

**selec****EM368 / EM368-C**

Operating Instructions



96 x 96

**FEATURES**

- 8 digit LCD with backlight display
- User programmable CT primary, CT Secondary, PT primary and PT Secondary
- User programmable network selection
- Memory retention
- Password protected energy reset
- Potential free Pulse output for energy
- 100 to 240V AC auxiliary supply
- 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

**WIRING INPUT**

3 Ø - 4 wire, 3 Ø - 3 wire, 2 Ø - 3 wire and

1 Ø - 2 wire system

**RATED INPUT VOLTAGE**

11 to 300V AC (L-N);

19 to 519V AC (L-L); Installation Category III (600V)

**UL Approval :**

11 to 277V AC (L-N);

19 to 480V AC (L-L); Installation Category III (600V)

**FREQUENCY RANGE**

45-65Hz

**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 (kVAh)

Power factor (Individual and Average)

**Note :** All energies are resettable**MEASUREMENT RANGE**

99999999

**POWER CONSUMPTION**

Less than 8VA

**ENVIRONMENTAL CONDITIONS**

- Indoor use
- Altitude of up to 2000 meters
- Pollution degree II

Temperature : Operating : -10°C to 55°C

Storage : -20°C to 75°C

Humidity : Up to 85% non-condensing

**PROTECTION CLASS : II****MOUNTING :** Panel mounting**WEIGHT**

EM368 : 302gms

EM368-C : 312gms

**OUTPUT****Pulse Output :** Voltage range : 24V DC max.

Current capacity : 100mA max.

**Pulse Width :** 100ms ± 5ms.

ORDER CODE INFORMATION			
PRODUCT	SUPPLY	CERTIFICATION	
		CE	cULus LISTED
EM368 / EM368-C	100 to 240V AC, -15% +12%, 50 / 60Hz, (±5%)	—	—
EM368-CE / EM368-C-CE	100 to 240V AC, -15% +12%, 50 / 60Hz, (±5%)	■	—
EM368-CU / EM368-C-CU	100 to 240V AC, -15% +12%, 50 / 60Hz, (±5%)	■	■

**Installation Category III**

ACCURACY	
Measurement	Accuracy
Active Power	±1%
Reactive Power	±1%
Power factor	±1%
Average Power factor	±1%
Active energy	Class 1
Reactive energy	±1%
Apparent energy	±1%

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.

**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 used in a manner specified by the manufacturer it might impair the protection provided by the equipment.

- Do not use the equipment if there is any mechanical damage.
- Ensure that the equipment is supplied with correct voltage.

**CAUTION :**

1. Read complete instructions prior to installation and operation of the unit.
2. Risk of electric shock.
3. 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.

**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 reduce electromagnetic interference use of wires with adequate ratings and twists of the same in equal size shall be made with shortest connections.
5. Layout of connecting cables shall be away from any internal EMI source.
6. Cable used for connection to power source, must have a cross section of 0.5mm<sup>2</sup> to 2.5mm<sup>2</sup> ( 20 to 14AWG ; 75°C (min) ). These wires shall have current carrying capacity of 6A.
7. Copper cable should be used (Stranded or Single core cable).
8. Before attempting work on device, ensure absence of voltages using appropriate voltage detection device.

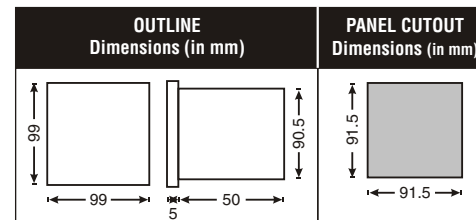
**INSTALLATION GUIDELINES****CAUTION :**

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.
5. The equipment shall not be installed in environmental conditions other than those mentioned in this manual.
6. The equipment does not have a built-in-type fuse. Installation of external fuse of rating 275V AC / 0.5Amp for electrical circuitry / battery is highly recommended.

