

METRALINE | ENERGY

Modbus RTU Interface of Energy Meters U28X

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1. Revisions History

Revision 1 The document is in first revision

2. Preface

2.1. Overview

The present guide describes the Modbus RTU interface of the METRALINE ENERGY meters from GOSSEN METRAWATT. In these meters, ASCII Protocol is not supported.

The physical layer is standard RS-485.

The link parameters are selectable in the following ranges:

- Baud Rate: selectable among 1200, 2400, 4800, 9600, 19200 and 38400 in all all devices Bits per byte: 8 (fixed)
- Parity: selectable among None, Even and Odd
- Number of Stop Bits: selectable between 1 and 2

The following parameters are configurable by means of keyboard/display interface and also by means of Modbus Protocol itself:

- Address (1...247)
- BaudRate (1200...38400)
- Parity (None, Odd or Even)
- Number of Stop Bits (1 or 2)

Refer to the product instruction manual for parameters' modification by means of display/keyboard. The procedure differs from product to product.

2.2. Default settings

These are the factory default settings:

- Protocol: Modbus RTU
- Modbus Address: 001
- Baud rate: 19200 bit/s
- Parity: None
- Stop bits: 1
- Big Endian

3. Modbus commands

The protocol supports only two functions, one for reading the register values, one for writing the configuration registers and/or to issue some commands. The reading is only possible for a block of registers (the command for a single register reading is not supported, but, of course, it is possible to read a block of one register only).

3.1. Read holding registers (function code 03)

This function code is used to read the contents of a contiguous block of holding registers. The Request frame specifies the starting register address and the number of registers.

The register data in the response message are packed as two bytes per register, with the binary contents left justified within each byte.

As we shall see in the next paragraphs:

- The first byte contains the most significant bits and the second contains the least significant bits.

In many cases, a value is stored in more than one register (more than one word of 16 bits). For example, the active energy is represented using 4 registers (4 words or 8 bytes). Please refer to the chapter "Internal registers" for details.

Maximum consecutive 100 registers

The maximum number of registers that can be read with a single reading request is 100. If the master tries to read more than 100 holding registers, the device will send an answer with Exception code 0x02 (illegal address). Of course, the minimum is 1 holding register.

Master Request for Read holding registers function

ADR	03	STh	STl	NRh	NRI	CRCh	CRCI
-----	----	-----	-----	-----	-----	------	------

ADR	Modbus Address
03	Read holding register function code (fixed)
STh	Starting address register (high order bits)
STl	Starting address register (low order bits)
NRh	Number of registers (high order bits)
NRI	Number of registers (low order bits)
CRCh	Modbus Checksum (high order bits)
CRCI	Modbus Checksum (low order bits)

Interface Description

3.2. Preset single register (function code 06)

This function code is used to write a single holding register in a slave counter. The Request specifies the address of the register to be written. The normal answer is an echo of the request, returned after the register contents have been written.

Master Request for Preset Single Register function

ADR	06	RAH	RAL	VALUE_H	VALUE_L	CRCh	CRCI
-----	----	-----	-----	---------	---------	------	------

ADR	Modbus Address
06	Write single register function code (fixed)
RAH	Register address (MSbyte)
RAL	Register address (LSbyte)
VALUE_H	Register value (MSbyte)
VALUE_L	Register value (LSbyte)
CRCh	Modbus Checksum (MSbyte)
CRCI	Modbus Checksum (LSbyte)

3.3. Registers Addressing convention

The addresses of the registers listed in the following tables are exactly those that must be included in the Modbus Master reading/preset requests. There is some very well-known Master Tools, freely downloadable from some Websites, in which you must write the address value N+1 when you want to read or preset the Holding Register N.

