

Technical data

Features at env. 25°C	Description			
Total configurability	From keypad or serial communications, the user selects: type of input - associated functions and corresponding outputs - type of control algorithm - type of output and safe conditions - alarm types and functionality - control parameter values			
PV input (for signal ranges see table 1)	Common characteristics	A/D converter with 50.000 points Update measurement time : 0.2 sec Sampling time : 0.5 sec Input shift: - 60...+ 60 digit Input filter : 1...30 sec (OFF= 0)		
	Accuracy	0.25% ± 1 digit (T/C and RTD) 0.1% ± 1 digit (mA and mV)		Between 100 and 240V~error is minimal
	Resistance thermometer (for ΔT: R1+R2 must be <320Ω)	Pt100Ω at 0°C (IEC 751) °C/°F selectable	2 or 3 wire connection Burnout (with any combination)	Line: 20 Ω max (3wire) Thermal drift 0.35°C/10°C env. T. <0.35°C/10 Ω line esist.
	Thermocouple	L,J,T,K,S,R,B,N,E, W3,W5 (IEC 584) °C/°F selectable	Internal cold junction compensation with NTC Error 1°C/20°C ± 0.5°C Burnout	Line: 150 Ω max Thermal drift <2μV/°C env. T. <5μV/10 Ω line resist.
	DC input (current)	0/4...20mA, 2.5Ωext. shunt Rj >10MΩ	Burnout. Engineering units, floating decimal point, configurable Low Range -999...9999 High Range -999...9999 100 digits minimum	Input drift: <0.1% / 20°C env. T. <5μV/10 Ω line resist.
	DC input (voltage)	0/10...50mV Rj >10MΩ		
Auxiliary inputs	Remote Setpoint (option) Not isolated accuracy 0.1%	Current 0/4...20mA Rj = 30Ω Voltage 1-5/0-5/0-10V Rj = 300KΩ	Bias in engineering units and ± range Ratio from -9.99...+99.99 Local + Remote	
	CT current transformer	50 or 100mA input hardware selectable	Current visualization 10...200 A with 1A resolution and Heater break alarm	
	Operating modes	1 single or double action P.I.D. loop or ON/OFF with 1, 2 or 3 alarms		
Control mode	Algorithm	P.I.D. with overshoot control or ON/OFF		
	Proport. band (P)	0.5...999.9%		User Enabled/Disabled
	Integral time (I)	0.1...100.0 min		
	Derivative time (D)	0.01...10.00 min		
	Error dead band	0.1...10.0 digit		
	Overshoot control	0.01...1.00		Single action PID algorithm
	Manual reset	0.0...100.0%		
	Cycle time (Time proportional only)	1...200 sec		
	Control output high limit	10.0...100.0%		
	Soft-start output value	0.1...100.0%	User Enabled/Disabled	
	Output safety value	0.0...100.0% (-100.0...100.0% for Heat/Cool)		ON/OFF algorithm
	Control output hysteresis	0.1...10.0%		
	Dead band	-10.0...10.0%		
	Relative cool gain	0.1...10.0		
	Cycle time (Time proportional only)	1...200 sec		Double action PID algorithm (Heat/Cool) with overlap
Cool output high limit	10.0...100.0%			
Cool output hysteresis	0.1...10.0%			
OP1-OP2 outputs	SPST relay N.O., 2A/250V~ for resistive load Triac, 1A/250V~ for resistive load			
OP3 output	SPDT relay N.O., 2A/250V~ for resistive load			
OP4 output	SSR drive not isolated: 0/5V~, ± 10%, 30mA max.			

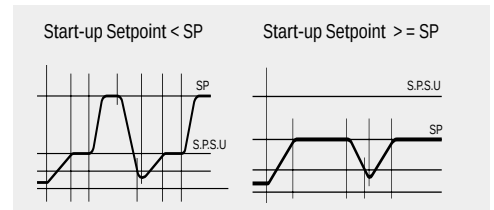
Input type	Scale range
RTD Pt100 IEC751	-99.9...300.0 °C -99.9...572.0 °F
RTD Pt100 IEC751	-200...600 °C -328...1112 °F
TC L Fe-Const DIN43710	0...600 °C 32...1112 °F
TC J Fe-CU45% NI IEC584	0...600 °C 32...1112 °F
TC T Cu-CuNi	-200...400 °C -328...752 °F
TC K Chromel-Alumel IEC584	0...1200 °C 32...2192 °F
TC S Pt10% Rh-Pt IEC584	0...1600 °C 32...2912 °F
TC R Pt13% Rh-Pt IEC584	0...1600 °C 32...2912 °F
TC B Pt30% Rh-Pt 6% IEC584	0...1800 °C 32...3272 °F
TC N Nicrosil-Nisil IEC584	0...1200 °C 32...2192 °F
TC E Ni10% CR-CuNi IEC584	0...600 °C 32...1112 °F
TC NI-NiMo18%	0...1100 °C 32...2012 °F
TC W3%Re-W25%Re	0...2000 °C 32...3632 °F
TC W5%Re-W26%Re	0...2000 °C 32...3632 °F
0/4...20 mA 0/10...50 mV mV Custom scale	Configurable engineering units mA, mV, V, bar, psi, Rh, ph On request

Table 1: PV input

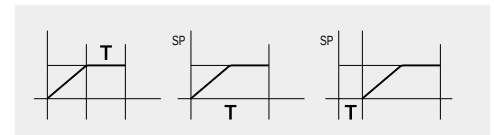
Special functions

To improve the instrument performance and to reduce the wiring and installation costs, two special functions are available:

- Start-up



- Timer



The use of these functions avoids additional device installation (e.g. external timer), therefore allowing a significant costs reduction.

