

MFM384-C
Operating Instructions



96 x 96

SPECIFICATIONS

DISPLAY

Liquid crystal display with backlight 4 lines, 4 digits per line to show electrical parameters
5th line, 8 digits to show energy
Bar graph for current indication

LCD INDICATIONS

- 1** - Integration of energy
- PRG** - Unit is in configuration menu
- ↔** - Communication in progress
- MAX DMD** - Maximum and Minimum Demand Power
- THD** - For Total harmonic 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

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 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

INSTALLATION CATEGORY : III

MOUNTING :Panel mounting

WEIGHT MFM384-C : 296gms

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

ORDER CODE INFORMATION

| Product | Supply | Certification |
|--------------------------------|---|---------------|
| MFM384-C-CE Class 1 | 85 to 300V AC, 50/60Hz (±5%) | CE |
| MFM384-C-CE-CL05 Class 0.5S | 85 to 300V AC, 50/60Hz (±5%) | CE |
| MFM384-C-CU Class 1 | 100 to 240V AC, -15% +12%, 50/60Hz (±5%) | CE |

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 | 1200, 2400, 4800, 9600,19200 (in bps) |
| Parity | None, Odd, Even |
| Stop bits | 1 or 2 |
| Response time | 100ms (max and independent of baud rate) |

ACCURACY

| Measurement | Accuracy | |
|-------------------|---|---|
| | MFM384-C-CE MFM384-C-CU | MFM384-C-CE-CL05 |
| Voltage V_{L-N} | ±0.5% of F.S. | ±0.5% of F.S. |
| Voltage V_{L-L} | ±0.5% of F.S. | ±0.5% of F.S. |
| Current | ±0.5% of F.S. | ±0.5% of F.S. |
| Frequency | ±0.1% For L-N $V > 20V$, For L-L $V > 35V$ | ±0.1% For L-N $V > 20V$, For L-L $V > 35V$ |
| Active Power | 1% | ±0.5% |
| Apparent power | 1% | ±0.5% |
| Reactive Power | 1% | ±1% |
| Power factor | ±0.01 | ±0.005 |
| Active energy | Class 1 | Class 0.5S (IEC 62053-22) |
| Reactive energy | Class 1 | Class 2 (IEC 62053-23) |
| Apparent energy | Class 1 | Class 0.5S |
| MAX / MIN kW | 1% | ±0.5% |
| MAX / MIN kVAr | 1% | ±1% |
| MAX kVA | 1% | ±0.5% |

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 |
| ≥150000 | 1M | 0.1M |

- NOTE :** 1) For Voltage, Current and Power, resolution is automatically adjusted.
2) For power factor, resolution is 0.001
3) **1** blinks after every 5 sec, if load is connected on any one of 3 phases.

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 0.5mm² to 2.5mm² (20 to 14AWG ; 750C(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

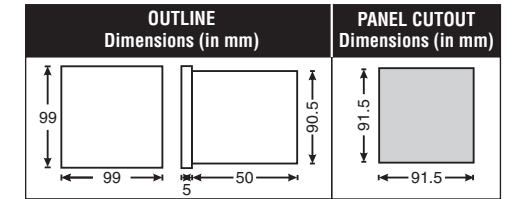
CAUTION :

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

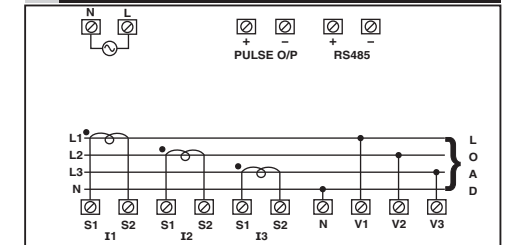
1. Prepare the panel cutout with proper dimensions as shown below.
2. Push the meter into the panel cutout. Secure the meter in its place by fitting the clamp on the rear side. Fit clamps on both sides in diagonally opposite location for optimum fitting.
3. For proper sealing, tighten the screws evenly 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



FRONT PANEL DESCRIPTION



ONLINE PAGE DESCRIPTION

There are 6 dedicated keys labelled as V, I, VAF, PF, P, E. Use these 6 keys to read meter parameters. Simply press these keys to read the parameters.

