OP631-V01

selec

PIC152A

Operating Instructions

SPECIFICATIONS

DISPLAY

4-digit (7 segment LED) 0.5" height Display Messages:

"Sbr" - a) Appears when measurement exceeds display scaling range(9999) for signal inputs
b) When open sensor is detected. (Applicable for TC/RTD/-5 to 56mV)

"Sre" a) Appears when measurement is below display scaling range (-1999) for signal inputs.
B) Sensor reverse condition occurs. (Applicable for TC/RTD/mV)

Display alternating between PV and ALrM with LED of respective alarm flashing.
(Programmable annunciator option)
LED Status Annunciators - Alarm ON (2 nos)

POWER

85 to 270V AC (AC : 50 or 60Hz), 4VA Max
24V DC, 4VA

SETTINGS

Via three keys on front panel.

MEMORY

Nonvolatile EEPROM retains all programmable parameters and values.

MAIN SENSOR INPUT (Universal)

Thermocouple inputs

J : -200 to 750°C
K : -200 to 1350°C
T : -200 to 400°C
R : 0 to 1750°C
S : 0 to 1750°C

RTD input (2 wire or 3 wire)

PT100 : -100 to 850°C

Signal inputs

mV (linear) : - 5 to 56mV
Voltage : 0 - 10V DC
Current : 0 - 20mA DC

INDICATION ACCURACY

TC Input : 0.25% of Span ±1°C (20min.Warmup)
R&S Input : 0.5% of Span ±2°C (20min.Warmup)
RTD Input : 0.1% of Span ±1°C
Signal input : 0.5% of FS

ALARM OUTPUTS

2 nos : Relay output : 5A @ 250V AC or 24V DC
Alarm modes - Alarm High, Alarm Low, Band, Fault
Hysteresis - Programmable.
Annunciator - Programmable.
Reset Action - Programmable : automatic or latched.
Standby(Hold) - Programmable : enable or disable.

SENSOR SUPPLY

24V DC supply to power the sensor (30mA)

LINEAR DC OUTPUT

Re-transmission : 0 to 20mA / 4 to 20 mA or
0 to 10V / 0 to 5V (Programmable)
Update rate : 100msec.
Accuracy: 0.25% of FS

ENVIRONMENTAL CONDITIONS

Operating Range : 0°C to 50°C
Storage Range : -20°C to 75°C
Humidity : 85% max.

ISOLATION BREAKDOWN RATINGS

AC line with respect to all inputs and outputs : 2000 Volts. All other inputs and outputs with respect to relay contacts : 2000V AC

CONNECTION

Wire clamping screw terminals

WEIGHT

220 grams

SAFETY PRECAUTIONS

All safety related codifications ; symbols and instructions that appear in this operating manual or on the equipment must be strictly followed to ensure the safety of the operating personnel as well as the instrument.

If the equipment is not handled in a manner specified by the manufacturer it might impair the protection provided by the equipment.

⚠ **CAUTION :** Read complete instructions prior to installation and operation of the unit.

⚠ **CAUTION :** Risk of electric shock.

WIRING GUIDELINES

⚠ **CAUTION :**

1. To prevent the risk of electric shock power supply to the equipment must be kept OFF while doing the wiring arrangement.
2. Wiring shall be done strictly according to the terminal layout with shortest connections. Confirm that all connections are correct.
3. Use lugged terminals to meet M3 screws.
4. To eliminate electromagnetic interference use of short wire with adequate ratings and twists of the same in equal size shall be made.
5. Cable used for connection to power source, must have a cross section of 1mm² or greater. These wires shall have insulation capacity made of at least 1.5KV.

MAINTENANCE

1. The equipment should be cleaned regularly to avoid blockage of ventilating parts.
2. Clean the equipment with a clean soft cloth. Do not use Isopropyl alcohol or any other cleaning agent.

