scientific

OWNER'S MANUAL

HF – Micro 100 Laboratory Turbidimeter

DECLARATION OF CONFORMITY

Application of Council Directive: 73/23/EEC

Standard to which Conformity is Declared:

Product Safety
UL3101-1
CSA-C22.2 No. 1010-1-92
CE EN 61010-1 2nd Edition

Emissions & Immunity
EN 61326-1:2006

Manufacture's Name: HF scientific, inc.

Manufacture's Address: 3170 Metro Parkway, Fort Myers, Florida 33916-7597

Importer's Name:

Importer's Address:

Type of Equipment: Turbidimeter

Model No.:			
Micro 100	Catalog No's	20001/19950
Micro 100IR		19952

    I, the undersigned, hereby declare that the equipment specified above conforms
to the above Directive and Standard

Place: **Fort Myers, Florida USA**

(Signature)

   Rowan T. Connelly, General Manager
(Full Name)

Micro 100 (5/10)
Rev 3.3

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SPECIFICATIONS:

MICRO 100	Conforms to specifications set forth in EPA method 180.1 (Nephelometric Method) [§]
MICRO 100 IR	Conforms to specifications set forth in ISO 7027: Water Quality - Determination of Turbidity.
Measurement Range	0-1000 NTU
Accuracy[†, ††]	±2% of reading or ±0.01 NTU whichever is greater
Repeatability[††]	$\leq$ ±1% of reading or ± 0.01 NTU whichever is greater
Resolution	0.01NTU in the range 0.00 – 9.99 NTU 0.1NTU in the range 10.0 – 99.9 NTU 1 NTU in the range 100 – 1000 NTU
Response Time	Less than 6 seconds
Recorder Output	Uni-directional RS232 output
Power Supply	UL, CSA approved 12V DC Wall Mount
Miscellaneous Specifications	1. Year 2000 Compliant 2. Built in Diagnostics 3. Three Year Battery Backup With no External Power
Operating Temperature Range	10°C – 40°C (50°F – 104°F)
Sample Temperature Range	0°C – 50°C (32°F – 122°F)
Dimensions	10.75" W x 10" L x 4.75" H (237mm W x 254mm L x 121mm H)
Shipping Weight	2.5 kg (5.5 lbs.)
Warranty	1 Year from date of shipment

[§] The specifications found in EPA method 180.1 are essentially the same as the specifications set out in method 2130B of the Standard Methods for the Examination of Water and Wastewater 19th edition and the specifications set out in ASTM Standard Method D1889-94. The MICRO 100 meets, or exceeds, the specifications set forth in these methods.

[†] Instrumental accuracy measured under controlled laboratory conditions at 25°C (77°F)

[††] Both the accuracy and repeatability specifications for the MICRO 100 are valid only for measurement of static (non-flowing) samples.

1.0 Using This Instruction Manual

Congratulations on your purchase of a new MICRO 100 or MICRO 100 IR Laboratory Turbidimeter (MICRO 100 hereafter). This turbidimeter has been designed for simple and easy measurement of turbidity.

This manual contains simple steps to follow to ensure that your instrument is operating properly. This material assumes that the user knows how to obtain representative samples of their process and has some familiarity with measuring the turbidity of samples[‡] .

The following sections describe how to use and care for your new MICRO 100.

In certain instances NOTES or reminders have been added to give further clarification to the instructions. Refer to the *Table of Contents* or the *Glossary* to easily find specific topics and to learn about unfamiliar terms.

2.0   Unpacking the Instrument

2.1 Packing List of Contents

Item	Qty.
MICRO 100 Laboratory Turbidimeter Instrument	1
Accessory Kit for MICRO 100 (0.02 NTU, 10.0 NTU, 1000 NTU Standards and 2 empty sample cuvettes)	1
MICRO 100 Laboratory Turbidimeter Instruction Manual	1
Power Supply for the MICRO 100	1

2.2   Unpacking and Inspection of the Instrument and Accessories

Remove the Accessory Kit (blue case) and the instrument from the packing carton. Carefully inspect all items to ensure that no visible damage has occurred during shipment. If the items you received do not match your order, please immediately contact your local distributor or the HF scientific Customer Service department.

NOTE: Extra care should be taken when unpacking, opening, and handling the calibration standards and sample cuvettes in the Accessory Kit; surface scratches or finger smudges on the cuvette surface may cause measurement errors. Handle these items by the top area of the cuvette only.

