Precision at the Heart of Your Process

Eurotherm EPC2000 programmable controller

Simplify the integration of fast-acting control while easing cybersecurity worries

Product at a glance

The EPC2000 programmable single loop temperature and process controller provides efficient and repeatable precision control in a convenient and easy to deploy DIN rail and surface mounting format.

The controller combines precise control and measurement performance with a high speed Ethernet connection incorporating an integral switch for daisy chain connection to supervisors, panels or PLC. Cybersecurity is certified to the stringent requirements of Achilles® CRT Level 1.

User function block wiring with optional math, logic, totalizer and specialized functions allows the unit to take on additional system functions beyond PID control.

EPC2000 is designed for an extended service life, with FRAM battery-free non-volatile data storage.

Accuracy and repeatability

The EPC2000 measurement input is fast and accurate, with exceptional thermal stability, aiding precise and consistent control over long periods without calibration drift. As such it provides excellent front end control for processes requiring accurate control, including aerospace and advanced materials processing.

The Eurotherm PID algorithm delivers fast reacting and repeatable control and has been further enhanced to help reduce overshoot Rapid attainment of operating temperature and low oscillation aids high process throughput at low scrap rates. Different PID settings may be applied in different operating ranges for optimum performance.

- Precision furnace control
- Composite materials processing
- Precision Metallurgy, Annealing, Sintering
- Semiconductor applications
- Baking Ovens
- Heat exchangers
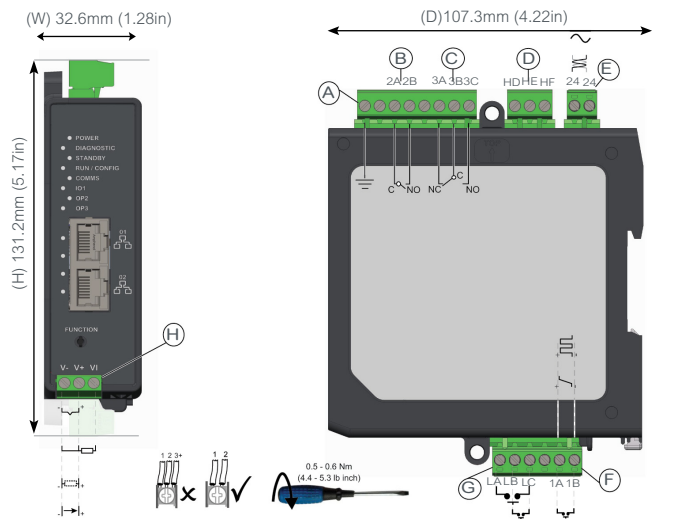- Automotive paint drying
- Glass Bushing control

- Precision single loop DIN rail mountable controller with cybersecurity qualification
- Precise (0.1%) universal inputs with 50ms sample rate
- Thermocouples, resistance thermometer, mA, mV, volts
- Exceptional thermal stability
- Fast PID response with minimal overshoot and oscillation
- Multi-programmer function with up to 20 multi step sequences
- Direct Daisy Chained Ethernet 100BASE-T RJ45 Connection certified to Achilles® CRT Level 1
- Quick code setup with application templates
- User function block wiring including math, logic and totalizer
- International approvals

EPC2000 Specification

General	
Controller function	Single loop DIN mount PID controller range with autotune, on/off, valve positioning (no slidewire required). Single loop profile/program up to 10 profiles of 24 segments or 20 profiles of 8 segments. 24V AC/DC options.
Ethernet	100BASE-T with integral switch. Achilles® Communications Robustness Testing Level 1.
Measurement input	Single input. +/− 0.1% accuracy
PID control	Two PID sets are available as standard with separate proportional band for heat and cool. Enhanced Auto-tuning control with cutback to minimize overshoot and oscillation. Fast reacting precision control to setpoint changes or after process disturbances. Enhanced valve positioning (unbounded) algorithm. Gain scheduling allows PID selection for a wide range of operating situations, including deviation from setpoint, absolute temperature, output level and others. PV and SP feed-forward functions.
Program/Profiler	Maximum 20 program sequences of 8 segments. Options for 1x8, 1x24, 10x24, with textual program and segment names Holdback ("guaranteed soak"), event outputs, time to target, ramp rate, dwell, step and call segment types. Additional timer functions available.
User function block wiring	Optional totalizer, math, logic and multiplexing, BCD conversion, counter/timer.
Additional functions	Average, min, max. 6 configurable alarms with manual, automatic, non-latching and event types plus alarm delay function and blocking. Alarms may be inhibited in standby. 5 recipes with 40 selectable parameters switchable from digital input.
Backup and configuration tools	Eurotherm iTools software for backup and configuration. iTools also connects using Ethernet (Modbus TCP) and/or serial (Modbus RTU).

