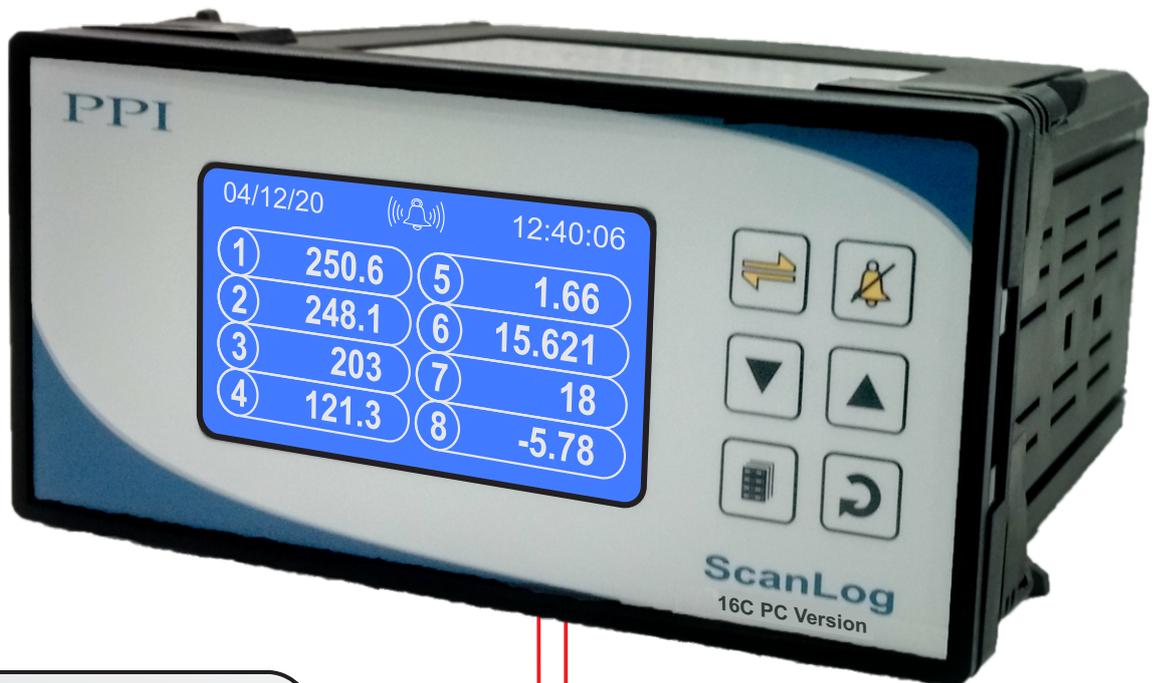


ScanLog

16C PC Version



16 Channel Universal Process Data Logger with PC Software



User Manual

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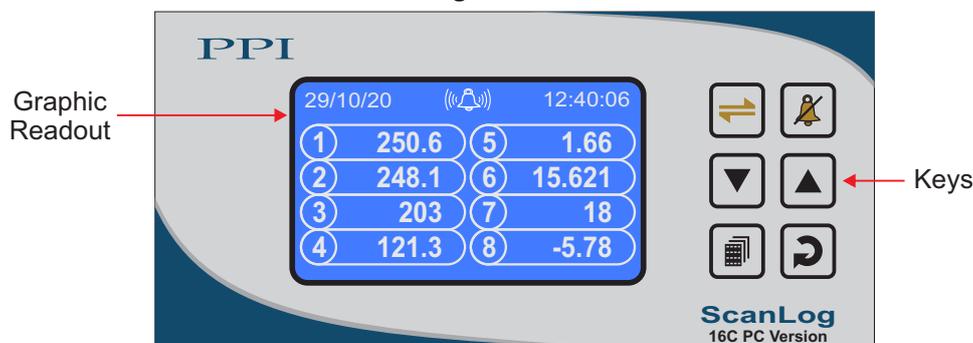
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Section 1

FRONT PANEL : LAYOUT AND OPERATION

The front panel comprises of 72x40 mm (160x80 pixels) Monochrome Graphic LCD Display & membrane keys. Refer Figure 1.1 below.

Figure 1.1



GRAPHIC READOUT

The Graphic Readout is a 80 X 160 Pixel Monochrome LCD Display. In Normal operation mode the Readout shows measured Process Values for All 16 Channels (2 screens for 8 channels each, 1 to 8 & 9 to 16) & currents Date/Time. Alarm Status screen can be viewed using 'Alarm Acknowledge' Key. The Scroll key can be used to view Channel Names, Recording Information & Stored Records.

In Set-up Mode, the Readout displays parameter names and values that can be edited using front keys.

KEYS

There are six tactile keys provided on the front panel for configuring the controller and setting-up the parameter values. The Table 1.1 below lists each key (identified by the front panel symbol) and the associated function.

Table 1.1

Symbol	Key	Function
	Scroll	Press to scroll through various Process Information Screens in Normal Operation Mode.
	Alarm Acknowledge	Press to acknowledge / mute alarm output (if active) & to view Alarm Status screen.
	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.

Table 1.1

Symbol	Key	Function
	SET-UP	Press to enter or exit set-up mode.
	ENTER	In Run Mode, press to toggle between Auto & Manual Scan Mode. In Set-up Mode, press to store the set parameter value and to scroll to the next parameter.

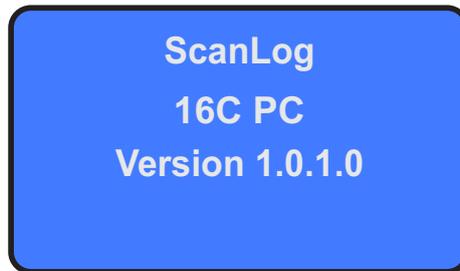


Section 2 BASIC OPERATION

POWER-UP DISPLAY

Upon power-up the display shows the instrument's Model Name (ScanLog 16C PC) and the Hardware & Firmware version (Version 1.0.1.0) for 4 seconds. During this time the instrument runs through a self-check sequence. Refer Figure 2.1.

Figure 2.1

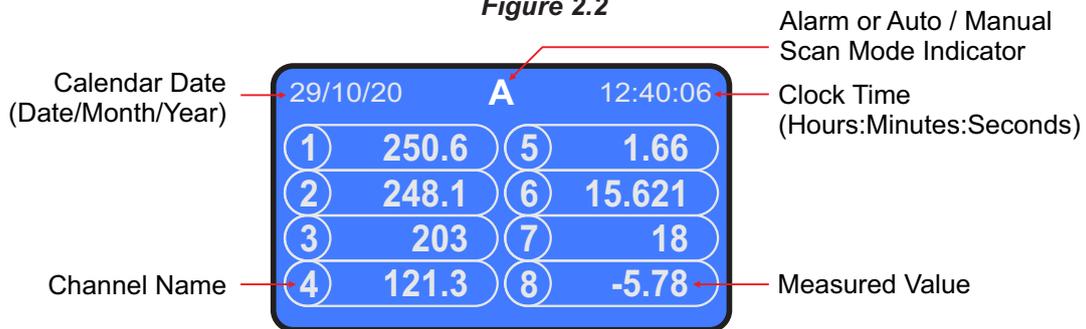


RUN MODE

After the Power-up display sequence, the instrument enters into RUN Mode. This is the normal operation mode wherein the instrument starts PV measurements, Alarm monitoring and Recording. The Display comprises of Main screen, Record Information screen & Record View screens described below. These screens appear one-after-the-other upon pressing Scroll key while in RUN Mode. The Alarm Status Screen is also available that can be viewed by pressing Alarm Acknowledge key.

Main Screen

Figure 2.2



The Main Screen shows Channel Numbers (CH1, CH2,) along with corresponding Process Values, Calendar Date, Clock Time and Alarm or Auto / Manual Scan Mode indicator as illustrated in Figure 2.2 above. Depending on Auto or Manual Scan Mode, the legend **A** or **M** respectively is indicated. The Alarm Indicator appears only if any one or more alarms are active. In case of Alarm, the Auto / Manual legend (**A** or **M**) and the Alarm symbol (🔔) indications are toggled.

