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Enercept Register Details

Which Registers to use:

Registers 1 through 39 represent the data as 16 bit integer values. Registers 257 through 334 represent the same data, as 32-bit floating point values. Any data may be read from either range.

For measured data, the floating point registers are recommended. Registers 1 through 29 (the measured data) can be difficult to use, because a multiplier must be used for each one to get the correct value. Most of the multipliers change depending on the CT Size. Reading the floating point registers avoids the need to use multipliers.

Registers 30 through 39 provide configuration information. These may be read from either area. Registers 36 through 39 may be written to configure the meter. Only the integer range (36 to 39) may be written. All writes to registers 257 to 334 are illegal, because the meter's firmware lacks the capability to translate floating point numbers back into integers.

Enercept Meter Enhanced Version, 3020 Exx-x Point Map:

Integer Format	Float Format	Description
1	257	Energy Consumption, kWH. As Integers,
2	259	#1 is the lower 16 bits, #2 is upper 16 bits. Both 257/258 and 259/260 have the same floating point value.
3	261	Real Power, kW
4	263	Reactive Power, kVAr
5	265	Apparent Power, kVA
6	267	Total Power Factor
7	269	Voltage, line to line, average of 3
8	271	Voltage, line to neutral, average of 3
9	273	Current, average of 3
10	275	Real Power, phase A
11	277	Real Power, phase B
12	279	Real Power, phase C

For Internal Use only

13	281	Power Factor, phase A
14	283	Power Factor, phase B
15	285	Power Factor, phase C
16	287	Voltage, phase A-B
17	289	Voltage, phase B-C
18	291	Voltage, phase A-C
19	293	Voltage, phase A-N
20	295	Voltage, phase B-N
21	297	Voltage, phase C-N
22	299	Current, phase A
23	301	Current, phase B
24	303	Current, phase C
25	305	Present Demand Sub-Interval (changing continuously) This is the currently accumulating sub-interval demand, which is constantly changing.
26	307	Minimum kW
27	309	Maximum kW
28	311	Present Demand (changes at end of every sub interval) This is the present demand, that is updated at the end of every sub interval. This value is the average of the previous N sub intervals, where N is the number of sub intervals (register 38)
29	313	Peak Demand The peak demand is the highest demand value (register 28) that has occurred. This value is stored in non-volatile memory.
30	315	System ID This register reads as 15022, to help identify the meter.
31	317	CT Size This register reads as the CT size, 100, 300, etc.
32	319	Count of KWH resets The number of times the KWH accumulator has been reset. This value is stored in non-volatile memory and can

never be reset. It will roll-over from 65535 to zero.

33	321	Count of Peak Demand Resets The number of times the peak demand (register 29) has been reset. This value is stored in non-volatile memory and can never be reset. It will roll-over from 65535 to zero.
34	323	Count of Sub Intervals This counts the number of sub-intervals that have elapsed. Because the demand (register 28) is updated every sub-interval, this register may be read to determine if an identical value in register 28 is actually the same demand interval or if it is a new interval and the load has remained steady. This register is stored in volatile memory, and will reset to zero if the meter loses power.
35	325	Count of number readings in present sub-interval This value indicates the number of readings that are represented by the present sub-interval (register 25). This register acts as an unsigned integer. Values larger than 32767 should not be "trusted". See below for explanation of sub-interval reading count overflow. This register will increment every 200 ms (5 Hz).
36	327	System Type 30 = Three Phase Delta 40 = Three Phase Wye
37	329	Sub Interval Length Sets the length of a sub-interval. Value is the number of seconds * 5, eg 4500 is 15 minutes. For sync-to-comms, set this to zero.
38	331	Number of Sub Intervals per Demand Interval Sets the number of sub-intervals that make a single demand interval. Legal values are 1 to 6. For block demand, set this to 1.
39	333	Command (bit mapped) bit 0 (mask 1) = Begin New Demand Sub-Interval bit 1 (mask 2) = Clear KWH accumulator bit 2 (mask 4) = Reset Peak Demand bits 3 to 15 should be written as zeros to avoid activating any additional commands that may be added in future revisions.

