Instructions for Operation and Maintenance

AccUView LED Ex

Online UV Analyzer for Hazardous Environments

⚠ WARNING

Read this Manual BEFORE using this equipment.

Failure to read and follow all safety and use information can result in death, serious personal injury, property damage, or damage to the equipment.

Keep this Manual for future reference.

THINK SAFETY FIRST

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Table of Contents

1.0 Understanding Safety Information

This manual contains safety and use instructions that must be followed during the installation, commissioning, operation, care and maintenance and service of the AccUView LED Ex. All responsible personnel must read this manual prior to working with this instrument and should familiarize themselves with the following safety symbols, signals and pictorials.

This is a safety-alert symbol. The safety alert symbol is shown alone or used with a signal word (DANGER, WARNING, or CAUTION), a pictorial and/or a safety message to identify hazards.

When you see this symbol alone or with a signal word on your equipment or in this Manual, be alert to the potential for death or serious personal injury.

This symbol identifies hazards which, if not avoided, could result in death or serious injury.

This symbol identifies hazards which, if not avoided, could result in minor or moderate injury.

This symbol identifies practices, actions, or failure to act which could result in property damage or damage to the equipment.

This pictorial alerts you to the need to read the manual.

This pictorial alerts you to electricity, electrocution, and shock hazards.

This pictorial alerts you to electricity, electrocution, and shock hazards.

2.0 Introduction to the Unit

2.1 Overview

The AccUView LED Ex Online UV Analyzer has been specially designed for operation in hazardous atmospheres, meeting IECEx and ATEX ratings as stated in the specifications. The analyzer uses an IECEx approved purge/pressurization controller called the Air Sentinel™ III. This allows for the monitor to safely measure the UV transmittance or absorbance of process water online while in a hazardous environment, Zone 1.

2.2 Specifications

Measurement Range	0 – 100.0 %T 0 – 2.0 ABS
Repeatability	± 1.0 %T ± 0.002 ABS
Resolution	0.1 % T 0.0004 ABS
Accuracy	± 2.0 % T ± 0.008 ABS
Response Time	User selectable from 4 to 60 seconds
Path Length	21.5 mm
Display	Multi-Line Liquid Crystal Backlit Display
Analog Output	Powered loop isolator 4-20 mA, 600 Ω drive (either 4-20mA or Modbus can be used)
Communications Port	Bi-directional RS-485 with Modbus (either 4-20mA or Modbus can be used)
Maximum Water Pressure	1380 kPa (200 psi.) with integral pressure regulator
Flow Rate	100 ml/min. – 1.5 liter/min. (.026-.26 Gal/min) flow switch set for 150 ml/min.
Operating Temperature	0°C – 55°C (32°F – 131°F)
Wetted Materials	Nylon, Quartz, Silicone, Polypropylene, Stainless Steel, Polyethylene, NORYL®, Ryton, Fluorocarbon, PVC
Sample Temperature Range	0°C – 50°C (34°F – 122°F)
Power Supply	100– 240 VAC, 47 – 63 Hz, 90VA
Insulation Rating	Double Insulated, Pollution Degree 2, Overvoltage Category II
Environmental Conditions	IP55 Rated - The unit is intended for indoor use. Altitude up to 2000 meters Up to 95 % RH (non-condensing)
IECEx Hazloc Rating	Ex pxb IIC T4 Gb 0°C ≤ Ta ≤ 55°C Ex = Explosion protected pxb = Keeps dangerous atmosphere outside by overpressure, mandatory power off when pressure drops IIC = Gas group (classified as most dangerous gases) T4 = Temperature classification Gb = Zone 1 (gas) 0°C ≤ Ta ≤ 55°C = Ambient Temperature Range
IECEx File #	IEC Ex LC 19.0013X
Compressed Air Requirements	Water and oil-free, Particles <5u, ISA Grade Hydrocarbon Free. Full time clean dry air at 5.5 - 7 bar (80 - 101.5 PSI) @ 35 SLPM (1.2 SCFM) @ 20oC (68oF) Max
Regulatory Compliance And Certifications	DNV-GL, USCG, IASC UR E-10 REv 7, IECEx, ATEX, CE, UL 61010-1 (Ed. 3) and CAN/CSA C22.2 No. 61010-1-12 (R2017)
Shipping Weight	27.2 kg (60 lbs.)

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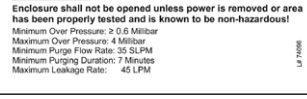
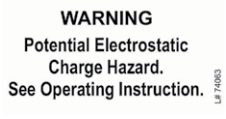
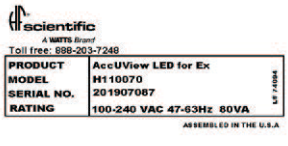
2.3 Unpacking and Inspection of the Analyzer

Remove all items from packing carton and carefully inspect to ensure that no visible damage has occurred during shipment and that all items listed below have been received. If the items received do not match the order, please contact your local distributer or the HF scientific Customer Service department.

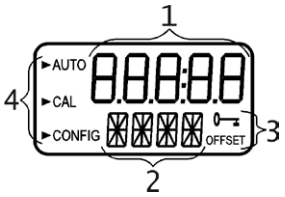
- AccuView LED Ex Analyzer
- Instruction Manual
- Quartz Cuvette with Ultrasonic Transducer (Single Pack)
- 100% T Calibration Standard

2.4 Instrument Labels

The following labels should be applied to the outside of the enclosure.

Purpose	Location	Label
Serial number, manufacturer, part number, power rating, CE & cLCus marking Conforms to: UL 61010-1 (Ed. 3) and CAN/CSA C22.2 No. 61010-1-12 (R2017)	Side of Unit	
Warning and Informational	Front of Unit	
Warning and Informational	Front of Unit	
Informational	Front of Unit	
Serial number, manufacturer, part number, power rating of AccUView LED for Ex	Side of AccUView LED for Ex Inside Enclosure	

2.5 Display



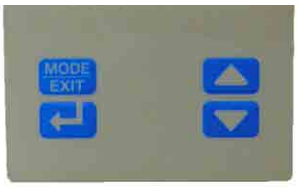
1 - Used for reporting the %T or ABS levels and provide user guidance to the customer.

2 - Used to communicate error messages, measurement scale and provide user guidance. All error messages will be added to a queue along with the units (%T).

3 - Icons used to indicate the use of access code and offset mode.

4 - Mode Arrows used to indicate the current operating mode; AUTO (normal operation), CAL (calibration) and CONFIG (configuration).

