neuro 100

PPI
The Perfection Experts

Universal Process Indicator

User Manual

CONTENTS

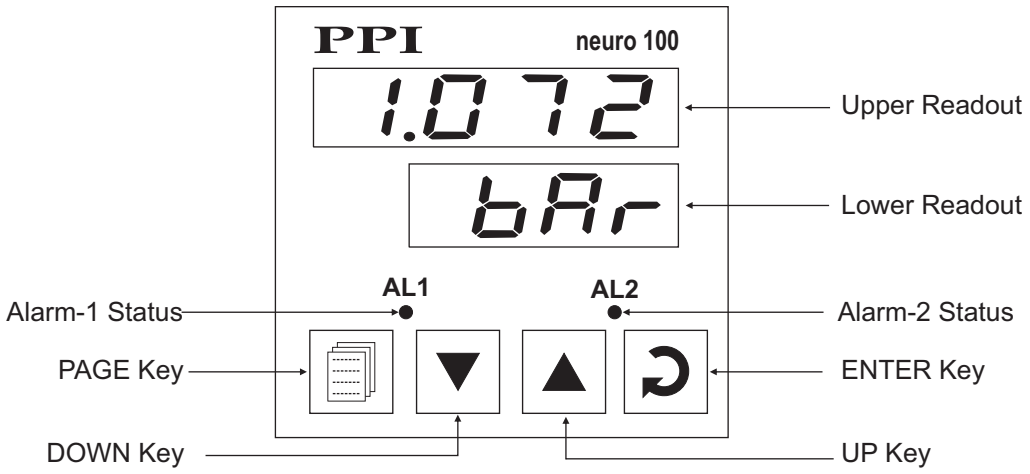
For Size 48X48

For Size 96X96

Section 1
FRONT PANEL LAYOUT

The indicator front panel comprises of digital readouts, LED indicators and membrane keys as shown in Figure 1.1 below.

Figure 1.1



READOUTS

The Upper Readout is a 4 digit, 7-segment bright red LED display and usually displays the PV (Process Value).In Set-up Mode, the Upper Readout displays parameter values/options.

The Lower Readout is a 4 digit, 7-segment bright green LED display and usually displays Process Value Units. In case of any active Alarm(s), the Lower Readout flashes Alarm Status information. In Set-up Mode, the Lower Readout displays the names (identifier tags) for the parameters.

INDICATORS

The front panel comprises 2 LED indicators that show Alarm status. Refer Table 1.1 below for details.

Table 1.1

LED	Status
AL1	Flashes while Alarm-1 is active.
AL2	Flashes while Alarm-2 is active.

KEYS

There are four tactile keys provided on the front panel for configuring the indicator, setting-up the parameter values. Refer Table 1.2 below.

Table 1.2

Symbol	Key	Function
	PAGE	Press to enter or exit set-up mode.
	DOWN	Press to decrease the parameter value. Pressing once decreases the value by one count; keeping pressed speeds up the change.
	UP	Press to increase the parameter value. Pressing once increases the value by one count; keeping pressed speeds up the change.
	ENTER	Press to store the set parameter value and to scroll to the next parameter on the PAGE.

Section 2
BASIC OPERATION

POWER-UP

Upon power-up, all displays and indicators are lit on for approximately 3 seconds. This is followed by the indication of the indicator model name n.100 on the Upper Readout and the firmware version 02.02 on the Lower Readout, for approximately 1 second.

MAIN DISPLAY MODE

After the Power-up display sequence, the Upper Readout starts showing the measured PV (Process Value) and the Lower Readout displays the user set Units for Process Value. This is the MAIN Display Mode that shall be used most often.

Alarm Status Information

In case of any Alarm (or Alarms) becoming active, the Lower Readout flashes the related Alarm details in the format 'Ax.YY', where x is the Alarm Number (1 or 2) and YY is the Alarm Type (Lo or Hi). For example; if Alarm -1 is active and the set Alarm Type is Low then the Lower Readout flashes A1.Lo In case of multiple Alarms, each Alarm Status is flashed sequentially with 1 Seconds interval.

PV Error Indications

The PV Error type is flashed on the Upper Readout. For different errors and the causes, refer Table 2.1 below.

Table 2.1

Message	Error Type	Cause
Or	Over-range	PV above Max. Range
Ur	Under-range	PV below Min. Range
OPEn	Sensor Open	Thermocouple / RTD broken

ALARM STATUS UNDER PV ERROR CONDITIONS

For Alarm activation, the under-range condition is treated as minimum PV, whereas the over-range and open conditions are treated as maximum PV. Thus, Process High alarm activates under *Over-range / Open error*. Similarly, Process Low alarm activates under *Under-range error*.

OPERATOR PAGE AND PARAMETERS

The parameters that require frequent settings are organized on a separate page, called the Operator Page. The availability of operator parameters is controlled at supervisory level and the parameter setting cannot be locked by the Master Lock.

Accessing Operator Page & Adjusting Parameters

Step through the following sequence to open the operator page and to adjust the operator parameter values.

1. Press and release PAGE key. The Lower Readout shows PAGE (PAGE) and Upper Readout shows 0 (0).
2. Press and release ENTER key. The Lower Readout shows prompt for the first available operator parameter and the Upper Readout shows value for the parameter.
3. Use UP / DOWN keys to adjust the value and then press ENTER key to store the set value and scroll to next parameter.

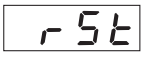
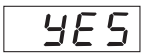
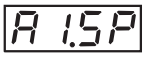
The indicator automatically reverts to MAIN Display Mode upon scrolling through the last operator parameter. Alternatively, use PAGE key to return to MAIN Display Mode.

The operator parameters are described in Table 2.2. Note that the parameters presented on Operator Page depend upon the functions selected/enabled and supervisory level permissions. The operator parameter list mainly includes :

a) Min / Max Process Monitoring Parameters.

b) Setpoint Values for Alarm-1 and Alarm-2.

Table 2.2

Parameter Description	Settings (Default Value)
ALARM ACKNOWLEDGE  Set this parameter value to 'Yes' to acknowledge any pending Alarm(s) to de-activate alarm relay(s). This parameter is available only when any alarm(s) is active. (Alternatively, use UP or DOWN key to acknowledge pending Alarm(s).	 No  Yes (Default :No)
MAXIMUM PV  This indicates the highest value attained by the Process Value. This is a read only value and is available only if Min/Max monitoring is enabled.	View Only (Default :NA)
MINIMUM PV  This indicates the lowest value attained by the Process Value. This is a read only value and is available only if Min/Max monitoring is enabled.	View Only (Default :NA)
RESET COMMAND  Available only if Min/Max monitoring is enabled. This feature clears the current Min/Max values and starts afresh monitoring the **PV** for new highest and lowest values.	 No  Yes (Default :No)
RESET PASSWORD  For resetting the Min/Max values, set the reset command to 'Yes' and then enter the correct password.	0 to 250 (Default :0)
ALARM-1 SETPOINT  The setpoint for Alarm-1. This parameter is not available if the selected Alarm-1 type is 'None'.	Min to max Range specified for the selected Input Type (Default : Min or Max Range)
ALARM-2 SETPOINT  The setpoint for Alarm-2. This parameter is not available if the selected Alarm-2 type is 'None'.	Min to max Range specified for the selected Input Type (Default : Min or Max Range)

Section 3

SET-UP MODE : ACCESS AND OPERATION

The various parameters are arranged in different groups, called PAGES, depending upon the functions they represent. Each group is assigned a unique numeric value, called PAGE NUMBER, for its access.

The parameters are always presented in a fixed format: The Lower Readout displays the parameter prompt (Identification Name) and the Upper Readout displays the set value. The parameters appear in the same sequence as listed in their respective sections.

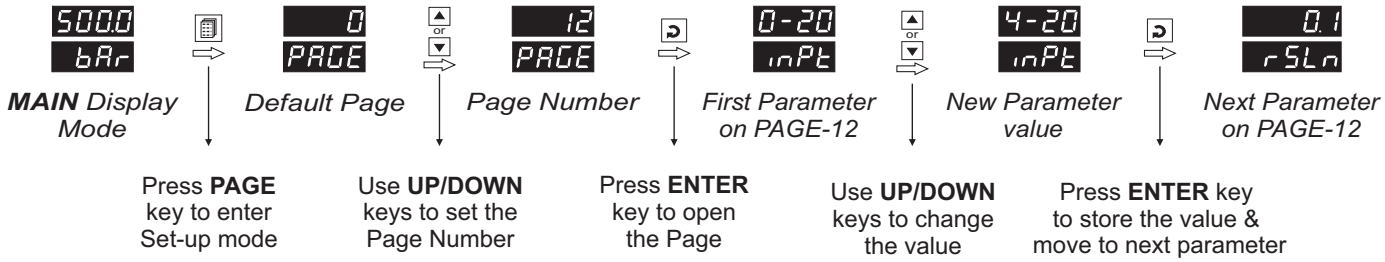
SET-UP MODE

The Set-up Mode allows the user to view and modify the parameter values. Follow the steps below for setting the parameter values:

1. Press and release PAGE key. The Lower Readout shows PAGE and the Upper Readout shows page number 0. Refer Figure 3.1.
2. Use UP / DOWN keys to set the desired PAGE NUMBER.
3. Press and release ENTER key. The Lower Readout shows the prompt for the first parameter listed in the set PAGE and the Upper Readout shows its current value. If the entered PAGE NUMBER is invalid (contains no parameter list or any associated function), the indicator reverts to the MAIN Display Mode.
4. Press and release the ENTER key until the prompt for the required parameter appears on the Lower Readout. (The last parameter in the list rolls back to the first parameter).
5. Use UP / DOWN keys to adjust the parameter value. (The display flashes if UP key is pressed after reaching the maximum value or DOWN key is pressed after reaching the minimum value).
6. Press and release the ENTER key. The new value gets stored in the indicator's non-volatile memory and the next parameter in the list is displayed.

The Figure 3.1 illustrates the example of altering the value for the parameter 'Input type'.

Figure 3.1



Notes

1. *Each page contains a fixed list of parameters that are presented in a pre-determined sequence. Note however that availability of a few parameters, called Conditional Parameters, depend upon the settings for some other parameters. For example, the parameter 'Alarm Setpoint' is available if corresponding 'Alarm type' is set to other than 'none'.*
2. *To exit the set-up mode and return to the MAIN Display Mode, press and release PAGE key.*
3. *If no key is pressed for approximately 30 seconds, the set-up mode times out and reverts to the MAIN Display Mode.*

MASTER LOCKING

The indicator facilitates locking all the PAGES (except Operator PAGE) by applying Master Lock Code. Under Locking, the parameters are available for *view only* and cannot be adjusted. The Master Lock, however, does not lock the operator parameters. This feature allows protecting the rather less frequently used parameters against any inadvertent changes while making the frequently used operator parameters still available for any editing.

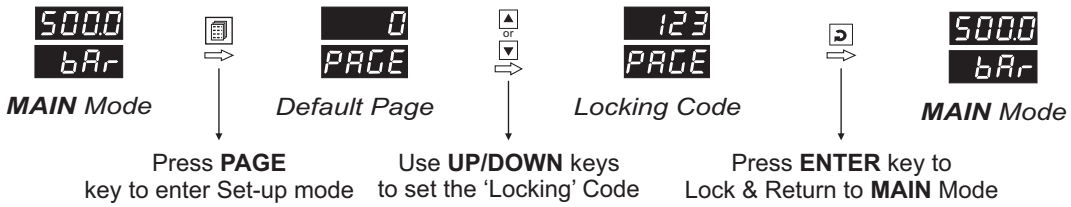
For enabling / disabling the Lock, step through the following sequence:

Locking

1. Press and release PAGE key while the indicator is in the MAIN Display Mode. The Lower Readout shows PAGE and the Upper Readout shows 0.
2. Use UP / DOWN keys to set the Page Number to 123 on the Upper Readout.
3. Press and release ENTER key. The indicator returns to the MAIN Display Mode with the Lock enabled.

