Quick User Guide

masibus LC5296-XP-AT

FLAMEPROOF AUTO-TUNE PID CONTROLLER
LC5296-XP-AT can be configured as PID or ON-OFF Controller

SPECIFICATIONS

Input type	Range	Input type	Range
PT100 (0.1°C)	-199.9 to 850.0 °C	**B**	450 to 1820°C
		R	0 to 1768°C
PT100 (1°C)	-200 to 850°C	**S**	0 to 1768°C
		***4-20mA /1-5VDC**	-1999 to 9999 (Field Scalable)
E	-200 to 1000°C		
J	-199.9 to 1200°C	***0-20mA /0-5VDC**	
K	-199.9 to 1372°C		
T	-199.9 to 400°C	**0-10VDC**	

*Use external 250ohms, 0.1% for current Input

Table 1.1

Inputs

Accuracy T/C and RTD : Linear :	 ± (0.25% of Full Span ± 1 count) ± (0.1% of Full Span ± 1 count)
Resolution	ADC: 16 bits, Display : 0.1°C/1 Count
Sampling Rate	5 Samples/Sec
CJC Error	±2.0 °C Max
Sensor Burnout current	0.25uA
RTD excitation current	0.166mA (Approx.)
Allowable wiring resistance for RTD	Maximum 15 ohms/wire (Conductor resistance between three wires should be equal)
NMRR	> 40 dB
CMRR	> 120 dB
Input Impedance	> 1MΩ (Voltage Input), 250Ω Current Input)
Max Voltage	20VDC

Display & Keys

PV Display	4-Digit, 7-Segment, 0.56" High, Red
SV Display	4-Digit, 7-Segment, 0.40" High, Green
Status Indication	Individual RED Led for Relay, SSR, Manual & Communication Status
Keys	Auto manual, Enter, Decrease, Increase

Output Types

Relay Output	Relay-1: For PID or ON-OFF Controlling. Used as Alarm-1 Output(Output Type is Linear) Relay-2: Alarm-2 Output
SSR Output	Voltage Pulse Output Available at Terminals of Relay-1
Linear	Available at Terminals of Retransmission-1. Linear
Output	Output Type as per selection in Retransmission-1 Output Type.

At a time unit can support Relay or SSR Output. (Factory settable)

Relay Output

Type	Single Change over Three Terminals (C, NO, NC)
Rating	5A @ 230VAC / 30VDC

Pulse Output (SSR)

Output signal	Voltage Pulse Output, On/Off-condition 11VDC or more / 2VDC or less
Resolution	10 ms

Linear Output

Output Signal	Voltage (0-5VDC, 1-5VDC, 0-10VDC)@3kΩMin Current (4-20mADC, 0-20mADC)@500ΩMax

Retransmission Output

Number of output Linear Output Type Relay/SSR Output Type	 1 (@Retransmission-2)or 2 (@Retransmisswion-1&2)
Output According to	Process Value
Output Signal	4-20mA/ 0-20mA/1-5VDC/ 0-5VDC / 0-10V DC
Load resistance **For Current o/p** **For Voltage o/p**	 <500Ω >3KΩ
Output accuracy	±0.25% of span

Alarm Output

Number of Outputs	2 if Output Type is Linear(@Relay-1&2), 1 if Output Type is Relay or SSR(@Relay-2) Control relays are available as alarm outputs
Type	Three terminals (NC, NO, and C)
Rating	250 V AC or 30 V DC, 5A (resistive load)

Loop Power Supply

Supply Voltage	24VDC (±10%) @26mA

Communication Details

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

Physical

Dimension (H x W x D) mm IIA & IIB IIA , IIB & IIC	 150 x 150 x 120 180 x 165 x 140
Weight (Approx.) IIA & IIB IIA , IIB & IIC	 2.6kg 3.1kg
Enclosure Material	Flameproof (Explosion Proof) Ex-d
Enclosure Protection	IP 66
Gas Groups	IIA, IIB, IIC (optional)
Area Classification	Zone 1 & 2

Environmental Conditions

TEMPCO Input to PV Display Display to RX and Control output	 < 100ppm/°C < 100ppm/°C
Humidity	30% to 95% RH (Non-Condensing)
Instrument Warm-up Time	Approx. 15 minutes
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
Data backup	Non-volatile memory (can be written up to 100000 times)

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.

