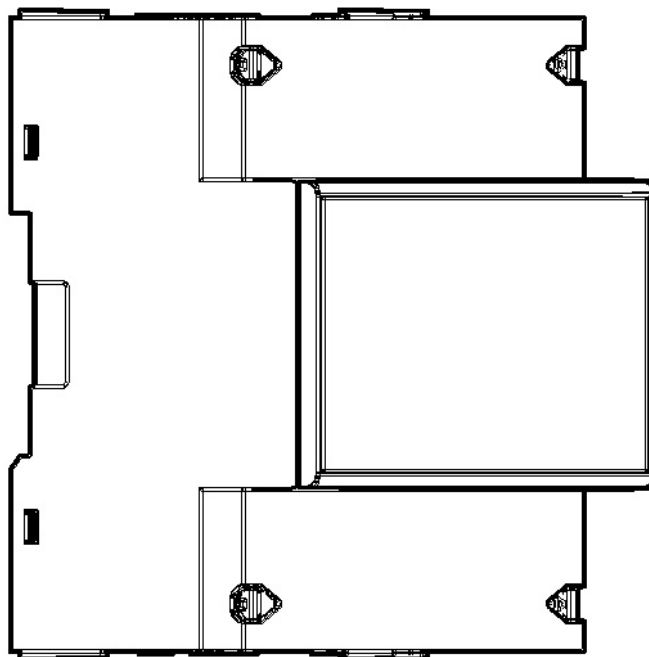


# NOARK

## Smart Energy Meters



Ex9EMS 3P 4M 100A 2T  
Ex9EMS 3P 4M 100A MB 2T  
Ex9EMS 3P 4M 100A MO 2T  
Ex9EMS 3P 4M CT 2T  
Ex9EMS 3P 4M CT MB 2T  
Ex9EMS 3P 4M CT MO 2T



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# 2 Safety instructions

## Information for your own safety

This manual does not contain all of the safety measures for operation of this meter because special operating conditions, local code requirements or local regulations may necessitate further measures. However, it does contain information which must be adhered to for your own personal safety and to avoid material damage. This information is highlighted by a warning triangle with an exclamation mark or a lightning bolt depending on the degree of actual or potential danger:



### Warning

This means that failure to observe the instruction can result in death, serious injury or considerable material damage.



### Caution

This means hazard of electric shock and failure to take the necessary safety precautions will result in death, serious injury or considerable material damage.

## Qualified personnel

Installation and operation of the device described in this manual may only be performed by qualified personnel. Only people that are authorized to install, connect and use this device, who have the proper knowledge about labeling and grounding electrical equipment and circuits and can do so in accordance with local (safety) regulations, are considered qualified personnel in this manual.

## Use for the intended purpose

This device may only be used for the application cases specified in the catalog and the user manual and only in connection with devices and components recommended and approved by NOARK Electric.

## Proper handling

The prerequisites for perfect, reliable operation of the product are proper transport, storage, installation and connection, as well as proper operation and maintenance. During its operation certain parts of the meter might carry dangerous voltages.

- Only use insulated tools suitable for the voltages this meter is used for.
- Do not connect while the circuit is connected to a power or current source.
- Only place the meter in a dry environment.
- Do not mount the meter in an explosive area or exposed to dust, mildew and/or insects.
- Make sure the used wires are suitable for the maximum current of this meter.
- Make sure the AC wires are connected correctly before activating the current/voltage to the meter.
- Do not touch the meter's connection clamps directly with your bare hands, with metal, blank wire or other conducting material as you will risk an electric shock that could cause possible injury, serious injury or death.
- Make sure the protection covers are replaced after installation.
- Maintenance and repair of the meter should only be carried out by qualified personnel.
- Never break any seals (if present on this meter) to open the front cover as this might influence the functionality or accuracy of the meter, and will void all warranty.
- Do not drop, or allow physical impact to the meter as there are high precision components inside that may break and affect the meter measurement negatively.
- All clamps should be properly tightened.
- Make sure the wires fit properly in the connection clamps.
- If the wires are too thin it will cause a bad contact which can spark causing damage to the meter and its surroundings.

# 3 Certificates



## EU-type examination certificate

Number **T11260** revision 0  
Project number 1901797  
Page 1 of 1

Issued by NMI Certin B.V.,  
designated and notified by the Netherlands to perform tasks with respect to  
conformity modules mentioned in article 17 of Directive 2014/32/EU, after  
having established that the Measuring instrument meets the applicable  
requirements of Directive 2014/32/EU, to:

Manufacturer NRKsM  
Pondweg 7  
2153 PK Nieuw-Vennep  
The Netherlands

Measuring instrument A static **Active Electrical Energy Meter**  
Type : Ex9EMS 3P 4M 100A 2T, Ex9EMS 3P  
4M 100A MB 2T and Ex9EMS 3P 4M  
: 100A MO 2T

Manufacturer's mark or name : NRKsM

Reference voltage : 3x230/400 V

Reference current : 5 A

Destined for the measurement of : electrical energy, in a  
- three-phase four-wire network  
- three-phase three-wire network  
- single-phase two-wire network

Accuracy class : B


Environment classes : M1 / E2

Temperature range : -40 °C / +70 °C

Further properties are described in the annexes:  
- Description T11260 revision 0;  
- Documentation folder T11260-1.

Valid until 19 January 2028

Issuing Authority **NMI Certin B.V., Notified Body number 0122**  
19 January 2018




C. Oosterman  
Head Certification Board

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[http://ec.europa.eu/growth/tools-  
databases/nando/](http://ec.europa.eu/growth/tools-databases/nando/)

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# EU-type examination certificate

Number **T11261** revision 0  
Project number 1901797  
Page 1 of 1

Issued by	NMi Certin B.V., designated and notified by the Netherlands to perform tasks with respect to conformity modules mentioned in article 17 of Directive 2014/32/EU, after having established that the Measuring instrument meets the applicable requirements of Directive 2014/32/EU, to:
Manufacturer	NRKsM Pondweg 7 2153 PK Nieuw-Vennep The Netherlands
Measuring instrument	A static <b>Active Electrical Energy Meter</b> Type : Ex9EMS 3P 4M CT 2T, Ex9EMS 3P 4M CT MB 2T and Ex9EMS 3P 4M CT MO 2T Manufacturer's mark or name : NRKsM Reference voltage : 3x230/400 V Reference current : 1,5 A Destined for the measurement of : electrical energy, in a - three-phase four-wire network - three-phase three-wire network - single-phase two-wire network Accuracy class : C Environment classes : M1 / E2 Temperature range : -25 °C / +70 °C Further properties are described in the annexes: - Description T11261 revision 0; - Documentation folder T11261-1.
Valid until	19 January 2028

