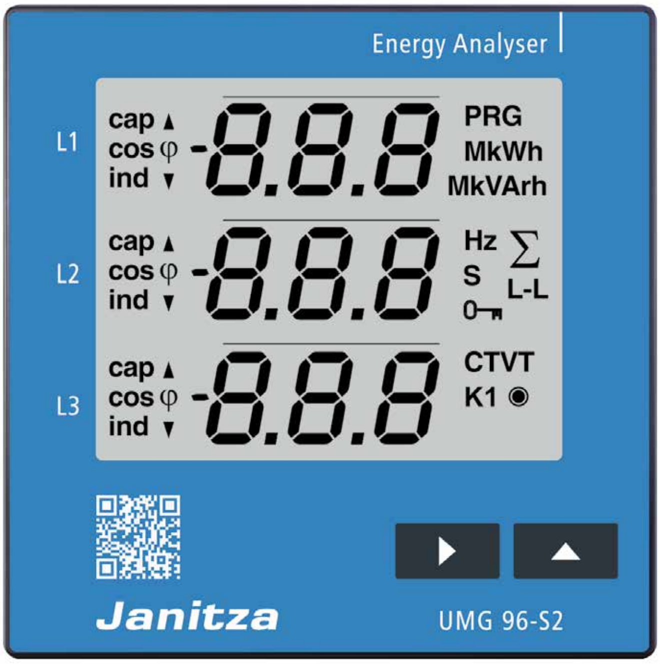
Energy Analyser

UMG 96-S2

Modbus-address list and Formulary



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Content

Comments on the handbook

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Modbus

Modbus-Funktionen

Das UMG 96-S2 unterstützt als Slave folgende Modbus-Funktionen:

03 Read Holding Registers

Reads the binary contents of holding registers (4X references) in the slave.

04 Read Input Registers

Reads the binary contents of input registers (3X references) in the slave.

06 Preset Single Register

Presets a value into a single holding register (4X reference). When broadcast, the function presets the same register reference in all attached slaves.

16 (10Hex) Preset Multiple Registers

Presets values into a sequence of holding registers (4X references). When broadcast, the function presets the same register references in all attached slaves.

23 (17Hex) Read/Write 4X Registers

Performs a combination of one read and one write operation in a single Modbus transaction. The function can write new contents to a group of 4XXXX registers, and then return the contents of another group of 4XXXX registers. Broadcast is not supported.

Transfer parameters

The UMG 96-S2 supports the following transfer parameters:

Baud rate	: 9600, 19200, 38400 Baud
Data bits	: 8
Parity	: odd / even
Stop bits (UMG 96-S2)	: 1 or 2
Stop bits external	: 1 or 2

Byte sequence

The data in the modbus address list can be called up in the
- Big-Endian (high-Byte before low-Byte) and in the
- Little-Endian (low-byte before high-byte)

format.
The addresses described in this address list supply the data in the „Big-Endian“ format.
If you require the data in the „Little-Endian“ format, you must add the value 32768 to the address.

Update rate

The modbus register addresses are updated every 200 ms.

Measured values

- Measured values in the **short** format do not take into account the set transformer ratio, i.e. these measured values have to be multiplied by the corresponding transformer factor!
- Measured values in **float or integer format** take into account the corresponding transformer factors!

Number formats

typee	Size	Minimum	Maximum
char	8 bit	0	255
byte	8 bit	-128	127
short	16 bit	-2^{15}	$2^{15}-1$
ushort	16 bit	0	$2^{16}-1$
int	32 bit	-2^{31}	$2^{31}-1$
uint	32 bit	0	$2^{32}-1$
long64	64 bit	-2^{63}	$2^{63}-1$
float	32 bit	IEEE 754	IEEE 754
double	64 bit	IEEE 754	IEEE 754

Symbols and definitions

N	Total number of sample points per period (For example, in a period of 20 ms)
k	Sample value or number of samples per period (0 <= k < N)
p	Number or identification of the phase conductor (p = 1, 2 oder 3)
i_{pk}	Sample value k of the current of the phase conductor p
u_{pNk}	Sample value k of the neutral voltage of the phase conductor p
P_p	Real power of the phase conductor p

Explanations of the measured values

- **Note: Depending on the instrument type, not all listed measured value types are available!**

Measured value

- A measured value is a effective value which is formed over a period (measuring window) of 200ms.
- A measuring window is 10 periods in the 50 Hz network and 12 periods in the 60 Hz network.
- A measuring window has a start time and an end time.
- The resolution between the start time and end time is approximately 2 ns.
- The accuracy of the start time and end time depends on the accuracy of the internal clock. (typeicaly +- 1 minute/month)
- In order to improve the accuracy of the internal clock, it is recommended that the clock in the device is compared with a time service and reset.

Mean value of measured value

- For each measured value, a sliding mean value is calculated over the selected averaging time.
- The mean value is calculated every 200 ms.
- You can take the possible averaging times from the table.

n	Mean time / seconds
0	5
1	10
2	15
3	30
4	60

n	Mean time / seconds
5	300
6	480
7	600
8	900

Max. value of measured value

- The ***max. value of the measured value*** is the largest measured value which has occurred since the last deletion.

Min. value of measured value

- The ***min. value of the measured value*** is the lowest measured value which has occurred since the last deletion.

Max. value of mean value

- The ***max. value of the mean value*** is the largest mean value which has occurred since the last deletion.

