

Temperature Controls

Single Loop PID-Controllers

Type PDI 20

CARLO GAVAZZI



- 4-dgt multi-range μ P-based PID controller
- Temperature measurements in °C or °F
- All software functions selectable by key-pad
- PID, ON/OFF and neutral zone selectable controls
- Autotuning, direct or reverse PID control and dynamic setpoint capability
- One relay or SSR control output
- One independent alarm setpoint (on request)
- Degree of protection: IP54
- Front size: 24 x 48 mm

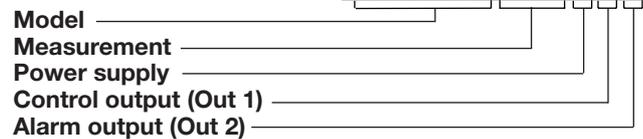
Product Description

4-dgt multi-range μ P-based controller for temperature measurements in °C or °F and for process signals. Input from thermoresistance or thermocouple, PTC, 0/4 to 20 mA or 0 to 10 VDC. Any parameter is fully programm-

able by user-friendly key-pad. The PDI 20 includes autotuning, direct or reverse PID control and dynamic setpoint capability. The housing is easy to mount and ensures a degree of protection of IP 54.

Ordering Key

PDI20A T1 HRX



Type Selection

Measurements	Power supply	Control output (Out 1) (*)	Alarm output (Out 2) (*)
T1: TC inputs: J, K, S	L: 24 VAC, -10% +10%, 50/60 Hz,	R: Relay	X: None
T2: RTD inputs: Pt100, Ni100	24VDC -10% +10% ¹⁾ with galvanic insulation	O: SSR (12 VDC)	R: Relay
T3: PTC input: KTY81	H: 90 to 240 VAC, 50/60Hz with galvanic insulation		O: SSR (12 VDC)
C1: 4 to 20 mADC			
C2: 0 to 20 mADC			
V1: 0 to 10 VDC			

¹⁾ On request

(*) If out1 is a relay type, out2 can be only an SSR type and viceversa

Input Specifications

Accuracy		Temperature drift	
RTD (Pt100, Ni100)		RTD	± 150 ppm/°C
(@ 25°C $\pm 5^\circ$ C, R.H. $\leq 60\%$)	$\pm 0.5\%$ f.s., ± 1 dgt	TC	± 150 ppm/°C
TC (J, K, S)		PTC (KTY 81, 990 Ω @ 25°C)	± 150 ppm/°C
(@ 25°C $\pm 5^\circ$ C, R.H. $\leq 60\%$)	$\pm 0.5\%$ f.s., ± 1 dgt	Process signals	± 150 ppm/°C
PTC (KTY81, 990 Ω @ 25°C)		Sampling rate	1 time/second
(@ 25°C $\pm 5^\circ$ C, R.H. $\leq 60\%$)	$\pm 0.5\%$ f.s., ± 1 dgt	Display	7-segment LED, h 12 mm
Process Signals (20 mA, 10 V)		Max. and min. indication	
(@ 25°C $\pm 5^\circ$ C, R.H. $\leq 60\%$)	$\pm 0.5\%$ f.s., ± 1 dgt	RTD/TC/PTC	Depending on range and type of the temperature probe
		Process signals	Max. 7000 (700,0), Min. -999 (-99.9)



Input Specifications (cont.)

Compensation		Input TC ranges	
RTD	For 3-wire connections, line resistance up to 10 Ω	Probe: TC-J	0°C/+32°F to +800°C/+1472°F
TC	Cold junction, within the temperature range from 0 to 55°C	Probe: TC-K	0°C/+32°F to +1200°C/+2192°F
		Probe: TC-S	0°C/+32°F to +1600°C/+2912°F
Input RTD ranges		Input process signal ranges	-999 to 7000
Probe: Pt100	-200°C/-328°F to +600°C /+1112°F		-99.9 to 700.0
Probe: Ni100	-99.9°C/°F to +600.0°C/+999.9°F	Key-pad	3 keys: "S" to enter into the programming procedure; "UP/DOWN" for parameter selection; "S" + "UP/DOWN" for value programming
	-50°C/-58°F to +150°C/+302°F		
	-50.0°C/-58.0°F to +150.0°C/+302.0°F		
Input PTC ranges:			
Probe: KTY81 (990Ω @ 25°C)	-50°C/-58°F to +150°C/+302°F		
	-50.0°C/-58.0°F to +150.0°C/+302.0°F		

