Quick Start Manual and Installation Guide

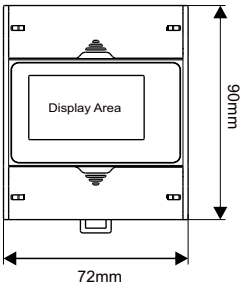
Introduction:

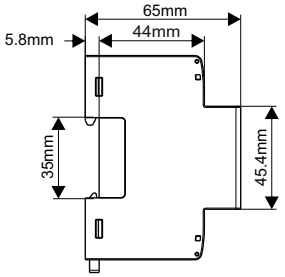
The Direct Connected Energy Meter NR33 is a DIN Rail mounted Digital Meter, primarily for bidirectional Active, Reactive and Apparent Energy measurement intended for use in industrial, commercial and residential electrical energy metering. It also accurately measures important electrical parameters like Voltage, Current, Frequency, Active, Reactive and Apparent Power and Power Factor in Three Phase and Single Phase Networks. It supports maximum 100 A current measurement on direct connection.

Installation:

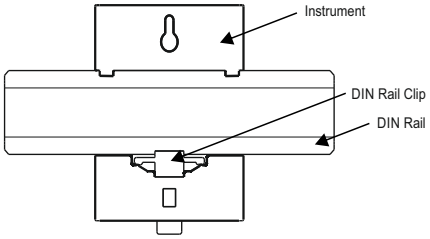
Installation to be carried out by qualified person along with life protecting equipment to prevent hazardous shock.
Isolate incoming supply before connection.
Keep at least 10-15 mm distance on both sides of device.
Install Fuses of 2 Amp in series with supply.

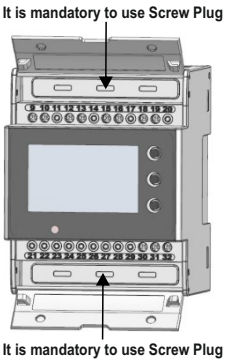
Dimensions:



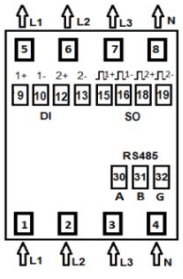


Mounting:

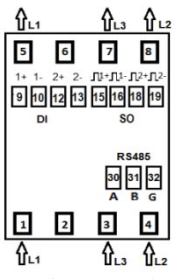




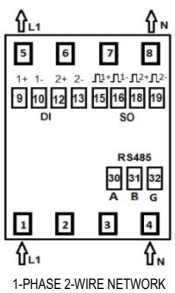
Connection diagram:



3-PHASE 4-WIRE NETWORK



3-PHASE 3-WIRE NETWORK



1-PHASE 2-WIRE NETWORK

Wiring Guidelines:

Current Input Wire Size	1 to 25 mm^2
Current / Voltage Tightening Torque	3 Nm
RS485 / SO / DI Wire Size	0.1 to 2.5 mm^2 (Solid/Stranded with pin type lug)
RS485 / SO / DI Tightening Torque	0.3 to 0.4 Nm

Technical Specifications:

Measurement Parameters:

Reference Voltage (Un)	230 VLN (400 VLL)
Operating Voltage Range	100-289 VLN (173 - 500 VLL)
Power Consumption in Voltage Circuit	< 2 W (10 VA) per phase
Starting Current (Ist = 0.04 *Itr)	20 mA
Minimum Current (Imin = 0.5*Itr)	250 mA
Transitional Current (Itr)	0.5 A
Reference Current (Iref = 10*Itr)	5 A
Maximum Current (Imax > 50*Itr)	100 A
Operating Current Range	0.25 - 5 A (100 A)
Short time Over-current	30*Imax for half cycle at 50 Hz
Power Consumption in Current Circuit	< 1 VA per phase
Frequency	50 / 60 Hz

Auxiliary Supply:

Type	Self Powered

Reference Condition for Accuracy:

