water measured by the LENS sensor. The measurement will be displayed in microsiemens/cm (micromhos/cm). Higher conductivity levels mean higher levels of dissolved solids and increased risk of corrosion, scaling, and fouling, depending on the types of contaminants.



Variables from the LENS sensor are data driven. There is no scaling available with this parameter. If sensor calibration is required, see the calibration section of this manual. The min/max values provide adjustment for on screen trend range and bar graph adjustment located below the actual microsiemens/cm value.

LENS Display Scaling: Temperature

Use the LENS setup screens to set desired graphical scales for the 5 sensor inputs. This determines the range of the percentage value that is displayed on bar graphs and trend screens. See HELP screen for function details.

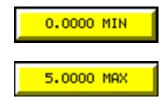




This window will display the water temperature measured by the LENS sensor. When cold water temperatures rise, bacterial growth and chlorine demand often increase. Water temperatures over 122 degrees F normally inhibit bacterial growth.



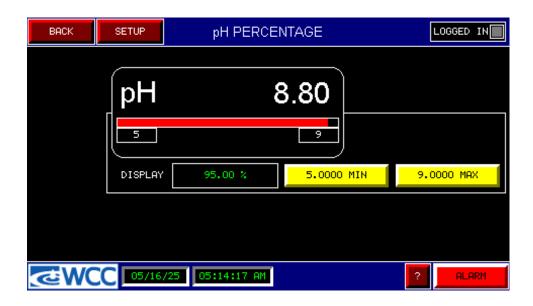
The measurement will be displayed in degrees F or degrees C. This can be adjusted via this window. Pressing this button will allow the user to toggle between degrees F or degrees C.



Variables from the LENS sensor are data driven. There is no scaling available with this parameter. If sensor calibration is required, see the calibration section of this manual. The min/max values provide adjustment for on screen trend range and bar graph adjustment located below the actual temperature value.

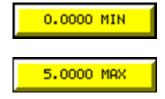
LENS Display Scaling: pH

Use the LENS setup screens to set desired graphical scales for the 5 sensor inputs. This determines the range of the percentage value that is displayed on bar graphs and trend screens. See HELP screen for function details.





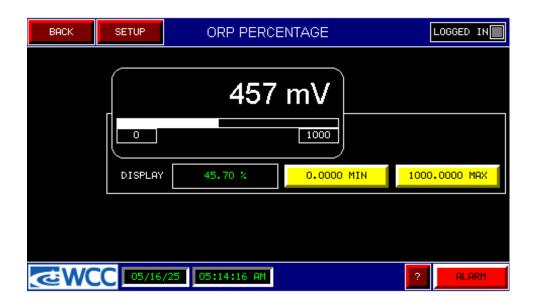
This window will display the water pH measured by the LENS sensor. pH is a measurement of the acidity or basicity of water. pH can range from 0 (very acidic) to 14 (very basic). Neutral water has a pH of 7.0. When pH drops below 6.5 corrosion can occur. When pH increases above 8.5, scaling can occur.



Variables from the LENS sensor are data driven. There is no scaling available with this parameter. If sensor calibration is required, see the calibration section of this manual. The min/max values provide adjustment for on screen trend range and bar graph adjustment located below the actual pH value.

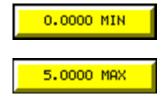
LENS Display Scaling: ORP

Use the LENS setup screens to set desired graphical scales for the 5 sensor inputs. This determines the range of the percentage value that is displayed on bar graphs and trend screens. See HELP screen for function details.





This window will display the water Oxygen Reduction Potential (ORP) as measured by the LENS sensor, in units of millivolts (mV). This provides a snapshot of overall water quality by displaying the amount of free oxidizing agents, capable of oxidizing and reducing contaminants.

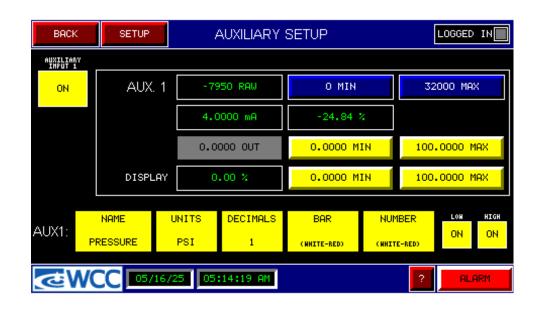


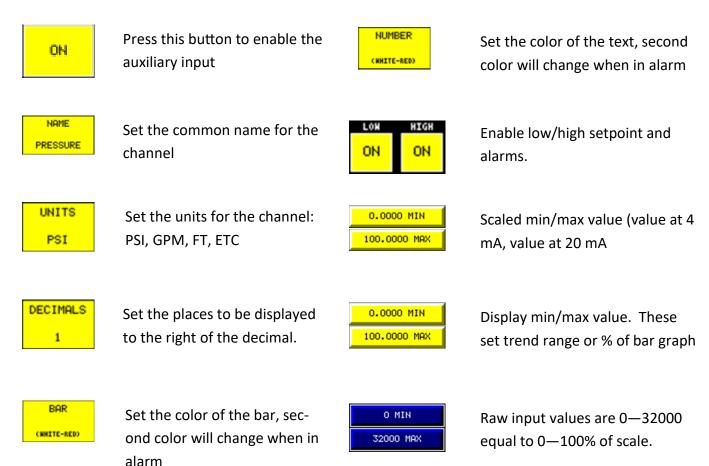
Variables from the LENS sensor are data driven. There is no scaling available with this parameter. If sensor calibration is required, see the calibration section of this manual. The min/max values provide adjustment for on screen trend range and bar graph adjustment located below the actual mV value.

4.7.2 Auxiliary Analog Channel Setup

External Auxiliary Analog Channel Setup and Configuration

Use the Auxiliary Setup screens to set up any of the 4 external, auxiliary analog channels. Each input has its own setup screen. See HELP screen for function details.

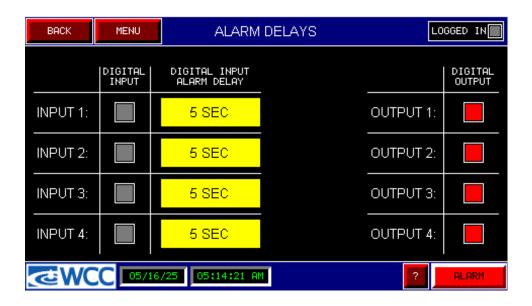




4.7.3 Digital I/O Setup

Digital Input Setup

The controller has connections for up to four (optional) digital (on/off) input signals from external sensors and equipment. When activated, they will appear on the alarm log. If desired, these digital inputs (along with any LENS or Analog inputs) can be tied to any of the four digital output connections. From the left side of this screen, the user can active or deactivate any of the digital inputs and set a specific delay time before an alarm is actuated.



5 SEC

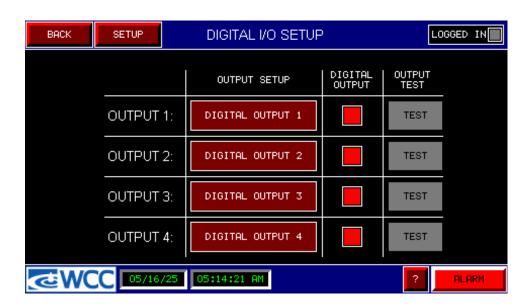
This button will set the delay for when the input will be triggered/activated. Once the input is activated, the delay timer will begin to count down. Once the user defined/adjustable value is met, the output will be triggered for as long as the input remains active if there is an output configured for the specific input. The output detailed on this page is a visual indicator as to if the output is currently active or not.



This box will illuminate when the input is triggered/ activated. It serves as a visual indicator as to whether the input is active to aid in troubleshooting.

Digital Output Setup

This screen provides access to a setup screen for each of the four digital outputs, which can be programmed to actuate based on reaching the min/max levels for the LENS parameters or any of the external auxiliary analog channels. They can also be programmed to actuate based on activation of any of the four digital inputs, general system alarm or any combination of alarms. The output will clear when the user acknowledges the alarm in the alarm banner.



DIGITAL OUTPUT 1

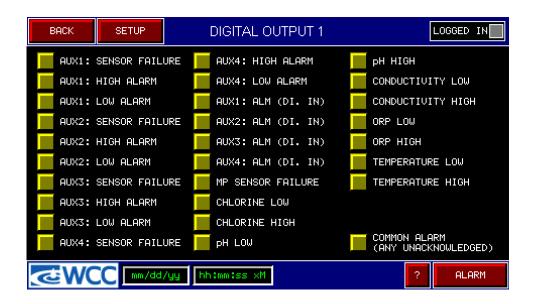
This button is used to navigate to the setup screen to configure the conditions that will activate the digital output(s).

TEST

This button is used to test the digital output. The output indicator will illuminate when this button is depressed and the physical output will be energized.

Digital Output Setup (continued)

Each digital output screen provides the ability to select the conditions for the output to turn on/activate. Multiple selections may be selected and may vary based on the application. Depress the yellow box next to the desired condition to activate for the specific output selected.



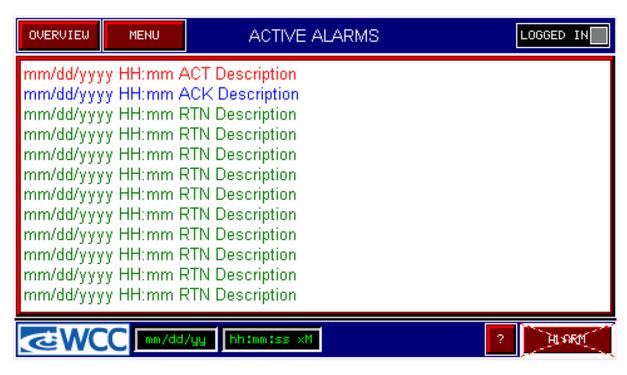


This icon indicates if a selection is enabled or disabled. The brighter yellow color indicates that the alarm output has been enabled. The darker yellow colors that the alarm output has been disabled.

4.8 Alarms

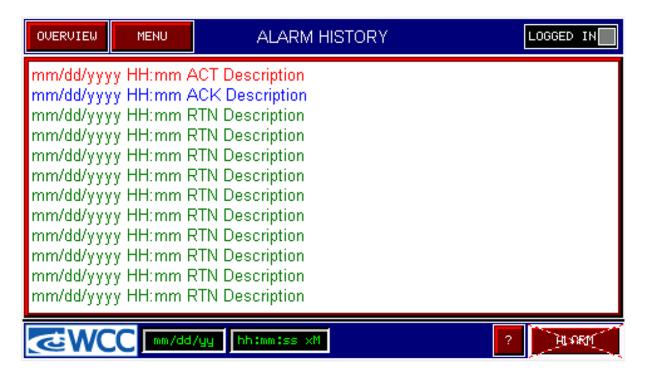
Active Alarms

The active alarms screen reports active alarms (ACT) displayed in red and acknowledged alarms (ACK) displayed in blue. Returned alarms (RTN) are those that have been cleared. See alarm history for historical record of alarms.



