invensys
Eurotherm

piccolo™ Controller SERIES

Temperature and Process Controllers

Specification Sheet

- Precision PID control
- Easy to use and apply
- High reliability and quality
- Three year warranty
- Ramp-soak timer and soft start
- Overshoot elimination
- Energy usage estimation
- Heater failure detection
- Modbus RTU digital communications
- Digital setpoint retransmission
- Analogue retransmission
- Simplified and customisable operator HMI
- High visibility three colour LED display
- Wipedown front fascia
- Recovery point "undo" function
- Configuration adaptor
- iTools Wizard

Invensys Eurotherm piccolo™ controllers offer precision PID control of temperature and other processes with many advanced features not normally found in this class of controllers.

Designed to offer outstanding performance in an affordable package providing a complete solution for a wide variety of applications, this range guarantees extremely easy access to parameterization and operation in a high quality unit.

Despite their advanced features, the controllers are easy to use and apply and may be customised for ease of operation. Full autotune is provided.

Ramp-soak timer and soft start

A ramp soak timer is provided for time based profiling of temperature sequences. These can be used to gradually vary the temperature in a control zone before maintaining it at a defined level, and is typically used to avoid the dangers of damage due to thermal shock.

Overshoot elimination

The Invensys Eurotherm unique cutback system ensures precise control to setpoint and when correctly tuned inhibits temperature overshoot.

Ideal for:

- Precision PID controller
- Plastics Extrusion
- Food and Beverage
- Furnaces and Ovens
- Incubators
- Laboratory equipment

imagine process excellence made easy

Energy usage estimation

The piccolo controller allows estimation of energy usage to provide basic data for evaluating energy saving control strategies for continuous improvement and Kaizen techniques.

Heater failure detection

Using the optional current transformer adaptor, the piccolo will monitor current levels in electrical heaters and generate status and alarm information allowing heater element failure and short circuit to be detected, thereby allowing corrective action and avoiding further stress on remaining heater elements.

Modbus digital communication

The piccolo optionally supports 2-wire EIA485 communications using the Modbus RTU protocol.

Digital setpoint retransmission

The piccolo controller is optionally able to send a setpoint to slave devices using Master Modbus communications to allow multizone control. Requires EIA485 option.

Analogue retransmission

Transmit setpoints or other process variables to downstream equipment or data recorders using a 4-20mA analogue retransmission function.

Simplified and customisable operator HMI

The piccolo controller has been designed around a simplified menu structure with settings clearly identified against sections in the user and engineering manuals to avoid guesswork during commissioning. The operator menus may be fully customised for the needs of operators and supervisors, with password protection so that unauthorised personnel are unable to adjust critical settings.

Wipedown front fascia

IP65 panel sealing allows these units to be used in washdown or dusty applications. Panels are easily customisable and are therefore ideal for OEM applications.

High visibility three colour LED display

Process and alarm indication is clearly indicated on a bright emissive three colour LED display.

Recovery point undo function

A new feature is provided in the piccolo controller, named RECOVERY POINT. Through this feature the user can create a snapshot of the current instrument settings (operative and configuration parameters). These values can be subsequently restored to reverse changes made during use.

Values in the Recovery Point table are modified by an authorized operator saving a working configuration through front panel or through PC based configuration tools.

Configuration adaptor

iTools configuration to piccolo controllers can be achieved by using a configuration adaptor. It provides iTools with the ability to communicate with and configure devices without the need for any power being connected.

iTools wizard

Used to simplify the set up of piccolo controllers. The wizard guides the user through the configuration process with interactive help and graphical demonstrations of features.

Specification

General

Environmental performance

Temperature limits	Operation:	0 to 55°C (32 to 131°F)
	Storage:	-10 to 70°C (14 to 158°F)
Humidity limits	Operation:	0 to 90% RH non condensing
	Storage:	5 to 90% RH non condensing
Panel sealing:		IP65
Shock:		BS EN61010
Vibration:		2g peak, 10 to 150Hz
Altitude:		<2000 metres
Atmospheres:		Not suitable for use in explosive or corrosive atmosphere

Electromagnetic compatibility (EMC)

Emissions and immunity:	BS EN61326

Electrical safety

(BS EN61010):	Installation cat. II; Pollution degree 2

INSTALLATION CATEGORY II
The rate impulse voltage for equipment on nominal 230V mains is 2500V.

