E+PLC100

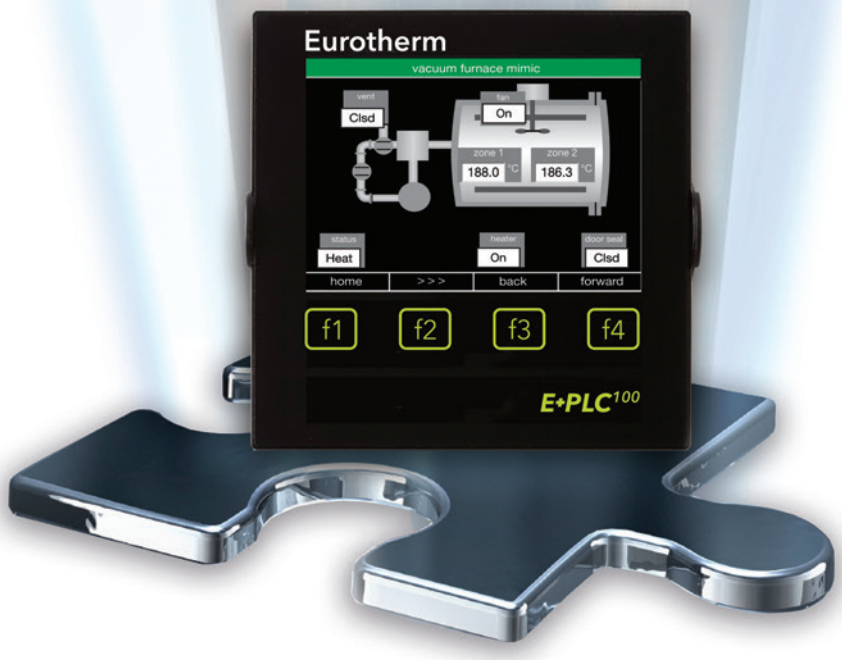
A Compact, Precision PLC

... with the best in PID control and recording performance

E+PLC100 is a cleverly designed PID controller, recorder and PLC all in a compact, single box instrument with a 3.5" TFT colour touchscreen. Using an open industry standard (IEC 61131-3) platform and a single, integrated programming environment, it dramatically reduces engineering time while offering better process performance and easier regulatory compliance.

This exceptionally compact solution combines complete PLC functionality with the best in class PID control and recording. It offers a vivid operator interface which uses familiar touchscreen controls to ensure intuitive operation. For its size, it has an impressive selection of precision I/O and is an ideal complete solution for smaller applications.

- **Open PLC with easy control and recording**
  - Single box solution
  - Standard IEC 61131-3 programming
  - Single, integrated CODESYS programming environment offering PLC, PID control, recording and visualisation
  - Pre-validated, function blocks, for rapid engineering
- **Precision PID control in a PLC**
  - Accurate, stable control performance
  - Reduces processing times
  - Increases productivity
  - Optimises energy usage
  - Improves quality
  - Minimises scrap/re-work
- **Secure recording in a PLC**
  - Easier regulatory compliance
  - Precision measurement of process variables
  - Secure data recording at point of measurement
  - Complete, accurate, traceable records
- **A PLC with integrated visualisation**
  - Intuitive, integrated touchscreen display
  - Mobile process viewing on PCs, tablets and smartphones



One small box, one complete solution

Eurotherm®

by Schneider Electric

All the pieces of your process puzzle in one small, very clever box

Precision measurement

To control accurately, you need to measure precisely. For its size, E+PLC^{100} has an impressive selection of precision I/O which enables accurate control and recording. It has four analogue inputs, two digital inputs and up to two logic outputs, three relay outputs and three DC outputs. Its high performance I/O gives accurate measurements, enabling tighter control and an exact historical record of a process.

A complete solution for small machines

Best in control

E+PLC^{100} incorporates over 50 years of control knowledge including unique Eurotherm auto-tuning PID algorithms that provide superior control performance.

