OPERATING MANUAL FOR

POWER GENIUS

(MULTIFUNCTION POWER METER)

(Model: MFM 9500)

INDUSTRIAL CONTROLS & DRIVES (INDIA) PVT. LIMITED
New No: 33 Old No:10, Mettukuppam Road, (via) Alapakkam Road,
Maduravoyal, Chennai - 600 095.
Ph: 8754422512, 531, 534
Website: www.icdipl.net e-mail : sales@icdipl.net

CONTENTS

1. General Features.......5

2. Installation.......6

    2.1. Mounting.......6

    2.2. Wiring.......6

3. Wiring Diagram.......8

4. Front Panel Features 11

    4.1 Changing the configuration Items :.......12

    4.2 Key Description.......12

5. Programming Instructions.......13

6. RUN Mode display pages.......19

7. Communication Port Details.......30

    7.1 Communication connection diagram.......33

8. Technical specification 34

POWER GENIUS

1. General Features

The Power Genius is the most ideal choice for the monitoring and controlling of electrical parameters in power distribution systems. It offers high accuracy, reliability and also real value for money. This next generation micro controller based instruments monitors over 40 vital parameters and does not require any external Transducers. This instrument is most suitable for measuring all electrical parameters in 3 phase industrial applications. It replaces several meters like Voltmeters, Ammeters, Wattmeters, Frequency meter, kVA meter, kVAR meter, pf meter and selector switches for the above in an electrical panel.

The measured informations are shown on Graphical LCD display with backlit. Four keys are provided on the front panel of the meter to access these information easily and quickly. The front panel is provided with antiglare feature for improved readability.

The measurement parameters include 3 phase voltage, 3 phase current, kVA, kW, kvar, PF, Frequency, THD, kWh, Kvah and Kvarh with Demand. All voltage, Current, Power and energy readings are true R.M.S including harmonics. The power and energy measurement is done for the full four quadrants. The energy reading is provided with imported and exported energy consumed by the consumer. The meter computes and updates the parameters in every 2 seconds.

The meter is also provided with a optional RS 485 optically isolated communication port supporting MODBUS RTU protocol. The port is very useful in networking the meters in multidrop communication and to collect datas in a centralised control room using any standard SCADA Software package like cimplicity, intellution, wonderware & citech etc.

(Note : For Every change of LT ⟷ HT or 1A ⟷ 5A or 3 Wire ⟷ 4 Wire the instrument should be switched OFF and then made ON.)

2. Installation

2.1. Mounting

The meter is housed in a compact ABS plastic enclosure of dimension 96(H) x 96(W) x 68(D)mm. The meter is suitable for panel mounting and has reliable mounting clamps to hold the meter to the panel.

The panel cut out for fixing the meter is a 92 x 92 mm. The depth behind the panel is 68mm. Always provide extra space for the connectors and wiring. The panel cut out should be punched with proper tool and should be free from burrs. Insert the meter through panel cutout from front and fix the mounting clamps provided with the meter on each side.

2.2. Wiring

2.2.1 Selection of PT & CT

The measurement of voltage and current is done using the PT voltage and CT current inputs. So the accuracy of measurement is determined by the accuracy and phase shift produced by the PT's and CT's so it is recommended to use PT's and CT's of instrument class 0.5 or better.

Also the PT's and CT's should have adequate VA rating to support the burden on the secondary side of them. The primary rating of the CT has to be selected such that the load variation lies between the dynamic range of the CT. (30% to 80% of the primary current).

2.2.2 Voltage signal connections

The MFM 9500 directly accepts voltages upto 415VAC R.M.S line to line (240VAC R.M.S line to neutral) with 10% over load capacity in case of LT selection and 110VAC R.M.S line to line (63.5 VAC R.M.S line to Neutral) with 10% over load capacity in case of HT selection. The primary of the PT is field programmable upto 330 kV.

There are four voltage input terminals marked as R, Y, B & N. The three phase input voltage should be connected to those terminals. MFM 9500 voltage input burden : 0.25VA per phase

2.2.3 Current signal connections

The MFM 9500 current inputs can accept 5A or 1A AC R.M.S (field selectable) for connecting external CT's. The CT Primary & Secondary value is field programmable. The current inputs has over load capability of 120% In both the cases.

There are three pairs of terminals marked as IR (M,L) IY (M,L) and IB (M,L) for the connection of external CT's. For proper measurements, the polarity of the CT's must be connected properly. The CT wiring must be properly done by deenergising the CT secondary by shorting it through a shorting block. The primary current of CT is field programmable upto 10000A.

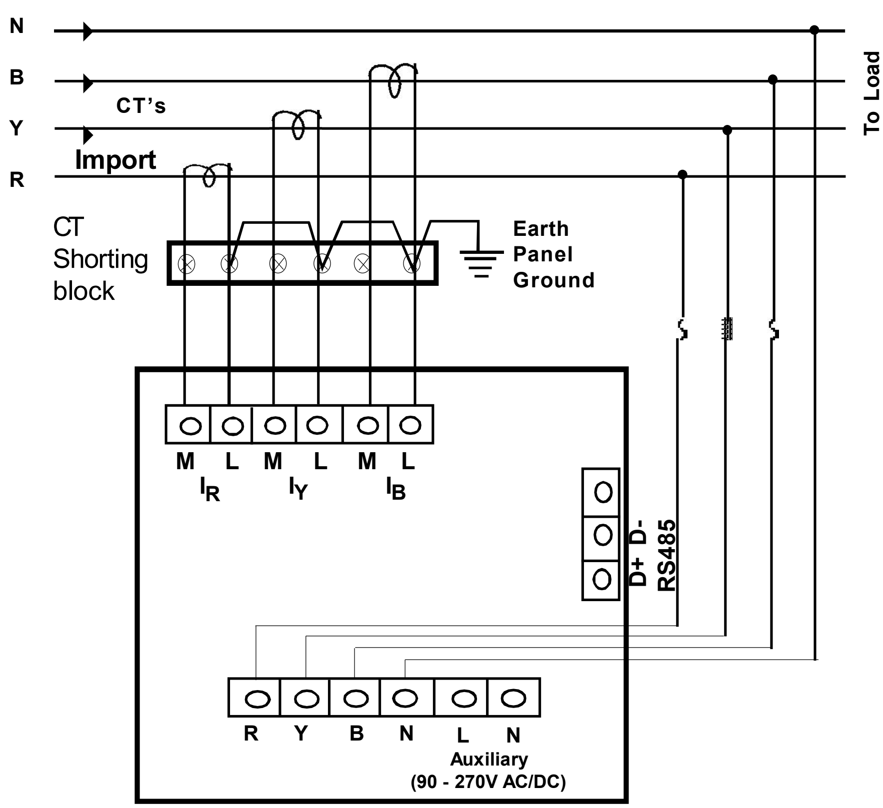
MFM 9500 Current input burden : 0.25VA per phase

