



## LC5296-AT/ LC5248E-AT

### Auto-tune PID Controller

Masibus LC5296-AT / LC5248E-AT PID Controller series is designed to offer outstanding control performance in a compact package providing a comprehensive solution for a wide variety of applications: such as plastic manufacturing, packaging machinery and food processing applications requiring precise heat/cool control and processes protection alarming.

LC5296-AT / LC5248E-AT PID Controller offers a cost-effective alternative to implement loops in a PLC while at the same time improving loop performance. It accepts one universal process input suitable for Thermocouple, RTD or linear mA/Volt. All inputs and outputs can be read directly over the Modbus communication interface by the supervisory host system as well as process value can be retransmitted to remote PLC/DCS. This expands capabilities of available PLC/DCS and host supervisory system I/O, simplifies machine troubleshooting and remote diagnostics.

With a fast responsive PID auto-tuning algorithm it is equipped with Heat/Cool relay or SSR output for control function. Auto-tuning adjusts the PID parameters for desired set-point according to the current process dynamics so it has no harmful effect on the current operation. It has flexibility to switch control to On-Off or Manual mode for non critical applications.

Two outputs are available providing a combination of Relay (alarm output) and Relay or SSR (control output) based on application requirement. Compact size and simple programming makes the installation and operation of Controller easier and user-friendly.

#### Features

- Auto tune PID
- Universal Input (TC, RTD, Volts, mA)
- Fail-safe Design
- 15 Alarm Configurations
- RS485 Modbus Communication (optional)
- Retransmission Output (optional)
- Relay / SSR control option
- Password protected configurations
- Auto/Manual selection with bump less transfer
- Fail-safe Design protecting the process in case of system malfunctioning
- Display brightness control
- Transmitter Power Supply

#### Applications

- Injection Molding machines
- Plastic Extrusion process
- Packaging machines
- Food processing applications

# Technical Specifications

Input	
Input Type	Thermocouple (E, J, K, T, B, R, S), RTD (Pt100), Current, Voltage
Display Range	Refer Table-1
Accuracy	±0.25% of FS ±1 Count for TC, RTD i/p ±0.1% of FS ±1 Digit for Linear i/p
ADC Resolution	16 bits
Display Resolution	0.1 / 1.0 °C
Sampling Rate	4 Samples/Sec
CJC Error	±3.0 °C
Sensor open	All inputs except 0-5V / 0-10 V
Sensor Burnout current	0.25µA
RTD excitation current	0.166 mA (Approx.)
NMRR	> 40dB
CMRR	> 120dB
Temp-co	< 150ppm/°C
Input Impedance	> 1MΩ
Max Voltage	20VDC

Display and Keys		
	LC5296-AT	LC5248E-AT
Process Value	0.56", 7 segment, Red LED, 4 digits	0.4", 7 segment, Red LED, 4 digits
Set Value	0.4", 7 segment, Red LED, 4 digits	0.28", 7 segment, Red LED, 4 digits
Keys	SET1, SET2, Increase, Decrease, A/M	Enter, Increase, Decrease, A/M
Status LEDs	Relay & Communication, A/M	

Output	
<b>Control Output</b>	
Control Type	On/Off, P, PI, Auto tune PID
Manual offset	±50% of P band
Proportional band	0.0 to 999.9 or 0 to 9999
Integral time	0(off) to 1000 Sec
Derivative time	0(off) to 180 Sec
Cycle time	For SSR 1 to 60 Sec For Relay 10 to 300 Sec (Hyst in on/off mode)
<b>Relay Control Output</b>	
Relays	1 No.
Type	Single Change over (C, NO, NC)
Rating	2A @ 230VAC / 30VDC
<b>SSR Control Output (Optional in lieu of Relay control o/p)</b>	
Rating	11V DC@20mA
Resolution	10ms
<b>Analogue MV Output (Optional)</b>	
Current	0-20mA/4-20mA@500Ω max
Voltage	0-5V/ 1-5V/ 0-10V @3 KΩ Min
Accuracy	0.25% of FS
<b>Analogue PV Output<sup>#</sup> (Optional)(only in LC5296-AT model)</b>	
Current	0-20mA/ 4-20mA @500Ω Max
Voltage	0-5V/ 1-5V/ 0-10V @3 KΩ Min
Accuracy	0.25% FS

Communication Output (Optional)	
Interface	RS485
Protocol	Modbus RTU
Baud Rate	9600, 19200, 38400

Alarm Output	
Relays	1 (If control output is Relay / SSR) or 2 (If control output is AO1)
Type	Single Change over (C, NO, NC)
Rating	2A @ 230VAC / 30VDC
<b>Transmitter supply</b>	24V DC(±10%) @26mA (Current limited)

Power supply	
Standard	85-260VAC/ 110-300VDC
Optional	18-36VDC
Power Consumption	10 VA Approx.

**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

Physical		
	LC5296-AT	LC5248E-AT
Dimension (in mm)(H x W x D)	96 x 96 x 75	48 x 48 x 120
Front Bezel (in mm)(H x W)	96 x 96	48 x 48
Panel Cutout (in mm)(H x W)	92.5 x 92.5	44 x 44
Depth behind panel (in mm)	65	65
Weight	300 g approx.	120 g approx.
Enclosure Material	Molded ABS	
Enclosure Protection	IP20	
Terminal Cable Size	2.5mm <sup>2</sup>	

Environmental	
Operating temperature	0-55 °C
Storage temperature	0-80 °C
Humidity	30-95 % RH non-condensing

Table 1: Display Range		
Input	Input Type	Ranges
Thermocouple	E	-200 to 1000 °C
	J	-200 to 1200°C
	K	-200 to 1372°C
	T	-200 to 400°C
	B	450 to 1820°C
	R	0 to 1768°C
RTD	Pt100 (3 wire)	-200 to 850°C, -199.0 to 850.0°C
		Linear

## Ordering Code

Model	Input		Power Supply		Control Output		Optional			
							1 (AO1*)		2 (AO2** or RS485)	
LC5296-AT	1	E	U1	85-260VAC / 110-300VDC	1	Relay	N	None	N	None
LC5248E-AT	2	J	U2	18-36VDC	2	SSR	1	4-20 mA	1	4-20 mA <sup>#</sup>
	3	K			3	AO1	2	0-20 mA	2	0-20 mA <sup>#</sup>
	4	T			3		3	1-5V <sup>#</sup>	3	1-5V <sup>#</sup>
	5	B			4		4	0-5V <sup>#</sup>	4	0-5V <sup>#</sup>
	6	R			5		5	0-10V <sup>#</sup>	5	0-10V <sup>#</sup>
	7	S							6	RS485
	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  
 # Not available in LC5248E-AT model