Nominal current, voltage, frequency

- The limit values for events and transients are set by the nominal value in percentage.

Nominal current I_{rated}

- The Irated is the nominal current of the transformers and is required for calculation of the K-factor.

Peak value negative

- Highest negative sampling value from the last 200 ms measuring window..

Peak value positive

- Highest positive sampling value from the last 200 ms measuring window.

Crest factor

- The crest factor describes the relation between the peak value and effective value of a periodic quantity. It serves as a characteristic value for general description of the curve form of a periodic quantity. The distortion factor is another example of a quantity for characterization of the difference from the pure sinusoidal form.
- Example: *A sinusoidal change voltage with an effective value of 230 V has a peak value of approx. 325 V.* The crest factor is then 325 V / 230 V =1.414 .

Effective value of the current for phase conductor p

$$I_p = \sqrt{\frac{1}{N} \cdot \sum_{k=0}^{N-1} i_{p_k}{}^2}$$

Effective value of neutral conductor current

$$I_N = \sqrt{\frac{1}{N} \cdot \sum_{k=0}^{N-1} (i_{1_k} + i_{2_k} + i_{3_k})^2}$$

Effective voltage L-N

$$U_{pN} = \sqrt{\frac{1}{N} \cdot \sum_{k=0}^{N-1} u_{pN_k}{}^2}$$

Effective voltage L-L

$$U_{pg} = \sqrt{\frac{1}{N} \cdot \sum_{k=0}^{N-1} (u_{gN_k} - u_{pN_k})^2}$$

Star connection voltage (vectorial)

$$U_{\text{Star connection voltage}} = U_{1_{rms}} + U_{2_{rms}} + U_{3_{rms}}$$

Real power for phase conductor

$$P_p = \frac{1}{N} \cdot \sum_{k=0}^{N-1} (u_{pN_k} \times i_{p_k})$$

Apparent power for phase conductor

- Unsigned

$$S_p = U_{pN} \cdot I_p$$

Total apparent power (arithmetic) Sa

- Unsigned

$$S_A = S_1 + S_2 + S_3$$

Peak demand P_{max}

- T = Periodic time
- tn = n-th interval time
- Pn = n-th Power measurement value
- N = Number of measuring intervals in the period T

$$P_{\max} = \max\left(P_{\max}; \frac{1}{T} \sum_{n=1}^{N} (t_n \cdot P_n)\right)$$

Order number of harmonics

xxx[0] = mains frequency (50 Hz/60 Hz)
xxx[1] = 2nd harmonic (100 Hz/120 Hz)
xxx[2] = 3rd harmonic (150 Hz/180 Hz)
etc.

THD

- THD (Total Harmonic Distortion) is the distortion factor and provides the relation of the harmonic parts of an oscillation to the mains frequency.

Distortion factor THD (U) for the voltage

- M = 40 (UMG 604, UMG 508, UMG 96RM)
- M = 50 (UMG 605, UMG 511)
- fund corresponds to n=1

$$THD_U = \frac{1}{\left|U_{fund}\right|}\sqrt{\sum_{n=2}^{M}\left|U_{n.Harm}\right|^2}$$

Distortion factor THD (I) for the current

- M = 40 (UMG 604, UMG 508, UMG 96RM)
- M = 50 (UMG 605, UMG 511)
- fund corresponds to n=1

$$THD_I = \frac{1}{\left|I_{fund}\right|}\sqrt{\sum_{n=2}^{M}\left|I_{n.Harm}\right|^2}$$

ZHD

- THD for the interharmonics.
- Is calculated in the product series UMG 511 and UMG 605.

Interharmonics

- Sinusoidal oscillations, which frequencies are not a multiple integer of the mains frequency.
- Is calculated in the product series and UMG 511 UMG 605.
- Calculation and measurement methods in accordance with the DIN EN 61000-4-30.
- The order number of inter harmonics corresponds to the order number of the next smallest harmonic. For example, between the 3rd and 4th harmonic of the 3rd inter harmonics.

TDD (I)

- TDD Total demand distortion, harmonic current distortion in % of maximum demand load current
- IL = Maximum demand load current
- M = 40 (UMG 604, UMG 508, UMG 96RM)
- M = 50 (UMG 605, UMG 511)

$$TDD = \frac{1}{I_L}\sqrt{\sum_{n=2}^{M} I_n^2} \times 100\%$$

Ripple control signal U (EN61000-4-30)

The ripple control signal U is a voltage (200 ms measured value) which is measured at a carrier frequency specified by the user. Only frequencies beneath 3 kHz are observed.

Ripple control signal I

The ripple control signal I is a current (200 ms measured value) which is measured at a carrier frequency specified by the user. Only frequencies beneath 3 kHz are observed.

Positive sequence-negative sequence-zero sequence

- The extent of a voltage or current imbalance in a three-phase system is identified using the positive sequence, negative sequence and zero sequence components.
- The balance of the rotation current system strived for in normal operation is disturbed by the unsymmetrical loads, errors and equipment.
- A three-phase system is called symmetric, when the three phase conductor voltages and currents are the same size and are displaced against each other by 120°. If one or both conditions are not fulfilled, the system is described as unsymmetrical. By calculating the symmetrical components consisting of the positive sequence, negative sequence and zero sequence, the simplified analysis of an imbalanced error is possible in a rotary current system..
- Imbalance is a feature of the network quality for the limits specified in international norms (EN 50160 for example).