Issuing Authority **NMi Certin B.V., Notified Body number 0122**  
19 January 2018



C. Oosterman  
Head Certification Board

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The designation of NMi Certin B.V. as Notified Body can be verified at <http://ec.europa.eu/growth/tools-databases/nando/>

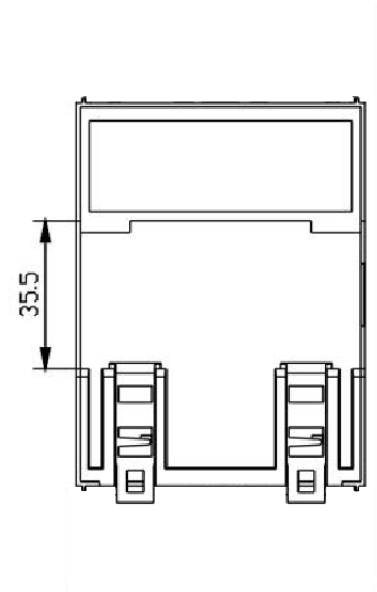
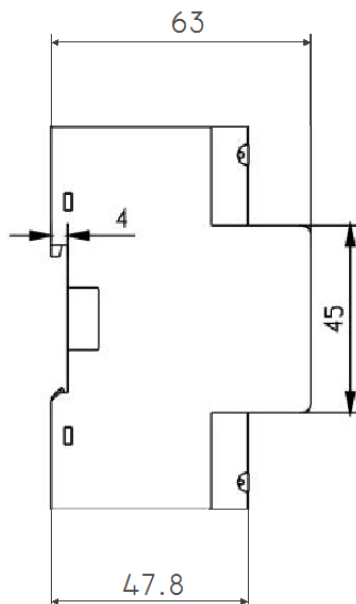
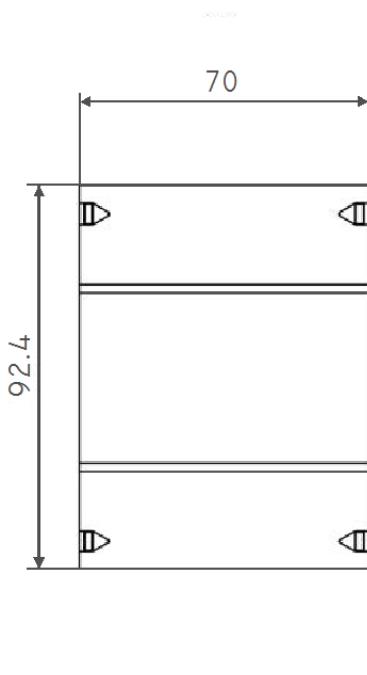
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# 4 Specifications

## 4.1 Dimensions

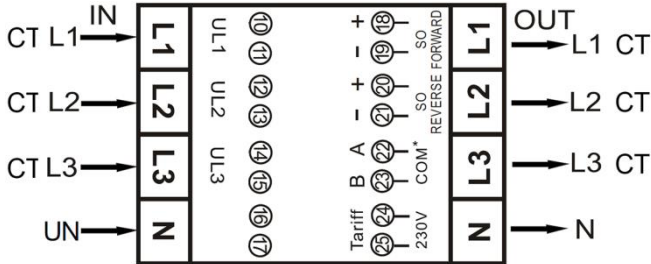
Height	92,4 mm
Width	70 mm
Depth	63 mm
Max. diameter power connection clamps	25mm <sup>2</sup> (Flex core)
	35 mm <sup>2</sup> (Solid copper)
Weight	0,39 Kg (net)



## 4.2 Connection diagram

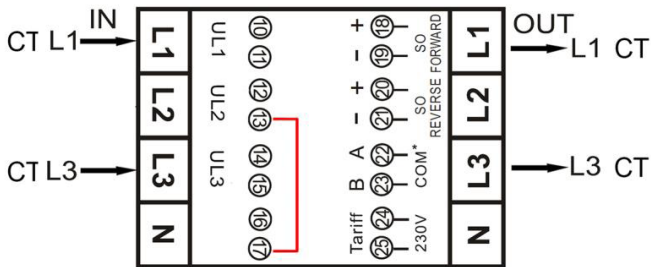
Ex9EMS 3P 4M Direct connected - 3P 4W	
	<p>L1 (in) Phase 1 input - L1 (out) Phase 1 output                      L2 (in) Phase 2 input - L2 (out) Phase 2 output                      L3 (in) Phase 3 input - L3 (out) Phase 3 output                      N (in) Neutral input - N (out) neutral output                      10/11 not used                      12/13 not used                      14/15 not used                      16/17 not used                      18/19 Forward pulse output contact (S0)                      20/21 Reverse pulse output contact (S0)                      22/23 M-bus / Modbus communication contact                      24/25 External tariff input (230V)</p>
Ex9EMS 3P 4M Direct connected - 3P 3W Open Delta (Aron)	
	<p>L1 (in) Phase 1 input - L1 (out) Phase 1 output                      L2 (in) Phase 2 input - L2 (out) Phase 2 output                      L3 (in) Phase 3 input - L3 (out) Phase 3 output                      N (in) not used - N (out) not used                      10/11 not used                      12/13 to be connected to 16/17                      14/15 not used                      16/17 to be connected to 12/13                      18/19 Forward pulse output contact (S0)                      20/21 Reverse pulse output contact (S0)                      22/23 M-bus / Modbus communication contact                      24/25 External tariff input (230V)</p>
Ex9EMS 3P 4M Direct connected - 3P 3W Delta	
	<p>L1 (in) Phase 1 input - L1 (out) Phase 1 output                      L2 (in) Phase 2 input - L2 (out) Phase 2 output                      L3 (in) Phase 3 input - L3 (out) Phase 3 output                      N (in) not used - N (out) not used                      10/11 not used                      12/13 not used                      14/15 not used                      16/17 not used                      18/19 Forward pulse output contact (S0)                      20/21 Reverse pulse output contact (S0)                      22/23 M-bus / Modbus communication contact                      24/25 External tariff input (230V)</p>
Ex9EMS 3P 4M Direct connected - 1P 2W - Single phase	
	<p>L1 (in) Phase 1 input - L1 (out) Phase 1 output                      L2 (in) not used - L2 (out) not used                      L3 (in) not used - L3 (out) not used                      N (in) Neutral input - N (out) neutral output                      10/11 not used                      12/13 not used                      14/15 not used                      16/17 not used                      18/19 Forward pulse output contact (S0)                      20/21 Reverse pulse output contact (S0)                      22/23 M-bus / Modbus communication contact                      24/25 External tariff input (230V)</p>

