LUMEL

3-PHASE DIN RAIL ENERGY METER 100A
(MID CERTIFIED)

NMID30-2 V1

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.

It also comes with a complete comms capability with built in Pulse and RS485 Modbus RTU outputs, configuration is password protected.

This unit is 10(100)A direct connected. Configuration is password protected.

1.1 Unit Characteristics

The NMID30-2 V1 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

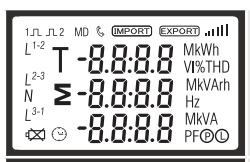
1.2 RS485 Serial – Modbus RTU

RS485 serial port with Modbus RTU protocol to provide a means of remotely monitoring and controlling the Unit. Set-up screens are provided for setting up 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***

1.3 Pulse output

Two pulsed outputs that can be set for active(kWh) or reactive (kVArh) energy.

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.

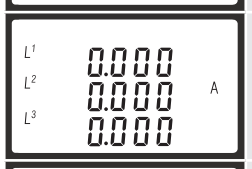
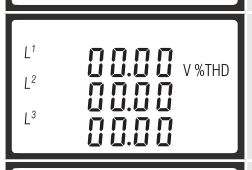
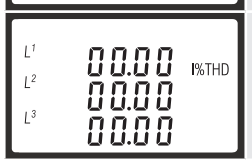
3 Measurements

The buttons operate as follows:

V/A ESC	Selects the Voltage and Current display screens. In Set-up Mode, this is the "Left" or "Back" button.
MD PF Hz	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.

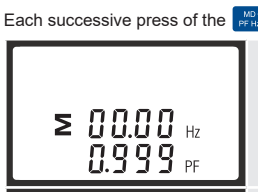
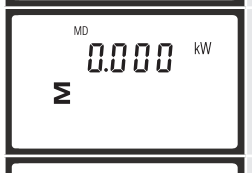
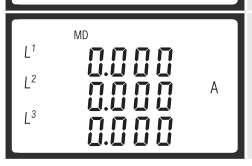
3.1 Voltage and Current

Each successive press of the 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.

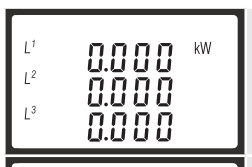
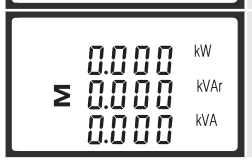
3.2 Frequency and Power Factor and Demand

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, press the E button for 3 seconds, until the password screen appears.

	Setting 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**

To exit setting-up mode, press V/A 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

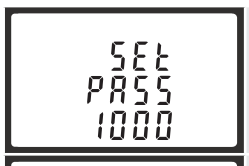
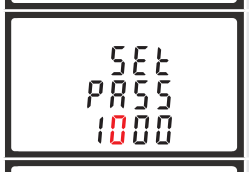
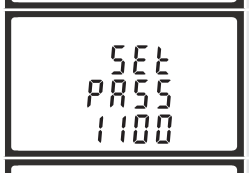
1. Use the MD PF Hz and P buttons to scroll through the different options of the set up menu.
2. Press E to confirm your selection
3. If an item flashes, then it can be adjusted by the MD PF Hz and P buttons.
4. Having selected an option from the current layer, press E to confirm your selection. The SET indicator will appear.
5. Having completed a parameter setting, press V/A to return to a higher menu level. The SET indicator will be removed and you will be able to use the MD PF Hz and P buttons for further menu selection.
6. On completion of all setting-up, press V/A 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 then can be adjusted using the MD PF Hz and P buttons
2. Press E to confirm each digit setting. The SET indicator appears after the last digit has been set.
3. After setting the last digit, press V/A to exit the number setting routine. The SET indicator will be removed.

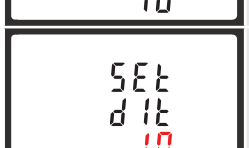
4.2 Change Password

	Use the MD PF Hz 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 MD PF Hz and P to set the 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, SET will show.

Press V/A to exit the number setting routine and return to the Set-up menu. SET will be removed

4.3 DIT Demand Integration Time

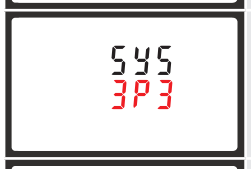
This sets the period in minutes over which the current and power readings are integrated for maximum demand measurement. The options are: off, 5, 10,15 30,60 minutes.

	From the set-up menu, use MD PF Hz 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 MD PF Hz and P buttons to select the time required.
	Press E to confirm the selection. SET indicator will appear.

Press V/A to exit the DIT selection routine and return to the menu.

4.4 Supply System

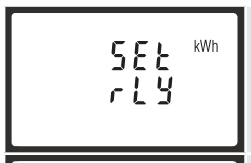
The unit has a default setting of 3Phase 4wire (3P4). Use this section to set the type of electrical system.

