

Safety Notes



Warning: Any interruption of the protective conductor inside or outside the apparatus, or disconnection of the protective earth terminal is likely to make the apparatus dangerous under some fault conditions. Intentional interruption is prohibited.

Safety requirements for permanently connected equipment state:

- A switch or circuit breaker shall be included in the building installation
 - It shall be in close proximity to the equipment and within easy reach of the operator
 - It shall be marked as the disconnecting device for the equipment.
 - Recommended external fuse ratings: For 100–230V ac, fuse type: T rated 2A 250V
1. Before any other connection is made, the protective earth terminal shall be connected to a protective conductor. The mains (supply voltage) wiring must be terminated in such a way that, should it slip, the earth wire would be the last wire to become disconnected.
 2. Whenever it is likely that protection has been impaired, the unit shall be made inoperative, and secured against accidental operation. The manufacturer's nearest service centre should be contacted for advice.
 3. Where conductive pollution (e.g. condensation, carbon dust) is likely, adequate air conditioning/filtering/ sealing etc. must be installed in the enclosure.
 4. Signal and supply voltage wiring should be kept separate from one another. Where this is impractical, shielded cables should be used for the signal wiring.
 5. If the unit is used in a manner not specified by the manufacturer, the protection provided by the equipment might be impaired.
 6. Installation must only be carried out by suitably qualified personnel.
 7. To prevent hands or metal tools touching parts that may be electrically live, the unit must be installed in an enclosure.



Caution: Live sensors. The unit is designed to operate if the temperature sensor is connected directly to an electrical heating element. However, you must ensure that service personnel do not touch connections to these inputs while they are live. With a live sensor, all cables, connectors and switches for connecting the sensor must be mains rated for use in 240V ac CAT II.



Caution: Wiring: It is important to connect the unit in accordance with the data in this sheet ensuring that the protective earth connection is ALWAYS fitted first and disconnected last. Wiring must comply with all local wiring regulations, i.e. UK, the latest IEE wiring regulations, (BS7671), and USA, NEC Class 1 wiring methods. Do not connect ac supply to low voltage sensor input or low level inputs and outputs.

8. The maximum continuous voltage applied between any of the following terminals must not exceed 240V ac:
 - relay output to logic, dc or sensor connections;
 - any connection to ground.
 The unit must not be wired to a three phase supply with an unearthed star connection. Under fault conditions such a supply could rise above 240V ac with respect to ground and the product would not be safe.
9. Grounding of the temperature sensor shield. In some installations it is common practice to replace the temperature sensor while the unit is still powered up. Under these conditions, as additional protection against electric shock, we recommend that the shield of the temperature sensor is grounded. Do not rely on grounding through the framework of the machine.
10. Over Temperature Protection. To prevent overheating of the process under fault conditions, a separate over-temperature protection unit should be fitted which will isolate the heating circuit. This must have an independent temperature sensor. Alarm relays within the unit will not give protection under all failure conditions.
11. Isopropyl alcohol, water or water based products may be used to clean labels. A mild soap solution may be used to clean other exterior surfaces.
12. Before removing a unit from its sleeve, disconnect the supply and wait at least two minutes to allow capacitors to discharge. Avoid touching the exposed electronics of an unit when withdrawing it from the sleeve.
13. This unit is intended for industrial temperature and process control applications within the requirements of the European Directives on Safety and EMC.

USB Device Precautions



Note: the use of U3 USB Flash drives is not recommended.

1. Precautions against electrostatic discharge should be taken when the unit terminals are being accessed. The USB and Ethernet connections are particularly vulnerable.
2. Ideally, the USB device should be plugged directly into the unit, as the use of extension leads may compromise the unit's ESD compliance. Where the unit is being used in an electrically 'noisy' environment, however, it is recommended that the user brings the USB socket to front of panel using a short extension lead. This is because the USB may 'lock up' or reset in noisy environments and the only means of recovery is to remove the device, then reinsert it. EMC-related failure during a write operation might cause corruption of the data held on a USB memory stick. For this reason, the data on the memory stick should be backed up before insertion and checked after removal.
3. When using a USB extension cable, a high quality screened cable must be used with a maximum length of 3 metres (10ft.).

