IT IS ESSENTIAL THAT THIS INSTRUCTION BOOK BE READ THOROUGHLY BEFORE PUTTING THIS PRODUCT INTO SERVICE.
Limited Warranty

Your MT-1/WT3 comes with a two-year hardware warranty. Probewell Lab Inc. (Probewell) warrants this MT-1/WT3 against defects in material and workmanship for a period of two (2) years from the date of purchase from Probewell. This warranty applies only to the original purchaser of the MT-1/WT3 and is not transferable.

All accessories come with a two-year hardware warranty. Probewell warrants all accessories against defects in material and workmanship for a period of two (2) years from the date of purchase from Probewell. This warranty applies only to the original purchaser and is not transferable.

This warranty does not cover any damage caused neither by negligence, non-authorized modifications, or parts installed without prior written permission from Probewell.

This warranty does not apply if the product has been damaged by accident, abuse, misuse, or misapplication, nor as a result of service to the product by anyone other than Probewell.

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<th>Complete Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Ampere</td>
</tr>
<tr>
<td>Amp</td>
<td>Ampere</td>
</tr>
<tr>
<td>AC</td>
<td>Alternating Current</td>
</tr>
<tr>
<td>AP</td>
<td>Access Point</td>
</tr>
<tr>
<td>ATK</td>
<td>Accuracy Testing Kit</td>
</tr>
<tr>
<td>CFM</td>
<td>Cubic feet per minute</td>
</tr>
<tr>
<td>CL</td>
<td>Class</td>
</tr>
<tr>
<td>CSV</td>
<td>Comma Separated Value</td>
</tr>
<tr>
<td>CT</td>
<td>Current Transformer</td>
</tr>
<tr>
<td>DSP</td>
<td>Digital Signal Processor</td>
</tr>
<tr>
<td>HL</td>
<td>High Load (Full Load)</td>
</tr>
<tr>
<td>Kh</td>
<td>Watthour constant. The number of watthours represented by one revolution of the disk. Also, called disk constant.</td>
</tr>
<tr>
<td>Kt</td>
<td>Test constant. For electronic (no disk) meter, the amount of energy represented by each calibrated pulse of the LED.</td>
</tr>
<tr>
<td>kW</td>
<td>Kilowatt</td>
</tr>
<tr>
<td>Lb</td>
<td>Pound</td>
</tr>
<tr>
<td>LL</td>
<td>Light Load</td>
</tr>
<tr>
<td>NIST</td>
<td>National Institute of Standard and Technology</td>
</tr>
<tr>
<td>PF</td>
<td>Power Factor</td>
</tr>
<tr>
<td>PPI</td>
<td>Pore per inch</td>
</tr>
<tr>
<td>Rev</td>
<td>Revolution, number of revolutions</td>
</tr>
<tr>
<td>RMS</td>
<td>Root mean square</td>
</tr>
<tr>
<td>TA</td>
<td>Test Ampere</td>
</tr>
<tr>
<td>THD</td>
<td>Total Harmonic Distortion</td>
</tr>
<tr>
<td>V</td>
<td>Volt</td>
</tr>
<tr>
<td>VA</td>
<td>Volt-Ampere</td>
</tr>
<tr>
<td>VAC</td>
<td>Volt Alternating Current</td>
</tr>
<tr>
<td>VARh</td>
<td>VARhour (Volt Ampere Reactive Hour)</td>
</tr>
<tr>
<td>Vdc</td>
<td>Voltage direct current</td>
</tr>
<tr>
<td>VT</td>
<td>Voltage Transformer</td>
</tr>
<tr>
<td>W</td>
<td>Watt</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Complete Term</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Wh</td>
<td>Watthour</td>
</tr>
<tr>
<td>WiFi</td>
<td>Wireless Fidelity</td>
</tr>
<tr>
<td>WLAN</td>
<td>Wireless Local Area Network</td>
</tr>
<tr>
<td>WWW</td>
<td>World Wide Web</td>
</tr>
<tr>
<td>µWh</td>
<td>Micro-Watthour</td>
</tr>
<tr>
<td>µVARh</td>
<td>Micro-VARhour</td>
</tr>
</tbody>
</table>
Chapter 1

Introduction

The Probewell Lab MT-1/WT3 is a portable three-phase meter tester with built-in WiFi technology.

MT-1/WT3 Overview

The MT-1/WT3 test socket adapter weighs only 6.4 lb which makes it the ideal tool for field testing. Within a few minutes, a residential, commercial or industrial electricity meter can be accurately tested on site by meter shop technicians. The MT-1/WT3 can be set to test all three phases simultaneously in one step (Quick Test) or set to do the three phases simultaneously followed by each element separately (Full Test). The MT-1/WT3 provides measurements for active and reactive energy with forward and reverse flow testing capability.

The MT-1/WT3 has a built-in three-phase phantom load made of synthesized 50A current sources and a three-phase electronic standard with a typical accuracy of ±0.02% and a guaranteed accuracy of ±0.05%. It comes with a complete calibration report certifying measurement accuracy across its entire operating range.

The MT-1/WT3 comes with a shock resistant carrying bag. The bag has individual compartments for the test socket, the pickups and the User’s Guide. There is also enough space for small accessories such as the magnetic adapter for the optical pickup, seals, pliers, etc.

Optional: A handheld remote is available for the MT-1/WT3, having a keypad and an LCD display and weighing only 0.6 lb.
Chapter 2

Description

The first part of this chapter describes the MT-1/WT3 socket. The second part explains the functioning theory of the tester.

MT-1/WT3 Socket

The MT-1/WT3 socket is cylinder-shaped, designed to be easily inserted in both ringless and ring-type meter bases. A latch with a quick release mechanism is available as an option for ring-type meter bases.

The socket contains three 50A synthesized AC current sources to simulate resistive and reactive loads, a high accuracy three-phase electronic standard and a WiFi communication controller.

The rear of the socket has six standard fixed tabs with bypasses and two removable twist-tabs, with twist and lock mechanism. The socket obtains its power directly from these back tabs and accepts an input voltage from 100 to 600VAC.

The twist-tabs can be placed at 3, 5, 6 and 9 o'clock position as required by the meter base where the test is conducted. The twist-tab at 3 o'clock can be inserted at two different positions to hold either forms 6S, 8S, 9S or form 4S. The twist-tab at 9 o'clock can be inserted at two different positions to hold either forms 6S, 8S, 9S or forms 3S, 4S, 12S. One of the twist-tab can be positioned at 5 o'clock for some 3S or 12S meter bases or positioned at 6 o'clock for 14S, 15S, 16S meter bases. See Appendix C for all twist-tab configurations.

The front of the socket has seven jaws and five spring loaded contact pistons. The pistons are actuated by the middle lugs of the meter. A spring contact at 6 o'clock is also provided for 12S meters. The meter under test is entirely controlled by the socket. No setup wiring is needed.

