Operating Manual

RISH Eine+

2-60-006-00-00510_Rev_G 03/2020

PROGRAMMABLE DC DPM

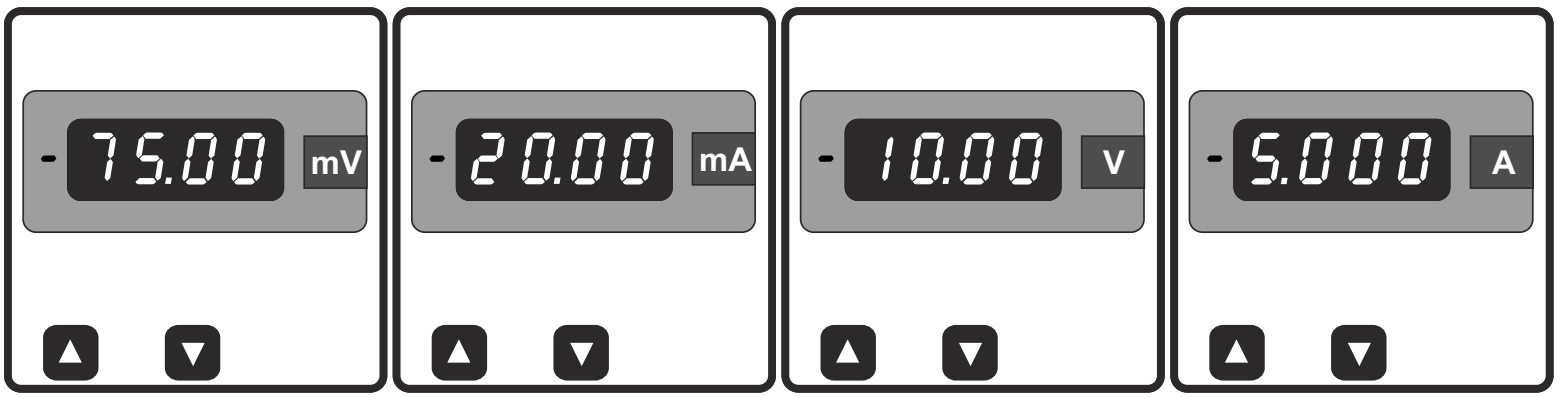
DC Voltmeter : Eine^{+} Voltage
DC Ammeter : Eine^{+} Current

Installation & Operating Instructions

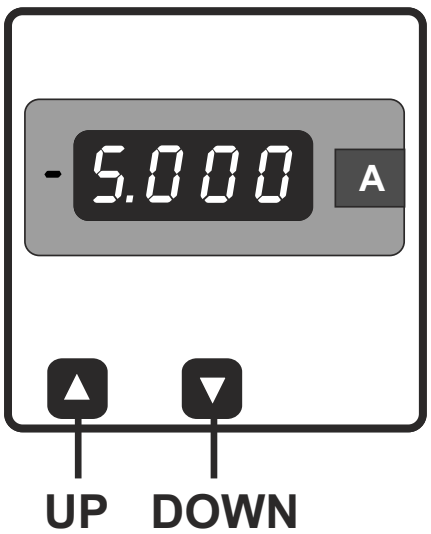
Section **Contents**

Available Models :

1. Eine+ mV
2. Eine+ mA
3. Eine+ V
4. Eine+ A



1. Introduction



The Eine+ is a series of panel mounted 96 x 96mm and 48x96 Digital Panel Meters for the measurement of DC Voltage and Current.

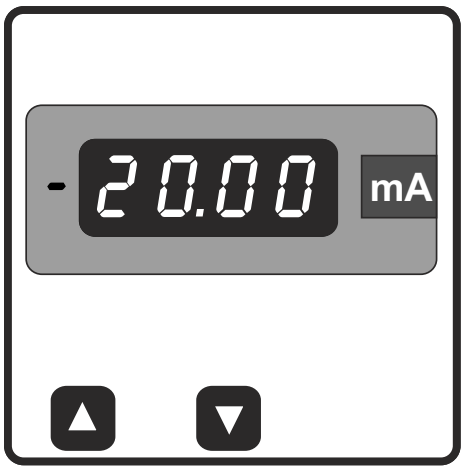
The instrument integrates accurate measurement technology. The parameters are displayed with Ultra high bright LED display with 14mm Digit height. Programmable DPM can be configured and programmed on site for the following:
Input start and bent values, Display start, end and bent values.
The front panel has two push buttons through which the user can enter into programming mode and can configure the meter.

2. Measurement Reading Screen

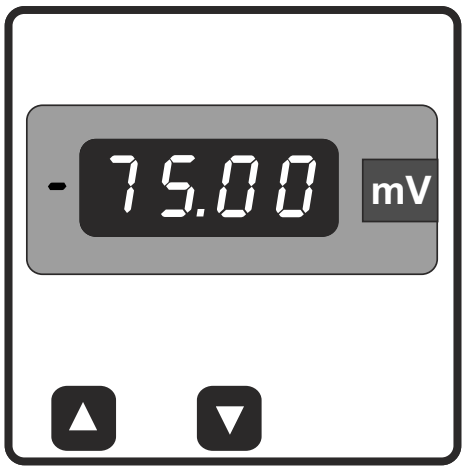
In normal operation the user is presented with the measurement reading screens. These screens may be scrolled through keys one at a time in incremental order by pressing the ▼ key and in decrementing order by pressing ▲ key.

Screens of Eine+

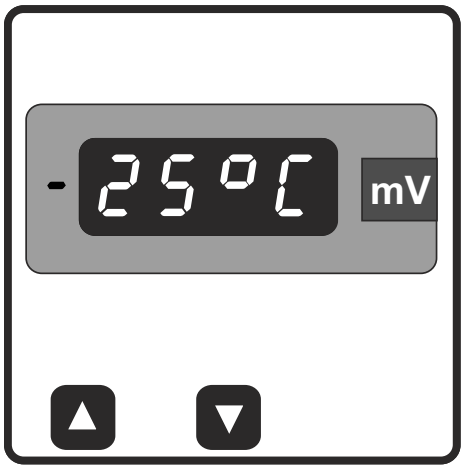
Screen 1 : Current



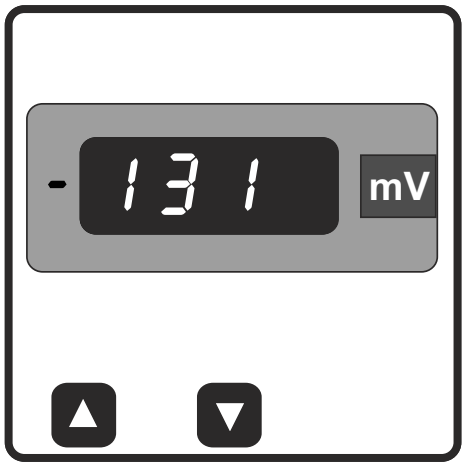
Screen 1 : Voltage



Screen 2 : Ambient Temperature (°C)