POLLUTION DEGREE 2
Normally, only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation shall be expected.

Physical

Panel mounting	P116:	1/16 DIN
	P108:	1/8 DIN
	P104:	1/4 DIN
Weight	P116:	250g
	P108:	350g
	P104:	420g
Panel cut-out dimensions		
	P116:	45W x 45Hmm
	P108:	45W x 92Hmm
	P104:	92W x 92Hmm
Panel depth	All:	90mm

Operator interface

Type:	LED
Main PV display:	4 digits, green
Secondary display:	4 digits, amber
Third display:	4 digits, amber
Status beacons:	Units, outputs, alarms, active setpoint

Power requirements

P116:	100 to 230 +/-15%, 48 to 62 Hz, max 6W 24V ac, –15%, +10%. 24V dc, –15% +20% ±5% ripple voltage max 6W
P108 and P104:	100 to 230 +/-15%, 48 to 62 Hz, max 8W 24V ac, –15%, +10%. 24V dc –15% +20% ±5% ripple voltage max 8W

Approvals

CE, cUL listed (file ES7766)
Suitable for use in Nadcap and AMS2750D applications under Systems Accuracy Test calibration conditions
Other standards pending

Transmitter PSU (not P116)

Rating:	24V dc, >28mA, <33mA
Isolation:	264V ac double insulated

Communications

Serial communications option

Protocol:	Modbus RTU slave Modbus RTU Master broadcast (1 parameter)
Isolation:	264V ac, double insulated
Transmission standard:	EIA485 (2 wire)

Process Variable Input

Calibration accuracy:	<±0.25% of reading ±1LSD (Note 1)
Sample rate:	4Hz(250ms)
Isolation:	264V ac double insulation from the PSU and communication
Resolution (µV):	<0.5µV with 1.6sec filter
Resolution (effective bits):	>17 bits
Linearisation accuracy:	< 0.1% of reading
Drift with temperature:	<50ppm (typical) <100ppm (worst case)
Common mode rejection:	48-62Hz, >-120dB
Series mode rejection:	48-62Hz, >-93dB
Input impedance:	100MΩ
Cold junction compensation:	>30:1 rejection of ambient change
Cold junction accuracy:	<±1°C at 25°C ambient
Linear (process) input range:	–10 to 80mV, 0 to 10V with 100K/806 external divider module
Thermocouple types:	K, J, N, R, S, B, L, T, C, custom download (Note 2)
Resistance thermometer types:	3-wire Pt100 DIN 43760
Bulb current:	0.2mA
Lead compensation:	No error for 22 ohms in all leads
Input filter:	Off to 59.9s
Zero offset:	User adjustable over full range
User calibration:	2-point gain & offset

OP 4 Relay

Type:	Form C (changeover)
Rating:	Min 100mA @ 12V dc, max 2A @ 264V ac resistive
Functions:	Control outputs, alarms, events

Current Transformer Input

Input range:	0-50mA rms, 48/62Hz. 10Ω burden resistor fitted inside module
Calibration accuracy:	<1% of reading (Typical), <4% of reading (Worst case)
Isolation:	By using external CT
Input impedance:	<20Ω
Measurement scaling:	10, 25, 50 or 100 Amps
Functions:	Partial load failure, SSR fault

Digital Input (DigIn 1/2, 2 not on P116)

Contact closure:	Open	>600Ω
	Closed	<300Ω
Input current:		<13mA
Isolation:		None from PV or system 264V ac double insulated from PSU and communications
Functions:		Includes alarm acknowledge, SP2 select, manual, keylock, timer functions, standby select