	From the set-up menu, use MD PF Hz and P buttons to select the system option. The screen will show the currently selected power supply.
	Press E to enter the selection routine. The current selection will flash.
	Use MD PF Hz and P buttons to select the required system option: 1P2(W),3P3(W) ,3P4(W).
	Press E to confirm the selection. SET indicator will appear.

Press V/A to exit the system selection routine and return to the menu. SET will disappear and you will be returned to the main set-up Menu.

4.5 Pulse Output

This option allows you to configure the pulse output. 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 relay pulse output—Units: kWh, kVArh

	From the set-up menu, use MD PF Hz and P buttons to select the Pulse output option.
	Press E to enter the selection routine. The unit symbol will flash.
	Use MD PF Hz and P buttons to choose kWh or kVArh.

On completion of the entry procedure, press E to confirm the setting and press V/A to return to the main set up menu.

4.5.1 Pulse rate

You can configure the pulse output to relate to a defined amount of imported or exported energy. This can also be set to use with active energy (kWh) or reactive energy (kVarh).

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 in one second.

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

	From the set-up menu, use MD PF Hz and P buttons to select the Pulse Rate option.
	Press E to enter the selection routine. The current setting will flash. 0.01/0.1/1/10/100kWh/ kVArh per pulse.

Use MD PF Hz and P buttons to choose pulse rate. On completion of the entry procedure, press E to confirm the setting and press V/A 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 selected as 200, 100 or 60ms.

	From the set-up menu, use MD PF Hz and P buttons to select the Pulse width option.
	Press E to enter the selection routine. The current setting will flash.

Use MD PF Hz and P buttons to choose pulse width. On completion of the entry procedure press E to confirm the setting and press V/A to return to the main set up menu.

4.6 Communication

There is a RS485 port can be used for communication using Modbus RTU protocol. For Modbus RTU, parameters are selected from Front panel.

4.6.1 RS485 Address

	From the set-up menu, use MD PF Hz and P buttons to select the address ID.

Press E button to enter the selection routine. The current setting will be flashing.

Use MD PF Hz and P buttons to choose Modbus address (001 to 247).

On completion of the entry procedure, press E button to confirm the setting and press V/A esc button to return the main set-up menu.

4.6.2 Baud Rate

From the set-up menu, use MD PF Hz and P buttons to select the Baud Rate option.

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

Use MD PF Hz and P buttons to choose Baud rate 2.4k. 4.8k, 9.6k, 19.2k, 38.4k

On completion of the entry procedure, press E to confirm the setting and press V/A esc to return to the main set up menu.

4.6.3 Parity

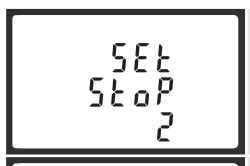
From the set-up menu, use MD PF Hz and P buttons to select the parity option.

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

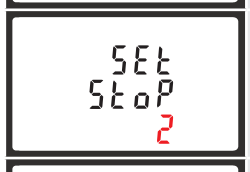
Use MD PF Hz and P buttons to choose parity (EVEN / ODD / NONE (default)).

On completion of the entry procedure, press E to confirm the setting and press V/A esc to return to the main set up menu.

4.6.4 Stop bits



From the set-up menu, use MD PF Hz and P buttons to select the stop bit option.



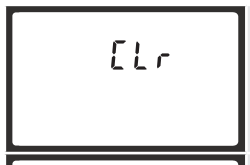
Press E to enter the selection routine. The current setting will flash.

Use MD PF Hz and P buttons to choose stop bit (2 or 1)

On completion of the entry procedure, press E to confirm the setting and press V/A esc to return to the main set up menu.

4.7 CLR

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



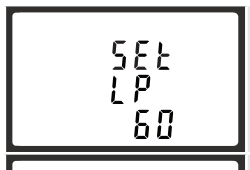
From the set-up menu, use MD PF Hz and P buttons to select the reset option.

Press E to enter the selection routine. The dIt will flash.

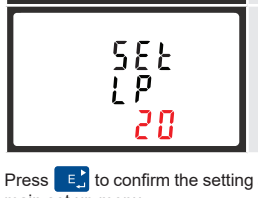
Press E to confirm the setting and press V/A esc to return to the main set up menu.

4.8 Backlight Set-up

Our high-definition backlit display can be set to a duration that suits the end-customer best.



From the set-up menu, use MD PF Hz and P buttons to select the reset option.



Press E to enter the selection routine. The dIt will flash. The options are 0/5/10/30/60/120 minutes.

Press E to confirm the setting and press V/A esc 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 to 289V a.c. (not for 3p3w supplies).
- Voltages between phases 173 to 500V a.c. (3p supplies only).
- Percentage total voltage harmonic distortion (THD%) for each phase to N (not for 3p3w supplies).
- Percentage voltage THD% between phases (three 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 to 99999 W
- Reactive power 0 to 99999 Var
- Volt-amps 0 to 99999 VA
- Maximum demanded power since last Demand reset Power factor
- Maximum neutral demand current, since the last Demand reset (for three phase supplies only)

5.1.3 Energy Measurements

• Imported/Exported active energy	0 to 999999.9 kWh
• Imported/Exported reactive energy	0 to 999999.9 kVArh
• Total active energy	0 to 999999.9 kWh
• Total reactive energy	0 to 999999.9 kVArh

5.2 Measured Inputs

Voltage inputs through 4-way fixed connector with 35mm² 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.