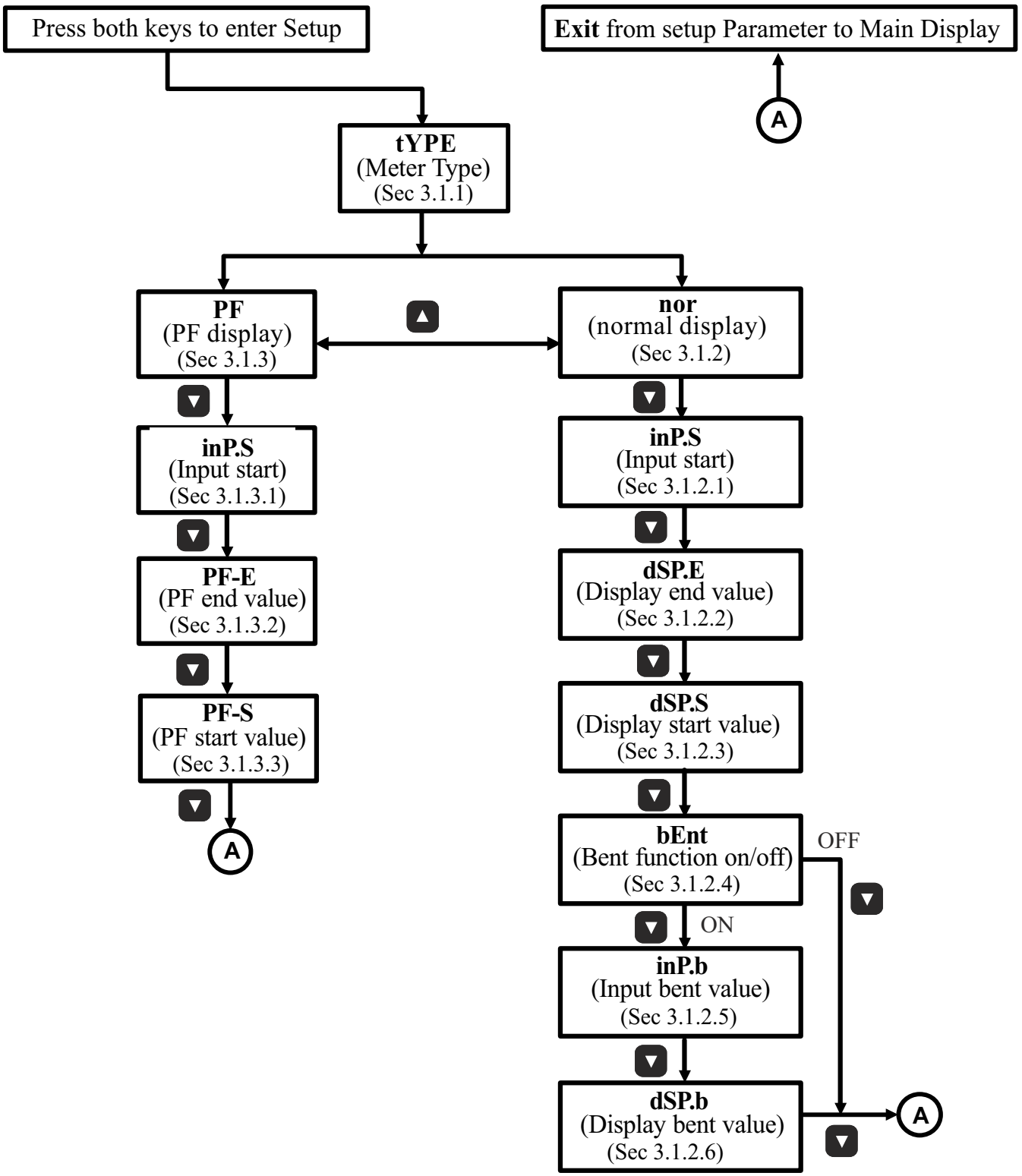
Screen 3 : Ambient Temperature (°F)



A flashing message of "**°F**" will be shown at intervals of 1.5 sec.

Note: All the screen shown in manual is for reference(Screens are applicable for both models i.e., 48x96 & 96x96)

Eine+ Setup Parameter Screen



3. Programming

The following sections comprise step by step procedures for configuring the meter for individual user requirements. To access the set-up screens press and hold the " △ " and " ▽ " keys simultaneously.

This will take the User into the Meter Type Screen. (section 3.1.1)

3.1 Setup Screens

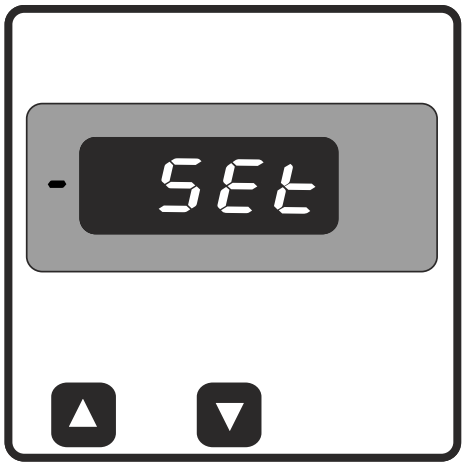
3.1.1 Meter type

This screen is used to set the meter type. The user can scroll between the following options using the " △ up" key
nor: normal operation
PF: operate as Power Factor DPM

Pressing the " ▽ down" key will accept the present type and advance to Input Start value selection(section 3.1.2.1).

Pressing the " △ up" key again will enter the meter type edit mode and user can scroll through the types available. Pressing the " ▽ down" key advances to the meter type confirmation menu.

Meter Type Confirmation



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

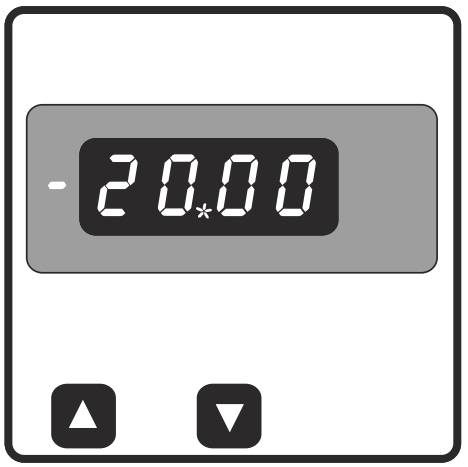
Pressing the " ▽ down" key sets the displayed type and will advance to Input Start value selection (section 3.1.2.1).

3.1.2 Normal Meter

3.1.2.1 Input Start Value (inP.S)

This screen allows the user to set the Start value of Input.
The Start value can be set from **-100% to 20%** of Input End value for all models, except for 500 & 1000V models in which Start value range is from **0 to 20%** of Input End value, where Input End value is the Nominal Input value of the meter.