The socket has a dead front design for safer operation. The front jaws of the socket become live only when a meter is inserted. See Appendix A for all technical specifications.
Fig. 2.1 – Front and Rear View of the Socket

Fig. 2.1 shows the removable twist-tabs which do not require any tools to be moved from a position to another. The above illustration shows only the twist-tab positioned at 3 and 9 o’clock.
Side View of the Socket

Fig. 2.2 – Side View of the Socket
<table>
<thead>
<tr>
<th>Identification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rear Tabs</td>
<td>The rear tabs connect the socket to the front jaws of the meter base. The socket gets its power directly from the meter base (100-600VAC) circuit. The service current shorting bars (bypasses) are rated for high capacity amperage.</td>
</tr>
<tr>
<td>Removable Tabs</td>
<td>These tabs can be positioned at 3, 5, 6, or 9 o'clock position as required by the meter base where the test is conducted. See Appendix C.</td>
</tr>
<tr>
<td>Form Selector</td>
<td>In position 1S, 2S, and 15S, the unit is powered from the two upper tabs. In position 3S, 12S, 14S and 16S, the unit is powered from the Phase C and the neutral tab. In position 4S, 6S, 8S and 9S the unit is powered from the 3 and 9 o'clock tabs.</td>
</tr>
<tr>
<td>Circuit Breakers</td>
<td>Protection for the MT-1/WT3 and the meter. Two circuit 1A breakers which can be reset by pressing a spring-loaded button.</td>
</tr>
<tr>
<td>Power Switch</td>
<td>Socket's main power on/off switch.</td>
</tr>
<tr>
<td>Front Jaws</td>
<td>The front jaws are controlled by internal relays allowing to test meters. The front jaws become live only when a meter is inserted. The voltage on the front jaws is current limited for additional protection.</td>
</tr>
<tr>
<td>Pistons</td>
<td>These are actuated by the small lugs on the back of the meter when inserted for testing.</td>
</tr>
<tr>
<td>I/O Connector</td>
<td>Isolated full-duplex communication port. It also provides an isolated and current limited low voltage supply for the accessories (optical pickup and metercam) and the optional handheld remote control.</td>
</tr>
<tr>
<td>QR Code Sticker</td>
<td>The QR code sticker contains the access point information to be scanned for a mobile device as well as the MAC address.</td>
</tr>
<tr>
<td>LED</td>
<td>Socket Status Indicator.</td>
</tr>
<tr>
<td>Magnetic Switch</td>
<td>Switch for any manual entry using a magnet.</td>
</tr>
<tr>
<td>Air Vent (1)</td>
<td>Warm air exit. A 5 CFM miniature fan forces air circulation inside the socket.</td>
</tr>
<tr>
<td>Air Inlet (1)</td>
<td>Cool air input. Filtered through polyurethane foam filter.</td>
</tr>
</tbody>
</table>

(1) Do not block air circulation. Keep away from direct heat or flame.
Functioning Theory

MT-1/WT3 applies a load to the meter under test, then measures exactly the quantity of energy that passes through the meter. After a predetermined number of disk revolutions, or a minimum time in the case of a solid-state meter, the test will end, and the application (Probewell Connect) will display the difference between the meter and the MT-1/WT3’s internal electronic standard.

Current Applied to the Meter

The current applied to the meter under test is achieved by three independents built-in 50A synthesized AC current sources. The current level is adjustable and regulated. The current sources allow to simulate loads at unity and 0.5 lagging power factor. They are isolated and form three independent current loads in closed-link arrangement. This configuration allows to check a meter without the need to open the potential link of the meter and no wiring setup is necessary.

Voltage Applied to the Meter

The voltage applied to the front jaws is derived from the meter base circuit. For safety reasons, the voltage is applied to the front jaws only when a meter is inserted. The voltage is also current limited.

The front jaws of the MT-1/WT3 are controlled by internal relays allowing to test self-contained and CT rated three-phase and single-phase watthour meter form configurations without wiring setup.

Built-in Electronic Standard

The built-in electronic standard in the MT-1/WT3 has an exceptional accuracy thanks to the use of electronic transducers developed by Probewell. These transducers have an exceptional long-term stability and linearity and are not affected by temperature.

The electronic standard does not contain any potentiometers or other types of screw adjustment that could become unstable with time. It uses digital technology to ensure a maximum of reliability over time. A DSP processor measures and calculates the exact energy, active or reactive, that passes through the meter. This technology has the advantage of obtaining a more compact and lightweight electronic standard while minimizing electronic components.

Accuracy Test

The MT-1/WT3’s electronic standard is calibrated using a primary standard traceable to NIST and comes with a complete calibration report certifying measurement accuracy on both Wh and VARh scales over its entire operating range. Accuracy test on MT-1/WT3 can be done in your own laboratory using:
• An electronic reference standard traceable to NIST. The electronic standard must have at least 1 isolated current input port of a minimum capacity of 50A with auto ranging capability and a typical precision of 0.01% or better;
• A laboratory stabilized and isolated AC power source with fundamental waveform selectable 120V or 240V, 60Hz, rated at least 150VA;
• The Accuracy Test Kit (ATK-3) for three-phase testers.

For more information on socket accuracy test please refer to the ATK and Probewell Connect for WT series documentations.
Meter Testing

Tests performed with a pickup accessory (Optical or Metercam)

Four different tests can be done with optical pickups: Quick, Full, Custom and Four-Quadrant Test.

Quick Test, Full Test and Four-Quadrant Test are made up of a predetermined sequence of consecutive steps and tests, all of which are done in one operation. The sequence is programmable and can be modified through the Settings tab. By default, the sequence includes one test point with each of the loads: HL, PF and LL.

In Quick Test, the three phases (ABC) are tested simultaneously in one step.

In Full Test, a Quick Test is performed followed by each phase separately (A, B, and C). In the Settings tab, there is an option to remove the PF and/or LL for each single element test.

In Four-Quadrant Test, the equivalent of a Quick Test is done at various phase lags between Voltage and Current. This is meant to test the operation of the meter in all four quadrants of the power vector diagram.

Please note that with single-phase meters, only the Quick Test and Four-Quadrant Test will be activated as there is no Full Test for single-phase meters.

Custom Test consists in choosing one of the three loads to apply to the meter: HL, PF or LL. The disk revolutions or pulses are counted automatically by the pickup. No critical timing is required to start a test. The test ends automatically.

When testing a three-phase meter, you can also choose to apply the load on all phases (ABC) at the same time or on each phase individually (A, B or C). The phase selection is done by selecting the appropriate phase (A, B, C, or A+B+C) in the Select Active Phase drop down window.

Tests performed without a pickup accessory (Optical or Metercam)

Manual Test is used when the operator counts the disk revolutions manually. A magnet is used to start and end the test manually by applying it to the side of the socket (see figure 2.2). The operator can set his own parameters for conducting a test, such as the number of revolutions and the load to be applied. The load can be switched dynamically during the test.

Please note that without the help of a pickup, if the operator signals the start or the end of a test too soon or too late using the magnet (magnetic switch), the number of disk revolutions (a whole number without fraction) might not be accurate and will affect the precision of the test.

Tracking Test is like the Manual Test except the socket counts the number of revolutions and displays them on your wireless device. The count is based on the selected Kh of the meter and the cumulative watthours recorded by the MT-1/WT3 and not the physical count of the disk revolutions. A magnet can be used to start and end the test.
**kW Demand** Test allows the operator to perform a kW demand test and the test is calculated using the following formula:

\[ kW = \text{kWh} \times \frac{60}{T} \]

Where \( T \) = Demand interval length in minutes

**Note:** With solid-state metering, conducting energy and demand tests may be considered redundant since they are both results of the same measurement.

Set up the meter for a kW demand test following the manufacturer's instructions. Please note that the kW demand test method varies between manufacturer's reference technical guide for instructions.

**Line monitor** Test analyzes the input voltage to determine statistically the line voltage, frequency fluctuations and its harmonic content (THD) up to the 32nd order.

**KYZ** Test is used to verify the KYZ or KY meter’s output pulses.
Accessories

Metercam

The Metercam is used with an electromechanical meter (rotating disk). It is a digital disk sensor without the many drawbacks found on usual photoelectric sensors, such as difficulty to align properly and sensitivity to light. With the Metercam, no alignment is necessary since it detects and picks up the disk by itself. Another feature is its electronic shutter that makes it insensitive to light variations including bright sunlight.

