Operating Manual

RISH OPTIMA VAF

2-60-006-00-00511_Rev. A - 5/2014

DIGITAL MULTIFUNCTION INSTRUMENT

Programmable Multi-function Digital Panel Meter

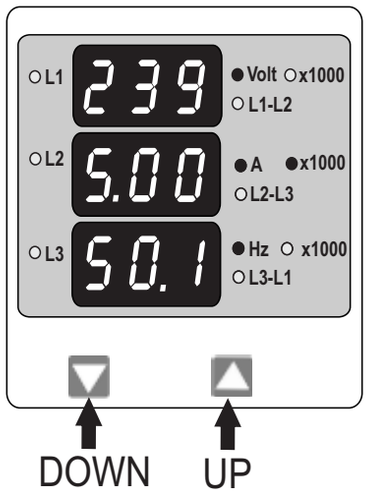
Installation & Operating Instructions

Section **Contents**

1. INTRODUCTION

The **VAF** is a panel mounted 96 x 96mm DIN Quadratic Digital Panel Meter for the measurement of important electrical parameters like AC Voltage, AC Current, RPM, Frequency.

The instrument integrates accurate measurement technology (All Voltages & current measurements are True RMS upto 15th Harmonic) with 3 line 3 digits Ultra high bright LED display.



VAF can be configured and Programmed On site for the following : PT Primary, PT Secondary, CT Primary, CT Secondary (5A or 1A) and System Type 3 phase 3W or 4W or single phase system.

The front panel has two push buttons using which the user can scroll through different screens and configure the product.

2. MEASUREMENT READING SCREENS

In normal operation, the user is presented with one of the measurement reading screens out of several screens. These screens may be scrolled through one at a time in incremental order by pressing the “UP key” and in decremental order by pressing “DOWN key”.

TABLE 1: Measured Parameters System Wise:

Measured Parameters	Units	3P 4W	3P 3W	1P 2W
System Voltage	Volts	✓	✓	✓
System Current	Amps	✓	✓	✓
Voltage VL1-N / VL2-N / VL3-N	Volts	✓	✘	✘
Voltage VL1-L2 / VL2-L3 / VL3-L1	Volts	✓	✓	✘
Current L1 / L2 / L3	Volts	✓	✓	✘
Frequency	Hz	✓	✓	✓
Run Hour	Hours	✓	✓	✓
On Hour	Hours	✓	✓	✓
Number of Interruptions	Counts	✓	✓	✓
Min / Max System Voltage	Volts	✓	✓	✓
Min / Max System Current	Amps	✓	✓	✓

3. Programming

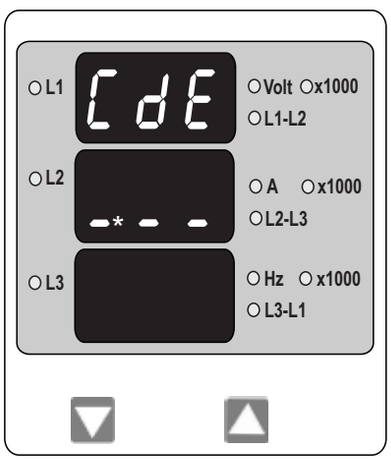
The following sections comprise step by step procedures for configuring the VAF for individual user requirements. To access the set-up screens press and hold the “DOWN” and “UP” keys Simultaneously. This will take the User into the Password Entry screen (Section 3.1).

In Setup mode, if none of the key pressed within 1 min, it will returns operation to the measurement mode.

3.1. Password Protection

Password protection can be enabled to prevent unauthorized access to set-up screens, by default password protection is not enabled.

Password protection is enabled by selecting a three digit number other than 000,setting a password of 000 disables the password protection.

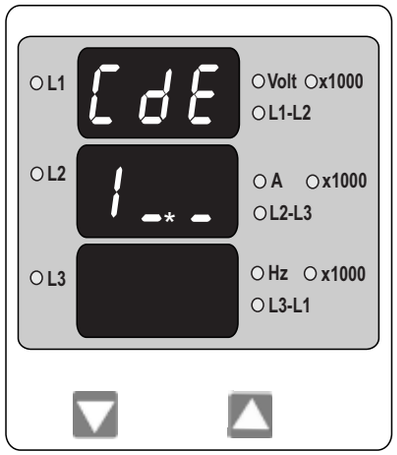


Enter Password, prompt for first digit.
(* Denotes that decimal point will be flashing).

Press the “DOWN” key to scroll the value of the first digit from 0 through to 9, the value will wrap from 9 round to 0.

Press the “UP” key to advance to next digit.

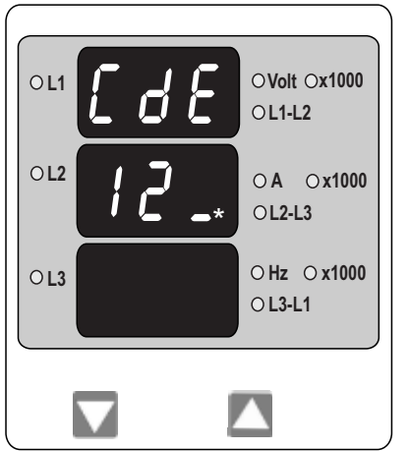
In the special case where the Password is “000” pressing the “UP” key when prompted for the first digit will advance to the “Password Confirmed” screen.



Enter Password, first digit entered, prompt for second digit.(* Denotes that decimal point will be flashing).

Press the “DOWN” key to scroll the value of the second digit from 0 through to 9, the value will wrap from 9 round to 0.

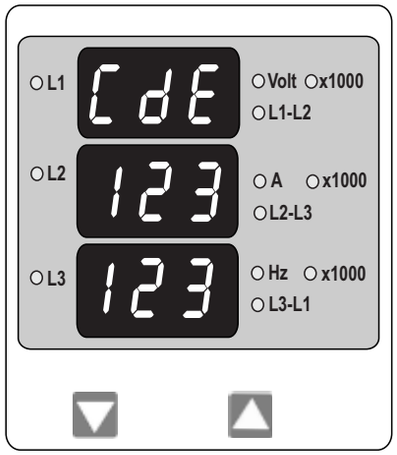
Press the “UP” key to advance to next digit.



Enter Password, second digit entered, prompt for third digit.(* Denotes that decimal point will be flashing).

Press the “DOWN” key to scroll the value of the third digit from 0 through to 9, the value will wrap from 9 round to 0.

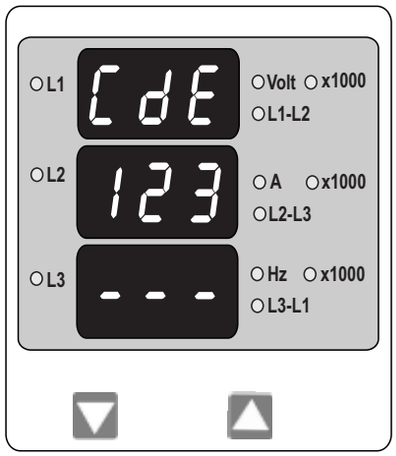
Press the “UP” key to advance to password confirmation screen.