INSTALLATION GUIDELINES

⚠ **CAUTION :**

1. This equipment, being built-in-type, normally becomes a part of main control panel and in such case the terminals do not remain accessible to the end user after installation and internal wiring.
2. Conductors must not come in contact with the internal circuitry of the equipment or else it may lead to a safety hazard that may in turn endanger life or cause electrical shock to the operator.
3. Circuit breaker or mains switch must be installed between power source and supply terminals to facilitate power 'ON' or 'OFF' function. However this switch or breaker must be installed in a convenient position normally accessible to the operator.

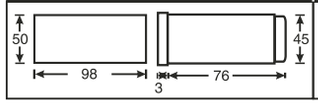
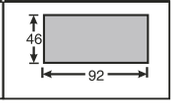
⚠ **CAUTION :**

1. The equipment shall not be installed in environmental conditions other than those mentioned in this manual.
2. Fuse Protection : The equipment does not have a built in-type fuse. Installation of external fuse of rating 275V AC/1Amp for electrical circuitry is highly recommended.
3. Thermal dissipation of equipment is met through ventilation holes provided on chassis of equipment. Such ventilation holes shall not be obstructed else it can lead to a safety hazard.
4. The output terminals shall be strictly loaded to the manufacturer specified values/range.

MECHANICAL INSTALLATION

For installing the controller

1. Prepare the panel cutout with proper dimensions as shown

OUTLINE Dimensions (in mm)	PANEL CUTOUT Dimensions (in mm)
	

2. Remove clamp from the controller and push the controller into the panel cutout. Secure the controller in its place by pushing the clamp on rear side.
3. For proper sealing, tighten the screws evenly with required torque.

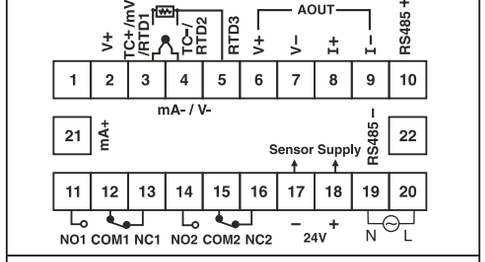
⚠ **CAUTION:**
The equipment in its installed state must not come in close proximity to any heating sources, caustic vapors, oils, steam, or other unwanted process by-products.

EMC Guidelines:

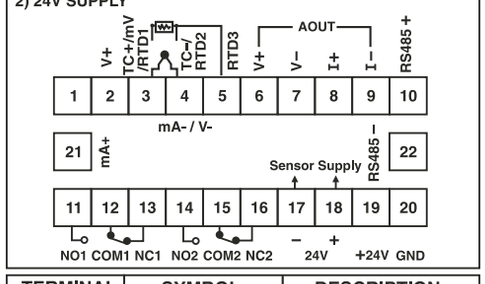
1. Use proper input power cables with shortest connections and twisted type.
2. Layout of connecting cables shall be away from any Internal EMI source.

TERMINAL CONNECTIONS

1) 230V SUPPLY

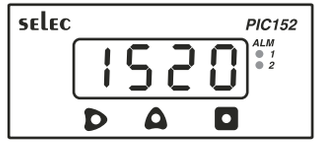


2) 24V SUPPLY



TERMINAL	SYMBOL	DESCRIPTION
2	V+	Signal I/P 0 to 10 V
3	TC+/RTD1/mV	Thermocouple I/P +
4	TC- / mA-/V-/RTD 2	Thermocouple I/P -
5	RTD 3	Terminal for 3wire RTD
6	V+(Aout)	Analog VTG O/P (+)
7	V-(Aout)	Analog VTG O/P (-)
8	I+(Aout)	Analog CURR O/P (+)
9	I-(Aout)	Analog CURR O/P (-)
10	RS485+	RS485 Communication (+)
11	NO1	NO of Relay 1
12	COM1	COM of Relay 1
13	NC1	NC of Relay 1
14	NO2	NO of Relay 2
15	COM2	COM of Relay 2
16	NC2	NC of Relay 2
17	Sensor Supply (-)	-Ve of Sensor Supply
18	Sensor Supply (+)	+Ve of Sensor Supply
19	N	Neutral
20	L	Live
21	mA +	Signal input 0-20mA
22	RS485-	RS485 Communication (-)

FRONT PANEL DESCRIPTION



Functions	Key press
To enter or exit program mode	Press for 3 seconds
To change levels.	Press Once
To increase or decrease the value of a particular function.	
To view next function.	key once

NOTE : The unit will autoexit program mode after 60 seconds of inactivity.

