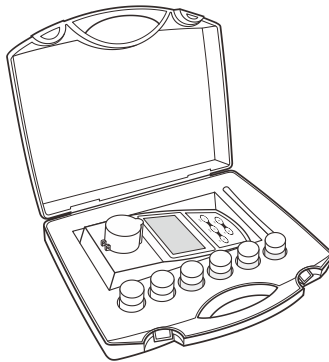# Kalstein

YR01841

Portable Turbidity Meter

Instruction Manual

Thank you very much for purchasing our YR01841 Portable Turbidity Meter.

Please read the "Operating Instructions" and "Warranty" before operating this unit to assure proper operation. After reading these documents, be sure to store them securely together with the "Warranty" at a hand place for future reference.

⚠️ Warning: Before operating the unit, be sure to read carefully and fully understand important warnings in the operating instructions.

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Introduction

Thank you for selecting the YR01841 portable turbidity meter. This manual provides a step-by-step guide to help you operate the meter, please carefully read the following instructions before use.

Environmental Conditions

Before unpacking, ensure that current environmental condition meets the following requirements.
- Relative humidity is less than 80%
- Ambient temperature is greater than 0°C/32°F and less than 50°C/122°F
- No ambient light and electromagnetic interference

Packing List

The following list describes all components of the meter. If any items are missing or damaged, contact the supplier immediately.

1 Turbidity meter	**2** Turbidity standards
3 Lint-free cloth	**4** Sample vials
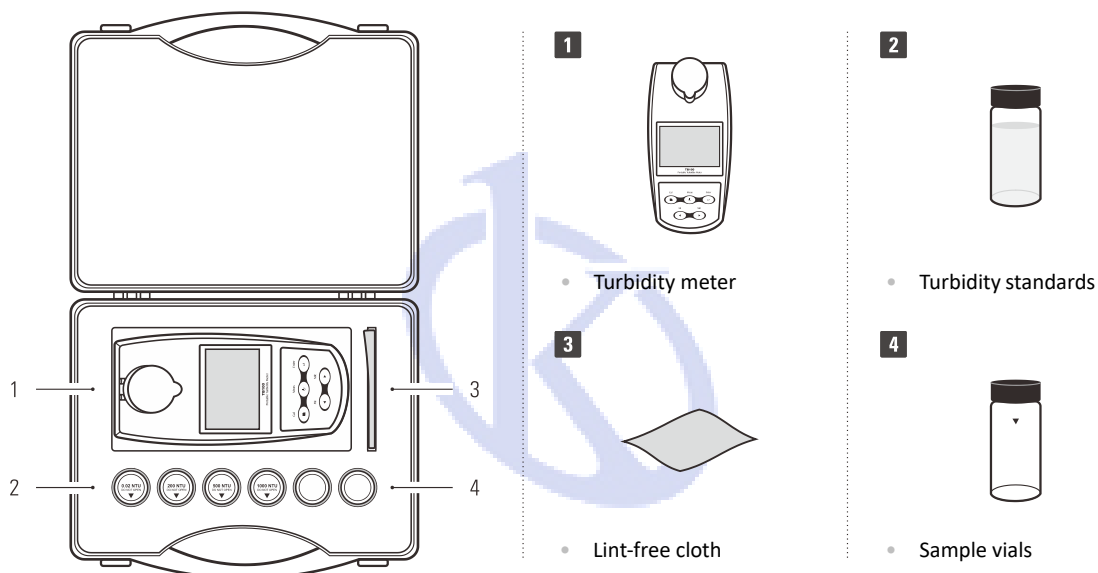
ⓘ The sample vial in the measurement chamber has been indexed with the 0.02 and 10 NTU standards at the factory.

