



VEBKO ONLINE HELP

“Onload” Test of the Meter

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1 Imported Content

An introduction to Edmi Mk63 meter

About "Edmi Mk63" that is the piece of equipment that we are going to test, this should be noted that this meter is basically an energy meter that measures varh, Wh and Vah basic values. Also, it is possible to measure a wide range of values instantaneously. In the picture of the cover of this meter depicted below, terminal blocks for measuring the current and voltage as well as the connectors for the pulse input and output (optionally) can be seen.

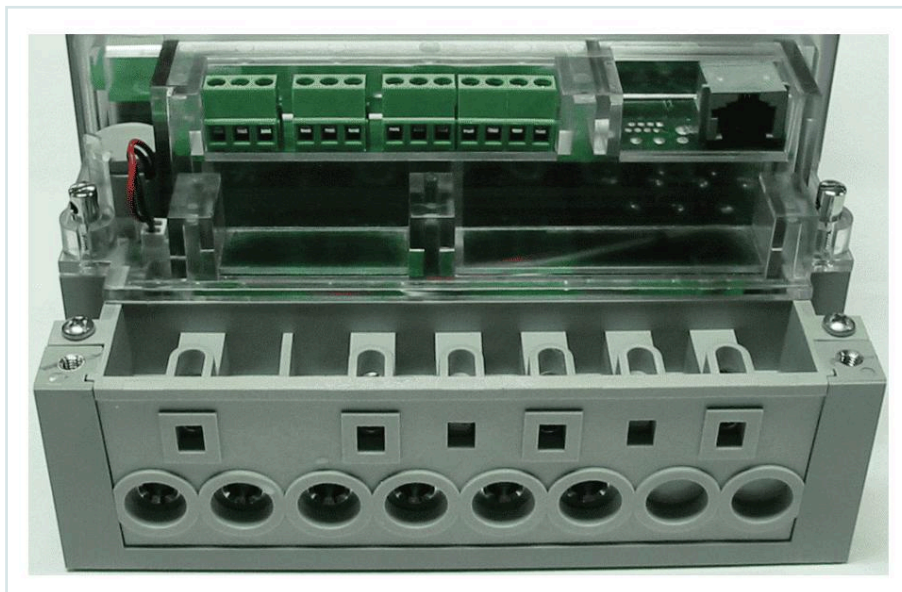


Figure 1

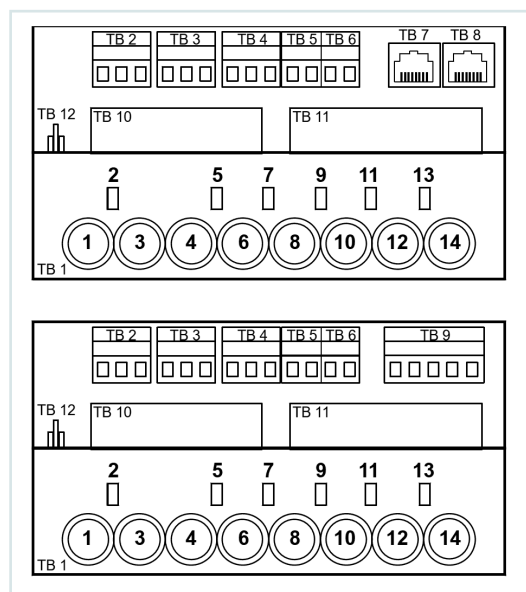


Figure 2

Possible diagrams for meter terminals

Terminal	Description
TB1	Current and voltage inputs as well as the side power supply
TB2	Inputs #1 and #2 (with common end)
TB3	Outputs #1 and #2 (with common end)
TB4	Outputs #3 and #4 (with common end)
TB5	Outputs #5 and #6 (using the TB4 common point)
TB6	Outputs #7 and #8 (using the TB4 common point)
TB7	RS-485 Port (RJ45)
TB8	RS-232 Port (RJ45) or RS-485 Port (RJ45)
TB9	RS-485 (Terminal)
TB10	Development space for future uses
TB11	Development space for future uses
TB12	Battery connector

Figure 3

The position of "Config" jumper in "MK6E" meter is displayed in this picture. This jumper is located on the right edge near the "Select" button. This jumper has two states of "Config" and "Secure". To change the settings, the plastic jumper is taken out and placed on another set of pins. Connecting the upper and center pins puts the jumper in the "Secure" state while connecting the lower and center pins puts it in the "Config" state.



