EMM.630MCT Series

Three Phase Multifunction Energy Meter

2WIRE

User Manual V1.0

1. Introduction

This document provides operating, maintenance and installation instructions. This unit measures and displays the characteristics of single phase two wires(1p2w), three phase three wires(3p3w) and three phase four wires(3p4w) networks. The measuring parameters include voltage(V), frequency(Hz), current(A), power (kW/kVA/kVAr), import, export and total Energy(kWh/kVArh). The unit can also measures Maximum demand of current and power. This is measured over preset periods of up to 60 minutes.

This unit is a 1A or 5A current transformer operated and can be configured to work with a wide range of CTs. Built-in Pulse, Modbus, Ethernet or Mbus outputs. Configuration is password protected.

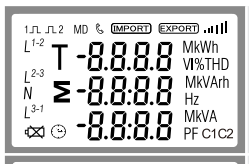
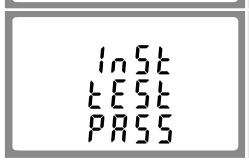
This unit can be powered by a separate auxiliary (AC or DC) supply. Alternatively it can be powered from the monitored supply by linking the voltage reference and neutral reference to terminals 5 and 6(Please refer to wiring diagram).

1.1 Unit Characteristics

Model table:

Model	Measurement	Outputs	Tarif fs
EMM.630MCT	Multi-parameters	Pulses & RS485	Single Tariff
EMM.630MCT-TCP	Multi-parameters	Ethernet TCP	Single Tariff
EMM.630MCT-DI	Multi-parameters	RS485	Single Tariff

2. Start Up Screens

	The first screen lights up all display segments and can be used as a display check.
	Software version information (This information is for reference only, in kind pervail.)
	The interface performs a self-test and indicates the result if the test passes.

*After a short delay, the screen will display active energy measurements.

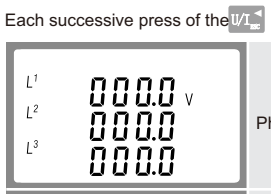
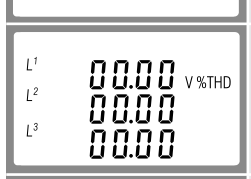
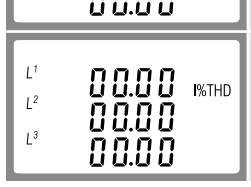
3. Measurements

The buttons operate as follows:

U/I ESC	Selects the Voltage and Current display screens. In Set-up Mode, this is the "Left"or "Back" button.
M ▲	Select the Frequency and Power factor display screens. In Set-up Mode, this is the"Up" button.
P ▼	Select the Power display screens. In Set-up Mode, this is the "Down" button.
E ▶	Select the Energy display screens. In Set-up mode, this is the "Enter"or "Right" button.

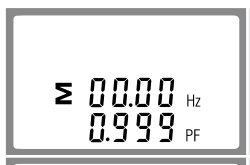
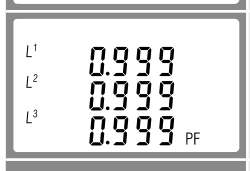
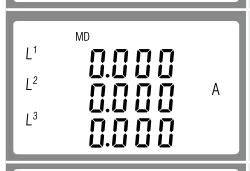
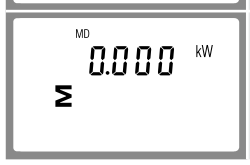
3.1 Voltage and Current

Each successive press of the U/I button selects a new parameter:

	Phase to neutral voltages.
	Current on each phase.
	Neutral Current
	Phase to neutral voltage THD%.
	Current THD% for each phase.

