



FEATURES

- 8 digit LCD with backlight display
- User programmable CT primary, CT Secondary, PT primary & PT Secondary
- User programmable network selection
- Memory retention
- Password protected energy reset
- Potential free Pulse output for energy
- 85 to 270V AC/DC auxiliary supply
- Battery backup
- RS485 communication (MODBUS Protocol)

SPECIFICATIONS

DISPLAY

8 digit LCD display. Height 10.5mm

LCD INDICATIONS

- INT** - Integration of energy
- X10** - Resolution is 10
- REV** - Reverse connected CT or Voltage wiring
- ↔** - Communication in progress
- ⚡** - Pulse output
- BAT** - Battery backed display

INPUT

3 Ø - 4 wire, 3 Ø - 3 wire, 2 Ø - 3 wire, 1 Ø - 3 wire & 1 Ø - 2 wire system

RATED INPUT VOLTAGE

11 to 300V AC (L-N) ; 19 to 519V AC (L-L)

FREQUENCY RANGE

50/60 Hz

RATED INPUT CURRENT

Nominal 5A (Min-11mA, Max-6A)

CT PRIMARY

1A / 5A to 10,000A (Programmable for any Value)
Note: 1A to 10,000A if CT secondary is 1 else CT primary is 5A to 10,000A

CT SECONDARY

1A or 5A (programmable)

PT PRIMARY

100V to 500kV (Programmable for any value)

PT SECONDARY

100 to 500V AC (L-L)
(Programmable for any value)

BURDEN

0.5 VA@5A per phase

MEASUREMENT

- Total active Energy (kWh)
 - Total reactive Energy (kVAh)
 - Total apparent Energy (kVAh)
 - Total active power (kW)
 - Total reactive power (kVAR)
 - Power factor (Individual & Average)
- Note:** All energies are resettable

ACCURACY

- Class 1 for Active/Apparent energy
- Class 2 for Reactive energy
- Class 0.5 for Power

RESOLUTION

PT Ratio x CT Ratio	kWh	Pulse
<15	0.01K	0.01K
<150	0.1K	0.1K
<1500	1K	1K
<15000	0.01M	0.01M
<150000	0.1M	0.1M
<1500000	1M	1M
≥1500000	10M	10M

NOTE:

- 1) For power, resolution is automatically adjusted
- 2) For power factor, resolution is 0.01
- 3) INT blinks after every 5 seconds, if load on any one of three phase is present

AUXILIARY SUPPLY RANGE

85 to 270V AC/DC, 50/60Hz

OUTPUT

- Pulse Output:** Voltage range - 24V DC
Current capacity - 100 mA max
- Pulse Width:** 100 ms ± 50 ms.

SERIAL COMMUNICATION

Interface standard & protocol
RS485 & MODBUS RTU

Communication address

1 to 255

Transmission mode

Half duplex

Data types

Float and Integer

Transmission distance

500 m maximum

Transmission speed

300, 600, 1200, 2400, 4800, 9600, 19200 (in bps)

Parity

None, Odd, Even

Stop bits

1 or 2

Response time

100 ms (independent of baud rate)

TEMPERATURE

Operating: 0 to 50 °C
Storage: -20 to 75 °C

HUMIDITY

85% non-condensing

MOUNTING

Panel mounting

WEIGHT

310 gms

SAFETY PRECAUTIONS

All safety related codifications, symbols and instructions that appear in this operating manual or on the equipment must be strictly followed to ensure the safety of the operating personnel as well as the instrument.

If the equipment is not handled in a manner specified by the manufacturer it might impair the protection provided by the equipment.

CAUTION: Read complete instructions prior to installation and operation of the unit.

CAUTION: Risk of electric shock.

WIRING GUIDELINES

WARNING:

1. To prevent the risk of electric shock power supply to the equipment must be kept OFF while doing the wiring arrangement.
2. Wiring shall be done strictly according to the terminal layout. Confirm that all connections are correct.
3. Use lugged terminals.
4. To eliminate electromagnetic interference use of wires with adequate ratings and twists of the same in equal size shall be made.
5. Cable used for connection to power source, must have a cross section of 1.5mm². These wires shall have current carrying capacity of 6A.

MAINTENANCE

1. The equipment should be cleaned regularly to avoid blockage of ventilating parts.
2. Clean the equipment with a clean soft cloth . Do not use Isopropyl alcohol or any other cleaning agent.

