neuro 100EX

PPI
The Perfection Experts

Enhanced
Universal Process Indicator

User Manual

CONTENTS

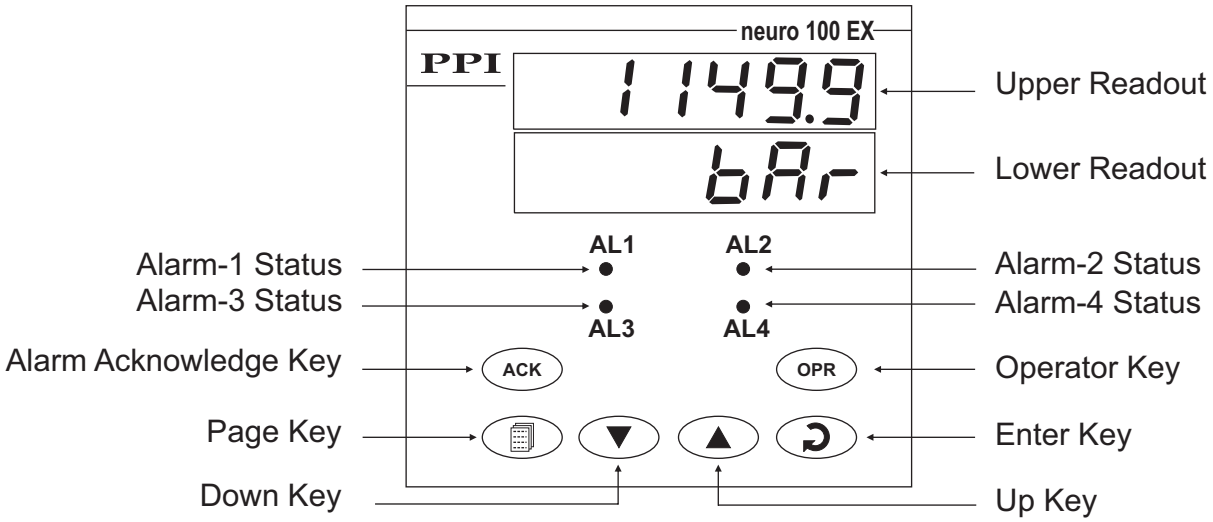
1.	FRONT PANEL LAYOUT	1
2.	BASIC OPERATION	3
3.	SET-UP MODE ACCESS AND OPERATION	5
4.	ALARM PARAMETERS	7
5.	RETRANSMISSION PARAMETERS	9
6.	INPUT CONFIGURATION	10
7.	SUPERVISORY PARAMETERS	14
8.	USER LINEARISATION PARAMETERS	16
9.	HARDWARE ASSEMBLY & CONFIGURATIONS	17
10.	MECHANICAL INSTALLATION	24
11.	ELECTRICAL CONNECTIONS	26

Section 1

FRONT PANEL LAYOUT

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

Figure 1.1



READOUTS

The Upper Readout is a 5 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 5 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 4 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.
AL3	Flashes while Alarm-3 is active.
AL4	Flashes while Alarm-4 is active.

KEYS

There are six tactile keys provided on the front panel for configuring the indicator, setting-up the parameter values and selecting Operation / Display Modes. 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.
	ALARM ACKNOWLEDGMENT	Press to acknowledge any pending Alarm(s). This also turns-off the Alarm relay.
	OPERATOR PAGE	Press to access 'Operator-Page' parameters. ***(The parameters are listed and described in section 2 : Basic Operations)***

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 01.01 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, 2, 3 or 4) and YY is Alarm Type (Lo or Hi) For example A1.Lo means Alarm-1 is active and the set Alarm Type is Low. In case of multiple Alarms, each Alarm Status is flashed sequentially with 3 Seconds time 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 turns ON under *Over-range/Open error*. Similarly, Process Low Alarm turns ON 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 'OPR' key. The Lower Readout shows prompt for the first available operator parameter and the Upper Readout shows value for the parameter.
2. Use UP / DOWN keys to adjust the value and then press ENTER key to store the set value and scroll to the 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.

Note:
The Operator Page can also be accessed through PAGE-0. (The pages and parameters are explained in next section).

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 all 4 Alarms (Alarm-1 to Alarm-4).

Table 2.2

Parameter Description	Settings (Default Value)
MAXIMUM PV Hi 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 Lo 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 rSt Available only if Min/Max monitoring is enabled. Set this parameter to 'Yes' followed by correct password entry (through next parameter) to clear the current Min/Max values and start afresh monitoring the PV for new Min/Max values.	no No YES Yes (Default : No)
RESET PASSWORD CodE 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 A1.SP The setpoint for Alarm-1. This parameter is not available if the selected Alarm type for Alarm-1 is 'None'.	Throughout the range for the selected Input Type. (Default : For Process Low : -200.0 For Process High : 1376.0)
ALARM-2 SETPOINT A2.SP The setpoint for Alarm-2. This parameter is not available if the selected Alarm type for Alarm-2 is 'None'.	
ALARM-3 SETPOINT A3.SP The setpoint for Alarm-3. This parameter is not available if the selected Alarm type for Alarm-3 is 'None'.	
ALARM-4 SETPOINT A4.SP The setpoint for Alarm-4. This parameter is not available if the selected Alarm type for Alarm-4 is 'None'.	

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.

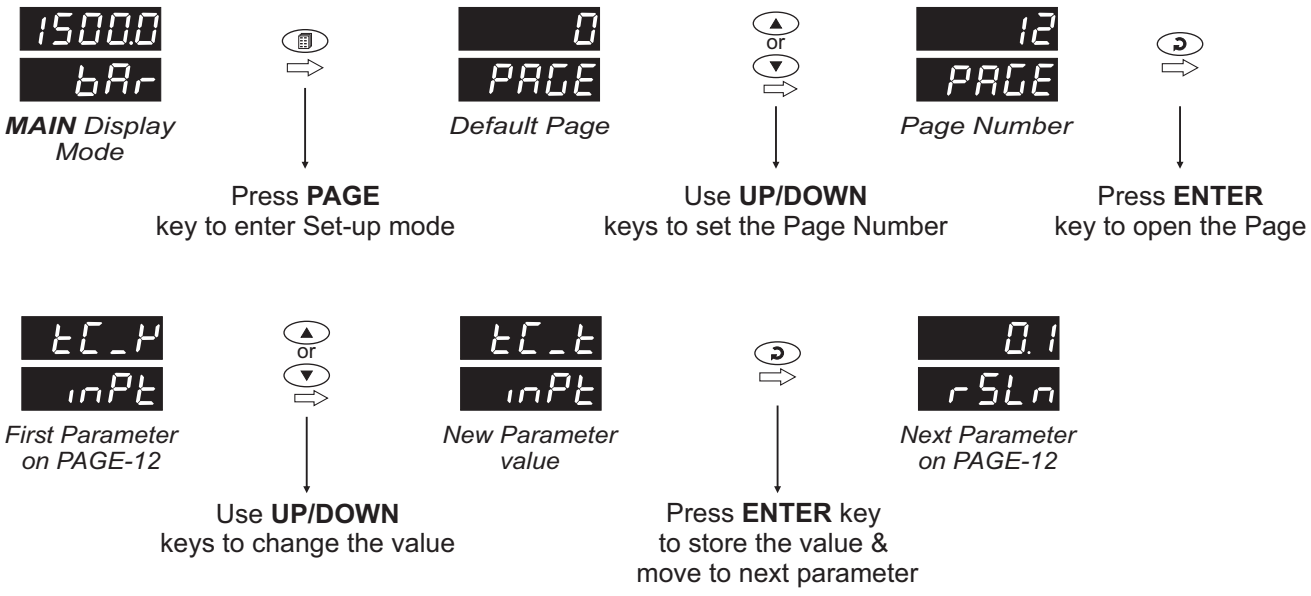
SET-UP MODE

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.