### Ex9EMS 3P 4M CT - 3P 4W



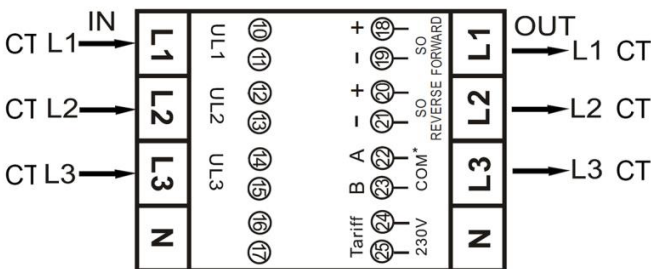
CT1 (in) Phase 1 input - CT1 (out) Phase 1 output  
 CT2 (in) Phase 2 input - CT2 (out) Phase 2 output  
 CT3 (in) Phase 3 input - CT3 (out) Phase 3 output  
 UN (in) Neutral input - UN (out) neutral output  
 10/11 Phase 1 - UL1  
 12/13 Phase 2 - UL2  
 14/15 Phase 3 - UL3  
 16/17 not used  
 18/19 Forward pulse output contact (S0)  
 20/21 Reverse pulse output contact (S0)  
 22/23 M-bus / Modbus communication contact  
 24/25 External tariff input (230V)

### Ex9EMS 3P 4M CT - 3P 3W Open Delta (Aron)



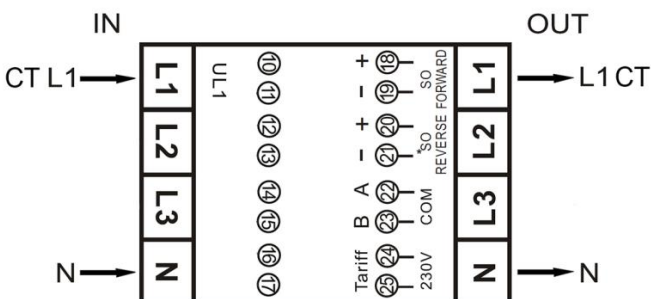
CT1 (in) Phase 1 input - CT1 (out) Phase 1 output  
 CT2 (in) not used - CT2 (out) not used  
 CT3 (in) Phase 3 input - CT3 (out) Phase 3 output  
 UN (in) not used - UN (out) not used  
 10/11 Phase 1 - UL1  
 12 Phase 2 - UL2  
 13 to be connected to 17  
 14/15 Phase 3 - UL3  
 17 to be connected to 13 (16 not used)  
 18/19 Forward pulse output contact (S0)  
 20/21 Reverse pulse output contact (S0)  
 22/23 M-bus / Modbus communication contact  
 24/25 External tariff input (230V)

### Ex9EMS 3P 4M CT - 3P 3W Delta



CT1 (in) Phase 1 input - CT1 (out) Phase 1 output  
 CT2 (in) Phase 2 input - CT2 (out) Phase 2 output  
 CT3 (in) Phase 3 input - CT3 (out) Phase 3 output  
 UN (in) not used - UN (out) not used  
 10/11 Phase 1 - UL1  
 12/13 Phase 2 - UL2  
 14/15 Phase 3 - UL3  
 16/17 not used  
 18/19 Forward pulse output contact (S0)  
 20/21 Reverse pulse output contact (S0)  
 22/23 M-bus / Modbus communication contact  
 24/25 External tariff input (230V)

### Ex9EMS 3P 4M CT - 1P 2W - Single phase



CT1 (in) Phase 1 input - CT1 (out) Phase 1 output  
 CT2 (in) not used - CT2 (out) not used  
 CT3 (in) not used - CT3 (out) not used  
 UN (in) Neutral input - UN (out) neutral output  
 10/11 Phase 1 - UL1  
 12/13 not used  
 14/15 not used  
 16/17 not used  
 18/19 Forward pulse output contact (S0)  
 20/21 Reverse pulse output contact (S0)  
 22/23 M-bus / Modbus communication contact  
 24/25 External tariff input (230V)



# 5 Installation



## Caution

- Turn off and if possible lock all sources supplying the energy meter and the equipment that is connected to it before working on it.
- Always use a properly rated voltage sensing device to confirm that power is off.



## Warning

- The installation should be performed by qualified personnel familiar with applicable codes and regulations.
- Use insulated tools to install the device.
- A fuse, thermal cut-off or single-pole circuit breaker should be fitted on the supply line and not on the neutral line.

- The connecting wire, connecting the device to the outside circuit, should be sized in accordance with local regulations for the maximum amount of the current breaker or other overcurrent protection devices used in the circuit.
- An external switch or a circuit-breaker should be installed on the supply wires, which will be used to disconnect the meter and the device supplying energy. It is recommended that this switch or circuit-breaker is placed near the meter because that is more convenient for the operator. The switch or circuit-breaker should comply with the specifications of the building's electrical design and all local regulations.
- An external fuse or thermal cut-off used as an overcurrent protection device for the meter must be installed on the supply side wires. It's recommended that this protection device is also placed near the meter for the convenience of the operator. The overcurrent protection device should comply with the specifications of the building's electrical design and all local regulations.
- The meter is intended to be installed in a Mechanical Environment 'M1', with Shock and Vibrations of low significance and Electromagnetic Environment 'E2', as per 2014/32/EC Directive. The meter shall be installed inside a suitable IP rated enclosure, in accordance with local codes and regulations.
- To prevent tampering, an enclosure with a lock or a similar device can be used.
- The meter has to be installed against a fire resistant wall.
- The meter has to be installed in a well-ventilated and dry place.
- The meter has to be installed in a protective box if the meter is exposed to dust or other contaminants.
- The meter can be installed and used after being tested and can be sealed afterwards.
- The device can be installed on a 35mm DIN rail.
- The meter should be installed on a location where the meter can be read easily.
- In case the meter is installed in an area with frequent surges for example due to thunderstorms, welding machines, inverters etc., the meter is required to be protected with a Surge Protection Device.
- The device should be sealed immediately after installing it in order to prevent tampering.

