2020 ClearTrace
In-line Turbidity System

Code 5-0113-24V
Code 5-0113-110V
Preface

This instruction manual serves to explain the use of the LaMotte 2020 ClearTrace Inline Turbidity System and is written to cover as many applications as possible. Please do not hesitate to contact LaMotte or an authorized LaMotte representative with questions or concerns.

The information presented in this instruction manual is subject to change without notice as improvements are made, and does not represent any commitment whatsoever on the part of LaMotte.

LaMotte cannot accept any responsibility for damage or malfunction of the sensor due to improper use.

Contact Information
Mail: LaMotte Company • PO Box 329 • Chestertown, MD 21620
Phone: 800-344-3100 • 410-778-3100
Fax: 410-778-6394
Email: csr@lamotte.com
Website: www.lamotte.com
The LaMotte 2020 ClearTrace Turbidity System shall be installed and operated only in the manner specified. Only a skilled, trained or authorized person should carry out installation, setup and operation of the system.

Before using the system, make sure that it is connected as specified. Failure to do so may result in permanent damage to the system and its components.

Protection against electric shock will be achieved only by observance of the corresponding installation rules.
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preface</td>
<td>2</td>
</tr>
<tr>
<td>Contact Information</td>
<td>2</td>
</tr>
<tr>
<td>Safety Information</td>
<td>3</td>
</tr>
<tr>
<td>1. Introduction</td>
<td>5</td>
</tr>
<tr>
<td>1.1 General Information</td>
<td>5</td>
</tr>
<tr>
<td>1.2 Intended Use</td>
<td>6</td>
</tr>
<tr>
<td>1.3 Safety Instructions</td>
<td>6</td>
</tr>
<tr>
<td>1.4 Removal from Service/Correct Disposal</td>
<td>6</td>
</tr>
<tr>
<td>2. Product Description</td>
<td>7</td>
</tr>
<tr>
<td>2.1 Drinking Water Turbidity</td>
<td>7</td>
</tr>
<tr>
<td>2.2 Calibration Kits</td>
<td>7</td>
</tr>
<tr>
<td>2.3 Replacement Parts</td>
<td>8</td>
</tr>
<tr>
<td>3. Mounting, Wiring, and Plumbing</td>
<td>9</td>
</tr>
<tr>
<td>3.1 Mounting</td>
<td>9</td>
</tr>
<tr>
<td>3.2 Plumbing</td>
<td>10</td>
</tr>
<tr>
<td>3.3 Valve Position for Operation</td>
<td>10</td>
</tr>
<tr>
<td>3.4 Wiring For 24 VDC and 110VAC Power</td>
<td>11</td>
</tr>
<tr>
<td>3.5 Sample Chamber Details</td>
<td>14</td>
</tr>
<tr>
<td>4. Measure Screen Overview</td>
<td>15</td>
</tr>
<tr>
<td>5. Menu Structure</td>
<td>16</td>
</tr>
<tr>
<td>6. Calibration</td>
<td>19</td>
</tr>
<tr>
<td>6.1 Span Calibration</td>
<td>19</td>
</tr>
<tr>
<td>6.2 Zero Calibration</td>
<td>22</td>
</tr>
<tr>
<td>6.3 Temperature Calibration</td>
<td>24</td>
</tr>
<tr>
<td>7. Configuration</td>
<td>26</td>
</tr>
<tr>
<td>8. DataStick Comms Menu</td>
<td>27</td>
</tr>
<tr>
<td>9. Analog Output(s)</td>
<td>27</td>
</tr>
<tr>
<td>11. Help Menu</td>
<td>30</td>
</tr>
<tr>
<td>12. Reset AV 38</td>
<td>31</td>
</tr>
<tr>
<td>13. Performance Specifications</td>
<td>31</td>
</tr>
<tr>
<td>14. Limited Warranty</td>
<td>33</td>
</tr>
</tbody>
</table>
1. INTRODUCTION

1.1. General Information

Thank you for purchasing the LaMotte 2020 ClearTrace Inline Turbidity System.