Logic Output Module

Output

Rating:	ON	12V dc @ <44mA,
	OFF	<300mV @ 100µA
Isolation:		None from PV or system. 264V ac double insulated from PSU and communications
Functions:		Control outputs, alarms, events

Relay Output Channels

Type:	Form A (normally open)
Rating:	Min 100mA @ 12V dc, max 2A@264V ac resistive
Functions:	Control outputs, alarms, events

Triac Output

Rating:	0.75A (rms) 30 to 264V (rms) resistive load
Isolation:	264V ac double insulated
Functions:	Control outputs, alarms, events

Analogue Output (Note 3)

OP2 (P116 only)

Rating:	0-20mA into <500Ω
Accuracy:	± (<1% of Reading + <100µA)
Resolution:	13.5 bits
Isolation:	264V ac double insulated from PSU and communications
Functions:	Control outputs, retransmission

OP3 (P108, P104 only)

Rating:	0-20mA into <500Ω
Accuracy:	±(<0.25% of Reading + <50µA)
Resolution:	13.5 bits
Isolation:	264V ac double insulated
Functions:	Control outputs, retransmission

Software Features

Control

Number of loops:	1
Loop update:	250ms
Control types:	PID, ON/OFF Cooling types: Linear, fan, oil, water
Modes:	Auto, manual, standby
Overshoot inhibition:	High, low

Alarms

Number:	3
Type:	Absolute high & low, deviation high, low or band
Latching:	Auto or manual latching, non-latching
Output assignment:	Relay and digital output

Other status outputs

Functions:	Including sensor break, timer status, loop break, heater diagnostics

Timer

Modes	Dwell when setpoint reached Delayed control action, Soft start limits power below PV threshold

Current monitor

Alarm types:	Over current, SSR short circuit, SSR open circuit
Indication type:	Flashing beacon

Special Features

Features	Energy monitoring, Recovery point

Notes

1. Calibration accuracy quoted over full ambient operating range and for all input linearisation types
2. Contact Eurotherm® for details of availability of custom downloads for alternative sensors
3. Voltage output can be achieved by external adaptor

Order codes

	1	2	3	4	5	6	7	8	9	10

Basic Product

P116	1/16 DIN
P108	1/8 DIN
P104	1/4 DIN

1 Function

CC	Controller

2 Supply Voltage

VH	85-264V ac
VL	24V ac/dc

3 Outputs

OP1, OP2 P116 only

	OP1	OP2
LRX	Logic	Relay
RRX	Relay	Relay
RCX	Relay	Analogue isolated
LTX*	Logic	Triac

OP1, OP2, OP3 P108 and P104 only

	OP1	OP2	OP3
LRR	Logic	Relay	Relay
RRR	Relay	Relay	Relay
RRC	Relay	Relay	Analogue isolated
LTR*	Logic	Triac	Relay

* Available with VH only

4 AA Relay (OP4)

X	Disabled
R	Changeover relay

5 Options

XXX	None
XCL	CT and digital input A
4CL	RS485 + CT and digital input 1

6 Custom Label

XXXXX	None

7 Special

XXXXXX	None

8 Warranty

XXXXX	Standard
WL005	Extended

9 Certificates

XXXXX	None
CERT1	Certificate of conformity
CERT2	5 point Factory Calibration

10 Accessories

XXXXXX	None
RES250	250R resistor for 0-5V dc OP
RES500	500R resistor for 0-10V dc OP

Accessories

HA031260	Engeering/CD manual
SUB35/ACCESS/249R.1	2.49R Precision resistor
RES250	250R resistor for 0-5V dc OP
RES500	500R resistor for 0-10V dc OP
CTR100000/000	10A Current transformer
CTR200000/000	25A Current transformer
CTR400000/000	50A Current transformer
CTR500000/000	100A Current transformer
iTools/None/3000CK	Configuration clip
SUB21/IV10	0-10V input adaptor