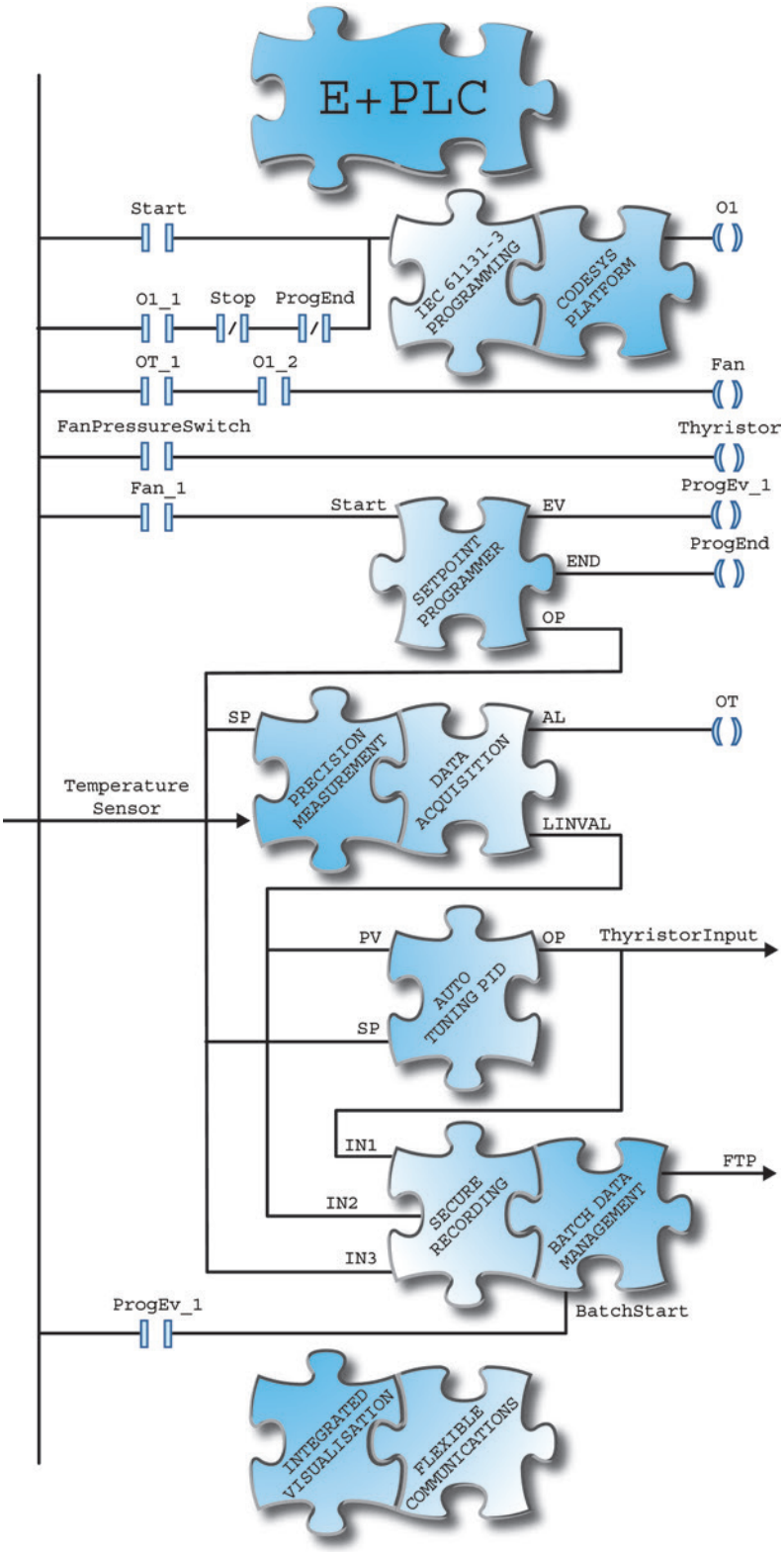
- Reduce process times by getting to the setpoint quickly
- Optimise energy usage by eliminating overshoot or undershoot while still providing a rapid control response
- Improve quality by giving stable control performance with tighter tolerances
- Provided in pre-engineered function block form that you simply need to parameterise

Cost effective, superior control performance – why compromise?

Easy setpoint programming

Feature rich, the E+PLC^{100} includes highly flexible, easily programmed setpoint programming. Using a spreadsheet style format, multiple programs with numerous segments can be quickly configured ensuring easy recipe setup and improved operational efficiency.