Alarm History

The alarm history screen displays all previous alarms. This screen can display up to the previous 64 historical alarms. All alarms are also recorded to the microSD card.



4.8.1 Alarm List and Trouble Shooting

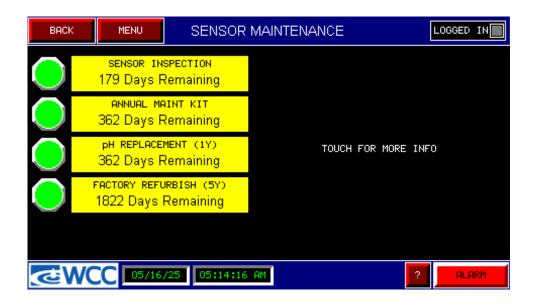
ALARM NUMBER	ALARM DESCRIPTION	POSSIBLE ISSUE	HOW TO RESET
1	AUXILARY 1: SENSOR FAILURE	WIRING INCORRECT OR FAILED SENSOR	INSPECT SENSOR AND WIRING
2	AUXILARY 1: HIGH ALARM	MEASURED VALUE ABOVE HIGH ALARM	VERIFY VALUE AND PHYSICAL PARAMETER BEING
3	AUXILARY 1: LOW ALARM	MEASURED VALUE BELOW LOW ALARM	VERIFY VALUE AND PHYSICAL PARAMETER BEING
4	AUXILARY 2: SENSOR FAILURE	WIRING INCORRECT OR FAILED SENSOR	INSPECT SENSOR AND WIRING
5	AUXILARY 2: HIGH ALARM	MEASURED VALUE ABOVE HIGH ALARM	VERIFY VALUE AND PHYSICAL PARAMETER BEING
6	AUXILARY 2: LOW ALARM	MEASURED VALUE BELOW LOW ALARM	VERIFY VALUE AND PHYSICAL PARAMETER BEING
7	AUXILARY 3: SENSOR FAILURE	WIRING INCORRECT OR FAILED SENSOR	INSPECT SENSOR AND WIRING
8	AUXILARY 3: HIGH ALARM	MEASURED VALUE ABOVE HIGH ALARM	VERIFY VALUE AND PHYSICAL PARAMETER BEING
9	AUXILARY 3: LOW ALARM	MEASURED VALUE BELOW LOW ALARM	VERIFY VALUE AND PHYSICAL PARAMETER BEING
10	AUXILARY 4: SENSOR FAILURE	WIRING INCORRECT OR FAILED SENSOR	INSPECT SENSOR AND WIRING
11	AUXILARY 4: HIGH ALARM	MEASURED VALUE ABOVE HIGH ALARM	VERIFY VALUE AND PHYSICAL PARAMETER BEING
12	AUXILARY 4: LOW ALARM	MEASURED VALUE BELOW LOW ALARM	VERIFY VALUE AND PHYSICAL PARAMETER BEING
13	DIGITAL INPUT 1: ALARM	INPUT ACTIVE	VERIFY STATUS OF EXTERNAL SENSOR
14	DIGITAL INPUT 2: ALARM	INPUT ACTIVE	VERIFY STATUS OF EXTERNAL SENSOR
15	DIGITAL INPUT 3: ALARM	INPUT ACTIVE	VERIFY STATUS OF EXTERNAL SENSOR
16	DITIGAL INPUT 4: ALARM	INPUT ACTIVE	VERIFY STATUS OF EXTERNAL SENSOR
17	MICROSD CARD 90% FULL	MICROSD CARD ALMOST FULL OF DATA	REPLACE OR CLEAR DATA FROM MICROSD CARD
18	LENS SENSOR FAILURE	COMMUNICATION FAILURE	VERIFY SENSOR WIRING, VERIFY SENSOR IS POW-
19	CHLORINE LOW	MEASURED VALUE BELOW LOW ALARM	VERIFY CHLORINE LEVEL, CALIBRATE SENSOR IF
20	CHLORINE HIGH	MEASURED VALUE ABOVE HIGH ALARM	VERIFY CHLORINE LEVEL, CALIBRATE SENSOR IF
21	pH LOW	MEASURED VALUE BELOW LOW ALARM	VERIFY PH LEVEL, CALIBRATE SENSOR IF REQUIRED
22	рН HIGH	MEASURED VALUE ABOVE HIGH ALARM	VERIFY PH LEVEL, CALIBRATE SENSOR IF REQUIRED
23	CONDUCTIVITY LOW	MEASURED VALUE BELOW LOW ALARM	VERIFY CONDUCTIVITY LEVEL, CALIBRATE SENSOR IF
24	CONDUCTIVITY HIGH	MEASURED VALUE ABOVE HIGH ALARM	VERIFY CONDUCTIVITY LEVEL, CALIBRATE SENSOR IF
25	ORP LOW	MEASURED VALUE BELOW LOW ALARM	VERIFY ORP LEVEL, CALIBRATE SENSOR IF REQUIRED

ALARM NUMBER	ALARM DESCRIPTION	POSSIBLE ISSUE	HOW TO RESET
26	ORP HIGH	MEASURED VALUE ABOVE HIGH ALARM	VERIFY ORP LEVEL, CALIBRATE SENSOR IF REQUIRED
27	TEMPERATURE LOW	MEASURED VALUE BELOW LOW ALARM	VERIFY TEMPERATURE, CALIBRATE SENSOR IF REQUIRED
28	TEMPERATURE HIGH	MEASURED VALUE ABOVE HIGH ALARM	VERIFY TEMPERATURE, CALIBRATE SENSOR IF REQUIRED
29	MAINT. REQUIRED—SENSOR INSPECTION	PERIODIC SENSOR INSPECTION	INSPECT/CLEAN SENSOR IF REQUIRED, RESET TIME DURATION ON CONTROLLER
30	MAINT. REQUIRED—ANNUAL MAINTE- NANCE KIT	ANNUAL SENSOR MAINTENANCE REQUIRED	PERFORM ANNUAL MAINTENANCE, RESET TIME DURATION ON CONTROLLER
31	MAINT. REQUIRED—pH SENSOR RE- PLACEMENT	pH PROBE REPLACEMENT REQUIRED	REPLACE pH PROBE, RESET TIME DURATION ON CONTROLLER
32	MAINT. REQUIRED—SENSOR FACTORY REFURBISH	FACTORY REFURBISH MAINTENANCE REQUIRED	RETURN SENSOR TO WCC FOR SERVICE, RESET TIME DURATION ON CONTROLLER
33	LENS SENSOR—AIR IN SENSOR 10 CYC	AIR IN SENSOR FOR 10 CYCLES	POWER ON/OFF SEVERAL TIMES, VERIFY SENSOR IS IMMERSED IN WATER, VERIFY INSTALLATION TO ENSURE OUTLET PORT IS VERTICAL OR PERPENDICULAR TO FLOW, VERIFY ORIENTATION
34	LENS SENSOR—SENSOR COMMUNICATION PROBLEM	COMMUNICATION FAILURE	VERIFY SENSOR WIRING, VERIFY SENSOR IS POW- ERED, CONTACT WCC
35	LENS SENSOR—ZERO CAL OOR	ZERO CALIBRATION OUT OF RANGE	RESET ZERO CALIBRATION TO ZERO
36	LENS SENSOR—BAD pH OFFSET	pH ZERO OUT OF RANGE	REPLACE pH PROBE
37	LENS SENSOR—BAD pH SLOPE	pH SLOPE OUT OF RANGE	REPLACE pH PROBE
38	LENS SENSOR—AIR IN SENSOR	AIR IN SENSOR	POWER ON/OFF SEVERAL TIMES, VERIFY SENSOR IS IMMERSED IN WATER, VERIFY INSTALLATION TO ENSURE OUTLET PORT IS VERTICAL OR PERPENDICULAR TO FLOW, VERIFY ORIENTATION
39	LENS SENSOR—MOTOR STALLED	DEBRIS IN SENSOR	CLEAN DEBRIS FROM SENSOR
40	LENS SENSOR—MOTOR RPM VERY LOW	DEBRIS IN SENSOR OR WORN IMPELLER BEARINGS	CLEAN DEBRIS, REPLACE BEARINGS IF WORN
41	LENS SENSOR—CL LEVEL OOR > 30 PPM	CHLORINE LEVEL TO HIGH, MAY BE INACCURATE	VERIFY CHLORINE LEVEL, REPLACE SENSOR IF TRO LEVEL IS NOT ACCURATE
42	LENS SENSOR—pH LOW < 5	MEASURED VALUE BELOW RANGE	VERIFY pH LEVEL, REPLACE pH PROBE
43	LENS SENSOR—pH HIGH > 10	MEASURED VALUE ABOVE RANGE	VERIFY pH LEVEL, REPLACE pH PROBE
44	LENS SENSOR—COND. HIGH > 65000 μs	MEASURED VALUE ABOVE RANGE	VERIFY CONDUCTIVITY LEVEL, REPLACE SENSOR
45	LENS SENSOR—TEMP. HIGH > 42°C	MEASURED VALUE ABOVE RANGE	VERIFY TEMPERATURE LEVEL, REDUCE PROCESS TEMPERATURE, REPLACE SENSOR

4.9 Maintenance & Calibration

Maintenance Reminders

This screen allows maintenance reminders to be configured to assist with proper system maintenance. Individual reminders may be activate and the time duration may be adjusted.



Calibration

Calibration is performed using a third party app. The QR code may be scanned to download the app. The below link may also be used to navigate to where the app may be downloaded.



4.10 Communication

FTP

File Transfer Protocol may be used to access data logged to the microSD card. The default address for FTP communication is FTP://10.24.108.158. For read only values, the login credentials are user: OPER and password: 1234. For read/write values, the login credentials are user: SUPER and password: 55303.

BACnet

The protocol converter is a Babel Buster BB3-7301. The IP address as shipped is 192.168.2.100. The login is "Root" and the password is on the side of the unit, however it has been configured with a simpler username: WCC and password: 7150.

The Babel Buster is looking for the LENS at 192.168.2.10. If the IP of the LENS changes, it will need to be changed in the configuration of the Babel Buster.