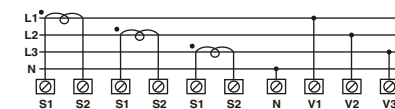
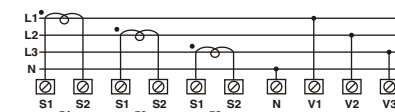
**MECHANICAL INSTALLATION**

For installing the meter

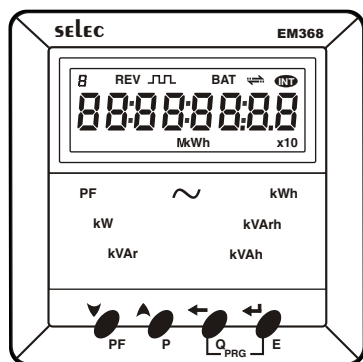
1. Prepare the panel cutout with proper dimensions as shown below.
2. Push the meter into the panel cutout. Secure the meter in its place by fitting the clamp on the rear side. Fit clamps on both sides in diagonally opposite location for optimum fitting.
3. For proper sealing, tighten the screws evenly with required torque.  
Terminal screw tightening torque :  
0.68 N-m to 0.79 N-m ( 6.018 In-Lb to 6.992 In-Lb )  
Screw clamp tightening torque : 0.1N-m (0.885 Lb-inch)

**MAINTENANCE**

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

**TERMINAL CONNECTIONS****EM368 (-CE/CU)****CONNECTIONS DIAGRAM****EM368-C (-CE/CU)****CONNECTIONS DIAGRAM**

## 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
4	E (↵)	To view total reactive and 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 5sec.

### Keys Description (Configuration)

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

### CONFIGURATION SCHEME (parameter setting)

To enter configuration : Press ↵ and ↵ for 3sec.

Key press	Display	Description
<b>01. Password</b> Factory setting : 10		
Display	PASSWORD	
Press ▼/▲	10	Range : 0 to 9998
Press ↵ key		for next parameter

### 02. Change password

Factory setting : No

Display C06PASYD  
 Press ▼/▲ 00 Range : No / Yes  
 Press ↵ key for next parameter  
**Note** : If 'NO' then after pressing ↵ key, menu will go to network selection

### 03. New password

Factory setting : 0

Display 0EYPRASYD  
 Press ▼/▲ 0 Range : 0 to 9998  
 Press ↵ for next parameter  
 Press ← for previous parameter

### 04. Network selection

Factory setting : 3P-4W

Display 0YSEL  
 Press ▼/▲ 3P-4W Range : 3 Ø - 4 W  
 3 Ø - 3 W  
 Press ↵ for next parameter  
**Note** : For 2 Ø 3 wire, 1 Ø 2 wire select 3 Ø 4 wire network

### 05. CT secondary

Factory setting : 5

Display CTSEL  
 Press ▼/▲ 5 Range : 1A or 5A  
 Press ↵ for next parameter  
 Press ← for previous parameter

### 06. CT primary

Factory setting : 5

Display CTPTIN  
 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 1else CT primary is 5 to 10,000A

### 07. PT secondary

Factory setting : 350

Display PTESEL  
 Press ▼/▲ 350 Range : 100 to 500V AC (L-L)  
 Press ↵ for next parameter  
 Press ← for previous parameter

### 08. PT primary

Factory setting : 350

Display PTEPTIN  
 Press ▼/▲ 350 Range : 100V to 500kV  
 Press ↵ for next parameters  
 Press ← for previous parameter

### 09. Slave ID

Factory setting : 1

Display SLAVEID  
 Press ▼/▲ 1 Range : 1 to 255  
 Press ↵ for next parameter  
 Press ← for previous parameter  
**(Optional, available in EM368-C)**

### 10. Baud rate

Factory setting : 9600

Display bD RATE  
 Press ▼/▲ 9600 Range : 300, 600, 1200, 2400, 4800, 9600 and 19200  
 Press ↵ for next parameter  
 Press ← for previous parameter  
**(Optional, available in EM368-C)**

### 11. Parity

Factory setting : None

Display PARITY  
 Press ▼/▲ NONE Range : Even, Odd, None  
 Press ↵ for next parameter  
 Press ← for previous parameter  
**(Optional, available in EM368-C)**

