Operating / 1004 / MFM384 / Ver1, OP278-V01.

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Creating Best Value

MFM384

Multifunction Meter

OPERATING INSTRUCTIONS

Operating / 1004 / MFM384 / Ver1, OP278-V01.

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Note

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Config page.	Function	Value or Selection	Factory Setting
13.7	Page sequence 7	_____	7
13.8	Page sequence 8	_____	8
13.9	Page sequence 9	_____	9
13.10	Page sequence 10	_____	10
13.11	Page sequence 11	_____	11
13.12	Page sequence 12	_____	12
13.13	Page sequence 13	_____	13
13.14	Page sequence 14	_____	14
13.15	Page sequence 15	_____	15

ABOUT MFM384

A suitable meter for the measurement of parameters such as voltage, current, power factor, frequency, power and energy. Features such as pulse output, communication are available thereby providing a complete solution for many measurement needs.

APPLICATION AREA:

Electric Automation SCADA System:
MFM384 can be used as Remote Terminal Unit (RTU) for monitoring purpose in a SCADA System. All measured data is available through RS485 communication ports with the Modbus Protocol.

Energy Management System / Building Management System:
MFM384 can be used to monitor power and energy parameters of an organisation which can be transmitted to main control room through RS485

HEAVY INDUSTRIES:
MFM384 is a suitable meter for heavy industries because of its ability to function even in rough conditions.

APPLICATION FIELD:

1. Power Transmission and Distribution field
2. Power System Protection Field
3. Industry Automation
4. Large UPS System

Note: Please read this manual carefully & completely before installing / operating MFM384.

Specifications subject to change as development is a continuous process

Overview

SALIENT FEATURES

- 4 lines, 4 digits per line, 8 digits for energy
- Bar graph for current indication
- Network supported: 1 Ø 2 wire, 1 Ø 3 wire, 2 Ø 3 wire, 3 Ø 3 wire, 3 Ø 4 wire
- User programmable network selection
- LCD with backlight
- User programmable ON time for backlight
- Auto / manual page scrolling
- User programmable page sequence for page displayed in auto mode
- Measures all electrical parameters (RMS Voltage, Current, Active power, Reactive power, Apparent power, Power factor, Frequency, Active energy, Reactive energy & Apparent energy)
- Programmable CT/ PT primary, CT/PT secondary
- Memory retention for ten years
- Potential free Pulse output for energy
- 90 to 270V AC auxiliary supply
- RS485 communication (MODBUS Protocol)
- Protection covering for terminal screws

ORDER CODE

MFM384

Config page.	Function	Value or Selection	Factory Setting
	Password		1000
1	Change Password		No
1.1	New Password		-
2	Network Selection		3P4W
3	CT Secondary		5
4	CT Primary		00005
5	PT Secondary		350
6	PT primary		350
7	Slave Id		001
8	Baud Rate		9600
9	Parity		None
10	Stop Bit		1
11	Back Light		0000
12	Max Page Auto		15
13	Change Page Sequence		No
13.1	Page sequence 1		1
13.2	Page sequence 2		2
13.3	Page sequence 3		3
13.4	Page sequence 4		4
13.5	Page sequence 5		5
13.6	Page sequence 6		6

Description of Parameter & Symbols

1. **VOLTAGE:** True RMS value of three phase voltage, three line to line voltages and their average values are measured and displayed on MFM384.

2. **CURRENT:** True RMS value of three phase currents and their average are measured and displayed in MFM384.There is also Bar graph presentation for current in percentage form.

3. **POWER FACTOR:** Individual and average power factor displayed on MFM384

4. **ACTIVE POWER (P):** Three phase active power and system total active power are measured and displayed on MFM384.

5. **REACTIVE POWER(Q):** Three phase reactive power and total reactive power of the system are measured and displayed on MFM384.

6. **APPARENT POWER (S):** Three phase apparent power and total apparent power of the system are measured and displayed on MFM384.

7. **FREQUENCY:** The frequency of available voltage input is measured as system frequency.

8. **ENERGY (kWh, kVArh, kVAh):** Total Active, Reactive and Apparent energy of the system is measured and displayed on MFM 384.

9. **PULSE O/P:** DC pulse output is generated by the MFM384 which can be used to interface MFM384 with SCADA systems.

10. '**INT**' : It indicates the integration of power available in the transmission lines. It blinks once after every 5 sec.

11. '⇌' : This symbol indicates that communication is in progress.