Enter Password, third digit entered, Awaiting verification of password.

Password confirmed.
Pressing “V” key will advance to the “New / change Password” entry stage.

Pressing the “UP” key will advance to the system type edit screen. (See section 3.2).

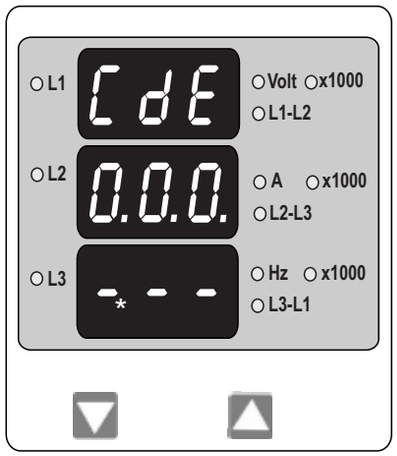


Password Incorrect.

The unit has not accepted the Password entered.

Pressing the “DOWN” key will return to the Enter Password stage.

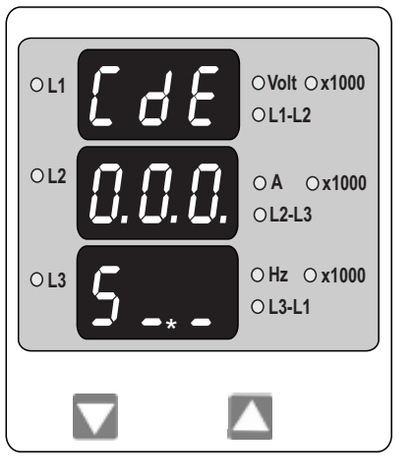
Pressing the “UP”key exits the Password menu and returns operation to the measurement reading mode.



New / Change Password

(*Decimal point indicates that this will be flashing).

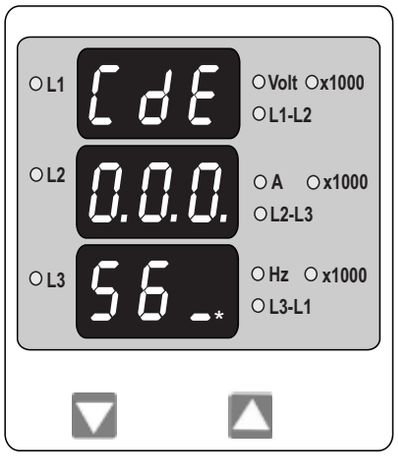
Pressing the “DOWN” key will scroll the value of the first Digit from 0 through to 9, the value will wrap from 9 round to 0.



New / Change Password, first digit entered, prompting for second digit.(*Decimal point indicates that this will be flashing).

Pressing the “DOWN” key will scroll the value of second digit from 0 through to 9, the value will wrap from 9 round to 0.

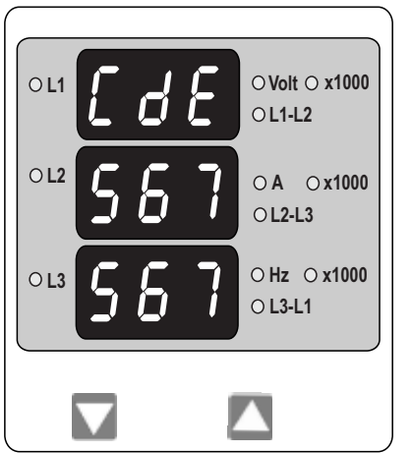
Pressing the “UP” key to advance the operation to the Next digit and sets the first digit, in this case to “5”



New / Change Password, second digit entered, prompting for third digit. (*decimal point indicates that this will be flashing).

Pressing the “DOWN” key will scroll the value of the third from 0 through to 9, the value will wrap from 9 round to 0.

Pressing the “UP” key to advance the operation to “New Password Confirmed” and sets the third digit, in this case to “7”.



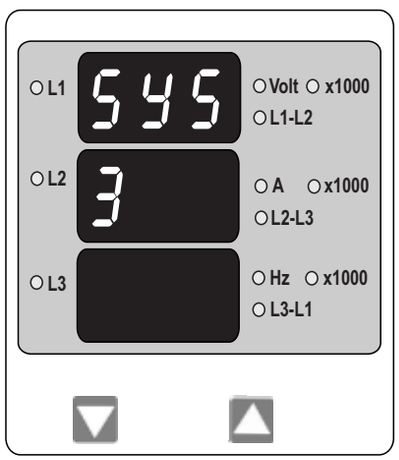
New Password confirmed.

Pressing the “DOWN” key will return to the “New/Change Password”.

Pressing the “UP” key will advances to the Set up screen.(see section 3.2).

3.2 Set Up Screens

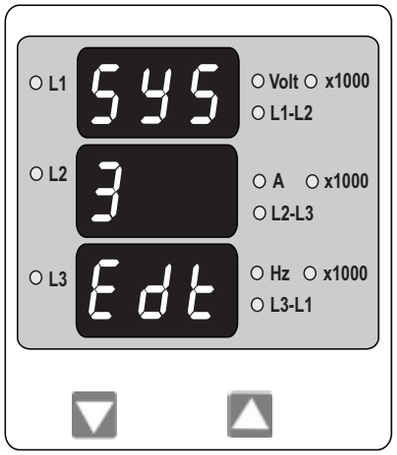
3.2.1. System Type



This screen is used to edit and set the system type. System type ”3” for 3 phase 3 wire & “4” for 3 phase 4 wire & 1 for Single phase system.

Pressing “UP” key accepts present value and advances to the “Potential transformer Primary Value Edit” menu.

Pressing “DOWN” Key will enter the System type edit mode.

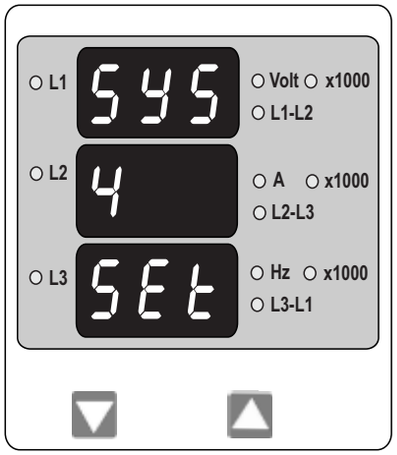


System Type Edit

This screen appears only if “DOWN” key is pressed in previous Menu.

Pressing “DOWN” scrolls through the values available.

Pressing “UP” Key advances to the system type Confirmation menu.



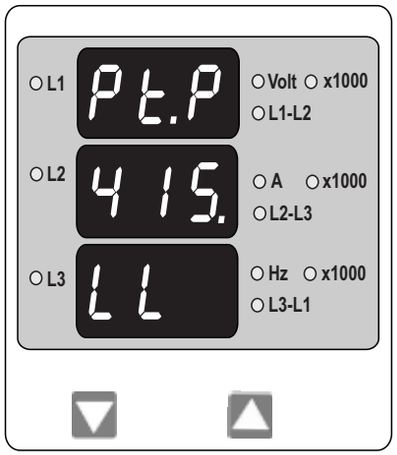
System Type Confirmation

This screen will only appear following the edit of system type.