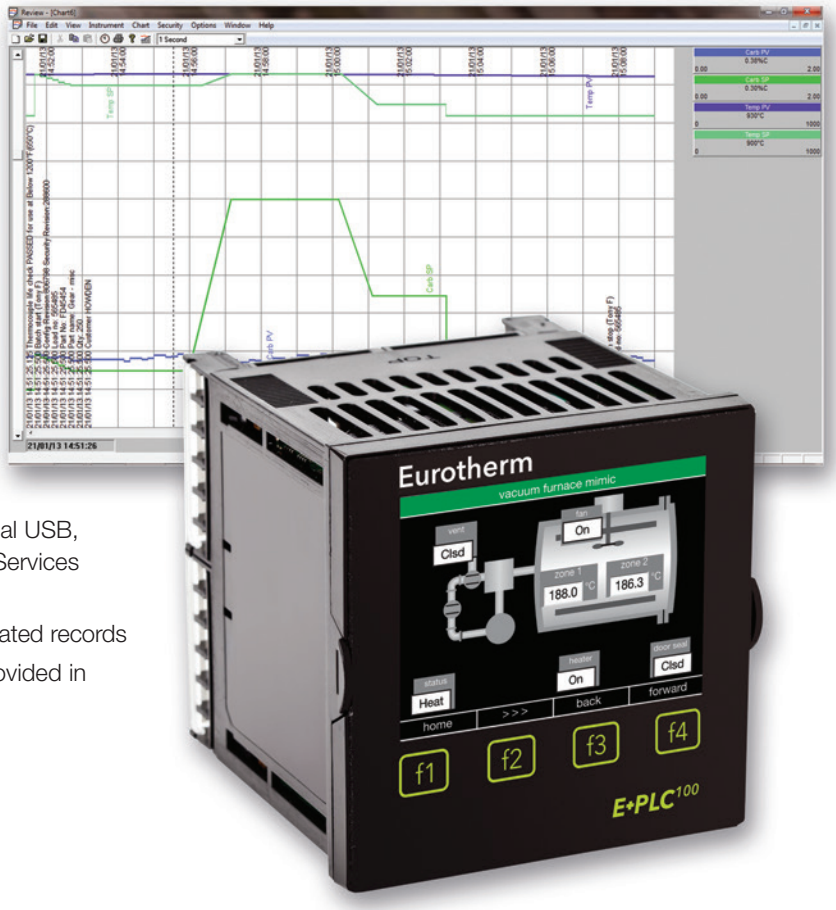
Guaranteed operation which can lower processing costs



Best in recording

E+PLC^{100} has integrated recording capability with highly efficient batch data management strategies to ensure total data integrity and security. It provides complete peace of mind by using decades of recording expertise to ensure compliance with both regulatory and quality standards through:

- Continual secure recording at point of measurement
- Incorporating power and network fail strategies to ensure complete data integrity
- Complete record/batch traceability with all process and metadata securely stored together
- Efficient archiving and data management using local USB, FTP servers and the innovative Eurotherm Online Services tool, EOS Director
- Archiving strategies providing self-healing, fully validated records
- Secure recording and batch data management provided in easily parameterised, function block form



Efficient data management of totally secure process records

Reduced engineering

The E+PLC^{100} uses the leading CODESYS platform to provide a familiar programming environment and reduce engineering costs. Complete solutions are built in this single, integrated environment. It incorporates advanced Eurotherm PID control and recording capability in the form of easy to use function blocks along with the integrated design of visualisation elements. E+PLC^{100} offers you a complete, high performance PLC solution for your process in a compact form that has never been easier to engineer.

Programming tools which will reduce your engineering time include:

- Rich functionality in easy to use function blocks
  - Auto-tuning PID control
  - Secure recording
  - Batch data management
  - Zirconia probe input
- Comprehensive inbuilt PLC function block libraries
- A single, integrated programming environment to engineer a complete process solution, including PLC, PID control, recording and visualisation

Creating a complete, high performance PLC solution has never been easier

E+PLC^{100} uses standard IEC 61131-3 programming languages

Continuous Function Chart (CFC)
Function Block Diagram (FBD)
Instruction List (IL)
Ladder Diagram (LD)
Sequential Function Chart (SFC)
Structured Text (ST)
Inbuilt visualisation objects

CODESYS

Runtime
Visualization
Fieldbus

CODESYS® is a trademark of 3S-Smart Software Solutions GmbH.

Easy system integration and efficient process management

E+PLC^{100} is designed for easy integration into wider systems with built-in Modbus TCP master/slave communications. It can write to and record data from slave devices and is easily combined with other system components such as power controllers and discrete control instruments.