The Figure 3.2 below illustrates the Locking procedure.

Figure 3.2



UnLocking

Repeat the Locking procedure twice for unlocking.

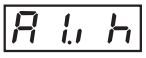
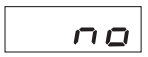
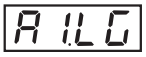
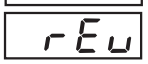
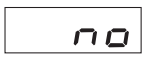
Section 4

ALARM PARAMETERS

Visit www.ppiindia.net for technical notes on ALARM for detailed understanding of the parameters / terminologies used for describing the Alarm parameters in this section.

The parameters required for configuring Alarms are grouped on PAGE-10. The configuration includes selecting the type of Alarm, setting the hysteresis value, enabling / disabling start-up Alarm suppression, etc. Refer Table 4.1 for parameter description & settings.

Table:4.1

Parameter Description	Settings (Default Value)
ALARM-1 TYPE  Select the Alarm-1 activation type. Selecting 'None' will disable the alarm and suppress all the related parameters for Alarm-1.	 None  Process Low  Process High (Default : None)
ALARM-1 SETPOINT  Sets the Process High or Process Low limit for Alarm-1.	Min. to Max. Range specified for the selected Input Type (Default : Min or Max Range)
ALARM-1 HYSTERESIS  Sets differential (dead) band between Alarm-1 ON and OFF states.	1 to 999 or 0.1 to 999.9 (Default : 2.0)
ALARM-1 INHIBIT  Set to Yes to suppress Alarm-1 activation upon power-up (process start-up) condition.	 No  Yes (Default :Yes)
ALARM-1 LOGIC  Select 'Normal' if Alarm-1 relay is to activate an Audio / Visual alarm. Select 'Reverse' for Tripping (cut-off) the system.	 Normal  Reverse (Default : Normal)
ALARM LATCH  No The Relay switches ON/OFF with Alarm switching. Yes The Relay Output switches (ON for Normal Logic / OFF for Reverse Logic) upon Alarm activation. However, Alarm de-activation does not affect the Relay status. The Relay status can only be regained by pressing 'Acknowledge-key' provided the Alarm has de-activated.	 No  Yes (Default :No)

Parameter Description	Settings (Default Value)
ALARM-2 TYPE AL_2 Select the Alarm-2 activation type. Selecting 'None' will disable the alarm and suppress all the related parameters for Alarm-2.	nonE None P_Lo Process Low P_hi Process High (Default : None)
ALARM-2 SETPOINT A2.SP Sets the Process High or Process Low limit for Alarm-2.	Min. to Max. Range specified for the selected Input Type (Default : Min/Max Range)
ALARM-2 HYSTERESIS A2.HY Sets differential (dead) band between Alarm-2 ON and OFF states.	1 to 999 **or** 0.1 to 999.9 (Default : 2.0)
ALARM-2 INHIBIT A2.inh Set to Yes to suppress Alarm-2 activation upon power-up (process start-up) condition.	no No YES Yes (Default :Yes)
ALARM-2 LOGIC A2LG Select 'Normal' if Alarm-2 relay is to activate an Audio / Visual alarm. Select 'Reverse' for tripping (cut-off) the system.	norn Normal rEv Reverse (Default : Normal)
ALARM LATCH A1LE *No* The Relay switches ON/OFF with Alarm switching. *Yes* The Relay Output switches (ON for Normal Logic / OFF for Reverse Logic) upon Alarm activation. However, Alarm de-activation does not affect the Relay status. The Relay status can only be regained by pressing 'Acknowledge-key' provided the Alarm has de-activated.	no No YES Yes (Default :No)

Section 5

RETRANSMISSION PARAMETERS

The parameters required for configuring *Retransmission* are grouped on PAGE-11. The configuration includes selecting the Output type, Recorder Low & High settings etc. Refer Table 5.1 for parameter description & settings.

Table 5.1

Parameter Description	Settings (Default Value)
RECORDER OUTPUT TYPE rEC.o Select Output Signal type in accordance with the hardware module fitted. Select 0-20 or 4-20 mA, if Current output module is fitted. Select 0-5 or 0-10 V, if Voltage output module is fitted.	0-20 0 to 20 mA 4-20 4 to 20 mA 0-5 0 to 5 Volts 0-10 0 to 10 Volts (Default : 0 to 20 mA)
RECORDER LOW rEC.L Set the minimum Process Value (**PV**) that shall correspond to the minimum recorder output signal level (0mA or 4mA or 0V).	Min. to Max. Range specified for the selected Input Type (Default : -200)
RECORDER HIGH rEC.h Set the maximum Process Value (**PV**) that shall correspond to the maximum recorder output signal level (20 mA or 10 V or 5 V).	Min. to Max. Range specified for the selected Input Type (Default : 1376)

Section 6

INPUT CONFIGURATION PARAMETERS

The indicator is needs to be appropriately configured in terms of input and other features like digital filter etc. The PAGE-12 presents Input configuration parameters that are listed below in Table 6.1 .

Table 6.1

Parameter Description	Settings (Default Value)
INPUT TYPE inPt Select Input type in accordance with the type of Thermocouple or RTD sensor or transducer output connected for process value measurement. Ensure proper hardware jumper settings, if required.	Refer Table 6.3 (Default : Type K)
RESOLUTION rSLn ***(Not Available for Thermocouple Inputs)*** Set the process value indication resolution (decimal point). All the resolution based parameters (hysteresis, alarm setpoints etc.) then follow this resolution setting.	Refer Table 6.3 (Default : 1)
UNITS Unit Select Temperature units in ºC or ºF for Thermocouple or Pt100 sensor. For DC Linear input (mA/mV/V), Select appropriate Units from the list in Table 6.2. Note however that the selected Units are for the purpose of Lower Readout indication only.	Refer Table 6.2 (Default : ºC)
DC RANGE LOW rLo ***(Available for DC Linear Input)*** Sets process value corresponding to minimum DC Linear signal input (e.g., 0V, 0mA, 4mA, etc.)	-1999 to 9999 (Default : 0.0)
DC RANGE HIGH rHi ***(Available for DC Linear Input)*** Sets process value corresponding to maximum DC Linear signal input (e.g., 5V, 10V, 20mA, etc.)	-1999 to 9999 (Default : 100.0)
OFFSET OFSt This value is algebraically added to the measured PV to derive the final PV that is displayed and used for Alarm / Retransmission. Final PV = Measured PV + Offset	-1999 to 9999 or -199.9 to 999.9 (Default : 0)
FILTER FiLt Sets the time constant, in seconds, for the low-pass digital filter applied to the measured PV. The filter helps smoothing / averaging the signal input and removing the undesired noise. The higher the filter value the lower the indication response to the PV changes and vice-a-versa.	0.5 to 60.0 Seconds (in steps of 0.5 Seconds) (Default : 2.0 sec.)

Table-6.2

Lower Readout	Units	
°C	°C	Temperature
°F	°F	
°K	Kelvin	
EU	Engineering Units	
PErc	Percentage	
PAS	Pascals	Pressure
nPAS	Mpascals	
KPAS	Kpascals	
bAr	Bar	
nbAr	Milli bar	
PSI	PSI	
KGcn	kg/sq cm	
nnWG	mm water gauge	
inWG	Inches water gauge	
nnHG	mm mercury	
torr	Torr	
L-H	Litres per hour	Flow
L-n	Litres per minute	
P.rh	% Relative Humidity	
P.O2	% O2	
P.CO2	% CO2	
P.CP	% Carbon Potential	

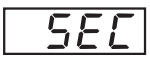
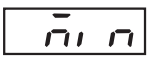
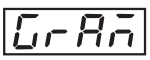
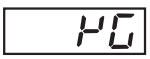
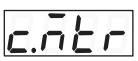
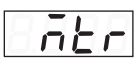
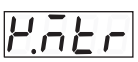
Lower Readout	Units	
	volts	Electricity
	Amps	
	Milli amps	
	Milli Volts	
	Ohms	
	Parts per million	
	Revolutions per pinute	
	Milli seconds	Time
	Seconds	
	Minutes	
	Hours	
	PH	
	%PH	
	Miles per hour	
	Milli grams	Weight
	Grams	
	Kilo grams	
	mm (Millimeter)	Length / Height / Distance
	cm (Centimeter)	
	Meter	
	Kilometer	
	Foot	
	Inch	
	Mile	

Table 6.3

Option	What it means	Range (Min. to Max.)	Resolution
tC_J	Type J Thermocouple	0 to +960°C / +32 to +1760°F	1 °C/°F
tC_K	Type K Thermocouple	-200 to +1376°C / -328 to +2508°F	
tC_t	Type T Thermocouple	-200 to +387°C / -328 to +728°F	
tC_r	Type R Thermocouple	0 to +1771°C / +32 to +3219°F	
tC_S	Type S Thermocouple	0 to +1768°C / +32 to +3214°F	
tC_b	Type B Thermocouple	0 to +1826°C / +32 to +3218°F	
tC_n	Type N Thermocouple	0 to +1314°C / +32 to +2397°F	
rESu	Reserved for customer specific Thermocouple type not listed above. The type shall be specified in accordance with the ordered (optional on request) Thermocouple type.		
rtd	3-wire, RTD Pt100	-199 to +600°C / -328 to +1112°F **or** -199.9 to +600.0°C / -199.9 to +999.9°F	1 °C/°F or 0.1 °C/°F
0-20	0 to 20mA DC current	-1999 to 9999 units	1, 0.1, 0.01, 0.001 units
4-20	4 to 20mA DC current		
0.050	0 to 50mV DC voltage		
0.200	0 to 200mV DC voltage		
1.25	0 to 1.25V DC voltage		
5.0	0 to 5.0V DC voltage		
10.0	0 to 10.0V DC voltage		
1-5	1 to 5.0V DC voltage		

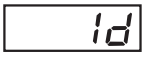
Section 7

SUPERVISORY PARAMETERS

The supervisory level responsibilities include exercising control over operator, making process related decisions and controlling the availability of process data for remote use. The PAGE-13 parameters allow implementation of supervisory level decisions. The Table 7.1 below lists supervisory parameters.

Table 7.1

Parameter Description	Settings (Default Value)
ALARM SP ADJUSTMENT ON OPERATOR PAGE AL.SP Supervisory permission for Alarm setpoint adjustments on Operator Page. Set to 'Enable' for permission.	dSbL Disable EnbL Enable (Default : Disable)
PROCESS VALUE HIGH-LOW MONITORING H iLo This parameter enables or disables the PV monitoring for Min/Max values. Set to 'Yes' for enabling the feature.	no No YES Yes (Default :No)
PASSWORD FOR RESETTING PV HIGH-LOW CodE This parameter allows protection against inadvertent resetting of Min/Max values. That is, the reset command is executed only if the operator sets the password that matches with this parameter value.	0 to 250 (Default : 0)
UTILITY OPTION SELECTION OPtn Select the feature based on the hardware module fitted. *None* No hardware module fitted. *Serial Comm.* RS485 communication with host PC *Remote Alarm Ack* Connect potential-free switch for remote Alarm acknowledgment.	nonE None SrL.C Serial Comm. rmt.A Remote Alarm Ack (Default : Serial Comm.)
BAUD RATE bAUd Communication speed in 'Bits per Second'. Set the value to match with the host baud rate.	4.8 4800 9.6 9600 19.2 19200 38.4 38400 57.6 57600 (Default : 9.6)
PARITY PAr i One of the communication error trapping features. Select the data packet parity as implemented by the host protocol.	nOnE None EuEn Even Odd Odd (Default : Even)

Parameter Description	Settings (Default Value)
SERIAL ID NUMBER  Unique numeric code assigned to the indicator for identification by the host. Set the value as required by the host.	1 to 127 (Default : 1)
SERIAL WRITE PERMISSION  Setting to 'No' disallows the host to set / modify any parameter value. The host, however, can read the value.	 No  Yes (Default :No)

Section 8
USER LINEARISATION PARAMETERS

Visit www.ppiindia.net for technical notes on USER LINEARISATION for detailed understanding of the parameters / terminologies used for describing the parameters in this section.