Figure 4

All current meters have "CT" to "VT" links between "TB1" terminals and ends number 1,2,4,5,8,9,12 and 13. Also, there is a static link between 12 and 14. To perform some tests, it is necessary for these

links to be removed.

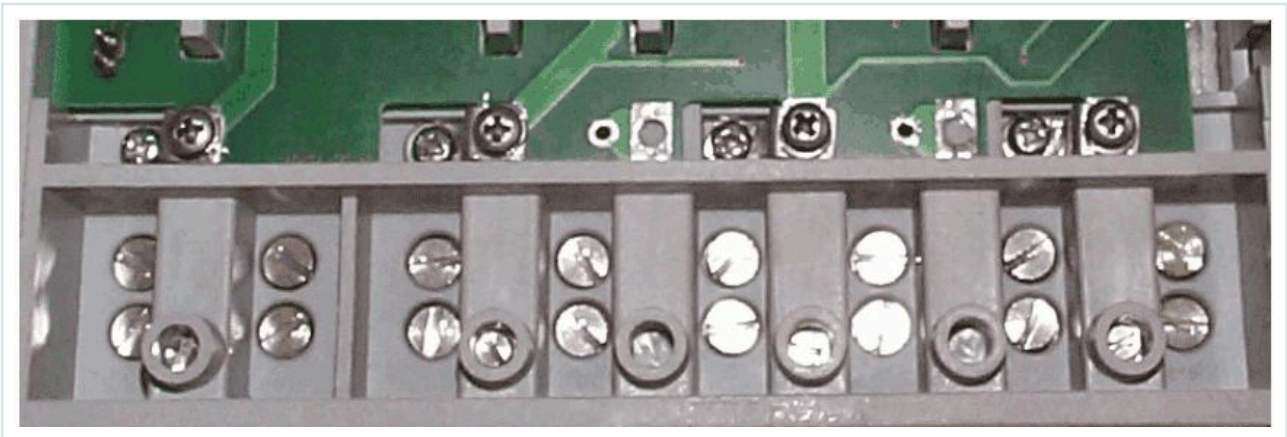


Figure 5

Position of CT to VT links

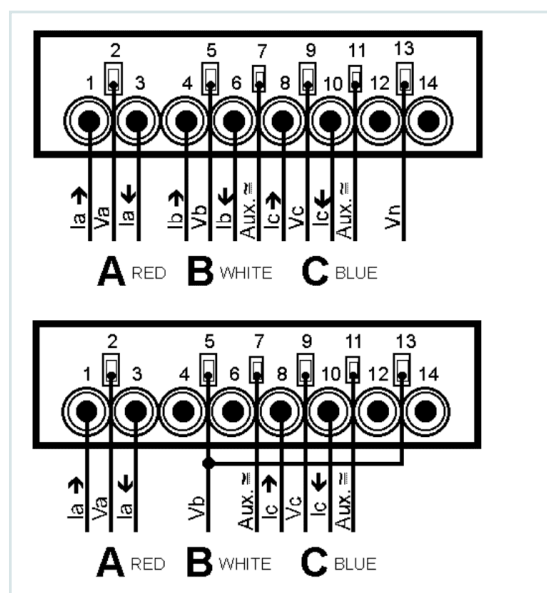


Figure 6

Power supply, voltage and current wiring in 3-wire and 4-wire structures

The voltage nominal input differs in accordance with the type of the meter. Also, the current range is in accordance with the meter current range and should be limited to "I_{max}". In 4-wire mode, the maximum line-to-neutral and the maximum line-to-line voltages are 290 and 500 volts, respectively. In 3-wire mode, the maximum line-to-line voltage equals 290 volts. In higher voltages, the meter cannot function appropriately and might get damaged.

"TB1-1" and "TB1-11" are the two inputs considered for the side power supply voltage. "TB1-11" needs to be considered as the negative input in DC systems and as neutral in AC systems. The voltage input

of the side power supply equals 110 VAC/VDC plus-minus 20 percent. Generally, it is possible to consider the following four combinations for the power supply:

- Type I – VT power supply: used for most metering applications, especially in Low Voltage sites where when all the VTs are disconnected, the meter turns off.
- Type II – LCD 24 volts side power supply with the local power supply: used in cases where it is necessary to read the meter even if the main power supply is not available. In such cases, a 24-volt battery power supply will be used to read the meter.
- Type III – side power supply: for switchyard uses where the meter needs to be always on and there is enough space for the side power supply of the system. If for any reason, this side power supply is disconnected, the meter turns off.
- VT Priority – along with the High Voltage auxiliary power supply with 200 to 240 volts range: in this state, naturally, the meter receives the necessary power from the VT circuits. When all of the VTs are disconnected, the changeover board activates and auxiliary terminals are used.
- VT Priority – along with the Low Voltage auxiliary power supply with 57 to 120 volts range: in this state, naturally, the meter receives the necessary power from the VT circuits. When all of the VTs are disconnected, the changeover board activates and auxiliary terminals are used. This structure is most useful in cases where the VT burden is not problematic but the power supply is always available for protective systems.