3.4. Values Reading conventions

As above explained, a reading request can ask for 1 to 100 registers. Each register is 2 bytes long. For example, suppose you want to read 4 holding register, starting from address 4119 from a slave at address 1. The reading request shall be:

0x01	0x03	0x10	0x17	0x00	0x04	0xF0	0xCD
slave address	Read holding registers function code	High and low byte of the address of the first register to be read (0x1017 = 4119)		High and low byte of the number of registers to be read (0x0004 = 4)		High and low byte of CRC16 calculation	

The answer will be:

0x01	0x03	0x08
same byte as in reading request	n. of data bytes in the answer (2 per register)	2 bytes of register at address 4119	2 bytes of register at address 4120	2 bytes of register at address 4121	2 bytes of register at address 4122						High and low byte of CRC16 calculation

The way the data of registers are stored inside the answer depends on the option:

- **Integer** or **Floating-Point format** (meaningful for numerical values only)

Interface Description

3.4.1. Integer / Floating Point Selection

This option is configurable through Modbus itself (with a Preset Single Register request at Register 4117). This option affects only the numerical values (instantaneous measures and accumulated energies). Inside the register list, in the next chapter, in case the value is numerical, it is tagged with N4 or N8:

N4 means:

4 bytes (2 registers) values

Voltages (Unit=Volt), Currents (Unit=Amp), Phase Powers (Unit=kW, kvar or kVA), Power Factors (from -1 to +1), Frequency (Unit=Hertz), THDs (unit=%)

N8 means:

8 bytes (4 registers) values

All Energies, including Partial Energies (Unit=kWh or kvarh) and 3Phase Powers (Unit=kW, kvar or kVA) Depending on the Integer/Floating Point selection, data will be inserted in the answer to a reading request in the different ways.

In case of Integer selection:

- a 4 bytes value (i.e., 2 registers value) is intended to be read multiplied by 10000. Suppose that a reading request of Phase 1 Apparent Power provides a read value = 65708700, it means the Phase 1 Apparent Power = 6570.8700 kVA.
- An 8 bytes value (i.e., 4 registers value) is more complicated. The value stored in the first 4 bytes must be multiplied by a factor of 10^9 (1000000000). Then it must be added to the value stored in the following 4 bytes. Finally, the result must be divided by 10000.
Example: Imported T1 Active Energy for Phase 2 (addresses 4139, 4140, 4141 & 4142)
Integer value (most significant 4 bytes): 12344
Integer value (less significant 4 bytes): 765532
Original value: $(12344 * 1000000000 + 765532) / 10000 = 1234400076,5532$ (kWh)

In case of Floating-Point selection, the 32-bit Single Precision Floating Point notation is adopted (IEEE ANSI 754) is adopted:

SEEEEEEE EMMMMMMM MMMMMMMM MMMMMMMM

S = sign bit (1=negative)

EEEEEEEE = 8 bits of exponent, with 127 of bias. Exponent = EEEEEEEE-127.

MM...MMM = 23 bits of mantissa. These are fractional part of the number, to be added to an implicit 1.0

(Refer to Wikipedia page for more details: http://en.wikipedia.org/wiki/Single-precision_floating-point_format)

With floating point notation, the value is directly read in the assigned unit (no adaptation is required)

- a 4 bytes value (ie 2 registers value) is read at the same addresses as in case of Integer option, because it takes the same number of bytes
- In case of values that takes 8 bytes (4 registers, the FP value is read at the first two addresses, and the remaining two registers are read as null. (Be aware that, with this choice, the resolution of the read value is limited to 23 bits, hence less than 6 decimal digits)

Interface Description

3.4.2. Reading a 4 bytes Value

Suppose you want to read Voltage of L1-N (addresses 4267, 4268) and that the value of the voltage is 226.85 Volt.

In case of **Integer**, you will read

0x00 0x22 0x9D 0x54 (0x00229D54 = 2268500, hence voltage is 22685/10000=226.85)

In case of **Floating Point**, you will read (in fp format 226.85 = 0x43 0x62 0xD9 0x9A)

0x43 0x62 0xD9 0x9A floating point is in the “natural sequence”

3.4.3. Reading a 8 bytes Value

Suppose you want to read “Active Energy 1st phase T1, imp (kWh)” and that its value is 187642,7800 kWh.