Pressing the “UP” key set the displayed value as system Type and will advance to “Potential Transformer Primary Value Edit” menu. (See section 3.2.2)

3.2.2. Potential Transformer Primary Value

The nominal full scale voltage which will be displayed as the Line to Line voltage for all system types. This screen enables the user to display Line to Line and Line to neutral Voltages inclusive of any PT ratios, the values displayed represent the voltage.



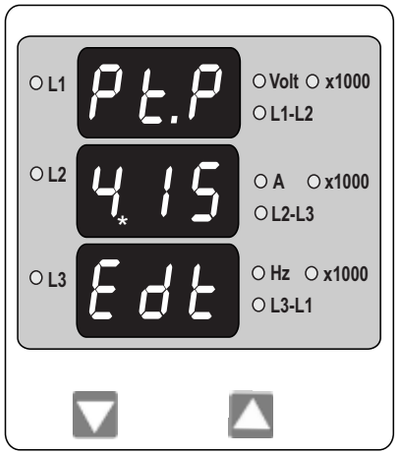
Pressing the “UP” key accepts the present value and advances to the “Current Transformer Primary value Edit” menu. (See Section 3.2.3)

Pressing the “DOWN” key will enter the “Potential transformer Primary value edit mode.

Initially the PT value must be selected pressing the “DOWN” key will move the decimal point position to the right side until it reaches # # #. after which it will return to #. # # with x1000 annunciation.

Pressing the “UP” key accepts the present multiplier (Decimal Point position with x1000 annunciation) and advances to the “Potential Transformer Primary Digit Edit” Screen.

Note : PT Values must be set as Line to Line Voltage for Primary as well as Secondary for all system types (3P3W/3P4W/1P2W).



Potential Transformer Primary Digit Edit

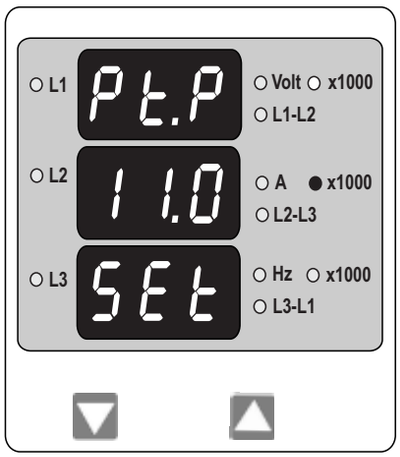
Pressing the “DOWN” key will scroll the value of the most significant digit from 0 to 9 unless the presently displayed Potential Transformer Primary value is less than 799 kilovolts in that case the digit range will be restricted.

Pressing the “UP” key accepts the present value at the cursor position and advances the cursor to the next Less significant digit.

Note : The flashing decimal point indicates the cursor position, a steady decimal point will be present to identify the scaling of the number until the cursor position coincides with the steady decimal point position. At this stage the decimal point will flash.

When the least significant digit has been set, pressing the “UP” key will advance to the “Potential transformer Primary Value Confirmation” stage.

Screen showing display of 11.0 k VL-L i.e. 11000 Volts Line to Line indicating steady decimal point and cursor flashing at the “hundreds of volts” position as shown below.



Potential Transformer Primary Value Confirmation

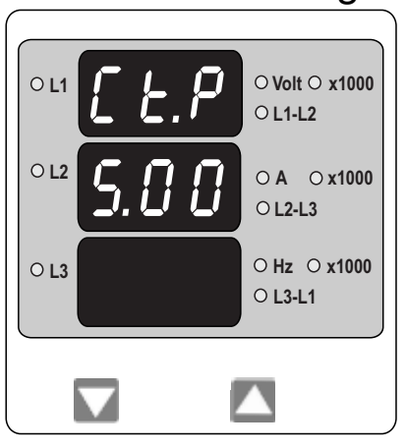
This screen will only appear following an edit of the Potential Transformer Primary Value.

If the set value is to be corrected, pressing the “DOWN” key will return to the “Potential Transformer Primary value Edit” stage.

Pressing the “UP” key sets the displayed value and will advance to the Current Transformer Primary Value. (See section 3.2.3.)

3.2.3. Current Transformer Primary Value

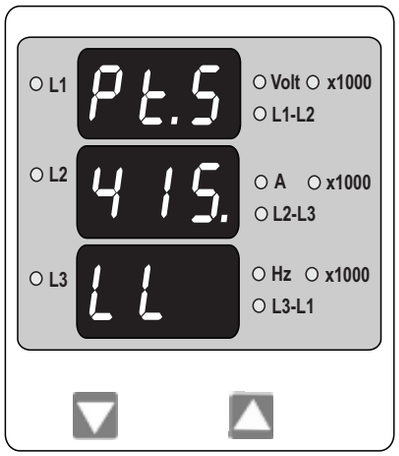
The nominal full Scale Current that will be displayed as the Line currents. This screen enables the user to display the Line currents inclusive of any current transformer ratios, the values displayed represent the Current in Amps or in kAmps when x1000 led is glows.



Pressing the “DOWN” key will enter the “Current Transformer Primary Value Edit” mode. Pressing the “UP” key will accept the present value And Advances to the “Potential Transformer Secondary Value edit screen (See section 3.2.4).

Further functionality is same as per **Potential Transformer Primary Value** (section 3.2.2).

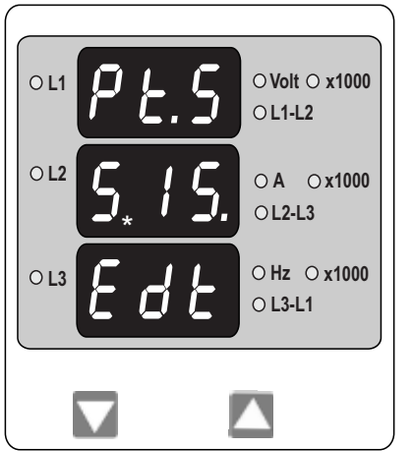
3.2.4. Potential Transformer Secondary Value



This screen is used to set the secondary value for Potential Transformer Secondary value from 100V to 500VL-L.

Pressing “UP” key accepts the present value and then advances to Current Transformer Secondary value edit mode.

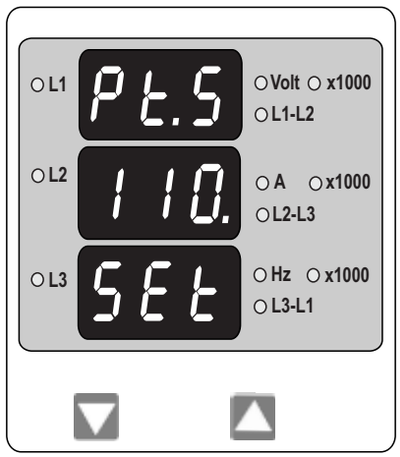
Pressing the “DOWN” key will enter the PT secondary value edit mode.
* Denotes that Decimal Point will be flashing.