3. Wiring Diagram

3.1) Three phase four wire LT systems (3 watt measurement)

Voltage Input : Direct 240V AC P-N (-20% to +10%)

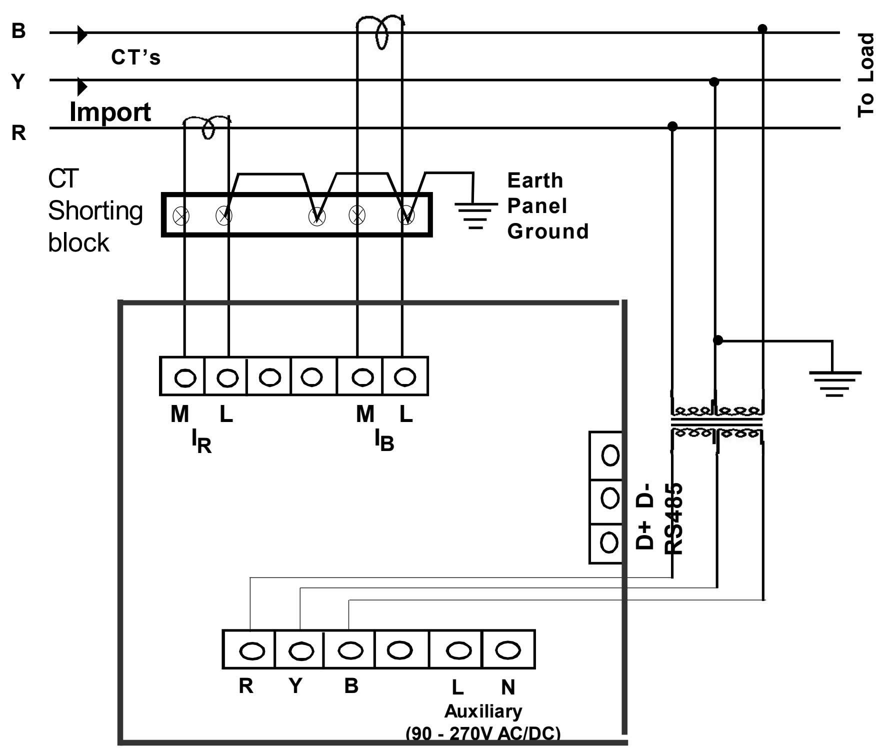
Current Input : 5/1A provide through 3 CT's



3.2) Three phase three wire HT systems (2 watt measurement)

Voltage Input : Direct 110V AC P-P (-20% to +10%)

Current Input : 5/1A provide through 2 CT's

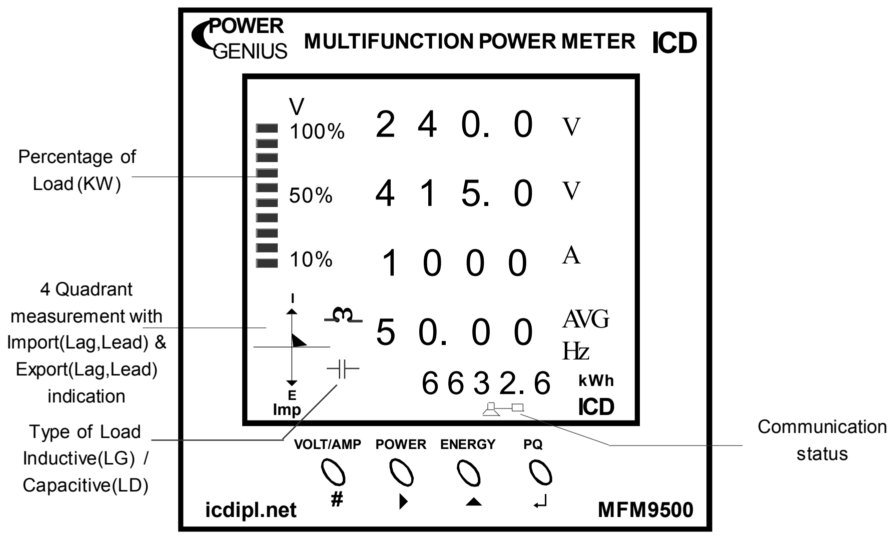


3.3) Auxiliary power supply connections

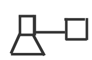
The Indicator MFM 9500 drives auxiliary power from the voltage input terminals as standard. If the burden of the PT is not sufficient in the case of HT Selection auxiliary power supply of 90 - 270VAC can be provided seperately. But it has to be specified at the time of ordering. In that case, seperate terminals will be provided for auxiliary supply. The auxiliary supply should be connected to proper specified voltage.

Burden on Auxiliary supply terminals : 4VA

4. Front Panel Features



The seven segment Graphical LCD Display is used to display voltage, current, kVA, kW, KVAr, PF, Freq., kWh,kVAh,kVArh, Run Hour, THD & program mode settings. The LCD backlit is switched off when no key is pressed for 3 minutes to save power and to enhance the life of LCD. The LCD backlit is switched ON, when any key is pressed.