The Metercam is built around a miniature digital camera with a ½" field view combined with a RISC processor that detects the position of the meter disk and locks automatically on the reference point (black flag).

The Metercam is mounted on four suction cups installed directly on its backside.

For a good and lengthy hold, lightly wet the inside of the suction cups, especially when field testing in colder weather. Also, keep the inside of the suction cups clean.

![Fig. 2.4 – Metercam](image)

**Note:** For electromechanical meters with a hidden disk, a side-mount Metercam is available.
Optical Pickup

The Optical Pickup is used with solid-state meters. It is mounted with a suction cup or integrated in a magnetic head that detects infrared light pulses from solid-state meters. The Optical Pickup uses edge triggering for less sensitivity to changes. On the top of the head of the pickup, there is a pulse indicator in the form of a visible red led that flashes when pulses are being received.

Adapters

The **Focus Adapter** is used with the Optical Pickup for meters with a protuberant shape over the test pulse. The **Magnetic Adapter** is used to install the suction cup of the Optical Pickup on meters with a metallic port. Can also be used a magnet for the magnetic switch.
Meter Adapters

**Sensus 3S**: This adapter is used to test Sensus’ 3S meter, without this adapter the meter will be damaged.

**Class 320**: This adapter is used to test 4S and 12S meter in a CL320 meter base, without this adapter the WT3 will not be insertable in the meter base.
Chapter 3

Operations

CAUTION!

The use of MT-1/WT3 is strictly reserved to personnel authorized to manipulate electric installation meters. For safety reasons, certified safety glasses and rubber gloves are strongly recommended but are not provided with the MT-1/WT3.

The operation of removing and inserting a meter from its meter base under power exposes live electric terminals. Be careful. Do no stick your hands or any metal objects into the open meter base. You could suffer bodily burns, electric shocks and even electrocution.

It is imperative you follow the safety procedures of your company.
Summary

The MT-1/WT3 is compatible with meter Forms 1S, 2S, 3S, 4S, 6S (36S, 46S), 8S, 9S, 12S (25S), 14S, 15S and 16S as well as Fitzall™ meters. Before testing a meter in the field, always make sure the electrical wiring of the meter base is fully compatible with those shown in Appendix B.

The MT-1/WT3 socket must first be inserted between the meter base and the meter. The installation procedure for a ringless meter base is described hereafter in Fig. 3.1.

When powered on, the MT-1/WT3 recognizes the type of meter installed and validation of the form and the TA is required. With some meters, it is sometimes necessary to select the form manually.

When a pickup (Optical or Metercam) is used, the socket detects the Kh of the meter and uses it. If for some reason the Kh suggested does not match the Kh indicated on the meter, the operator can change it manually by restarting the socket and disabling Kh autodetection. Without a pickup, the user must manually enter the meter Kh.

The next step is to choose a type of test to perform.

If a pickup is used, the test becomes fully automatic and the test modes available are Custom, Quick, Full and Four-Quadrant.

Without a pickup, the modes Manual and Tracking are available. In Tracking, the test is done manually and the meter disk (or the simulated disk in case of a solid-state meter) must do a precise number of revolutions. It is up to the operator to start and stop the test precisely pressing on START/STOP or using the magnetic switch on the side of the socket.

Once the load is applied and the test has started, the MT-1/WT3 measures the energy that passes through the meter with its internal electronic standard. All the important measurements are shown on the mobile device or computer display while testing.

When the test ends, the test result is displayed in percentage error (Ex. -0.02%) or in percentage registration (Ex. 99.98%).
Installation of the Socket

1. Meter Removal

WARNING:
Do not remove the meter when it is under a heavy load to avoid sparks. The front jaws of the meter base are live; do not stick your hands or any metal objects into the meter base! Certified safety glasses and rubber gloves are strongly recommended.

Carefully remove the meter from its meter base according to your company safety procedures. Avoid removing the meter under heavy load due to sparks. Before removing the meter from a CT rated meter base, make sure to short the secondary CT's to prevent equipment damages and personal injuries.

Make sure that the wiring connecting the meter to the line is compatible with one of the configurations shown in Appendix B. If not compatible, stop here and put the meter back into place. Field-testing with the MT-1/WT3 is not possible for that meter installation.

2. Installation of the MT-1/WT3 Socket

Make sure the power switch of the MT-1/WT3 socket is OFF. Check Appendix B to setup the twist-tabs and the Form Selector before inserting into the meter base. With ringless meter base, remove the latch if necessary, using the quick release mechanism.

Firmly take the MT-1/WT3 socket with the arrow pointing upward and align the rear tabs of the socket with the front jaws of the meter base. Then firmly insert the MT-1/WT3 socket into the meter base. Secure the installation. For ring-type meter bases, a latch can be purchased as an option.

1 When the MT-1/WT3 is used in the meter shop, do not plug it in a test board. It will not run properly. You may use a single-phase four-jaw meter base of at least 150VA capacity and keep the Form Selector in the 1S/2S/15S position for all types of meters. The nominal voltage must be respected according to the meter being tested.
3. Installation of the Meter

Plug in the meter into the front of the MT-1/WT3 socket. If I/O cables are present place them into the notch before inserting the meter. Make sure everything is well secured. The socket installation is complete. Operation examples are provided further on.

Installation Procedure (ringless meter base)

Fig. 3.1 – Installation Ringless Meter Base

THIS SYMBOL INDICATES THAT VOLTAGE IS PRESENT AND EXTREME CARE SHOULD BE USED.
INSTALL THE MT-1/WT3 SOCKET ONLY IN A COMPATIBLE METER BASE. SEE APPENDIX B FOR COMPATIBILITY.
Connecting to the MT-1/WT3

This section explains how to connect with a WT3 over WiFi for a quick start, for more detailed information please refer to the Probewell Connect for WT series documentation.

Setting up connection

First, power up the MT-1/WT3 with the ON/OFF switch.

Probewell Connect for IOS and Android

Start the application on your mobile device

How to get the app:
For iOS: Go to the Apple App Store
For Android: Go to Google Play Store
Search for Probewell Connect

Scan QR for a first use or select known socket SSID.

For a Probewell Connect for Windows 10

Go to Windows Settings
Select Network & Internet
Click on Show available networks
Scroll down at the end of the list, select Hidden Network or Other Network.
Enter the SSID written under the QR code on the side of the socket: PW-WT3-{serial Number}-AP.
Wait to be connected to the socket.

Note

When the procedure was done once, the SSID will be accessible directly for the network list.

The Probewell Connect for Windows is downloadable from our web site.

(https://probewell.com/pw-connect/)

Running the application

Please refer to the Probewell Connect User’s guide.

1 We recommend Windows 10; other versions are not being tested
Tests available

- **Quick**: tests all phases simultaneously with all loads (HL, PF, LL).
- **Custom**: tests all phases simultaneously with only one load selected by the user.
- **Full**: performs a Quick Test and all phases separately (only available with polyphase meters).
- **Four-Quadrant**: performs a Quick Test at various phase angle lags between voltage and current to test operation in all four quadrants.
- **Manual/Tracking**: tests the meter manually, without using a pickup.
- **Line Monitor**: analyzes the line voltage, the frequency fluctuation and the line voltage harmonic content (THD) up to the 32nd order.
- **Creep**: performs a creep test.
- **Demand**: allows the operator to perform a KW demand test.
- **KYZ**: allows the operator to test KYZ interface of the meter.
- **Accuracy**: verifies against a NIST traceable electronic standard (only available in the Settings page if no meter is installed).