Default display screen

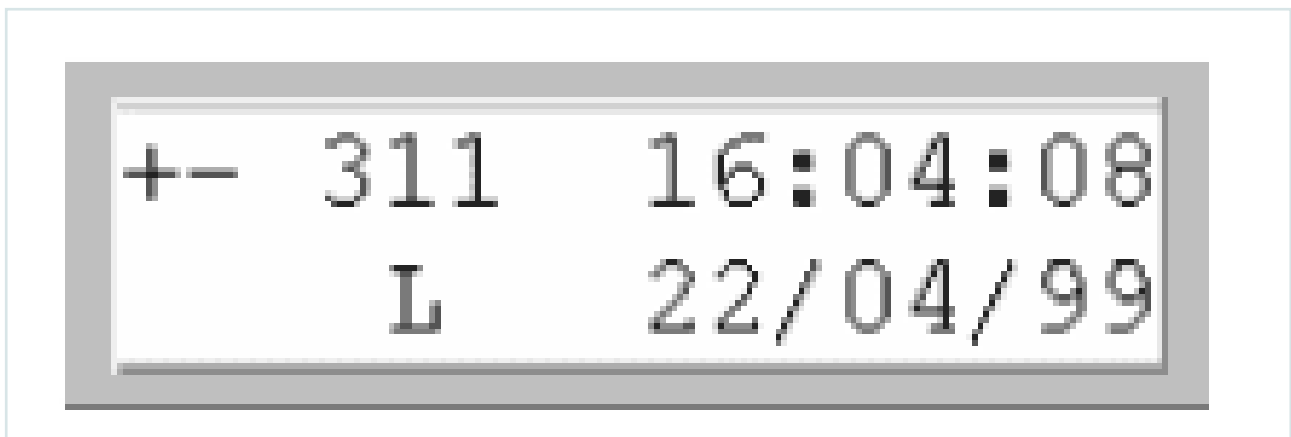


Figure 7

"The structure of the digits and symbols displayed on the screen from the top left are as follows: The two first characters of the first row of the screen stand for the direction of the var and var, respectively. "+" sign refers to positive energy / output / delivered and "-" sign refers to negative energy / input / received. If the slot for these characters is empty, it means that the amount of energy equals zero.

The third character that resembles a beating heart indicates that the meter is active and the display screen is up to date. The fourth, fifth, and sixth characters show the active rate for W, var and VA

values, respectively, in form of numbers from 1 to 8. The seventh character indicates the state of the battery and means that the battery is empty or unrecognized when turning on.

If the Daylight Saving feature that refers to the daylight saving time is active, the letter D is displayed as the eighth character. The current time is displayed on the right side of the screen. The initial three characters at the bottom of the screen show the alarm status. The fifth, sixth and seventh characters at the bottom of the screen show the login state. L means login through the optical port (Local), M means through the modem port and S means login through SCAD port. In the end, we can see the current date on the right side of the bottom.