In case of measured value errors for Channels, the messages listed in Table 2.1 flash in place of process value as illustrated in Figure 2.3.

Table 2.1

Message	Error Type	Cause
OPEN	Sensor Open	RTD / Thermocouple Broken / Open
OVR	Over-range	Process Value above Max. Specified Range
UNR	Under-range	Process Value below Min. Specified Range

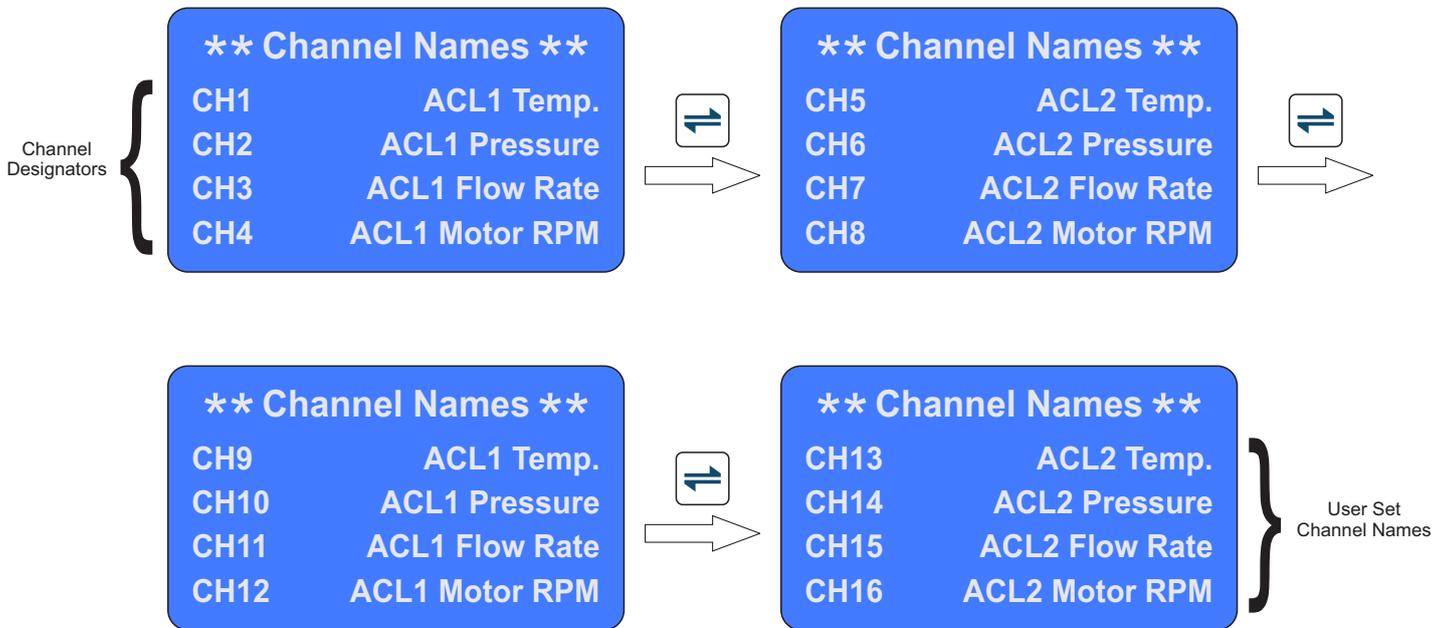
Figure 2.3



Channel Names Screen

This screen is shown upon pressing  (Scroll) key from Main screen. This screen shows the user set Channel Names mapped against the designators CH1 for Channel 1, CH2 for Channel 2 and so on. The 16 Channels are split in four screens. Use Scroll key to move from first screen to the next. Refer figure 2.4 for example screens.

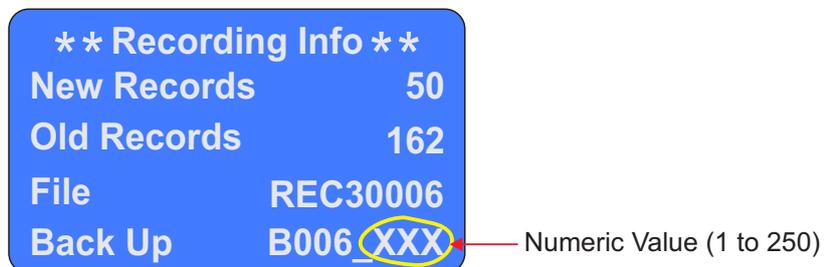
Figure 2.4



Recording Information Screen

This screen is shown upon pressing  (Scroll) key from Channel Names screen. This screen shows the numbers of New Records, Old Records, the File Name used to download the records and the back up file name that is created in case of an interrupted pen drive write operation (Refer section 3 : PEN DRIVE OPERATION). Note the XXX in the Back Up File Name is replaced by a numeric value from 1 to 250 in the actual file name assigned.

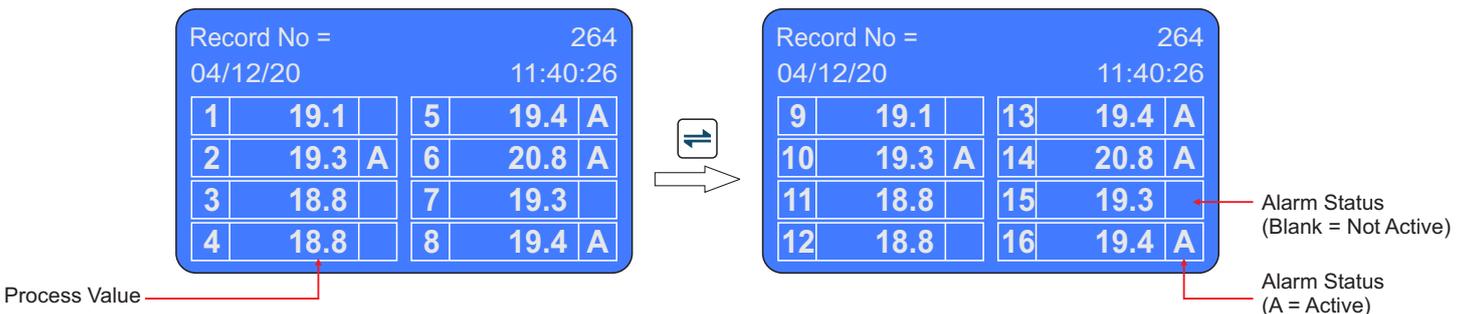
Figure 2.5



Record View Screen

This screen is shown upon pressing  (Scroll) key from Recording Information screen. This screen facilitates viewing the stored New Records. The records can be scrolled for viewing using  (UP) &  (DOWN) keys. As depicted in Figure 2.6; the record view screen shows one record at a time (along with Record Number) that comprises Process Value & Alarm Status for Each Channel duly date / time stamped. Upon pressing the UP key while showing the last stored record, the first record is shown. Similarly upon pressing the DOWN key while showing the first stored record, the last record is shown.

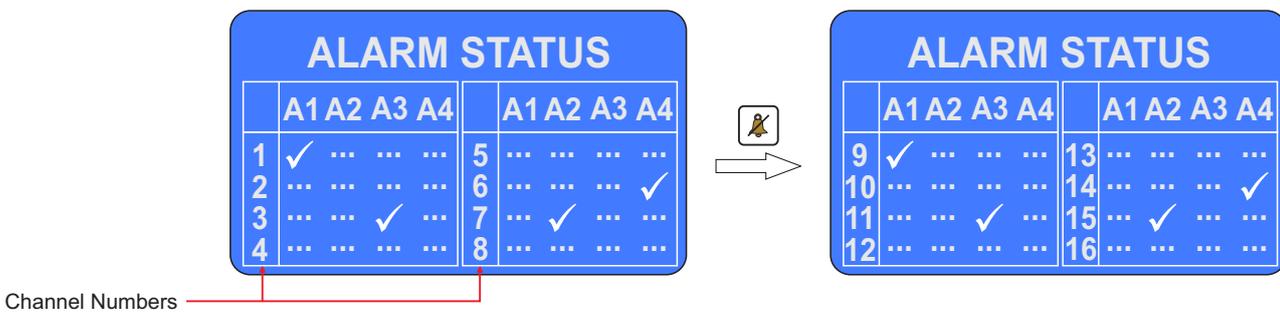
Figure 2.6



Alarm Status Screen

This screen is shown upon pressing  (Alarm Acknowledge) key from Run Mode screen. This screen shows the alarm status for all 4 alarms (AL1 to AL4) for each channel (CH1 to CH8 & CH9 to CH16). The  symbol means active alarm.

