



Manufactured by :

MINILEC (INDIA) PVT. LTD.,
S.No. 1073/1-2-3, At. Post. Pirangoot,
Tal. Mulshi, Dist. Pune - 412 111.
Tel. No. : 0091-20 - 22922354/55/56/57
Fax No.: 0091-20 - 22922134
Email : mkt1@minilecgroup.com
URL : www.minilecgroup.com

IMPORTANT STORAGE AND HANDLING INSTRUCTIONS

All Installation, wiring and periodic maintenance of the F3 MFM as well as its associated circuits involves high voltages and currents. The product must be used with the safety codes in force at your location. Failure to practice safe working procedures is likely to cause damage to the installation, severe injury and / or death. All work including handling of electrical circuits during Installation, wiring and periodic maintenance, must be done only by qualified personnel.

Neither Minilec nor its distributors may be held responsible for damage or death arising out of the wiring and / or PT, CT or other external circuits.

The covers of the F3 MFM should never be dismantled or opened. There are no user-serviceable parts inside. The F3 MFM contains high-precision components which require special handling available only at authorized Minilec service locations. Opening the covers of the F3 MFM and/or any attempts to dismantle, service, repair or modify the unit by unauthorized persons may cause severe injury, will damage the unit and will also render Minilec's warranty void.

Product Warranty

Minilec warrants all products to be free from defects in material, workmanship and title and will be of the kind and quality specified in Minilec's written description in the manual. The foregoing shall apply only to failures to meet said warranties, which appear within one year from the date of shipping. During the warranty period, Minilec will, at its option, either repair or replace any product that proves to be defective.

Statement of Calibration

Our instruments are inspected and tested in accordance with specifications published by an independent testing facility. The accuracy and calibration of our instruments are traceable to the National Standards through equipment that is calibrated at planned intervals by comparison to certified standards.

Disclaimer

The information presented in this publication has been carefully checked for reliability; however, no responsibility is assumed for inaccuracies. The information contained in this document is subject to change without notice

Document Revision History

Revision No.	Date	Description
0	14.12.2009	Release

INDEX

1.	Introduction.....	5
2.	Specifications.....	6
3.	Keyboard and Display Operation.....	7
4.	Description of Models.....	8
5.	Screens.....	8
	5.1 Run Mode	
	5.2 Menu	
	5.3 Configuration Edit	
	5.4 Configuration Read	
	5.5 Display Parameter	
	5.6 Custom Screen Configuration	
	5.7 Clear Mode	
	5.8 Version History	
6.	Modbus Operation.....	18
7.	Installation.....	29
8.	Drawing and Wiring	30

1. Introduction

F3 MFM Multifunction Meter Series is a microcontroller based 3 Phase Static Meter suitable for HT and LT applications. It measures and displays instantaneous True RMS values of Electrical Parameters as stated below.

Voltage, Current, Line Frequency, Power Factor, Active, Reactive and Apparent Power, Active Energy (Total, Import, Export), Reactive Energy (Total, Import, Export), Apparent Energy, Maximum Demand, Rising Demand, Time Interval, On Hours, Run Hours and Power Fail Interruptions.

The Meter is an ideal replacement of existing analog meters and can be used as a stand-alone meter in custom panels, PDUs, switchboards, switchgear, UPS, generator sets, MCCs systems etc.

On the front panel of the Meter, 3 rows of 4 digit 7 segment LED displays simultaneously show three parameters. Additionally 3 keys and 9 status LEDs are provided for user friendly interaction. On the rear panel, connectors are provided for 3 Phase Voltage and Current path, RS 232 or RS 485 Communication Signals (optional) and Auxiliary Power Supply wiring.

The Meter features user programmable PT and CT Ratio.

An optional RS 232 or RS 485 Communication Port is provided for transmission of electrical parameters over Modbus RTU Protocol. The Meter ID, Baud Rate, Parity and are programmable through keyboard operation as well as through remote configuration over Modbus.

F3 MFM has 4 different Models

MFM 1 : Any 10 Parameters selectable except for Demand

MFM 2 : All Electrical Parameters except for Energy and Demand

MFM 3 : Same as MFM 2 with Energy

MFM 4 : Same as MFM 3 with Demand

2. Specifications

General Specifications :

Display	: 3 Rows of 4 Digit 7 Segment Displays (0.56") and 9 Status LEDs
Keys	: 3 Tactile Keys
Communication Port	: RS232 with Tx, Rx and Ground Terminals or RS485 Half Duplex Port Protocol : Modbus RTU
Communication Settings	: Slave ID : 1 – 247 Baud Rate : 2.4, 4.8, 9.6, 19.2 Kbps Parity : Odd, Even, None Stop Bits : 1
Display Update Rate	: 1 Sec.
Auxiliary Power Supply	: 45 – 300 V AC/DC, 18 – 60 V DC, Self Powered (Please refer your Model)
Auxiliary Supply Burden	: Less than 5 VA
Accuracy Class	: $\pm 0.5\%$
Operating Temperature	: 0 to 55 Deg. C, 95 % RH Non-Condensing
Insulation Test Voltage between Input / Output / Aux. Supply	: 2 KV AC, 50 Hz for 1 min.
Insulation Resistance	: More than 100 Mohms at 500 V DC
Impulse Voltage Test	: 5 KV AC having waveform of 1.2/50 μ Sec.
Terminals	: Suitable up to 2.5 sq.mm wires
Mounting	: Panel
Enclosure Type	: ABS
Weight	: 0.4 Kg
Dimensions	: Front Bazel : 96 X 96 mm Panel Cutout : 92 X 92 mm Depth Behind Panel : 75 mm

Input Specifications :

Electrical Network	: Singe Phase, 3 Phase 3 Wire or 4 Wire
Input Waveform	: Sine Wave
Nominal Input Voltage	: 0 – 120% of Selected Range
Nominal Input Current	: 1 or 5 A AC
Continuous Overload Capacity	: 1.2 times nominal value for Voltage 2 times nominal value for Current
Power Factor Range	: Lag 0.5 – 1 – Lead 0.5
Frequency Range	: 40 to 60 Hz

3. Keyboard and Display Operation

Keyboard

The Meter is provided with 3 Keys, 3 rows of 4 Digit 7 Segment Displays and 9 LEDs for user friendly operation.



Use this key to navigate through various parameter screens



Use this key to navigate through parameter sub screens



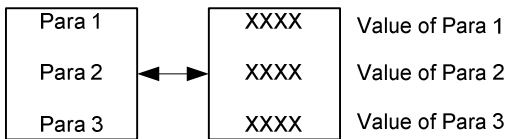
Press this key in any of the Run Mode screens to enter Configuration Mode.

Use above Keys in described in various Run and Configuration modes.

9 Status LEDs are provided to indicate status of electrical parameters. (-), K and M sign LEDs are used to indicate Sign, Kilo or Mega readings of the currently Displayed Parameter on the Screen if applicable.

Display

The Meter is normally in Run Mode and it displays instantaneous values of various electrical parameters.



The Parameter Name Screen is displayed for 2 seconds.
The Parameter Value Screen is displayed for 8 seconds.

