

selec

MFM284

Operating Instructions



72 X 72

## SPECIFICATIONS

## DISPLAY

Liquid crystal display with backlight  
4 lines, 4 digits per line to show electrical parameters  
5th line, 8 digits to show energy

## LCD INDICATIONS

- ➡ - Communication in progress
- MAX DMD - Maximum and Minimum Demand Power
- THD - For Total harmonics distortion
- IM - Import Energy
- EP - Export Energy

## WIRING INPUT

3 Ø - 4 wire, 3 Ø - 3 wire, 2 Ø - 3 wire and  
1 Ø - 2 wire system (Programmable as P1,P2,P3)

## RATED INPUT VOLTAGE

11 to 300V AC (L-N) ;  
19 to 519V AC (L-L) ; Installation Category III (600V)

## FREQUENCY RANGE

45-65 Hz

## RATED INPUT CURRENT

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

## BURDEN

0.5 VA@5A per phase

## 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)

## Display update time

1 sec. for all parameters

## Display Scrolling

Automatic, Default or Manual (Programmable)

## 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

## OUTPUT

Pulse Output : Voltage range : External 24V DC max.

Current capacity : 100mA max

Pulse Width : 100 ms ± 5ms(Programmable  
depending upon CT x PT Ratio.)

## ORDER CODE INFORMATION

| Product        | Supply                                     | Certification |
|----------------|--------------------------------------------|---------------|
| MFM284-CE-RoHS | 85 to 3270V AC, -15% + 12%, 50 / 60Hz, ±5% | CE            |

## Installation Category III

## SERIAL COMMUNICATION

|                                 |                                                  |
|---------------------------------|--------------------------------------------------|
| Interface standard and protocol | RS485 and MODBUS RTU                             |
| Communication address           | 1 to 255                                         |
| Transmission mode               | Half duplex                                      |
| Data types                      | Float and Integer                                |
| Transmission distance           | 500m maximum                                     |
| Transmission Speed              | 300, 600, 1200, 2400, 4800, 9600, 19200 (in bps) |
| Parity                          | None, Odd, Even                                  |
| Stop bits                       | 1 or 2                                           |

## ACCURACY :

| Measurement              | Accuracy                                               |
|--------------------------|--------------------------------------------------------|
| Voltage $V_{L-N}$        | ±0.5% of Full scale                                    |
| Voltage $V_{L-L}$        | ±0.5% of Full scale                                    |
| Current                  | ±0.5% of Full scale                                    |
| Frequency                | ±0.1%<br>For L-N Voltage >20V,<br>For L-L Voltage >35V |
| Active Power             | 1%                                                     |
| Apparent power           | 1%                                                     |
| Reactive Power           | 1%                                                     |
| Power factor             | ±0.01                                                  |
| Active energy            | Class 1                                                |
| Reactive energy          | Class 1                                                |
| Apparent energy          | Class 1                                                |
| MAX / MIN Active Power   | 1%                                                     |
| MAX / MIN Reactive Power | 1%                                                     |
| MAX Apparent Power       | 1%                                                     |

## RESOLUTION :

| PT Ratio x CT Ratio | kWh / kVAh / kVArh | 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    |

**NOTE :** 1) For Voltage, Current and Power, resolution is automatically adjusted.

2) For power factor, resolution is 0.001

## 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

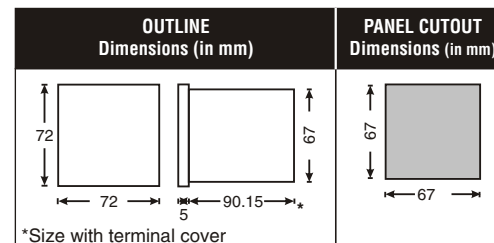
## CAUTION :

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.