# 6 Operation

## 6.1 Energy flow indication

The red LED on the front panel indicates the power flow measured by the meter. When power flows, the LED will flash. The faster the LED flashes, the more power flows. For this meter, the LED will flash 10.000 times per kWh. The first display indication of the meter is either FW (forward) or RV (reverse). This page (shown below) indicates per phase the direction of the energy. In this picture phase 1 and 2 are forward and phase 3 is reverse.



## 6.2 Reactive energy indication

The display will show kvarh to indicate the meter is measuring reactive energy.

## 6.3 Tariff indication

The tariff LED will be powered off for T1 or powered on for T2.

## 6.4 Reading the meter

A red LED on the front panel indicates the consumption measured by the meter. When power is consumed, the LED will flash. The faster the LED flashes, the more power is consumed. For this meter, the LED will flash 10.000 times per kW.

The meter is equipped with an 8 digit LCD. For the energy consumption the meter will display 99999.99 kWh and switch to 999999.9 kWh when over this value and so on.

## 6.5 LCD display of the meter

The LCD is a multifunctional display, it has two rows to indicate the status of the meter. The top row shows the value, while the bottom row shows the units, phase and/or direction



## 6.6 Scrolling function

### 6.6.1 Automatic scroll

Every 10 seconds the meter will display the next programmed data page (depending on the setting).

### 6.6.2 Change scrolling time by button

- Scroll with the buttons to Program mode 2.
- Hold the right button for 3 seconds to enter the menu.
- Scroll to LCD page LCD cycle time (rt xx).
- Hold the right button for 5 seconds to enter program mode.
- The value starts blinking: select the new value 1-30 seconds.
- Confirm the new scrolling time by holding both buttons for 3 seconds.
- The LCD will show SET OK when the setting is confirmed.



### 6.6.3 Add/remove registers to/from automatic scroll

- Scroll to the register\* that you would like to add or remove.
- Hold the right button for 5 seconds to add or remove.
- The LCD will show OK in or OK out.



\*Only the registers in the sub-menu after: Current direction, Total active energy, Total reactive energy, Active power and Program mode 1 can be added or removed to/from the automatic scroll. Total active energy cannot be removed.

## 6.7 Button scroll

By pressing the button for 1, 3 or 5 seconds you will go through all data pages one by one.

Set CT ratio (CT version only)

**NOTE: CT ratio has to be programmed before use. Once programmed the CT ratio cannot be changed. Wrong CT ratio can cause wrong billing charges.**

		Select secondary current /1 or /5. Confirm by holding both buttons for 3 seconds.
		Select the 4 digit primary current (0001-9995). Confirm each digit by holding both buttons for 3 seconds. The CT ratio is set when the last digit is confirmed

Automatic scroll: default 10 seconds

Total active energy

Total active power

Ex9EMS 3P 4M 100A MB 2T & Ex9EMS 3P 4M 100A MO 2T  
Ex9EMS 3P 4M CT MB 2T & Ex9EMS 3P 4M CT MO 2T

Ex9EMS 3P 4M 100A MO 2T  
Ex9EMS 3P 4M CT MO 2T

Button scroll: press the buttons for less than 3 seconds to scroll. After 30 seconds of no interaction the meter goes back to automatic scroll mode.

<p>Current direction</p>	<p>Hold the right button for 3 seconds to enter the next menu. Hold the left button for 3 seconds to go back.</p> <p>Display Shows:</p> <p>or</p>	<p>Current direction</p>	<p>Comb. active status word</p>	<p>Serial number</p>	<p>Software version</p>	<p>Software version</p>	<p>Hold the right button for &gt;=5 seconds to add or remove from the automatic scroll.</p> <p>Display Shows:</p> <p>or</p>
<p>Total active energy</p>		<p>T1 active energy</p>	<p>T2 active energy</p>	<p>Total FW active energy</p>	<p>T1 FW active energy</p>	<p>T2 FW active energy</p>	
<p>Total reactive energy</p>		<p>T1 reactive energy</p>	<p>T2 reactive energy</p>	<p>Total FW reactive energy</p>	<p>T1 FW reactive energy</p>	<p>T2 FW reactive energy</p>	
<p>Total active power</p>		<p>L1 active power</p>	<p>L2 active power</p>	<p>L3 active power</p>	<p>Total apparent power</p>	<p>L1 apparent power</p>	
<p>Resettable kWh</p>	<p>Hold the right button for 5 seconds to reset.</p>					<p>Resettable kWh</p>	
<p>Program mode 1 (read only)</p>	<p>CT rate (CT version only)</p>	<p>Forward 50 output</p>	<p>Reverse 50 output</p>	<p>Combination code</p>	<p>Modbus/M-bus ID</p>	<p>LCD cycle time</p>	
<p>Program mode 2 (write)</p>	<p>Baud rate</p>	<p>Resettable kWh</p>	<p>Backlight</p>	<p>Parity</p>	<p>Power down counter</p>	<p>Modbus/M-bus ID</p>	
<p>Program mode 3 (Write: Password protected)</p>	<p>Forward 50 output</p>	<p>Reverse 50 output</p>	<p>Combination code</p>	<p>Baud rate</p>	<p>Parity</p>	<p>Modbus/M-bus ID</p>	
<p>Hold the right button for 3 seconds and enter 4 digit password to enter program mode.</p>	<p>Scroll with the buttons to select 10.000/2.000/1.000/100/10/1/0,1/0,01.</p> <p>Hold both buttons for 3 seconds to confirm.</p>	<p>Scroll with the buttons to select 10.000/2.000/1.000/100/10/1/0,1/0,01.</p> <p>Hold both buttons for 3 seconds to confirm.</p>	<p>Scroll with the buttons to select 01(F)/04(R)/05(F-R)/06(F-R)/09(F-R)/10(F-R)/11(F-R). <b>NOTE: Combination code 10 can only be set once!</b></p> <p>Hold both buttons for 3 seconds to confirm.</p>	<p>Scroll with the buttons to select 300/600/1200/4800/9600.</p> <p>Hold both buttons for 3 seconds to confirm.</p>	<p>Scroll with the buttons to select even/none/odd.</p> <p>Hold both buttons for 3 seconds to confirm.</p>	<p>Scroll with the buttons to select on/off/button. Hold both buttons for 3 seconds to confirm.</p>	
<p>Power down counter</p>	<p>Program password</p>	<p>Hold both buttons for 3 seconds to confirm.</p> <p>Select the new 4 digit password by choosing each digit (0-9).</p> <p>Confirm each digit by holding both buttons for 3 seconds.</p>					

## 6.8 Backlight

The meter is equipped with a blue backlight. The backlight can be set to always on, off or button mode.