Eurotherm: International Sales and Support

Eurotherm Limited
Faraday Close
WORTHING
BN13 3PL
UK

TEL +44 1903 268500
FAX +44 1903 265982

www.eurotherm.com/worldwide



Scan for local contacts

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E+PLC¹⁰⁰

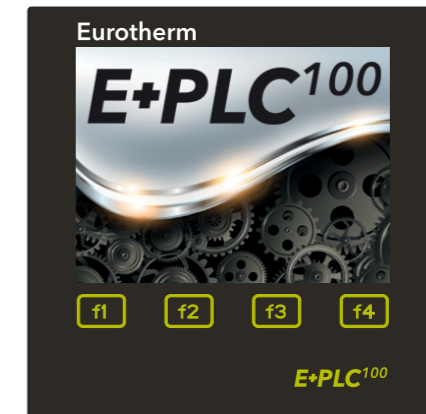
Installation Guide

GB

E+PLC100 is a ¼ DIN instrument that combines a PLC with precise control, secure recording and archiving strategies for compliance with industry standards. It has the following features:

- Modbus TCP master/slave
- Programmer
- Control loops with autotune
- Zirconia probe support (optional)
- Recording
- Batch
- Archiving
- Webserver (optional)

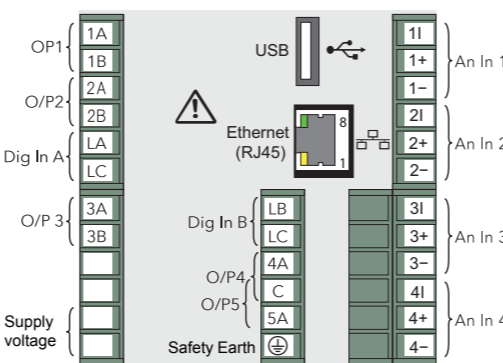
Further information is available in the *E+PLC100 User Manual*, part number HA32001, which may be downloaded from www.eurotherm.co.uk.



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Rear Terminals



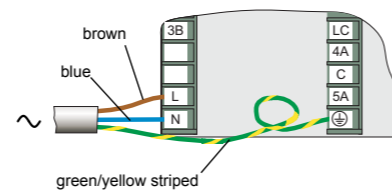
Communications

Ethernet (10/100baseT)

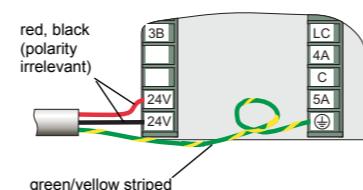
Pin	Function
8	not connected
7	not connected
6	Rx-
5	not connected
4	not connected
3	Rx+
2	Tx-
1	Tx+