### 12. Stop bit

Factory setting : 1

Display STOPBIT  
 Press ▼/▲ 1 Range : 1 / 2  
 Press ↵ for next parameter  
 Press ← for previous parameter  
**(Optional, available in EM368-C)**

### 13. Reset energy

Factory setting : No

Display RSEENERG  
 Press ▼/▲ 00 Range : No / Yes  
 Press ↵ for next parameter  
 Press ← for previous parameter  
**Note** : If 'NO' then after pressing ↵ key, menu will go to Network selection

### 14. Password

Factory setting : 11

Display PASSWORD  
 Press ▼/▲ 11 Range : 1 to 9999  
 Press ↵ for next parameter  
 Press ← for previous parameter  
**Note** : Password is : configuration password +1

### 15. Reset Active Energy

Factory setting : No

Display RSEEAH  
 Press ▼/▲ 00 Range : No / Yes  
 Press ↵ for next parameter  
 Press ← for previous parameter  
**Note** : User should note the reading before resetting

### 16. Reset Apparent Energy

Factory setting : No

Display RSEEAH  
 Press ▼/▲ 00 Range : No / Yes  
 Press ↵ for next parameter  
 Press ← for previous parameter  
**Note** : User should note the reading before resetting

### 17. Reset Reactive Energy

Factory setting : No

Display RSEEARH  
 Press ▼/▲ 00 Range : No / Yes  
 Press ↵ for next parameter  
 Press ← for previous parameter  
**Note** : User should note the reading before resetting

### 18. Default value

Factory setting : No

Display DEFAULT  
 Press ▼/▲ 00 Range : No / Yes  
 Press ↵ for next parameter  
 Press ← for previous parameter  
**Note** : On pressing ↵ key, configuration will go to network selection page.  
 If 'yes' selected unit will be formatted to factory setting

## SERIAL NUMBER DESCRIPTION

Press P (▲) key for 10sec. to display 8 digit serial number only for 5sec.

### Exit configuration mode:



- Press ↵ and ↵ 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 ↵ key will save the value of the current parameter and move on to next parameter.
- 2) Continuous operating of ▼ or ▲ key makes parameter value update speed faster in 3 stages after 7 sec.
- 3) In configuration menu repeated pressing of ↵ key will allow toggling between all the configuration parameters.



## USER GUIDE

What does the INT, X10, REV,  and  on the LCD display indicate?

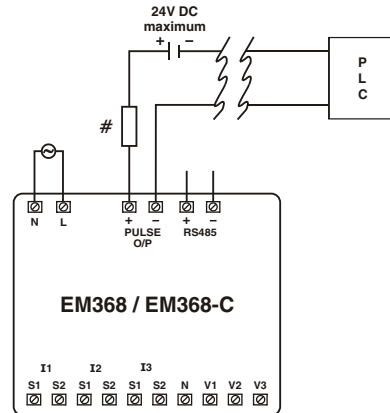
- INT : The INT on the LCD provides quick visual indication of energy integration. INT indication keeps blinking once in 5 sec, for presence of voltage and current in any of the three phases.
- X10 : X10 on the LCD is ON when the resolution is 10. It is the indication of count reading which must be multiplied 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.
-  This symbol on the LCD shows that the communication is in progress.
-  This symbol on the LCD indicates that a pulse is output.

## NETWORK SELECTION AND WIRING INPUT

Network selection in configuration mode	Wiring
3P4W	3P4W, 2P3W, 1P2W
3P3W	3P3W

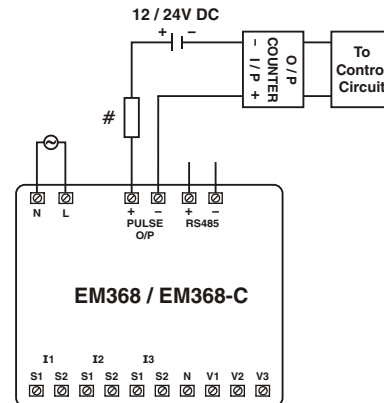
## APPLICATION OF PULSE OUTPUT

### ● 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 digital input, external DC 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 Pre-settable 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.

