UPI-5D

The Perfection Experts

Universal Process Indicator with Enhanced Features

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(a) for New Version & 1.1(b) for Old Version below.

Figure 1.1(a) :
New Version

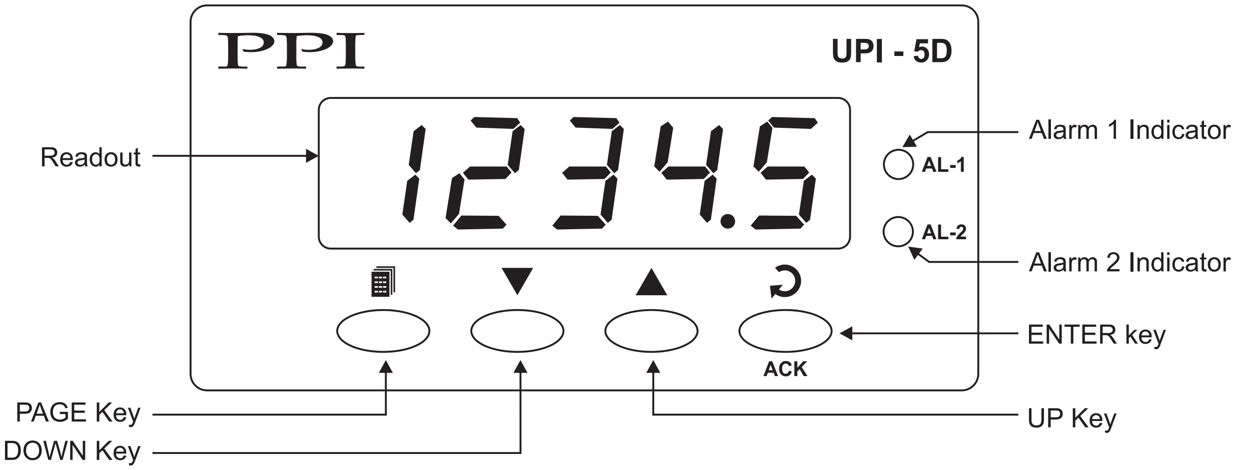
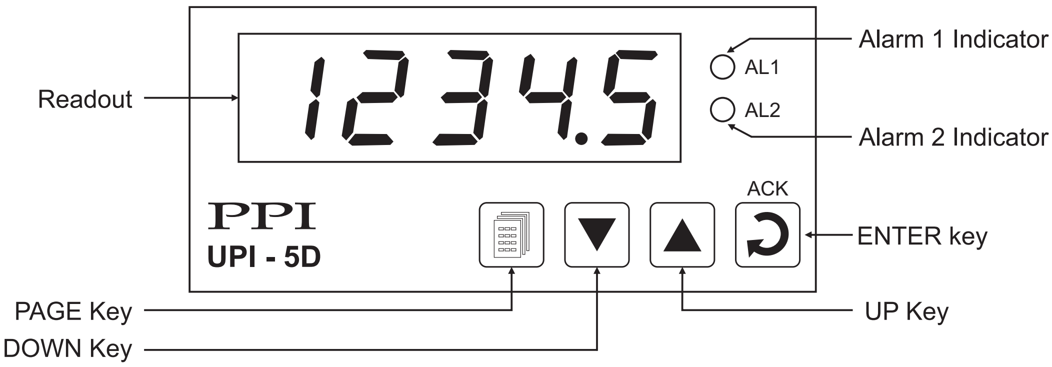


Figure 1.1(b) :
Old Version



READOUTS

The Readout is a 5 digit, 7-segment bright red LED display and usually displays the PV (Process Value). In Set-up Mode, the Readout displays parameter prompts and values/options, alternatively.

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 / exit Set-up mode.
▼	DOWN	Press to decrease the parameter value. Pressing once decreases the value by one count; holding the key pressed speeds up the change.
▲	UP	Press to increase the parameter value. Pressing once increases the value by one count; holding the key pressed speeds up the change.
ACK	ENTER	If Readout is showing Parameter Name in the setup mode then upon pressing this key the Readout shows the value for the parameter. If Readout is showing Parameter Value in the setup mode then upon pressing this key the set parameter value is stored and the Readout shows the next Parameter Name. **Note** : While in Main mode, this key can be used to acknowledge any pending Alarm(s) to de-activate alarm relay(s).

Section 2

BASIC OPERATION

POWER UP

Upon switching on the power to the indicator, all displays are lit on for approximately 3 seconds. This is followed by the indication of the model name UP I and Version Number 0 1.0 1 for 1 second each.

MAIN DISPLAY

After the Power-up display sequence, the Indicator enters MAIN Display Mode. The Readout shows the measured PV (Process Value).

PV Error Indications

The process value is said to be in error if it exceeds the minimum / maximum range specified for the selected Input sensor type or if the sensor is disconnected (Open or Broken).The PV Error type, as shown in Table 2.1, is flashed on the Readout.

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*.

Alarm Acknowledgment

While in Main mode, press ENTER Key to acknowledge any pending Alarm(s) to de-activate alarm relay(s).

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 Readout shows **PAGE**. Press and release PAGE key again. The Readout shows page number **0.**
2. Press and release ENTER key. The Readout shows prompt for the first available operator parameter. Press and release ENTER key again. The Readout shows value for the first parameter.
3. 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.

