Life Is On | Eurotherm by Schneider Electric

Optimizing efficiency and regulatory compliance

E+PLC^{100} Combination PLC

Advanced control, data management and visualization in a single box solution

Product at a glance

E+PLC^{100} is a combination single box PLC designed to meet the stringent regulatory requirements of thermal and other advanced manufacturing industries.

By utilizing the open industry standard IEC61131-3 CODESYS® platform, E+PLC enables simplified engineering through a single integrated programming and visualization environment.

Includes advanced function block libraries for:

- Heat treatment applications
- Control and data recording
- 'OEM security' and customization

Eurotherm's unique PID control functions are built-in, enabling faster commissioning and tighter control of the overall process, as well as easing conformance to regulatory and end-customer requirements, including:

- 6 PID sets to help maintain tight control at different setpoints
- Intelligent auto-tune for optimal control and commissioning
- Specialized cutback function for overshoot control

Data management embedded in E+PLC helps manufacturers meet strict regulatory process data requirements, including:

- Tamper-resistant file format .uhh (a superior alternative to editable .csv solutions commonly found in PLCs)

Ethernet communications offer connectivity to IIoT (Industrial Internet of Things) and Industry 4.0 technologies, such as EOS (Eurotherm Online Services).

To assist with operational efficiency, E+PLC^{100} includes a fully configurable touchscreen HMI, as well as an embedded web-server for remote viewing on mobile devices.

Typical application fields

- Industrial furnaces and ovens
- Climate chambers
- Autoclaves
- Dryers
- Sterilizers
- Specialized machines and test equipment

Easy to use function block libraries

- Auto-tuning PID control
- Data recording
- Batch data management
- Setpoint programming
- Carbon control (including 3GASIR and online diffusion)
- Vacuum control (including active gauge support, auto, and leak rate checks)

IEC 61131-3 Programming Languages

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

CODESYS

E+PLC100 Specification

General hardware and software

I/O types	
Analog input	Four
Digital input	Three max (dependent on option board)
Digital (logic) output	Two max (dependent on option board)
Relay output	Three max (dependent on option board)
DC output	Three max (dependent on option board)

Network communications	
Ethernet	10/100BASE-T Ethernet (IEEE802.3)
Protocols	Modbus TCP/IP master/slave
Cable type	Category 5
Maximum length	100 meters (110 yards)
Termination	RJ45 Green LED illuminated shows 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) Barcode scanner (US locale support only) Keyboard (US keyboard layout only)

HMI	
Integrated display	3.5" TFT color display (320 pixels wide x 240 pixels high) with PCT (projected capacitive touchscreen)
Web server	Compatible with HTML5 web browsers

Integrated development environment	
Software	CODESYS IDE Version 3 with E+PLC packages

Memory resource	
Application/visualization files	12MB
Data recording history files	28MB
Retain/persistent data	62kB

Real time clock battery	
Stored data	Time, date
Replacement period	Three years typical
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	Lithium poly-carbonmonofluoride

Data recording update/archiving		
Sample rate	8Hz	
Trend update	10Hz guidance limit[1]	
Recording groups	2	
Recording channels	**Guidance limit[1]**	**Absolute limit**
Recording points	24	48
Display channels	6 per group	24 per group