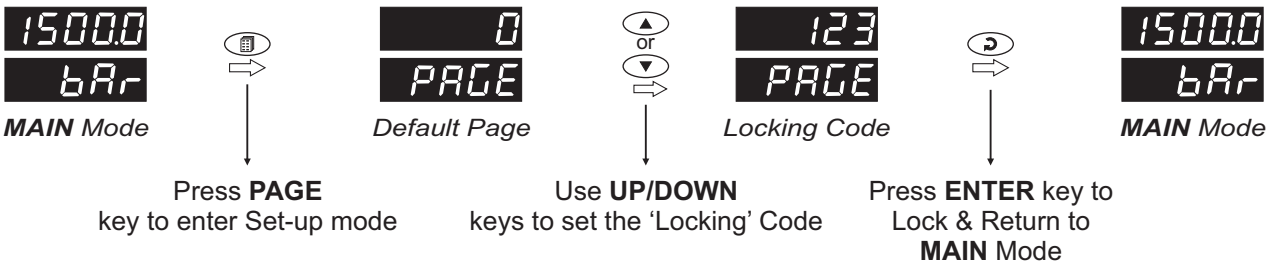
For enabling / disabling the Lock, step through the following sequence:

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.

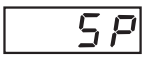
Section 4

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 NUMBER  Select Alarm Number for parameter setting. For example; setting the value to 1, selects Alarm-1.	1 to 4 (Default : 1)
ALARM TYPE  *None* Disable the Alarm . *Process Low* The Alarm activates when the PV equals or falls below the 'Alarm Setpoint' value. *Process High* The Alarm activates when the PV equals or exceeds the 'Alarm Setpoint' value.	 None  Process Low  Process High (Default : None)
ALARM SET POINT  This parameter sets the Process High or Process Low limit for Alarm.	Min. to Max. of selected input type range (Default : For Process Low : -200.0 & Process High : 1376.0)
ALARM HYSTERISIS  This parameter value sets a differential (dead) band between the ON and OFF Alarm states. Keep it large enough to avoid frequent switching of the Alarm relay.	***For DC Lin. Volts/Current*** 1 to 30000 Counts ***For Thermocouple/RTD*** 1 to 3000 or 0.1 to 3000.0 (Default : 2.0)
ALARM INHIBIT  *Yes* The Alarm activation is suppressed until the PV is within Alarm limits from the time the indicator is switched ON. This allows suppressing the Alarm during the start-up Alarm conditions. *No* The Alarm is not suppressed during the start-up Alarm conditions.	 No  Yes (Default : No)

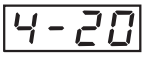
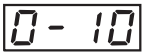
Parameter Description	Settings (Default Value)
ALARM LOGIC LOG Select 'Normal' if Alarm is to activate an Audio / Visual alarm. Select 'Reverse' if Alarm is to Trip the system.	norn Normal rEu Reverse (Default : Normal)
ALARM LATCH LACh *No* The Relay switches ON/OFF with Alarm switching. *Yes* The Relay 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  Select 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 to 20 mA  4 to 20 mA  0 to 5 Volts  0 to 10 Volts (Default : 0 to 20 mA)
RECORDER LOW  Set the Lower **PV** Limit that shall correspond to the minimum recorder output signal level (0 mA / 4 mA / 0 V).	Min. to Max. Range Specified for the Selected Input Type (Default : -200.0)
RECORDER HIGH  Set the Higher **PV** Limit that shall correspond to the maximum recorder output signal level (20 mA / 10 V / 5 V).	Min. to Max. Range Specified for the Selected Input Type (Default : 1376.0)

Section 6

INPUT CONFIGURATION PARAMETERS

The indicator needs to be appropriately configured for sensor Input type PV indication, digital filter etc. The **PAGE-12** parameters are listed below in Table 6.1.

Table 6.1

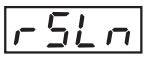
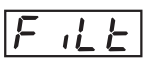
Parameter Description	Settings (Default Value)
INPUT TYPE  Select Input type in accordance with the type of Thermocouple or RTD, sensor or Transducer output connected for process value measurement. Ensure proper hardware jumper settings.	Refer Table 6.3 (Default : Type K)
RESOLUTION  Set the Process Value indication resolution (decimal point). All the resolution based parameters (hysteresis, alarm setpoints etc.) then follow this resolution setting.	Refer Table 6.3 (Default : 0.1)
UNITS  Select Temperature units in °C or °F for Thermocouple or Pt100 sensor. For DC Linear inputs (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 : EU)
DC RANGE LOW  ***(Available for DC Linear Inputs)*** Sets process value corresponding to minimum DC Linear signal input. (e.g., 0 V, 0 mA, 4 mA, etc.)	-19999 to 30000 (Default : 0.0)
DC RANGE HIGH  ***(Available for DC Linear Inputs)*** Sets process value corresponding to maximum DC Linear signal input. (e.g., 5 V, 10 V, 20 mA, etc.)	-19999 to 30000 (Default : 100.0)
OFFSET  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	***For DC Lin. Volts/Current*** -19999 to 30000 Counts ***For Thermocouple/RTD*** -1999 to 3000 or -1999.9 to 3000.0 (Default : 0)
DIGITAL FILTER  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
mPAS	Mpascals	
KPAS	Kpascals	
bAr	Bar	
mbAr	Milli bar	
PSI	PSI	
KGcm	kg/sq cm	
mmWG	mm water gauge	
inWG	Inches water gauge	
mmHG	mm mercury	
torr	Torr	
L-H	Litres per hour	Flow
L-m	Litres per minute	
P.rh	% Relative Humidity	
P.O2	% O2	
P.CO2	% CO2	
P.CP	% Carbon Potential	

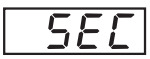
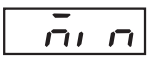
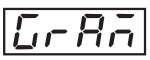
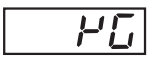
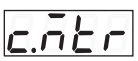
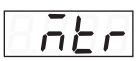
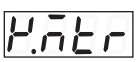
Lower Readout	Units	
	volts	Electricity
	Amps	
	Milli amps	
	Milli Volts	
	Ohms	
	Parts per million	
	Revolutions per pinute	
	Milli seconds	Time
	Seconds	
	Minutes	
	Hours	
	PH	
	%PH	
	Miles per hour	
	Milli grams	Weight
	Grams	
	Kilo grams	
	mm (Millimeter)	Length / Height / Distance
	cm (Centimeter)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