NOTE: Decimal point will be fixed depending upon the Nominal Input value of meter. Eg. For 20mA model, decimal pt. will be fixed after second digit. Hence, Input start value of 04.00 will correspond to 4mA.



Initially, **'inP.S'** message is displayed on screen following which user can start editing Input Start value by pressing the " △ " key.
After entering the edit mode, by pressing the " △"key user can turn the **'-'** symbol On or Off. If **'-'** symbol is On then Input Start value will be set as negative.
Pressing the " ▽ " key will set the **'-'** symbol and editing of first digit will start. By pressing the " △ "key user can scroll the value from 0 to 9 or it will get restricted by Input End value.

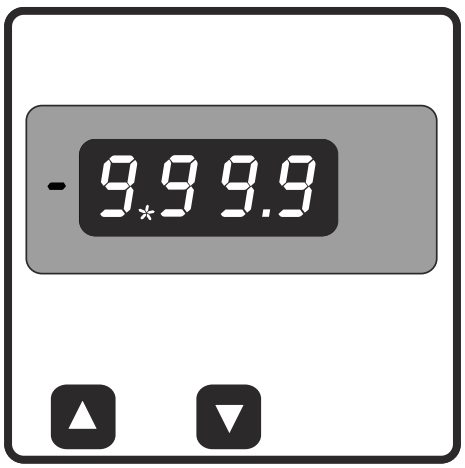
Pressing the " ▽ " key will set the first digit and advance the operation to next digit. Similarly, user can edit the remaining three digits.
After all four digits have been set, pressing the " ▽ " key will advance to the Input Start value confirmation mode.

Pressing the " △ " key will re-enter into the Start value edit mode.
Pressing the " ▽ " key will confirm the set value. If meter type had been earlier selected as **'nor'** then operation will advance to Display End value selection (section 3.1.2.2) , otherwise if **'PF'** had been selected then it will advance to PF end value selection (section 3.1.3.2).

3.1.2.2 Display End Value (dSP.E)

This screen allows the user to set the Display End value which will correspond to the Input End value.
The End value can be set from **-9999 to -10** or **+10 to +9999** counts.

Initially,**'dSP.E'** message is displayed on screen following which user can start editing Display End value by pressing the " △ " key.
Instead on pressing the " ▽ " key will confirm the present value and advance to Display Start value selection (section 3.1.2.3).



After entering the edit mode, by pressing the " △ " key user can turn the **'-'** symbol On or Off. If **'-'** symbol is On then Display End value will be set as negative else it will be positive.
Pressing the " ▽ " key once will set the **'-'** symbol.
Next, on pressing " △ " key editing of Decimal point will start. With each press of the same key, the Decimal point will shift towards right by one digit.
Pressing the " ▽ " key will set the decimal point position and advance to digit editing.

By pressing the " △ " key user can scroll the value from 0 to 9.
Pressing the " ▽ " key will set the first digit and advance the operation to next digit.
Similarly, user can edit the remaining three digits.
After all four digits have been set, pressing the " ▽ " key will advance to the Display End value confirmation mode.

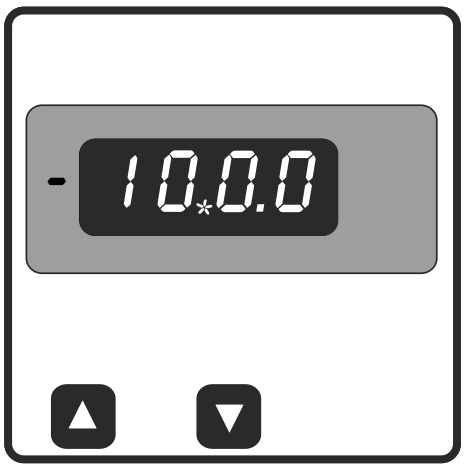
Pressing the " △ " key will re-enter into the End value edit mode.
Pressing the " ▽ " key will confirm the set value and advance to Display Start value selection (section 3.1.2.3).

NOTE: The decimal point position can only be set in the Display End value screen and the same will reflect in the measurement screen.

3.1.2.3 Display Start Value (dSP.S)

This screen allows the user to set the Display Start value which will correspond to the Input Start value.
If the Display End value is negative then Start value can be set from **90% of End value to +9999 counts**, otherwise if the End value is positive then Start value can be set from **-9999 to 90% of End value**.

Initially, **'dSP.S'** message is displayed on screen following which user can start editing Display Start value by pressing the " △" key.
Instead on pressing the " ▽" key will confirm the present value and advance to Bent Function Selection menu (section 3.1.2.4).



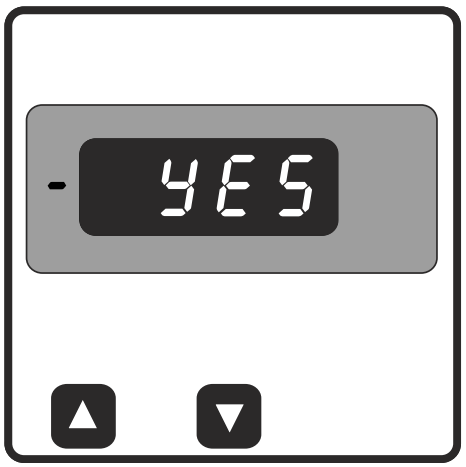
After entering the edit mode, by pressing the " △ " key user can turn the **'-'** symbol On or Off. If **'-'** symbol is On then Display Start value will be set as negative else it will be positive.
Pressing the " ▽ " key will set the **'-'** symbol and editing of first digit will start.
By pressing the " △ " key user can scroll the value from 0 to 9.

Pressing the " ▽ " key will set the first digit and advance the operation to next digit. Similarly, user can edit the remaining three digits.
After all four digits have been set, pressing the " ▽ " key will advance to the Display Start value confirmation mode.

Pressing the " △ " key will re-enter into the Start value edit mode.
Pressing the " ▽ " key will confirm the set value and advance to Bent Function Selection menu (section 3.1.2.4).

3.1.2.4 Bent Function Selection

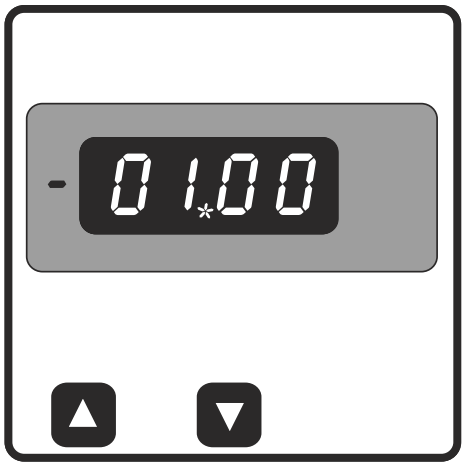
This screen allows the user to enable or disable the bent characteristics function. This is applicable only to Normal meter type, and not to PF meter.