The BB3 is capable of talking BACnet IP (Ethernet) or BACnet MSTP (Serial). Objects are discoverable and Object Names/units are filled out and descriptive.

A typical installation of BACnet IP would require two IP addresses to get these devices on the building's network; one for the protocol converter and one for our LENS controller. The IP is editable in the LENS from the touch screen. The IP of the protocol converter can be changed through the web interface, but use caution as once the IP is changed you'll have to access it from the new IP address. If you're not experienced in doing this, please reach out, once it's address is lost or unknown it's difficult to recover/find. Additionally in the protocol converter, the target IP needs to be changed. The target is the LENS's address and must match. It also needs to be saved as the configuration file.

A typical installation of BACnet MSTP will isolate the small Ethernet network to our control panel. Our default settings are 192.168.2.10 for the LENS controller, and 192.168.2.100 for the protocol converter. These two devices should communicate as shipped. MSTP settings such as baud rate, MAC address, etc., will need to be changed to put this device on the customer's network.

As rule of thumb, if it does not retain changes through a power cycle, the configuration file will need to be saved after the changes.

Modbus

The LENS controller is capable of communicating over Modbus TCP/IP. The IP address as shipped is 192.168.2.10. The IP address is editable in the LENS from the touch screen.

4.11 BACnet and Modbus Map

LENS - Modbus&BACnet Map

	MODBUS				BACnet		
					Units		
Command	CHEST CHEST CONTRACTOR	2058000		ENGLISHED BUTTON	(Enumerated)	NAME	DESCRIPTION
	411601	S16	0.001	3000		LENS CHLORINE	CHLORINE
HOLDING REG.	411602	S16	0.01	71770 27	957	LENS PH	pH
HOLDING REG.	411603	S16	1	AI3		LENS CONDUCTIVITY	CONDUCTIVITY
HOLDING REG.	411604	S16		AI4		LENS ORP	ORP
HOLDING REG. HOLDING REG.	411605 411606	S16		AI5 AI6	1,700	LENS TEMP	RPM RPM
HOLDING REG.	411608	S16 S16	-	AI7		LENS RPM LENS AUX VOLT	VOLTAGE
HOLDING REG.	415502	S16	19.00	AI8	10000	CL PERCENT INT	CHLORINE PERCENT
HOLDING REG.	415512	S16		AI9		PH PERCENT INT	pH PERCENT
HOLDING REG.	415522	S16		Al10		COND PERCENT INT	CONDUCTIVITY PERCENT
HOLDING REG.	415532	S16		Al11		ORP PERCENT INT	ORP PERCENT
HOLDING REG.	415542	S16	1	Al12	98	TMP PERCENT INT	TEMPERATURE PERCENT
HOLDING REG.	410212	FP	1	1200 C	10.2	CH1 PV HI SP	CH1 HIGH ALARM SETPOINT
HOLDING REG.	410214	FP	1	Al14	95	CH1 PV LO SP	CH1 LOW ALARM SETPOINT
HOLDING REG.	410218	S16	1	Al15	73	CH1 PV HI SP DLY	DELAY SETPOINT
HOLDING REG.	410219	S16	1	Al16	73	CH1 PV LO SP DLY	DELAY SETPOINT
HOLDING REG.	410222	FP	1	Al17	95	CH2 PV HI SP	CH2 HIGH ALARM SETPOINT
HOLDING REG.	410224	FP	1	Al18	95	CH2 PV LO SP	CH2 LOW ALARM SETPOINT
HOLDING REG.	410228	S16	1	Al19	73	CH2 PV HI SP DLY	DELAY SETPOINT
HOLDING REG.	410229	S16	100	Al20	(4.3)	CH2 PV LO SP DLY	DELAY SETPOINT
HOLDING REG.	410232	FP	1		95	CH3 PV HI SP	CH3 HIGH ALARM SETPOINT
HOLDING REG.	410234	FP	1	Al22		CH3 PV LO SP	CH3 LOW ALARM SETPOINT
HOLDING REG.	410238	S16	1	AI23		CH3 PV HI SP DLY	DELAY SETPOINT
HOLDING REG.	410239	S16	100	Al24		CH3 PV LO SP DLY	DELAY SETPOINT
HOLDING REG.	410242	FP	100	Al25	1000	CH4 PV HI SP	CH4 HIGH ALARM SETPOINT
HOLDING REG.	410244	FP	2	AI26		CH4 PV LO SP	CH4 LOW ALARM SETPOINT
HOLDING REG.	410248	S16		AI27	2000	CH4 PV HI SP DLY	DELAY SETPOINT
HOLDING REG. HOLDING REG.	410249 410500	S16 FP		Al28 Al29	- X-00	CH4 PV LO SP DLY	DELAY SETPOINT CH1 DAILY LOW VALUE
HOLDING REG.	410500	S16	1	V		CH1 DAILY LOW VALUE DAYS AGO 1 CH1 DAILY LOW SEC DAYS AGO 1	CH1 DAILY LOW TIMESTAMP ss
HOLDING REG.	410503	S16	1	- 10		CH1 DAILY LOW MIN DAYS AGO 1	CH1 DAILY LOW TIMESTAMP mm
HOLDING REG.	410504	S16	1			CH1 DAILY LOW HR DAYS AGO 1	CH1 DAILY LOW TIMESTAMP hh
HOLDING REG.	410505	S16	1	Al33	200	CH1 DAILY LOW DAY DAYS AGO 1	CH1 DAILY LOW TIMESTAMP DD
HOLDING REG.	410506	S16	1	Al34	95	CH1 DAILY LOW MO DAYS AGO 1	CH1 DAILY LOW TIMESTAMP MM
HOLDING REG.	410507	S16	1	Al35	95	CH1 DAILY LOW YR DAYS AGO 1	CH1 DAILY LOW TIMESTAMP YY
HOLDING REG.	410508	FP	1	AI36	95	CH1 DAILY HIGH VALUE DAYS AGO 1	CH1 DAILY HIGH VALUE
HOLDING REG.	410510	S16	1	Al37	95	CH1 DAILY HIGH SEC DAYS AGO 1	CH1 DAILY HIGH TIMESTAMP ss
HOLDING REG.	410511	S16	1	AI38	95	CH1 DAILY HIGH MIN DAYS AGO 1	CH1 DAILY HIGH TIMESTAMP mm
HOLDING REG.	410512	S16	1	Al39	95	CH1 DAILY HIGH HR DAYS AGO 1	CH1 DAILY HIGH TIMESTAMP hh
HOLDING REG.	410513	S16	1	Al40	95	CH1 DAILY HIGH DAY DAYS AGO 1	CH1 DAILY HIGH TIMESTAMP DD
HOLDING REG.	410514	S16	1	Al41	95	CH1 DAILY HIGH MO DAYS AGO 1	CH1 DAILY HIGH TIMESTAMP MM
HOLDING REG.	410515	S16	1	7 10 10-0	95.5	CH1 DAILY HIGH YR DAYS AGO 1	CH1 DAILY HIGH TIMESTAMP YY
HOLDING REG.	410612	FP	1	AI43		CH2 DAILY LOW VALUE DAYS AGO 1	CH2 DAILY LOW VALUE
HOLDING REG.	410614	S16	1	A144		CH2 DAILY LOW SEC DAYS AGO 1	CH2 DAILY LOW TIMESTAMP SS
HOLDING REG.			_	Al45		CH2 DAILY LOW HIN DAYS AGO 1	CH2 DAILY LOW TIMESTAMP INT
HOLDING REG. HOLDING REG.		S16	-	Al46		CH2 DAILY LOW HR DAYS AGO 1 CH2 DAILY LOW DAY DAYS AGO 1	CH2 DAILY LOW TIMESTAMP hh CH2 DAILY LOW TIMESTAMP DD
HOLDING REG.		S16 S16		AI47 AI48	17.07	CH2 DAILY LOW DAY DAYS AGO 1 CH2 DAILY LOW MO DAYS AGO 1	CH2 DAILY LOW TIMESTAMP DD
HOLDING REG.	C. Colonia Policy	S16		Al49	75%	CH2 DAILY LOW YR DAYS AGO 1	CH2 DAILY LOW TIMESTAMP PIM
HOLDING REG.		FP	50	AI50		CH2 DAILY HIGH VALUE DAYS AGO 1	CH2 DAILY HIGH VALUE
HOLDING REG.	_	S16	-	Al51		CH2 DAILY HIGH SEC DAYS AGO 1	CH2 DAILY HIGH TIMESTAMP ss
	410623	S16		Al52		CH2 DAILY HIGH MIN DAYS AGO 1	CH2 DAILY HIGH TIMESTAMP mm
HOLDING REG.	410624	S16		AI53	100	CH2 DAILY HIGH HR DAYS AGO 1	CH2 DAILY HIGH TIMESTAMP hh
HOLDING REG.	410625	S16		Al54	099	CH2 DAILY HIGH DAY DAYS AGO 1	CH2 DAILY HIGH TIMESTAMP DD
	410626	S16	1	AI55	200	CH2 DAILY HIGH MO DAYS AGO 1	CH2 DAILY HIGH TIMESTAMP MM
HOLDING REG.	410627	S16	1	AI56	95	CH2 DAILY HIGH YR DAYS AGO 1	CH2 DAILY HIGH TIMESTAMP YY
HOLDING REG.	410724	FP	1	AI57	95	CH3 DAILY LOW VALUE DAYS AGO 1	CH3 DAILY LOW VALUE
HOLDING REG.	410726	S16	1	AI58	95	CH3 DAILY LOW SEC DAYS AGO 1	CH3 DAILY LOW TIMESTAMP ss
HOLDING REG.	410727	S16	1	Al59	95	CH3 DAILY LOW MIN DAYS AGO 1	CH3 DAILY LOW TIMESTAMP mm
HOLDING REG.		S16	1000	Al60	4000	CH3 DAILY LOW HR DAYS AGO 1	CH3 DAILY LOW TIMESTAMP hh
HOLDING REG.	200	S16		Al61	9013	CH3 DAILY LOW DAY DAYS AGO 1	CH3 DAILY LOW TIMESTAMP DD
HOLDING REG.	CONTRACTOR OF	S16	100	Al62	100.00	CH3 DAILY LOW MO DAYS AGO 1	CH3 DAILY LOW TIMESTAMP MM
HOLDING REG.	410731	S16	1	Al63	95	CH3 DAILY LOW YR DAYS AGO 1	CH3 DAILY LOW TIMESTAMP YY