| KEY PRESS | ONLINE PAGE DESCRIPTION |
|-----------|--|
| Press "V" | The first screen : Displays line to neutral Voltage of three phase and average line to neutral voltage. The second screen : Displays line to line voltage of three phase and average line to line voltage. The third screen : Displays total percentage harmonics of line to neutral voltage of three phase and average line to neutral voltage. The fourth screen : Displays total percentage harmonics of line to line voltage of three phase and average line to line voltage. The fifth screen : Press for 3 sec, Displays phase sequence indication. Note : 1) For 3 Ø 3 wire system, only the second, fourth and fifth screen will be available. 2) In 1 Ø 2 wire system only first, third and fifth screen will be available. |
| Press "I" | The first screen : Displays phase current of three phase and neutral current. The second screen : Displays phase maximum current demand of three phase and average current. The third screen : Displays total percentage harmonic of current of three phase and average phase current. The fourth screen : Press for 3 sec, Displays current connection indication page. Note : For 3 Ø 3 wire system only first, second and third screen will be available. Displays average current instead of neutral current. |

| KEY PRESS | ONLINE PAGE DESCRIPTION |
|-------------|--|
| Press "VAF" | <p>The first screen : Displays voltage, current, power factor of first phase and frequency.</p> <p>The second screen : Displays voltage, current, power factor of second phase and frequency.</p> <p>The third screen : Displays voltage, current, power factor of third phase and frequency.</p> <p>The fourth screen : Displays average value of voltage, current and power factor of three phase and frequency.</p> <p>Note : 1) In 3 Ø 3 wire system voltage current power factor and freq. will be line to line. 2) In 1 Ø 2 wire system only first screen will be available.</p> |
| Press "PF" | <p>The first screen : Displays power factor of three phase and average power factor.</p> <p>Note : For 3 Ø 3 wire system, only average power factor will be available on this screen.</p> |
| Press "P" | <p>The first screen : Displays active power of three phase and total active power.</p> <p>The second screen : Displays reactive power of three phase and total reactive power.</p> <p>The third screen : Displays apparent power of three phase and total apparent power.</p> <p>The fourth screen : Displays active, reactive, apparent power and power factor of first phase.</p> <p>The fifth screen : Displays active, reactive, apparent power and power factor of second phase.</p> <p>The sixth screen : Displays active, reactive, apparent power and power factor of third phase.</p> <p>The seventh screen : Displays total active, reactive, apparent power and average power factor of three phase.</p> <p>The eighth screen : Displays maximum active power demand, reactive power demand and apparent power demand.</p> <p>The ninth screen : Displays minimum active power demand and reactive power demand.</p> <p>Note : 1) For 3 Ø 3 wire system only seventh, eighth and ninth screen will be available. 2) In 1 Ø 2 wire system only first, second, third, fourth, eighth and ninth screen will be available.</p> |
| Press "E" | <p>The first Screen : Displays import active energy of first phase.</p> <p>The second screen : Displays import active energy of second phase.</p> <p>The third screen : Displays import active energy of third phase.</p> <p>The fourth screen : Displays export active energy of first phase.</p> <p>The fifth screen : Displays export active energy of second phase.</p> <p>The sixth screen : Displays export active energy of third phase.</p> <p>The seventh screen : Displays total import active energy of three phase.</p> <p>The eighth screen : Displays total export active energy of three phase.</p> <p>The ninth screen : Displays total net active energy of three phase.</p> <p>The tenth screen : Displays import reactive energy of first phase.</p> <p>The eleventh screen : Displays import reactive energy of second phase.</p> <p>The twelfth screen : Displays import reactive energy of third phase.</p> <p>The thirteenth screen : Displays export reactive energy of first phase.</p> <p>The fourteenth screen : Displays export reactive energy of second phase.</p> <p>The fifteenth screen : Displays export reactive energy of third phase.</p> <p>The sixteenth screen : Displays total import reactive energy of three phase.</p> <p>The seventeenth screen : Displays total export reactive energy of three phase.</p> <p>The eighteenth screen : Displays total net reactive energy of three phase.</p> <p>The nineteenth screen : Displays apparent energy of first phase.</p> <p>The twentieth screen : Displays apparent energy of second phase.</p> |