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)
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)
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-1 type is 'None'.	Min to max Range specified for the selected Input Type (Default : Min or Max Range)
ALARM-2 SETPOINT A2.SP 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 Indicator requires various user settings that determine how the indicator will function or operate. These settings are called Parameters.

For the convenience and ease of operation, the various parameters have been grouped separately depending upon the functions they define. Each such group is called a PAGE. Each PAGE is assigned a unique number, called PAGE NUMBER, for its access. The parameters contained in a PAGE are presented in a fixed sequence to the user for setting. The user can access a desired PAGE by entering its PAGE NUMBER and can select and set the desired parameter values.

PARAMETER NAMES

Each parameter has an identifying tag, called the Parameter Name. While setting parameter values in a PAGE, the Parameter Name precedes the Parameter Value.

While the readout shows Parameter Name, the UP / DOWN keys are non-functional. Upon pressing the ENTER key the readout shows the Parameter Value that can be adjusted using UP / DOWN keys.

ACCESSING A PAGE & ADJUSTING PARAMETER VALUES

Each PAGE is accessible only from the MAIN Display Mode. That is, from the current PAGE, the user must return to the MAIN Display Mode before the other PAGE can be accessed.

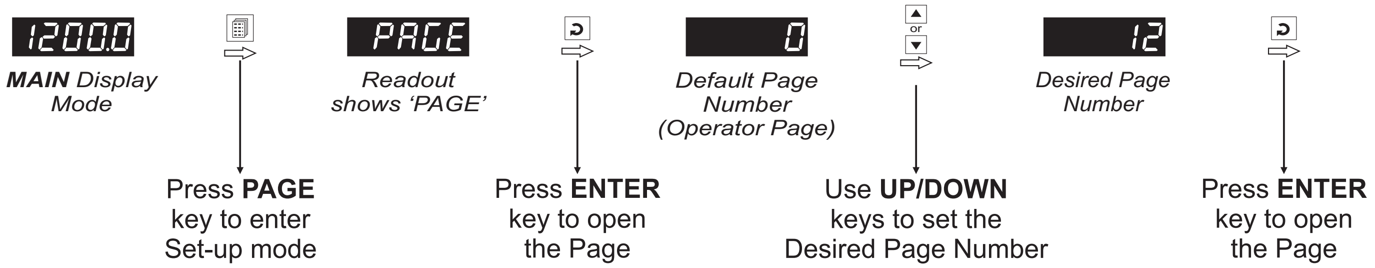
Step through the following sequence to open a desired PAGE and to adjust the parameter values.

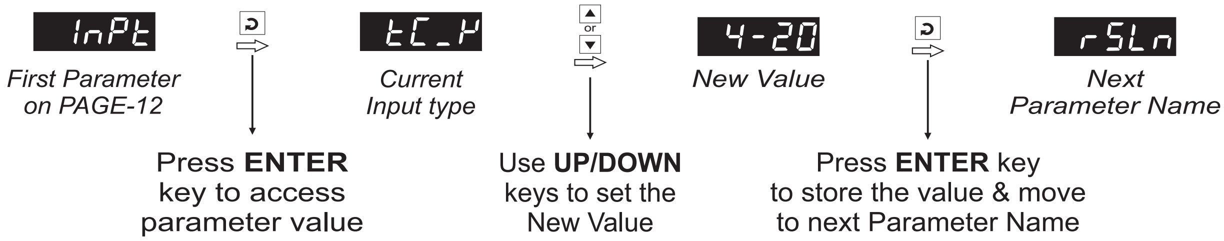
1. Press and release PAGE key. The Readout shows **PAGE**.
2. Press and release ENTER key. The Readout shows **0**, the default page value.
3. Use UP/DOWN keys to set the desired PAGE NUMBER.
4. Press and release ENTER key. The Readout shows Name for the first available parameter under the selected page number.
5. Press and release ENTER key. The Readout shows value for the first parameter.
6. Go to step 8 if the value for first parameter is to be edited.
7. Press & release Enter Key until the readout shows the name for the desired parameter.
8. Use UP / DOWN keys to adjust the value and then press ENTER key to store the set value and scroll to the next parameter.
9. Go to step 7.

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

Figure 3.1 illustrates the example of altering the value for the parameter 'Input Type' from Type K Thermocouple to 4-20 mA .

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 **not available** if the corresponding 'Alarm type' is set to '**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 the indicator 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.

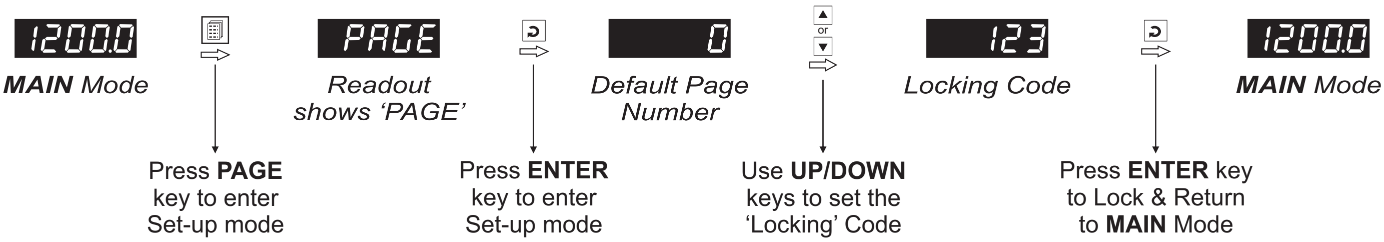
For enabling / disabling the Lock, step through the following sequence:

Locking

1. Press and release PAGE key while the indicator is in the MAIN Display Mode. The Readout shows **PAGE**.
2. Press and release ENTER key the Readout shows page number **0**
3. Use UP / DOWN keys to set the Page Number to 123 on the Readout.
4. 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 : PAGE-10

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 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 A 1.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 A 1.HY Sets differential (dead) band between Alarm-1 ON and OFF states.	***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-1 INHIBIT A 1.ih Set to Yes to suppress Alarm-1 activation upon power-up (process start-up) condition.	no No YES Yes (Default :No)
ALARM-1 LOGIC A 1.LG Select 'Normal' if Alarm-1 relay is to activate an Audio / Visual alarm. Select 'Reverse' for Tripping (cut-off) the system.	norm Normal rEv Reverse (Default : Normal)
ALARM-1 LATCH A 1.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 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.	***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-2 INHIBIT A2.ih Set to Yes to suppress Alarm-2 activation upon power-up (process start-up) condition.	no No YES Yes (Default :No)
ALARM-2 LOGIC A2.LG Select 'Normal' if Alarm-2 relay is to activate an Audio / Visual alarm. Select 'Reverse' for tripping (cut-off) the system.	norm Normal rEu Reverse (Default : Normal)
ALARM-2 LATCH A2.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)

Section 5

RETRANSMISSION PARAMETERS : PAGE-11

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)
RETRANSMISSION (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)
RETRANSMISSION (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 : -200.0)
RETRANSMISSION (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 : 1376.0)

Section 6

INPUT CONFIGURATION PARAMETERS : PAGE-12

Table 6.1

<table>
<tr><th>Parameter Description</th><th>Settings
(Default Value)</th></tr>
<tr><td>SQUARE ROOT SELECTION Sqrt

Set this parameter value to ‘Yes’ if the Square Root Extraction function is required for Flow Rate measurement.</td><td>no No
YES Yes
(Default :No)</td></tr>
<tr><td>CONST MULTIPLIER RESOLUTION C.rLn

(Available if Square root is set to ‘Yes’)

This parameter sets the decimal position (resolution) for the parameter Constant Multiplier.</td><td>1
0.1
0.01
0.001
(Default : 1)</td></tr>
<tr><td>CONST MULTIPLIER C.MUL

(Available if Square root is set to ‘Yes’)

This parameter is multiplied with square root extracted value to derive the flow rate. The resolution for this parameter is set by the parameter Constant Multiplier resolution.</td><td>1 to 9999
(Default : 0)</td></tr>
<tr><td>INPUT TYPE inPt

Select Input type in accordance with the type of Thermocouple or RTD sensor or transducer output connected for process value measurement.

Note : The Thermocouple & RTD Pt100 Inputs are not available if the Square Root selection is set to ‘Yes’.</td><td>Refer Table 6.2
(Default : Type K)</td></tr>
<tr><td>RESOLUTION rSLn

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 6.2
(Default : 1°C)</td></tr>
<tr><td>UNITS Unit

(Applicable for Thermocouple & RTD Pt100 Input only)

Select Temperature units in °C or °F.</td><td>°C
°F
(Default : °C)</td></tr>
<tr><td>DC SIGNAL LOW SG.Lo

(Available for DC Linear Input)

This parameter is the transmitter output signal value that corresponds to the Range Low process value. Refer Appendix-A : DC Linear Signal Interface for details.</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>0 to 80m V</td><td>0.00 to Signal High</td><td>0.00</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>
</table>

<table>
<tr><th>Parameter Description</th><th>Settings
(Default Value)</th></tr>
<tr><td>DC SIGNAL HIGH SG.hi

(Available for DC Linear Input)

This parameter is the transmitter output signal value that corresponds to the Range High process value. Refer Appendix-A : DC Linear Signal Interface for details.</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>0 to 80 mV</td><td>Signal Low to 80.00</td><td>80.00</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>DC RANGE LOW r.Lo

(Available for DC Linear Input)

Sets process value corresponding to minimum DC Linear signal input (e.g., 0V, 0mA, 4mA, etc.)</td><td>-19999 to 30000
(Default : 0.0)</td></tr>
<tr><td>DC RANGE HIGH r.hi

(Available for DC Linear Input)

Sets process value corresponding to maximum DC Linear signal input (e.g., 5V, 10V, 20mA, etc.)</td><td>-19999 to 30000
(Default : 100.0)</td></tr>
<tr><td>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</td><td>For DC Lin. Volts/Current
-19999 to 30000 Counts
For Thermocouple/RTD
-1999 to 3000 or
-1999.9 to 3000.0
(Default : 0)</td></tr>
<tr><td>DIGITAL 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.