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.

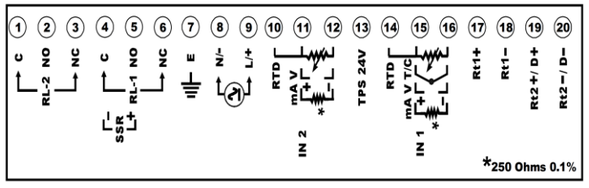
Before start-up it is particularly important to ensure:

• 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.

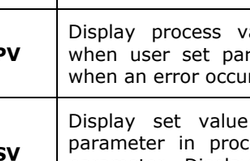
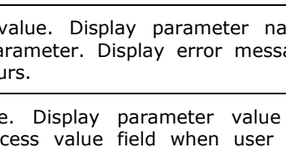
• Unused control terminals should not be used as jumper points as they may be internally connected, which may cause damage to the unit.

TERMINAL CONNECTION



Terminal No.	Description
1 C2 **2 NO2** **3 NC2**	• For Relay-1 potential free Contacts • Terminal 4,5:- SSR Pulse o/p.
4 C1 **5 NO1** **6 NC1**	• For Relay-2 potential free Contacts • Alarm-2 o/p.
7 Earth	Earth Connection
8 N/- **9 L/+**	Power Supply Input
10 C+	For RTD Input (3-wire Compensation)
11 TC+/V+ **12 TC-/V-/LPS-**	For Thermocouple, RTD & Linear Input
13 LPS+	24VDC Loop power supply
14 C+	For RTD Input (3-wire Compensation)
15 TC+/V+	For Thermocouple, RTD & Linear Input
16 TC-/V-/LPS-	
17 Linear O/P +/RTR1+ **18 Linear O/P -/RTR1-**	• For Retransmission-1 output • Linear type Control Output
19 D+/ RTR2+ **20 D- / RTR2-**	• For Retransmission-2 output OR Modbus-RTU Communication Output

LOAD CONNECTION

For load current less than 0.5A	For bigger loads, use interposing relay / contactor
	

Electrical precautions during use

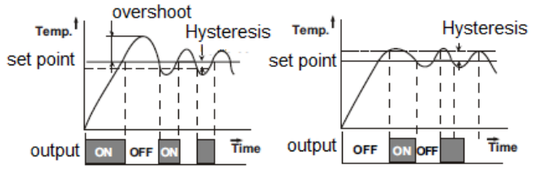
Electrical noise generated by switching of inductive loads can create momentary disruption, erratic display, latch up, data loss or permanent damage to the instrument. Use of snubber circuits across loads as shown above, is recommended.

FRONT PANEL DESCRIPTION

Symbol	Function
	Increment the Value of any Parameter. Shows ambient value for T/C Input in RUN mode. In Manual Mode this key is used to Increment the %Power.
	Decrement the Value of any Parameter. Shows %Power value if Device is in Auto Mode in RUN mode. In Manual Mode this key is used to Decrement the %Power.
	In Sub Menu it can be used to get to the next Parameter. It is also used to save the parameters to nonvolatile memory, for parameter configuration. In RUN mode it shows different set point.
ESC	Get to the Previous Menu level.
A/M	It is used to switch between Auto to Manual mode and Manual to Auto mode if pressed for at least 2 sec if function key is A/M. Shows remaining soak time when pressed if function key is selected SOK.T.
PV	Display process value. Display parameter name when user set parameter. Display error message when an error occurs.
SV	Display set value. Display parameter value of parameter in process value field when user set parameter. Display control output value when in manual mode.
RL1	ON when Relay-1 is energized & OFF otherwise.
RL2	ON when Relay-2 is energized & OFF otherwise.
SSR	SSR ON status.
MAN	ON when unit is in Manual mode, Off Otherwise.
Tx	ON when device is transmitting Data (RS-485).
Rx	ON when device is receiving Data (RS-485).