The parameters listed on this page are used to implement the linearisation curve on the process value represented by the DC linear output of a transmitter. The parameters affect the measured PV only if the 'User Linearisation' feature is 'Enabled' and if the input type is DC Linear. That is, the PV measured using Thermocouple or RTD is not affected by the linearisation parameters. The Table 8.1 below lists the user linearisation parameters.

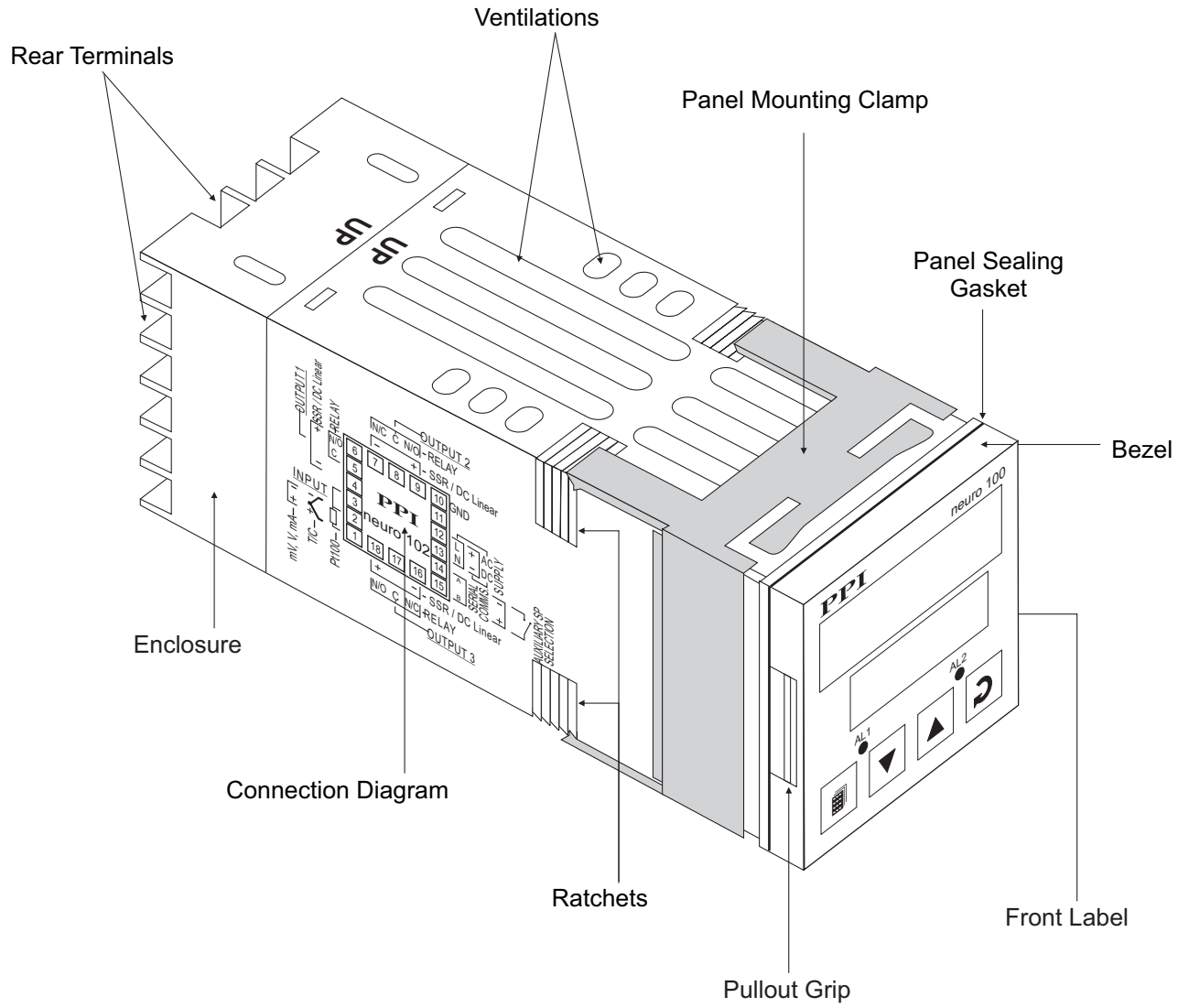
Table 8.1

Parameter Description	Settings (Default Value)
USER LINEARIZATION SETTING CODE CodE Protection password for access to the linearisation related parameters. Set to **333** as valid password.	0 to 9999 (Default : 0)
USER LINEARIZATION UL in Enable / Disable user linearisation feature.	no No YES Yes (Default :No)
TOTAL BREAK POINTS PntS Select number of segments for the purpose of input **PV** curve linearisation by setting the number of total break points.	2 to 32 (Default : 2)
BREAK POINT NUMBER Co.or Select the break point for which the X, Y co-ordinates are to be set.	1 to 32 (Default : 1)
ACTUAL VALUE FOR BREAK POINT (X CO-ORD) A.Pnt Set the actual measured (X co-ordinate) value for the selected break point number.	-1999 to 9999 (Default : Undefined)
DERIVED VALUE FOR BREAK POINT (Y CO-ORD) d.Pnt Set the computed or derived (Y co-ordinate) value for the selected break point number.	-1999 to 9999 (Default : Undefined)

Section 9

HARDWARE ASSEMBLY AND CONFIGURATIONS

Figure 9.1



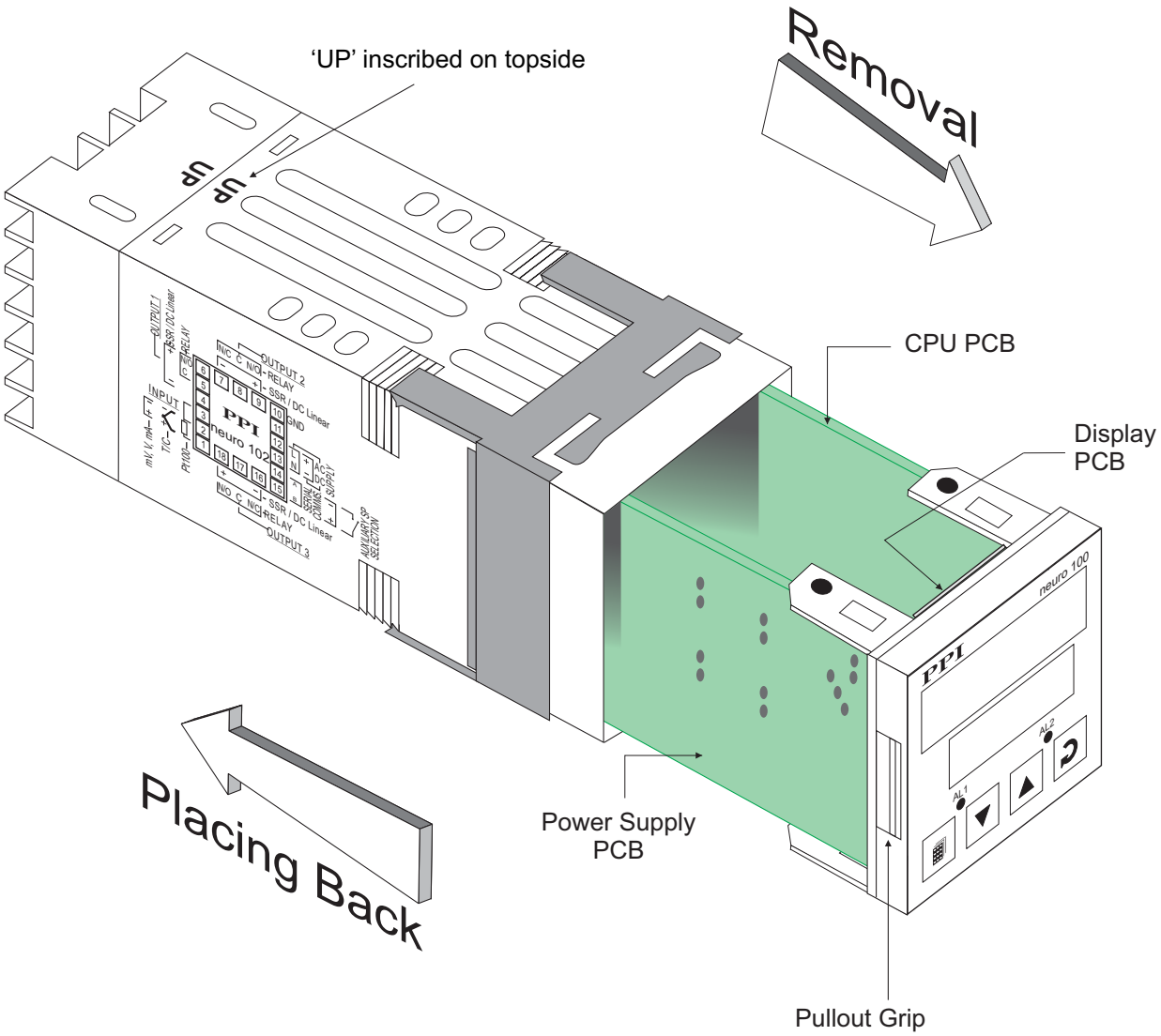
The Figure 9.1 above shows the indicator outer-case viewed with front label upright.

ELECTRONIC ASSEMBLY

The basic electronics assembly (without any plug-in modules), comprises of 3 Printed Circuit Boards (PCB). When viewed from the front; the CPU PCB is to the right, Power-supply PCB is to the left and the Display PCB is behind the bezel.

The electronic assembly can be removed from the plastic enclosure and placed back as described and illustrated in Figure 9.2.

Figure 9.2



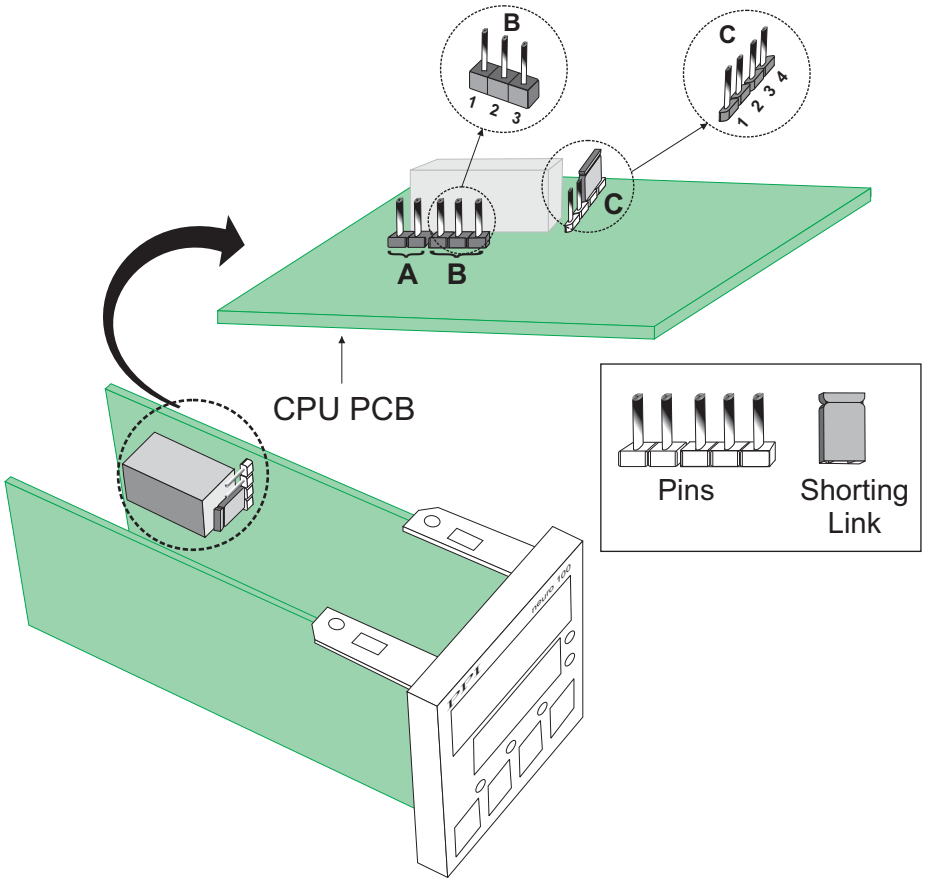
Removing Assembly from Enclosure

With the indicator upright, hold the Bezel with the fingers on the pullout grips provided on the left and right sides of the bezel. Pull the bezel outward. The assembly comes out with the bezel.