The product is designed for continuous use in industrial process applications and complies with safety regulations currently in force. Improper use could lead to hazards for the user or a third-party, and/or adverse effects to the plant or other equipment.

LaMotte does not accept any liability for damage that may arise if information in this manual is not followed. Therefore, the operating instructions and specifications must be read and understood by all persons involved in installation and operation of this equipment.

This manual identifies safety instructions and additional information by means of the following symbols:

1. This symbol draws attention to safety instructions and warnings of potential danger, which if neglected, could result in injury to persons and/or damage to property.

2. This symbol identifies additional information and instructions, which if neglected, could lead to inefficient operation and possible loss of production.

It is recommended that this manual be made accessible to everyone who may need it as a reference.

Please contact LaMotte or an authorized LaMotte representative with any questions.
1.2. Intended use
The LaMotte 2020 ClearTrace Inline Turbidity System is used for continuous monitoring of low-range turbidity in drinking water applications. The system also measures water temperature. Data is reported through a local display and a scalable 4-20 milliamp current output.
Any other use, or use not mentioned here, that is incompatible with the technical specifications is deemed inappropriate. The operator is solely responsible for any damage arising from such use. Other prerequisites for appropriate use include:

- Observing the instructions, notes and requirements set out in this instruction manual.
- Observing all local safety regulations.
- Observing all warnings and cautions in the documentation regarding all products used in this measurement system, including the sensor, mounting hardware, AV38 electronics and cabling.
- Observing the prescribed environmental and operational conditions.
- Observing chemical compatibility with all wetted materials.

1.3. Safety Instructions
The Turbidity System should be installed and operated only by personnel familiar with the sensor and qualified for such work.
A defective Turbidity System should be returned to LaMotte for repair or replacement. Contact LaMotte to obtain a Return Material Authorization (RMA) number.
No modifications to the Turbidity System are allowed. The manufacturer/supplier accepts no responsibility for damage caused by unauthorized modifications. The risk is borne entirely by the user.

1.4. Removal from Service / Correct Disposal of the Turbidity System

Removal from Service
- Disconnect the cable wiring from the controller terminal block.
- Remove the Turbidity System from the mounting hardware.

Correct Disposal of Unit
- When the Turbidity System is taken out of service, observe the local environmental regulations for correct disposal.
2. PRODUCT DESCRIPTION

2.1 Drinking Water Turbidity

The LaMotte 2020 ClearTrace Inline Turbidity System continuously monitors low-range turbidity and temperature in drinking water applications.

In the standard system configuration, data is reported through a local display and a scalable 4–20 milliamp current output. All functions can be accessed through a digital network with or without the local display interface.

The Turbidity System uses a pre-calibrated turbidity probe mounted in a DataStick and attached to a sample chamber specifically designed to prepare water for low-range turbidity measurements. The chamber removes bubbles from the water sample so that solid particles can be accurately detected. Because the chamber volume is only 135 milliliters, only a small amount of a turbidity standard is necessary to perform EPA mandated calibrations.

A white light source in the chamber lid illuminates suspended particles with a collimated white light. The chamber lamp will provide collimated white light for up to two years and is easily changed from the top of the system.

Measurement data from the turbidity probe is communicated through the DataStick communication adapter for direct computer communications.

2.2 Calibration Kits

Calibration kits containing calibration standards and accessories are available for use with the 2020 ClearTrace.

Code 5-0114
- 1 liter 0.0 NTU, calibration standard
- 1 liter 20.0 NTU, calibration standard
- 2 squirt bottles, for standards
- 2 cleaning swabs

Code 5-0115
- 1 gallon 0.0 NTU, calibration standard
- 1 gallon 20 NTU, calibration standard
- 2 spigots, for dispensing standards
- 2 squirt bottles, for standards
- 2 cleaning swabs
### 2.3 Replacement Parts