PROGRAMMING OF LEVELS

PROGRAMMING OF LEVEL 0

KEY PRESS	DISPLAY	DESCRIPTION
Press	For 3 Sec	LUL.0

Press key to select input sensor type

Default setting : J

Display	inP	for 1sec	**Input sensor selection**
	J		J (-200 to 750°C)
Press	K		K (-200 to 1350°C)
Press	t		T (-200 to 400°C)
Press	r		R (0 to 1750°C)
Press	S		S (0 to 1750°C)
Press	P100		PT100 (-100 to 850°C)
Press	mU		mV (linear) -5 to 56mV
Press	VOLt		10V DC
Press	CURr		20mA DC

FUNCTIONS MENU

To change levels press

LVL.0 — INPUT PARAMETERS (to scroll through functions press ◘)

Display	Parameter
INP	Input type
UNIT	Temp. Unit
RESL	Resolution
FTC	Filter time constant
BIAS	PV Bias
d.SC.L	Display scaling (low)
I.SC.L	Input scaling (low)
d.SC.H	Display scaling (high)
I.SC.H	Input scaling (high)
r.SCI	Reverse scaling
SPHL	S.P. High limit
SPLL	S.P. Low limit
LOCK	Lock code
rSt	Reset

LVL.1 — ALARM MODULE (ALARM 1) (to scroll through functions ◘)

Display	Parameter
HA	Alarm high limit
LA	Alarm low limit
HYST	Alarm hysteresis
dLY	Delay
MOdE	Alarm mode
LtCH	Latch
HOLd	Hold
rLY	Alarm status
ANN	Alarm annunciator

LVL.2 — ALARM MODULE (ALARM 2) (to scroll through functions ◘)

Display	Parameter
HA	Alarm high limit
LA	Alarm low limit
HYST	Alarm hysteresis
dLY	Delay
MOdE	Alarm mode
LtCH	Latch
HOLd	Hold
rLY	Alarm status
ANN	Alarm annunciator

LVL.3 — ANALOG O/P MODULE (to scroll through functions ◘)

Display	Parameter
tYPE	Analog output type
MANL	Manual
A-LO	Lower limit
A-HI	Upper limit
S.ERR	Sensor error level
PtAG	Analog output %

LVL.4 — *COMMUNICATION MODULE (to scroll through functions ◘)

Display	Parameter
Add	Address
bAUd	Baud Rate
PARI	Parity

LVL.5 — LOCK LEVEL (to scroll through functions ◘)

Display	Parameter
Id	ID
LV-0	Lock Level 0
LV-1	Lock Level 1
LV-2	Lock Level 2
LV-3	Lock Level 3

☞ Appearance of all shaded menus dependent on selection of other parameters. Refer programming for further details.
*-Applicable only for Communication models.

KEY PRESS	DISPLAY	DESCRIPTION
Press ◘ key to select Temperature unit Default setting : °C NOTE : This parameter is not prompted if analog input is selected.		
		Temperature Unit
Display	UNIt	for 1 sec.
	°C	Value displayed in °C
Press ▲	°F	Value displayed in °F
Press ◘ key to select Resolution Default value : 1 NOTE : This parameter is not prompted if input is R, S type thermocouple.		
		Resolution
Display	RESL	for 1 sec.
	1	Range : 1 / 0.1 for TC / RTD
Press ▲	0.1	1 / 0.1 / 0.01 / 0.001 for AIN
Press ◘ key to select Filter time constant Default value : 1sec.		
		Filter time constant *
Display	FtC	for 1 sec.
Press ▲ to change value	1	Range : 1 to 99 sec.