Operating Principle

The YR01841 turbidity meter operates on the nephelometric principle of turbidity measurement and is designed to meet the criteria specified in ISO 7027. The following figure shows the basic optical system of meter. It includes a light source and a detector to monitor the light scattered at 90° with respect to the incident beam.
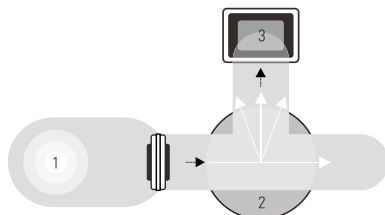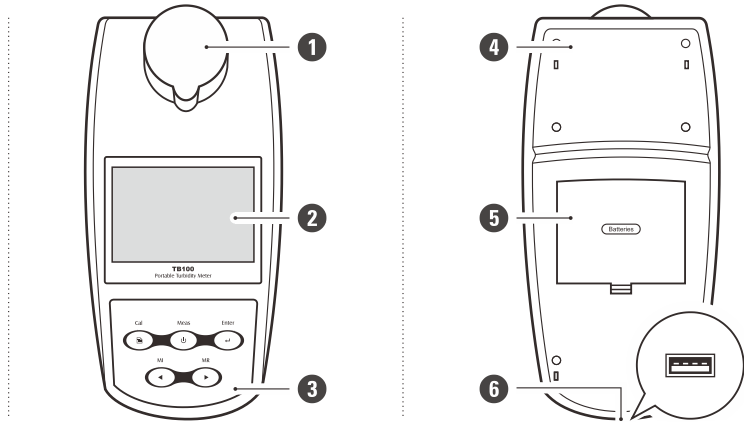

1. IR LED
2. Sample solution   3. Detector

Meter Overview

1. Measurement chamber
2. Display
3. Membrane keypad
4. Measurement module
5. Battery compartment
6. USB-A interface to computer

Keypad

Key	Function
Meas ⏻	• Switch the meter on or off • Press the key to perform a measurement • Exit the calibration, settings, data log and return to the measurement mode
Cal 📄	• Start calibration • Press and hold the key to enter the setup menu
MI ◄	• Store current reading to memory • Increase value or scroll up through a list of options
MR ►	• View the stored readings • Decrease value or scroll down through a list of options
Enter ↵	• Confirm the calibration, setting or displayed option

Display

1. Shows the battery status. Replace the batteries if the icon disappears.
2. Indicates that the meter is in the measurement mode.
3. Indicates that the meter is in the calibration mode.
4. Indicates that the meter is in the setup mode.
5. Indicates that you are viewing stored
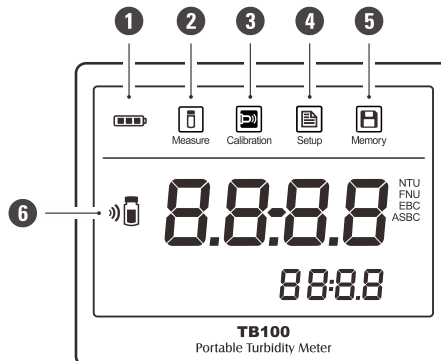
data or a reading is stored into the memory.
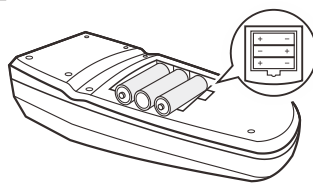6. Indicates that the meter is calibrating.

Installing the Batteries

1. Remove the battery compartment cover from the backside of meter.
2. Insert the three AA batteries into the battery compartment, note polarity.
3. Replace the battery compartment cover to its original position, push the limiter until it locks.
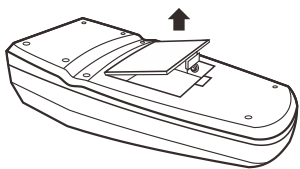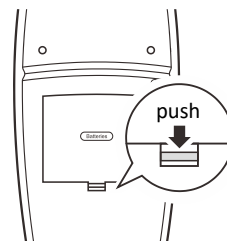

ℹ️ The meter allows using the DC5V power adapter (order code: DCPA-5V) or USB port on computer as a power supply. Note, take out the

Switching the Meter On and Off

• Press the ⏻ key to switch on the meter.
• Press and hold the ⏻ key to switch off the meter.

ℹ️ To enable the auto-power off function, refer to the *Setup Menu* section.

Setup Menu

The YR01841 turbidity meter contains 8 menu items in the setup menu, the following table describes the functions of each option.