Setting the value to 0.0 disables the filter.</td><td>0.0 to 60.0 Seconds

(Default : 2.0 sec.)</td></tr>
</table>

Table 6.2

Option	What it means	Range (Min. to Max.)	Resolution
tC_J	Type J Thermocouple	0.0 to +960.0°C / +32.0 to +1760.0°F	1 °C/°F or 0.1 °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	-199.9 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		
0.080	0 to 80mV DC voltage		
rESu	Reserve		
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 : PAGE-13

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 ALARM ACKNOWLEDGE SWITCH rmt Supervisory permission for use of the rear panel terminals for connecting remote switch for Alarm acknowledgment.	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 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)
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 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)
SERIAL WRITE PERMISSION Com.E Setting to ‘No’ disallows the host to set / modify any parameter value. The host, however, can read the value.	no No YES Yes (Default :No)

Section 8

USER LINEARISATION PARAMETERS : PAGE-33

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.	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.	-19999 to 30000 (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.	-19999 to 30000 (Default : Undefined)

Section 9

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 9.1(a), 9.1(b) & 9.1(c) show the outer dimensions for the **Version 3 (Latest), Version 2** & **Version 1 (Oldest)**, respectively.

Figure 9.1(a) : Version 3 (Latest)

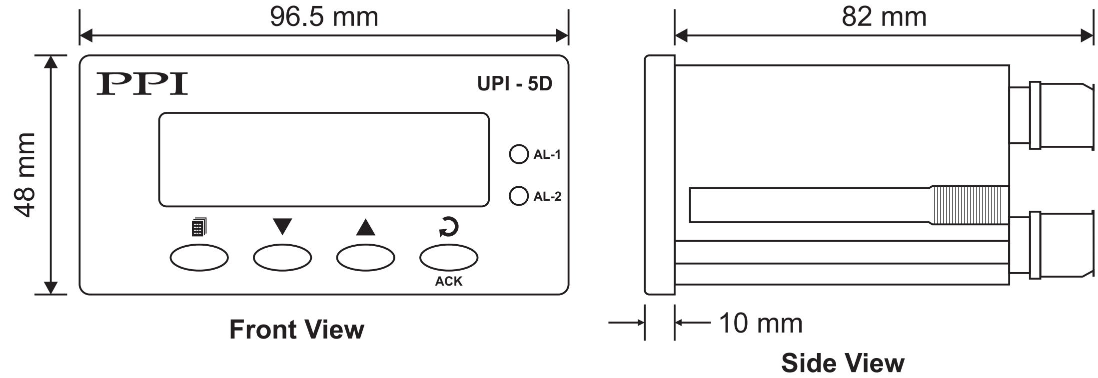


Figure 9.1(b) : Version 2

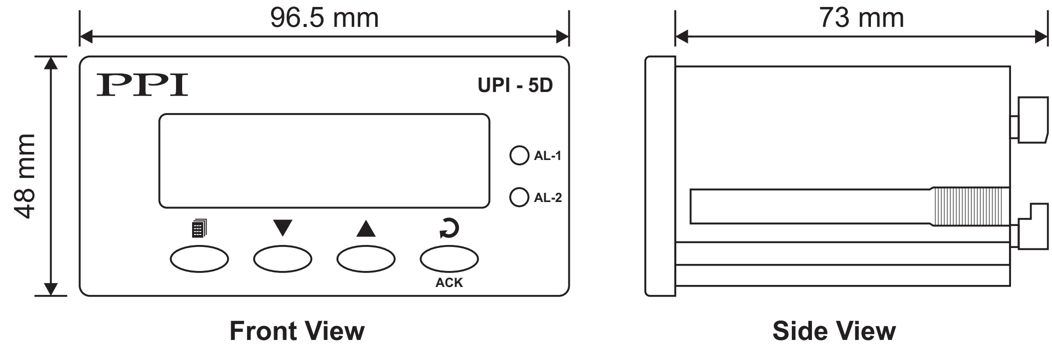
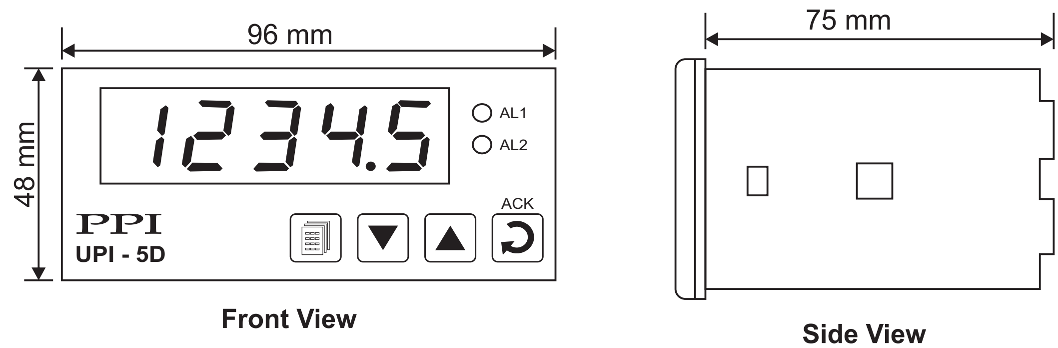


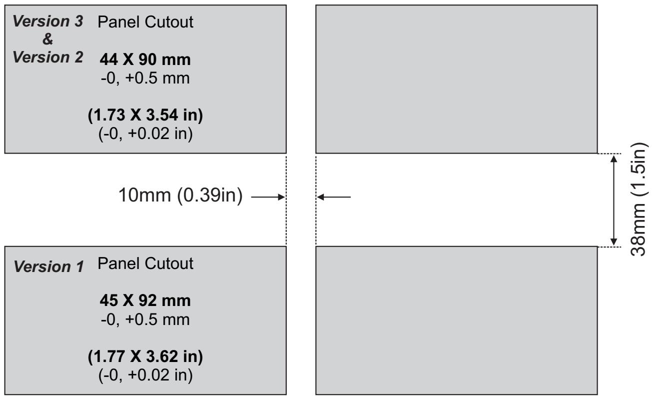
Figure 9.1(c) : Version 1 (Oldest)