Table 6.3

Option	What it means	Range (Min. to Max.)	Resolution
tC_J	Type J Thermocouple	0.0 to +9600°C / +32.0 to +1760.0°F	1 °C/°F or 01°C/°F
tC_K	Type K Thermocouple	-200.0 to +1376.0°C / -328.0 to +2508.0°F	
tC_t	Type T Thermocouple	-200.0 to +387.0°C / -328.0 to +728.0°F	
tC_r	Type R Thermocouple	0.0 to +1771.0°C / +32.0 to +3219.0°F	
tC_S	Type S Thermocouple	0.0 to +1768.0°C / +32.0 to +3214.0°F	
tC_b	Type B Thermocouple	0.0 to +1826.0°C / +32.0 to +3218.0°F	
tC_n	Type N Thermocouple	0.0 to +1314.0°C / +32.0 to +2397.0°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 / -328.0 to +1112.0°F	1 °C/°F or 0.1 °C/°F
0-20	0 to 20mA DC current	-19999 to 30000 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)
REMOTE ACKNOWLEDGE SWITCH rmt Supervisory permission for use of the rear panel terminals for connecting remote switch for Alarm acknowledge.	dSbL Disable EnbL Enable (Default : Disable)
RECORDER rEC Supervisory permission for enabling recorder (retransmission) output.	dSbL Disable EnbL Enable (Default : Disable)
PROCESS VALUE HIGH-LOW MONITORING HiLo 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 enters the password that matches with this parameter value.	0 to 250 (Default : 0)
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)

Parameter Description	Settings (Default Value)
PARITY  One of the communication error trapping features. Select the data packet parity as implemented by the host protocol.	 None  Even  Odd (Default : Even)
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

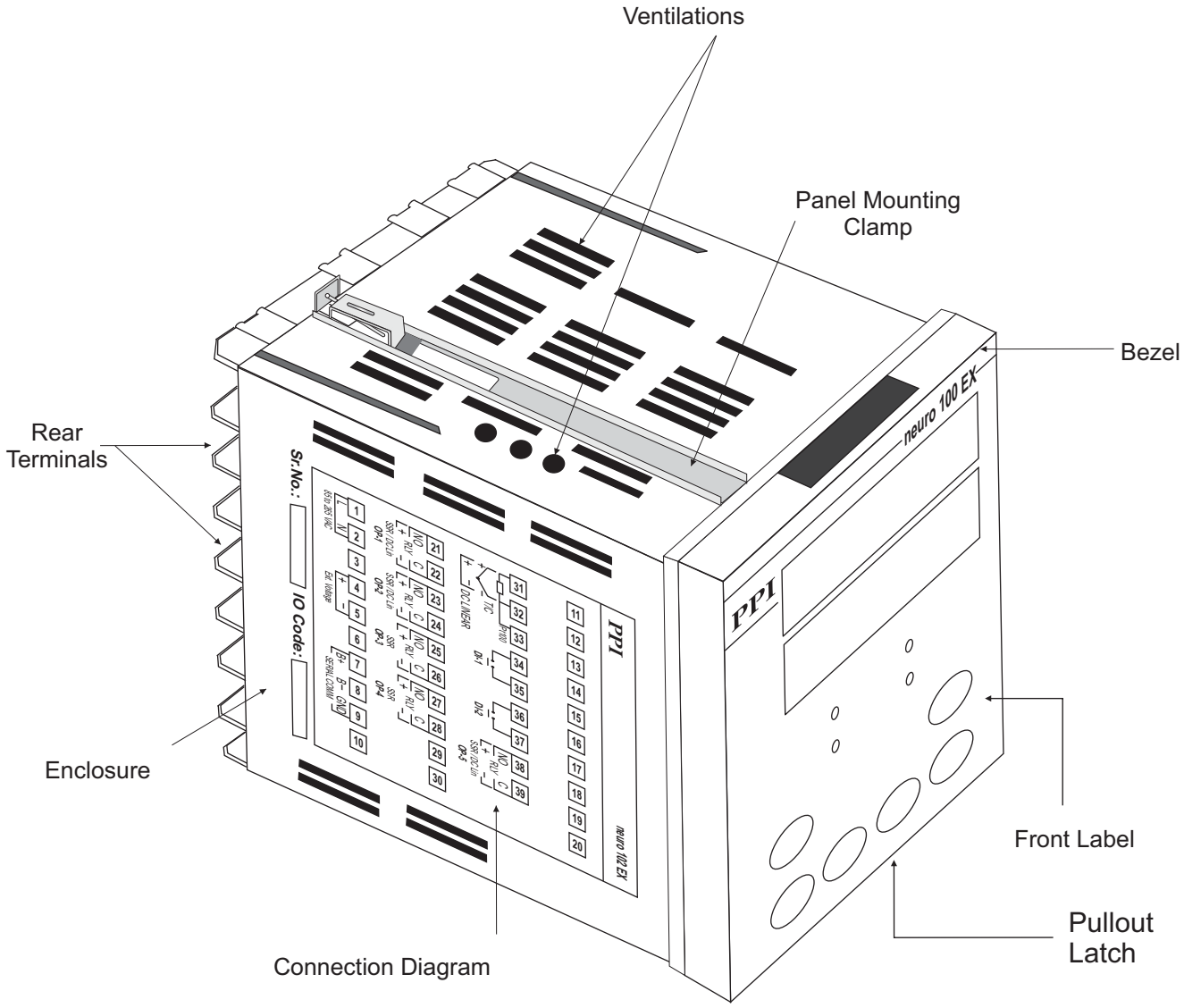
Parameter Description	Settings (Default Value)
USER LINEARIZATION SETTING CODE CodE Protection password for access to the linearisation related parameters. Set to **333** as valid password.	0 to 9999 (Default : 0)
USER LINEARIZATION U.L in Enable / Disable user linearisation feature.	no No YES Yes (Default : 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.	1 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.	-19999 to 30000 (Default : Undefined)
DERIVED VALUE FOR BREAK POINT (Y CO-ORD) d.Pnt Set the computed or derived (Y co-ordinate) value.	-19999 to 30000 (Default : Undefined)