Potential Transformer secondary value Edit

Pressing “DOWN” Key advances the Most Significant Digit To scroll from 1 through 5 .Pressing “UP” Key shifts the Decimal Position to right.

When value of least significant Digit is set, Pressing of “UP” key advances the screen to “PT secondary value Confirmation” screen.



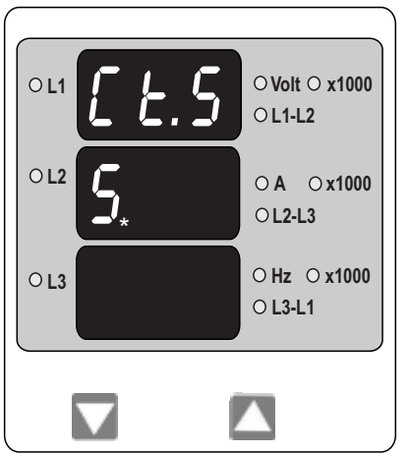
PT Secondary value confirmation.

This screen will only appears following an edit of PT secondary value.

If secondary value shown is not correct, pressing the “DOWN” key will return to PT secondary edit stage.

Pressing “UP” key sets the displayed value and will advance to CT Secondary Value Edit menu. (See section 3.2.5)

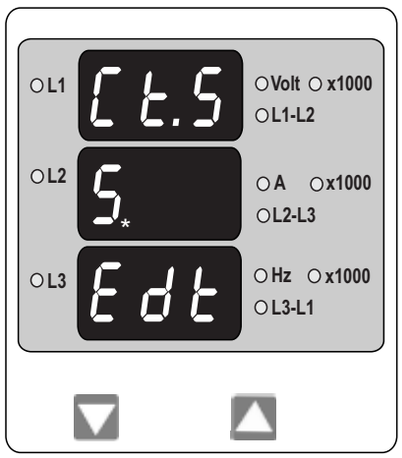
3.2.5. Current Transformer Secondary Value



This screen is used to set the secondary value for Current Transformer Secondary value from 1 and 5 Amperes.

Pressing “UP” key accepts the present value and then advances to RESET menu..

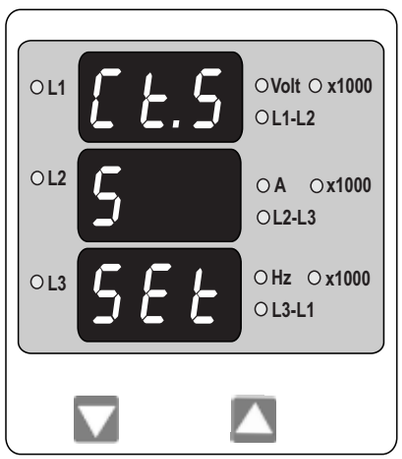
Pressing the “DOWN” key will enter the CT secondary value edit mode.



Current Transformer secondary value Edit

Pressing “DOWN” key scroll the value between 1 and 5.

Pressing “UP” key will enter the CT Secondary Value Confirmation menu.



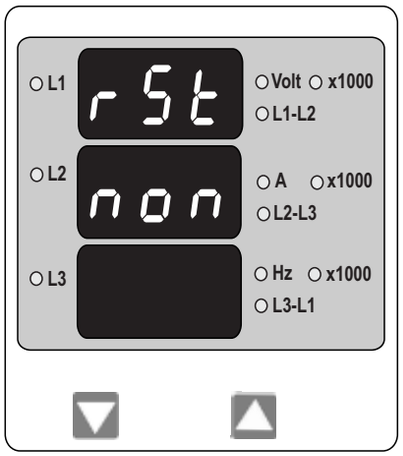
CT Secondary value confirmation.

This screen will only appears following an edit of CT secondary value.

If secondary value shown is not correct, pressing the “DOWN” key will return to CT secondary edit stage.

Pressing “UP” key sets the displayed value and will advance RESET menu (See section 3.2.5)

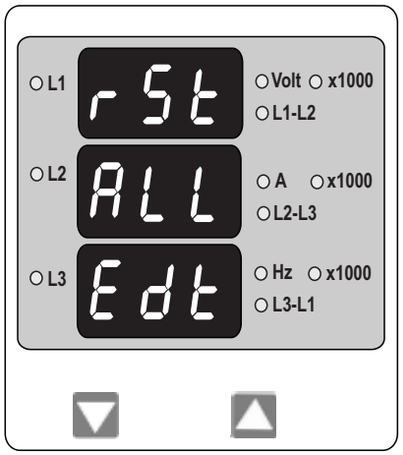
3.2.6. Reset



The following screens allow the users to reset the run hour, ON Hour, No. Of Interruptions, Min and Max. Values of Voltage and Current.

Pressing the “DOWN” key will enter the “Reset edit” menu.

Pressing the “UP” key will Reset None and enter to screen Auto of fixed selection menu.

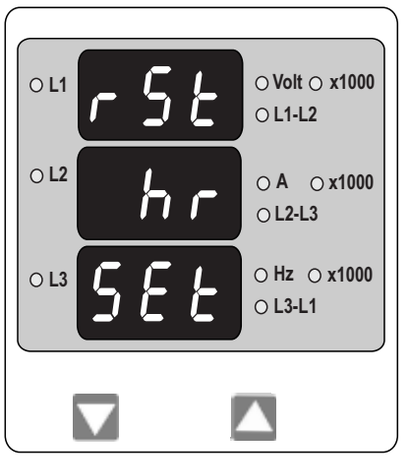


Edit the Reset of Parameters

Pressing “DOWN” will scroll the parameters in sequence as Follow :

1. All : To reset All parameters,
2. Hi : To reset Max values,
3. Lo : To reset min. Values,
4. Hr : To reset Run Hrs, On Hrs,
5. Int : To reset No. Of Interruptions,
6. None : No to reset any of the Parameters,

Select the Correct parameter to Reset and then Press “UP” key. This will enter to Reset Parameter Confirmation Screen.

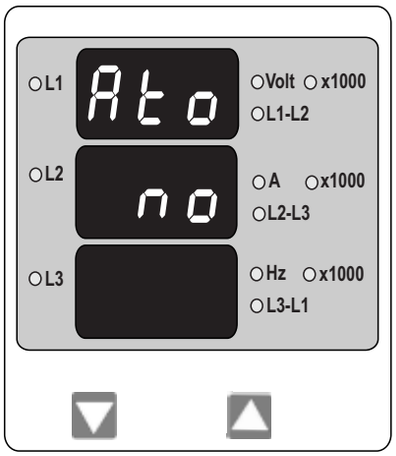


Confirmation of parameter for RESET

Pressing “DOWN” will enter reset menu back and scroll etween parameters as above.

Pressing “UP” key will Reset the Selected Parameter. In this case hour parameters will get reset.Then it will enter to auto scrolling or fixed screen selection parameter.