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-0124</td>
<td>Bulb and cable assembly</td>
</tr>
<tr>
<td>5-0125</td>
<td>Sample chamber lid, without bulb</td>
</tr>
<tr>
<td>5-0126</td>
<td>Replacement sample chamber</td>
</tr>
<tr>
<td>5-0127</td>
<td>DataStick</td>
</tr>
<tr>
<td>5-0126</td>
<td>Turbidity Probe</td>
</tr>
<tr>
<td>5-0116</td>
<td>Turbidity standard, 0.0 NTU, 1 liter</td>
</tr>
<tr>
<td>5-0117</td>
<td>Turbidity standard, 0.0 NTU, 1 gallon</td>
</tr>
<tr>
<td>5-0118</td>
<td>Turbidity standard, 1.0 NTU, 1 liter</td>
</tr>
<tr>
<td>5-0119</td>
<td>Turbidity standard, 1.0 NTU, 1 gallon</td>
</tr>
<tr>
<td>5-0120</td>
<td>Turbidity standard, 10.0 NTU, 1 liter</td>
</tr>
<tr>
<td>5-0121</td>
<td>Turbidity standard, 10.0 NTU, 1 gallon</td>
</tr>
<tr>
<td>5-0122</td>
<td>Turbidity standard, 20.0 NTU, 1 liter</td>
</tr>
<tr>
<td>5-0123</td>
<td>Turbidity standard, 20.0 NTU, 1 gallon</td>
</tr>
</tbody>
</table>
3. MOUNTING, WIRING AND PLUMBING

3.1 Mounting

The 2020 ClearTrace Turbidity System is mounted on a 12 inch x 12 inch panel with four ¼ inch mounting holes. Use ¼ inch bolts with washers to mount the panel to a wall. Make sure the sample chamber is level and plumb to insure proper water levels are maintained in the sample chamber. It is important to note that the system must be fixed securely to the wall to insure the chamber does not move when handled or touched.

Mounting tools and equipment:

- ½ inch Drill with drill bit for appropriate wall anchor.
- Four ¼ diameter bolts – 1.5 inches long.
- Four ¼ inch ID flat washers
- Wrench to turn bolts
- Level to insure the system is level when mounted

General Mounting Instructions:

1. Place the 12x12 inch panel on the wall where it is to be mounted and mark the placement of the upper left hole.

2. Drill a mounting hole for the upper left corner with a masonry drill bit.

3. Mount the Turbidity System with the upper left bolt.

4. Using a level, rotate the system until level, then mark the other three mounting holes.
5. Rotate the Turbidity System out of the way and drill the other three mounting holes.

6. Place all four bolts with washers and tighten. Use shims if necessary to insure the sample chamber is level.

3.2 Plumbing

The Turbidity System has an INLET, an OUTLET and a DRAIN. Barb fittings are provided for the INLET and OUTLET in the event that 3/8 inch ID tubing is used.

When piping is used instead of tubing, remove the barb fittings to install ¼ inch NPT threaded pipe for the INLET, OUTLET and DRAIN.

OUTLET and DRAIN Plumbing Recommendations: Use straight ¼ inch NPT threaded pipe that extends to a vented drain. Pipe restrictions that result in back pressure for OUTLET and DRAIN are not allowed.

INLET Plumbing Recommendations: Use 3/8 ID tube or ¼ inch NPT threaded pipe from sample source.

Flow rate must be between 250 to 750 ml/min (4 to 12 gph). If the source is under pressure, use an appropriate flow or pressure valve to obtain consistent flow. The turbidity sample chamber has an overflow weir that must not be restricted.

3.3 Valve Position for Operation

Measure
- Inlet valve open
- Drain valve closed

Water goes in the INLET and out the OUTLET. The sample chamber should be full.

Drain Sample Chamber
- Inlet valve closed
- Drain valve open

Drain sample chamber and wipe clean prior to calibration.

Calibration
- Inlet valve closed
- Drain valve open

When sample chamber is empty and clean, pour in 20 NTU standard until it overflows to the OUTLET (approx. 135 mL).
3.4 Wiring For 24 VDC and 110 VAC Power

Access to all User wiring is through the ¼ DIN junction box in the lower left on the mounting panel.

The standard on-line turbidimeter requires 24 VDC for power and typically draws 270 mA (6.5 watts) or optionally requires 100-240 VAC at 50/60 Hz for power and typically draws up to 250 mA (10 watts).