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

## MODBUS register addresses list

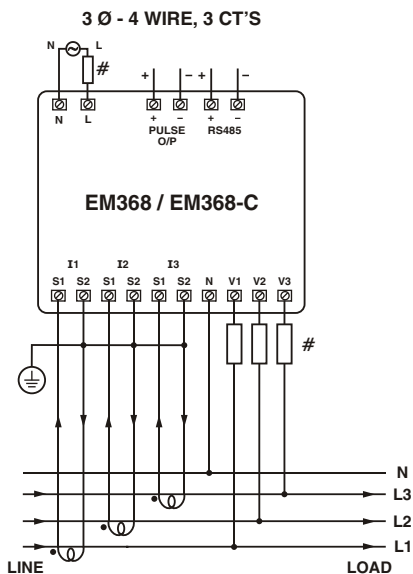
Readable parameters from EM368-C					
Address	Hex Address	Parameter	Length (Register)	Data Structure	
30000	0x00	Active Energy	2	Float	
30002	0x02	Apparent Energy	2	Float	
30004	0x04	Reactive Energy	2	Float	
30006	0x06	Power Factor Phase 1	2	Float	
30008	0x08	Power Factor Phase 2	2	Float	
30010	0x0A	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-C

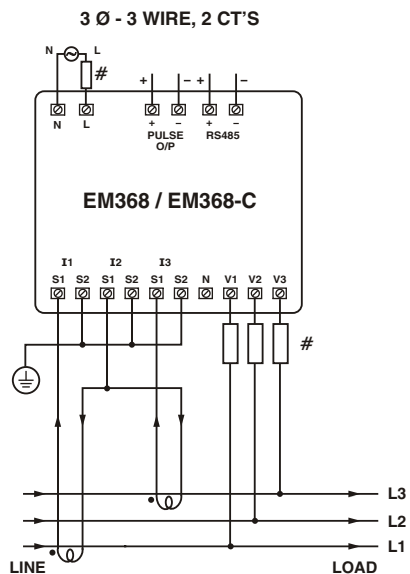
Address	Hex Address	Parameter	Range		Length (Register)	Data Structure
			Min value	Max value		
40000	0x00	New Password	1	9998	1	Integer
40001	0x01	N/W selection	Value	Meaning		
			0	3P-4W	1	Integer
			1	3P-3W		
40002	0x02	CT Secondary	Write Value	CT Secondary	1	Integer
			1	1A		
			5	5A		
40003	0x03	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
40008	0x08	Slave Id	1	255	1	Integer
40009	0x09	Baud rate	Value	Baud rate (bps)		
			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

