

Application Note

AN0807

WattsOn®-Mark II Advanced Configuration Registers

Associated Product: WattsOn-Mark II

Summary

The WattsOn-Mark II features advanced configuration registers to alter the method used to calculate power and energy. Specifically, these registers may be used to reverse the sign of a specific phase, or to reassign the voltage channel to current channel mapping.

Background

NOTE: It is **ALWAYS** recommended that the meter and CTs be wired correctly during the initial install, paying close attention to the CT orientation, CT polarity, current to voltage phase relationship, and CT wire pairing. Even if a problem is found after installation, it is recommended to correct the issue at the wiring. The reason for this is to avoid problems in the future in case the meter must be replaced with a new one.

However, if it is impractical to correct the wiring, the WattsOn-Mark II allows for advanced configuration to reverse the phase polarity, or to remap the voltage to current assignment. If these advanced configuration registers are used, it should be noted either on the meter, or in the installation, which software applied corrections were required post hardware installation. Technical Support for these functions is limited.

Reading and writing of these registers follows the same methodology as all other registers. Therefore, locking the meter should be considered to avoid tampering of these registers, as they affect the measurement methodology.

Name	Offset	Address	Size	Type	R/W	Default	Description
Force Quadrant 1	0x1400	45121	16	B	RW	False (0)	Forces all measurements as absolute (kW=+, kVAR=+)
Reverse CT A	0x1401	45122	16	B	RW	False (0)	Reverses the polarity of CT A
Reverse CT B	0x1402	45123	16	B	RW	False (0)	Reverses the polarity of CT B
Reverse CT C	0x1403	45124	16	B	RW	False (0)	Reverses the polarity of CT C
Reverse Active Power Sign A	0x1404	45125	16	B	RW	False (0)	Reverses sign of Active Power (kW), phase A
Reverse Active Power Sign B	0x1405	45126	16	B	RW	False (0)	Reverses sign of Active Power (kW), phase B
Reverse Active Power Sign C	0x1406	45127	16	B	RW	False (0)	Reverses sign of Active Power (kW), phase C
Reverse Reactive Power Sign A	0x1407	45128	16	B	RW	False (0)	Reverses sign of Reactive Power (kVAR), phase A
Reverse Reactive Power Sign B	0x1408	45129	16	B	RW	False (0)	Reverses sign of Reactive Power (kVAR), phase B
Reverse Reactive Power Sign C	0x1409	45130	16	B	RW	False (0)	Reverses sign of Reactive Power (kVAR), phase C
Current A to Voltage →	0x140A	45131	16	U	RW	0	Assign <i>current</i> wired to phase A with <i>voltage</i> A, B or C
Current B to Voltage →	0x140B	45132	16	U	RW	0	Assign <i>current</i> wired to phase B with <i>voltage</i> A, B or C
Current C to Voltage →	0x140C	45133	16	U	RW	0	Assign <i>current</i> wired to phase C with <i>voltage</i> A, B or C
Active Calibration Set	0x140D	45134	16	U	RW	0	Currently selected calibration set (for multiple calibration set meters)
Calibration Set Name	0x140E	45135	96	ST	R	Varies	String containing name of the current calibration set. Null terminated. Each register contains two bytes.
No Load Power Factor	0x1414	45141	16	U	RW	0	Power factor below which to avoid measuring W and avoid accumulating kW (see AN1601-Effect of Current Transformer Phase Shift)

Force Quadrant 1

Setting this register to true (1), the WattsOn-Mark II will treat all real power/energy (kW/kWh) and reactive power/energy (kVAR/kVARh) measurements as absolute (positive). This in essence forces all measurements to “Quadrant 1”. This setting works on a global scale as it affects all three channels.

This setting is useful if the sign of the power is not relevant in the installation.

Reverse CT A, B, C

Setting any of these registers to true (1) reverses the current polarity into the meter in software. The result is that the real power/energy (kW/kWh) and reactive power/energy (kVAR/kVARh) signs are each reversed. The effect is a 180° phase shift on the current input, the same as reversing the orientation of the CT on the wire, or swapping the polarity of the current input into the meter.

This setting is useful if one or more of the CT inputs is reversed.

Reverse Active Power Sign A, B, C

Setting any of these registers to true (1) reverses the sign of the active power/energy (kW/kWh). Note that this is NOT the same as reversing the CT input, since the reactive power/energy (kVAR/kVARh) measurements are not affected.

This setting is useful if the desired sign of the power/energy is opposite (ie: import is to be represented as negative, and export is to be represented as positive – which is opposite to the default WattsOn-Mark II convention).

Reverse Reactive Power Sign A, B, C

Setting any of these registers to true (1) reverses the sign of the reactive power/energy (kVAR/kVAh). Note that this is NOT the same as reversing the CT input, since the active power/energy (kW/kWh) measurements are not affected.