Pg11 and Pg16 punch out conduit holes are provided for user terminal connections. We supply Pg11 cord grips that can be removed.

Note: Loop 2 and Relay options are not currently available on 2020 ClearTrace System.
**USER WIRING FOR: 1 Current Loop without Host Communications**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Wiring</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>24VDC or 110 VAC from Power Supply</td>
</tr>
<tr>
<td>2</td>
<td>Ground from Power Supply</td>
</tr>
<tr>
<td>4</td>
<td>Earth Ground from Power Supply</td>
</tr>
<tr>
<td>6</td>
<td>Current Loop -</td>
</tr>
<tr>
<td>7</td>
<td>Current Loop +</td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

Note: Current Loop Requires 24 VDC or 110 VAC supply.

**USER WIRING FOR: 24 VDC or 110 VAC Power**

AC-Powered Models:
The AC-powered ClearTrace Tubidimeter comes with a Junction Box below the two terminal blocks when ordered with one or two 4-20 mA analog outputs and/or host communications. If relays are ordered, a third terminal block is present.

- **100-240 VAC Power Cable Wiring:**
  1. 100-240 VAC, 50/60 Hz power is wired to the wider-spaced strip on left side of terminals.
  2. Typically Black wire to 'LINE', White wire to 'NEUTRAL', and Green wire to 'EARTH'

- **Terminal Connections to AV38; 24 VDC power.**
  - Red wire to '+24V' terminal
  - Black wire to 'GND'

- **Lamp cable connection.**
  - Red wire to 'LAMP+'
  - Black wire to 'LAMP-'
USER WIRING FOR: Digital Communications to Host Computer with 2 Outputs and Relay

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Wiring</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Red wire from Host Network (+24 VDC or 110 VAC)</td>
</tr>
<tr>
<td>2</td>
<td>BLACK wire from Host Network (Network Ground)</td>
</tr>
<tr>
<td>3</td>
<td>White wire from Host Network</td>
</tr>
<tr>
<td>4</td>
<td>Blue wire from Host Network</td>
</tr>
<tr>
<td>5</td>
<td>Shield wire from Host Network</td>
</tr>
<tr>
<td>6</td>
<td>OUTPUT 1 (-)</td>
</tr>
<tr>
<td>7</td>
<td>OUTPUT 1 (+)</td>
</tr>
<tr>
<td>8</td>
<td>OUTPUT 2 (-)</td>
</tr>
<tr>
<td>9</td>
<td>OUTPUT 2 (+)</td>
</tr>
<tr>
<td>10</td>
<td>Relay – Normally Open Terminal</td>
</tr>
<tr>
<td>11</td>
<td>Relay – Common Terminal</td>
</tr>
<tr>
<td>12</td>
<td>Relay – Normally Closed Terminal</td>
</tr>
</tbody>
</table>

Note: Output 2 and Relay options are not currently available on 2020 ClearTrace System.
3.6 Sample Chamber Details

The sample chamber is designed for easy access and maintenance. The chamber lid is lifted to gain access to the sample chamber. Set it on top of the AV38 during chamber maintenance. When replacing the lid, it should be aligned using the exterior alignment markers on the front edge of the chamber and the lid.

*DataStick is a registered trademark of Thermo Fisher Scientific Inc. and its subsidiaries.
4. MEASURE SCREEN OVERVIEW

The AV38 user interface is shown in Figure 3.1. It consists of an LCD module that contains two lines of 16 alphanumeric characters and seven keys to navigate the menu. The contrast of the LCD module can be adjusted by simultaneously pressing the escape and up-arrow keys (for more contrast) or the escape and down-arrow keys (for less contrast).

When the DataStick and communications adapter are connected to the AV38 display but the optical sensor head is absent, the measure screen indicates the fault as shown in Figure 3.2.

When the DataStick or communications adapter are not connected to the AV38 display, the measure screen indicates the fault as shown in Figure 3.2.

Figure 3.1: The elements of the measure screen

Figure 3.2: The measure screen when the Sensor Head is absent.