**TYPICAL WIRING DIAGRAM**

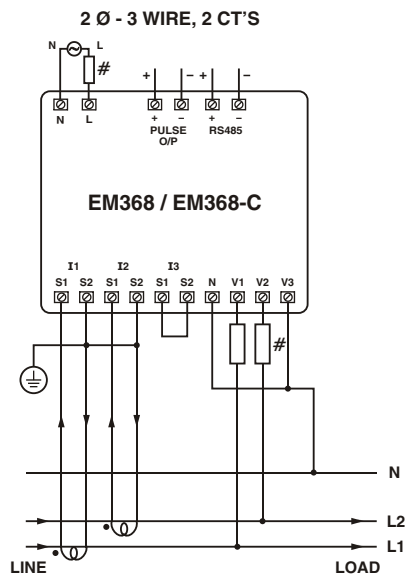
**3 PHASE 4-WIRE (COMMONLY USED)**



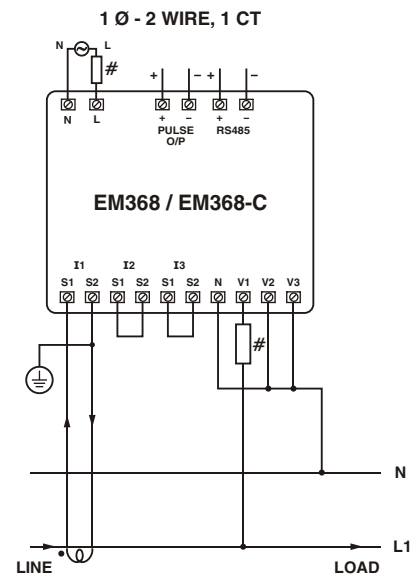
**3 PHASE 3-WIRE**



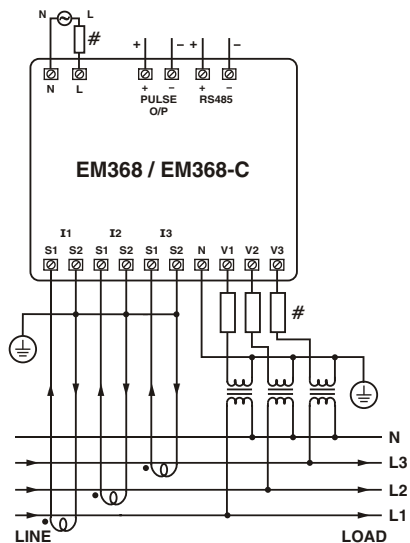
**2 PHASE - 3 WIRE**



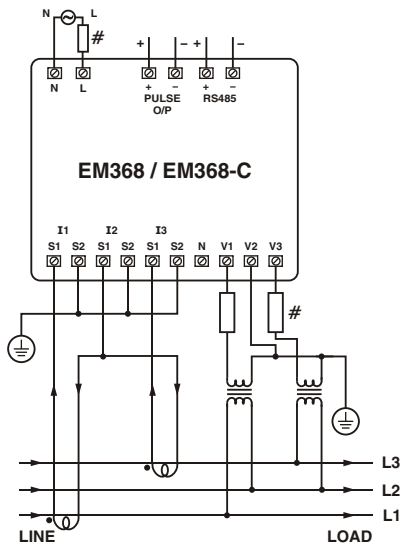
**1 PHASE - 2 WIRE**



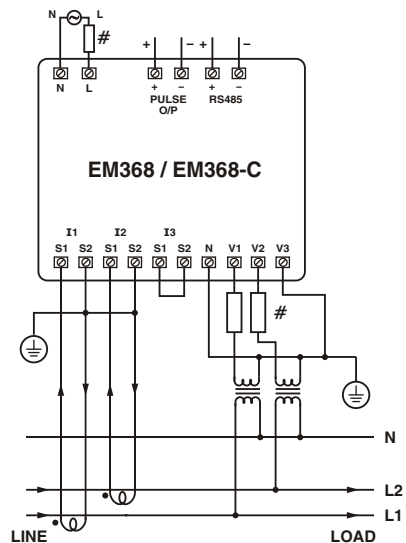
**3 Ø - 4 WIRE, 3 CT'S and 3 PT'S**



**3 Ø - 3 WIRE, 2 CT'S and 2 PT'S**

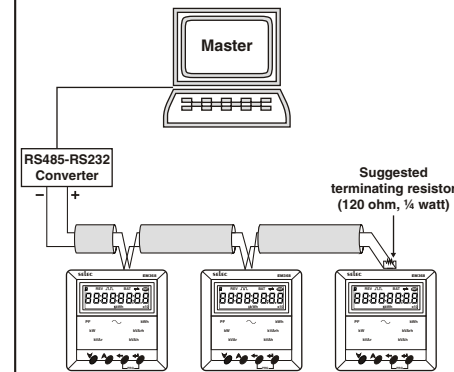


**2 Ø - 3 WIRE, 2 CT'S and 2 PT'S**



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

**CONNECTION DIAGRAM FOR COMMUNICATION**



Contact sales for PC based monitoring software to communicate with the meters.

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

**Selec Controls Pvt. Ltd., India**  
 Factory Address :  
 EL-27/1, Electronic Zone, TTC Industrial Area,  
 MIDC, Mahape, Navi Mumbai - 400 710, INDIA.  
 Tel. No. : +91-22-28476443 / 1882  
 Fax No. : +91-22-28471733 | Toll free : 1800 227 353  
 Website: www.selec.com | Email: sales@selec.com