Output Specifications

Output combinations	<ul style="list-style-type: none"> - only one control output (Out 1) type: ON/OFF, PID; - one independent control output (Out 1) with additional alarm output: up, down alarm; - two dependent ON/OFF control outputs; - one ON/OFF control output (Out 1) with dependent relative or absolute alarm output: up, down alarm; - one control output with additional control output (dead band) to carry out the neutral zone control 	Output Working	Direct (cooling) or reverse (heating)
		Type of output	Relay: 5A-AC1, 2A-AC3, 250 VAC, 100.000 cycles
		Insulation	SSR: 6 VDC/max. 15 mA Relay output: 2000 V _{rms} from output to: measuring input, AC power supply input. SSR output: no insulation from output to measuring input. 2000 V _{rms} from output to AC power supply input.
Control output	1 (standard)	Alarm output	1 (on request)
Control types	PID, ON/OFF	Output types	Alarm, ON/OFF, neutral zone
Setpoint adjustment	0 to 100% of the input range.	Alarm functions	Up alarm or down alarm
Limits of setpoint adjustment	Programmable minimum and maximum values	Setpoint adjustment	0 to 100% of the input range
PID control parameters	Programmable proportional band within the whole input range (1 or 0.1°C resolution); Programmable manual reset within the whole input range; Programmable integral time (0 to 3600 s); Programmable derivative time (0 to 3600 s); Programmable cycle time (1 to 500 s)	Limits of setpoint adjustment	Programmable minimum and maximum values
		ON/OFF control parameters	Programmable hysteresis within the whole measuring range
ON/OFF control parameters	Programmable hysteresis within the whole input range; Programmable activation time delay (0 to 500 s)		Programmable activation time delay (0 to 500 s)
Neutral zone control	Programmable dead band within the whole input range (available only if the 2nd output is present)	Neutral zone control	Programmable dead band within the whole measuring range
		Output working	Direct (cooling) or reverse (heating)
		Type of output	Relay: 5A-AC1, 2A-AC3, 250 VAC, 100.000 cycles
		Insulation	SSR: 6 VDC/max. 15 mA Relay output: 2000 V _{rms} from output to measuring input, AC power supply input. SSR output: no insulation from output to measuring input. 2000 V _{rms} from output to AC power supply input.

Software functions

Dynamic setpoint (see fig. 4)	<ul style="list-style-type: none"> - Action only on 1st output, automatic increase of the set-point up to the programmed one - Half band programming (drb) (0 to 100% of the input range) over which the dynamic set-point is active 	<ul style="list-style-type: none"> - step increase (dSl) parameter, programmable from 0 to 100% of the input range - time interval (dSt) between two step increases programmable from 1 to 3600 s
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Software Functions (cont.)

Scaling factor	<p>programming of the lower limit of the displayed scale (only mA/V input) connected to 0 mA/V or 4 mA, programming of the higher limit of the displayed scale (only mA/V input) connected to 20 mA/10 V.</p> <p>Offset programming value: from -999 to 999, selection of decimal point activation (1 or 0.1), °C/°F engineering unit selection, least digit approximation</p>	Autotuning	Activation of autotuning feature or manual programming of the PID parameters
		Diagnostics	<p>The display flashes when the limits of the displayed range are exceeded.</p> <p>Over-range: EEEE</p> <p>Under-range: - - - -</p>
		Burn-out TC	Opening of the probe connection, EEEE indication
		RTD /PTC/mA/V	Opening of the probe connection, EEEE indication
		Outputs	Probe short-circuit, - - - - indication
			In case of error the outputs are de-activated