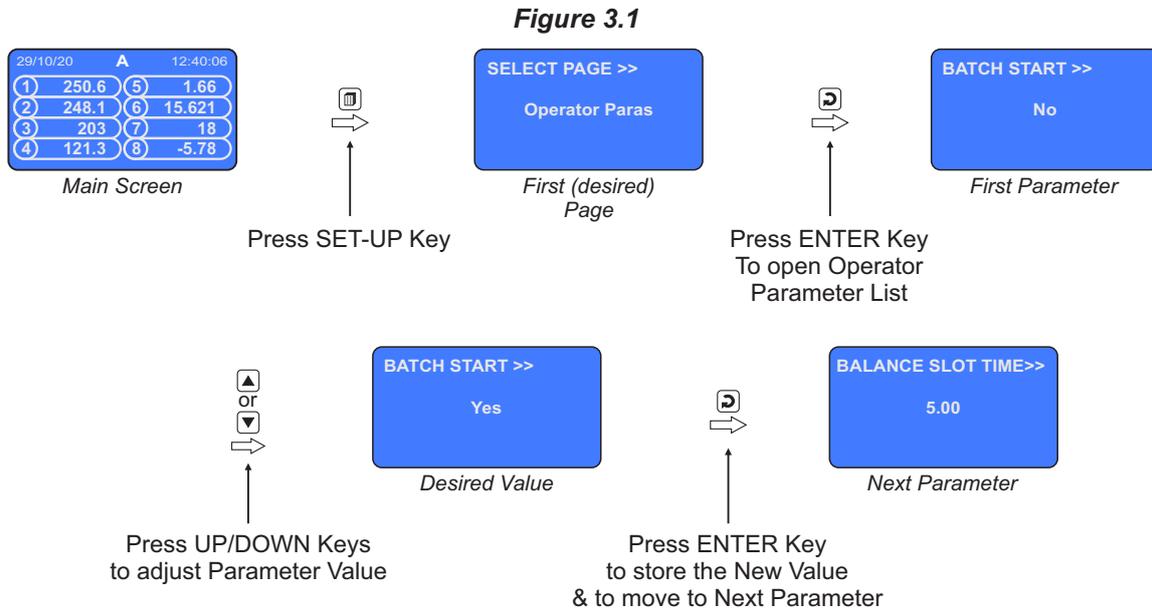
Figure 2.7



Section 3 OPERATOR PARAMETERS

The Operator Parameter list includes Start / Stop command for batch (Slot) recording and allows viewing the balance slot time. If batch recording feature is not enabled, selecting the operator parameter page returns to the Main screen.

The Figure 3.1 shows how to access Operator Parameters. The Example illustrates how to start batch recording.



The Table 3.1 below described the Operator Parameters in detail.

Table 3.1

Parameter Description	Settings
<p>BATCH START>> (Available if Batch Recording is selected)</p> <p>This parameter is presented only if the batch is not already started.</p> <p>Set BATCH START command to 'Yes' to start recording the data. This is usually issued at the begin of a batch process.</p>	<p>No Yes</p>
<p>BALANCE SLOT TIME>> (Available if Batch Recording is selected & if BATCH START command is issued)</p> <p>This is a read only value that shows the remaining Batch Time.</p>	<p>Read Only</p>
<p>BATCH STOP>> (Available if Batch Recording is selected)</p> <p>This parameter is presented only if the batch is already started.</p> <p>Through the Batch Recording automatically stops at the end of the set time interval; it may be desired to abort recording any time during the batch. Set BATCH STOP command to 'Yes' to stop recording the data and terminate the batch.</p>	<p>No Yes</p>

Section 4 ALARM SETTINGS

The Figure 4.1 shows how to access Alarm Setting Parameters. The Example illustrates how to change the Alarm 2 setpoint value for channel 2.