In case of **Integer**, you will read

0x00 0x00 0x00 0x01 0x34 0x3D 0x3A 0x18

(as explained above, the value of the upper part of the integer (MS 4 bytes) is multiplied by 10⁹, then the value of the 4 LS bytes is added. Finally, the result must be divided by 10000.)

4 MS bytes = 0x00000001 = 1

4 LS bytes = 0x343D3A18 = 876427800

Value = (1*10⁹ + 876427800)/10000 = 187642,7800

In case of **Floating Point**, you will read (in fp format 187642,7800 = 0x48 0x37 0x3E 0xB2)

0x48 0x37 0x3E 0xB2 0x00 0x00 0x00 0x00

floating point is in the “natural sequence”, with 4 LS bytes not used, read as null

4. Internal registers

This is the complete list of the internal registers; some of them are different depending on the model.

LEGENDA:

Register access

R the register is read only

R/W the register is readable and writable

R=0 the register is read only, and its value is always = 0

W, R=0 the register is writable, but its reading always gives a value = 0 (typically for commands)

NA the register is neither readable nor writable (any access is refused with Illegal address exception)

Type:

N4 numerical value (2 consecutive registers, 4 bytes) see previous paragraph for more details

N8 numerical value (4 consecutive registers, 8 bytes) see previous paragraph for more details

ASCII a pair of ASCII characters

Blank non numerical value

Register Address	Register Tag	U281B	U282B	U289B U289E	Type
4100	Firmware version	R	R	R	
4101	Range overflow alarm	R=0	R	R	
4102	Running tariff	R=0	R	R	
4103	Read-only not used register.	R=0	R=0	R=0	
4104	PID (Product Identification) bytes 1 and 2	R	R	R	ASCII
4105	PID – bytes 3 and 4	R	R	R	ASCII
4106	PID – bytes 5 and 6	R	R	R	ASCII
4107	PID – bytes 7 and 8	R	R	R	ASCII
4108	PID – bytes 9 and 10	R	R	R	ASCII
4109	PID – bytes 11 and 12	R	R	R	ASCII
4110	PID – bytes 13 and 14	R	R	R	ASCII
4111	Not used read/write register.	R=0	R=0	R=0	
4112	Modbus Baud Rate	R/W	R/W	R/W	
4113	Modbus Parity	R/W	R/W	R/W	
4114	Modbus Stop Bits	R/W	R/W	R/W	
4115	Modbus Address	R/W	R/W	R/W	
4116	Not used read/write register.	R=0	R=0	R=0	
4117	Float Integer format	R/W	R/W	R/W	
4118	Reset energy counters command (*)	W, R=0	W, R=0	W, R=0	
4119...4122	Active Energy (L1, T1, imported) [kWh]	R	R	R	N8
4123...4126	Active Energy (L2, T1, imported) [kWh]	R=0	R=0	R	N8
4127...4130	Active Energy (L3, T1, imported) [kWh]	R=0	R=0	R	N8
4131...4134	Active Energy (Σ, T1, imported) [kWh]	R=0	R=0	R	N8
4135...4138	Active Energy (L1, T2, imported) [kWh]	R=0	R	R	N8
4139...4142	Active Energy (L2, T2, imported) [kWh]	R=0	R=0	R	N8
4143...4146	Active Energy (L3, T2, imported) [kWh]	R=0	R=0	R	N8
4147...4150	Active Energy (Σ, T2, imported) [kWh]	R=0	R=0	R	N8
4151 & 4152	Active Power (L1) [kW]	R	R	R	N4
4153 & 4154	Active Power (L2) [kW]	R=0	R=0	R	N4
4155 & 4156	Active Power (L3) [kW]	R=0	R=0	R	N4
4157...4160	Active Power (Σ) [kW]	R=0	R=0	R	N4
4161...4164	Active Energy (L1, T1, exported) [kWh]	R	R	R	N8
4165...4168	Active Energy (L2, T1, exported) [kWh]	R=0	R=0	R	N8
4169...4172	Active Energy (L3, T1, exported) [kWh]	R=0	R=0	R	N8
4173...4176	Active Energy (Σ, T1, exported) [kWh]	R=0	R=0	R	N8
4177...4180	Active Energy (L1, T2, exported) [kWh]	R=0	R	R	N8
4181...4184	Active Energy (L2, T2, exported) [kWh]	R=0	R=0	R	N8
4185...4188	Active Energy (L3, T2, exported) [kWh]	R=0	R=0	R	N8
4189...4192	Active Energy (Σ, T2, exported) [kWh]	R=0	R=0	R	N8
4193...4196	Reactive Energy (L1, T1, imported) [kvarh]	R=0	R	R	N8
4197...4200	Reactive Energy (L2, T1, imported) [kvarh]	R=0	R=0	R	N8
4201...4204	Reactive Energy (L3, T1, imported) [kvarh]	R=0	R=0	R	N8
4205...4208	Reactive Energy (Σ, T1, imported) [kvarh]	R=0	R=0	R	N8
4209...4212	Reactive Energy (L1, T2, imported) [kvarh]	R=0	R	R	N8
4213...4216	Reactive Energy (L2, T2, imported) [kvarh]	R=0	R=0	R	N8
4217...4220	Reactive Energy (L3, T2, imported) [kvarh]	R=0	R=0	R	N8
4221...4224	Reactive Energy (Σ, T2, imported) [kvarh]	R=0	R=0	R	N8
4225...4228	Reactive Energy (L1, T1, exported) [kvarh]	R=0	R	R	N8
4229...4232	Reactive Energy (L2, T1, exported) [kvarh]	R=0	R=0	R	N8
4233...4236	Reactive Energy (L3, T1, exported) [kvarh]	R=0	R=0	R	N8
4237...4240	Reactive Energy (Σ, T1, exported) [kvarh]	R=0	R=0	R	N8
4241...4244	Reactive Energy (L1, T2, exported) [kvarh]	R=0	R	R	N8