| KEY PRESS | ONLINE PAGE DESCRIPTION |
|-----------|--|
| | <p>The twenty first screen : Displays apparent energy of third phase.</p> <p>The twenty second screen : Displays total net apparent energy of three phase.</p> <p>The twenty third screen : Displays run hour.</p> <p>The twenty fourth screen : Displays Auxiliary Interrupts.</p> <p>Note : 1) In 3 Ø 3 wire system only ninth, eighteenth, twenty second, twenty third and twenty fourth screens will be available. 2) In 1 Ø 2 wire system first, fourth, seventh, eighth, ninth, tenth, thirteenth, sixteenth, seventeenth, eighteenth, nineteenth, twenty second, twenty third and twenty fourth screens will be available.</p> |

NETWORK SELECTION AND WIRING INPUT

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

Note : P1, P2 and P3 are Three Phase.

AUTOMATIC / MANUAL MODE DESCRIPTION

Press E (←) button for 3 seconds to toggle between 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.

CONFIGURATION

There are 6 dedicated keys with symbols marked as use these 6 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 ◀ or ▶ keys to move cursor left or right by one digit each time.
- Use ▲ or ▼ keys for increasing or decreasing parameters value.
- Use ← key 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 |
| 4 | CT Primary | 1A, 5A to 10,000A | 5 |
| 5 | PT Secondary | 100V to 500V | 350 |
| 6 | PT primary | 100V to 500kV | 350 |
| 7 | Slave Id | 1 to 255 | 1 |
| 8 | Baud Rate | 300, 600, 1200, 2400, 4800, 9600 and 19200 (bps) | 9600 |
| 9 | Parity | None, Odd, Even | None |
| 10 | Stop Bit | 1 or 2 | 1 |
| 11 | Back Light | 0 to 7200 sec. | 0000 |

| Config page. | Function | Range or Selection | Factory Setting |
|--------------|------------------------------|--------------------|-----------------|
| 12 | Demand interval method | Sliding / Fixed | Sliding |
| 13 | Demand interval duration | 1 to 30 | 15 |
| 14 | Demand interval length | 1 to 30 min | 1 |
| 15 | Max Page Auto | 1 to 21 | 21 |
| 16 | Change Page Sequence | No / Yes | No |
| 16.01 | Page sequence 1 | 1 to 21 | 1 |
| 16.02 | Page sequence 2 | 1 to 21 | 2 |
| 16.03 | Page sequence 3 | 1 to 21 | 3 |
| 16.04 | Page sequence 4 | 1 to 21 | 4 |
| 16.05 | Page sequence 5 | 1 to 21 | 5 |
| 16.06 | Page sequence 6 | 1 to 21 | 6 |
| 16.07 | Page sequence 7 | 1 to 21 | 7 |
| 16.08 | Page sequence 8 | 1 to 21 | 8 |
| 16.09 | Page sequence 9 | 1 to 21 | 9 |
| 16.10 | Page sequence 10 | 1 to 21 | 10 |
| 16.11 | Page sequence 11 | 1 to 21 | 11 |
| 16.12 | Page sequence 12 | 1 to 21 | 12 |
| 16.13 | Page sequence 13 | 1 to 21 | 13 |
| 16.14 | Page sequence 14 | 1 to 21 | 14 |
| 16.15 | Page sequence 15 | 1 to 21 | 15 |
| 16.16 | Page sequence 16 | 1 to 21 | 16 |
| 16.17 | Page sequence 17 | 1 to 21 | 17 |
| 16.18 | Page sequence 18 | 1 to 21 | 18 |
| 16.19 | Page sequence 19 | 1 to 21 | 19 |
| 16.20 | Page sequence 20 | 1 to 21 | 20 |
| 16.21 | Page sequence 21 | 1 to 21 | 21 |
| 17 | Pulse weight (kWh) | 0.01 to 99.99 | 0.01 |
| 18 | Pulse duration (Sec) | 0.1 to 2.0 | 0.1 |
| 19 | Factory default | No / Yes | No |
| 20 | Reset energy and MAX demand | No / Yes | No |
| *20.1 | Password | 0001 to 9999 | 1001 |
| 20.01 | Reset active energy | No / Yes | No |
| 20.02 | Reset reactive energy | No / Yes | No |
| 20.03 | Reset apparent energy | No / Yes | No |
| 20.04 | Reset Current MAX DMD | No / Yes | No |
| 20.05 | Reset active power MAX DMD | No / Yes | No |
| 20.06 | Reset active power MIN DMD | No / Yes | No |
| 20.07 | Reset Reactive power MAX DMD | No / Yes | No |
| 20.08 | Reset Reactive power MIN DMD | No / Yes | No |
| 20.09 | Reset apparent power MAX DMD | No / Yes | No |
| 21 | Reset Run Hour | No / Yes | No |
| 22 | Reset Auxiliary Interrupt | No / Yes | No |

