SELEC

Energy Meter

NEW



User Manual

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PREFACE

Thank you for choosing the Energy Meter Em369. This manual will provide you with detailed steps and precautions regarding installation, wiring, setting of functional parameters, routine maintenance, malfunction diagnosis and solution, etc.

To utilize the meter to its full potential and ensure the safety of both users and the product, please read this manual carefully before using the meter. Any incorrect operations may lead to fault, malfunction or shortened lifetime, or even damage to the device or the people around it.

This manual is available on our website and is accessible through the QR code provided on the unit. We request that you keep it safe considering its importance in commissioning, inspecting, and maintaining the product. In the pursuit of constant improvement, kindly note that all information contained in these materials, including products and product specifications represent information on the product at the time of publication and are subject to change without notice.

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The **EM369-C-CE-CL05** is a energy meter that offers comprehensive 3-phase electrical metering and energy monitoring.

The meter is a panel-mounted 96 x 96mm panel meter that measures important electrical parameters in 3P4W, 3P3W, and 1P2W L-N, 1P2W L-L and 2P3W networks with field-programmable CT / PT primary and secondary values.

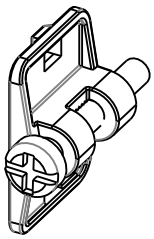
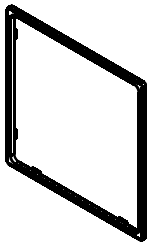
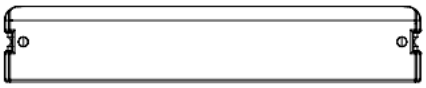
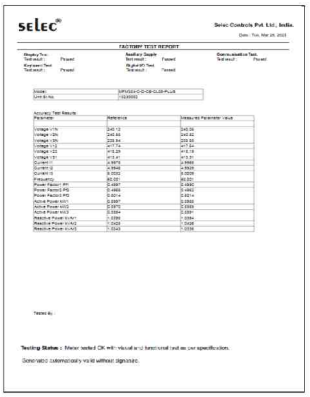
The meter is easy to install, easy to use, compact in size, and meets all safety and reliability standards.
The meter is normally supplied readily pre-programmed for operation and can be directly installed in the usual manner.
The user can read and write through the front panel or by using RS485 communication.

This user manual describes the basic functions and operation methods of the meter. Please read through this manual carefully before using the product.

Contents of the package

Unpack the box and check the contents before using the product. If any part or accessory is missing or if the product appears to be damaged, contact our sales representative.

List of accessories

Sr No.	Description of accessories	Image	Qty
1	Panel mount clamp		4
2	Gasket		1
3	Terminal cover		2
4	Record test certificate		1

SAFETY RECOMMENDATION

Read this manual carefully and follow all safety precautions before mounting, installing, operating and servicing the energy meter. Ignoring the safety protocols can result in damage or loss of life or property.

Warning

People working on the device should take part in professional electrical and safety training, receive the certification, and be familiar with all steps and requirements of installing, commissioning, operating and maintaining the device to avoid any hazards.

Delivery and Installation

A pre-delivery inspection for each meter is strictly implemented by our QC department. The packaging is adequately strengthened with special packing materials to protect it from justifiable harm during handling and transportation. However, as an added precaution, we request that you kindly check the following points upon receipt of the device:

- Please check for any damage caused during transportation
- Please check if the enclosed documents are inside the case, namely the record test certificate
- Please check if this is the model of the product for which you placed an order

Safety guidelines

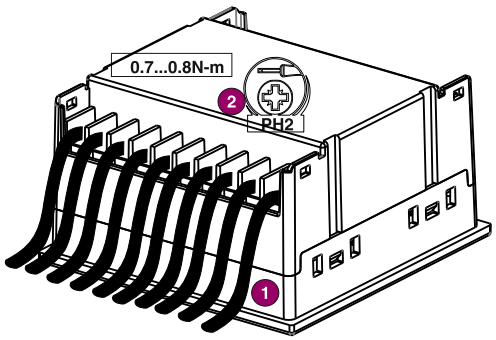
All safety-related codifications, symbols and instructions that appear in this operating manual or on the meter must be strictly followed to ensure the safety of the operating personnel as well as the instrument. If the meter is not used in the manner specified by the manufacturer, it might impair the protection provided by the meter.

Caution

- Do not use the meter if there is any mechanical damage
- Ensure that the equipment is supplied with the correct voltage
- Read the complete instructions prior to the installation and operation of the Unit
- The equipment in its installed state must not come in close proximity to any heating sources, oils, steam, caustic vapors or other unwanted process by-products
- Power must be shut down completely before performing any kind of wiring on the auxiliary terminals
- Do not touch the internal components for your own and the product's safety
- Only qualified professional engineers are allowed to assemble, wire, commission, or maintain
- Do not conduct the procedure of inspection or maintenance until the meter has been shut down for at least 3 minutes
- No permission is granted to change or modify the internal components or circuits

Wiring guidelines

- To prevent the risk of electric shock, power supply to the equipment must be kept OFF while doing the wiring arrangement
- Wiring shall be done strictly according to the terminal layout. Confirm that all connections are correct
- Use lugged terminals
- To reduce electromagnetic interference use of wires with adequate ratings and twists of the same in equal size shall be made with shortest connections
- Layout of connecting cables shall be away from any internal EMI source
- Copper cable should be used (Stranded or Single core cable)
- Before attempting work on device, ensure absence of voltages using appropriate voltage detection device

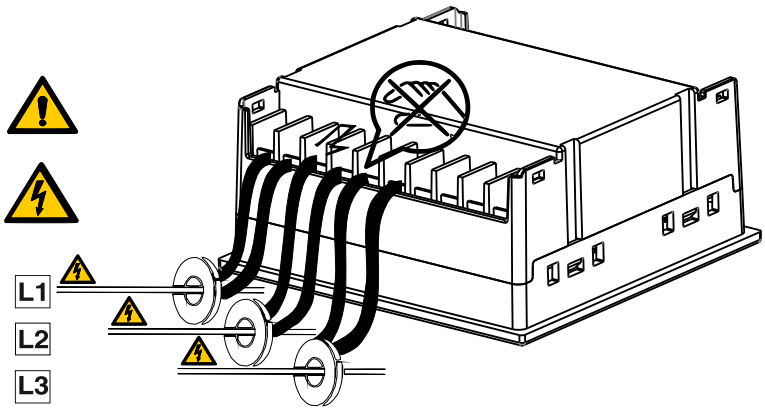


Danger

Hazardous voltage cause death or serious injury. Turn off lock out all power supply before working on this device

Note: Installation & maintenance must be carried out by qualified personnel

- This product has been designed for environment A. Use of this product in environment B may cause unwanted electromagnetic disturbances in which case the user may require to take adequate mitigation measures
- Risk of damage: Please ensure the proper isolation of meter during the IR (meggering) test



Installation environment

- The surroundings must be free from dust, Caustic / Corrosive / Inflammable gases / Liquids
- There should not be any metal particulates in the surrounding air
- The ambient temperature should be -10 °C to + 55 °C

Installation guidelines

- This equipment, being built-in, normally becomes part of the main control panel
- The terminals do not remain accessible to the end user after installation and internal wiring
- Conductors must not come into contact with the internal circuitry of the meter, or else it may lead to a safety hazard that may in turn endanger life or cause an electrical shock to the operator
- A circuit breaker or mains switch must be installed between the power source and supply terminals to facilitate power ON or OFF functions. However, this switch or breaker must be installed in a convenient position that is normally accessible to the operator
- Before disconnecting the secondary of the external current transformer from the equipment, make sure that the current transformer is short-circuited to avoid the risk of electric shock and injury
- The equipment does not have a built-in-type fuse; installation of an external fuse of rating 300V 0.5A AC

FEATURES SUMMARY

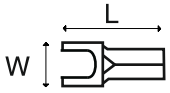
Features

- LCD display screen
- True RMS measurement
- Measurement of 3-phase energy
- Maximum and Minimum demand measurements
- Password protected programmable features
- Pages Auto scrolling and manual (fixed) mode provision
- Site programmable for CT / PT ratio
- Site programmable for network selection
- RS485 MODBUS communication
- Enclosure protection for dust and water
- Compliance with the International standard IEC 61326-1

Salient features

- Accuracy class for Active energy (Wh) Class 0.5S as per IEC62053-22
- Accuracy class for Reactive energy (VARh) Class 2 as per IEC62053-23
- On site firmware update downloading via the boot loader functionality through RS485 communication
- Energy auto resolution for Kilo, Mega and Giga values
- Min/Max values of instantaneous parameters (Voltage, Current, Power, Frequency and Power factor)
- Four quadrant measurements of Power factor, Power and Reactive energy
- 3 phase Import, Export, Import + Export, Import - Export (Active, Reactive, Apparent) Energies
- Reactive (Inductive & Capacitive)*
- Demand parameters with various methods (Last, Present, Predictive, Peak)
- Measurements of True, Displacement and Distortion power factor
- Programmable minimum suppression current (5mA to 99mA)
- THD% and individual harmonics up to the 31st harmonics for Voltage and Current
- Pulse output - MAX 24V DC
- Configurable pulse weight from 1 to 9999000 (pulse/k_h)
- Voltage phase sequence detection
- Current polarity reversal detection and correction
- Run Hour - Based on accumulated energy-Import and Export, ON Hour and Number of Auxiliary interruptions
- Communication parameter values on MODBUS are in both float and integer