INSTALLATION GUIDELINES

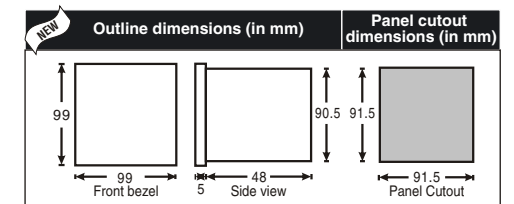
CAUTION:

1. This equipment, being built-in-type, normally becomes a part of main control panel and in such case the terminals do not remain accessible to the end user after installation and internal wiring.
 2. Conductors must not come in contact with the internal circuitry of the equipment or else it may lead to a safety hazard that may in turn endanger life or cause electrical shock to the operator.
 3. Circuit breaker or mains switch must be installed between power source and supply terminals to facilitate power 'ON' or 'OFF' function. However this switch or breaker must be installed in a convenient position normally accessible to the operator.
 4. Before disconnecting the secondary of the external current transformer from the equipment, make sure that the current transformer is short circuited to avoid risk of electrical shock and injury.
- CAUTION:**
1. The equipment shall not be installed in environmental conditions other than those mentioned in this manual.
 2. The equipment does not have a built-in-type fuse. Installation of external fuse of rating 275VAC/1Amp for electrical circuitry is highly recommended.

MECHANICAL INSTALLATION

For installing the meter

1. Prepare the panel cutout with proper dimensions as shown below :



2. Push the meter into the panel cutout. Secure the meter in its place by pushing the clamp on the rear side. The clamps must be secured in diagonally opposite slots.

3. For proper sealing, tighten the screws evenly with required torque.

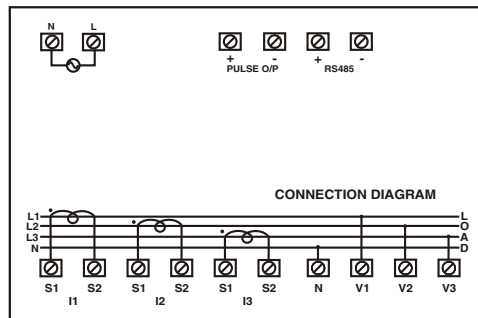
CAUTION:

The equipment in its installed state must not come in close proximity to any heating sources, caustic vapors, oils, steam, or other unwanted process by-products.

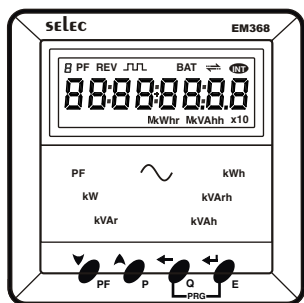
EMC Guidelines:

1. Use proper input power cables with shortest connections and twisted type.
2. Layout of connecting cables shall be away from any internal EMI source.

TERMINAL CONNECTIONS



FRONT PANEL DESCRIPTION



Keys Description (Online pages)

Sr No	Keys	Function
1	PF (▼)	To view individual and average power factor
2	P (▲)	To view total active power
3	Q (←)	To view total reactive power
3	E (↵)	To view total reactive & apparent energy

NOTE:
By default total active energy (kWh) will be displayed all the time and at momentary key press unit shall display the corresponding page for 5 sec.

Keys Description (Configuration)

Sr No	Functions	Key press
1	To enter into configuration mode.	← & ↵ for 3 seconds
2	To scroll through the pages in forward direction in configuration mode.	← to next pages
3	To scroll through the pages in reverse direction in configuration mode.	↵ to previous pages
4	To increase and decrease all parameter values	▲ Increase ▼ Decrease

CONFIGURATION SCHEME (parameter setting)
To enter configuration: Press ← & ↵ for 3 sec

Key press	Display	Description
1. Password Factory setting: 10		
	Display: PASSYOPD	
Press ▼/▲	10	Range: 0 to 9998
		Press ← key for next parameter
2. Change password Factory setting: No		
	Display: CN6PASyD	
Press ▼/▲	NO	Range: No / Yes
		Press ← for next parameter
Note: If 'NO' then after pressing ← key, menu will go to network selection		
3. New password Factory setting: 0		
	Display: NEyPASyD	
Press ▼/▲	0	Range: 0 to 9998
		Press ← for next parameter
		Press ← for Previous parameter
4. Network selection Factory setting: 3P - 4W		
	Display: NY SEL	
Press ▼/▲	3P-4W	Range: 3 Ø - 4 wire 3 Ø - 3 wire
		Press ← for next parameter
Note: For 2 Ø 3 wire, 1 Ø 3 wire, 1 Ø 2 wire select 3 Ø 4 wire network		

