neuro 200

PPI
The Perfection Experts

Advanced
Universal Process Indicator

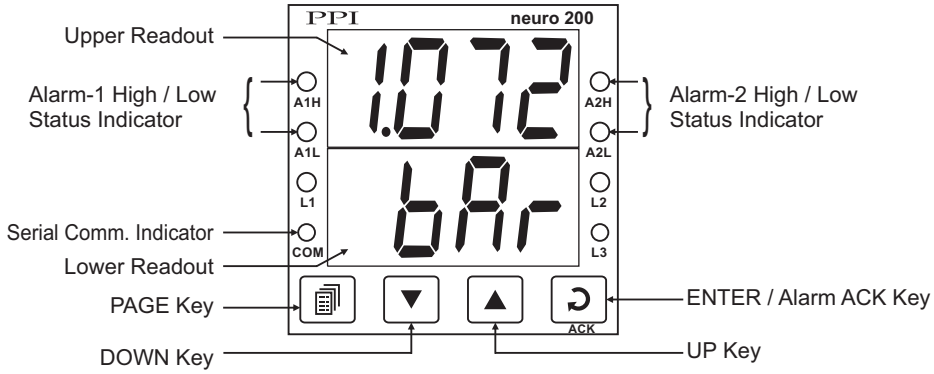
User Manual

CONTENTS

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 green 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 5 LED indicators that show Alarm status. Refer Table 1.1 below for details.

Table 1.1

Indicator	Function
A1H	Flashes when Alarm-1 high limit is crossed.
A1L	Flashes when Alarm-1 low limit is crossed.
COM	Serial Communication Status. Flashes when data is being exchanged with Master Device.
A2H	Flashes when Alarm-2 high limit is crossed.
A2L	Flashes when Alarm-2 low limit is crossed.
L1, L2, L3	Unused

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 / ACK	Set up Mode : Press to store the set parameter value and to scroll to the next parameter on the PAGE. Run Mode : Press to acknowledge any pending Alarm(s). This also turns off the Alarm relay.

Section 2
BASIC OPERATION

POWER-UP

Upon power-up the controller executes the following sequence of operations.

- Checks for Sensor Fault. If the connected sensor type is RTD Pt100 and the selected sensor type is any of thermocouples or vice-a-versa; the controller displays sensor fault massage (S.FLt) on upper readout. The user is advised to take necessary corrective action and press Enter key to acknowledge the fault.
- All displays and indicators are lit on for approximately 3 seconds to check any display segment failure.
- Displays controller model name on the Upper Readout and the firmware version on the Lower Readout, for approximately 1 second. This helps user to verify features and refer to the correct documents versions.

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) and Upper Readout shows (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.

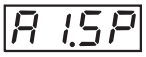
The operator parameters are described in Table 2.2. Note that the parameters presented on Operator Page depend upon the functions selected/enabled and supervisory level permissions. The operator parameter list mainly includes :

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 ACK 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 and not latched. (Alternatively, use ENTER key to acknowledge pending Alarm(s).	no No YES Yes (Default : No)
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. This feature clears the current Min/Max values and starts afresh monitoring the **PV** for new highest and lowest values.	no No YES Yes (Default :No)

Parameter Description	Settings (Default Value)
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.

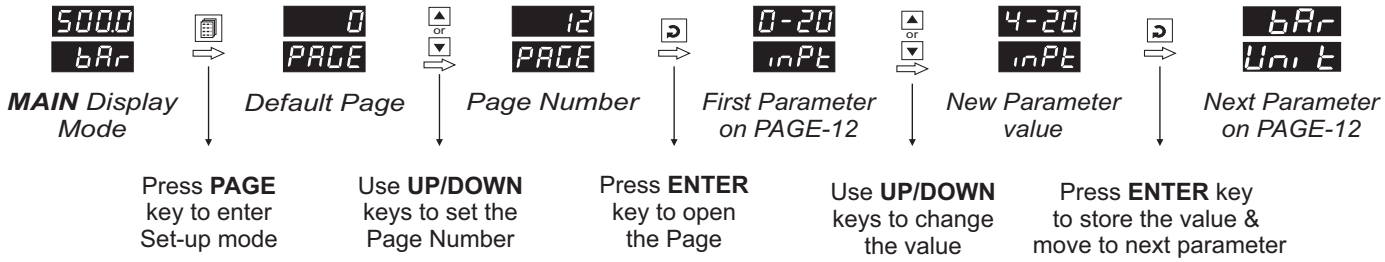
SET-UP MODE

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.