Technical specifications		
Type of measurement	Networks	3P4W, 3P3W, 1P2W L-N, 1P2W-LL, 2P3W
		True RMS
Measurement accuracy		Class 0.5S as per IEC62053-22
Display	LCD	Single line display of 9 digits : 10 x 5.33 mm Back light LCD
Auxiliary input	Aux voltage	40V - 300V AC/DC (Cat III)
	Power consumption	<6VA / 2W
	Freq range	50/60 Hz
Measurement input	**Input voltage**	19 to 480V AC L-L (277V AC L-N) (Cat III); 520V AC L-L (300V AC L-N) (Cat II)
	PT secondary	100,110,115,120V (programmable)
	PT primary	100V to 999000V (programmable)
	Frequency	45 to 65Hz
	Measurement method	True RMS
	Burden	0.5VA
	Wire gauge	20 to 14 AWG
	Input current	Nominal 5A AC (Min-5mA, Max-6A)
	CT primary	1A/5A to 32760A (programmable)
	CT secondary	1A / 5A (programmable)
	Measurement method	True RMS
	Burden	0.5VA
	Wire gauge	20 to 14 AWG
Pulse output	Pulse width for POP	1 to 9999000 (pulse per k_h)
	Pulse duration for POP	For LED: 50ms
LED output	Pulse width for LED	1 to 9999000 (pulse per k_h)
	Pulse duration for LED	For LED: 25ms
Communication	Type	RS485 Modbus RTU
	Baud rate	300, 1200, 2400, 4800, 9600, 19200, 38400 bps (programmable)
	Slave ID	1 to 255 (programmable)
	Parity	Odd, Even, None
	Isolation	2 kV AC isolation for 1 minute between communication and other circuits
Certification		CE, RoHS

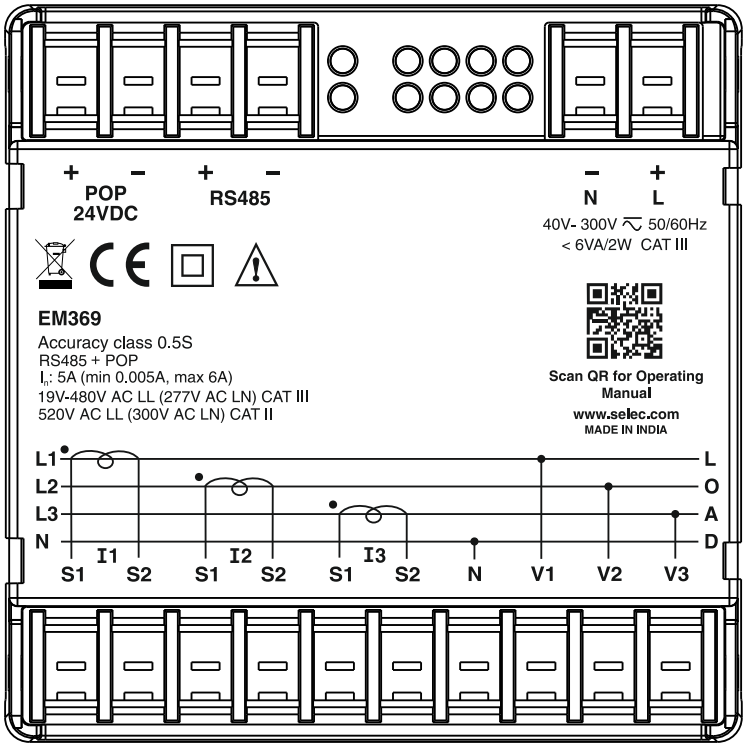
Accuracy		
Measurement type	Class of accuracy as per IEC 61557-12 (In = 5A-nominal CT)	Permissible error
Active energy	Class 0.5S (Class 0.5S [1] as per IEC 62053-22 at In = 5A nominal CT) (1). 50 mA to 6 A	±0.5%
Reactive energy	Class 2 (Class 2 as per IEC 62053-23 at In = 5A nominal CT)	±1%
Apparent energy	Class 0.5 (Class 0.5 at In = 5A nominal CT)	±0.5%
Active power	Class 0.5	±0.5%
Reactive power	Class 1	±1%
Apparent power	Class 0.5	±0.5%
Current	Class 0.5	±0.5%
Voltage (L-L)	Class 0.5	±0.5%
Voltage (L-N) Class 0.5 ±0.2%6	Class 0.5	±0.5%
Frequency	Class 0.05	±0.05%
Power factor	Class 0.5	±0.01 Count
THD and individual harmonics till 15th harmonics	Class 5	±5%
Electrical specification		
Insulation properties	Impulse voltage test	±4kV as per IEC 61010-1
	AC voltage test	±2kV double insulation as per IEC 61010-1
	Insulation resistance	500V DC Voltage as per IEC 61010-1
Electrical requirements	Test of power consumption	As per IEC 61010-1
	Voltage dips and interrupts	As per IEC 61000-4-11
	Short time over current protection	20 times of I_{MAX} for half a second as per IEC 61010-1
Electromagnetic compatibility (EMC)	Electrical fast transient / burst immunity test	±2kV as per IEC 61000-4-4
	Electrostatic discharge immunity test	±8kV air discharge, ±4kV contact discharge as per IEC 61000-4-2
	Radiated, Radio-frequency, electromagneti field immunuty test	10 V/m as per IEC 61000-4-3
	Immunity to conducted disturbances, induced by radio-frequency fields	3V as per IEC 61000-4-6
	Surge immunity test	±2kV as per IEC 61000-4-5
	Rated power frequency magnetic fields	30A/m as per IEC 61000-4-8 for continuous duration 300A/m as per IEC 61000-4-8 for short duration
	Emission	Class A as per CISPR 11
Environmental	Temperature	Operating: -10 °C to 55 °C Storage: -20 °C to 75 °C
	Humidity	Up to 85% non-condensing
Lug dimension		W = 6.35mm L = 11.20mm
Recommended fuse specifications	300V 0.5A AC	

Mechanical specifications		
Mounting type	Panel mount	
Size	96 x 96mm	
Front bezel	96 x 96mm	
Panel cutout	90.7 x 90.7mm	
Material	Poly carbonate	
Accessories	Panel mount clamp, Gasket	
Weight	303 gm approx.	
Protection rating	IP Rating Front: IP65 Back: IP20	
Mechanical testing	Shock	40 g in 3 planes
	Vibration	10 to 55Hz, 0.15mm peak amplitude
	Casing plastic mould protected to IP65 from front	

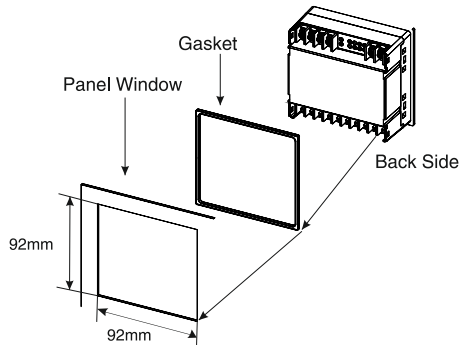
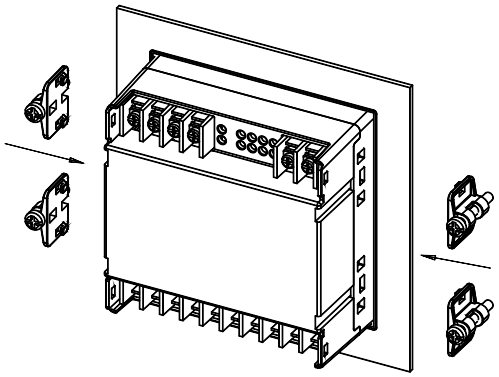
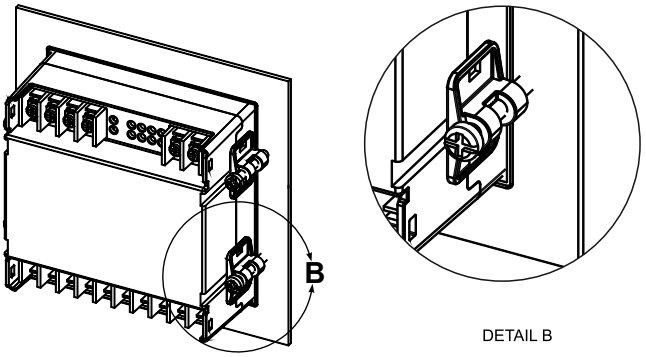
Front panel view



