

selec**MFM383A SERIES**

Operating Instructions



96 x 96

SPECIFICATIONS**DISPLAY**

Liquid crystal display with backlight
3 lines, 4 digits per line to show electrical Parameters
Dedicated 7½ digit show energy

WIRING INPUT

3Ø - 4 wire, 3Ø - 3 wire, 2Ø - 3 wire and
1Ø - 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 (300V L-N)

FREQUENCY RANGE

45-65Hz

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 10,000V (Programmable for any value)

PT SECONDARY

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

DISPLAY UPDATE TIME

1sec. for all parameters

DISPLAY SCROLLING

Automatic or Manual (Programmable)

POWER CONSUMPTION

MFM383A / MFM383A-C : Less than 8VA

ENVIRONMENTAL CONDITIONS

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

Temperature : Operating : -10 to 55°C

Storage : -20 to 75°C

Humidity : Up to 85% RH, non-condensing

PROTECTION CLASS : II**MOUNTING**

Panel mounting

WEIGHT

MFM383A : 310gms ; MFM383A-C : 344gms

OUTPUT

Pulse Output : Voltage range : External 24V DC max.
Current capacity : 100mA max.

Pulse Width : 100ms ±5ms.

ORDER CODE INFORMATION

| Product | Supply | Certification | |
|---------------------|---|---------------|-----------|
| | | CE | UL LISTED |
| MFM383A / MFM383A-C | 100 to 240V AC, -15% +12%, 50/60Hz, (±5%) | — | — |
| MFM383A-C-CE | 100 to 240V AC, -15% +12%, 50/60Hz, (±5%) | ■ | — |

Installation Category III

SERIAL COMMUNICATION [Applicable for MFM383A-C]

| | |
|---------------------------------|--|
| 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% For L-N Voltage >20V, 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 |

RESOLUTION :

| PT Ratio x CT Ratio | kWh | Pulse |
|---------------------|------|-------|
| <150 | 0.1K | 0.1K |
| ≥150 | 1K | 1K |

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 :

- Read complete instructions prior to installation and operation of the unit.
- Risk of electric shock.
- 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 :**

- To prevent the risk of electric shock, power supply to the equipment must be kept OFF while doing the wiring arrangement.
- Wiring shall be done strictly according to the terminal layout. Confirm that all connections are correct.
- Use lugged terminals.
- To reduce electromagnetic interference use of wires with adequate ratings and twists of the same in equal size shall be made with shortest connections.
- Layout of connecting cables shall be away from any internal EMI source.
- Cable used for connection to power source, must have a cross section of 0.5mm² to 2.5mm² (20 to 14AWG ; 75°C (minimum)). These wires shall have current carrying capacity of 6A.
- Copper cable should be used (Stranded or Single core cable).
- Before attempting work on device, ensure absence of voltages using appropriate voltage detection device.

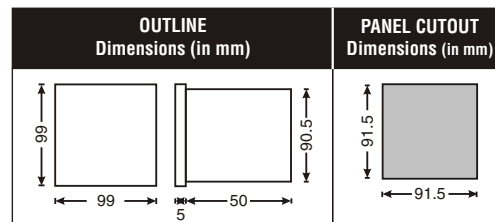
INSTALLATION GUIDELINES**CAUTION :**

- 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.
- 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.
- 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.
- 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.
- The equipment shall not be installed in environmental conditions other than those mentioned in this manual.
- 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.