The symbol  Indicates that the instrument is connected with the computer. The import, export and Lag, Lead indications are also displayed in the window so that the user can easily identify whether the load is import/export.

The front panel is also provided with 4 keys. The key descriptions are given below.The keys are used to select the respective parameters in the normal operating mode and to configure various items in the program mode.

4.1 Changing the configuration Items

In program mode, after selecting the configuration item through Index key, It can be altered by using shift, Increment & Enter key.

The shift (▶) key is used to select the digit one by one. The selected digit is shown by flashing that digit.

The Increment (▲) key is used to increment the selected digit. The increment key Increments the digit from 0 to 9 and then wraps down to zero once again. Shift and Increment keys are also used for selecting the required parameter.

Once the required values are set in the configuration items press the Enter ↵ key to store it in memory. If the change is accepted the display Indicates 'E' otherwise an error message is displayed as 'Error'.

Once the configuration Items are programmed hold in the ▶ & ▲ keys together for 3 seconds to return back to normal operating mode.

4.2 Key Description :

Keys	Program mode	Normal operating mode
VOLT/AMP #	Index key *(To select Menu's)*	VOLT/AMP Key *(Shows further Parameters of Voltage & currnet)*
POWER ▶	Shift Key *(To move between characters & to select parameters)*	POWER Key *(Shows further Parameters of Power)*
ENERGY ▲	Increment Key *(To increment the selected digit & to select parameters)*	ENERGY Key *(Shows further Parameters of Energy & Demand)*
PQ ↵	Enter Key *(To store the modifications & datas)*	PQ Key *(Shows further Parameters of VTHD & ITHD)*

5. Programming Instructions

All meters are to be programmed properly to work in a particular Installation. The various items that are to be programmed are shown in the table below.

Configuration Item	MultiFunction Power Meter
New pass word	*All meters*
Primary & secondary Voltage	*All meters*
Primary & secondary Current	*All meters*
Wiring Type	*All meters*
Device Id	*Meters with Communication Interface only*
Energy & Runhour reset	*All meters*
Demand reset	*All meters*

The meters are provided with password facility to prevent alteration of configuration items by unauthorised persons. The configuration Items of the meter may be changed by the following sequence given below.

With power applied to the meter hold in the ▶ & ▲ keys (shift and Incr) together for 3 seconds.

E P $\bar{u}$
- - - -

The display Indicates Program enter password. The password set in the menu, “new password” has to be entered by using Shift, Incr and enter keys (Refer changing the configuration items for using Shift, Incr and Enter keys).

P r o g
$\bar{n}$ o d E

After valid password is entered the meter enters into program mode by showing it in display.

Special Note :

*If the user enters the 'Enter pass word' for the first time, or if the user fails to remember the password entered in 'New pass word', the default password **0386** can be entered.*

The configuration Items can be selected by pressing the Index (#) key. Top row in displays are used to differentiate the various configuration items. The displays for various configuration item are given below,

P r o g

P A S S
u O r d
0 0 0 0
ICD

Password to prevent unauthorised persons entry (Range : 0000 - 9999)

Press # Key

P r o g

P r I
V O L t
0 0 0 4 1 5
ICD

Primary Voltage setting
(Range : 0 - 330000V AC)

Press # Key

P r o g

S E C
V O L t
4 1 5
ICD

Secondary Voltage setting
(Range : 110 (HT) / 415 (LT) VAC)

Press # Key

Prog
PrI
Crnt
1000
ICD

Primary Current setting
(Range : 0 - 9999 AC)

Press # Key

Prog
SEC
Crnt
5A
ICD

Secondary Current setting
(Range : 1 / 5 A AC)

Press # Key

Prog
uIrE
typE
4uIrE
ICD

Wiring System
4 Wire(3 watt) / 3 Wire (2watt)

Press # Key

Prog
tInE
SEt
17.22.56
ICD

Real Time clock setting(HH:MM:SS) *(00.00.00 - 23.59.59)*

Press # Key

Display	Description
P r o g d A t E S E t 05. 12. 12 ICD	Calender setting-dd/mm/yy *(01/01/2001-31/12/2098)*

Press # Key

Display	Description
P r o g d $\overline{n}$ n d t I $\overline{n}$ E 15 $\overline{n}$ ICD	Demand time selection. (15min/ 30min)

Press # Key

Display	Description
P r o g d E V I d 0 0 1 ICD	Device address (for meters with communication interface only (001 - 255)

Press # Key

Display	Description
P r o g b A U d r A t E 9 6 0 0 ICD	Baude Rate setting for Communication speed (Range : 4800 / 9600 / 19200 / 38400)

Press # Key

Prog
PAr
SEt
nonE
ICD

Parity Set Either we can select
(None / Odd / Even)

Press # Key

Prog
StoP
bIt
1
ICD

Stop bit, Either we can select
(1 / 2)

Press # Key

Prog
FVrt
PAgE
EnErgy
ICD

Favourite page selection, Either we can select any one as a first page Voltage / Power / Energy/Power quality

Press # Key

Prog
P$\bar{u}$r
SAVE
dIS
ICD

LCD Power save Enabled/Disabled is selected using Shift or Increment key and pressing Enter key.
(If it is Enabled, then backlit is automatically switched off when there is no any key press for 3 minutes. Pressing any key will make backlit ON. If LCD power save is Disabled, then backlit is switched on permanently)

Press # Key

P r o g

E n E r
r s t
d 0 n E
ICD

Energy Reset. *(pressing Enter key resets energy & Run Hour and displays* “d0nE” *in Bottom Row)*