Menu	Description	Options	Description	Default
CAL	Set the number of calibration points	2	2 to 5 points	2 points
dAtE	Set the date and time	---	Year, month, day, hour, minute	---
UNIt	Set the turbidity unit	NTU	Nephelometric turbidity unit	NTU
		FNU	Formazin nephelometric unit	
		EBC	European Brewery Commission units	
		ASBC	American Society of Brewing Chemists units	
rESO	Set the resolution of measurement	0.01	0.01	0.01
		0.1	0.1	
HOLd	Set the measurement mode	YES	Single measurement	Yes
		NO	Continuous measurement	
OFF	Auto-power off	YES	15 minutes after last key pressed	No
		NO	Disable	

| CLr | Clear all data logs | YES | Enable | No |
		NO	Disable	
rSt	Reset the meter to factory defaults	YES	Enable	No
		NO	Disable	

Setting a Default Option

1. In the measurement mode, press and hold the 📄 key to enter the setup menu.
2. Press the ◄/► key to select a menu item.
3. Press the **Enter** key, the meter shows the default option.
4. Press the ◄/► key to select a desired option.
5. Press the **Enter** key to save and return to the measurement mode.

Setting the Date and Time

1. In the measurement mode, press and hold the 📄 key to enter the setup menu.
2. Press the ► key, the meter shows $dAtE/P-2$.
3. Press the **Enter** key, the meter shows the current year.
4. Press the ◄/► key to set the year, press the **Enter** key to switch to the date and time options.
5. Press the ◄/► key to set the month, day, hour, minute, press the **Enter** key to save until the meter returns to the measurement mode.
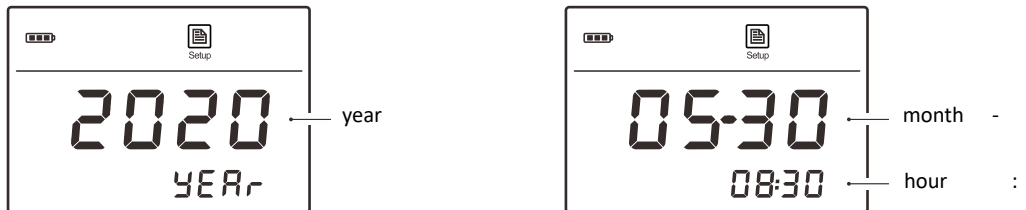
Factory Reset

The rSt option is used to restore the meter back to the factory default settings. If enabled, all of the calibration data and user-specific settings will be deleted or reset, the meter must be recalibrated.

1. In the measurement mode, press and hold the 📄 key to enter the setup menu.
2. Press the ◄ key, the meter shows $rSt/P-8$.
3. Press the **Enter** key, the meter shows NO/rSt indicating that do not reset the meter.
4. Press the ◄ key to select the YES/rSt, press the **Enter** key to confirm.
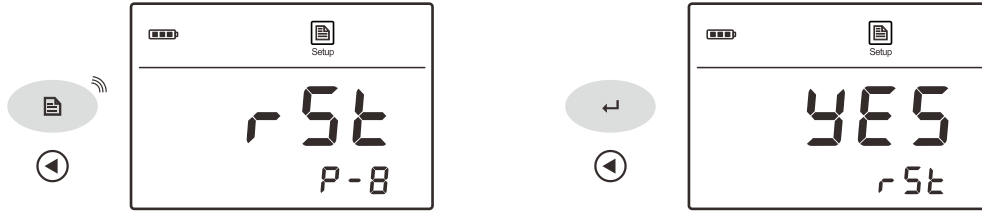
ℹ️ To exit the setup menu without saving changes, press the **Meas** key.

Measurement and Calibration Hints

- Do not hold the meter in the hand during the calibration and measurement.
- Never pour liquid directly into the measurement chamber.
- Keep the outside of vial clean and dry. If necessary, wipe the vial with a lint-free cloth.
- If the vial has scratches or scuffs, replace a new one (order code: TB-GV).
- Ensure that the sample is homogeneous. Do not shake or agitate the solution violently to prevent air bubbles.
- During the calibration and measurement processes, the triangle mark on the vial must be aligned with the arrow on the meter.
- Always close the light shield lid to prevent the measurement errors from ambient light.
- Wash the vial thoroughly with distilled water after measurement. Any residues can cause inaccurate readings.

Turbidity Calibration

The YR01841 turbidity meter allows turbidity calibration up to 5 points with minimum of 2 points, the default calibration points include the 0.02, 10, 200, 500, 1000 NTU. For better accuracy, we recommend that selecting a calibration point close to the sample value you are measuring. Note, the meter is calibrated with Formazin Standards at the factory and does not require user calibration before use.