Positive sequence

$$U_{Mit} = \frac{1}{3}\left| U_{L1,fund} + U_{L2,fund} \cdot e^{j\frac{2\pi}{3}} + U_{L3,fund} \cdot e^{j\frac{4\pi}{3}} \right|$$

Negative sequence

$$U_{Geg} = \frac{1}{3}\left| U_{L1,fund} + U_{L2,fund} \cdot e^{-j\frac{2\pi}{3}} + U_{L3,fund} \cdot e^{-j\frac{4\pi}{3}} \right|$$

Zero sequence

$$U_{zero} = \frac{1}{3}\left| U_{L1,fund} + U_{L2,fund} + U_{L3,fund} \right|$$

A zero component can only occur if a sum current can flow back through the main conductor.

Voltage imbalance

$$Voltage\ imbalance = \frac{U_{Geg}}{U_{Mit}}$$

Under difference U (EN61000-4-30)

$$U_{under} = \frac{U_{din} - \sqrt{\frac{\sum_{i=1}^{n} U^2_{rms-under,i}}{n}}}{U_{din}} [\%]$$

Under difference I

$$I_{under} = \frac{I_{Nominal\ current} - \sqrt{\frac{\sum_{i=1}^{n} I^2_{rms-under,i}}{n}}}{I_{Nominal\ current}} [\%]$$

K-factor

- The K-factor describes the increase of the eddy current losses when loaded with harmonics. For a sinusoidal load on the transformer, the K-factor =1. The larger the K-factor, the heavier a transformer can be loaded with harmonics without overheating.

Power Factor (vectorial) - Lambda

- The power factor is unsigned.

$$PF_x = \frac{|P_x|}{S_x}$$

x = L1, L2, L3, L4

CosPhi - Fundamental Power Factor

- Only the mains frequency part is used for calculation of the cosphi.
- CosPhi sign:
  - = for the supply of real power
  + = for obtaining real power

$$PF_1 = \cos(\varphi) = \frac{P_1}{S_1}$$

CosPhi total

- CosPhi sign:
  - = for the supply of real power
  + = for obtaining real power

$$\cos(\varphi)_{Sum_3} = \frac{P_{1_{fund}} + P_{2_{fund}} + P_{3_{fund}}}{\sqrt{(P_{1_{fund}} + P_{2_{fund}} + P_{3_{fund}})^2 + (Q_{1_{fund}} + Q_{2_{fund}} + Q_{3_{fund}})^2}}$$

$$\cos(\varphi)_{Sum_4} = \frac{P_{1_{fund}} + P_{2_{fund}} + P_{3_{fund}} + P_{4_{fund}}}{\sqrt{(P_{1_{fund}} + P_{2_{fund}} + P_{3_{fund}} + P_{4_{fund}})^2 + (Q_{1_{fund}} + Q_{2_{fund}} + Q_{3_{fund}} + Q_{4_{fund}})^2}}$$

Phase Angle Phi

- The phase angle between current and voltage of the external conductor p is calculated according to DIN EN 61557-12 and displayed.
- The sign of the phase angle corresponding to the sign of the reactive power.

Mains frequency reactive power

The mains frequency reactive power is the power factor of the mains frequency and is calculated using the fourier analysis (FFT). Voltage and current do not have to be sinusoidal. All in the device calculated reactive power are resulting of fundamental reactive power.

Reactive power sign

- Sign Q = +1 for phi in the range 0° .. 180° (inductive)
- Sign Q = -1 for phi in the range 180° .. 360° (capacitive)

$$Sign\ Q(\varphi_p) = +1\ if\ \ \varphi_p \in [0° - 180°]$$

$$Sign\ Q(\varphi_p) = -1\ if\ \ \varphi_p \in [180° - 360°]$$

Reactive power for phase conductor p

- Reactive power of the mains frequency.

$$Q_{fund\,p} = Sign\ Q(\varphi_p) \cdot \sqrt{S_{fund\,p}^{2} - P_{fund\,p}^{2}}$$

Total reactive power

- Reactive power of the mains frequency.

$$Q_V = Q_1 + Q_2 + Q_3$$

Distortion power factor

- The distortion power factor is the power factor of all mains frequencies and is calculated using the fourier analysis (FFT).

$$D = \sqrt{S^2 - P^2 - Q_{fund}^2}$$

- The apparent power „S” contains all fundamental harmonics and all harmonic rates up to the M-th harmonic.
- The effective power „P” contains all fundamental harmonics and all harmonic rates up to the M-th harmonic.
- M = 50 (UMG 605, UMG 605-PRO, UMG 511, UMG 512-PRO)

Reactive energy per phase

$$E_{r_{L1}} = \int Q_{L1}(t) \cdot \Delta t$$

Reactive energy per phase, inductive

$$E_{r(ind)_{L1}} = \int Q_{L1}(t) \cdot \Delta t \qquad \text{for } Q_{L1}(t) > 0$$

Reactive energy per phase, capazitive

$$E_{r(cap)_{L1}} = \int Q_{L1}(t) \cdot \Delta t \qquad \text{for } Q_{L1}(t) < 0$$

