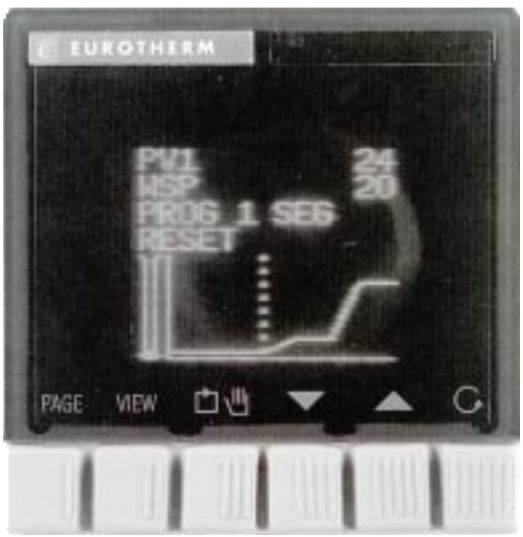
900 EPC

SERIES

EUROTHERM
CONTROLS

900 EPC Programmer Controllers



Product data

Multiple stored programs - for varying process requirements
450 program segments - for specialised profile generation
Mimic display - simple Programmer operation and clear indication of progress
User defined screens - for clear application specific operation
Up to 16 logic outputs - for logical process interaction
Up to 14 logic inputs - for complex program control

General description

The 900 EPC range of Eurotherm Programmer Controllers are high stability, high accuracy, communicating units designed to cope with a wide range of process needs and environments by use of high technology in both design and manufacturing.

The range of programmers covers all major process requirements including temperature, pressure and flow; these may be combined with cascade control and inputs from complex derived variables if needed. Linearisations for all standard thermocouples, RTDs and many Pyrometers are included as standard. Range changing may take place via the front panel or via communications.

Each version is fully configurable for all software options, and all hardware options are by plug-in modules. Software options are selectable from the front panel and are protected from unauthorised modification by a security code, which is settable on an individual basis.

All programmers are available in both single and dual loop format. Any program may be loaded and run on either loop. A single program may be run on both loops simultaneously, or separate programs may be set to run concurrently.

Program storage - The 900 EPC programmer can store up to 20 separate programs (50 in the programmer PLUS instruments) using up to a total of 450 segments. Types of segments available are RAMP, DWELL, STEP and SUBPROGRAM. These may be entered in a totally free format. Additionally each program has a special END segment, which is used to terminate the program.

Programmer Mimic - The mimic page simplifies use with a graphical display of program status. Remote switches can be used for easy program selection and to control the load, run, hold and reset operations.

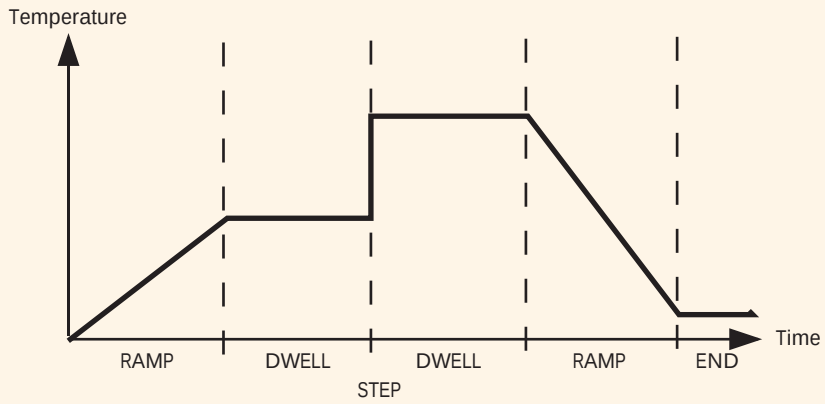
User screens - The user can create up to 5 screens of their own design using the most important parameters for their application.

Digital communications - All instrument parameters are available via the communications link, also complete programs and sets of programs may be downloaded. The IPSG software package can be used to create and store programs on a PC.

Digital retransmission - Digital retransmission can be used to transmit setpoints to remote slave instruments. This is more accurate and easier to commission than analogue retransmission. Different setpoint trims for each zone can also be added.

Programmer segments

A simple example of a program or profile is shown below to explain some of the principles, terminology and abbreviations in general use. The purpose of a programmer is to generate a setpoint which changes with time as determined by stored parameters. This changing setpoint is used by the controller, which ensures the process variable follows the same profile.



A program is made up of a number of different stages called segments. Typical segments are a ramp segment where the temperature changes at a linear rate (e.g. 10 °C/hour or time to target) up to a target level, or a dwell where the setpoint remains constant for a specified time interval. There are also step segments where the setpoint jumps instantaneously to a new value.