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.

5.5 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 400imp/kWh (not configurable)

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

5.5.1 Pulse Output

Opto-coupler with potential free SPST-NO Contact (Contact range 5-27VDC / 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 nnn – 3-digit number, 1 to 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	76 x 100 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:

NMID30-2 V1 with the measurement range 3x230/400V AC 0.5-10 (100)A, 50Hz, 3200imp/kWh. Are in conformity with the type as described in the EU-type examination certificate **0120/SGS0424**.

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.

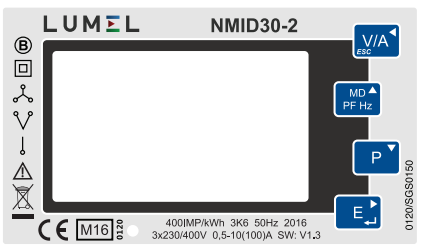
Signed on behalf of Lumel S.A.

Signature: DYREKTOR R&D I LABORATORIUM Dariusz Tront

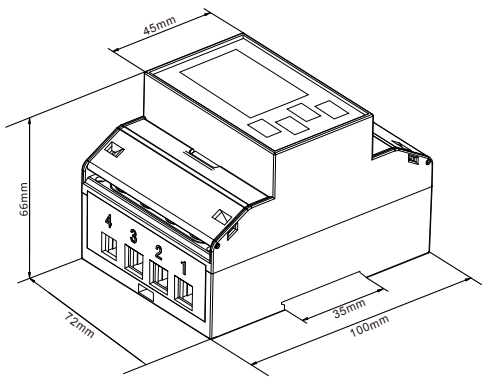
Position: R&D and Laboratory Director

6 NMID30-2 V1

6.1 Nameplate



7 Dimensions



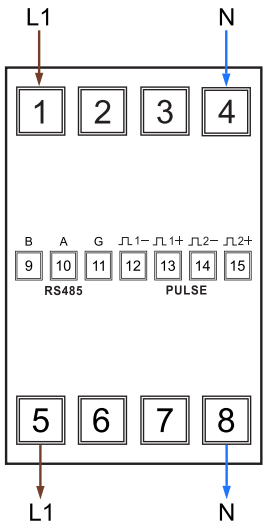
8 Installation / Maintenance

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"

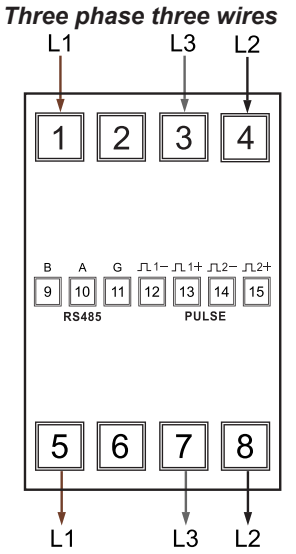
- **The assembly and installation of electrical connections must be carried out by a person authorized to install electrical equipment.**
- **Apply appropriate personal protective equipment and follow safe electrical work practices applicable to local standards.**
- **Turn off all power supplying this 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.

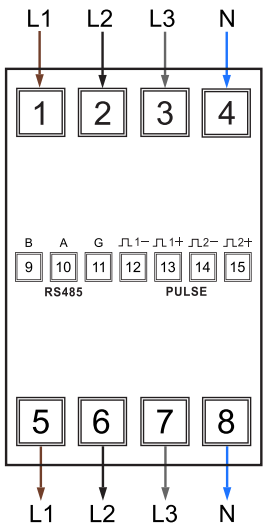
8.1 Single phase two wires



8.2 Three phase three wires



8.3 Three phase four wires



8.4

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.

8.5 Input Wiring and Fusing

Choose fuses of a type and with a breaking capacity appropriate to the supply and in accordance with local regulations.

A switch or circuit breaker allowing isolation of supplies to the unit must be provided where practical. In primary metering applications, ensure the supply is isolated before any maintenance on the product. Tampering with the product seals may contravene local laws.

8.6 Wire Size / Torque

Connections (depending on system type, see section 8.1 to 8.3)	Cable size (mm² / AWG)	Torque
B A G 1− 1+ 2− 2+ / 9 10 11 12 13 14 15 / RS485 PULSE	two conductor cable stranded	0.6 Nm
L1 L2 L3 N	25mm²	3.5 Nm

8.7 Maintenance

The front of the case should be wiped with a dry cloth only, using minimal pressure. If necessary wipe the rear case with a dry cloth.

No user serviceable parts

CE RoHS MID

NMID30-2_V1_09

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