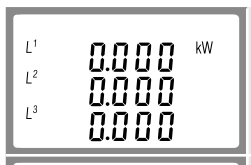
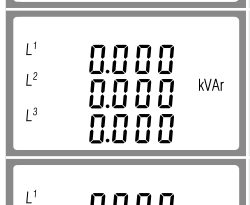
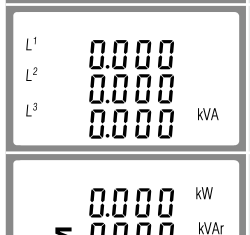
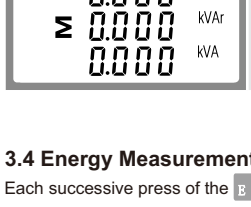
3.2 Frequency and Power Factor and Demand

Each successive press of the M button selects a new range:

	Frequency and Power Factor (total).
	Power Factor of each phase.
	Maximum Current Demand.
	Maximum Power Demand.

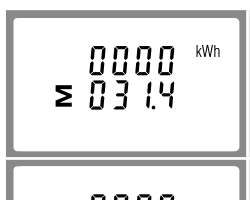
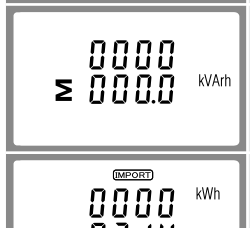
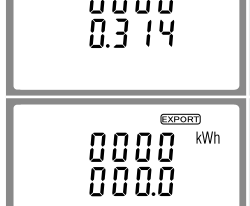
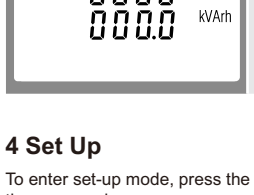
3.3 Power

Each successive press of the P button selects a new range:

	Instantaneous Active Power in kW.
	Instantaneous Reactive Power in kVAr.
	Instantaneous Volt -Ampsin KVA.
	Total kW, kVAr, kVA.

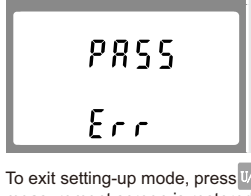
3.4 Energy Measurements

Each successive press of the E button selects a new range:

	Total Active Energy in kWh.
	Total Reactive Energy in kVArh.
	Import Active Energy in kWh. *Not shown on 2 tariffs or 4 tariffs meter
	Export Active Energy in kVArh. *Not shown on 2 tariffs or 4 tariffs meter
	Import Reactive Energy in kVArh. *Not shown on 2 tariffs or 4 tariffs meter
	Export Reactive Energy in kVArh. *Not shown on 2 tariffs or 4 tariffs meter

4 Set Up

To enter set-up mode, press the E button for 3 seconds until the password screen appears.

	Setting up is password-protected. The user should enter the correct password(default '1000') before processing.
	If an incorrect password is entered, the display will show: PASS Err

To exit setting-up mode, press U/I repeatedly until the measurement screen is restored.

4.1 Set-up Entry Methods

Some menu items, such as password and CT, require a four-digit number entry while others, such as supply system, require selection from a number of menu options.

4.1.1 Menu Option Selection

1.Use the U/I and P buttons to scroll through the different options of the set up menu.

2.Long press E to confirm your selection.

3.If an item flashes, then it can be adjusted by the M and P buttons.

4.Having selected an option from the current layer, long press E to confirm your selection.

5.Having completed a parameter setting, press U/I to return to a higher menu level.
You will be able to use the M and P buttons for further menu selection.

6.On completion of all setting-up, press U/I repeatedly until the measurement screen is restored.

4.1.2 Number Entry Procedure

When setting up the unit, some screens require the entering of a number. In particular, on entry to the setting up section, a password must be entered. Digits are set individually, from left to right.
The procedure is as follows:

1.The current digit to be set flashes and is set using the M and P buttons.

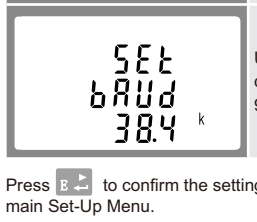
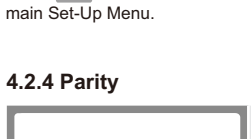
2.Long press E to confirm each digit setting.