Reactive energy, sum L1-L3

$$E_{r_{L1,L2,L3}} = \int (Q_{L1}(t) + Q_{L2}(t) + Q_{L3}(t)) \cdot \Delta t$$

Reactive energy, sum L1-L3, inductive

$$E_{r(ind)_{L1,L2,L3}} = \int (Q_{L1}(t) + Q_{L2}(t) + Q_{L3}(t)) \cdot \Delta t$$

for $(Q_{L1}(t) + Q_{L2}(t) + Q_{L3}(t)) > 0$

Reactive energy, sum L1-L3, capazitive

$$E_{r(cap)_{L1,L2,L3}} = \int (Q_{L1}(t) + Q_{L2}(t) + Q_{L3}(t)) \cdot \Delta t$$

for $(Q_{L1}(t) + Q_{L2}(t) + Q_{L3}(t)) < 0$

Address list

Frequently required readings

Address	Format	RD/WR	Unit	Note
19000	float	RD	V	voltage L1-N
19002	float	RD	V	voltage L2-N
19004	float	RD	V	voltage L3-N
19006	float	RD	V	voltage L1-L2
19008	float	RD	V	voltage L2-L3
19010	float	RD	V	voltage L3-L1
19012	float	RD	A	current L1
19014	float	RD	A	current L2
19016	float	RD	A	current L3
19018	float	RD	A	current sum (calculated current in N)
19020	float	RD	W	active power L1
19022	float	RD	W	active power L2
19024	float	RD	W	active power L3
19026	float	RD	W	active power sum
19028	float	RD	VA	apparent power L1
19030	float	RD	VA	apparent power L2
19032	float	RD	VA	apparent power L3
19034	float	RD	VA	apparent power sum
19036	float	RD	var	reactive power L1
19038	float	RD	var	reactive power L2
19040	float	RD	var	reactive power L3
19042	float	RD	var	reactive power sum
19044	float	RD	-	power factor L1
19046	float	RD	-	power factor L2
19048	float	RD	-	power factor L3
19050	float	RD	Hz	measured frequency
19052	int	RD	-	rotation field; 1=right (clockwise), 0=none, -1=left (counter clockwise)
19054	float	RD	Wh	active energy L1
19056	float	RD	Wh	active energy L2
19058	float	RD	Wh	active energy L3
19060	float	RD	Wh	active energy sum
19062	float	RD	Wh	active energy L1, consumed
19064	float	RD	Wh	active energy L2, consumed
19066	float	RD	Wh	active energy L3, consumed
19068	float	RD	Wh	active energy sum, consumed
19070	float	RD	Wh	active energy L1, delivered
19072	float	RD	Wh	active energy L2, delivered
19074	float	RD	Wh	active energy L3, delivered
19076	float	RD	Wh	active energy sum, delivered
19078	float	RD	VAh	apparent energy L1
19080	float	RD	VAh	apparent energy L2
19082	float	RD	VAh	apparent energy L3
19084	float	RD	VAh	apparent energy sum
19086	float	RD	varh	reactive energy L1
19088	float	RD	varh	reactive energy L2
19090	float	RD	varh	reactive energy L3
19092	float	RD	varh	reactive energy sum
19094	float	RD	varh	reactive energy, inductive, L1
19096	float	RD	varh	reactive energy, inductive, L2
19098	float	RD	varh	reactive energy, inductive, L3
19100	float	RD	varh	reactive energy, inductive, sum
19102	float	RD	varh	reactive energy, capacitive, L1
19104	float	RD	varh	reactive energy, capacitive, L2
19106	float	RD	varh	reactive energy, capacitive, L3
19108	float	RD	varh	reactive energy, capacitive, sum

Address	Format	RD/WR	Unit	Note
19110	float	RD	%	harmonic, THD, U L1-N
19112	float	RD	%	harmonic, THD, U L2-N
19114	float	RD	%	harmonic, THD, U L3-N
19116	float	RD	%	harmonic, THD, I L1
19118	float	RD	%	harmonic, THD, I L2
19120	float	RD	%	harmonic, THD, I L3

Parameter

Address	Format	RD/WR	Note
0	short	RD/WR	device address (0…255*)
1	short	RD/WR	baudrate (0=9.6 kbps; 1=19.200 kbps; 2=38.400 kbps)
2	short	RD/WR	framing (0=1 stopbit; 1=2 stopbit; 2=even; 3=odd)
10	float	RD/WR	current transformer, primary (in A: 0…1000000**)
12	float	RD/WR	current transformer, secondary (in A: 1,5)
14	float	RD/WR	voltage transformer, primary (in V: 0…1000000**)
16	float	RD/WR	voltage transformer, secondary (in V: 100, 400)
35	short	RD/WR	display contrast (0=low ... 9=high)
37	short	RD/WR	display profile (0=profil 1; 1 = profile 2; 2=profile 3)
38	short	RD/WR	rotation profile (0=profil 1; 1 = profile 2; 2=profile 3)
39	short	RD/WR	rotation time (0=off; 1…60 sec.)
40	short	RD/WR	averaging time, I (in sec: 0=5; 1=10; 2=30; 3=60; 4=300; 5=480; 6=900; 7=1800; 8=3600)
41	short	RD/WR	averaging time, P (in sec: 0=5; 1=10; 2=30; 3=60; 4=300; 5=480; 6=900; 7=1800; 8=3600)
42	short	RD/WR	averaging time, U (in sec: 0=5; 1=10; 2=30; 3=60; 4=300; 5=480; 6=900; 7=1800; 8=3600)
43	short	RD/WR	current threshold (in A: 0…0.2)
45	short	RD/WR	voltage threshold (in V: 0…32)
50	short	RD/WR	password
100	short	RD/WR	dig. output 1 (0=P; 1=Q; 2=S; 3=off)
102	float	RD/WR	puls valence, output 1 (in e.g. imp/kWh: -1000000…1000000)
106	short	RD/WR	min. pulse duration (in ms: 10…1000)
506	short	RD/WR	delete min. and max. values (0, 1)
507	short	RD/WR	delete energy (0,1)
600	int	RD/WR	overrange (0, 0x0000007F)
618	short	RD/WR	tariff, active energy (0, 1=tariff 1; 2=tariff 2, 3=tariff 1+2)
619	short	RD/WR	tariff, active energy, consumed (0, 1=tariff 1; 2=tariff 2, 3=tariff 1+2)
620	short	RD/WR	tariff, active energy, delivered (0, 1=tariff 1; 2=tariff 2, 3=tariff 1+2)
621	short	RD/WR	tariff, reactive energy (0, 1=tariff 1; 2=tariff 2, 3=tariff 1+2)
622	short	RD/WR	tariff, reactive energy, inductive (0, 1=tariff 1; 2=tariff 2, 3=tariff 1+2)
623	short	RD/WR	tariff, reactive energy, capacitive (0, 1=tariff 1; 2=tariff 2, 3=tariff 1+2)
624	short	RD/WR	tariff, apparent energy (0, 1=tariff 1; 2=tariff 2, 3=tariff 1+2)