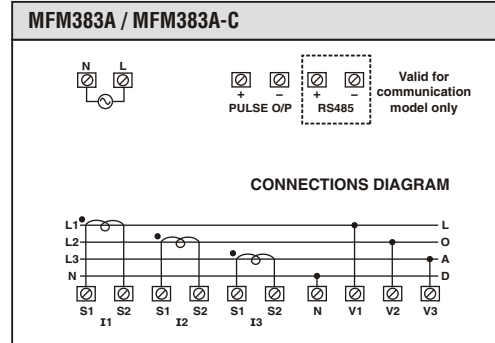
MECHANICAL INSTALLATION

For installing the meter

- Prepare the panel cutout with proper dimensions as shown below.
- 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.
- 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**

- The equipment should be cleaned regularly to avoid blockage of ventilating parts.
- 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 3 dedicated keys labelled as VI, VAF, P. Use these 3 keys to read meter parameters. Simply press these keys to read the parameters.

| KEY PRESS | ONLINE PAGE DESCRIPTION |
|-------------|---|
| Press "VI" | <p>The 1st screen : (Page 1) Displays line to neutral voltage of 3 phases.</p> <p>The 2nd screen : (Page 2) Displays line to line voltage of 3 phases.</p> <p>The 3rd screen : (Page 3) Displays phase current of 3 phases.</p> <p>Note : For 3 Ø 3 W system, only the 2nd and 3rd screen available</p> |
| Press "VAF" | <p>The 1st screen : (Page 4) Displays voltage, current of 1st phase and frequency.</p> <p>The 2nd screen : (Page 5) Displays voltage, current of 2nd phase and frequency.</p> <p>The 3rd screen : (Page 6) Displays voltage, current of 3rd phase and frequency.</p> <p>The 4th screen : (Page 7) Displays average value of line to neutral voltage, current of three phases and frequency.</p> <p>The 5th screen : (Page 8) Displays average value line to line voltage, current and Power factor of three phases.</p> <p>Note : For 3 Ø 3 W system, only the 1st, 2nd, 3rd and 5th screen available. For 3 Ø - 4 W : Display Line to Neutral Voltage For 3 Ø - 3 W : Display Line to Line Voltage</p> |
| Press "P" | <p>The 1st screen : (Page 9) Displays power factor of 3 phase.</p> <p>The 2nd screen : (Page 10) Displays active power of 3 phase.</p> <p>The 3rd screen : (Page 11) Displays reactive power of 3 phase.</p> <p>The 4th screen : (Page 12) Displays apparent power of 3 phase.</p> <p>The 5th screen : (Page 13) Displays active power, reactive power and power factor of 1st phase.</p> <p>The 6th screen : (Page 14) Displays active power, apparent power and power factor of 1st phase.</p> <p>The 7th screen : (Page 15) Displays active power, reactive power and power factor of 2nd phase.</p> <p>The 8th screen : (Page 16) Displays active power, apparent power and power factor of 2nd phase.</p> <p>The 9th screen : (Page 17) Displays active power, reactive power and power factor of 3rd phase.</p> <p>The 10th screen : (Page 18) Displays active power, apparent power and power factor of 3rd phase.</p> |

| KEY PRESS | ONLINE PAGE DESCRIPTION |
|-----------|---|
| Press "P" | <p>The 11th screen : (Page 19) Displays total active power, reactive power and power factor of 3 phases.</p> <p>The 12th screen : (Page 20) Displays total active power, apparent power and power factor of 3 phases.</p> <p>Note : For 3 Ø - 3 W system only the 11th and 12th screen available.</p> |
| Press "E" | <p>The 1st screen : Displays active energy of three phase.</p> <p>The 2nd screen : Displays reactive energy of three phase.</p> <p>The 3rd screen : Displays apparent energy of three phase.</p> <p>Note : 1) Only 1st screen will be displays of active energy when active select in configuration. 2) Energy parameter and Energy reading toggle automatically at the rate of 2 sec when select all in energy selection in configuration.</p> |

AUTOMATIC / MANUAL MODE DESCRIPTION

Press (▼) key 3 sec. to toggle between Automatic and Manual mode.

Note : By default unit operates in automatic mode. In automatic mode online pages scroll automatically at the rate of 5 sec. 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 5sec., unit resumes automatic mode.

SERIAL NUMBER DESCRIPTION

Press 4th key (←) for 10sec. to display 8 digit serial number on first and second row.