Press # Key

P r o g

d $\bar{n}$ n d
r S t
4 1 5
ICD

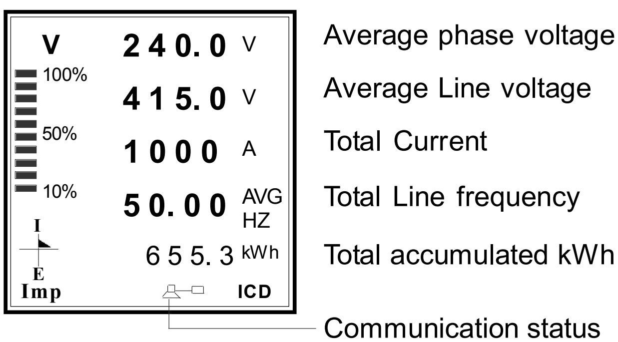
MD Reset. *(pressing Enter key resets MD history and displays* “dOnE” *in Bottom Row)*

Again pressing Index (#) key repeats the same process in cyclic manner. Press ▶ & ▲ keys (Shift & Increment) together for few seconds to quit program mode & return to RUN mode.

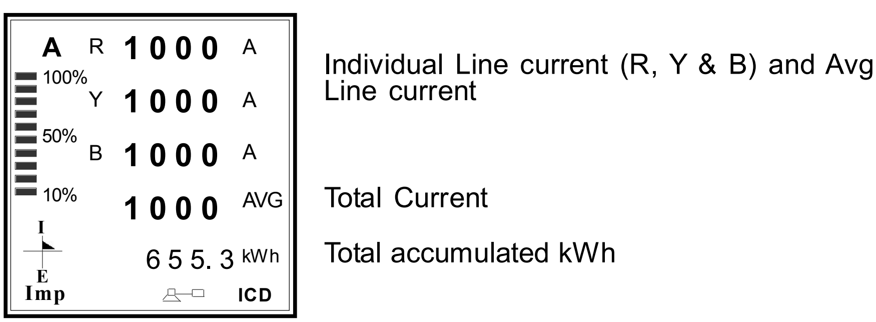
6. Run Mode display pages

When power is applied to the meter the starting message consisting of model no., make and year ICD 2019, and the run mode is selected automatically. In Run mode the power parameters are shown in different pages. These pages are accessed using the "Volt/Amp, Power, Energy & PQ" keys provided on the front panel. We can select any one of the page as a home page in run mode using favourite page selection option in programe mode. The available display pages are given below.

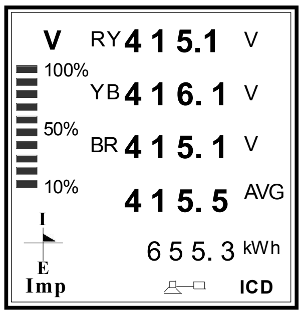
6.1 Voltage / Current page



Press VOLT/AMP Key



Press VOLT/AMP Key

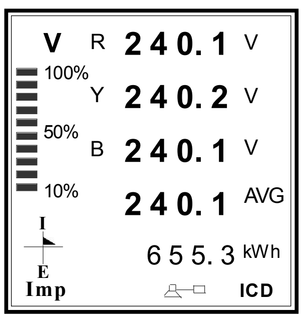


Individual Line voltage (RY, YB & BR)

Avg. Line voltage

Total accumulated kWh

Press VOLT/AMP Key

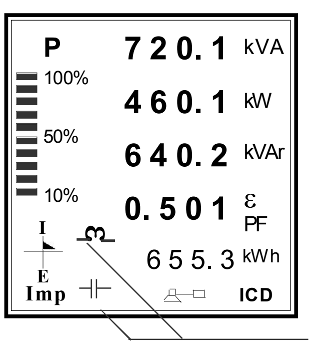


Individual Phase voltage (RN, YN & BN)

Avg. Phase voltage

Total accumulated kWh

6.2 Power page



Total kVA

Total kW

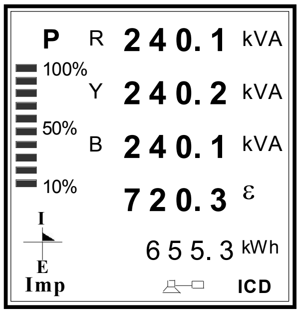
Total kVAr

Total PF

Total accumulated kWh

Type of Load Inductive or Capacitive

Press POWER Key

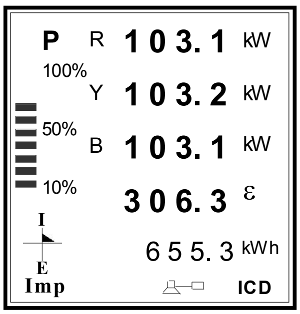


Individual kVA (R, Y & B)

Total kVA

Total accumulated kWh

Press POWER Key

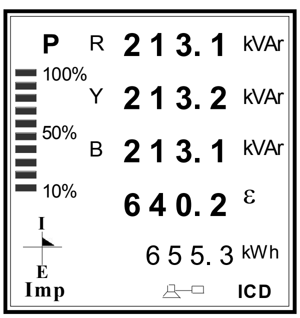


Individual kW (R, Y & B)

Total kW

Total accumulated kWh

Press POWER Key

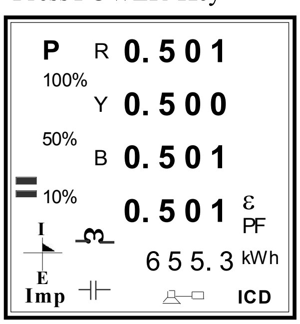


Individual kVAr (R, Y & B)

Total kVAr

Total accumulated kWh

Press POWER Key

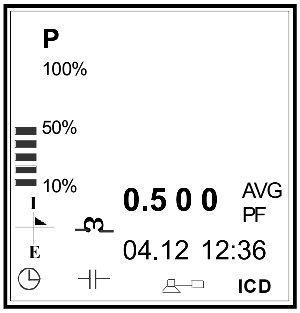


Individual PF (R, Y & B)