Placing Assembly Back into Enclosure

With the indicator upright (the UP inscribed on the Enclosure is on the topside), insert the bezel gently with the boards on either side sliding into the guides provided inside of the Enclosure. Ensure that the bezel fits in tight on the Enclosure-front to secure the panel-sealing gasket.

Figure 9.3



INPUT : Jumper Settings

The Input type is user configurable and thus requires, besides parameter selections, proper jumper-settings prior to electrical connections. The jumper settings are provided in the form of Pins & Shorting-Link arrangements on the CPU PCB towards the rear end as shown in Figure 9.3.

The Jumper setting marked A is for Input configuration. (Jumper settings marked B & C are unused.) For DC Linear Current Inputs (0-20mA or 4-20mA), short the Pins using Shorting-Link. For all other Input types, keep the Shorting-Link parked leaving the Pins open.

MOUNTING PLUG-IN MODULES

The indicator supports up to 3 plug-in modules, viz. *Output-2 Module* (Relay/SSR), *Output-3 Module* (Relay/SSR) and *Option Module* (RS485 Serial Port or Remote Alarm Acknowledgment). These modules are either pre-fitted while the indicator is shipped from the factory or can be fitted by the user later.

All 3 plug-in modules are provided with female socket that directly fits into the corresponding male plug provided on either Power-supply PCB or CPU PCB. The *Output-2* and *Option* Modules fit into plugs provided on Power-supply PCB whereas the *Output-3* Module fits into plug provided on the CPU PCB

OUTPUT-2 & OUTPUT-3 : Modules and Jumper Settings

The *Output-2* and *Output-3* Modules are identical and, thus, can be fitted interchangeably in Output-2 or Output-3 positions. These modules can be configured for either Relay or SSR output through proper jumper selection. Two jumper settings A and B, as shown in Figure 9.4, are required for Relay or SSR selection. Refer Table 9.1 for appropriate jumper setting positions.

Figure 9.4

Relay/SSR Module

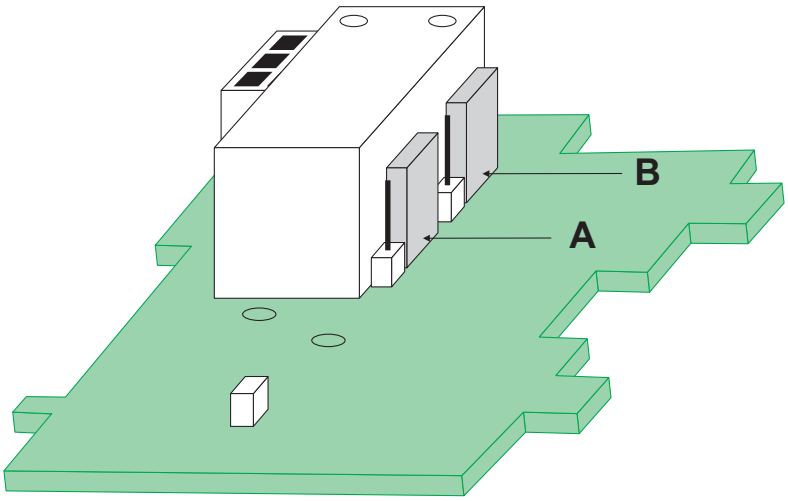
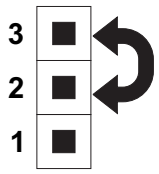
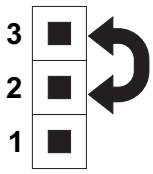
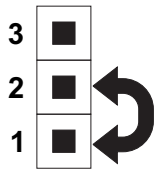
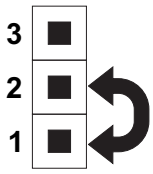


Table 9.1

Output Type	Jumper Setting - A	Jumper Setting - B
Relay		
SSR		

MOUNTING / UN-MOUNTING OF MODULES

The Figures 9.5 & 9.6 illustrates how to mount the plug-in Output-2 & Output-3 module, respectively. Notice the orientation of the indicator and a few identifying components shown in figures to help locate the plugs for the modules. Ensure that the socket snap-fits into the plug and the 2 projected parts on the module fit into the 2 slots provided on the Power-Supply / CPU PCB for proper electrical contacts and secured fitting.

For plugging out the module(s), follow the steps below:

1. Gently pull apart the Power-supply board and the CPU board until the projections of the module board come out of the slots.
2. Pull the module outward to unlock the socket from the plug.

Figure 9.5

Mounting Output-2 Module

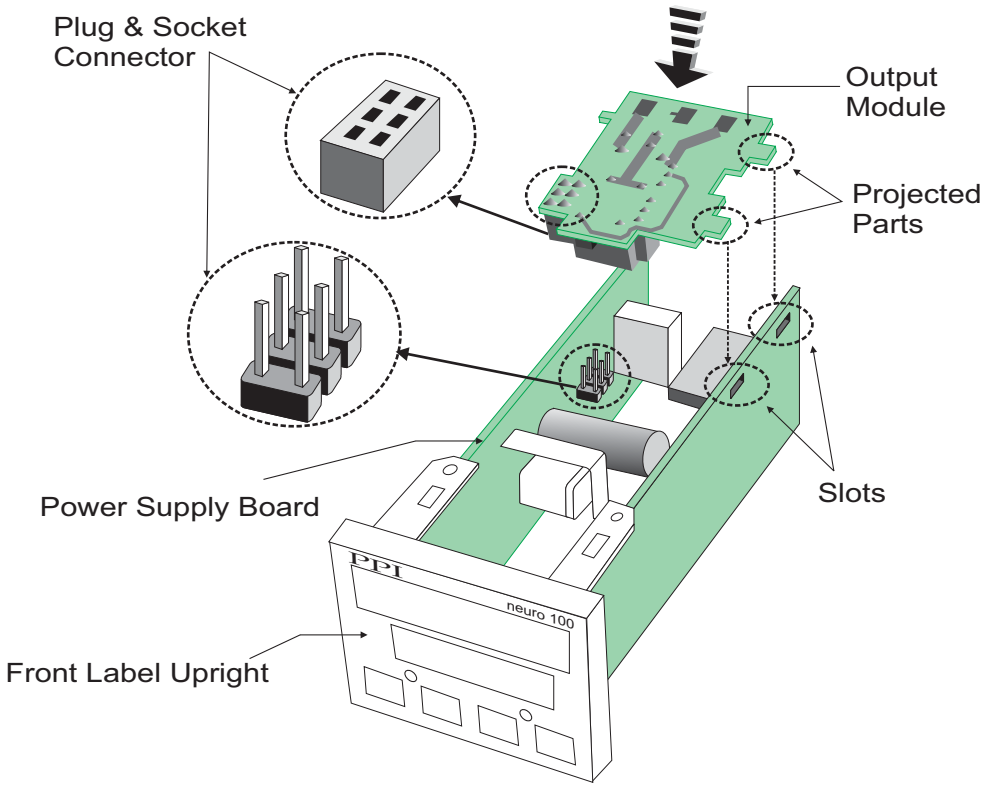
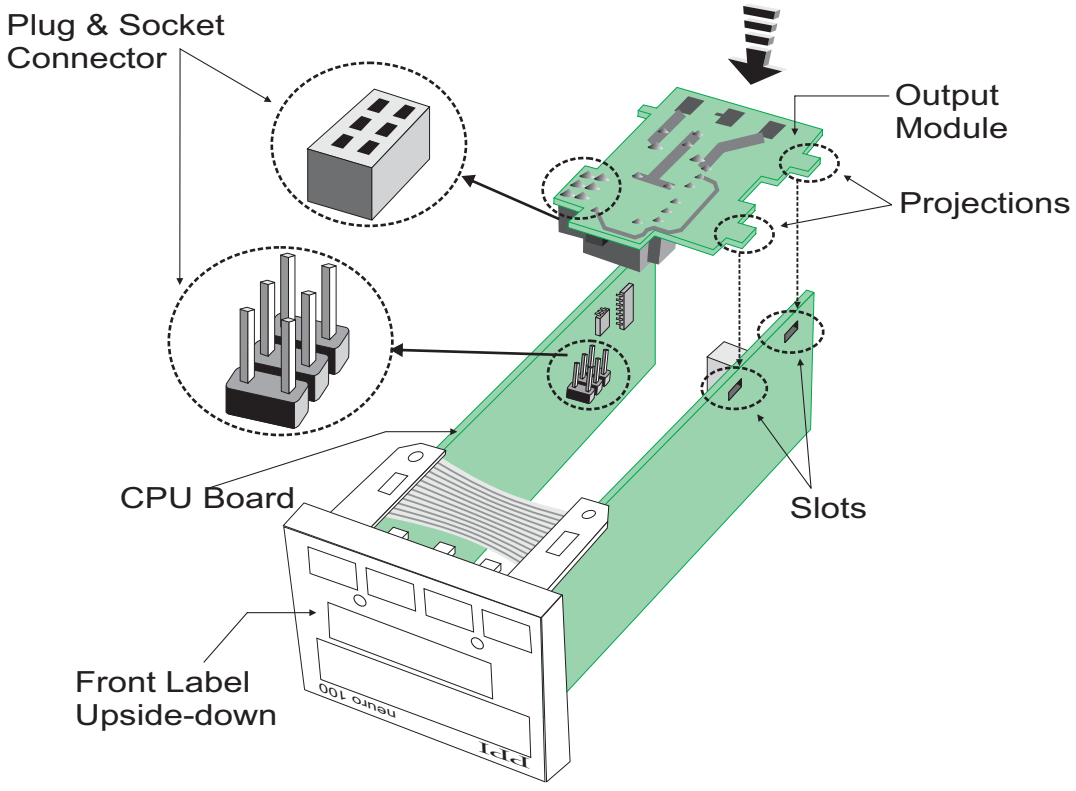


