



TECHNICAL NOTE

Verifying ION 7500 / ION 7600 Accuracy

All ION meters are tested and verified at the factory according to International Electrotechnical Commission (IEC) standards; however, before a new revenue meter is installed it is important to perform a final accuracy verification.

This technical note outlines a procedure for accuracy testing ION 7500 / ION 7600 meters.

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Applicable Products

ION 8500	
ION 8400	
ION 8300	
ION 7600	✓
ION 7500	✓
ION 7350	
ION 7330	
ION 7300	
ION 6200	
ION Enterprise	✓
ION Setup	✓

Additional Information

- ◆ Your meter's technical documentation
- ◆ *ION Setup Online Help*
- ◆ The online *ION Enterprise Help*
- ◆ *ION Reference*

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Introduction

The revenue-accurate ION 7500 / ION 7600 meter is digital and therefore needs no servicing. It is tested for accuracy at the factory and remains accurate for the life of the meter. In contrast, electro-mechanical meters need mechanical adjustment before installation and periodic calibration thereafter. This procedure of 'calibration testing' is unnecessary for digital meters.

Digital meters require 'accuracy' testing, or verification to ensure the meter meets required accuracy specifications. If you know your meter is within required accuracy specification before installation, errors observed in the field could be attributed to incorrect connections or instrument transformer ratio settings.

Testing Overview

The most common method for testing meters is to inject voltage and current from a stable power source in combination with a reference meter. Although meter shops use different methods for testing revenue meters, most test equipment requirements are similar. See below for test equipment guidelines:

Test harness

A test harness is essential for non-socket meters. Ensure that the test harness for the meter is wired properly. The current and voltage transformers must be accurately rated and must perform within specifications to provide accurate results.

Power source

It is important to have a steady power source. Power that energizes the meter from the socket must be reliable and provide the rated voltage of the meter, unity power factor (1) and lagging power factor of 0.0 (for VARh testing) or 0.5.

Test loads

There are three methods of current loading: customer's load (a meter in service), resistance load (characteristics similar to a lighting load), and phantom loading (a test board). Your test load device or other loading circuit must be set within the current capacity ranges for the meter. The procedure outlined in this technical note describes verification using a phantom load or test board.

Control equipment

Control equipment is required for counting and timing the pulse outputs (revolutions) from the front panel LEDs or the digital outputs. Most standard test benches have an arm with infrared sensors used for this purpose.

Environment

The meter should be tested at the same temperature as the testing equipment. The ideal temperature is about 22°C (72°F). Ensure the meter is sufficiently warmed-up before testing.

NOTE

Verify the accuracy and precision of any measurement equipment you use (i.e. voltmeters, ammeters, power factor meters).

Test Procedure

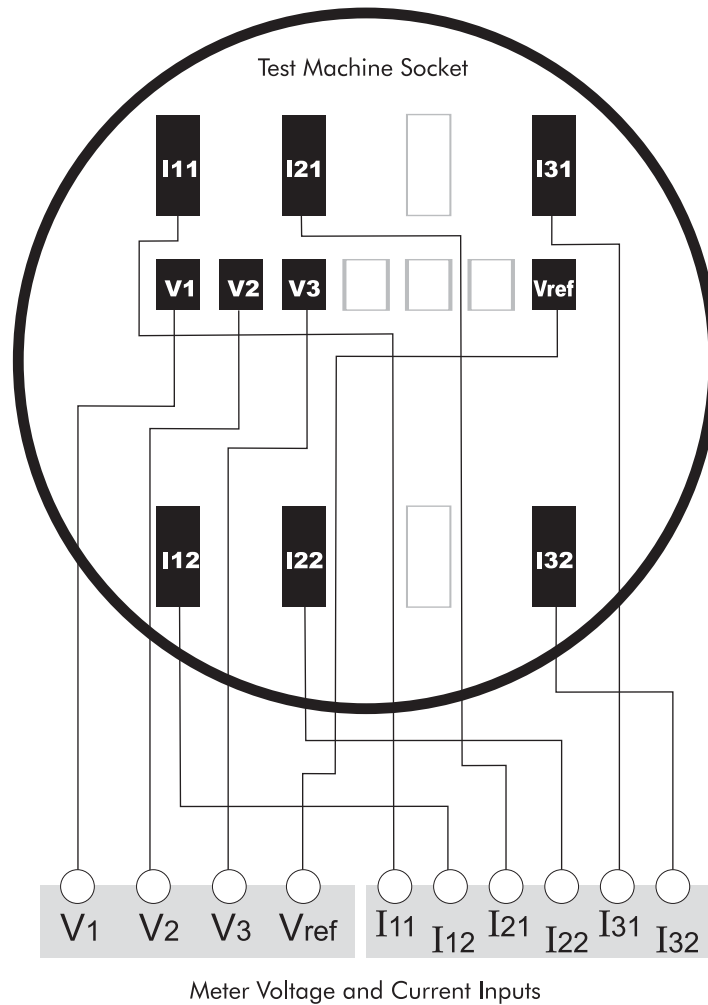
The following are guidelines for testing the meter. Your meter shop may have other testing methods:

1. Place the meter into the test harness or other standard measuring device. Ensure all voltages are in parallel with the meter being tested and all currents are in series (see “Connecting the Test Harness” on page 4).
 2. Connect the control equipment used for switching the voltage to the test standard device.
 3. Connect the control equipment used for counting the standard output pulses using either method:
 - ◆ align the infrared sensor on the standard test bench armature over the bottom front panel LED pulser.
- OR**
- ◆ connect to the meter’s digital outputs (see “Connecting the Control Equipment” on page 5).
4. Apply the rated current and voltage to the terminals of the meter.
 5. Before performing the verification test, let the test equipment power up the meter. Apply voltage for at least 20 seconds. The warm-up allows the internal circuitry and capacitors to stabilize.
 6. Set the meter’s volts mode to 4W-WYE.
 7. You may choose to place the meter in test mode (see “Using Test Mode” on page 6). This allows the meter to enter the field with no kWh values in the registers. If you are performing field testing, put the meter in test mode to avoid incorrect customer billing.
 8. Perform testing on the test points (see “Test Points” on page 11).
 9. Run each test point for at least five seconds to allow the test bench equipment to read an adequate number of pulses. Allow three seconds of dwell time between test points.

Connecting the Test Harness

WECO model 8CA-1 adapter provides an easy means of connecting an ION 7500 / ION 7600 meter to a WECO test machine.

1. Connect the harness wires to the meter's voltage and current inputs. See below for details:



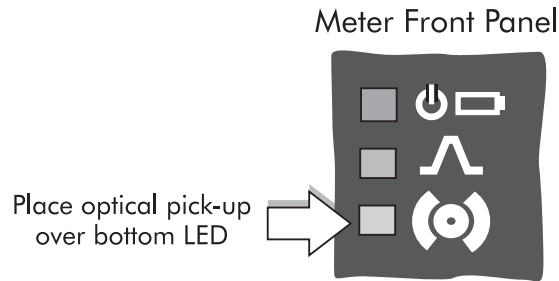
2. Plug the adapter into the WECO test machine's socket.
3. Set the WECO machine to **9S**.

Connecting the Control Equipment

You can use either the meter’s front panel LED or the digital outputs for control purposes. TRAN models do not have LEDs; use the digital outputs instead.

Using the LED

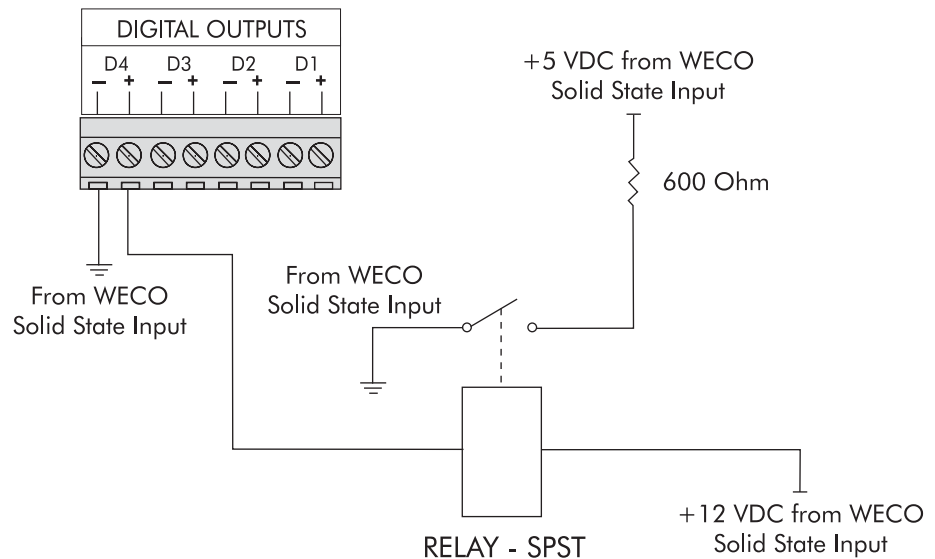
- Carefully position the test machine’s optical arm over the meter’s bottom red Alarm LED. See below:



- Set test machine to “adjust optics” and ensure that LED pulses are being read.

Using the Digital Outputs

Connect the meter’s digital outputs to the WECO test machine. These captured wire connectors are found on the rear of the meter. See below for details:



Using Test Mode

When the meter is in test mode, it does not accumulate billable quantities. The test measurements collected by the meter are sent to different registers so that the billing quantities are not changed.