Figure 3.3: The measure screen when the DataStick is absent.
Pressing the menu key while a measure screen is displayed accesses the main menu. The items in the main menu are the same regardless of the type of sensor head that is installed in the DataStick. Table 4.1 shows all accessible functions including optional features.

Note: Not all optional features are currently available on 2020 ClearTrace System.

<table>
<thead>
<tr>
<th>Main Menu Option</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calibrate (Station Number)</td>
<td>Sensor calibration choices are automatically available for installed sensor head. Enter the MENU from the measure display of interest – station in lower right.</td>
</tr>
<tr>
<td>Configure (Station Number)</td>
<td>Configuration choices are automatically available for the installed sensor head. Enter the MENU from the measure display of interest – station in lower right.</td>
</tr>
<tr>
<td>DataStick Comms</td>
<td>Not currently available</td>
</tr>
<tr>
<td>Chlorine Configure</td>
<td>Not currently available</td>
</tr>
<tr>
<td>Hold Outputs</td>
<td>Holds the 4-20 mA and Relay outputs</td>
</tr>
<tr>
<td>Analog Output 1</td>
<td>Set 4 mA and 20 mA values. Calibrate and test the current output with a meter.</td>
</tr>
<tr>
<td>Analog Output 2 (option)</td>
<td>Not currently available</td>
</tr>
<tr>
<td>PID Controller</td>
<td>Not currently available</td>
</tr>
<tr>
<td>Relay A (option)</td>
<td>Not currently available</td>
</tr>
<tr>
<td>Relay B (option)</td>
<td>Not currently available</td>
</tr>
<tr>
<td>Help</td>
<td>Indicates AV38 software version</td>
</tr>
<tr>
<td>Reset AV38</td>
<td>Resets AV38 configuration to default current output, relay and PID settings.</td>
</tr>
<tr>
<td>Exit</td>
<td>Returns to the measure screen</td>
</tr>
</tbody>
</table>

The main menu is navigated using the up/down arrows to display a desired function. The (=) symbol is used to indicate main menu choices.

To select a menu choice, press the ENTER key when the desired choice is displayed.

To return to the measure screen, press the ESC key.

Whenever there is a value to be entered or a choice to be made, the second line of the display will be surrounded by parentheses (( )). The name of the value being entered or choice being made will appear on the upper line of the screen and be appended with a question mark (?) to indicate that the user is to provide input. Figure 4.1 shows the list of standard menu choices and optional menu choices in the context of the AV38 display presentation.
To illustrate navigation through the main menu the following sequence of down arrow key presses is shown. The up arrow can always be used to scroll up through the list.

A pressed key is identified by a gray background, e.g.,.

From the measure screen, press MENU to display the list of options. Generally, Calibration will be the first option. To select a calibration function, press ENTER. Press the down arrow to scroll through the list. Press ESC to return to the measure screen.

Pressing the down arrow from Calibration will display Configure. To select Configure functions, press ENTER. To continue scrolling the list, press the down arrow. Press ESC to return to the measure screen.

Pressing the down arrow from Configure will display DataStick Comms. To select DataStick Comms functions, press ENTER. To continue scrolling the list, press the down arrow. Press ESC to return to the measure screen.

Note: The DataStick Comms option is not available on 2020 ClearTrace System.
Pressing the down arrow from DataStick Comms will display Analog Output. To select analog output functions, press ENTER To continue scrolling the list, press the down arrow. Press ESC to return to the measure screen.

Pressing the down arrow from Analog Output will display Help. To select Help functions, press ENTER To continue scrolling the list, press the down arrow. Press ESC to return to the measure screen.

Pressing the down arrow from Help will display Reset AV38. To select Reset functions, press ENTER To continue scrolling the list, press the down arrow. Press ESC to return to the measure screen.

To return to the measure screen press ENTER when in the EXIT screen. Pressing ESC from any screen will take the user up one level. In this example ESC will also take the user to the measure screen. Since this screen is at the bottom of the main menu list, the down arrow will not work here. The up arrow can be used to go back through the list.
NOTE: The unit should be on for 30 minutes to allow the lamp to warm up before beginning calibrations or taking measurements.