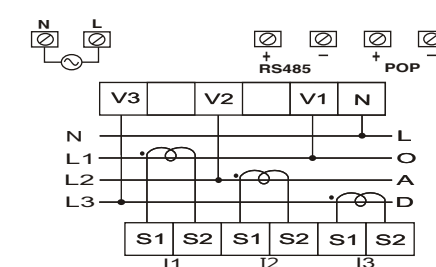


## MAINTENANCE

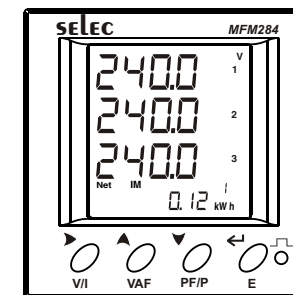
1. The equipment should be cleaned regularly to avoid blockage of ventilating parts.
2. Clean the equipment with a clean dry or damp cloth. Do not use any cleaning agent other than water.

## TERMINAL CONNECTIONS

## CONNECTIONS DIAGRAM



## FRONT PANEL DESCRIPTION



## ONLINE PAGE DESCRIPTION

There are 4 dedicated keys labelled as V/I, VAF, PF/P, E. Use these 4 keys to read meter parameters. Simply press these keys to read the parameters.

| KEY PRESS           | ONLINE PAGE DESCRIPTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Press "V/I"</b>  | <p><b>The 1st screen</b> : Display Line to neutral voltage of Three Phase.</p> <p><b>The 2nd screen</b> : Display line to line Voltage of Three Phase.</p> <p><b>The 3rd screen</b> : Display Total Percentage Harmonics of Line to neutral voltage of three phase and avg Line to neutral Voltage.</p> <p><b>The 4th screen</b> : Display Total Percentage Harmonics of Line to Line voltage of three phase and avg Line to Line Voltage.</p> <p><b>The 5th screen</b> : Display three phase of current and Neutral Current.</p> <p><b>The 6th screen</b> :Display Phase Maximum Current Demand of three phase and Avg phase Current.</p> <p><b>The 7th screen</b> : Display Total Percentage Harmonics of current of three Phase and Avg Phase Current</p> <p><b>The 8th screen</b> :Press for 3Sec.Displays Voltage sequence detection.</p> <p><b>Note</b> : 1) For 3 Ø 3 wire system, for only the 2nd, 4th,5th,6th and 7th screen will be available.<br/>2) In 1 Ø 2 wire system only the 1nd, 3rd,5th,6th and 7th screen will be available.</p> |
| <b>Press "VAF"</b>  | <p><b>The 1st screen</b> : Display Voltage,current,power Factor and Frequency of 1<sup>st</sup> Phase.</p> <p><b>The 2nd screen</b> : Display Voltage,current,power Factor and Frequency of 2<sup>nd</sup> Phase.</p> <p><b>The 3rd screen</b> : Display Voltage,current,power Factor and Frequency of 3<sup>rd</sup> Phase.</p> <p><b>The 4th screen</b> : Display Avg voltage,Current,power Factor and Frequency of Three phase.</p> <p><b>The 8th screen</b> : Press for three Sec Displays current connection indication Page.</p> <p><b>Note</b> : 1) In 3 Ø 3 wire system Avg voltage current power factor and freq. will be line to line.<br/>2) In 1 Ø 2 wire system only selectabel phase parameter will be available.</p>                                                                                                                                                                                                                                                                                                                   |
| <b>Press "PF/P"</b> | <p><b>The 1st screen</b> : Display power Factor of three phase and Avg Power Factor.</p> <p><b>The 2nd screen</b> : Display Active Power of Three Phase and Avg Active Power.</p> <p><b>The 3rd screen</b> : Display Reactive Power of Three Phase and Avg Reactive Power.</p> <p><b>The 4th screen</b> : Display Apperant power of three Phase and Avg Apperant Power.</p> <p><b>The 5th screen</b> : Display Total Active ,Reactive, Apperant Power and Avg Power Factor of Three Phase.</p> <p><b>The 6th screen</b> :Display Max Active Power Demand,Max Reactive Power Demand and Max apperant Power Demand.</p> <p><b>The 7th screen</b> : Display Min Active Power Demand and Reactive Power Demand.</p> <p><b>Note</b> : 1) For 3 Ø 3 wire system, for only the 5th,6th and 7th screen will be available.<br/>2) In 1 Ø 2 wire system only selectabel phase parameter will be available.</p>                                                                                                                                                  |
| <b>Press "E"</b>    | <p><b>The 1st screen</b> : Display IMP kWh of 1<sup>st</sup> Phase.</p> <p><b>The 2nd screen</b> : Display IMP kWh of 2<sup>nd</sup> Phase.</p> <p><b>The 3rd screen</b> : Display IMP kWh 3<sup>rd</sup> Phase.</p> <p><b>The 4th screen</b> : Display EXP kWh of 1<sup>st</sup> Phase.</p> <p><b>The 5th screen</b> : Display EXP kWh of 2<sup>nd</sup> Phase.</p> <p><b>The 6th screen</b> :Display EXP kWh of 3<sup>rd</sup> Phase.</p> <p><b>The 7th screen</b> : Display Total IMP kWh of Three Phase.</p> <p><b>The 8th screen</b> : Display Total EXP kWh of Three Phase.</p> <p><b>The 9th screen</b> : Display Total Net kWh of Three Phase.</p> <p><b>The 10th screen</b> : Display IMP kVAh of 1<sup>st</sup> Phase.</p> <p><b>The 11th screen</b> : Display IMP kVAh of 2<sup>nd</sup> Phase.</p> <p><b>The 12th screen</b> :Display IMP kVAh of 3<sup>rd</sup> Phase.</p>                                                                                                                                                               |

