Temperature Indicator With Alarm

SPECIFICATIONS

Table 1.1

Input type	Range	Input type	Range
E	-200.0 to 1000.0 °C	0-2 V	
J	-200.0 to 1200.0°C	0.4 – 2V	
K	-200.0 to 1350.0°C	± 10V	
T	-200.0 to 400.0°C	0-10 V	
B	450.0 to 1800.0°C	-10-20mV	-19999 to 99999
R	0.0 to 1750.0°C	± 75 mV	
S	0.0 to 1750.0ºC	0-75 mV	
Pt 100	-199.9 to 850.0 ºC	0-400Ω	
4-20 mA		0-6000Ω	
0-20 mA	-19999 to 99999		
0-5 V		PV Write Facility	-19999 to 19999
1-5 V			

*Use external 250ohms, 0.1% for current Input

Inputs

Accuracy T/C,RTD & Linear	± (0.1% of Full Span ± 1 count)
Resolution	ADC: 17 bits,Display :0.1°C/1Count
Sampling Rate	4 Samples/Sec
CJC Error	±2.0 °C
Sensor Burnout current	0.5uA (Approx.)
RTD excitation current	0.8mA (Approx.)
Repeatability	0.05% of FS
Response time	< 1000ms
Allowable wiring resistance for RTD	Maximum 15 ohms/wire (Conductor resistance between three wires should be equal)
NMRR	> 40 dB
CMRR	>100 dB
Input Impedance	1MΩ(Approx.) for TC,RTD,0-2V, 0.4-2V,0-75mV, ±75mV,0-400Ω 220 kΩ for 0-10V, ±10V 440 kΩ for 0-5V, 1-5V, 0-6000 Ω 250Ω for 0-20mA,4-20mA
Max Voltage	20VDC

Display & Keys

PV Display	5-Digit, 7-Segment, 0.56" High, Red
Status Indication	Individual RED Led for Alarm & Communication Status
Keys	Menu, Enter, Increase, Decrease

Output Types
Retransmission Output

Output Signal	
DC Current	4-20mA/ 0-20mA
DC Voltage	0 to 10 V , 0 to 5V , 1 to 5V
Load resistance	
For Current o/p	<500Ω
For Voltage o/p	>2KΩ
Output accuracy	±0.25% of FS

Alarm Output

Relays	2 Nos.
Type	Single Change over (C, NO, NC)
Rating	5A @ 230VAC / 30VDC

Loop Power Supply

Supply Voltage	24VDC (±10%) @26mA

Communication Details

Communication	
Interface	RS485 (2 Wire)
Protocol	Modbus-RTU
Baud rate	4800,9600, 19200, 38400 bps

Physical

Dimension (H x W x D) mm	48 x 96 x 112
Front Bezel (H x W)mm	48 x 96
Panel Cutout mm	92x 46
Depth Behind Panel mm	100
Weight Approx.	260g.
Enclosure Material	ABS Plastic
Enclosure Protection	IP 20
Terminal Cable Size	2.5mm²

Environmental Conditions

TEMPCO	
Input to PV Display	< 100ppm
Display to RX	< 100ppm
Humidity	20% to 95% RH (Non-Condensing)
Ambient temperature	0 to 55°C
Storage Temperature	0 to 80°C

Power Supply

| Standard	85-265VAC/ 100-300VDC
Optional	18-36VDC
Power consumption	<10 VA

Isolation (Withstanding voltage)

- Between primary terminals* and secondary terminals**: At least 1500 V AC for 1 minute
- Between primary terminals* and grounding terminal: At least 1500 V AC for 1 minute
- Between grounding terminal and secondary terminals**: At least 1500 V AC for 1 minute
- Between secondary terminals**: At least 500 V AC for 1 minute

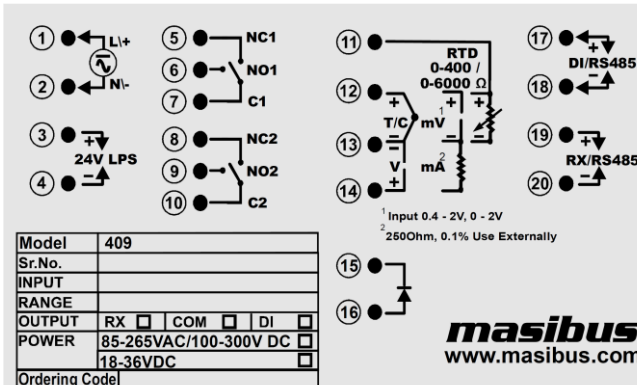* Primary terminals indicate power terminals and relay output terminals.