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 (←) and (→) keys for 3sec. to enter or exit from configuration menu.
- Use (▼) and (▲) keys for increasing and decreasing parameters value respectively.
- Use (←) key to go back to previous page.
- Use (→) key to save the setting and move on next page.

| Config page. | Function | Range or Selection | Factory Setting |
|--------------|-------------------|---------------------------|-----------------|
| | Password | 0000 to 9998 | 10 |
| 1 | Change Password | No / Yes | No |
| 1.1 | New Password | 0000 to 9998 | 10 |
| 2 | Network Selection | 3P3W and 3P4W | 3P4W |
| 3 | CT Secondary | 1A or 5A | 5 |
| 4 | CT Primary | 1A, 5A to 10,000A(10.0kA) | 5 |
| 5 | PT Secondary | 100V to 500V | 350 |
| 6 | PT primary | 100V to 10000V | 350 |

| Config page. | Function | Range or Selection | Factory Setting |
|--------------|-----------------------|--|-----------------|
| 7 | Energy selection | Active / All | Active |
| * 8 | Slave Id | 1 to 255 | 1 |
| * 9 | Baud Rate | 300, 600, 1200, 2400, 4800, 9600 and 19200 | 9600 |
| * 10 | Parity | None, Even, Odd | None |
| * 11 | Stop Bit | 1 or 2 | 1 |
| 12 | Back Light | 0 to 7200 sec. | 0000 |
| 13 | Max Page | 1 to 20 | 20 |
| 14 | Change Sequence | No / Yes | No |
| 14.01 | Page Sequence 1 | 1 to 20 | 1 |
| 14.02 | Page Sequence 2 | 1 to 20 | 2 |
| 14.03 | Page Sequence 3 | 1 to 20 | 3 |
| 14.04 | Page Sequence 4 | 1 to 20 | 4 |
| 14.05 | Page Sequence 5 | 1 to 20 | 5 |
| 14.06 | Page Sequence 6 | 1 to 20 | 6 |
| 14.07 | Page Sequence 7 | 1 to 20 | 7 |
| 14.08 | Page Sequence 8 | 1 to 20 | 8 |
| 14.09 | Page Sequence 9 | 1 to 20 | 9 |
| 14.10 | Page Sequence 10 | 1 to 20 | 10 |
| 14.11 | Page Sequence 11 | 1 to 20 | 11 |
| 14.12 | Page Sequence 12 | 1 to 20 | 12 |
| 14.13 | Page Sequence 13 | 1 to 20 | 13 |
| 14.14 | Page Sequence 14 | 1 to 20 | 14 |
| 14.15 | Page Sequence 15 | 1 to 20 | 15 |
| 14.16 | Page Sequence 16 | 1 to 20 | 16 |
| 14.17 | Page Sequence 17 | 1 to 20 | 17 |
| 14.18 | Page Sequence 18 | 1 to 20 | 18 |
| 14.19 | Page Sequence 19 | 1 to 20 | 19 |
| 14.20 | Page Sequence 20 | 1 to 20 | 20 |
| * 15 | Endianness | LSRF/MSRF | MSRF |
| 16 | Factory Default | No / Yes | No |
| * 17 | Reset Energy | No / Yes | No |
| 17.1 | Password | 0001 to 9999 | 11 |
| 17.2 | Reset Active Energy | No / Yes | No |
| 17.3 | Reset Reactive Energy | No / Yes | No |
| 17.4 | Reset Apparent Energy | No / Yes | No |

* Marked parameters are available only in MFM383A-C.

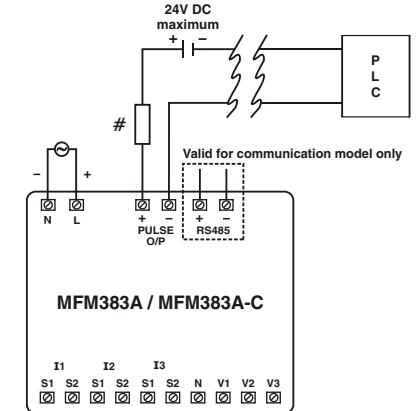
- For resetting energy parameters user will be prompted for password. If correct password is entered, the user will be able to reset all energy parameters. This password will be value which will be greater than the configuration password by 1.