Initially, **'bEnt'** message is displayed on screen.
On pressing the " △" key, the meter will enter the Bent function edit mode and user can scroll between yes and no.
YES: Bent function is enabled
no: Bent function is disabled
Pressing the " ▽" key will accept the displayed condition.
If Bent function is enabled, then the meter will advance to Input Bent value selection (section 3.1.2.5) otherwise will exit the Setup menu and return to measurement mode.

3.1.2.5 Input Bent Value (inP.b)

This screen appears only when Bent Function has been enabled. This screen allows the user to set the Input Bent value. The Bent value can be set in-between **(Input Start value + (1.5% of Input End value)) and 98.5% of Input End value**.

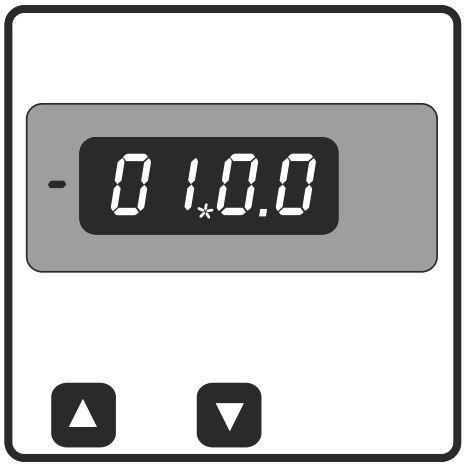


Initially, **'inP.b'** message is displayed on screen following which user can start editing Input Bent value by pressing the " △ " key.
Instead on pressing the " ▽" key will confirm the present value and advance to Display Bent value selection (section 3.1.2.6).
After entering the edit mode, by pressing the " △" key user can turn the **'-'** symbol On or Off. If **'-'** symbol is On then Input Bent value will be set as negative.
Pressing the " ▽ " key will set the **'-'** symbol and editing of first digit will start. By pressing the " △" key user can scroll the value from 0 to 9 or it will get restricted depending upon Input Start and End value.

Pressing the " ▽ " key will set the first digit and advance the operation to next digit. Similarly, user can edit the remaining three digits.
After all four digits have been set, pressing the " ▽ " key will advance to the Input Bent value confirmation mode.
Pressing the " △ " key will re-enter into the Bent value edit mode.
Pressing the " ▽ " key will confirm the set value and advance to Display Bent value selection (section 3.1.2.6).

3.1.2.6 Display Bent Value (dSP.b)

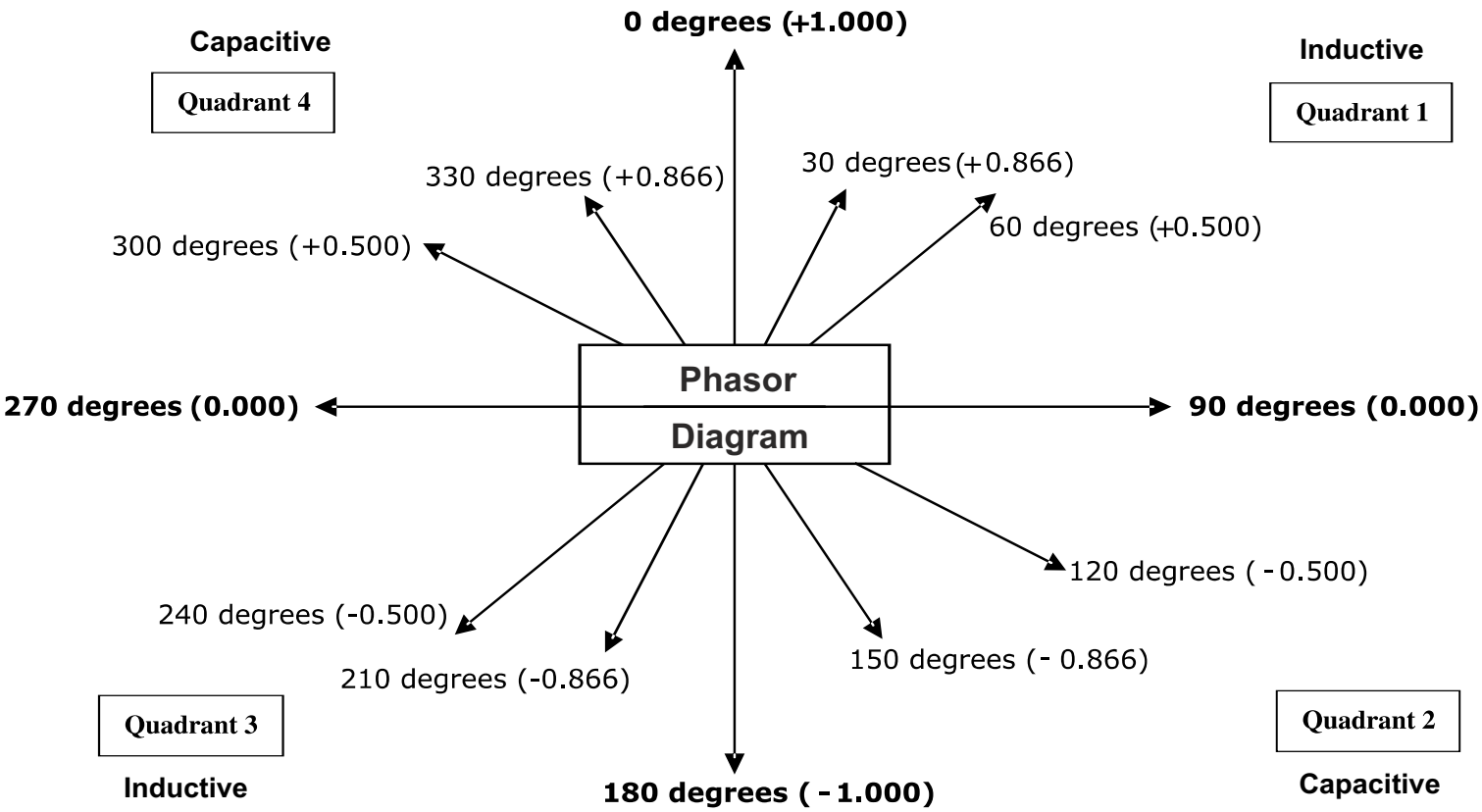
This screen appears only when Bent Function has been enabled. This screen allows the user to set the Display Bent value. The Bent value can be set in-between **(Display Start value + (1.5% of Display End value)) and 98.5% of Display End value**.