** Secondary terminals indicate analog I/O signal and Communication O/P.

Insulation resistance: 20MΩ or more at 500 V DC between power terminals and grounding terminal.
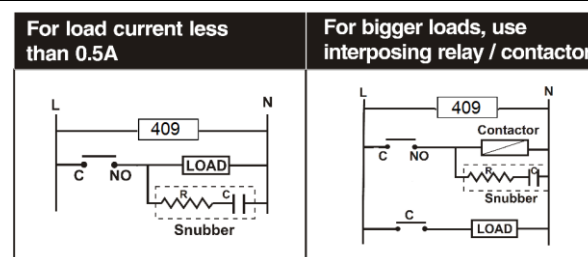
MOUNTING DETAILS

MOUNTING DETAIL

All units are in mm.
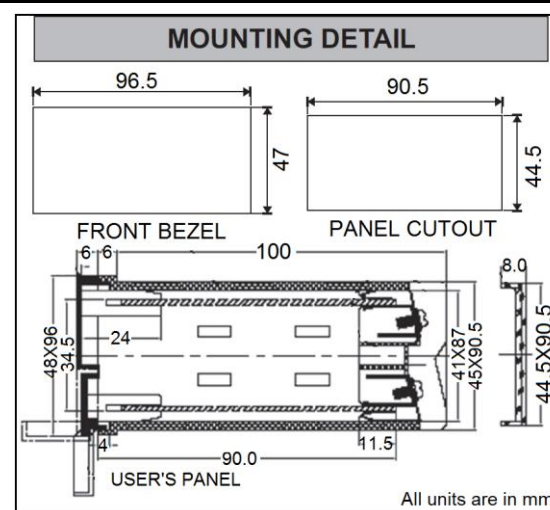
TERMINAL CONNECTION

LOAD CONNECTION

Electrical precautions during use
Electrical noise generated by switching of inductive loads can create momentary disruption, erratic display, latch up, data loss or permanent damage to the instrument. Use of snubber circuits across loads as shown above, is recommended.

FRONT PANEL DESCRIPTION

Symbol	Function
⊡	It is used to come out from the main or sub menu.
↻	It is used to select the desired parameter in various operating Mode. After setting the data to proper value, by increment or decrement key, it is used to enter the value of the selected parameter in memory. It is used as an acknowledgement key for Latching of alarm in Run mode.
⬆	It is used to increment the parameter for selection. Value of Parameter can be incremented by pressing this key. If the key is pressed continuously for more than 10 counts change, the rate of increment will be made faster. This facility is to allow faster data change for higher values.
⬇	It is used to decrement the parameter for selection. Value of parameter can be decremented by pressing this key. If the key is pressed continuously for more than 10 counts change, the rate of decrement will be made faster. This facility is to allow faster data change for higher values. User presses during RUN mode for Thermocouple input it shows ambient value.
PV	5 digit 0.56 inch RED Display. Display process value. Display parameter name when user set parameter. Display error message when an error occurs.
AL1	When alarm occurs respective alarm lamp will on.
AL2	When alarm occurs respective alarm lamp will on.
Tx	ON when device is transmitting Data (RS-485).
Rx	ON when device is receiving Data (RS-485).