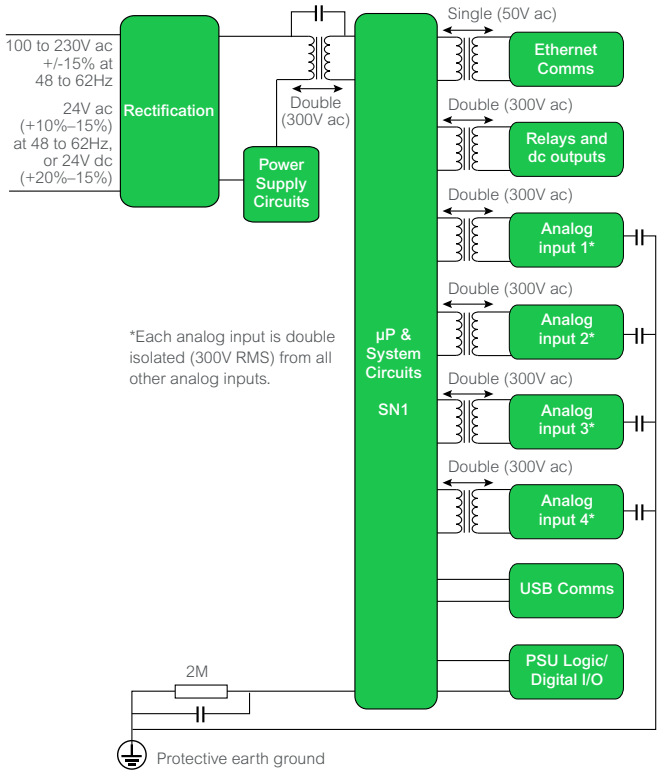
Standard library functions
Inputs
• Universal inputs (mA, RTD, TC, V) • Signal conditioning (filter, temperature conversion, etc.) • Calibration (offset, scaling)
Control
• Logic functions • PID control (autotune, cutback etc.) • Setpoint programming/setpoint profiler • Visualization (PID faceplate)
Data recording and archiving
• Batch management • Archiving FTP • Trend visualization
Carbon control
• Zirconia (carbon potential, dewpoint, oxygen) • Carbon profile visualization • 3GasIR • Probe cleaning • Sooting prediction • Impedance measurement
Vacuum control
• Vacuum gauge linearization • Vacuum leak test (rate, leak-up) • Vacuum gauge switch • Vacuum pump-down timer
Other
• Thermocouple life (based on AMS2750E) • Time synchronization (SNTP) • Modbus library (Eurotherm 3200i, EPack, EPower, Mini8)

[1] 'Guidance limit' represents a practical number considering average memory usage and execution speed of a typical dual loop control application, including typical visualizations and navigation for the operator.

E+PLC^{100} Specification

Power supply, isolation, environmental and compliance

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



Isolation details

Environmental specifications, approvals and compliance		
Operating temperature		0 to 55°C
Storage temperature		–20 to +70°C, max rate of change 1°C per minute
Operating humidity		5% to 85% RH non condensing
Storage humidity		5% to 85% RH non condensing
Front of panel protection		IP66, NEMA12
Back of panel protection		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 meters
Atmosphere		Not suitable for use in explosive or corrosive atmospheres
Electromagnetic compatibility (EMC)	Emissions	Standard units to BS EN 61326 Class B – Light industrial Low voltage option to BS EN 61326 Class A – Heavy industrial
	Immunity	BS EN 61326 Industrial
Regional approvals	Europe	CE, RoHS, REACH, WEEE
	USA, Canada	UL, cUL
	Russia	EAC and Metrological Pattern Approval
	China	CCC: Exempt (Product not listed in catalog of products subject to China Compulsory Certification), RoHS
Industry specific standards	Nadcap	E+PLC^{100} is suitable for use in Nadcap applications in all furnace classes A-E, as defined in section 3 of the AMS2750E standard. For more information, see www.eurotherm.com/certificates
Electrical safety		BS EN61010-1 (installation category II; Polution degree 2)

E+PLC100 Specification

Built in I/O

Analog inputs (An In 1-4)