6.1. Span Calibration

To calibrate the span for the Turbidity System:

1. Drain the sample chamber.
2. Shut off flow to the sample chamber.
3. Remove the chamber lid and place it on top of the AV38.
4. Rinse the chamber with clean water and then with a small amount of calibration solution. (See calibration kit instructions Code-5-0114 or code 5-0015 for procedure.)
5. Shut off the Drain.

6. Fill the sample chamber with AMCO Clear Turbidity Standard, 20 NTU calibration solution. The standard should overflow the OUTLET weir located about ¾ of the way to the top of the sample chamber. As an alternative a formazin 20 NTU calibration standard may be prepared from a stock solution of 4000 NTU formazin and used within 24 hours. Refrigerate when stored.

7. After filling the sample chamber with the standard, wait for the reading to settle (less than a minute depending on the filter setting).

8. Perform a 1-point sample calibration as shown in the following menu tree.

The complete calibrate menu for the turbidity and suspended solids is shown.

Figure 5.15: The complete calibrate menu for turbidity
From the measure screen, press MENU.

From the Main Menu, use the up/down arrows to select Calibrate. Then press ENTER.

From the Calibrate Menu, use the up/down arrows to select 1-Point Sample. Then press ENTER.

The current sensor value is dynamically displayed and asks the user to be sure the measurement is ready for calibration before proceeding. When ready, press the ENTER key.

The calibration value can be adjusted with the arrow keys. Use the up/down arrows for fine adjust and the left/right arrows for course adjust. After the calibration value is adjusted to the desired value, press the ENTER key.

NOTE: The display may default to 40 MTU. Adjust to 20.00 NTU.
One the actual 1-point sample calibration has been initiated; the display will indicate that a calculation is progressing. During this calculation it is important that nothing disturb the measurement sample. To abort the calibration during this calculation, press ESC.

When the calibration calculation is complete, the result will be displayed on the second line of the display. If the calibration is successful, the message will be CAL OK. If the calibration is not successful, the message will be CAL FAIL. In either case, press ENTER to continue.

If the calibration is successful, pressing ENTER will return to the measure screen. If the calibration is not successful, pressing ENTER will return to the beginning of the 1-point sample calibration. Reasons for calibration failure include a sample that is not in the correct measurement range or is changing in value too quickly.

**After Calibration:**

1. Drain the sample chamber.
2. Pour clean water into the chamber and wipe interior surfaces with a lint free clean cloth.
3. Rinse with clean water.
5. Open the Inlet Valve to allow process water to fill the sample chamber.
6. Replace the sample chamber lid. Be sure that the alignment post in the chamber is properly inserted into the alignment hole in the lid.
6.2 Zero Calibration

The zero calibration is extremely sensitive and should not be adjusted unless absolutely necessary. The following criteria must be met to achieve a successful zero calibration:

1. The chamber must be completely clean and free of particulates.
2. An AMCO CLEAR TURBIDITY STANDARD, 0.0 NTU or water passed through a 0.2 micron filter must be used.
3. There must be no air bubbles introduced through the inlet to the chamber.

From the Calibrate menu, use the UP/DOWN arrows to display ZERO calibration. Press ENTER to select.

1. Drain the sample chamber.
2. Shut off flow to the sample chamber.
3. Remove the chamber lid and place it on top of the AV38.
4. Rinse the chamber with clean water and then with a small amount of calibration solution. (See calibration kit instructions Code-5-0114 or code 5-0015 for procedure.)
5. Shut off the Drain.
6. Fill sample chamber with AMCO CLEAR TURBIDITY STANDARD, 0 NTU calibration solution. The standard should overflow the OUTLET weir located about 3/4 of the way to the top of the sample chamber.
Press ENTER to initiate zero calibration. A zero calibration may take some time, as the zero must be calibrated over a wide dynamic range. During this process the calibrating... message is shown.

When the zero calibration is complete the user will be asked to confirm the result with the ENTER key.