CONTROL FUNCTION

ON/OFF Control (For L-ON Mode): The relay is 'ON' up to the set temperature and cuts 'OFF' above the set temperature. As the temperature of the system drops, the relay is switched 'ON' at a temperature slightly lower than the set point.



L-ON H-ON

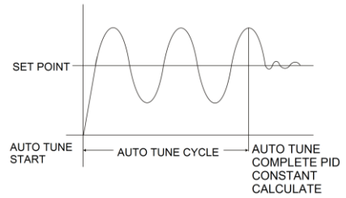
Figure 1.1: Typical Relay operation

HYSTERESIS: The difference between the temperatures at which relay switches 'ON' and at which the relay switches 'OFF' is the hysteresis or dead band.

PID Control

Auto Tuning: The Auto tuning process is performed at set point. Temperature will oscillate around the set point during tuning process. Set a set point to a lower value if overshooting around the normal process value is likely to cause damage. To start the auto tuning process, set the desired set point, select the parameter A.TUN in TUNE menu and set it to YES. During Auto tuning lower display (SV) will flash "AT" message. After auto tune procedure is completed, the message will be removed and controller will revert back to the PID control by using the new calculated PID values. The PID values obtained are stored in the non-volatile memory.

AUTO TUNE FUNCTION:

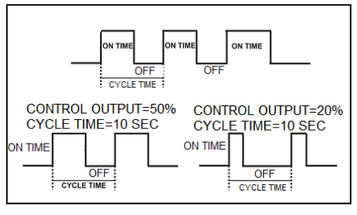


Manual Reset: After some time the process temperature settles at some point and there is a difference between the set temperature & the controlled temperature. This difference can be removed by setting the manual reset value equal & opposite to the offset. Range for the manual reset is -50.0% to +50.0% of proportional band.

Cycle Time: The Cycle time for output is the time where the output is on for percentage of that time and off for a percentage of that time, creating a portioning effect. The cycle time is only used where PI, PD or PID control action is used. The shorter the cycle time, the higher the proportionate resolution is, and better is the control.

For Relay output: Set to 10 to 300 seconds or more

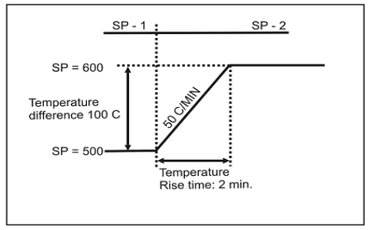
For SSR output: Set to 1 to 60 seconds or more



Ramp and Soak Function:

This function is used to stop the sudden change of set point. The ramp function is performed in following conditions. The target set point is changed. Target set point number is changed. The power is turned ON or the controller is recovered from power failure. A change is made from manual mode to auto mode. When the process value crosses the set point value for the first instant, a "soak period" begins. The ramp function will be performed when ramp unit parameter is selected as **MInR**(minute rate) or **HRR** (hour rate). The ramp rate can be programmed by setting the parameter rmp.r. The Soak rate is programmed by setting sok.r. Soak time will be performed according to s.hod and s.rst. When the soak type is s.hod it will not reset the soak rate when the power is down and when the

Soak type is s.rst it will reset the soak rate when the power is down.



The ramp and Soak function will be cancelled in following conditions.

- A change is made from Auto mode to manual mode.
- Sensor Failure occurs.
- Auto tuning function is activated.