Overview

Display & Key description

1. Bargraph
   Display current in bargraph format

2. 4 lines of seven segment digits in metering area
   Display parameters such as voltage, Current, Power factor, Power & Frequency

3. Unit (V, A, PF, Hz, kW, kVAr, kVA)
   Indicates unit of parameter to be measured

Voltage: V, kV	Current: A
Active Power: kW, MW	Reactive power: kVAr, MVAr
Apparent power: kVA, MVA	Frequency: Hz,
Energy: kWh, MWh	Reactive energy: kVArh, MVArh
Apparent energy: kVAh, MVAh	

4. Integration of energy: Energy accumulation indication

5. Keypad: keypad with six dual function keys (HMI or Programming)

6. Energy: 8 dedicated digits for energy (Active, Reactive & Apparent)

7. Backlight: Backlight LCD display (ON / OFF time programable, auto ON on key press)

8. Phase (1, 2, 3, 1-2, 2-3, 3-1) : Display phase to neutral or phase to phase values

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Technical Overview

Functional Descriptions	
Description	MFM384
Display	➤ Liquid crystal display with backlight ➤ 4 lines, 4 digits per line to show all electrical parameters ➤ 5th line, 8 digits to show energy ➤ Bar graph for current indication
LCD Indications	➤ INT: Integration of energy ➤ PRG: Unit is in configuration menu ➤ [symbol] : This symbols indicates communication is in progress
Display update time	➤ 1 sec for all parameter
Display Scrolling	Auto / Manual
Online Pages	Customized page selection from available standard pages (selection via configuration menu)
Input Point Electrical Specification	
Electrical input type	1 Ø 2 wire, 1 Ø 3 wire, 2 Ø 3 wire, 3 Ø 3 wire, 3 Ø 4 wire
Rated input voltage	11 to 300V AC max phase to neutral 19 to 519V AC max phase to phase
Rated input current	Nominal 5A AC (11mA minimun) 6A max (External CT is advised to connect)
Frequency range	45 to 65 Hz
CT Primary	1A or 5A to 10,000A (Programmable for any value) Note: 1A or 5A depends upon the CT secondary
CT Secondary	Programmable 1A or 5A
PT Primary	100V to 500kV (Programmable for any value)
PT Secondary	100 to 500V AC (L-L) Programmable for any value
Accuracy Class	Class 0.5 / 1
Burden	0.5 VA per phase @ 5A

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Range		Length (Register)	Data Structure
Write Value	Meaning		
Value			
1	15	1	Integer
Page No	**Meaning**		
1- 15	1- First Page ; 15-Last Page	1	Integer
1- 15	1- First Page ; 15-Last Page	1	Integer
1- 15	1- First Page ; 15-Last Page	1	Integer
1- 15	1- First Page ; 15-Last Page	1	Integer
1- 15	1- First Page ; 15-Last Page	1	Integer
1- 15	1- First Page ; 15-Last Page	1	Integer
1- 15	1- First Page ; 15-Last Page	1	Integer
1- 15	1- First Page ; 15-Last Page	1	Integer
1- 15	1- First Page ; 15-Last Page	1	Integer
1- 15	1- First Page ; 15-Last Page	1	Integer
1- 15	1- First Page ; 15-Last Page	1	Integer
1- 15	1- First Page ; 15-Last Page	1	Integer
1- 15	1- First Page ; 15-Last Page	1	Integer
1- 15	1- First Page ; 15-Last Page	1	Integer
1- 15	1- First Page ; 15-Last Page	1	Integer

MODBUS register addresses list *continued*		
Readable parameters from MFM384		
Address	**Hex Address**	**Parameter**
40017	0x11	Auto Mode Pgs
40018	0x12	Page Address Sequence
40019	0x13	Page Address Sequence
40020	0x14	Page Address Sequence
40021	0x15	Page Address Sequence
40022	0x16	Page Address Sequence
40023	0x17	Page Address Sequence
40024	0x18	Page Address Sequence
40025	0x19	Page Address Sequence
40026	0x1A	Page Address Sequence
40027	0x1B	Page Address Sequence
40028	0x1C	Page Address Sequence
40029	0x1D	Page Address Sequence
40030	0x1E	Page Address Sequence
40031	0x1F	Page Address Sequence
40032	0x20	Page Address Sequence

Serial Communication	
Interface standard & protocol	RS485 & MODBUS RTU
Communication address	1 to 255
Transmission mode	Half duplex
Data types	Float and Integer
Transmission distance	500 m maximum
Transmission speed	300, 600,1200, 2400, 4800, 9600,19200 (in bps)
Parity	None, Odd, Even
Stop bits	1 or 2
Response time	100 ms (Independent of baud rate)

Pulse Output	
Pulse Output (type)	Opto-Isolated
Pulse Voltage	24V DC max.
Pulse Current	100mA max.
Pulse Width	100 ms ± 50 ms.