Address list

Measured values, type float

Address	Format	RD/WR	Note
1000	float	RD	voltage L1-N
1002	float	RD	voltage L2-N
1004	float	RD	voltage L3-N
1006	float	RD	voltage L1-L2
1008	float	RD	voltage L2-L3
1010	float	RD	voltage L3-L1
1012	float	RD	power factor L1
1014	float	RD	power factor L2
1016	float	RD	power factor L3
1018	float	RD	power factor sum3=Psum3/Ssum3
1020	float	RD	THD voltage L1
1022	float	RD	THD voltage L2
1024	float	RD	THD voltage L3
1026	float	RD	THD current L1
1028	float	RD	THD current L2
1030	float	RD	THD current L3
1032	float	RD	cos(phi) L1
1034	float	RD	cos(phi) L2
1036	float	RD	cos(phi) L3
1038	float	RD	cos(phi) sum
1040	float	RD	phi L1 (in °)
1042	float	RD	phi L2 (in °)
1044	float	RD	phi L3 (in °)
1046	float	RD	current L1
1048	float	RD	current L2
1050	float	RD	current L3
1052	float	RD	current sum (calculated current in N)
1054	float	RD	active power L1
1056	float	RD	active power L2
1058	float	RD	active power L3
1060	float	RD	active power sum
1062	float	RD	reactive power L1
1064	float	RD	reactive power L2
1066	float	RD	reactive power L3
1068	float	RD	reactive power sum
1070	float	RD	apparent power L1
1072	float	RD	apparent power L2
1074	float	RD	apparent power L3
1076	float	RD	apparent power sum
1078	float	RD	active power of the fundamental oscillation L1
1080	float	RD	active power of the fundamental oscillation L2
1082	float	RD	active power of the fundamental oscillation L3
1084	float	RD	active power of the fundamental oscillation sum
1086	float	RD	frequency
1088	int	RD	rotation field (0 = no, 1 = clockwise, -1 = counterclockwise)

Mean values, type float

Address	Format	RD/WR	Note
2000	float	RD	mean value voltage L1
2002	float	RD	mean value voltage L2
2004	float	RD	mean value voltage L3
2006	float	RD	mean value voltage L1-L2
2008	float	RD	mean value voltage L2-L3
2010	float	RD	mean value voltage L3-L1
2012	float	RD	mean value current L1
2014	float	RD	mean value current L2
2016	float	RD	mean value current L3
2018	float	RD	mean value current sum
2020	float	RD	mean value active power L1
2022	float	RD	mean value active power L2
2024	float	RD	mean value active power L3
2026	float	RD	mean value active power sum
2028	float	RD	mean value reactive power L1
2030	float	RD	mean value reactive power L2
2032	float	RD	mean value reactive power L3
2034	float	RD	mean value reactive power sum
2036	float	RD	mean value apparent power L1
2038	float	RD	mean value apparent power L2
2040	float	RD	mean value apparent power L3
2042	float	RD	mean value apparent power sum
2044	float	RD	mean value active power, fundamental oscillation L1
2046	float	RD	mean value active power, fundamental oscillation L2
2048	float	RD	mean value active power, fundamental oscillation L3
2050	float	RD	mean value active power, fundamental oscillation sum
2052	float	RD	mean value frequency

Minimum values, type float

Address	Format	RD/WR	Note
2204	float	RD	min. value voltage L1
2206	float	RD	min. value voltage L2
2208	float	RD	min. value voltage L3
2210	float	RD	min. value voltage L1-L2
2212	float	RD	min. value voltage L2-L3
2214	float	RD	min. value voltage L3-L1
2216	float	RD	min. value, frequency