2.6 Touch Pad



The touchpad has 4 buttons: **MODE/ EXIT**, ↵ , ▲ and ▼. The **MODE/ EXIT** button is used to cycle between the three operational modes of the instrument: **CAL**, **CONFIG** and **AUTO** (Measurement) Mode. The ↵ button enters the option (or mode that is highlighted or chosen). The ▲ and ▼ buttons are used to change settings.

2.7 Vapor Purge

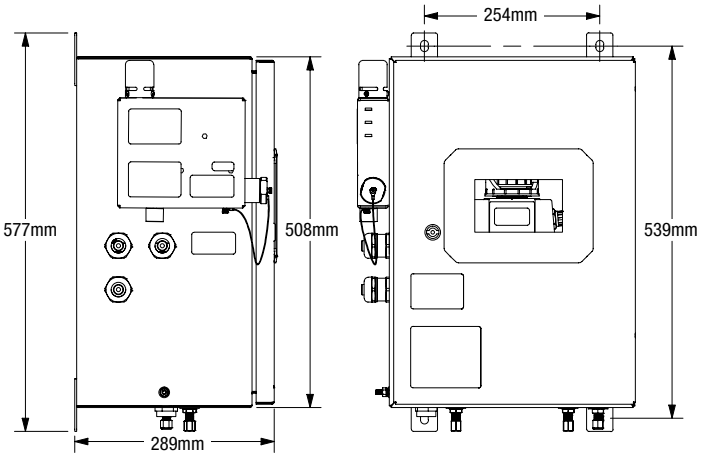
The AccUView LED Ex is equipped with a continuous vapor purge system. System heat is used to warm the air. A fan inside the instrument continuously circulates heated dry air around the optical well and the flow through cuvette. This feature eliminates the need for a dry purge line.

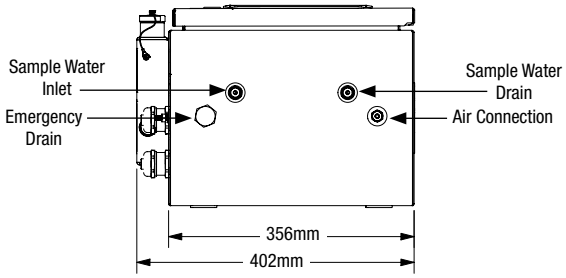
3.0 Installation

3.1 Site Selection and Mounting

The instrument is designed for wall mounting. The instrument should be mounted at eye level and be easily accessible for operation and service. Recommended mounting screws are M8 (5/16") fasteners for the instrument enclosure.

It is critical that the instrument be mounted as close as possible to the sampling point to ensure a quick response time (within 2 to 3 meters (6 to 10 feet) of the sampling point).





3.2 Air Sentinel™ III Controller

The AccUView LED Ex will not function without proper air purging of the enclosure. The Air Sentinel III Controller governs the power. See Electrical Connections section.

3.3 Air Dryer/Filter

For proper operation, dry clean air must be supplied to the AccUView LED Ex at pressures between 5.5 and 7 bar (80 to 101.5 PSI). The dryer comes with fittings suitable for use with 6mm tubing. If using the supplied fittings for installation, ensure that a proper thread sealant is used.

Air Dryer/Filter

3.4 Plumbing & Air Connections

3.4.1 Process Water Requirements

Required Head Pressure	6.9kPa (1 PSI)
Flow Requirements	100ml/min to 1.5 liter/min (0.026 to 0.26 Gal/min
Max Pressure Allowed by Pressure Regulator	1380kPa (200 PSI)
Allowable Fluid Temp	0°C - 50°C (34°F - 122°F)
Flow Switch Requirements (to prevent screen indication)	150 ml/min

3.4.2 Air Requirements

Required Air Pressure	5.5 to 7 bar (80-100 PSI)
Required Air Flow	35 l/min

The instrument is equipped to be plumbed using 6mm OD copper or stainless steel tubing for the sample water inlet, drain and air. The fittings are swagging type connections.

The emergency drain is not equipped for a connection.

3.4.3 Pressurized System

The AccUView LED Ex comes standard with a pressure regulator. The regulator is rated for use up to 1380 kPa (200 PSI) and will lower the pressure down to a pressure more suitable for use in the AccUView LED Ex. If inlet pressures can exceed 325 kPa (47 PSI) use appropriate tubing to connect to the AccUView LED Ex.

NOTICE

When using this instrument in potable water applications, the drain water from this instrument should NEVER be reintroduced back into the incoming water stream. This water MUST be directed to a convenient drain.

3.5 Electrical Connections

All of the electrical connections to the instrument are made at the DIN rail connector. The connections are labeled beside the terminal block and are self-descriptive. Please follow all local and government recommendations and methods for installation of electrical connections to and between the instrument and other peripheral devices.

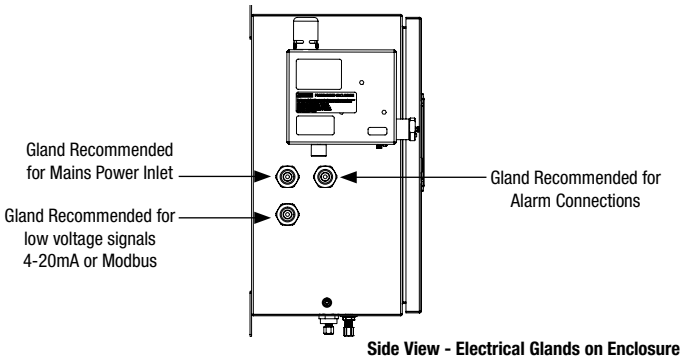
Plugs are inserted into the 4-20mA/RS-485 cable bulkheads when shipped to ensure a watertight seal. These plugs can be removed and discarded when connecting to either of these connections.

The power cable bulkhead will accept cable diameters from 5.8mm (.23") up to 10mm (.395"). All terminals are designed to accept wires in the range of 14 to 28 AWG. All wires should be stripped to a length of 6mm (.25"). A strain relief strap is provided to reduce tension on the power terminals.

It is the user's responsibility to ensure that the water and air tight seal is maintained after the connection has been wired for operation. If any of the glands are not tightened properly around a cable or plug, the ratings of the instrument will be jeopardized and there is a possibility of creating a shock hazard.