General Specification	
Auxiliary Supply	90 to 270V AC/DC
Operating frequency	50/60Hz
Power Consumption	0.5 VA max.@5A per phase
Temperature	Operating temperature: 0 to +50°C Storage temperature: -20 to +75°C
Humidity	85% RH
Mounting	Panel mounting
Weight	320 gms

Parameter Measured / Calculated		
Parameters	**Measured values**	**Unit**
Voltage	V1N, V2N, V3N, V12, V23, V31, Vavg L-N, Vavg L-L	V
Current	I_1, I_2, I_3, I_{Avg}	A
Active Power	kW_1, kW_2, kW_3 & Total kW	kW
Reactive Power	$kVAr_1$, $kVAr_2$, $kVAr_3$ and Total kVAr	kVAr
Apparent Power	kVA_1, kVA_2, kVA_3 & Total kVA	kVA
Power Factor	Pf_1, Pf_2, Pf_3, Avg Pf	-
Frequency	Hz	Hz
Active Energy	Total kWh	kWh
Reactive Energy	Total kVArh	kVArh
Apparent Energy	Total kVAh	kVAh

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

NOTE:

1) For voltage, Current, Power, resolution is automatically adjusted
2) For power factor, resolution is 0.001
3) INT blinks after every 5 seconds, if load is connected on any one of 3 phase

Range		Length (Register)	Data Structure
Write Value	**Meaning**		
Value	**Meaning**		
1	255	1	Integer
Value	**Baud rate**		
0x0000	300	1	Integer
0x0001	600		
0x0002	1200		
0x0003	2400		
0x0004	4800		
0x0005	9600		
0x0006	19200		
Value	**Parity**		
0x0000	None	1	Integer
0x0001	Odd		
0x0002	Even		
Min value	**Maximum value**		
0	7200	1	Integer
1	Set to factory setting range		
Value	**Meaning**		
1	Reset Total Active Energy	1	Integer
1	Reset Total Apparent Energy	1	Integer
1	Reset Total Reactive Energy	1	Integer

MODBUS register addresses list *continued*		
Readable parameters from MFM384		
Address	**Hex Address**	**Parameter**
40007	0x07	Slave Id
40008	0x08	Baud rate
40009	0x0A	Parity
40010	0x0C	Backlight OFF
40011	0x0D	Factory Default
40012	0x0E	Reset kWh
40013	0x0F	Reset kVAh
40014	0x10	Reset kVArh

Accuracy Table:	
Measurement	**Accuracy**
Voltage V_{L-N}	±0.5% of F.S.
Voltage V_{L-L}	±0.5% of F.S.
Average Voltage $_{L-N}$	±0.5% of F.S.
Average Voltage $_{L-L}$	±0.5% of F.S.
Current	±0.5% of F.S.
Average current	±0.5% of F.S.
Frequency	±0.1% For Voltage >20V L-N, For Voltage >35V L-L
Active Power	Class 1
Apparent power	Class 1
Reactive Power	Class 1
Power factor & Avg Pf	±0.01 PF
Active energy	Class 1
Reactive energy	Class 2
Apparent energy	Class 1

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Installation Guide

Safety Precautions

All safety related codifications, symbols and instructions that appear in this operating manual or on the equipment must be strictly followed to ensure the safety of the operating personnel as well as the instrument.
If the equipment is not handled in a manner specified by the manufacturer it might impair the protection provided by the equipment.

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

⚠ **CAUTION:** Risk of electric shock.

WIRING GUIDELINES

WARNING:

1. To prevent the risk of electric shock power supply to the equipment must be kept OFF while doing the wiring arrangement.

2. Wiring shall be done strictly according to the terminal layout. Confirm that all connections are correct.

3. Use lugged terminals.

4. To eliminate electromagnetic interference use of wires with adequate ratings and twists of the same in equal size shall be made.

5. Cable used for connection to power source, must have a cross section of 1.5mm^2. These wires shall have current carrying capacity of 6A.
6. The following safety earth symbol is used in this user's manual ⏚

	Length (Register)	Data Structure
	2	Float
	2	Float
	2	Float
	2	Float
	2	Float
	2	Float
	2	Float
	2	Float
	2	Float

Range		Length (Register)	Data Structure
Min value	**Max value**		
0	9998	1	Integer
Value	**Meaning**		
0	3P-4W	1	Integer
1	3P-3W	1	Integer
Write Value	**Meaning**		
1		1	Integer
5			
5	10000	1	Integer
1	10000		
100	520	1	Integer
100	99.9KV	2	Integer

MODBUS register addresses list *continued*		
Readable parameters from MFM384:		
Address	**Hex Address**	**Parameter**
30046	0x2E	Total kVAr
30048	0x30	PF1
30050	0x32	PF2
30052	0x34	PF3
30054	0x36	Average PF
30056	0x38	Frequency
30058	0x3A	kWh
30060	0x3C	kVAh
30062	0x3E	kVArh
Readable / writable parameters from MFM384:		
Address	**Hex Address**	**Parameter**
40000	0x00	Password
40001	0x01	N/W selection
40002	0x02	CT Secondary
40003	0x03	CT primary (CT Secondary = 5)
40004	0x04	CT primary (CT Secondary = 1)
40005	0x05	PT Secondary
40006	0x06	PT primary

Maintenance

1. The equipment should be cleaned regularly to avoid blockage of ventilating parts.

2. Clean the equipment with a clean soft cloth. Do not use Isopropyl alcohol or any other cleaning agent.

Installation Guidelines

CAUTION:

1. This equipment, being built-in-type, normally becomes a part of main control panel and in such case, the terminals do not remain accessible to the end user after installation and internal wiring.