PANEL CUTOUT AND RECOMMENDED MINIMUM SPACING

The Figure 9.2 shows **Version 3 (Latest), Version 2** & **Version 1 (Oldest)** 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 9.2

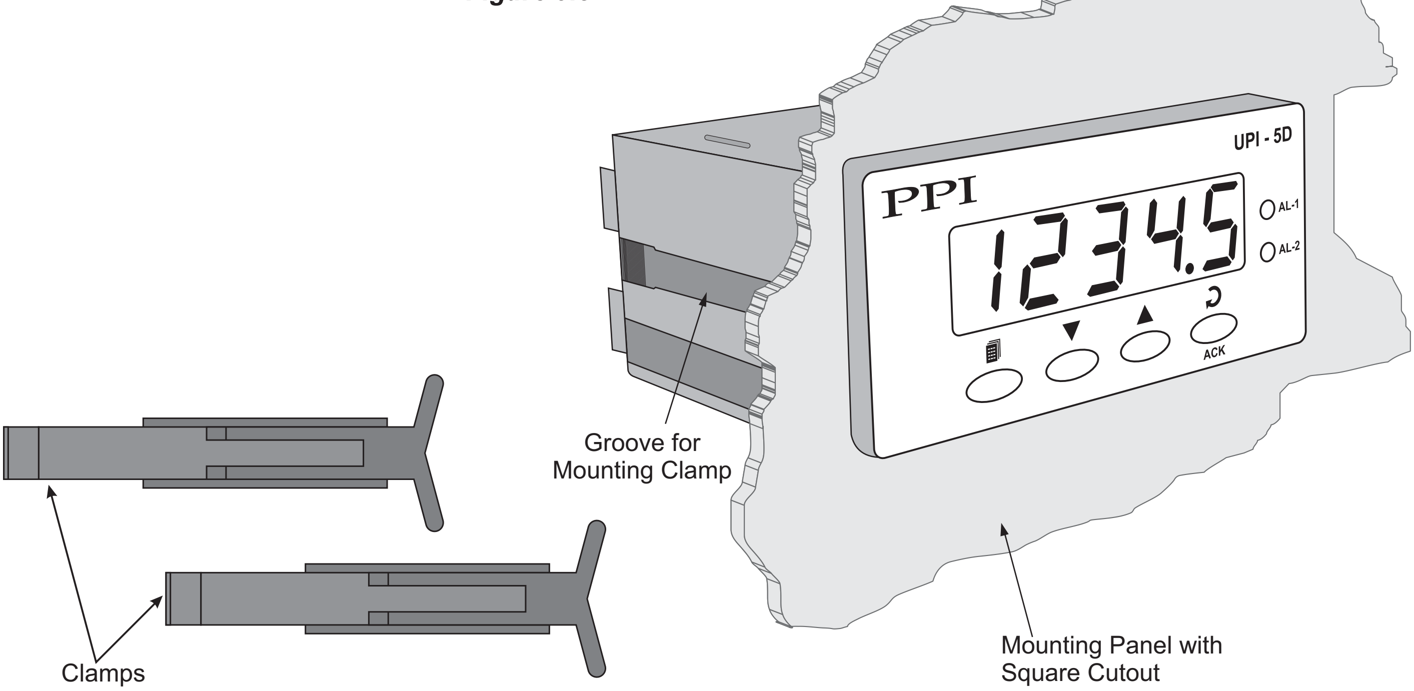


PANEL MOUNTING

Follow the steps below for mounting the Indicator on panel:

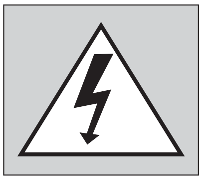
1. Prepare a ractangular cutout to the size shown in Figure 9.2.
2. Remove the Panel Mounting Clamp from the Indicator Enclosure.
3. Insert the rear of the Indicator housing through the panel cutout from the front of the mounting panel.
4. Hold the Indicator gently against the mounting panel such that it positions correctly against the panel wall, see Figure 9.3. Apply pressure only on the bezel and not on the front label.
5. Insert the clamps on either side of the enclosure in the grooves provided and slide them forward until this are firmly in contact with the rear face of the mounting panel. Refer Figure 9.3 below.

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 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 a few connections are functional / applicable only if the respective plug-in modules are fitted.

The rear panel electrical wiring connection diagram is shown in Figure10.1(a), 10.1(b) & 10.1(c) for **Version 3 (Latest), Version 2** & **Version 1 (Oldest)** below.