Parameter Screen and Value Screen alternatively get displayed.

4. Description of Models

On the following page different parameter screen groups are annotated by numbers from 1 to 9. Group 9 is common to all Models.

A) For F3 MFM 1, After first power up user needs to select any 10 parameters except for Demand as per requirement. By default any 10 parameters are initially loaded in the Meter. Refer Pages 10 and 14 for parameter selection.

The Run Mode screens will be as per user selection of parameters.

Energy Parameter will have a complete screen where as other parameter will have single row. Custom Screen is not applicable to this Model.

B) For F3 MFM 2 Model screen groups 1 to 4 are available.

C) For F3 MFM 3 Model screen groups 1 to 4 and 6 to 8 are available

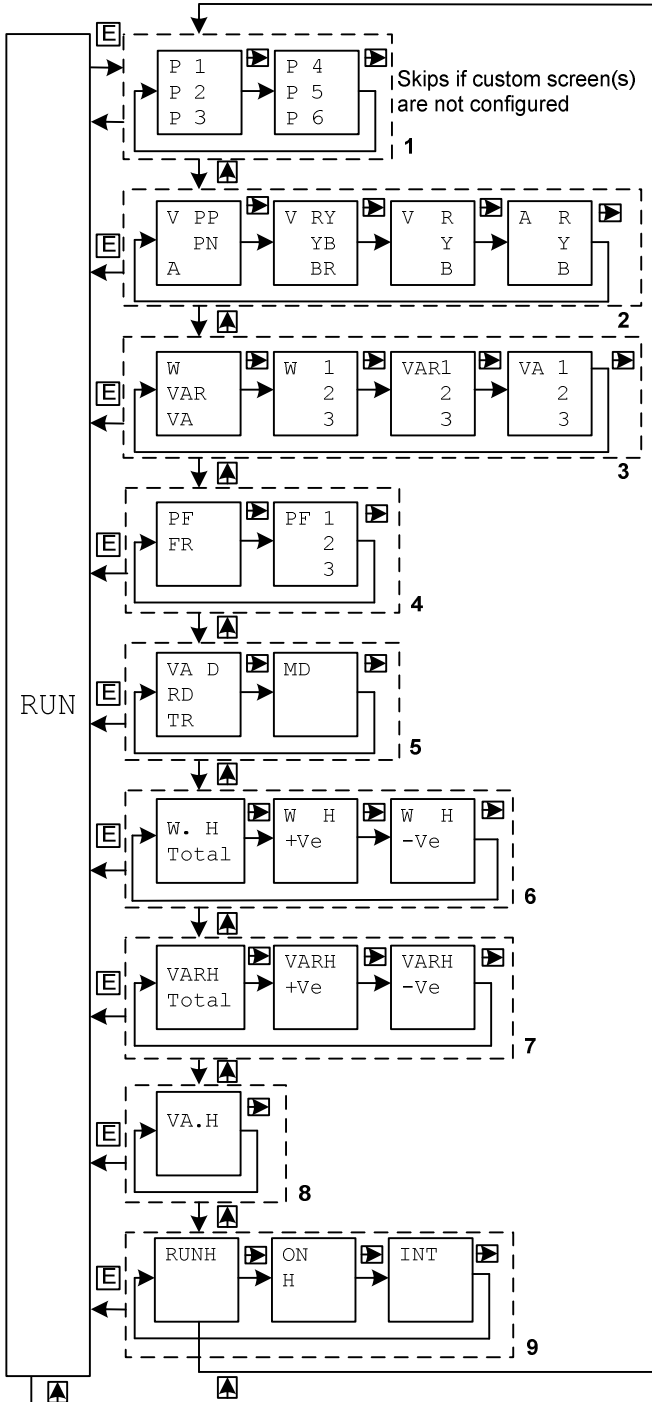
D) For F3 MFM 4 Model all screen groups are available.

5. Screens

The Electrical Parameters are displayed on the LED Displays in certain groups. Such as Voltages, Current, Active Power, Reactive Power, Power Factor, Active Energy etc. Apart from Run Mode Screens, all other Screens and Menu is same.

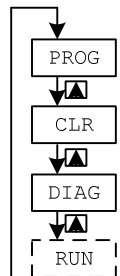
Various Screens are shown in the following pages.

5.1 Run Mode Screens



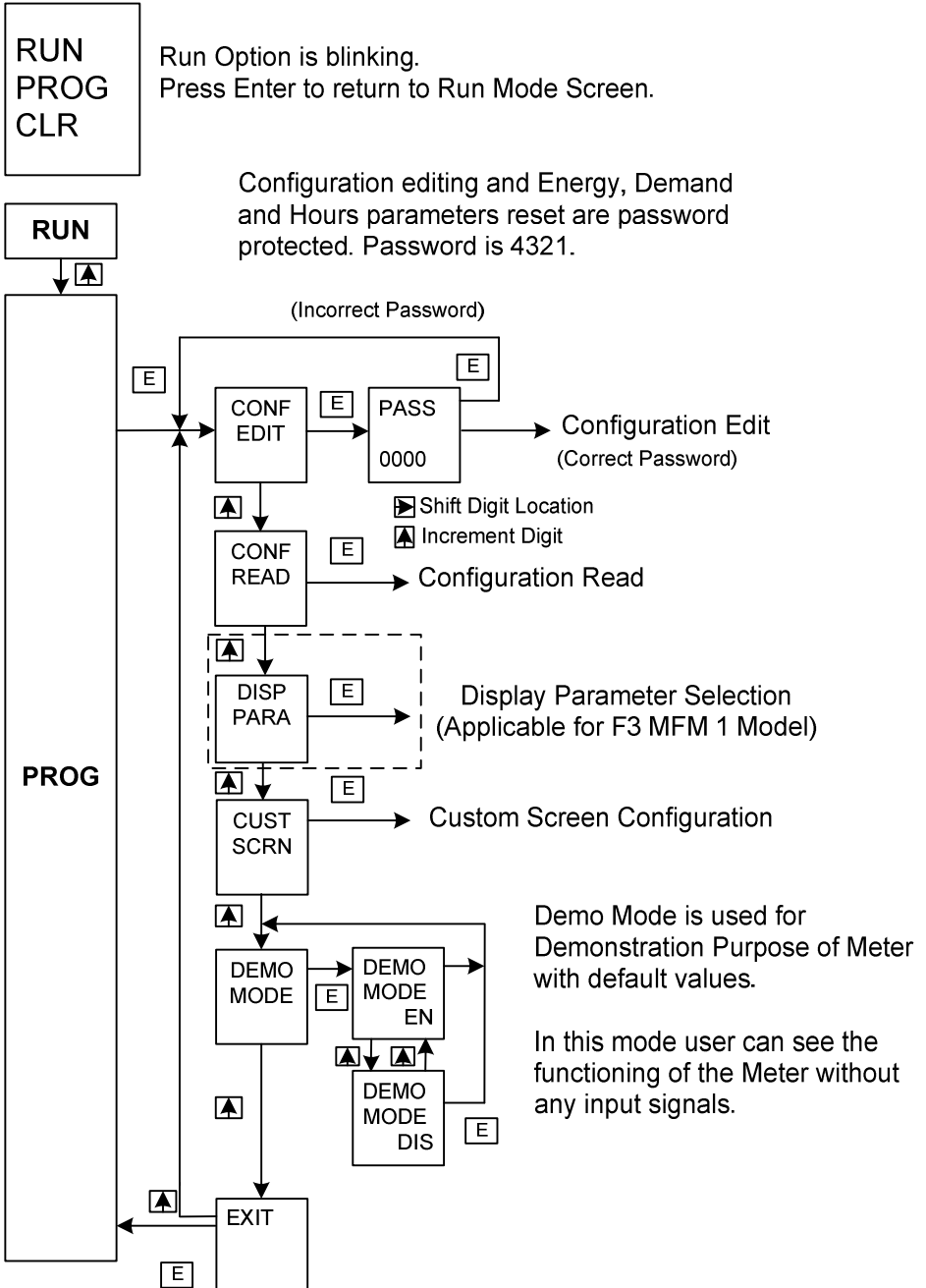
Power Sign LEDs glow as per Power Flow Quadrants Standard IEC62053-23