After pressing ENTER to confirm Calibration is okay, the Measure screen will be displayed.

NOTE: 0.000 NTU may not be displayed. An acceptable reading could be as high as 0.015 NTU.

If an error occurs during calibration, the reason for the failure is shown.

Press ENTER to acknowledge the calibration failure and return to the measure screen.
6.3 Temperature Calibration

Press the ENTER key from the TEMPERATURE calibration menu to initiate the calibration process.

When the temperature calibration procedure is started, the analog output is placed into hold mode. The user is prompted to prepare the sensor. The sensor value is dynamically updated during this step.

When the sensor is ready, the ENTER key is pressed and the user is presented with a calibration value for editing. Please note that it is best to calibrate temperature when the sample chamber is full of flowing process water.

When the value has been edited as desired, the enter key is pressed and the calibration of the point is started.

During this time, the calibration procedure can be aborted by pressing the escape key.

After the calibration point has been stored, the user is prompted to confirm a successful calibration procedure.
When the enter key is pressed, the analog output is placed into active mode and the monitoring of sensor and temperature values is resumed. This successfully completes the temperature calibration procedure.

If an error occurs during calibration that causes the procedure to fail, the reason for the failure will be shown.

When the enter key is pressed, the calibrate menu is displayed. This ends the temperature calibration procedure. The user has the option of repeating the procedure if desired.
The complete configure menu for turbidity is shown.

From the measure screen, press MENU.

From the Main Menu, use the up/down arrows to select Configure. Then press ENTER.

From the Configure menu, use the up/down arrows to select Sensor Filter. Then press ENTER.

Edit the sensor filter with the up/down arrows. Press ENTER to select a new filter value. Press ESC to abort the new sensor value. The temperature filter edit screen works the same way.

The Temperature units selection offers °C and °F in the edit screen.
8. DATASTICK COMMS MENU

The DATASTICK Comms Menu is currently not operational with the 2020 ClearTrace System.

9. ANALOG OUTPUT(S)

The analog output menu is used to setup the 4milliamp to 20 milliamp analog output in the AV38. This function allows the following assignments:

- Parameter: Assign either turbidity or temperature to the output.
- 4mA Value: Assign the lowest value of turbidity or temperature to be reported.
- 20mA Value: Assign the highest value of turbidity or temperature to be reported.
- Calibrate: Use an external ammeter to calibrate the output for precise current readings.

When the AV38 is configured with two current outputs then the main menu list shows “Analog Output 1” and “Analog Output 2”. The menu system for each output is identical.

Note: During calibration, the analog output is held at its present value.

The complete analog output menu is shown in 8.1.

To configure the Analog Output, select it from the main menu by pressing ENTER.

To view or reassign the parameter driving the output (turbidity or temperature), select “Set Parameter” with the ENTER key.
To view or reassign the parameter driving the output (turbidity or temperature) use the up/down arrows to select Sensor or Temperature. Accept the displayed parameter with the ENTER key. Exit without changing by using the ESC key.

To set the 4 milliamp value select “Set 4 mA Value” with the up/down arrows and the ENTER key.

Use the up/down arrows for fine adjustment of the low sensor or temperature value. Use the left/right arrows for course adjustment. Accept the displayed value with the ENTER key. Exit without changing by using the ESC key.

To set the 20 milliamp value select “Set 20 mA Value” with the up/down arrows and the ENTER key.

Use the up/down arrows for fine adjustment of the low sensor or temperature value. Use the left/right arrows for course adjustment. Accept the displayed value with the ENTER key. Exit without changing by using the ESC key.
To calibrate the current for the current output function select “Calibrate” in the Analog Output sub-menu with the up/down arrows and the ENTER key. This is a maintenance function and is only used when the expected current at the 4 and 20 milliamp points needs to be adjusted. To use the function, remove all current loop wiring and connect an ammeter to the current output terminal blocks.

To calibrate the 4 mA Point, select the “4 mA Point” display with the up/down arrows and press ENTER.

Remove all wiring to the analog output terminals and connect a calibrated ammeter to those terminals. Adjust the displayed count value with the up/down arrows until the meter reads exactly 4.000 mA. Accept the displayed value with the ENTER key. Exit without changing by using the ESC key.