[‡] **If you need more information on turbidity please see section 2130 of the 19th edition of the Standard Methods for the Examination of Water and Wastewater.**

3.0   Becoming Familiar with the Instrument

Figure 1 is a depiction of the front of the MICRO 100. Not shown in this picture are the RS-232 serial printer port and the 12V DC power plug connector, which are located on the back panel of the instrument.
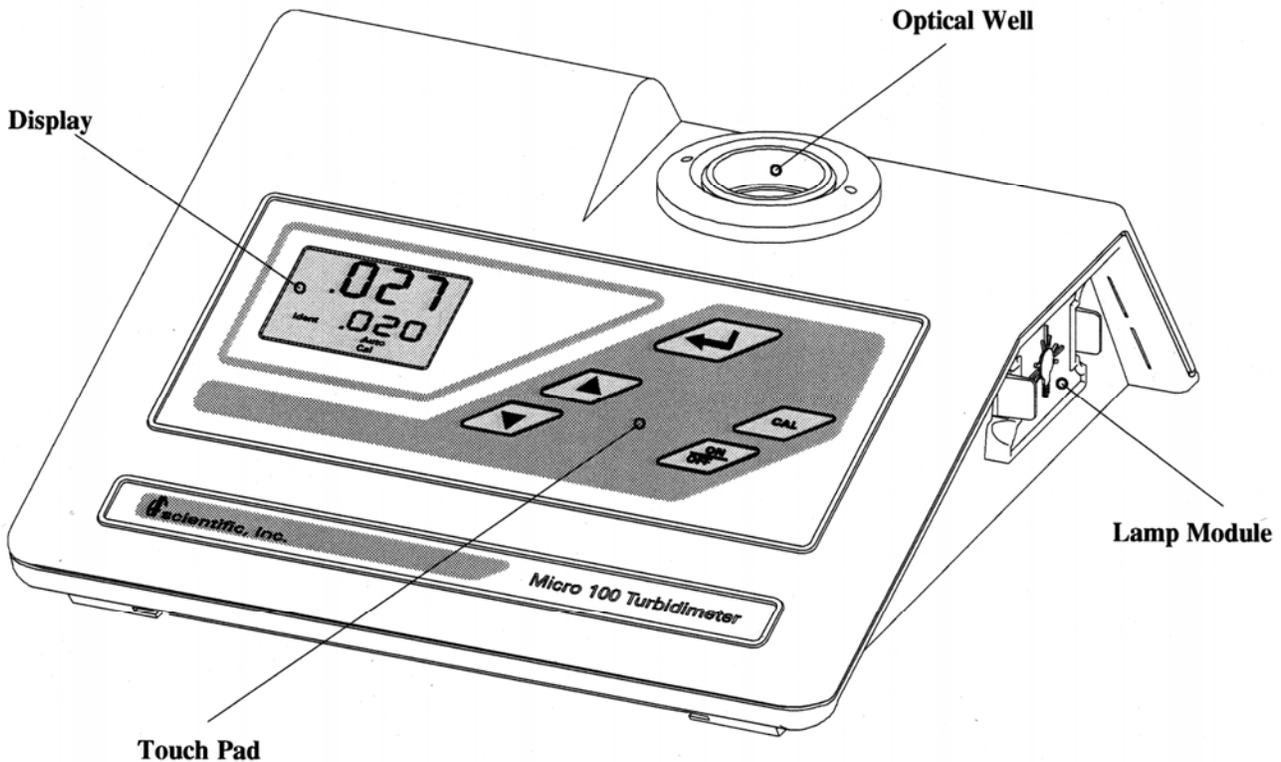
The user interface of the MICRO 100 has been designed with a 5 key touchpad and user display. The five keys of the Touch Pad and their functionality are described below:

The [ON/OFF] key is used to turn the instrument on and off. The [CAL] key is used to enter, or exit, calibration mode. The [▲] and [▼] are used to set numerical values and to scroll through lists. The [↵] key stores value on the screen and/or causes the turbidity data to be output to the printer port when pressed.

Figure 2 illustrates all the items that can appear on the display. The upper row of the display (1) is used for reporting the turbidity levels and to provide user guidance in the customer settings routine. The lower row of the display (2) is used to display the stored turbidity reading and to communicate error messages and user guidance. The display has several status indicators (3) which distinguish the operation of the instrument. In addition, the **"LoBat"** block (4) flashes when the batteries need to be replaced. Finally, several indicators (5) provide guidance when the customer settings routine is being used and when the calibration routine is being used.