2. Conductors must not come in contact with the internal circuitry of the equipment or else it may lead to a safety hazard that may in turn endanger life or cause electrical shock to the operator.

3. Circuit breaker or mains switch must be installed between power source and supply terminals to facilitate power 'ON' or 'OFF' function. However this switch or breaker must be installed in a convenient position normally accessible to the operator.

4. Before disconnecting the secondary of the external current transformer from the equipment, make sure that the current transformer is short circuited to avoid risk of electrical shock and injury.

CAUTION:

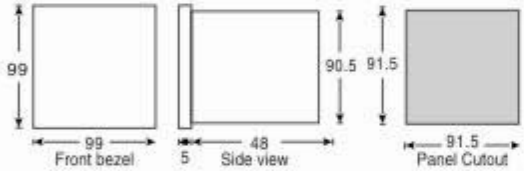
1. The equipment shall not be installed in environmental conditions other than those mentioned in this manual.

2. The equipment does not have a built-in-type fuse. Installation of external fuse of rating 275V AC/1Amp for electrical circuitry is highly recommended.

Mechanical Installation

For installing the controller

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



2. Push the meter into the panel cutout. Secure the meter in its place by pushing the clamp on the rear side. The screws, of the pane of the clamp, must be in the farthest forward slot.

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

⚠ CAUTION:

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

EMC Guidelines

EMC Guidelines:

1. Use proper input power cables with shortest connections and twisted type.

2. Layout of connecting cables shall be away from any internal EMI source.

? SERVICE DETAILS

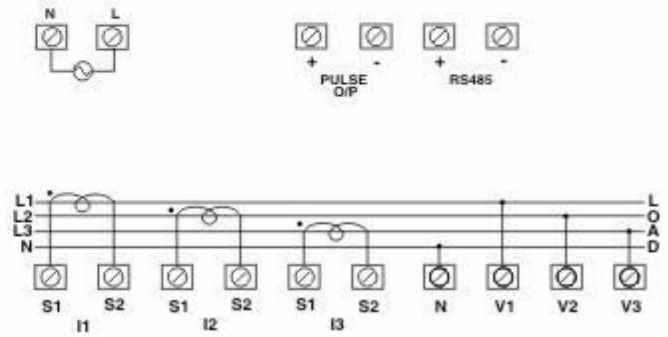
This device contains no user serviceable parts and requires special equipment and specialized engineers for repair.

NO WARRANTY ON UNIT DAMAGED DUE TO WRONG INPUT / OUTPUT WIRING CONNECTION.

	Length (Register)	Data Structure
	2	Float
	2	Float
	2	Float
	2	Float
	2	Float
	2	Float
	2	Float
	2	Float
	2	Float
	2	Float
	2	Float
	2	Float
	2	Float
	2	Float
	2	Float
	2	Float
	2	Float
	2	Float
	2	Float
	2	Float
	2	Float
	2	Float
	2	Float
	2	Float
	2	Float

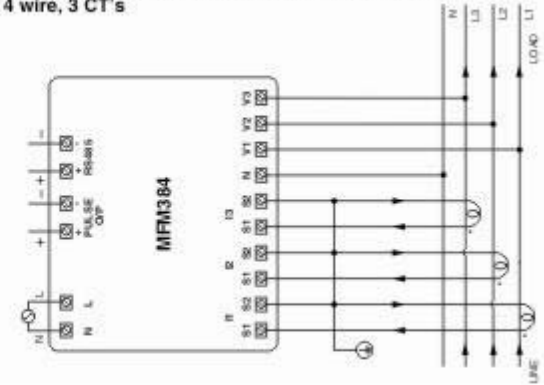
MODBUS register addresses list		
Readable parameters from MFM384:		
Address	**Hex Address**	**Parameter**
30000	0x00	Voltage V1N
30002	0x02	Voltage V2N
30004	0x04	Voltage V3N
30006	0x06	Average Voltage LN
30008	0x08	Voltage V12
30010	0x0A	Voltage V23
30012	0x0C	Voltage V31
30014	0x0E	Average Voltage 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