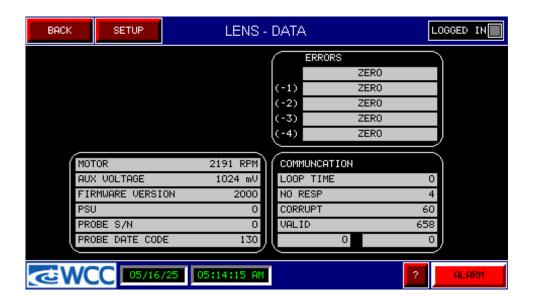
	MODBUS				BACnet		
					Units		
Command	THE REAL PROPERTY.	0.0000000	A CONTRACTOR OF THE PARTY OF TH	A TRANSPORTER	(Enumerated)		DESCRIPTION
HOLDING REG.	410732	FP		Al64	15.0	CH3 DAILY HIGH VALUE DAYS AGO 1	CH3 DAILY HIGH VALUE
HOLDING REG.	410734	S16	100	AI65		CH3 DAILY HIGH SEC DAYS AGO 1	CH3 DAILY HIGH TIMESTAMP ss
HOLDING REG.	410735 410736	S16		Al66 Al67		CH3 DAILY HIGH MIN DAYS AGO 1 CH3 DAILY HIGH HR DAYS AGO 1	CH3 DAILY HIGH TIMESTAMP mm
HOLDING REG. HOLDING REG.	410736	S16 S16		Al68		CH3 DAILY HIGH DAY DAYS AGO 1	CH3 DAILY HIGH TIMESTAMP hh CH3 DAILY HIGH TIMESTAMP DD
HOLDING REG.	410737	S16	22	Al69	1000	CH3 DAILY HIGH MO DAYS AGO 1	CH3 DAILY HIGH TIMESTAMP MM
HOLDING REG.	410739	S16		AI70	1889	CH3 DAILY HIGH YR DAYS AGO 1	CH3 DAILY HIGH TIMESTAMP YY
HOLDING REG.	410836	FP	200	AI71	10.00	CH4 DAILY LOW VALUE DAYS AGO 1	CH4 DAILY LOW VALUE
HOLDING REG.	410838	S16		AI72	1000	CH4 DAILY LOW SEC DAYS AGO 1	CH4 DAILY LOW TIMESTAMP ss
HOLDING REG.	410839	S16	- 1	AI73	†	CH4 DAILY LOW MIN DAYS AGO 1	CH4 DAILY LOW TIMESTAMP mm
HOLDING REG.	410840	S16		AI74	95	CH4 DAILY LOW HR DAYS AGO 1	CH4 DAILY LOW TIMESTAMP hh
HOLDING REG.	410841	S16	. 1	AI75	95	CH4 DAILY LOW DAY DAYS AGO 1	CH4 DAILY LOW TIMESTAMP DD
HOLDING REG.	410842	S16	o 11	AI76	95	CH4 DAILY LOW MO DAYS AGO 1	CH4 DAILY LOW TIMESTAMP MM
HOLDING REG.	410843	S16	1	AI77	95	CH4 DAILY LOW YR DAYS AGO 1	CH4 DAILY LOW TIMESTAMP YY
HOLDING REG.	410844	FP	-	AI78	95	CH4 DAILY HIGH VALUE DAYS AGO 1	CH4 DAILY HIGH VALUE
HOLDING REG.	410846	S16	-	AI79		CH4 DAILY HIGH SEC DAYS AGO 1	CH4 DAILY HIGH TIMESTAMP ss
HOLDING REG.	410847	S16	-	AI80		CH4 DAILY HIGH MIN DAYS AGO 1	CH4 DAILY HIGH TIMESTAMP mm
HOLDING REG.	410848	S16		AI81		CH4 DAILY HIGH HR DAYS AGO 1	CH4 DAILY HIGH TIMESTAMP IN
HOLDING REG.	410849	S16		AI82		CH4 DAILY HIGH DAY DAYS AGO 1	CH4 DAILY HIGH TIMESTAMP DD
HOLDING REG.	410850	S16	100	AI83	3937	CH4 DAILY HIGH MO DAYS AGO 1	CH4 DAILY HIGH TIMESTAMP MM
HOLDING REG. HOLDING REG.	410851 415100	S16 FP		AI84 L AI85	9550	CH4 DAILY HIGH YR DAYS AGO 1 CH1 PV	CH4 DAILY HIGH TIMESTAMP YY PROCESS VARIABLE ENGINEERING UNITS
HOLDING REG.	415100	FP	-	Al86		CH1 PV PCT	PROCESS VARIABLE ENGINEERING UNITS PROCESS VARIABLE %
HOLDING REG.	415200	FP	-	AI87		CH2 PV	PROCESS VARIABLE ENGINEERING UNITS
HOLDING REG.	415202	FP		-		CH2 PV PCT	PROCESS VARIABLE %
HOLDING REG.	415300	FP	22	AI89	-	CH3 PV	PROCESS VARIABLE ENGINEERING UNITS
HOLDING REG.	415302	FP		Al90	1893	CH3 PV PCT	PROCESS VARIABLE %
HOLDING REG.	415400	FP	9	AI91	95	CH4 PV	PROCESS VARIABLE ENGINEERING UNITS
HOLDING REG.	415402	FP	1	Al92	98	CH4 PV PCT	PROCESS VARIABLE %
HOLDING REG.	410301	S16	1	Al93	73	CH1 DI DLY SP	DELAY SETPOINT
HOLDING REG.	410302	S16	1	AI94	73	CH2 DI DLY SP	DELAY SETPOINT
HOLDING REG.	410303	S16	17	Al95	1000	CH3 DI DLY SP	DELAY SETPOINT
HOLDING REG.	410304	S16	7015000	Al96	Paris 25-7.	CH4 DI DLY SP	DELAY SETPOINT
READ COIL	10 7/8/19/20	0.00	N/A	MI1	N/A	CH1 ALM DIGITAL INPUT	OFF,ON
READ COIL	0.000	BOOL	N/A	MI2 MI3	N/A	CH2 ALM DIGITAL INPUT	OFF,ON
READ COIL READ COIL	_	BOOL	N/A N/A	MI4	N/A N/A	CH3 ALM DIGITAL INPUT CH4 ALM DIGITAL INPUT	OFF,ON OFF,ON
READ COIL		BOOL	N/A	MI5	N/A	ALARM - AUXILIARY 1: SENSOR FAILURE	CLEAR,ALARM
READ COIL		BOOL	N/A	MI6	N/A	ALARM - AUXILIARY 1: HIGH ALARM	CLEAR,ALARM
READ COIL	2000000	BOOL	N/A	MI7	N/A	ALARM - AUXILIARY 1: LOW ALARM	CLEAR,ALARM
READ COIL	20000000	BOOL	N/A	MI8	N/A	ALARM - AUXILIARY 2: SENSOR FAILURE	CLEAR,ALARM
READ COIL	7813	BOOL	N/A	MI9	N/A	ALARM - AUXILIARY 2: HIGH ALARM	CLEAR,ALARM
READ COIL	-	BOOL	N/A	MI10	N/A	ALARM - AUXILIARY 2: LOW ALARM	CLEAR,ALARM
READ COIL		BOOL	N/A	MI11	N/A	ALARM - AUXILIARY 3: SENSOR FAILURE	CLEAR,ALARM
READ COIL	7816	BOOL	N/A	MI12	N/A	ALARM - AUXILIARY 3: HIGH ALARM	CLEAR,ALARM
READ COIL		BOOL		MI13	N/A	ALARM - AUXILIARY 3: LOW ALARM	CLEAR,ALARM
READ COIL	CONTRACTOR CONTR	BOOL	200000	MI14	N/A	ALARM - AUXILIARY 4: SENSOR FAILURE	CLEAR,ALARM
READ COIL	-	BOOL	-	MI15	N/A	ALARM - AUXILIARY 4: HIGH ALARM	CLEAR,ALARM
READ COIL	1	BOOL	Control of	MI16	N/A	ALARM - AUXILIARY 4: LOW ALARM	CLEAR,ALARM
READ COIL		BOOL	-	MI17	N/A	ALARM - DIGITAL INPUT 1: ALARM	CLEAR,ALARM
READ COIL		BOOL		MI18	N/A	ALARM - DIGITAL INPUT 2: ALARM	CLEAR,ALARM
READ COIL	2000	BOOL	10131900	MI19	N/A	ALARM - DIGITAL INPUT 3: ALARM	CLEAR,ALARM CLEAR,ALARM
READ COIL READ COIL	100000	BOOL	75.00	MI20 MI21	N/A N/A	ALARM - DIGITAL INPUT 4: ALARM ALARM - microSD CARD 90% FULL	CLEAR,ALARM
READ COIL	1990990	BOOL	1000000	MI22	N/A	ALARM - MP SENSOR FAILURE	CLEAR,ALARM
READ COIL	10 10 10 10 10	BOOL	JOSEPH C.	MI23	N/A	ALARM - CHLORINE HIGH	CLEAR,ALARM
READ COIL	_		N/A	MI24	N/A	ALARM - CHLORINE LOW	CLEAR,ALARM
READ COIL		BOOL		MI25	N/A	ALARM - pH HIGH	CLEAR.ALARM
READ COIL		BOOL	2000	MI26	N/A	ALARM - pH LOW	CLEAR,ALARM
READ COIL	200000	BOOL	111111111111111111111111111111111111111	MI27	N/A	ALARM - CONDUCTIVITY HIGH	CLEAR,ALARM
READ COIL	1000000	BOOL		MI28	N/A	ALARM - CONDUCTIVITY LOW	CLEAR,ALARM
READ COIL	7833	BOOL	N/A	MI29	N/A	ALARM - ORP HIGH	CLEAR,ALARM
				_			