KEY PRESS	DISPLAY	DESCRIPTION
Press ◘ key to select PV bias Default value : 0.0		
Display	bIAS	for 1 sec. **PV bias ***
Press ▲ to change value	0.0	Range : 1)-20.0 to 20.0 (For TC/RTD) 2)-20.0 to 20.0 (For V/I/mV) Independent of Decimal Point
Press ◘ key to select Display value scaling point1 Default value : 0 NOTE : This parameter is not prompted if TC/RTD input types are selected		
		Display value scaling point low (DSCL) *
Display	d.SC.L	for 1sec
Press ▲ to change value	0	Range : -1999 to DSCH For AIN display as per decimal point selected.

KEY PRESS	DISPLAY	DESCRIPTION
Press ◘ key to select input value scaling point 1 Default value : 0.00 NOTE : This parameter is not prompted if TC/RTD input types are selected		
		Input value scaling point low (ISCL) *
Display	I.SC.L	for 1sec.
Press ▲ to change value	0.00	Range : 0.0mA / -5mV / 0.0 V to ISCH (default value changes as per analog input selected)
Press ◘ key to select Display value scaling point 2 Default value : 9999 NOTE : This parameter is not prompted if TC/RTD input types are selected		
		Display value scaling point high (DSCH) *
Display	d.SC.H	for 1sec.
Press ▲ to change value	9999	Range : DSCL to 9999 For AIN display as per decimal point selected.

Note : * mark explained in the user guide.
AIN - Analog Input

KEY PRESS	DISPLAY	DESCRIPTION
Press ◘ key to select Input value scaling point 2 Default value : 20.0mA NOTE : This parameter is not prompted if TC/RTD input types are selected		
		Input value scaling point high (ISCH) *
Display	I.SC.H	for 1 sec.
Press ▲ to change value	20.00	Range : ISCL to 20.00mA / 56mV / 10.00V (default value changes as per analog input selected)
Press key to select Reverse scaling Default setting : NO NOTE : This parameter is not prompted if TC/RTD input types are selected		
		Reverse scaling*
Display	r.SCL	for 1 sec.
	NO	The display scaling point settings can be reversed by selecting Reverse scaling as YES
Press ▲	YES	
Press ◘ key to select Set point high limit Default value : 750°C		
		Set point high limit (SPHL)
Display	SPHL	for 1sec
Press ▲ to change value	750	Range : SPLL to max. range of sensor (for TC/RTD) SPLL to DPSH (for AIN) for AIN display as per decimal point selected.

KEY PRESS	DISPLAY	DESCRIPTION
Press ◘ key to select Set point low limit Default value : -200°C		
		Set point low limit (SPLL)
Display	SPLL	for 1sec
Press ▲ to change value	-200	Range : min. range of sensor to SPHL (for TC/RTD) DSCL to SPHL (for AIN) for AIN display as per decimal point selected.
Press ◘ key to select Lock code Default setting : 0		
		Lock code
Display	LOCK	for 1sec
Press ▲ to change value	0	Range : 0 to 9999 **Note:** This code is need in Level 5
Press ◘ key to select Reset Default setting : NO		
		Reset
Display	rSt	for 1sec
	NO	All parameters set to factory setting
Press ▲	YES	

NOTE : After altering the value of the input parameters press ◘ for change to actually take effect.

NOTE : Programming steps for Level1 (Alarm1 module**) & Level2 (**Alarm2 module**) is same.** Programming of level1 is shown.