Analog inputs general	
Number of inputs	Four
Input types	dc volts, dc mV, dc mA (external shunt required), thermocouple, linear ohms, RTD (2-wire and 3-wire)
Input type mix	Freely configurable
Update rate	125ms max.
Conversion method	16 bit delta sigma
Input ranges	See individual tables
Mains rejection (48 to 62Hz) Common mode voltage Series mode voltage	> 95dB series mode >179dB common mode 250V ac max. 280mV at lowest range; 5V peak to peak at highest range
Input impedance	>100MΩ (40mV, 80mV, 2V ranges only) 667kΩ for input < 5.6V, 62.5kΩ for input > 5.6V (10V range only)
Overvoltage protection	±30V RMS (continuous) ±200V pk-pk between terminals (transient <1ms)
Sensor break detection	ac sensor break on each input giving quick response with no associated dc offset Recognition time<3 seconds Minimum break resistance: 5kΩ for 40mV and 80mV ranges; 12.5kΩ for 2V and 10V ranges
Isolation	300V RMS or dc (double insulation) channel to channel 300V RMS or dc (double insulation) channel to processor electronics 300V RMS or dc (single insulation) channel to ground
Dielectric strength	BS EN 61010, 1 minute type test 2500V ac channel to channel 1500V ac channel to ground

Voltage inputs

mV and V inputs				
Low range	High range	Resolution	Calibration accuracy (instrument at 25°C)	Temperature performace
-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

Thermocouple inputs

Thermocouple inputs	
Temperature scale	ITS90
CJC types	Off, internal, external, remote
Remote CJC source	Any analog input channel
Internal CJC accuracy	<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

Thermocouple types			
T/C type	Overall range (°C)	Standard	Linearization accuracy
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

E+PLC100 Specification

Built in I/O

Current inputs

mA input accuracy is based on the shunt value and voltage range. Standard mA selection uses -3 to 10V range, therefore use -3 to 10V range specifications.

mA inputs			
Low range	High range	External shunt	Shunt accuracy
0	20mA	1Ω to 1kΩ	Dependent on shunt selection. 0.1% of input for shipped 2.49Ω shunt.

Resistance inputs

Linear ohms inputs				
Low range	High range	Res	Calibration accuracy (Instrument at 25°C)	Temperature performace
0Ω	400Ω	20mΩ	120mΩ + 0.023% of reading	25ppm of input per °C

RTD inputs

Pt100 inputs	
Temperature scale	ITS90
Maximum source current	200µA
Range	0 to 400Ω (–200 to +850°C)
Resolution	0.05°C
Calibration accuracy	±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 1.6s input filter
Linearity	0.0033% (best fit straight line)
Lead resistance	0 to 22Ω matched lead resistances

RTD types			
RTD type	Overall range (OC)	Standard	Linearization accuracy
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

Digital inputs (Dig in A and Dig in B only)

Contact closure input	
Closed circuit sensing current (source)	5.5mA min to 6.5mA max
Open circuit (inactive) resistance	>600Ω
Closed circuit (active) resistance	<300Ω
Update rate	8ms max

Relay outputs (O/P4 and O/P5 only)

Form A N/O relay outputs	
Contact switching power (resistive)	1A max at 240V RMS +/-15%, 5mA min at 5V
Current through terminals	1A
Isolation	300V RMS or dc, double insulated from processor/comms electronics
Update rate	8ms max

E+PLC100 Specification

Built in I/O

Three channel I/O options

To complement the fixed I/O, a three channel option board can be fitted to fill option channel positions 1, 2 and 3 (named Opt 1, Opt 2, and Opt 3). Two option board variants are available: LLR (logic, logic, relay) and DDD (dc, dc, dc).

LLR option board (logic, logic, relay)

Logic input (Available in Opt 1 only)

Active (current on) contact closure logic input	
Input current (input at 12V)	0mA min to 44mA max
Input current (input at 0V)	6mA (steady state) to 44mA (switch current)
Open circuit input voltage	+11V to +13V
Open circuit (inactive) resistance)	>500Ω
Closed circuit (active) resistance	<150Ω
Update rate	8ms max

Logic outputs (Available in Opt 1 and Opt 2)

Active (current on) current sourcing	
Voltage output across terminal	+11V to +13V
Short circuit output current	6mA (steady state) to 44mA (switch current)
Update rate	8ms max

Inactive (current off) current sourcing	
Voltage output across terminal	0mV to +300mV
Output source leakage current into short circuit	0µA to100µA
Update rate	8ms max

Relay output (Available in Opt 3)