Key press	Display	Description
5. CT secondary Factory setting: 5		
	Display: Ct SEC	
Press ▼/▲	5	Range: 1A or 5A
		Press ← for next parameter
		Press ← for Previous parameter
6. CT primary Factory setting: 5		
	Display: Ct PPrIn	
Press ▼/▲	5	Range: 5 to 10,000A OR 1 to 10,000A
		Press ← for next parameter
		Press ← for Previous parameter
Note: 1 to 10,000A if CT secondary is 1 else CT primary is 5 to 10,000A		
7. PT secondary Factory setting: 350		
	Display: Pt SEC	
Press ▼/▲	350	Range: 100 to 500V AC (L-L)
		Press ← for next parameter
		Press ← for Previous parameter
8. PT primary Factory setting: 350		
	Display: Pt PPrIn	
Press ▼/▲	350	Range: 100V to 500kV
		Press ← for next parameters
		Press ← for Previous parameter
9. Battery backup Factory setting: No		
	Display: bAtEeBtUP	
Press ▼/▲	NO	Range: No / Yes
		Press ← for next parameter
		Press ← for Previous parameter
10. Slave ID Factory setting: 1		
	Display: SLAVE Id	
Press ▼/▲	1	Range: 1 to 255
		Press ← for next parameter
		Press ← for Previous parameter

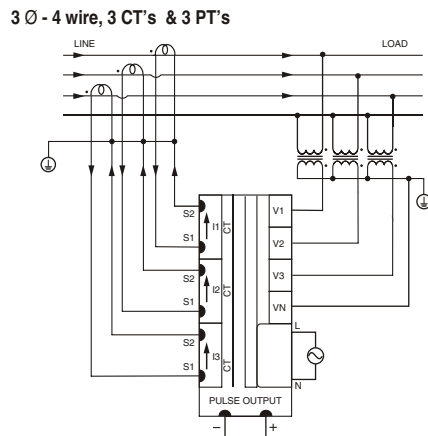
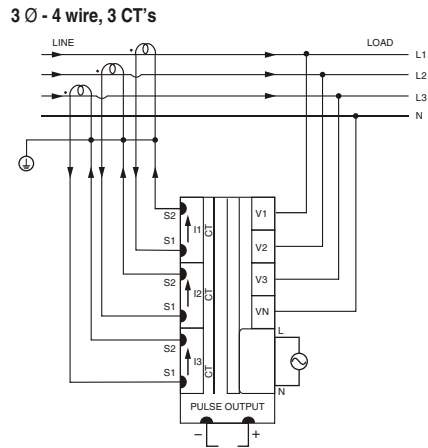
Key press	Display	Description
11. Baud rate Factory setting: 9600		
	Display: bD rAtE	
Press ▼/▲	9600	Range: 300, 600, 1200, 2400, 4800, 9600 & 19200
		Press ← for next parameter
		Press ← for Previous parameter
12. Parity Factory setting: None		
	Display: PAR ItY	
Press ▼/▲	NONE	Range: Even, Odd, None
		Press ← for next parameter
		Press ← for Previous parameter
13. Stop bit Factory setting: 1		
	Display: StOPb It	
Press ▼/▲	1	Range: 1 / 2
		Press ← for next parameter
		Press ← for Previous parameter
14. Reset energy Factory setting: No		
	Display: rSt ENrE	
Press ▼/▲	NO	Range: No / Yes
		Press ← for next parameter
		Press ← for Previous parameter
Note: If 'NO' then after pressing ← key, menu will go to Network selection		
15. Password Factory setting: 11		
	Display: PASSYOPD	
Press ▼/▲	11	Range: 1 to 9999
		Press ← for next parameter
		Press ← for Previous parameter
Note: Password is : configuration password + 1		
16. Reset Active Energy Factory setting: No		
	Display: rSt eYh	
Press ▼/▲	NO	Range: No / Yes
		Press ← for next parameter
		Press ← for Previous parameter
Note: User should note the reading before resetting		