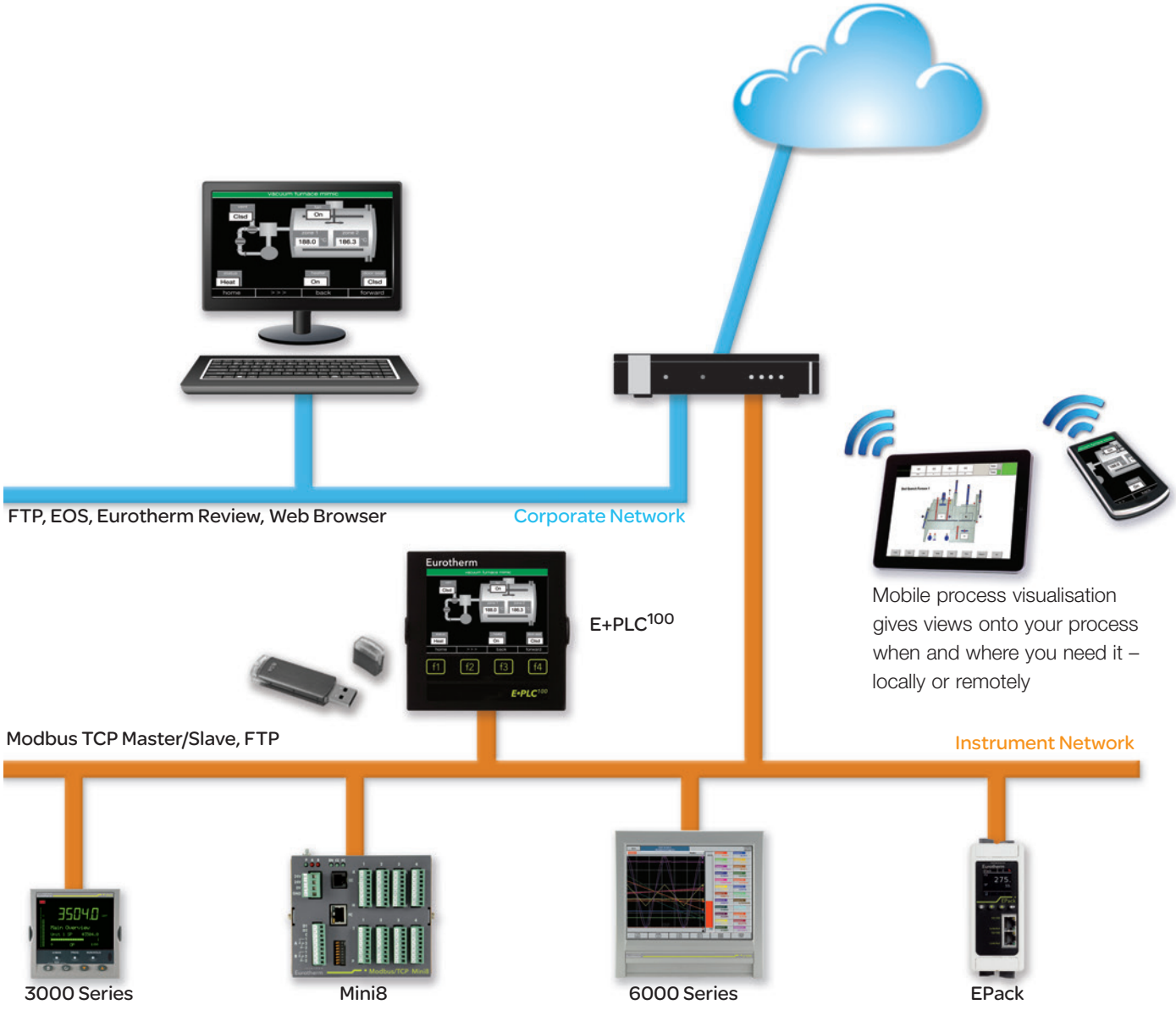
The natural network capability of the E+PLC^{100} is also utilised for secure archiving strategies to multiple FTP servers and/or to the highly efficient EOS online data management services. It further provides the ability to view and manage your process when and where needed by utilising any web browser.