Form A N/O relay	
Contact switching power (resistive)	2A max at 240V RMS +/-15%, 100mA min at 12V
Current through terminals	2A
Update rate	8ms max
Isolation	300V RMS or dc, double insulated from processor electronics

DDD option board (dc o/p, dc o/p, dc o/p)

DC current outputs (Available in Opt 1 to Opt 3)

mA current output	
Output range	Configurable within 0-20mA
Load resistance	500Ω max
Calibration accuracy	<+/-100µA +/-1% of reading
Resolution	>11 bits
Thermal drift	<100ppm/°C
Update rate	125ms max
Isolation	300V RMS or dc, double insulated from processor electronics

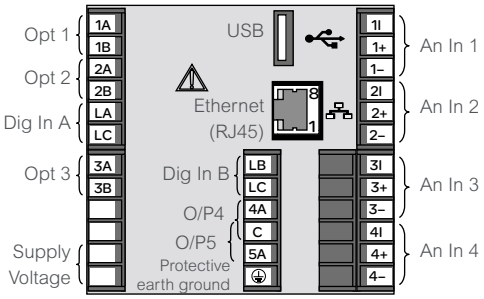
DC voltage output (Available in Opt 3 only)

Voltage output	
Output range	Configurable within 0-10Vdc
Load resistance	500Ω min
Calibration accuracy	<+/-50mV +/-1% of reading
Resolution	>11 bits
Thermal drift	<100ppm/°C
Update rate	125ms max
Isolation	300V RMS or dc, double insulated from processor electronics

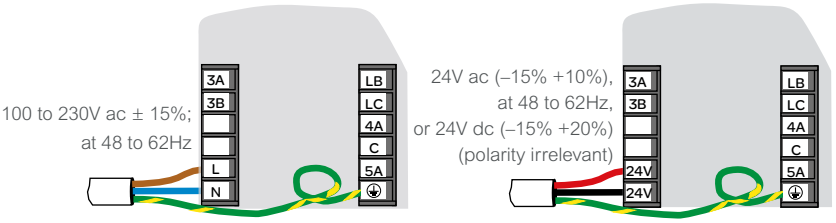
E+PLC^{100} Specification

Terminal wiring details

No. of wires	Wire size		Screw terminal torque	
	mm2	AWG	Nm	lb in
1 wire	0.205 to 2.08 mm^2	24 to 14 AWG	0.4Nm max	3.54 lb in max
2 wires	0.205 to 1.31 mm^2 (inclusive)	24 to 16 AWG (inclusive)	0.4Nm max	3.54 lb in max



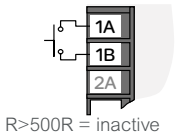
Rear terminals



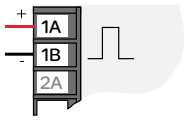
Supply voltage wiring

I/O terminations

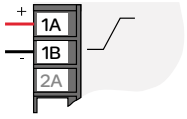
Opt 1



R>500R = inactive
R<150R = active
Contact closure

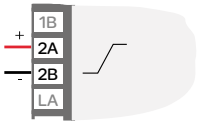


Logic O/P (active high)

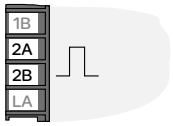


Isolated DC O/P (mA)

Opt 2

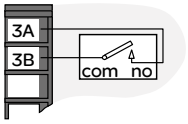


Isolated DC O/P (mA)

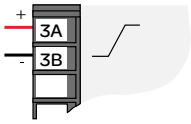


Logic O/P (active high)

Opt 3

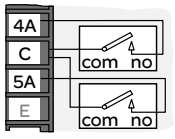


Relay output



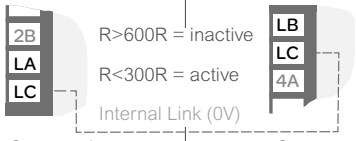
Isolated DC O/P (mA / V)