Quick, Custom, Full and Four-Quadrant test are only available when an optical pickup or a metercam is installed.
Test Examples

In the following examples, we assume the MT-1/WT3 socket is already installed into the meter base and the meter under test is also plugged into the MT-1/WT3 socket and the installation is well secured. For more detailed information, refer to the Probewell Connect for WT series documentation.

Here is a list of testing examples included in this manual:

1. Quick-Test – 9S solid-state meter
2. Custom Test – 9S solid-state meter
3. Tracking Test – 12S(N) electromechanical meter
4. Custom Test – 2S electromechanical meter
5. KW demand test – 14S (M-90) electromechanical meter
6. Full Test – 8S Fitzall™ meter
7. Four-Quadrant Test – 9S solid-state meter
8. Meter tested in a meter shop

Please refer to the Probewell Connect User’s Guide for more information.
Example 1: Quick Test - Solid-state 9S meter

<table>
<thead>
<tr>
<th>Meter:</th>
<th>Solid-State, Form 9S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage:</td>
<td>120-480V</td>
</tr>
<tr>
<td>Kh:</td>
<td>1.8</td>
</tr>
<tr>
<td>TA:</td>
<td>2.5</td>
</tr>
<tr>
<td>CL:</td>
<td>20</td>
</tr>
<tr>
<td>Accessory:</td>
<td>Optical Pickup</td>
</tr>
</tbody>
</table>

A Quick Test consists in applying loads on the meter for at least 20 seconds (the time can be modified) for each loads HL, PF and LL. Please note that the three potential coils of the meter are automatically switched in parallel by the socket.

1. **Connect the optical Pickup**

To connect the cables:

- Plug the RJ12 connector of the straight cable of the Optical Pickup into the I/O port of the socket.
- Look for the LED output pulse of the meter and position the suction cup of the Optical Pickup over it.

**Note:** An optional adapter may be required on some meters and can be purchased as an option.

2. **Performing a Quick Test**

Once the installation is completed and the connection to the socket and meter setup is done (see previous section), we can proceed with the test.

Select *Quick Test*.

Start the sequence; the load current will increase to HL; the meter will start to send pulses and the internal electronic standard will begin to register the energy that passes through the meter. The test can be stop at any time.

In addition to the test parameters appearing on the display, the operator can see the voltage and current applied to the meter, the chronometer and the cumulated energy registered by the electronic standard.

While testing, you can check the partial results of the test scrolling up and down the screen. You will get the results as they are done.

3. **Obtaining and saving Test Results**

After the three test points, the watthour measurement period ends automatically. Then, the load is removed, and three test results are displayed: one for HL, one for
PF and one for LL. A fourth test result is available, showing the weight average according to the formula \((4HL+2LL+PF)/7\).

Then, the tests results can be saved

Before being saved, the operator must enter the meter ID if the meter ID was not already entered or scanned and answer to up the 8 custom questions saved in the WT3.

Please note that if you had chosen the **Full Test** mode in this example, the test would have continued, checking each of the phases A, B, C, one after the other under the HL, PF and LL loads.

Remark: To speed up the test in **Full Test** mode, the LL and/or the PF load can be disabled using the **Settings** tab.

In the **Full Test** mode, once the test of all phases ABC together is completed and the test of each phase has begun, you can cancel the test at any time by pressing STOP TEST.
Example 2: Custom Test - Solid-state 9S meter

<table>
<thead>
<tr>
<th>Meter:</th>
<th>Solid-State, Form 9S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage:</td>
<td>120-480V</td>
</tr>
<tr>
<td>Kh:</td>
<td>1.8</td>
</tr>
<tr>
<td>TA:</td>
<td>2.5</td>
</tr>
<tr>
<td>CL:</td>
<td>20</td>
</tr>
<tr>
<td>Accessory:</td>
<td>Optical Pickup</td>
</tr>
</tbody>
</table>

1. Performing Custom Test

Press Custom Test when in the Tests tab.

Select the load (HL, PF, LL) and the phase.

If you press HL with all the phases (A+B+C), the load current will increase to 2.5A and the meter will start to send pulses. In the following display, the meter sees a load of 873.75W (voltage x current x 3)

| Note: If you wish to test only Phase A, select phase A in the Select active phase dropdown window. If you wish to test only phase B, select the B phase and so on for phase C. In the current example, only phase B is selected. The selection is shown on the third line in the middle of the screen. |

Press START TEST to start the test. The meter sends pulses and the internal electronic standard of the MT-1/WT3 starts measuring the energy sent to the meter.

In addition to the test parameters appearing on the display, the operator can see the voltage and current applied to the meter, the chronometer and the cumulated energy registered by the electronic standard.

On this display, the internal electronic standard of the MT-1/WT3 shows that it has registered up to now 3.93Wh (voltage x load x 3 x time/3600). When calculating Wh, time is expressed in hours.

2. Test Results

The watthour measurement period ends automatically after the minimum time of test by default, here >20 seconds. Then the load is removed automatically, and test results are displayed.

The test results show this meter has a percentage registration of 100.02% under a 2.5A load. By default, the test result is displayed in percentage registration. Test results can be saved by clicking YES.

Please note that you can abort a test at any time.
Example 3: Tracking Test - 12S(N) meter

<table>
<thead>
<tr>
<th>Meter:</th>
<th>Electromechanical, Form 12S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage:</td>
<td>120V, 3-wire network</td>
</tr>
<tr>
<td>Kh:</td>
<td>14.4</td>
</tr>
<tr>
<td>TA:</td>
<td>30</td>
</tr>
<tr>
<td>CL:</td>
<td>200</td>
</tr>
<tr>
<td>Accessory:</td>
<td>None</td>
</tr>
</tbody>
</table>

When Tracking Test is chosen, it consists in applying a 30A (HL) load for 10 revolutions. No pickup is used for this test. The test can be started and ended by the START/STOP TEST button or by using a magnet on the side of the tester (see figure 2.2).

The meter setup will be displayed on your wireless device with the form 12S and a TA of 30A. A 12S will be detected if the meter has the 9 o’clock contact terminal pressed down on the proper piston on the front of the test socket. However, if a meter has a 6 o’clock terminal, the form detected would be 2S. In that case, use the drop-down menu to select form 12S instead of 2S. Once the proper form appears, press NEXT.

By default, the selected Kh for a 12S meter is 14.4. It can be changed in the Tests tab using the Select meter Kh. The test is done over 10 revolutions by default, but you can change the value by clicking on the number of revolutions and entering the desired value.

1. Performing Tracking mode test

In the Manual Test page, toggle the selected mode to Tracking. In the Rev select the desired amount of revolution. By default, the revolution will be set at 10.

The load current will increase to 3A and the disk will start to rotate slowly. When the black flag of the disk lines up with the black line (on the meter nameplate), apply a magnet on the side of the socket to initiate the test and change the current from 3A to 30A. At this precise moment, the internal electronic standard of the MT-1/WT3 begins to register the energy that goes through the meter.

Note: it is easier to start and end a test when the disk rotates slowly by pressing TOGGLE LOAD to change between HL to LL and to LL to HL.

On this display, the internal electronic standard measures the energy that passes through the meter.

Press on TOGGLE LOAD. The current will increase to 30A and the disk will rotate rapidly.

The socket emits a beep each time the disk has completed one revolution.

At the 9th revolution, the sound of the beep is different to warn that the end of the test is near. The socket switch to LL to slow down the disk then, when the black flag
of the disk lines up with the black line, apply the magnet on the side of the socket to end the test.

