EUROTEC LUMEL

3-PHASE DIN RAIL ENERGY METER 1/5A (MID CERTIFIED)

NMID30-1

USER'S MANUAL

CE

1 Introduction

This document provides operating, maintenance and installation instructions. This unit measures and displays the characteristics of Single Phase Two Wire (1P2W), Three Phase Three Wire (3P3W) and Three Phase Four Wire (3P4W) networks. The measuring parameters include Voltage (V), Current (A), Frequency (Hz), Power (kW/KVA/KVAr), Power Factor (PF), Imported, Exported and Total Energy (kWh/kVArh). The unit also measures Maximum Demand Current and Power, this is measured over preset periods of up to 60 minutes.

This particular model accommodates 1A or 5A Current Transformers and can be configured to work with a wide range of CTs. It also comes with a complete comms capability with built in Pulse and RS485 Modbus RTU outputs, configuration is password protected.

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

1.1 Unit Characteristics

The NMID30-1 can measure and display:

- Phase to Neutral Voltage and THD% (Total Harmonic Distortion) of all Phases
- Line Frequency
- Current, Maximum Demand Current and Current THD% of all Phases
- Power, Maximum Power Demand and Power Factor
- Imported, Exported & Total Active Energy
- Imported, Exported & Total Reactive Energy

The unit has a Password-Protected set up menu for:

- Changing the Password
- System Configuration - 1P2W, 3P3W, 3P4W.
- Demand Interval Time
- Reset for Demand Measurements
- Pulsed Output Duration

1.2 Current Transformer Primary Current

This unit requires configuring to operate with the appropriate curren transformer(s), the optional secondary currents are 1A or 5A. It is programmed by inputting the ratio (CT Primary divided by the CT Secondary). It can be used on primary currents up to 6000A.

On the MID Version, you can only program the CT Rate ONCE.

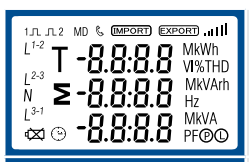
1.3 RS485 Serial – Modbus RTU

This unit is compatible with remote monitoring through RS485 Modbus RTU. Set-up screens are provided for configuring the RS485 port. Refers to section 4.8. **The list of registers and description of the Modbus protocol can be found in a separate manual available at *www.lumel.com.pl***

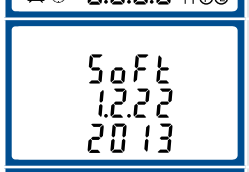
1.4 Pulsed Outputs

The NMID30-1 has Two Pulsed Outputs that can be set for active (kWh) or reactive (kVArh) energy. Terminals 11 & 12 have a fixed output of 3200imp/kWh. Terminals 9 & 10 are configurable within the setup menu.

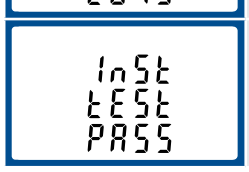
2 Start Up Screens



The first screen lights up all display segments and can be used as a display check.



The second screen indicates the firmware installed in the unit and its build number.



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:

Selects the Voltage and Current display screens. In Set-up Mode, this is the "Left" (press) or "Escape" (hold 3sec) button.

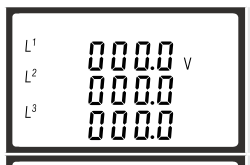
Select the Frequency and Power factor display screens. In Set-up Mode, this is the "Up" (press) button.

Select the Power display screens. In Set-up Mode, this is the "Down" (press) button.

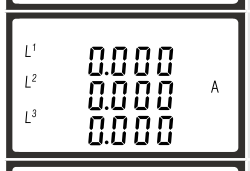
Select the Energy display screens. In Set-up mode, this is the "Right" (press) or "Enter" (hold 3sec) button.

3.1 Voltage and Current

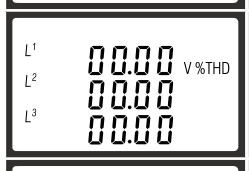
Each successive press of the V/A button selects a new parameter:



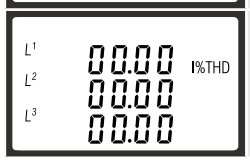
Phase to neutral voltages.



Current on each phase.



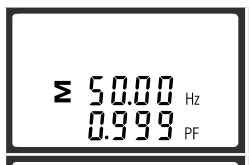
Phase to neutral voltage THD%.



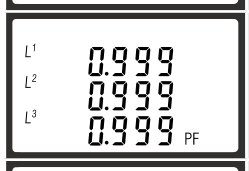
Current THD% for each phase.