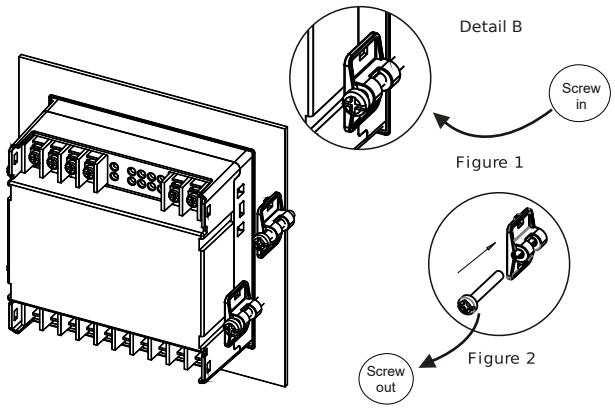
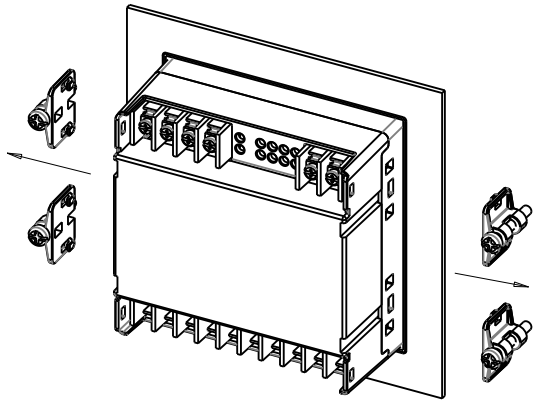
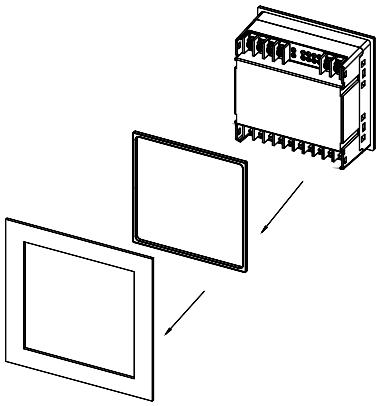
Back panel view



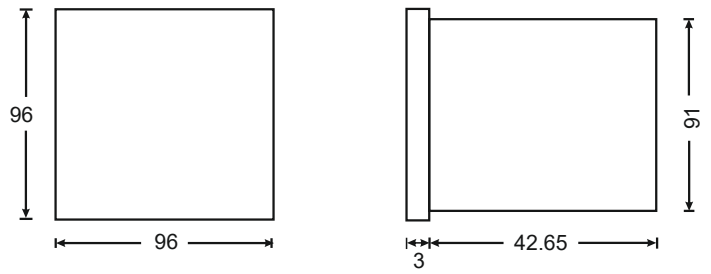
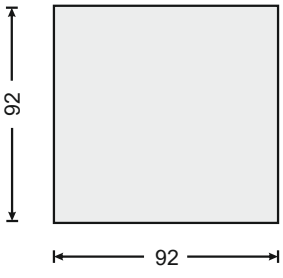
Mounting

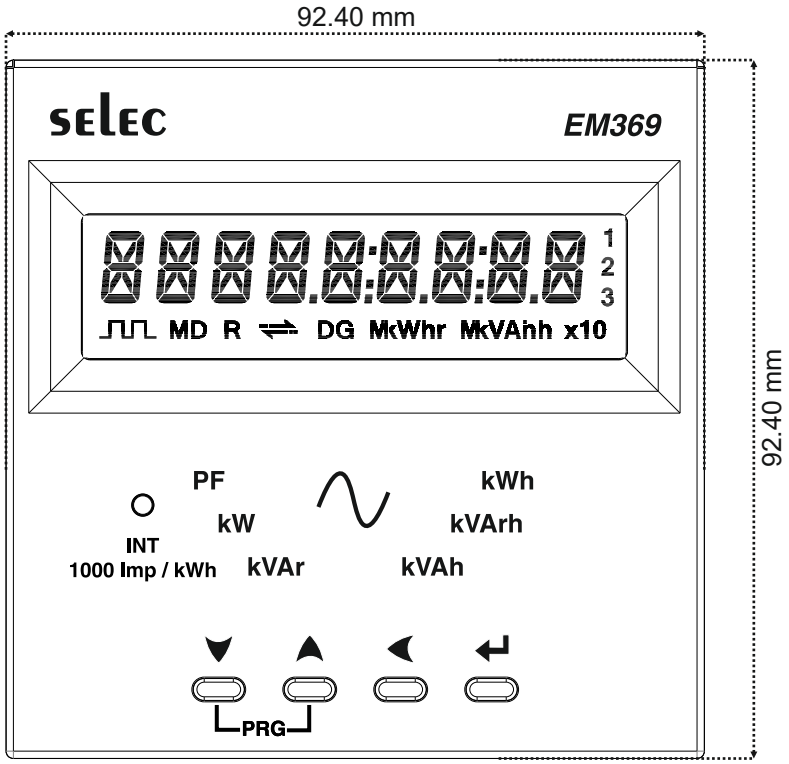
Step	Instruction	Visualization
1	Prepare the panel cutout with proper dimensions as shown below, and push the meter with a gasket into the panel cutout	
2	Fit clamps on both side for optimum fitting	
3	Lock all the four clamps onto the slot as shown in the figure and screw it until the unit fits tightly on the panel. Ensure the meter is properly tightened **Note:** Ensure the torque of screwing machine is set to 0.2 Nm	

Demounting

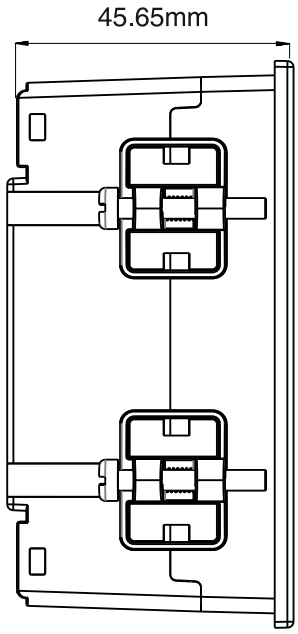
Step	Instruction	Visualization
1	Screw out all the four clamps as shown in the figure.	
2	Pull out the clamps from the slots as shown in the figure and push the meter out of the panel.	
3	Remove the unit from the panel	

Meter dimensions

Outline dimensions (in mm)	Panel cutout dimension (in mm)
	

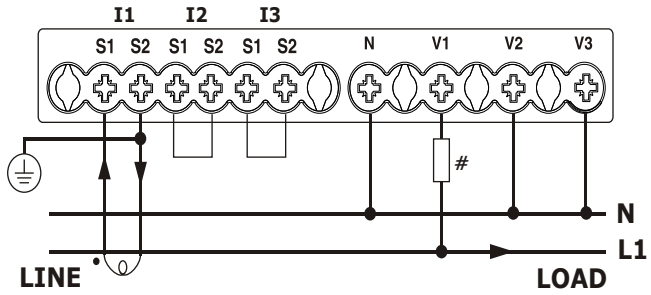
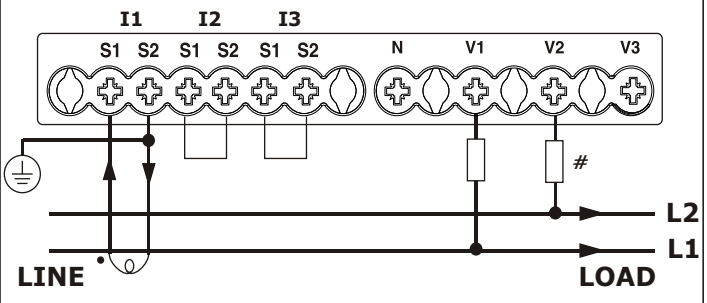


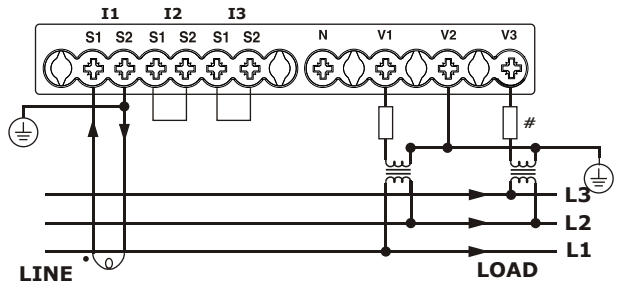
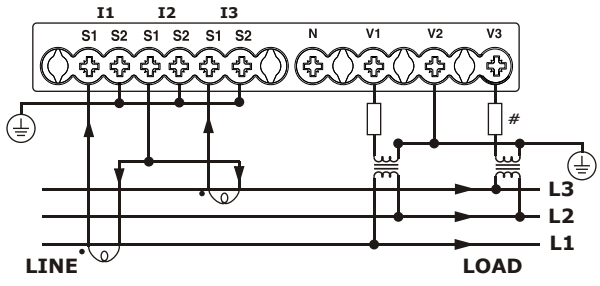
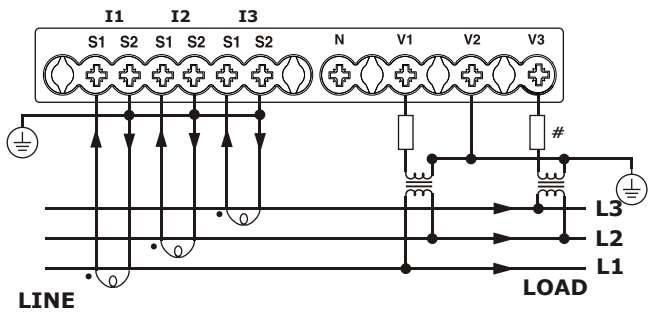
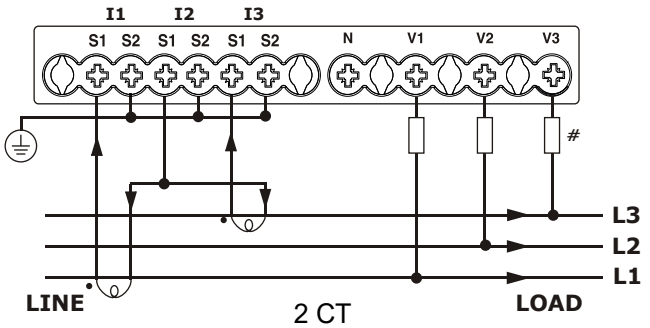
Front view