### 6.8.1 Change the backlight setting

- Scroll with the buttons to Program mode 2.
- Hold the right button for 3 seconds to enter the menu.
- Scroll to LCD page Backlight setting (bL xx).
- Hold the right button for 5 seconds to enter program mode.
- The value starts blinking: select button/on/off.
- Confirm the new setting by holding both buttons for 3 seconds.
- The LCD will show SET OK when the setting is confirmed.



## 6.9 Resettable day counter

The meter is equipped with a day counter for consumed energy. This is the energy forward calculated and can be reset to zero by the user.

### 6.9.1 How to reset the day counter back to 0

- Scroll to register Resettable kWh in the main menu.
- Hold the right button for 3 seconds to enter the menu.
- The value starts blinking: hold the right button for 5 seconds to reset.
- The LCD will show SET OK when the value is reset.



## 6.10 S0 output rate

The energy meter is equipped with two pulse outputs (forward and reverse) which are optically isolated from the inside circuit. It generates pulses in proportion to the measured consumption for purpose of remote reading or accuracy testing. The pulse output is a polarity dependent, open-collector transistor output requiring an external voltage source for correct operation. For this external voltage source, the voltage (Ui) should be lower than 27V DC. The maximum switching current (Imax) is 100mA. To connect the impulse output, connect 5-27V DC to connector 18/20 (collector), and the signal wire (S) to connector 19/21 (emitter).

### 6.10.1 How to change the S0 output rate

- Scroll with the buttons to Program mode 3.
- Hold the right button for 3 seconds to enter the menu.
- Enter the 4 digit password: scroll with the buttons and select each digit 0-9, hold the right button for 3 seconds to confirm each digit.
- Scroll to LCD page S0 output (S0 xxxxxx).
- Hold the right button for 5 seconds to enter program mode.
- The value starts blinking: select 10.000/2.000/1.000/100/10/1/0,1/0,01.
- Confirm the new setting by holding both buttons for 3 seconds.
- The LCD will show SET OK when the setting is confirmed.



## 6.11 Combination code

The meter allows you to display the total energy (usage) shown on the display in accordance to different calculation methods. You can use the following calculation methods for total energy:

Code	Total (active) energy
C-01	Forward only
C-04	Reverse only
C-05	Forward + Reverse
C-06	Reverse - Forward
C-09	Forward - Reverse
C-10*	Forward - Reverse
C-11	Forward - Reverse

Example of flow through the meter	
L1	+5 kWh
L2	+5 kWh
L3	-12 kWh

LCD reading and calculation of total energy							
Code	C-01	C-04	C-05	C-06	C-09	C-10*	C-11
Total	10	-12	22	-22	-2	-2	-2
Forward	10	10	10	10	10	0	10
Reverse	-12	-12	12	-12	-12	-2	-12

S0 output per code							
Code	C-01	C-04	C-05	C-06	C-09	C-10	C-11
Forward	10		10	10	10	0	0
Reverse		12	12	12	12	2	2

\*Meters ordered or set afterwards to C-10 cannot be set to another calculation mode.

### 6.11.1 How to change the combination code

- Scroll with the buttons to Program mode 3.
- Hold the right button for 3 seconds to enter the menu.
- Enter the 4 digit password: scroll with the buttons and select each digit 0-9, hold the right button for 3 seconds to confirm each digit.
- Scroll to LCD page Combination code (Code-xx).
- Hold the right button for 5 seconds to enter program mode. The value starts blinking: select 01/04/05/06/09/10/11.
- Confirm the new setting by holding both buttons for 3 seconds.
- The LCD will show OK when the setting is confirmed.



## 6.12 Modbus/M-bus ID

The Modbus ID can be set from 001 to 247, the default Modbus ID is 001. The M-bus ID can be set from 000 to 250, the default M-bus ID is 000.

### 6.12.1 How to change the Modbus/M-bus ID

- Scroll with the buttons to Program mode 2.
- Hold the right button for 3 seconds to enter the menu.
- Scroll to LCD page Modbus/M-bus ID (addr xxx).
- Hold the right button for 5 seconds to enter program mode.
- The value starts blinking: select 3 digits (Modbus: 001-247 or M-bus: 000-250). Confirm each digit by holding both buttons for 3 seconds.
- The LCD will show OK when the setting is confirmed.



## 6.13 Baud rate

The Modbus baud rate can be set from 1200 to 9600. The M-bus baud rate can be set from 300 to 9600.

### 6.13.1 How to change the baud rate

- Scroll with the buttons to Program mode 3.
- Hold the right button for 3 seconds to enter the menu.
- Enter the 4 digit password: scroll with the buttons and select each digit 0-9, hold the right button for 3 seconds to confirm each digit.
- Scroll to LCD page Baud rate (bd xxxx).
- Hold the right button for 5 seconds to enter program mode.
- The value starts blinking: select 9600/4800/2400/1200/600/300.
- Confirm the new setting by holding both buttons for 3 seconds.
- The LCD will show OK when the setting is confirmed.



## 6.14 Parity

The Modbus parity can be set to even, none or odd. The M-bus parity is always even.

### 6.14.1 How to change the parity

- Scroll with the buttons to Program mode 3.
- Hold the right button for 3 seconds to enter the menu.
- Enter the 4 digit password: scroll with the buttons and select each digit 0-9, hold the right button for 3 seconds to confirm each digit.
- Scroll to LCD page Parity (PAR xxxx).
- Hold the right button for 5 seconds to enter program mode.
- The value starts blinking: select even/none/odd.
- Confirm the new setting by holding both buttons for 3 seconds.
- The LCD will show OK when the setting is confirmed.



## 6.15 Power down counter

The power down counter registers the number of times that the meter has been turned off.

### 6.15.1 How to reset the power down counter

- Scroll with the buttons to Program mode 3.
- Hold the right button for 3 seconds to enter the menu.
- Enter the 4 digit password: scroll with the buttons and select each digit 0-9, hold the right button for 3 seconds to confirm each digit.
- Scroll to LCD page Power down counter (P00 - xxxx).
- Hold the right button for 5 seconds to enter program mode.
- The value starts blinking: hold both buttons for 3 seconds to reset.
- The LCD will show OK when the value is reset.



