APPLICATION NOTE

Revenue meter socket checks using the Fluke 113 Utility Multimeter

All utilities generally require that revenue self-contained meter sockets be checked and tested for proper wiring and no back-feed conditions. These checks happen before setting a meter in place and supplying utility power to the facility. This is also true when re-connecting a meter after a service termination or disconnect. This application note describes the procedure for testing a meter socket with the Fluke 113 Utility Multimeter before setting or re-connecting a revenue meter to utility power.

About the Fluke 113 Utility Multimeter

Testing revenue meter sockets, for sets or re-connects, is easier with the Fluke 113 Utility Multimeter. The Fluke 113 offers several advantages for revenue socket tests over standard high impedance multimeters or testers.

1. VCHEK™ measurement function
2. Low impedance input
3. Ease of use
4. CAT IV 300 V/CAT III 600 V safety rating

VCHEK combines a continuity test and a voltage measurement on a single switch position. The meter automatically determines and displays what is being measured. This eliminates the guesswork and allows the meter technician to quickly determine whether continuity or voltage is present without changing switch positions or pressing any buttons.

The Fluke 113 also incorporates a low impedance input, which acts as a load for the socket tests, in cases where ghost voltages may be present. This combination makes ease of use a key factor in selecting and using the Fluke 113 for all meter socket checks.

Meter socket test procedure

The sample test procedure in this application note uses a self contained 120 V/240 V single phase three wire socket. A similar test methodology would be utilized for other commercial and industrial socket checks, with the only difference being the line side voltage readings for the different socket configurations.

Setup recommendations:

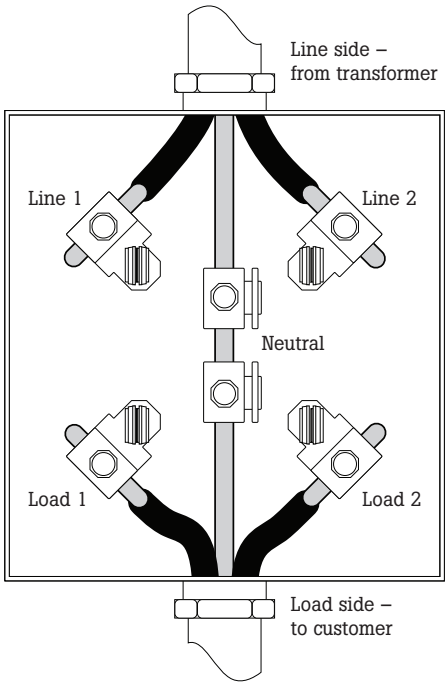
Complete a thorough visual inspection of the meter socket and its surroundings. Look for improperly mounted enclosures, exposed weatherheads, frayed conductors, discolored socket contacts, and so forth.
Do not begin meter socket tests until all visible external defects are corrected.

- If the socket has a bypass handle, do not raise the handle until the meter socket has been completely checked out.
- Use appropriate PPE (Personal protective equipment) for ALL checks. While your employer or utility may have different guidelines, this equipment generally consists of, but may not be limited to, the following items:
  - Hard hat
  - Safety glasses
  - Rubber gloves with approved protectors (600 V)
  - Flame retardant (FR) clothing
  - 100 % natural fiber clothing
  - Safety toe shoes

Before beginning the socket checks, switch the Fluke 113 to the VCHEK position. The meter display looks like this.

The Fluke 113 is now ready to make either a continuity test, diode check, or voltage measurement. All three tests are automatic. The meter will determine the correct measurement.

Below is a diagram of a typical self-contained 120 V/240 V 3 wire meter socket.



First and foremost: Work safe

To begin the tests, first ensure that your test leads and meter are in good working order.

Check the leads and probes for any physical or visual damage. Do not use and replace if damage is apparent or visible.

Short the test probes together. This checks and tests for continuity of the leads. An audible tone will also be heard if the leads are OK.

Measure a known live voltage source. In this case, test #1 below accomplishes this.

Then, for this example and this type of installation, there are six tests to be performed.

Always make line side measurements first. This ensures utility power is present and connected and that your test meter is working correctly before doing the load side checks. Also make sure the load side breaker is OFF.

Make the tests in the following order, and look for results similar to those shown below:

1. Line 1 to Neutral.

2. Line 2 to Neutral.

3. Line 1 to Line 2.

4. Load 1 to Neutral.

5. Load 2 to Neutral.

6. Load 1 to Load 2.

Do not set or re-connect the meter if the load side readings are not as indicated above.

The "OL" indication on the meter display indicates no continuity or an open circuit condition when checking the load side of the meter socket. This is the expected result. Do not set the meter or operate a bypass handle if there is a reading other than "OL" indicated during steps 4 through 6. A reading means:

1. There may be a short circuit or fault on the load side of the meter socket or service equipment.
2. There could be a back feed voltage present from another source connected to the load side.
3. There could be a line to neutral wiring error on the load side of the system.

If a foreign voltage or unexpected reading is found during the load side tests, many utilities require their personnel to "blank and seal" or "boot" the socket at this point. The meter cannot be set or re-connected until the load side problem is corrected by the customer.

A typical method of disconnecting service is to "boot" or seal the meter at the socket, by placing sleeves over the two load side terminals of the meter and placing the meter back into the socket. This cuts the service to a customer, but allows the meter to remain in place. Removing the meter, installing a blank plate, and sealing the socket prevents the meter from being set until the socket is tested for load, foreign voltage, or faults, which may cause an arc fault if one of these conditions exists. Whether the socket is booted, or blanked and sealed, is generally established through work practices from the appropriate utility, or local or state guidelines.

If the socket tests described in the six tests above agree with the displayed readings shown, it is OK to set or reconnect the meter.

In summary

There are around a dozen meter socket variants, with voltage levels ranging from 120 volts to 480 volts available, depending upon the configuration. Most basic test and safety practices are similar. Although many multimeters can probably be used to make these tests, the Fluke 113 was designed by customers with simplicity and ease of use in mind, which eliminates the guesswork. Unlike other multimeters, which may require range and function changes to check for continuity or voltage to make these measurements, the Fluke 113 requires no interaction from the meter technician to test the socket other than putting the meter in the VCHEK function and using the test probes.

Generally accepted guidelines

1. Visually inspect the enclosure and socket first
2. Use the appropriate PPE
3. Check your meter and test leads/probes
4. Load side breaker should be OFF and bypass handle should be open
5. Always make line side tests first
6. Load side tests second
7. If load side tests indicate no back feeds or continuity (shorts or faults), it's OK to set the meter.

Disclaimer

This application note is only a guide. It is intended to provide general information on meter socket testing using the Fluke 113 Multimeter. Your employer, power utility or municipality may have different testing practices or test procedures and equipment that are required for these tests.

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Printed in U.S.A. 2/2017 3338221b-en