PROGRAMMING OF LEVEL 1

Press + ▲ till Level 1 is displayed

KEY PRESS	DISPLAY	DESCRIPTION
	LVL 1	Parameters in this level can be set.
Press ◘ key to select Alarm high limit Default value : 750°C NOTE : This parameter is not prompted if alarm mode is OFF / FdA / FOA / LA		
		Alarm high limit
Display	HA	for 1sec
Press ▲ to change value	750	Range : LA to SPHL (BAND mode) SPLL to SPHL (HA mode) for AIN display as per decimal point selected.
Press ◘ key to select Alarm low limit Default value : -200°C NOTE : This parameter is not prompted if alarm mode is OFF / FdA / FOA / LA		
		Alarm low limit
Display	LA	for 1sec
Press ▲ to change value	-200	Range : SPLL to HA (BAND mode) SPLL to SPHL (LA mode) for AIN display as per decimal point selected.

Press key to select Alarm hysteresis.
Default value: 1.0
NOTE : This parameter is not prompted if alarm mode is OFF / FdA / FOA

Display HYSt for 1sec
Press to change value 1.0 Range: 0.1 to 99.9 °C (for TC/RTD) 1 to 999 (for analog input) for AIN display as per decimal point selected.

Press key to select Delay.
Default setting : 0.0

Display dLY for 1sec
Press to change value 0.0 Range :0.0 to 99.59 min:sec

KEY PRESS	DISPLAY	DESCRIPTION

Press key to select Alarm mode.
Default setting : HA
In **level 2** default setting is LA

Alarm mode *

Display MODE for 1sec
OFF Alarm off
Press HA High Alarm
Press LA Low Alarm
Press bAnd Band Alarm
Press FOA Fail Output Alarm

Press key to select Alarm latch status.
Default setting : OFF
NOTE : This parameter is not prompted when alarm mode is OFF

Latch alarm*

Display LtCH for 1 sec.
Press OFF / ON When latch is ON Alarm status will be preserved at any process condition.

Press key to select Alarm hold status.
Default setting : OFF
NOTE : This parameter is not prompted if alarm mode is OFF

Hold Alarm*

Display HOLd for 1 sec.
Press OFF / ON Used to avoid alarm at power ON. Alarm is enabled only after the process value has reached the set point.

Press key to select Relay status for alarm1.
Default setting : EN
NOTE : This parameter is not prompted when alarm mode is OFF

Relay status for Alarm1

Display rLY for 1 sec.
Press EN Relay Energized.
dEN Relay De - energized

Press key to select Alarm annunciator.
Default setting : OFF
NOTE : This parameter is not prompted if alarm mode is OFF

Alarm annunciator*

Display ANN for 1 sec.
OFF OFF No annunciator
Press LEd LEd LED of alarm1 blinks at the rate of 0.2sec
Press dSP dSP LED blinking ; display flashing b/w PV and message (ALRM) at 1 sec.

NOTE : Applicable only if Analog output is available.

PROGRAMMING OF LEVEL 3

Press till Level 3 is displayed

KEY PRESS	DISPLAY	DESCRIPTION
	LUL.3	Parameters in this level can be set.

Press key to select Analog output type.
Default setting : 10U

Type

Display tYPE for 1sec Used to set analog o/p type
10U V Output:- 0 to 10V
Press 5U V Output:- 0 to 5V
Press 0mA I Output:- 0 to 20mA
Press 4mA I Output:- 4 to 20mA

Press key to select Manual.
Default setting : OFF

Manual

Display mANL for 1sec
OFF Used to set manual output On / Off.
Press ON

Press key to select Analog low scaling point
Default value : -9999
NOTE : This parameter is prompted only if manual is OFF

Low scaling point

Display A-LO for 1sec
Press to change value -1999 Programmable from -1999 to 9999. Fixed 1°C resolution for TC / RTD. For AIN display as per decimal point selected.

Press key to select Analog high scaling point
Default value : 9999
NOTE : This parameter is prompted only if manual is OFF

High scaling point

Display A-HI for 1 sec.
Press to change value 9999 Programmable from -1999 to 9999 Fixed 1°C resolution for TC / RTD. For AIN display as per decimal point selected.