NOTE

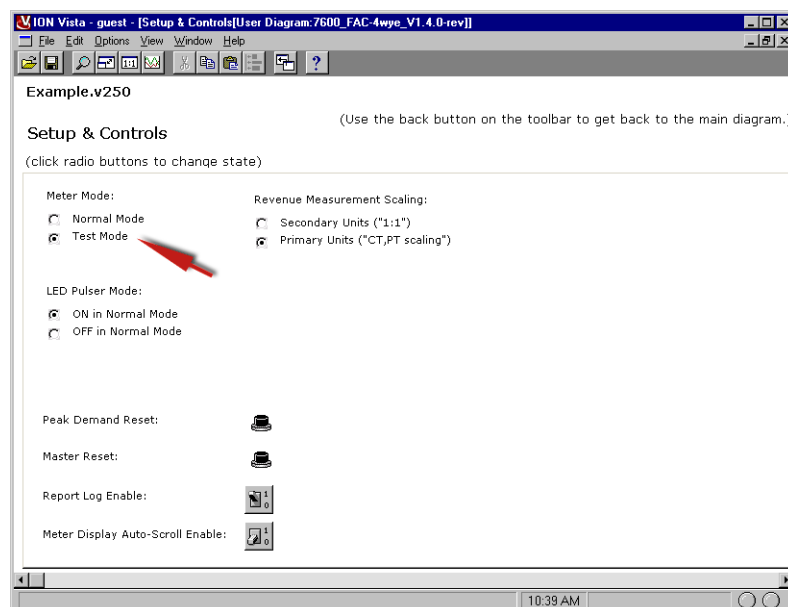
Hardware locked meters must be unlocked before they can enter test mode. See the ION 7500 / ION 7600 Revenue Meter product option document for more information on locking and unlocking meters.

Switching to Test mode

Place the meter into test mode using the Vista component of ION Enterprise software or using ION Setup. The meter's front panel informs you when the meter is in test mode with a special Test Mode display screen.

Entering Test Mode using Vista

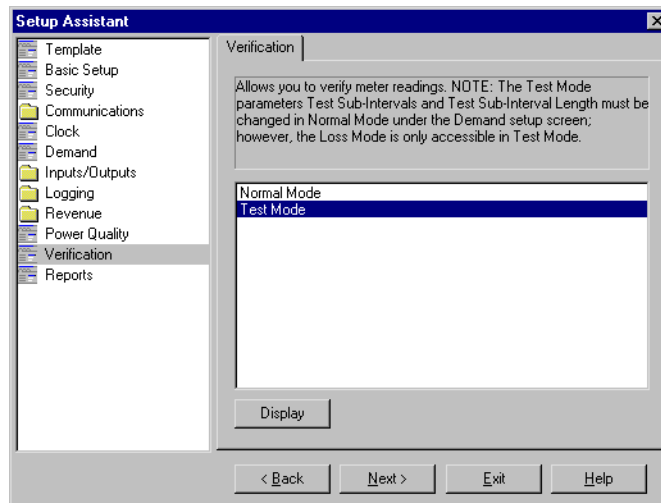
1. Open the meter in Vista and click the Revenue button.
2. Click the Setup & Controls button in the bottom right-hand corner of the revenue screen.
3. Select the Test Mode radio button. You are prompted for the ION Enterprise user password. If meter security is enabled, you are also prompted for the meter password.



Use this screen to view and reset the registers that accumulate real-time data. For more information see the online *ION Enterprise Help*.

Entering Test Mode using ION Setup

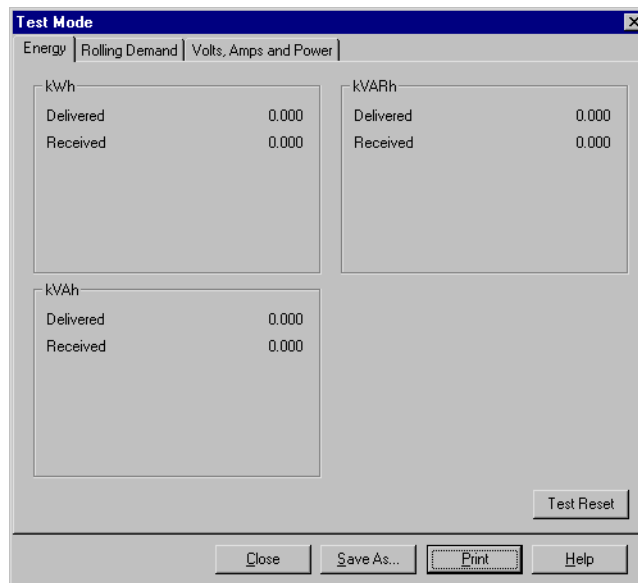
1. Open ION Setup and connect to the meter using Basic Mode.
2. Click on Setup Assistant and select the Verification folder.