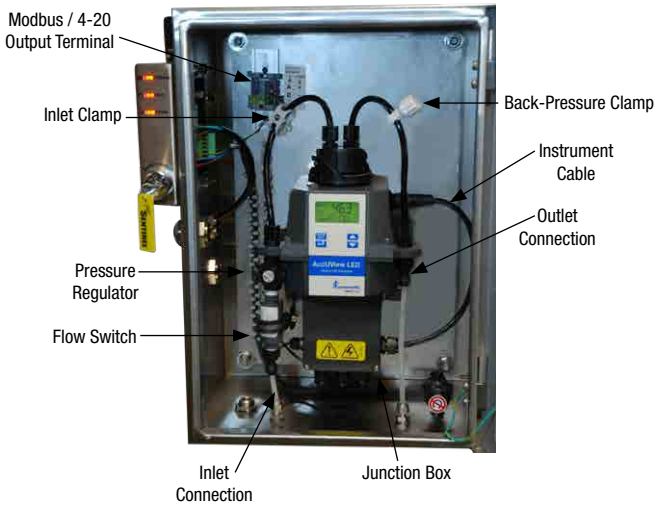
⚠ WARNING

Installation of this instrument involves line voltage that could endanger life. Only qualified electricians should perform installation of the instrument.



Side View - Electrical Glands on Enclosure

3.5.1 Power



⚠ WARNING

The instrument can accept 100-240 VAC, 47-63 Hz. Verify that the mains voltage falls within these specifications.

It is recommended that a circuit breaker be placed in a safe area prior to the power connection to allow for service. Mains connection should only be made to the Air Sentinel III. See Side View image above for gland selection. **The AccUView LED Ex is not supplied with a power cord.**

⚠ WARNING

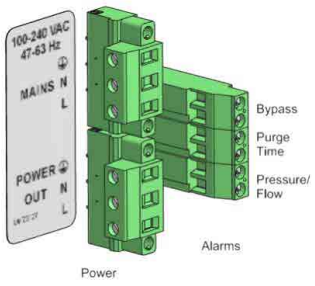
Only qualified electricians should be allowed to perform the installation of the instrument as it involves a line voltage that could endanger life.

The Air Sentinel III purge controller requires 100-240 VAC 47-63 Hz.

A circuit breaker must be placed prior to the power connection in close proximity and within easy reach to allow for service. This circuit breaker must be marked to indicate that it is a disconnecting means for the instrument. The rating of the circuit should be 5A.

Supply power connections are made ONLY to top “MAINS” connection on the back of the Air Sentinel III purge controller:

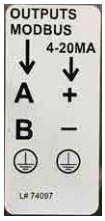
Terminal 3: Earth Ground
Terminal 2: Neutral
Terminal 1: Line or Hot



Suitable wire would be stranded, 3 conductors 18-12 AWG copper or tin plated copper with a voltage rating of 600 VAC with a temperature rating of 90°C or higher.

Common earth bond points are provided both inside the enclosure on the chassis and outside of the enclosure. This terminal set can be removed for easier connections. Please ensure this terminal set is properly tightened using the two side screws.

3.5.2 RS-485



The RS-485 Modbus or special protocol half-duplex (2-wire) digital interface operates with differential levels that are less susceptible to electrical interferences. This is why cable lengths up to 3000 feet can be implemented. The last device on each bus may require terminating with a 120-ohm resistor to eliminate signal reflection on the line. **DO NOT run RS-485 cables in the same conduit as power.**

For ease of connecting, remove the plug-in DIN rail mount connector. Connections are labeled next to this connector.

NOTICE

To prevent damage to the instrument, ensure that power is disconnected prior to making connections.

3.5.3 4-20 mA

The 4-20 mA output is driven by a 15 VDC power source and can drive recorder loads up to 600 ohms. **Do not run 4-20 mA cables in the same conduit as power.** Operation of this output is covered in the Setting the 4-20 mA section. The outputs are equipped standard with an installed loop powered isolator (500V isolation).

For ease of connecting, remove the plug-in DIN rail mount connector. Polarity of the connections is labeled next to this connector.

NOTICE

To prevent damage to the instrument, ensure that power is disconnected prior to making connections.

4.0 Commissioning and Start-Up

1. Once all water, air and electrical connections have been made, turn on power to the Air Sentinel III.
2. The Air Sentinel III will run through an automatic seven-minute purge cycle.
3. Once the purge cycle is complete, power will then be supplied to the AccUView LED Ex.

If at any time there is a loss of pressurization in the electrical enclosure, the Air Sentinel III will remove power to the AccUView LED Ex.

4.1 Air Sentinel III LED Lamp Indicators

Lamp Color Matrix	Operation	Power to AccUView LED Ex	Condition
All Lamps GREEN	Safe Operation	ON	Normal Operation
Timer Lamp RED	Instrument is Purging	OFF	If pressure lamp is green, the instrument is purging.
Pressure Lamp RED	Unsafe Operation, Low Pressure	OFF	Insufficient Air Pressure
By Pass Lamp RED	Unsafe Operation	ON	By-Pass key enabled
NO lamps	No power out applied	OFF	No power applied to Air Sentinel III

The AccUView LED Ex is ready for operation when the Air Sentinel III displays all green LED lamps.

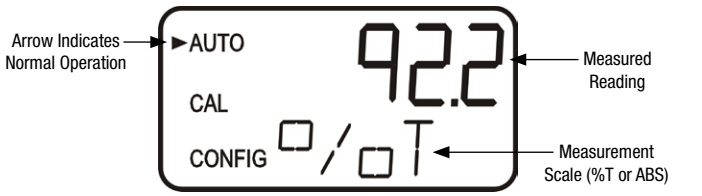
⚠ WARNING

A by-pass key is provided for operating the AccUView LED Ex with the enclosure open. This is an unsafe operating condition. It is very important that the operator checks the operating atmosphere and determines that it is safe, before opening the enclosure. This is intended as a temporary operating condition.

Do not operate the Air Sentinel for long periods of time in the bypass mode. This is intended only for maintenance operations.

Do not operate the Air Sentinel in bypass mode unattended.

4.2 Measurements



Screen Display - Normal Operation

This process monitor allows for the measurement of the transmittance of process water online. Process water is usually reported in %T. Readings above 102 %T are indicated by a flashing display. Readings above 100 %T indicate that the current sample is better than the calibration water. Readings above 110 %T are not possible. All readings are path length corrected to 10mm.

Measurements can also be taken in Absorbance. Negative Absorbance readings indicate the need for a calibration or that the water tested is better than what the instrument was calibrated to. These readings show ABS on the lower line of the display. All readings are path length corrected to 10mm.