Figure 10.1(a):
Version 3 (Latest)

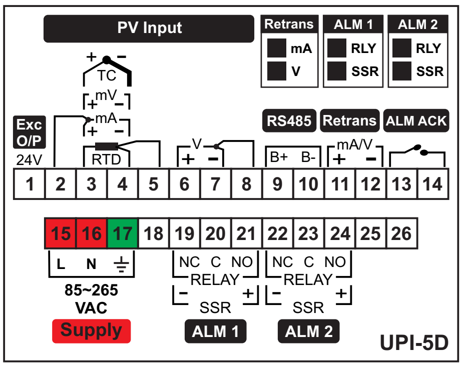


Figure 10.1(b):
Version 2

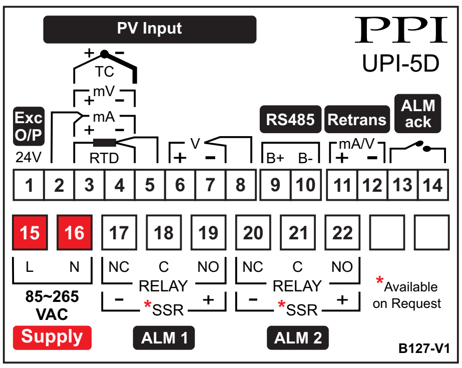
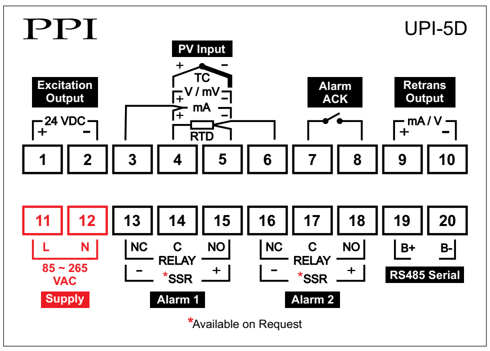


Figure 10.1(c):
Version 1 (Oldest)



DESCRIPTIONS

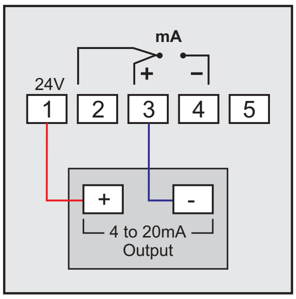
The back panel connections are described as under:

DC EXCITATION (24 V Excitation Voltage)

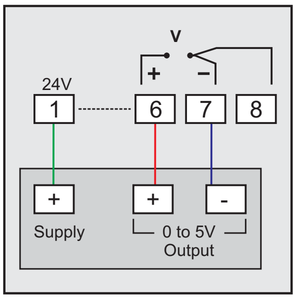
As standard the indicator is supplied with 24 VDC @ 40 mA power source. This is primarily meant for exciting 2-wire or 4-wire current output transmitters.

Version 3 (Latest) & Version 2

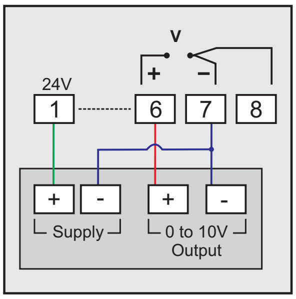
Only Single terminal (T1) is provided for 24V DC excitation supply. The following figures illustrate a few connection examples.



2-wire Current Transmitter



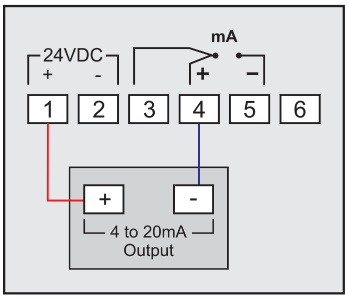
3-wire Voltage Transmitter



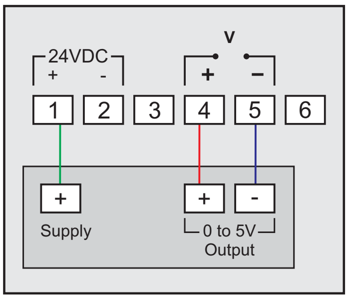
4-wire Voltage Transmitter

Version 1 (Oldest)

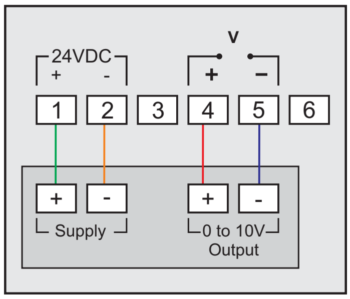
Terminals T1 & T2 provide the 24VDC Excitation supply. The following figures illustrate a few connection examples.



2-wire Current Transmitter



3-wire Voltage Transmitter



4-wire Voltage Transmitter

INPUT

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. The terminals provided for connections differ in **Version 3 (Latest), Version 2** & **Version 1 (Oldest)**. Figures 10.2 (a), 10.2 (b) & 10.2 (c) below are referred for description of **Version 3 (Latest), Version 2** & **Version 1 (Oldest)** connections.

Figure 10.2 (a)
Connections for all types other than Voltage (V) Input for all 3 Versions

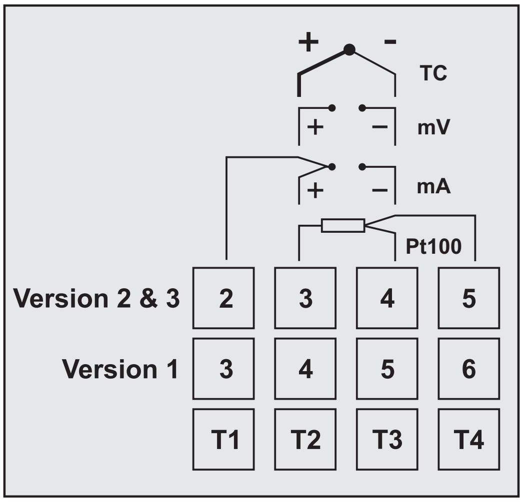


Figure 10.2 (b)
Connections for Voltage Input for Version 2 & 3

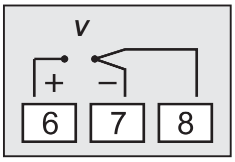
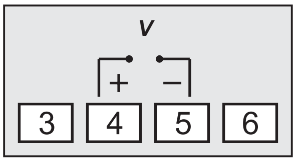


Figure 10.2 (c)
Connections for Voltage Input for Version 1



Thermocouple

Connect Thermocouple Positive (+) to terminal T2 and Negative (-) to terminal T3 as shown in Figure 10.2 (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.