Selecting the Number of Calibration Points

1.1 Press and hold the 🗏 key to enter the setup menu, the meter shows $CAL/P-1$.
1.2 Press the **Enter** key, the display shows $2/CAL$ (2 points calibration).
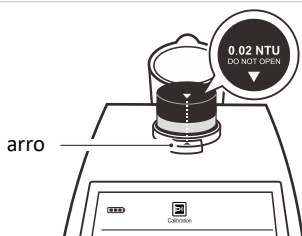1.3 Press the ◄/► key to select the number of calibration points, press the **Enter** key to confirm.

Calibrating the Meter

2.1 Press the **Cal** key, the meter enters the calibration mode, the display shows "0.02 NTU/CAL 1". If necessary, press the ◄/► key to select first calibration point, the meter will perform the calibration from the low to high turbidity.
2.2 Take out the corresponding turbidity standard from carrying case (e.g., 0.02 NTU), wipe the vial with a lint-free cloth to remove fingerprints. Hold the vial cap and gently inverting vial several times. Ensure that the turbidity standard is homogeneous and no air bubbles.
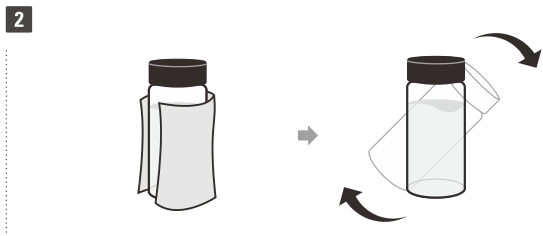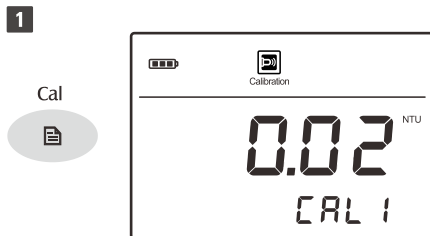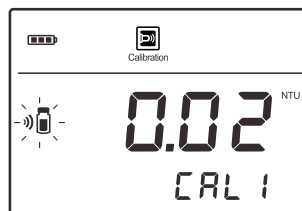

2.3 Insert the vial into the measurement chamber. Align the triangle mark on the vial cap with the arrow on the meter. Close the light shield lid.
2.4 Press the **Enter** key, the meter begins the calibration, the »🗏 icon continuously flashing.

3

0.02 NTU
DO NOT OPEN
▼

arro

4

Enter
↵

Calibration

0.02 NTU

CAL 1

2.5 When the reading stabilizes, the meter shows the next calibration point. If necessary, press the ► key to select a desired calibration point.

2.6 Repeat steps 2.2 through 2.4 above until the meter shows "End". Calibration is completed.

i To exit the calibration without saving calibrated values, press the **Meas** key.

Turbidity Measurement

## Selecting the Measurement Mode

The YR01841 turbidity meter contains two measurement modes. If the single measurement mode is enabled, the meter will automatically sense a stable reading and lock the measurement. If the continuous measurement mode is enabled, the meter will continuously measure and update readings.

1. In the measurement mode, press and hold the 🗏 key to enter the setup menu.
2. Press the ► key until the meter shows HOLd/P-S.
3. Press the **Enter** key, the display shows YES/HOLd indicating that the single measurement mode is enabled.
4. Press the ► key, the display shows NO/HOLd indicating that the continuous measurement mode is enabled.
5. Select one of the above options, press the **Enter** key to confirm.

Single Measurement – Low Turbidity Samples

For the low turbidity samples (< 200 NTU), we recommend that use the same vial to perform the calibration and measurement.

1.1 Rinse the vial with approximately 10 ml of sample. Cap the vial and gently inverting it several times. Discard the used sample and repeat the rinsing procedure two more times.

1.2 Fill the vial with the sample. Cap the vial and wipe with the lint-free cloth to remove waterdrop and fingerprints. Ensure that the outside of vial is dry and clean, the sample is homogeneous, no air bubbles.

1.3 Insert the vial into the measurement chamber. Align the triangle mark on the vial with the arrow on the meter. Close the light shield lid.