4.3 Warm-Up

The AccUView LED Ex requires a 30 minute warm-up period. To improve the accuracy, allow the AccUView LED Ex to complete warm-up time before calibrating. During the warm-up period, the display may flash, indicating that it has detected a temperature change. This is normal operation during the warm-up period.

NOTICE

A flashing display may occur after warm-up. This is an indication that either the ambient or water temperature has changed rapidly. During this time, the readings may be slightly out of the specified accuracy. The AccUView LED Ex will automatically compensate as soon as the rate of temperature change slows.

4.4 Routine Measurement

1. Apply power to the instrument and allow the unit an initial warm up of 30 minutes.
2. When a continuous process stream is flowing through the instrument, the instrument will display the measured %T or ABS level of the sample on the LCD screen. In addition, the equivalent signal is provided on the analog (4-20 mA) output or the digital output, depending on the options selected.

4.5 Initial Operation

Be sure that the cuvette is tightly installed on the flow through unit prior to introducing water to the unit. The cuvettes are pressure checked at the factory but could have loosened during shipping.

The instrument is factory calibrated. However, for the best accuracy, the flow through cuvette should be locked in place and calibration should be done with DI water. Refer to next section for complete calibration instructions.

5.0 Instrument Calibration

⚠ WARNING

To perform calibration, the enclosure door needs to be opened. Therefore, calibration should only be performed when the atmosphere is known to be safe.

The instrument is calibrated and tested prior to leaving the factory. While it is possible to use the instrument directly out of the box, but for the most accurate measurements, calibration is recommended before initial use. Under normal conditions, recalibration is recommended at least once a month. To get the greatest accuracy, calibrating once a week may be necessary.

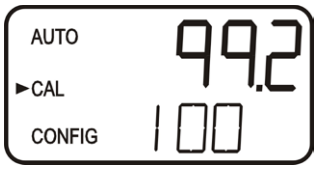
The two cuvettes supplied with the instrument may be exchanged with one another. One cuvette should always be kept clean for replacement when calibrating.

The instrument is designed to store the last reading prior to calibrating. The 4-20 mA is held at this stored reading and will not change until calibration is complete. 30 seconds after completion of the calibration the AccUView LED Ex will start taking online measurements. These measurements will be averaged with the stored reading (depending on setting). In order to prevent disruptions in data, the operator should release the clamp to allow the sample water to flush out the calibration water as soon as calibration is complete.

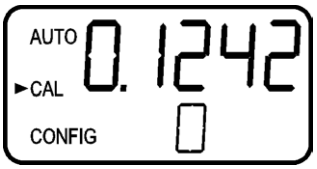
While in calibration mode, the instrument has a time-out feature that automatically returns the system operation to the AUTO mode after a 15-minute period of inactivity.

5.1 Calibration

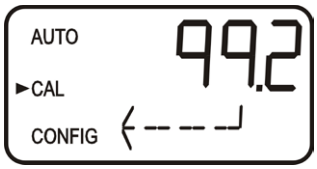
1. Press the **MODE/EXIT** one time to enter calibration mode. The arrow besides **CAL** will be illuminated. The lower display will show alternating ↵ with either **100** (indicating that 100%T standard is selected) or **0** (indicating that 0.000ABS standard is selected). Once entering calibration mode, the last reading is stored and the equivalent reading is being output on the 4-20 mA signal. This output will be held after the instrument returns to **AUTO**, allowing time for the flow to be restarted.

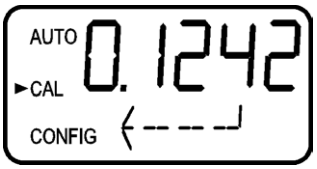


Screen Display - Calibration Menu (100% T)



Screen Display - Calibration Menu (0.000ABS)





2. Using the shutoff clamp, close off the flow of water.
3. Remove the flow through cuvette and retain for future use.
4. Fill the second clean cuvette with 100% T calibration fluid and reinstall the filled cuvette tightly on the flow through unit.
5. Wipe flow through unit dry, install and lock in place.
6. Press the ↵ button to start the calibration.
7. The upper display will count down the progress of the calibration step. The instrument will return to **AUTO** mode at the end of the calibration.
8. Release the shutoff clamp to restore sample flow. **DO NOT move or remove flow through cuvette after calibrating.**

The last reading before calibration may be displayed for at least 30 seconds after completing calibration. The length of time it takes to show the current reading will depend on the response time and lamp duty cycle settings.

There is no need to recalibrate when changing ranges from %T to ABS or reverse.

⚠ CAUTION

The UV lamp is very low power but it is recommended to avoid looking directly into the optical well while the flow through unit is removed.

5.2 Calibration Error

If this screen is displayed after calibration is complete, the internal diagnostics have determined that the calibration fluid or the flow through cuvette requires replacement. Check the calibration fluid and cuvette and then recalibrate or restore the factory calibration. The instrument cannot be used without performing one of these operations. See Restoring Factory Settings section for more information.

Screen Display - Calibration Error

To recalibrate, press the **MODE** key and start the calibration sequence again.

6.0 Restore Factory Settings

If the instrument is unable to perform a calibration due to a low lamp output, bad calibration standard or a dirty cuvette, the instrument will display **CAL** and **Err** on the display. If the problem is determined to be a poor calibration or low lamp, fix the problem and recalibrate. If the problem cannot be determined, the instrument must be restored to the factory calibration and configuration settings.

To restore factory settings:

1. Push and hold the ▲ button.
2. Push and release the ↵ button and then release the ▲ button.

The instrument has now been restored to it's original factory settings.

NOTICE

Restoring the factory settings allows the use of the AccUView LED Ex with reduced accuracy. The original problem still exists and must be determined and corrected before accurate operation of the AccUView LED Ex will be resumed. The AccUView LED Ex will always reset to %T and factory defaults after restoring.

7.0 Instrument Configuration (CONFIG Mode)

The instrument has the ability to be customized at any time during operation. **CONFIG** Mode has been split into sub-menus to facilitate instrument configuration. While in Configuration Mode, the instrument has a time-out feature that automatically returns the system operation to **AUTO** mode after a 15 minute period.

To enter **CONFIG** Mode:

1. Press the **MODE/EXIT** button until the arrow next to **CONFIG** is illuminated.
2. Press the ↵ button. You are now in **CONFIG** Mode.
3. To exit **CONFIG** Mode, press the **MODE/EXIT** button.