|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Press "E"</b> | <p><b>The 13th screen</b> : Display EXP kVAh of 1<sup>st</sup> Phase.</p> <p><b>The 14th screen</b> : Display Exp kVAh of 2<sup>nd</sup> Phase.</p> <p><b>The 15th screen</b> : Display EXP kVAh of 3<sup>rd</sup> Phase.</p> <p><b>The 16th screen</b> : Display Total IMP kVAh of Three Phase.</p> <p><b>The 17th screen</b> : Display Total EXP kVAh of Three Phase.</p> <p><b>The 18th screen</b> :Display Total Net kVAh of Three Phase.</p> <p><b>The 19th screen</b> : Dispaly kVAh of 1<sup>st</sup> Phase.</p> <p><b>The 20th screen</b> : Display kVAh of 2<sup>nd</sup> Phase.</p> <p><b>The 21th screen</b> : Display kVAh of 3<sup>rd</sup> Phase.</p> <p><b>The 22nd screen</b> : Display Total Net kVAh of Three Phase.</p> <p><b>The 23rd screen</b> : Display run hour</p> <p><b>The 24th screen</b> :Display Auxillary interrupt (How many time auxillary interrupted)</p> |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Note :

- 1)For 3P3W network 19th,18th, 22nd, 23rd and 24th screen will be availabel.
- 2) For 1 phase 2 wire network, all page will be same as 3 phase 4 wire but only selected phase

#### AUTOMATIC/MANUAL/DEFLT MODE DESCRIPTION

Press E (↵) button for 3 seconds to toggle between Default , Automatic and Manual mode.

**Note** : By default unit operates in Manual 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.

In Default mode after 60 sec of any page, Product will shift to Voltage L-N page automatically.

#### SERIAL NUMBER DESCRIPTION

Press PF/P (♥) key for 10sec. to display 8 digit serial number only for 10sec. at 5th line of display

#### CONFIGURATION

There are 4 dedicated keys with symbols marked as

►, ▲, ▼, ◀. use these 4 keys to enter into configuration menu / change setting.

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

For the configuration setting mode :

- Use ▼ + ◀ keys for 3 sec. to enter or exit from the configuration menu.
- Use ► keys to move curser right by one digit each time.
- Use ▲, ▼ keys for increasing and decreasing parameters value.
- Long press▲ Key and press◀ key simultaneously to go back to previous page
- Use ◀ key to save the setting and move on to next Page.