1.4 Press the **Meas** key, the meter begins the measurement. When the reading stabilizes, the Measure icon will stop flashing.

alig

Meas
⏻
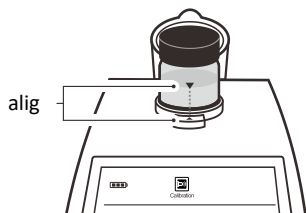
Measure

5.00 NTU

Single Measurement – High Turbidity Samples

For the high turbidity samples (> 1100 NTU), the solution must be diluted before measurement. The dilution water can be obtained by filtering distilled water through a < 0.45 µm filter membrane.

2.1 Repeat steps 1.1 through 1.4 above and record the reading.

2.2 Calculate the true turbidity of the original sample using the following formula.

$$T = [T_d (V_s + V_d)] / V_s$$

Where:T = Ture turbidity of the original sample $\quad$ V_s = Volume of the original sample (ml)

$\quad\quad\quad\quad$ T_d = Measured value $\quad\quad\quad\quad\quad\quad$ V_d = Volume of the dilution water (ml)

Continuous Measurement

3.1 $\quad$ Ensure that the meter is in the continuous measurement mode.

3.2 $\quad$ Repeat steps 1.1 through 1.3 above.

3.3 $\quad$ Press the **Meas** key, the Measure icon begins flashing, the meter continuously measures the sample.

ⓘ $\quad$ To stop the measurement, press the **Meas** key again.

Data Management

Storing a Measurement Result

The YR01841 turbidity meter is capable of storing and recalling up to 100 data sets. In the measurement process, press the **MI** key to store the reading into the memory, the Memory icon appears on the display.

Viewing the Data Logs

1. $\quad$ Press the **MR** key, the meter shows the serial number of stored data.

2. $\quad$ Press the ▶ key to view the date and time of measurement (format: month - day, hour : minute).

3. $\quad$ Press the ▶ key to view the stored data.

4. $\quad$ Press the ▶ key to view the next data set.

5. $\quad$ Press the **Meas** key to return to the measurement mode.

3

MR
▶

5.00 NTU
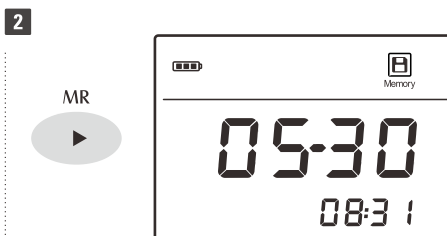
Clearing the Data Logs

If the memory is full, the meter will automatically show $FULL$ when the **MI** key is pressed. To delete data logs, please follow the steps below.
1.   In the measurement mode, press and hold the 🖹 key to enter the setup menu.
2.   Press the ◄ key until the meter shows $CLr/P-7$.
3.   Press the **Enter** key, the meter shows NO/CLr.
4.   Press the ◄ key to select the YES/CLr, press the **Enter** key to confirm.

Communication

Receiving the Data

1.   Connect the USB cable to meter and computer.
2.   Click the **DAS_TB_Series** icon, the system automatically scans an available communication port and shows a message box "Found a port on your computer".
3.   Click the **OK** button, the application starts.
4.   Click the **Connect** button, the screen shows "Port is connected".
5.   Click the **OK** button, then click the **Receive** button, the stored data automatically transfer to computer.

ⓘ   If your computer can not find a communication port, click the "CP210xVCPInstaller_x64.exe" or "CP210xVCPInstaller_x86.exe" to update the drive program.

Creating an Excel File

When the transfer is completed, click the **Save as Excel** button, the readings in data sheet will automatically convert to Excel file.

⚠   Note, once the software is closed, all received data will be lost and can not be recovered.

Appendix

Indexing a Sample Vial

The United States Environmental Protection Agency (U.S. EPA) recommends that the vial used for turbidity calibration or sample measurement be indexed. Its purpose is obtain a position which provides the lowest turbidity reading. The indexing methods are as follows.
1.1   Fill the vial with the distilled water (< 0.5 NTU). Cap the vial.
1.2   Wipe the vial with the lint-free cloth. Ensure that the outside of vial is clean and dry.
1.3   Place the vial in the measurement chamber. Align the triangle mark on the vial with the arrow on the meter.
1.4   Press the **Meas** key, the meter begins the measurement.
1.5   Slowly rotate the vial approximately 45°. Close the light shield lid and record the reading.
1.6   Repeat the step 1.5 until the lowest turbidity reading is shown. Mark this position on the vial.