Quick Start code

1	2	3	4	5	6	7	8	9

1 Quick start

0	Quick code request at start up
F	Factory default table
P	piccolo code pre loaded

2 Input Type

Thermocouple	
B	Type B
J	Type J
H	Type K
L	Type L
N	Type N
R	Type R
S	Type S
T	Type T
C	Custom/Type C
Resistance Thermometer	
P	Pt100
Linear	
V	0-80mV
2	0-20mA
4	4-20mA

3 Range

C	°C full range
F	°F full range
Centigrade	
0	0 to 100
1	0 to 200
2	0 to 400
3	0 to 500
4	0 to 800
5	0 to 1000
6	0 to 1200
7	0 to 1400
8	0 to 1600
9	0 to 1800
Fahrenheit	
G	32 to 212
H	32 to 392
I	32 to 752
L	32 to 1112
M	32 to 1472
N	32 to 1832
O	32 to 2192
P	32 to 2552
R	32 to 2912
T	32 to 3272

4 Output 1

N	Unconfigured
Control	
H	PID heating (logic, relay)
C	PID cooling (logic, relay)
J	ON/OFF heating (logic, relay)
F	ON/OFF cooling (logic, relay)
Alarm 3 Energised in alarm	
0	High alarm
1	Low alarm
2	Deviation high
3	Deviation low
4	Deviation band
Alarm 3 De-energised in alarm	
5	High alarm
6	Low alarm
7	Deviation high
8	Deviation low
9	Deviation band
Event (Note 1) **Timer/programmer events**	
E	Timer end status
R	Timer run status

5 Output 2

N	Unconfigured
Control	
H	PID heating (logic, relay, or 4-20mA (Note 3))
C	PID cooling (logic, relay or 4-20mA (Note 3))
J	ON/OFF heating (logic, relay or 4-20mA (Note 3))
F	ON/OFF cooling (logic, relay or 4-20mA (Note 3))
Alarm 1 Energised in alarm	
0	High alarm
1	Low alarm
2	Deviation high
3	Deviation low
4	Deviation band
Alarm 1 De-energised in alarm	
5	High alarm
6	Low alarm
7	Deviation high
8	Deviation low
DC OUT Retransmission	
T	4-20mA setpoint
U	4-20mA process value
Y	4-20mA output power
A	0-2mA setpoint
B	0-20mA process value
D	0-20mA output power
Event (Note 1) **Timer/programmer events**	
E	Timer end status
R	Timer run status

6 Output 3 P108 and P104 only

N	Unconfigured
Control	
H	PID heating (relay or 4-20mA)
C	PID cooling (relay or 4-20mA)
J	ON/OFF heating (relay or 4-20mA)
F	ON/OFF cooling (relay or 4-20mA)
Alarm 3 Energised in alarm	
0	High alarm
1	Low alarm
2	Deviation high
3	Deviation low
4	Deviation band
Alarm 3 De-energised in alarm	
5	High alarm
6	Low alarm
7	Deviation high
8	Deviation low
9	Deviation band
DC OUT Retransmission	
T	4-20mA setpoint
U	4-20mA process value
Y	4-20mA output power
A	0-2mA setpoint
B	0-20mA process value
D	0-20mA output power
Event (Note 1) **Timer/programmer events**	
E	Timer end status
R	Timer run status

7 Output 4

N	Unconfigured
Control	
H	PID heating (relay)
C	PID cooling (relay)
J	ON/OFF heating (relay)
F	ON/OFF cooling (relay)
Alarm 2 Energised in alarm	
0	High alarm
1	Low alarm
2	Deviation high
3	Deviation low
4	Deviation band
Alarm 2 De-energised in alarm	
5	High alarm
6	Low alarm
7	Deviation high
8	Deviation low
9	Deviation band
Event (Note 1) **Timer/programmer events**	
E	Timer end status
R	Timer run status

8 Digital Input 1

N	Unconfigured
A	Alarm acknowledge
S	Setpoint 2 select
T	Timer/programmer reset
R	Timer/programmer run
U	Timer/programmer run/reset
H	Timer/programmer hold
M	Manual status
B	Standby mode
L	Keylock