EOS Director:

- Secure offsite storage of long-term historical records
- Efficiently manage, search and analyse data
- Secure access when and where you need it

EOS Advisor:

- Efficient online management of calibration and accreditation data
- Designed to increase plant availability



E+PLC100 Specification

General

General

I/O types	Analogue i/p:	Four
	Digital i/p:	Two
	Digital (logic) o/p:	Two max (dependant on build variant)
	Relay o/p:	Three max (dependant on build variant)
	DC output:	Three max (dependant on build variant)
Features:		Modbus TCP master/slave
		Programmer
		Control loops with auto-tune
		Recording
		Batch
		Archiving
		CODESYS IDE programming tool
		Zirconia probe support (consult factory)
		Webserver (consult factory)
Memory resources:	12Mbytes:	For application/visualisation files
	28Mbytes:	For data recording history files
	62Kbytes:	For retain/persistent data

Environmental performance

Ambient temperature range		
	Operating:	0 to 55°C
	Storage:	–20 to +70°C max rate of change 1°C/min
Humidity range	Operating:	5% to 85% RH non condensing
	Storage:	5% to 85% RH non condensing
Protection	Front panel	IP66, NEMA12
	Behind panel:	IP10 (International)
	Shock/Vibration:	To BS EN61131-2 : section 4.2.1 (5 to 150 Hz. at 2g; 0.5 octave per min.)
Altitude:		<2000 metres
Atmosphere:		Not suitable for use in explosive or corrosive atmospheres
Electrical safety:		BS EN61010-1 (Installation category II; Pollution degree 2)
Electromagnetic compatibility		
Emissions	(Standard units):	BS EN61326 Class B – Light industrial
	(Low voltage option):	BS EN61326 Class A – Heavy industrial
Immunity:		BS EN61326 Industrial
Other approvals and compliance details		
	General:	CE and cUL, EN61010
	PV input:	AMS2750E compliant
	RoHS:	EU; China
	Packaging:	BS61131-2: 2007 section 6.3.3/6.3.4
GOST:		GOST CUTR
CCC:		Exempt

Physical

Panel mounting:	1/4 DIN
Weight: Instrument only:	0.44kg (15.52ozs)
Panel cutout dimension:	92 mm x 92 mm (both -0.0 +0.8) or 3.62 in x 3.62 in (both -0.00 +0.03 in)
Depth behind panel:	90 mm (3.54 in) excluding wiring

Operator interface

Display:	3.5” TFT colour display (320 pixels wide x 240 pixels high)
Controls:	Touchscreen

Power requirements

Supply voltage:	Standard:	100 to 230V ac ±15% at 48 to 62Hz
	Low voltage:	24V ac (+10% –15%) at 48 to 62Hz, or 24V dc (+20% –15%)
Power dissipation:		9W (max.)
Fuse type:		No internal fuse fitted
Interrupt protection:	Standard:	Holdup >20ms at 85V RMS supply voltage
	Low voltage:	Holdup >10ms at 20.4V RMS supply voltage

Battery backup

Stored data:		Time, date
Replacement period:		Three years typical
Clock (real-time clock) data:		
	Support time:	Minimum of 1 year with unit unpowered
	Temperature stability:	0 to 55°C ≤±3.5ppm
	RTC Aging:	First year to 10 year <± 5ppm
Type:		Poly-carbonmonofluoride/lithium Eurotherm Part Number (PA260195)

Caution Battery may explode if mistreated. Do not recharge, disassemble or dispose of in fire.

USB port

Number of ports:	One at rear of instrument
Standard:	USB1.1
Transmission speeds:	1.5MBit/sec (low speed device)
Maximum current:	<100mA
Peripherals supported:	Memory stick (8GB max)

Update/Archive rates

Sample rate (input/output):	8Hz
Trend update:	10Hz max.
Archive sample value:	Latest value at archive time
Display value:	Latest value at display update time

Standard Communications

Ethernet communications

Type:	10/100baseT Ethernet (IEEE802.3)
Protocols:	Modbus TCP/IP master/slave
Cable type:	Category 5
Maximum length:	100metres (110 yards)
Termination:	RJ45
	Green LED illuminated = link connected; Amber LED flashing shows link activity

Option Boards

LLR (Logic, Logic, Relay)
DDD (DC o/p, DC o/p, DC o/p)