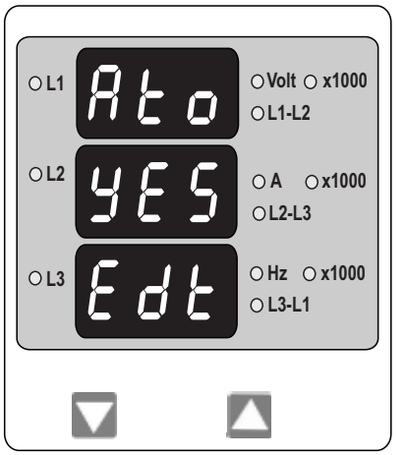
3.2.7 Screen Auto scrolling / Fixed Screen selection



This menu allow to select scrolling or fixed screen.

Pressing “UP” key enters confirmation of Fixed Screen.

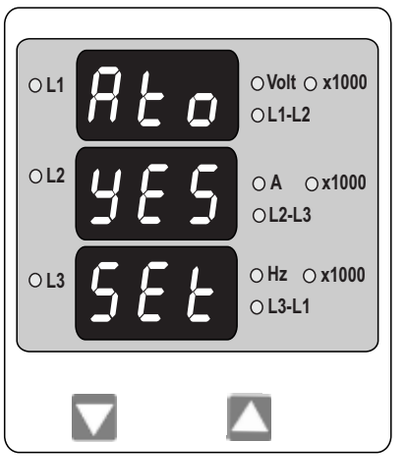
Pressing of “DOWN” key enters to Edit menu.



Fixed Screen / Auto Scrolling Edit.

Pressing of “DOWN” key Rolls between “Yes” and “No”.

Pressing “UP” key enters Auto scrolling / fixed screen select confirmation.

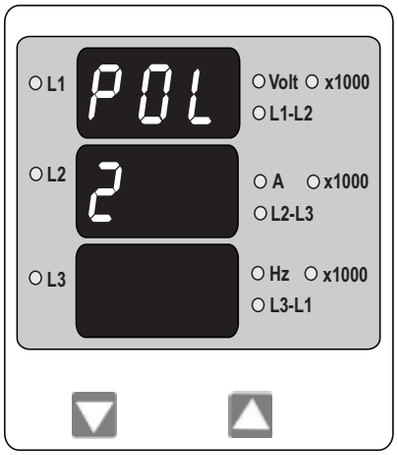


Confirmation of Auto Scrolling / Fixed Screen

Pressing “DOWN” key enter back to edit menu.

Pressing “UP” key confirms the selection and enters Number of poles selection menu.

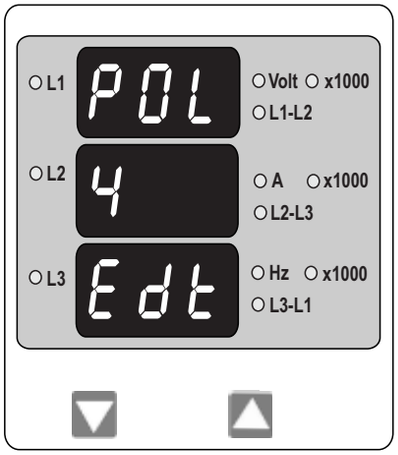
3.2.8 No. of Poles Selection :



This screen enables to set No. of poles on a Generator of which RPM is to be measured and to which the instrument is connected to measure its output parameters.

Pressing “DOWN” key enters into no. of pole edit menu.

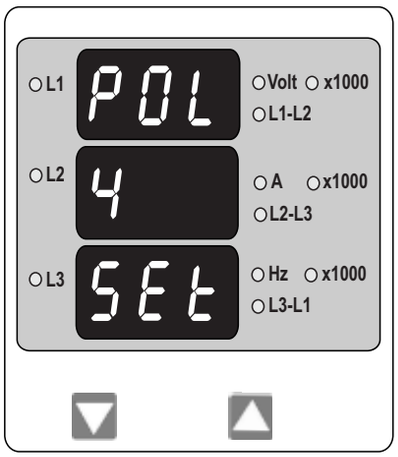
Pressing “UP” key will set the displayed number as No. of poles. Then it advanced to Relay limit parameter selection screen (see section 3.2.9).



No. of Poles edit

Pressing “DOWN” key scrolls the number from 02 to 40 in step of 2. After 40 it wraps to the number again 02.

Pressing “UP” key enters into No. of poles Confirmation screen.

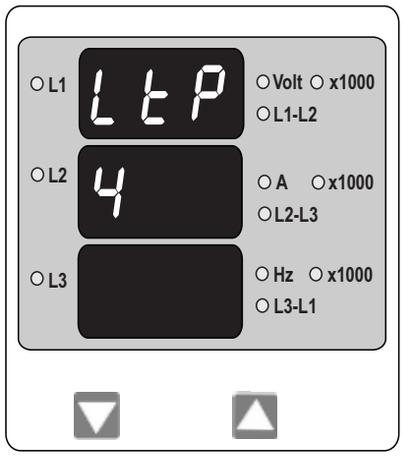


No. of Poles Confirmation

Pressing “DOWN” key enters back to No. of poles edit menu.

Pressing “UP” key sets the number on screen, 4 in this case, as number of poles of generator and advanced to Relay limit parameter selection screen (see section 3.2.9).

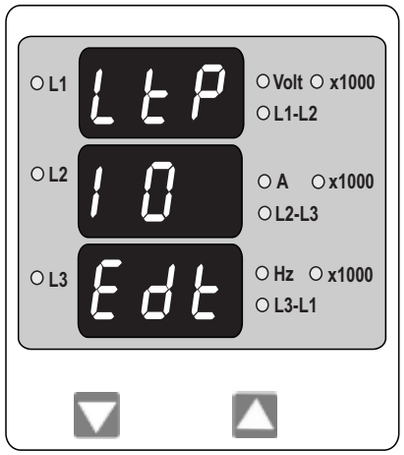
3.2.9 Relay Limit Parameter selection (Optional)



This screen enables user to select Parameter for limit monitoring via a Relay.

Pressing “UP” key selects the displayed parameter for monitoring and enters trip point selection screen.

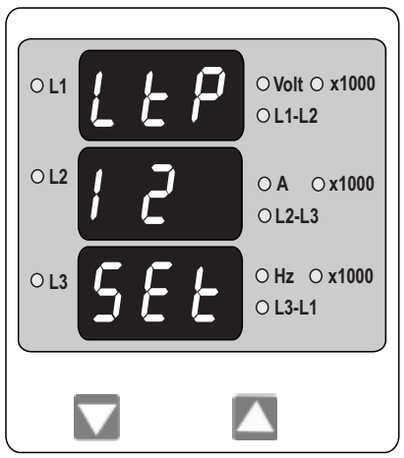
Pressing “DOWN” key enters Trip parameter edit screen.



Trip parameter edit screen

Pressing “DOWN” key scrolls the parameters one by one as per table 2. Selecting 00(None) disables relay function.

Pressing “UP” key selects the parameter and enters the Trip parameter confirmation screen.In this case displayed number 10 will select VL1-L2 For relay monitoring as per table 2.