ORDERING CODE

MODEL		INPUT			DIGITAL INPUT*		POWER SUPPLY		COMMUNIC-ATION		RETRANSMIS-SION O/P	
409	1	E	F	0-5V	N	None	U1	85-265VAC/ 100-300VDC	N	NONE	N	None
	2	J	G	0-10V	Y	Yes			Y	RS485	C	4-20mA
	3	K	H	0-2 V			U2	18-36VDC			D	0-20mA
	4	T	I	0.4 – 2V							E	1-5V
	5	B	R	±75mV							F	0-5V
	6	R	U	0-75mV							G	0-10V
	7	S	V	0-400Ω								
	9	PT-100	W	0-6000Ω								
	C	4-20 mA	M	Serial RS 485#								
	D	0-20mA	S	Special								
	E	1-5V										

* If Digital input is Yes, Retransmission o/p is not possible.

When Serial input type is selected, RS485 o/p needs to be selected.

SAFETY/WARNING PRECAUSTIONS

To ensure that the device can be operated safely and all functions can be used, please read these instructions carefully.

Installation and Start-up must be carried out by qualified personnel only.

The relevant county-specific regulations must also be observed.

Before start-up it is particularly important to ensure:
• Terminal wiring: check that all cables are correctly connected according to the connection diagram
• All wiring must confirm to appropriate standards of good practice and local codes and regulations. Wiring must be suitable for voltage, current and temperature rating of the system.
• Unused control terminals should not be used as jumper points as they may be internally connected, which may cause damage to the unit.

PARAMETER SETTING

Following parameters can view or change during run time.

• For Thermocouple input type, Press ⬇ key to show ambient temperature

• Press ⬇ and ⬆ keys simultaneously will ask to enter password. On entering correct password, It will show OP after that press 🔳 key unit will show parameters.

• Following parameters can be viewed using ⬆ or ⬇ Key.

Its value can be viewed using 🔄 key and it can be changed using ⬆ or ⬇ Keys.

Display	Name	Description	Default Value
INPUT (INPUt)	INPUT Type	Set PV input type tC E/tC J/tC P/tC t/tC b/tC r/tC S/Pt 100 /0- 6V/1- 10u /0- 10u /0-5u /1-5u /0-2u /.4-2u /-10-20u/ 1-75/0-75 /SErL / 4-20 / 0-20	1-5u
*DP (dP)	Decimal Point	Set position of Decimal Point on Display. 0/ .0/ .00/ .000/ .0000	.0
ZERO (ZEro)	Zero	Can be set to any value within the Input Range & less the SPAN Value.	-1999 .9
SPAN (SPAn)	Span	Can be set to any value within the Input Range & greater the ZERO Value.	9999 .9
*INLO (inLo)	Input Low Value	Can be set to any value within the Input Range & less the SPAN Value.	1 .000 (1-5V)
*INHI (inh i)	Input High Value	Can be set to any value within the Input Range & greater the ZERO Value.	5 .000 (1-5V)
CALIB (CAL ib)	Calibration Input	Calibration Menu CALS/CAL2/CALA	-
*CALZ (CAL2)	Calibration Zero	Calibration Zero for PV Input	-
CALS (CALS)	Calibration Span	Calibration Span for PV Input	-
$CALA (CALA)	Calibration Ambient	Ambient Adjustment	-