3.After setting the last digit, press U/I to exit the number setting routine.

4.2 Communication

4.2.1 RS485/Mbus Primary Address

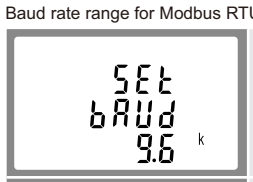
(The range is from 001 to 247 for Modbus and 001 to 250 for Mbus)

	From the Set-Up Menu, M and P buttons to select the address ID.
	Long press E button to enter the selection routine. The current setting will flash
	Use M and P buttons to choose Modbus or Mbus primary address

Procedure, press E button to confirm the setting and press U/I button to return the main Set-Up Menu.

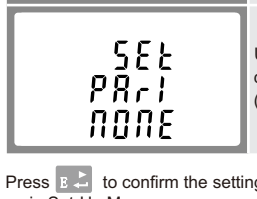
4.2.3 Baud Rate

Baud rate range for Modbus RTU: 2.4k, 4.8k, 9.6k, 19.2k, 38.4k.

	From the Set-Up Menu, use M and P buttons to select the baud rate option.
	Long press E to enter the selection routine. The current setting will flash.
	Use M and P buttons to choose baud rate 2.4k, 4.8k, 9.6k, 19.2k, 38.4k

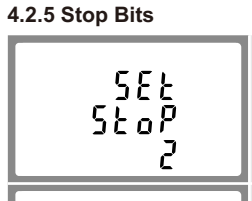
Press E to confirm the setting and press U/I to return to the main Set-Up Menu.

4.2.4 Parity

	From the Set-Up Menu, use M and P buttons to select the parity option.
	Press E to enter the selection routine. The current setting will flash.
	Use M and P buttons to choose parity (EVEN/ODD/NONE(default)).

Press E to confirm the setting and press U/I to return to the main Set-Up Menu.

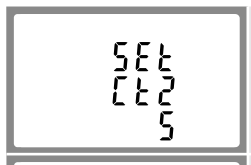
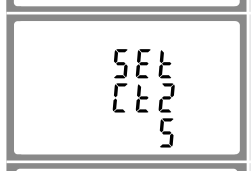
4.2.5 Stop Bits

	From the Set-Up Menu, use M and P buttons to select the stop bit option.
	Long press E to enter the selection routine. The current setting will flash.
	Use M and P buttons to choose stop bit(2 or 1) Note: Default is 1, and only when the parity is NONE that the stop bit can be changed to 2.

Long press E to confirm the setting and press U/I to return to the main Set-Up Menu.

4.3 CT

The CT option sets the secondary current (CT2 1A or 5A) of the current transformer (CT) that wires to the meter.

	From the Set-Up Menu, use M and P buttons to select the CT option.
	Secondary CT setting Press E to enter the CT Secondary current selection routine: 5A/1A.
	Set CT rate value Press E to enter the CT rate setting screen. The range is from 0001 to 9999.

Ct1 is the Ct rate or multiply factor.
For example, if using a 100/5A current transformer CT2 shall be set to 5 and CT1 shall be set to 0020.

***Please note for the MID approved version device, you will only have one opportunity to set the CT rate.**

4.4 PT

The PT option sets the secondary voltage (PT 2100 to 500V) of the voltage transformer (PT) that may be connected to the meter.

	Use M and P buttons to select will PT option. The screen will show the voltage PT secondary voltage value. The default value is 400V.
	Secondary PT setting Press E to enter the PT secondary voltage selection routine. The range is from 100 to 500V.
	Set PT rate value Press E to enter the PT rate screen. The range is from 0001 to 2000.

For example, if set the rate to 100, it means the primary voltage equals secondary voltage x100.

***Please note for the MID approved version device, you will only have one opportunity to set the PT rate.**

4.5 Pulse Output (For EMM.630MCT only)

The option allows you to configure the pulse output 1.
The output can be set to provide a pulse for a defined amount of energy active or reactive. Use this section to set up the pulse output—Units:kWh,kVArh.