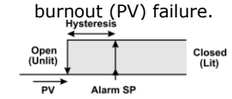
ALARM OUTPUT

Alarm Types:

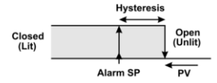
Various alarm operations are shown in the reference figure.

Display message	ALARM TYPE	Display message	ALARM TYPE
none	None	**SP.A.L**	Absolute value set point low alarm
Pv.d.H	Deviation High alarm	**P.S.d.H**	Deviation High alarm with standby
Pv.d.l	Deviation Low alarm	**P.S.d.L**	Deviation Low alarm with standby
Pv.d.r	Deviation High & Low range alarm	**P.S.d.r**	Deviation High & Low range alarm with standby
Pv.d.b	Deviation High & Low Band alarm	**P.S.d.b**	Deviation High & Low limit alarm with standby
Pv.a.H	Absolute value High alarm	**P.S.A.H**	Absolute value High alarm with standby
Pv.A.L	Absolute value Low alarm	**P.S.A.L**	Absolute value Low alarm with standby
SP.A.H	Absolute value set point high alarm	**PV.-E.**	PV error (OPEN /OVER/UNDER)

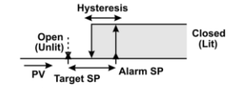
Note**:** The fault diagnosis output turns on in case of input burnout (PV) failure.



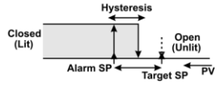
Absolute Value High Alarm
Figure: 1



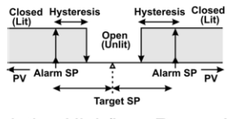
Absolute Value Low Alarm
Figure: 2



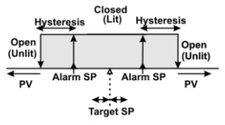
Deviation High Alarm
Figure: 3



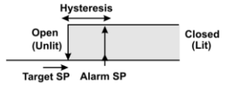
Deviation Low Alarm
Figure: 4



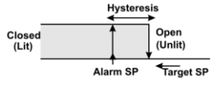
Deviation High/Low Range Alarm
Figure: 5