Section 9

HARDWARE ASSEMBLY AND CONFIGURATIONS

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

Figure 9.1

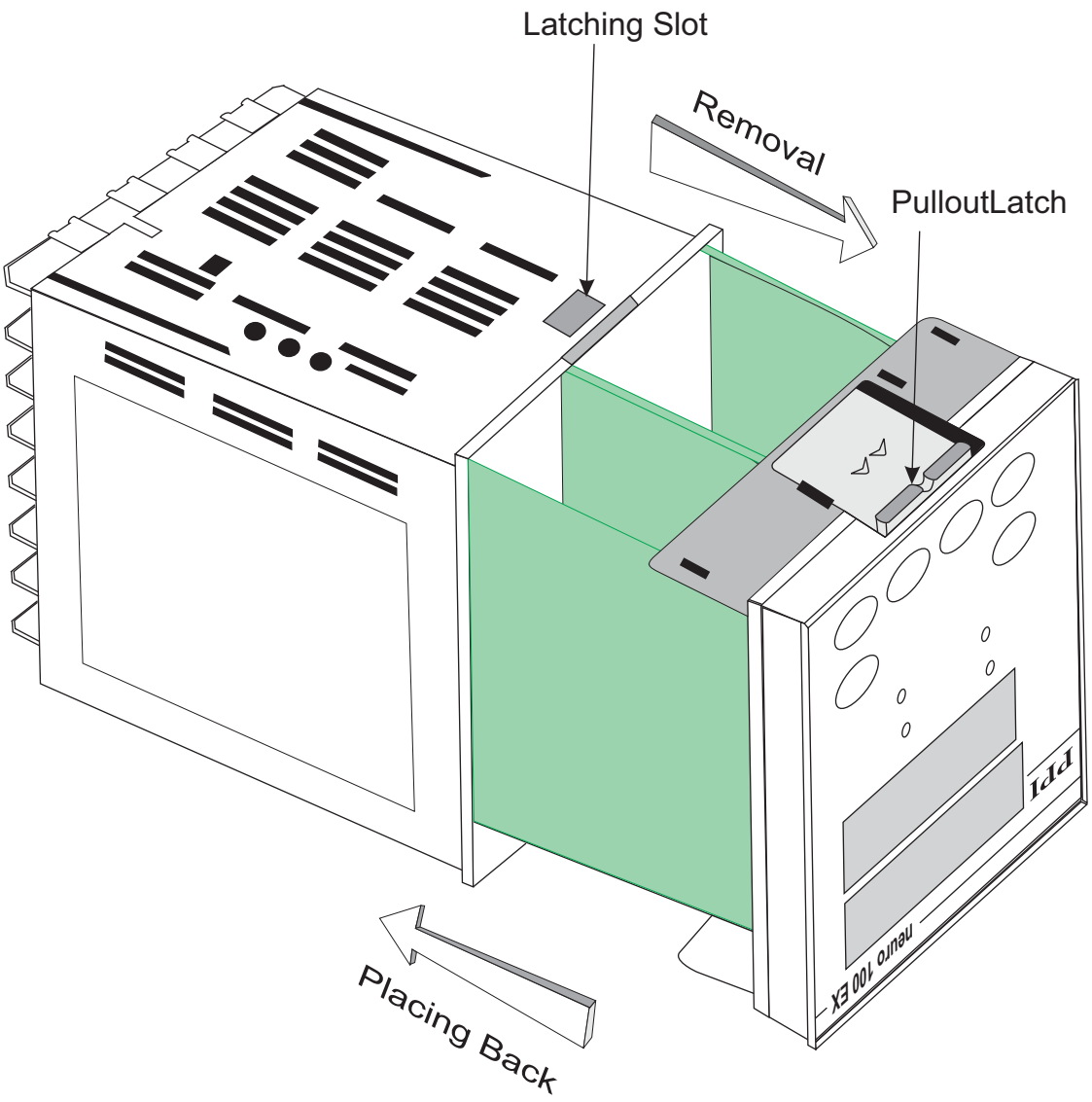


ELECTRONIC ASSEMBLY

The basic electronics assembly (without any plug-in modules), comprises of 4 Printed Circuit Boards (PCB). When viewed from the front; the CPU PCB is to the left, Power-supply PCB is to the right, Output PCB is in the center 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



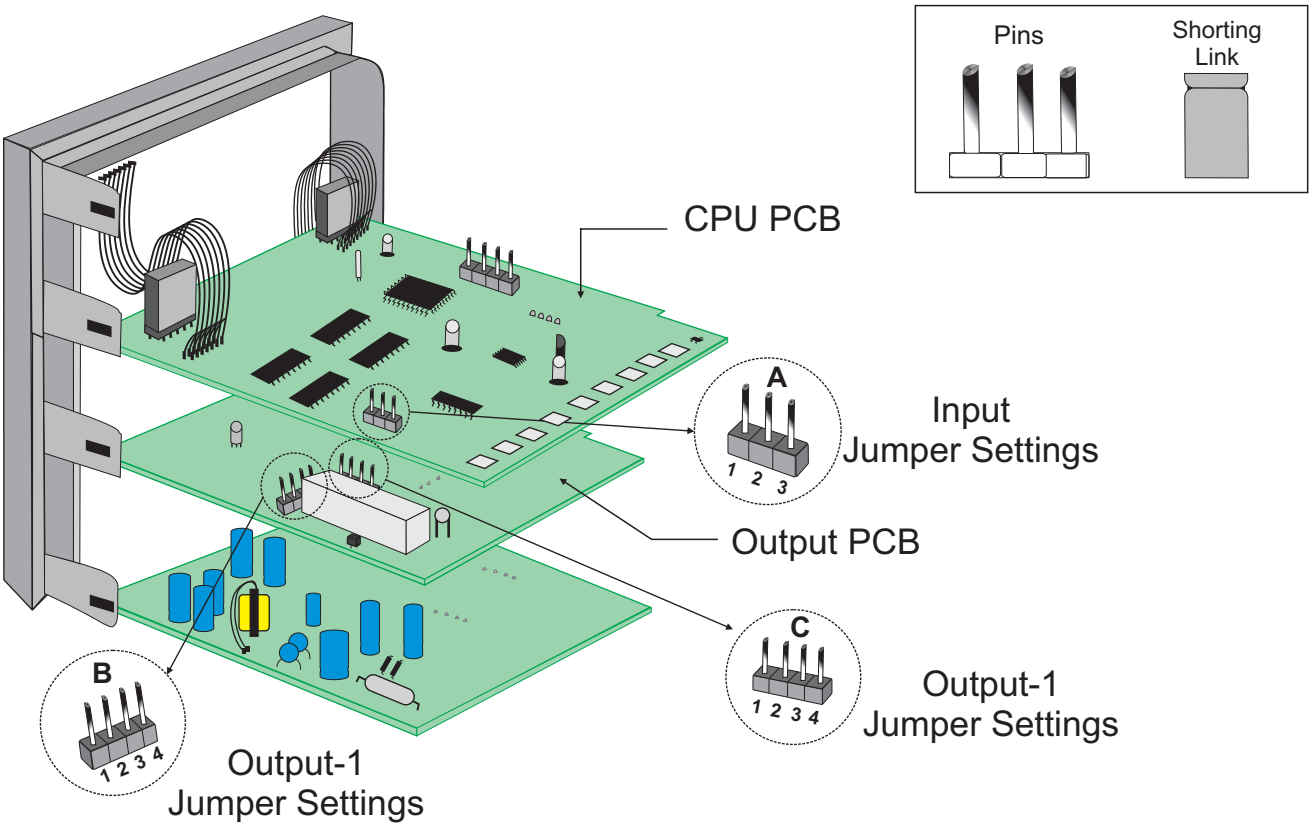
Removing Assembly from Enclosure

Hold the indicator upside down and press the pullout latch to unlock the front bezel from the enclosure (Refer Figure 9.2 above). Pull the bezel outward. The electronics assembly comes out with the bezel.

Placing Assembly Back into Enclosure

Hold the Enclosure and the Bezel such that the Latching Slot on the Enclosure and the Pullout Latch on the Bezel face upward (See Figure 9.2). Insert the bezel gently into the Enclosure until the Bezel snap fits.

Figure 9.3



INPUT : Jumper Settings

In addition to parameter settings, the Input Type selection also requires proper jumper settings. For the jumper settings; Pins & Shorting-Link arrangement, marked 'A', is provided on the CPU PCB as shown in Figure 9.3.

For DC Linear Current Inputs (0-20 mA or 4-20 mA), short the Pins 2 & 3 using Shorting-Link as shown in Figure 9.4 (b). For all other Input types, short the Pins 1 & 2 using Shorting-Link as shown in Figure 9.4 (a).