To calibrate the 20 mA Point, select the “20 mA Point” display with the up/down arrows and press ENTER.

Remove all wiring to the analog output terminals and connect a calibrated ammeter to those terminals. Adjust the displayed count value with the up/down arrows until the meter reads exactly 20.000 mA. Accept the displayed value with the ENTER key. Exit without changing using the ESC key.
The help menu displays the product name and the firmware version. To view the current software version of the AV38, press ENTER at each screen level as shown in the diagrams below.
12. RESET AV38

To reset all configuration information to default values, select “Reset AV38” from the main menu.

The AV38 will ask the question, “Are you sure?” to notify the user that they are about to make changes to the system. Press ENTER to initiate a reset. Press ESC to abort the reset.

When the reset is done, the AV38 will require that the Enter key is pressed to be sure the user acknowledges that a reset has been done.

13. PERFORMANCE SPECIFICATION

Measurement
Range: 0 to 100 NTU (Can range to 200 NTU when necessary).
Resolution: 0.001 NTU
Accuracy: +/-2% of reading or +/-0.015 NTU whichever is greater. +/-5% of reading above 40 NTU.

Operational Environment
Water Temperature Range: -5°C to 50°C
Air Temperature Range: -20°C to 60°C
Maximum Flow Rate: 500 ml/min (7.9 gal/hr)
Minimum Flow Rate: 250 ml/min (4 gal/hr)
Power Requirements
Voltage Range: 24 VDC (Line power option available)
Maximum Power: 8W with AV38 and Light Source
Typical Power: 6W with AV38 and Light Source
Note: Class II DC power supply required

Construction
Light Source: White Light (Tungsten)
Sample Chamber Material: ABS plastic
Sample Chamber Volume: 135 ml
Light Source Housing Material: Anodized Aluminum
Mounting Plate: 12x12 inches, 4 mounting holes
Sensor Head Material: Quartz Glass, Anodized Aluminum
Weight: 5.6 lbs

Units of Measure
Measurement Units: NTU
Temperature Units: °C, °F

Calibration
Sample (Span): 1 point
Zero: 1 point
Temperature: 1 point

Interface
Display: 2 lines, 16 characters, 7 key menu navigation
Current Loops: 1 loop standard.

Product Safety
cULus Listed 367G E 328889
14. LIMITED WARRANTY

2020 ClearTrace WARRANTY/REPLACEMENT PLAN

LaMotte warrants its products against material and workmanship defect for a period of one year from the date of shipment. LaMotte warrants the turbidity lamp to illuminate for a period of 2 years.

In the event that a defect is discovered during the warranty period, LaMotte agrees, at its option, to repair or replace the defective product. Any product repaired or replaced under this warranty will be warranted only for the remainder of the original product warranty period.

This warranty does not apply to consumable products associated with this product including, but not limited to, chemical reagents and salt bridges.

Products may not be returned without authorization from LaMotte. To obtain authorization, please call LaMotte for a return material authorization number.

Limitations:

This warranty does not cover:

1. Damage caused by misuse, neglect (lack of appropriate maintenance), alteration, accident or improper application or installation.
2. Damage caused by any repair or attempted repair not authorized by LaMotte.
3. Any product not used in accordance with the instructions furnished by LaMotte.
4. Damage caused by acts of God, natural disaster, acts of war (declared or undeclared), acts of terrorism, work actions, or acts of any governmental jurisdiction.
5. Freight charges to return merchandise to LaMotte.
6. Travel fees associated with on-site warranty repair.

This warranty is the sole expressed warranty made by LaMotte in connection with its products. All other warranties, whether expressed or implied, including without limitation, the warranties of merchantability and fitness for a particular purpose, are expressly disclaimed.

LaMotte's liability shall be limited to the cost of the item giving rise to the claim. In no event shall LaMotte be liable for incidental or consequential damages.

This warranty is the sole and complete warranty for LaMotte. No person is authorized to make any warranties or representations on behalf of LaMotte.