The Meter starts with last parameter screen in case Power Cycle occurs.

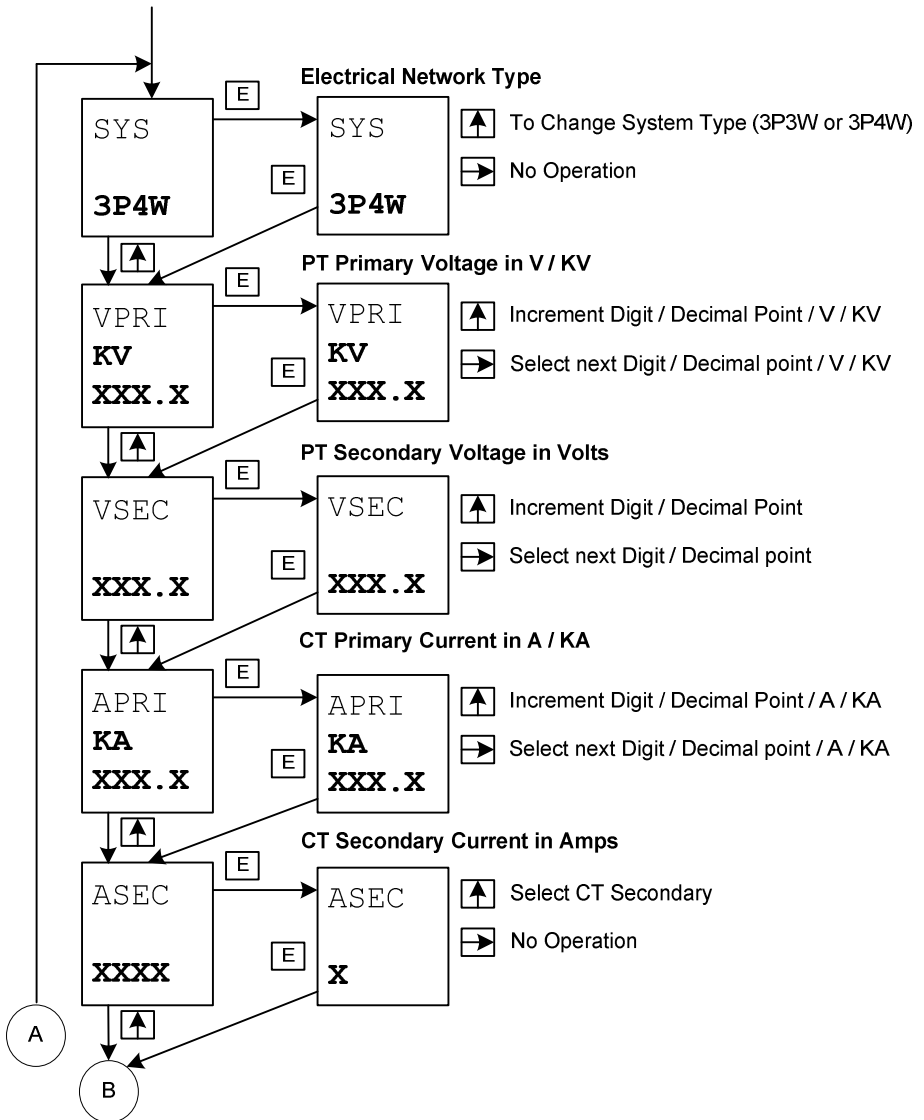


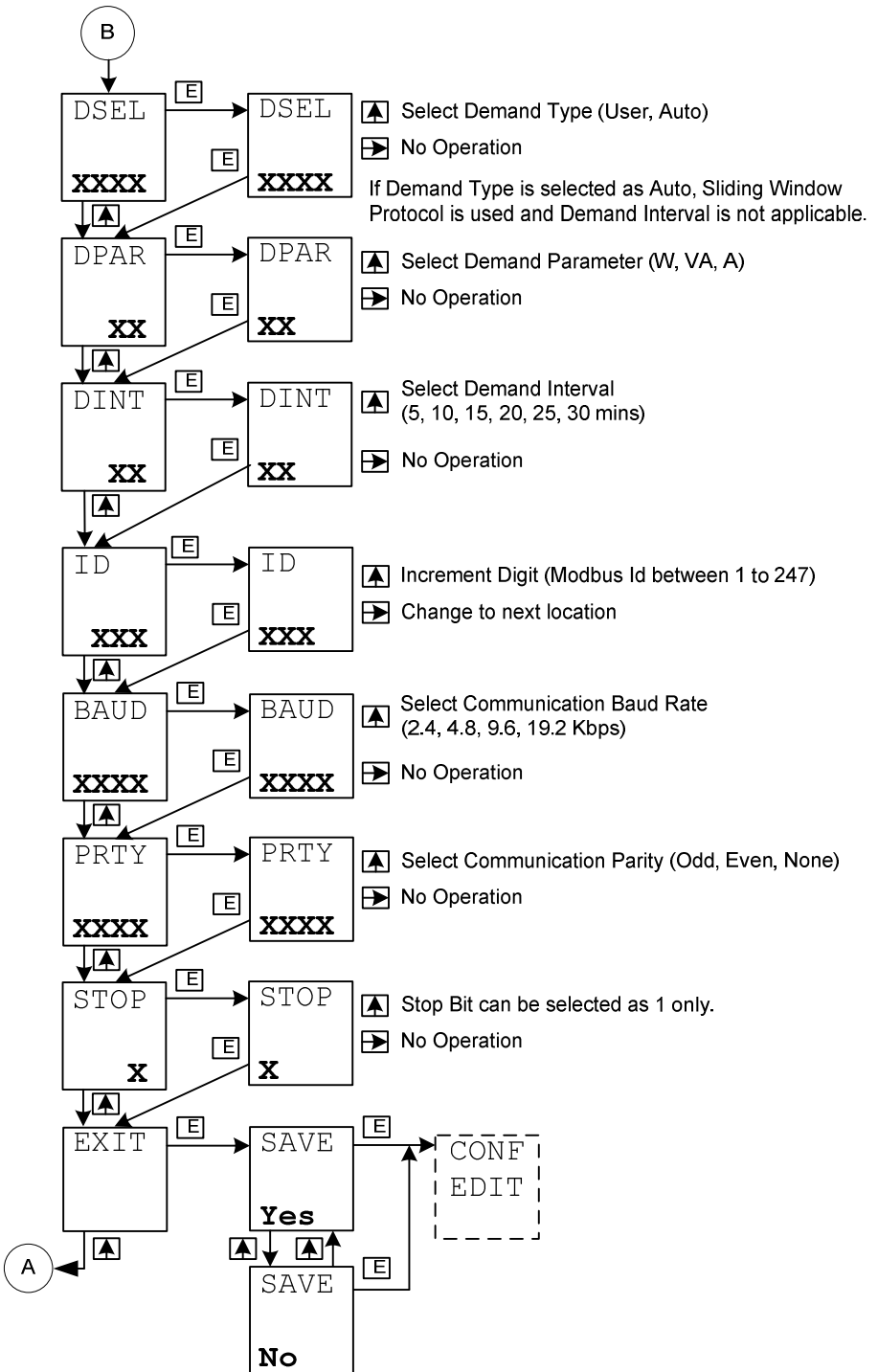
5.2 Menu Screens

Enter Key is pressed in any of the the Run Mode Screen to enter Menu Mode.