NETWORK SELECTION AND WIRING INPUT

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

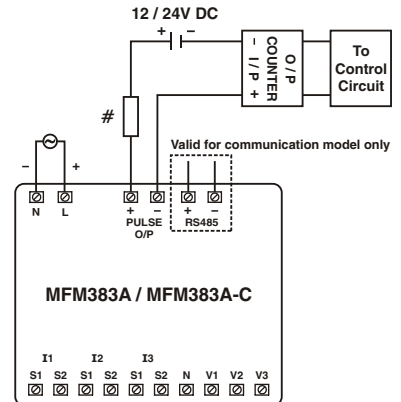
APPLICATION OF PULSE OUTPUT

● PROCESS INTEGRATION



Pulse output from MFM383A 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 MFM383A 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.

Note : + and - on aux. supply is applicable only for 24V product

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

MODBUS REGISTER ADDRESSES LIST
Readable parameters from MFM383A-C : [Length (Register) : 2 ; Data Structure : Float]

| Address | Hex Address | Parameter | Address | Hex Address | Parameter |
|---------|-------------|--------------------|---------|-------------|---|
| 30000 | 0x00 | Voltage V1N | 30034 | 0x22 | kVA3 |
| 30002 | 0x02 | Voltage V2N | 30036 | 0x24 | kVAr1 |
| 30004 | 0x04 | Voltage V3N | 30038 | 0x26 | kVAr2 |
| 30006 | 0x06 | Average Voltage LN | 30040 | 0x28 | kVAr3 |
| 30008 | 0x08 | Voltage V12 | 30042 | 0x2A | Total kW |
| 30010 | 0x0A | Voltage V23 | 30044 | 0x2C | Total kVA |
| 30012 | 0x0C | Voltage V31 | 30046 | 0x2E | Total kVAr |
| 30014 | 0x0E | Average Voltage LL | 30048 | 0x30 | PF1 |
| 30016 | 0x10 | Current I1 | 30050 | 0x32 | PF2 |
| 30018 | 0x12 | Current I2 | 30052 | 0x34 | PF3 |
| 30020 | 0x14 | Current I3 | 30054 | 0x36 | Average PF |
| 30022 | 0x16 | Average Current | 30056 | 0x38 | Frequency |
| 30024 | 0x18 | kW1 | 30058 | 0x3A | kWh |
| 30026 | 0x1A | kW2 | 30060 | 0x3C | kVAh |
| 30028 | 0x1C | kW3 | 30062 | 0x3E | kVArh |
| 30030 | 0x1E | kVA1 | 30064 | 0x40 | Serial Number (Data Structure : Hex) |
| 30032 | 0x20 | kVA2 | | | |

Readable / writable parameters :