Mechanical Mounting	
Mounting	Mounting is top hat EN50022 DIN rail or surface mounting through fixing screw holes provided. Vertical mounting only. No horizontal separation required between units.
IP Rating	IP20*
Weight	0.21kg (0.46lb)

* IP20 rating achieved with all connector plugs fitted

Key	Title		Terminals	Function	Symbol
A	Functional ground connection			Functional ground connection point	
B	OP2 (Output 2)	Common (C) Normally Open (NO)	2A 2B	Relay Form A (Normally Open)	
C	OP3 (Output 3)	Normally Closed (NC) Common (C) Normally Open (NO)	3A 3B 3C	Relay Form C, (Change Over Relay)	
D	COMMS (Serial Communication)	COM A(+) RX B(-) TX	HD HE HF	EIA485	
E	Power Input (Low voltage only)		24 24	24Vac/Vdc	
F	IO1 (Input/Output 1) - Option 1		1A(+) 1B(-)	Analog output	
	IO1 (Input/Output 1) - Option 2 Note: Multiple output/input functions depending on controller configuration purchased.		1A(+) 1B(-)	Logic (SSR drive), output or Contact Input, connected to Logic output	
G	DI x2 (Digital Input)		LA LB LC		
		Digital Input 1	LA LC	Contact Input	
		Digital Input 2	LB LC	Contact Input	
H	IP1 (Input 1), Sensor Measuring Analog Input - Do not run input wires with power cables - Ground shielded cable at one point only - Sensor input not isolated from the logic output & digital inputs - Use appropriate compensating cable to extend thermocouple cabling Note: Fixed connector - not removable.		V- V+ Or	Thermocouple (TC)	
			V- V+ VI Or	Resistance Temperature Detector (RTD)	
			V- V+ Or	Current (mA)	
			V- V+	Voltage (mV/V)	

#	1	2	3	4	5	6	7	8	9
mm²	.25 − 2.5	0.2 − 2.5		.25 − 2.5		2x .2 − 1.0	2x .2 − 1.5	2x .25 − 1	.5 − 1.5
AWG	24 − 13	24 − 14		23 − 13		2x 24 − 17	2x 24 − 16	2x 23 − 17	20 − 16

1. Maximum exposed conductor length
2. Solid cable
3. Multi strand cable
4. Multi strand cable, ferrule
5. Multi strand cable, ferrule with skirt
6. Solid cable x2
7. Multi strand cable x2
8. Multi strand cable x2, ferrule x2
9. Multi strand cable x2, twin ferrule

EPC2000 Specification

Inputs and Outputs	
Analog Inputs	1 Universal input
Form A relay output	1
Form C relay output	1
Logic IO (SSR drive)	1 (mutually exclusive with DC Output)
DC Output	1 (mutually exclusive with Logic IO)
Contact closure logic input	2

Communications	
Ethernet	Dual Ethernet switch. Shielded grounded RJ45 connections supporting 10/100BASE-T auto sensing. Fixed IP address or DHCP. Modbus/TCP Slave.
Serial	EIA485 Half duplex Baud rates 9600, 19200 Modbus RTU 8 data bits, odd/even/no parity selectable

Universal process input	
Input types	Thermocouples, PT100 RTD, 4-20mA, 0-20mA, 10V, 40mV, 80mV. Accuracy ±0.1% reading, when subject to the necessary field calibration.
Sample time	Sample rates are 20Hz for mV/mA, 16Hz for thermocouple and 10Hz for RTD.
Mains rejection	Series mode rejection 48-62Hz >60dB. Common mode rejection >150dB
Sensor break	AC sensor break. Break detected within 3 seconds worst case.
Input filtering	OFF to 60 seconds filter time constant.
User calibration	User 2 point input adjust (offset/gradient), transducer scaling
Thermocouple	K, J, N, R, S, B, L, T as standard, plus 2 downloadable custom curves Linearization accuracy CJ calibration accuracy: <±1.0°C at 25°C ambient CJ ambient rejection ratio: better than 40:1 from 25°C ambient CJ automatic (internal), variable (external fixed 0 - 50°C)