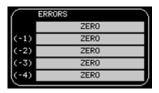
LENS - Modbus&BACnet Map

	MODBUS				BACnet		
					Units		
Command	Address	Туре	Scale	Object	(Enumerated)	NAME	DESCRIPTION
READ COIL	7835	BOOL	N/A	MI31	N/A	ALARM - TEMPERATURE HIGH	CLEAR,ALARM
READ COIL	7836	BOOL	N/A	MI32	N/A	ALARM - TEMPERATURE LOW	CLEAR,ALARM
READ COIL	7837	BOOL	N/A	MI33	N/A	ALARM - MAINT. REQUIRED - SENSOR INSPEC	CLEAR,ALARM
READ COIL	7838	BOOL	N/A	MI34	N/A	ALARM - MAINT. REQUIRED - ANNUAL MAINTE	CLEAR,ALARM
READ COIL	7839	BOOL	N/A	MI35	N/A	ALARM - MAINT. REQUIRED - pH SENSOR REP	CLEAR,ALARM
READ COIL	7840	BOOL	N/A	MI36	N/A	ALARM - MAINT. REQUIRED - SENSOR FACTOR	CLEAR,ALARM
READ COIL	7841	BOOL	N/A	MI37	N/A	ALARM - MP SENSOR - AIR IN SENSOR 10 CY	CLEAR,ALARM
READ COIL	7842	BOOL	N/A	MI38	N/A	ALARM - MP SENSOR - SENSOR COMM PROBLEM	CLEAR,ALARM
READ COIL	7843	BOOL	N/A	MI39	N/A	ALARM - MP SENSOR - ZERO CAL OOR	CLEAR,ALARM
READ COIL	7844	BOOL	N/A	MI40	N/A	ALARM - MP SENSOR - BAD pH OFFSET	CLEAR,ALARM
READ COIL	7845	BOOL	N/A	MI41	N/A	ALARM - MP SENSOR - BAD pH SLOPE	CLEAR,ALARM
READ COIL	7846	BOOL	N/A	MI42	N/A	ALARM - MP SENSOR - AIR IN SENSOR	CLEAR,ALARM
READ COIL	7847	BOOL	N/A	MI43	N/A	ALARM - MP SENSOR - MOTOR STALLED	CLEAR,ALARM
READ COIL	7848	BOOL	N/A	MI44	N/A	ALARM - MP SENSOR - MOTOR RPM VERY LOW	CLEAR,ALARM
READ COIL	7849	BOOL	N/A	MI45	N/A	ALARM - MP SENSOR - CL LEVEL OOR 30PPM	CLEAR,ALARM
READ COIL	7850	BOOL	N/A	MI46	N/A	ALARM - MP SENSOR - pH LOW <5	CLEAR,ALARM
READ COIL	7851	BOOL	N/A	MI47	N/A	ALARM - MP SENSOR - pH HIGH >10	CLEAR,ALARM
READ COIL	7852	BOOL	N/A	MI48	N/A	ALARM - MP SENSOR - COND. HIGH>65000uS	CLEAR,ALARM
READ COIL	7853	BOOL	N/A	MI49	N/A	ALARM - MP SENSOR - TEMP, HIGH>42C	CLEAR,ALARM
READ COIL	7856	BOOL	N/A	MI50	N/A	ALARM - REMOTE IO FAILURE	CLEAR,ALARM

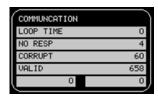
4.11 Advanced LENS Information

This screen provides additional information regarding the LENS sensor and PLC. This information may be requested by WCC for advanced troubleshooting assistance.

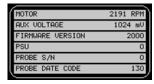




This table shows the current alarm (if active) and up to four previous alarms generated by the LENS sensor.



This table shows additional information pertaining to communications between the PLC and LENS sensor.



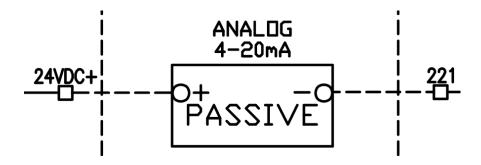
This table shows real time data pertaining to the LENS sensor.

5. CONNECTING EXTERNAL SENSORS

Up to (4) auxiliary analog sensors and (4) dry contact sensors, switches, etc. may be wired directly to the LENS panel for additional monitoring. This is accomplished by utilizing the integral 24VDC power supply located in the LENS panel. The power would be supplied by the LENS panel to the external device and returned to the panel, completing the circuit.

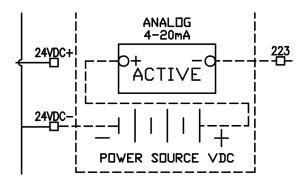
Auxiliary Analog Sensor (Passive)

- 1) Verify the desired sensor is compatible with the 24VDC power being supplied by the LENS panel and that the analog type is a 4-20mA type sensor.
- It is recommend to de-energize the panel prior to opening the panel door to perform the subsequent sensor installation.
- 3) Connect the (+) wire from the sensor to one of (4) terminals labeled 24VDC+ to supply power to the auxiliary analog sensor.
- 4) Connect the (-) wire from the sensor to one of the (4) terminals labeled as analog input. Each analog input has a specific terminal associated with it. If the sensor is landed on the incorrect terminal, the auxiliary analog setup process will not be able to be completed correctly. Consult the included wiring diagram for analog input terminal listing.



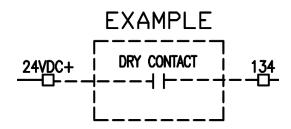
Auxiliary Analog Sensor (Active)

- 1) Verify the desired sensor is compatible with the LENS panel and that the analog type is a 4-20mA type sensor.
- 2) It is recommend to de-energize the panel prior to opening the panel door to perform the subsequent sensor installation.
- 3) Connect the (+) wire from the sensor to the external or LENS panel power supply (24VDC+). Connect the analog signal wire from the sensor to one of (4) terminals labeled as analog input. Each analog input has a specific terminal associated with it. If the sensor is landed on the incorrect terminal, the auxiliary analog setup process will not be able to be completed correctly. Consult the included wiring diagram for analog input terminal listing.
- 4) Connect the (-) wire from the sensor to the external or LENS panel power supply (24VDC-). If using an external power supply, the negative side of the power supply must be tied together with one of the negative terminals located in the LENS panel labeled 24VDC-.



Digital Input Sensor/Switch

- 1) Verify the desired sensor/switch is compatible with the 24VDC power being supplied by the LENS panel. The sensor/switch needs to either activate based on 24VDC power or be dry contact type sensor/switch.
- 2) It is recommend to de-energize the panel prior to opening the panel door to perform the subsequent sensor installation.
- 3) Connect the (+) wire from the sensor/switch to one of (4) terminals labeled 24VDC+ to supply power to the auxiliary sensor/switch.
- 4) Connect the (-) wire from the sensor/switch to one of the (4) terminals labeled as digital input. Each digital input has a specific terminal associated with it. If the sensor is landed on the incorrect terminal, the digital input setup process will not be able to be completed correctly. Consult the included wiring diagram for digital input terminal listing.



Page 46 of 62



LENS

107
WATER QUALITY
MONITORING SYSTEM
CONTROL PANEL

П				ENGINEER MDN	MDN
\vdash			+	SERIAL NO 25CP-XXXX	DRAWN BY SAS
\Box			_	SCALE	6/12/25
					NCC
NO.	DATE	REVISION	BY	C	

CUSTOM WATER TREATMENT SYSTEMS HIGH PURITY - RECLAMATION DISINFECTION & PATHOGEN CONTROL SOFTENING - CONTAMINANT REMOVAL

WATER CONTROL CORPORATION 7150 143RD AVENUE NW RAMSEY, MINNESOTA 55303 PHONE: 763-427-9638 THIS DRAWING INCLUDES CONFIDENTIAL INFORMATION THAT UST NOT BE COPIED, UTILIZED, OR REVEALED IN ANY FORM, EITHER NTIRELY OR PARTIALLY, WITHOUT PRIOR WRITTEN AUTHORIZATION.

SUSTINE PROBLEM NO. THE SUSTINE SUSTINE PROBLEM NO. THE SUSTINE SUSTINE PROBLEM NO. SU FS DIVIDENCE AB TAG LIMIT SWITCH
PILOT LIGHT
MOTOR STARTER
MOTOR STARTER
MOTOR SWITCH
PUSH BUTTON PILOT LIGHT
POWER DISTRIBUTION BLOCK
PROGRAMABLE LOGIC CONTROLLER
PRESSURE TRANSDUCER
PRESSURE TRANSDUCER
PRESSURE TRANSDUCER TIMER
TEMPERATURE SWITCH
ULTRAVIOLET
VARIABLE FREQ. DRIVE
WATER SOFTENER DIVERT VALVES
DISCONNECT
FLOAT LEVEL SWITCH
FFLOW METER
FLOW SENSOR
GROUND REVERSE ISMISIS
SIGNAL ISOLATOR
SOLENOID
SIGNAL SPLITTER
SELECTOR SWITCH
SURGE PROTECTOR
TEMPERATURE SWITCH TAG ANALOG OUTPUT
CIRCUIT BREAKER
CONTACTOR CONTROL RELAY
DIGITAL INPUT
DIGITAL OUTPUT TERMINAL BLOCK DESCRIPTION ANALOG INPUT TRANSFORMER NAMING 18 AWG 16 AWG 14 AWG 14 AWG AMPACITIES OF INSULATED CONDUCTORS-UL508A TABLE 28.1, 38 COPPER WIRE 4 / 0

MINIMUM WIRE GAUGES

PLC I/O AAND ANALOG (SHIELDED TWISTED PAIR)
AC AND DC CONTROL CIRCUITS AND POWER TO PLC
POWER CIRCUITS, CIRCUIT BREAKERS AND GROUND CONDUCTORS VULTAGES GREATER THAN 120 VULTS

ANALOG	DRANGE	YELLOW	WHITE W/BLUE STRIPE	BLUE	GREEN	WHITE	RED	BLACK	
WHITE OR CLEAR POSITIVE (+), BLACK NEGATIVE (-)	EXTERNAL VOLTAGE SOURCE (UL508A UPDATE)	EXTERNAL VOLTAGE SOURCE	WHITE W/BLUE STRIPE 24 VDC, 15 VDC AND 12 VDC COMMON	24 VDC, 15 VDC AND 12 VDC POSITIVE	GROUND	GROUNDED 120 VAC NEUTRAL	INTERNAL 120 VAC CONTROL WIRING	120 VAC HOT FROM LIGHTING PANEL AND HIGH VOLTALGE CIRCUITS	WIRE COLOR CODES

4 / 0	3 / 0	2 / 0	1 / 0	1	2	З	4	6	8	10	12	14	16	18	20	22	24	WIRE SIZE-AWG
				110	95	85	70	55	40	30	20	15	10	7	S	з	N	AMPS-60° C AMPS 75°
230	200	175	150	130	115	100	85	65	50	30	20	15						AMPS 75° (

	L						,	L	1.0	ŏ
CLR	BRN	- RG	YEL	WHT/BLU	BLU	GRN	VHT	RED	BLK	WIRE COL
CLEAR	BROWN	DRANGE	YELLOW	WHITE W/BLUE STRIPE	BLUE	GREEN	WHITE	RED	BLACK	WIRE COLOR ABBREVIATIONS