O/P4; O/P5



Relay output

Dig InA

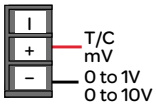


Contact closure

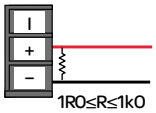
Contact closure

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

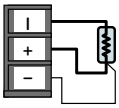
An In1; An In2; An In3; An In4



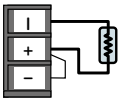
T/C, Volts, millivolts



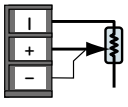
Milliamps



RTD (three wire)



RTD (two wire)

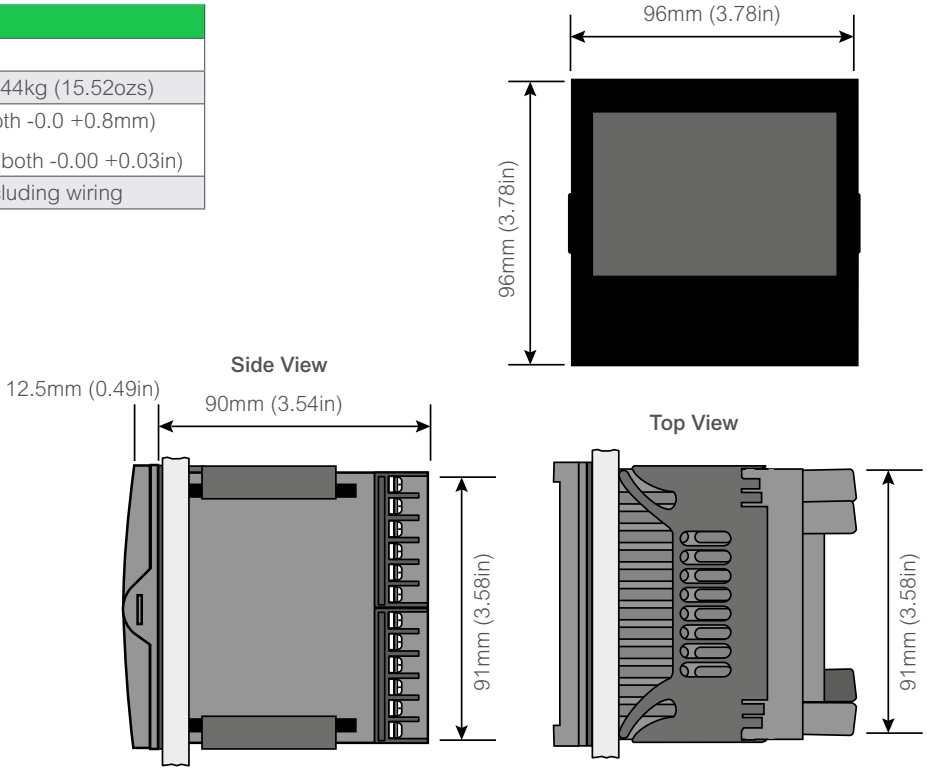


Ohms Inputs

E+PLC^{100} Specification

Terminal wiring details

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



E+PLC^{100} Order Codes

E+PLC^{100}	1	2	3	4	5	6	7	8	9	10	11	12
			STD	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE

13	14	15	16	17	18	19	20	21	22	23
NONE	XXXXXX	XXXXXX	NONE	NONE	NONE	XXXXXX	XXXXXX		XXXXXX	

Basic Product	
EPLC100	Box PLC

1	Supply Voltage
VH	100-230Vac
VL	24Vac/dc

2	Optional I/O
LLR	Logic, Logic, Relay
DDD	DC output x 3

3	Bezel
STD	Eurotherm (default)

4-13	Features
NONE	No features required

14	Not Used
XXXXXX	

15	Future
XXXXXX	Eurotherm (default)

16-18	Comms option
NONE	Standard Comms: Ethernet Modbus/ TCP Master/Slave

19	Not Used
XXXXXX	

20	Not Used
XXXXXX	

21	Labels
XXXXXX	No custom labels (Eurotherm)
Fnnnn	Custom label

22	Specials
XXXXXX	Default

23	USB Memory Stick
NONE	Not required
008G	8GB USB memory stick

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