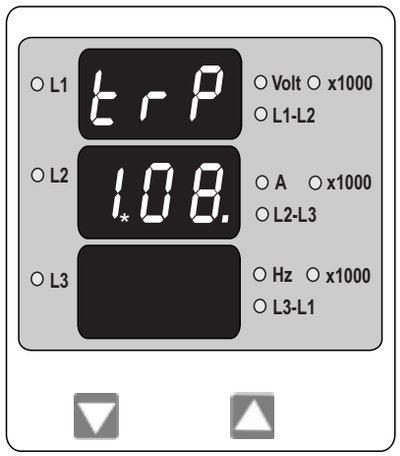


Trip parameter confirmation screen.

This screen will appear only after parameter edit.

Pressing “DOWN” key will re-enter the parameter selection menu.

Pressing “UP” key will set the parameter for relay trip and then it will enter the trip point selection menu.



Trip point selection

This screen will not appear if parameter None (00) is Selected in previous menu. The trip point can be set as % of the Nominal value of selected parameter (Refer Table 2).

Pressing “DOWN” key will enter trip point edit screen.

Pressing “UP” key will set displayed value as trip point and exit set up. Further Functionality is same as **Potential Transformer Secondary value** (see section 3.2.4)

TABLE 2 : Parameters for limit monitoring

Parameter No.	Measured Parameters	3P4W	3P3W	1P2W	Trip point Set range	100% Value
00	None	✓	✓	✓	—	—
01	Voltage L1	✓	X	✓	10 - 120%	Vnom (L-N)
02	Voltage L2	✓	X	X	10 - 120%	Vnom (L-N)
03	Voltage L3	✓	X	X	10 - 120%	Vnom (L-N)
04	Current L1	✓	✓	✓	10 - 120%	Inom
05	Current L2	✓	✓	X	10 - 120%	Inom
06	Current L3	✓	✓	X	10 - 120%	Inom
07	Frequency	✓	✓	✓	10 - 100%	66Hz(1)
10	Voltage VL1-L2	✓	✓	X	10 - 120%	Vn (L-L)
11	Voltage VL2-L3	✓	✓	X	10 - 120%	Vn (L-L)
12	Voltage VL3-L1	✓	✓	X	10 - 120%	Vn (L-L)
13	System Voltage	✓	✓	X	10 - 120%	Vnom (2)
14	System Current	✓	✓	X	10 - 120%	Inom

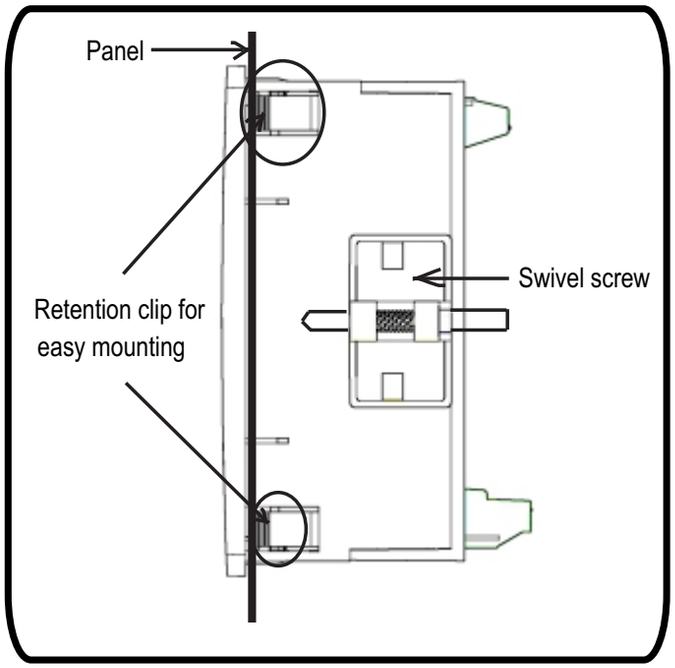
Note : (1) For Frequency 10% corresponds to 45Hz and 100% corresponds to 66Hz.

(2) For 3P 4wire and 1ph the nominal value is V_{L-N} and that for 3P3W is V_{L-L}.

(3) Nominal Value is to be considered with set CT/ PT Primary values.

(4) For single phase L1 Phase values are to be considered as System values.

4. Installation



Mounting of VAF is featured with easy “Clip- in” mounting. Push the meter in panel slot (size 92 x92 mm), it will click fit into panel with the four integral retention clips on two sides of meter.

If required Additional support is provided with swivel screws (optional) as shown in figure.

The front of the enclosure conforms to IP50. Additional protection to the panel may be obtained by the use of an optional panel gasket. The terminals at the rear of the product should be protected from liquids.

The VAF should be mounted in a reasonably stable ambient temperature and where the operating temperature is within the range -10° to 55°C . Vibration should be kept to a minimum and the product should not be mounted where it will be subjected to excessive direct sunlight.

Caution:

1. In the interest of safety and functionality this product must be installed by a qualified engineer, abiding by any local regulations.
2. Voltages dangerous to human life are present at some of the terminal connections of this unit. Ensure that all supplies are de-energised before attempting any connection or disconnection.
3. These products do not have internal fuses therefore external fuses must be used to ensure safety under fault conditions.

4.1 EMC Installation Requirements

This product has been designed to meet the certification of the EU directives when installed to a good code of practice for EMC in industrial environments.

e.g. screened output and low signal input leads or have provision for fitting RF suppression components, such as ferrite absorbers, line filters etc., in the event that RF fields cause problems.

Note: It is good practice to install sensitive electronic instruments that are performing critical functions, in EMC enclosures that protect against electrical interference which could cause a disturbance in function.