00	7	6	Ch	4	ω	2	-1	PIN	R		
BRN	WHT/BRN	GRN	WHT/BLU	BLU	WHT/GRN	ORG	WHT/ORG	WIRE COLOR	RJ-45 (T568B) TO RJ-45 (T568A)	CROSS-OVER CABLE	0
G	4	2	œ	7	1	6	ω	PIN	45 (T568A)	BLE	þ

WHT/BRN	00 7 0
WHT/BLU	o Un
WHT/GRN	ω 4
ORG	12
WHT/ORG	1
WIRE COLOR	PIN
	WHE COLOR WHT/ORG ORG WHT/GRN BLU WHT/BLU GRN WHT/BRN

T568B CABLE ETHERNET

V

CROSSOVER CABLE WIRING DIAGRAM (1568B):

	T568A CABLE	£ # {
PIN	WIRE COLOR	10Bose-T Signol 100Bose-TX Signol
-	WHT/GRN	TRANSMIT +
N	GRN	TRANSMIT -
ω	WHT/ORG	RECEIVE +
4	BLU	UNUSED
Ch	WHT/BLU	UNUSED
6	ORG	RECEIVE -
7	WHT/BRN	UNUSED
00	BRN	UNUSED

ETHERNE	(BOTH ENDS ARE	TANDARD, STRAIGHT-THROUG
낊	R	형
-	Ħ	坐
	THE SAME):	WIRING D
		DIAGRAM
- 1		

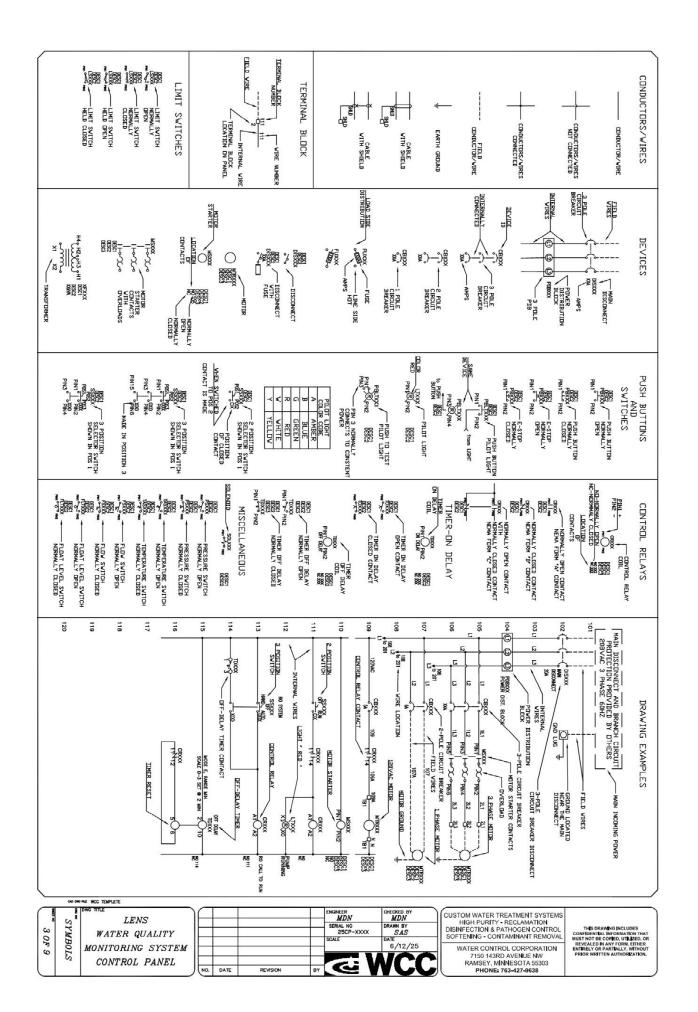
	CAD DW	PALE WCC TEMPLETE
20F9	STANDARDS	LENS WATER QUALITY MONITORING SYSTEM CONTROL PANEL

				ENGINEER MDN	MDN
\dashv				SERIAL NO 25CP-XXXX	DRAWN BY SAS
				SCALE	6/12/25
NO.	DATE	REVISION	BY	2 V	NCC

CUSTOM WATER TREATMENT SYSTEMS HIGH PURITY - RECLAMATION DISINFECTION & PATHOGEN CONTROL SOFTENING - CONTAMINANT REMOVAL

WATER CONTAMINANT REMOVA 7150 143RD AVENUE NW RAMSEY, MINNESOTA 55303 PHONE: 763-427-9638

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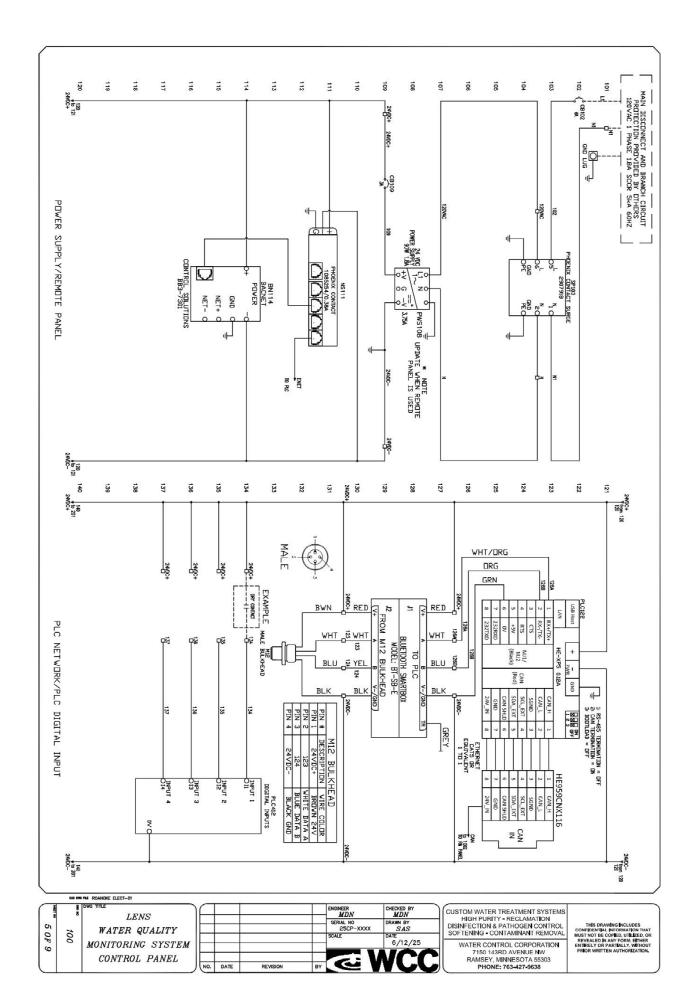
WCC			71	N	
TURCK		M12 MALE BULKHEAD	FS 4,4-0.5	↦	
PHOENIX CONTACT		TB1 TB2	3044102	U	
PHOENIX CONTACT		UTTB 4 COVER	3047293	ω	
PHOENIX CONTACT		UT4 COVER	3047028	3	
PHDENIX CONTACT		TB3 TB4 TB5	3044814	27	
PHOENIX CONTACT		UTTB 4-PE	3044759	N	
PHOENIX CONTACT		END STOP	3022276	18	
PHDENIX CONTACT		CR201 CR203 CR205 CR207	2966171	4	
PHOENIX CONTACT		SP103	2907918	1	
PHOENIX CONTACT		PWS108	2902993	1	
PHOENIX CONTACT		TITLE NAMEPLATE	828806	1	
PENN UNION		GND LUG	LA-2-1	1	
HORNER		PLC122	HE-XP5	1	
FIBOX		ENCLOSURE	AR20168CHSSL	1	
FIBOX		PANEL	ABP2016	1	
ABB		CB102	SU201M-K6	1	
ABB		CB109	SU201M-K4	1	
MFG	SUB	TAGS	CATALOG	QTY	REC

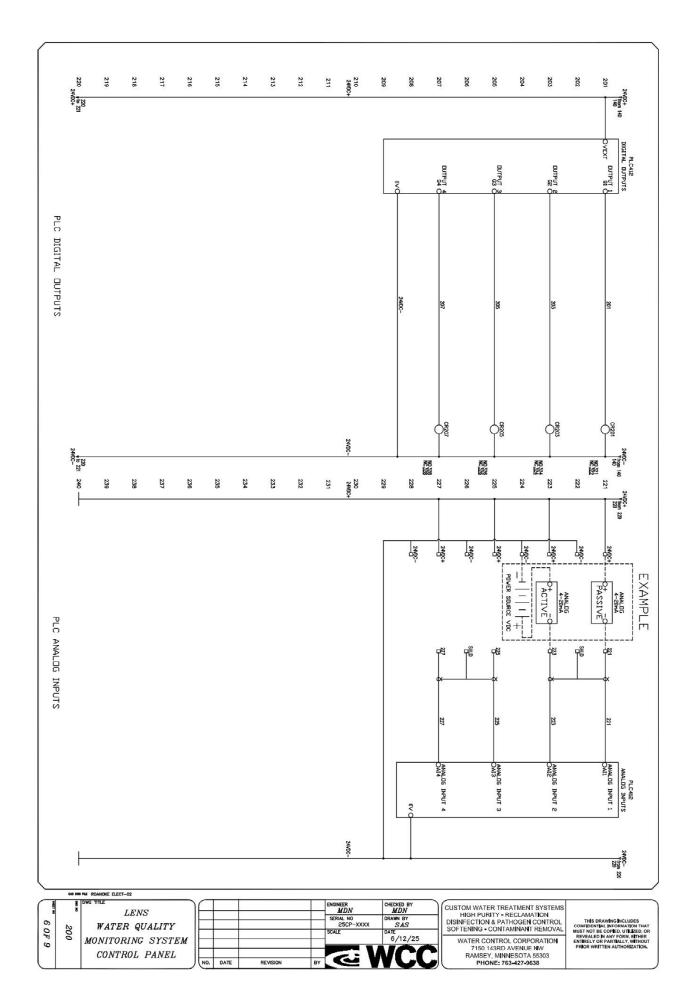
CAD DIRD PLE WCC TEMPLETE				
4 OF 9	BOM	LENS WATER QUALITY MONITORING SYSTEM CONTROL PANEL		
	ВОМ	WATER QUALITY MONITORING SYSTEM		