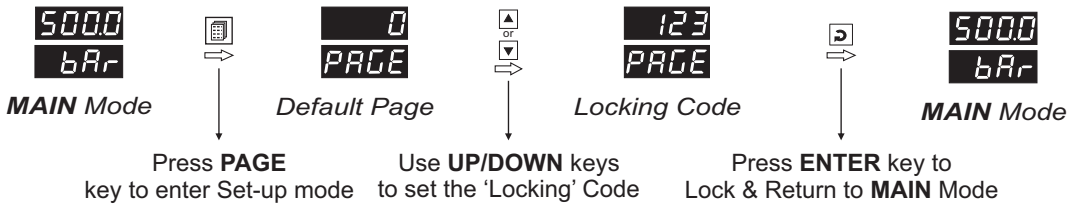
For enabling / disabling the Lock, step through the following sequence:

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.

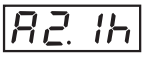
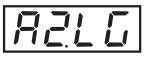
Section 4

PAGE-10 : ALARM PARAMETERS

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 AL_1 Select the Alarm-1 activation type. Selecting 'None' will disable the alarm and suppress all the related parameters for Alarm-1.	nonE None P_Lo Process Low P_Hi Process High (Default : None)
ALARM-1 SETPOINT A1.SP 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 A1.HY 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 A1.Ih Set to Yes to suppress Alarm-1 activation upon power-up (process start-up) condition.	no No YES Yes (Default :Yes)
ALARM-1 LOGIC A1.LG Select 'Normal' if Alarm-1 relay is to activate an Audio / Visual alarm. Select 'Reverse' for Tripping (cut-off) the system.	norn Normal rEv Reverse (Default : Normal)
ALARM LATCH A1.Lt 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)

Parameter Description	Settings (Default Value)
ALARM-2 TYPE  Select the Alarm-2 activation type. Selecting 'None' will disable the alarm and suppress all the related parameters for Alarm-2.	 None  Process Low  Process High (Default : None)
ALARM-2 SETPOINT  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  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  Set to Yes to suppress Alarm-2 activation upon power-up (process start-up) condition.	 No  Yes (Default :Yes)
ALARM-2 LOGIC  Select 'Normal' if Alarm-2 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)

Section 5

PAGE-11 : 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

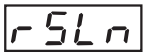
Parameter Description	Settings (Default Value)
RECORDER OUTPUT TYPE rEC.O Select Output Signal type in accordance with the hardware module fitted. Select 0-20 or 4-20 mA, if Current output module is fitted. Select 0-5 or 0-10 V, if Voltage output module is fitted.	0-20 0 to 20 mA 4-20 4 to 20 mA 0-5 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

PAGE-12 : 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

<table>
<tr><th>Parameter Description</th><th>Settings
(Default Value)</th></tr>
<tr><td>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, if required.</td><td>Refer Table 6.3
(Default : Type K)</td></tr>
<tr><td>UNITS 
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.</td><td>Refer Table 6.2
(Default : ºC)</td></tr>
<tr><td>SIGNAL RANGE LOW 
This parameter is available only if the selected input type is DC Voltage / Current and defines the transmitter output signal value corresponding to Range Low process value.</td><td><table><tr><th>Input Type</th><th>Settings</th><th>Default</th></tr><tr><td>0 to 20 mA</td><td>0.00 to Signal High</td><td>0.00</td></tr><tr><td>4 to 20 mA</td><td>4.00 to Signal High</td><td>4.00</td></tr><tr><td>Reserved</td><td>0.0 to Signal High</td><td>0.0</td></tr><tr><td>0 to 80 mV</td><td>0.00 to Signal High</td><td>0.00</td></tr><tr><td>0 to 1.25 V</td><td>0.000 to Signal High</td><td>0.000</td></tr><tr><td>0 to 5 V</td><td>0.000 to Signal High</td><td>0.000</td></tr><tr><td>0 to 10 V</td><td>0.00 to Signal High</td><td>0.00</td></tr><tr><td>1 to 5 V</td><td>1.000 to Signal High</td><td>1.000</td></tr></table></td></tr>
<tr><td>SIGNAL RANGE HIGH 
This parameter is available only if the selected input type is DC Voltage / Current and defines the transmitter output signal value corresponding to Range High process value.</td><td><table><tr><th>Input Type</th><th>Settings</th><th>Default</th></tr><tr><td>0 to 20 mA</td><td>Signal Low to 20.00</td><td>20.00</td></tr><tr><td>4 to 20 mA</td><td>Signal Low to 20.00</td><td>20.00</td></tr><tr><td>Reserved</td><td>Signal Low to 80.00</td><td>80.00</td></tr><tr><td>0 to 80 mV</td><td>Signal Low to 80.00</td><td>80.00</td></tr><tr><td>0 to 1.25 V</td><td>Signal Low to 1.250</td><td>1.250</td></tr><tr><td>0 to 5 V</td><td>Signal Low to 5.000</td><td>5.000</td></tr><tr><td>0 to 10 V</td><td>Signal Low to 10.00</td><td>10.00</td></tr><tr><td>1 to 5 V</td><td>Signal Low to 5.000</td><td>5.000</td></tr></table></td></tr>
<tr><td>RESOLUTION 
(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.</td><td>Refer Table 6.3
(Default : 1)</td></tr>
</table>