2. **Test Results**

The result indicates that the meter is accurate at 99.93% under a load of 30A, therefore slightly slow by -0.07%.

**Note:** The results of a test in *Manual* or *Tracking* modes can’t be saved.
**Example 4: Custom Test - 2S electromechanical meter**

<table>
<thead>
<tr>
<th>Meter:</th>
<th>Electromechanical, Form 2S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage:</td>
<td>240V</td>
</tr>
<tr>
<td>Kh:</td>
<td>7.2</td>
</tr>
<tr>
<td>TA:</td>
<td>30</td>
</tr>
<tr>
<td>CL:</td>
<td>200</td>
</tr>
<tr>
<td>Accessory:</td>
<td>Metercam</td>
</tr>
</tbody>
</table>

The *Custom* mode consists in applying a 30A load during 10 revolutions. The Metercam is used for this test.

1. **Installing the Metercam and the cable**

   Install the Metercam and the cables:
   
   1. Roughly align the 0.5" field view disk zone of the Metercam with the meter disk.
   2. Press the four corners of the Metercam onto the meter cover hard enough to allow the suction cups to take hold.
      
      Notes: Make sure that the 4 suction cups stick perfectly on the meter cover *during the entire test*. If necessary, lightly wet the inside of the suction cups.
   3. Connect the coiled cable with the red ends from the socket to the bottom right connector of the Metercam. See Fig. 2.4.

2. **Disk Detection**

   Once the unit detects the presence of the Metercam a load is applied automatically to the meter to spin the disk. The Metercam starts the scanning process to detect the position of the meter disk. The red LED turns on when the scanning starts. The green LED turns on when the Metercam has found the position of the disk. Finally, the red LED turns off when the black flag is found on the disk and turns on only when the black flag passes in front of the Metercam.

   Once the Metercam has found the black flag, a self-test is done automatically to estimate the Kh of the meter. If the estimated Kh found is already stored in the remote, it is chosen to do the test.

3. **Initialization**

   In the test page, select *Custom Test* to go to the *Tests* tab.

   At the top right of your screen, check that the Kh is 7.2.
4. Loading and Testing

Press HL, the load current will increase to 30A and the disk will start to rotate. Press START/STOP to initiate the test. The measurements will begin only when the Metercam has picked up the black flag and starts to count the disk revolutions. At this precise time, the MT-1/WT3 starts to measure the energy that passes through the meter. A double beep is heard, indicating that the test has begun.

In addition to the test parameters appearing on the display, the operator can see the voltage and current applied to the meter, the chronometer and the cumulated energy registered by the electronic standard.

On this display, the internal electronic standard of the MT-1/WT3 shows that it has registered up to now 14.4Wh (voltage x load x time/3600). When calculating Wh, time is expressed in hours.

5. Test Results

The watthour measurement period ends automatically after the 10th disk revolution is completed i.e. when the Metercam has registered its 10th revolution. Then the load is removed automatically to stop the disk and test results are displayed.

The test results shows the meter accuracy under a 30A load.

Tests results can be saved by clicking YES.

Once the test is saved, it is possible to repeat the test at PF or LL.

To not save the results, press CANCEL. It will go right back to the Tests tab and it is possible to repeat the test at PF or LL, if desired.
Example 5: kW Demand Test – Electromechanical 14S meter

Meter: Electromechanical, Form 14S
Voltage: 120V, 3-wire network,
Kh: 21.6
TA: 30
CL: 200
Accessory None

The meter is equipped with an electronic kW demand register (Type M-90). The kW demand test will be done at 50A on 15 minutes time interval. You must first set the meter in kW demand test by removing the meter's cover and flip over the small tab located on the M-90's face plate. This enables kW demand test by pressing a small push-button switch. (Please see your meter user manual to determine how to setup your meter to do demand testing)

1. Initialization

Be sure to select the right form 14S.

In the Tests tab select Demand Test.

By default, the maximum load applied to the meter is 50A, the timer or test duration is 3 minutes and the meter's demand interval is 15 minutes. Test duration (timer) can be set from 3 to 15 minutes and set the Load at 50.

Set up the meter for a kW demand test following the manufacturer's instructions. Please note that the kW demand test method varies between manufacturer's reference technical guide for instructions.

Then, set the timer for the duration of the test. The timer must be less or equal to the demand interval of the meter under test.

Finally, make sure the interval matches the demand interval length of the meter under test. The test interval can be set between 1 and 99 minutes.

Loading and Testing

While resetting the demand register on the meter under test, press START TEST on your mobile device.

The timer for the duration of the test will be counting down while the kW Max will accumulate.

When the timer for the duration of the test reaches zero, the load is removed, and the demand test ends.

Type in the value of the demand meter register in the results KW Max Meter. Afterwards, click GET RESULTS and the MT-1/WT3 will calculate and display the results.
A result higher than 100% means the meter records a higher kW demand compared to the reference. Conversely, a result lower than 100% means the meter records less kW demand compared to the reference.

Please note that the response time to signal the beginning of the test and reset the demand register of the meter may affect the precision of the test.
Example 6: Full Test – Solid-state 8S Fitzall meter

Meter: kV GE Fitzall, programmed in form 8S
Voltage: 120-480V
Kh: 0.3
TA: 2.5
CL: 20
Accessory Optical Pickup

A **Full Test** consists in applying loads on the meter for at least 20 seconds (the time can be modified) for each loads HL, PF and LL. Please note that the three potential coils of the meter are automatically switched in parallel by the socket.

1. **Connect the optical pickup**

   To connect the cables:
   - Plug the RJ12 connector of the straight cable of the Optical Pickup into the I/O port of the socket.
   - Look for the LED output pulse of the meter and position the suction cup of the Optical Pickup over it.

   **Note:** An optional adapter may be required on some meters and can be purchased as an option.

2. **Performing a Full Test**

   Once the installation is completed and the connection to the socket and meter setup is done (see previous section), we can proceed with the test.

   Select **Quick Test**.

   Start the sequence; the load current will increase to HL; the meter will start to send pulses and the internal electronic standard will begin to register the energy that passes through the meter. The test can be stop at any time.

   In addition to the test parameters appearing on the display, the operator can see the voltage and current applied to the meter, the chronometer and the cumulated energy registered by the electronic standard.

   While testing, you can check the partial results of the test scrolling up and down the screen. You will get the results as they are done.

3. **Obtaining and saving Test Results**

   After the three test points, the watthour measurement period ends automatically. Then, the load is removed, and three test results are displayed: one for HL, one for
PF and one for LL. A fourth test result is available, showing the weight average according to the formula \((4HL+2LL+PF)/7\).

Then, the tests results can be saved

Before being saved, the operator must enter the meter ID if the meter ID was not already entered or scanned and answer to up the 8 custom questions saved in the WT3.

Please note that if you had chosen the **Full Test** mode in this example, the test would have continued, checking each of the phases A, B, C, one after the other under the HL, PF and LL loads.

Remark: To speed up the test in **Full Test** mode, the LL and/or the PF load can be disabled using the **Settings** tab.

In the **Full Test** mode, once the test of all phases ABC together is completed and the test of each phase has begun, you can cancel the test at any time by pressing STOP TEST.
Example 7: Four-Quadrant Test – Solid-state 9S meter

| Meter: | Solid-State, Form 9S |
| Voltage: | 120-480V |
| Kh: | 1.8 |
| TA: | 2.5 |
| CL: | 20 |
| Accessory: | Optical Pickup |

A Four-Quadrant Test consists in running the equivalent of a Quick Test at various phase angle lags to assess the meter’s ability to register energy in all four quadrants of the power vector diagram.