Key press	Display	Description
17. Reset Apparent Energy Factory setting: No		
Display	05E 218h	
Press	00	Range: No / Yes
Press \blacktriangleleft for next parameter Press \blacktriangleleft for Previous parameter		
Note: User should note the reading before resetting		
18. Reset Reactive Energy Factory setting: No		
Display	05E 218h	
Press	00	Range: No / Yes
Press \blacktriangleleft for next parameter Press \blacktriangleleft for Previous parameter		
Note: User should note the reading before resetting		
19. Default value Factory setting: No		
Display	DEFAULT	
Press	00	Range: No / Yes
Press \blacktriangleleft for next parameter Press \blacktriangleleft for Previous parameter		
Note: On pressing \blacktriangleleft key, configuration will go to network selection page. If 'yes' selected unit will be formatted to factory setting		
Exit configuration mode:		
<ul style="list-style-type: none"> • Press \blacktriangleleft & \blacktriangleleft key for 3 sec in configuration mode • Do not press any key for 30 sec in configuration mode. • Power OFF and power ON the unit again. 		
Note:-		
1) Pressing \blacktriangleleft key will save the value of the current parameter and move on to next parameter.		
2) Continuous operating of \blacktriangledown or \blacktriangle key makes parameter value update speed faster in 3 stages after 7 seconds		
3) In configuration menu repeated pressing of \blacktriangleleft key will allow toggling between all the configuration parameters		
USER GUIDE		
What does the INT, REV, X10, COM & BAT on the LCD display indicate?		
<ul style="list-style-type: none"> • INT: The INT on the LCD provides quick visual indication of energy integration. INT indication keeps blinking at a rate of 5 sec, even for presence of voltage & current in any of the three phases. 		

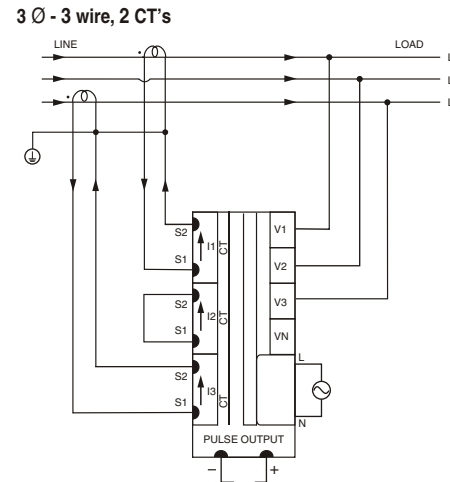
- X10: X10 on the LCD is ON when the resolution is 10. It is the indication of count reading which must be multiplied by 10 to get actual kWh / kVAh / kVAh consumed.
- REV: REV on the LCD gives the indication of reversal of one or more CT connections / Phase. In such cases meter may not indicate the correct energy consumption. The CT should be connected to the meter with correct polarities.
- \blacktriangleleft This symbol on the LCD shows that the communication is in progress.
- BAT: BAT on the LCD shows that the unit is working on battery in absence of auxiliary supply. **The display will turn OFF after 48 hrs when operated in battery backup mode continuously. No measurement or output will take place in this mode.**
- $\square\square$ This symbol on the LCD indicates that a pulse output is available.

TYPICAL WIRING DIAGRAM

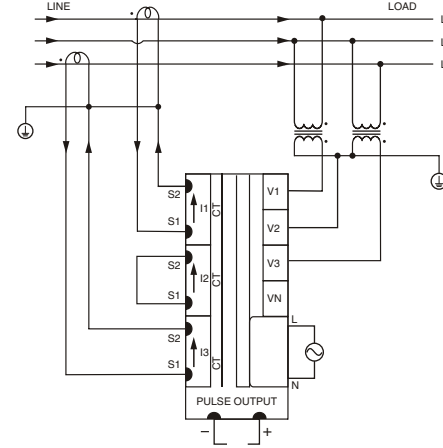
3 PHASE 4-WIRE (COMMONLY USED) WIRING DIAGRAM