Figure 9.6

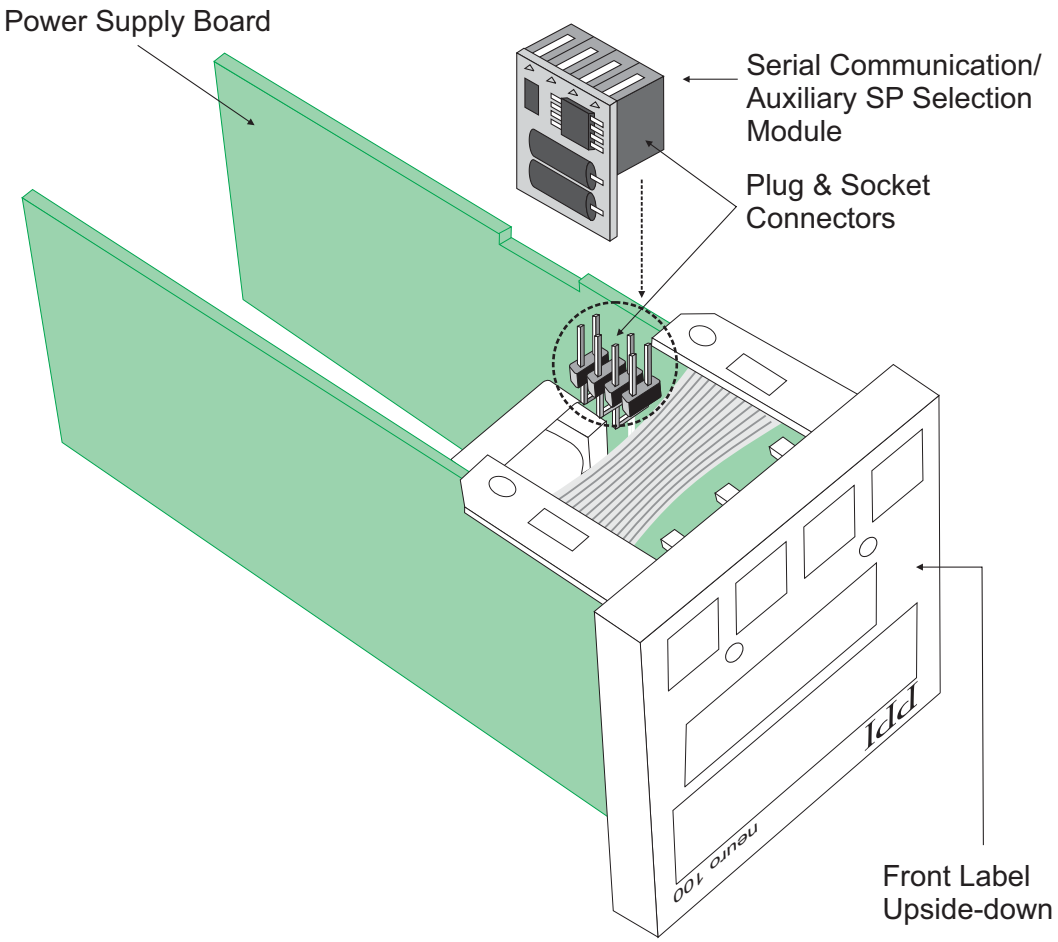
Mounting Output-3 Module



The plug for the Serial Communication or Remote Alarm Acknowledgment module is located on the Power-supply PCB. The Figure 9.7 below illustrates how to plug-in the Serial Communication/Remote Alarm Acknowledgment module. To plug (or unplug) the module simply insert (or remove) the socket into (or from) the plug.

Figure 9.7

Mounting Serial Communication/
Remote Alarm Acknowledgment Module



Section 10
MECHANICAL INSTALLATION

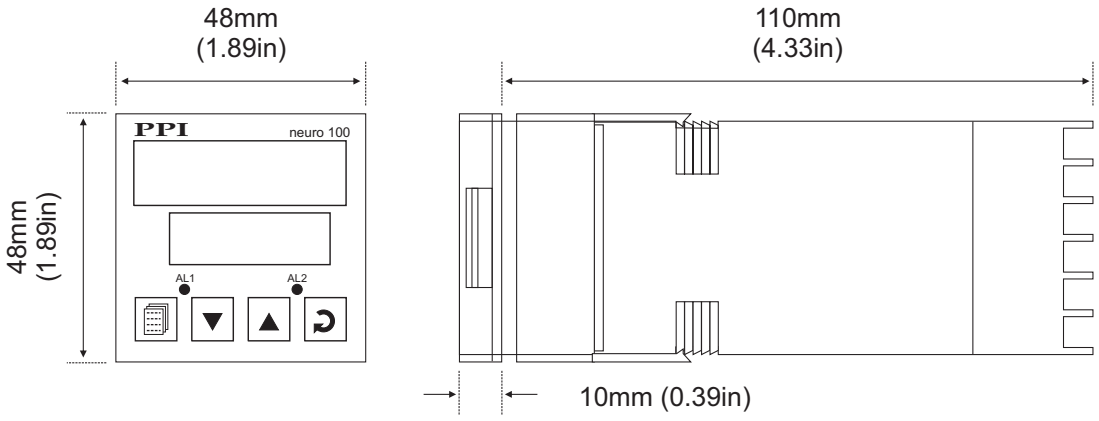
The following precautions should be strictly observed while installing the indicator:

1. The place of installation should be free of corrosive/combustible gases and electrically conductive pollution.
2. Ensure that the place of installation is not subject to rapid ambient changes that can cause condensation. Also the Ambient Temperature and Relative Humidity surrounding the indicator should not exceed the maximum specified for the proper operation of the Indicator.
3. The place of installation should be adequately protected against excessive electrostatic or electromagnetic interference.
4. The Indicator should not be subject to direct vibration or shock.
5. The Indicator should not be exposed to dust, salt air, direct sunlight or radiant heat.

OUTER DIMENSIONS

The Figure 10.1 shows the outer dimensions of the indicator.

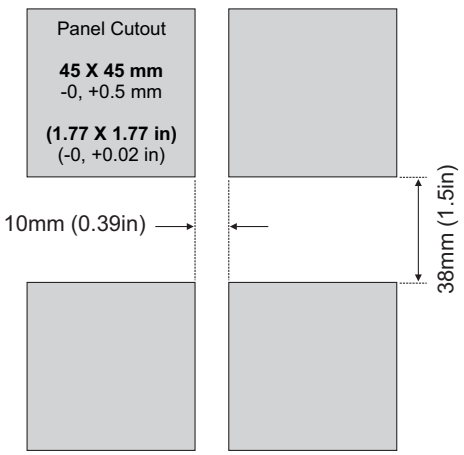
Figure 10.1



PANEL CUTOUT AND RECOMMENDED MINIMUM SPACING

The Figure 10.2 shows the panel cutout requirements for a single Indicator and also the minimum spacing recommended if several Indicators are required to be mounted on a single panel.

Figure 10.2

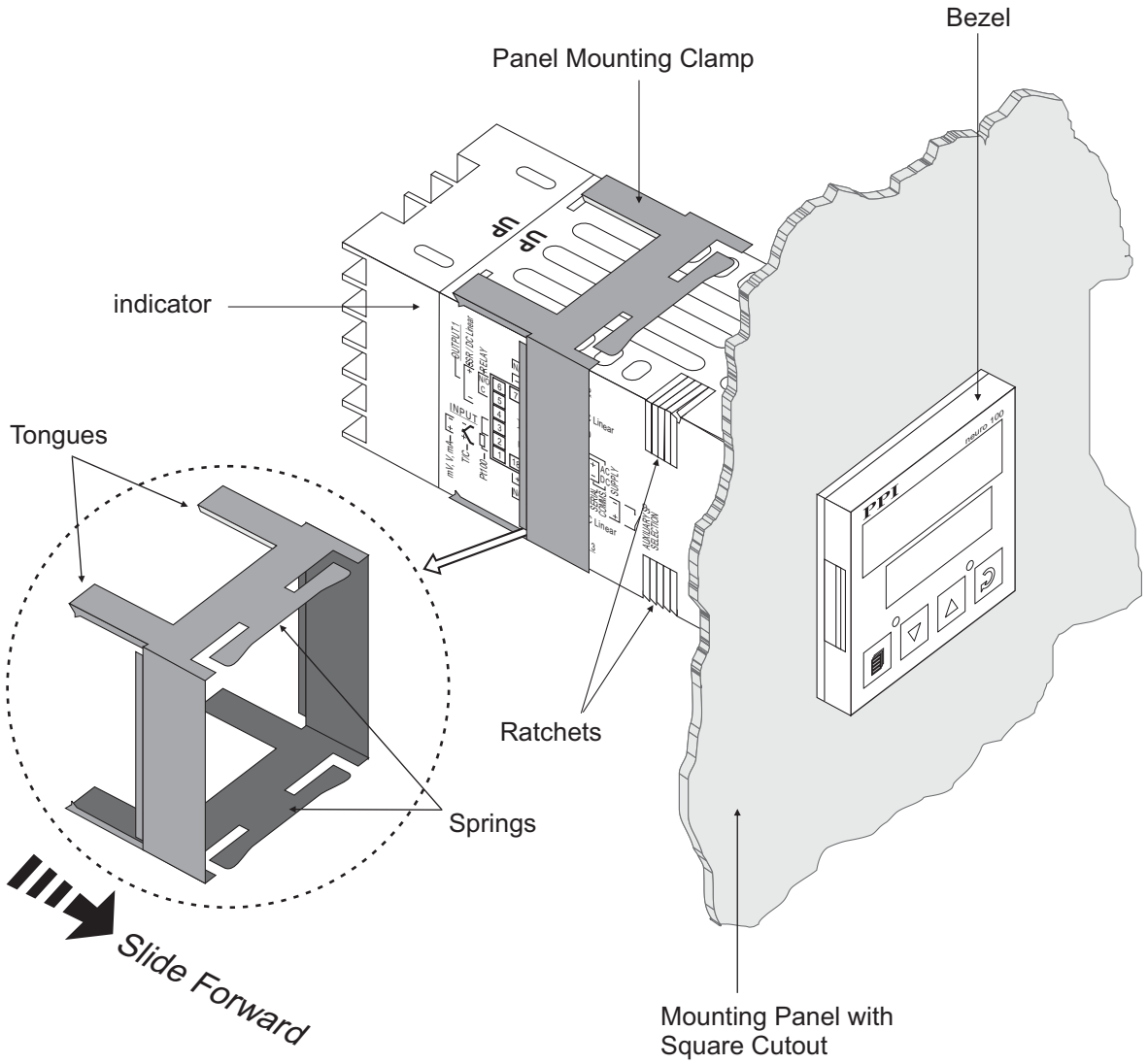


PANEL MOUNTING

Follow the steps below for mounting the Indicator on panel:

1. Prepare a square cutout to the size shown in Figure 10.2.
2. Remove the Panel Mounting Clamp from the Indicator Enclosure.
3. Insert the rear of the Indicator housing through the panel cutout from the front of the mounting panel.
4. Hold the Indicator gently against the mounting panel such that it positions squarely against the panel wall, see Figure 10.3. Apply pressure only on the bezel and not on the front label.
5. Slide the mounting clamp forward until it is firmly in contact with the rear face of the mounting panel and the tongues of the clamp engage in the ratchets on the Indicator enclosure, as shown in Figure 10.3. Ensure that the springs of the clamp push firmly against the rear face of the mounting panel for secured mounting.

Figure 10.3



Section 11

ELECTRICAL CONNECTIONS

WARNING
MISHANDLING / NEGLIGENCE CAN RESULT IN PERSONAL DEATH OR SERIOUS INJURY.

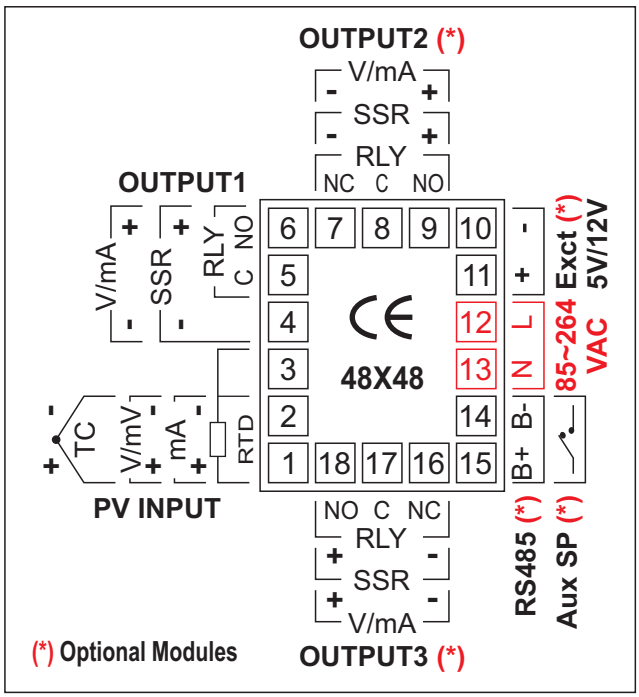
1. The user must rigidly observe the Local Electrical Regulations.
2. Do not make any connections to the unused terminals for making a tie-point for other wires (or for any other reasons) as they may have some internal connections. Failing to observe this may result in permanent damage to the indicator.
3. Run power supply cables separated from the low-level signal cables (like Thermocouple, RTD, DC Linear Current/Voltage, etc.). If the cables are run through conduits, use separate conduits for power supply cable and low-level signal cables.
4. Use appropriate fuses and switches, wherever necessary, for driving the high voltage loads to protect the indicator from any possible damage due to high voltage surges of extended duration or short-circuits on loads.
5. Take care not to over-tighten the terminal screws while making connections.
6. Make sure that the Indicator supply is switched-off while making/removing any connections or removing the Indicator from its enclosure.