Please note that the three potential coils of the meter are automatically switched in parallel by the socket.

1. **Connect the optical pickup**

   To connect the cables:
   
   - Plug the RJ12 connector of the straight cable of the Optical Pickup into the I/O port of the socket.
   - Look for the LED output pulse of the meter and position the suction cup of the Optical Pickup over it.

   **Note:** An optional adapter may be required on some meters and can be purchased as an option.

   **Note:** Some high-end meters can have two pulse outputs, one for the Watthour reading and one for the VARhour reading. Connect the Optical Pickup to the Watthour pulse output before starting the test.

2. **Starting a Four-Quadrant Test**

   Once the installation is completed and the connection to the socket and meter setup is done (see previous section), we can proceed with the test.

   Select *Four-Quadrant Test*.

   Start the sequence; the load current will increase to HL; the meter will start to send pulses and the internal electronic standard will begin to register the energy that passes through the meter. The test can be stopped (aborted) at any time.

   In addition to the test parameters appearing on the display, the operator can see the voltage and current applied to the meter, the chronometer and the cumulated energy registered by the electronic standard.
While testing, you can check the partial results of the test in the mobile app. You will get the results as they are completed.

3. Test execution
The four-quadrant test sequence is divided in 6 distinct subtests. Each subtest runs the equivalent of a Quick Test, with the base phase lag angle between voltage and current changing each time.

a) Subtest 1: Watthour (Quadrant 4)
   HL angle: 0° / Power factor angle: -60°
   Loads: HL, PF, LL
   Quadrant: 4
   Measurement mode: Watthour

b) Subtest 2: Watthour (Quadrant 2)
   HL angle: 180°/ Power factor angle: 120°
   Loads: HL, PF, LL
   Quadrant: 2
   Measurement mode: Watthour

c) User setup
   This is where the test sequence switches its measurement mode from Watthour to VARhour. The user must perform one of the following actions:
   - If the meter has two pulse outputs (one for Watthour and one for VARhour), position the Optical Pickup over the VARhour pulse output.
   - If the meter has a single pulse output, select the meter program to have it pulse for VARhour instead of Watthour. Please follow meter manufacturer guidelines.

d) Subtest 3: VARhour (Quadrant 4)
   HL angle: 270°/ Power factor angle: 330°
   Loads: HL, PF, LL
   Quadrant: 4
   Measurement mode: VARhour

e) Subtest 4: VARhour (Quadrant 2)
   HL angle: 90°/ Power factor angle: 150°
   Loads: HL, PF, LL
   Quadrant: 2
   Measurement mode: VARhour
f) Subtest 5: VARhour (Quadrant 1)

HL angle: 90°/ Power factor angle: 30°
Loads: HL, PF, LL
Quadrant: 1
Measurement mode: VARhour

g) Subtest 6: VARhour (Quadrant 3)

HL angle: 270°/ Power factor angle: 210°
Loads: HL, PF, LL
Quadrant: 3
Measurement mode: VARhour

4. Obtaining and saving Test Results

After each subtest, the three load test results are displayed: one for HL, one for PF and one for LL. A fourth test result is available, showing the weight average according to the formula \((4HL + 2LL + PF) / 7\).

Once the complete test sequence is done, the operator can save the test results. When prompted, enter the meter ID (if not already entered or scanned) and answer up to 8 custom questions saved in the WT tester.

When saved to the unit’s non-volatile memory, the Four-Quadrant Test will be divided into 6 separate test reports (one for each subtest). They can be viewed in the Reports section of the mobile app.

Remark: To speed up the test in *Four-Quadrant Test* mode, the LL and/or the PF load can be disabled using the *Settings* tab.
Example 8: Meter tested in the meter shop

The MT-1/WT3 can be used as a test board in the meter shop to check both single-phase and three-phase meters using a single-phase 4-jaw meter base mounted on the wall. The meter base must provide a voltage of 120V or 240V on the 2 upper jaws with a capacity of at least 150VA. The meter base's voltage must respect the nominal voltage value of the meter under test.

Before inserting the MT-1/WT3 in the meter base, you must set the form selector switch in the back of the tester at the 1S/2S/15S position so that the MT-1/WT3 is powered from the 2 upper tabs (see Appendix C). It is recommended to use a holding ring to secure the MT-1/WT3 in place.

Once installed, the test procedure is the same as testing in the field.
Appendix A

Specifications

General

Physical Dimensions

- **Test Socket (Diam. x D)**: 6.9" x 7.7" (175 x 195 mm)
- **Remote Control (HxLxD)**: 8.3" x 3.9" x 1" (210 x 100 x 26 mm)
- **Carrying Bag (HxLxD)**: 11" x 11" x 8" (280 x 280 x 203 mm)

Weight

- **Test Socket**: 6.4 lb (2.91 kg)
- **Overall with Carrying Bag**: 8.5 lb (3.86 kg)

Temperature

- **Operation**: -4 to 140 °F (-20 to 60 °C)
- **Storage**: -4 to 140 °F (-20 to 60 °C)
- **Humidity**: 0% to 95% (non-condensing)

Optional Test Accessories

- **Metercam**: Metercam (digital camera disk sensor)
- **Pulse pickup**: Optical pickup for electronic meters
- **Magnetic optical pickup**: Magnetic Optical Pickup for electronic meters with metallic output pulse
- **MT-1/ATK-3**: Accuracy Testing Kit
- **Remote Control**: An optional handheld controller
- **Latch**: To secure socket to the ring typed meter bases
- **Quick Release**: A quick release to remove the latch from the socket
- **Focus Adapter**: Used with the MT-1/PUL-3 optical pickup for L&G Focus with a triangle output pulse
- **Magnetic Adapter**: Used with optical pickup MT-1/PUL-3 for meters with metallic output pulse
- **KYZ device**: To monitor the KYZ output for meter equipped with the KYZ feature.
## Test Socket

### Input

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>100-600VAC</td>
</tr>
<tr>
<td>Line Frequency</td>
<td>58-62Hz</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>75VA (maximum)</td>
</tr>
<tr>
<td>Bypass Circuit</td>
<td>200A (standard)</td>
</tr>
<tr>
<td>Circuit Breakers</td>
<td>2 x 1A (press-to-reset mechanism)</td>
</tr>
</tbody>
</table>

### Output

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage</td>
<td>No voltage source is included in the MT-1/WT3.</td>
</tr>
<tr>
<td></td>
<td>The Line Voltage is used for the energy measurement. Therefore, the accuracy is less than 200ppm.</td>
</tr>
<tr>
<td>Current</td>
<td>The current sources are designed with a very tight feedback loop to get the most accurate current, therefore the current accuracy is less than 200ppm.</td>
</tr>
</tbody>
</table>

### Communication

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wireless</td>
<td>802.11b/g</td>
</tr>
<tr>
<td>I/O port</td>
<td>Full-duplex (isolated)</td>
</tr>
</tbody>
</table>

### Forms of Meter

<table>
<thead>
<tr>
<th>Type</th>
<th>Forms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-phase</td>
<td>1S, 2S, 3S, 4S, 12S(N), 25S</td>
</tr>
<tr>
<td>Three-phase</td>
<td>6S (36S, 46S), 8S, 9S (10S), 12S, 14S, 15S, 16S</td>
</tr>
<tr>
<td>Fitzall™</td>
<td>CT-rated and Self-Contained</td>
</tr>
<tr>
<td>Class</td>
<td>CL10, CL20, CL100, CL200, CL320</td>
</tr>
</tbody>
</table>