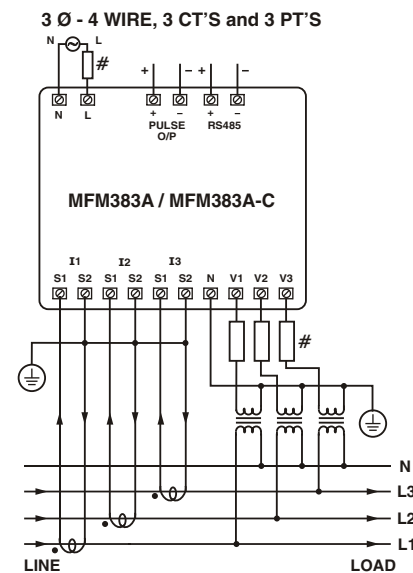
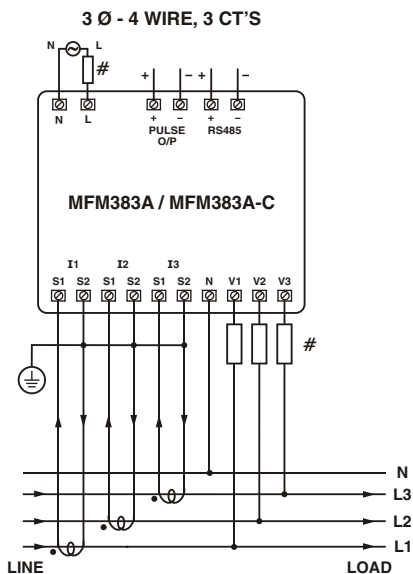
| Address | Hex Address | Parameter | Range | | Length (Register) | Data Structure |
|---------|-------------|-------------------------------|------------------|----------------------|-------------------|----------------|
| | | | Min value | Max value | | |
| 40000 | 0x00 | Password | 0 | 9998 | 1 | Integer |
| | | | Value | Meaning | | |
| 40001 | 0x01 | N/W selection | 0 | 3P-4W | 1 | Integer |
| | | | 1 | 3P-3W | 1 | Integer |
| | | | Min Value | Max Value | | |
| 40002 | 0x02 | CT Secondary | 1 | 5 | 1 | Integer |
| 40003 | 0x03 | CT primary (CT Secondary = 5) | 5 | 10000 | 1 | Integer |
| | | CT primary (CT Secondary = 1) | 1 | 10000 | | |
| 40004 | 0x04 | PT Secondary | 100 | 500 | 1 | Integer |
| 40005 | 0x05 | PT primary | 100 | 10000 | 2 | Integer |
| 40007 | 0x07 | Slave Id | 1 | 255 | 1 | Integer |
| | | | Value | Meaning (bps) | | |
| 40008 | 0x08 | Baud rate | 0x0000 | 300 | 1 | Integer |
| | | | 0x0001 | 600 | | |
| | | | 0x0002 | 1200 | | |
| | | | 0x0003 | 2400 | | |
| | | | 0x0004 | 4800 | | |
| | | | 0x0005 | 9600 | | |
| | | | 0x0006 | 19200 | | |

MODBUS register addresses list *continued*
Readable / writable parameters from MFM383A-C :