4.0   Routine Operation

The MICRO 100 measures and reports the turbidity of a
 sample in nephelometric turbidity units (NTU).

NOTE: Nephelometric turbidity units (NTU's) are numerically equivalent to Formazin turbidity units (FTU's) (See Glossary).
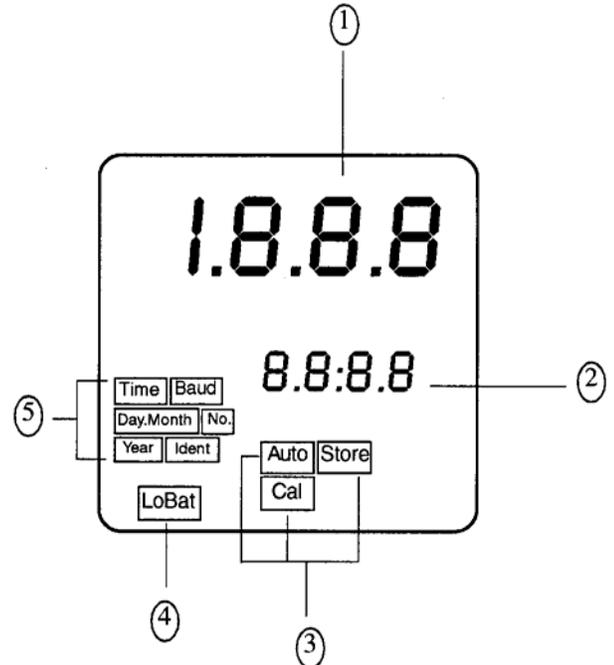
Figure 2

Micro 100 LCD Display

Sections 4.1 and 4.2 describe how to use the MICRO 100 under normal operating conditions. These sections include details on how to input certain customer selectable parameters and how to take normal, routine turbidity measurements using the MICRO 100.

4.1   Grab Sample Measurement (Routine Measurement)

The following steps describe how to measure the turbidity of a sample using the MICRO 100:
1. Turn on the MICRO 100. The instrument will be in the normal mode (the **"AUTO"** block should be illuminated). Allow instrument to warm up for at least 30 minutes.
2. Sample approximately 100 ml of the process stream as you would normally do for turbidity measurement.
3**.** Obtain a clean and dry sample cuvette.
4. Rinse the cuvette with approximately 20 ml of the sample water (2/3 of cuvette volume), capping the cuvette with the black light shield (cuvette top) and inverting several times. Discard the 20 ml of used sample and repeat the rinsing procedure two more times.
5. Completely fill the rinsed cuvette (from step 4) with the remaining portion (approximately 30 ml) of the grab sample and then cap the cuvette with the black light shield. Ensure that the outside of the cuvette is dry, clean and free from smudges[**] .
6. Place the cuvette in the MICRO 100 and index the cuvette to the lowest reading (the displayed turbidity is continuously updated on the upper row of the display). Once the cuvette is indexed, the reading displayed on the MICRO 100 display should be recorded as the sample turbidity (see Glossary for more
    information on indexing a cuvette).

[**] Any typical glass cleaner can be used along with a lint free cloth, or tissue, to clean the outside of the cuvette.

7. If you are measuring and comparing more than one sample, pressing the enter key ⏎ will display the latest reading (displayed on the lower row of the display). In addition, if you have selected printer output in the customer setup section pressing the enter key ⏎ will output data to the RS232 port.

8. Repeat steps 2 through 7 for all of your samples.

NOTE: The Micro 100 may display - - - for a few seconds while it determines the correct reading.

NOTE: An indication of ⌐‾¬ ⌐ **(over-range) in the upper row of the display indicates that the standard in the sample well is higher than 1000 NTU.**

WARNING: *NEVER* pour liquid directly into the sample well of the MICRO 100, always use a cuvette. The MICRO 100 will accurately measure the turbidity of a sample using only cuvettes with the black light shield on the cuvette (provided by HF scientific) or the optional pour through assembly.