### Current Synthesizers

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel</td>
<td>3</td>
</tr>
<tr>
<td>Adjustable Current</td>
<td>0.25 to 50A</td>
</tr>
<tr>
<td>Phase Angle (Wh)</td>
<td>Unity and 60° Lag</td>
</tr>
<tr>
<td>Phase Angle (VARh)</td>
<td>90° Lag and 30° Lag</td>
</tr>
</tbody>
</table>

### Voltage Applied to Meter

Line-voltage protected by two 1A circuit breakers and activated only when meter is inserted. Voltage is also current limited.
Electronic standard accuracy

Typical ±0.02%
Maximum guaranteed ±0.05%
Influence affecting accuracy None

Multifunction measurements accuracy

RMS Voltage ±0.05%, maximum
RMS Current ±0.05%, maximum
Frequency ±0.01%, maximum

---

1 The MT-1/WT3’s internal electronic standard is calibrated using a reference standard traceable to NIST and comes with a complete calibration report certifying measurement accuracy for both Wh and VARh scales over its entire operating range. Test accuracy can be done using a reference standard and the three-phase Accuracy Testing Kit (ATK-3). The calibration of the MT-1/WT3’s standard can be slightly changed using the User calibration menu. However, User calibration offset is limited to ±0.05% (with steps of ±0.001%) from the factory calibration. User Calibration is stored in the non-volatile memory of the socket. The socket contains a unique internal number that identifies its internal electronic standard.
Appendix B

Compatible Meter Forms

This Appendix refers to all meter Forms compatible with the MT-1/WT3. For each meter Form, the electrical service is shown at the top left and an internal schematic of the meter installed at the top right. Wiring that connects the meter to the line and load is also shown. Before proceeding to a field test, make sure that the connections to the socket for a given Form are similar to those shown hereafter. The symbols used are described here:

- **Circuit**
  - Current Conductor
  - Voltage Conductor
  - Ground
  - No Connection
  - Connection

- **Meter & Meter Socket**
  - Current Coil
  - Tab (Meter)
  - Voltage Coil
  - Jaw (Meter Socket)
  - Circuit-Closing Device

- **Instrument Transformer**
  - Current Transformer (CT) With Polarity Marks
**Form 1S**

**Single-Phase Two-Wire**

120 or 240 volts

**Form 1S**

Meter Internal Wiring (Front View)

**Connections to Socket (Front View)**

Neutral

Line

Load
Form 2S

Single-Phase Three-Wire

120 volts line-to-neutral
240 volts line-to-line

Meter Internal Wiring
(Front View)

Connections to Socket
(Front View)
Form 3S single-phase, 120 volts two-wire with CT is also compatible.

**Caution:** Never open a circuit-closing device if current is flowing in the CT primary. Serious personal injury may result.

**Note:** Some 3S, 240V of older design have higher impedance and will not reach full HL when tested with MT-1/WT3. However, it will test as high as it can.
Caution: Never open a circuit-closing device if current is flowing in either CT primaries. Serious personal injury may result.
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Form 5S, 35S & 45S Fitzall\textsuperscript{tm} (Y 3CT)

\textbf{Caution}: Never open a circuit-closing device if current is flowing in either CT primaries. Serious personal injury may result.
Caution: Never open a circuit-closing device if current is flowing in either CT primaries. Serious personal injury may result.
Form 5S, 35S & 45S Fitzall\textsuperscript{tm} (Y 2CT)

\textbf{Caution:} Never open a circuit-closing device if current is flowing in either CT primaries. Serious personal injury may result.
Form 5S, 35S & 45S Fitzall™ (Y 3CT 2PT)

Caution: Never open a circuit-closing device if current is flowing in either CT primaries. Serious personal injury may result.
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Caution: Never open a circuit-closing device if current is flowing in either CT primaries. Serious personal injury may result.
Form 6S (36S, 46S) (Y 3CT)

Wye with three CTs

Caution: Never open a circuit-closing device if current is flowing in the CT primary. Serious personal injury may result.
Caution: Never open a circuit-closing device if current is flowing in the CT primary. Serious personal injury may result.
Caution: Never open a circuit-closing device if current is flowing in the CT primary. Serious personal injury may result.
Form 6S (36S, 46S) Fitzall™ (Y 3CT 2PT)

Caution: Never open a circuit-closing device if current is flowing in the CT primary. Serious personal injury may result.
Caution: Never open a circuit-closing device if current is flowing in the CT primary. Serious personal injury may result.
Form 9S (4Δ 3CT)

Caution: Never open a circuit-closing device if current is flowing in the CT primary. Serious personal injury may result.
Form 9S (Y 3CT)

Caution: Never open a circuit-closing device if current is flowing in the CT primary. Serious personal injury may result.
Form 9S (Y 3CT 3PT)

Caution: Never open a circuit-closing device if current is flowing in the CT primary. Serious personal injury may result.
Form 12S (25S) (3N)

(N) Network

Three-Wire Network

120 volts line-to-neutral
208 volts line-to-line

Form 12S

Meter Internal Wiring
(Front View)

Connections to Socket
(Front View)

Line 1
N Neutral
2

or

Load 2
N
1
Form 12S (25S) \((3\Delta)\)

(25S) Delta

Two-Phase
Three-Wire Delta

\[ 240 \text{ volts line-to-line or } 480 \text{ volts line-to-line or } 120 \text{ volts line-to-line} \]

Form 12S

Meter Internal Wiring (Front View)

Connections to Socket (Front View)
Form 14S (4Y)s

Three-Phase
Four-Wire Wye

208 volts line-to-line
120 volts line-to-neutral
or
480 volts line-to-line
277 volts line-to-neutral

Meter Internal Wiring
(Front View)

Connections to Socket
(Front View)

Line
1
2
3
N

1
2
Load
3
N
Form 15S (4Δ)

Three-Phase
Four-Wire Delta

240 volts: 1 to 2, 2 to 3, 3 to 1
120 volts: 1 to neutral, 2 to neutral
208 volts: 3 to neutral

Form 15S

Meter Internal Wiring
(Front View)

Connections to Socket
(Front View)

Line

Load

N

3

2

1

N
Form 16S (4Y)

Three-Phase
Four-Wire Wye

208 volts line-to-line
120 volts line-to-neutral
or
480 volts line-to-line
277 volts line-to-neutral

Meter Internal Wiring
(Front View)

Connections to Socket
(Front View)
Appendix C

Form Configurations

Below are shown various back tabs configurations for the test socket that you could configure according to the meter base being used.

<table>
<thead>
<tr>
<th>Forms</th>
<th>3 o’clock</th>
<th>6 o’clock</th>
<th>9 o’clock</th>
<th>Form Selector</th>
</tr>
</thead>
<tbody>
<tr>
<td>1S, 2S</td>
<td><img src="image" alt="Diagram" /></td>
<td><img src="image" alt="Diagram" /></td>
<td><img src="image" alt="Diagram" /></td>
<td></td>
</tr>
<tr>
<td>3S, 12S</td>
<td><img src="image" alt="Diagram" /></td>
<td><img src="image" alt="Diagram" /></td>
<td><img src="image" alt="Diagram" /></td>
<td></td>
</tr>
<tr>
<td>4S</td>
<td><img src="image" alt="Diagram" /></td>
<td><img src="image" alt="Diagram" /></td>
<td><img src="image" alt="Diagram" /></td>
<td></td>
</tr>
<tr>
<td>6S, 8S, 9S, 36S, 46S, (Fitzall 5S, 6S, 36S, 45S)</td>
<td><img src="image" alt="Diagram" /></td>
<td><img src="image" alt="Diagram" /></td>
<td><img src="image" alt="Diagram" /></td>
<td></td>
</tr>
<tr>
<td>15S</td>
<td><img src="image" alt="Diagram" /></td>
<td><img src="image" alt="Diagram" /></td>
<td><img src="image" alt="Diagram" /></td>
<td></td>
</tr>
<tr>
<td>14S, 16S</td>
<td><img src="image" alt="Diagram" /></td>
<td><img src="image" alt="Diagram" /></td>
<td><img src="image" alt="Diagram" /></td>
<td></td>
</tr>
</tbody>
</table>
Appendix D

Troubleshooting

If the MT-1/WT3 seems to have operation problems, consult the following list to help determine the source of the problem. You can also refer to our support page for more information (https://probewell.com/support/). If any problem persists, please contact Probewell Lab Inc. Technical Services.