Reference Temperature	23°C ± 2°C
Input Voltage	Un ± 1 %
Input Waveform	Sinusoidal (Distortion Factor < 2 %)
Input Frequency	50 Hz ± 0.3 %

Accuracy:

Active Energy (Import/Export)	Class B as per EN50470-3 Class 1 as per IEC 62053-21
Reactive Energy (Import/Export)	Class 2 as per IEC 62053-23
Apparent Energy	± 1.0 %
Voltage	± 0.5 % range max
Current	± 0.5 % Nominal value
Frequency	± 0.2 % of Mid frequency
Active Power	± 1 % of range max
Reactive Power	± 1 % of range max
Apparent Power	± 1 % of range max
Power Factor	± 1 % of range max
VTHD and ITHD	± 4 % (THD >= 15 %)

Pulse Output:

SO1 and SO2	Passive Opto-isolated
Contact Ranges	5-27V DC, 27 mA DC (max)
Pulse Duration	60, 100 and 200 millisecond
Pulse Rate	0.01, 0.1, 1, 10, 100, 500 and 1000 pulse per kWh/kVARh
Parameters	Total/Import/Export kWh/kVARh

Communication Status:

Protocol	RS485 MODBUS
Baudrate	4.8 / 9.6 / 19.2 / 38.4./ 57.6 kbps
Data Width	8
Parity-Stop Bits	None - 1 / None - 2 / Even - 1 / Odd - 1
Response Time	200 millisecond
Device Address	1-247

Impulse LED:

Impulse Rate	1000 pulse per kWh

Display Ranges:

Active Energy	0-9999999.99 kWh
Reactive Energy	0-9999999.99 kVARh
Apparent Energy	0-9999999.99 kVAh
Active Power	0-99999 W
Reactive Power	0-99999 VAR
Apparent Power	0-99999 VA

Digital Input:

0 V	Low
20.....300 VAC / 10.....60 VDC	High

Installation:

Installation	Indoor
Enclosure	IP51 (Front)
Housing	(4 Module DIN 43880)
Dimensions	72 mm X 90 mm X 65 mm
Weight	350 gm
Mounting	Snap-on 35 mm DIN Rail

Safety:

Safety Standard	According to EN50470
Installation Category	III
Protective Class	II
Pollution Degree	2
AC Voltage Test	4 kV for 1 Minute
Impulse Voltage Withstand	6 kV (1.2 microsecond waveform)
Housing Flame Resistance	Flammability Class V-0 acc to UL-94, Self Extinguishing, Non-Dripping, Free of Halogen

Environmental Safety:

Mechanical Environment	M1
Electromagnetic Environment	E2
Operating Temperature	-25°C to +55°C
Storage / Transport Temperature	-40°C to +70°C
Relative humidity	0... 90% non condensing
Altitude	< 2000 m

TABLE 1 : Measurement Parameters:

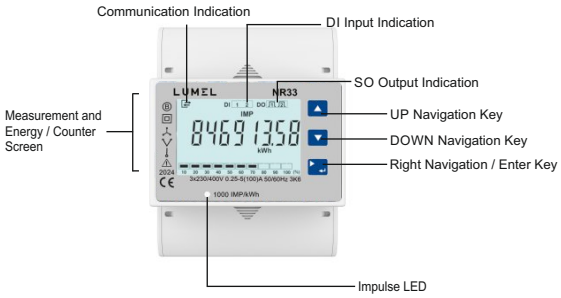
Parameter No.	Parameters	On Display			On Modbus		
		3P 4W	3P 3W	1P 2W	3P 4W	3P 3W	1P 2W
1	Import Active Energy	✓	✓	✓	✓	✓	✓
2	Export Active Energy	✓	✓	✓	✓	✓	✓
3	Total Active Energy	✓	✓	✓	✓	✓	✓
4	Import Reactive Energy	✓	✓	✓	✓	✓	✓
5	Export Reactive Energy	✓	✓	✓	✓	✓	✓
6	Total Reactive Energy	✓	✓	✓	✓	✓	✓
7	Total Apparent Energy	✓	✓	✓	✓	✓	✓
8	L1, L2, L3 Import Active Energy	✓	×	×	✓	×	×
9	L1, L2, L3 Export Active Energy	✓	×	×	✓	×	×
10	L1, L2, L3 Total Active Energy	✓	×	×	✓	×	×
11	L1, L2, L3 Import Reactive Energy	✓	×	×	✓	×	×
12	L1, L2, L3 Export Reactive Energy	✓	×	×	✓	×	×
13	L1, L2, L3 Total Reactive Energy	✓	×	×	✓	×	×
14	L1, L2, L3 Total Apparent Energy	✓	×	×	✓	×	×
15	Partial Import Active Energy	✓	✓	✓	✓	✓	✓
16	Partial Export Active Energy	✓	✓	✓	✓	✓	✓
17	Partial Total Active Energy	✓	✓	✓	✓	✓	✓
18	Partial Import Reactive Energy	✓	✓	✓	✓	✓	✓
19	Partial Export Reactive Energy	✓	✓	✓	✓	✓	✓
20	Partial Total Reactive Energy	✓	✓	✓	✓	✓	✓
21	Partial Total Apparent Energy	✓	✓	✓	✓	✓	✓
22	T1 Import Active Energy	✓	✓	✓	✓	✓	✓
23	T1 Export Active Energy	✓	✓	✓	✓	✓	✓
24	T1 Total Active Energy	✓	✓	✓	✓	✓	✓
25	T1 Import Reactive Energy	✓	✓	✓	✓	✓	✓
26	T1 Export Reactive Energy	✓	✓	✓	✓	✓	✓
27	T1 Total Reactive Energy	✓	✓	✓	✓	✓	✓
28	T1 Total Apparent Energy	✓	✓	✓	✓	✓	✓
29	T1 Partial Import Active Energy	✓	✓	✓	✓	✓	✓
30	T1 Partial Export Active Energy	✓	✓	✓	✓	✓	✓
31	T1 Partial Import Reactive Energy	✓	✓	✓	✓	✓	✓

Parameter No.	Parameters	On Display			On Modbus		
		3P 4W	3P 3W	1P 2W	3P 4W	3P 3W	1P 2W
32	T1 Partial Export Reactive Energy	✓	✓	✓	✓	✓	✓
33	T2 Import Active Energy	✓	✓	✓	✓	✓	✓
34	T2 Export Active Energy	✓	✓	✓	✓	✓	✓
35	T2 Total Active Energy	✓	✓	✓	✓	✓	✓
36	T2 Import Reactive Energy	✓	✓	✓	✓	✓	✓
37	T2 Export Reactive Energy	✓	✓	✓	✓	✓	✓
38	T2 Total Reactive Energy	✓	✓	✓	✓	✓	✓
39	T2 Total Apparent Energy	✓	✓	✓	✓	✓	✓
40	T2 Partial Import Active Energy	✓	✓	✓	✓	✓	✓
41	T2 Partial Export Active Energy	✓	✓	✓	✓	✓	✓
42	T2 Partial Import Reactive Energy	✓	✓	✓	✓	✓	✓
43	T2 Partial Export Reactive Energy	✓	✓	✓	✓	✓	✓
44	T3 Import Active Energy	✓	✓	✓	✓	✓	✓
45	T3 Export Active Energy	✓	✓	✓	✓	✓	✓
46	T3 Total Active Energy	✓	✓	✓	✓	✓	✓
47	T3 Import Reactive Energy	✓	✓	✓	✓	✓	✓
48	T3 Export Reactive Energy	✓	✓	✓	✓	✓	✓
49	T3 Total Reactive Energy	✓	✓	✓	✓	✓	✓
50	T3 Total Apparent Energy	✓	✓	✓	✓	✓	✓
51	T3 Partial Import Active Energy	✓	✓	✓	✓	✓	✓
52	T3 Partial Export Active Energy	✓	✓	✓	✓	✓	✓
53	T3 Partial Import Reactive Energy	✓	✓	✓	✓	✓	✓
54	T3 Partial Export Reactive Energy	✓	✓	✓	✓	✓	✓
55	T4 Import Active Energy	✓	✓	✓	✓	✓	✓
56	T4 Export Active Energy	✓	✓	✓	✓	✓	✓
57	T4 Total Active Energy	✓	✓	✓	✓	✓	✓
58	T4 Import Reactive Energy	✓	✓	✓	✓	✓	✓
59	T4 Export Reactive Energy	✓	✓	✓	✓	✓	✓
60	T4 Total Reactive Energy	✓	✓	✓	✓	✓	✓
61	T4 Total Apparent Energy	✓	✓	✓	✓	✓	✓
62	T4 Partial Import Active Energy	✓	✓	✓	✓	✓	✓