Parameter Description	Settings (Default Value)
DC RANGE LOW r.Lo This parameter is available only if the selected input type is DC Voltage / Current and defines the process value corresponding to the Signal Low value from the transmitter.	-1999 to 9999 (Default : 0.0)
DC RANGE HIGH r.Hi This parameter is available only if the selected input type is DC Voltage / Current and defines the process value corresponding to the Signal High value from the transmitter.	-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
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	

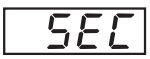
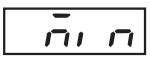
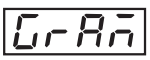
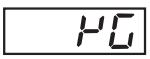
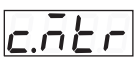
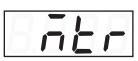
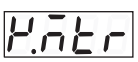
Lower Readout	Units	
	volts	Electricity
	Amps	
	Milli amps	
	Milli Volts	
	Ohms	
	Parts per million	
	Revolutions per pinute	
	Milli seconds	Time
	Seconds	
	Minutes	
	Hours	
	PH	
	%PH	
	Miles per hour	
	Milli grams	Weight
	Grams	
	Kilo grams	
	mm (Millimeter)	Length / Height / Distance
	cm (Centimeter)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

Table 6.3

Option	What it means	Range (Min. to Max.)	Resolution
tC_J	Type J Thermocouple	0 to +960°C / +32 to +1760°F	Fixed 1°C / 1°F
tC_K	Type K Thermocouple	-200 to +1376°C / -328 to +2508°F	
tC_t	Type T Thermocouple	-200 to +385°C / -328 to +725°F	
tC_r	Type R Thermocouple	0 to +1770°C / +32 to +3218°F	
tC_S	Type S Thermocouple	0 to +1765°C / +32 to +3209°F	
tC_b	Type B Thermocouple	0 to +1825°C / +32 to +3092°F	
tC_n	Type N Thermocouple	0 to +1300°C / +32 to +2372°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	User settable 1°C / 1°F **or** 0.1°C / 0.1°F
0-20	0 to 20mA DC current	-1999 to +9999 units	User settable 1 / 0.1 / 0.01/ 0.001 units
4-20	4 to 20mA DC current		
rESu	Reserved		
0.080	0 to 80mV 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

PAGE-13 : 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 Hi Lo 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)
SERIAL ID NUMBER Id 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)
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 (Default : 9.6)
PARITY PAri 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)
SERIAL WRITE PERMISSION ConE Setting to 'No' disallows the host to set / modify any parameter value. The host, however, can read the value.	no No YES Yes (Default :Yes)

Section 8

PAGE-33 : USER LINEARISATION PARAMETERS

The parameters listed on this **PAGE-33** 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

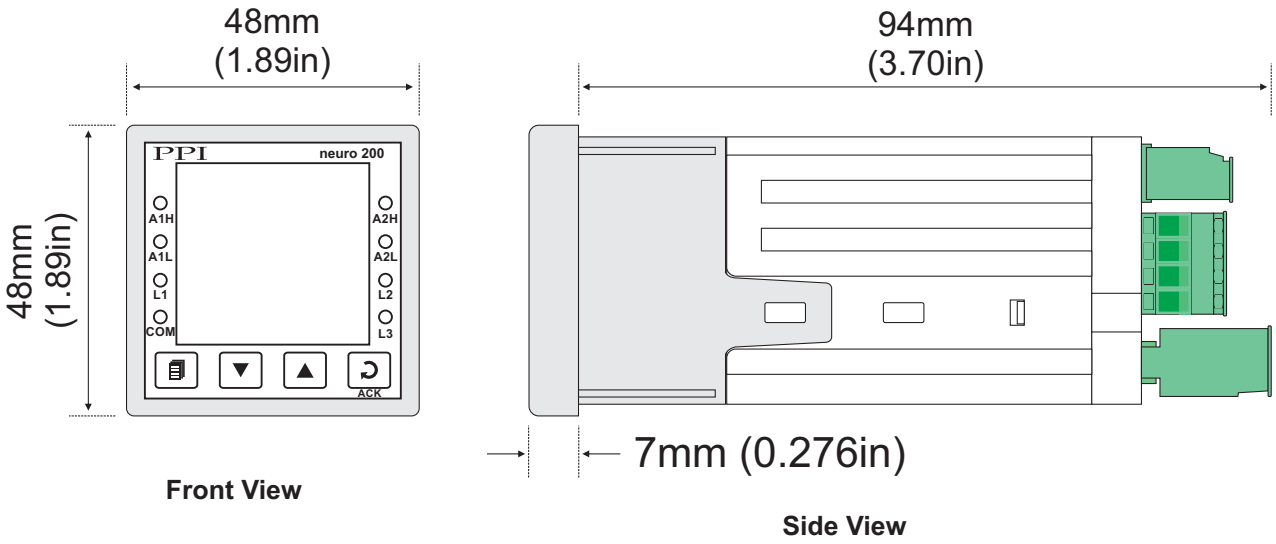
Parameter Description	Settings (Default Value)
USER LINEARIZATION SETTING CODE [CodE] Protection password for access to the linearisation related parameters. Set to **333** as valid password.	0 to 9999 (Default : 0)
USER LINEARIZATION [U.Li n] Enable / Disable user linearisation feature.	[no] No [YES] 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
MECHANICAL INSTALLATION