<table>
<thead>
<tr>
<th>FAULT</th>
<th>DESCRIPTION</th>
<th>FIX</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT POWER ON THE SOCKET DOES NOT START</td>
<td>The socket is not powering up and cannot connect to the socket web server.</td>
<td>• Check if the fan inside the socket is running.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Make sure the form selector is set according to the meter base being used.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Verify the voltage of the meter base between 100 and 480VAC.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The meter base must be able to provide at least 150VA.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Do not install tester in a test board.</td>
</tr>
<tr>
<td>METER UNDER TEST DOES NOT WORK</td>
<td>If the meter is not powering up after selection of the form.</td>
<td>• Make sure the selected form matches with the one indicated on the meter nameplate.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Turn the MT-1/WT3 off and on and try again.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Check meter insertion.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The meter could be defective. Try another meter.</td>
</tr>
<tr>
<td>NO PULSE FOUND (SOLID-STATE METERS)</td>
<td>On the web interface you only see check meter parameters and doesn’t go to the Tests tab.</td>
<td>• Make sure the sensor is positioned over the IR pulse emitter of the meter.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Some meters need to be set in Test Mode to emit a proper pulse for testing. See the meter user manual.</td>
</tr>
<tr>
<td>FAULT</td>
<td>DESCRIPTION</td>
<td>FIX</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| METER NOT INSTALLED          | The socket is not detecting the meter current elements and a message meter not installed is displayed in the web page interface. | • Make sure the meter tabs are fully plugged in MT-1/WT3 front jaws.  
• Check if the front jaws of the MT-1/WT3 socket are clean and in good condition.  
• Check the meter’s contacts for good condition and cleanliness.  
• Try another meter.  
• Turn off and on the MT-1/WT3 and start again. |
| METERCAM IS NOT SYNCHRONIZED WITH THE DISK | The Metercam is not detecting correctly the black flag on the disk. | • Make sure the Kh correspond with the one indicated on the nameplate of the meter.  
• Reposition Metercam and start test over again. |
| METERCAM KEEPS ON SCANNING WITHOUT FINDING THE DISK | The Metercam is not detecting the black flag on the disk of the meter being tested. | • Check if the disk is turning.  
• Check the disk of the meter is in the Metercam disk zone.  
• Check that the suction cups are adhering properly on the meter face. If needed, lightly wet the suction cups. |
Appendix E

Parameters for Data Logging Option

The following describes all the different data fields contained in the .CSV (Comma Separated Value) file generated by Probewell Connect application.

1- TEST# This test # is given to each subsequent test conducted in the field. The unit can store up to 100 tests. Once the tests have been uploaded into your PC and deleted from the remote, the test # restarts at 1.

2- REC# This is a permanent record number, it cannot be modified or deleted (already stored in remote). This number is incremented at each new logged test. It starts at 1 and increment by 1 up to 99999 then restarts at 1.

3- DATE/TIME Stamp date and time of the test

4- REMOTE# MT-1/WT3 Remote Serial Number (same as the SOCKET#)

5- SOCKET# MT-1/WT3 Socket Serial Number (already stored in socket).

6- FORM Meter form

7- PHASE Phase tested

8- TA Testing Amperage of meter tested

9- Kh Kh of the meter tested

10- MODE Mode in which test was conducted. Result can be full, quick or custom (single).

11- SENSOR Indicates what type of sensor was used during test. Result can be Optical Pickup or Metercam.

12- METER ID: Tested meter’s serial number as entered by the technician in the field.

13- %HL Result of HL test in registration percentage

14- %LL Result of LL test in registration percentage

15- %WT Weighted average in registration percentage as calculated with the configured ratio.

16- %PF Result of PF test in registration percentage

17- CREEP Status and result of creep test. There are 5 possible answers:
   a) N/A This will be returned when the %HL and %LL error difference falls within the acceptable error margin and no creep test needs to be run.
   b) SKIP This will be returned when the %HL and %LL error difference is outside the acceptable error margin, but the technician decided not to run a creep test.
c) YES  This will be returned when the %HL and %LL error difference is outside the acceptable error margin; a creep test has been run and the technician answers YES to the question: Does the meter creep?

d) NO  This will be returned when the %HL and %LL error difference is outside the acceptable error margin; a creep test has been run and the technician answers NO to the question: Does the meter creep?

e) N/S  Not supported

18- 33 Q & A  8 custom questions and answers
34- RevHL  Revolutions run during HL test
35- RevLL  Revolutions run during LL test
36- RevPF  Revolutions run during PF test
37- RatioWT  Weighted error ratio as defined in configuration
38- AmpHL  Load in amps applied during HL test
39- AmpLL  Load in amps applied during LL test
40- AmpPF  Load in amps applied during PF test
41- WhHL  Watthours recorded during HL test
42- WhLL  Watthours recorded during LL test
43- WhPF  Watthours recorded during PF test
44- VOLT  Line voltage recorded at end of all tests
45- FREQ  Line Frequency recorded at end of all tests
46- GPS  GPS coordinates
Appendix F

Customer Service

If your MT-1/WT3 becomes defective while under warranty (two years after original date of purchase) Probewell Lab Inc. will repair or replace it. If the unit becomes defective after the warranty has expired, Probewell Lab. Inc. will repair it charging the cost of labor and spare parts.

Please do not return your MT-1/WT3 without contacting customer service at 1-866-626-1126 or send an email at info@probewell.com. Detailed delivery procedure will be provided to you.

If you have a technical question regarding the MT-1/WT3 operation, contact the technical support at 1-866-626-1126 or send an email at support@probewell.com.
Probewell Lab Inc. suggests that you respect the following recommendations to gain maximum use of the MT-1/WT3 and its accessories for many years. *Any unauthorized modifications or broken seals will immediately void the warranty and any further services.*

**MT-1/WT3**

- Do not try to open the MT-1/WT3 socket; there are no serviceable parts inside.
- Never block the air vents on the MT-1/WT3 socket.
- Never expose equipment to bad weather or direct rain.
- Keep front jaws and rear tabs clean. Use lubricant for electric contacts. *Do not use abrasive materials.*
- Never use *solvent* to clean the MT-1/WT3. Use a soft moist cloth with non-abrasive soap to clean surface.
- Handle the MT-1/WT3 with care.

**Metercam & Optical Pickup**

- Do not try to open; there are no serviceable parts inside.
- Never expose equipment to bad weather or direct rain. Do not expose to direct sunlight for long periods at a time.
- Keep the back window of the Metercam and the suction cups clean. *Do not use abrasive materials.* Use a soft moist cloth with non-abrasive soap to clean surface. Use mineral oil to soften hardened suction cups.
- Handle both pickups with care. Use one of the side pouches located inside the carrying bag to store the Metercam and the optical pickup.