Press key to select Sensor error level
Default setting : HIGH

Sensor error level

Display S.ErR for 1 sec.
HIGH Incase of sensor failure the output can be set to high or low value of range.
Press LOW

Press key to select Analog output %.
Default setting : 0.0
NOTE : This parameter is prompted only if manual is ON

Analog output %

Display PtAG for 1 sec.
Press to change value 0.0 Programmable from 0.0 to 100.0

PROGRAMMING OF LEVEL 4

Press till Level 4 is displayed

KEY PRESS	DISPLAY	DESCRIPTION
	LUL.4	Parameters in this level can be set.

Press key to select Address
Default Value : 001

Address

Display Add
Press to change value 247 Programmable from 0 to 247.

Press key to select Baud rate
Default Value : 9600

Baud rate

Display bAUd
Press to change value 9600 Programmable from 2400 to 115k

Press key to select Parity.
Default setting : None

Parity

Display NONE for 1sec
Press Odd for odd parity
Press EVEN for even parity

PROGRAMMING OF LEVEL 5

Press till Level 5 is displayed

KEY PRESS	DISPLAY	DESCRIPTION

Press key to select Address
Default Value : 001

ID

Display Id for 1sec
Press key to change value 0000 Programmable from 0000 to 9999
Note: This ID should match with the lock code set in Level 0.

Press key to select Level lock
Default Value : Full

Display LK-0 for 1sec
Press key FULL for select full mode
Press key REAd To select Read only mode
Press key LOCK To lock the level.
Display LK-1 for 1sec
Press key FULL for select full mode
Press key REAd To select Read only mode
Press key LOCK To lock the level.

Note: Programming steps are same for LK-2, LK-3 and LK-4.

USER GUIDE

ALARM MODES

High Alarm:
The alarm is turned ON when PV rises above a preset value.

Low Alarm:
The alarm is turned ON when PV falls below a preset value.

Band Alarm:
The alarm is turned ON when PV rises above or falls below a preset value.

Fail Output Alarm:
The alarm is turned ON in case of :
a) measurement value exceeds range
b)Sensor reverse condition(applicable for TC/RTD).

Latch Alarm:
This function is used to latch the alarm. When activated, the alarm is latched until it is acknowledged manually, even though the alarm condition may have disappeared.

Hold Alarm:
When hold is selected, in any alarm mode, it prevents an alarm signal on power-up. The alarm is enabled only if the process temperature is within alarm range.

Alarm display options :

(1) Press the key to view the status of alarm1
(2) Press the key to view the status of alarm2

Only the alarms that are active can be viewed.
Alarm status (e.g : of alarm 1) will be displayed as follows:
LA-1 for low alarm, HA-1 for high alarm,
FO-1 for Fail output alarm.
(3) Press to acknowledge the particular alarm
(Alarm will be acknowledged only if latch ON).

FILTER TIME CONSTANT :

The filter is an adaptive digital filter that discriminates between measurement noise and actual process changes. If the signal is varying too greatly due to measurement noise, increase the filter value. If the fastest controller response is needed, decrease the filter value.

BIAS :

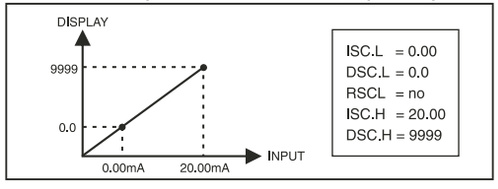
This value offsets the indicator's PV display value by the entered amount. This is useful in applications in which the sensor cannot provide the actual temperature signal due to mounting constraints, inaccuracy etc.

SCALING FOR ANALOG INPUT :

To scale the controller, two scaling points are necessary. Each scaling point has a coordinate pair of Display Values and Input Values. It is recommended that the two scaling points be at the low and high ends of the input signal being measured. Process value scaling will be linear between and continue past the entered points to thelimits of the input range.

(Factory settings example will display 0.0 at 0mA input and display 9999 at 20.00mA input.) Reverse acting indication can be accomplished by setting reverse scaling parameter as YES. In this case referring the above eg. For 0.00mA input the display will show 9999 and 20.00mA input the display will show 0.0.