4.2   Pour Through Sample Measurement (Optional Accessory)

Install the pour through assembly and index it according to the instruction sheet that accompanies the assembly. The following steps describe how to measure the turbidity of a sample using the MICRO 100 fitted with the optional pour through assembly:

1. Turn on the MICRO 100. The instrument will be in the normal automatic mode (the **"AUTO"** block should be illuminated). Allow instrument to warm up for at least 30 minutes.
2. Sample approximately 500 ml of the process stream as you would normally do for turbidity measurement.
3. Pour the complete 500 ml sample into the pour through assembly. Record the turbidity of the sample displayed after the entire 500 ml sample has been poured into the assembly and the flow to drain has ceased, and after the reading has stabilized.

4. If you are measuring and comparing more than one sample, pressing the enter key ⏎ will store the reading (displayed on the lower row of the display). In addition, if you have selected printer output in the customer setup section pressing the enter key ⏎ will output data to the RS232 port.
5. Repeat steps 2 through 4 for all of your samples.

The sample cuvette used in the pour through assembly is identical to the two standard sample cuvettes supplied with the MICRO 100. Clean the cuvette on a periodic basis according to your experience with the type and turbidity of the sample found in your facility.

5.0   Calibration Procedures

The instrument was calibrated and tested prior to leaving the factory. Therefore, it is possible to use the instrument directly out of the box. Under normal conditions, re-calibration is recommended at least once every three months[1].

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[1] **The EPA recommends that on-line turbidimeters be calibrated with a primary standard at least once every three months if they are to be used for EPA reporting.**

If the Micro 100 will be used over the entire range of .02 to 1000 NTU a complete calibration as described below will be required. If instrument accuracy is only required below 10 NTU, such as potable water, a calibration may be performed using only a 10 NTU and a 0.02 NTU standard. To calibrate starting at the 10 NTU, press the ▼ button to bypass the 1000 NTU and proceed to Section 5.2 *Calibration Procedures*, step 4.

We recommend that the following materials be used during calibration to achieve the full-scale accuracy stated in this manual:
1.   0.02 NTU *ProCal* Calibration Standard available from HF scientific.
2.   10.0 NTU *ProCal* Calibration Standard available from HF scientific.
3.   1000 NTU *ProCal* Calibration Standard available from HF scientific.

It is well known that diluted Formazin is unstable. If Formazin is used to calibrate the instrument, ensure that a fresh stock suspension of Formazin is used to achieve the accuracy quoted for the instrument. A Formazin Stock Solution Kit is available from HF scientific (Catalog No. 50040). The HF scientific *ProCal*, primary calibration standards (refer to section 10.0 *Accessories and Replacement Parts List*) are more stable than Formazin and have a minimum shelf life of 12 months. Prior to recalibration, review the expiration dates, to ensure that the standards have not expired.

NOTE: The MICRO 100 must be re-calibrated after lamp replacement.

5.1   Indexing the Calibration Standard(s)

The United States Environmental Protection Agency (US EPA) recommends that cuvettes used for instrument calibration or sample measurement be indexed. To comply with this recommendation, each HF scientific calibration standard is supplied with an indexing ring for quick and repeatable indexing of the calibration standards.

To index a calibration standard perform the following steps:

  1. Slowly rotate the calibration standard one complete revolution (360°).
  2. While rotating the standard, observe the Micro 100 and locate the cuvette position with the lowest turbidity reading.
  3. With the calibration standard positioned at the location having the lowest turbidity reading, install the Indexing Ring over the black light shield on the standard so that the pointer of the Ring faces forward, toward the operator.
When using the standards in the future, always insert the standard so that the pointer of the indexing ring faces forward. Slowly rotate the standard, back and forth about 5° to find the lowest point. The standard is now indexed and read for use.

5.2   Calibration Procedure

Even though it is possible to calibrate the MICRO 100 using any sequence of the prescribed calibration standards, to achieve the stated accuracy you must use the procedure below to calibrate the instrument.

  1. Press the ◢CAL◣ key. Once this key is pushed the **"Ident"** block and the **"Cal"** block will illuminate on the display.

2. The turbidity value displayed in the lower row of the display should read 1000 NTU. This is the first standard that must be used in calibration. Insert the 1000 NTU calibration standard into the sample well (see figure 3) and index to the lowest value (see section 5.1 if you have not already indexed the standard) and wait for the reading to stabilize.

3. Press the enter key ⏎ when the standard is in position. After the enter key has been pressed, the instrument will calibrate on the 1000 NTU level (the "**Store**" block will flash) and the upper row of the display should display 1000 NTU. The lower row of the display now shows that the 10.0 NTU calibration standard should be placed in the sample well for continuing the calibration sequence.