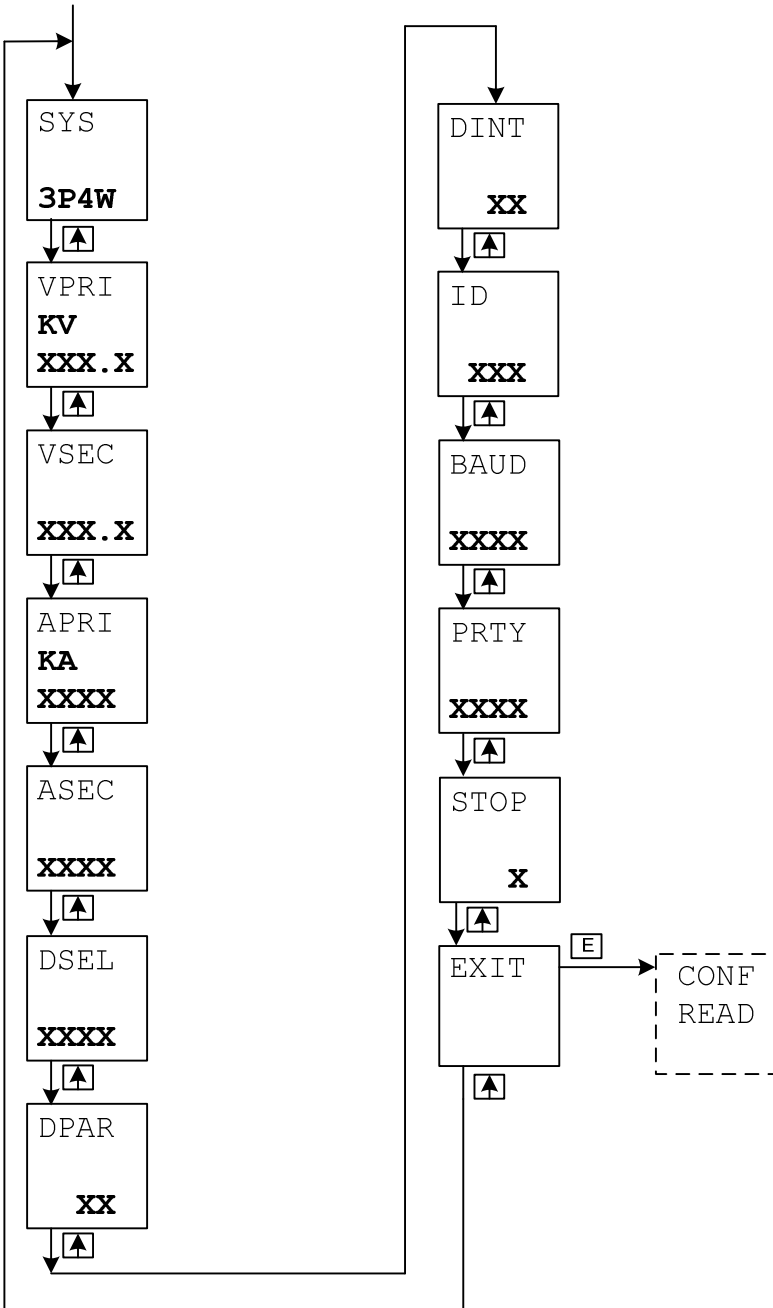


5.3 Configuration Edit Mode





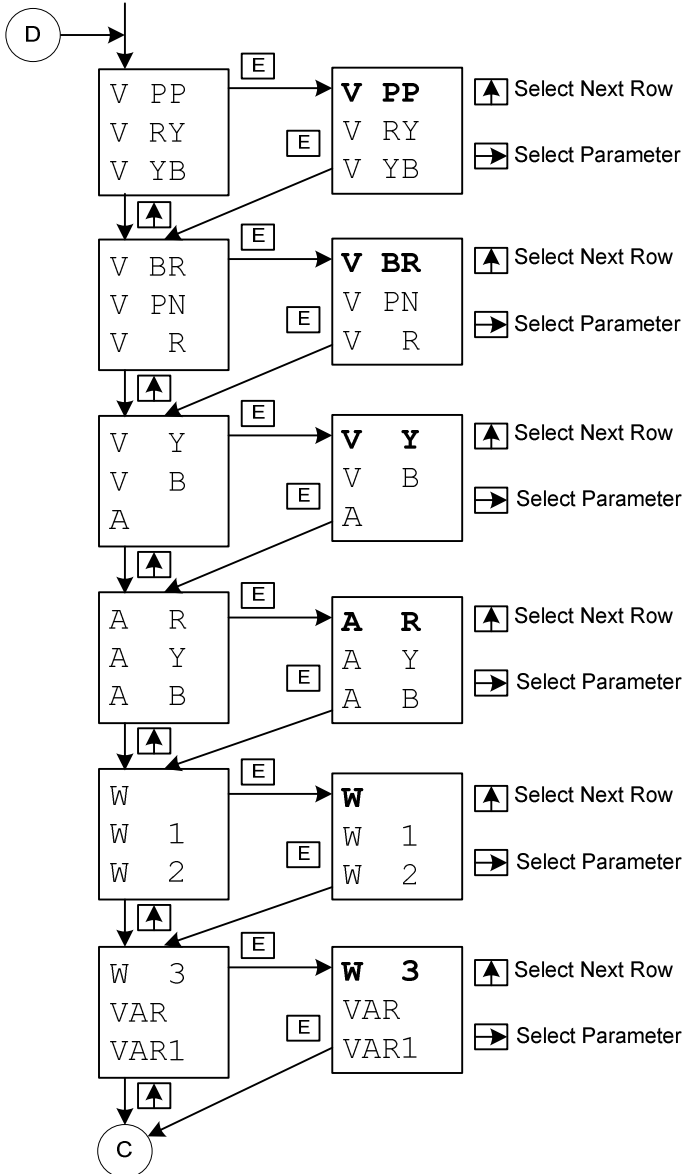
5.4 Configuration Read Mode

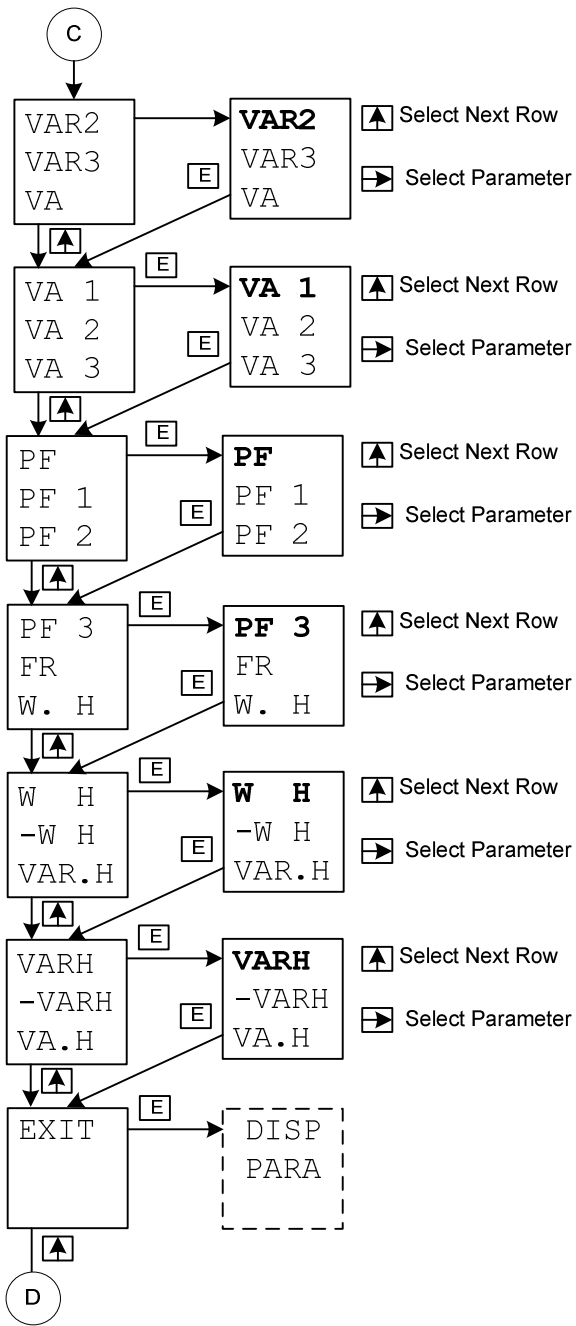


In this mode, keys **E** and **→** have no operation.

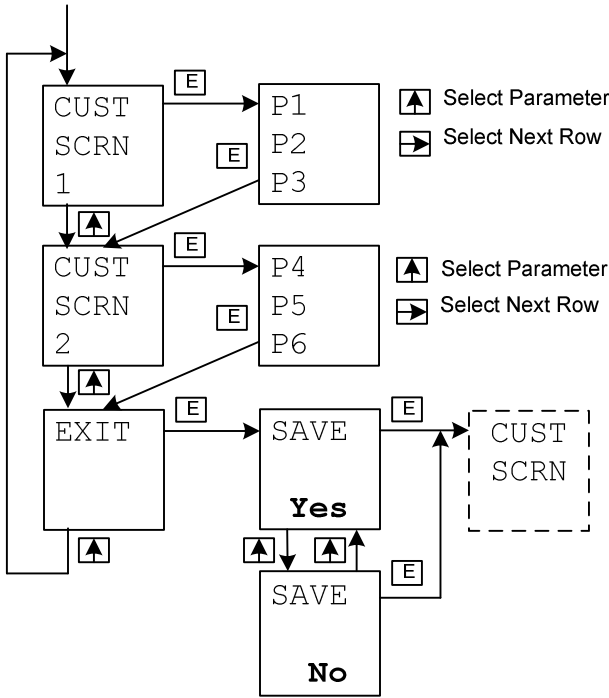
5.5 Parameter Selection (Applicable for F3 MFM 1 Only)

In this mode, 10 Parameters for F3 MFM 1 Model are to be selected.
K and M LEDs will glow when the parameter is selected, else will be off.





5.6 Custom Screen Configuration Mode