	From the Set-Up Menu, use M and P buttons to select the Pulse output option.
	Press E to enter the selection routine. The unit symbol will flash.
	use M and P buttons to choose kWh or kVArh.

Press E to confirm the setting and press U/I to return to the main Set-Up Menu.

4.5.1 Pulse Rate

Use this to set the energy represented by each pulse. Rate can be set to 1 pulse per 0.01/0.1/1/10/100/1000kWh/kVArh.

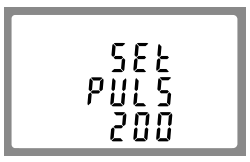
(It shows 1 impulse =10kWh/kVArh)

	From the Set-Up Menu, use M and P buttons to select the pulse rate option.
	Press E to enter the selection routine. The current setting will flash. 0.01/0.1/1/10/100/1000kWh/kVArh per pulse.

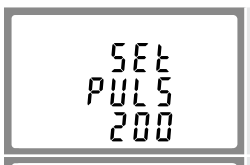
Use M and P buttons to choose pulse rate. Long press E to confirm the setting and press U/I to return to the main Set-Up Menu.

4.5.2 Pulse Duration

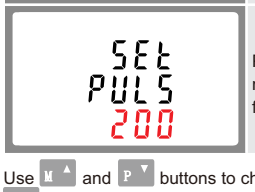
The energy monitored can be active or reactive and the pulse width can be set as 200,100 or 60ms.



（It shows pulse width of 200ms)



From the Set-Up Menu, use M and P buttons to select the pulse width option.



Press E to enter the selection routine. The current setting will flash.

Use M and P buttons to choose pulse width. Long press E to confirm the setting and press U/I to return to the main Set-Up Menu.

4.6 DIT Demand Integration Time

This sets the period in minutes over which the current and power readings are integrated for maximum demand measurement. The options are:0,5,8,10,15,20,30,60 minutes.

From the Set-Up Menu, use M and P buttons to select the DIT option. The screen will show the currently selected integration time.

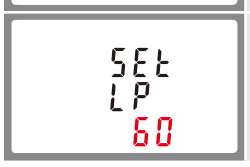
Press E to enter the selection routine. The current time interval will flash.

Use M and P buttons to choose the selection. Long press E to confirm the setting and press U/I to return to the main Set-Up Menu.

4.7 Backlit Set-up

The meter provides a function to set the backlit lasting time (0/5/10/30/60/120 minutes).
Option 0 means the backlit always on here.

Default:60
If it is set as 5, the backlit will be o ffin 5 minutes.

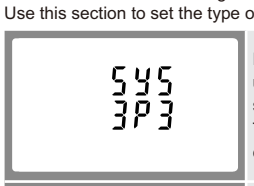


use M and P buttons to choose the time.

Long press E to confirm the setting and press U/I to return to the main Set-Up Menu.

4.8 Supply System

The unit has a default setting of three phase four wires (3P4W). Use this section to set the type of electrical system.



From the Set-Up Menu, use M and P buttons to select the system option. The screen will show the currently selected system type.

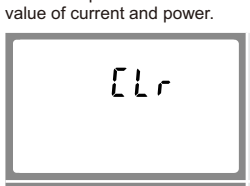
Long press E to enter the selection routine. The current selection will flash.

Use M and P buttons to select the required system option:1P2(W), 3P3(W), 3P4(W).

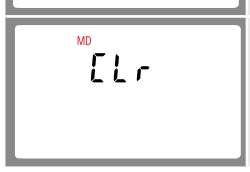
Press E to confirm the selection. Press U/I to exit the system selection routine and return to the menu.

4.9 CLR

The meter provides a function to reset the maximum demand value of current and power.



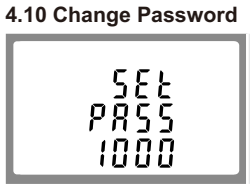
From the Set-Up Menu, use M and P buttons to select the reset option.