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

SERIAL NUMBER DESCRIPTION

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

EXAMPLE TO READ DATA FROM INPUT REGISTER

Data format: Big Endian (Default format)

If Total Active Energy = 1234.12kWh
Start Address : 30090, No. Of register : 02
Hexadecimal Equivalent of 1234.12 is 0x449A43D7

Data stored at 30090 is LSB : $\frac{A}{44} \frac{B}{9A}$

Data Stored at 30091 is MSB : $\frac{C}{43} \frac{D}{D7}$

Data Format to be followed is A-B-C-D

Data format: Mid Little Endian

If Total Active Energy = 1234.12kWh
Start Address : 30090, No. Of register : 02
Hexadecimal Equivalent of 1234.12 is 0x449A43D7

Data stored at 30090 is LSB : $\frac{C}{43} \frac{D}{D7}$

Data Stored at 30091 is MSB : $\frac{A}{44} \frac{B}{9A}$

Data Format to be followed is C-D-A-B

POWER FACTOR SIGN CONVENTION

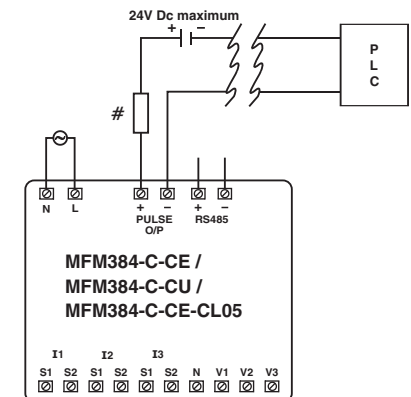
Power Factor sign convention (PF sign) can be positive or negative, and is defined by the conventions used by the IEC standard.

PF sign correlates with the direction of real power (kW) flow.

- Quadrant 1 and 4: Positive real power (+kW).
The PF sign is positive(+).
- Quadrant 2 and 3: Negative real power (-kW).
The PF sign is negative(-).

APPLICATION OF PULSE OUTPUT

PROCESS INTEGRATION



Pulse output from MFM384-C 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.

| MODBUS REGISTER ADDRESSES LIST | | |
|--|-------------|-----------------------------|
| Readable Parameters : [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 net kWh |
| 30060 | 0x3C | Total net kVAh |
| 30062 | 0x3E | Total net kVArh |
| 30064 | 0x40 | kW Active Power Max DMD |
| 30066 | 0x42 | kW Active Power Min DMD |
| 30068 | 0x44 | kVAr Reactive Power Max DMD |
| 30070 | 0x46 | kVAr Reactive Power Min DMD |
| 30072 | 0x48 | kVA Apparent Power Max DMD |
| 30080 | 0x50 | Auxiliary Interrupt |
| 30082 | 0x52 | Run hour |
| 30084 | 0x54 | kWh1 (Imp) |
| 30086 | 0x56 | kWh2 (Imp) |
| 30088 | 0x58 | kWh3 (Imp) |
| 30090 | 0x5A | kWh1 (Exp) |
| 30092 | 0x5C | kWh2 (Exp) |
| 30094 | 0x5E | kWh3 (Exp) |
| 30096 | 0x60 | Total kWh (Imp) |
| 30098 | 0x62 | Total kWh (Exp) |
| 30100 | 0x64 | kVArh1 (Imp) |