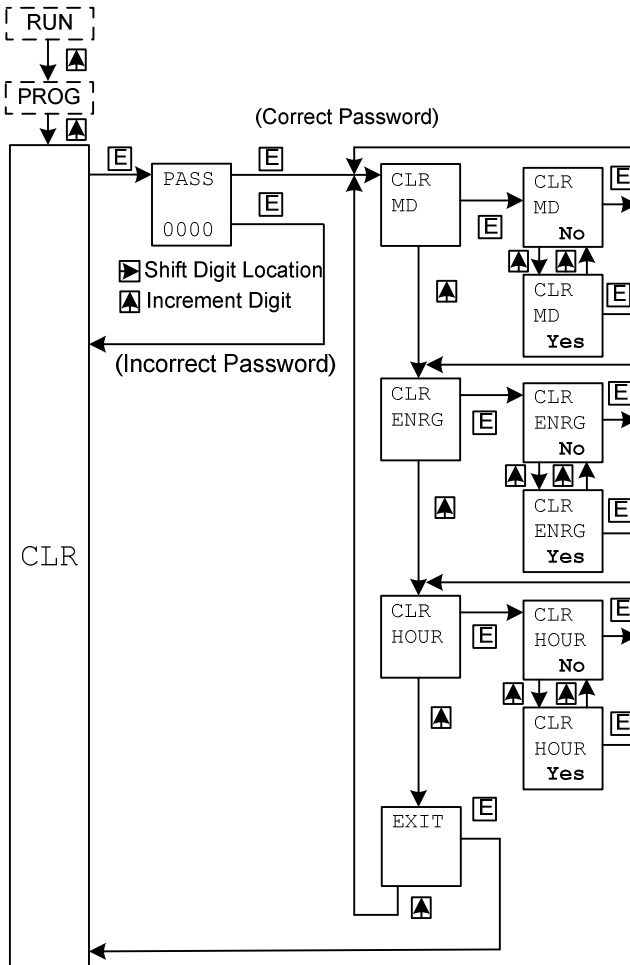
User can select maximum 3 parameters per screen. Use **▲** this key to select desired parameter. The parameter selection is sequential as listed below :

Vrn, Vyn, Vbn, Vry, Vyb, Vbr, Ar, Ay, Ab, W1, W2, W3,
 VAR1, VAR2, VAR3, VA1, VA2, VA3, PF1, PF2, PF3,
 Vpn, Vpp, A, W, VAR, VA, PF, Fr & nonE

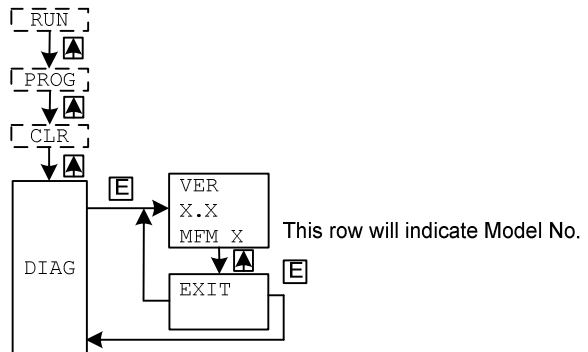
If nonE is selected, the corresponding row will be blank. If all the rows are selected as nonE, the corresponding screen will be hidden.