RETRN (rEtrn)	Retransmission	Retransmission menu rEtu/rEtmA/rCAL	-
RET V (rEt u)	Retransmission Voltage	Set Voltage o/p 0- 10u/0-5u/ 1-5u	0- 10u
RETMA (rEtmA)	Retransmission Current	Set Current o/p 0-20/4-20	0-20
R CAL (r CAL)	Retransmission Calibration	Retransmission Calibration Menu rtN 2/ rtN S	-
RTN Z (rtN 2)	Retransmission Zero	Calibration Zero for Retransmission o/p	0 .000 (RET is 0-10V)
RTN S (rtN S)	Retransmission Span	Calibration Span for Retransmission o/p	10 .000 (RET is 0-10V)
ALARM (ALArn)	Alarm Parameter	Alarm Menu AtYPE /SELCt/LAtCH/HYSt/S ENSr/SEtP 1/SEtP2/rL dLY/CtrLY	-
ATYPE (AtYPE)	Alarm Type	Set Alarm Type hh/hL/LL	LL
SELCT (SELCt)	Select Alarm no.	Select Alarm No AL 1/AL2	AL 1
AL1 (AL 1)	Alarm 1 type	Set Logic for Alarm1 ALm/tr IP	ALm
AL2 (AL2)	Alarm 2 type	Set Logic for Alarm2 ALm/tr IP	ALm
LATCH (LAtCH)	Latch Option	Select Latch YES/No	no
HYST (HYSt)	Hysteresis	Hysteresis Value for Relay-1 0.0 to 25.5	0 .1
SENSR (SENSr)	Open sensor	Set Alarm o/p and Retransmission state when i/p Open Condition douN/UP	UP
SETP1 (SEtP 1)	Set Point-1	Range Depending on Input Type	10 .0
SETP2 (SEtP2)	Set point 2	Range Depending on Input Type	10 .0
RLDLY (rLdLY)	Relay Delay	Relay Delay 0 to 9999	0
CTRLY (CtrLY)	Control Relay	Set Control Relay on/oFF	oFF
COMUN (ComUN)	Communication Menu	Select Communication Parameter Sr-No/bAUd	-
SR-NO (Sr-No)	Serial No	Unit ID for Communication 1 to 247	1
BAUD (bAUd)	Baud Rate	Set Baud Rate 4800/9600/ 19200/ 38400	9600
DI IP (d I IP)	Digital Input	Digital Input Pu h i /Pu Lo	-
PVHI (Pu h i)	PV high Value	Save Maximum Value of PV	-
PVLO (Pu Lo)	PV Low Value	Save Minimum Value of PV	-
#TOUT (toUt)	Time Out	PV Time Out 1 to 32	1
*SQRT (Sqrt)	Square Root	Square root of PV YES/No	no
FILT (F ILt)	Filter	Digital Filter Value 0 to 60	-
BRIHT (br IHt)	Brightness	Adjust Brightness 1 to 100	100
CHANG	Password	Set device Password	0

(CHANG)		0 to 9999	

*Parameter is only Shows if Input Type is Linear
$ Parameter is only Shows if Input Type is TC
# Parameter is only Shows if Input Type is Serial

When 24V Signal applied momentarily at the DI terminal (or Power OFF) then it will clear both values and same value will be stored in PV HI and in PV LO. Input is OPEN then message OVER will be in PV HI and UNDER will be in PV LO. Note that during power on wait until all functionality initialized otherwise PV HI/LO values will be wrong.

ALARM OPERATION

Alarm type
HH-Very high, high.   AL1- Very high, AL2- high
HL-high, low   AL1-low, AL2-high.
LL-low, Very low   AL1-very low, AL2-low.
This setting is common for all groups.

Status of ALARM/TRIP
It will toggle between ALARM and TRIP depending up on selection in menu. ALARM mode is further subdivided into Alarm with Latch and Alarm without Latch.
TRIP is useful when the relay is used for tripping the plant or device and it is not to be started once again. Open condition is treated as normal condition in TRIP type.

Latching of ALARM
This is used for latching of discrete LEDs and relay status when alarm limit is crossed. This option will keep discrete LEDs/Relay latched even after channel has come to normal status until ENTER (ACK) key is pressed. This option can be changed to YES or NO for enabling or disabling respectively. When configurations of Alarms are of TRIP type, these parameters will be skipped from display.

HH Logic
HH- Very high, high.   AL1- Very high, AL2- high
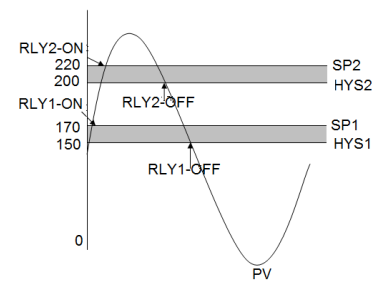
SP2>SP1
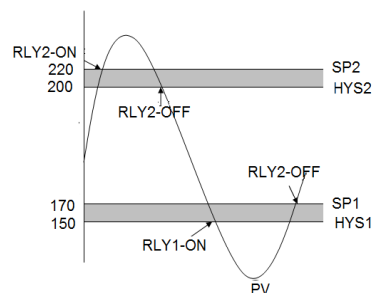If PV>SP1 but, less then SP2 => Relay1- ON, Relay2-OFF.
If PV<SP1-Hyst1 => Relay1-OFF, Relay2-OFF.
PV>SP2 => Relay1 and Relay2 both are ON.
If PV<SP2-Hyst2 but, >SP1 => Relay1-ON, Relay2-OFF.
Depending up on condition set i.e. Latch Yes/No, Acknowledge Yes/No or Trip refer table 1.1,1.2,1.3,1.4 in Annexure-I.