Interface Description

Register Address	Register Tag		U281B	U282B	U289B U289E	Type
4245...4248	Reactive Energy (L2, T2, exported)	[kvarh]	R=0	R=0	R	N8
4249...4252	Reactive Energy (L3, T2, exported)	[kvarh]	R=0	R=0	R	N8
4253...4256	Reactive Energy (Σ , T2, exported)	[kvarh]	R=0	R=0	R	N8
4257 & 4258	Reactive Power (L1)	[kvar]	R=0	R	R	N4
4259 & 4260	Reactive Power (L2)	[kvar]	R=0	R=0	R	N4
4261 & 4262	Reactive Power (L3)	[kvar]	R=0	R=0	R	N4
4263...4266	Reactive Power (Σ)	[kvar]	R=0	R=0	R	N8
4267 & 4268	Phase Voltage (L1-N)	[Volt]	R	R	R	N4
4269 & 4270	Phase Voltage (L2-N)	[Volt]	R=0	R=0	R	N4
4271 & 4272	Phase Voltage (L2-N)	[Volt]	R=0	R=0	R	N4
4273 & 4274	System Voltage (L1-L2)	[Volt]	R=0	R=0	R	N4
4275 & 4276	System Voltage (L2-L3)	[Volt]	R=0	R=0	R	N4
4277 & 4278	System Voltage (L3-L1)	[Volt]	R=0	R=0	R	N4
4279 & 4280	Current (L1)	[Ampere]	R	R	R	N4
4281 & 4282	Current (L2)	[Ampere]	R=0	R=0	R	N4
4283 & 4283	Current (L3)	[Ampere]	R=0	R=0	R	N4
4285 & 4286	Apparent Power (L1)	[kVA]	R=0	R	R	N4
4287 & 4288	Apparent Power (L2)	[kVA]	R=0	R=0	R	N4
4289 & 4290	Apparent Power (L3)	[kVA]	R=0	R=0	R	N4
4291...4294	Apparent Power (Σ)	[kVA]	R=0	R=0	R	N8
4295 & 4296	Power Factor (L1)		R	R	R	N4
4297 & 4298	Power Factor (L2)		R=0	R=0	R	N4
4299 & 4300	Power Factor (L3)		R=0	R=0	R	N4
4301 & 4302	Power Factor (Σ)		R=0	R=0	R	N4
4303 & 4304	Frequency	[Hz]	R	R	R	N4
4305 & 4306	Voltage Total Harmonic Distortion (L1)	[%]	NA	R=0	R=0	N4
4307 & 4308	Voltage Total Harmonic Distortion (L2)	[%]	NA	R=0	R=0	N4
4309 & 4310	Voltage Total Harmonic Distortion (L3)	[%]	NA	R=0	R=0	N4
4311 & 4312	Current Total Harmonic Distortion (L1)	[%]	NA	R=0	R=0	N4
4313 & 4314	Current Total Harmonic Distortion (L2)	[%]	NA	R=0	R=0	N4
4315 & 4316	Current Total Harmonic Distortion (L3)	[%]	NA	R=0	R=0	N4
4317 & 4318	Residual Leakage Current	[Ampere]	NA	R=0	R	N4
4319...4222	Total Active Energy (Σ , T1+T2, imported)	[kWh]	NA	R	R	N8
4323...4326	Total Active Energy (Σ , T1+T2, exported)	[kWh]	NA	R	R	N8
4327...4330	Partial Active Energy (Σ , T1, imported)	[kWh]	NA	R	R	N8
4331...4334	Partial Active Energy (Σ , T2, imported)	[kWh]	NA	R	R	N8
4335...4338	Partial Active Energy (Σ , T1, exported)	[kWh]	NA	R	R	N8
4339...4342	Partial Active Energy (Σ , T2, exported)	[kWh]	NA	R	R	N8