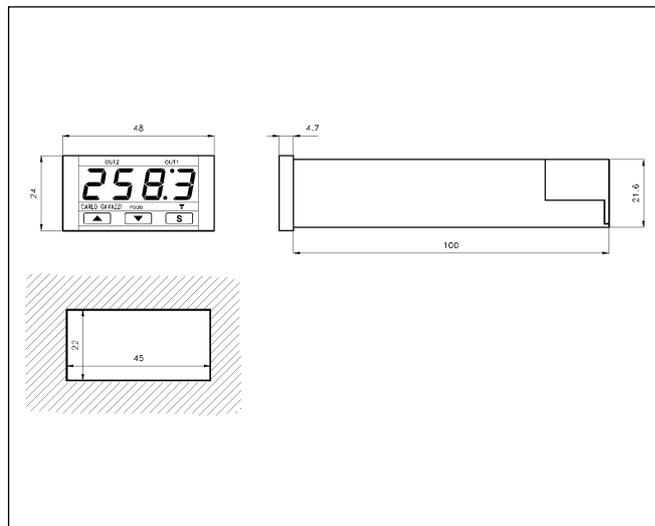
Supply Specifications

AC supply	24 VAC ±10%, 90 to 240VAC 50/60 Hz
Insulation	1350 V _{rms} from power supply input to: measuring input, relay output
DC supply	24 VDC, ±10%
Insulation	500 V _{rms} from power supply input to: measuring input, relay output
Power consumption	5 VA
Operating temperature	From 0° to +55°C (R.H. < 90% non-condensing)
Storage temperature	From -10° to +60°C (R.H. < 90% non-condensing)
Insulation reference voltage	300 V _{rms} to earth
Dielectric strength	3750 V _{rms} for 1 minute

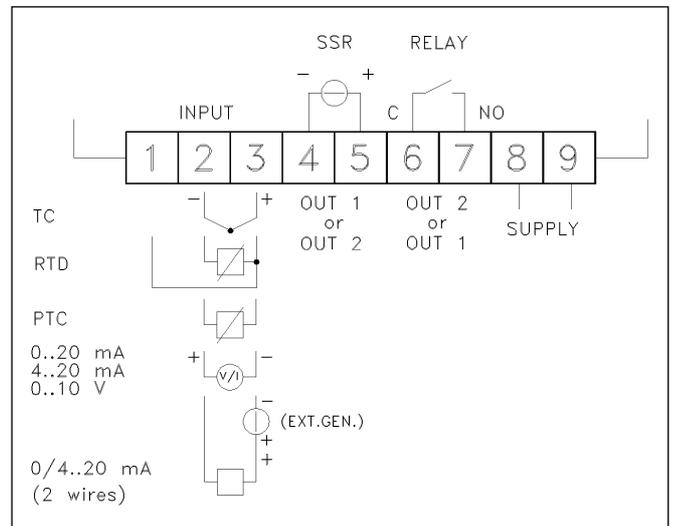
General Specifications

Noise rejection	NMRR 40 dB, from 40 to 60 Hz CMRR 100 dB, from 40 to 60 Hz
EMC	EN 50 081-1, EN 50 082-1
Safety standards	EN 60730-1
Connector	Screw terminal
Housing	Dimensions 24 x 48 x 100 mm Material ABS, self-extinguishing: UL 94 V-0
Degree of protection	IP 54 with gasket
Weight	Approx. 100 g
Approvals	CE