This setting is useful if the desired sign of the reactive power/energy is opposite (ie: inductive is to be represented as negative, and capacitive is to be represented as positive – which is opposite to the default WattsOn-Mark II convention).

Current A,B, C to Voltage →

Setting these registers alters the channel association between the current and voltage inputs.

The register value (0, 1, 2, 3) defines the current to voltage channel assignment. The default value of "0" assigns the default mapping for each channel (A to A, B to B, C to C).

The channel mapping may be overridden by assigning a value to each phase independently. Values are: 1, 2 or 3; representing voltage phase A, B or C respectively.

Example:

To swap phase A and B:

Write "2" ("Voltage B") to register 0x140A (Current A to Voltage B)

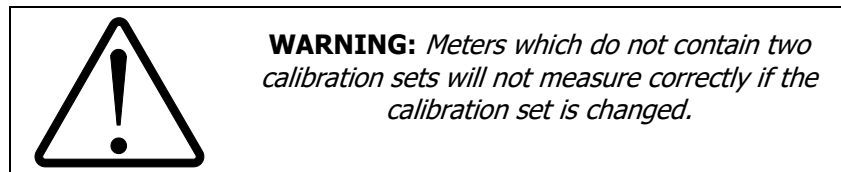
Write "1" ("Voltage A") to register 0x140B (Current B to Voltage A)

It is important to note that it is possible to assign the same voltage channel to multiple current channels. While this is not relevant for most installations, it may be useful in cases where the voltage phases are identical, and multiple circuits of the same voltage branch are being measured.

Active Calibration Set

Certain metering models allow for a dual calibration. This dual calibration is configured at the factory and may be field selectable. Currently this includes the -RC / -RCH meters (Rogowski Coil input) as well as high sensitivity mA input calibration (-LR part number extension).

It is possible to field select the calibration set in the case where the meter supports multiple calibrations. This option must be used with care and consideration. While selecting the wrong calibration set should not damage the meter (provided that the electrical limits of the meter are not exceeded for the specific model), the metering accuracy may be compromised. Additionally, changing the calibration set may affect how energy is accumulated, therefore it is not recommended to change this parameter dynamically, and also to reset the accumulated energy after doing so to avoid any energy corruption.



To change the active calibration set:

Using a special register in the "Advanced Configuration Registers" block (0x140D):

1. First write "0xABCD" to register 0x140D to allow a change
2. Next write either "0" or "1" to the register to set the new value ("0" is the default)

Calibration Set Name

To identify the calibration set, the name of the calibration set is stored as a set of six (6) Modbus registers. These registers form a string up to 12 characters long. Each register (16-bit) contains two bytes (8-bit). The string is null terminated if shorter than 12 characters.

Calibration Sets (for compatible meters)

Meters containing dual calibration are as follows:

Model	Calibration Set	Description	Calibration Set Name
-RC	0	Rogowski Coil Inputs	"RC Mode"
	1	mV Inputs	"mV Mode"
-mA-LR	0	Normal mA Input Range	"200mA Mode"
	1	Low mA Input Range	"20mA Mode"

No Load Power Factor

In cases where CTs are used which may cause a phase shift in the system at poor power factors, this register prevents kW and kWh accumulation if the measured power factor in the phase is below the set threshold (divided by 1000). For instance, if the No Load Power Factor register is set to "100", a power factor reading (within the WattsOn-Mark II) of 0.100 for that specific phase will yield no measurement of kW and no kWh accumulation.

This feature is useful for systems which have large reactive power (for instance inverters at night) to prevent errant "phantom" power measurement / energy accumulation due to induced CT or PT phase shift phenomenon. Please refer to AN1601 – Effect of Current Transformer Phase Shift.

Advanced Configuration Defaults

By default, the advanced configuration registers [0x1400 – 0x140C] have a value of "0". This may be used as a method to quickly determine if any of the configuration values have been changed.

Using Advanced Configuration Registers in Modbus Commander

It is possible to access the Advanced Configuration Registers in Modbus Commander, but a plugin must be installed first. This is to prevent accidental or errant reconfiguration of the meter registers.

To install the plugin:

1. Download the plugin from:
<http://www.elkor.net/bin/ModbusCommanderElkorDeviceAdvancedPlugin.dll>
2. Copy the plugin into your Modbus Commander plugins directory. By default it is:
C:\Program Files (x86)\Elkor Technologies\Modbus Commander\Plugins
3. Restart Modbus Commander, and make sure that you are connected to the meter. (ie: try to read the configuration)
4. You should now see a new item under "Devices" menu called "Elkor WattsOn-Mark II Advanced"