Initially, **'dSP.b'** message is displayed on screen following which user can start editing Display Bent value by pressing the " △ " key.
Instead on pressing the " ▽" key will confirm the present value and exit the Setup menu to return to measurement mode.
After entering the edit mode, by pressing the "△" key user can turn the **'-'** symbol On or Off. If **'-'** symbol is On then Display Bent value will be set as negative.
Pressing the " ▽ " key will set the **'-'** symbol and editing of first digit will start. By pressing the "△" key user can scroll the value from 0 to 9 or it will get restricted depending upon Display Start and End value.

Pressing the " ▽ " key will set the first digit and advance the operation to next digit. Similarly, user can edit the remaining three digits.
After all four digits have been set, pressing the " ▽ " key will advance to the Display Bent value confirmation mode.
Pressing the " △ " key will re-enter into the Bent value edit mode.
Pressing the " ▽ " key will confirm the set value and exit the Setup menu to return to measurement mode.

3.1.3 Power Factor Meter



PHASOR DIAGRAM

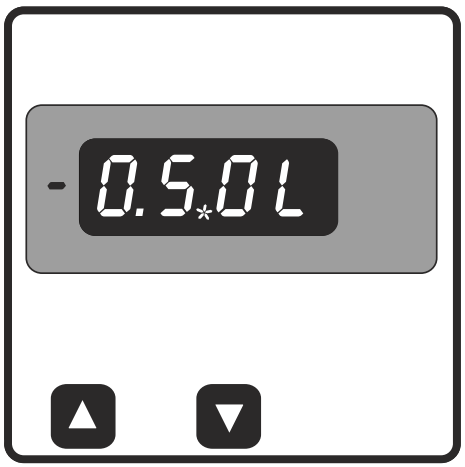
3.1.3.1 Input Start Value (inP.S)

Refer section 3.1.2.1.

3.1.3.2 PF End Value (PF-E)

This screen allows the user to set the PF End value which will correspond to the Input End value.
The End value can be set from **-1 to +1** (quadrants 1 & 2).

Initially, **'PF-E'** message is displayed on screen following which user can start editing PF End value by pressing the " △ " key.
Instead on pressing the " ▽ " key will confirm the present value and advance to PF Start value selection (section 3.1.3.3).



After entering the edit mode, by pressing the " △ " key user can turn the **'-'** symbol On or Off. If **'-'** symbol is On then PF End value will be set as negative else it will be positive. 'L' (inductive) or 'C' (capacitive) are automatically displayed depending on the quadrant in which value is being set.
Pressing the " ▽ " key will set the **'-'** symbol and digit editing will start.

By pressing the " △ " key user can scroll the value between 0 and 1.
Pressing the " ▽ " key will set the first digit and advance the operation to next digit.
Similarly, user can edit the remaining two digits from 0 to 9 if first digit is 0.
After all three digits have been set, pressing the " ▽ " key will advance to the PF End value confirmation mode.

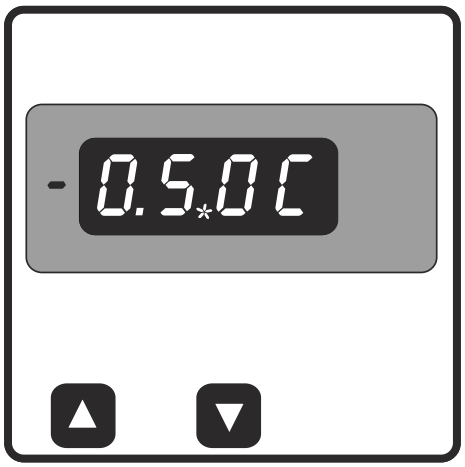
Pressing the " △ " key will re-enter into the End value edit mode.
Pressing the " ▽ " key will confirm the set value and advance to PF Start value selection (section 3.1.3.3).

NOTE: The decimal point position will remain fixed after the first digit, both in setup and in the measurement screen.

3.1.3.3 PF Start Value (PF-S)

This screen allows the user to set the PF Start value which will correspond to the Input Start value.
The Start value can be set from **-1 to +1** (quadrants 3 & 4). Refer the Phasor diagram.
If the End value is -1 or +1, then the Start value will get restricted to **-0.98 or +0.98** respectively.

Initially, **'PF-S'** message is displayed on screen following which user can start editing Display Start value by pressing the " △ " key.
Instead on pressing the " ▽ " key will confirm the present value and exit the Setup menu to return to measurement mode.



After entering the edit mode, by pressing the " △ " key user can turn the **'-'** symbol On or Off. If **'-'** symbol is On then PF Start value will be set as negative else it will be positive. 'L' (inductive) or 'C' (capacitive) are automatically displayed depending on the quadrant in which value is being set.
Pressing the " ▽ " key will set the **'-'** symbol and digit editing will start.

By pressing the " △ " key user can scroll the value between 0 and 1.
Pressing the " ▽ " key will set the first digit and advance the operation to next digit.
Similarly, user can edit the remaining two digits from 0 to 9 if first digit is 0.
After all three digits have been set, pressing the " ▽ " key will advance to the PF Start value confirmation mode.
Pressing the " △ " key will re-enter into the Start value edit mode.
Pressing the " ▽ " key will confirm the set value and exit the Setup menu to return to measurement mode.

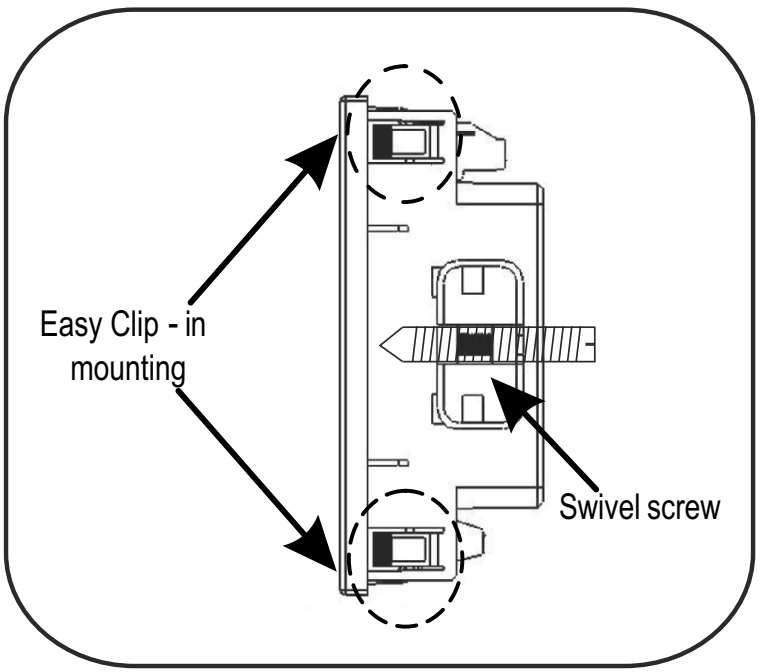
3.2 Other Display Indications

Indication	Description
-oL-	Overload indication above 125% input
– – – –	When display count exceeds 9999
0 reading	If negative input is given to 500/1000 V meter (for eg. due to wrong connection) , it will display value same as that displayed for no input value(according to input start, display start and display end values set by user).
–ve reading	For 4-20mA range, if meter setting is as follows: input start value = 04.00, display end value = 20.00 & display start value = 00.00, then if input falls below 4mA or input gets disconnected, then meter will show negative reading