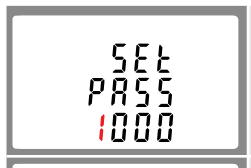
Long press E to enter the selection routine.
The “MD” will flash.

Long press E to confirm the setting and press U/I to return to the main Set-Up Menu.

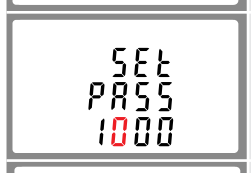
4.10 Change Password



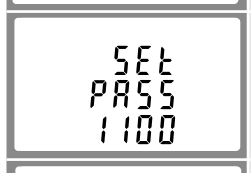
Use the M and P to choose the change password option.



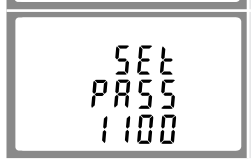
Press the E to enter the change password routine.
The new password screen will appear with the first digit flashing.



Use M and P to setthe first digit and press E to confirm your selection.
The next digit will flash.



Repeat the procedure for the remaining three digits.

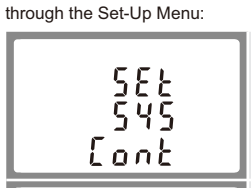


After setting the last digit, Press E to confirm the selection.

Press E to exit the number setting routine and return to the Set-Up Menu.

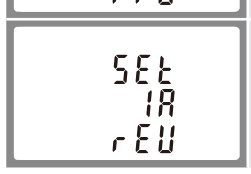
4.11 CT Reversal

If the CT connections are incorrectly wired, they can be reversed through the Set-Up Menu:



Use the M and P buttons to select the menu option. Hold the E button to view the sub-menu.

This screen will display, you can change Forward to Reverse on each individual CT connection.



Hold the E button to confirm your adjustment. You can then move on to IB or IC using the M and P buttons.

Hold the U/I button for 3 seconds to exit the Set-Up Menu.

5. Specifications ⚠

5.1 Voltage and Current

• Voltage AC(Un)	3x230/400V
• Voltage Range	100-276V AC L-N, Max. 276V 172-480V AC L-L, Max. 480V
• Rated Current (Iref)	5A
• Current Input	0.05-5(6)A, Max. 6A
• Over Current Withstand	20Imax for 0.5S
• Voltage Circuit	< 2W/10VA
• Current Circuit	< 1VA
• Frequency	50/60Hz

5.2 Auxiliary Power Supply

• Operating range	100-277V AC
• Current range	0. 04A
• Consumption	< 10W

*For billing operation: auxiliary power supply shall be permanently energized.

5.3 Accuracy

• Voltage	0.5%of range maximum
• Current	0.5%of nominal
• Frequency	0.2%of mid-frequency
• Power factor	1%of unity (0.01)
• Active power (W)	±1%of range maximum
• Reactive power (VAr)	±1%of range maximum
• Apparent power (VA)	±1%of range maximum
• Active energy (Wh)	Class 1 IEC 62053-21
• Reactive energy (VArh)	Class 2 IEC 62053-23
• Total harmonic distortion	1%up to 31st harmonic
• Response time to step input	1s,typical,to >99%of final reading, at 50 Hz.

5.4 Insulation

• AC voltage withstand	4KV for 1 minute
• Impulse voltage withstand	6KV

5.5 Environment

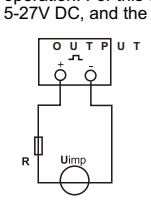
• Operating temperature	-40 to + 70
• Storage and transportation temperature	-40 to + 80
• Reference temperature	23 2
• Relative humidity	0 to 95%, non-condensing
• Installation category	CAT III
• Altitude	Up to 2000m
• Protective Class	II
• Location	Dry
• Warm up time	3s
• Mechanical environment	M1
• Electromagnetic environment	E2
• Installation environment	wall or cabinet
• Degree of pollution	2

5.6 Mechanics

• DIN rail dimensions	72x94.5x65mm(WxH) per DIN43880
• Mounting	DIN rail 35mm
• Ingress protection	Front Panel IP51 (indoor)
• Material	Self-extinguishing UL94 V-0

5.7 Pulse Output

The meter is equipped with pulse output, which is fully isolated from the inside circuit. That generates pulses in proportion to the measured energy. The pulse output is polarity dependent, passive transistor output requiring an external voltage source for correct operation. For this external voltage source, the voltage shall be 5-27V DC, and the maximum input current shall be 27mA DC.