Input Ranges			40mV	80mV	10V	RTD (PT100)	mA
Range		Min	-40mV	-80mV	-10V	0Ω (-200°C)	-32mA
		Max	+40mV	+80mV	+10V	400Ω (850°C)	+32mA
Thermal stability from 25°C ambient			±0.4µV/°C ±13ppm/°C	±0.4µV/°C ±13ppm/°C	±0.8µV/°C ±70ppm/°C	±0.01°C/°C ±25ppm/°C	±0.16µA/°C ±113ppm/°C
Resolution			1.0µV unfiltered	1.6µV	250µV	0.05°C	0.6µA
Electrical noise (peak to peak with1.6s input filter)			0.8µV	3.2µV	250µV	0.05°C	1.3µA
Linearity accuracy (best fit straight line)			0.003%	0.003%	0.007%	0.033%	0.003%
Calibration accuracy at 25°C ambient			±4.6µV ±0.053%	±7.5µV ±0.052%	±1.5mV ±0.063%	±0.31°C ±0.023%	±3µA ±1.052%
Input resistance			100MΩ	100MΩ	57kΩ	–	2.49Ω (1% shunt)
Bulb current			–	–	–	190µA/180µA	–

EPC2000 Specification

Logic IO (SSR Drive)	
Output rating	ON 12V DC 44mA max. Minimum control cycle time 50ms (auto)
Output functions	Time proportioned heat, time proportioned cool. SSR drive alarm and event outputs, interlock outputs, other functions available using soft wiring.
Contact closure (input)	Contact open > 400Ω, Contact closed < 100Ω
Input functions	Auto/Manual select, Integral hold, Control inhibit, Program run functions, Recipe select, PID select, BCD bit, Autotune enable, Standby and other functions available using soft wiring.

DC Output	Current output	Voltage output
Range	0-20mA	0-10V
Load resistance	<550Ω	>450Ω
Calibration accuracy	< ±(0.5% of reading + 100uA offset)	< ±(0.5% of reading + 50mV offset)
Resolution	13.5 bits resolution	13.5 bits resolution
Output functions	SCR/Power control drive. Proportional valve. Retransmission to chart recorder or other instrumentation. Other functions using soft wiring.	

Relays (Form A & Form C)	
Types	Form A (normally open) Form C (changeover) Integrated snubbers (MOV type)
Output functions	Time proportioned heat, time proportioned cool. SSR Drive. Direct valve raise/lower. Alarm and event outputs, interlock outputs, other functions available using soft wiring.
Rating	Min 100mA @ 12V, Max 2A @ 264V AC resistive.

Contact closure logic inputs	
Thresholds	Open > 400Ω, Closed < 100Ω
Input functions	Auto/Manual select, Integral hold, Control inhibit, Program run functions, Recipe select, PID select, BCD bit, Autotune enable, Standby and other functions available using soft wiring.

EPC2000 Specification

| Operator interface	
Type	No integrated HMI, support for external HMI via communications. Proface GP4100 recommended. Diagnostic indication via LEDs on front face.

Function Blocks	Function	Standard	Toolkit enabled
Instrument	Interface to Instrument wide settings	1	-
Loop	Enhanced Eurotherm PID Loop	1	-
Programmer	Ramp/Dwell Programmer	1	-
Timer	Timer based functions	1	-
Alarm	General purpose analogue alarm monitoring	6	-
Recipe	General purpose recipe function	1	-
Comms	Interface to serial and ethernet comms	2	-
AI	Interface to main analogue input	1	-
IP Monitor	Input monitoring (min, max, other functions)	2	-
IO	Interface to Inputs and Outputs	6	-
Remote Input	Interface to remote (communications) input	1	-
Math2	Two input math functions	-	4
Lgc2	Two input logic operatons	-	2
Lgc8	Eight input logic operations	-	8
OR	Eight input logical "OR" operation	-	8
BCD	BCD Conversion	-	1
Mux8	Eight input multiplexer	-	3
Total	Totalizer	-	1
Counter	Counter block (32 bit)	-	1
UsrVal	User values (freely assignable)	-	4
Wires		50	200