Figure 4.1

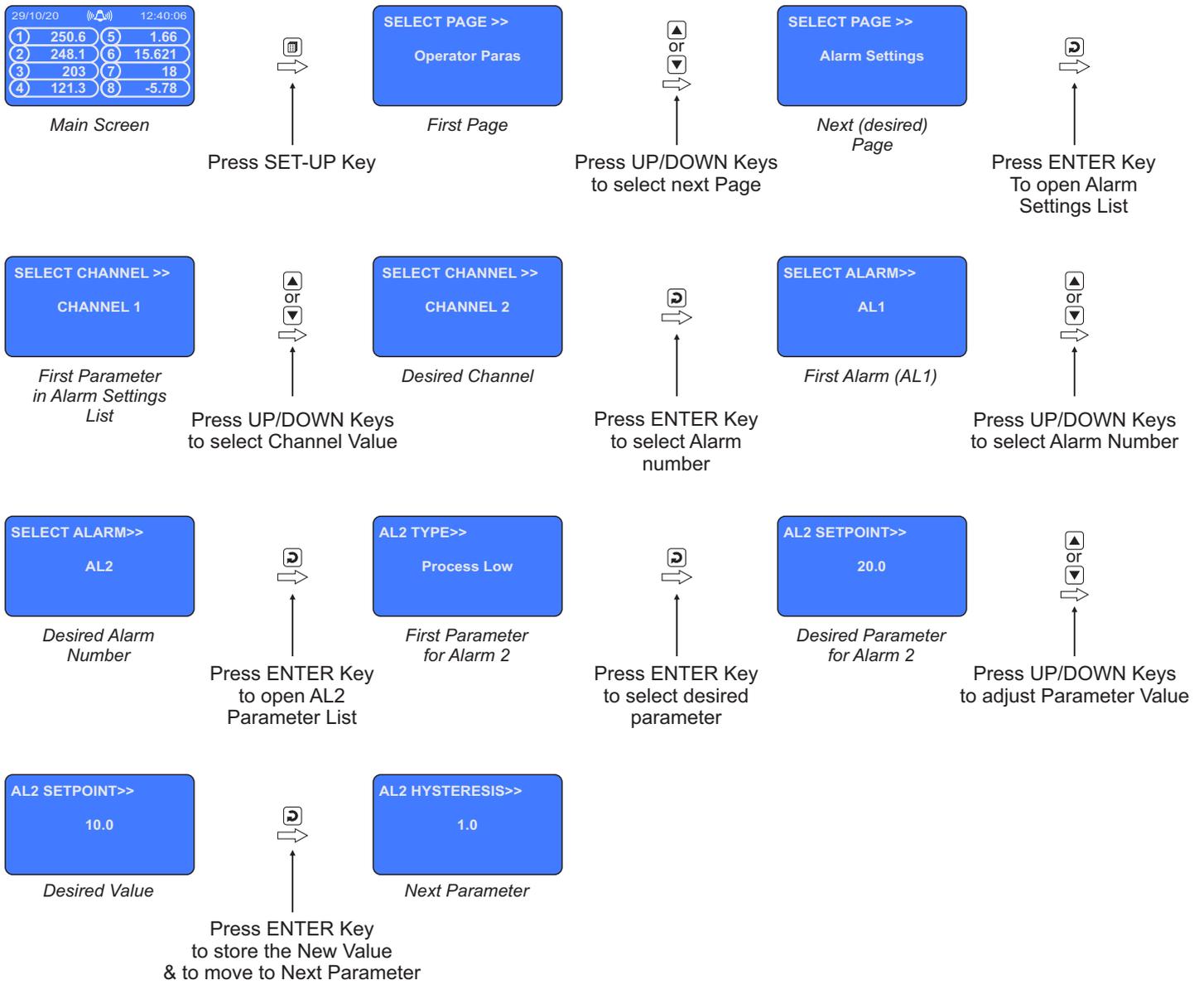


Table : 4.1

Parameter Description	Settings (Default Value)
SELECT CHANNEL>> Select the desired Channel Name whose Alarms parameters are to be set.	Channel - 1 to Channel - 16
SELECT ALARM>> Select the desired Alarm Number whose parameters are to be set.	AL1, AL2, AL3, AL4 (The actual available options depends on the numbers of Alarms set per channel on Alarm configuration page)
AL1 TYPE>> <i>The parameter name depends upon the Alarm selected (AL1 TYPE, AL2 TYPE, etc.).</i> None : Disable 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)
AL1 SETPOINT>> <i>The parameter name depends upon the Alarm selected (AL1 Setpoint, AL2 Setpoint, etc.).</i> Setpoint Value for 'Process High' or 'Process Low' Alarm.	Min. to Max. of selected input type range (Default : 0)
AL1 HYSTERESIS>> <i>The parameter name depends upon the Alarm selected (AL1 Hysteresis, AL2 Hysteresis, etc.).</i> This parameter Value sets a differential (dead) band between the ON and OFF Alarm states.	1 to 30000 (Default : 20)
AL1 INHIBIT>> <i>The parameter name depends upon the Alarm selected (AL1 Inhibit, AL2 Inhibit, etc.).</i> No : The Alarm is not suppressed during the start-up Alarm conditions. Yes : The Alarm activation is suppressed until the PV is within Alarm limits from the time the Recorder is switched ON.	No Yes (Default : No)

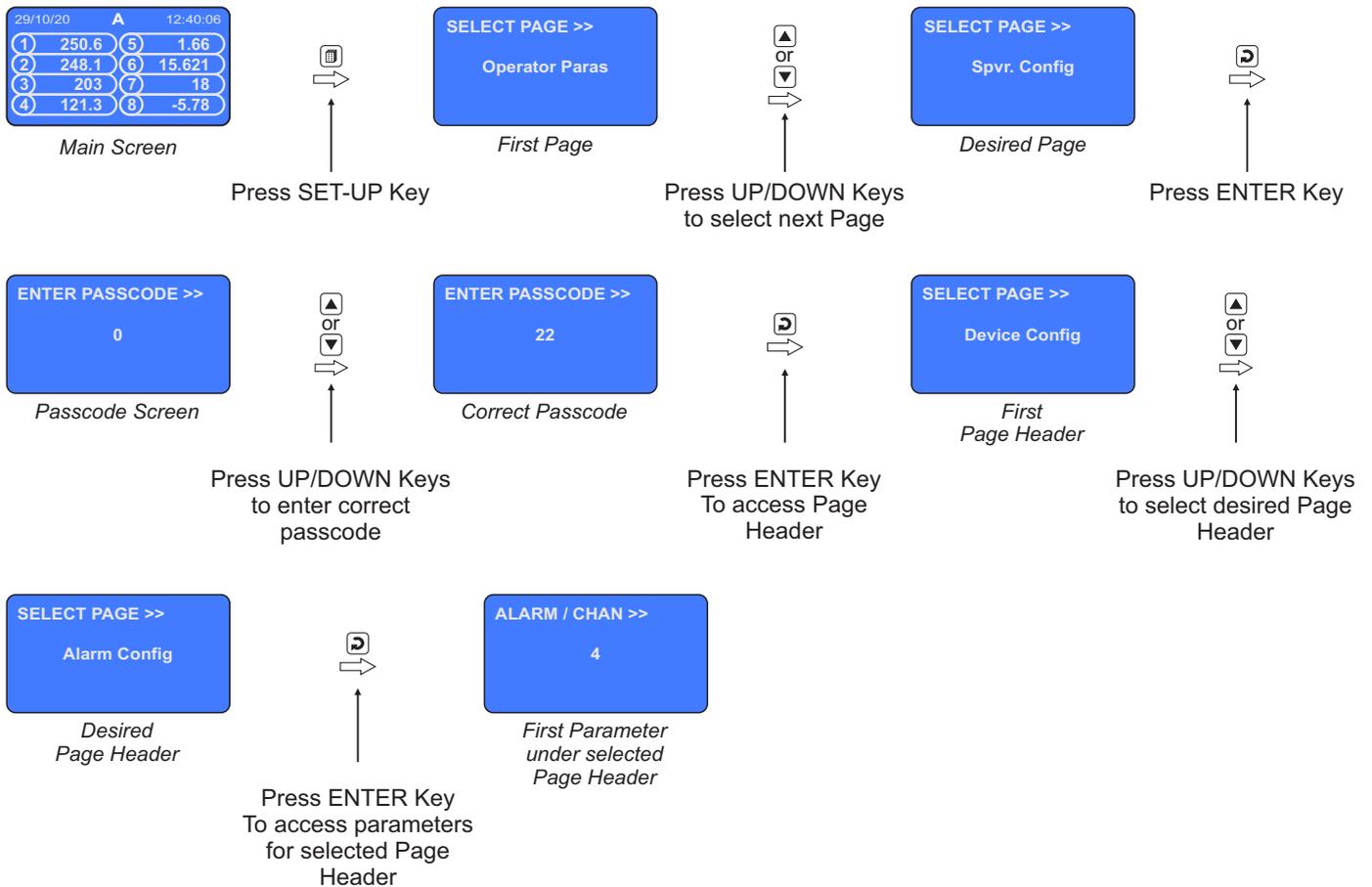
Section 5 SUPERVISORY CONFIGURATION

The Page Header 'Spvr. Config' encompasses a subset of Page Headers containing parameters that are set less frequently. These parameters should only be accessible to Supervisory level and thus are protected by password. Upon entering the appropriate password for the parameter 'ENTER PASSCODE', the following list of Page Header is available.

1. Device Configuration (*Device Config*)
2. Channel Configuration (*Channel Config*)
3. Alarm Configuration (*Alarm Config*)
4. Recorder Configuration (*Recorder Config*)
5. RTC Settings (*RTC Settings*)
6. Utilites (*Utilites*)

The figure below illustrates how to access the parameters under the supervisory Page Header "Alarm Configuration". The parameters covered under each Page Header are described in detail in the following sections.

Figure 5.1



Section 6 DEVICE CONFIGURATION

Table : 6.1

Parameter Description	Settings (Default Value)
<p>DELETE RECORDS>> Setting this command to 'Yes', erases all the records stored in the internal Memory.</p>	<p>No Yes (Default : No)</p>
<p>SCAN RATE>> Due to Space constraint the 16 Channels are displayed in two separate Screens, each showing 8 Channels (CH-1 to CH-8 & CH-9 to CH-16). If Auto Scan Mode is selected then this parameter defines the Time Interval for which each screen is shown.</p>	<p>1 Sec. to 99 Sec. (Default : 3 Sec.)</p>
<p>RECORDER ID>> This parameter assigns a unique identification number to the ScanLog which is then used in file naming system for downloading the records to the PC.</p>	<p>1 to127 (Default : 1)</p>



Section 7

CHANNEL CONFIGURATION

The Channel configuration parameters are listed in Table below and are generally required to be set only at the time of installation.