Matching the Sample Vials

For better accuracy and repeatability, using a indexed vial is best choice for turbidity measurement. If you need to use a few vials, match these vials are necessary.

2.1   Repeat steps 1.1 through 1.6 above for each vial and record the readings.

2.2   Find the closest position of these vials measuring value and mark it.

Preparation of Formazin Standards

Turbidity-Free Water:

The turbidity-free water is used for preparation of turbidity standards and is prepared by filtering distilled water through a 0.45 µm or smaller pore-sized membrane.

Turbidity Standards:

4000 NTU	• Dissolve 1 gram hydrazine sulfate $(NH_2)_2 \cdot H_2SO_4$ in the turbidity-free water and dilute to 100 ml in a volumetric flask • Dissolve 10 grams hexamethylenetetramine $(CH_2)_6N_4$ in the turbidity-free water and dilute to 100 ml in a volumetric flask • Mix 5 ml of hydrazine sulfate and 5 ml of hexamethylenetetramine solutions in a 100 ml volumetric flask and let stand 24 hours at 25/±3°C (77/±5.4°F)
1000 NTU	Mix 25 ml of 4000 NTU standard in a 100 ml volumetric flask and dilute to the mark
500 NTU	Mix 12.5 ml of 4000 NTU standard in a 100 ml volumetric flask and dilute to the mark
200 NTU	• Mix 10 ml of 4000 NTU standard in a 100 ml volumetric flask and dilute to the mark • Mix 50 ml of above standard in a 100 ml volumetric flask and dilute to the mark
10 NTU	• Mix 10 ml of 4000 NTU standard in a 100 ml volumetric flask and dilute to the mark • Mix 2.5 ml of above standard in a 100 ml volumetric flask and dilute to the mark - Or - Mix 2 ml of 500 NTU standard in a 100 ml volumetric flask and dilute to the mark

Optional Accessories

Order Code	Description
TB-GV	Glass sample vial, 60 (H) × 25 (Dia) mm (2.36 × 0.98")
TB-CAL	Turbidity standards kit, includes 0.02, 200, 500, 1000 NTU, 30 ml each bottle
TB-FZ	4000 NTU formazin standard stock solution, 480 ml
USB-A	USB cable, 1 m (3.2 ft)
DCPA-5V	DC5V power adapter, european standard plug, 1 m (3.2 ft) cable

Specifications

Model	YR01841
Measurement Method	ISO 7027 nephelometric method (90°)
Range	0 to 1100 NTU/FNU, 0 to 275 EBC, 0 to 9999 ASBC
Resolution	0.01 NTU (0 to 100 NTU), 0.1 NTU (100 to 999 NTU), 1 NTU (999 to 1100 NTU)
Accuracy	±2% of reading (0 to 500 NTU), ±3% of reading (501 to 1100 NTU)
Calibration Points	2 to 5 points
Calibration Standards	0.02, 10, 200, 500, 1000 NTU
Light Source	Infrared-emitting diode (850 nm wavelength)

Detector	Silicon photodiode
Stray Light	< 0.02 NTU
Sample Vial	60 (H) × 25 (Dia) mm (2.36 × 0.98")
Sample Volume	30 ml (1 oz.)
Memory	100 data sets
Communication Interface	USB
Operating Temperature	0 to 50°C (32 to 122°F), meter only
Storage Temperature	-5 to 60°C (23 to 140°F)
Relative Humidity	< 80% (non-condensing)
Display	Segmented LCD, 60 × 40 mm (2.36 × 1.57")
Power Requirements	3 × 1.5V AA alkaline batteries or DC5V power adapter
Dimensions	180 (L) × 85 (W) × 70 (H) mm (7.08 × 3.34 × 2.75")
Weight	300 g (10.6 oz.)

Disposal

This meter is required to comply with the European Union's Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC and may not be disposed of in domestic waste. Please dispose of this product in accordance with local regulations at the collecting point specified for electrical and electronic equipment.

Warranty

The warranty period for meter is 1 year from the date of shipment. Above warranty does not cover the standard solutions. Out of warranty products will be repaired on a charged basis. The warranty on your meter shall not apply to defects resulting from:
- Improper or inadequate maintenance by customer.
- Unauthorized modification or misuse.
- Operation outside of the environment specifications of the products.

For more information, please contact the supplier.