OUTER DIMENSIONS AND PANEL CUTOUT

The Figure 9.1 shows the controller outer dimensions.

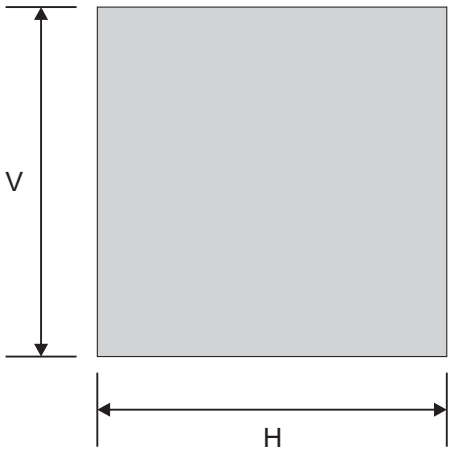
Figure 9.1



PANEL CUTOUT

The Figure 9.2 shows the panel cutout requirements for a single controller.

Figure 9.2



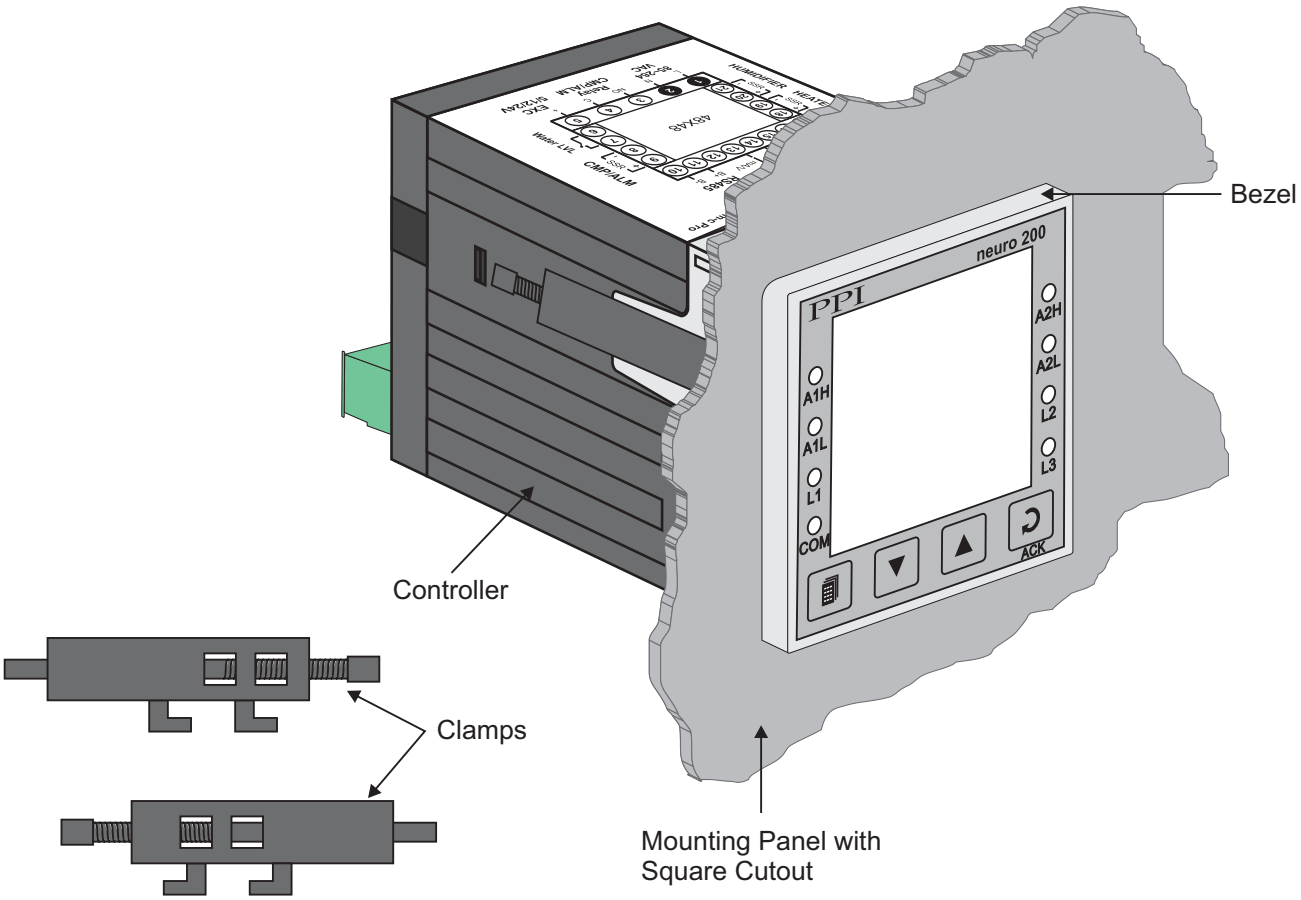
Parameter	Dimensions	
	mm	inches
H	45 (-0, +0.5)	1.77 (-0, +0.02)
V	45 (-0, +0.5)	1.77 (-0, +0.02)