Terminal Diagram

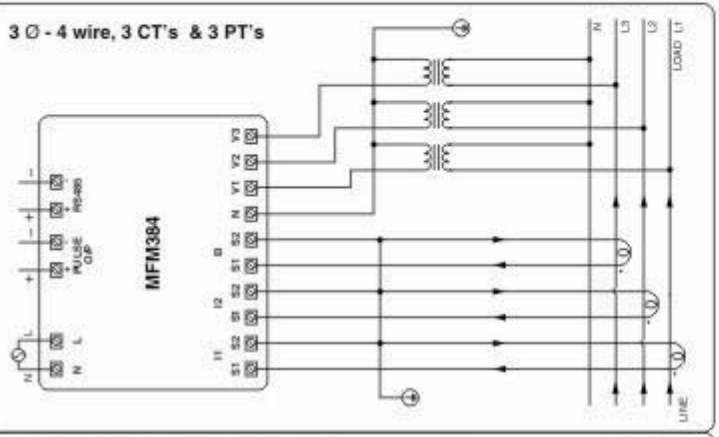


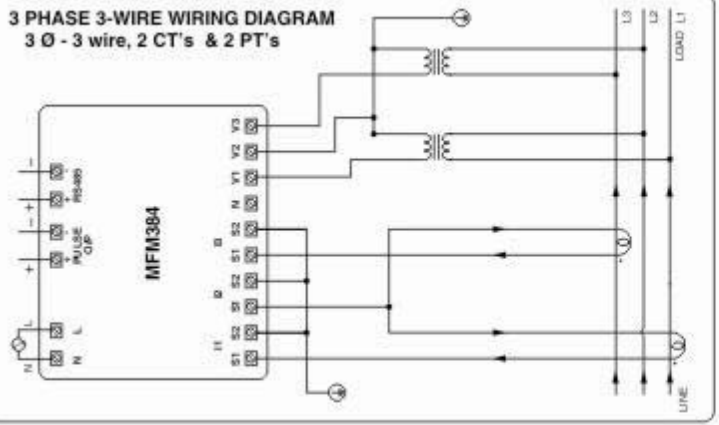
Wiring guide

3 PHASE 4-WIRE (COMMONLY USED) WIRING DIAGRAM
3 Ø - 4 wire, 3 CT's



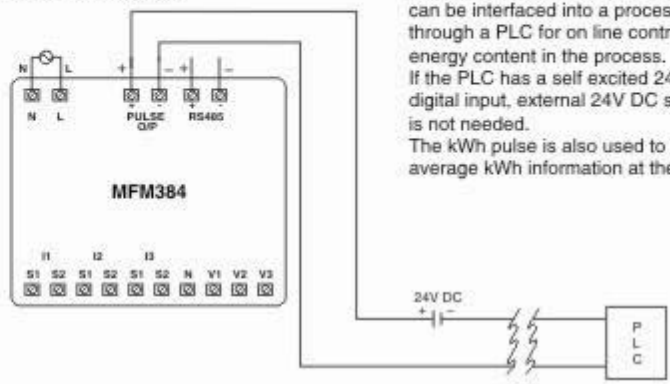
Wiring Guide





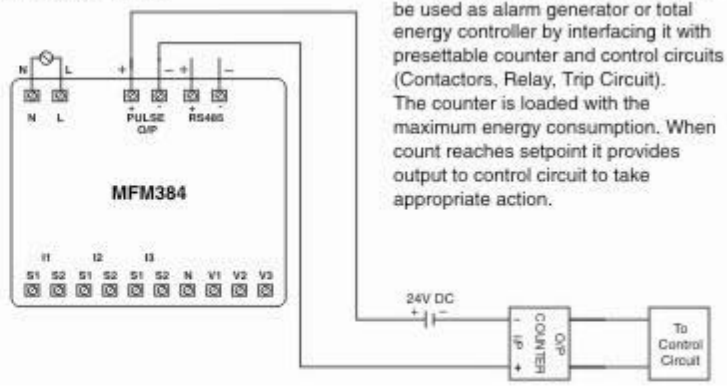
Application of Pulse Output

- **Process Integration**



Pulse output from MFM384 meter can be interfaced into a process through a PLC for on line control of energy content in the process.
If the PLC has a self excited 24V digital input, external 24V DC supply is not needed.
The kWh pulse is also used to derive average kWh information at the PLC.

- **Energy Controller**



Pulse output from MFM384 meter can be used as alarm generator or total energy controller by interfacing it with presettable counter and control circuits (Contactors, Relay, Trip Circuit).
The counter is loaded with the maximum energy consumption. When count reaches setpoint it provides output to control circuit to take appropriate action.

Configuration

Reset Active Energy
Default Setting: No
Selection: No / Yes

Note: User can reset energy by selecting 'Yes'. User should note the reading before resetting

Reset Reactive Energy
Default Setting: No
Selection: No / Yes

Note: User can reset energy by selecting 'Yes'. User should note the reading before resetting

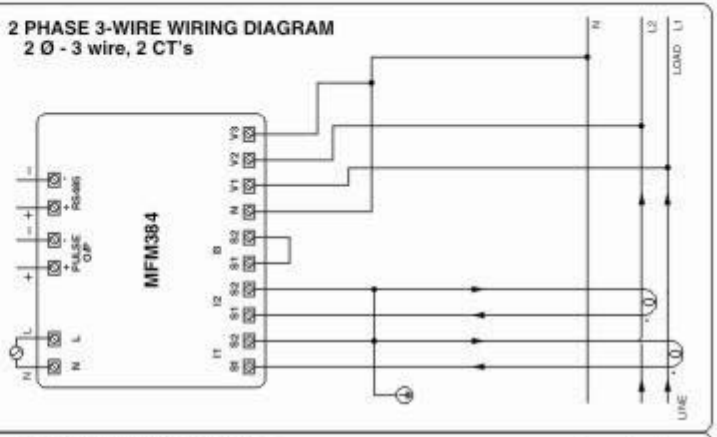
Reset Apparent Energy
Default Setting: No
Selection: No / Yes

Note: User can reset energy by selecting 'Yes'. User should note the reading before resetting.