LEDs:
Green= link connected
Amber= network activity

Mains (Line) voltage supply wiring
100 to 230 Vac ±15%, 48 to 62Hz

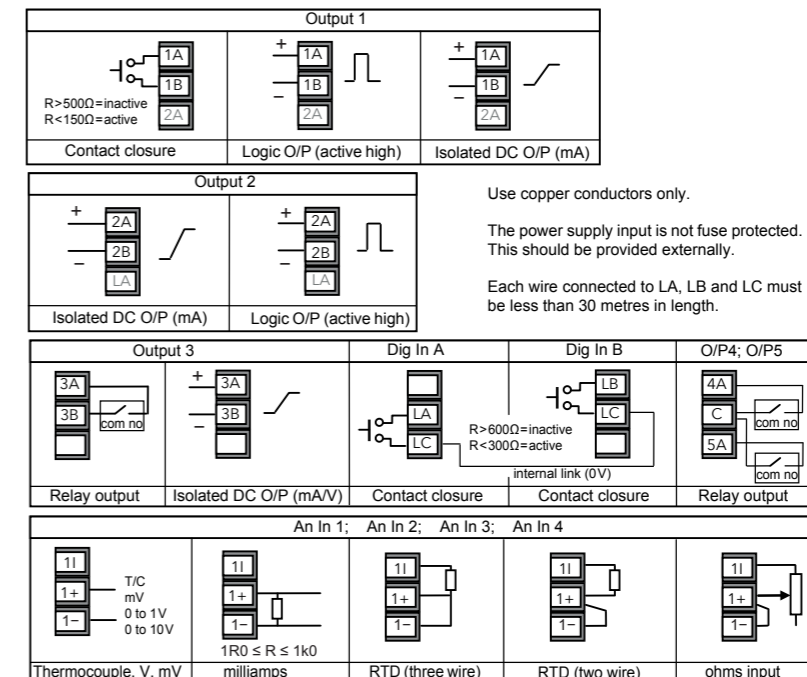


Low voltage option supply wiring
24Vac (-15%, +10%), 48 to 62Hz
or 24Vdc (-15%, +20%)



Termination Details

The screw terminals accept wire sizes in the range:
Single wire 0.205 to 2.08 mm² (14 to 24 AWG). Two wires 0.205 to 1.31 mm² (16 to 24 AWG) inclusive.
Screw terminals should be tightened to a torque not exceeding 0.4 Nm (3.54 lbin).



Installation

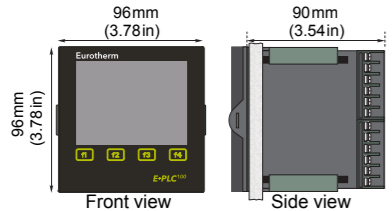
Requirements

- The PC must be running Windows XP or Windows 7.
- At least 1 GB RAM is required.

Procedure

- Insert the DVD into the PC drive. The setup program should run automatically unless 'autorun' has been disabled.
- If the DVD fails to autorun, in Windows Explorer double-click the DVD icon to see contents, then double click the **setup.exe** file.
- In the **Do Install** section of the dialog, click the required button to start the installation.
- Follow the instructions shown on-screen for each item of the installation.

Mechanical Installation



Panel Cutout

92mm (3.62in) × 92mm (3.62in)
[both -0 +0.8mm (0.03in)]

Minimum inter-unit spacing

Horizontal = 10mm (0.4in).
Vertical = 38mm (1.5in)

Labelling

Symbols used on this instrument

One or more of the symbols may appear as a part of the instrument labelling. When connecting a USB device, it must be plugged directly into the instrument. The use of extension USB leads may compromise the ESD compliance. Observe static precautions when accessing the rear terminals. Take special care with respect to USB and Ethernet connections.

Symbol	Meaning
	Refer to E+PLC100 User Manual for instructions.
	This unit is CE approved.
	C-Tick mark for Australia (ACA) and New Zealand (RSM).
	Underwriters laboratories listed mark for Canada and the U.S.
	For environmental reasons, this unit must be recycled before its age exceeds the number of years shown in the circle.
	Risk of electric shock.
	Precautions against static electrical discharge must be taken when handling this unit.
	Ethernet connector.
	USB connector.
	Protective-conductor terminal (Earth)

Specification

General

I/O types: Analogue input: Four
Digital input: Two
Digital (logic) output: Two max. (dependant on build variant)
Relay output: Three max. (dependant on build variant)
DC output: Three max. (dependant on build variant)
Memory Resources: for Application/Visualisation files: 12Mbytes
for Data Recording history files: 28Mbytes
for Retain/Persistent data: 64432 bytes