7.1 Selecting the Output (O/P)

The first configuration sub-menu is the O/P. The O/P options are:

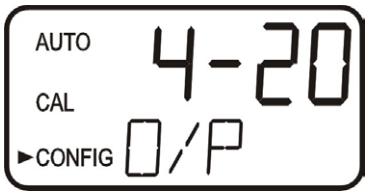
- **4-20** for the 4-20 mA output
- **485** for the RS-485 and modbus
- **OFF** if no outputs are required

1. Using the ▲ and ▼ buttons, select the desired output.
2. Once the desired output has been selected, press the ↵ button to set it.

The next prompts will depend on the output selected. For RS-485 and Modbus, certain combinations of settings are not allowed and some menus will not appear based on previous selections.

7.2 Setting the 4-20 mA

If the 4-20 mA output was selected, you will be asked to set the 4mA (**4MA**) and 20mA (**20MA**) %T or ABS limit levels.



Screen Display - Setting the 4-20 mA limits

1. Select the %T or ABS level you wish to assign to the **4MA** setting using the ▲ and ▼ buttons. The factory setting is 90%T or 0 for ABS.
2. Once the desired level has been selected, press the ↵ button to set it.

The 4MA level cannot be set higher than the 20 MA level.

3. Select the %T or ABS level you wish to assign to the **20MA** setting using the ▲ and ▼ buttons. The factory default setting is 100%T or 2 for ABS.
4. Once the desired level has been selected, press the ↵ button to set it.

The 20MA level cannot be set lower than the 4MA level.

7.3 Setting the Error Level

Screen Display - Setting the Error Level

In case of an error in the AccUView LED Ex, the 4-20 mA reading can be used to indicate a problem by sending the output to either:

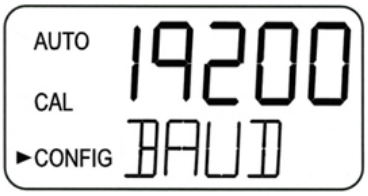
- 4.00 mA
- 2.00 mA
- 0 mA
- OFF - In the case of OFF, the 4-20mA is unaffected by any error condition. OFF is the factory default setting.

1. Select the desired **ERLV** using the ▲ and ▼ buttons.
2. Once the desired level is selected, press the ↵ button to set it.

7.4 Configuring the RS-485 Port

If the instrument is wired for this option and the I/O selection is changed to **485**, prompts will appear for setting the baud rate and the address.

7.5 Setting the Baud Rate



Screen Display - Setting the Baud Rate

1. Select the desired baud rate (1200, 2400, 4800, 9600 or 19200) for operation of the I/O using the ▲ and ▼ buttons. Factory setting is 19200 baud.
2. Once the desired baud rate is selected, press the ↵ button to set it.

7.6 Setting the Address

The last selection is the address. The address is important when multiple instruments are wired on a single string. Each instrument MUST have a unique address. The factory default is Address 1.

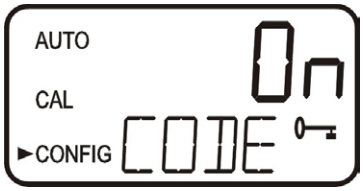
Screen Display - Setting the Address

1. Select the desired instrument address using the ▲ and ▼ buttons.
2. Once the instrument address is selected, press the ↵ button to set it.

7.7 Modbus Mode

To enable the Modbus mode, select **ASCII** or **RTU**. For more information, refer to the Modbus section later in this manual.

7.8 Security Access Feature

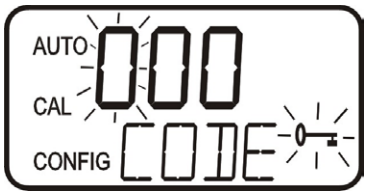


Screen Display - Security Access On

The instrument is equipped with a security access feature that can be activated in Configuration Mode. If this option is turned on, the user is required to enter the access code into the instrument to get to any mode other than **AUTO**. The security code is 333 and may not be changed.

If the security feature is enabled, the screen shown below will appear when the **MODE/EXIT** button is pressed.

The security code (333) must be entered to gain access to **CAL** or **CONFIG** menus. Flashing digit indicates that is the number to be entered.



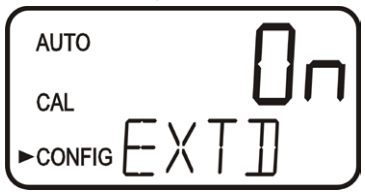
Screen Display - Security Access Enabled

1. Use the ▲ or ▼ buttons to select the first of the three numbers in the code.
2. Press the ↵ button to set the first number.
3. Repeat steps 1 and 2 for the remaining two numbers in the code.

If the valid access code has been entered, the instrument will switch to Calibration Mode (**CAL**). If the configuration mode (**CONFIG)** is needed, push the **MODE/EXIT** button one more time.

If the wrong access code is entered, the instrument will return to the **AUTO** mode.

7.9 Extended Settings

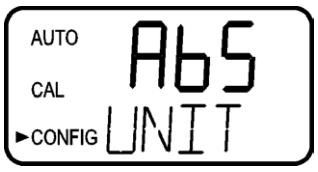


Screen Display - Extended Settings

The last few settings are grouped together to prevent them being unintentionally changed. To gain access to the extended settings:

1. Use the ▲ and ▼ buttons to select ON.
2. Press the ↵ button to enter the extended settings menu.

7.9.1 Units



Screen Display - Units

This instrument can measure in either ABS or %T. This selection affects menus prior to the Extended Settings menu.

1. Use the ▲ and ▼ buttons to select the desired unit of measurement.
2. Once the desired unit of measurement is selected, press the ↵ button to set it.

7.9.2 Speed of Response

Screen Display - Response Time

The speed of response for both displayed and output values can be adjusted. There are 10 response speed options; the factory default is 3. The response is simply an average of the previous readings combined with the current reading. If the setting is 1, only the current reading is displayed. If the setting is 10, the last 9 readings are averaged with the current reading.

1. Use the ▲ and ▼ buttons to select the desired speed of response.
2. Once the desired speed of response has been selected, press the ↵ button to set it.

7.9.3 LCD Backlight Brightness

Screen Display - LCD Brightness

The backlit LCD allows for easier readability of the LCD display in low light or no light conditions. The backlight is intended for continuous operation.

The LCD backlight brightness has 10 brightness levels available; the factory brightness level is 8.

1. Use the ▲ and ▼ buttons to select the desired brightness.
2. Once the desired brightness is selected, press the ↵ button to set it.

7.9.4 Ultrasonic Cleaning

This option is used to continuously clean the flow through cuvette. It is not intended to clean cuvettes that are already dirty or replace manual cleaning entirely. The system will increase the time between cleanings dramatically. Please note that the system requires the use of a special cuvette. This cuvette must be used for the system to operate correctly.