PANEL MOUNTING

Follow the steps below for mounting the controller on panel:

1. Prepare a square cutout to the size shown in Figure 9.2.
2. Remove the Panel Mounting Clamp from the controller Enclosure and insert the rear of the controller housing through the panel cutout from the front of the mounting panel.
3. Hold the controller gently against the mounting panel such that it positions squarely against the panel wall, see Figure 9.3. Apply pressure only on the bezel and not on the front label.
4. Insert the mounting clamps on either side of the controller in the slots provided for the purpose. Rotate the screws clockwise so that they move forward until they push firmly against the rear face of the mounting panel for secured mounting.

Figure 9.3



Section 10

ELECTRICAL CONNECTIONS

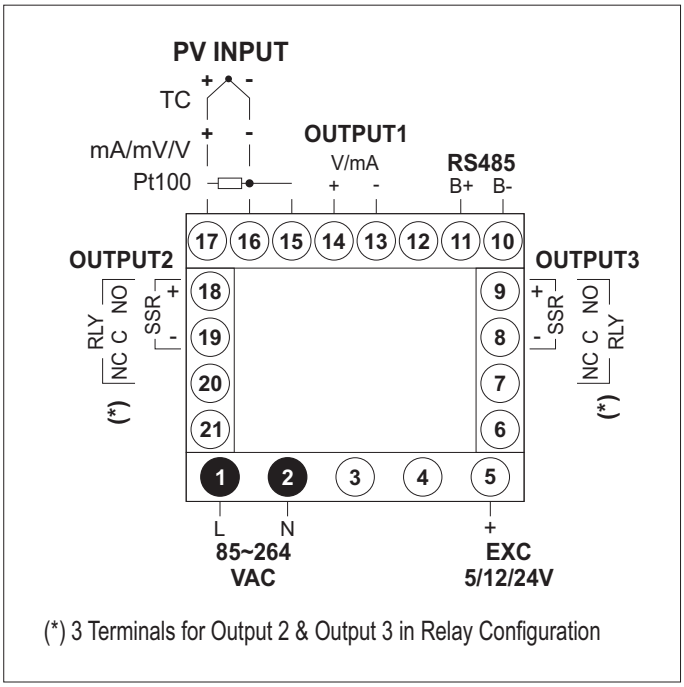
WARNING
MISHANDLING / NEGLIGENCE CAN RESULT IN PERSONAL DEATH OR SERIOUS INJURY.

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 top side of the enclosure. The diagram shows the terminals viewed from the REAR SIDE with the controller label upright. The connecters provided for wiring are pluggable male-female type. The female parts are soldered on the controller PCBs while the male parts are with screws and removable. The rear panel electrical wiring connection diagram is shown in Figure 10.1.

Figure 10.1

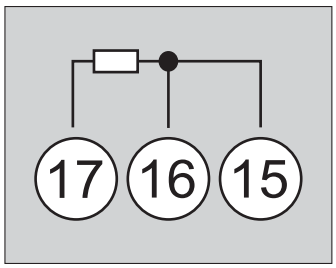


DESCRIPTIONS

The back panel connections are described as under:

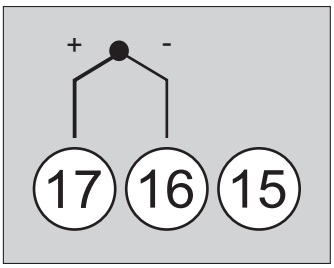
PV INPUT : RTD Pt100, 3-wire / Thermocouple / mA / mV / V (Terminals : 17, 16, 15)