4. Insert the indexed 10.0 NTU calibration standard into the sample well and index to the lowest value (see section 5.1 if you have not already indexed the standard) and wait for the reading to stabilize.

5. Press the enter key ⏎ when the standard is in position. After the enter key has been pressed, the instrument will calibrate on the 10.0 NTU level (the "**Store**" block will flash) and the upper row of the display should display 10.0 NTU. The lower row of the display now shows that the 0.02 NTU calibration standard should be placed in the sample well for continuing the calibration sequence and wait for the reading to stabilize.

6. Insert the indexed 0.02 NTU calibration standard into the sample well and index to the lowest value (see section 5.1 if you have not already indexed the standard).

7. Press the enter key ⏎ when the standard is in position. After the enter key ⏎ has been pressed, the instrument will calibrate on the 0.02 NTU level. The instrument automatically exits out of the calibration mode and then returns to the normal automatic mode. The display should read 0.02 NTU since this is the turbidity level of the standard that is still in the sample well. At this point, you have calibrated the instrument so that it measures accurately across the full range of the instrument.

8. Proceed to use the instrument normally.

NOTE: During calibration, the MICRO 100 will perform some system self-diagnostics. Several error messages may be displayed. If there is an error, one of the four error messages E01, E02, E03, and E04 will be displayed in the lower row of the display (see section 7.2).

NOTE: At any point in time during calibration, you can cycle through the required calibration points (0.02 NTU, 10 NTU, and 1000 NTU) by pressing either the ▲ or ▼ keys to individually calibrate with a particular calibration standard. If you wish to exit the calibration mode you may do so at any time by simply pressing the ⌐CAL key. However, exiting the calibration process without completing the steps for calibration may cause the accuracy of the instrument to be diminished.

Actual turbidity reading of the sample in the optical well.

Identifier block.

Required standard for the calibration step.

Calibration block indicating that the instrument is in calibration mode.

Figure 3
Display appearance during calibration of the 1000 NTU standard

6.0   User Selectable Parameters

The MICRO 100 provides you the ability to customize your instrument according to your needs at any time during normal operation. This section describes how you can customize your instrument.

NOTE: You cannot access any of the user selectable parameters during calibration.

Enter the customer selectable parameters section of the MICRO 100 by simultaneously pressing the ▲ key while holding down the ▼ key when the instrument is operating in the normal automatic mode. The **"Year"** block will be highlighted and the year will be displayed.

NOTE: To skip the selection of any parameter simply press the enter key ↵ to continue on to the next section.

6.1   Setting the Year

With the **"Year"** block highlighted and the year displayed, change the displayed year using the ▲ or ▼ keys. When you have selected the proper year press the enter ↵ key to accept the year.

6.2   Setting the Day and Month

After pressing the ↵ key, the **"Day.Month"** block will be displayed and you will see two numbers on the lower row of the display. The number flashing corresponds to the month. Select the correct month by pressing the ▲ or ▼ key to change the displayed month. When you have selected the proper month, press the ↵ key. After pressing the ↵ key, the **"Day.Month"** block will still be displayed and the second number on the lower row of the display will be flashing: this number corresponds to the day of the month. Select the correct day by pressing the ▲ or ▼ keys to change the displayed day. When you have selected the proper day, press the ↵ key.

NOTE: The MICRO 100 is year 2000 (Y2K) compliant and automatically adjusts for leap years.

6.3   Setting the Time

After pressing the ↵ key, the **"Time"** block will be displayed and you will see the time displayed on the lower row of the display in 24 hour format. The number flashing corresponds to the hour. Select the correct hour by pressing the or key to change the displayed hour. When you have selected the proper hour, press the ↵ key. After pressing the ↵ key, the" **Time"** block will still be displayed and the second number on the lower row of the display will be flashing: this number corresponds to minutes. Select the correct minutes level by pressing the ▲ or ▼ key to change the displayed minutes. When you have selected the proper minutes level, press the ↵ key.

