

Temperature Controls

Single Loop PID-Controllers

Type PDI 40

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)
- Front size: 48 x 48mm

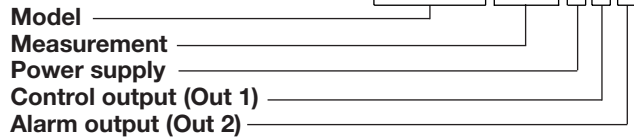
Product Description

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 20mA or 0 to 10VDC. Any parameter is fully programm-

able by user-friendly key-pad. The PDI 40 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

PDI40 T1 DRX



Type Selection

Measurements	Power supply	Control output (Out 1)	Alarm output (Out 2)
T1: TC inputs: J, K, S	A: 24 VAC, -10% +10%, 50/60 Hz ¹⁾	R: Relay	X: None
T2: RTD inputs: Pt100, Ni100	B: 48 VAC, -10% +10%, 50/60 Hz ¹⁾	O: SSR (12VDC)	R: Relay
T3: PTC input: KTY81	C: 115 VAC, -10% +10%, 50/60 Hz ¹⁾		O: SSR (12VDC)
C1: 4 to 20 mA DC	D: 230 VAC, -10% +10%, 50/60 Hz (standard)		
C2: 0 to 20 mADC	E: 120 VAC, -10% +10%, 50/60 Hz ¹⁾		
V1: 0 to 10 VDC	F: 240 VAC, -10% +10%, 50/60 Hz ¹⁾		
	3: 24 VDC, -10% +10% with galvanic insulation ¹⁾		

¹⁾ On request

Input Specifications

Accuracy		Temperature drift	
RTD (Pt100, Ni100)	± 0.5% f.s., ± 1 dgt	RTD	± 150 ppm/°C
(@ 25°C ± 5°C, R.H. ≤ 60%)		TC	± 150 ppm/°C
TC (J, K, S)		PTC (KTY 81, 990Ω@25°C)	± 150 ppm/°C
(@ 25°C ± 5°C, R.H. ≤ 60%)		Process signals	± 150 ppm/°C
PTC (RTY81, 990Ω @25°C)		Sampling rate	1 time/second
(@ 25°C ± 5°C, R.H. ≤ 60%)		Display	7-segment LED, h 12 mm
Process Signals (20mA, 10V)	± 0.5% f.s., ± 1 dgt	Max. and min. indication	
(@ 25°C ± 5°C, R.H. ≤ 60%)		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: 8A-AC1, 3A-AC3, 250 VAC, 100.000 cycles
		Insulation	SSR: 12 VDC/max. 12 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 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: 8A-AC1, 3A-AC3, 250 VAC, 100.000 cycles
		Insulation	SSR: 12 VDC/max. 12 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
--------------------------------------	--	---



Software Functions (cont.)

Scaling factor

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.
Offset programming value: from -999 to 999, selection of decimal point activation (1 or 0.1), °C/°F engineering unit selection, least digit approximation

Autotuning

Activation of autotuning feature or manual programming of the PID parameters

Diagnostics

The display flashes when the limits of the displayed range are exceeded.
Over-range: EEEE
Under-range: - - - -

Burn-out
TC

Opening of the probe connection, EEEE indication
Opening of the probe connection, EEEE indication
Probe short-circuit, - - - - indication

RTD /PTC/mA/V

Outputs

In case of error the outputs are de-activated

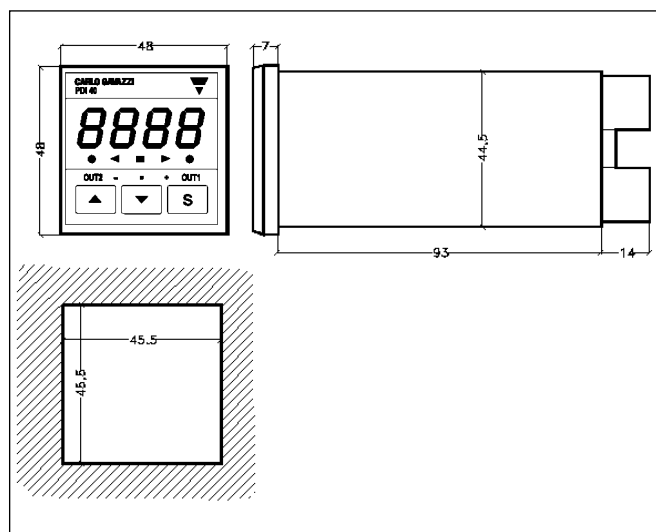
Supply Specifications

AC supply	24 VAC, 48 VAC, 115 VAC, 120 VAC, 230 VAC, 240 VAC, -10%+10%, 50/60 Hz
Insulation	2000 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