RTD Pt100, 3-wire

Connect single leaded end of RTD bulb to terminal T2 and the double leaded ends to terminal T3 and T4 (interchangeable) as shown in Figure 10.2 (a). 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.

DC Linear MilliVolts (mV)

Use a shielded twisted pair with the shield grounded at the signal source for connecting mV source. Connect signal (+) to terminal T2 & common (-) to terminal T3, as shown in Figure 10.2 (a).

DC Linear Current (mA)

Use a shielded twisted pair with the shield grounded at the signal source for connecting mA source. Connect signal (+) to terminal T2 & common (-) to terminal T3 and also *short terminals T1 & T2*, as shown in Figure 10.2 (a).

DC Linear Volts (V)

Use a shielded twisted pair with the shield grounded at the signal source for connecting Volts source.

For **Version 2 & 3**; Connect signal (+) to terminal 6 & common (-) to terminal 7 and also short terminals 7 & 8, as shown in Figure 10.2 (b).

For **Version 1**; Connect signal (+) to terminal 4 & common (-) to terminal 5, as shown in Figure 10.2 (c).

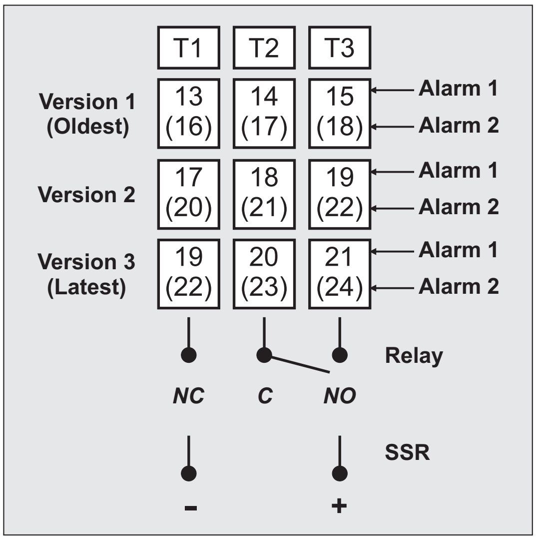
ALARM-1
ALARM-2

The Alarm-1 & Alarm-2 are available in the form of Relay outputs as standard. The SSR outputs can be provided on request. The connection descriptions are shown in figures 10.3.

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.

Drive for SSR
(***Available on Request in place of Relay Output***)
12 VDC/30mA Signal is generated for switching the external SSR (Solid State Relay). Connect (+) and (-) terminals of SSR to indicator terminals T3 and T1, 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.

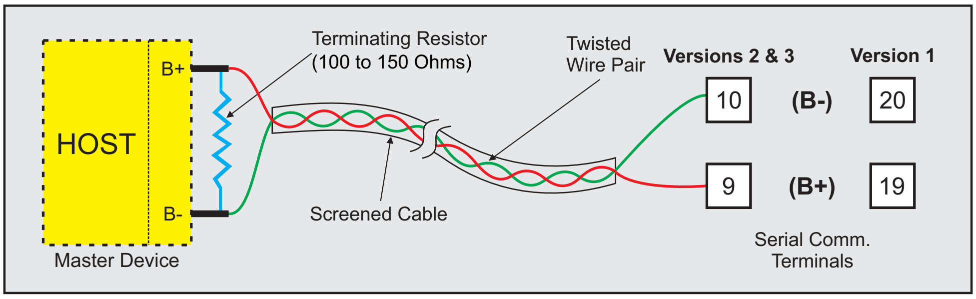
Figure 10.3



SERIAL COMMUNICATION PORT

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

Figure 10.4



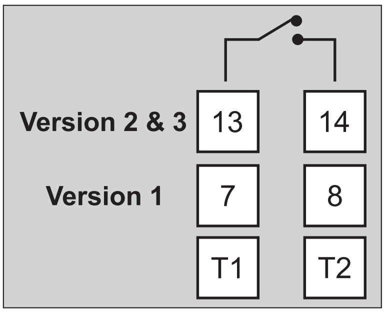
If the Optional plug-in communication board is fitted, connect terminals B+ and B- of the Indicator to the respective terminals of the Master device (PC/HMI). For reliable noise free communication, use a pair of twisted wires inside screened cable as shown in Figure 10.4. The wire should have less than 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

(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 terminals T1 & T2 as shown in figure 10.5.