| Config. page | Function          | Range or Selection                       | Factory Setting |
|--------------|-------------------|------------------------------------------|-----------------|
|              | Password          | 0000 to 9998                             | 1000            |
| 1            | Change Password   | No / Yes                                 | No              |
| 1.1          | New Password      | 0000 to 9998                             | 1000            |
| 2            | Network Selection | 3P4W, 3P3W, 1P2W-P1, 1P2W-P2 and 1P2W-P3 | 3P4W            |
| 3            | CT Secondary      | 1A or 5A                                 | 5               |

| Config. page | Function                    | Range or Selection                               | Factory Setting |
|--------------|-----------------------------|--------------------------------------------------|-----------------|
| 4            | CT Primary                  | 1A, 5A to 10,000A                                | 5               |
| 5            | PT Secondary                | 100V to 500V                                     | 350             |
| 6            | PT Primary                  | 100V to 500kV                                    | 350             |
| 7            | Demand interval method      | Sliding / Fixed                                  | Sliding         |
| 8            | Demand interval duration    | 1 to 30                                          | 15              |
| 9            | Demand interval length      | 1 to 30 min                                      | 1               |
| 10           | Pulse weight (kWh)          | 0.01 to 99.99                                    | 0.01            |
| 11           | Pulse duration (Sec)        | 0.1 to 2.0                                       | 0.1             |
| 12           | Run Hour selection(%)       | 0 to 10                                          | 0               |
| 13           | Slave Id                    | 1 to 255                                         | 1               |
| 14           | Baud Rate                   | 300, 600, 1200, 2400, 4800, 9600 and 19200 (bps) | 9600            |
| 15           | Parity                      | None, Odd, Even                                  | None            |
| 16           | Stop Bit                    | 1 or 2                                           | 1               |
| 17           | Back Light                  | 0 to 7200 sec.                                   | 0000            |
| 18           | Factory default             | No / Yes                                         | No              |
| 19           | Reset Energy and MAX demand | No / Yes                                         | No              |
| 19.0         | Password                    | 0001 to 9999                                     | 1001            |
| 19.1         | Reset active energy         | No / Yes                                         | No              |
| 19.2         | Reset reactive energy       | No / Yes                                         | No              |
| 19.3         | Reset apparent energy       | No / Yes                                         | No              |
| 19.4         | Reset MAX Demand            | No / Yes                                         | No              |
| 19.5         | Reset Run Hour              | No / Yes                                         | No              |
| 19.6         | Reset Auxillary Interrupt   | No / Yes                                         | No              |

- For resetting energy parameters user will be prompted the password. If correct password is entered, the user will be able to reset all energy parameters. This password will be value which will be greater than the configuration password by 1.

#### NETWORK SELECTION AND WIRING INPUT

| Network selection in configuration mode | Wiring                      |
|-----------------------------------------|-----------------------------|
| <b>3P4W</b>                             | 3P4W, 2P3W, 1P2W (P1/P2/P3) |
| <b>3P3W</b>                             | 3P3W                        |

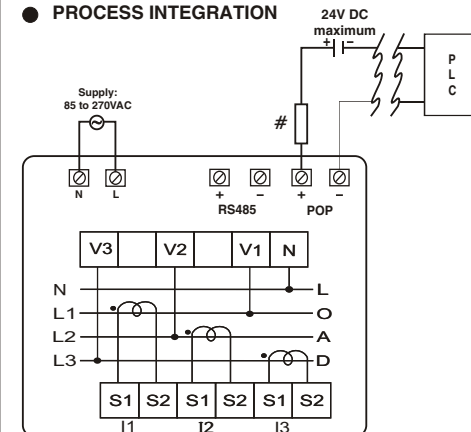
**Note** : P1, P2 and P3 are Three Phase.

#### RUN HOUR SELECTION

The value set in configuration is the percentage of current to be apply to increment run hour.If 5% is selected then after applying 5% of current run hour will increment as 0.01 at every 36 sec.If 0% is selected then run hour will increment at every 36sec even after no current is applied.