Maximum values, type float

Address	Format	RD/WR	Note
2054	float	RD	max. value, voltage L1-N
2056	float	RD	max. value, voltage L2-N
2058	float	RD	max. value, voltage L3-N
2060	float	RD	max. value, voltage L1-L2
2062	float	RD	max. value, voltage L2-L3
2064	float	RD	max. value, voltage L3-L1
2162	float	RD	max. value current L1
2164	float	RD	max. value current L2
2166	float	RD	max. value current L3
2168	float	RD	max. value current sum
2170	float	RD	max. value active power L1
2172	float	RD	max. value active power L2
2174	float	RD	max. value active power L3
2176	float	RD	max. value active power sum
2178	float	RD	max. value reactive power L1
2180	float	RD	max. value reactive power L2
2182	float	RD	max. value reactive power L3
2184	float	RD	max. value reactive power sum
2186	float	RD	max. value apparent power L1
2188	float	RD	max. value apparent power L2
2190	float	RD	max. value apparent power L3
2192	float	RD	max. value apparent power sum
2194	float	RD	max. value active power, fundamental frequency L1
2196	float	RD	max. value active power, fundamental frequency L2
2198	float	RD	max. value active power, fundamental frequency L3
2200	float	RD	max. value active power, fundamental frequency sum
2202	float	RD	max. value frequency

Maximum values of mean values, type float

Address	Format	RD/WR	Note
2218	float	RD	max. of mean value current L1
2220	float	RD	max. of mean value current L2
2222	float	RD	max. of mean value current L3
2224	float	RD	max. of mean value current sum
2226	float	RD	max. of mean value active power L1
2228	float	RD	max. of mean value active power L2
2230	float	RD	max. of mean value active power L3
2232	float	RD	max. of mean value active power sum

Energy values, type float

Address	Format	RD/WR	Note
4000	float	RD	active energy L1
4002	float	RD	active energy L2
4004	float	RD	active energy L3
4006	float	RD	active energy sum
4008	float	RD	active energy L1, consumed
4010	float	RD	active energy L2, consumed
4012	float	RD	active energy L3, consumed
4014	float	RD	active energy sum, consumed
4016	float	RD	active energy L1, delivered
4018	float	RD	active energy L2, delivered
4020	float	RD	active energy L3, delivered
4022	float	RD	active energy sum, delivered
4024	float	RD	reactive energy L1
4026	float	RD	reactive energy L2
4028	float	RD	reactive energy L3
4030	float	RD	reactive energy sum
4032	float	RD	reactive energy L1, inductive
4034	float	RD	reactive energy L2, inductive
4036	float	RD	reactive energy L3, inductive
4038	float	RD	reactive energy sum, inductive
4040	float	RD	reactive energy L1, capacitive
4042	float	RD	reactive energy L2, capacitive
4044	float	RD	reactive energy L3, capacitive
4046	float	RD	reactive energy sum, capacitive
4048	float	RD	apparent energy L1
4050	float	RD	apparent energy L2
4052	float	RD	apparent energy L3
4054	float	RD	apparent energy sum
4056	float	RD	active energy L1 , tariff 1
4058	float	RD	active energy L2, tariff 1
4060	float	RD	active energy L3, tariff 1
4062	float	RD	active energy sum, tariff 1
4064	float	RD	active energy L1, consumed, tariff 1
4066	float	RD	active energy L2, consumed, tariff 1
4068	float	RD	active energy L3, consumed, tariff 1
4070	float	RD	active energy sum, consumed, tariff 1
4072	float	RD	active energy L1, delivered, tariff 1
4074	float	RD	active energy L2, delivered, tariff 1
4076	float	RD	active energy L3, delivered, tariff 1
4078	float	RD	active energy sum, delivered, tariff 1
4080	float	RD	reactive energy L1, tariff 1
4082	float	RD	reactive energy L2, tariff 1
4084	float	RD	reactive energy L3, tariff 1
4086	float	RD	reactive energy sum, tariff 1
4088	float	RD	reactive energy L1, inductive, tariff 1
4090	float	RD	reactive energy L2, inductive, tariff 1
4092	float	RD	reactive energy L3, inductive, tariff 1
4094	float	RD	reactive energy sum, inductive, tariff 1
4096	float	RD	reactive energy L1, capacitive, tariff 1
4098	float	RD	reactive energy L2, capacitive, tariff 1
4100	float	RD	reactive energy L3, capacitive, tariff 1
4102	float	RD	reactive energy sum, capacitive, tariff 1
4104	float	RD	apparent energy L1, tariff 1
4106	float	RD	apparent energy L2, tariff 1
4108	float	RD	apparent energy L3, tariff 1
4110	float	RD	apparent energy sum, tariff 1
4112	float	RD	active energy L1 , tariff 2
4114	float	RD	active energy L2, tariff 2
4116	float	RD	active energy L3, tariff 2

Address	Format	RD/WR	Note
4118	float	RD	active energy sum, tariff 2
4120	float	RD	active energy L1, consumed, tariff 2
4122	float	RD	active energy L2, consumed, tariff 2
4124	float	RD	active energy L3, consumed, tariff 2
4126	float	RD	active energy sum, consumed, tariff 2
4128	float	RD	active energy L1, delivered, tariff 2
4130	float	RD	active energy L2, delivered, tariff 2
4132	float	RD	active energy L3, delivered, tariff 2
4134	float	RD	active energy sum, delivered, tariff 2
4136	float	RD	reactive energy L1, tariff 2
4138	float	RD	reactive energy L2, tariff 2
4140	float	RD	reactive energy L3, tariff 2
4142	float	RD	reactive energy sum, tariff 2
4144	float	RD	reactive energy L1, inductive, tariff 2
4146	float	RD	reactive energy L2, inductive, tariff 2
4148	float	RD	reactive energy L3, inductive, tariff 2
4150	float	RD	reactive energy sum, inductive, tariff 2
4152	float	RD	reactive energy L1, capacitive, tariff 2
4154	float	RD	reactive energy L2, capacitive, tariff 2
4156	float	RD	reactive energy L3, capacitive, tariff 2
4158	float	RD	reactive energy sum, capacitive, tariff 2
4160	float	RD	apparent energy L1, tariff 2
4162	float	RD	apparent energy L2, tariff 2
4164	float	RD	apparent energy L3, tariff 2
4166	float	RD	apparent energy sum, tariff 2