Programmer states

The 900 EPC has four main programmer modes of operation.

1. **RESET** The program is not running but the controller is and the setpoint can be changed as if it was a normal controller. The programmer will be waiting for a 'RUN' command.

2. **RUNNING** The program has been started and is moving through its various segments.

3. **HOLD** If this mode is selected during a program the timebase is effectively stopped and the setpoint will remain unchanged until the 'HOLD' is released. Putting the programmer into 'HOLD' effectively lengthens the total run time of the program.

4. **END** The program is completed and the system is waiting to be reset. There are various actions that can be triggered at the end of a program, one action is: The end temperature is controlled at the last value in the program. (other 'end' options are available).

Other Features

1. **Logic outputs and programme relays** A programmer may also offer open collector logic outputs or program relays which will be activated during chosen segments. These may be used to drive a solenoid, for example, in segment (2) to purge the plant with nitrogen. Alternatively the END logic signal may be used via a relay to ring a bell, sound an alarm, or end of program indication.

2. **Looping or Cycling** This feature allows a program to repeat itself a specific number of times.

3. **Servo** This feature means that the setpoint at the start of the initial ramp is made equal to the process variable at the instant the RUN button is depressed. There is therefore no 'Bump' to the control loop at the start of the process. The alternative is to start at a particular setpoint, regardless of where the measure value is.

4. **Holdback** The holdback function automatically places the programmer into 'HOLD' if the measured value deviates more than a specified amount from the programmer setpoint. When the measured value re-enters the holdback band, the timing for the segment resumes.

The functions of the programmer controller range are:

Type	Function	Single Loop	pages	Dual Loop	pages
906	Temperature programmer	906S	8/9	906D	10 /11
908	Humidity programmer	908S	8/9	-	-
910	Temperature and humidity programmer	-	-	910D	10/11
912	Temperature cascade programmer	912S	8/9	-	-
914	Temperature and process programmer	-	-	914D	10/11
916	Pulsed Burner temperature programmer	916S	8/9	-	-
941	Process programmer	941S	8/9	941D	10/11
943	Pressure programmer	943S	8/9	943D	10/11
945	Process cascade programmer	945S	8/9	-	-
961	Furnace atmosphere/kiln atmosphere programmer	961S	8/9	-	-
963	Furnace atmosphere/kiln atmosphere & independent programmer	-	-	963D	10/11
966	Ratio/Normal programmer	-	-	966D	10/11
968	Ratio/Independent programmer	-	-	968D	10/11
970	Computed input programmer	970S	8/9	-	-
972	Derived input programmer	972S	8/9	972D	10/11

TECHNICAL SPECIFICATION

Input

General	Input Range	-20 to +100mV (or 20V in the range +/-10V; see Process below)
	Maximum Sensitivity	Minimum input per least significant display digit For spans less than +/- 20mV = 1µV For spans less than +50 to -10mV = 2µV For spans less than +100 to -20mV = 3µV
	Maximum Span	120mV
	Common Mode Rejection	>150 dB in the range 48-52 Hz and 58-62 Hz
	Series Mode Rejection	> 87 dB at 10 Hz sampling in the range 48-52 Hz and 58-62 Hz. > 47 dB at 20 Hz sampling in the range 48-52 Hz and 58-62 Hz.
	Input Impedance	>100M Ohms Resistive.
	Sample Rate	20/second for Single Loop 10/second for Dual Loop
	Sensor Break Current	0-125 µA
Thermocouple	Standards	British BS4937(1973), German DIN43710, U.S. ASTM E230(1972).
	Linearisation	Better than +/- 0.2°C for standard thermocouples.
	C.J.C.	Internal or External, variable over the range 0-100°C
	Internal C.J.C.	>30:1, one minute after the rear terminal temperature has stabilized in the range of 0-50°C.
R.T.D.	Standards	British BS 1904, German DIN 43760 Pt 100, Japanese JIS 100.
	Linearisation	Better than + / - 0.2°C for standard resistance thermometers.
	Connection	3 wire, automatic lead resistance compensation.
	Bulb Current	185 µA
	Lead Compensation Error	With 3 wire connection, negligible error up to 100 ohm loop resistance.
Pyrometer	C.J.C	C.J.C. will be applied to pyrometer inputs requiring this facility.
	Emmissivity	Set in commissioning to a value in the range 0.01-1.00
Process	Voltage Span Maximum	20V in the range +/- 10V
	Current Span Maximum	0-20mA. Instrument dispatched with 5Ω resistor. This must be wired across the rear terminals to convert the current signal to 0-100mV.
	Millivolt Span Maximum	-20 to +100mV.
	Characterisation	Input can be characterised for any standard thermocouple or RTD