(*) The reset of Energies is not applicable in MID certified Energy Meters

4.1. General read-only registers

These registers store general read-only information.

Register	Tag	Description
4100	Firmware revision	0xFF00+Firmware revision of the counter. For example, revision 2.1 is read 0xFF21
4101	Range overflow alarm	The register is set by the counter if it has detected a value over the voltage or the current nominal threshold. The lowest order byte of the register is bit-coded as follows: n.u. n.u. OFV3 OFI3 OFV2 OFI2 OFV1 OFI1 Where: OFV Voltage overflow (on phase 1, 2 and 3) OFI Current overflow (on phase 1, 2 and 3) n.u. Not Used
4102	Running tariff	0 Tariff 1 is currently in use 1 Tariff 2 is currently in use
4104... 4110	PID (product identification)	Product identification string (a maximum of 14 bytes), They are expected to be printable ASCII characters.

Interface Description
4.2. Writable parameters and command (Modbus configuration and Energy reset)

In most of devices the Parity and the Number of Stop Bits are neither writable nor readable. One register (4118) is dedicated to reset the energy registers internal to the counter, including Partial Registers (**assuming that the counter is not MID certified**).

Register	Tag	Description
4112	Modbus Baud Rate	One of the following: 1200, 2400, 4800, 9600, 19200, 38400
4113	Modbus Parity	0=None, 1=Even, 2=Odd
4114	Modbus Number of Stop Bits	1=One Stop Bit, 2=Two Stop Bits
4115	Modbus address	From 1 to 247
4117	Float Integer format	0 Numeric values are coded as floating point 32 bit 1 Numeric values are coded as integers (see par. 4.4)
4118	Reset energy counters command. The command is not accepted by MID certified counters.	1 Reset active energy registers (including partial registers) 2 Reset reactive energy registers 3 Reset all the registers (including active partial registers)

4.3. Readable values (energy registers and instantaneous measurements)

These registers hold the electrical values measured or calculated by the counter. The number of available readable values depends on the counter type.