Figure 9.4 (a)

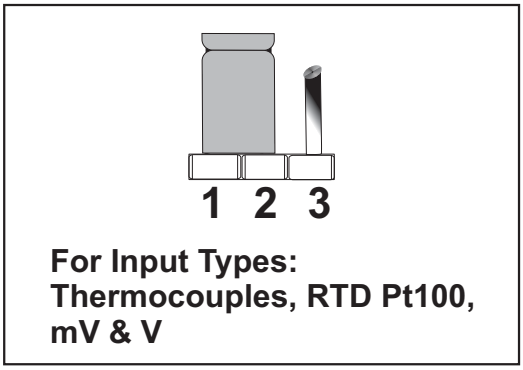
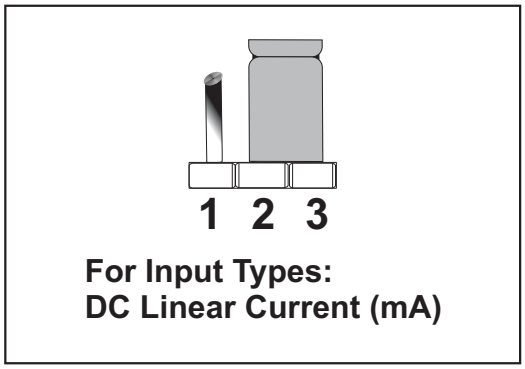


Figure 9.4 (b)

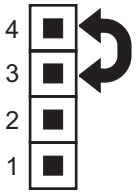
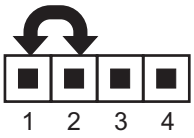
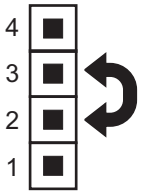
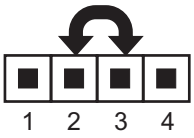


OUTPUT-1 : Jumper Settings

The Output-1 Type is user selectable as Relay or SSR through proper jumper settings. The jumper settings are provided as Pins & Shorting Link arrangement (marked 'B' & 'C') on Output PCB, as shown in Figure 9.3 and listed in Table 9.1.

Table 9.1

Output-1 Jumper Settings

Output Type	Jumper Setting - B	Jumper Setting - C
Relay		
SSR Drive		

OUTPUT PLUG-IN MODULES (OP2, OP3,OP4 & OP5)

The indicator supports 3 types of 'Plug-in Modules' that can be used as outputs (OP2, OP3, OP4 & OP5).The 3 types are; (a) Relay /SSR Module, (b) DC Linear Voltage Module *and* (c)DC Linear Current Module. Each Module is provided with one 4-Pin & one 5-Pin Female Socket that can directly fit into corresponding male plugs provided on either *Output PCB (OP2, OP3 & OP4) or CPU PCB (OP5). Refer Figure9.5(a) & 9.5(b).* These modules are either pre-fitted while the indicator is shipped from the factory or can be fitted later by the user.

Figure 9.5(a)

Relay/SSR Module - Bottom View

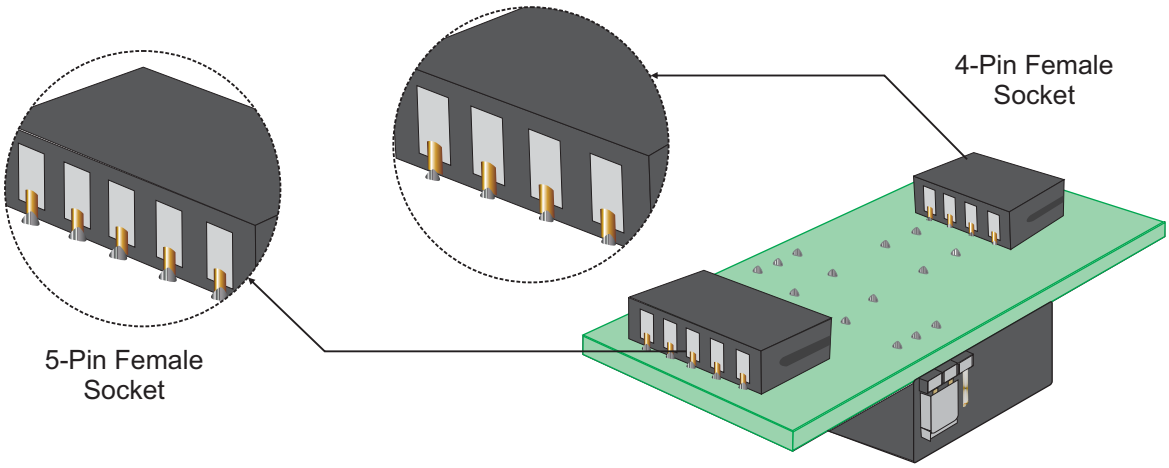


Figure 9.5(b)

Mounting Parts for Output Mouldes

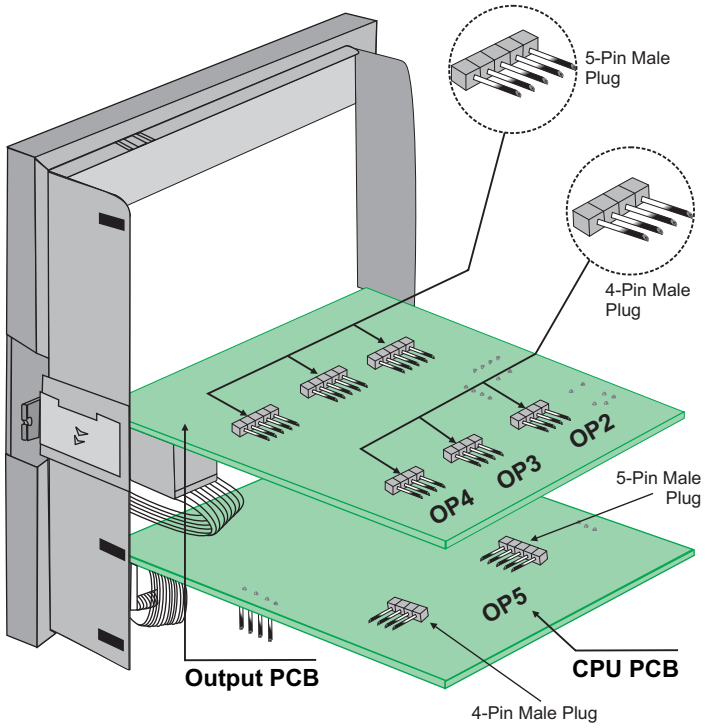
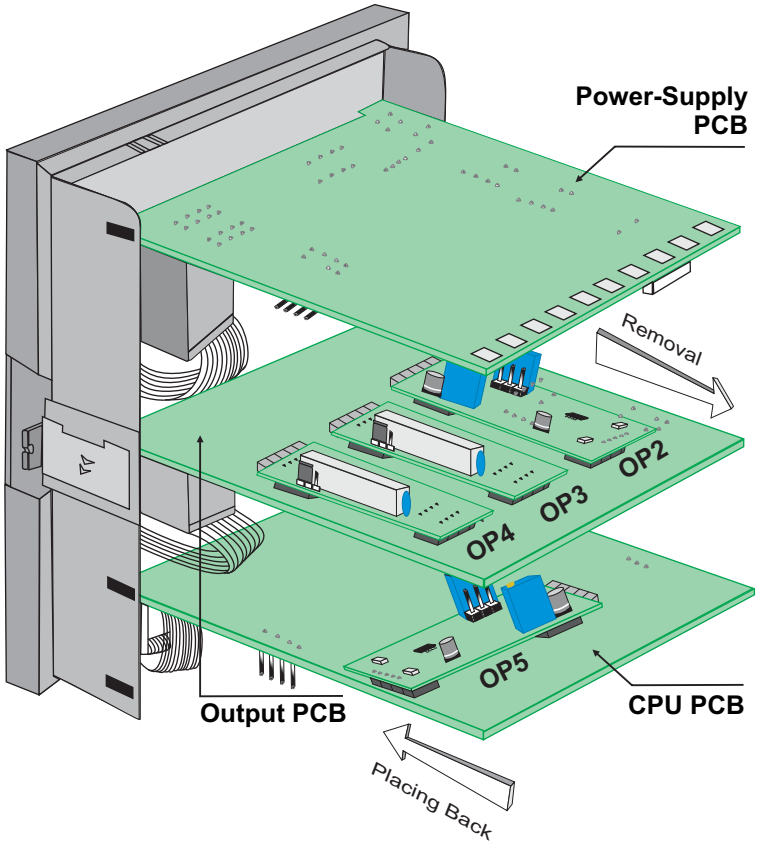


Figure 9.6



The Figure 9.5(a) shows the 4 & 5 Pin Female Sockets mounted on the bottom side of the output modules. The Figure 9.5(b) shows the 4 & 5 Pin Male Plugs Mounted on the CPU & Output PCBs. For clarity, the modules and the Power-Supply PCB are not shown in the figure.