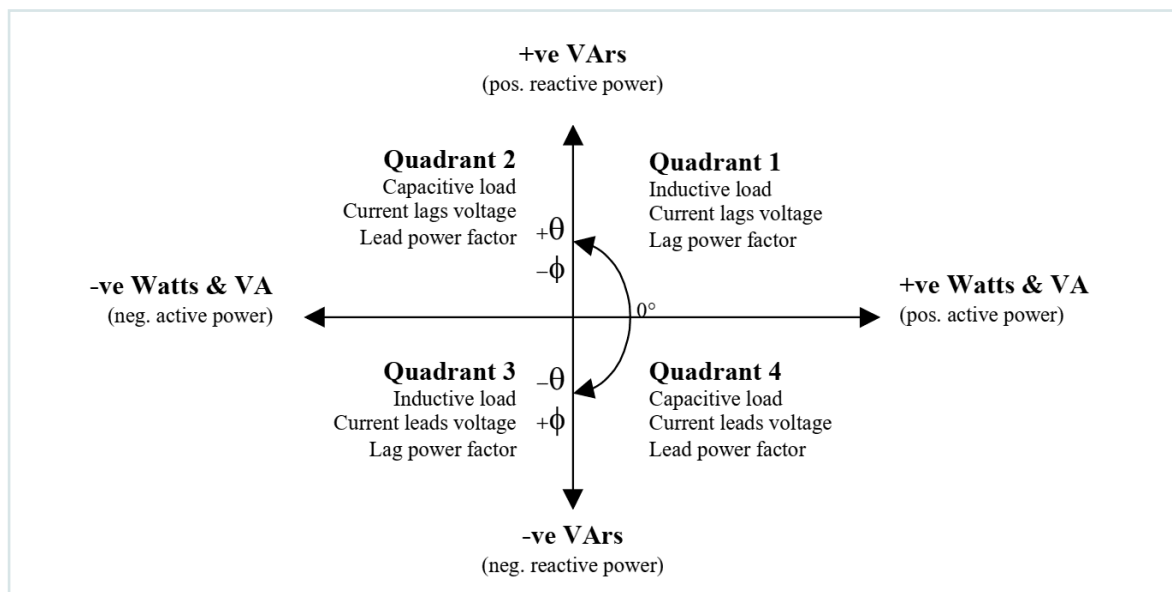


Figure 8

Power direction graph

In the above figure:

Refers to voltage impedance angle in relation to the current and

equals current admittance angle in relation to the voltage.

Pulse outputs: The pulse outputs are capable of doing more than only showing the power usage. MK6E has a maximum number of 6 outputs that are directly located inside the meter.

At the bottom of the LCD, there are two LEDs located on the meter that are used to assess the pulses produced in the accuracy test. These LEDs are connected to outputs number 1 and 2. The state of these LEDs is directly reflected on the TB3 outputs. The picture below indicates the state of EDM1 MK6E terminals. In fact, TB5, TB4, TB3 and TB6 are the terminals in which the outputs are located. All of the outputs are voltageless contacts. These outputs are completely isolated from the other circuits and in some cases, have common terminals. MOSFET drivers are set at 110 nominal volts.

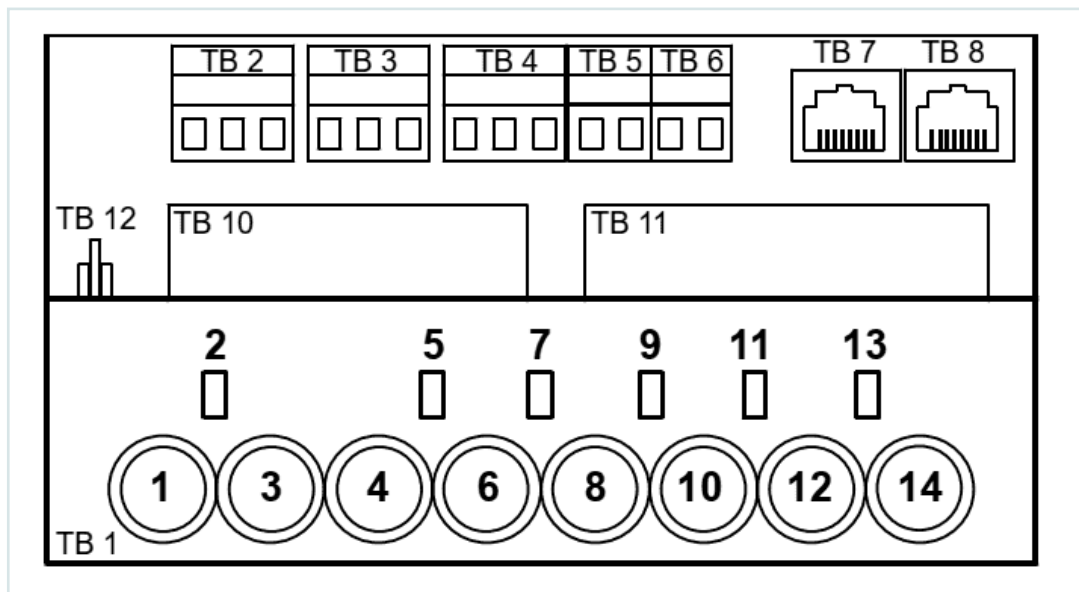


Figure 9

Terminal	Description
TB3-1	Common Terminal (#1 and #2)
TB3-2	Output #1 (LED #1)
TB3-3	Output #2 (LED #2)
TB4-1	Common Terminal (#3 and #4)
TB4-2	Output #3
TB4-3	Output #4
TB5-1	Output #5
TB5-2	Output #6
TB6-1	Output #7
TB6-2	Output #8