Figure 10.2 (a)



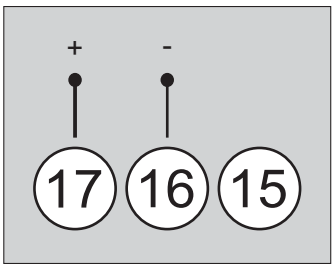
RTD Pt100, 3-wire

Figure 10.2 (b)



Thermocouple

Figure 10.2 (c)



mA / mV / V

RTD Pt100, 3-wire

Connect single leaded end of RTD bulb to terminal 17 and the double leaded ends to terminal 16 and 15 (interchangeable) as shown in Figure 10.2 (a). Use low resistance copper conductor leads of the same gauge and length. Avoid joints in the cable.

Thermocouple

Connect Thermocouple Positive (+) to terminal 17 and Negative (-) to terminal 16 as shown in Figure 10.2 (b). Use correct type of extension lead wires or compensating cable. Avoid joints in the cable.

mA / mV / V

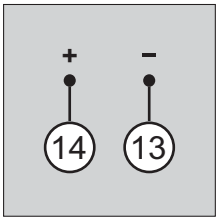
Use a shielded twisted pair with the shield grounded at the signal source for connecting mV / V source. Connect common (-) to terminal 2 and the signal (+) to terminal 1, as shown in Figure 10.2 (c).

OUTPUT1 : Retransmission - V/mA (Terminals : 13, 14)

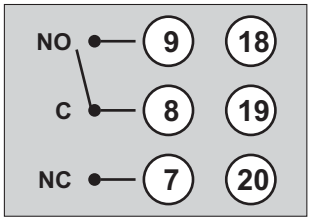
OUTPUT2 : Alarm-1 - Relay (Terminals : 18, 19, 20)
Alarm-1 - SSR (Terminals : 18, 19)

OUTPUT3 : Alarm-2 - Relay (Terminals : 7, 8, 9)
Alarm-2 - SSR (Terminals : 8, 9)

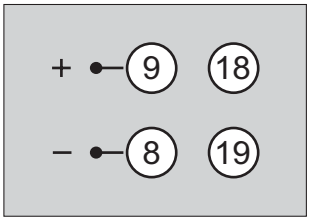
Figure 10.3



Ouput1
V/mA



Output2 / Output3
Relay



Output2 / Output3
SSR

mA / V Output

The Positive (+) of mA / V is available at Terminal 14 & the Negative (-) at Terminal 13.

Relay Output

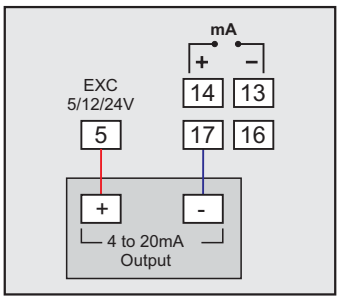
Potential-free Relay changeover contacts NO (Normally Open) and C (Common) rated 10A/240 VAC (resistive load).

SSR Output

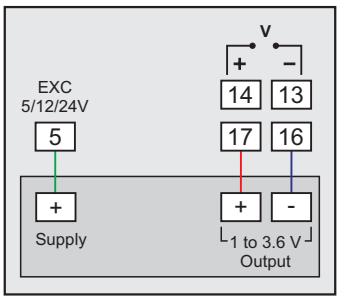
Connect (+) and (-) terminals of SSR to (+) and (-) terminals of controller, respectively. Use Zero-Crossover, 3 to 30 VDC operated SSR.

EXC 5/12/24VDC : Excitation Voltage for Transmitters (Terminal : 5)

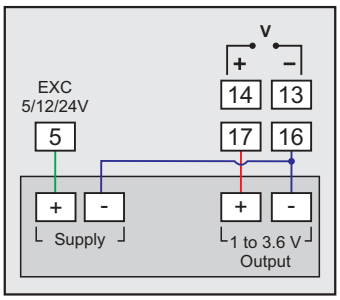
The Controller is supplied with either 5 or 12 or 24VDC @ 30 mA power source. This is primarily meant for exciting 2-wire or 4-wire Current / Voltage output transmitters. Please note that only the Source terminal (positive) is provided on the back panel termination. The Sensor negative terminal is used as Return terminal (ground) for excitation output.