Table : 7.1

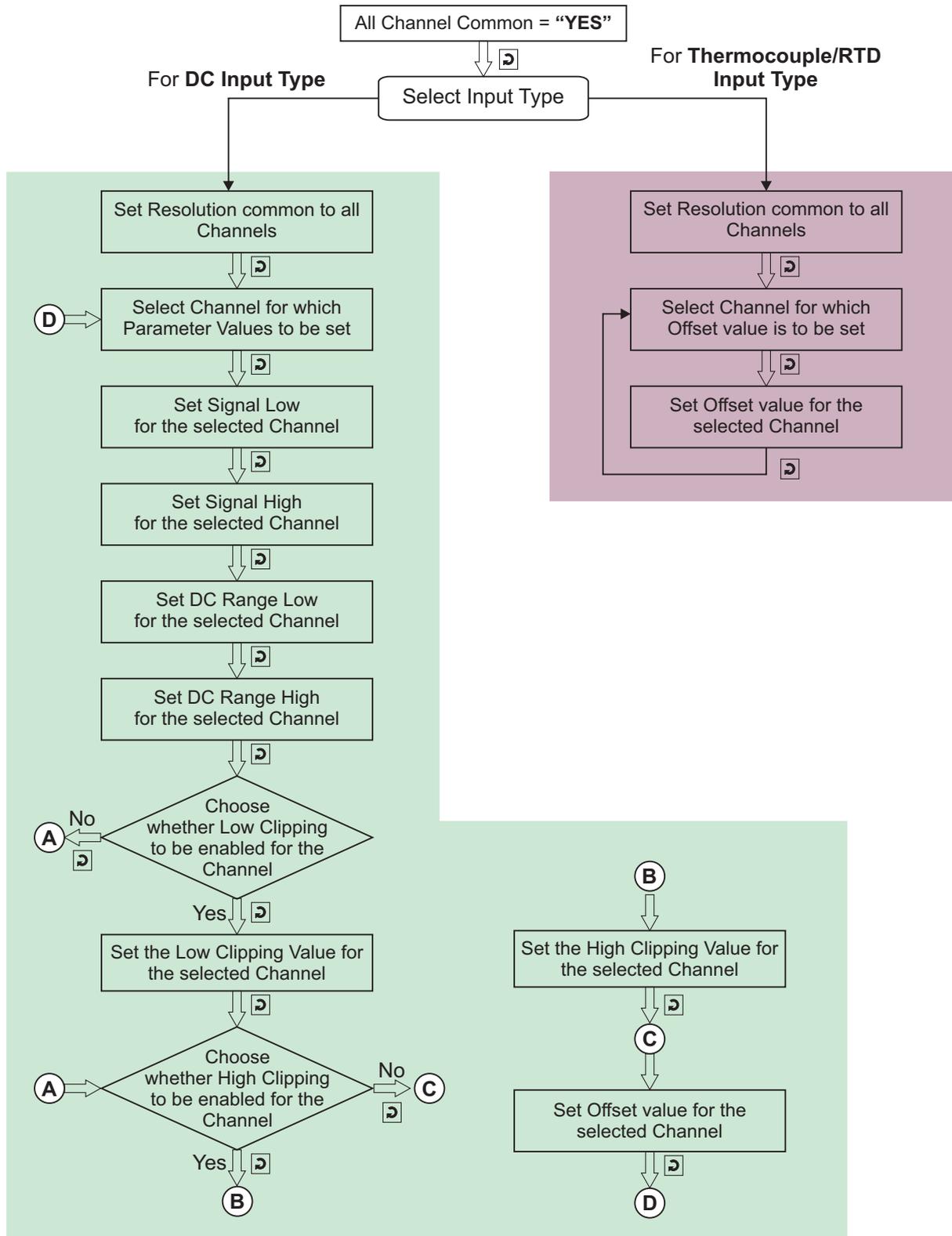
Parameter Description	Settings (Default Value)																								
<p>ALL CHAN COMMON>> In most applications the Data Logging Unit is used to monitor the process values at different points within a closed space (Chamber, Cold Room, etc). Thus the type of sensors and also the measurement resolution used are Identical (Common) for all channels. This parameter facilitates eliminating repetitive settings for multiple channels in such cases. Yes : The parameter values for Input type and Resolution are applied to all channels. No : The parameter values for Input type and Resolution need to be set independently for each channel.</p>	No Yes (Default : No)																								
<p>SELECT CHANNEL>> Refer Figure 7.1 (a) and 7.1 (b).</p>	Channel 1 to Channel 16																								
<p>INPUT TYPE>> Set the type of Thermocouple / RTD / DC Linear signal input type connected to the selected channel.</p>	Refer Table 7.2 (Default : 0 to 10 V)																								
<p>RESOLUTION>> Set the process value indication resolution (decimal point). All the resolution based parameters (hysteresis, alarm setpoints etc.) then follow this resolution setting.</p>	Refer Table 7.2																								
<p>SIGNAL LOW>> (Applicable only for DC Linear Inputs) The transmitter output signal value corresponding to RANGE LOW process value. Refer <i>Appendix-A : DC Linear Signal Interface</i> for details.</p>	<table border="1"> <thead> <tr> <th>Input Type</th> <th>Settings</th> <th>Default</th> </tr> </thead> <tbody> <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 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> </tbody> </table>	Input Type	Settings	Default	0 to 20 mA	0.00 to Signal High	0.00	4 to 20 mA	4.00 to Signal High	4.00	0 to 80 mV	0.00 to Signal High	0.00	0 to 1.25 V	0.000 to Signal High	0.000	0 to 5 V	0.000 to Signal High	0.000	0 to 10 V	0.00 to Signal High	0.00	1 to 5 V	1.000 to Signal High	1.000
Input Type	Settings	Default																							
0 to 20 mA	0.00 to Signal High	0.00																							
4 to 20 mA	4.00 to Signal High	4.00																							
0 to 80 mV	0.00 to Signal High	0.00																							
0 to 1.25 V	0.000 to Signal High	0.000																							
0 to 5 V	0.000 to Signal High	0.000																							
0 to 10 V	0.00 to Signal High	0.00																							
1 to 5 V	1.000 to Signal High	1.000																							
<p>SIGNAL HIGH>> (Applicable only for DC Linear Inputs) The transmitter output signal value corresponding to RANGE HIGH process value. Refer <i>Appendix-A : DC Linear Signal Interface</i> for details.</p>	<table border="1"> <thead> <tr> <th>Input Type</th> <th>Settings</th> <th>Default</th> </tr> </thead> <tbody> <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 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> </tbody> </table>	Input Type	Settings	Default	0 to 20 mA	Signal Low to 20.00	20.00	4 to 20 mA	Signal Low to 20.00	20.00	0 to 80 mV	Signal Low to 80.00	80.00	0 to 1.25 V	Signal Low to 1.250	1.250	0 to 5 V	Signal Low to 5.000	5.000	0 to 10 V	Signal Low to 10.00	10.00	1 to 5 V	Signal Low to 5.000	5.000
Input Type	Settings	Default																							
0 to 20 mA	Signal Low to 20.00	20.00																							
4 to 20 mA	Signal Low to 20.00	20.00																							
0 to 80 mV	Signal Low to 80.00	80.00																							
0 to 1.25 V	Signal Low to 1.250	1.250																							
0 to 5 V	Signal Low to 5.000	5.000																							
0 to 10 V	Signal Low to 10.00	10.00																							
1 to 5 V	Signal Low to 5.000	5.000																							

Parameter Description	Settings (Default Value)
<p>RANGE LOW>> (Applicable only for DC Linear Inputs)</p> <p>The Process Value corresponding to the SIGNAL LOW value from the transmitter.</p> <p>Refer Appendix-A: DC Linear Signal Interface for details.</p>	<p>-30000 to +30000 (Default : 0)</p>
<p>RANGE HIGH>> (Applicable only for DC Linear Inputs)</p> <p>The Process Value corresponding to the SIGNAL HIGH value from the transmitter.</p> <p>Refer Appendix-A: DC Linear Signal Interface for details.</p>	<p>-30000 to +30000 (Default : 1000)</p>
<p>LOW CLIPPING>> (Applicable only for DC Linear Inputs)</p> <p>Refer Appendix-B.</p>	<p>Disable Enable (Default : Disable)</p>
<p>LOW CLIP VAL>> (Applicable only for DC Linear Inputs)</p> <p>Refer Appendix-B.</p>	<p>-30000 to HIGH CLIP VAL (Default : 0)</p>
<p>HIGH CLIPPING>> (Applicable only for DC Linear Inputs)</p> <p>Refer Appendix-B.</p>	<p>Disable Enable (Default : Disable)</p>
<p>HIGH CLIP VAL>> (Applicable only for DC Linear Inputs)</p> <p>Refer Appendix-B.</p>	<p>LOW CLIP VAL to 30000 (Default : 1000)</p>
<p>ZERO OFFSET>></p> <p>In many application, the measured PV at the input requires a constant value to be added or subtracted to obtain a final process value for removing sensor zero error or to compensate known thermal gradient. This parameter is used to remove such errors.</p> <p>Actual (Displayed) PV = Measured PV + Offset for PV.</p>	<p>-30000 to +30000 (Default : 0)</p>