NOTE : This change will not be visible in the programming menu.



SETTING FOR MANUAL OUTPUT MODE :

KEY PRESS	DISPLAY	DESCRIPTION
Eg. For 0-10V if constant 5V output Voltage is desired then setting for manual output :		
Press key to enter into mode.		
Press key till	LUL.3	
Press	TYPE	display
Press	10V	(for Selection of voltage/ Current)
Press	MANL	display
Press	ON	(Selection for manual output mode)
Press	PALG	
Press	50.0	Adjust the display to 50.0 to get 5V at output

SETTING FOR RETRANSMISSION MODE

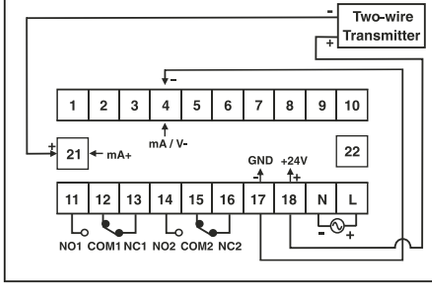
Eg. : 1) For Temperature Input :
Input : RTD Input
Retransmission output : 0 - 20 mA
Desired output : 0mA at 0°C, 20mA at 400°C
Settings :

Press	LUL.0	
Press	INP	
Using	P100	Select the Input type as RTD
Press till	LUL.0	is displayed
Press till	LUL.3	is displayed
Press	TYPE	display momentarily
Press	OMA	Select Analog output type
Press	MANL	display momentarily
and then display	OFF	(Selection for retransmission mode)
Press	A-LO	
Press	0	Adjust the display to 0
Press	A-HI	

KEY PRESS	DISPLAY	DESCRIPTION
Press	400	Adjust the display to 400
Press		
Eg. : 2) For analog Input (0-10V):		
Retransmission output : 4 - 20 mA		
Desired output : 4mA at 0V ; 20mA at 10V		
Input Scaling : 0V - 0 ; 10V - 400		
Settings :		
Press	LUL.0	
Press	INP	
Using	VOLT	Select the Input type as voltage
Press until	d.SC.L	is displayed
Using	0	Adjust the display to 0
Press	I.SC.L	
Press	0.00	Adjust the display to 0
Press	d.SC.H	
Press	400	Adjust the display to 400
Press	I.SC.H	
Press	10.0	Adjust the display to 10
Note : By default the display will be 10.00 for 0-10V Input		
Press		
Setting for Retransmission :		
Press till	LUL.3	
Press	TYPE	display momentarily
Press	4mA	Select Analog output type
Press	MANL	displays momentarily
and then display	OFF	
Press	A-LO	
Press	0	Adjust the display to 0
Press	A-HI	
Press	400	Adjust the display to 400
Press		

CONNECTION WITH 2-WIRE TRANSMITTER

Connection with Internal 24V DC supply :
Eg : To give 0-20mA/4-20mA DC analog input



CALIBRATION CERTIFICATE

Date:

Model No:_____

Sr. No.:_____

Claimed Accuracy : ± 0.25 % of full scale ± 1 digit
(After 20min warmup time)

The calibration of this unit has been verified at the following values :

SENSOR	CALIBRATION TEMP. (°C) (0.1Resolution)	DISPLAY VALUE (°C)
K	35.0	35.0
	700.0	700.0
	1350	1350
PT100	0.0	0.0
	500.0	500.0
	800.0	800.0

SENSOR	CALIBRATION VALUE (0.1Resolution)	DISPLAY VALUE
Voltage (VDC)	0.0	0.0
	10.0	10.0
Current (mA)	0.0	0.0
	20.0	20.0

The thermocouple / RTD curves are linearised in this microprocessor based product; and hence the values interpolated between the readings shown above are also equally accurate; at every point in the curve.

Unit is accepted as accuracy is within the specified limit of claimed accuracy and certificate is valid up to one year from the date of issue

CHECKED BY :

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(Specifications subject to change as development is a continuous process.)

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