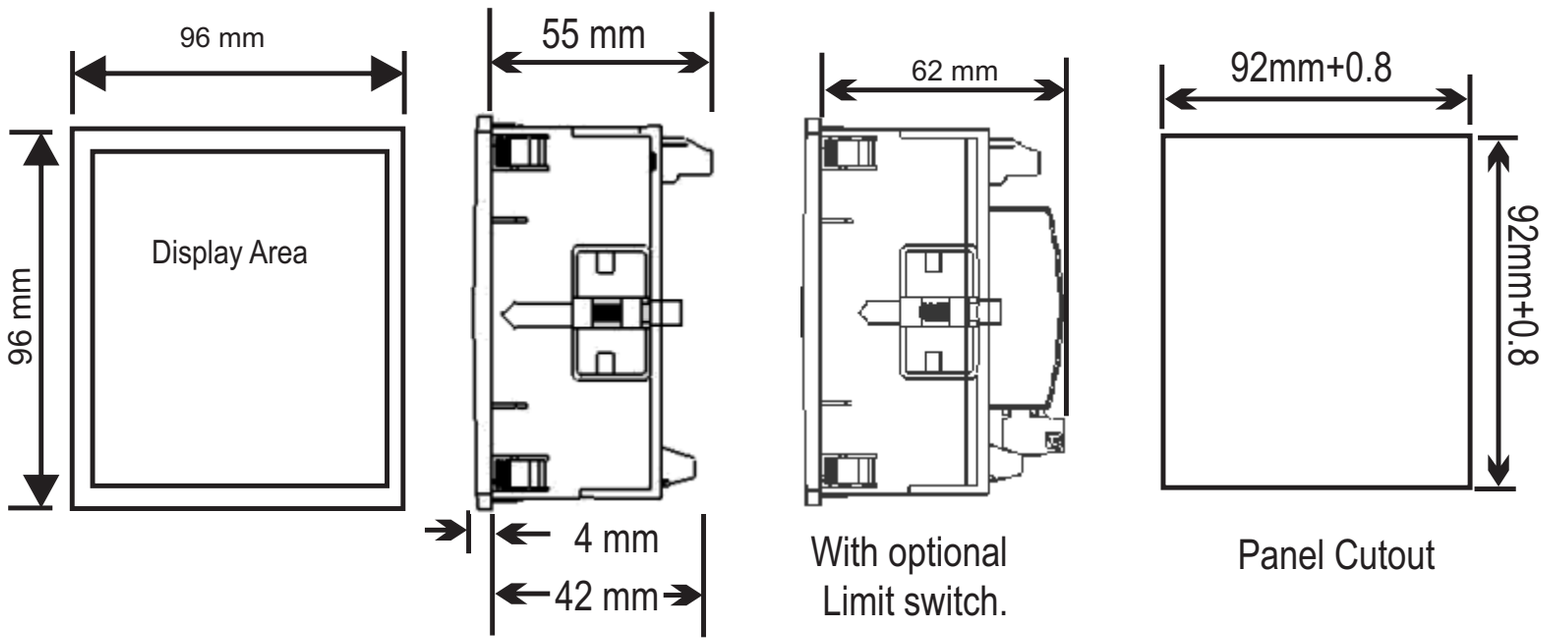
Avoid routing leads alongside cables and products that are, or could be, a source of interference.

To protect the product against permanent damage, surge transients must be limited to 2kV pk. It is good EMC practice to suppress differential surges to 2kV at the source. The unit has been designed to automatically recover in the event of a high level of transients.In extreme circumstances it may be necessary to temporarily disconnect the auxiliary supply for a period of greater than 5 seconds to restore correct operation.

The Current inputs of these products are designed for connection in to systems via Current Transformers only, where one side is grounded.

ESD precautions must be taken at all times when handling this product.

4.2 Case Dimension and Panel Cut Out



4.3 Wiring

Input connections are made directly to screw-type terminals with indirect wire pressure. Numbering is clearly marked on the connector. Choice of cable should meet local regulations. Terminal for both Current and Voltage inputs will accept upto $4mm^2$ (12AWG) solid or 2.5 mm^2 (12AWG) standard cable.

Note : It is recommended to use wire with lug for connection with meter.

4.4 Auxiliary Supply

VAF should ideally be powered from a dedicated supply, however it may be powered from the signal source, provided the source remains within the limits of the chosen auxiliary voltage range.

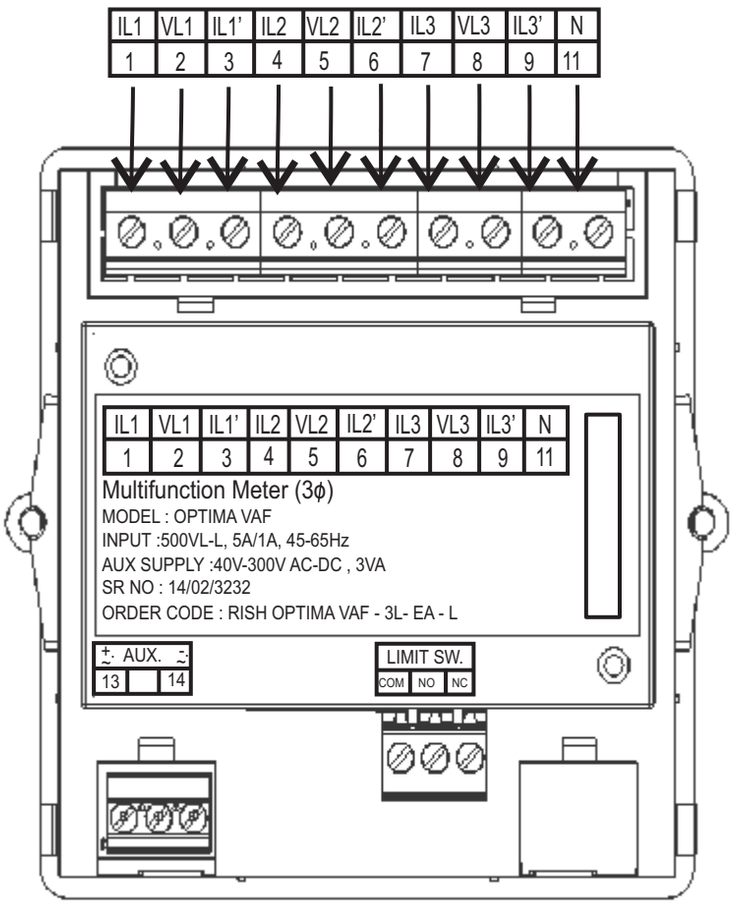
4.5 Fusing

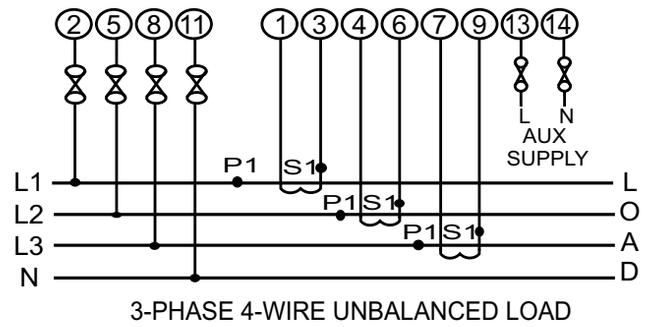
It is recommended that all voltage lines are fitted with 1 amp HRC fuse.

4.6 Earth/Ground Connections

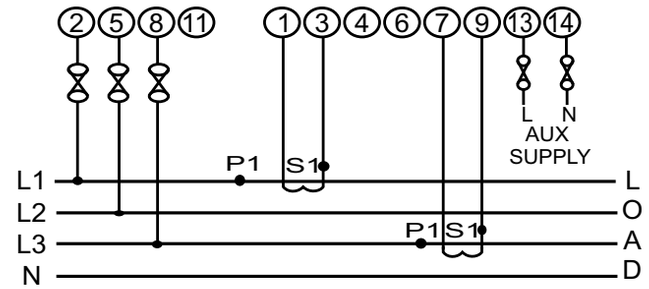
For safety reasons, CT secondary connections should be grounded in accordance with local regulations.