CONNECTION DIAGRAM

The Electrical Connection Diagram is shown on the left side of the Indicator enclosure. The diagram shows the terminals viewed from the REAR SIDE with the Indicator label upright. Refer the label provided on the Rear Side for terminal numbers. Note that the OUTPUT-2, OUTPUT-3 and the Serial Comm./Remote Alarm Acknowledgment connections are applicable only if the respective plug-in modules are fitted. Also the DC SUPPLY is applicable only if the Indicator is supplied with 18 to 34 VDC supply voltage option.

The rear panel electrical wiring connection diagram is shown in Figure11.1 below.

Figure 11.1



DESCRIPTIONS

The back panel connections are described as under:

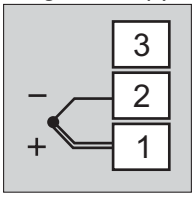
INPUT (Terminals : 1, 2, 3)

The Indicator accepts Thermocouples (J, K, T, R, S, B, N), 3-wire RTD Pt100 and DC Linear Current/Voltage (mA/mV/V) as input.

Thermocouple

Connect Thermocouple Positive (+) to terminal 1 and Negative (-) to terminal 2 as shown in Figure 11.2 (a). Use the correct type of Thermocouple extension lead wires or compensating cable for the entire distance ensuring the correct polarity throughout. Avoid joints in the cable.

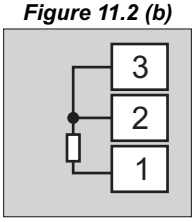
Figure 11.2 (a)



RTD Pt100, 3-wire

Connect single leaded end of RTD bulb to terminal 1 and the double leaded ends to terminal 2 and 3 (interchangeable) as shown in Figure 11.2 (b). Use copper conductor leads of very low resistance ensuring that all 3 leads are of the same gauge and length. Avoid joints in the cable.

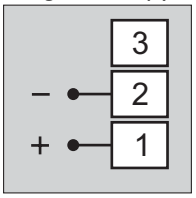
Figure 11.2 (b)



DC Linear Voltage (mV / V)

Use a shielded twisted pair with the shield grounded at the signal source for connecting mV / V source. Connect common (-) to terminal 2 and the signal (+) to terminal 1, as shown in Figure 11.2 (c).

Figure 11.2 (c)

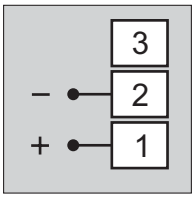


DC Linear Current (mA)

Use a shielded twisted pair with the shield grounded at the signal source for connecting mA source. Connect common (-) to terminal 2 and the signal (+) to terminal 1, as shown in Figure 11.2 (d).

Make sure that the Jumper Pins for Input selection are shorted using the Shorting-Link (Refer S*ection 9 Hardware Assembly and Configurations, Input-Jumper Settings).*

Figure 11.2 (d)

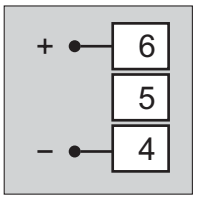


OUTPUT-1 (Terminals : 4, 6)

DC Linear Current / Voltage Output

The DC Linear (0/4-20 mA) Current or (0-5/10V) Voltage output is also available at Terminal 6 (+) and Terminal 4 (-) for Retransmission (Recorder) output. Refer Figure 11.3.

Figure 11.3



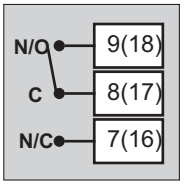
OUTPUT- 2 (Terminals : 7, 8, 9)
OUTPUT- 3 (Terminals : 16, 17, 18)

The Output-2 and Output-3 are available through plug-in modules that can be configured as Relay or SSR through appropriate Jumper Settings. The connection descriptions are shown in figures 11.4(a) and 11.4(b).

Relay

Potential-free Relay changeover contacts N/O (Normally Open) and C (Common) rated 2A/240 VAC (resistive load) are provided as Relay output. Use external auxiliary device like contactor with appropriate contact rating for driving the actual load.

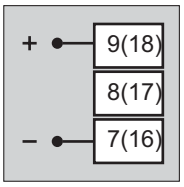
Figure 11.4 (a)



Drive for SSR

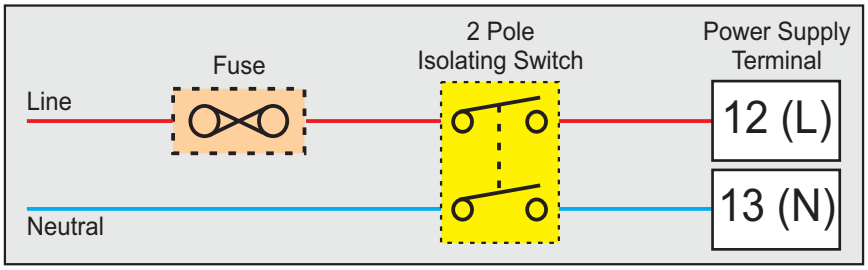
DC Voltage level is generated for switching the external SSR (Solid State Relay). Connect (+) and (-) terminals of SSR to indicator terminals 9(18) and 7(16), respectively. Use Zero-Crossover, 3 to 30 VDC operated SSR, rated approximately 1.5 times the actual load rating. Use appropriate Heat Sink for load rating exceeding 10A.

Figure 11.4 (b)



POWER SUPPLY (Terminals : 12, 13)

Figure 11.5



The indicator is designed for installation in an enclosure which provides adequate protection against electric shock. Local regulations regarding electrical installation should be rigidly observed. Consideration should be given to prevention of access to the Power Supply terminals by unauthorized personnel.

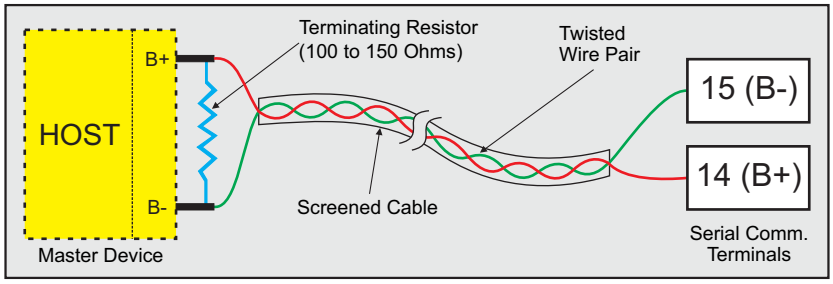
As standard, the indicator is supplied with power connections suited for 85 to 264 VAC. Use well-insulated copper conductor wire of the size not smaller than 0.5mm^2 for connections. Connect Line (Phase) to terminal 12 and the Neutral (Return) to terminal 13 as shown in Figure 11.5. The indicator is not provided with fuse and power switch. If necessary, mount them separately. Use a time lag fuse rated 1A @ 240 VAC.

For DC Supply, connect Signal (+) & Common (-) to indicator terminals 12 & 13, respectively.

SERIAL COMMUNICATION PORT (Terminals : 14 , 15)

(Applicable if the Option plug-in module for RS485 Serial Port is fitted)

Figure 11.6



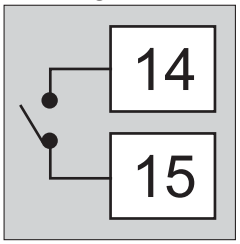
If the Optional plug-in communication board is fitted, connect terminal 15 and 14 of the indicator to (+) and (-) terminals of the Master device. For reliable noise free communication, use a pair of twisted wires inside screened cable as shown in Figure 11.6. The wire should have less than 100 ohms/km nominal DC resistance (Typically 24 AWG or thicker). Connect the terminating resistor (Typically 100 to 150 ohm) at one end to improve noise immunity.

REMOTE ALARM ACKNOWLEDGMENT INPUTS (Terminals : 14,15)

(Applicable if the Option plug-in module for Remote Alarm Acknowledge is fitted).

Figure 11.7

Use potential-free push button switch with normally Open contacts for the purpose of Alarm Acknowledgment. Connect the switch across the terminals14 &15 as shown in figure 11.7.



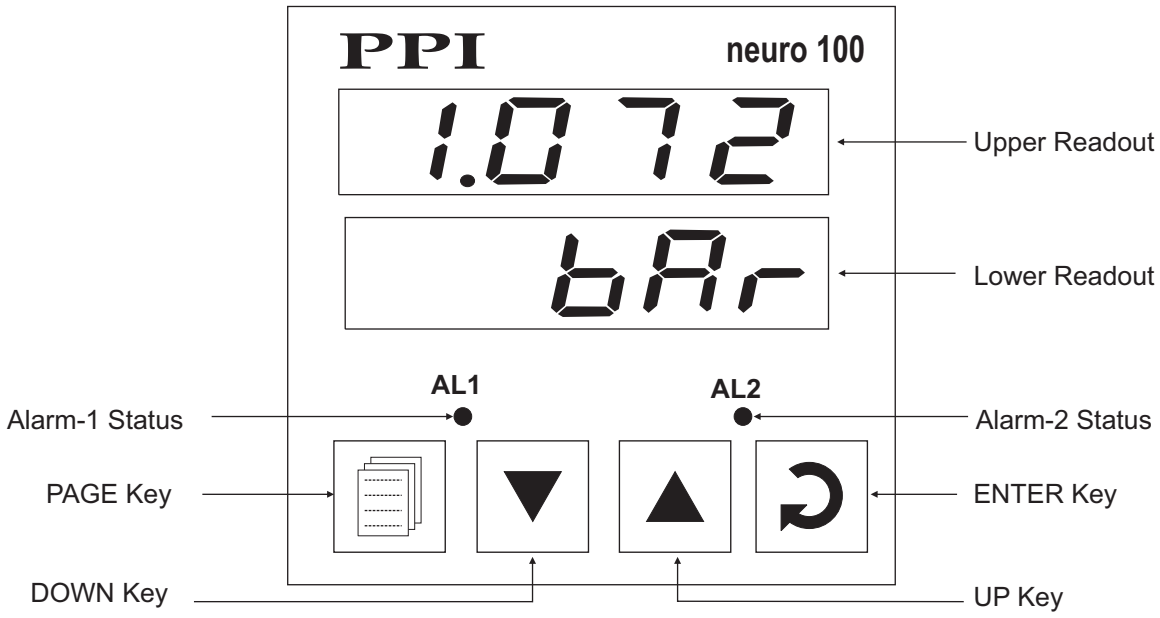
neuro 100 96X96

Section 1

FRONT PANEL LAYOUT

The indicator front panel comprises of digital readouts, LED indicators and membrane keys as shown in Figure 1.1 below.

Figure 1.1



READOUTS

The Upper Readout is a 4 digit, 7-segment bright red LED display and usually displays the PV (Process Value).In Set-up Mode, the Upper Readout displays parameter values/options.

The Lower Readout is a 4 digit, 7-segment bright green LED display and usually displays Process Value Units. In case of any active Alarm(s), the Lower Readout flashes Alarm Status information. In Set-up Mode, the Lower Readout displays the names (identifier tags) for the parameters.

INDICATORS

The front panel comprises 2 LED indicators that show Alarm status. Refer Table 1.1 below for details.

Table 1.1

LED	Status
AL1	Flashes while Alarm-1 is active.
AL2	Flashes while Alarm-2 is active.

KEYS

There are four tactile keys provided on the front panel for configuring the indicator, setting-up the parameter values. Refer Table 1.2 below.

Table 1.2

Symbol	Key	Function
	PAGE	Press to enter or exit set-up mode.
	DOWN	Press to decrease the parameter value. Pressing once decreases the value by one count; keeping pressed speeds up the change.
	UP	Press to increase the parameter value. Pressing once increases the value by one count; keeping pressed speeds up the change.
	ENTER	Press to store the set parameter value and to scroll to the next parameter on the PAGE.