The system works by sending an ultrasonic frequency through spring connections into a piezo transducer bonded to the bottom of a flow through cuvette. The ultrasonic frequency generated by the cleaning system is virtually not detectable at 1 meter distance with the enclosure door open or closed.

The system can detect that an incorrect cuvette is installed, an error has occurred in the transducer or the transducer is not making contact with the spring connections. This error is indicated by **CLN** on the screen. Since this is an error condition, the 4-20mA will be affected based on the set error level.

After installing a flow through cuvette, there will be a 30-minute period where the ultrasonic circuit will not operate to allow the vapor purge system to remove all moisture from the ultrasonic transducer.

Even with the above drying system, it is still recommended that ultrasonic cuvettes be dried by hand, including the transducer on the bottom, prior to use.

Ultrasonic cleaning has the option to be turned **OFF**. The default setting is **On**.

Screen Display - Ultrasonic Cleaning

1. Use the ▲ and ▼ buttons to select the desired cleaning option.
2. Once the desired cleaning option is selected, press the ↵ button to set it.

7.9.5 RS-485 Parameter - Bits

Screen Display - RS-485 Bits

This is the first of three menus to setup the RS-485 parameters. These menus will only appear if the RS-485 mode is selected. There are 2 options, 7 or 8 bits; the factory default is 8 bits.

1. Use the ▲ and ▼ buttons to select the desired bits selection.
2. Once the desired option has been selected, press the ↵ button to set it.

Screen Display - RS-485 Parity

7.9.6 RS-485 Parameter - Parity

There are 3 parity options in this menu. Those options are No Parity (**nOnE**), odd parity (**Odd**) or even parity (**E**); the factory default is no parity.

1. Use the ▲ and ▼ buttons to select the desired parity option.
2. Once the desired option is selected, press the ↵ button to set it.

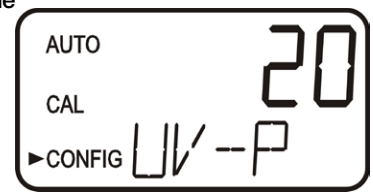
7.9.7 RS-485 Parameter - Stop Bits

Screen Display - RS-485 Stop Bits

There are 2 options for this menu, 1 stop bit or 2 stop bits; the factory default is 1 stop bit.

1. Use the ▲ and ▼ buttons to select the desired stop bit setting.
2. Once the desired option has been selected, press the ↵ button to set it.

7.9.8 Duty Cycle



Screen Display - Duty Cycle

The duty cycle determines how often the LED turns on and updates the reading. The LED will operate for 1 second each time to obtain readings. The duty cycle can be set from 4 to 60 seconds; the factory default is 6 seconds. This setting also affects the life of the LED. With the duty cycle set to 4 seconds, the life of the LED is about 4 years. The factory default setting of 6 seconds will theoretically extend the LED life to over 5 years. The 60 second setting theoretically extends the life of the LED to about 14 years, but will delay all updates.

1. Use the ▲ and ▼ buttons to select the desired number of seconds for the duty cycle.
2. Once the desired number of seconds has been selected, press the ↵ button to set it.

7.9.9 Desiccant Warning

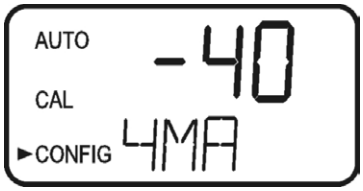
Screen Display - Desiccant Warning

The AccUView LED Ex is equipped with a humidity detector to monitor the internal environment. Once the relative humidity reaches 34%, the instrument will display **DESC** as a warning. Note that condensation has the potential to form when the relative humidity reaches 19%.

The default setting is **OFF**, which means it will only display **DESC** on the screen. Turning the setting to **ON** will affect the 4-20mA signal based on the set error level as well as display the **DESC** warning on the screen. Refer to Setting the Error Level section earlier in the manual.

1. Use the ▲ and ▼ buttons to select the desired option.
2. Once the desired option is selected, press the ↵ button to set it.

7.9.10 4mA Adjustment

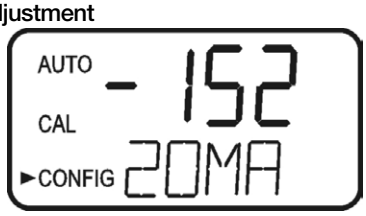


Screen Display - 4mA Adjustment

If the 4-20mA setting is turned ON (see section Setting the 4-20mA Output for more information) the following menu along with the 20mA Adjustment menu will appear. The first menu outputs a constant 4mA while allowing for a small amount of adjustment. This allows the operator to make the AccUView LED Ex align with a PLC or SCADA system. The adjustment limits are ±200 counts or about ±0.2mA. This setting will differ slightly on each instrument, as each AccUView LED Ex will be factory set to 4.00mA.

1. Use the ▲ and ▼ buttons to select the desired adjustment for the 4mA adjustment setting.
2. Once the desired adjustment has been selected, press the ↵ button to set it and move on to the 20mA Adjustment menu.

7.9.11 20mA Adjustment



Screen Display - 20mA Adjustment

This menu operates in the same way as the 4mA menu. This menu outputs a constant 20mA while allowing for a small amount of adjustment. This setting will be slightly different on each instrument, as each AccUView LED Ex will be factory set to 20.00mA.

1. Use the ▲ and ▼ buttons to select the desired adjustment for the 20mA adjustment setting.
2. Once the desired adjustment has been selected, press the ↵ button to set it.

7.9.12 Saving Configuration Settings

If the extended settings are set to **OFF**, pressing the ↵ button will save all settings and the AccUView LED Ex will automatically return to the normal **AUTO** mode of the instrument.

If extended settings are set to **On**, after the last menu of the extended settings, pressing the ↵ button will save all settings and the AccUView LED Ex will automatically return to the normal **AUTO** mode of the instrument.

The CONFIG menu may be used at any time to reset or change any of the parameters. The CONFIG menu may be exited at any point in the menu by using the MODE/EXIT key. Any features that have been modified will be saved.

While operating in CONFIG mode, the reading before entering that mode is held.

8.0 Flow Switch

The AccUView LED Ex comes standard with a flow switch installed. There is an additional menu in the configuration which gives you the selection of ON or OFF.

If “Low Flow” is enabled, a flow of less than 150ml/minute (.04 GPM) will cause a screen indication. The flow switch can act on the 4-20mA. A “Low Flow” will affect the 4-20mA signal based on the set error level. A modbus register is also set. The condition takes 2-1/2 minutes of low flow to actuate or restore.