Table 7.2

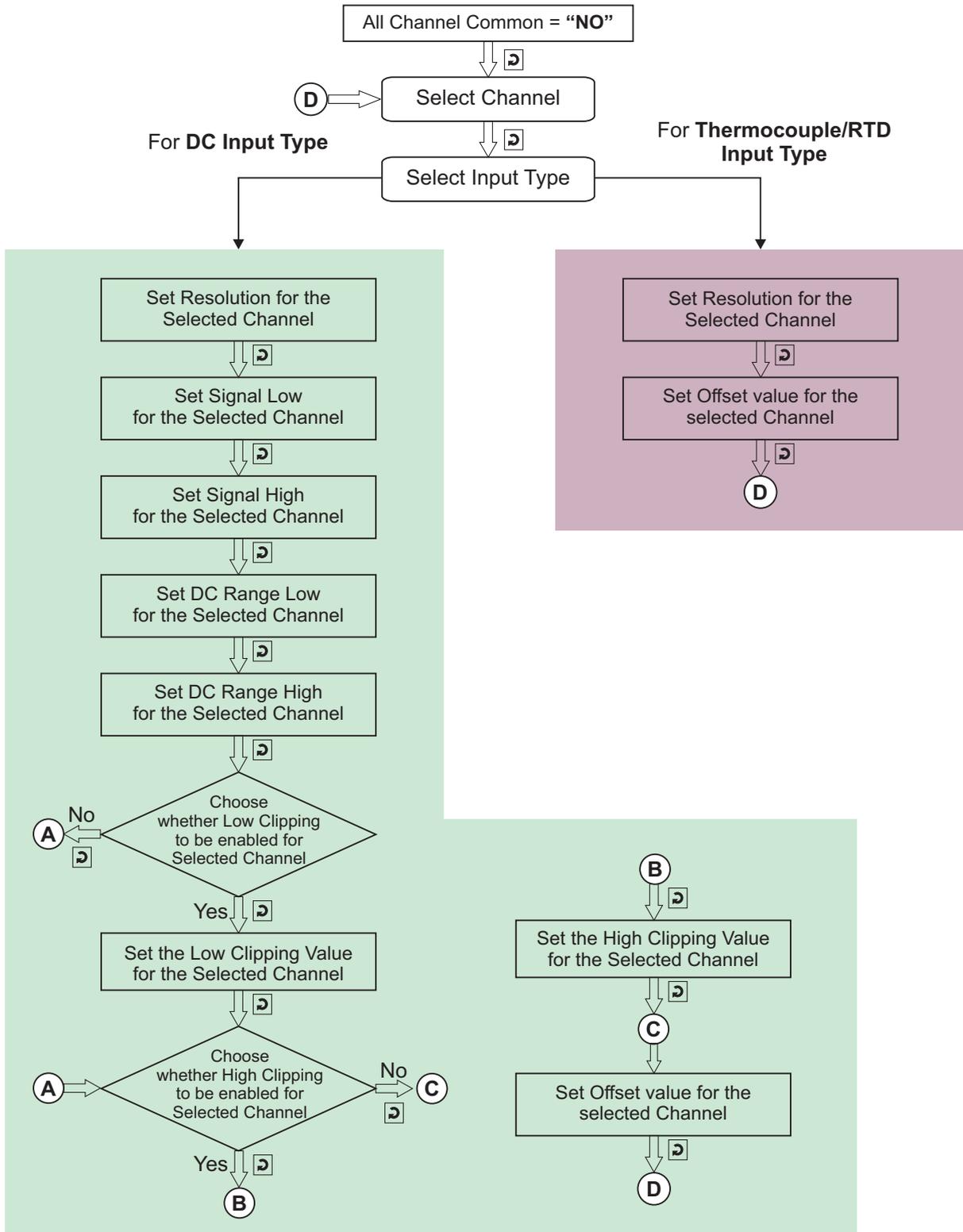
Option	Range (Min. to Max.)	Resolution & Unit
Type J (Fe-K)	0.0 to +960.0°C	1 °C or 0.1 °C
Type K (Cr-Al)	-200.0 to +1376.0°C	
Type T (Cu-Con)	-200.0 to +387.0°C	
Type R (Rh-13%)	0.0 to +1771.0°C	
Type S (Rh-10%)	0.0 to +1768.0°C	
Type B	0.0 to +1826.0°C	
Type N	0.0 to +1314.0°C	
Reserved for customer specific Thermocouple type not listed above. The type shall be specified in accordance with the ordered (optional on request) Thermocouple type.		
RTD Pt100	-199.9 to +600.0°C	1°C or 0.1 °C
0 to 20 mA	-30000 to 30000 units	1 0.1 0.01 0.001 units
4 to 20 mA		
0 to 80 mV		
Reserved		
0 to 1.25 V	-30000 to 30000 units	1 0.1 0.01 0.001 units
0 to 5 V		
0 to 10 V		
1 to 5 V		

Figure 7.1(a)



Note : Press PAGE Key to Revert to Main Display Mode.

Figure 7.1(b)



Section 8
ALARM CONFIGURATION

Table : 8.1

Parameter Description	Settings (Default Value)
<p>ALARMS/CHAN>></p> <p>The ScanLog 16C PC is provided with 4 independently settable soft Alarms per channel. However, the actual number of Alarms required per channel may vary from application to application. This parameter allows selecting the exact number of Alarms required per channel.</p>	<p>1 to 4 (Default : 4)</p>



Section 9 RECORDER CONFIGURATION

Table : 9.1

Parameter Description	Settings (Default Value)
<p>NORMAL INTERVAL>> The ScanLog 16C PC respects this parameter value for generating periodic records when none of the channels is under Alarm. For e.g., If this parameter value is set to 0:00:30, then a new record is generated every 30 Sec. if no channel is in Alarm. Setting this parameter value to 0:00:00 disables normal recording.</p>	0:00:00 (H:MM:SS) to 2:30:00 (H:MM:SS) (Default : 0:00:30)
<p>ZOOM INTERVAL>> The ScanLog 16C PC respects this parameter value for generating periodic records when any one or more channels are under Alarm. For e.g., If this parameter value is set to 0:00:10, then a new record is generated every 10 Sec. whenever there is any channel(s) is in Alarm. Setting this parameter value to 0:00:00 disables zoom recording.</p>	0:00:00 (H:MM:SS) to 2:30:00 (H:MM:SS) (Default : 0:00:10)
<p>ALRM TOGGL REC>> Set to 'Enable' if a record is to be generated every time the Alarm status for any of the channels is toggled (On-to-Off or Off-to-On).</p>	Disable Enable (Default : Enable)
<p>RECORDING MODE>> Continuous The ScanLog 16C PC keeps generating records indefinitely. There are no Start / Stop commands. Suitable for continuous processes. Batch The ScanLog 16C PC generates records over a preset time interval. The recording begins upon issuance of Start command and continues until the user set time interval is elapsed. Suitable for batch processes.</p>	Continuous Batch (Default : Continuous)
<p>BATCH TIME>> (Available for Batch Recording Mode) Sets the time period in Hours:Minutes for which the recording to take place from the time the Start command is issued.</p>	0:01 (HH:MM) to 250:00 (HHH:MM) (Default : 1:00)
<p>BATCH START>> BATCH STOP>> These two parameters are also available on Operator parameter list. Refer Section 3 : Operator Parameters.</p>	No Yes

Section 10
RTC SETTING

Table : 10.1

Parameter Description	Settings
TIME (HH:MM)>> Set current clock time in Hrs:Min (24 Hours format).	0.0 to 23:59
DATE>> Set current calendar date.	1 to 31
MONTH>> Set current calendar month.	1 to 12
YEAR>> Set current calendar year.	2000 to 2099
UNIQUE ID NUMBER>> Ignore this parameter as it is for Factory Use Only.	