Analogue Input

General

Number of Inputs:		Four
Input types:		dc Volts, dc mV, dc mA, mV, RTD (2-wire and 3-wire), Thermocouple
Input type mix:		Freely configurable
Sample rate:		8Hz (125ms)
Conversion method:		16 bit delta sigma
Input ranges:		See Table 1 and Table 2
Mains rejection (48 to 62Hz)		
	Series mode:	> 95dB
	Common mode:	>179dB
	Common mode voltage:	250V ac max.
Series mode voltage:		280mV at lowest range; 5V peak to peak at highest range
Input Impedance:		40mV, 80mV, 2V ranges > 100MΩ; 62.5kΩ for input voltages > 5.6V 667kΩ for input ranges < 5.6V
Overvoltage protection		
	Continuous:	±30V RMS
	Transient (<1ms):	±200V pk-pk between terminals
Sensor break detection	Type:	ac sensor break on each input giving quick response with no associated dc errors
	Recognition time:	<3 seconds
	Minimum break resistance:	40mV, 80mV ranges: 5kΩ; other ranges: 12.5kΩ
Shunt (mA inputs only):		1Ω to 1KΩ mounted externally
additional error due to shunt:		0.1% of Input
Isolation:		
	Channel to Channel:	300V RMS or dc (Double insulation)
	Channel to common electronics:	300V RMS or dc (Double insulation)
	Channel to ground:	300V RMS or dc (Double insulation)
Dielectric strength	Test:	BS EN61010, 1 minute type test
	Channel to Channel:	2500V ac
	Channel to Ground:	1500V ac

Low Range	High Range	Res	Maximum error (Instrument at 25°C)	Temperature Performance
–40mV	40mV	1.9µV	4.6µV + 0.053% of reading	13ppm of input per °C
–80mV	80mV	3.2µV	7.5µV + 0.052% of reading	13ppm of input per °C
–2V	2V	82µV	420µV + 0.044% of reading	13ppm of input per °C
–3V	10V	500µV	1.5mV + 0.063% of reading	45ppm of input per °C

Table 1 Voltage input ranges

Resistance input ranges

Temperature scale:		ITS90
Types, ranges and accuracies:		See Table 3
Maximum source current:		200µA
Pt100 figures	Range:	0 to 400Ω (–200 to +850°C)
	Resolution:	0.05°C
	Calibration error:	±0.31°C ±0.023% of measurement in °C at 25°C ambient
	Temperature coefficent:	±0.01°C/°C ±25ppm/°C measurement in °C from 25°C ambient
	Measurement noise:	0.05°C peak-peak with 1.6s input filter
	Linearity error:	0.0033% (best fit straight line)
	Lead resistance:	0 to 22Ω matched lead resistances
	Bulb current:	200µA nominal

Low Range	High Range	Res	Maximum error (Instrument at 25°C)	Temperature Performance
0Ω	400Ω	20mΩ	120mΩ + 0.023% of reading	25ppm of input per °C

Table 2 Ohms (RTD) input ranges

RTD Type	Overall range (°C)	Standard	Max. linearisation error
Cu10	–20 to +400	General Electric Co.	0.02°C
Cu53	–70 to +200	RC21-4-1966	0.01°C
JPT100	–220 to +630	JIS C1604:1989	0.01°C
Ni100	–60 to + 250	DIN43760:1987	0.01°C
Ni120	–50 to +170	DIN43760:1987	0.01°C
Pt100	–200 to + 850	IEC751	0.01°C
Pt100A	–200 to + 600	Eurotherm Recorders SA	0.09°C

Table 3 RTD type details

Thermocouple data

Temperature scale:		ITS90
	CJC Types:	Off, internal, external, remote
	Remote CJC source:	Any input channel
	Internal CJC error:	<1°C max., with instrument at 25°C
	Internal CJC rejection ratio:	40:1 from 25°C
	Upscale/downscale drive:	High, low or none independently configurable for each channel's sensor break detection
Types, ranges and accuracies:		See Table 4

T/C Type	Overall range (°C)	Standard	Max. linearisation error
B	0 to +1820	IEC584.1	0 to 400°C = 1.7°C 400 to 1820°C = 0.03°C
C	0 to +2300	Hoskins	0.12°C
D	0 to +2495	Hoskins	0.08°C
E	–270 to +1000	IEC584.1	0.03°C
G2	0 to +2315	Hoskins	0.07°C
J	–210 to +1200	IEC584.1	0.02°C
K	–270 to +1372	IEC584.1	0.04°C
L	–200 to +900	DIN43710:1985 (to IPTS68)	0.02°C
N	–270 to +1300	IEC584.1	0.04°C
R	–50 to +1768	IEC584.1	0.04°C
S	–50 to +1768	IEC584.1	0.04°C
T	–270 to +400	IEC584.1	0.02°C
U	–200 to +600	DIN43710:1985	0.08°C
NiMo/NiCo	–50 to +1410	ASTM E1751-95	0.06°C
Platinel	0 to +1370	Engelhard	0.02°C
Mi/NiMo	0 to +1406	Ipsen	0.14°C
Pt20%Rh/ Pt40%/Rh	0 to +1888	ASTM E1751-95	0.07°C