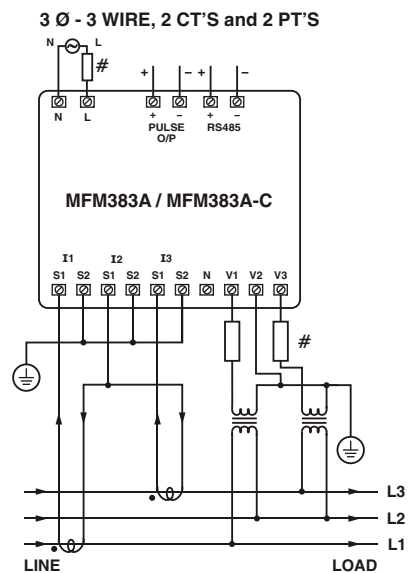
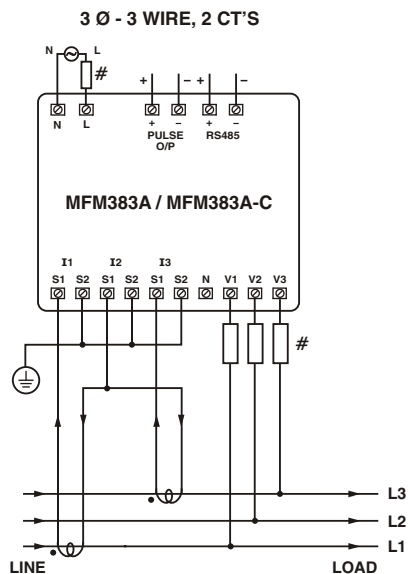
| Address | Hex Address | Parameter | Range | | Length (Register) | Data Structure |
|---------|-------------|-----------------------|-------------------------------------|--------------------------------|-------------------|----------------|
| | | | Value | Meaning | | |
| 40009 | 0x09 | Parity | 0x0000 | None | 1 | Integer |
| | | | 0x0001 | Odd | | |
| | | | 0x0002 | Even | | |
| 40010 | 0x0A | Stop bit | 0x0000 | 1 | 1 | Integer |
| | | | 0x0001 | 2 | | |
| 40011 | 0x0B | Factory Default | 1 | Set to factory setting range | 1 | Integer |
| 40012 | 0x0C | Reset kWh | 1 | Reset Total Active Energy | 1 | Integer |
| 40013 | 0x0D | Reset kVAh | 1 | Reset Total Apparent Energy | 1 | Integer |
| 40014 | 0x0E | Reset kVArh | 1 | Reset Total Reactive Energy | 1 | Integer |
| 40015 | 0x0F | Auto Mode Pages | Min Value : 1 | Max Value : 20 | 1 | Integer |
| | | | Page No | Meaning | | |
| 40016 | 0x10 | Page Address Sequence | 1- 20 | 1- First Page ; 20-Last Page | 1 | Integer |
| 40017 | 0x11 | Page Address Sequence | 1- 20 | 1- First Page ; 20-Last Page | 1 | Integer |
| 40018 | 0x12 | Page Address Sequence | 1- 20 | 1- First Page ; 20-Last Page | 1 | Integer |
| 40019 | 0x13 | Page Address Sequence | 1- 20 | 1- First Page ; 20-Last Page | 1 | Integer |
| 40020 | 0x14 | Page Address Sequence | 1- 20 | 1- First Page ; 20-Last Page | 1 | Integer |
| 40021 | 0x15 | Page Address Sequence | 1- 20 | 1- First Page ; 20-Last Page | 1 | Integer |
| 40022 | 0x16 | Page Address Sequence | 1- 20 | 1- First Page ; 20-Last Page | 1 | Integer |
| 40023 | 0x17 | Page Address Sequence | 1- 20 | 1- First Page ; 20-Last Page | 1 | Integer |
| 40024 | 0x18 | Page Address Sequence | 1- 20 | 1- First Page ; 20-Last Page | 1 | Integer |
| 40025 | 0x19 | Page Address Sequence | 1- 20 | 1- First Page ; 20-Last Page | 1 | Integer |
| 40026 | 0x1A | Page Address Sequence | 1- 20 | 1- First Page ; 20-Last Page | 1 | Integer |
| 40027 | 0x1B | Page Address Sequence | 1- 20 | 1- First Page ; 20-Last Page | 1 | Integer |
| 40028 | 0x1C | Page Address Sequence | 1- 20 | 1- First Page ; 20-Last Page | 1 | Integer |
| 40029 | 0x1D | Page Address Sequence | 1- 20 | 1- First Page ; 20-Last Page | 1 | Integer |
| 40030 | 0x1E | Page Address Sequence | 1- 20 | 1- First Page ; 20-Last Page | 1 | Integer |
| 40031 | 0x1F | Page Address Sequence | 1- 20 | 1- First Page ; 20-Last Page | 1 | Integer |
| 40032 | 0x20 | Page Address Sequence | 1- 20 | 1- First Page ; 20-Last Page | 1 | Integer |
| 40033 | 0x21 | Page Address Sequence | 1- 20 | 1- First Page ; 20-Last Page | 1 | Integer |
| 40034 | 0x22 | Page Address Sequence | 1- 20 | 1- First Page ; 20-Last Page | 1 | Integer |
| 40035 | 0x23 | Page Address Sequence | 1- 20 | 1- First Page ; 20-Last Page | 1 | Integer |
| 40036 | 0x24 | Backlight | Min Value : 0 (Always ON) | Max Value (Sec.) : 7200 | 1 | Integer |
| 40037 | 0x25 | Energy Selection | 0 | Active | 1 | Integer |
| | | | 1 | All | 1 | Integer |
| 40070 | 0x46 | Change Endianess | Value : 0x0000 | Meaning : LSRF | 1 | Integer |
| | | | Value : 0x0001 | Meaning : MSRF | 1 | Integer |