3.2 Frequency and Power Factor and Demand

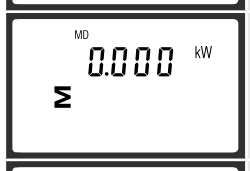
Each successive press of the MD/PF Hz button selects a new range:



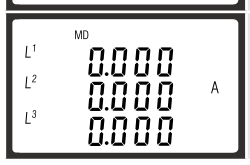
Frequency and Power Factor (total).



Power Factor of each phase.



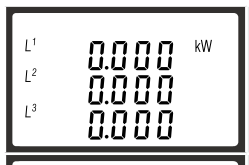
Maximum Power Demand.



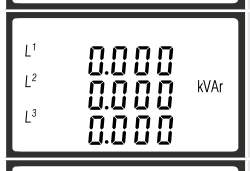
Maximum Current Demand.

3.3 Power

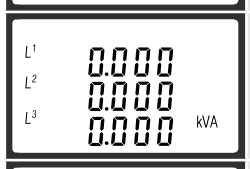
Each successive press of the P button select a new range:



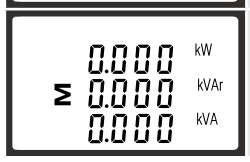
Instantaneous Active Power in kW.



Instantaneous Reactive Power in kVAr.



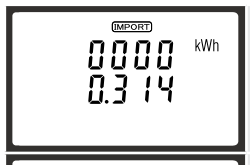
Instantaneous Volt-Amps in KVA.



Total kW, kVArh, kVA.

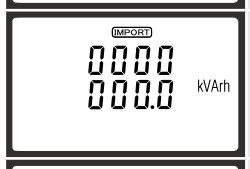
3.4 Energy Measurements

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



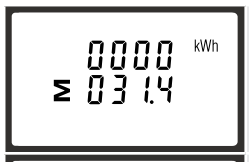
Imported active energy in kWh.

Exported active energy in kWh.

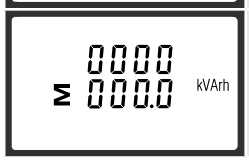


Imported reactive energy in kVArh.

Exported reactive energy in kVArh.



Total active energy in kWh.



Total reactive energy in kVArh.

Please note the register is 9999999.9 display over two lines.

4 Set Up

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

The set up is password-protected so you must enter the correct password (default '1000') before processing.

If an incorrect password is entered, the display will show:

PASS Err (Error)

To exit the set up menu, hold the V/A for 3 seconds, the measurement screen will display.

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

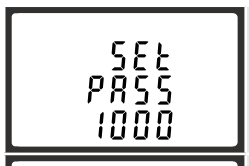
1. Use the MD/PF Hz and P buttons to scroll through the different options of the set up menu.
2. Hold the E button for 3 seconds to confirm your selection.
3. If an item flashes, then it can be adjusted by the MD/PF Hz and P buttons.
4. Having selected an option from the current layer, hold the E button for 3 seconds to confirm your selection.
5. Having completed a parameter setting, hold the V/A button for 3 seconds to return to a higher menu level.
6. On completion of all setting-up, hold the V/A button for 3 seconds, the measurement screen will then be 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 then can be adjusted using the MD/PF Hz and P buttons.
2. Press the E button to more right to the next digit.
3. After setting the last digit, hold the E button for 3 seconds to save your selection.

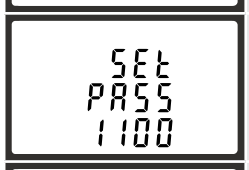
4.2 Change Password



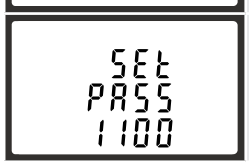
Use the MD/PF Hz and P to choose the change password option.

Hold the E button to enter the set up menu. The first digit will start flashing.

Use MD/PF Hz and P to set the first digit and press E to move right. The next digit will flash.



Repeat the procedure for the remaining three digits.

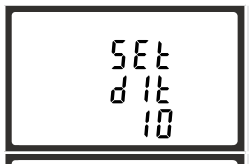


After setting the last digit, Hold the E button to save your selection.

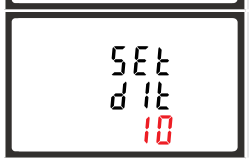
Hold the V/A button for 3 seconds to exit the set up menu.