| Address | Hex Address | Parameter |
|---------|-------------|---|
| 30102 | 0x66 | kVArh2 (Imp) |
| 30104 | 0x68 | kVArh3 (Imp) |
| 30106 | 0x6A | kVArh1 (Exp) |
| 30108 | 0x6C | kVArh2 (Exp) |
| 30110 | 0x6E | kVArh3 (Exp) |
| 30112 | 0x70 | Total kVArh (Imp) |
| 30114 | 0x72 | Total kVArh (Exp) |
| 30116 | 0x74 | kVAh1 |
| 30118 | 0x76 | kVAh2 |
| 30120 | 0x78 | kVAh3 |
| 30122 | 0x7A | Neutral Current |
| 30124 | 0x7C | THD of 1st Phase Voltage |
| 30126 | 0x7E | THD of 2nd Phase Voltage |
| 30128 | 0x80 | THD of 3rd Phase Voltage |
| 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) |
| 30692 | 0x2B4 | MAX I1 Demand |
| 30694 | 0x2B6 | MAX I2 Demand |
| 30696 | 0x2B8 | MAX I3 Demand |
| 30698 | 0x2BA | MAX Avg. I Demand |
| 30700 | 0x2BC | Phase Sequence Indication (0-Invalid, 1-Anticlockwise, 2-OK clockwise) |
| 30702 | 0x2BE | Existing KW Active Power MAX DMD |
| 30704 | 0x2C0 | Existing KW Active Power MIN DMD |
| 30706 | 0x2C2 | Existing KVAr Reactive Power MAX DMD |
| 30708 | 0x2C4 | Existing KVAr Reactive Power MIN DMD |
| 30710 | 0x2C6 | Existing KVA Apparent Power MAX DMD |
| 30712 | 0x2C8 | Existing MAX I1 Demand |
| 30714 | 0x2CA | Existing MAX I2 Demand |
| 30716 | 0x2CC | Existing MAX I3 Demand |
| 30718 | 0x2CE | Existing MAX Avg. I Demand |

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 14th Harmonic address of Voltage V31 following formula can be used :

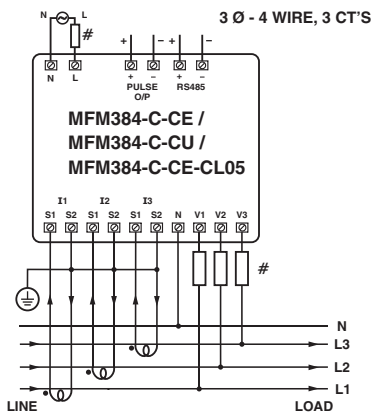
Formula with the parameter :
{143 + [(Harmonic no-2) x 2] + 60 x C P}
Eg. {143 + [(14-2) x 2] + 60 x 5} = 467

So, Check the 14th Harmonic of Voltage V31 at 467 address.