TYPICAL WIRING DIAGRAM

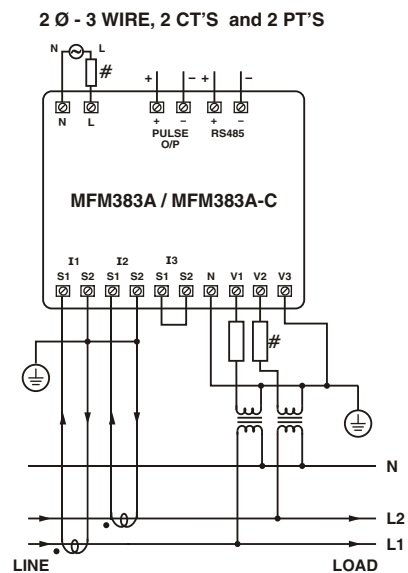
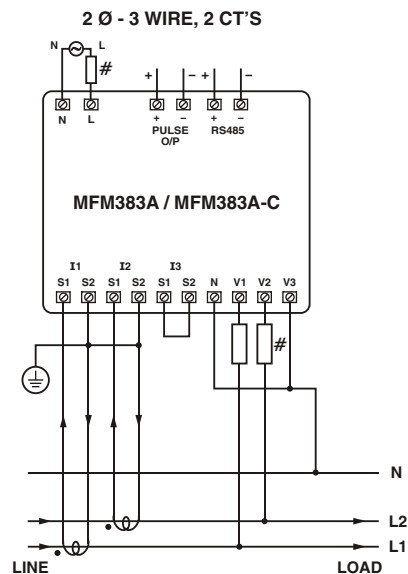
3 PHASE 4-WIRE (COMMONLY USED)



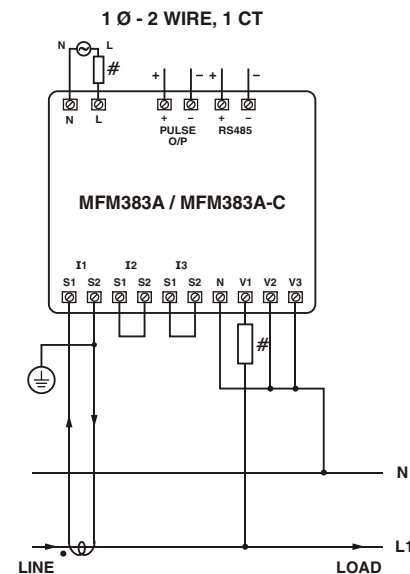
3 PHASE 3-WIRE



2 PHASE - 3 WIRE

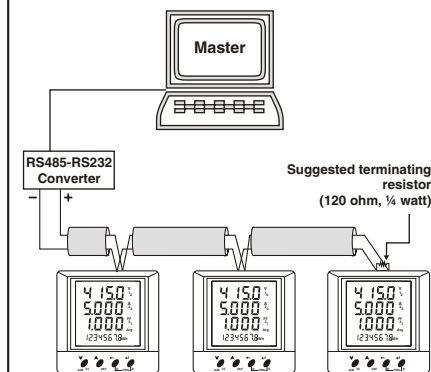


1 PHASE - 2 WIRE



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

CONNECTION DIAGRAM FOR COMMUNICATION



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

(Specifications are subject to change, since 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. : +91-22-41 418 419/430 | Fax No. : +91-22-28471733
Toll free : 1800 227 353 (BSNL/MTNL Subscribers only)
Website : www.selec.com | Email : sales@selec.com

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