Side view

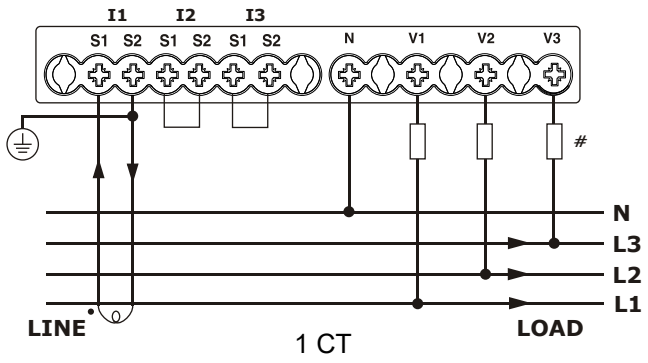
Wiring diagram

1 PHASE -2 WIRE (L-N)	1 PHASE -2 WIRE (L-L)
	
1CT (LN)	1CT (LL)

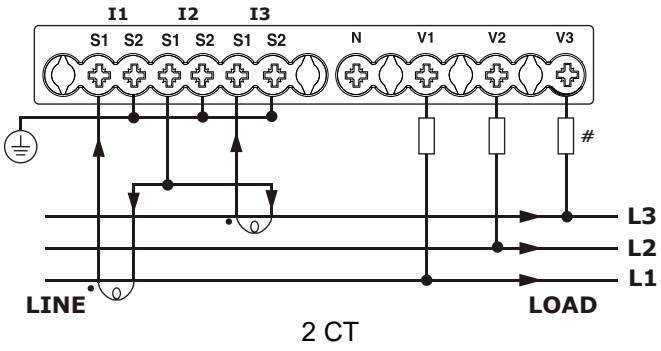
3 PHASE 3 WIRE	
	
1 CT and 2 PT	2 CT and 2 PT
	
3 CT and 2 PT	2 CT

Note:
All fuse types : 0.5A class CC UL type
0.5A fast acting 600V

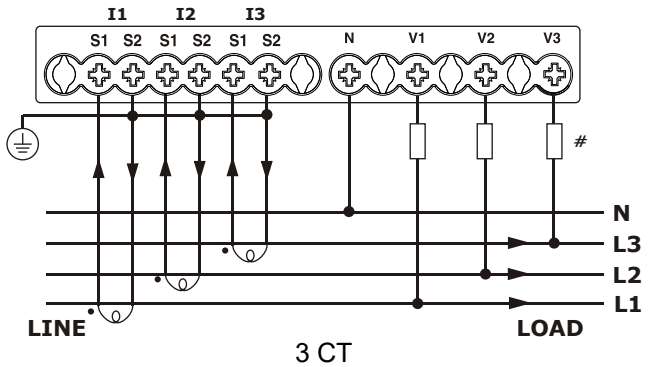
3 PHASE 4 WIRE



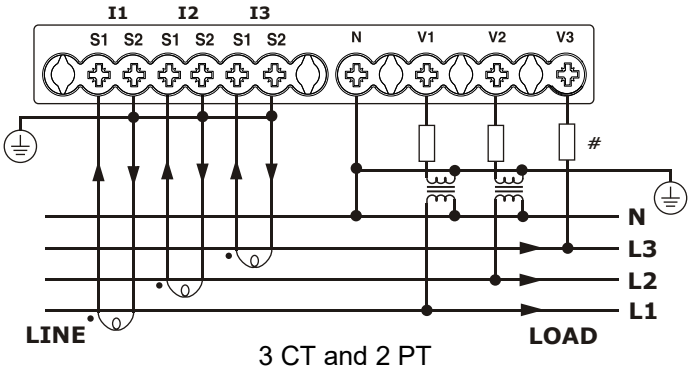
1 CT



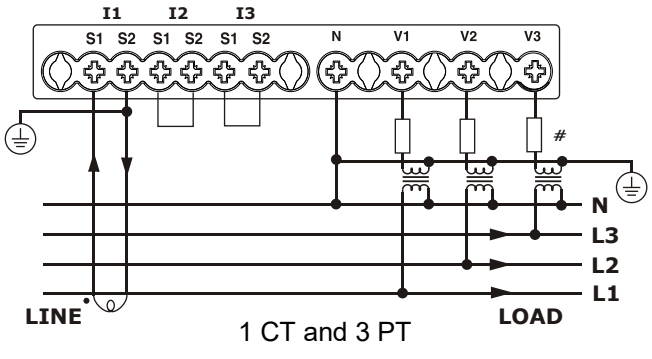
2 CT



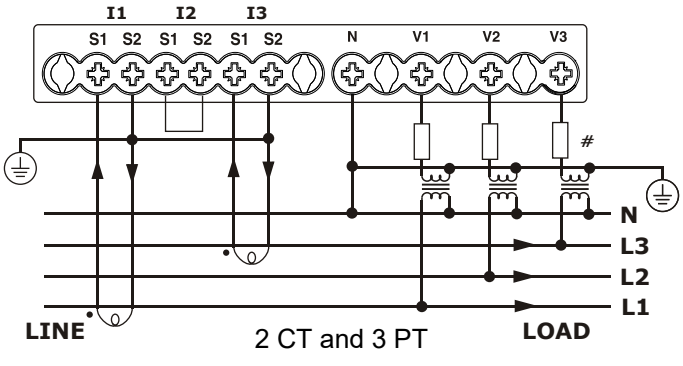
3 CT



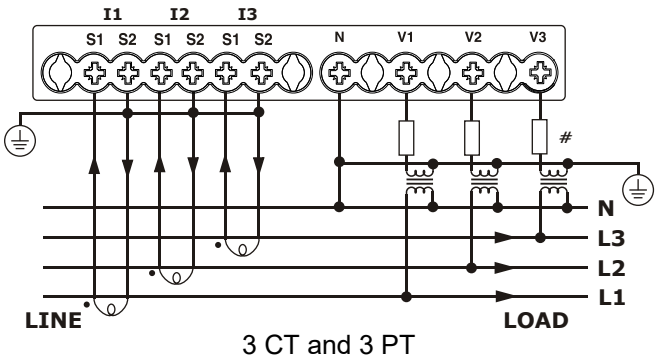
3 CT and 2 PT



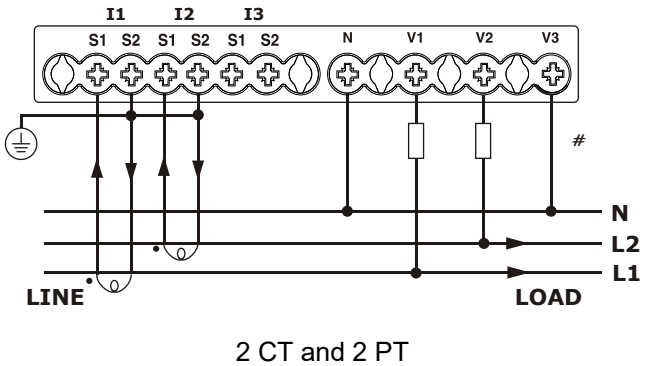
1 CT and 3 PT



2 CT and 3 PT



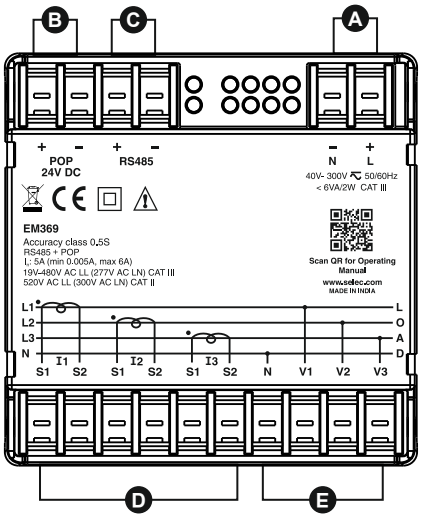
3 CT and 3 PT



2 CT and 2 PT

Note:
All fuse types : 0.5A class CC UL type
0.5A fast acting 600V

Description of terminals



Terminal	Description	
A	L (line)	Auxiliary input
	N (neutral)	
B	POP+	Pulse output
	POP-	
C	RS485+	Communication connection
	RS485-	
D	S1(I1)	3 Phase current input
	S2(I1)	
	S1(I2)	
	S2(I2)	
	S1(I3)	
	S2(I3)	
E	N (neutral for voltage input)	Three phase voltage input
	V1 (voltage R-Phase)	
	V2 (voltage Y-Phase)	
	V3 (voltage B-Phase)	

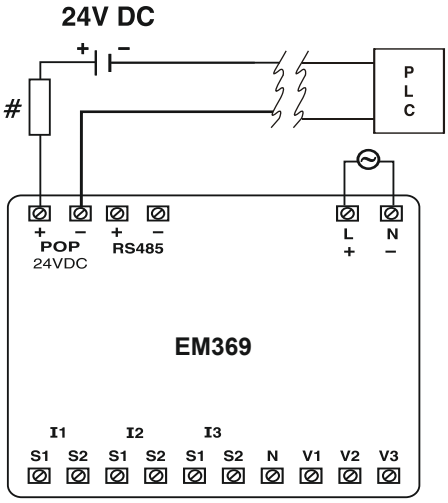
Pulse output (POP)

- Process integration
- Energy controller

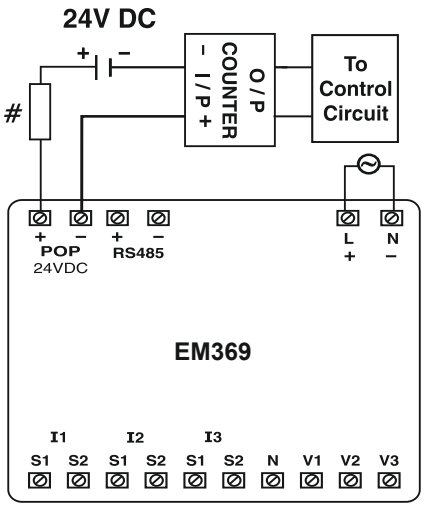
Process integration: Pulse output for EM369 meter can be interface into a process through a PLC for on line control of energy content in the process.