4.3 DIT (Demand Integration Time)

This sets the period (in minutes) in which the Current and Power readings are integrated for maximum demand measurement. The options are off; 5; 10; 15; 30 or 60 minutes.

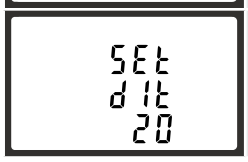


Use the MD/PF Hz and P buttons to select the menu option. The screen will show the current setting.



Hold the E button to enter the menu option, the current selection will flash.

Use the MD/PF Hz and P buttons to select the required option.



Hold the E button to confirm the selection.

Hold the V/A button for 3 seconds to exit the set up menu.

4.4 Supply System

The unit has a default setting of 3 Phase 4 Wire (3P4W). Use this section to set the type of electrical system.

Use the MD/PF Hz and P buttons to select the menu option. The screen will show the current setting.

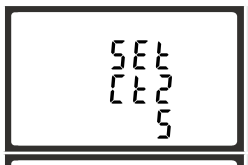
Hold the E button to enter the menu option, the current selection will flash.

Use the MD/PF Hz and P buttons to select the required option.

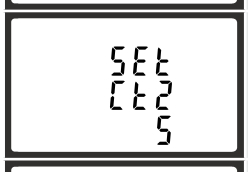
Hold the E button to confirm your adjustment. Hold the V/A button for 3 seconds to exit the set up menu.

4.5 CT Configuration

The CT options set the Secondary Current (CT2 5A or 1A) of the Current Transformer (CT) that are used with the meter.



Use the MD/PF Hz and P buttons to select the menu option. The screen will show the current setting.



Secondary CT Setting: Hold the E button to set the CT secondary option: 5A (default) or 1A.

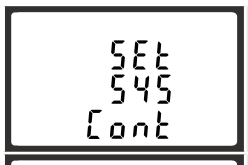
Set the CT Ratio Value: Hold the E button to enter the CT Ratio setting screen. The range is from 0001 to 9999.

The CT Rate is the CT Primary divided by the CT Secondary. For Example: 200/5A Current Transformers - 200÷5=40, so the CT Rate would be 0040 and the CT2 would be 5.

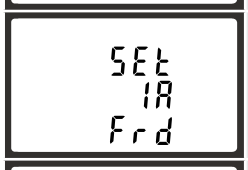
On the MID Version, you can only program the CT Rate ONCE.

4.5.1 CT Reversal

If the CT connections are incorrectly wired, they can be reversed through the "Set System Continued" menu:



Use the MD/PF Hz and P buttons to select the menu option. Hold the E button to view the sub-menu.



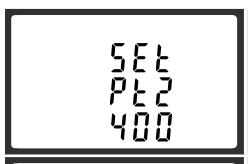
This screen will display, you can change "Forward" to "Reverse" on each individual CT connection.

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

Hold the V/A button for 3 seconds to exit the set up menu.

4.6 PT

The PT option sets the Secondary Voltage (PT2 100-500V) of the Voltage Transformer (PT) that may be connected to the meter.



Use the MD/PF Hz and P buttons to select the menu option. The screen will show the current setting. The default value is 400V.

Secondary PT Setting: Hold the E button to set the PT secondary option: 100-500V.

Set the PT Ratio Value: Hold the E button to enter the PT Ratio setting screen. The range is from 0001 to 9999.

The PT Rate is the PT Primary divided by the PT Secondary. For Example: Voltage Transformer - 11000÷110=100, so the PT Rate would be 0100 and the PT2 would be 110.

4.7 Pulsed Output

Use this section to configure the Pulsed Output Type. Units: kVArh (default); kWh.

SEt rLY kWh	Use the MD/PF Hz and P buttons to select the menu option. The screen will show the current setting.
SEt rLY kWh	Hold the E button to enter the menu option, the current selection will flash.
SEt rLY kVArh	Use the MD/PF Hz and P buttons to select the required option. Hold the E button to confirm the selection.

Hold the V/A button for 3 seconds to exit the set up menu.

4.7.1 Pulse Rate

You can configure the number of pulses to relate to a defined amount of Total Energy.

Please note there are limitations that need to be factored in when setting the pulsed output. This is based upon the relay output only being able to pulse 2 times per second.

For example, If the CT is set to 500/5A on a Single Phase network this would generate (500Ax230V=115,000 / 1000) 115kWh which is 31W per second. A setting of 10IMP/kWh (10 pulses per kWH) would generate 3 pulses per second. This will exceed the 2 pulse per second limitation.