6.4   Setting the Calibration Interval

After pressing the ⏎ key, the upper row of the display will have the letters **"Int"** printed in it. This corresponds to the calibration time interval. The number in the lower row of the display corresponds to the number of days that you wish to have between scheduled calibrations (default is 30 days). Select the desired number of days between scheduled calibrations by pressing the ▲ or ▼ key to change the displayed day. In normal automatic mode, if you exceed this number of days between calibration, the **"Cal"** block will flash until you re-calibrate the instrument. When you have selected the desired calibration interval press the ⏎ key.

6.5   Setting the Printing Function

After pressing the ⏎ key, the upper row of the display will have the letters **"Prt"** printed in it. This feature allows you to turn the printing option on the instrument on or off. Select the desired printing action (on or off) by pressing the ▲ or ▼ key. When you have selected the proper printing option press the ⏎ key.

If you selected to turn off the printing function, pressing the ⏎ key will return you back to the normal mode of the instrument. If, on the other hand, you chose to turn on

the printing function, pressing the ⏎ key will cause the **"Baud"** block to be highlighted and you can select the correct baud rate for operation of your printer. Select the desired baud rate (1200, 2400, 4800, or 9600) by pressing the ▲ or ▼ key to change the displayed baud rate. The other RS 232 parameters are fixed at 2 stop bits, 8 data bits and odd parity. Once you have selected the proper baud rate press the ⏎ key. Pressing the ⏎ key will return you back to the normal automatic mode of the instrument.


```
14:30     10 JAN 1998    996.7 NTU

14:33     10 JAN 1998    0.025 NTU

14:40     10 JAN 1998    4.003 NTU

14:50     10 JAN 1998    0.021 NTU
```

Figure 4

By turning on the printing function, you have instructed the instrument to print out specific information. When the ⏎ key is pressed during the normal mode, information is output on the sample in the optical well (See Figure 4). This figure shows the information printed for four different samples. The format of the information is time, date and turbidity level.

Also, a specific message will be printed out upon exit or completion of the calibration routine (See Figure 5). This printout shows all of the information that is pertinent to the calibration status of the instrument.

6.6   Completing Selectable Parameters

You have now completed the customer selectable parameters section of the instrument. You can enter this menu at any time to re-set, or change any of the parameters.


```
DATE:       10 JAN 1998         14:26

LAST CAL: 10 JAN 1998           14:26
CALIBRATION INTERVAL:        30 DAYS

CALIBRATION POINTS:
   STANDARD      DATE            TIME
   0.02 NTU    10 JAN 1998  14:26
   10.0 NTU    10 JAN 1998  14:25
1000.0 NTU    10 JAN 1998  14:24

   30 DAYS UNTIL NEXT CALIBRATION
```
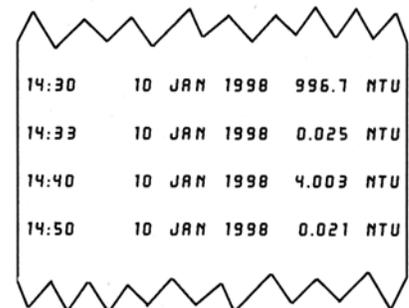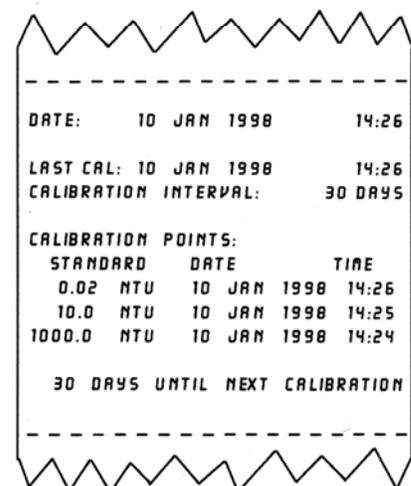
Figure 5

7.0   Troubleshooting

7.1   *System Warning Message(s)*

Automatic warning messages are generated by the MICRO 100 to provide you with specific diagnostic information about the instrument. These messages are for your use and do not reduce the performance of the instrument.

7.1.1   *Flashing "Cal" block*

A flashing **"Cal"** block observed during normal automatic mode indicates that you should recalibrate your instrument. The factory default is 30 days. HF recommends calibration every 30 days. The flashing **"Cal"** block is only a warning and does not mean that the instrument will stop performing accurately. The **"Cal"** block will flash until you have recalibrated the instrument.

7.1.2   *Flashing "LoBat" block*

A flashing **"LoBat"** block on the display indicates that the backup batteries need to be replaced. Under this condition, the parameters that are stored in memory (all of the user settable parameters and the instrument calibration) may be lost under conditions when power is not supplied to the instrument. See section 8.3 for instructions on replacing the batteries.