If the PLC has self excited 24V digital input, external 24V DC supply is not needed.

The kWh pulse is also use to drive average kWh information at the PLC.



Energy controller: Pulse output from EM369 meter can be used as alarm generator or total energy controller by interfacing it with presettable counter and control circuits (Contactors, Relay, Trip Circuit). The counter is loaded with the maximum energy consumption. When count reaches setpoint it provides output to control circuit to take appropriate action.



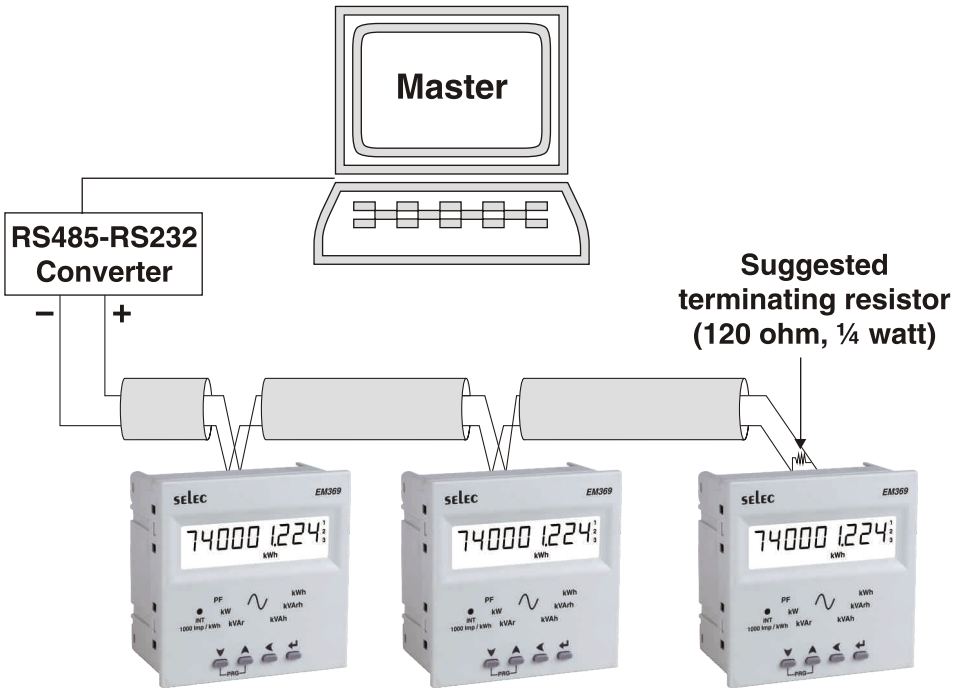
Note:
All fuse types : 0.5A class CC UL type
0.5A fast acting 600V

Serial communication

The meter has RS485 port for the purpose of Serial communication, the RS485 bus can support up to 32 devices connected to it. In RS485 bus the devices are connected in point-to-point configuration. With (+) and (-) terminals of devices connected in series.

Note: Use a shielded twisted pair RS485 cable .

The total distance for devices connected on an RS-485 bus should not exceed 500m

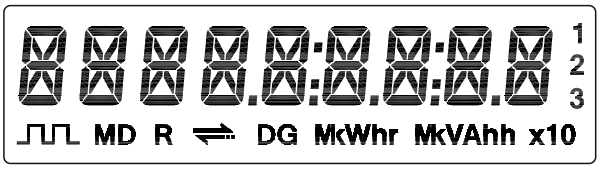


Serial communication wiring diagram

LCD description

The front of the meter consists of LCD screen and four control keys. All the display segments are illustrated as below. Function LCD symbols

All display segments



Segment description

Sr. No.	Display	Description
1	 Single line of 9 digit	Display energy data
2	KV, kA, PF, Hz, kW, kVAr, kVA, kWh, kVArh, kVAh	Symbols represents for units representation of parameter values Voltage: V, KV Current: A, KA Active power: kW, MW Reactive power: KVAr, MVAr Apparent power: KVA, MVA Frequency: Hz Active energy: kWh, MWh, kMWh) Reactive energy: KVArh, MVArh, KMVAh(1) Apparent energy: KVAh, MVAh, KMVAh(1) (1)**For Giga-k and M both symbols will be ON**
3		Communication symbol

LCD description

There are 4 dedicated keys to read the meter parameters. Simply press these keys to read the parameters.
Illustrations of keyboard operations with different modes

Key Function to access Configuration mode parameters

Mode	Key press	Key description
Online mode	▼	To decrement the sub-page
	▲	To increment the sub-page
	◀	To decrement the main page
	↵	To increment main page

Mode	Key press	Key description
Configuration mode	▼	To decrement the parameter value
	▲	To increment the parameter value
	◀	To shift one digit
	↵	To save the setting and move on to next page

Key function to access different features of meter

Mode	Key press	Key description
Measurement mode	▼ + ▲	Press and hold key for 3 seconds to enter or exit from the configuration mode
	↵	Press and hold key for 3 seconds to toggle between Auto, manual and default mode

Reading of parameter

Screen	Online Page Description	Key
Main page	Display 1st Phase Line Neutral Voltage	◀ / ↵
Sub-page	Display 2nd Phase Line Neutral Voltage	▼ / ▲
Sub-page	Display 3rd Phase Line Neutral Voltage	▼ / ▲
Sub-page	Display Average of Three Phase Line To Neutral Voltage	▼ / ▲
Note: 1) For 3Ø 3 wire and 1Ø 2 wire L-L system these screens will not be available 2) In 1Ø 2 wire system screen will be available according to CT selection		
Main page	Display 1st & 2nd Phase Line to Line Voltage	◀ / ↵
Sub-page	Display 2nd & 3rd Phase Line to Line Voltage	▼ / ▲
Sub-page	Display 3rd & 1st Phase Line to Line Voltage	▼ / ▲
Sub-page	Display Average of Three Phase Line to Line Voltage	▼ / ▲
Note: 1) For 1Ø 2 wire system these screens will not be available 2) In 1Ø 2 wire L-L system screen will be available according to CT selection		
Main page	Display 1st Phase Current	◀ / ↵
Sub-page	Display 2nd Phase Current	▼ / ▲
Sub-page	Display 3rd Phase Current	▼ / ▲
Sub-page	Display All 3 Phase Average Current	▼ / ▲
Note: In 1Ø 2wire system and 1Ø 2 wire L-L system screen will be available according to CT selection		
Main page	Display 1st Phase Power Factor	◀ / ↵
Sub-page	Display 2nd Phase Power Factor	▼ / ▲
Sub-page	Display 3rd Phase Power Factor	▼ / ▲
Sub-page	Display Average of All 3 Phase Power Factor	▼ / ▲
Note: 1) For 3Ø 3 wire and 1Ø 2 wire L-L system only average page will be available 2) In 1Ø 2 wire system screen will be available according to CT selection		
Main page	Display Frequency	◀ / ↵
Main page	Display 1st Phase Active Power	◀ / ↵
Sub-page	Display 2nd Phase Active Power	▼ / ▲
Sub-page	Display 3rd Phase Active Power	▼ / ▲
Sub-page	Display Total Active Power Of All 3 Phases	▼ / ▲
Note: 1) For 3Ø 3 wire and 1Ø 2 wire L-L system only total page will be available 2) In 1Ø 2 wire system screen will be available according to CT selection		