4. Installation

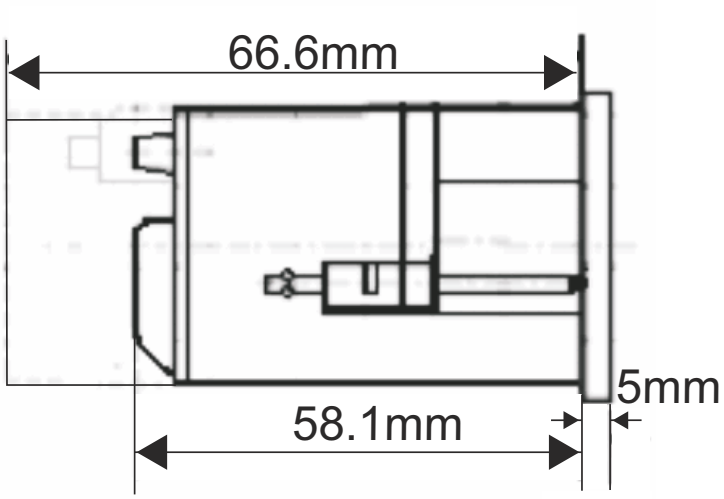
Mounting of EINE+ is featured with easy “Clip- in” mounting. Push the meter in panel slot (size 92 x92 mm), it will click fit into panel with the four integral retention clips on two sides of meter.

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



As the front of the enclosure conforms to IP 50. 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 meter should be mounted in a reasonably stable ambient temperature and where the operating temperature is within the range -10 to 55 ^{0}C . Vibration should be kept to a minimum and the product should not be mounted where it will be subjected to excessive direct sunlight.



For 48 x 96mm-Mounting of Rish Eine+ DC DPM 48 x 96 is featured with easy “Clip- in” mounting. Push the meter in panel slot (size 48.5 x 96 mm), it will click fit into panel with the four integral retention clips on two sides of meter. The front of the enclosure conforms to IP54. 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 Rish Eine+ DC DPM should be mounted in a reasonably stable ambient temperature and where the operating temperature is within the range -10°C 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 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.

1. 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.

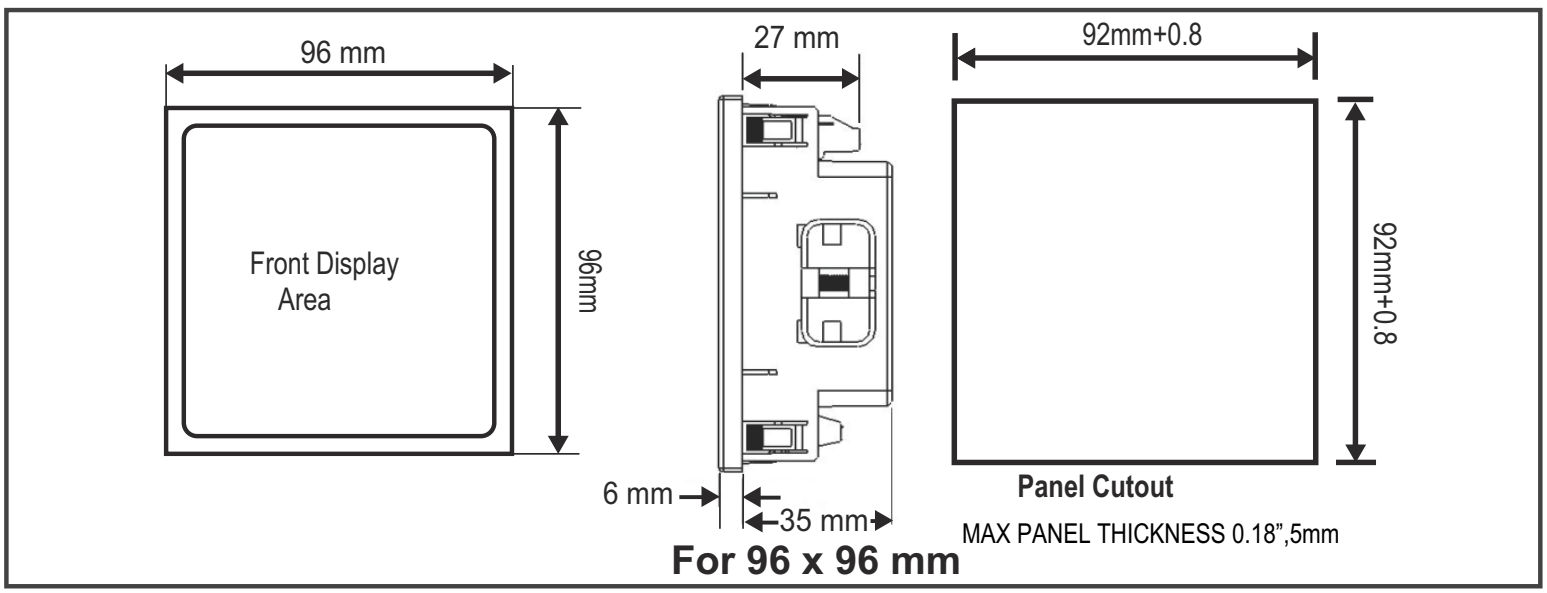
NOTE: It is good practice to install sensitive electronic instruments that are performing critical functions, in EMC enclosures that protect against electrical interference which could cause a disturbance in function.