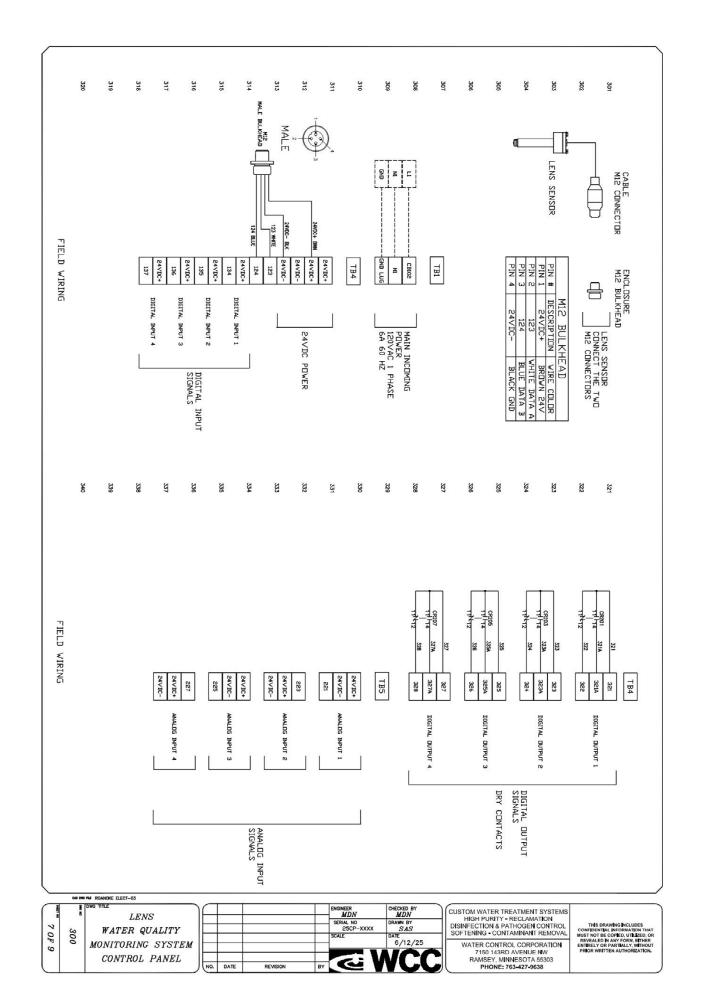
			E	MDN	MDN
\dashv			+	SERIAL NO 25CP-XXXX	DRAWN BY SAS
			S	CALE	6/12/25
				7:1	NCC
NO.	DATE	REVISION	BY	C	

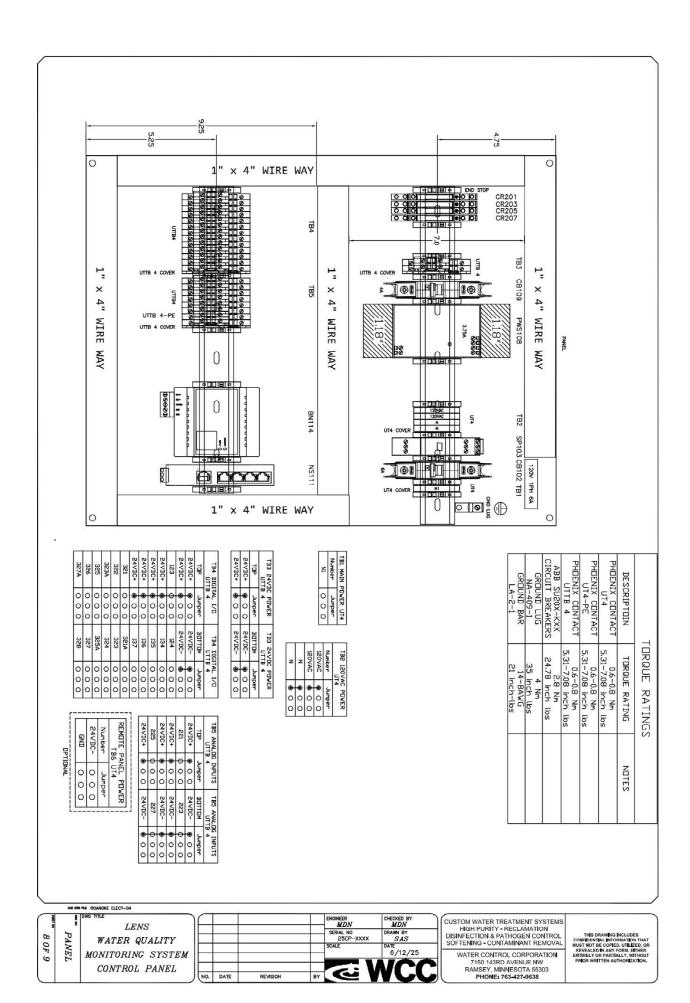
CUSTOM WATER TREATMENT SYSTEMS
HIGH PURITY - RECLAMATION
DISINFECTION & PATHOGEN CONTROL
SOFTENING - CONTROHNAIT REMOVAL
WATER CONTROL CORPORATION
7150 1438D AVENUE NW
RAMSEY, MINNESOTA 55303
PHONE: 763-427-9638

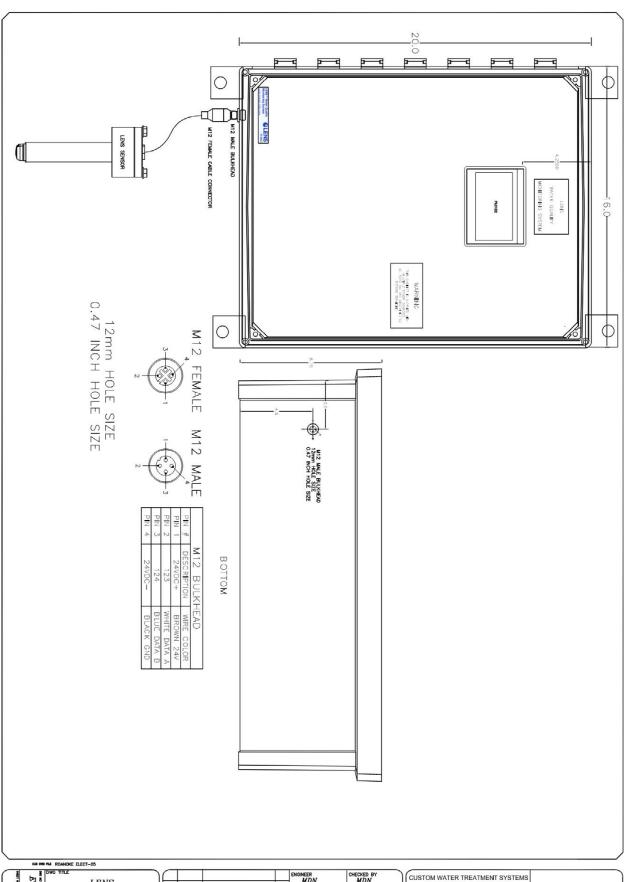
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ON THE LECT-OS

SOURCE PLECT-OS

SOURCE PLECT-OS

WATER

MONITORIA

CONTROL CHECKED BY
MDN

DRAWN BY
SAS

DATE
6/12/25 MDN SERIAL NO LENS 9 OF 9 WATER QUALITY WATER CONTROL CORPORATION 7150 143RD AVENUE NW RAMSEY, MINNESOTA 55303 PHONE: 763-427-9638 MONITORING SYSTEM CONTROL PANEL NO. DATE

CUSTOM WATER TREATMENT SYSTEMS HIGH PURITY - RECLAMATION DISINFECTION & PATHOGEN CONTROL SOFTENING - CONTAMINANT REMOVAL

6.1 Electrical Points of Connection

CONNECTION	<u>ТҮРЕ</u>	TERMINALS
Main Power Supply	120V / 1PH	L1, N1, GND
Digital Input 1	24VDC Powered	24VDC+, 134
Digital Input 2	24VDC Powered	24VDC+, 135
Digital Input 3	24VDC Powered	24VDC+, 136
Digital Input 4	24VDC Powered	24VDC+, 137
Asslanda	24VDC Powered—Passive	24VDC+, 221
Analog Input 1	24VDC—Active	221, 24VDC-
Audusta 12	24VDC Powered—Passive	24VDC+, 223
Analog Input 2	24VDC—Active	223, 24VDC-
Analog Ingut 2	24VDC Powered—Passive	24VDC+, 225
Analog Input 3	24VDC—Active	225, 24VDC-
Asslanta	24VDC Powered—Passive	24VDC+, 227
Analog Input 4	24VDC—Active	227, 24VDC-
21.110	Dry Contact—Normally Open	321, 321A
Digital Output 1	Dry Contact—Normally Closed	321, 322
21.110.1.10	Dry Contact—Normally Open	323, 323A
Digital Output 2	Dry Contact—Normally Closed	323, 324
Divido III I	Dry Contact—Normally Open	325, 325A
Digital Output 3	Dry Contact—Normally Closed	325, 326
	Dry Contact—Normally Open	327, 327A
Digital Output 4	Dry Contact—Normally Closed	327, 328
Modbus TCP/IP	RJ45	NS111—Any Open Port
BACnet IP (If equipped)	RJ45	NS111—Any Open Port
BACnet MS/TP (If equipped)	Screw Terminal	BB3-7301—Net+, Net1, GND

7. MAINTENANCE

The LENS sensor requires very little maintenance in drinking water applications. Since there is no membrane or electrolyte, the maintenance cycle is dramatically longer, and cleaning tasks are typically not required. The sensor has an integrated cleaning system using polymeric beads that cleans all the electrodes, including the pH sensor cartridge.

7.1 Sensor Removal

7.1.1 Sensor Removal—Wet Tap Installation

- 1. Ensure that the cap nut is installed on at least one of the threaded rods on the wet tap assembly. This will ensure that the sensor is not removed too far when being backed out of the pipe.
- 2. Loosen (counter-clockwise rotation) the nuts evenly to allow the sensor to be backed out from the pipe.

 Note if the pipe is still pressurized, the sensor will be pushed out from the pipe as the nuts are loosened.
- 3. Once the sensor has been backed out from the pipe, but not removed from the sensor end cap, slowly close the ball valve. Note that if there is resistance when attempting to close the ball valve, the sensor may not have been backed out far enough to allow the ball valve to close. Continue to evenly loosen the nuts to allow the sensor to be backed out further in small increments. Attempt to slowly close the ball valve again.
- 4. With the ball valve closed, the nuts can continue to be loosened further. Note that if the sensor is being removed from a pressurized pipe, there will be residual pressure trapped between the ball valve and sensor. This can be relieved by continuing to slowly remove the sensor.
- 5. Once any residual pressure is relieved, the nuts may be removed from the threaded rod. This will allow the sensor to be removed from the wet tap assembly.
- 6. Reference section 3.2.3 to reinstall the sensor.