#### APPLICATION OF PULSE OUTPUT

##### ● PROCESS INTEGRATION

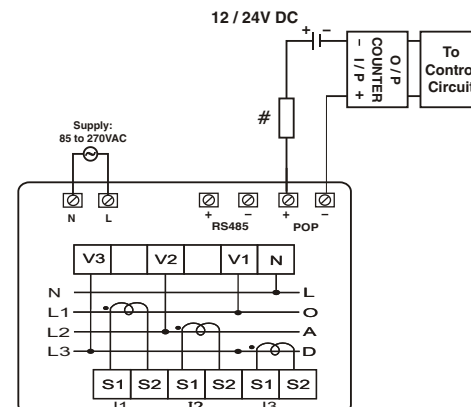


Pulse output from MFM284 meter can be interfaced into a process through a PLC for on line control of energy content in the process.

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 MFM284 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 for Communication Model Only : [ Length (Register) : 2 ; Data Structure : Float ]

| Address | Hex Address | Parameter               |
|---------|-------------|-------------------------|
| 30000   | 0x00        | Voltage V1N             |
| 30002   | 0x02        | Voltage V2N             |
| 30004   | 0x04        | Voltage V3N             |
| 30006   | 0x06        | Average Voltage LN      |
| 30008   | 0x08        | Voltage V12             |
| 30010   | 0x0A        | Voltage V23             |
| 30012   | 0x0C        | Voltage V31             |
| 30014   | 0x0E        | Average Voltage LL      |
| 30016   | 0x10        | Current I1              |
| 30018   | 0x12        | Current I2              |
| 30020   | 0x14        | Current I3              |
| 30022   | 0x16        | Average Current         |
| 30024   | 0x18        | kW1                     |
| 30026   | 0x1A        | kW2                     |
| 30028   | 0x1C        | kW3                     |
| 30030   | 0x1E        | kVA1                    |
| 30032   | 0x20        | kVA2                    |
| 30034   | 0x22        | kVA3                    |
| 30036   | 0x24        | kVAr1                   |
| 30038   | 0x26        | kVAr2                   |
| 30040   | 0x28        | kVAr3                   |
| 30042   | 0x2A        | Total kW                |
| 30044   | 0x2C        | Total kVA               |
| 30046   | 0x2E        | Total kVAr              |
| 30048   | 0x30        | PF1                     |
| 30050   | 0x32        | PF2                     |
| 30052   | 0x34        | PF3                     |
| 30054   | 0x36        | Average PF              |
| 30056   | 0x38        | Frequency               |
| 30058   | 0x3A        | Total kWh               |
| 30060   | 0x3C        | TotalkVAh               |
| 30062   | 0x3E        | Total kVArh             |
| 30064   | 0x40        | kW MAX Active Power     |
| 30066   | 0x42        | kW MIN Active Power     |
| 30068   | 0x44        | kVAr MAX Reactive Power |
| 30070   | 0x46        | kVAr MIN Reactive Power |
| 30072   | 0x48        | kVA MAX Apparent Power  |
| 30074   | 0x4A        | MAX I1 Demand           |
| 30076   | 0x4C        | MAX I2 Demand           |
| 30078   | 0x4E        | MAX I3 Demand           |
| 30080   | 0x50        | MAX Avg. I Demand       |
| 30082   | 0x52        | Run Hour                |
| 30084   | 0x54        | IMP kWh1                |
| 30086   | 0x56        | IMP kWh2                |
| 30088   | 0x58        | IMP kWh3                |
| 30090   | 0x5A        | EXP kWh1                |
| 30092   | 0x5C        | EXP kWh2                |
| 30094   | 0x5E        | EXP kWh3                |
| 30096   | 0x60        | Total IMP kWh           |
| 30098   | 0x62        | Total EXP kWh           |
| 30100   | 0x64        | IMP kVarh1              |
| 30102   | 0x66        | IMP kVarh2              |
| 30104   | 0x68        | IMP kVarh3              |
| 30106   | 0x6A        | EXP kVarh1              |
| 30108   | 0x6C        | EXP kVarh2              |