9.0 Modbus Communication

The AccUView LED Ex uses a communication protocol called Modbus. A company, called Modicon, developed the Modbus protocol for use with their programmable controllers. Since that time, Modbus has evolved into a common communication protocol in the industry.

The communication method involves using a master-slave technique, in which there is one master and several slaves. The AccUView LED is a slave device. Only the master can initiate queries. These queries are directed to an individual slave device and the appropriate slave responds with the requested data.

A broadcast message can be sent to all slaves. The slave devices do not answer these broadcasts.

There are two transmission modes. These modes are known as RTU (Remote Terminal Unit) and ASCII (American Standard Code for Information Interchange).

The AccUView LED can be setup in a network of up to 255 slave devices. Each device must have a different address (1-255). The instrument can be set for either RTU or ASCII mode.

9.1 Modbus RS-485 Output & Commands

9.1.1 Coils

These single-bit values are readable and changeable from the master. The data will be returned with the lowest addressed coil in the LSB of the data. Unused bits in the data will be set to 0. True is a 1 and False is a 0.

9.1.2 Valid Commands

Code	Name	Broadcast
0x01	Read Coil Status	No
0x05	Force Single Coil	Yes

9.1.3 Format

16-bit word format

MSB															LSB
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

9.1.4 Valid Addresses

00001 - 00XXX

9.1.5 Definitions

Address	Function	Default
00002	Flow alarm selected	False
00003	Access code enabled	False
00004	Ultrasonic cleaning enabled (if available)	True
00005	Desiccant set as error (True) or warnings (False)	True

9.2 Input Status

These single-bit values are readable from the master. The data will be returned with the lowest address input status in the LSB of the data. Unused bits in the data will be set to 0.

9.2.1 Valid Commands

Code	Name	Broadcast
0x02	Read Input Status	No

9.2.2 Format

16-bit word format

MSB															LSB
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

9.2.3 Valid Addresses

10001 - 10XXX

9.2.4 Definitions

Address	Function
10001	Instrument error
10003	Heater stable at set point
10004	Calibration error
10005	Desiccant error

9.3 Holding Registers

These 16-bit values are readable and changeable from the master. The data is stored and transmitted with the MSB first and then the LSB.

9.3.1 Valid Commands

Code	Name	Broadcast
0x03	Read Holding Registers	No
0x06	Preset Single Register	Yes
0x16	Preset Multiple Registers	Yes

9.3.2 Format

Float - stored in two consecutive addresses with the first address containing the least significant word (lower part of mantissa) and the second address containing the most significant word (sign, exponent and upper part of mantissa).

9.3.3 Valid Addresses

40001 - 40XXX

9.3.4 Definitions

Address	Type	Register	Value	Default	Function
40001, 40002	Float	Cuvette Path Length	--	2.15	0.2 - 4.0
40003	Int	Decimal places	0	2	XXXXX.
			1		XXXX.X
			2		XXX.XX
			3		XX.XXX
			4		X.XXXX
40004	Int	Response time (Averaging)	--	3	1 - 10 readings
40005	Int	LCD backlight	--	8	1 - 10 (brightest)
40006	Int	Output option	0	0	None
			1		4-20 mA
			2		RS-485 (if available)
40007, 40008	Float	4-20 mA minimum value	--	0.02	0.0 to max range of instrument
40009, 40010	Float	4-20 mA maximum value	--	10.0	0.0 to max range of instrument
40011	Int	RS-485 baud rate	0	3	1,200
			1		2,400
			2		4,800
			3		9,600
			4		19,200
40012	Int	RS-485	0		7
			1	1	8
40013	Int	RS-485 Parity	0	0	None
			1		Even
			2		Odd
40014	Int	RS-485 Stop Bits	1		1 stop bit
			2	1	2 stop bit
40015	Int	Instrument address	--	1	1 - 255
40016	Int	Modbus serial mode	0	0	RTU
			1		ASCII
40028	Int	LED Lamp Current	--	40	2 - 40

9.4 Input Registers

These 16-bit values are readable by the master. The data is stored with the MSB first and then the LSB.

9.4.1 Valid Commands

Code	Name	Broadcast
0x04	Read Input Registers	No

9.4.2 Format

Float - stored in two consecutive addresses with the first address containing the least significant word (lower part of mantissa) and the second address containing the most significant word (sign, exponent and upper part of mantissa).

9.4.3 Valid Addresses

30001 - 30XXX

9.4.4 Definitions

Address	Type	Register	Value	Function
30001, 30002	Float	Sensor reading	--	The meter reading
30003, 30004	Float	Sensor reading raw	--	Sensor reading to six significant places
30005	Int	Version major	--	Software version major number
30006	Int	Version minor	--	Software version minor number
30007	Int	Version revision	--	Software version revision number
30008	Int	Model number	--	Product number
30009	Int	Model suffix number	--	0 if no options
30010	Int	Reading status	1	Normal
			2	Over range
			3	Under range
			6	Reading problem
30011	Int	Instrument error summary (bit-mapped)	0x0000	Normal
			0x0001	Error
			0x0008	Calibration error
30012	Int	Errors (bit-mapped)	0x0000	Normal
			0x0001	Desiccant Warning
			0x0002	Break in the 4-20 mA
			0x0004	Calibration error
			0x0010	Data over-range
			0x0020	Flow switch alarm
			0x0040	Lamp problem
			0x0080	Auto-cleaning problem
			0x0100	General error
			0x0200	General error
			0x0400	General error
30013	Int	PCB revision	0	Revision 1
			1	Revision 2

9.5 Exception Responses Implemented

Code	Name	Meaning
00	--	No Error
01	Illegal function	The function code is not allowed in the device.
02	Illegal Data Address	The data address is not allowed in the device.
03	Illegal Data Value	A value contained in the query field is wrong for the device.

10.0 Routine Maintenance

⚠ WARNING

Specific condition of use: Parts of the enclosure are non-conducting and exceed the maximum permissible resistance according to the IEC 60079-0. Therefore, to avoid electrostatic charge build-up, it must not be rubbed or cleaned with solvents or a dry cloth when installed/used within a potentially explosive atmosphere.

10.1 Cleaning the Flow Through Cuvette

Measurement cuvettes used for the flow through should be clean and free of marks or scratches. The interior and exterior of the cuvette can be cleaned with a detergent solution and then rinsed several times with distilled or de-ionized water.