## 6.16 Password

Program mode 3 is protected with a password. The default password is 0000.

### 6.16.1 How to change the password

- Scroll with the buttons to Program mode 3.
- Hold the right button for 3 seconds to enter the menu.
- Enter the 4 digit password: scroll with the buttons and select each digit 0-9, hold the right button for 3 seconds to confirm each digit.
- Scroll to LCD page Password (PAS \_xxxx).
- Hold the right button for 5 seconds to enter program mode.
- The value starts blinking: select each digit 0-9, confirm each digit by holding both buttons for 3 seconds.
- The LCD will show OK when the setting is confirmed.

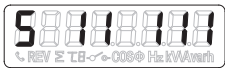


# 7 Troubleshooting

Problem	Possible cause	Check/solution
The red consumption LED is not flashing (PULSE LED).	There is no load connected to the meter. The load on the line is very low.	Connect a load to the meter. Check with an Ohm-meter if the load value is very low.
The register doesn't count.	There is almost no load connected to the meter.	Check if the red consumption LED is flashing.
No pulse output.	The pulse output is not supplied with DC power. The pulse output is not connected correctly.	Check the external voltage source (Ui) is 5-27V DC with a voltage meter. Check if the connection is correct: the 5-27V DC should be connected to the collector connection (pin 20+) and the signal wire (S) to the emitter connection (pin 21-).
The pulse output rate is wrong.	Is the correct pulse rate set via the infrared software or in Program mode 3?	Download or request the software and use the infrared eye which can be bought separately.
If none of the above works, please contact technical support		

## 7.1 Errors / Diagnostics display

The meter is equipped with a display field that shows errors and diagnostics. It consists of the character S followed by 2 + 3 digits. The meaning of each digit is as follows:



- First digit: Program status (0 fail / 1 passed)
- Second digit: Eeprom status (0 fail / 1 passed)
- Third digit: Phase A status (0 not available / 1 available)
- Fourth digit: Phase B status (0 not available / 1 available)
- Fifth digit: Phase C status (0 not available / 1 available)

If the first or second digit shows a 0 (zero); then please return the meter, as the meter is malfunctioning.

If the third, fourth or fifth digit shows a 0 (zero); please check the wiring for power issues.



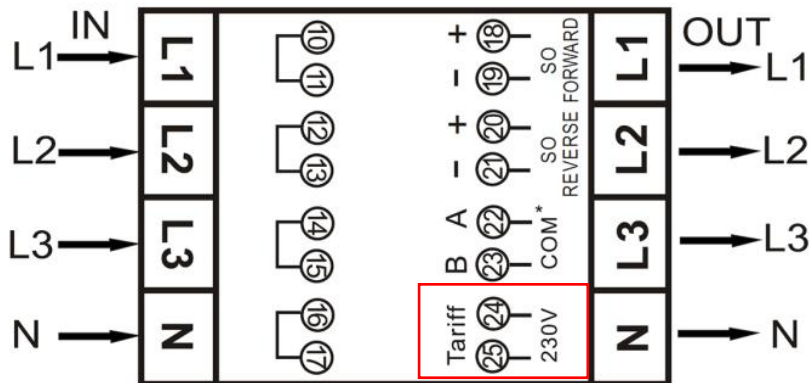


# Appendix 1 - Ex9EMS 3P 4M 2T

## A1.1 How to switch between T1 and T2

The meter is equipped with 2 tariff functionality which need to be activated by an external voltage connected to the terminals 23/24.

This is an AC voltage between 23 and 24:



# Appendix 2 - Ex9EMS 3P 4M MB

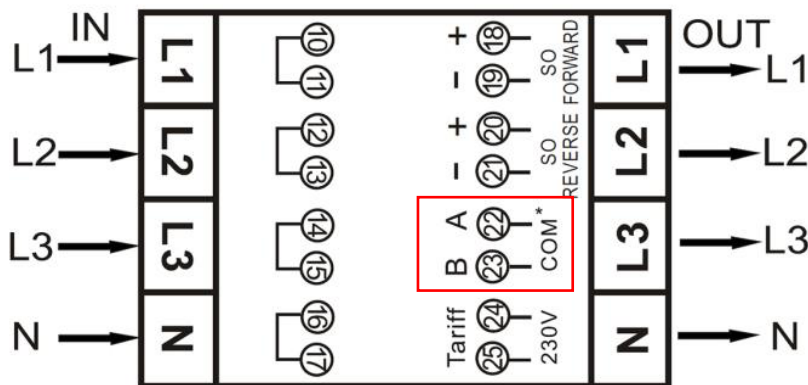
## A2.1 Communicating via the M-bus output

The Ex9EMS 3P 4M MB meter is equipped with an M-bus port, the data can be read out via this port. The communication protocol conforms to the EN13757-3 standard.

The meter can communicate with your PC. In order to read out the meter registers first install and configure the PC software. Use an M-bus level converter to connect the PC and the meter. The cable should be connected to terminals 22 and 23. The default communication address of the meter is 00.

The defaults for M-bus communication are:

- Baud rate 9600
- 8 data bits
- Even parity
- 1 stop bit



The secondary addressing (253/FD) is preset to the last 8 digits of the serial number printed on the side of the meter. However this can be changed to a more convenient number through IR or M-bus communication.

The baud rate can be lowered to values 4800, 2400, 1200, 600 and 300 baud. Data, parity and stop bit cannot be changed.

For the registers used in the meter and how to interpret the data, please use the M-bus register map on the next page.

More detailed information on M-Bus can be found:

[www.m-bus.com](http://www.m-bus.com)

## A2.2 M-bus register map

M-bus command	Contents	M-bus register header DIF	M-bus register VIF	Response	Remarks
<b>REQ_UD2 10 5B xx</b>				68 xx xx 68 08 xx 72	68 [data length] 68 08 [address] 72 [header] [datablocks] [checksum] 16
Serial number		<b>Header</b>		00 00 00 00	00000000
Manufacturer ID				25 CD	INM
Version				01	Version
Medium				02	Electricity
Access number				02	Number of accesses
Status				00	00 = OK 02 = error
Signature				00 00	Always 00 00