HL Logic
HL-high, low   AL1-low, AL2-high.
SP2>SP1
If PV>SP2 then Relay2-ON.

If PV<SP2-Hyst2 => Relay2-OFF.
PV<SP1 => Relay1 ON.
If PV>SP1+Hyst1 then. Relay 1-OFF.

Depending up on condition set i.e. Latch Yes/No, Acknowledge Yes/No or Trip refer table 1.1,1.2,1.3,1.4 in Annexure-I.
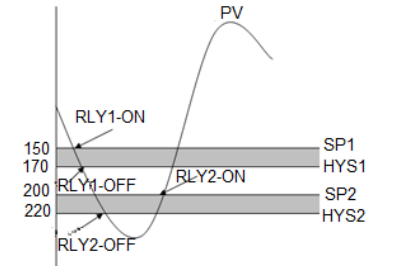
LL Logic
LL-low, Very low   AL1-very low, AL2-low.
SP2>SP1
If PV<SP1 then => Relay 1-ON, Relay 2-ON
Relay 1-ON till   PV>SP1+HYS1 after that Relay 1-OFF.
Relay 2-ON till   PV>SP2+HYS2 after that Relay 2-OFF.

Depending upon condition set i.e. Latch Yes/No, Acknowledge Yes/No or Trip refer table 1.1,1.2,1.3,1.4 in Annexure-I.

Open sensor UP scale/DOWN scale
This is used to define the state of the alarms in OPEN sensor condition. It can be configured as UP Scale or DOWN Scale by keys. This condition works if and only if OPEN sensor condition occurs. Suppose ,UP scale has been selected and "HH" logic is there then during OPEN sensor condition Relay 1 & 2 will be ON and Lamp will be FLASH as shown in table 1.1,1.2,1.3,1.4 in Annexure-I. if DOWN logic is selected then relays and Lamp will be OFF.

HH Logic
HH- Very high, high.   AL1- Very high, AL2- high.
In this logic if "UP Scale" condition has been selected than in OPEN sensor condition ALARM 1 and ALARM 2 will be in the ABNORMAL condition and will work according to the following table 1.1,1.2,1.3,1.4 in Annexure-I. If "DOWN Scale" Condition has been selected for this logic than in OPEN sensor condition ALARM 1 and ALARM 2 will be in the NORMAL State of operation.

HL Logic
HL-high, low   AL1-low, AL2-high.
In this logic if "UP Scale" condition has been selected than in OPEN sensor condition ALARM 2 will be in the ABNORMAL condition and ALARM 1 will be in the NORMAL condition   will work according to the following table 1.1,1.2,1.3,1.4 in Annexure-I. If "DOWN Scale" Condition has been selected for this logic than in OPEN sensor condition ALARM 1 will be in the ABNORMAL condition and ALARM 2 will be in the NORMAL condition and will work according to table 1.1,1.2,1.3,1.4 in Annexure-I.

LL Logic
LL-low, Very low AL1-very low, AL2-low.
In this logic if "UP Scale" condition has been selected than in OPEN sensor condition ALARM 1 and ALARM 2 will be in the NORMAL condition and will work according to the following table 1.1,1.2,1.3,1.4 in Annexure-I. If "DOWN Scale" Condition has been selected for this logic than in OPEN sensor condition ALARM 1 and ALARM 2 will be in the ABNORMAL State of operation

For operation manual please visit www.masibus.com
Specifications are subject to change without notice due to continuous improvements.
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