Pulse settings: 1 Pulse per: 10W (0.01) / 100W (0.1) / 1000W/1kWh (1) / 10kWh (10) / 100kWh (100) /1000kWh (1000)

SEt rAtE 10	Use the MD/PF Hz and P buttons to select the menu option. The screen will show the current setting.
SEt rAtE 10	Hold the E button to enter the menu option, the current selection will flash.

Use the MD/PF Hz and P buttons to choose the desired pulse rate. To save the new setting, hold the E button for 3 seconds until the selection stops flashing.

4.7.2 Pulse Duration

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

SEt PULS 200	Use the MD/PF Hz and P buttons to select the menu option. The screen will show the current setting.
SEt PULS 200	Hold the E button to enter the menu option, the current selection will flash.

Use the MD/PF Hz and P buttons to choose the desired pulse rate. To save the new setting, hold the E button for 3 seconds until the selection stops flashing.

4.8 Communication

The RS485 port can be used for communication using Modbus RTU Protocol. To configure the Modbus settings, such as Address and Baud Rate, this is also done within the Password-protected set up menu.

4.8.1 RS485 Address

SEt Addr 001	Use the MD/PF Hz and P buttons to select the menu option. The screen will show the current setting.
SEt Addr 101	Hold the E button to set the meter Address. Range: 001(default) to 247.
SEt Addr 101	Hold the E button to confirm the selection.

Use the MD/PF Hz and P buttons to choose the necessary number, then press the E button to move along to the next number. To save the new setting, hold the E button for 3 seconds until the selection stops flashing.

4.8.2 Baud Rate

SEt bAUd 9.6 k	Use the MD/PF Hz and P buttons to select the menu option. The screen will show the current setting.
SEt bAUd 9.6 k	Hold the E button to enter the menu option, the current selection will flash.
SEt bAUd 38.4 k	Use the MD/PF Hz and P buttons to select the required option.

On completion of the entry procedure, hold the E button to confirm the setting.

4.8.3 Parity

SEt PAr1 EuEN	Use the MD/PF Hz and P buttons to select the menu option. The screen will show the current setting.
SEt PAr1 EuEN	Hold the E button to enter the menu option, the current selection will flash.
SEt PAr1 nONE	Use the MD/PF Hz and P buttons to select the required option. Range: None (default), Odd or Even.

On completion of the entry procedure, hold the E button for 3 seconds until the selection stops flashing.

4.8.4 Stop bits

SEt StoP 1	Use the MD/PF Hz and P buttons to select the menu option. The screen will show the current setting.
SEt StoP 2	Hold the E button to enter the menu option, the current selection will flash.
SEt StoP 2	Use the MD/PF Hz and P buttons to select the required option. Range: 1 (default) or 2.

On completion of the entry procedure, hold the E button for 3 seconds until the selection stops flashing.

4.9 CLR

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

CLr	Use the MD/PF Hz and P buttons to select the menu option. The screen will show the current setting.
CLr dlt	Hold the E button to enter the menu option, the current selection will flash.

Hold the E button to confirm the setting and press V/A to return to the main set up menu.

5 Specifications

5.1 Measured Parameters

The unit can monitor and display the following parameters of a Single Phase Two Wire (1P2W), Three Phase Three Wire (3P3W) or Three Phase Four Wire (3P4W) system.

5.1.1 Voltage and Current

- Phase to Neutral Voltages 100-289V AC (not for 3P3W supplies).
- Phase to Phase Voltages 173-500V AC (3 Phase supplies only).
- Percentage Total Voltage Harmonic Distortion (V %THD) for each Phase to Neutral (not for 3P3W supplies).
- Percentage Total Voltage Harmonic Distortion (V% THD) between Phases (3 Phase supplies only).
- Current %THD for each Phase.

5.1.2 Power factor and Frequency and Max. Demand

- Frequency in Hz
- Instantaneous power:
- Power 0-3600 MW
- Reactive power 0-3600 MVAr
- Volt-amps 0-3600 MVA
- Maximum Demand Power since last reset
- Power factor
- Maximum Neutral Demand Current, since the last reset (for Three Phase supplies only)

5.1.3 Energy Measurements

• Imported/Exported active energy	0 to 9999999.9 kWh
• Imported/Exported reactive energy	0 to 9999999.9 kVArh
• Total active energy	0 to 9999999.9 kWh
• Total reactive energy	0 to 9999999.9 kVArh

5.2 Measured Inputs

Voltage inputs through 4-way fixed connector with 2.5mm² stranded wire capacity. Single Phase Two Wire (1P2W), Three Phase Three Wire (3P3W) or Three Phase Four Wire (3P4W) unbalanced. Line frequency measured from L1 Voltage or L3 Voltage. Three current inputs (six physical terminals) with 2.5mm² stranded wire capacity for connection of external CTs. Nominal rated input current 5A or 1A AC RMS.