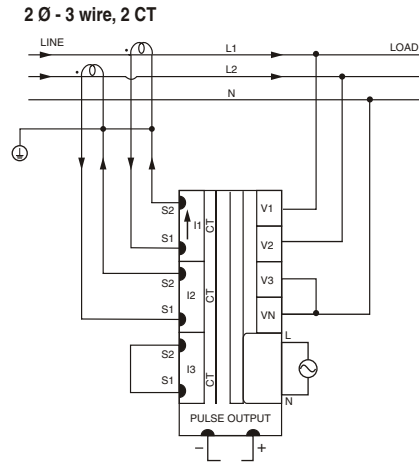
3 PHASE 3-WIRE WIRING DIAGRAM



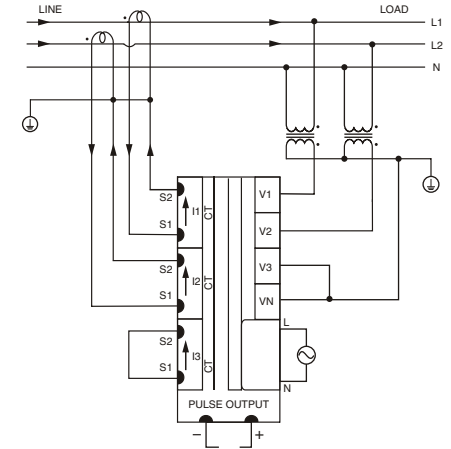
3 \emptyset - 3 wire, 2 CT's & 2 PT's



2 PHASE 3-WIRE WIRING DIAGRAM

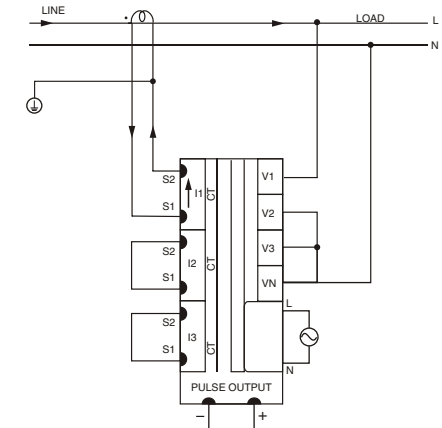


2 \emptyset - 3 wire, 2 CT's & 2 PT's

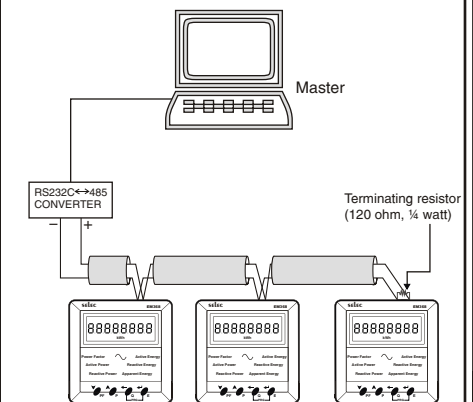


1 PHASE 2-WIRE (COMMONLY USED) WIRING DIAGRAM

1 \emptyset - 2 wire, 1 CT



CONNECTION DIAGRAM FOR COMMUNICATION



MODBUS register addresses list						
Readable parameters from EM368						
Address	Hex Address	Parameter	Length (Register)	Data Structure		
30000	0x00	Active Energy	2	Float		
30002	0x02	Apparent Energy	2	Float		
30004	0x04	Reactive Energy	2	Float		
30006	0x06	Power Factor Phase 1	2	Float		
30008	0x08	Power Factor Phase 2	2	Float		
30010	0x0A	Power Factor Phase 3	2	Float		
30012	0x0C	Average Power factor	2	Float		
30014	0x0E	Total kW	2	Float		
30016	0x10	Total kVAh	2	Float		
Readable / Writable parameters from EM368						
Address	Hex Address	Parameter	Range		Length (Register)	Data Structure
			Min value	Max value		
40000	0x00	New Password	1	9998	1	Integer
40001	0x01	N/W selection	Value	Meaning		
			0	3P-4W	1	Integer
			1	3P-3W		
40002	0x02	CT Secondary	Write Value	CT Secondary	1	Integer
			1	1A		
			5	5A		
40003	0x03	CT primary	5A (CT Sec = 5A)	10000A	1	Integer
40003	0x03	CT primary	1A (CT Sec = 1A)	10000A	1	Integer
40004	0x04	PT Secondary	100V	500V	1	Integer
40005	0x05	PT primary	100V	500kV	2	Integer
40007	0x07	Batt Back up	Value	Meaning		
			0	No	1	Integer
			1	Yes		
40008	0x08	Slave Id	1	255	1	Integer
40009	0x09	Baud rate	Value	Baud rate		
			0x0000	300	1	Integer
			0x0001	600		
			0x0002	1200		
			0x0003	2400		
			0x0004	4800		
			0x0005	9600		
			0x0006	19200		
40010	0x0A	Parity	Value	Parity		
			0x0000	None	1	Integer
			0x0001	Odd		
			0x0002	Even		
40011	0x0B	Stop bits	Value	Stop bit	1	Integer
			0x0000	1		
			0x0001	2		
			Value	Meaning		
40012	0x0C	Reset kWh	1	Reset Active Energy	1	Integer
40013	0x0D	Reset kVAh	1	Reset Apparent Energy	1	Integer
40014	0x0E	Reset kVAh	1	Reset Reactive Energy	1	Integer

APPLICATION OF PULSE OUTPUT

• PROCESS INTEGRATION

Pulse output from EM368 meter can be interfaced into a process through a PLC for on line control of energy content in the process. If the PLC has a self excited 24V digital input, external 24 VDC supply is not needed. The kWh pulse is also used to derive average kWh information at the PLC.

• ENERGY CONTROLLER

Pulse output from EM368 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.

(Specifications subject to change as development is a continuous process).

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