| Address | Hex Address | Parameter                        |
|---------|-------------|----------------------------------|
| 30110   | 0x6E        | EXP kVarh3                       |
| 30112   | 0x70        | Total IMP kVarh                  |
| 30114   | 0x72        | Total EXP kVarh                  |
| 30116   | 0x74        | KVah1                            |
| 30118   | 0x76        | KVah2                            |
| 30120   | 0x78        | KVah3                            |
|         |             | Total Harmonic Distortion (THD)  |
| 30124   | 0x7C        | THD of Voltage V1N               |
| 30126   | 0x7E        | THD of Voltage V2N               |
| 30128   | 0x80        | THD of Voltage V3N               |
| 30130   | 0x82        | THD of Voltage V12               |
| 30132   | 0x84        | THD of Voltage V23               |
| 30134   | 0x86        | THD of Voltage V31               |
| 30136   | 0x88        | THD of Current I1                |
| 30138   | 0x8A        | THD of Current I2                |
| 30140   | 0x8C        | THD of Current I3                |
| 30684   | 0x2AC       | Serial No.(Data structure: Hex ) |

Formula to find address of individual Harmonic

| Constant Parameter | Meaning     |
|--------------------|-------------|
| 0                  | Voltage V1N |
| 1                  | Voltage V2N |
| 2                  | Voltage V3N |
| 3                  | Voltage V12 |
| 4                  | Voltage V23 |
| 5                  | Voltage V31 |
| 6                  | Current I1  |
| 7                  | Current I2  |
| 8                  | Current I3  |

{143 + [(Harmonic no-2) x 2] + 60 x Constant Parameter }

For Example,

To find the 14<sup>th</sup> Harmonic address of Voltage V31  
following formula can be used :

Formula with the parameter :

{143 + [(Harmonic no-2) x 2] + 60 x C P}  
Eg. {143 + [(14-2) x 2] + 60 x 5} = 467

So, Check the 14<sup>th</sup> Harmonic of Voltage V31 at 467 address.

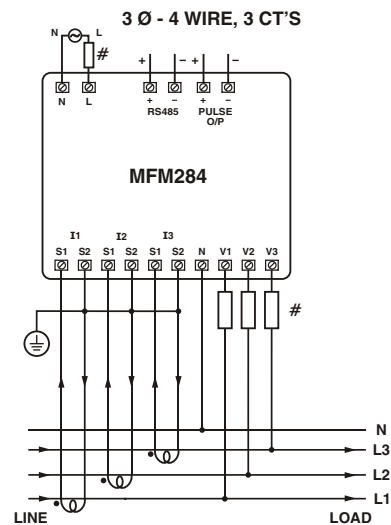
MODBUS register addresses list *continued*

Readable / writable parameters for Communication Model Only :