Parameter No.	Parameters	On Display			On Modbus		
		3P 4W	3P 3W	1P 2W	3P 4W	3P 3W	1P 2W
63	T4 Partial Export Active Energy	✓	✓	✓	✓	✓	✓
64	T4 Partial Import Reactive Energy	✓	✓	✓	✓	✓	✓
65	T4 Partial Export Reactive Energy	✓	✓	✓	✓	✓	✓
66	System Current Max Demand	✓	✓	✓	✓	✓	✓
67	System kW Max Demand	✓	✓	✓	✓	✓	✓
68	System kVAR Max Demand	✓	✓	✓	✓	✓	✓
69	System kVA Max Demand	✓	✓	✓	✓	✓	✓
70	System Import kW Max Demand	✓	✓	✓	✓	✓	✓
71	System Export kW Max Demand	✓	✓	✓	✓	✓	✓
72	System Import kVAR Max Demand	✓	✓	✓	✓	✓	✓
73	System Export kVAR Max Demand	✓	✓	✓	✓	✓	✓
74	System L1, L2, L3 Current Max Demand	✓	✓	×	✓	✓	×
75	System Voltage	✓	✓	✓	✓	✓	✓
76	L1, L2, L3 Voltage	✓	×	×	✓	×	×
77	System Voltage L12	✓	✓	×	✓	✓	×
78	System Voltage L23	✓	✓	×	✓	✓	×
79	System Voltage L31	✓	✓	×	✓	✓	×
80	System Current	✓	✓	✓	✓	✓	✓
81	L1, L2, L3 Current	✓	✓	×	✓	✓	×
82	Frequency	✓	✓	✓	✓	✓	✓
83	System Active Power	✓	✓	✓	✓	✓	✓
84	L1, L2, L3 Active Power	✓	×	×	✓	×	×
85	System Reactive Power	✓	✓	✓	✓	✓	✓
86	L1, L2, L3 Reactive Power	✓	×	×	✓	×	×
87	System Apparent Power	✓	✓	✓	✓	✓	✓
88	L1, L2, L3 Apparent Power	✓	×	×	✓	×	×
89	System Power Factor	✓	✓	✓	✓	✓	✓
90	L1, L2, L3 Power Factor	✓	×	×	✓	×	×

Parameter No.	Parameters	On Display			On Modbus		
		3P 4W	3P 3W	1P 2W	3P 4W	3P 3W	1P 2W
91	System Phase Angle	✓	✓	✓	✓	✓	✓
92	L1, L2, L3 Phase Angle	✓	×	×	✓	×	×
93	System Voltage THD	✓	✓	✓	✓	✓	✓
94	L1, L2, L3 Voltage THD	✓	×	×	✓	×	×
95	System Current THD	✓	✓	✓	✓	✓	✓
96	L1, L2, L3 Current THD	✓	×	×	✓	×	×
97	System Current Demand	×	×	×	✓	✓	✓
98	System kW Demand	×	×	×	✓	✓	✓
99	System kVAR Demand	×	×	×	✓	✓	✓
100	System kVA Demand	×	×	×	✓	✓	✓
101	System Import kW Demand	×	×	×	✓	✓	✓
102	System Export kW Demand	×	×	×	✓	✓	✓
103	System Import kVAR Demand	×	×	×	✓	✓	✓
104	System Export kVAR Demand	×	×	×	✓	✓	✓
105	System L1, L2, L3 Current Demand	×	×	×	✓	✓	×