Average PF

Total accumulated kWh

Press POWER Key

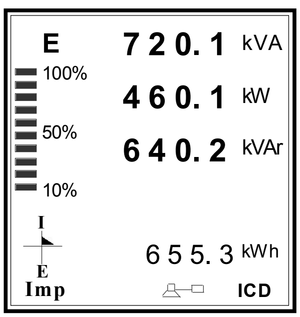


Average PF calculated from the kWh & kVAh ratio

PF value

Last Avg PF captured time with date

6.3 Energy page



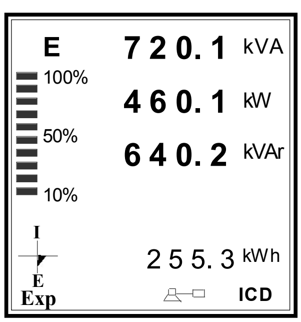
Total kVA

Total kW

Total kVAr

Total accumulated kWh in Import mode

Press ENERGY Key



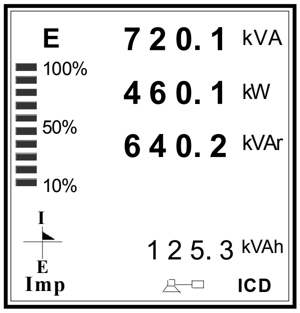
Total kVA

Total kW

Total kVAr

Total accumulated kWh in Export mode

Press ENERGY Key



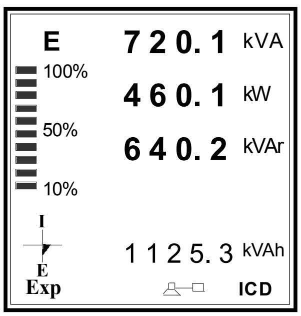
Total kVA

Total kW

Total kVAr

Total accumulated kVAh in Import mode

Press ENERGY Key



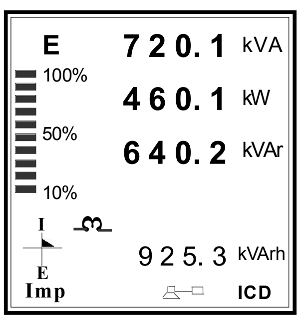
Total kVA

Total kW

Total kVAr

Total accumulated kVAh in Export mode

Press ENERGY Key



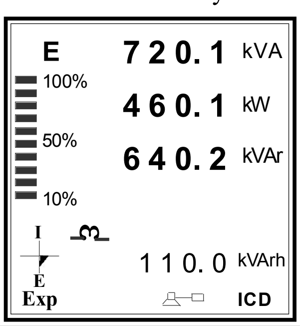
Total kVA

Total kW

Total kVAr

Total accumulated Lag kVArh in Import mode

Press ENERGY Key

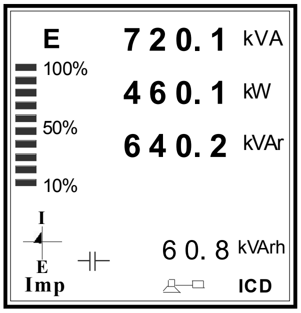


Total kVA

Total kW

Total kVAr

Total accumulated Lag kVArh in Export mode



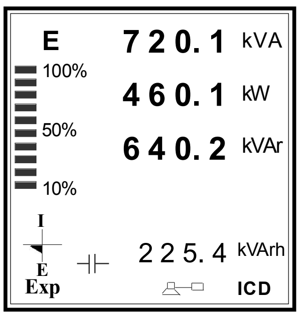
Total kVA

Total kW

Total kVAr

Total accumulated Lead kVArh in Import mode

Press ENERGY Key



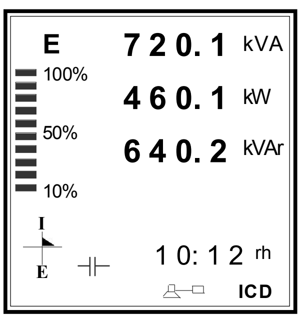
Total kVA

Total kW

Total kVAr

Total accumulated Lead kVArh in Export mode

Press ENERGY Key



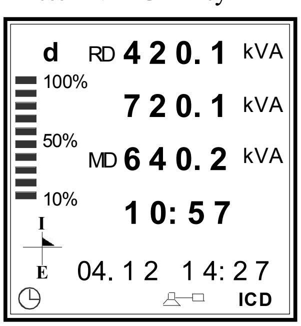
Total kVA

Total kW

Total kVAr

Run hour

Press ENERGY Key



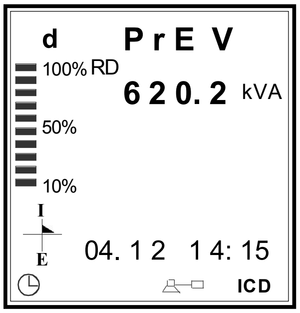
Rising demand for kVA

Instant kVA

Maximum demand for kVA

Demand time

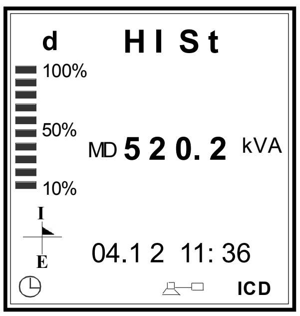
MD KVA peak value captured Date, Month & time.