Screen	Online Page Description	Key
Main page	Display 1st Phase Reactive Power	◀ / ↵
Sub-page	Display 2nd Phase Reative Power	▼ / ▲
Sub-page	Display 3rd Phase Reactive Power	▼ / ▲
Sub-page	Display Total Reactive Power Of All 3 Phases	▼ / ▲
Note: 1) For 3Ø 3 wire and 1Ø 2 wire L-L system only total page will be available 2) In 1Ø 2 wire system screen will be available according to CT selection		
Main page	Display 1st Phase Apparent Power	◀ / ↵
Sub-page	Display 2nd Phase Apparent Power	▼ / ▲
Sub-page	Display 3rd Phase Apparent Power	▼ / ▲
Sub-page	Display Total Apparent Power of All 3 Phases	▼ / ▲
Note: 1) For 3Ø 3 wire and 1Ø 2 wire L-L system only total page will be available 2) In 1Ø 2 wire system screen will be available according to CT selection		
Main page	Display IMP Active Energy of 1st Phase	◀ / ↵
Sub-page	Display IMP Active Energy of 2nd Phase	▼ / ▲
Sub-page	Display IMP Active Energy of 3rd Phase	▼ / ▲
Sub-page	Display EXP Active Energy of 1st Phase	▼ / ▲
Sub-page	Display EXP Active Energy of 2nd Phase	▼ / ▲
Sub-page	Display EXP Active Energy of 3rd Phase	▼ / ▲
Sub-page	Display Total IMP Active Energy	▼ / ▲
Sub-page	Display Total EXP Active Energy	▼ / ▲
Sub-page	Display Total Active Energy (IMP & EXP)	▼ / ▲
Note: In 3Ø 3 wire system, 1Ø 2wire system and 1Ø 2 wire L-L system only total energy pages will be available		
Main page	Display IMP Reactive Energy of 1st Phase	◀ / ↵
Sub-page	Display IMP Reactive Energy of 2nd Phase	▼ / ▲
Sub-page	Display IMP Reactive Energy of 3rd Phase	▼ / ▲
Sub-page	Display EXP Reactive Energy of 1st Phase	▼ / ▲
Sub-page	Display EXP Reactive Energy of 2nd Phase	▼ / ▲
Sub-page	Display EXP Reactive Energy of 3rd Phase	▼ / ▲
Sub-page	Display Total IMP Reactive Energy	▼ / ▲
Sub-page	Display Total EXP Reactive Energy	▼ / ▲
Sub-page	Display Total Reactive Energy (IMP + EXP)	▼ / ▲
Note: In 3Ø 3 wire system, 1Ø 2wire system and 1Ø 2 wire L-L system only total energy pages will be available		

Screen	Online Page Description	Key
Main page	Display IMP Apparent Energy of 1st Phase	◀ / ↵
Sub-page	Display IMP Apparent Energy of 2nd Phase	▼ / ▲
Sub-page	Display IMP Apparent Energy of 3rd Phase	▼ / ▲
Sub-page	Display EXP Apparent Energy of 1st Phase	▼ / ▲
Sub-page	Display EXP Apparent Energy of 2nd Phase	▼ / ▲
Sub-page	Display EXP Apparent Energy of 3rd Phase	▼ / ▲
Sub-page	Display Total IMP Apparent Energy	▼ / ▲
Sub-page	Display Total EXP Apparent Energy	▼ / ▲
Sub-page	Display Total Apparent Energy (IMP & EXP)	▼ / ▲
Note: In 3Ø 3 wire system, 1Ø 2wire system and 1Ø 2 wire L-L system only total energy pages will be available		
Main page	On Hour	◀ / ↵

Configuration mode

The configuration mode allows the user to configure the functions. The functions are explained in the table below

Note: The settings should be done by a professional, after going through this users manual and after having understood the application situation

Time out for configuration mode is 1 minute. After time out, meter exits configuration mode and goes to measurement mode

- Basic setup
- Communication
- Demand
- POP
- Reset

Sr No.	Menu	Function	Description	Range or selection	Factory setting	Remarks
1	Basic setup	PSW	Configuration password	0000 to 9998	1000	
2		CPW	Change password	NO/YES	NO	
3		NWW	New password	0000 to 9997	0	**Note:** The new password is enabled only if change password is YES
4		NET	Network selection	3P4W 3P3W 1P2W L-N 1P2W L-L	3P4W	
5		CTM	CT terminal selection	CT1 CT2 CT3 CT12 CT23 CT31 CT123	CT123	**Note:** The CT terminal selection is enabled based on the selected network
6		CTP	CT primary	1 OR 5 to 32760	5	
7		CTS	CT secondary	1 OR 5	5	
8		VCN	Voltage connection selection	NO VT 1 VT 2 VT 3 VT	NO VT	**Note:** The Voltage connection selection is enabled based on selected network
9		PTP	PT primary selection	100 to 999000	100	**Note:** PT primary selection will not be enabled if PT Selection is NO VT
10		PTS	PT secondary selection	100 110 115 120	100	**Note:** PT secondary will not be enabled if PT connect is NO PT
11		FRQ	System frequency selection	50/60 Hz	50Hz	
12		MSC	Minimum suppression current	5 to 99mA	11 mA	

13	Basic setup	SEQ	CT sequence	CT123 CT321 CT312 CT231 CT132	CT123	**Note:** The CT sequence is applicable for 3P3W and 3P4W configurations and CT123 CT terminal value. If you change the network or CT terminal value, then the CT sequence resets to the default value
14		POL	CT polarity	NONE CT1 CT2 CT3 CT12 CT23 CT31 CT123	NONE	**Note:** The CT polarity parameters are enabled based on selected network and CT terminal value. If you change the network or CT terminal value, then the CT Polarity correction resets to the default value
15	Communication	COM	Communication	ON / OFF	ON	
16		SID	Salve ID selection	1 to 255	1	
17		BUD	Baud rate selection	300 / 600 / 1200 / 2400 / 4800 /9600 / 19200 / 38400	9600	
18		PRT	Parity selection	NONE / ODD / EVEN	NONE	
19		STB	Stop bit selection	1 OR 2	1	
20		END	Endianess	MSRF / LSRF	MSRF	**Note:** This parameter will help you see values in LSRF (Mid-Little Endian) or MSRF (Big Endian) sequence of bytes of word
21		BAC	Backlight OFF timer	0 to 7200	0	
22	Power demand	PMD	Power demand	SLIDING / FIXED / FIXED-SLIDING	SLIDING	
23		DUN	Power demand duration	1 to 60 MINUTES	15	
24		LNG	Power demand length	1 to 60 MINUTES	1	
25	Current demand	CUD	Current remand method	SLIDING / FIXED / FIXED-SLIDING	SLIDING	
26		DUN	Current demand duration	1 to 60 MINUTES	15	
27		LNG	Current demand length	1 to 60 MINUTES	1	
28	Demand sync	SYN	Demand sync type	NONE / COMMAND	NONE	

29		LED	LED ON / OFF	ON / OFF	ON	
30	LED POP	ERG	LED POP energy parameter	IMPORT kWh EXPORT kWh TOTAL kWh IMPORT kVARh EXPORT kVARh TOTAL kVARh IMPORT kVAh TOTAL kVAh NONE	IMPORT-kWh	**Note:** These parameters cannot be viewed if LED is OFF
31		WD	LED POP pulse width	1 to 9999000	1	
32		POP	POP ON / OFF	ON / OFF	ON	
33	Pulse output	ERG	POP energy parameter	IMPORT kWh EXPORT kWh TOTAL kWh IMPORT kVARh EXPORT kVARh TOTAL kVARh IMPORT kVAh TOTAL kVAh NONE	IMPORT-kWh	**Note:** These parameters cannot be viewed if PULSE OUTPUT is OFF
34		WD	POP pulse width	1 to 9999000	1	
35	Number of pole	NPL	Number of pole selection	02 to 98	2	
36		DFT	Factory default	NO / YES	NO	
37		RST	Reset energy	NO / YES	NO	
38		PSW	Reset password	0002 to 9999	1002	
39	Reset	W	Reset active energy	NO / YES	NO	
40		VAR	Reset reactive energy	NO / YES	NO	
41		VA	Reset apperant energy	NO / YES	NO	
42		DMD	Reset max demand	NO / YES	NO	

43	Reset	NHR	Reset run hour	NO / YES	NO	
44		OHR	Reset ON hour	NO / YES	NO	
45		AUX	Reset auxiliary interrupt	NO / YES	NO	
46		MMX	Reset Min-Max parameter	NO / YES	NO	

Configuration mode password

For setting the configuration mode parameters user will be prompted for the password. If correct password is entered, user will be able to access the all programming parameters.

Description	Range	
Configuration mode	0000-9998	Default: 1000
Reset	0001-9999	This password will be greater than the configuration password by 1. i.e. (1001)

Note: The configuration mode is always password protected

Scrolling mode

The user can set the display screen in auto scrolling mode or manual (fixed) screen mode via the front panel keys

Long press ↵ for 3 seconds to toggle between manual and automatic mode

• **Automatic mode:** In automatic mode, online pages scroll automatically at the rate of 5 seconds per page. In Automatic mode when any key is pressed, unit temporarily switches to manual mode and the appropriate page is displayed. Also if any key is not pressed for 5 sec, unit resumes automatic mode.

• **Manual mode (fixed):** In manual mode, selected online page will remains static

• **Default mode (fixed):** In default mode, online page will automatically switch to Total kWh page after 5 seconds.