3. Click on Test Mode. If security is enabled, you are prompted for password. A dialog box informs you the meter is in Test Mode.



4. Click OK. The Test Mode screen appears and test values are displayed.



Click on the tabs to perform various test-related tasks. See the *ION Setup Online Help* for more information.

5. Click Close. A dialog box informs you the meter is back in Normal Mode.



Configuring Test Settings

When testing the meter, ensure the test parameters are suited to your testing methods.

Two meter hardware channels can be used for accuracy testing, depending on which method of control you are using: the bottom red LED on the meter's front panel or a digital output (DO4) on the rear of the meter. You can have either channel pulse the following energy measurements:

- ◆ kWh del+rec (default for DO4)
- ◆ kVARh del (delivered)
- ◆ kVARh rec (received)
- ◆ kWh del
- ◆ kWh rec

To change the energy measurement that a hardware channel pulses, you may need to first "unlink" the channel from its associated ION module. This is necessary if the channel is already in use (such as DO4 which is linked, by default, to the kWh del+rec module). Once unlinked, you can then associate the port with another energy measurement (for example, kVARh delivered). If the channel does not appear in your list of port options, it is already linked and must be unlinked.

Changing the energy measurement in ION Setup

1. Open ION Setup and connect to your meter in Advanced Mode.
2. Click the Calibration Pulser Modules folder.

Unlinking the hardware channel

3. Double-click the Wh Pulser -LED module to edit the LED or the Wh Pulser -D4 module to edit the digital output. If security is enabled on the meter, you are prompted for a password.
4. Select the Setup Registers tab.
5. Double-click the Port register to edit. Select **NotUsed** from the list and click OK.
6. Click Send to save your changes to the meter.

Re-linking the hardware channel

7. Double-click the module you want to associate with the now unlinked hardware channel (for example, kVARh delivered).
8. Select the Setup Registers tab.
9. Double-click the Port register to edit. Select either **Alarm LED** or **Port DO4** from the list and click OK.
10. Click Send to save your changes to the meter.

Changing the energy measurement in Designer

1. Open the meter using Designer software and double-click the Pulse Frequency folder in Energy Pulsing Setup.
2. Right-click Calibration Pulser module 1 to configure the LED or Calibration Pulser module 2 to configure the digital output channel.

Unlinking the hardware channel

3. Double-click the Port register, select **NotUsed** and click OK.
4. Click the Save icon (or choose Send & Save from the File menu).

Re-linking the hardware channel

5. Right-click the module you want to associate with the now unlinked hardware channel (for example, kVARh delivered).
6. Double-click the Port register to edit. Select either **Alarm LED** or **Port DO4** from the list and click OK.
7. Click the Save icon (or choose Send & Save from the File menu).

You may need to adjust the pulse rate; use Designer software or ION Setup Advanced Mode.

Changing the pulse rate in ION Setup

1. Open ION Setup and connect to your meter in Advanced Mode.
2. Click the Calibration Pulser Modules folder.
3. Double-click the Wh Pulser -LED module to edit the LED or the Wh Pulser -D4 module to edit the digital output. If security is enabled on the meter, you are prompted for a password.
4. Select the Setup Registers tab.
5. Double-click the W Kt register to edit. When you have finished editing the register, click OK and then Send to save your changes to the meter.

Changing the pulse rate in Designer

1. Open the meter using Designer software and double-click the Pulse Frequency folder in Energy Pulsing Setup.
2. Right-click Calibration Pulser module 1 to configure the LED or Calibration Pulser module 2 to configure the digital output channel.
3. Double-click the Kt register, make your change and click OK.
4. Click the Save icon (or choose Send & Save from the File menu).

The value entered defines how much energy the module accumulates before a pulse is sent to the hardware channel. The default Kt value is 1.8 kW.

Test Points

Wh test points

It is common practice to test these watt-hour test points:

Watt-hour Test Point	Specifications
Full Load	100% of the rated current, test voltage and rated frequency at unity power factor, or one (1).
Light Load	10% of the rated current, test voltage and rated frequency at unity power factor, or one (1).
Lagging Power Factor	100% of the rated current, test voltage and rated frequency at 0.50 lagging power factor (current lagging voltage by 60° phase angle).

VARh points

It is common practice to test these VAR-hour test points:

VAR-hour Test Point	Specifications
Full Load	100% of the rated current, test voltage and rated frequency at zero power factor (current lagging voltage by 90° phase angle).
Light Load	10% of the rated current, test voltage and rated frequency at zero power factor (current lagging voltage by 90° phase angle).
Lagging Power Factor	100% of the rated current, test voltage and rated frequency at 0.50 lagging power factor (current lagging voltage by 60° phase angle).