Previous Rising demand

PRD Date, Month & Time

Press ENERGY Key

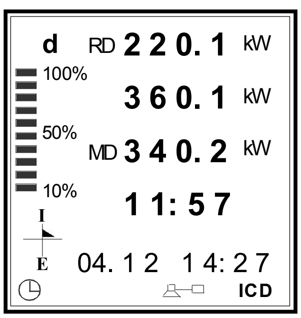


MD History

Last MD value

MD History Date, Month & Time

Press ENERGY Key



Rising demand for kW

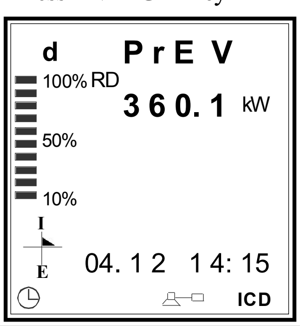
Instant kW

Maximum demand for kW

Demand time

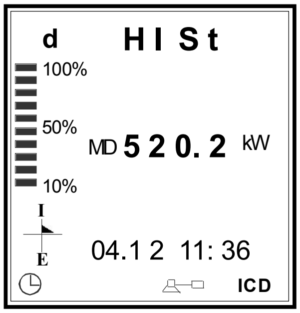
MD KW peak value captured Date, Month & time.

Press ENERGY Key



Previous Rising demand

PRD Date, Month & Time

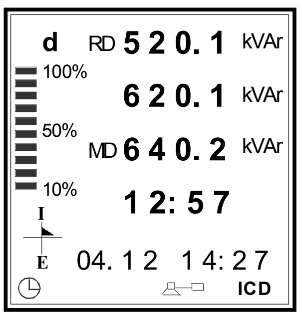


MD History

Last MD value

MD History Date, Month & Time

Press ENERGY Key



Rising demand for kVAr

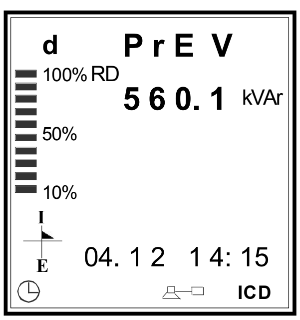
Instant kVAr

Maximum demand for kVAr

Demand time

MD KVAr peak value captured Date, Month & time.

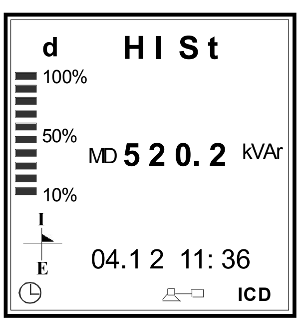
Press ENERGY Key



Previous Rising demand

PRD Date, Month & Time

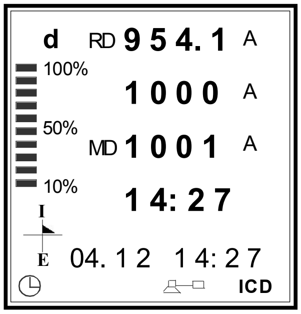
Press ENERGY Key



MD History

Last MD value

MD History Date, Month & Time



Rising demand for current

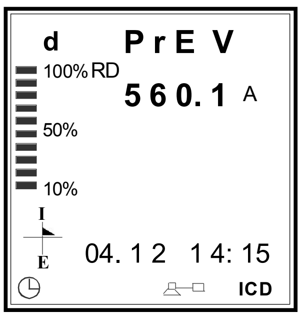
Instant current

Maximum demand for current

Demand time

MD Current peak value captured Date, Month & time.

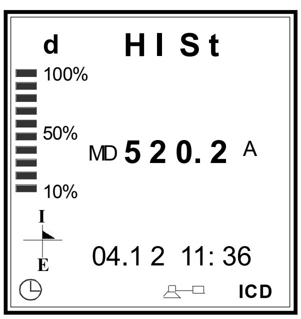
Press ENERGY Key



Previous Rising demand

PRD Date, Month & Time

Press ENERGY Key

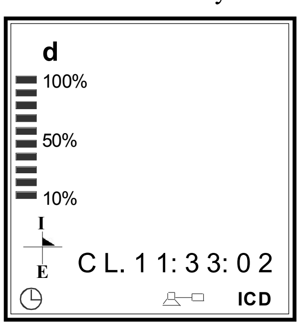


MD History

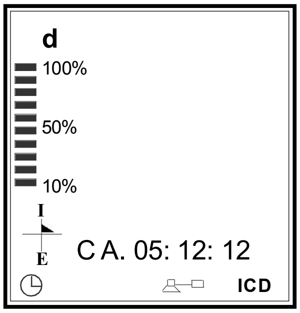
Last MD value

MD History Date, Month & Time

Press ENERGY Key

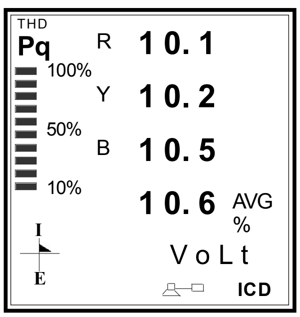


Real time Clock



Calender

6.4 Power quality

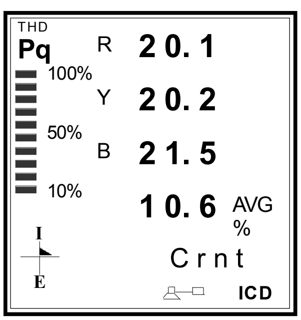


Total harmonics distortion for individual phase voltages

Average THD

Voltage THD

Press PQ Key



Total harmonics distortion for individual line current

Average THD

Current THD

The above pages are given for 3 phase 4 wire LT meters. For HT meters, the resolution and units will change as given in technical specifications.The display pages, sequence and parameters can be altered based on user requirement (to be mention while ordering).

Rising Demand (RD) :

It is the Integrated kVA /kW/kVAr/Amps which is the average rate of consumption per cycle of Integration. At the end of the integration cycle the integrated value would equal that of the instantaneous value available throughout the cycle. At the end of the cycle, RD resets to zero(00) and and its value shifts to previous RD with date & time.

Demand Time :

It is the total time of integration cycle, selectable in program mode (15/30min).

Integration Demand Time :

It is the instant demand time during integration cycle.

Maximum Demand :

It is the Highest demand (Peak values of kVA/kW/kVAr/Amps) obtained from the Last peak demand. MD resets & its value shifts to HMD, when MD is made reset.