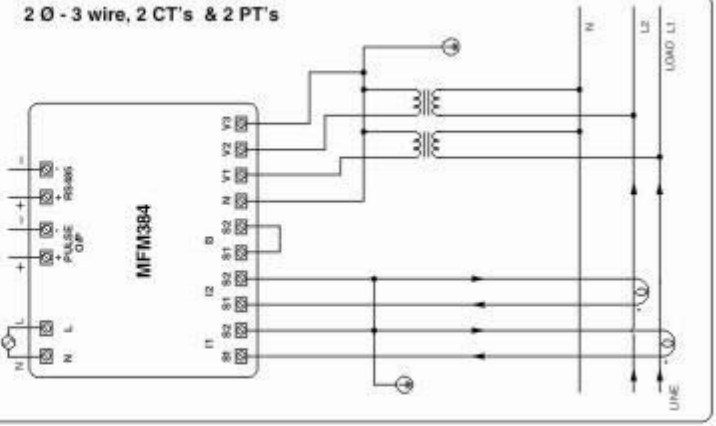
After pressing enter key configuration will move on to change password page.

Wiring Guide

2 PHASE 3-WIRE WIRING DIAGRAM
2 Ø - 3 wire, 2 CT's

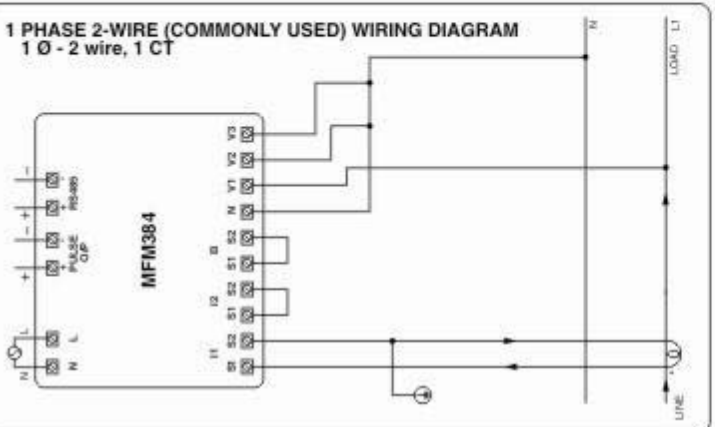


2 Ø - 3 wire, 2 CT's & 2 PT's

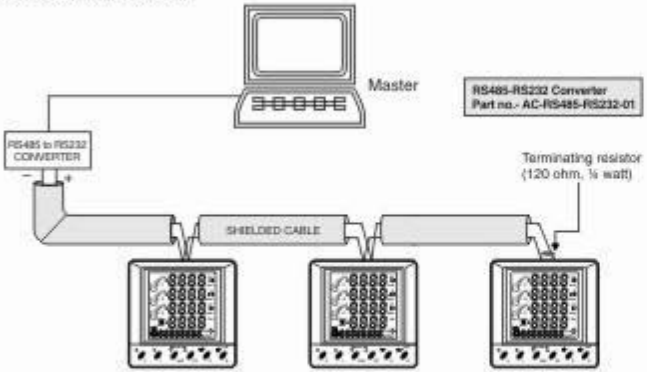


Wiring Guide

1 PHASE 2-WIRE (COMMONLY USED) WIRING DIAGRAM
1 Ø - 2 wire, 1 CT



COMMUNICATION WIRING DIAGRAM



Configuration

Factory Default
Default Setting: No
Range: No / Yes

Note: If 'Yes' selected unit will be formatted to factory default settings.
User should note all previous settings before formatting the unit.

Reset
Default Setting: No
Range: No / Yes

Note: For resetting energy parameters user has to select 'Yes' option
If option selected is 'No' the configuration will move to change password

Password
Default Setting: 1001
Selection: 0000 To 9999

Note: 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 a value which will be greater than the configuration password by 1.

Configuration

Maximum Auto Page
Default Setting: 15
Range: 1 to 15

Note: User can select maximum number of pages being displayed on the unit in auto mode.

Change Page Sequence
Default Setting: No
Range: No / Yes

Note: User can change page sequence by selecting 'Yes'
If option selected is 'No' the configuration will move to factory default page.

Page Sequence

Note: Page sequence depends on maximum page selection.
User will be prompted to change page sequence depending upon maximum page selection defined.

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.