7.2   *System Error Message(s)*

Error messages are generated by the MICRO 100 when it detects problems with the instrument operation. When these messages are observed and if you do not understand the instructions shown below, contact the HF scientific. Technical Services department to determine a resolution to the problem. An error message is indicated by the instrument when an "E-0X" is displayed on the lower row of the display. The MICRO 100 has five error codes, each assessing a different component or system of components in the instrument. The following table lists the error messages and their associated meanings.

ERROR MESSAGE	ASSOCIATED MEANING	TYPICAL CAUSE
E-01	Overall light level detected is too low during calibration	Wrong standard is in the optical well or lamp failure
E-02	Overall light level detected is too high during calibration	Wrong standard is in the optical well.
E-03	Amount of light detected between 0.02 NTU and 10.0 NTU is too small during calibration	Wrong standard is in the optical well or bad A/D circuitry
E-04	Amount of light detected between10.0 NTU and 1000 NTU is too small during calibration	Wrong standard is in the optical well or bad A/D circuitry
E-05	Amount of light detected is too low during normal mode	Lamp failure

If errors 1-4 are noted, turn the instrument off and then back on. Once the instrument is back on, re-calibrate the instrument. If the error persists, please contact the HF scientific Technical Service Department to rectify the error. (See Section 9.0)

If error 5 is noted, replace the lamp module with a spare lamp module. If you do not have a spare lamp module, refer to Section 10.0 for ordering information.

7.3   Factory Default Parameters

The MICRO 100 memory retains all original factory settings. At any time, you can force the instrument to change back to these default settings. All calibration values and settable parameters (see section 5 & 6) will change back to default configurations. You will need to recalibrate the instrument after performing this reset.

To invoke this option, first turn on the instrument. Next, press the ⬡ key while holding down the ▲ key. The instrument will continue operating in normal automatic mode with all adjustable parameters reset to factory default conditions.

8.0   Routine Maintenance

The MICRO 100 has been designed for ease of use and simple operation. When not in use, ensure that the instrument has been turned off and that a clean sample cuvette fitted with a black light shield cap has been placed in the sample well. This will ensure that a minimal amount of dust and/or debris will be able to settle on the optics of the instrument.

8.1   Cuvette Cleaning and Care

Proper measurement of the turbidity of a sample requires the use of a cuvette that is free of marks, smudges, scratches and any bacterial growth. Cleaning the cuvette is accomplished by washing the interior and exterior of the cuvette in a detergent solution. Once cleaned, the cuvette should be rinsed thoroughly 8 to 10 times with clean distilled water to eliminate the possibility of detergent build-up and streaking. Cleaned and dried cuvettes should be stored with the black light shield cap on the cuvette and can be stored in a cuvette rack (see accessories and replacement parts list). During normal operation you may use any typical glass cleaner along with a lint free cloth, or tissue, to clean the outside of the cuvettes. HF scientific sells a Cuvette Maintenance Kit Catalog No. 19959 for this purpose.

8.2   Lamp Replacement

Periodically the lamp module will require replacement. Figure 1 illustrates the location of the lamp module. An error message will be illuminated when it is time to replace the lamp (see section 7.2). It is recommended that one spare lamp for each MICRO 100 turbidimeter be kept on hand at all times to ensure continuous use of the instrument.

Before replacing the lamp module ensure that the instrument is turned off. Once you have turned off the instrument, proceed with the following instructions:

Lamp Replacement cont'd.

1. Remove the lamp module from the instrument by squeezing the two side tabs on the module inward while pulling the module out of the instrument. Pull the module away from the instrument until the in-line power connector is exposed (about 6-8 inches).
2. Unfasten the connector by holding on to the white in-line connector and pulling the in-line connector apart. When pulling the in-line connector apart, DO NOT hold on to the wires.
3. The new lamp module can now be connected to the instrument using the in-line power connector.
4. Feed the wire back into the instrument being careful that the wire does not get in the way of the lamp or the lamp holder Z (on instrument). Make sure that the light bulb icon on the back of the lamp module is upright. Press the module into the instrument until you hear it click firmly into place.

Note: The side tabs may need to be pressed outward until they click to secure the new lamp module.