Standards	
Operating temperature	0°C to 55°C (32°F to 131°F)
Storage temperature	-20°C to 70°C (-4°F to 158°F)
Operating/storage humidity	5% to 90% RH non condensing
Atmosphere	Non-corrosive, non-explosive
Altitude	<2000 meters (<6562 feet)
Vibration and Shock	EN61131-2 (5 to 11.9Hz @ 7mm peak to peak displacement, 11.9-150Hz @ 2g, 0.5 octave min.) EN60068-2-6 Test FC, Vibration. EN60068-2-27 Test Ea and guidance, Shock.
Flammability of plastic materials	UL746C-V0
Emissions	LV PSU units to EN61326-1 Class A – Heavy industrial
Immunity	BS EN61326-1 Industrial
Approvals and certification	CE (EN61326), RoHS (EN50581), WEEE, UL, cUL, REACH, EN14597TW/TB pending, EAC (CUTR) pending, CCC Exempt Achilles® CRT Level 1 Cybersecurity Assessment Schneider Electric Green Premium
Electrical safety	EN61010-1 (installation category II, pollution degree 2)

EPC2000 Specification

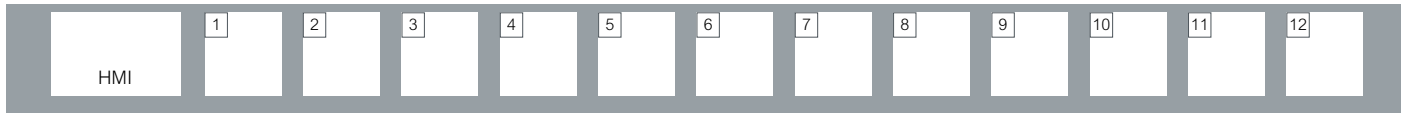## Isolation Diagram
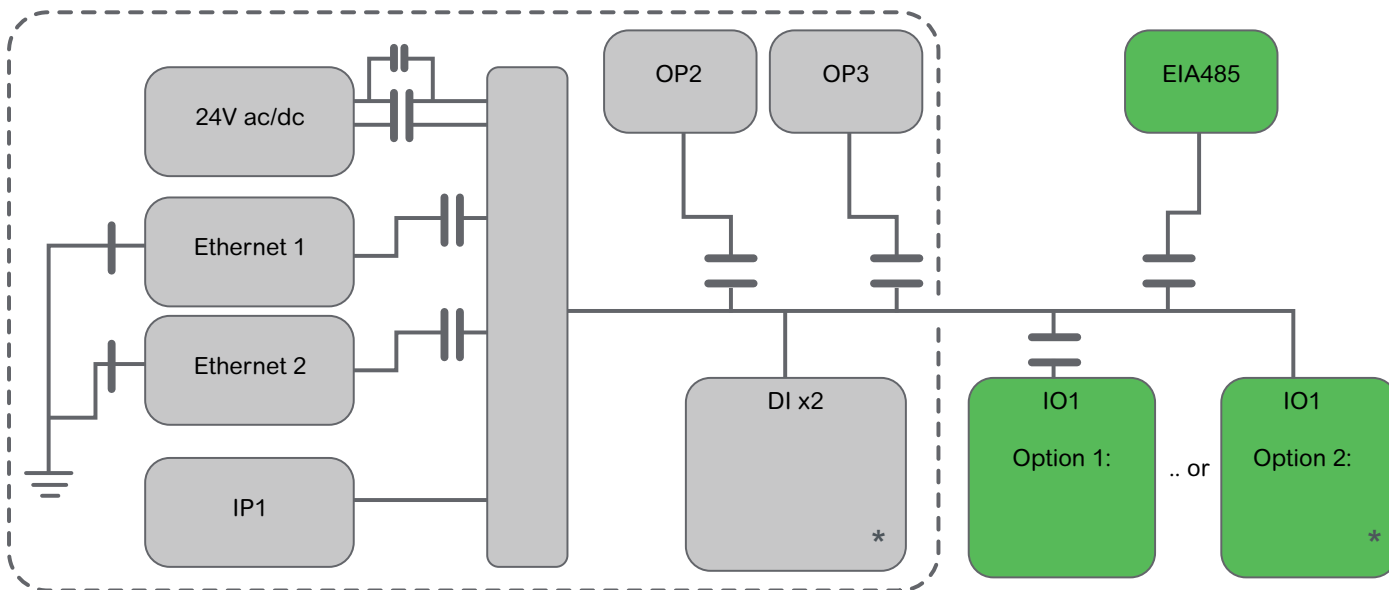
Key									
⊣⊦	300Vac DOUBLE Isolation	+	300Vac BASIC Isolation	*	Contact In/ Logic out - not isolated from each other	⬚	Standard for all variants		