ATTENTION: Pule output must be fed as shown in the wiring diagram on the left. Scrupulously respect polarities and the connection mode.
Opto-coupler with potential-free SPST-NO Contact.

Contact range:5~27VDC
Max. current Input:27mA DC

The unit provides two pulse outputs. Both pulse outputs are passive type.
Pulse output 1 is configurable. The pulse output can be set to generate pulses to represent total kWh or kVarh.
The pulse constant can be set to generate 1 pulse per:
0.01 = 10 Wh/VArh
0.1 = 100 Wh/VArh
1 = 1 kWh/kVArh
10 = 10 kWh/kVArh
100 = 100 kWh/kVArh
1000=1000 kWh/kVArh

Pulse width: 200/100(default)/60ms
Pulse output 2 is non-configurable. It is fixed up with total kWh.
The constant is 3200imp/kWh.

*Not available on EMM.630MCT-TCP or EMM.630MCT-DI

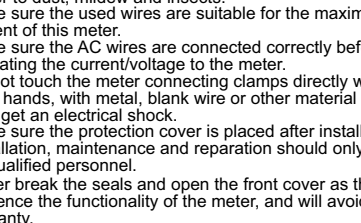
5.8 RS485 Modbus RTU

For Modbus RTU, the following RS485 communication parameters can be configured from the Set-up menu:
Baud rate: 2400, 4800, 9600, 19200, 38400bps
Parity: NONE (default)/ODD/EVEN
Stop bits: 1 or 2
RS485 network address nnn – 3-digit number, 001 to 247

5.9 Ethernet Modbus TCP

For Ethernet Modbus TCP, the following communication parameters can be configured from the Set-up Menu:
Modbus address range: 1-247
IP: 192.168.1.200(default)
Port: 502
MASK: 255.255.255.0
Gateway: 192.168.1.1
DHCP: Off(default)

6 Dimension



7. Installation

7.1 Safety instruction

Information for your own safety

Important safety information is contained in the maintenaned section. Familarize yourself with this information before attempting installation or other procedures. Symbols used in this documents:

Risk of Danger
This means to call attention to a high risk, for example: "High voltage". 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 thenecessary safety precautions will result in death, serious injury or considerable material damage.

Qualified Personnel

Operation of the equipment (module, device) described in this manual may only be performed by qualified personnel. Qualified personnel in this manual means person who are authorized to commission, start up, ground and label devices, systems and circuits according to safety and regulatory standards. The installer is responsible for coordinating the rating and the characteristics of the supply side overcurrent protection devices with the maximum current rating and, in the case of direct connected meters, with the UC rating of the metering equipment.

Proper Handling

The equipment (device, module) may only be used for the application specified in the catalogue and the user manual, and only be connected with devices and components recommended and approved by Qonnex BV.

- The unit does not have internal fuses therefore external fuses must be used for protection and safety under fault conditions.
- Use only insulating tools.
- Do not connect while circuit is live (hot).
- Place the meter only in dry surroundings.
- Do not mount the meter in an explosive area or expose the meter to dust, mildew and 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 connecting clamps directly with your bare hands, with metal, blank wire or other material as you may get an electrical shock.
- Make sure the protection cover is placed after installation.
- Installation, maintenance and reparation should only be done by qualified personnel.
- Never break the seals and open the front cover as this might influence the functionality of the meter, and will avoid any warranty.
- Do not drop, or allow physical impact to the meter as there are high precision components inside that may break.
- An external switch or circuit-breaker should be installed on the power 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 must comply with the specifications of the building' selectrical design and all local regulations