Dimensions



Terminal Board



Output Controls

ON/OFF control

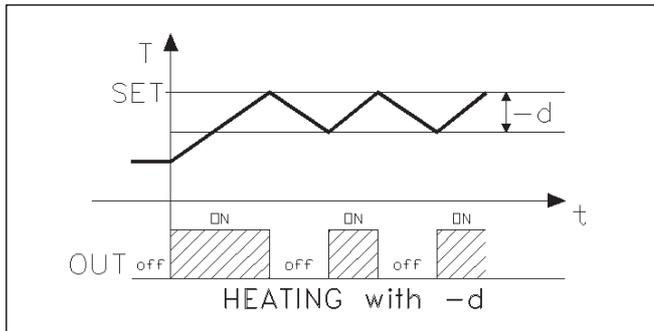


Fig. 1

ON/OFF control

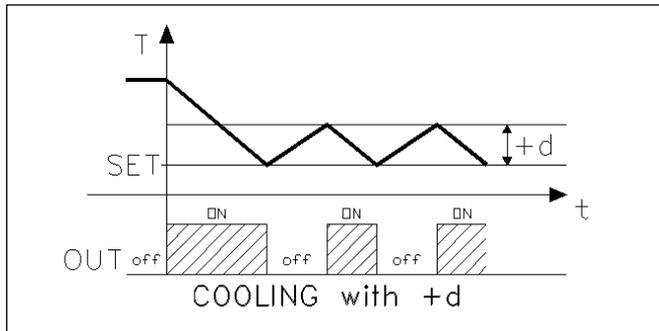


Fig. 2

Neutral zone control

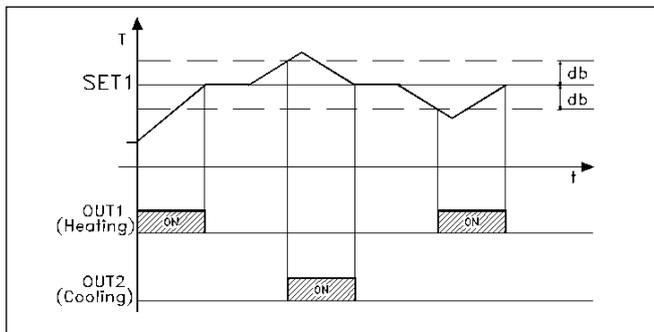


Fig. 3

Dynamic setpoint

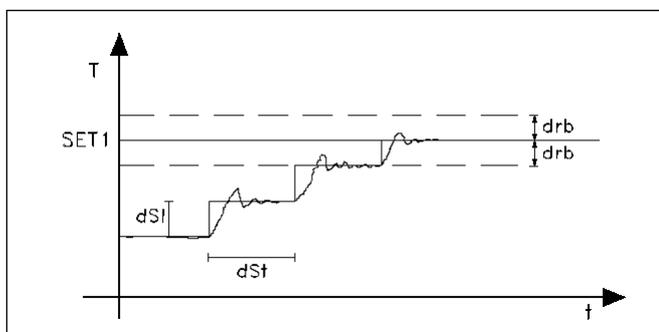
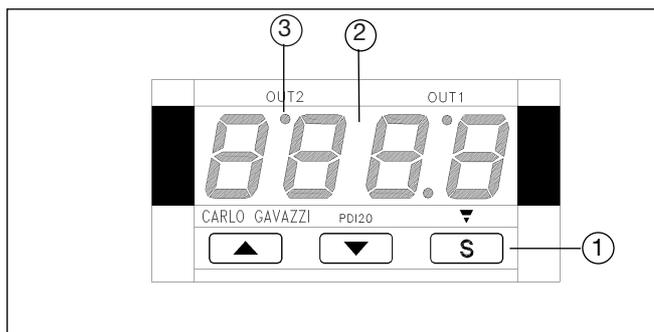


Fig. 4

- d = negative hysteresis
- + d = positive hysteresis
- dB = dead band

- drb = half band parameter
- dSt = step increase
- dSt = time interval between two step increases

Front Panel Description



1. Key-pad

Set-up and programming procedures are easily controlled by the 3 pushbuttons.

“S”

- Key to enter the programming procedure (instrument configuration)

“▲” and “▼”

- Up and down keys for selecting programming parameters.
- S + Up and down keys for value programming.

2. Display

4-digit (maximum read-out 7000).

Alphanumeric indication by means of 7-segment display for:

- Displaying of the measured value, over-range, burn-out and programming indications.
- Indication of programming parameters.

3. LED's

2 red LEDs for the indication of:

- activation of the first output (out 1)
- activation of the second output (out 2)