2-wire Current Transmitter
(5/12/24VDC Supply)



3-wire Voltage Transmitter
(5/12/24VDC Supply)



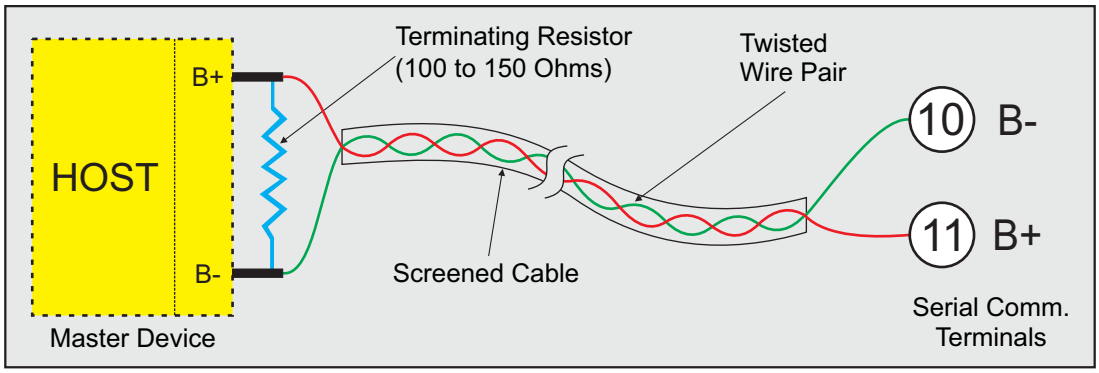
4-wire Voltage Transmitter
(5/12/24VDC Supply)

RS485 : Serial Communication Port (Terminals 10, 11)

Connect terminal 11 and 10 of the controller to (+) and (-) RS485 terminals of the Master device.

To ensure reliable operation of the Serial Communication Link (without data corruption due to line noise or reflections), use a pair of twisted wires inside screened cable with the terminating resistor (100 to 150 Ohms) at one end, as shown in Figure 10.4 below.

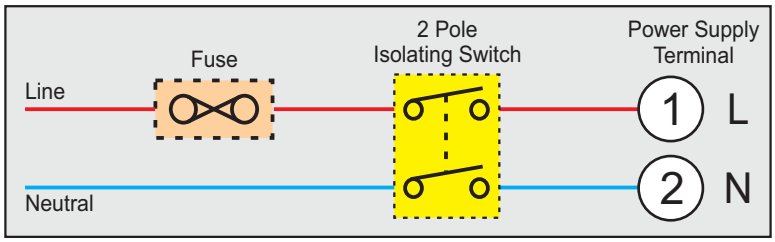
Figure 10.4



85~264 VAC : Power Supply (Terminals 1, 2)

The controller 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 10.5 below. The controller is not provided with fuse and power switch. If necessary, mount them separately. Use a time lag fuse rated 1A @ 240 VAC.

Figure 10.5



APPENDIX - A

DC LINEAR SIGNAL INTERFACE

This appendix describes the parameters required to interface process transmitters that produce Linear DC Voltage (mV/V) or Current (mA) signals in proportion to the measured process values. A few examples of such transmitters are;

1. Pressure Transmitter producing **4 to 20 mA** for **0 to 5 psi**
2. Relative Humidity Transmitter producing **1 to 4.5 V** for **5 to 95 %RH**
3. Temperature Transmitter producing **0 to 20 mA** for **-50 to 250 °C**

The instrument (indicator/controller/recorder) that accepts the linear signal from the transmitter computes the measured process value by solving the mathematical equation for Straight-Line in the form:

$$Y = mX + C$$

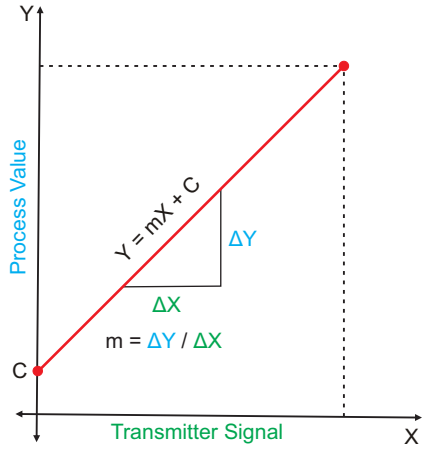
Where;

X : Signal Value from Transmitter

Y : Process Value Corresponding to Signal Value X

C : Process Value Corresponding to X = 0 (Y-intercept)

m : Change in Process Value per unit Change in Signal Value (Slope)



As is evident from the aforementioned transmitter examples, different transmitters produce signals varying both in *Type* (mV/V/mA) and *Range*. Most PPI instruments, thus, provide programmable Signal Type and Range to facilitate interface with a variety of transmitters. A few industry standard signal types and ranges offered by the PPI instruments are: 0-50mV, 0-200mV, 0-5 V, 1-5 V, 0-10V, 0-20 mA, 4-20 mA, etc.

Also, the output signal range (e.g. 1 to 4.5 V) from different transmitters corresponds to different process value range (e.g. 5 to 95 %RH); the instruments thus also provide facility for programming the measured process value range with programmable Resolution.