Register Address	Register Tag		U281B	U282B	U289B U289E	Signed Unsigned & Length (bytes)
4119...4122	Active Energy (L1, T1, imported)	[kWh]	R	R	R	U 8
4123...4126	Active Energy (L2, T1, imported)	[kWh]	R=0	R	R	U 8
4127...4130	Active Energy (L3, T1, imported)	[kWh]	R=0	R	R	U 8
4131...4134	Active Energy (Σ , T1, imported)	[kWh]	R=0	R	R	U 8
4135...4138	Active Energy (L1, T2, imported)	[kWh]	R	R	R	U 8
4139...4142	Active Energy (L2, T2, imported)	[kWh]	R=0	R	R	U 8
4143...4146	Active Energy (L3, T2, imported)	[kWh]	R=0	R	R	U 8
4147...4150	Active Energy (Σ , T2, imported)	[kWh]	R=0	R	R	U 8
4151 & 4152	Active Power (L1)	[kW]	R	R	R	S 4
4153 & 4154	Active Power (L2)	[kW]	R=0	R	R	S 4
4155 & 4156	Active Power (L3)	[kW]	R=0	R	R	S 4
4157...4160	Active Power (Σ)	[kW]	R=0	R	R	S 8
4161...4164	Active Energy (L1, T1, exported)	[kWh]	R	R	R	U 8
4165...4168	Active Energy (L2, T1, exported)	[kWh]	R=0	R	R	U 8
4169...4172	Active Energy (L3, T1, exported)	[kWh]	R=0	R	R	U 8
4173...4176	Active Energy (Σ , T1, exported)	[kWh]	R=0	R	R	U 8
4177...4180	Active Energy (L1, T2, exported)	[kWh]	R	R	R	U 8
4181...4184	Active Energy (L2, T2, exported)	[kWh]	R=0	R	R	U 8
4185...4188	Active Energy (L3, T2, exported)	[kWh]	R=0	R	R	U 8
4189...4192	Active Energy (Σ , T2, exported)	[kWh]	R=0	R	R	U 8
4193...4196	Reactive Energy (L1, T1, imported)	[kvarh]	R	R	R	U 8
4197...4200	Reactive Energy (L2, T1, imported)	[kvarh]	R=0	R	R	U 8
4201...4204	Reactive Energy (L3, T1, imported)	[kvarh]	R=0	R	R	U 8
4205...4208	Reactive Energy (Σ , T1, imported)	[kvarh]	R=0	R	R	U 8
4209...4212	Reactive Energy (L1, T2, imported)	[kvarh]	R	R	R	U 8
4213...4216	Reactive Energy (L2, T2, imported)	[kvarh]	R=0	R	R	U 8
4217...4220	Reactive Energy (L3, T2, imported)	[kvarh]	R=0	R	R	U 8
4221...4224	Reactive Energy (Σ , T2, imported)	[kvarh]	R=0	R	R	U 8
4225...4228	Reactive Energy (L1, T1, exported)	[kvarh]	R	R	R	U 8
4229...4232	Reactive Energy (L2, T1, exported)	[kvarh]	R=0	R	R	U 8
4233...4236	Reactive Energy (L3, T1, exported)	[kvarh]	R=0	R	R	U 8
4237...4240	Reactive Energy (Σ , T1, exported)	[kvarh]	R=0	R	R	U 8
4241...4244	Reactive Energy (L1, T2, exported)	[kvarh]	R	R	R	U 8
4245...4248	Reactive Energy (L2, T2, exported)	[kvarh]	R=0	R	R	U 8
4249...4252	Reactive Energy (L3, T2, exported)	[kvarh]	R=0	R	R	U 8
4253...4256	Reactive Energy (Σ , T2, exported)	[kvarh]	R=0	R	R	U 8
4257 & 4258	Reactive Power (L1)	[kvar]	R	R	R	S 4
4259 & 4260	Reactive Power (L2)	[kvar]	R=0	R	R	S 4
4261 & 4262	Reactive Power (L3)	[kvar]	R=0	R	R	S 4