5.7 Clear Mode

This mode clears all Energy values, Demand and Hour Information.



5.8 Version History



6. Modbus Operation

The Meter supports MODBUS RTU Protocol over RS 232 or RS 485 Communication Port.

The remote monitoring of Electrical Parameters enables user to log parameters in real time. The parameter values are available in Float as well Integer Format.

Table 1 : Electrical Parameter in Float Format for Single or Multiple Parameter read back

Float RMS Parameter Registers				
Table 1				
Read Registers (Function 3)				
Address in Decimal	Type	Register Description	Parameter Name	Unit
101	IEEE 754 32-bit Float	Average PP Voltage	V PP	V
103		Average PN Voltage	V PN	
105		Average Current	A	A
107		RY Voltage	V RY	V
109		YB Voltage	V YB	
111		BR Voltage	V BR	
113		RN Voltage	V R	
115		YN Voltage	V Y	
117		BN Voltage	V B	
119		R Current	A R	A
121		Y Current	A Y	
123		B Current	A B	
125		WATT	W	WATT
127		VAR	VAR	VAR
129		VA	VA	VA
131		WATT 1	W 1	WATT
133		WATT 2	W 2	
135		WATT 3	W 3	
137		VAR 1	VAR 1	VAR
139		VAR 2	VAR 2	
141		VAR 3	VAR 3	
143		VA 1	VA 1	VA
145		VA 2	VA 2	
147		VA 3	VA 3	
149		PF	PF	PF
151		Line Frequency	FR	Hz
153		PF 1	PF 1	PF
155		PF 2	PF 2	
157		PF 3	PF 3	

Notes :

- 1) PF invalid register value is -3
- 2) For F3 MFM 1 the unselected register would return 0xFFFFFFFF.

Table 2 : Energy Parameters in Float Format

Float Energy Parameter Registers				
Table 2				
Read Registers (Function 3)				
Address in Decimal	Type	Register Description	Parameter Name	Unit
201	IEEE 754 32-bit Float	WH +Ve	WH +Ve	WH
203		WH -Ve	WH -Ve	
205		WH Total	WH Total	
207		VARH +Ve	VARH +Ve	VARH
209		VARH -Ve	VARH -Ve	
211		VARH Total	VARH Total	
213		VAH Total	VAH Total	

Notes :

- 1) For F3 MFM 1 the unselected register would return 0xFFFFFFFF.
- 2) For F3 MFM 2 this table is not accessible.

Table 3 : Demand Parameters in Float Format

Float Demand Parameter Registers				
Table 3				
Read Registers (Function 3)				
Address in Decimal	Type	Register Description	Parameter Name	Unit
301	IEEE 754 32-bit Float	Demand	A/W/VA Demand	A / WATT / VA
303		Rising Demand	RD	
305		Maximum Demand	MD	
307		Time Remaining	TR	Minute

Note : Above Table is accessible for F3 MFM 4 only.

Table 4 : Electrical Parameter in Integer Format for Single or Multiple Parameter read back

Integer RMS Parameter Registers				
Table 4				
Read Registers (Function 3)				
Address in Decimal	Type	Register Description	Parameter Name	Unit
401	Signed Integer	Average PP Voltage	V PP	Refer Table 13
402		Average PN Voltage	V PN	
403		Average Current	A	
404		RY Voltage	V RY	
405		YB Voltage	V YB	
406		BR Voltage	V BR	
407		RN Voltage	V R	
408		YN Voltage	V Y	
409		BN Voltage	V B	
410		R Current	A R	
411		Y Current	A Y	
412		B Current	A B	
413		WATT	W	
414		VAR	VAR	
415		VA	VA	
416		WATT 1	W 1	
417		WATT 2	W 2	
418		WATT 3	W 3	
419		VAR 1	VAR 1	
420		VAR 2	VAR 2	
421		VAR 3	VAR 3	
422		VA 1	VA 1	
423		VA 2	VA 2	
424		VA 3	VA 3	
425		PF	PF	
426		Line Frequency	FR	
427		PF 1	PF 1	
428		PF 2	PF 2	
429		PF 3	PF 3	

Notes :

- 1) PF invalid register value is -3000
- 2) For F3 MFM 1 the unselected register would return 0xFFFFFFFF.

Table 5 : Energy Parameters in Integer Format

Integer Energy Parameter Registers				
Table 5				
Read Registers (Function 3)				
Address in Decimal	Type	Register Description	Parameter Name	Unit
501	Unsigned Long Integer	WH +Ve	WH +Ve	Refer Table 12 and Table 8 Register 811
503		WH -Ve	WH -Ve	
505		WH Total	WH Total	
507		VARH +Ve	VARH +Ve	
509		VARH -Ve	VARH -Ve	
511		VARH Total	VARH Total	
513		VAH Total	VAH Total	

Notes :

- 1) For F3 MFM 1 the unselected register would return 0xFFFFFFFF.
- 2) For F3 MFM 2 this table is not accessible.

Table 6 : Demand Parameters in Integer Format

Integer Demand Parameter Registers				
Table 6				
Read Registers (Function 3)				
Address in Decimal	Type	Register Description	Parameter Name	Unit
601	Unsigned Integer	Demand	A/W/VA Demand	Refer Table 13
602		Rising Demand	RD	
603		Maximum Demand	MD	
604		Time Remaining	TR	Min

Note : Above Table is accessible for F3 MFM 4 only.

Table 7 : Time Parameters

On Hours, Run Hours, Interruptions Parameter Registers				
Table 7				
Read Registers (Function 3)				
Address in Decimal	Type	Register Description	Parameter Name	Unit
701	Unsigned Long Integer	On Hours	ON H	Seconds
703		Run Hours	RUNH	
705		Interruptions	INT	---

Table 8 : Electrical System Configuration Table

System Configuration Registers in Unsigned Integer Format			
Table 8			
Read / Write Register (Function 3 / Function 6)			
Address in Decimal	Register Description	Valid Register Value	Factory Default Value
801	System Type	1 = 3P3W 2 = 3P4W	2
802	PT Primary Voltage Phase-Phase (Long High Word)	100(V) - 999(KV)	4157
803	PT Primary Voltage Phase-Phase (Long Low Word)	(Note 1)	
804	PT Secondary Voltage Phase-Phase	100(V) - 600(V) (Note 1)	4157
805	CT Primary Current (Long High Word)	1(A) - 99(KA)	5
806	CT Primary Current (Long Low Word)		
807	CT Secondary Current	1 = 1 A 5 = 5A	5
808	Demand Select	1 = Auto 2 = User 65535 = Not applicable to this Model	2
809	Demand Parameter Select	1 = Amps 2 = Watt 3 = VA 65535 = Not applicable to this Model	3
810	Demand Interval	0 = 5 Min 1 = 10 Min 2 = 15 Min 3 = 20 Min 4 = 25 Min 5 = 30 Min 65535 = Not applicable to this Model	5
811	Integer Energy Counter Type (Refer Table Below)	0 = Fixed Unit and Resolution 1 = Auto Unit and Resolution 65535 = Not applicable to this Model	0