For Internal Use only

Enercept Meter Basic Version, 3020 Bxx-x Point Map:

The Basic Version is the "energy-only" low cost version of the meter, which only provides energy consumption and real power. It has a similar point map, where unavailable readings return N/A (SMS-3000) values.

Integer Format	Float Format	Description
1 2	257 259	Energy Consumption, kWH. As Integers, #1 is the lower 16 bits, #2 is upper 16 bits. Both 257/258 and 259/260 have the same floating point value.
3	261	Real Power, kW
4-29	263-313	Not Available These registers are not available. The integers always return -32768. The floats always return 0x7FC00000 (IEEE NaN, not a number).
30	315	System ID This register reads as 15023, to help identify the meter.
31	317	CT Size This register reads as the CT size, 100, 300, etc.
32	319	Count of KWH resets The number of times the KWH accumulator has been reset. This value is stored in non-volatile memory and can never be reset. It will roll-over from 65535 to zero.
33-35	321-325	Not Available Integers read -32768, floats read 0x7FC00000 (NaN)
36	327	System Type, R/W, nonvolatile Writing to this register does nothing
37	329	Dummy Register, R/W, nonvolatile This register has no function
38	331	Dummy Register, R/W, nonvolatile This register has no function
39	333	Command (bit mapped) bit 1 (mask 2) = Clear KWH accumulator bits 0, 2 and 3 to 15 should be written as zeros to avoid activating any additional commands that may be added in future revisions.

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Modbus Size Block Reads:

The maximum recommended Modbus block read size is 30 registers. This allows the meter to compose the entire Modbus response in its 66-byte buffer before transmitting any of it. Modbus RTU requires tight byte-to-byte timing. By limiting the Modbus block read to 30 registers, this timing will always be met. In practice, larger block sizes may be used, but there are is no guarantee that the Modbus RTU timing specs will be met

Demand Computation, Internal Algorithm:

The meter will compute average kW, by accumulating every kW reading and keeping a count of the number of kW readings accumulated. This will occur every 200 ms (5 Hz). The accumulated value, divided by the number of kW readings, will be the present sub-interval demand, which may be read at register 25.

A sub-interval may be terminated in two ways. If a write to the command register has bit #0 set, it will cause the present sub-interval to end. The present sub interval will also end automatically if the sub interval length (register 37) has been set to a non-zero value. If the count of the number of kw readings equals or exceeds the non-zero sub interval length, then the sub interval will be ended. While there are two ways to end a sub interval, it is expected that applications will use only one of them.

The maximum legal sub-interval length is 65535 readings, which corresponds to 3 hours, 38 minutes, 27.2 seconds. When the 65536th reading is taken, the sub-interval reading counter will overflow. This condition is detected and handled as follows. The total accumulated kw count is divided in half, and the sub-interval reading counter is set to 32768. This preserves the average kw seen over the previous 3.64 hours, but new readings are weighted twice as heavily. In normal operation, it is expected that a sub interval should not last longer than 1 hour.

When a sub-interval ends, the average kw during that sub-interval (which is the accumulated kw readings divided by the number of readings) is added to a 6 value fifo that stores the 6 most recent sub-intervals. The kw accumulator and count of kw readings are cleared to zero, to begin a new sub interval. The count of sub intervals (register 34) is incremented. The present demand is recomputed by averaging the first N elements of the fifo, where N is the value in register 38. If the new present demand is higher than the stored peak demand, then the peak demand is updated to the new present demand.

Misc

The system type (register 36) may be written to indicate the type of system the meter is connected to. If a 30 is written, the system is a 3-wire delta. Points which do not apply to 3-wire delta

will read as -32768.

The kWH accumulator may be reset by writing to the command register with bit #1 set. This will clear the kWH accumulator to zero. Any writes to the kWH points will be ignored.

Floating Point Registers

The Enhanced Version's Modbus firmware is written so that a copy of all registers appears starting at 257, as 32 bit floating point values. These are compatible with the "32 bit IEEE Real" format in SMS-3000. All of these registers will appear as floats. All floating point variables are read-only, because they are generated on-the-fly. The command register (#39) must be written at register 39, not its floating point counterpart. Likewise, when configuring the demand calculation, registers 37 and 38 must be written, not their corresponding floats.