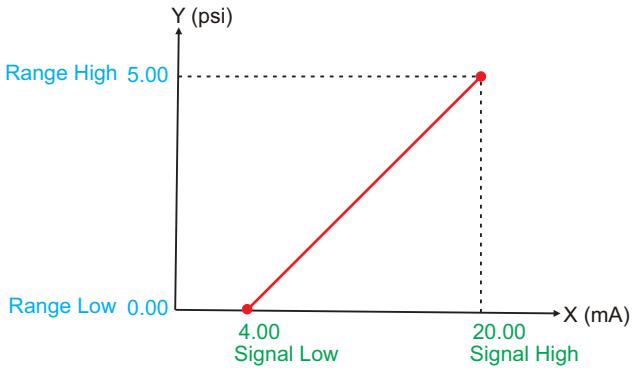
The linear transmitters usually specify two signal values (Signal Low and Signal High) and the corresponding Process Values (Range Low and Range High). In the example Pressure Transmitter above; the Signal Low, Signal High, Range Low & Range High values specified are: 4 mA, 20 mA, 0 psi & 5 psi, respectively.

In summary, the following 6 parameters are required for interfacing Linear Transmitters:

1. Input Type : Standard DC Signal Type in which the transmitter signal range fits (e.g. 4-20 mA)
2. Signal Low : Signal value corresponding to Range Low process value (e.g. 4 mA)
3. Signal High : Signal value corresponding to Range High process value (e.g. 20 mA)
4. PV Resolution : Resolution (least count) with which to compute process value (e.g. 0.01)
5. Range Low : Process value corresponding to Signal Low value (e.g. 0.00 psi)
6. Range High : Process value corresponding to Signal High value (e.g. 5.00 psi)

The following examples illustrate appropriate parameter value selections.

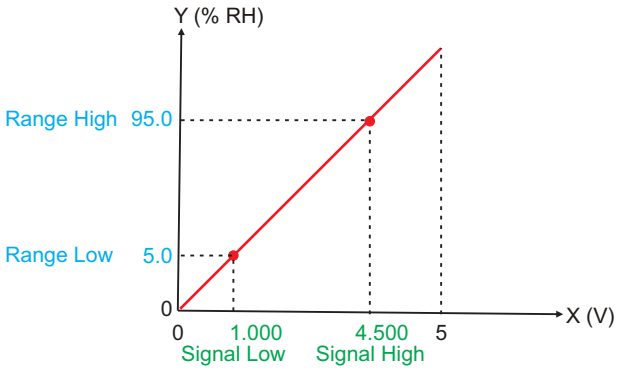
Example 1: Pressure Transmitter producing **4 to 20 mA** for **0 to 5 psi**



Presume the pressure is to be measured with 0.01 Resolution, that is 0.00 to 5.00 psi.

Input Type	:	4-20 mA
Signal Low	:	4.00 mA
Signal High	:	20.00 mA
PV Resolution	:	0.01
Range Low	:	0.00
Range High	:	5.00

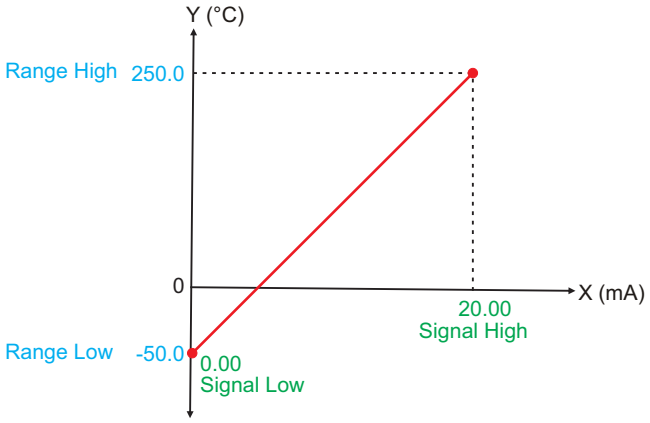
Example 2: Relative Humidity Transmitter producing **1 to 4.5 V** for **5 to 95 %RH**



Presume the humidity is to be measured with 0.1 Resolution, that is 0.0 to 100.0 %.

Input Type	:	0-5 V
Signal Low	:	1.000 V
Signal High	:	4.500 V
PV Resolution	:	0.1
Range Low	:	5.0
Range High	:	95.0

Example 3: Temperature Transmitter producing **0 to 20 mA** for **-50 to 250 °C**



Presume the Temperature is to be measured with 0.1 Resolution, that is -50.0 to 250.0°C.

Input Type	:	0-20 mA
Signal Low	:	0.00 mA
Signal High	:	20.00 mA
PV Resolution	:	0.1
Range Low	:	-50.0
Range High	:	250.0

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