Note : Value should be entered by multiplying by 10
For example : 415.7 should be entered as 4157

Integer Energy Counter Type	Description
Fixed Unit and Resolution (0)	Energy Registers Unit = KWH, KVARH, KVAH
	Energy Registers Resolution = 1 (1 KWH, KVARH, KVAH)
Auto Unit and Resolution (1)	Energy Registers Unit = As per Table 12
	Energy Registers Resolution = As per Table 12

Table 9 : Communication Parameters Configuration Table

Communication Configuration Registers in Unsigned Integer Format			
Table 9			
Read / Write Register (Function 3 / Function 6)			
Address in Decimal	Register Description	Valid Register Value	Factory Default Value
901	Device ID	1 - 247	1
902	Baud Rate	1 = 2400 Baud, 2 = 4800 Baud 3 = 9600 Baud 4 = 19200 Baud	4
903	Parity	1 = Odd 2 = Even 3 = None	3
904	Stop Bits	1 = 1 Stop Bit	1

Table 10 : Control Register Clear Table

Control Registers in Unsigned Integer Format			
Table 10			
Read / Write Register (Function 3 / Function 6)			
Address in Decimal	Register Description	Valid Register Value	Factory Default Value
1001	Maximum Demand	0 = Default / Maximum Demand Register Cleared 1 = Reset Maximum Demand Register 255 = Not applicable to this Model	0
1002	Energy Parameters	0 = Default / Energy Registers Cleared 1 = Reset Energy Registers 255 = Not applicable to this Model	0
1003	Run, On Hours, Interruptions	0 = Default / Run, On Hours Interruptions Register Cleared 1 = Reset Run, On Hours Interruptions Register	0

Table 11 : Bulk Query Parameter Selection Table

Function 65 Bulk Query Instantaneous Parameters Selection Registers				
Table 11				
Read / Write Register (Function 3 / Function 6) (See Note)				
Address in Decimal	Type	Register Description	Parameter Name	Factory Default Value
1101	Unsigned Integer	Average PP Voltage	V PP	0
1102		Average PN Voltage	V PN	0
1103		Average Current	A	0
1104		RY Voltage	V RY	0
1105		YB Voltage	V YB	0
1106		BR Voltage	V BR	0
1107		RN Voltage	V R	0
1108		YN Voltage	V Y	0
1109		BN Voltage	V B	0
1110		R Current	A R	0
1111		Y Current	A Y	0
1112		B Current	A B	0
1113		WATT	W	0
1114		VAR	VAR	0
1115		VA	VA	0
1116		WATT 1	W 1	0
1117		WATT 2	W 2	0
1118		WATT 3	W 3	0
1119		VAR 1	VAR 1	0
1120		VAR 2	VAR 2	0
1121		VAR 3	VAR 3	0
1122		VA 1	VA 1	0
1123		VA 2	VA 2	0
1124		VA 3	VA 3	0
1125		PF	PF	0
1126		Line Frequency	FR	0
1127		PF 1	PF 1	0
1128		PF 2	PF 2	0
1129		PF 3	PF 3	0

0 : Parameter not selected for Bulk Query read back
1 : Parameter selected for Bulk Query read back

Note : For F3 MFM 1 Write Register is not applicable.
 User selected parameters automatically get set in this table.

Read back Type (Refer Example Bulk Query read back)	For Units
Float	Refer Table 1
Integer	Refer Table 4

Table 12 : Energy Parameter Divider Guide Table

Integer Energy Register Unit and Dividers in 16 bits Unsigned Integer Format		
Table 12		
Read Registers (Function 3)		
Address in Decimal	Register Description	Meaning of Register Value
1201	WH +Ve Unit	0 = Don't Care, 1 = WH, 2 = KWH, 3 = MWH, 4 = GWH
1202	WH +Ve Divider	0 = Don't Care 1 = 1000000 (Max Value 99.999999) 2 = 100000 (Max Value 999.99999) 3 = 10000 (Max Value 9999.9999)
1203	WH -Ve Unit	1 = WH, 2 = KWH, 3 = MWH, 4 = GWH
1204	WH -Ve Divider	Same as WH +Ve Divider
1205	WH Total Unit	1 = WH, 2 = KWH, 3 = MWH, 4 = GWH
1206	WH Total Divider	Same as WH +Ve Divider
1207	VARH +Ve Unit	1 = VARH, 2 = KVARH, 3 = MVARH, 4 = GVARH
1208	VARH +Ve Divider	Same as WH +Ve Divider
1209	VARH -Ve Unit	1 = VARH, 2 = KVARH, 3 = MVARH, 4 = GVARH
1210	VARH -Ve Divider	Same as WH +Ve Divider
1211	VARH Total Unit	1 = VARH, 2 = KVARH, 3 = MVARH, 4 = GVARH
1212	VARH Total Divider	Same as WH +Ve Divider
1213	VAH Total Unit	1 = VAH, 2 = KVAH, 3 = MVAH, 4 = GVAH
1214	VAH Total Divider	Same as WH +Ve Divider

Note : For F3 MFM 2 this Table is not accessible.

Table 13 : Parameter Display Resolution and Divide Factor Table

Parameter	Input	Range	Resolution	Unit	Divider Factor
Voltage (120%)	< 1000 V	0 – 999.9	0.1	V	10
	< 10 KV	0 – 9.999	0.001	KV	1000
	< 100 KV	0 – 99.99	0.01	KV	100
	< 1000 KV	0 – 999.9	0.1	KV	10
Current (120%)	< 10 A	0 – 9.999	0.001	A	1000
	< 100 A	0 – 99.99	0.01	A	100
	< 1000 A	0 – 999.9	0.1	A	10
	< 10000 A	0 – 9999	1	A	1
	< 100 KA	0 – 99.99	0.01	KA	100
	< 1000 KA	0 – 999.9	0.1	KA	10
Power (144%) Total & Individual (Active, Reactive, Apparent)	< 100 W	0 – 99.99	0.01	W	100
	< 1000 W	0 – 999.9	0.1	W	10
	< 10000 W	0 - 9999	1	W	1
	< 100 KW	0 – 99.99	0.01	KW	100
	< 1000 KW	0 – 999.9	0.1	KW	10
	< 10000 KW	0 - 9999	1	KW	1
	< 100 MW	0 – 99.99	0.01	MW	100
	< 1000 MW	0 – 999.9	0.1	MW	10
	< 10000 MW	0 - 9999	1	MW	1
	< 100 GW	0 – 99.99	0.01	GW	100
	< 1000 GW	0 – 999.9	0.1	GW	10
	< 10000 GW	0 – 9999	1	GW	1
PF	---	-1 – +1	0.001	PF	1000
Frequency	---	45.00 – 65.00	0.01	Hz	100

Example for Bulk Transfer Query :

In this example, the Meter Input is 415 V (Phase – Phase) 5 A, 50 Hz, PF = 1.