<b>REQ_UD2</b>				68 4B 4B 68 08 00 72	68 xx xx [Data length] 68 08 xx [Address] 72
10 5B 00 5B 16		<b>Datablocks:</b>			
	Total active energy	0C	04	14 48 60 01	01604814 Energy 10 (Wh) = 16048,14kWh
	Total active energy T1	8C10	04	23 80 35 00	00358023 Energy 10 (Wh) = 3580,23 kWh
	Total active energy T2	8C20	04	91 67 24 01	01246791 Energy 10 (Wh) = 12467,91kWh
	Total forward active energy	1C	04	46 13 69 00	00691346 Energy 10 (Wh) = 6913,46 kWh
	Forward active energy T1	9C10	04	56 34 12 00	00123456 Energy 10 (Wh) = 1234,56 kWh
	Forward active energy T2	9C20	04	90 78 56 00	00567890 Energy 10 (Wh) = 5678,9 kWh
	Total reverse active energy	2C	04	68 34 91 00	00913468 Energy 10 (Wh) = 9134,68 kWh
	Reverse active energy T1	AC10	04	67 45 23 00	00234567 Energy 10 (Wh) = 2345,67 kWh
	Reverse active energy T2	AC20	04	01 89 67 00	00678901 Energy 10 (Wh) = 6789,01 kWh
	<b>Checksum</b>			7C 16	xx 16

<b>Default</b>	
Baudrate	9600
Databits	8
Parity	Even
Stopbit	1
Address	00
Broadcast primary address	FE (only for read)

<b>CRC settings without checksum</b>	
Start byte REQ_UD2	2
Start byte write commands	5
CRC type	SUM
Terminating symbol	16
HEX	-
Low byte first	-
1 byte	-

<b>CRC settings with checksum</b>	
No CRC	-

## Write

Contents	Command part 1	Address	Command part 2	New value	Response	Remarks
Baudrate	68 03 03 68 53	01	-	BB	E5 (new Baud 2400)	B8 = 300; B9 = 600; BA = 1200; BB = 2400; BC = 4800; BD = 9600
Primary address	68 06 06 68 53	01	51 01 7A	01	E5 (new id 01)	000 - 247 write in HEX
Secondary address	68 09 09 68 53	01	51 0C 79	15 01 23 45	E5 (new address 1501 2345)	4 bytes BCD same as read
Tariff mode	68 08 08 68 53	01	51 09 7C 01 54	02	E5 (tariff 2)	T1 = 01 ; T2=02
Combined code	68 07 07 68 53	01	51 09 FD 3A	05	E5 (combined code 05)	01, 04, 05, 06, 09 and 10
S0 rate	68 0A 0A 68 53	01	51 0C FD 3A	00 00 01 00	E5 (S0 rate 100)	10000, 2000, 1000, 100, 10, 1, 0.1, 0.01
Resettable kWh	68 09 09 68 53	01	51 0C 04	00 00 00 00	E5	Value is ignored, always set to 0
Reset power down counter	68 08 08 68 53	01	51 0A FD 60	00 00	E5	Value is ignored, always reset to 0

<b>SND_NKE</b>	10 40	01	-	-	E5	Can be send to primary or secondary address and resets all communication values
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Selecting slave by secondary addressing	Serial number	Manufacturer ID	Generation version	Medium
68 0B 08 68 53 FD 52	aa aa aa aa	bb bb	cc	dd
Input	01 00 07 13	25 CD	01	02
Remarks	13070001		Major version of the software	Electricity

# Appendix 3 - Ex9EMS 3P 4M MO

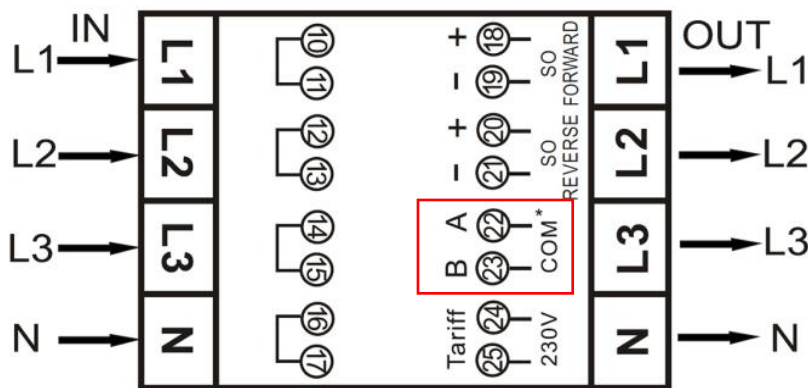
## A3.1 Communicating via the Modbus output

The meter can communicate with your PC. In order to read out the meter registers first install and configure the PC software. Use an RS485 level converter to connect the PC and the meter. The cable should be connected to terminals 22 and 23. The default communication address of the meter is 01.

The Ex9EMS 3P 4M MO can be connected for Modbus communication. The Modbus implementation used is Modbus basic (standard). This means the following:

- Baud rate 9600
- 8 data bits
- Even parity
- 1 stop bit

The baud rate can be lowered to values 4800, 2400, 1200, 600 and 300. The parity can be set to none or odd. Data and stopbit cannot be changed.



*When connecting the meter through a serial converter (RS485) for testing, please be aware that because of not implementing the complete Modbus infrastructure, there will be a need to put an additional resistor (120 ohms/ 0,25 watts) across the terminals (22 & 23) on the meter side.*

For the registers used in the meter and how to interpret the data, please use the Modbus register map on the next pages. Please note that the old (V1.14) Modbus registers still can be used.

More info on Modbus can be found:

Physical: [http://www.modbus.org/docs/Modbus\\_over\\_serial\\_line\\_V1\\_02.pdf](http://www.modbus.org/docs/Modbus_over_serial_line_V1_02.pdf)

Protocol: [http://www.modbus.org/docs/Modbus\\_Application\\_Protocol\\_V1\\_1b3.pdf](http://www.modbus.org/docs/Modbus_Application_Protocol_V1_1b3.pdf)

## A3.2 Modbus register map

Reg. address	Content	Function code	Register length	Unit	Data type
4000	Serial number	03	2	-	HEX
4002	Meter code	03	1	-	HEX
4003	Modbus ID	03	1	-	Signed
4004	Baud rate	03	1	-	Signed
4005	Protocol version	03	2	-	Float ABCD
4007	Software version	03	2	-	Float ABCD
4009	Hardware version	03	2	-	Float ABCD
400B	Meter amps	03	1	A	Signed
400C	CT ratio	03	1	A	HEX
400D	S0 output rate	03	2	imp/kWh	Float ABCD
400F	Combination code	03	1	-	Signed
4010	LCD cycle time	03	1	sec.	HEX
4011	Parity setting	03	1	-	Signed
4012	Current direction	03	1	-	ASCII
4013	L2 Current direction	03	1	-	ASCII
4014	L3 Current direction	03	1	-	ASCII
4015	Error code*	03	1	-	Signed
4016	Power down counter	03	1	-	Signed
4017	Present quadrant	03	1	-	Signed
4018	L1 Quadrant	03	1	-	Signed
4019	L2 Quadrant	03	1	-	Signed
401A	L3 Quadrant	03	1	-	Signed
401B	Checksum	03	2	-	HEX
401D	Active status word	03	2	-	HEX
401F	CT mode	03	1	A	Signed