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)	±1% of range maximum
• 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 Auxiliary Supply

Two-way fixed connector with 2.5mm² stranded wire capacity. 85-275V AC 50/60Hz ±10% or 120-380V DC ±20%. Consumption <2W 10VA.

5.5 Interfaces for External Monitoring

Three interfaces are provided:

- RS485 communication channel that can be programmed for Modbus RTU protocol
- Relay output indicating real-time measured energy. (configurable)
- Pulse output 3200IMP/kWh (not configurable)

The Modbus configuration (baud rate etc.) and the pulse relay output assignments (kW/kVArh) are configured through the set-up screens.

5.5.1 Pulse Output

Opto-coupler with potential free SPST-NO Contact (Contact rating 5-27V DC / Max current input: Imin 2mA and Imax 27mA DC). The pulse output can be set to generate pulses to represent kWh or kVArh.

Rate 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

Pulse width 200/100/60 mS.

5.5.2 RS485 Output for Modbus RTU

For Modbus RTU, the following RS485 communication parameters can be configured from the set-up menu:

Baud rate: 2400, 4800, 9600, 19200, 38400

Parity: none (default) / odd / even

Stop bits: 1 or 2

RS485 Network Address: 3 digit number - 001-247

Modbus™ Word order Hi/Lo byte order is set automatically to normal or reverse. It cannot be configured from the set-up menu.

5.6 Reference Conditions of Influence Quantities

Influence Quantities are variables that affect measurement errors to a minor degree. Accuracy is verified under nominal value (within the specified tolerance) of these conditions.

• Ambient temperature	23°C ±1°C
• Input waveform	50 or 60Hz ±2%
• Input waveform	Sinusoidal (distortion factor < 0·005)
• Auxiliary supply voltage	Nominal ±1%
• Auxiliary supply frequency	Nominal ±1%
• Auxiliary supply waveform (if AC)	Sinusoidal (distortion factor < 0·05)
• Magnetic field of external origin	Terrestrial flux

5.7 Environment

• Operating temperature	-25°C to +55°C*
• Storage temperature	-40°C to +70°C*
• Relative humidity	0 to 95%, non-condensing
• Altitude	Up to 3000m
• Warm up time	1 minute
• Vibration	10Hz to 50Hz, IEC 60068-2-6, 2g
• Shock	30g in 3 planes

*Maximum operating and storage temperatures are in the context of typical daily and seasonal variation.

5.8 Mechanics

• DIN rail dimensions	72 x 94.5 mm (WxH) per DIN 43880
• Mounting	DIN rail (DIN 43880)
• Sealing	IP51 indoor
• Material	Self-extinguishing UL 94 V-0

5.9 Declaration of Conformity

EU Declaration of Conformity

We, Lumel S.A ,ul. Sulechowska 1, 65-022 Zielona Góra, Poland
Ensure and declare that electricity meter types:

NMID30-1 with the measurement range 3x230/400V AC 0.25-5 (6)A, 50Hz, 3200imp/kWh. Are in conformity with the type as described in the EU-type examination certificate 0120/SGS0423.

The fulfilment of the essential requirements set out in Annex I and in the relevant instrument specific Annexes has been demonstrated.

The electricity meter types described above are in conformity with the relevant Union harmonization legislation and satisfy the appropriate requirements of the Directive 2014/32/EU with the following standards:

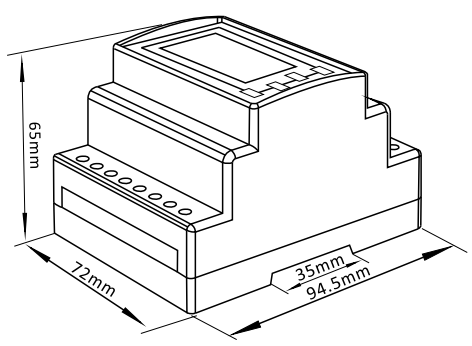
EN50470-1:2006, Electricity metering equipment (AC) part 1: General requirements, tests and test conditions. Metering equipment (class indexes A, B and C)

EN50470-3:2006, Electricity metering equipment (AC) Part 3: Particular requirements- Static meters for active energy (class indexes A, B and C)

This Declaration of Conformity is issued under the sole responsibility of the manufacturer.