7. Communication Port Details

The MFM 9500 is provided with a optically Isolated RS 485 communication Port, which is an optional Feature and has to be specified at the time of ordering. The communication protocol used is MODBUS - RTU or MODBUS-ASCII (to be specified while ordering). Using the communication Port, the meters can be connected in multi drop network and data can be collected in a centralised control room using any standard SCADA Software.

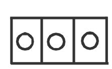
The communication between the PC and the instrument would be in Master slave mode. P.C acts as a master and sends a command message (query) containing the slave Id, function code and address of the information required. The command is received by all the slaves. The slave whose address is matching with that of the command address would respond with the requested data.

The communication settings are,

Protocol	:	MODBUS RTU
Baud rate	:	9600
Data bit	:	8
Parity	:	None
Stop bit	:	1
Starting Address	:	40001
Data Type	:	UINT
Communicating mode	:	Half Duplex

The above configuration are to be done in any standard scada package for collecting the data.

The instrument is provided with screwable 3 pin phoenix connector for connecting the communication cable at the rear side. Terminal details are (From left to right)



D+D- Gnd

The address of the parameters are as follows.

Sl.No	**Parameter**	**Address**	**Resolution**	
			LT	**HT**
1	R - Voltage	40001	0.1	0.01
2	Y - Voltage	40002	0.1	0.01
3	B - Voltage	40003	0.1	0.01
4	RY Voltage	40004	0.1	0.01
5	YB Voltage	40005	0.1	0.01
6	BR Voltage	40006	0.1	0.01
7	R Current	40007	0.1	0.1
8	Y Current	40008	0.1	0.1
9	B Current	40009	0.1	0.1
10	Total kVA	40010	0.1	1
11	Total kW	40011	0.1	1
12	Total kVAr	40012	0.1	1
13	Total PF	40013	0.001	0.001
14	Frequency	40014	0.01	0.01
15	kWH MSB	40015	0.1	1
16	kWH LSB	40016	0.1	1
17	Meter Type / Runhour MSB	40017		
18	Runhour LSB	40018		
19	Import / Export	40019		
20	kVAh MSB	40020	0.1	1
21	kVAh LSB	40021	0.1	1
22	Lag kVArh MSB	40022	0.1	1
23	Lag kVArh LSB	40023	0.1	1
24	Lead kVArh MSB	40024	0.1	1
25	Lead kVArh LSB	40025	0.1	1
26	RD kVA	40026	0.1	1
27	Demand Time hh:mm	40027		
28	PRD kVA	40028	0.1	1
29	Date/Month	40029		
30	Hour/Minute	40030		

Sl.No	Parameter	Address	Resolution LT	Resolution HT
31	RD kW	40031	0.1	1
32	PRD kW	40032	0.1	1
33	MD kVA	40033	0.1	1
34	Date/Month	40034		
35	Hour/Minute	40035		
36	MD kW	40036	0.1	1
37	Date/Month	40037		
38	Hour/Minute	40038		
39	R Voltage THD	40039	0.1	0.1
40	Y Voltage THD	40040	0.1	0.1
41	B Voltage THD	40041	0.1	0.1
42	R Current THD	40042	0.1	0.1
43	Y Current THD	40043	0.1	0.1
44	B Current THD	40044	0.1	0.1
45	Export kWh MSB	40045	0.1	1
46	Export kWh LSB	40046	0.1	1
47	Export kVAh MSB	40047	0.1	1
48	Export kVAh LSB	40048	0.1	1
49	Export Lag kVArh MSB	40049	0.1	1
50	Export Lag kVArh LSB	40050	0.1	1
51	Export Lead kVArh MSB	40051	0.1	1
52	Export Lead kVArh LSB	40052	0.1	1

Note:

a) Σ PF Calculation : If P.F < 1000 PF is in Lag (P.F = PF)
If P.F > 1000 PF is in Lead P.F = (PF-1000)

b) Σ kWh Calculation : Σ kWh = (kWh MSB * 65536) + kWH LSB

c) Meter Type / Runhour MSB : 256

d) Q = Meter Type : 03 = LT Meter ; 05 = HT Meter

e) Imp. & Exp. status : 0 = Import, 1 = Export

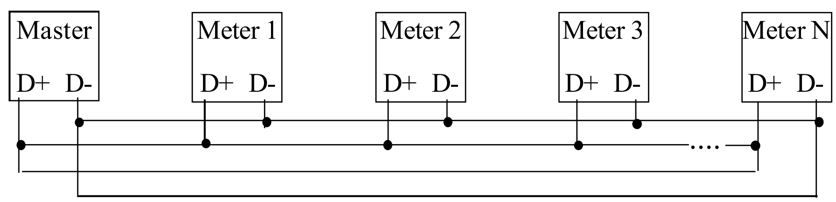
f) R : Runhour MSB

g) Total Runhour : (Runhour MSB * 65536) + Runhour LSB

7.1 Communication connection diagram

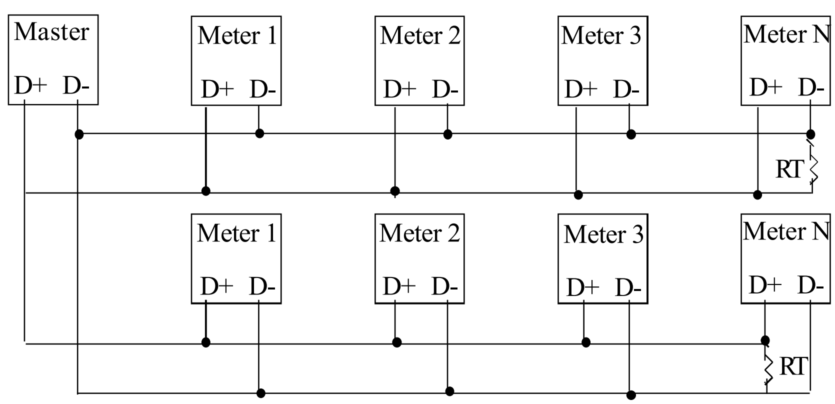
When connecting the meters in multidrop communication network, the following methods are to be adopted for trouble free communication.