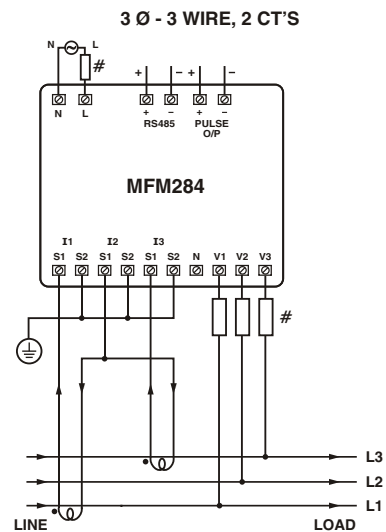
| Address | Hex Address | Parameter                         | Range         |                              | Length (Register) | Data Structure |
|---------|-------------|-----------------------------------|---------------|------------------------------|-------------------|----------------|
|         |             |                                   | Min value     | Max value                    |                   |                |
| 40000   | 0x00        | Password                          | 0             | 9998                         | 1                 | Integer        |
|         |             |                                   | Value         | Meaning                      |                   |                |
| 40001   | 0x01        | N/W selection                     | 0             | 3P-4W                        | 1                 | Integer        |
|         |             |                                   | 1             | 3P-3W                        | 1                 | Integer        |
|         |             |                                   | 2             | 1P2W-P1                      | 1                 | Integer        |
|         |             |                                   | 3             | 1P2W-P2                      | 1                 | Integer        |
|         |             |                                   | 4             | 1P2W-P3                      | 1                 | Integer        |
| 40002   | 0x02        | CT Secondary (A)                  | 1             | 5                            | 1                 | Integer        |
| 40003   | 0x03        | CT primary (CT Secondary = 5) (A) | 5             | 10000                        | 1                 | Integer        |
|         |             | CT primary (CT Secondary = 1) (A) | 1             | 10000                        |                   |                |
| 40004   | 0x04        | PT Secondary (V)                  | 100           | 500                          | 1                 | Integer        |
| 40005   | 0x05        | PT primary (V)                    | 100           | 500000                       | 2                 | Integer        |
| 40007   | 0x07        | Slave id                          | 1             | 255                          | 1                 | Integer        |
|         |             |                                   | Value         | Meaning                      |                   |                |
| 40008   | 0x08        | Baud rate (bps)                   | 0x0000        | 300                          | 1                 | Integer        |
|         |             |                                   | 0x0001        | 600                          |                   |                |
|         |             |                                   | 0x0002        | 1200                         |                   |                |
|         |             |                                   | 0x0003        | 2400                         |                   |                |
|         |             |                                   | 0x0004        | 4800                         |                   |                |
|         |             |                                   | 0x0005        | 9600                         |                   |                |
|         |             |                                   | 0x0006        | 19200                        |                   |                |
|         |             |                                   | Value         | Meaning                      |                   |                |
| 40009   | 0x09        | Parity                            | 0x0000        | None                         | 1                 | Integer        |
|         |             |                                   | 0x0001        | Odd                          |                   |                |
|         |             |                                   | 0x0002        | Even                         |                   |                |
| 40010   | 0x0A        | Stop bit                          | 0x0000        | 1                            | 1                 | Integer        |
|         |             |                                   | 0x0001        | 2                            |                   |                |
| 40011   | 0x0B        | Backlight OFF (sec.)              | 0             | 7200                         | 1                 | Integer        |
| 40012   | 0x0C        | Factory Default                   | 1             | Set to factory setting range | 1                 | Integer        |
| 40013   | 0x0D        | Reset kWh                         | 1             | Reset Total Active Energy    | 1                 | Integer        |
| 40014   | 0x0E        | Reset kVAh                        | 1             | Reset Total Apparent Energy  | 1                 | Integer        |
| 40015   | 0x0F        | Reset kVArh                       | 1             | Reset Total Reactive Energy  | 1                 | Integer        |
|         |             |                                   | Value         | Meaning                      |                   |                |
| 40016   | 0x22        | Demand Interval Method            | 0X0000        | Sliding                      | 1                 | Integer        |
|         |             |                                   | 0X0001        | Fixed                        |                   |                |
| 40017   | 0x23        | Demand Interval Duration          | Min Value : 1 | Max Value : 30               | 1                 | Integer        |
| 40018   | 0x24        | Demand Interval Length(min)       | Min Value : 1 | Max Value : 30               | 1                 | Integer        |
| 40019   | 0x25        | Reset MAX/MIN Demand              | 1             | Reset MAX/MIN Demand         | 1                 | Integer        |
| 40020   | 0x26        | Reset Run Hour                    | 1             | Reset Run Hour               | 1                 | Integer        |
| 40021   | 0x26        | Reset Auxillary Interupt          | 1             | Reset Auxillary Interupt     | 1                 | Integer        |
| 40022   | 0x26        | Pulse Weight (kWh)                | 0.01          | 99.99                        | 1                 | Integer        |
| 40023   | 0x26        | Pulse duration (Sec)              | 0.1           | 2                            | 1                 | Integer        |

# TYPICAL WIRING DIAGRAM

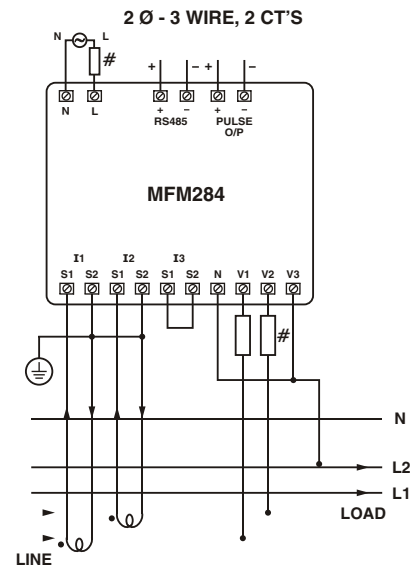
## 3 PHASE 4-WIRE (COMMONLY USED)