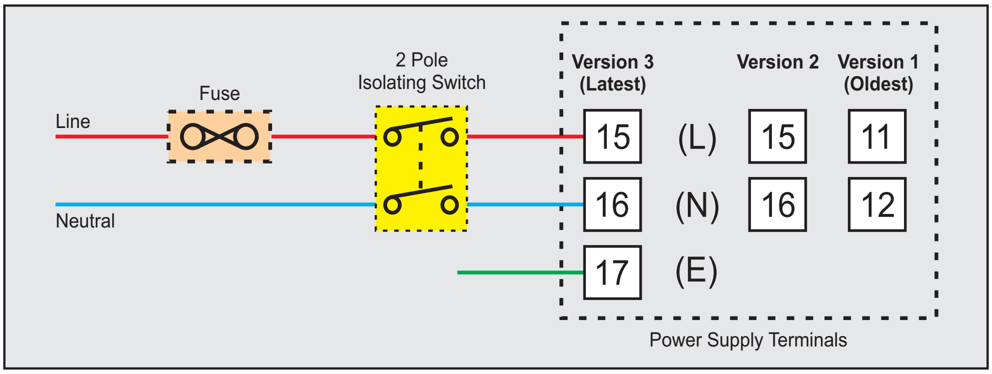
Figure 10.5



POWER SUPPLY

> 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.

Figure 10.6



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 power supply connections ensuring proper polarity as shown in Figure 10.6. The indicator is not provided with fuse and power switch. If necessary, mount them separately. Use a time lag fuse rated 1A @ 240 VAC.

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:

$$Y = mX + C$$

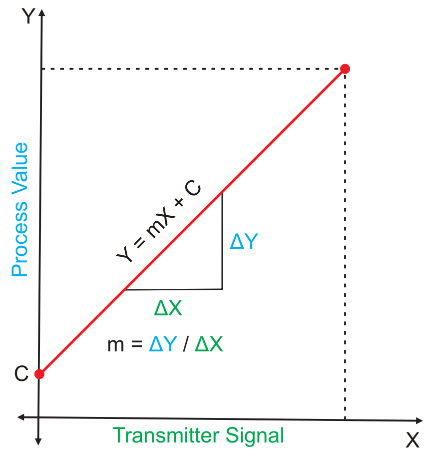
Where;

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: 0-80mV, 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.

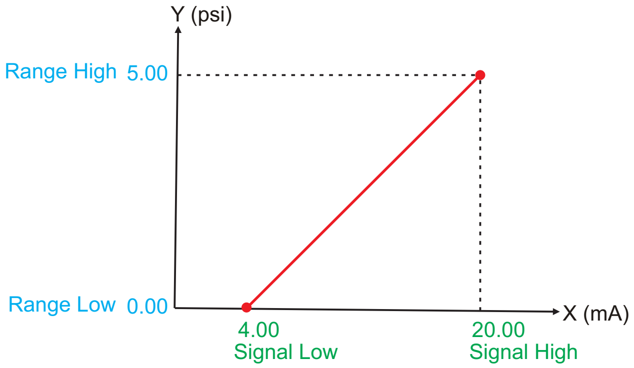
The linear transmitters usually specify two signal values (Signal Low and Signal High) and the corresponding Process Values (Range Low and Range High). In the example Pressure Transmitter above; the Signal Low, Signal High, Range Low & Range High values specified are: 4 mA, 20 mA, 0 psi & 5 psi, respectively.

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. 4.00 mA)
3. Signal High : Signal value corresponding to Range High process value (e.g. 20.00 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.

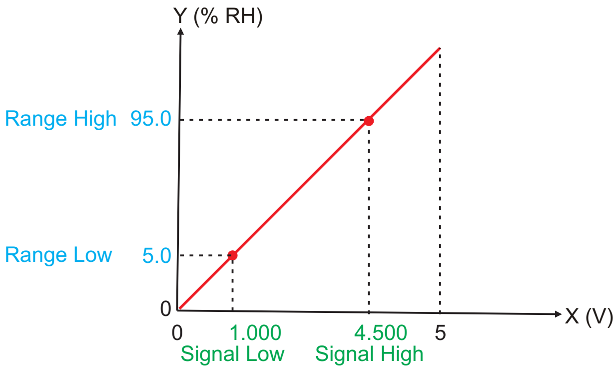
Example 1: Pressure Transmitter producing **4 to 20 mA** for **0 to 5 psi**



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

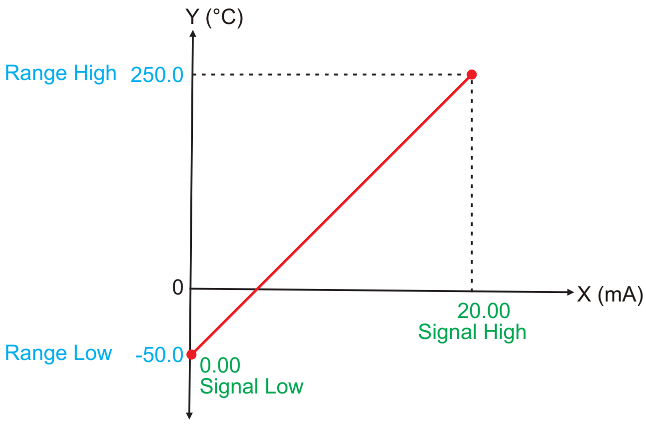
Example 2: Relative Humidity Transmitter producing **1 to 4.5 V** for **5 to 95 %RH**



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

PPI
The Perfection Experts

Process Precision Instruments

101, Diamond Industrial Estate, Navghar, Vasai Road (E),
Dist. Palghar - 401 210.Maharashtra, India
Sales : 8208199048 / 8208141446
Support : 07498799226 / 08767395333
sales@ppiindia.net, support@ppiindia.net

Jan 2022