Interface Description

Register Address	Register Tag		U281B	U282B	U289B U289E	Signed Unsigned & Length (bytes)
4263...4266	Reactive Power (Σ)	[kvar]	R=0	R	R	S 8
4267 & 4268	Phase Voltage (L1-N)	[Volt]	R	R	R	U 4
4269 & 4270	Phase Voltage (L2-N)	[Volt]	R=0	R	R	U 4
4271 & 4272	Phase Voltage (L2-N)	[Volt]	R=0	R	R	U 4
4273 & 4274	System Voltage (L1-L2)	[Volt]	R=0	R	R	U 4
4275 & 4276	System Voltage (L2-L3)	[Volt]	R=0	R	R	U 4
4277 & 4278	System Voltage (L3-L1)	[Volt]	R=0	R	R	U 4
4279 & 4280	Current (L1)	[Ampere]	R	R	R	U 4
4281 & 4282	Current (L2)	[Ampere]	R=0	R	R	U 4
4283 & 4283	Current (L3)	[Ampere]	R=0	R	R	U 4
4285 & 4286	Apparent Power (L1)	[kVA]	R	R	R	U 4
4287 & 4288	Apparent Power (L2)	[kVA]	R=0	R	R	U 4
4289 & 4290	Apparent Power (L3)	[kVA]	R=0	R	R	U 4
4291...4294	Apparent Power (Σ)	[kVA]	R=0	R	R	U 4
4295 & 4296	Power Factor (L1)		R	R	R	S 4
4297 & 4298	Power Factor (L2)		R=0	R	R	S 4
4299 & 4300	Power Factor (L3)		R=0	R	R	S 4
4301 & 4302	Power Factor (Σ)		R=0	R	R	S 4
4303 & 4304	Frequency	[Hz]	R	R	R	U 4
4305 & 4306	Voltage Total Harmonic Distortion (L1)	[%]	R=0	R=0	R	U 4
4307 & 4308	Voltage Total Harmonic Distortion (L2)	[%]	R=0	R=0	R	U 4
4309 & 4310	Voltage Total Harmonic Distortion (L3)	[%]	R=0	R=0	R	U 4
4311 & 4312	Current Total Harmonic Distortion (L1)	[%]	R=0	R=0	R	U 4
4313 & 4314	Current Total Harmonic Distortion (L2)	[%]	R=0	R=0	R	U 4
4315 & 4316	Current Total Harmonic Distortion (L3)	[%]	R=0	R=0	R	U 4
4317 & 4318	Residual Leakage Current	[Ampere]	R=0	R	R	U 4
4319...4222	Total Active Energy (Σ , T1+T2, imported)	[kWh]	R	R	R	U 8
4323...4326	Total Active Energy (Σ , T1+T2, exported)	[kWh]	R	R	R	U 8
4327...4330	Partial Active Energy (Σ , T1, imported)	[kWh]	R	R	R	U 8
4331...4334	Partial Active Energy (Σ , T2, imported)	[kWh]	R	R	R	U 8
4335...4338	Partial Active Energy (Σ , T1, exported)	[kWh]	R	R	R	U 8
4339...4342	Partial Active Energy (Σ , T2, exported)	[kWh]	R	R	R	U 8

Notes

T1/T2 indicates the Tariff (1 or 2) of the accumulated Energy

The symbol Σ indicates a total amount value (for example: the Reactive Power Σ kvar value is the total Reactive Power on the three phases. It is of course significant in a three-phase counter only).

imported/exported indicates whether the energy is generated (exported) or consumed (imported).

U 4: 4 bytes, unsigned

U 8: 8 bytes, unsigned

S 4: 4 bytes, signed

S 8: 8 bytes, signed

5. References

For any further information concerning the Modbus protocol implementation, you can consult the following documents and references:

Modbus application protocol specifications V 1.1b, at <http://www.modbus.org>

Modbus over serial line – Specification and implementation guide V. 1.02, at <http://www.modbus.org>

6. Support and Contact

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