The Figure 9.6 shows the Output Modules fitted in their respective positions on the CPU & Output PCBs. For OP2, OP3 & OP4 modules; push the modules towards front for mounting and pull the modules towards back for removal. For OP5 module; push the module towards right for mounting and pull the module towards left for removal.

(a) Relay / SSR Module

The Relay/SSR Module is supported by OP2, OP3 & OP4.The module can be configured to function as either Relay or SSR Output by appropriate jumper settings, 'A' and 'B',as shown in Figure 9.7(a) & 9.7(b) and Table 9.2 below. Use *Shorting - Link* for jumper settings

Figure 9.7(a)

Jumper Setting 'A' - Viewed facing module

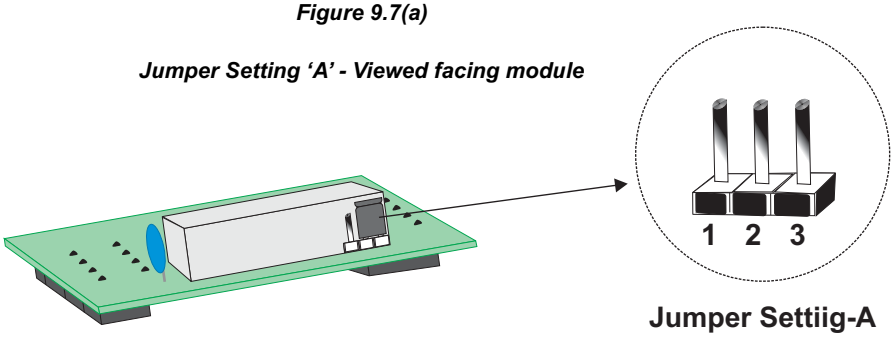


Figure 9.7(b)

Jumper Setting 'B' - Viewed facing module

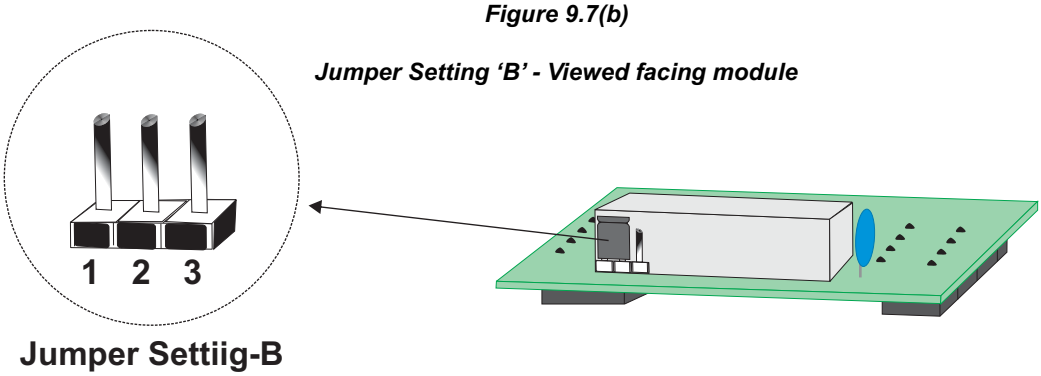
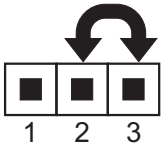
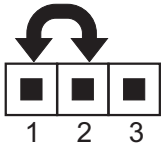
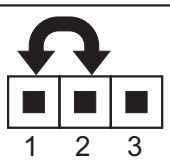
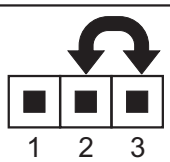


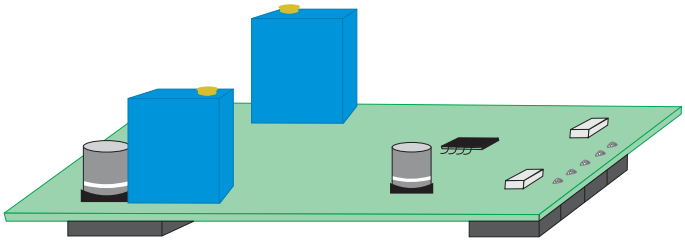
Table 9.2

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

(b) DC Linear Voltage Module
(c) DC Linear Current Module

The DC Linear Module, shown in Figure 9.8 below, is factory configured for either Current or Voltage output and is supported by OP5 only. The DC Current Module can be configured to output either 0-20 mA or 4-20 mA by appropriate parameter settings. Similarly, the DC Voltage Module can be configured to output either 0-5 V or 0-10 V by appropriate parameter settings.

Figure 9.8
DC Voltage/Current Module

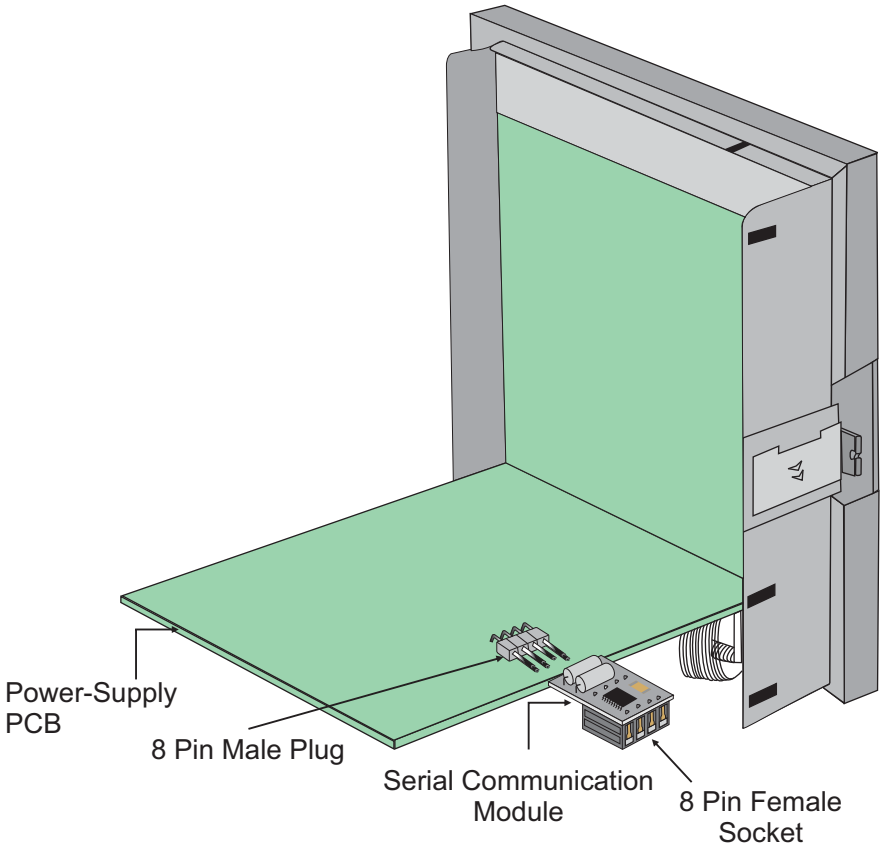


Serial Communication Plug-in Module

The 8-Pin Male Plug for mounting the Serial Communication Module is located on the Power-supply PCB, as shown in the Figure 9.9 below. The Serial Communication Module is provided with an 8-Pin female sockets on the bottom side for the mounting purpose. To plug (or unplug) the module simply insert (or remove) the socket into (or from) the plug.