Energy values, type double

Address	Format	RD/WR	Note
3000	double	RD	active energy L1
3004	double	RD	active energy L2
3008	double	RD	active energy L3
3012	double	RD	active energy sum
3016	double	RD	active energy L1, consumed
3020	double	RD	active energy L2, consumed
3024	double	RD	active energy L3, consumed
3028	double	RD	active energy sum, consumed
3032	double	RD	active energy L1, delivered
3036	double	RD	active energy L2, delivered
3040	double	RD	active energy L3, delivered
3044	double	RD	active energy sum, delivered
3048	double	RD	reactive energy L1
3052	double	RD	reactive energy L2
3056	double	RD	reactive energy L3
3060	double	RD	reactive energy sum
3064	double	RD	reactive energy L1, inductive
3068	double	RD	reactive energy L2, inductive
3072	double	RD	reactive energy L3, inductive
3076	double	RD	reactive energy sum, inductive
3080	double	RD	reactive energy L1, capacitive
3084	double	RD	reactive energy L2, capacitive
3088	double	RD	reactive energy L3, capacitive
3092	double	RD	reactive energy sum, capacitive
3096	double	RD	apparent energy L1
3100	double	RD	apparent energy L2
3104	double	RD	apparent energy L3
3108	double	RD	apparent energy sum
3112	double	RD	active energy L1 , tariff 1
3116	double	RD	active energy L2, tariff 1
3120	double	RD	active energy L3, tariff 1
3124	double	RD	active energy sum, tariff 1
3128	double	RD	active energy L1, consumed, tariff 1
3132	double	RD	active energy L2, consumed, tariff 1
3136	double	RD	active energy L3, consumed, tariff 1
3140	double	RD	active energy sum, consumed, tariff 1
3144	double	RD	active energy L1, delivered, tariff 1
3148	double	RD	active energy L2, delivered, tariff 1
3152	double	RD	active energy L3, delivered, tariff 1
3156	double	RD	active energy sum, delivered, tariff 1
3160	double	RD	reactive energy L1, tariff 1
3164	double	RD	reactive energy L2, tariff 1
3168	double	RD	reactive energy L3, tariff 1
3172	double	RD	reactive energy sum, tariff 1
3176	double	RD	reactive energy L1, inductive, tariff 1
3180	double	RD	reactive energy L2, inductive, tariff 1
3184	double	RD	reactive energy L3, inductive, tariff 1
3188	double	RD	reactive energy sum, inductive, tariff 1
3192	double	RD	reactive energy L1, capacitive, tariff 1
3196	double	RD	reactive energy L2, capacitive, tariff 1
3200	double	RD	reactive energy L3, capacitive, tariff 1
3204	double	RD	reactive energy sum, capacitive, tariff 1
3208	double	RD	apparent energy L1, tariff 1
3212	double	RD	apparent energy L2, tariff 1
3216	double	RD	apparent energy L3, tariff 1
3220	double	RD	apparent energy sum, tariff 1
3224	double	RD	active energy L1 , tariff 2
3228	double	RD	active energy L2, tariff 2
3232	double	RD	active energy L3, tariff 2

Address	Format	RD/WR	Note
3236	double	RD	active energy sum, tariff 2
3240	double	RD	active energy L1, consumed, tariff 2
3244	double	RD	active energy L2, consumed, tariff 2
3248	double	RD	active energy L3, consumed, tariff 2
3252	double	RD	active energy sum, consumed, tariff 2
3256	double	RD	active energy L1, delivered, tariff 2
3260	double	RD	active energy L2, delivered, tariff 2
3264	double	RD	active energy L3, delivered, tariff 2
3268	double	RD	active energy sum, delivered, tariff 2
3272	double	RD	reactive energy L1, tariff 2
3276	double	RD	reactive energy L2, tariff 2
3280	double	RD	reactive energy L3, tariff 2
3284	double	RD	reactive energy sum, tariff 2
3288	double	RD	reactive energy L1, inductive, tariff 2
3292	double	RD	reactive energy L2, inductive, tariff 2
3296	double	RD	reactive energy L3, inductive, tariff 2
3300	double	RD	reactive energy sum, inductive, tariff 2
3304	double	RD	reactive energy L1, capacitive, tariff 2
3308	double	RD	reactive energy L2, capacitive, tariff 2
3312	double	RD	reactive energy L3, capacitive, tariff 2
3316	double	RD	reactive energy sum, capacitive, tariff 2
3320	double	RD	apparent energy L1, tariff 2
3324	double	RD	apparent energy L2, tariff 2
3328	double	RD	apparent energy L3, tariff 2
3332	double	RD	apparent energy sum, tariff 2