9 Digital Input 2 P108 and P104 only

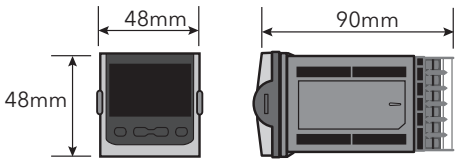
N	Unconfigured
A	Alarm acknowledge
S	Setpoint 2 select
T	Timer/programmer reset
R	Timer/programmer run
U	Timer/programmer run/reset
H	Timer/programmer hold
M	Manual status
B	Standby mode
L	Keylock

Notes

1. If controller timer is configured as dwell timer.
2. OUT2 = can be also DC linear output only on 1/16 DIN.

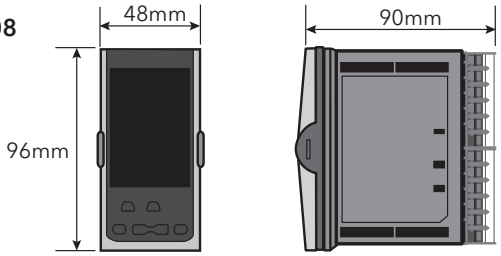
Mechanical Details

P116



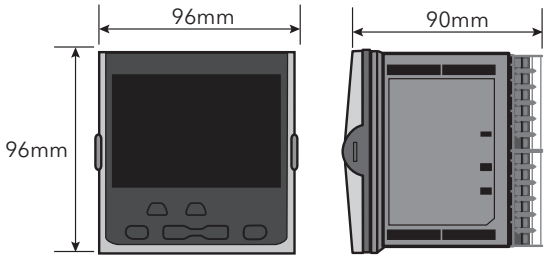
Panel cut-out 45mm (–0.0 +0.6) x 45mm (–0.0 +0.6)

P108



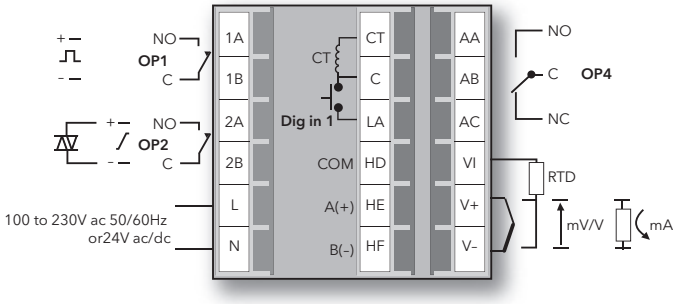
Panel cut-out 45mm (–0.0 +0.6) x 92mm (–0.0 +0.8)

P104

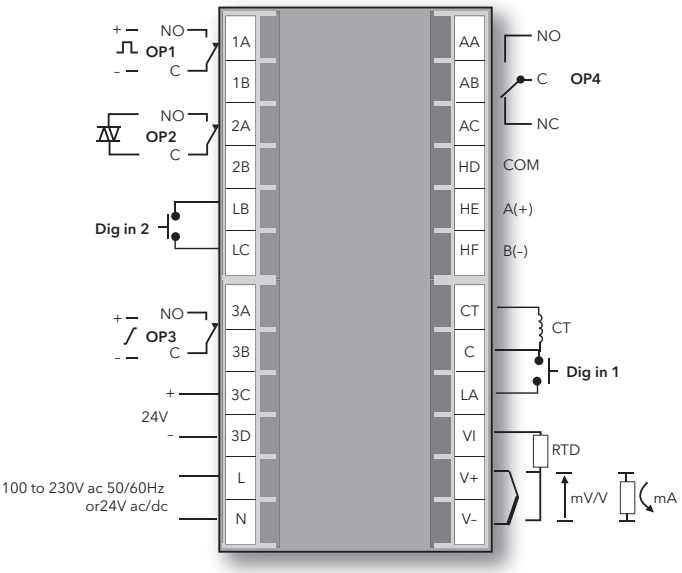


Panel cut-out 92mm (–0.0 +0.8) x 92mm (–0.0 +0.8)

P116 Rear Terminals



P108 and P104 Rear Terminals



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Operations Management