Section 11 UTILITIES

Table : 11.1

Parameter Description	Settings (Default Value)
<p>LOCK>> UNLOCK>></p> <p>These parameters lock or unlock parameter settings. Locking inhibits editing (modifying) of parameter values to prevent any inadvertent changes by the operator.</p> <p>The Parameters 'Lock' and 'Unlock' are mutually exclusive. When in locked condition, the instrument asks for UNLOCK (Yes / No). Set the parameter to 'Yes' and the instrument returns to Main Mode. Access this parameter again to set the value for UNLOCK to 'Yes'. The instrument returns to Main mode with lock open.</p> <p>For locking, the parameter LOCK needs to be set to 'Yes' only once.</p>	<p>No Yes (Default : No)</p>
<p>FACTORY DEFAULT>></p> <p>Setting this parameter to 'Yes', resets all parameters to their default values.</p> <p>Upon issuing factory default command, the instrument first enters into 'Memory Checking' mode wherein the internal non-volatile memory is checked and this might take several seconds. After memory checking the parameter are set to factory default values and the instrument resets & restarts.</p>	<p>No Yes (Default : No)</p>

Section 12 ELECTRICAL CONNECTIONS



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

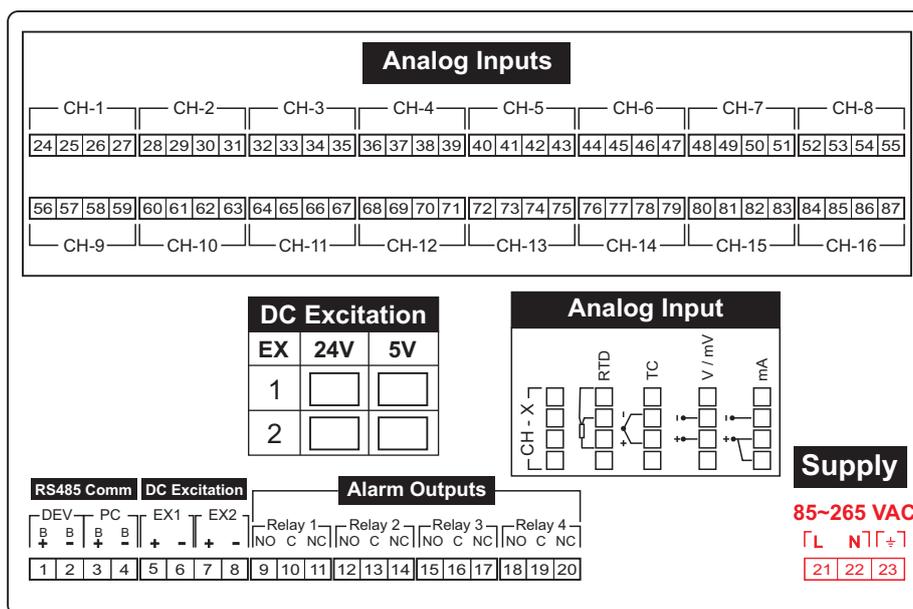
Caution The recorder is designed for installation in an enclosure which provides adequate protection against electric shock. Local regulations regarding electrical installation should be rigidly observed. Consideration should be given to prevention of access to the Power Supply terminals by unauthorized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

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 recorder.
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 recorder 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 power supply is switched-off while making / removing any connections.

CONNECTION DIAGRAM

The Electrical Connection Diagram is shown on the Rear Side of the enclosure. Refer figure 12.1.

Figure 12.1



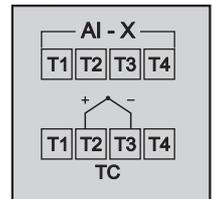
Input Channels

Each of the 16 input channels are identical from wiring connection viewpoint. For explanation purpose, the 4 terminals pertaining to each channel have been marked as T1, T2, T3 & T4 in the following pages. The descriptions below apply to all the channels with no deviations.

Thermocouple

Connect Thermocouple Positive (+) to terminal T2 and Negative (-) to terminal T3 as shown in **Figure 12.2(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.

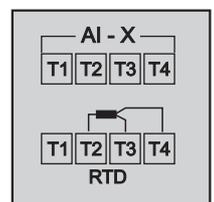
Figure 12.2(a)



RTD Pt100, 3-wire

Connect single leaded end of **RTD** bulb to terminal T2 and the double leaded ends to terminals T3 and T4 (interchangeable) as shown in **Figure 12.2(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.

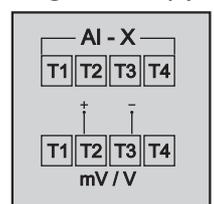
Figure 12.2(b)



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 T3 and the signal (+) to terminal T2, as shown in **Figure 12.2(c)**.

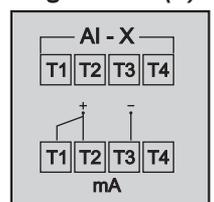
Figure 12.2(c)



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 T3 and the signal (+) to terminal T2. Also **short** terminals T1 & T2. Refer **Figure 12.2(d)**.

Figure 12.2(d)

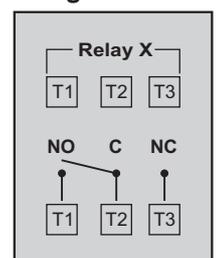


ALARM OUTPUTS

- Relay 1 (Terminals : 9, 10, 11)
- Relay 2 (Terminals : 12, 13, 14)
- Relay 3 (Terminals : 15, 16, 17)
- Relay 4 (Terminals : 18, 19, 20)

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

Figure 12.3



5 VDC / 24 VDC Excitation Voltage (Terminals : 5, 6, 7, 8)

If ordered, the Instrument is supplied with none, one or two excitation voltage outputs. Both the excitation outputs are factory configured for either 5VDC @ 15 mA or 24VDC @ 83 mA. The '+' and '-' terminals are for voltage 'Source' and 'Return' paths, respectively.

The availability of Excitation Voltages, as per order, are indicated (with a ✓) on the connection diagram label as shown in the figures 12.4 below.

Figure 12.4

DC Excitation		
EX	24V	5V
1	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2	<input checked="" type="checkbox"/>	<input type="checkbox"/>

PC COMMUNICATION PORT (Terminals 3, 4)

The PC Communication Port is RS485. Use appropriate protocol converter (say, RS485 - RS232 or USB - RS485) for interfacing with PC.

For reliable noise free communication, use a pair of twisted wires inside screened cable. 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.

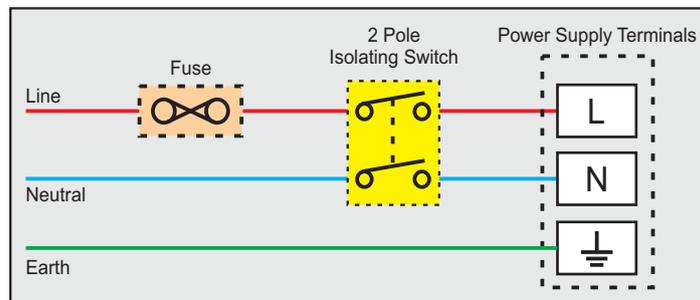
DEVICE COMMUNICATION PORT (Terminals 1, 2)

Not used. Do not make any connections.

POWER SUPPLY

As standard, the module 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 0.5mm² for power supply connections ensuring proper polarity as shown in Figure 12.5. The module is not provided with fuse and power switch. If necessary, mount them separately. Use a time lag fuse rated 1A @ 240 VAC.