Procedure to select parameters V pn, A, W, VAR, VA for Bulk Transfer.

Refer Table 11

Function	06h
Register Address	1102, 1103, 1113,1114,1115
Length	1
Type	Unsigned Integer

Write Query for parameter selection

Query for	Slave ID	Function Code	Register Address	Data to write
V pn	0x01	0x06	0x025A	0x0001
A	0x01	0x06	0x025B	0x0001
W	0x01	0x06	0x0265	0x0001
VAR	0x01	0x06	0x0266	0x0001
VA	0x01	0x06	0x0267	0x0001

Read back of Table 6 Registers

Address in Decimal	Parameter Name	Value in Register
1102	V pn	1
1103	A	1
1113	W	1
1114	VAR	1
1115	VA	1

The value '1' in these registers suggests that the above parameters are selected for a bulk query read back.

In the above example, the Checksum bytes are not shown.

Each Query sent or Response received contains two bytes for CRC.

Bulk read back of all selected parameters :

Slave Id	0x01
Function Code	0x41
Parameter Type	0x01 = Integer, 0x02 = Float
Don't Care	0x00
Don't Care	0x00
Don't Care	0x00
CRC	2 bytes

Query for bulk read back uses special function 65 (41h).

The Query does not need any specific Register Address and Register Length.

Meter Response for Bulk Query :

Slave ID	0x01	0x01
Function No	0x41 (65d)	0x41 (65d)
Number of Bytes	0x14 (20d)	0x0A (10d)
Data	0x07504370	0x0960
	0x040040A0	0x1388
	0x103D4561	0x0E11
	0x00003E80	0x0000
	0x08F64561	0x0E10
CRC16 Checksum	2 bytes	2 bytes

Data Response

Average PN Voltage	240.02 (43700750 h)	240.0 (960 h)
Average Current	5.000 (40A00400 h)	5.000 (1388 h)
WATT	3601.01 (4561103D h)	3601 (E11 h)
VAR	0.25 (3E800000 h)	0 (0 h)
VA	3600.56 (456108F6 h)	3600 (E10 h)

Exceptional Response :

Exception Response Code	Exception Code name	Description
01	Illegal Function	Query Function Code not supported
02	Illegal Data Address	Register Address not supported

The exception response is sent by the Meter if a query deviates from the defined limits, in context of register address, invalid function number.

Recommended Communication Settings :

No. of Queries per Second	Recommended Baud Rate	Recommended Minimum Time Out
3 - 5	19200 bps	1 Second
1 - 2	9600 bps	1 Second
< 1	2400 to 19200 bps	1 Second

7. Installation

The Meter is to be mounted on a Panel with 92 X 92 Cutout.
The electrical connections are to be done as per the Wiring Diagram.

Current and Voltage Path Connections :

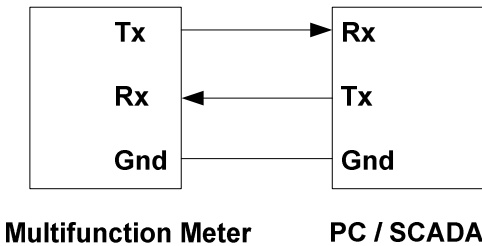
Follow proper CT polarities considering Supply and Load side for Current Input.
Follow proper Phase Sequence for Voltage Input.

Auxiliary Supply Connections :

Ensure that proper rating Auxiliary Supply with correct polarity is connected.

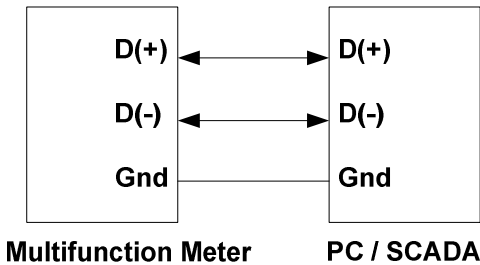
RS 232 Communication Connections :

RS 232 Connections Tx, Rx and Ground are provided on the Meter.
Ensure that following connection scheme is followed.

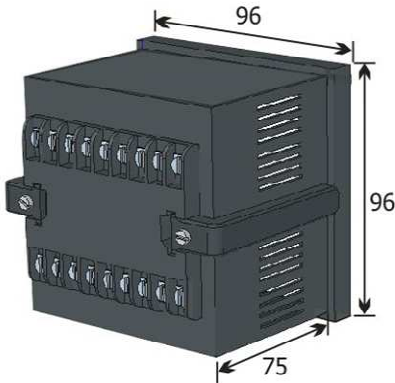


RS 485 Communication Connections :

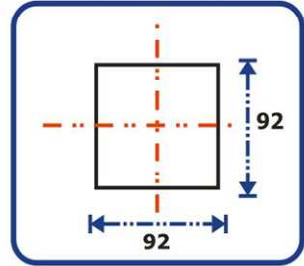
RS 485 Half Duplex Connections D(+), D(-) and Gnd are provided on the Meter.
Ensure that following connection scheme is followed.



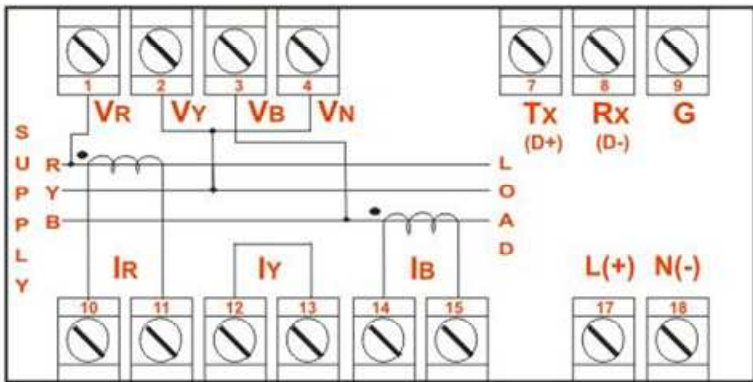
8. Drawing and Wiring



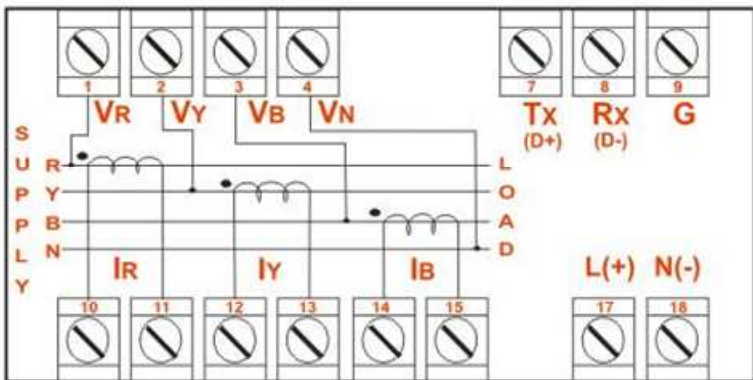
Panel Cutout



All Dimensions in mm



3 Phase 3 Wire Connection



3 Phase 4 Wire Connection