5. Connection Diagrams

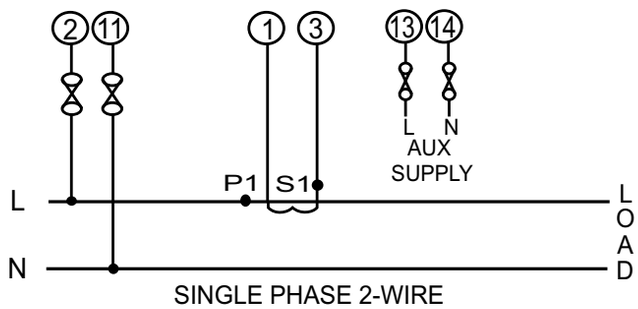




3-PHASE 4-WIRE UNBALANCED LOAD

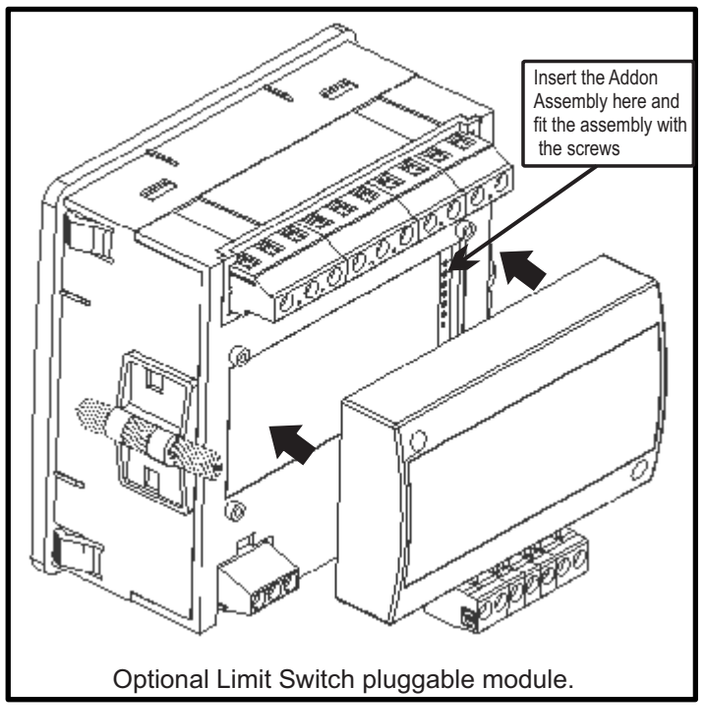


3-PHASE 3-WIRE UNBALANCED LOAD



SINGLE PHASE 2-WIRE

6. Optional Pluggable Module



Optional Limit Switch pluggable module.

7. Specification :

System

3 Phase 3 Wire / 4 Wire or Single Phase programmable at site

Inputs

Nominal Input Voltage	100V - 500 VL-L 57.7V - 290 VL-N
System PT Primary values	100VL-L to 799 kVL-L programmable at site
System PT Secondary values	100VL-L to 500 VL-L, programmable at site
Max continuous input voltage	120% of Rated value
Max short duration input voltage	2 x Rated value (1s application repeated 10 times at 10s intervals)
Nominal input voltage burden	< 0.3 VA Approx. per phase
Nominal Input Current	1A / 5A AC
Max continuous input current	120% of Rated value
Nominal input current burden	< 0.2 VA Approx. per phase
Max short duration input current	20 x Rated value (1s application repeated 5 times at 5 min. interval)
System CT Primary values	1A to 799 K Amps programmable at site
System CT Secondary values	1A or 5A programmable at site

Operating Measuring Ranges

Voltage	10 ... 120 % of Rated value
Current	5 ... 120 % of Rated value
Frequency	45 Hz ... 65 Hz

NOTE: When Voltage input is absent, current measurement starts from 75 mA.

Auxiliary

External Auxiliary Supply	40V to 300V AC/DC (+/- 5%) or 20V to 40V AC / 20V to 60V DC
Frequency Range	45 to 65 Hz
VA Burdon	< 4 VA

Accuracy

Voltage	±1.0 % of nominal value
Current	±1.0 % of nominal value
Frequency	±0.5 % of mid frequency

Reference conditions for Accuracy :

Reference temperature	23°C ± 2°C
Current	10... 100% of nominal value
Voltage	20... 100% of nominal value
Input frequency	50 / 60Hz ± 2%
Input waveform	Sinusoidal (distortion factor 0.005)
Auxiliary supply voltage	Rated Value ± 1 %
Auxiliary supply frequency	Rated Value ± 1 %

Relay

Settable parameters	as per table 2
Trip Point setting	10%...120% of set range of parameter (except frequency which is 10%...100%)
Hysteresis	5% of trip point
Contact type	single pole NO+NC, volt free contacts
Contact rating	250V, 5A

Influence of Variations:

Temperature Coefficient	0.05% / °C

Display

LED	3 line 3 digits, Display height : 14mm
Update rate	Approx. 1 seconds

Controls

User Interface	2 Keys

Applicable Standards:

EMC	IEC 61326
Immunity	IEC 61000-4-3. 10V/m min – Level 3 industrial Low level
Safety	IEC 61010-1-2010 , Permanently connected use
IP for water & dust	IEC 60529
Pollution degree:	2
Installation category:	III

Isolation

High Voltage Test	3.3 kV AC, 50 Hz for 1 minute between all Electrical circuits.

Environmental

Operating temperature	-10 to +55°C
Storage temperature	-20 to +65°C
Relative humidity	0... 90% non condensing
Warm up time	Minimum 3 minute
Shock	15g in 3 planes
Vibration	10... 150.... 10 Hz, 0.15mm amplitude
Enclosure front	IP50
Enclosure back	IP20

Enclosure

Style	96mm x 96mm DIN Quadratic
Material	Polycarbonate Housing
Terminals	Screw-type terminals
Depth	< 60 mm
Weight	300 grams Approx.

WARRANTY

Dear Customer,

You are now the privileged owner of **MFM**, a product that ranks the first of its kind in the world. **Company** provides 12 months warranty from the original date of Purchase against defective material and workmanship.

In the unlikely event of failure of the instrument / accessories within the warranty period. **Company** will repair meter / accessories free of charge. Please hand over the meter / accessories to the dealer / stockist from whom you have purchased along with this card and relevant Cash Memo / Invoice. This warranty entitles you to bring the meter / accessories at your cost to the nearest stockist / dealer and collect it after repairs.

NO TRANSPORTATION CHARGES WILL BE REIMBURSED.

The warranty is not valid in following cases:

1. Warranty card duly signed and stamped and original Cash Memo / Invoice is not sent along with **MFM**.
2. Complete warranty card is not presented to authorised person at the time of repairs.
3. Meter / accessories is not used as per the instructions in the instruction manual.
4. Defect caused by misuse, negligence, accidents, tampering and Acts of God.
5. Improper repairing by any person not authorised by the company.
6. Any sort of Modification, Alteration of any sort is made in electrical circuitry.
7. Seal provided inside/outside is broken.

In case of dispute to the validity of the warranty, the decision of Company service center will be final.

If you bought this **MFM** directly from the company, and if you notice transit damage, then you must obtain the insurance surveyors report and forward it to **Company** .

Thank you.

(To be filled by authorized dealer)

Model No.:_____ Serial No. : _____

Date of Purchase : _____ Cash Memo / Invoice No. : _____

Dealer's Signature : _____ Dealer's Stamp : _____