Deviation High/Low Band Alarm
Figure: 6



Absolute Value Set Point High Alarm
Figure: 7

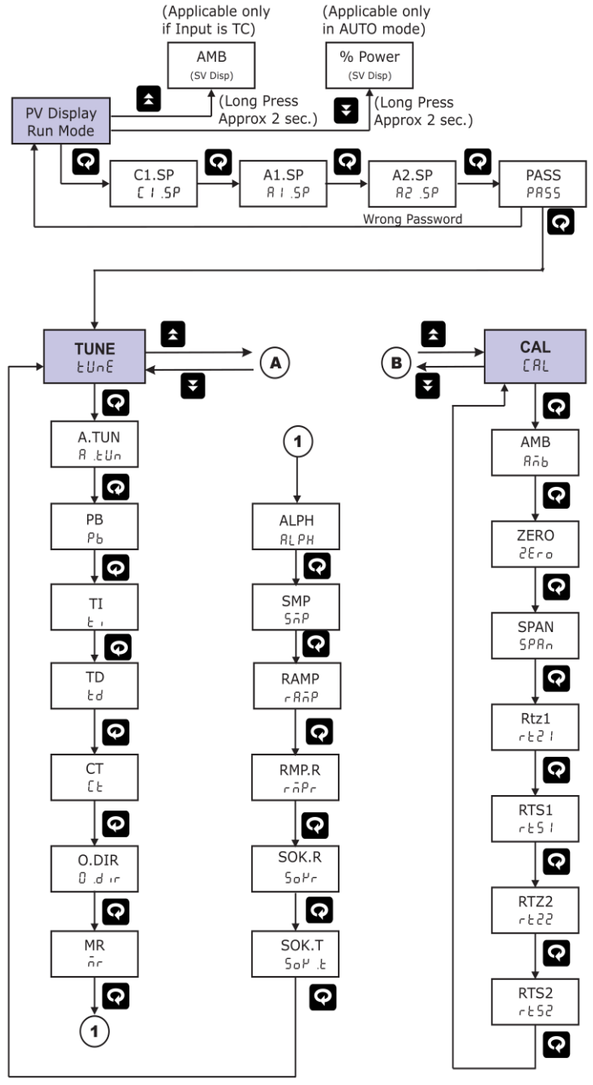


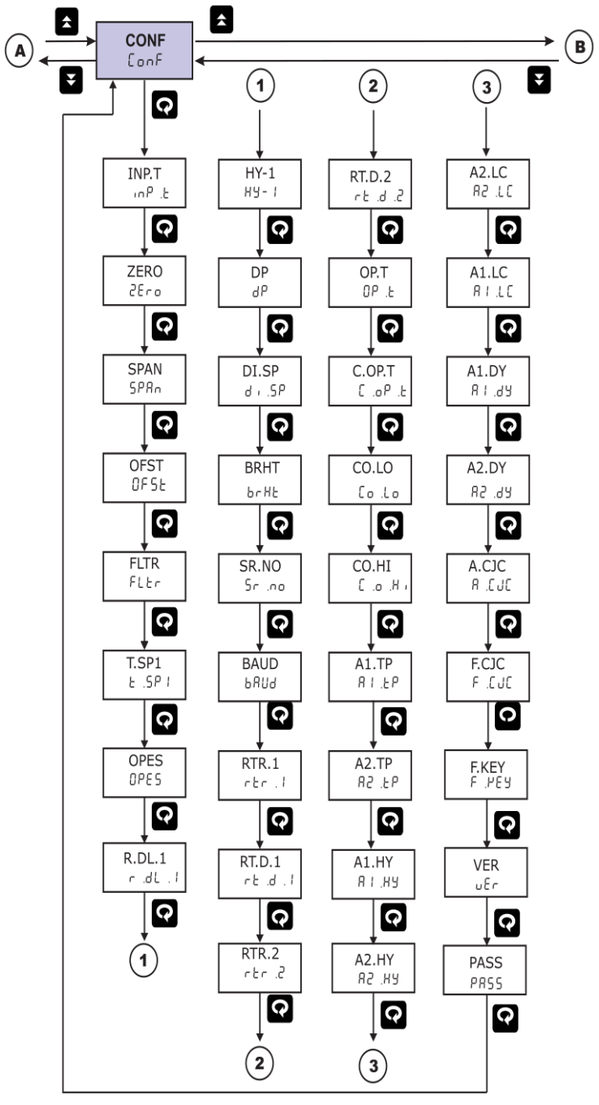
Absolute Value Set Point Low Alarm
Figure: 8

NOTE:-

- LIT = LED on, UNLIT = LED off
- Up arrow indicate Alarm will ON from this value.
- Down arrow indicate Alarm will OFF from this value

MENU LAYOUT For LC5296-XP-AT





ORDERING CODE

Model	Input		Power Supply		Control Output		Option 1 (AO1*)		Option 2 (AO2** or RS485)		Gas Group	
LC5296-XP -AT	1	E	U1	85-265VAC/ 100300VDC	1	Relay	N	None	N	None	1	IIA & IIB
	2	J			2	SSR	1	4-20 mA	1	4-20 mA	2	IIA, IIB & IIC
	3	K	U2	18-36VDC			2	0-20 mA	2	0-20 mA		
	4	T					3	1-5V	3	1-5V		
	5	B					4	0-5V	4	0-5V		
	6	R					5	0-10V	5	0-10V		
	7	S							6	RS-485		
	9	Pt-100										
	C	4-20mA										
	D	0-20mA										
	E	1-5V										
	F	0-5V										
	G	0 -10V										

*Configurable as MV or PV

** PV only

For operation manual please visit www.masibus.com

Specifications are subject to change without notice due to continuous improvements.

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