Signed on behalf of Lumel S.A.
Signature: DYREKTOR R&D i LABORATORIUM Dariusz Tront
Position: R&D and Laboratory Director

6 Dimensions



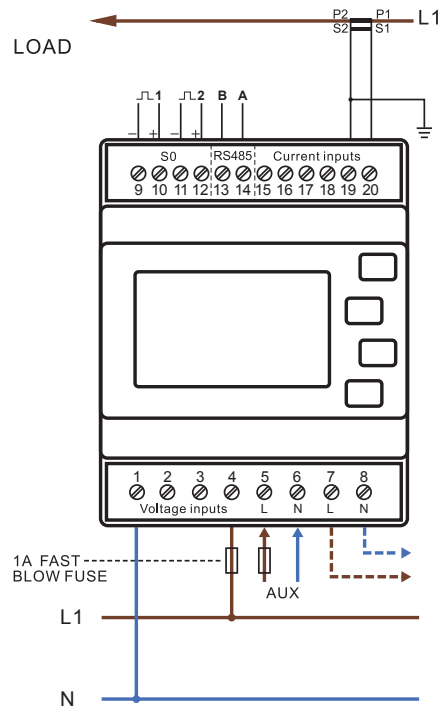
7 Installation / Maintenance ⚠

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install "HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH"

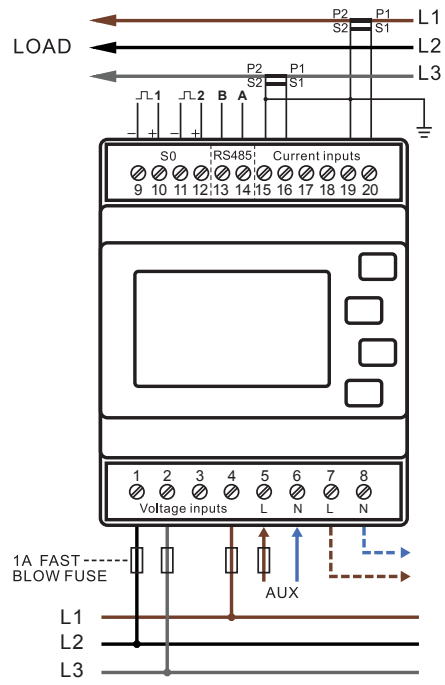
- **The assembly and installation of electrical connections must be carried out by a person authorized to install electrical equipment.**
- **Apply appropriate personal protective equipment and follow safe electrical work practices applicable to local standards.**
- **Turn off all power supplying this device and the equipment in which it is installed before working on it.**
- **Always use a properly rated voltage sensing device to confirm that all power is off.**
- **Do not exceed the device's ratings for maximum limits.**
- **Do not use this device for critical control or protection applications where human or equipment safety relies on the operation of the control circuit.**
- **Do not allow the total additive current flowing through the device to exceed maximum continuous current rating.**

Failure to follow these instructions will result in death or serious injury.
The transducer meets the requirements of EN 61010-1:2010 standard in terms of operational safety.
Requirements for electromagnetic compatibility compliant with the EN 61326-1: 2013 standard.

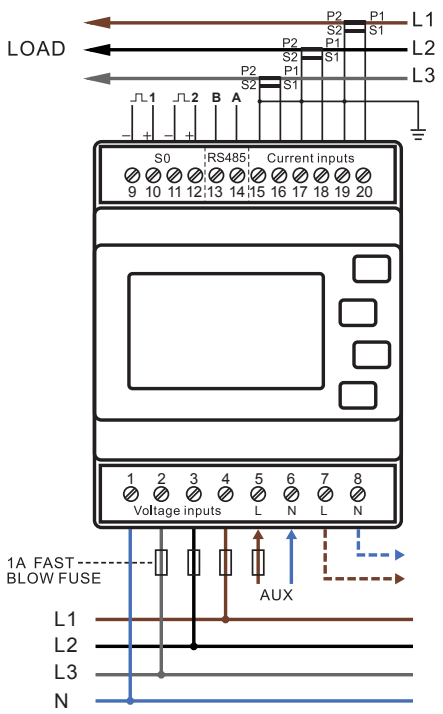
7.1 Single phase two wires



7.2 Three phase three wires



7.3 Three phase four wires



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