Fourier analysis

Measured values, type float, fourier analysis

Address	Format	RD/WR	Note
1090	float	RD	1. harmonic voltage L1
1092	float	RD	3. harmonic voltage L1
1094	float	RD	5. harmonic voltage L1
1096	float	RD	7. harmonic voltage L1
1098	float	RD	9. harmonic voltage L1
1100	float	RD	11. harmonic voltage L1
1102	float	RD	13. harmonic voltage L1
1104	float	RD	15. harmonic voltage L1
1106	float	RD	1. harmonic voltage L2
1108	float	RD	3. harmonic voltage L2
1110	float	RD	5. harmonic voltage L2
1112	float	RD	7. harmonic voltage L2
1114	float	RD	9. harmonic voltage L2
1116	float	RD	11. harmonic voltage L2
1118	float	RD	13. harmonic voltage L2
1120	float	RD	15. harmonic voltage L2
1122	float	RD	1. harmonic voltage L3
1124	float	RD	3. harmonic voltage L3
1126	float	RD	5. harmonic voltage L3
1128	float	RD	7. harmonic voltage L3
1130	float	RD	9. harmonic voltage L3
1132	float	RD	11. harmonic voltage L3
1134	float	RD	13. harmonic voltage L3
1136	float	RD	15. harmonic voltage L3
1138	float	RD	1. harmonic current L1
1140	float	RD	3. harmonic current L1
1142	float	RD	5. harmonic current L1
1144	float	RD	7. harmonic current L1
1146	float	RD	9. harmonic current L1
1148	float	RD	11. harmonic current L1
1150	float	RD	13. harmonic current L1
1152	float	RD	15. harmonic current L1
1154	float	RD	1. harmonic current L2
1156	float	RD	3. harmonic current L2
1158	float	RD	5. harmonic current L2
1160	float	RD	7. harmonic current L2
1162	float	RD	9. harmonic current L2
1164	float	RD	11. harmonic current L2
1166	float	RD	13. harmonic current L2
1168	float	RD	15. harmonic current L2
1170	float	RD	1. harmonic current L3
1172	float	RD	3. harmonic current L3
1174	float	RD	5. harmonic current L3
1176	float	RD	7. harmonic current L3
1178	float	RD	9. harmonic current L3
1180	float	RD	11. harmonic current L3
1182	float	RD	13. harmonic current L3
1184	float	RD	15. harmonic current L3

Maximum values, type float, fourier analysis

Address	Format	RD/WR	Note
2066	float	RD	max. value, 1. harmonic voltage L1
2068	float	RD	max. value, 3. harmonic voltage L1
2070	float	RD	max. value, 5. harmonic voltage L1
2072	float	RD	max. value, 7. harmonic voltage L1
2074	float	RD	max. value, 9. harmonic voltage L1
2076	float	RD	max. value, 11. harmonic voltage L1
2078	float	RD	max. value, 13. harmonic voltage L1
2080	float	RD	max. value, 15. harmonic voltage L1
2082	float	RD	max. value, 1. harmonic voltage L2
2084	float	RD	max. value, 3. harmonic voltage L2
2086	float	RD	max. value, 5. harmonic voltage L2
2088	float	RD	max. value, 7. harmonic voltage L2
2090	float	RD	max. value, 9. harmonic voltage L2
2092	float	RD	max. value, 11. harmonic voltage L2
2094	float	RD	max. value, 13. harmonic voltage L2
2096	float	RD	max. value, 15. harmonic voltage L2
2098	float	RD	max. value, 1. harmonic voltage L3
2100	float	RD	max. value, 3. harmonic voltage L3
2102	float	RD	max. value, 5. harmonic voltage L3
2104	float	RD	max. value, 7. harmonic voltage L3
2106	float	RD	max. value, 9. harmonic voltage L3
2108	float	RD	max. value, 11. harmonic voltage L3
2110	float	RD	max. value, 13. harmonic voltage L3
2112	float	RD	max. value, 15. harmonic voltage L3
2114	float	RD	max. value, 1. harmonic current L1
2116	float	RD	max. value, 3. harmonic current L1
2118	float	RD	max. value, 5. harmonic current L1
2120	float	RD	max. value, 7. harmonic current L1
2122	float	RD	max. value, 9. harmonic current L1
2124	float	RD	max. value, 11. harmonic current L1
2126	float	RD	max. value, 13. harmonic current L1
2128	float	RD	max. value, 15. harmonic current L1
2130	float	RD	max. value, 1. harmonic current L2
2132	float	RD	max. value, 3. harmonic current L2
2134	float	RD	max. value, 5. harmonic current L2
2136	float	RD	max. value, 7. harmonic current L2
2138	float	RD	max. value, 9. harmonic current L2
2140	float	RD	max. value, 11. harmonic current L2
2142	float	RD	max. value, 13. harmonic current L2
2144	float	RD	max. value, 15. harmonic current L2
2146	float	RD	max. value, 1. harmonic current L3
2148	float	RD	max. value, 3. harmonic current L3
2150	float	RD	max. value, 5. harmonic current L3
2152	float	RD	max. value, 7. harmonic current L3
2154	float	RD	max. value, 9. harmonic current L3
2156	float	RD	max. value, 11. harmonic current L3
2158	float	RD	max. value, 13. harmonic current L3
2160	float	RD	max. value, 15. harmonic current L3

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