5. If the two side tabs on the lamp module do not click the lamp module securely in place, check that the power wire is not obstructing the lamp module.
6. Turn on the instrument and follow the instructions in section 4.1 to re-calibrate the instrument with the new lamp module. **The instrument must be re-calibrated after lamp module replacement.**
7. Resume normal operation.

8.3   Battery Replacement

The backup of calibration and user preferences requires power. For this reason, the MICRO 100 should be plugged in (it can be left off) when not in use. If the unit is unplugged from the wall receptacle or the provided power supply, the batteries in the MICRO 100 will provide the backup power. As these batteries are non rechargeable and have a finite life, they will need replacement if the instrument is left unplugged for long periods of time.

It is recommended that the battery replacement be performed at HF scientific. Please refer to the following section for contact information.

9.0   Contacting the HF scientific Technical Service Department

For technical assistance or to order replacement parts please contact the HF scientific Technical Services Department or HF scientific Customer Service Department.

HF scientific
3170 Metro Parkway
Fort Myers, Florida 33916-7597
Phone: (239) 337-2116   Toll free: 888-203-7248
Fax: (239) 332-7643
Email: HFinfo@Watts.com

10.0   Accessories and Replacement Parts List

Accessory or Replacement Part	Catalog number
Micro 100 Calibration Set (includes 0.02 NTU, 10.0 NTU, 1000 NTU *ProCal* Calibration Standards)	39957
Formazin Stock Solution Kit	50040
Formazin, 4000 NTU Stock Solution, 500 ml	70914
Lamp Module – Tungsten Filament	19972
Turbidity Free Water	70908
Pour Through Assembly	19975
Cuvette Stand (holds 11 cuvettes)	19981
Sample Cuvettes – 3 pack	50051
Sample Cuvettes – 10 pack	50052
Batteries (set of 2)	19786
RS232 Cable for Serial Printer	19798

Glossary

Formazin Turbidity Units (FTU): *see Nephelometric Turbidity Units*

Indexing a Cuvette: The United States Environmental Protection Agency (US EPA) recommends that cuvettes used for turbidimeter calibration or sample measurement be indexed. To index a cuvette with a sample in it, slowly rotate the cuvette throughout one complete revolution (360°). While rotating the sample cuvette, observe the display and locate the position that the cuvette is in which provides the lowest turbidity reading. This position is the indexed position of the cuvette.

Nephelometric Turbidity Units (NTU): Unit of measure used when comparing the light scattered by a liquid media to the light scattered by a known concentration of Formazin Polymer. This unit of measure is recognized as a measure of the optical clarity of an aqueous sample. NTU is the accepted unit of measurement for turbidity.

Turbidity: 1) A measure of the attenuation of a radiant flux as it passes through a liquid media. 2) Optical clarity of a liquid, 3) a phenomena caused by the presence of undissolved matter in a liquid media.

WARRANTY

HF scientific, as vendor, warrants to the original purchaser of the instruments to be free of defects in material and workmanship, in normal use and service, for a period of one year from date of delivery to the original purchaser. HF scientific's obligation under this warranty is limited to replacing, at its factory, the instrument or any part thereof. Parts which by their nature are normally required to be replaced periodically, consistent with normal maintenance, specifically lamps including fluorescent backlight, reagent, desiccant, sensors, electrodes and fuses are excluded. Also excluded are accessories and supply type items.

Original purchaser is responsible for return of the instruments, or parts thereof, to HF scientific's factory. This includes all freight charges incurred in shipping to and from HF scientific's factory.

HF scientific is not responsible for damage to the instrument, or parts thereof, resulting from misuse, negligence or accident, or defects resulting from repairs, alterations or installation made by any person or company not authorized by HF scientific.

HF scientific assumes no liability for consequential damage of any kind, and the original purchaser, by placement of any order for the instrument, or parts thereof, shall be deemed liable for any and all damages incurred by the use or misuse of the instruments, or parts thereof, by the purchaser, its employees, or others, following receipt thereof.

Carefully inspect this product for shipping damage, if damaged, immediately notify the shipping company and arrange an on-site inspection. HF scientific cannot be responsible for damage in shipment and cannot assist with claims without an on-site inspection of the damage.

This warranty is given expressly and in lieu of all other warranties, expressed or implied. Purchaser agrees that there is no warranty on merchantability and that there are no other warranties, expressed or implied. No agent is authorized to assume for HF scientific. any liability except as above set forth.

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