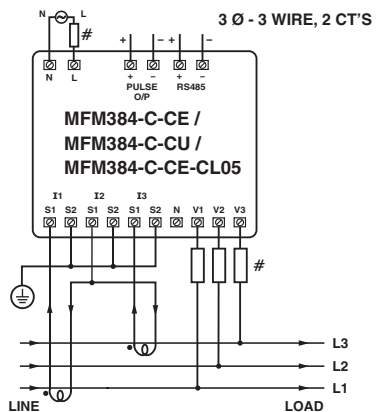
| Readable / writable parameters : [Data Structure : Integer] | | | | | |
|---|-------------|-----------------------------|-----------------|--|-------------------|
| Address | Hex Address | Parameter | Range | | Length (Register) |
| 40000 | 0x00 | Password | Min value : 0 | Max value : 9998 | 1 |
| 40001 | 0x01 | N/W Selection | Value : 0 | Meaning : 3P4W | 1 |
| | | | Value : 1 | Meaning : 3P3W | 1 |
| | | | Value : 2 | Meaning : 1P2W-P1 | 1 |
| | | | Value : 3 | Meaning : 1P2W-P2 | 1 |
| | | | Value : 4 | Meaning : 1P2W-P3 | 1 |
| 40002 | 0x02 | CT Secondary | Min value : 1 | Max value : 5 | 1 |
| 40003 | 0x03 | CT primary (CT Secondary=5) | Min value : 5 | Max value : 10000 | 1 |
| | | CT primary (CT Secondary=1) | Min value : 1 | Max value : 10000 | |
| 40004 | 0x04 | PT Secondary | Min value : 100 | Max value : 500 | 1 |
| 40005 | 0x05 | PT primary | Min value : 100 | Max value : 500kV | 2 |
| 40007 | 0x07 | Slave id | Min value : 1 | Max value : 255 | 1 |
| 40008 | 0x08 | Baud rate | Value : 0x0000 | Meaning : 300 | 1 |
| | | | Value : 0x0001 | Meaning : 600 | |
| | | | Value : 0x0002 | Meaning : 1200 | |
| | | | Value : 0x0003 | Meaning : 2400 | |
| | | | Value : 0x0004 | Meaning : 4800 | |
| | | | Value : 0x0005 | Meaning : 9600 | |
| | | | Value : 0x0006 | Meaning : 19200 | |
| 40009 | 0x09 | Parity | Value : 0x0000 | Meaning : None | 1 |
| | | | Value : 0x0001 | Meaning : Odd | |
| | | | Value : 0x0002 | Meaning : Even | |
| 40010 | 0x0A | Stop bit | Value : 0x0000 | Meaning : 1 | 1 |
| | | | Value : 0x0001 | Meaning : 2 | 1 |
| 40011 | 0x0B | Backlight OFF | Min Value : 0 | Max Value : 7200 | 1 |
| 40012 | 0x0C | Factory Default | 1 | Meaning : Set to factory setting range | 1 |
| 40013 | 0x0D | Reset Active Energy | 1 | Meaning : Reset Total Active Energy | 1 |
| 40014 | 0x0E | Reset Apparent Energy | 1 | Meaning : Reset Total Apparent Energy | 1 |
| 40015 | 0x0F | Reset Reactive Energy | 1 | Meaning : Reset Total Reactive Energy | 1 |
| 40016 | 0x10 | Auto Mode Pages | Min Value : 1 | Max Value : 21 | 1 |
| 40017 | 0x11 | Page Address Sequence | 1-21 | Meaning : 1-First Page ; 21-Last Page | 1 |
| 40018 | 0x12 | Page Address Sequence | 1-21 | Meaning : 1-First Page ; 21-Last Page | 1 |
| 40019 | 0x13 | Page Address Sequence | 1-21 | Meaning : 1-First Page ; 21-Last Page | 1 |
| 40020 | 0x14 | Page Address Sequence | 1-21 | Meaning : 1-First Page ; 21-Last Page | 1 |
| 40021 | 0x15 | Page Address Sequence | 1-21 | Meaning : 1-First Page ; 21-Last Page | 1 |
| 40022 | 0x16 | Page Address Sequence | 1-21 | Meaning : 1-First Page ; 21-Last Page | 1 |
| 40023 | 0x17 | Page Address Sequence | 1-21 | Meaning : 1-First Page ; 21-Last Page | 1 |
| 40024 | 0x18 | Page Address Sequence | 1-21 | Meaning : 1-First Page ; 21-Last Page | 1 |
| 40025 | 0x19 | Page Address Sequence | 1-21 | Meaning : 1-First Page ; 21-Last Page | 1 |
| 40026 | 0x1A | Page Address Sequence | 1-21 | Meaning : 1-First Page ; 21-Last Page | 1 |
| 40027 | 0x1B | Page Address Sequence | 1-21 | Meaning : 1-First Page ; 21-Last Page | 1 |
| 40028 | 0x1C | Page Address Sequence | 1-21 | Meaning : 1-First Page ; 21-Last Page | 1 |
| 40029 | 0x1D | Page Address Sequence | 1-21 | Meaning : 1-First Page ; 21-Last Page | 1 |
| 40030 | 0x1E | Page Address Sequence | 1-21 | Meaning : 1-First Page ; 21-Last Page | 1 |
| 40031 | 0x1F | Page Address Sequence | 1-21 | Meaning : 1-First Page ; 21-Last Page | 1 |
| 40032 | 0x20 | Page Address Sequence | 1-21 | Meaning : 1-First Page ; 21-Last Page | 1 |
| 40033 | 0x21 | Page Address Sequence | 1-21 | Meaning : 1-First Page ; 21-Last Page | 1 |
| 40034 | 0x22 | Demand Interval Method | Value : 0x0000 | Meaning : Sliding | 1 |
| | | | Value : 0x0001 | Meaning : Fixed | |
| 40035 | 0x23 | Demand Interval Duration | Min Value : 1 | Max Value : 30 | 1 |
| 40036 | 0x24 | Demand Interval Length | Min Value : 1 | Max Value : 30 | 1 |