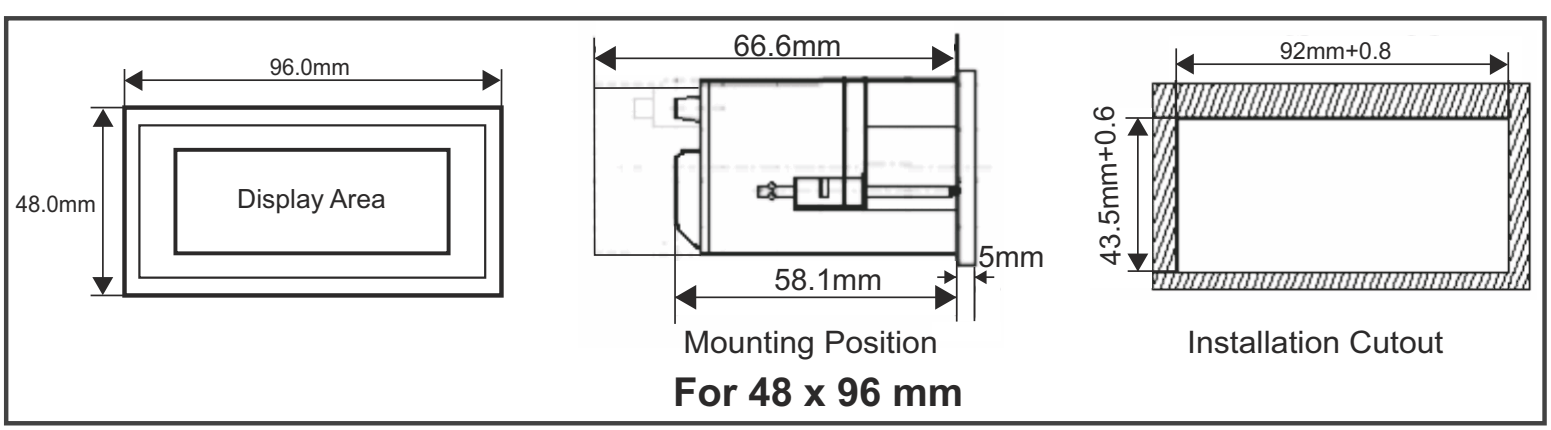
2. Avoid routing leads alongside cables and products that are, or could be, a source of interference.

3. 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.

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

4.2 Case Dimensions 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 inputs will accept up to $4mm^2$(12 AWG) or $2.5mm^2$ (12AWG) Standard.

Note : 1) It is recommended to use wire with lug for connection with meter.

2) For disconnecting the device a switch or circuit-breaker shall be included at the site and shall be within easy reach of the operator. The specification are as below.

For Aux. = At least 1.5 times of applied Power supply.

For Measuring Input = At least 1.5 times of applied measuring inputs.

4.4 Auxiliary Supply

Eine+ should ideally be powered from a dedicated supply.

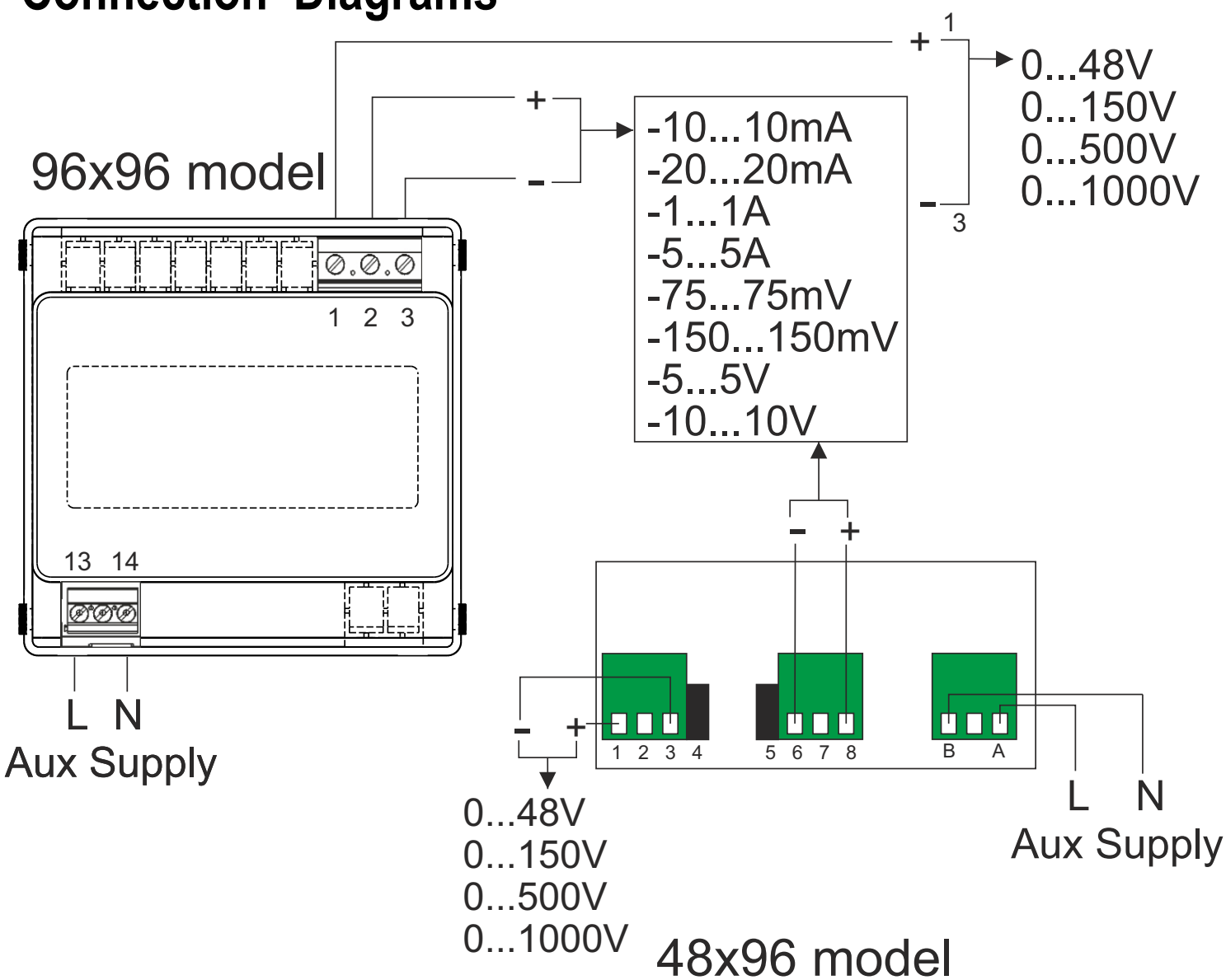
4.5 Fusing

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

4.6 Earth/Ground Connections

For safety reasons, panels and accesoriess should be grounded in accordance

5. Connection Diagrams



6. Specifications :

Measuring Range (Eine+ Voltage) :

Nominal Input Voltage Ranges	-75...0...75 mV, -150...0...150 mV, -5...0...5 V, -10...0...10 V 0...48 V, 0...150 V, 0...500 V, 0...1000 V
Max continuous input voltage	120% of nominal value
Input Current	< 300 uA

Measuring Range (Eine+ Current) :

Nominal Input Current Ranges	-10...0...10 mA, -20...0...20 mA, 4...20 mA, -1...0...1 V, -5...0...5 V
Max continuous input current	120% of nominal value
Voltage Drop	< 600 mV

Overload Indication :

"-oL-"
(If input is greater than 125% of nominal value)

Auxiliary Supply :

AC-DC Auxiliary Supply	40V to 300V AC/DC (+/- 5%) 20V-60V DC / 20V-40V AC (+/- 5%)
AC Auxiliary Supply	80V to 300V AC
Frequency Range	45 to 65 Hz
VA Burden	< 4.5 VA at 240V, 50Hz < 1 VA at 24V, 50Hz

Overload Withstand :

Voltage	2 X Rated Value for 1 Second, repeated 10 times at 10 second interval.
Current	4 X Rated Value for 1 Second, repeated 5 times at 5 min interval.