Figure 10

Settings	Description
Inv.	Output polarity
Active Time	The approximate time (in terms of ms) during which the output has an active pulse.
Inactive Time	This time (in terms of ms), needs to be at least between the pulses. If it does not happen, the output of the pulses makes an EFA alarm to warn of the possibility of losing the pulses.
Parameter	This element is the amount of energy stated by every pulse in form of Wh, varh or Vah. Valid settings range from 0.000001 to 1000000000000.0.
P/S	The parameter mentioned above may be primary (in VT/CT inputs) or secondary (in meter terminals). P stands for primary and S stands for secondary. S is an appropriate option to test LEDs in laboratory so that the turn ratios do not influence the performance.
Channel	This element determines the source input channels of the energy. "All" is the commonly used option that stands for all of the three phases (2 phases in two-element mode). Phase-to-phase options (B,A and C) are the most commonly used options in three-element mode where it is possible to display every phase separately.
Type	This element determines the energy type which can be Wh, varh or Vah.
Sign	Abs option here means that the output functions on both sides. + and - options activate "only output" and "only input" state, respectively. The diagram under the installation screen shows the directions of the energy.

Figure 11

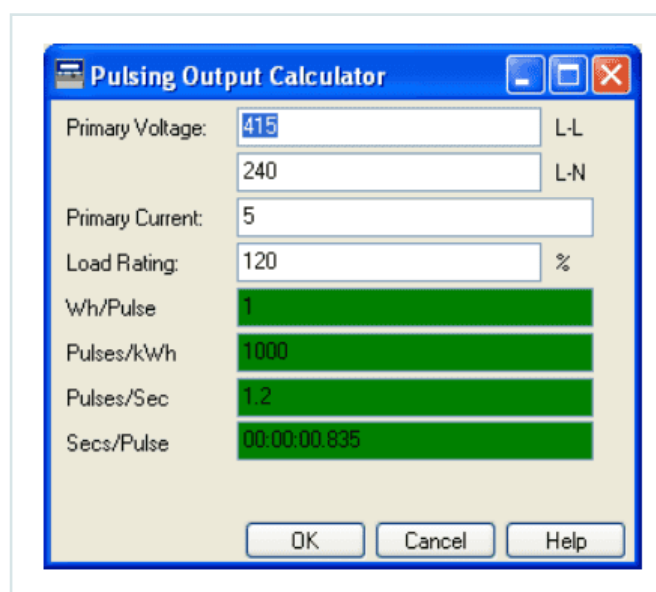
An important point is that for Active and Inactive times, the exact time is one percent shorter than the specified value. This amount will be even shorter if the system frequency is more than the nominal value. Therefore, the output will be lower as much as the same amount. Under normal conditions, these factors will not have any noticeable effect on the length of the pulse. It should be noted that this will only change the pulse time duration and the minimum off-time of the LED but not the rate of the pulse.

If during inactive times, the rate of the pulse is zero or less than zero, the output will remain active. If the rate of the pulse decreases, the pulses will be recognizable one more time. If this time is too short, the pulses will not be backed up and will merge into one another. Therefore, to avoid missing the pulses in high load conditions, selecting the appropriate parameter is of great importance.

Using the LED output to test the accuracy of the delivered Wh is a necessity. A 0.01 Wh/p pulse rate will be needed in the meter terminals. The light pulse must be 90ms long with a minimum interval of 50ms between the pulses so that the sensor can appropriately recognize the current process.

The settings and combinations required for the test are as follows: No Inversion, 90ms active time, 50ms inactive time, parameter 0.01, All channels, W, Export (+)

It should be noted that the EziView software has a built-in calculator for connecting to this meter that can help the user in adjusting the parameters for the pulse output. This tool can be used by clicking on the calculator when configuring the output in form of Pulsing. This calculator enables the user to specify the system characteristic (line-to-line voltage or line-to-neutral voltage, current and the amount of load) and determine the pulse output rate.