Figure 9.9

Mounting Serial Communication



Section 10

MECHANICAL INSTALLATION

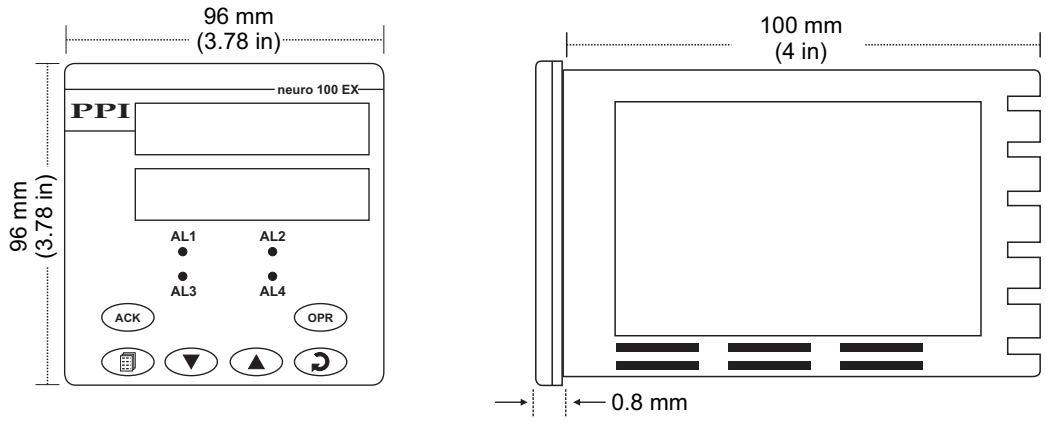
The following precautions should be strictly observed while installing the indicator:

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



Front View **Side View**

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.

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. Fix the Mounting Clamps (one after the other) such that the metallic projection fits in the square hole provided on the top and bottom sides of the enclosure. Tighten the clamp screw until the clamps firmly secures against the panel wall.

Figure 10.2

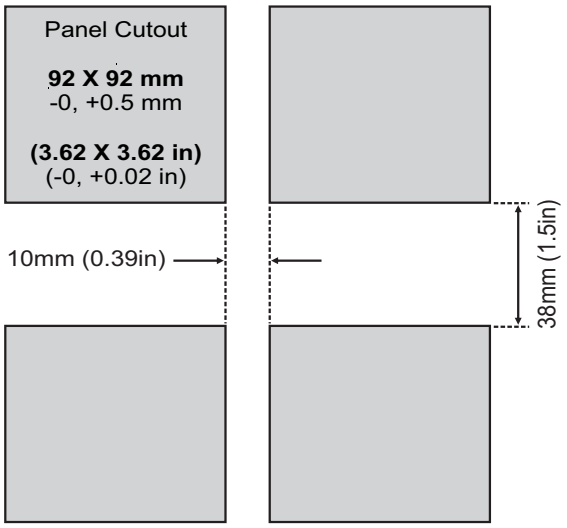
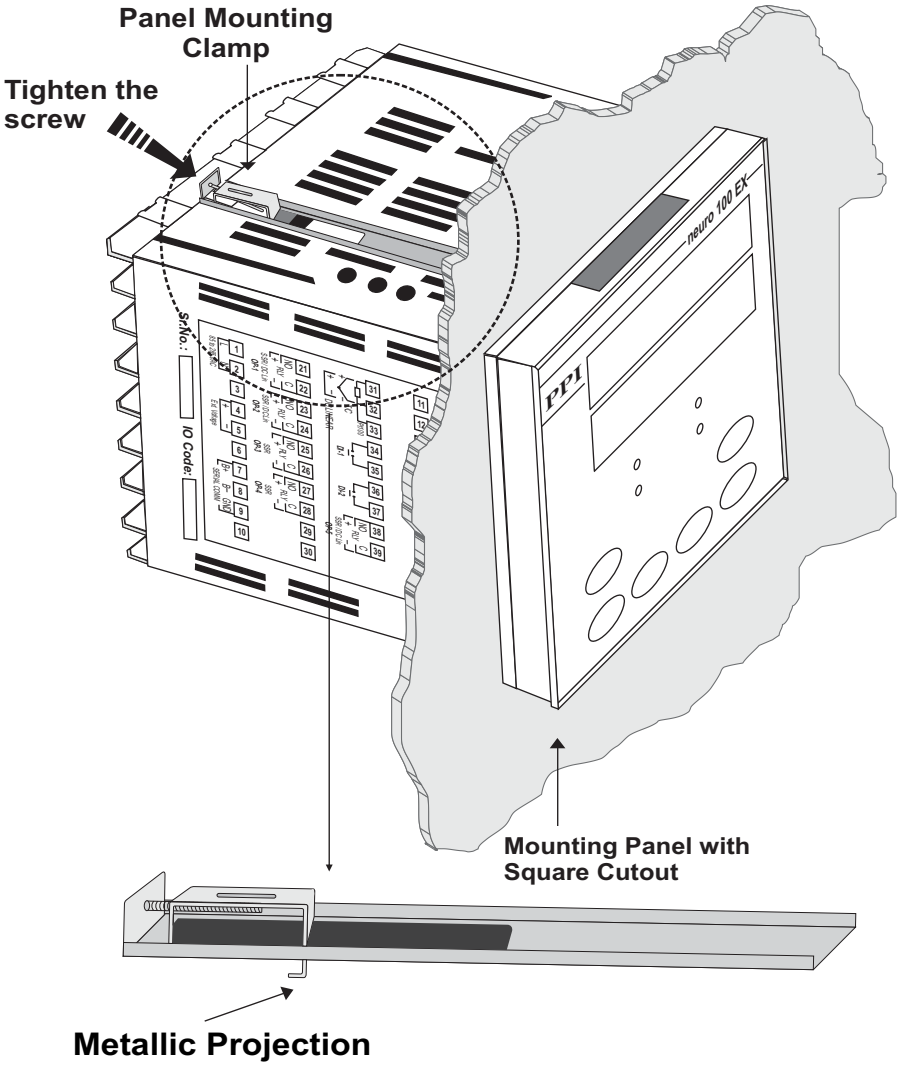