Reg. address	Content	Function code	Register length	Unit	Data type
5000	Voltage*	03	2	V	Float ABCD
5002	L1 Voltage	03	2	V	Float ABCD
5004	L2 Voltage	03	2	V	Float ABCD
5006	L3 Voltage	03	2	V	Float ABCD
5008	Grid frequency	03	2	Hz	Float ABCD
500A	Current*	03	2	A	Float ABCD
500C	L1 Current	03	2	A	Float ABCD
500E	L2 Current	03	2	A	Float ABCD
5010	L3 Current	03	2	A	Float ABCD
5012	Total active power	03	2	kW	Float ABCD
5014	L1 Active power	03	2	kW	Float ABCD
5016	L2 Active power	03	2	kW	Float ABCD
5018	L3 Active power	03	2	kW	Float ABCD
501A	Total reactive power	03	2	kvar	Float ABCD
501C	L1 Reactive power	03	2	kvar	Float ABCD
501E	L2 Reactive power	03	2	kvar	Float ABCD
5020	L3 Reactive power	03	2	kvar	Float ABCD
5022	Total apparent power	03	2	kVA	Float ABCD
5024	L1 Apparent power	03	2	kVA	Float ABCD
5026	L2 Apparent Power	03	2	kVA	Float ABCD
5028	L3 Apparent Power	03	2	kVA	Float ABCD
502A	Power factor	03	2	-	Float ABCD
502C	L1 Power factor	03	2	-	Float ABCD
502E	L2 Power factor	03	2	-	Float ABCD
5030	L3 Power factor	03	2	-	Float ABCD

Reg. address	Content	Function code	Register length	Unit	Data type
6000	Total active energy	03	2	kWh	Float ABCD
6002	T1 Total active energy	03	2	kWh	Float ABCD
6004	T2 Total active energy	03	2	kWh	Float ABCD
6006	L1 Total active energy	03	2	kWh	Float ABCD

6008	L2 Total active energy	03	2	kWh	Float ABCD
600A	L3 Total active energy	03	2	kWh	Float ABCD
600C	Forward active energy	03	2	kWh	Float ABCD
600E	T1 Forward active energy	03	2	kWh	Float ABCD
6010	T2 Forward active energy	03	2	kWh	Float ABCD
6012	L1 Forward active energy	03	2	kWh	Float ABCD
6014	L2 Forward active energy	03	2	kWh	Float ABCD
6016	L3 Forward active energy	03	2	kWh	Float ABCD
6018	Reverse active energy	03	2	kWh	Float ABCD
601A	T1 Reverse active energy	03	2	kWh	Float ABCD
601C	T2 Reverse Active Energy	03	2	kWh	Float ABCD
601E	L1 Reverse active energy	03	2	kWh	Float ABCD
6020	L2 Reverse active energy	03	2	kWh	Float ABCD
6022	L3 Reverse active energy	03	2	kWh	Float ABCD
6024	Total reactive energy	03	2	kvarh	Float ABCD
6026	T1 Total reactive energy	03	2	kvarh	Float ABCD
6028	T2 Total reactive energy	03	2	kvarh	Float ABCD
602A	L1 Total reactive energy	03	2	kvarh	Float ABCD
602C	L2 Total reactive energy	03	2	kvarh	Float ABCD
602E	L3 Total reactive energy	03	2	kvarh	Float ABCD
6030	Forward reactive energy	03	2	kvarh	Float ABCD
6032	T1 Forward reactive energy	03	2	kvarh	Float ABCD
6034	T2 Forward reactive energy	03	2	kvarh	Float ABCD
6036	L1 Forward reactive energy	03	2	kvarh	Float ABCD
6038	L2 Forward reactive energy	03	2	kvarh	Float ABCD
603A	L3 Forward reactive energy	03	2	kvarh	Float ABCD
603C	Reverse reactive energy	03	2	kvarh	Float ABCD
603E	T1 Reverse reactive energy	03	2	kvarh	Float ABCD
6040	T2 Reverse reactive energy	03	2	kvarh	Float ABCD
6042	L1 Reverse reactive energy	03	2	kvarh	Float ABCD
6044	L2 Reverse reactive energy	03	2	kvarh	Float ABCD
6046	L3 Reverse reactive energy	03	2	kvarh	Float ABCD
6048	Tariff	03	1	-	Signed
6049	Resettable day counter	03	2	kWh	Float ABCD

### Write

Reg. address	Content	Function code	Register length	Unit	Data type
4003	Modbus ID	06	1	-	Signed
Command:	01 06 4003 000A (new ID: 10)		01~247 - 01 default - 00 broadcast		
4004	Baud rate	06	1	-	Signed
Command:	01 06 4004 25 80 (new Baudrate: 9600)		300 - 600 - 1200 - 4800 - 9600		
400D	S0 output rate	10	2	imp/kWh	Float ABCD
Command:	01 10 400D 0002 04 41 20 00 00 (new S0: 10)		10.000 - 2.000 - 1.000 - 100 - 10 - 1 - 0,1 - 0,01		
400F	Combination code	06	1	-	Signed
Command:	01 06 400F 000A (new code: 10 F-R)		01, 04, 05, 06, 09, 10, 11		
4010	LCD cycle time	06	1	sec.	HEX
Command:	01 06 4010 0025 (new time: 25 sec.)		01~30		
4011	Parity setting	06	1	-	Signed
Command:	01 06 4011 0002 (new parity: none)		01: even - 02: none - 03: odd		
4016	Power down counter	06	1	-	Signed
Command:	01 06 4016 0000		Reset to 0		
6048	Tariff	06	1	-	Signed
Command:	01 06 6048 0002 (new tariff: 2)		01: T1 - 02: T2 - 11: T1 not saved - 12: T2 not saved		
6049	Resettable day counter	10	1	kWh	Float ABCD
Command:	01 10 6049 0002 04 0000 0000		Reset to 0		

\*Ex9EMS 1P 1M only