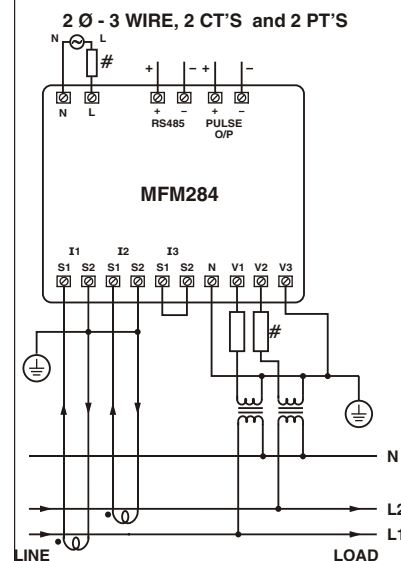
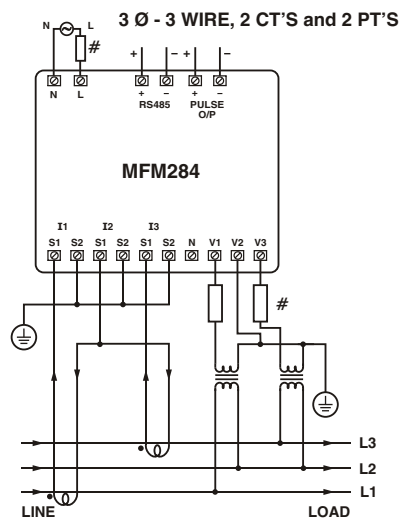
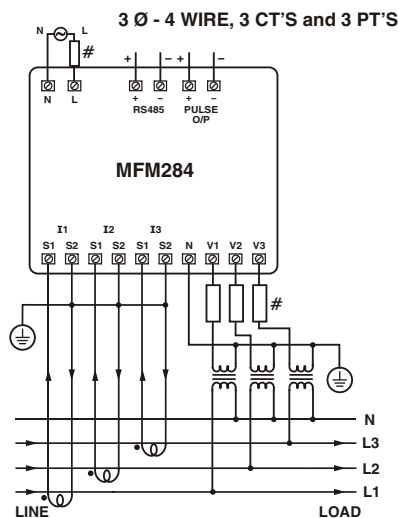
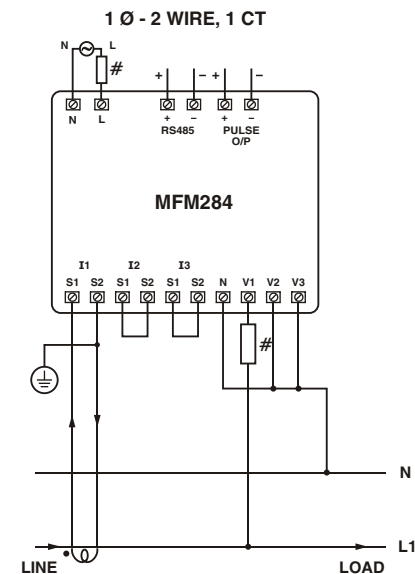
## 3 PHASE 3-WIRE



## 2 PHASE - 3 WIRE

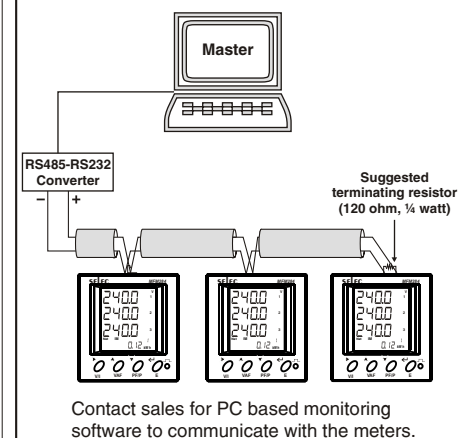


## 1 PHASE - 2 WIRE



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

## CONNECTION DIAGRAM FOR COMMUNICATION



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

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