7.1.2 Sensor Removal—Immersion Installation

- 1. Disconnect the piping securing the sensor assembly in the tank and remove it from the tank.
- 2. Disconnect the LENS sensor cable from the LENS controller.
- 3. Unthread the LENS sensor from the installation piping.
- 4. Reference section 3.3 to reinstall the sensor

7.2 Sensor Cleaning

When sensors are installed in applications with high iron or high biofouling concentrations, a buildup can occur on the end of the sensor (strainer) that may restrict flow through the sensor. In these applications, the sensor should be inspected every two weeks. If build up is present, the follow cleaning procedure should be followed:

Cleaning Method: White Vinegar

To acid clean the sensor, remove the sensor from the process, and rinse the sensor to remove any residual disinfectant that may be present in the water.

- 1. Select a small container and fill with 2 inches of tap water and immerse the sensor in the water.
- 2. Power the sensor on and tap lightly to remove any air that may be trapped in the sensor and rinse the sensor in the tap water. After completed, power down the sensor.
- 3. Drain the water from the container and refill the container with white vinegar.
- 4. Place the sensor in the container, power the sensor and clear air in the same method as defined in step 2.
- 5. Power the sensor while in the vinegar for 5 10 minutes.
- 6. Rinse the sensor as defined in step 2.
- 7. Return the sensor to the process and verify sensor readings are correct.

For a sensor that is underreporting even after performing the above mentioned cleaning method, a further cleaning step may be required. This will involve cleaning the measurement probe surfaces with either Isopropyl Alcohol or Dawn Dish soap.

- 1. Remove the sensor cover
- Clean the measurement surfaces with a clean, microfiber cloth saturated with either Isopropyl Alcohol or Dawn Dish soap.
- 3. Reinstall the sensor cover.
- 4. Verify that the sensor has adequate water ejection from the ejection port before reinstalling the sensor into the process.

7.3 Annual Maintenance

The annual maintenance is dedicated to the vital practice of replacing wear components internal to the sensor. Wear parts such as gaskets, bearings, impellers and wear rings experience natural wear/tear during normal operation. By understanding when and how to replace these components, users can ensure the accuracy of their measurements, prolong the sensor's service life and ensure the efficiency of water treatment processes/readings.

Tools Required:

- 1. #1 Philips Screwdriver
- 2. Isopropyl Alcohol
- 3. Lint free, clean cloth

Wear Part Removal: Remove the cover screws (quantity 2) from the sensor cover. Maintain pressure on the sensor cover and rotate the sensor vertically. Remove the sensor cover and screws from the sensor end while keeping the sensor orientated vertically. Remove the impeller from the impeller well. Impellers are magnetically coupled and should be easily removed. Remove the wear ring. All removed parts can be discarded. If fouling is present, it is recommended to clean the sensor end with Isopropyl Alcohol and a lint-free cloth. Care should be taken not to scratch the electrode surface.

New Wear Part Installation: Remove parts from the replacement wear kit. Install new wear ring into wear ring groove. Install new impeller into impeller well. Place 15 cleaning beads into the sensor end cover. Beads must only be present in the electrode compartment. Align the temperature sensor and impeller with their respective holes in the sensor cover. Lower sensor into sensor cover. Twist the cover gently until the sensor guide pins drop into the sensor end. Holding the sensor cover in place, insert and tighten both cover screws until there is no gap between the sensor cover gasket and the sensor end. To prevent motor biding, do not over-tighten the screws.

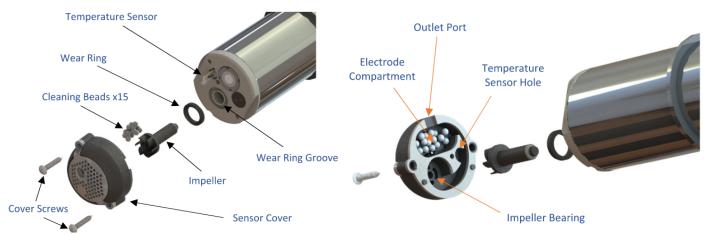


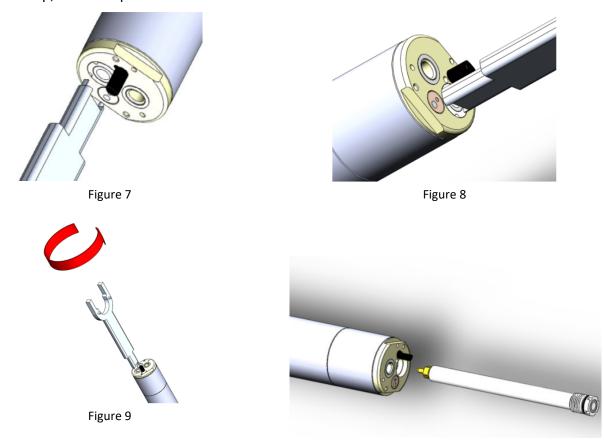
Figure 1: Exploded assembly - bottom view.

Figure 2: Exploded assembly - correct cleaning bead location.

7.3.1 pH Sensor Replacement

The pH sensor should be replaced every year for the best accuracy. Other than calibration, there is no maintenance required for this sensor. It does not require wet storage when removed from service.

- 1. Use the LENS repair tool (included in the kit) and insert the prongs into the recess in the pH sensor (Figure 7 & 8).
- 2. Rotate the sensor counterclockwise (CCW) to unthread the probe from the sensor body (Figure 9).
- 3. Remove the old pH sensor and replace it with the new pH sensor (Figure 10).
- 4. Upon startup, reset the pH default value.



7.4 Five Year Maintenance

Figure 10

It is recommended to return the sensor to the factory to perform a five year rebuild of the sensor to replace the internal motor assembly, worn parts and perform any factory calibrations required.

7.5 Replacement Parts

PART NUMBER	DESCRIPTION	<u>USED ON</u>
3-210-02042	PH SENSOR REPLACEMENT KIT	WET TAP OR IMMERSION
3-210-02043	WEAR PART REPLACEMENT KIT	WET TAP OR IMMERSION
2-210-15018	LENS WET TAP REPLACEMENT O-RING KIT	WET TAP ONLY

8. TROUBLE SHOOTING

PROBLEM	POSSIBLE ISSUE	HOW TO CORRECT
	NO POWER IS BEING SUPPLIED TO THE PANEL	CORRECT POWER BEING SUPPLIED TO PANEL
PANEL NOT POWERED	WRONG VOTLAGE BRING SUPPLIED TO PANEL	
	POWER FEED BREAKER IS TRIPPED	RESET BREAKER
	INCORRECT SENSOR WIRING	CORRECT SENSOR WIRING
	INCORRECT SENSOR TYPE	REPLACE WITH CORRECT SENSOR TYPE, CORRECT WIRING FOR SENSOR TYPE
AUXILIARY ANALOG SENSOR NOT REGISTER-ING ON PLC	INCORRECT VOLTAGE FOR SENSOR	REPLACE WITH CORRECT SENSOR TYPE, CORRECT WIRING FOR SENSOR TYPE
	SENSOR WIRED TO INCORRECT CHANNEL INPUT	CORRECT SENSOR WIRING
	LOW VOLTAGE POWER NOT BEING SUPPLIED FROM PANEL	RESET BREAKER, REPLACE POWER SUPPLY
	INCORRECT SENSOR WIRING	CORRECT SENSOR WIRING
DISCRETE SENSOR NOT REGISTERING ON	INCORRECT SENSOR TYPE	REPLACE SENSOR WITH CORRECT TYPE (NO/NC), CORRECT SENSOR WIRING
PLC	SENSOR WIRED TO INCORRECT CHANNEL INPUT	CORRECT SENSOR WIRING
	LOW VOLTAGE POWER NOT BEING SUPPLIED FROM PANEL	RESET BREAKER, REPLACE POWER SUPPLY
	BAD OR FAILED RELAY	REPLACE RELAY
OUTPUT NOT ACTIVATED		RELAY USED FOR INCORRECT APPLICATION (INDUCTIVE LOAD)
	OUTPUT NOT CONFIGURED IN PLC	CONFIGURE OUTPUT SETTINGS IN PLC
	INCORRECT PORT USED FOR COMMUNICATION	CORRECT PORT BEING USED FOR COMMUNICATION
PANEL NOT COMMUNICATING OVER BUILD-	INCORRECT PROTOCOL USED FOR COMMUNICATION	CORRECT PROTOCOL BEING USED FOR COMMUNICA- TION, ORDER PROTOCOL CONVERTER
ING NETWORK	INCORRECT ADDRESS DATA ENTERED INTO PLC	CORRECT NETWORK ADDRESS DATA ENTERED INTO PLC
	INCORRECT POINTS BEING REFERENCED	CORRECT POINTS BEING REFERENCED, CONSULT INCLUDED POINTS MAP

Official Warranty

Water Control Corporation LENS System

Limited Warranty

Water Control Corporation warrants the monitoring system to be free of manufacturers defects for the lesser of 18 months from the date of delivery or 12 months from the date of startup. We will, at our discretion, repair or replace defective products. This warranty does not include any costs associated with removal of defective products, or installation of replacement products. All replacement parts will be provided FOB Ramsey, MN. This warranty is transferable.

DISCLAIMER OF IMPLIED WARRANTIES

Water Control Corporation makes no warranties except those expressly stated in this document. To the extent permitted by the laws of the applicable state, ALL WARRANTIES CONTAINED IN THIS DOCUMENT ARE EXPRESSLY IN LIEU OF, AND WATER CONTROL CORPORATION EXPRESSLY DISCLAIMS, ANY AND ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

WHAT IS NOT COVERED BY THESE WARRANTIES

- Replaceable or "sacrificial" parts, including (but not limited to) wear ring, cleaning beads, impellers, impeller bearings, temperature sensor, or pH probe.
- Conditions and damages resulting from any of the following:
 - Wear caused by unfavorable water conditions
 - Improper installation, delivery, or maintenance
 - Any repair, modification, alteration, or adjustment not authorized by the manufacturer or an authorized servicer
 - Misuse, abuse, accidents, or unreasonable use
 - Improper setting of any control
 - Incorrect electric current, voltage, or supply
 - Improper system storage
- Warranties are void if the original serial numbers have been removed, altered, or cannot be readily determined
- The cost of service or service call to:
 - Correct installation errors
 - Instruct the user on proper use of the product
 - Transport the product to the servicer
- Any costs associated with removal of defective products, or installation of replacement products.
- Consequential, special, or incidental damages sustained by any person as a result of the breach of these
 warranties. Some states do not allow the exclusion or limitation of consequential or incidental damages, so the
 above exclusion may not apply to you.