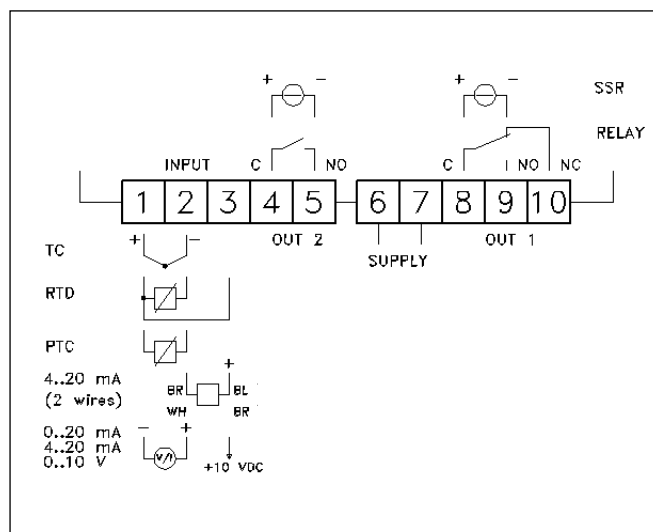
General Specifications

Dielectric strength	3750 V _{rms} for 1 minute
Noise rejection NMRR CMRR	40 dB, from 40 to 60 Hz 100 dB, from 40 to 60 Hz
EMC	EN 50 081-1, EN 50 082-1
Safety standards	EN 60730-1
Connector	Fast-on 6,3 mm
Housing Dimensions Material	48 x 48 x 107 mm ABS, self-extinguishing: UL 94 V-0
Degree of protection	IP 54 with gasket
Weight	Approx. 250 g
Approvals	CE

Dimensions



Terminal Board



Output Controls

ON/OFF control

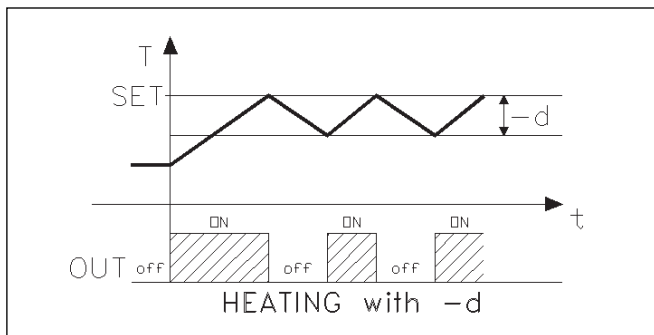


Fig. 1

ON/OFF control

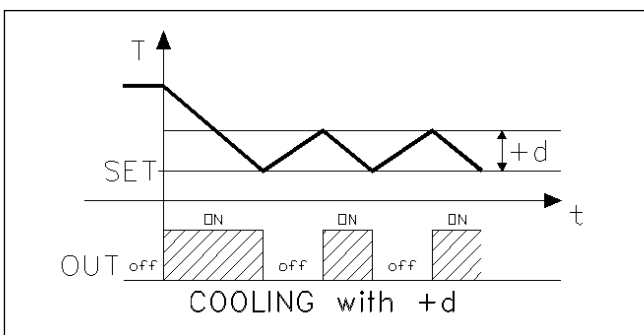


Fig. 2

Neutral zone control

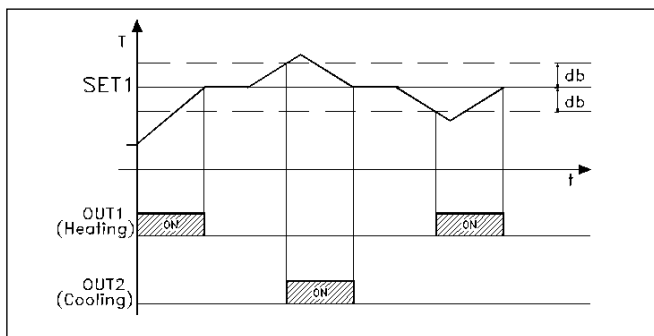


Fig. 3

Dynamic setpoint

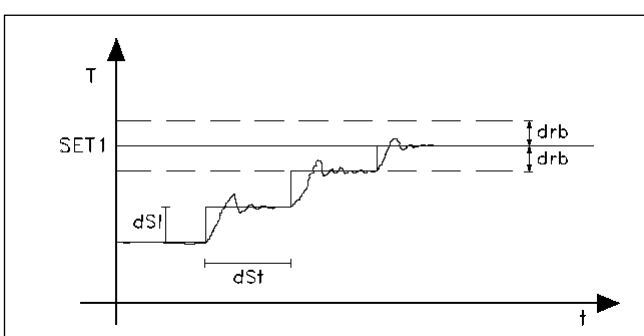
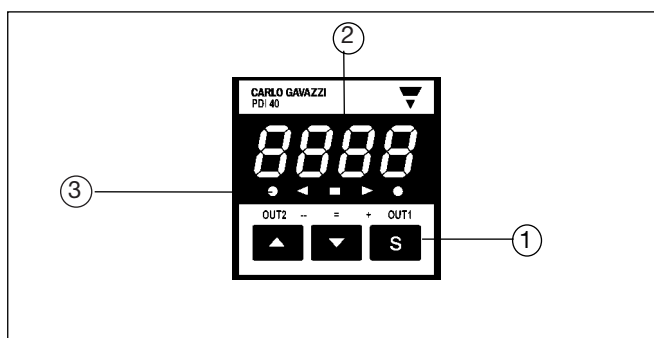


Fig. 4

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

- drb = half band parameter
- dSI = 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

4 red LEDs for the indication of:

- process variable under (-) the setpoint limit
- process variable over (+) the setpoint limit
- activation of the first output (out 1)
- activation of the second output (out 2)

1 green LED for the indication of the process variable equal to the setpoint.