Display parameter

Function	Description	Parameters
Real time measuring	VL-N phase voltage per phase and 3 phase average	V1, V2, V3, VLN_{AVG}
	VL-L line voltage per phase and 3 phase average	V12, V23, V31, VLL_{AVG}
	Current-per phase and 3 phase average	I1, I2, I3,I_{AVG}
	Calculated neutral current*	In
	Unbalanced voltage*	V1, V2, V3, V12, V23, V31, VL-N_{AVG}, VL-L_{AVG}, VL-N_{WORST}, VL-L_{WORST}
	Unbalanced current*	I1, I2, I3,I_{AVG}, I_{WORST}
	Active power	kW1, kW2, kW3, kW_{TOTAL}
	Reactive power	kVAR1, kVAR2, kVAR3, $kVAR_{TOTAL}$
	Apparent power	kVA1, kVA2, kVA3, kVA_{TOTAL}
	Phase angle	Pa1, Pa2, Pa3
	True power factor-per phase and 3 phase average	PF1, PF2, PF3, PF_{AVG}
	Displacement power factor-per phase and 3 phase average*	PF1, PF2, PF3, PF_{AVG}
	Distortion power factor-per phase and 3 phase average*	PF1, PF2, PF3, PF_{AVG}
	Frequency	Hz
	THD VL-N %*	V1, V2, V3, VLN_{AVG}
	THD VL-L %*	V12, V23, V31, VLL_{AVG}
	THD current %*	I1, I2, I3, I_{AVG}
Min and Max values with	Average voltage L-N	VLN^*_{MIN}, VLN^*_{MAX}
	Average voltage L-L	VLL^*_{MIN}, VLL^*_{MAX}
	Current	I^*_{MIN}, I^*_{MAX}
	Neutral current*	In^*_{MIN}, In^*_{MAX}
	PF*	$PF1^*_{MIN}$, $PF1^*_{MAX}$ $PF2^*_{MIN}$, $PF2^*_{MAX}$ $PF3^*_{MIN}$, $PF3^*_{MAX}$
	Total power	kW^*_{MIN}, kW^*_{MAX} kVA^*_{MIN}, kVA^*_{MAX} $kVAR^*_{MIN}$, $kVAR^*_{MAX}$
	Frequency	Hz^*_{MIN}, Hz^*_{MAX}
Demand	Power demand (kW, kVAR, kVA)	Last demand* Present demand* Predictive demand* Peak demand*
	Current demand (I)	Last demand Present demand Predictive demand Peak demand
Energy	Active energy Apparent energy Reactive energy (4 quadrant based VARh*) Reactive (Inductive & Capacitive)*	Accumulated energy Import-per phase and Total Export-per phase and Total Total NET (Import+Export) Total NET (Import-Export)*
		Last cleared energy* Import-Per phase and Total Export-Per phase and Total

		Total NET (Import+Export) Total NET (Import-Export)
RPM	Revolution per minute*	RPM
Meter ON hour		On hour
Run hours	Run hours-Import / Export*	Import Run hours*
		Export Run hours*
Auxiliary interrupts*		Auxiliary Interrupts*

All features can be accessed via communication or from the meter font, however,

*** indicates features that can only be accessed via communication**

Phase and System measurement

The meter measures the true RMS values of all three phases and neutral. Meter measures AC voltage and AC current inputs continuously at a sampling rate of 64 samples per cycle

All real time value data can be accessed via communication or from the meter front

Total harmonics distortion %

Meter can measure and analyze several power quality parameters which is useful for further analyzing the voltage and current signals measured by the meter

Total harmonic Distortion: A ratio of the sum of powers in all harmonic components to the power of the fundamental frequency Meter also supports even and odd order THD, where even order harmonics are the 2^{nd}, 4^{th}, 6^{th}, and so on, and odd order harmonics are 3^{rd}, 5^{th}, 7^{th}, etc.

%THD of voltage and current per phase and average value data can be accessed via communication. Individual harmonics can also be accessed via communication

Min/Max values

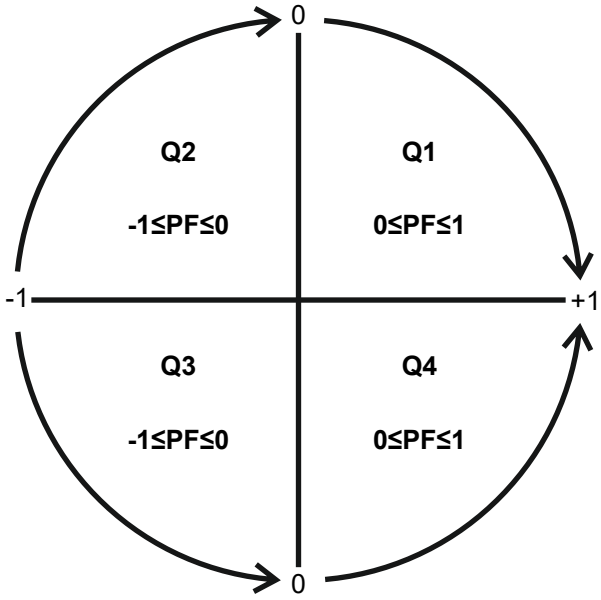
The meter logs maximum and minimum value. . All data is stored in non-volatile memory so that statistic information can be preserved even when the meter is loses power or gets shut off

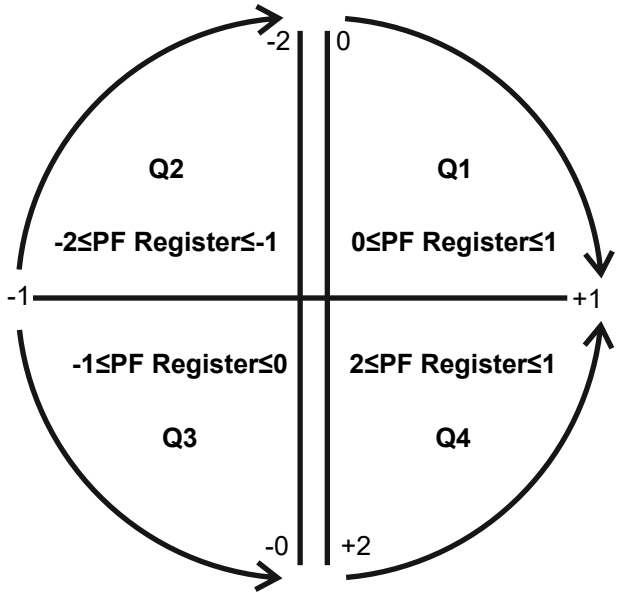
All maximum and minimum data of VLN, VLL, Current, Total Power, Frequency and Power Factor can be accessed via communication.

Power factor Min/Max convention

In order to determine the minimum and maximum Power Factor values, the meter uses a specific Power factor convention method. All maximum and minimum Power Factor data can only be accessed via communication

For communication, The power factor are display in the form of PF registers value as below





The Power Factor value is calculated from the PF register value using the following formula:

Quadrant	Power factor range	PF register range	PF formula
Quadrant 1	0 to +1	0 to +1	PF value = PF register value
Quadrant 2	-1 to 0	-2 to -1	PF Value = (-2) - PF register value
Quadrant 3	0 to -1	-1 to 0	PF value = PF register value
Quadrant 4	+1 to 0	+1 to +2	PF Value = (+2) - PF register value

Type of power factor	Range of power factor	Minimum power factor	Maximum power factor
Negative power factor reading	PF readings between -0 to -1	Closest to -0	Closest to -1
Positive power factor reading	PF readings between +1 to +0	Closest to +1	Closest to +0

Demand measurement

The meter can support demand measurements consisting of power and current demand readings

The demand will be calculated using the demand calculation method configured in the meter

There are four standard types of demand calculation methods, that Meter supports: Fixed, Sliding Fixed-Sliding

The meter provides last, present, predicted, and peak demand value

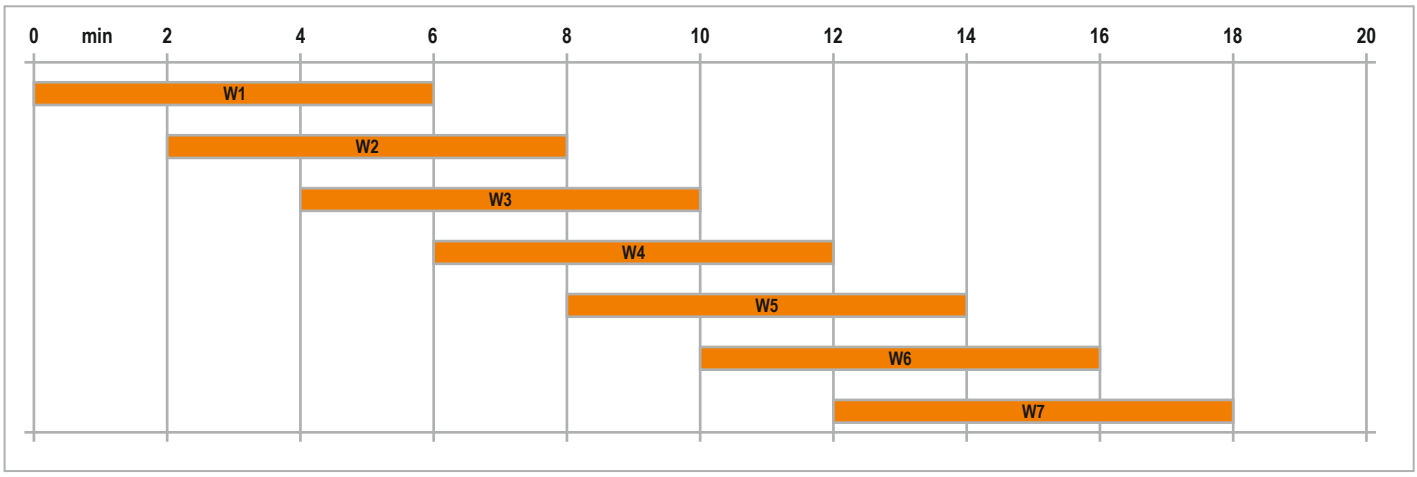
- **Power demand (Total kW, kVAr, kVA)**
- **Current demand (Average Amps)**

All demand value data can be accessed and reset via communication.