The image shows a Windows-style dialog box titled "Pulsing Output Calculator". It contains several input fields and calculated values:

- Primary Voltage:** Two input fields. The first is labeled "L-L" and contains the value "415". The second is labeled "L-N" and contains the value "240".
- Primary Current:** An input field containing the value "5".
- Load Rating:** An input field containing the value "120" followed by a percentage symbol "%".
- Wh/Pulse:** A green output field containing the value "1".
- Pulses/kWh:** A green output field containing the value "1000".
- Pulses/Sec:** A green output field containing the value "1.2".
- Secs/Pulse:** A green output field containing the value "00:00:00.835".

At the bottom of the dialog box are three buttons: "OK", "Cancel", and "Help".

Figure 12

Using the pulse outputs for the test: The easiest way to test the accuracy of the meter is to use the LED pulse (or output pulse). This test is similar to performing a test for meters with spinning disc. Pulse outputs are configured using the EzView software. To achieve the best results, the pulse rate must never exceed 10 pulses per second. Also, the test must be at least 10 seconds long.

Testing the meter and the software settings: To test "Energy Meters" or meters in online mode or under load, "AMR Transducer & Meter" room can be used. As mentioned before, this room is composed of "Test View" and "Transducer Characteristic" main windows. Since the function of each of these options has been explained before, repeating them does not seem necessary.

To begin the test, the user needs to double click on "Transducer" option after completing the information in "Device", in "General Test Object" window. There is a set of "Functions" available on "Transducer Properties" page. To test a meter, two functions of "Wh (watt-hour)" and "Varh (var-hour)" can be used and here "Wh" is selected. To perform an "Onload" test, the user needs to select the "Read from Binary" option in "Input" section. By selecting this option, the values are entered into the "Inputs" of the device using the clamps and interface cables.

The output type of the meter can be specified in the "Output" section. To test the meter, if only the output values of the meter are being displayed on the screen, the "Open Loop" option can be used. Here the "Pulse" option is used so that by using the light sensor that comes with the device, the number of output pulses of the device is recorded. The connection related to the current transformers needs to be specified in "CT Star point connection" section. Since normally the active power flows from the busbar toward the line, "Toward Line" option is selected. In "Tolerance" section, it is possible to enter the fault value in two forms of absolute and relative and the default values are 1 millipulse and 0/25 percent.

Also, in „Number of phases" section, it is possible to select from among single-phase or three-phase in accordance with the meter type. The test characteristic is specified in „Characteristic Definition" section. Since the meter characteristic is linear, the „Characteristic Type" is set at „Linear" and cannot be changed.

"Saturation Range", "Knee Point" and "Minimum Value" fields are deactivated for the meter test but in "Maximum Value" section, it is possible to specify the amount of power and the number of pulses received in return. Usually, the meter factor or "c/r" value is entered in this section. For example, the factor for an edmi mk6e meter equals 5000 watt-hour per pulse.

After completing the information in „Transducer Properties" section, the settings in „Hardware Configuration" need to be examined. By opening this window, the user can see that the current and voltage outputs are configured by default. Also, in „Binary/Analog Input" tab, the user can see that binary number 8 is selected to record the meter pulses by default. However, it is possible to use a custom „Binary" of the device as well.

" The only difference between onload and offload tests of the meter is that the inputs need to be prepared to record the values measured using the measurement equipment (clamps). To do this, the user only needs to click on "Test Hardware Configuration" option in the "Binary Input Calibration" section and assign the available binaries to record the values of current and voltage in accordance with the meter characteristic or that it is either single-phase or three-phase. By default, binaries number 2, 1, and 3 are assigned to record the voltage while binaries number 5, 6, and 7 are assigned to record the current values measuring using the clamp.

Using the "Sum", "Mul", and "Deg" parameters, it is possible to edit the measured values in different conditions in accordance with the measurement equipment being used. For example, if a clamp shows 1 volt in the output in return for 10 amps, by measuring a 15 amps current, our binary will receive 1.5 volt. Therefore, by entering factor "10" in "Mul" section, this value can be edited. As another example, if our clamp has a 0.5 degree phase measurement error, this item can be edited through "Deg" section. In "Sum" section it is possible to perform a "DC" shift that is not of use in this test.

By selecting the option in "Analog Output" section in "Test Hardware Configuration" window and entering the values of current and voltage, it is possible to calibrate the binary inputs. To perform the test, the user only needs to specify the inputs of the intended binary and then, begin the process of measuring the elements of current and voltage to compare with the meter characteristic. It should be noted that in "Online Values" section, the power, voltage, current and other elements related to the meter are displayed and updated instantly.

[\[jg1\]ONLOAD_test_of_the_meter](#)