Reference conditions for Accuracy :

Reference temperature	23 ^{0}C ± 2%
Auxiliary Supply Voltage	Rated value ±1%
Auxiliary Supply Frequency	Rated value ±1%

Accuracy :

Voltage (mV / V)	<0.5% of Display End value ± 1 digit
Current (mA / A)	<0.5% of Display End value ± 1 digit
Ambient Temperature	±3 °C

Factor C (The highest value applies if calculated C is less than 1,then C=1 applies)

Linear characteristics:

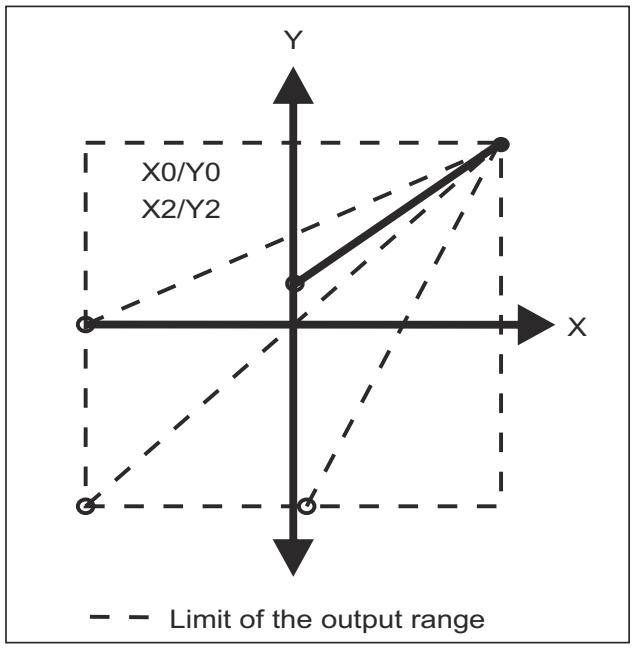
$$C = \frac{1-\frac{Y0}{Y2}}{1-\frac{X0}{X2}} \text{ or } C=1$$

Bent characteristics:

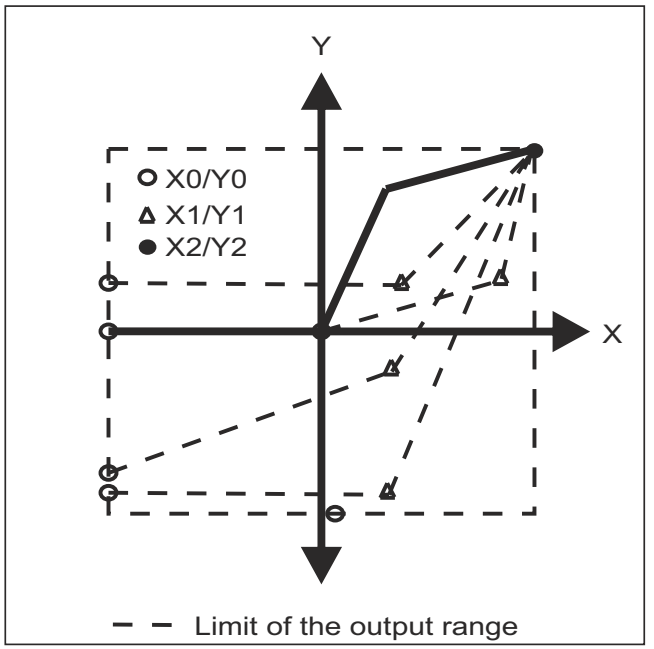
For $X0 \leq X \leq X1$ $\quad C = \frac{Y1 - Y0}{X1 - X0} \cdot \frac{X2}{Y2}$ or $C=1$

For $X1 \leq X \leq X2$ $\quad C = \frac{1-\frac{Y1}{Y2}}{1-\frac{X1}{X2}}$ or $C=1$

Output Characteristics:



Linear characterstics



Bent characterstic

Display Output Equation:

For $X \leq X1$:-

$$Y = \frac{Y1 - Y0}{X1 - X0}(X - X0) + Y0$$

For $X > X1$:-

$$Y = \frac{Y2 - Y1}{X2 - X1}(X - X1) + Y1$$

X = Input Value

Y = Display output Value

X0 = Start value of input

Y0 = Start value of display

X1 = Elbow value of input

Y1 = Elbow value of display

X2 = End value of input

Y2 = End value of display

Note : End value of(Y2) output cannot be changed onsite.

Influence of Variations :

Temperature Coefficient	0.05% / °C, plus
Zero point drift	0.025% / °C

Display :

Type	1 line 4-digits 7 segment LED display
Digit height	14mm
Annunciator LED	For Displaying Negative sign
Display Range	-9999...+9999

Controls :

User Interface	2 Keys

Applicable Standards :

EMC	IEC 61326-1: 2005 10V/m min-Level 3 industrial low level Electromagnetic radiation environment
Safety	IEC 61010-1: 2010, Permantly Connected use.
IP for water & dust	IEC 60529

Safety :

Pollution Degree	2
Installation Category	III
High Voltage Test	2.2 kV AC, 50 Hz for 1 minute

Environmental conditions :

Operating temperature	-10 to 55 ^{0}C
Storage temperature	-25 to 70 ^{0}C
Relative humidity	0 .. 90 % (Non condensing)
Warm up time	Minimum 3 minute
Shock	15g in 3 planes
Vibration	10 .. 55 Hz, 0.15mm amplitude

Enclosure :

Front	IP50(For 96x96 model) IP54(For 48x96 model)
Back	IP20
Material	Polycarbonate Housing
Terminals	Screw-type terminals

Dimension and weight :

For 96 x 96mm

Bezel Size (DIN 43718)	96mm X 96mm
Panel Cut-Out	92 + 0.8mm X 92 + 0.8mm
Overall Depth	40mm
Weight	310g Approx.

For 48 x 96mm

Bezel Size (DIN 43718)	48mm X 96mm
Panel Cut-Out	45 + 0.8mm X 92 + 0.8mm
Overall Depth	<75mm
Weight	250 grams Approx.

The Information contained in these installation instructions is for use only by installers trained to make electrical power installations and is intended to describe the correct method of installation for this product. However, Manufacturer has no control over the field condition which influence product installation.

It is the user's responsibility to determine the suitability of the installation method in the user's field conditions. Manufacturer only obligations are those in Manufacturer standard Conditions of Sale for this product and in no case will Manufacturer be liable for any other Incidental, indirect or consequential damages arising from the use or misuse of the products.