1. **Loop Topology**



In this method, the communication continous to work even if there is a breakage in any one of the Loop. Termination resistors are not required.

2. **Straight line Topology**



In this method termination resistor RT (60 -100 Ω) of value equal to characteristic Impedance of the cable used may be required to avoid reflection loses.

It is recommended to use proper & suitable communication cable for trouble free communication.

8. Technical specification (class 0.5 / 1)

Type	: ICD make **MULTIFUNCTION POWER METER / POWER GENIUS**
Model	: **MFM 9500**
Application	: LT / HT Application (Field Programmable)
Voltage Input (Line to Line)	: **LT :** 415 AC RMS (-20% to +10%) **HT :** 110V AC RMS (-20% to +10%)
Current Input	: 5A / 1A AC R.M.S. (Field Programmable)
Over Load Capacity	: 10A Max continuous, 50A max for 3 seconds
Working Load Range	: 0.5% to120% of load current
Frequency	: 45.00 to 55.00Hz
Measurement Method	: 3 Watt Meter or 2 Watt Meter (Field programmable).
Accuracy	: **Class 0.5** as per **IS 14697** (or) **Class 1** as per **IS 13779 (ordering Option)**
Display	: Seven segment GRAPHICAL LCD display with Backlit
Programmable Parameters	: PT primary & secondary Voltage,CT Primary & secondary current, Device ID, Demand time, Real time Clock, Date, Energy & Runhour
Reset	: Facility with password protection
Parameters storage	: In non-volatile EERAM (including Energy & Runhour)
Display page selection	: By set of keys provided in front panel.
THD Accuracy	: ± 2%OFS for % values (for loads > 20%)

Burden on Voltage I/P : 0.25VA per phase

Burden on Current I/P : 0.25 V A per phase

PC Interface (Optional) : An optically isolated RS 485 O/P is available with MODBUS-RTU protocol.

Isolation : 2 kV Isolation for 1 minute between communication and other circuits.

Parameter displayed : (Class 0.5)

Parameter	Range	Resolution	Accuracy
R, Y, B Voltage	50 - 280 V AC	0.1 V (LT)	±0.5%+2Least digit
	25 - 80 V AC	0.01kV (HT)	±0.5%+2Least digit
RY, YB, BR Voltage	90 - 485 V AC	0.1 V (LT)	±0.5%+2Least digit
	40 - 140 V AC	0.01kV (HT)	±0.5%+2Least digit
Current	0 - 100 A AC	0.1 A (LT & HT)	±0.5%+2Least digit
	> 100 A - primary current (CT) set	1 A (LT & HT)	
kVA/KW/kVAr (LT) 3 Phase & total	0 -1000 KVA/KW/KVAr	0.1kV A/KW / kVAr	±0.5%+2Least digit
	>1000 kVA/KW / kVAr	1 kVA /KW / kVAr	±0.5%+2Least digit
kVA/KW/kVAr(HT) 3 Phase & total	0-10000kVA/KW/ kVAr	1kV A/KW / kVAr	±0.5%+2Least digit
	>10000 kVA/KW/ kVAr	0.01 MVA/MW/MVAr	±0.5%+2Least digit
3Phase Power factor & Avg PF	0.0Lg - Unity - 0.0Ld	0.001 (LT & HT)	±0.5%+2Least digit
Frequency	40.00 - 60.00 Hz	0.01Hz(LT & HT)	±0.2%+2Least digi
kWh, KVAh & kVarh	9999999.9	0.1 (LT/HT)	Class 0.5 as per IS 14697 (±0.5%)
Run Hour	9999.59 Hours Max.	1 Minute	± 3 sec/day

Parameter displayed : (Class 1)

Parameter	Range	Resolution	Accuracy
R, Y, B Voltage	50 - 280 V AC	0.1 V (LT)	±1%+2Least digit
	25 - 80 V AC	0.01kV (HT)	±1%+2Least digit
RY, YB, BR Voltage	90 - 485 V AC	0.1 V (LT)	±1%+2Least digit
	40 - 140 V AC	0.01kV (HT)	±1%+2Least digit
Current	0 - 100 A AC	0.1 A (LT & HT)	±1%+2Least digit
	> 100 A - primary current (CT) set	1 A (LT & HT)	
kVA/KW/kVAr (LT) 3 Phase & total	0 -1000 KVA/KW/KVAr	0.1kVA / KW / kVAr	±1%+2Least digit
	>1000 kVA/KW / kVAr	1 kVA / KW / kVAr	±1%+2Least digit
kVA/KW/kVAr(HT) 3 Phase & total	0-10000kVA/KW/ kVAr	1kVA / KW / kVAr	±1%+2Least digit
	>10000 kVA/KW/ kVAr	0.01 MVA/MW/MVAr	±1%+2Least digit
3Phase Power facto r& Avg PF	0.0Lg - Unity - 0.0Ld	0.001 (LT & HT)	±1%+2Least digit
Frequency	40.00 - 60.00 Hz	0.01Hz(LT & HT)	±0.2%+2Least digi
kWh, KVAh & kVArh	9999999.9	0.1 (LT/HT)	Class 1 as per IS 13779 (±1%)
Run Hour	9999.59 Hours Max.	1 Minute	± 3 sec/day

Auxiliary Supply : 90 - 270V AC

Burden on Auxiliary I/P : 4 V A

Operating Temperature : 10ºC to 55ºC

Box Dimension : 96(W) x 96(H) x 68(D) mm

Cutout : 92 x 92 mm

Mounting : Panel

Enclosure : ABS Plastic case

Weight : 500 g (Approximately)