7.2 Maintance

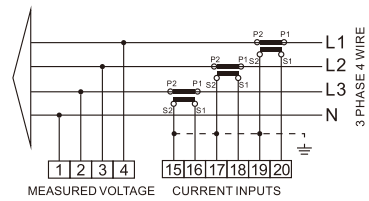
In normal use, little maintenance is needed. As appropriate for service conditions, isolate electrical power, inspect the unit and remove any dust or other foreign material present. Periodically check all connections for freedom from corrosion and screw tightness, particularly if vibration is present. The front of the case should be wiped with a dry cloth only. Use minimal pressure, especially over the viewing window area. If necessary wipe the rear case with a dry cloth. If a cleaning agent is necessary, isopropyl alcohol is the only recommended agent and should be used sparingly. Water should not be used. If the rear case exterior or terminals should be contaminated accidentally with water, the unit must be returned to Qonnex BV for inspection and testing.

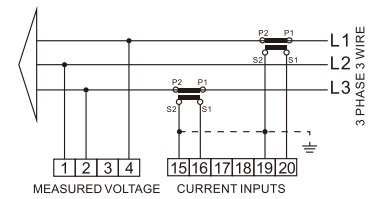
7.3 Safety Instructions for Transformers

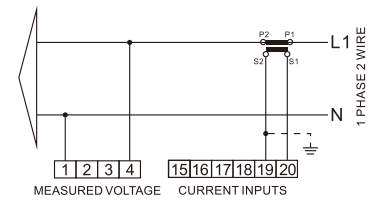
- The current or voltage transformer used must meet the requirements of reinforced insulation.
- Always open or disconnect circuit from power-distribution system (or service) of building before installing or servicing current or voltage transformer.
- The current transformers may not be installed in equipment where they exceed 75 percent of the wiring space of any cross-sectional area within the equipment.
  Restrict installation of current transformer in an area where it would block ventilation openings.
  Restrict installation of current transformer in an area of breaker arc venting.
  Not suitable for Class 2 wiring methods" and "Not intended for connection to Class 2 equipment.
  Secure current transformer and route conductors so that the conductors do not directly contact live terminals or bus.
  The word "WARNING" and the following or equivalent statement: "To reduce the risk of electric shock, always open or disconnect circuit from power-distribution system (or service) or building before installing or servicing current or voltage transformer".

8. Wiring Diagram ⚠

Current and Voltage Inputs

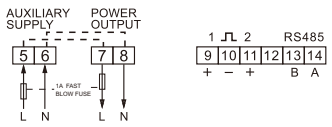




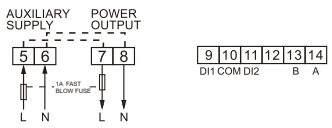


Definitions of Other Terminals

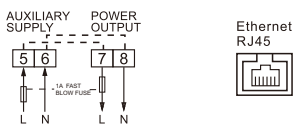
EMM.630MCT



EMM.630MCT-DI



EMM.630MCT-TCP



Terminals Capacity	COMM/Pulse	0.5~2.5mm
	Load	
Screw Torque	COMM/Pulse	0.2Nm
	Load	

*Cable spec.: single core copper cable, 105°C, 600V

9. Declaration of Conformity(for the MID approved meters only)

The fulfilment of the essential requirements set out in Annex I and in the relevant instrument-specific Annexes has been demonstrated. We declare under our sole responsibility as the manufacturer that the poly phase multifuntion electrical meter “EMM.630MCT” correspond to the production model described in the EU-type examination certificate and to the requirements of the Directive 2014/32/EU EC type examination certificate number 0120/SGS0726. Identification number of the NB0598 SGS Fimko Finland. The object described above is in conformity with the relevant Union harmonization legislation.

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CE RoHS MID