EPC2000 Specification

HMI Order Codes

HMI	1	2	3	4	5	6	7	8	9	10	11	12

*1 Note 1. Supplied unprogrammed
**2 Note 2. Always supplied with RTC/Battery

1	Model
HMI	Proface HMI

2	Series
GP	GP 4100 Series*1 **2

3	GP 4100 Series
XXXXXX	Not required
GP4114	4.3" (480 x 272 pixel) HMI Ethernet only

4	Future
XXXXXX	Future

5	Future
XXXXXX	Future

6	BLUE Developer Software
XXXX	Not required
BLUE	BLUE Standard DVD

7	Future
XXXXXX	Future

8	Future
XXXXXX	Future

9	RTC Battery
BATT	RTC Battery Supplied NOT Fitted (default)

10	Labels
XXXXX	None (Default)

11	Specials
XXXXXX	None (Default)

12	OEM Options
XXXXXX	Not Required

HMI Accessory Order Codes

HMIACC	1	2	3	4
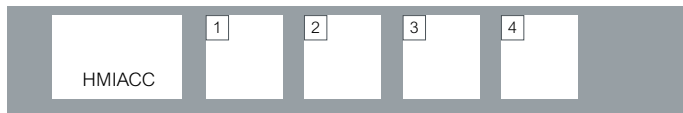
1	Model
GP	GP Series

2	GP Series
XXXX	Not Required
BATT	RTC/Battery for GP4100

3	SP Series
XXXX	Not Required

4	PS Series
XXXX	Not Required
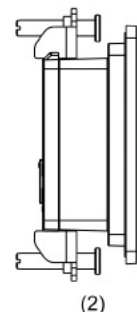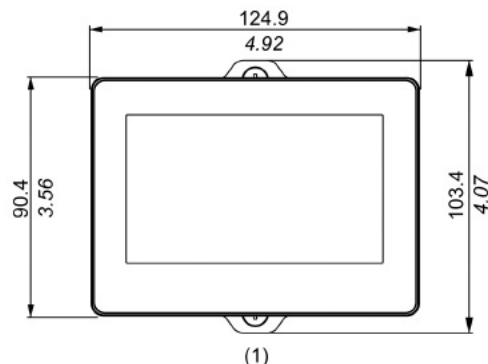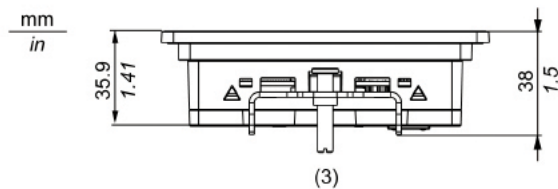
DIN PSU Order Codes

DINPSU	1

	Model and Analogue Input
DINPSU	DIN Rail Mount 24vdc PSU

1	Type
1A2	1.2 A (30W) 24Vdc Output

$\frac{mm}{in}$

35.9 / 1.41   38 / 1.5

(3)

124.9 / 4.92

90.4 / 3.56   103.4 / 4.07

(1)   (2)

1 Front
2 Left
3 Bottom

EPC2000 Specification

EPC2000 Order Codes

	1	2	3	4	5	6	7	8	9	10	11	12
EPC2000		VL			E1	XX			XX			

13	14	15	16	17	18	19	20	21	22
				X					XX
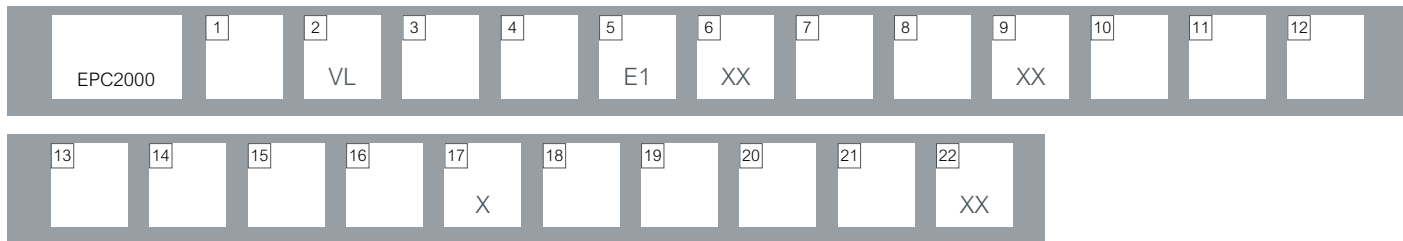
* Note 1. Order code options 14-22 are optional