| MODBUS REGISTER ADDRESSES LIST | | | | | |
|---|-------------|---|----------------------|---|---|
| Readable / writable parameters : [Data Structure : Integer] | | MODBUS register addresses list continued... | | | |
| Address | Hex Address | Parameter | Range | Length (Register) | |
| 40037 | 0x25 | Reset Active Power Max DMD | Value : 1 | Meaning : Reset Max Active power | 1 |
| 40038 | 0x26 | Reset Active Power Min DMD | Value : 1 | Meaning : Reset Min Active power | 1 |
| 40039 | 0x27 | Reset Reactive Power Max DMD | Value : 1 | Meaning : Reset Max Reactive power | 1 |
| 40041 | 0x29 | Reset Apparent Power Max DMD | Value : 1 | Meaning : Reset Max Apparent Power | 1 |
| 40042 | 0x2A | Reset Run Hour | Value : 1 | Meaning : Reset Run Hour | 1 |
| 40043 | 0x2B | Reset Auxiliary Interrupt | Value : 1 | Meaning : Reset Auxiliary Interrupt | 1 |
| 40044 | 0x2C | Reset Reactive Power Min DMD | Value : 1 | Meaning : Reset Min Reactive power | 1 |
| 40054 | 0x36 | Page Address Sequence | 1-21 | 1-First Page ; 21-Last Page | 1 |
| 40055 | 0x37 | Page Address Sequence | 1-21 | 1-First Page ; 21-Last Page | 1 |
| 40057 | 0x39 | Pulse Duration | Min Value : 0.1(sec) | Max Value : 2.0(sec) | 1 |
| 40058 | 0x3A | Pulse Weight | Min Value : 0.01 | Max Value : 99.99 | 1 |
| 40059 | 0x3B | Page Address Sequence | 1-21 | 1-First Page ; 21-Last Page | 1 |
| 40060 | 0x3C | Page Address Sequence | 1-21 | 1-First Page ; 21-Last Page | 1 |
| 40064 | 0x40 | Reset Max Current | Value : 1 | Meaning : Reset Max Current | 1 |
| 40070 | 0x46 | Change Endianness | Value : 0 or 1 | Meaning : 0: Mid Little Endian (CDAB) 1: Big Endian (ABCD) Default setting :Big Endian | 1 |

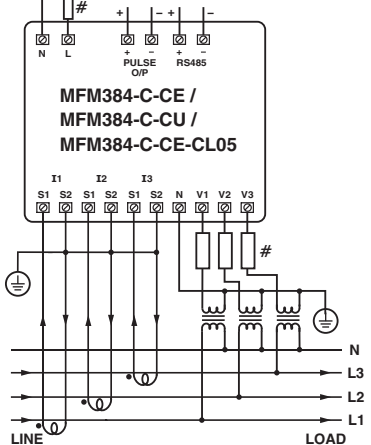
3 PHASE 4-WIRE (COMMONLY USED)