Table 4 Thermocouple types, ranges and accuracies

Relay and Logic I/O

O/P1, O/P2 and O/P3 logic I/O and relay specification

Active (current on) current sourcing logic output

(O/P1 or O/P2 only)

Voltage o/p across terminals:	+11V min.; +13V max.
Short circuit output current:	6mA min. (steady state); 44mA max. (switch current)

Inactive (current off) current sourcing logic output

(O/P1 or O/P2 only)

Voltage output across terminals:	0V (min.); 300mV (max.)
Output source leakage current into short circuit:	0µA (min.); 100µA (max.)

Active (current on) contact closure sourcing logic input

(O/P1 only)

Input current	Input at 12V:	0mA (min.); 44mA (max.)
	Input at 0V:	6mA min. (steady state); 44mA max. (switch current)
Open circuit input voltage:		11V (min.); 13V (max.)
Open circuit (inactive) resistance:		>500Ω (min.)
Closed circuit (active) resistance:		0Ω(min.); 150Ω (max.)

Relay Contacts

Contact switching power (resistive):	Max. 2A at 230V RMS ±15% Min. 100mA at 12V
Current through terminals:	2A

General

Isolation:	300V RMS or dc (double insulation) relays to common electronics

Digital Inputs

Dig InA and Dig InB contact closure logic input

Contact closure

Short circuit sensing current(source):	5.5mA (min.); 6.5mA (max.)
Open circuit (inactive) resistance:	>600Ω (min.)
Closed circuit (active) resistance:	0Ω (min.); 300Ω (max.)

DC Output (option)

O/P1, O/P2, O/P3 DC analogue outputs

Current outputs

(O/P1, O/P2 and O/P3)

Output ranges:	Configurable within 0 to 20mA
Load resistance:	500Ωmax.
Calibration accuracy:	<±100µA ±1% of reading

Voltage outputs

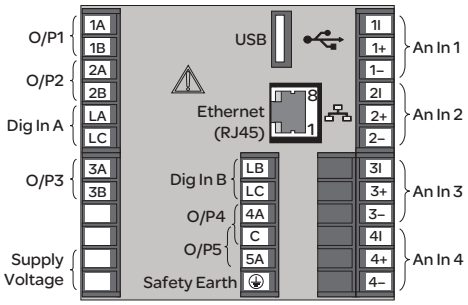
(O/P3 only)

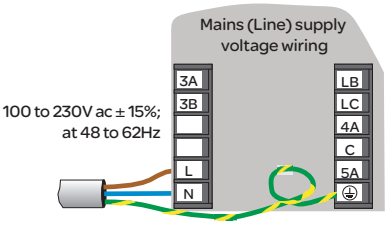
Output ranges:	Configurable within 0-10V
Load resistance:	500Ω min.
Calibration accuracy:	<±50mV ±1% of reading

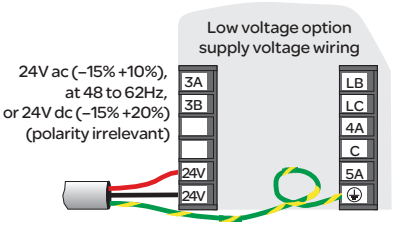
General

Isolation:	300V RMS or dc (double insulation) relays to common electronics
Resolution:	>11 bits
Thermal drift:	<100ppm/°C

Rear Terminals

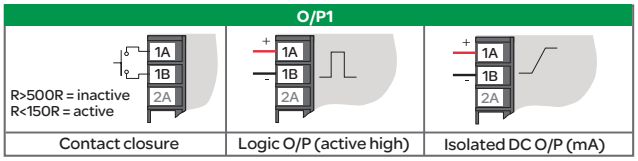


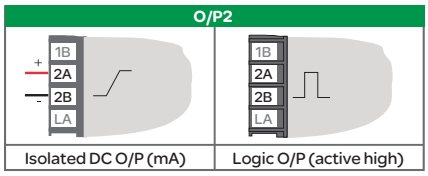




Termination details
The screw terminals accept wire sizes in the range:
Single wire 0.205 to 2.08mm² (14 to 24 AWG) 2 wires 0.205 to 1.31mm² (16 to 24 AWG) inclusive.