Basic product

EPC2000	DIN Rail Mount Controller with Universal Precision Input

1 Type

CC	Controller (Default)
CP	1 x 8 Segment Basic Programmer
P1	1 x 24 segment Advanced Programmer
P10	10 x 24 Segment Advanced Programmer
P20	20 x 8 Segment Advanced Programmer

2 Supply Voltage

VL	24Vac +10%, -15% (48 to 62 Hz); 24Vdc +20, -15%; 5% ripple (Default)

3 Outputs

LRR	Logic SSR Drive, 1 Form A Relay, 1 Form C Relay
DRR	Isolated DC Output, 1 Form A Relay, 1 Form C Relay

4 Serial Communications

XX	Not fitted
C1	EIA485 Modbus RTU

5 Ethernet Communications

E1	Modbus/TCP Slave

6 Digital Inputs

XX	Default) 2x Contact Closure Digital Inputs

7 Tool Kit Blocks

XX	None (Default)
TK	Toolkit Blocks enabled

8 OEM Security

XXX	None
OEM	OEM Security Enabled

9 Gain Scheduling Sets

XX	Two sets Standard (Default)

10 Labels

XXXXX	None (Default)
Fnnnn	Custom Label

11 Specials

XXXXX	None (Default)
Exnnn	Custom Special

12 Extended Warranty

XXXXX	Standard warranty

13 Certificate of Conformity

XXXXX	None Required
CERT1	Supplied with Certificate of Conformity

14 Default Application*

X	Not Configured
1	PID Heat (IO1), High/Low Alarm (OP3) (Default)
2	PID Heat (IO1), Cool (OP2), High/Low Alarm (OP3)

15 Main PV Sensor Type*

X	Not Configured (Default)
M	Linear 0 to 80mVdc
V	Linear 0 to 10Vdc
2	Linear 0 to 20mA
4	Linear 4 to 20mA
B	Type B Thermocouple
J	Type J Thermocouple
K	Type K Thermocouple
L	Type L Thermocouple
N	Type N Thermocouple
R	Type R Thermocouple
S	Type S Thermocouple
T	Type T Thermocouple
P	PT100

16 Input 1 Range*

X	Not Configured (Default)
F	Sensor range or full scale
1	0 to 100°C or 32 to 212°F or 273 to 373K
2	0 to 200°C or 32 to 392°F or 273 to 473K
3	0 to 400°C or 32 to 752°F or 273 to 673K
4	0 to 600°C or 32 to 1112°F or 273 to 873K
5	0 to 800°C or 32 to 1472°F or 273 to 1073K
6	0 to 1000°C or 32 to 1832°F or 273 to 1273K
7	0 to 1200°C or 32 to 2192°F or 273 to 1473K
8	0 to 1300°C or 32 to 2552°F or 273 to 1573K
9	0 to 1600°C or 32 to 2912°F or 273 to 1873K
A	0 to 1800°C or 32 to 3272°F or 273 to 2073K

17 Reserved*

X	Not Used (Default)

18 Digital Input A Function*

X	Not Configured (Default)
W	Alarm Acknowledge
M	Auto/Manual
R	Programmer Run/Hold
K	Loop Track
P	Local Setpoint Select
T	Programmer Reset
U	Remote Setpoint Select
V	Recipe Select

19 Digital Input B Function*

X	Not Configured (Default)
W	Alarm Acknowledge
M	Auto/Manual
R	Programmer Run/Hold
K	Loop Track
P	Local Setpoint Select
T	Programmer Reset
U	Remote Setpoint Select
V	Recipe Select

20 Units*

X	Not used (Default)
C	Degrees Celsius (Default)
F	Degrees Fahrenheit
K	Kelvin

21 OEM Kit*

XXXXXX	Not Required

22 Future*

XX	Future

Accessory Order Codes

	1	

Model

EPC2000ACC	Accessories for EPC2000 DIN Rail Controller

1 Type

RES2R9	2.49 Ohm Resistor
RES250	250 Ohm Resistor
RES500	500 Ohm Resistor
ITOOLS	Itools configuration Software
STCON	Standard set of Connectors

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