01

X1

Press V (◄) button, the first screen shows:
- ✓ L-N Voltage and Average Voltage (V1, V2, V3 & V_{AVG})
- ✓ Bargraph indicates amount of % current present in the system (Independent of key press)
- ✓ The lower most display shows total energy (kWh, kVArh, kVAh), based on user selection

02

X2

Press V (◄) button, the second screen shows:
- ✓ L-L voltage & average L-L voltage (V 1-2, V 2-3, V 3-1, V_{AVG})
- ✓ Bargraph indicates amount of % current present in the system (Independent of key press)
- ✓ The lower most display shows total energy (kWh, kVArh, kVAh), based on user selection

Note: In 3 Ø 3 wire system only L-L voltage & average L-L voltage (V 1-2, V 2-3, V 3-1, V_{AVG}) will be displayed

03

X1

Press I (►) button, the first screen shows:
- ✓ Current (I1, I2, I3) & average current (I_{AVG})
- ✓ Bargraph indicates amount of % current present in the system (Independent of key press)
- ✓ The lower most display shows total energy (kWh, kVArh, kVAh), based on user selection

Note: In 3 Ø 3 wire system L-L current & average L-L current (I 1-2, I 2-3, I 3-1, I_{AVG}) will be displayed

Online Page Description

04

X1

Press VAF (▼) button, the first screen shows:
- ✓ Voltage (L-N), Current, Power factor of first phase (V1, I1, PF1) & Frequency (Hz)
- ✓ Bargraph indicates amount of % current present in the system (Independent of key press)
- ✓ The lower most display shows total energy (kWh, kVArh, kVAh), based on user selection

05

X2

Press VAF (▼) button, the second screen shows:
- ✓ Voltage (L-N), Current, Power factor of second phase (V2, I2, PF2) & Frequency (Hz)
- ✓ Bargraph indicates amount of % current present in the system (Independent of key press)
- ✓ The lower most display shows total energy (kWh, kVArh, kVAh), based on user selection

06

X3

Press VAF (▼) button, the third screen shows:
- ✓ Voltage (L-N), Current, Power factor of third phase (V3, I3, PF3) & Frequency (Hz)
- ✓ Bargraph indicates amount of % current present in the system (Independent of key press)
- ✓ The lower most display shows total energy (kWh, kVArh, kVAh), based on user selection

Configuration

Parity
Default Setting: None
Range: None, Even, Odd

Note: for asynchronous communication, user can select any one of three
None, Even, Odd

Stop Bit
Default Setting: 1
Range: 1 or 2

Note: for asynchronous communication, user can select any one of two
1 or 2

Backlight
Default Setting: 0 sec.
Range: 0 to 7200 sec.

Note: Backlight remains on permanently if the time programmed is 0 second. User can switch OFF the backlight by entering a value within the defined range. The backlight switches OFF after the entered time elapses & automatically switches ON for time after detection of any key press

Configuration

PT Primary
Default Setting: 350V
Range: 100V to 500kV

Note: User can select PT primary value as per external PT specifications
(Programmable for all values)

Slave ID
Default Setting : 1
Range: 1 to 255

Note: Slave Id is for communication purpose. Each meter on same RS485 network should have different address according to Modbus RTU protocol

Baud Rate
Default Setting: 9600.
Range: 300, 600, 1200, 2400, 4800, 9600 & 19200

Note: The baud rate could be on of the six, 300, 600, 1200, 2400, 4800, 9600 & 19200

Online Page Description

07

X4

Press VAF (▼) button, the fourth screen shows:
- ✓ Average Voltage (L-N), Current, Power factor of three phase (V_{AVG}, I_{AVG}, PF_{AVG}) & Frequency (Hz)
- ✓ Bargraph indicates amount of % current present in the system (Independent of key press)
- ✓ The lower most display shows total energy (kWh, kVArh, kVAh), based on user selection

Note: In 3 Ø 3 wire system only L-L / AVG voltage, L-L / AVG current, Average PF & Frequency will be displayed

08

X1

Press PF (▲) button, the first screen shows:
- ✓ Power factor of each phase (PF1, PF2, PF3) & average power factor (PF_{AVG})
- ✓ Bargraph indicates amount of % current present in the system (Independent of key press)
- ✓ The lower most display shows total energy (kWh, kVArh, kVAh), based on user selection

Note: In 3 Ø 3 wire system only average power factor will be displayed

09

X1

Press P (←) button, the first screen shows:
- ✓ Active power of each phase (P1, P2, P3) & total power (P_{SUM})
- ✓ Bargraph indicates amount of % current present in the system (Independent of key press)
- ✓ The lower most display shows total energy (kWh, kVArh, kVAh), based on user selection

Note: For 3 Ø 3 wire system, this page will not be available.

Online Page Description

10

X2

Press P (↵) button, the second screen shows:
- ✓ Reactive power of each phase (Q1, Q2, Q3) & total power (Q_{SUM})
- ✓ Bargraph indicates amount of % current present in the system (Independent of key press)
- ✓ The lower most display shows total energy (kWh, kVArh, kVAh), based on user selection

Note: For 3 Ø 3 wire system, this page will not be available.