To replace the cuvette:

1. Shut off the flow using the provided shutoff clamp.
2. Unscrew the old cuvette and replace with a fresh, clean cuvette.
3. Recalibration is required for accurate operation.

NOTICE

Ensure the cuvette is tightened to the flow through assembly before each operation. After replacing a cuvette, it is recommended that the water be run with the flow through not installed to allow for inspection of the seal.

10.2 Replacing the Source LED

The life of the UV source lamp in the AccUView LED Ex is dependent on the setting of the Duty Cycle and operating conditions. See section on Duty Cycle for more information on the LED life.

When the UV source LED requires replacement, it is required to open the enclosure. Contact the HF scientific Customer Service department before servicing or to purchase a service module.

11.0 Troubleshooting

11.1 AccUView LED Ex Fault Detection

The AccUView LED Ex performs continuous diagnostic monitoring. There are 3 levels of fault detection: warnings, errors and failures. Any faults are displayed in a queue form in the bottom row of the display.

A warning is a screen indication of a problem.

An error indicates a fault or a problem that can usually be corrected by the operator. During an Error, the 4-20mA output will be affected based on the set error level. If an error occurs, the instrument will still display readings and warnings, however the accuracy is unknown and the readings should not be trusted.

A failure is a system fault. This is NOT a problem the operator can correct and the unit must be returned to the factory for service. If a failure occurs, the instrument will not function properly. The 4-20mA output will be affected based on the set error level.

Type of Fault	Display Reading	Possible Cause	Solution
Failure	**FAIL**	Major system failure.	Contact HF scientific Technical Service or Customer Service Department.
Warning	Flashing %T or ABS reading	Reading may be above 102%T.	Recalibrate the instrument.
		Water temperature changed rapidly.	Allow water temperature to stabilize.
Error	**LAMP**	LED Failed	Replace lamp. Refer to Replacing the Source LED section.
Error	**MA**	4-20 mA loop open	Check wiring. See Setting the 4-20mA section.
Error	**CAL Err**	100%T or 0 ABS calibration failure.	Replace the flow through cuvette. Replace the calibration fluid.
Error	**TECO**	Temperature Compensation Calibration failed.	Contact HF scientific Technical Service or Customer Service Department.
Error	**DESC**	Humidity is higher than the set point.	Check air supply.
Error	**FLOW**	Sample flow has stopped.	Restore flow.
Error	**CLN**	The ultrasonic transducer is not making contact with the spring connections.	Adjust the cuvette to be sure it is making contact with the springs connections.
		The flow through has been removed.	Put the flow through back in place.

For questions or concerns, please contact HF scientific Technical Service or Customer Service Department.

11.2 Readings - Troubleshooting

Symptom	Possible Cause	Solution
Readings are lower than expected.	Bubbles in the solution.	Ensure that the drain vent is open and not obstructed. Apply back-pressure using the back-pressure clamp. For severe cases of bubbles, a stilling chamber is available (Part #20106).
	Condensate or leaky cuvette.	Check flow through cuvette for condensate or leaks.
	Flow through cuvette.	Clean cuvette as described in the Maintenance section.
	Instrument out of calibration.	Recalibrate the instrument as described in the Instrument Calibration section.
Readings are erratic.	Bubbles in the solution.	See above solution.
	Debris in flow through.	Clean debris from the cuvette.

If you need assistance regarding this instrument, please contact the HF scientific Technical Service or Customer Service Department.

12.0 Accessories and Replacement Parts List

Catalog Number	Accessory Description
19323	100%T Calibration Solution - 500ml
Contact Factory	Replacement Electronics Service Module
24232S	Replacement Quartz Cuvette with Ultrasonic Transducer
100125	Operation Manual, AccUView LED Ex
24306S	Replacement Pressure Regulator
28474	Replacement UV LED Assembly
21062	Tubing Kit (1-Shutoff Clamp, 1 Back-pressure valve, 2 connecting tubings with fittings for flow through assembly, drain vent)
28044	AccUView LED Ex Instrument
28161	Air Prep Kit with Dryer

To order any accessory or replacement parts, please contact HF scientific Customer Service Department.

Notes

13.0 Warranty

Watts Regulator Co. (the “Company”) warrants each ballast water market instrument product to be free from defects in material and workmanship under normal usage for a period of two (2) years from first use or three (3) years from date of the Company’s invoice from the original sale of the product, whichever occurs first. In the event of such defects within the warranty period, the Company will, at its option, replace or recondition the product without charge. Parts, which by their nature are normally required to be replaced periodically, consistent with normal maintenance, specifically reagents, desiccant, sensors, electrodes and fuses are excluded. Also excluded are accessories and supply type items.

Proof of purchase from the company (Company invoice or paid order confirmation) and/or first use (commissioning) must be provided when making a product warranty claim.

THE WARRANTY SET FORTH HEREIN IS GIVEN EXPRESSLY AND IS THE ONLY WARRANTY GIVEN BY THE COMPANY WITH RESPECT TO THE PRODUCT. THE COMPANY MAKES NO OTHER WARRANTIES, EXPRESSED OR IMPLIED. THE COMPANY HEREBY SPECIFICALLY DISCLAIMS ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OR MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

The remedy described in the first paragraph of this warranty shall constitute the sole and exclusive remedy for breach of warranty, and the Company shall not be responsible for any incidental, special or consequential damages, including without limitation, lost profits or the cost of repairing or replacing other property which is damaged if this product does not work properly, other costs resulting from labor charges, delays, vandalism, negligence, fouling caused by foreign material, damage from adverse water conditions, chemical, or any other circumstances over which the Company has no control. In addition, the Company shall not be responsible for any costs incidental to the Company’s warranty response efforts, including, without limitation, costs associated with the removal and replacement of systems, structures or other parts of facilities, de-installation, decontamination and re-installation of products, or transportation of products to and from the Company. This warranty shall be invalidated by any abuse, misuse, misapplication, improper installation or improper maintenance, alteration of the product, or use of any parts or accessories (including but not limited to reagents) not provided by the company.

Some states do not allow limitations on how long an implied warranty lasts, and some states do not allow the exclusion or limitation of incidental or consequential damages. Therefore the above limitations may not apply to you. This Limited Warranty gives you specific legal rights, and you may have other rights that vary from State to State. You should consult applicable state laws to determine your rights. **SO FAR AS IS CONSISTENT WITH APPLICABLE STATE LAW, ANY IMPLIED WARRANTIES THAT MAY NOT BE DISCLAIMED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO ONE YEAR FROM THE DATE OF ORIGINAL SHIPMENT.**

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