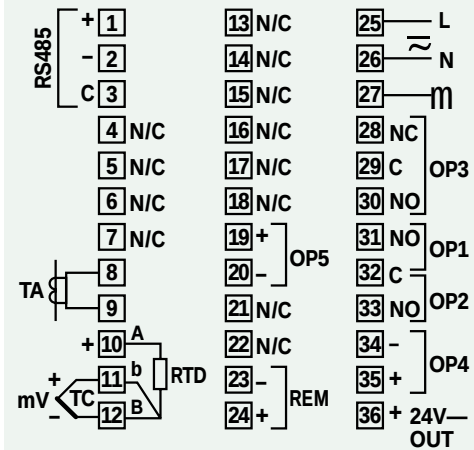
Moreover there are:

- **Keypad lock/unlock** function, to avoid incorrect operator actions
- **Outputs lock/unlock** function, at any moment it is possible to stop the control action, but not the process variable display, without switching-off the power supply.

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OP5 (option) analogue output	PV/SP retransmission	Galvanically isolated: 500V~ /1min Resolution: 12 bit Accuracy: 0.1%		In current: 0/4...20mA, 750Ω /15V max
AL1- AL2 - AL3 alarms	Hysteresis	0.1...10.0%		
	Action	Active high	Action type	Deviation threshold ± range
		Active low		Band threshold 0...range
		Special functions	Absolute threshold, whole range	
			Sensor break, Heater break and Loop break detection	
			Acknowledge (latching), activation inhibit (blocking)	
Setpoint	Local	Up and down ramps 0.1...999.9 digit/min.		
	Local plus two stored (tracking or Stand-by)	(OFF=0) Low limit:		
	Local and Remote	If option installed	from low range to high limit	
	Local with trim		High limit:	
	Remote with trim		from low limit to high range	
Special functions (options)	Timer	Automatic start at the power on, manual start by keypad or serial comm.s		
		Setting time: 1...9999 sec/min		
	Start-up	Stand-by Setpoint: from Setpoint low limit to Setpoint high limit		
		Start-up Setpoint: from Setpoint low limit to Setpoint high limit		
One-shot Fuzzy-Tuning	Depending on the process condition, the controller applies the best method			Step response
				Natural frequency
Serial comm.s (option)	RS 485 isolated, Modbus/Jbus protocol 1200, 2400, 4800, 9600 bit/sec, three wires			
Auxiliary power supply	+24V– ±20%, 30 mA max for external transmitter supply			
Operational safety	Measure input	Detection of out of range, short circuit or sensor break with automatic activation of the safety strategies and alerts on display		
	Control output	Safety value: -100%...100%		
	Parameters	A non volatile memory stores for unlimited time all the configuration and parameter values		
	Password	Password to access the configuration and parameters data, keypad lock, outputs lock		
General characteristics	Power supply (fuse protected)	100-240~ (-15% + 10%) 50/60Hz or 24~ (-15% + 25%) 50/60Hz and 24V– (analogue) (-15% + 25%)		Power consumption 4W max
	Safety	Compliance EN61010-1 (IEC 1010-1), installation class 2 (2500V), pollution class 2, class II instrument		
	Electromagnetic compatibility	Compliance to the CE standards for industrial system and equipment		
	Approval UL and cUL	File E176452		
	Protection EN60529 (IEC529)	IP65 front panel		
	Dimensions	1/8 DIN - 48 x 96, depth 110 mm, weight 250g appr.		

Electrical wirings



Fuzzy-Tuning

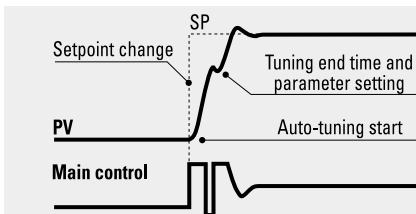
Two methods of tuning are available:

- **Auto-Tuning "one shot"**
- **Natural frequency "one shot"**

The **Fuzzy-Tuning** automatically selects one of the two methods which assure the best result for each condition.

The **Auto-Tuning** method works best on the step response basis. When activated, if a deviation exists between the Setpoint and process variable larger than 5% of scale range, the controller modifies the output value. Then, in a short time, it calculates the PID parameters and the new algorithm is operational immediately.

The main advantages of this method are fast calculation and quick implementation.



The **Natural frequency** method works best when the process variable is very near to the Setpoint. When activated, it causes a process oscillation around the Setpoint value. The main advantage of this method is a reduced disturbance to the process.