Section 2

HARDWARE ASSEMBLY AND CONFIGURATIONS

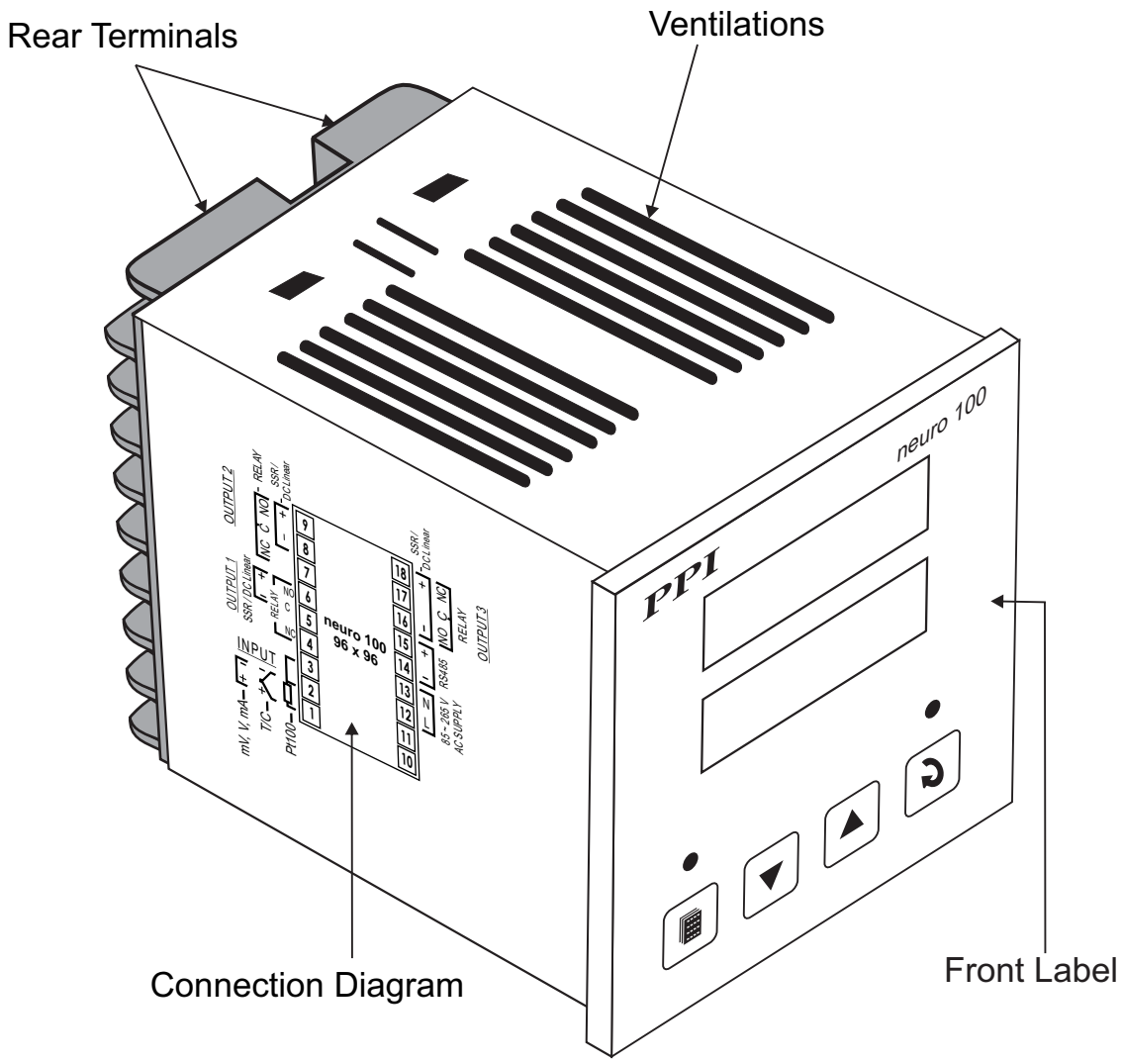
The Figure 2.1 below shows the controller outer-case viewed with front label upright.

ELECTRONIC ASSEMBLY

The basic electronics assembly (without any plug-in modules), comprises of 3 Printed Circuit Boards (PCB). When viewed from the front; the CPU PCB is to the left, Power-supply PCB is to the right and the Display PCB is behind the bezel.

The electronic assembly can be removed from the plastic enclosure and placed back as described and illustrated in Figure 2.1.

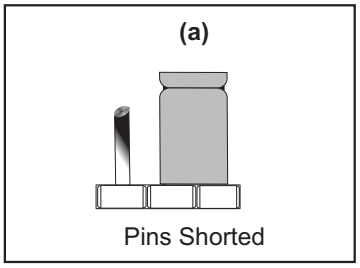
Figure 2.1



Input Jumper Setting

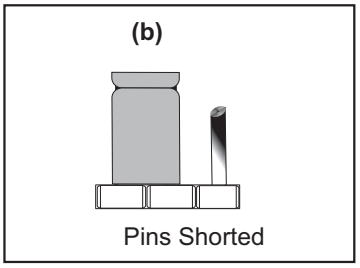
For DC Linear Current Inputs (0-20mA or 4-20mA), short the Pins using Shorting-Link as shown in Figure 2.2 (a). For all other Input types, keep the Shorting-Link parked leaving the Pins open, as shown in Figure 2.2 (b).

Figure 2.2 (a)



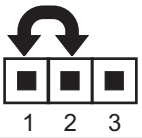
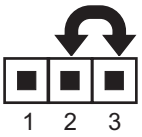
DC Linear Current (mA)

Figure 2.2 (b)



All other Input Types

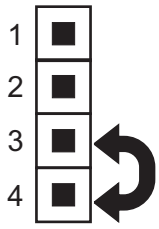
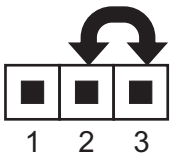
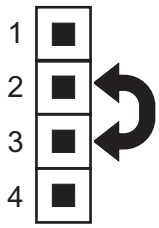
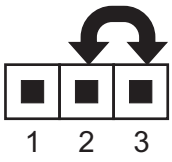
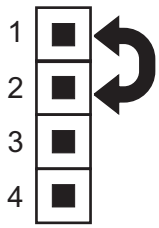
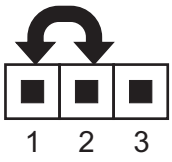
Table 2.1 **Input Jumper Settings**

Input Type	Jumper 'A' Setting
Thermocouple, RTD Pt100, mV & V	
DC Linear Current (mA)	

OUTPUT-1 : Jumper Settings

Besides the parameter settings, the Output-1 configuration requires jumper settings marked B & C for different output type selections as shown in the Table 2.2 below.

Table 2.2 **Output-1 Jumper Settings**

Output Type	Jumper Setting - B	Jumper Setting - C
Relay		
SSR Drive		
DC Linear Current (or Voltage)		

OUTPUT-2 & OUTPUT-3 : Modules and Jumper Settings

The *Output-2* and *Output-3* Modules are identical and, thus, can be fitted interchangeably in Output-2 or Output-3 positions. These modules can be configured for either Relay or SSR output through proper jumper selection. Two jumper settings A and B, as shown in Figure 2.3, are required for Relay or SSR selection. Refer Table 2.3 for appropriate jumper setting positions.

Figure 2.3

Relay/SSR Module

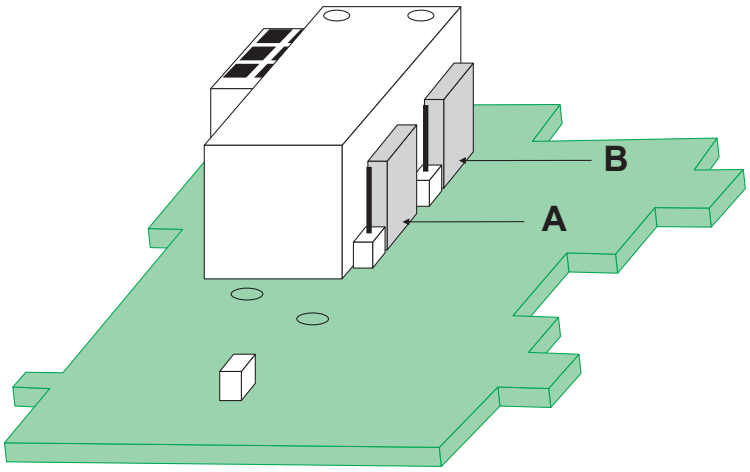


Table 2.3 **Output-2 Jumper Settings**

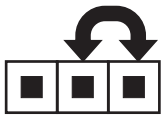
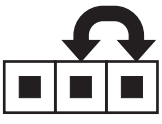
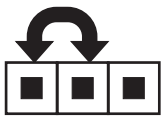
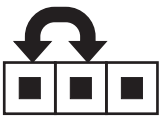
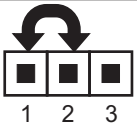
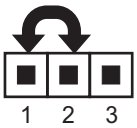
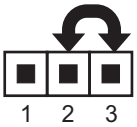
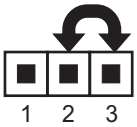
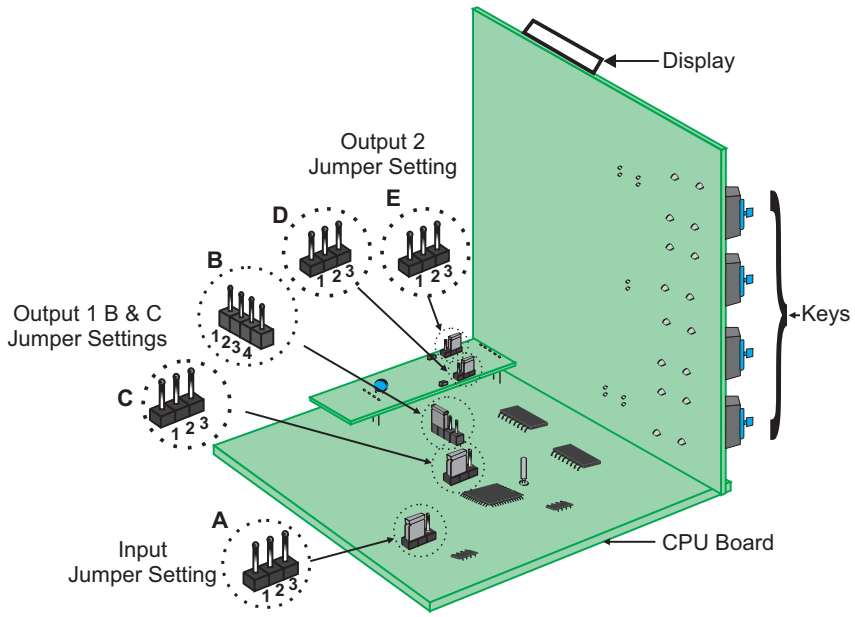
Output Type	Jumper Setting - D	Jumper Setting - E
Relay		
SSR		

Table 2.4 **Output-3 Jumper Settings**

Output Type	Jumper Setting - A	Jumper Setting - B
Relay		
SSR		

Mounting Output Modules

Figure 2.4



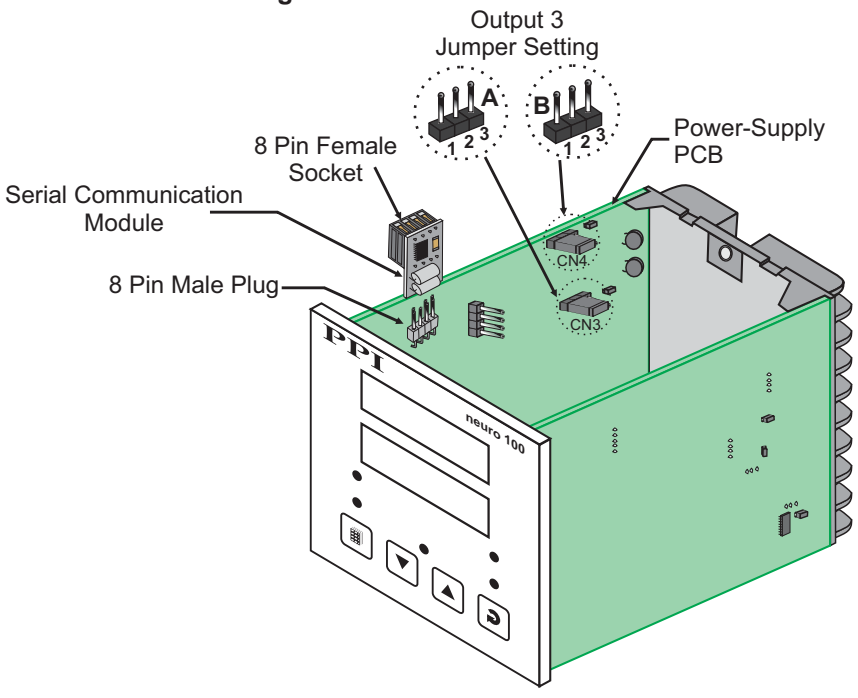
Mounting / Un-Mountion of Modules

The Figure 2.4 Illustrates how to mount output-2 & output-3 module, respectively. Notice the orientation of the controller & a few identifying components shown in figure to help locate the plugs for the modules.