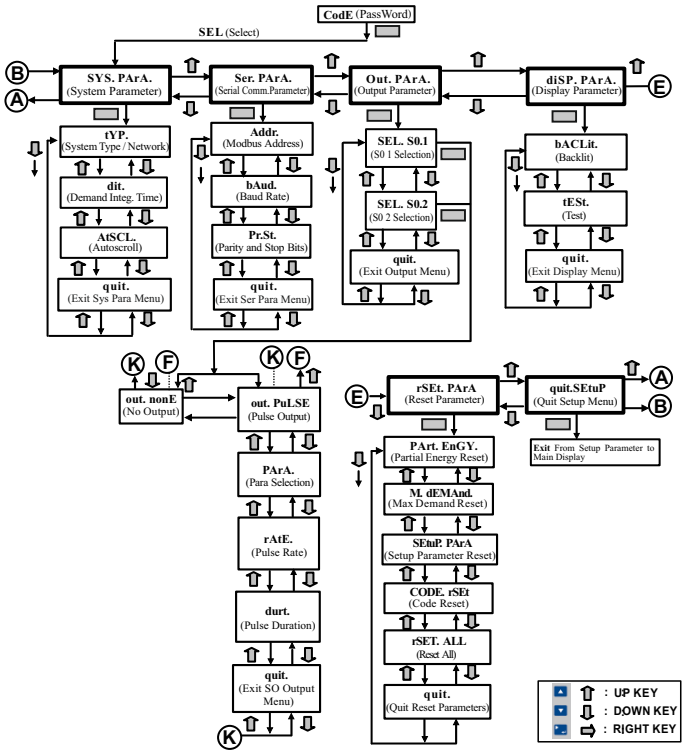
Bright LCD Display:



Using front keys:

Meter after powered, first shows the full display (All Glow Screen). After 3 seconds the measurement screens are shown one by one automatically if auto scroll is enabled. If auto scrolling is disabled then use UP and DOWN key to scroll through all measurement screens.
Keys : 3 Keys are provide for easy setting and scrolling of parameters.
The ▲ key function as UP key
The ▼ key function as DOWN key
The ↵ key function as ENTER key
Upon pressing enter key for 2 sec "CodE" screen is displayed.

Setup Parameters Screens Navigation Map:



Digital Input :

The meter has 2 digital input and for which it has 4 tariff, select different tariff as given below:

1. If both digital input is LOW then Tariff 1 will be active.
2. If digital input 1 is HIGH and digital input 2 is LOW then Tariff 2 will be active.
3. If digital input 1 is LOW and digital input 2 is HIGH then Tariff 3 will be active.
4. If both digital input are HIGH then Tariff 4 will be active.

SO Output :

The Meter is provided with two opto-isolated pulse outputs that can be configured for any one of the Active and Reactive Energy (Total/ Import/ Export) parameters. Refer TABLE 2 for parameters for pulse output. The pulse width and rate of pulse out is onsite programmable .

Pulse Output is opto-coupler based S0 which can be used to drive an external mechanical counter for energy measurement. The Pulse Output can be configured to the parameters mentioned in TABLE 2 through setup parameter screen:

TABLE 2 : Parameters for Pulse Output

Parameter Number	Parameter	3P4W	3P 3W	1P 2W
0	Total Active Energy	✓	✓	✓
1	Import Active Energy	✓	✓	✓
2	Export Active Energy	✓	✓	✓
3	Total Reactive Energy	✓	✓	✓
4	Import Reactive Energy	✓	✓	✓
5	Export Reactive Energy	✓	✓	✓

***Note :** If the Pulse rate is set to 500 or 1000 Impulses/kWh/kVARh and if System power (kW or kVAr whichever is applicable) goes above 13 kW/kVAr limit then the pulse duration is reduced to 20ms.