1. Sliding demand

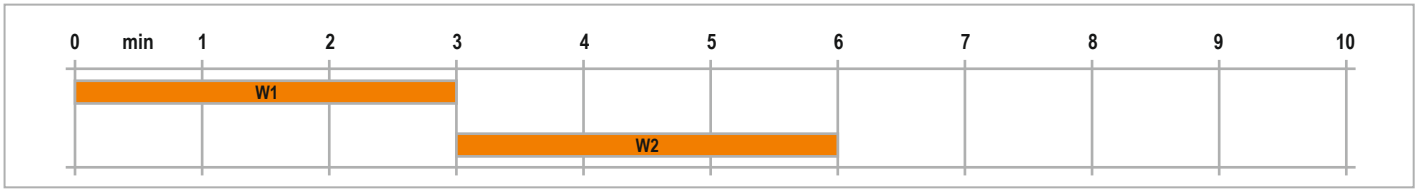
Present and peak demand are updated at the end of each sub-interval. Last demand lags one sub-interval. If the demand duration selected is 3 and the demand length selected is 2, then demand is updated at the end of 2 minutes

Here, the interval is 6 minutes and the update time is 2 minutes



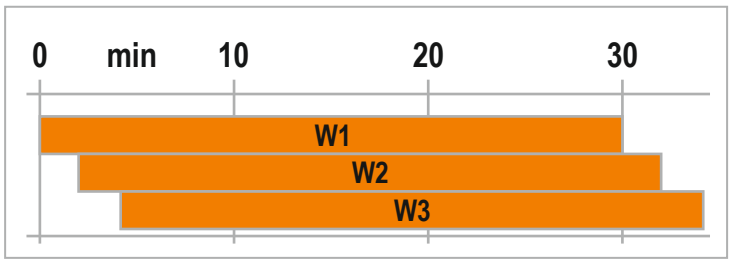
2. Fixed demand

Present demand updates at the end of every 1 minute (fixed) and the peak and last demand values are updated at the end of the interval



3. Fixed - Sliding demand

Present and peak demand updates every 15 seconds (if demand duration is between 1 and 15 minutes) or 60 seconds (if demand duration is between 16 and 60 minutes) and last demand is updated at the end of interval



Energy

The meter offers energy monitoring of electricity board and data can be accessed and reset via communication.

Accumulated energy

- Active, Apparent, Reactive energy
  - Import-Per phase and Total
  - Export-Per phase and Total
  - Total NET (Import + Export)
  - Total NET (Import - Export)

Last cleared energy

- Active, Apparent, Reactive energy
  - Import-Per phase and Total
  - Export-Per phase and Total
  - Total NET (Import + Export)
  - Total NET (Import - Export)

When any energy value exceeds the maximum value 999999.999 GWh, GVArh, GVAh, then that particular energyrolls over and stores the count at modscan address and starts accumulating fresh from 0

Energy will automatically rollover on display from k_hr to M_hr to G_hr (W, VAr, VA)

Energy Unit symbol will change to k/M/G depending on the value

Within specific limits, the meter's energy pulsing LED and pulse output are capable of performing energy pulsing

Energy pulsing detailed method:

Within specific limits, the meter's energy pulsing LED and pulse outputs are capable of performing energy pulsing.

Energy pulsing at	Max. No of Pulses/Sec
LED OUTPUT	36
PULSE OUTPUT	18

Configurable Pulse width : 1 to 9999000 (per k_h)

Note: Pulse duration is fixed for LED output is 25ms and for POP output is 50ms

Calculation to allow the energy pulsing at LED output

LED Output will increment only if the Total number of pulses is more than configured pulse width otherwise the LED pulsing count will be 0.

$$\text{Total No of pulses/Hr are calculated as} = \frac{\text{Max. No of Pulses/ Sec X 3600}}{\text{Total Power}}$$

$$= \frac{36 \text{ X } 3600}{3.6\ (kW_{Total})}$$

$$= 36000/Hr$$

Configured pulse width	Condition	LED output
10	Total No of pulses > Pulse Width	LED Pulsing will start incrementing as per observed energy
10000	Total No of pulses > Pulse Width	LED Pulsing will start incrementing as per observed energy
37000	Total No of pulses < Pulse Width	LED Pulsing will not start incrementing. Remains OFF.

The LED pulse count is dependent on the configured pulse width in relation to the incrementing energy as below table.

Sr No.	Configured LED Pulse Width	Energy in kWh	LED pulse count
1	1	1.000	1
2	10	0.100	1
3	100	0.010	1
4	1000	0.001	1
5	10000	0.001	10
6	100000	0.001	100
7	1000000	0.001	1000
8	9999000	0.001	10000

Calculation to allow the energy pulsing at POP output

Pulse Output will increment only if the Total number of pulses is more than configured pulse width otherwise the POP count will be 0.

$$\text{Total No of pulses/Hr are calculated as} = \frac{\text{Max. No of Pulses/ Sec X 3600}}{\text{Total power}}$$

$$= \frac{18 \text{ X } 3600}{3.6\ (kW_{Total})}$$

$$= 18000/Hr$$

Configured pulse width	Condition	LED output
10	Total No of pulses > Pulse Width	POP will start incrementing as per observed energy
10000	Total No of pulses > Pulse Width	POP will start incrementing as per observed energy
19000	Total No of pulses < Pulse Width	POP will not start incrementing

The POP count is dependent on the configured pulse width in relation to the incrementing energy as below table.

Sr No.	Configured POP Pulse Width	Energy in kWh	POP count
1	1	1.000	1
2	10	0.100	1
3	100	0.010	1
4	1000	0.001	1
5	10000	0.001	10
6	100000	0.001	100
7	1000000	0.001	1000
8	9999000	0.001	10000

RPM:

Meter provides the measurement of rotational speed of motor. Usually displays value in terms of RPM.
The speed a synchronous motor will run can be determined by the number of poles of the motor and the frequency of the electrical service using. No of poles are settable through communication.

ON hour:

ON hour shows how long the meter has been powered up. ON hour data can be accessed via communication.

Import run hour-mains:

Load run hours show how much time a load has been running, based on accumulated energy-Import (Delivered) of Mains supply Run hour Import Mains data can be accessed and reset via communication.

Export run hour-mains:

Load run hours show how much time a load has been running, based on accumulated energy - Export (Received) of Mains supply Run hour Export Mains data can be accessed and reset via communication.

Import Run Hour- DG:

Load run hours show how much time a load has been running, based on accumulated energy - Import (Delivered) of DG supply. Run hour Import DG data can be accessed and reset via communication.

Export Run Hour- DG:

Load run hours show how much time a load has been running, based on accumulated energy - Export (Received) of DG supply. Run hour Import DG data can be accessed and reset via communication.

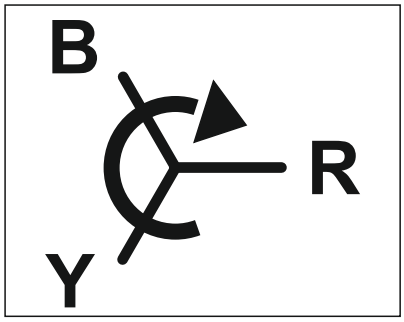
Auxiliary interrupts:

Auxiliary interrupts shows number of auxiliary supply interruptions. Auxiliary Interrupts data can be accessed and reset via communication.

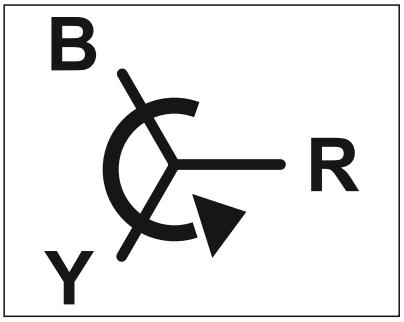
Voltage sequence detection:

Meter performs the analysis of the input voltage signals. It detect the wrong phase sequence or failure of one of the input voltage and displays result upon pressing ▼ key for 3 seconds

1. OK Phase sequence - "Clockwise”
2. Wrong phase sequence - "Anticlockwise”
3. Failure of one of the input voltage - "Invalid”



CLOCKWISE



ANTI-CLOCKWISE

Current Polarity (CT Reversal Detection and Correction)

The meter supports a setting that allows user to changes the current polarity in the meter via communication and from panel in Configuration mode. This is beneficial is the CT's have been installed in the reverse direction polarity.

Configure the CT through the front panel according to the CT polarity shown on the current reversal detection page. With Changing the current polarity to negative is basically changing the phase angle of the current by 180 degrees, making it possible to correct any installation errors. There is no need to change the physical wiring. By default The current direction is configured to positive for CT1, CT2 and CT3 i.e., NONE.

Upon pressing the key ▲ for 5 seconds, the Current Reversal detection page will appear with the CT number of the input current that is reversed in polarity.

1. 1st phase CT polarity has reverse connection “1"
2. 1st and 2nd phase CT polarity has reverse connection "12"
3. 1st, 2nd, 3rd phase CT polarity has reverse connection “123"

Note: CT polarity correction should be referred when input active power is positive

Specifications are subject to change, since development is a continuous process.

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