Figure 12.5



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;

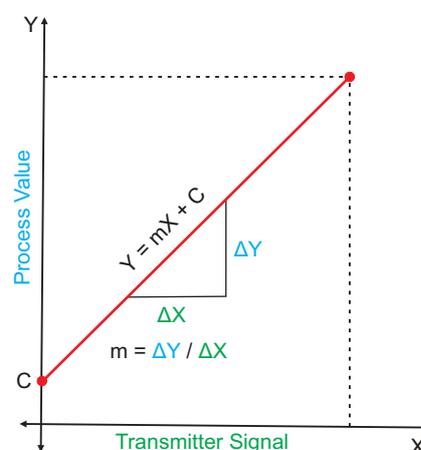
1. Pressure Transmitter producing **4 to 20 mA** for **0 to 5 psi**
2. Relative Humidity Transmitter producing **1 to 4.5 V** for **5 to 95 %RH**
3. Temperature Transmitter producing **0 to 20 mA** for **-50 to 250 °C**

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: 0-80mV, 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.

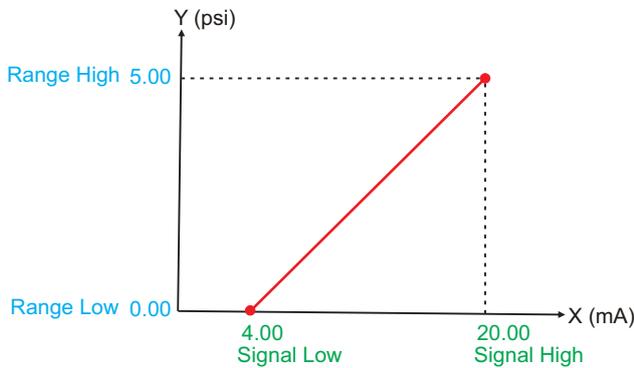
The linear transmitters usually specify two signal values (Signal Low and Signal High) and the corresponding Process Values (Range Low and Range High). In the example Pressure Transmitter above; the Signal Low, Signal High, Range Low & Range High values specified are: 4 mA, 20 mA, 0 psi & 5 psi, respectively.

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.

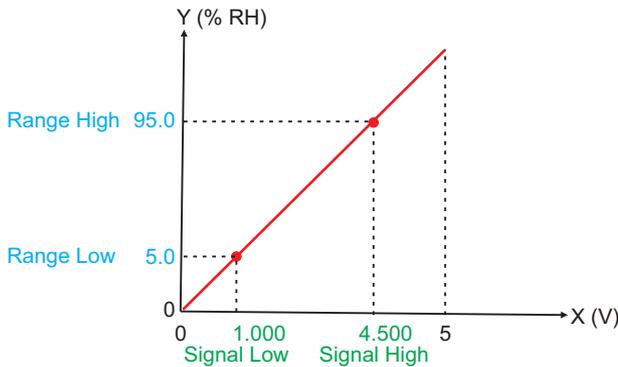
Example 1: Pressure Transmitter producing **4 to 20 mA** for **0 to 5 psi**



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

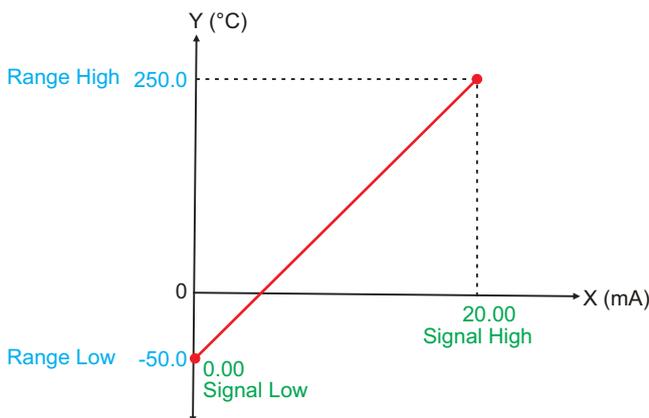
Example 2: Relative Humidity Transmitter producing **1 to 4.5 V** for **5 to 95%RH**



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.

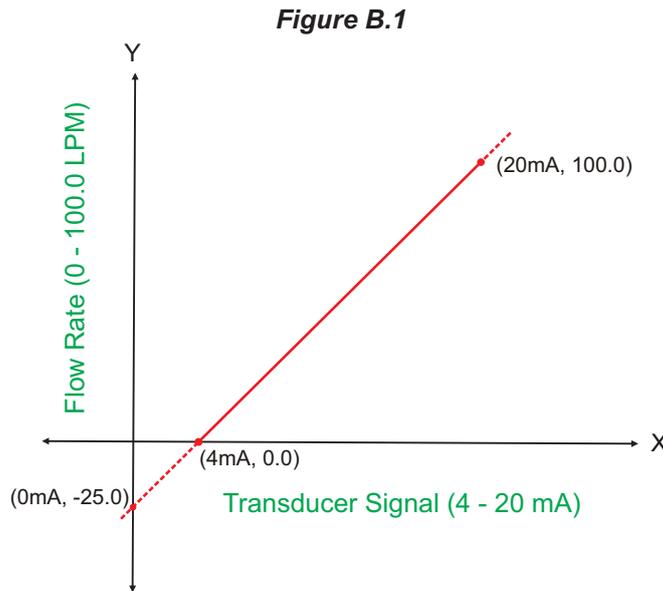
Input Type	: 0-20 mA
Signal Low	: 0.00 mA
Signal High	: 20.00 mA
PV Resolution	: 0.1
Range Low	: -50.0
Range High	: 250.0



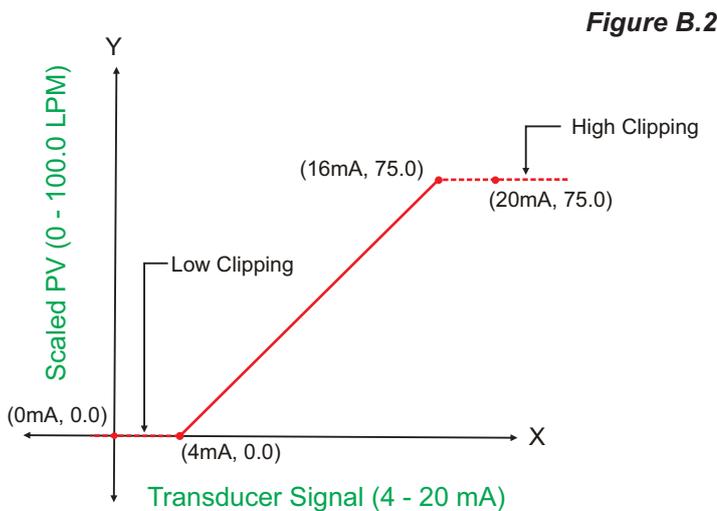
APPENDIX B LOW / HIGH CLIPPING

For mA/mV/V inputs the measured PV is a scaled value between the set values for 'PV Range Low' and 'PV Range High' parameters corresponding to the Signal Minimum and Signal Maximum values respectively. Refer Appendix A.

The Figure B.1 below illustrates an example of flow rate measurement using a transmitter / transducer producing a signal range of 4 - 20 mA corresponding to 0.0 to 100.0 Liters per Minute (LPM).



If this transmitter is to be used for a system having a flow rate range of 0.0 to 75.0 LPM then the actual useful signal range from the example transmitter is 4 mA (~ 0.0 LPM) to 16 mA (~ 75.0 LPM) only. If no Clipping is applied on the measured flow rate then the scaled PV will also include 'out-of-range' values for the signal values below 4 mA and above 16 mA (may be due to open sensor condition or calibration errors). These out-of-range values can be suppressed by enabling the Low and/or High Clippings with appropriate Clip values as shown in figure B.2 below.



Parameter Values	
PV Range Low	: 0.0
PV Range High	: 100.0
Enable Low Clipping	: Yes
Low Clip Value	: 0.0
Enable High Clipping	: Yes
High Clip Value	: 75.0



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