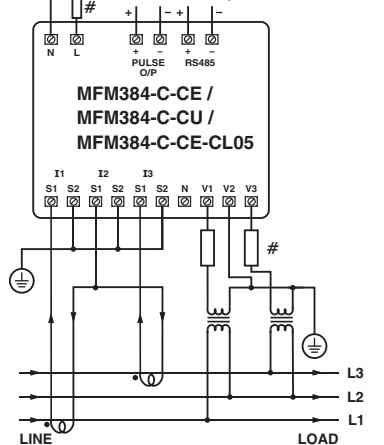
3 PHASE 3-WIRE



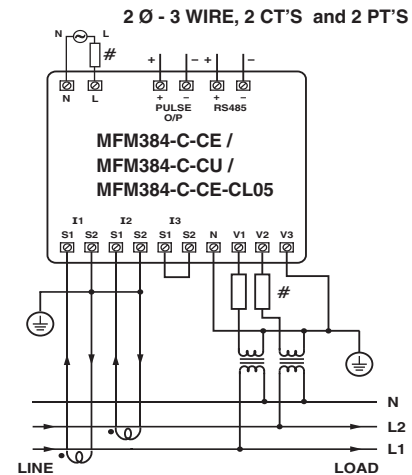
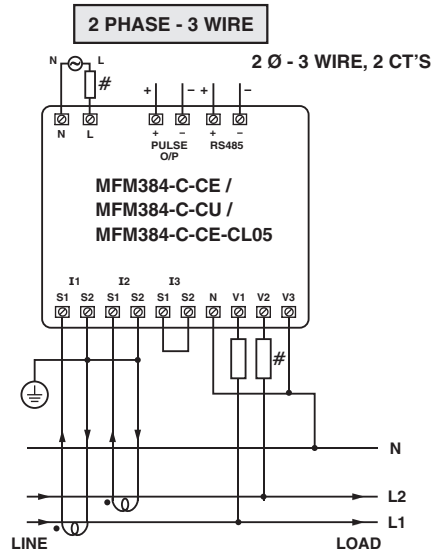
3 Ø - 4 WIRE, 3 CT'S and 3 PT'S



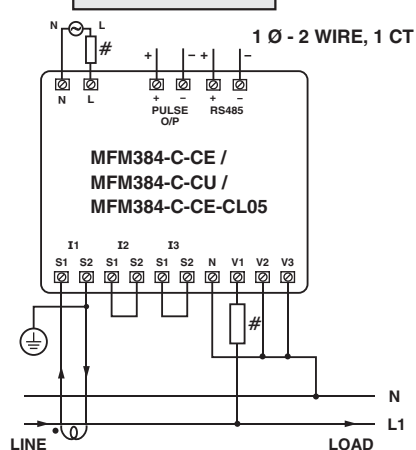
3 Ø - 3 WIRE, 2 CT'S and 2 PT'S



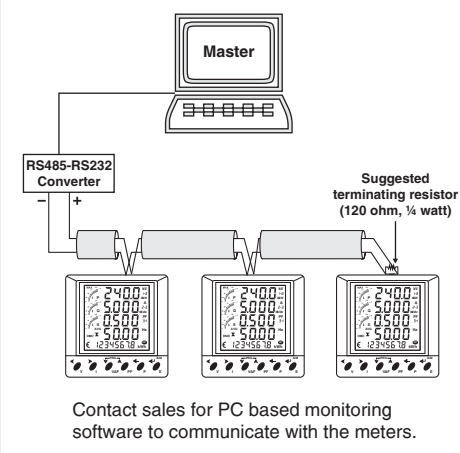
TYPICAL WIRING DIAGRAM



1 PHASE - 2 WIRE



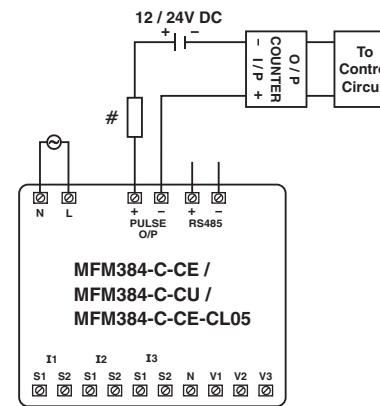
CONNECTION DIAGRAM FOR COMMUNICATION



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

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

ENERGY CONTROLLER



Pulse output from MFM384-C 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

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

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