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 150Hz at 2g; 0.5 octave per min.) <2000 metres
Altitude: Not suitable for use in explosive or corrosive atmospheres
Atmosphere: 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
BS EN61326 Industrial
Immunity: CE and cUL, EN61010
Other approvals and compliance details
General: CE and cUL, EN61010
PV input: AMS2750 compliant
RoHS: EU; China
Packaging: BS61131-2:2007 section 6.3.3/6.3.4.
Physical
Panel mounting: ¼ DIN
Weight: Instrument only: 0.44kg (15.52ozs)
Panel cut out dimension: 92×92mm (both -0.0 +0.8) or 3.62×3.62" (both -0.00 +0.03")
90mm (3.54in) excluding wiring
Depth behind panel: 90mm (3.54in) excluding wiring

Operator Interface

Display: Touchscreen: 3.5" TFT colour display (320 pixels wide × 240 pixels high)
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 Ageing: 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.

Ethernet communications

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

USB port

Number of ports: One at rear of instrument
Standard: USB1.1
Transmission speeds: 1.5MBit/s (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

Option Boards

LLR (Logic, Logic, Relay)
DDD (DC output, DC output, DC output)

Analogue Input

General
Number of Inputs: Four
Input types: dc Volts, dc mV, dc mA, mV, RTD (2-wire and 3-wire)
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, 8mV, 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	Resolution	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 400°C (-200 to +850 °C)
Resolution: 0.05 °C
Calibration error: ±0.31 °C ±0.023% of measurement in °C at 25 °C ambient
Temperature coefficient: ±0.01 °C / °C ±25ppm/°C
measurement in °C from 25 °C ambient
Measurement noise: 0.05°C peak-peak with τ = 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	Resolution	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 (°C)
Cu10	-20 to +400	General Electric Co.	0.02
Cu53	-70 to +200	RC21-4-1966	0.01
JPT100	-220 to +630	JIS C1604:1989	0.01
Ni100	-60 to +250	DIN43760:1987	0.01
Ni120	-50 to +170	DIN43760:1987	0.01
Pt100	-200 to +850	IEC751	0.01
Pt100A	-200 to +600	Eurotherm Recorders SA	0.09

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

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

Table 4: Thermocouple types, ranges and accuracies

Relay and Logic I/O

output 1, output 2 and output 3 logic I/O and relay specification
Active (current on) current sourcing logic output (O/P1 or O/P2 only)
Voltage output 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 o/p 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)
11V (min.); 13V (max.)
Open circuit input voltage: >500Ω (min.)
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
2A
Current through terminals:
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)

output 1, output 2, output 3 DC analogue outputs
Current outputs (O/P1, O/P2 and O/P3)
Output ranges: Configurable within 0 to 20mA
Load resistance: 500Ω max.
Calibration accuracy: < ±100µA ±1% of reading
Voltage outputs (OP3 only)
Output ranges: Configurable within 0 to 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

Restriction of Hazardous Substances (RoHS)

Restriction of Hazardous Substances (RoHS)						
Product group	E+PLC100					
Table listing restricted substances	Chinese					
限制使用材料一览表						
产品	有毒有害物质或元素					
E+PLC100	铅	汞	镉	六价铬	多溴联苯	多溴二苯醚
印刷电路板组件	X	○	○	○	○	○
附属物	○	○	○	○	○	○
显示器	X	○	X	○	○	○
○	表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T11363-2006标准规定的限量要求以下。					
X	表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T11363-2006标准规定的限量要求。					
English						
Restricted Materials Table						
Product	Toxic and hazardous substances and elements					
E+PLC100	Pb	Hg	Cd	Cr(VI)	PBB	PBDE
PCBA	X	○	○	○	○	○
Enclosure	○	○	○	○	○	○
Display	X	○	X	○	○	○
○	Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.					
X	Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006.					
Approval						
Name:	Position:	Signature:	Date:			
Kevin Shaw	R&D Director	<i>K. Shaw</i>	29th January 2014			