Screw terminals should be tightened to a torque not exceeding 0.4Nm (3.54 lb in).

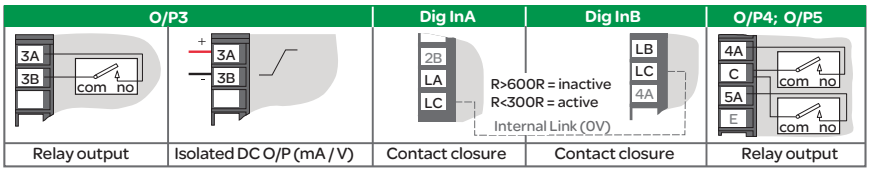


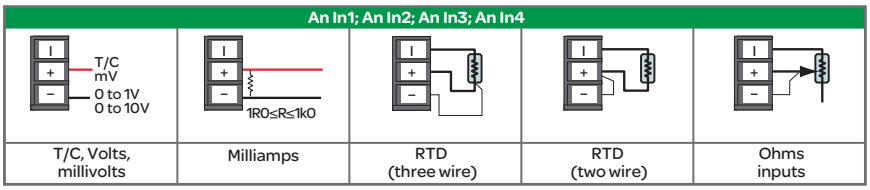


Use copper conductors only.

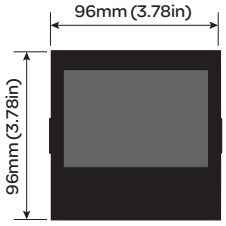
The power supply input is not fuse protected. This should be provided externally.

Each wire connected to LA, LB and LC must be less than 30 metres in length

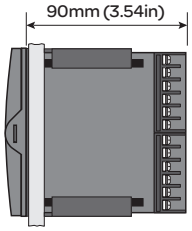


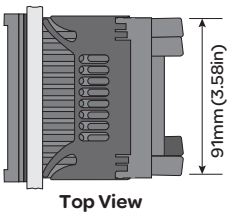


Mechanical details



Side View





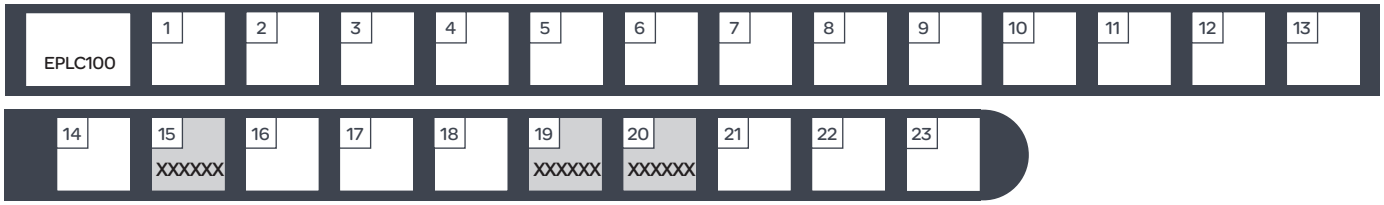
Top View

Panel cutout:
92mm (3.62in) x 92mm (3.62in)
(both -0 + 0.8mm (0.03in))

Minimum inter-unit spacing:
Horizontal ('x') = 10mm (0.4in)
Vertical ('y') = 38mm (1.5in)



E+PLC^{100} Order code



Basic Product

EPLC100	Precision PLC

1 Supply Voltage

VH	High voltage option (default)
VL	Low voltage option

2 Output Options 1-2-3

LLR	Logic, Logic, Relay
DDD	DC output x 3

3 Bezel

STD	Eurotherm (default)

4-13 Features

NONE	No features required
WVIS	Webserver visualisation*
PROG	Setpoint prorammer
BATCH	Batch and recording
VAC	Vacuum furnace package
HT	Heat Treatment atmosphere control package (zirconia, carbon diffusion, 3 gas IR)

14 Future

XXXXXX	Future
PH2	"Phase 2" advanced order

15 Future

XXXXXX	

16-18 Communications Option

NONE	Standard Comms: Ethernet Modbus/TCP Master/Slave

19 Future

XXXXXX	

20 Future

XXXXXX	

21 Labels

XXXXX	No custom labels (Eurotherm)
Fnnnn	Custom label

22 Specials

XXXXXX	Default

23 USB Memory Stick

NONE	Not required
008G	8GB USB memory stick

* Contact factory for availability

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Document Number HA032072 Issue 4

November 2014