11

X3

Press P (↵) button, the third screen shows:
- ✓ Apparent power of each phase (S1, S2, S3) & total apparent power (S_{SUM})
- ✓ Bargraph indicates amount of % current present in the system (Independent of key press)
- ✓ The lower most display shows total energy (kWh, kVArh, kVAh), based on user selection

Note: For 3 Ø 3 wire system, this page will not be available.

12

X4

Press P (↵) button, the fourth screen shows:
- ✓ Active, Reactive, Apparent power of first phase (kW1, kVAr1, kVA1) & power factor
- ✓ Bargraph indicates amount of % current present in the system (Independent of key press)
- ✓ The lower most display shows total energy (kWh, kVArh, kVAh), based on user selection

Note: For 3 Ø 3 wire system, this page will not be available.

Configuration

CT Secondary
Default Setting: 5 A
Range: 1A or 5A

Note: User can select from 1A and 5A as per external CT specification

CT Primary
Default Setting: 5 A
Range: 1A, 5A to 10,000A (10.0 kA)

Note: As per CT secondary selection, CT primary will be 1A to 10000A or 5A to 10000A (Programmable for all values)

PT Secondary
Default Setting: 350V
Range: 100V to 500V

Note: User can select from 100 to 500V as per external PT specification (Programmable for all values)

Configuration

Change Password
Default Setting: No
Range: No / Yes

Note: If user want to change default password, make selection as 'Yes' and proceed.
If selection is 'No' then configuration will move on to the network selection page.

New Password
Default Setting: 0000
Range: 0000 To 9998

Note: After selecting 'Yes' on previous page, user can set new password
Use ◄ or ► keys to move curser left or right by one digit each time.
Use ▲ or ▼ keys for increasing or decreasing parameters value

Network Selection
Default Setting: 3P4W
Range: 3P3W and 3P4W

Note: Network selection can be done as per wiring diagram given on Pg. no. 11 and selecting appropriate network selection from configuration eg. for 1 Ø 2 wire / 2 Ø 3 wire connection the network selection should be set to 3P4W and user can make the requisite hardwired connection at the terminals

Online Page Description

13

X5

Press P (↵) button, the fifth screen shows:
- ✓ Active, Reactive, Apparent power of second phase (kW2, kVAr2, kVA2) & power factor
- ✓ Bargraph indicates amount of % current present in the system (Independent of key press)
- ✓ The lower most display shows total energy (kWh, kVArh, kVAh), based on user selection

Note: For 3 Ø 3 wire system, this page will not be available.

14

X6

Press P (↵) button, the sixth screen shows:
- ✓ Active, Reactive, Apparent power of third phase (kW3, kVAr3, kVA3) & power factor
- ✓ Bargraph indicates amount of % current present in the system (Independent of key press)
- ✓ The lower most display shows total energy (kWh, kVArh, kVAh), based on user selection

Note: For 3 Ø 3 wire system, this page will not be available.

15

X7

Press P (↵) button, the seventh screen shows:
- ✓ Total Active, Reactive, Apparent power of all three phase (kW_{SUM}, $kVAr_{SUM}$, kVA_{SUM}) & power factor
- ✓ Bargraph indicates amount of % current present in the system (Independent of key press)
- ✓ The lower most display shows total energy (kWh, kVArh, kVAh), based on user selection

Note: In 3 Ø 3 wire system only total L-L power (kW, kVAr, kVA) will be displayed

Online Page Description

X1

Press E (↵) button, the first screen shows:
- ✓ Total active energy on the bottom most display, Irrespective of page being displayed
- ✓ Bargraph indicates amount of % current present in the system (Independent of key press)

Note: User can toggle between the 3 types of energy parameters (kWh, kVArh, kVAh) irrespective of page being displayed, by pressing E button

X2

Press E (↵) button, the second screen shows:
- ✓ Total apparent energy on the bottom most display, Irrespective of page being displayed
- ✓ Bargraph indicates amount of % current present in the system (Independent of key press)

X3

Press E (↵) button, the third screen shows:
- ✓ Total reactive energy on the bottom most display, Irrespective of page being displayed
- ✓ Bargraph indicates amount of % current present in the system (Independent of key press)

A/M

Press E (↵) button for 3 seconds to toggle between Auto & Manual mode.
Note: By default unit operates in auto mode.
In auto mode online pages scrolls automatically at the rate of 5 seconds per page.
In auto mode when any key is pressed, unit temporarily switches to manual mode and the appropriate page is displayed, also if no key is pressed for 5 sec, unit resumes auto mode

Configuration

There are 6 dedicated keys labelled as V, I, VAF, PF, P, E. 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 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 curser 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

Password for entering into configuration
Default Setting: 1000
Range: 0000 to 9998

Note: Access code (Password) needed for getting into configuration menu. Only the person who knows the access code can do the parameter setting