The plug for the Serial Communication or Remote Alarm Acknowledgment module is located on the Power-supply PCB. The Figure 2.5 below illustrates how to plug-in the Serial Communication/Remote Alarm Acknowledgment module. To plug (or unplug) the module simply insert (or remove) the socket into (or from) the plug.

Figure 2.5

Mounting Serial Communication Module



Section 3

ELECTRICAL CONNECTIONS

WARNING
MISHANDLING / NEGLIGENCE CAN RESULT IN PERSONAL DEATH OR SERIOUS INJURY.

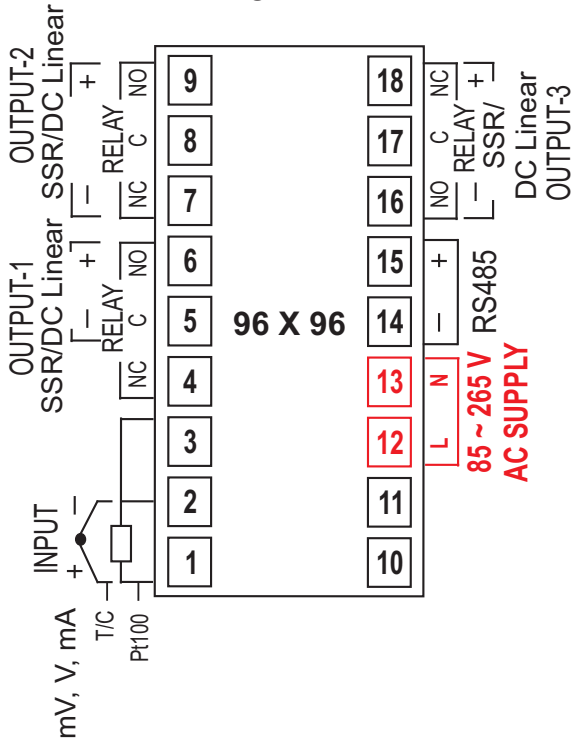
1. The user must rigidly observe the Local Electrical Regulations.
2. Do not make any connections to the unused terminals for making a tie-point for other wires (or for any other reasons) as they may have some internal connections. Failing to observe this may result in permanent damage to the controller.
3. Run power supply cables separated from the low-level signal cables (like Thermocouple, RTD, DC Linear Current/Voltage, etc.). If the cables are run through conduits, use separate conduits for power supply cable and low-level signal cables.
4. Use appropriate fuses and switches, wherever necessary, for driving the high voltage loads to protect the controller from any possible damage due to high voltage surges of extended duration or short-circuits on loads.
5. Take care not to over-tighten the terminal screws while making connections.
6. Make sure that the controller supply is switched-off while making/removing any connections or removing the controller from its enclosure.

CONNECTION DIAGRAM

The Electrical Connection Diagram is shown on the left side of the controller enclosure. The diagram shows the terminals viewed from the REAR SIDE with the controller label upright. Refer the label provided on the Rear Side for terminal numbers. Note that the OUTPUT-2, OUTPUT-3 and the Serial Comm./Auxiliary SP connections are applicable only if the respective plug-in modules are fitted. Also the DC SUPPLY is applicable only if the controller is supplied with 20 to 50 VDC supply voltage option.

The rear panel electrical wiring connection diagram is shown in Figure 3.1 below.

Figure 3.1



DESCRIPTIONS

The back panel connections are described as under:

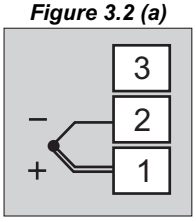
INPUT (Terminals : 1, 2, 3)

The controller accepts Thermocouples (J, K, T, R, S, B, N & Reserved), 3-wire RTD Pt100 and DC Linear Current / Voltage (mA/mV/V) as input.

Thermocouple

Connect Thermocouple Positive (+) to terminal 1 and Negative (-) to terminal 2 as shown in Figure 3.2 (a). Use the correct type of Thermocouple extension lead wires or compensating cable for the entire distance ensuring the correct polarity throughout. Avoid joints in the cable.

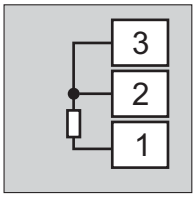
Figure 3.2 (a)



RTD Pt100, 3-wire

Connect single leaded end of RTD bulb to terminal 1 and the double leaded ends to terminal 2 and 3 (interchangeable) as shown in Figure 3.2 (b). Use copper conductor leads of very low resistance ensuring that all 3 leads are of the same gauge and length. Avoid joints in the cable.

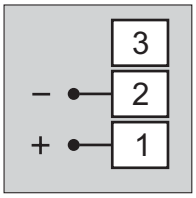
Figure 3.2 (b)



DC Linear Voltage (mV / V)

Use a shielded twisted pair with the shield grounded at the signal source for connecting mV / V source. Connect common (-) to terminal 2 and the signal (+) to terminal 1, as shown in Figure 3.2 (c).

Figure 3.2 (c)

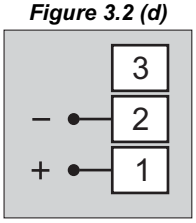


DC Linear Current (mA)

Use a shielded twisted pair with the shield grounded at the signal source for connecting mA source. Connect common (-) to terminal 2 and the signal (+) to terminal 1, as shown in Figure 3.2 (d).

Make sure that the Jumper Pins for Input selection are shorted using the Shorting-Link (Refer *Section 9 Hardware Assembly and Configurations, Input-Jumper Settings).*

Figure 3.2 (d)

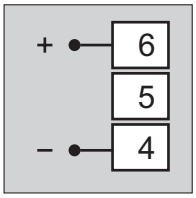


OUTPUT-1 (Terminals : 4, 6)

DC Linear Current / Voltage Output

The DC Linear (0/4-20 mA) Current or (0-5/10V) Voltage output is also available at Terminal 6 (+) and Terminal 4 (-) for Retransmission (Recorder) output. Refer Figure 3.3

Figure 3.3



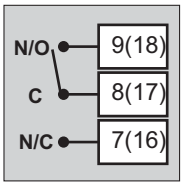
OUTPUT- 2 (Terminals : 7, 8, 9)
OUTPUT- 3 (Terminals : 16, 17, 18)

The Output-2 and Output-3 are available through plug-in modules that can be configured as Relay or SSR through appropriate Jumper Settings. The connection descriptions are shown in figures 3.4(a) and 3.4(b).

Relay

Potential-free Relay changeover contacts N/O (Normally Open) and C (Common) rated 2A/240 VAC (resistive load) are provided as Relay output. Use external auxiliary device like contactor with appropriate contact rating for driving the actual load.

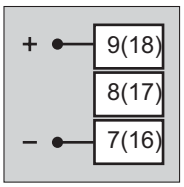
Figure 3.4 (a)



Drive for SSR

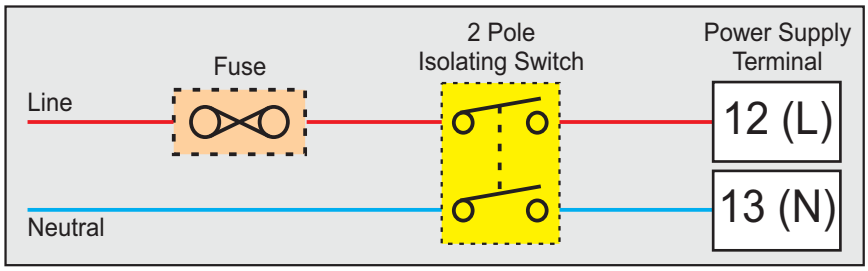
DC Voltage level is generated for switching the external SSR (Solid State Relay). Connect (+) and (-) terminals of SSR to indicator terminals 9(18) and 7(16), respectively. Use Zero-Crossover, 3 to 30 VDC operated SSR, rated approximately 1.5 times the actual load rating. Use appropriate Heat Sink for load rating exceeding 10A.

Figure 3.4 (b)



POWER SUPPLY (Terminals : 12, 13)

Figure 3.5



Caution

The indicator is designed for installation in an enclosure which provides adequate protection against electric shock. Local regulations regarding electrical installation should be rigidly observed. Consideration should be given to prevention of access to the Power Supply terminals by unauthorized personnel.

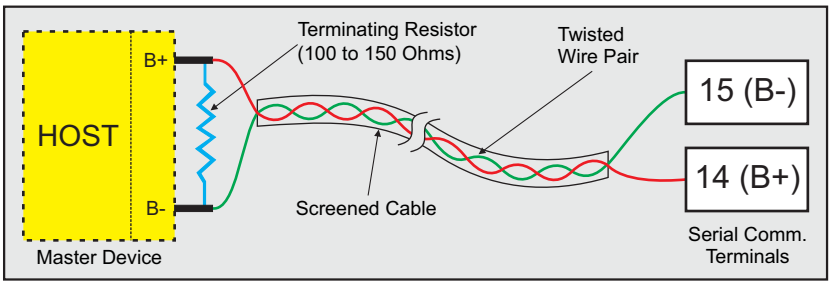
As standard, the indicator is supplied with power connections suited for 85 to 264 VAC. Use well-insulated copper conductor wire of the size not smaller than 0.5mm^2 for connections. Connect Line (Phase) to terminal 12 and the Neutral (Return) to terminal 13 as shown in Figure 3.5. The indicator is not provided with fuse and power switch. If necessary, mount them separately. Use a time lag fuse rated 1A @ 240 VAC.

For DC Supply, connect Signal (+) & Common (-) to indicator terminals 12 & 13, respectively.

SERIAL COMMUNICATION PORT (Terminals : 14 , 15)

(Applicable if the Option plug-in module for RS485 Serial Port is fitted)

Figure 3.6



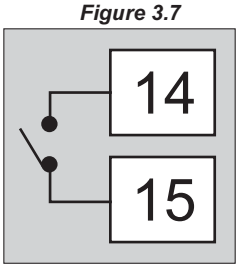
If the Optional plug-in communication board is fitted, connect terminal 15 and 14 of the indicator to (+) and (-) terminals of the Master device. For reliable noise free communication, use a pair of twisted wires inside screened cable as shown in Figure 3.6. The wire should have less than 100 ohms/km nominal DC resistance (Typically 24 AWG or thicker). Connect the terminating resistor (Typically 100 to 150 ohm) at one end to improve noise immunity.

REMOTE ALARM ACKNOWLEDGMENT INPUTS (Terminals : 14,15)

(Applicable if the Option plug-in module for Remote Alarm Acknowledge is fitted).

Use potential-free push button switch with normally Open contacts for the purpose of Alarm Acknowledgment. Connect the switch across the terminals14 &15 as shown in figure 3.7.

Figure 3.7



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