Figure 10.3



Section 11

ELECTRICAL CONNECTIONS

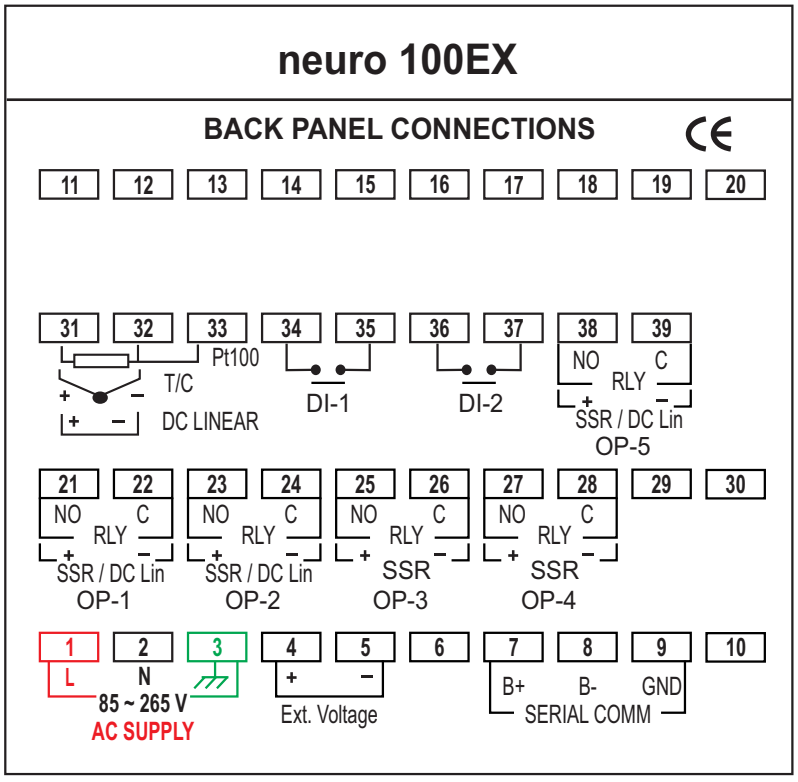
WARNING
MISHANDLING / NEGLIGENCE CAN RESULT IN PERSONAL DEATH OR SERIOUS INJURY.

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

Figure 11.1



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. The Connection Diagram is a generic one; the connections shown for optional modules are applicable only if the modules are fitted.

DESCRIPTIONS

The back panel connections are described as under:

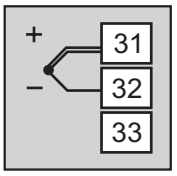
INPUT (Terminals : 31, 32, 33)

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

Thermocouple

Connect Thermocouple Positive (+) to terminal 31 and Negative (-) to terminal 32 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.

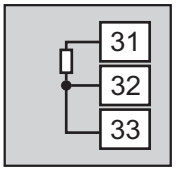
Figure 11.2 (a)



RTD Pt100, 3-wire

Connect single leaded end of RTD bulb to terminal 31 and the double leaded ends to terminal 32 and 33 (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.

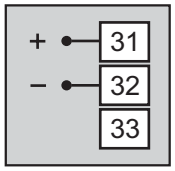
Figure 11.2 (b)



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 32 and the signal (+) to terminal 31, as shown in Figure 11.2 (c).

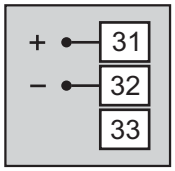
Figure 11.2 (c)



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 32 and the signal (+) to terminal 31, as shown in Figure 11.2 (d).

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).*

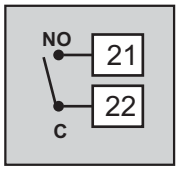
OUTPUT-1 (Terminals 21 & 22)

The Output-1 can be configured (through jumper settings) as either Relay or SSR Drive.

Relay

Potential-free Relay changeover contacts NO (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.

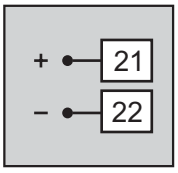
Figure 11.3 (a)



Drive for SSR

DC Voltage level is generated for switching the external SSR (Solid State Relay). Connect (+) and (-) terminals of SSR to indicator terminals 21 and 22, 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 11.3 (b)



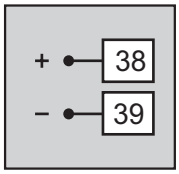
OUTPUT- 2 (Terminals 23 & 24) **OUTPUT- 3** (Terminals 25 & 26)
OUTPUT- 4 (Terminals 27 & 28)

The Output-2, Output-3 and Output-4 are available through plug-in modules. The modules are factory configured for either Relay or SSR. The connection descriptions are the same as those described for Output-1.

OUTPUT- 5 (Terminals 38 & 39)

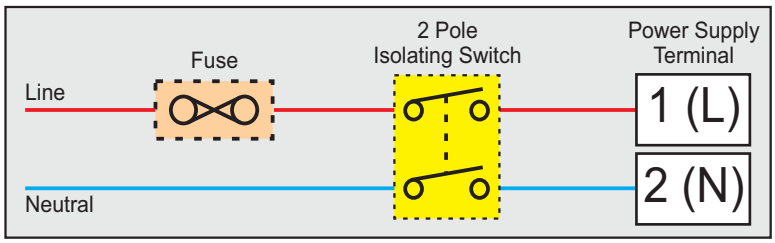
The Output-5 plug-in module is a DC Linear (0/4-20 mA) Current or (0-5/10V) Voltage output for retransmission, as shown in Figure 11.3 (c).

Figure 11.3 (c)



POWER SUPPLY (Terminals 1 & 2)

Figure 11.4



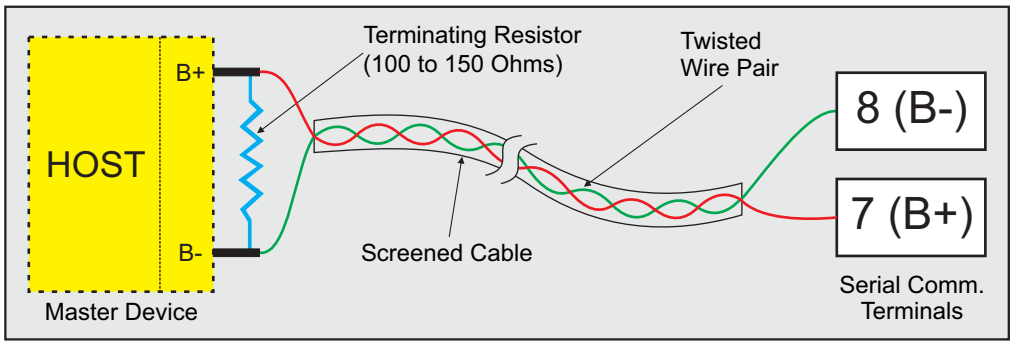
Caution

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 line supply. Use well-insulated copper conductor wire of the size not smaller than 0.5mm^2 for power supply connections. Connect Line (Phase) supply line to terminal 1 and the Neutral (Return) supply line to terminal 2 as shown in Figure 11.4. The indicator is not provided with fuse and power switch. If necessary, mount them separately. Use a time lag fuse rated 1A @ 240 VAC.

SERIAL COMMUNICATION PORT (Terminals 7 & 8)

Figure 11.5



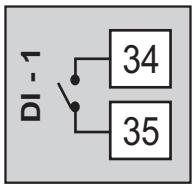
If the Optional plug-in communication board is fitted, connect terminal 7 and 8 of the indicator to (+) and (-) terminals of the Master device.

For reliable noise free communication, use a pair of twisted wires inside screened cable as shown in Figure 11.5. 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.

DIGITAL INPUT FOR ALARM ACKNOWLEDGMENT (Terminals 34 & 35)

The Digital Input-1(DI-1) is a potential-free contact closure input provided for connecting a remote switch for the purpose of issuing an Alarm Acknowledgment command. An 'OPEN' to 'CLOSE' change-over of the contacts acts as an Acknowledgment command.

Figure 11.6



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