Transducer/Transmitter P.S.U

	Voltage	5, 10 or 24Vdc
	Current	Maximum current 29mA any range
	Accuracy	+5, +10V > ±0.25% +24V > ±2.0%
	Drift Coefficient	5V, 10V < ±0.1mV/°C
	Connection	2 wire or 3 wire automatic lead compensation. If 3 wire <4mV output error for equal lead resistances

Control Outputs (Isolated, max 4)

	Relay	Maximum of 264V 2A ac into a resistive load, with spark suppression. Minimum voltage 50V R.M.S. or 24Vdc Leakage current through snubber= 2mA at 264V ac 50 Hz. (On/off or time proportional)
	Triac	Maximum of 264V 0.75A into resistive load. Minimum voltage 85V R.M.S. Leakage current through snubber= 2mA at 264V ac 50 Hz. (On/off or time proportional)
	Logic	20mA at 18V minimum. (On/off or time proportional)
	Travel Time	5 to 1000 seconds (VP control only)
	Minimum Response Time	0.05 to 10.0 seconds (VP control only)
	Cycle Time	0.1 to 999 seconds at 50% power (relay 3 to 999 seconds).
	Power Feedback	Optionally available on to any of the above when fitted in output 1 (temperature versions)
	Analogue	DC 0-10V at 20 mA max or 0-20 mA at 18V minimum. Offsets provided as software option. e.g. 4-20mA. Short circuit proof on voltage, limiting current less than 25mA.
	Cooling	Output 2 (when used in a cooling application), when not on/off, can be configured as either Fan, Oil, Water or linear.

Analogue Retransmission (Isolated)

	Output	10V span (max.), range lying between -5.0 to +10.0V at 20mA max. 0-20mA (max.) at 18V (min.). Offsets provided as software options. e.g. 4-20mA.
	Resolution	Voltage = 1.00mV. Current = 0.002mA
	Linearity	Better than +/-0.25% under all load conditions which are within the above specification.
	Configuration	Process Value, Setpoint, Error or Output

Analogue Remote Input (Isolated)

	Range	20V span (max.), range lying between -10 to +10V or 0-10mA or 0-20mA. Offsets provided in software e.g. 4-20mA.
	Input Impedance	>100M ohms.
	Configuration	Full Scale or Trim of Setpoint, Power Limit or Process Feedforward
	Resolution	Minimum input of 500µV to represent one least significant digit.
	Accuracy	Linearised inputs = +/- 0.2°C Linear inputs = +/- 0.1% of full scale input. Calibration = +/- 0.25% of full scale input
	Sampling Rate	10 per second.
	Filter	0.1 to 999.9 seconds

Valve Position Feedback

	Accuracy	1% of full range
	Resolution	1% of full range
	Potentiometer Resistance	Will operate with potentiometer with resistance in the range 100 to 1K ohms.

Alarms (Isolated, max 8)

	Relays	264V 2A (3A for a pair) maximum into a resistive load, with snubber Minimum switching voltage 50V R.M.S. or 24Vdc. Leakage current through snubber = 2mA at 264V ac 50 Hz.
	Hysteresis	0.1% to 50% of parameter span.
	Type	Full Scale High and Low, Deviation High, Low and Band, Rate of Change of P.V. and Output Sensor Break, also against customer derived parameter and controller failure.
	Range	All alarms may be set over the complete instrument range.

General

Front Panel	Display Type	80 x 64 vacuum fluorescent dot matrix display.
	Display Size	48 x 39 mm
	Resolution	+/- 1 least significant digit.
	Push Buttons	6 with tactile feedback.
	Calibration Error	Better than +/- 0.1% of recommended range

Programmer Parameters

	Programs	Maximum number for separate programs is 20 (or 50 in the programmer plus)
	Segments	Maximum number of segments available is 450. Each segment is free format and maybe allocated to any one program.
	Ramp Rate	Settable as either Ramp Rate or Time to Target. Ranges are from one display unit to span; per hour, minute or second. Rate ramp resolution independently settable down to 0·01°C/hr
	Dwell Time	Settable in Hours, Minutes or Seconds. Ranges are 9999·9 hours, 9999·9 minutes, 9999·9 seconds.
	End Segment	Dedicated End segment may be set as, Indefinite Dwell, Reset to active S/P, Ramp to defined Setpoint or set to a defined Output Level.
	Holdback	Settable on a per program basis as Deviation High, Low or Band.
	Servo	Programs may start from PV or Setpoint
	Subprograms	Programs 11-20 may be used as Subprograms if required.
	Cycles	1 - 9998 or continuous.

Control Parameters

Auto/Manual	Bumpless procedure auto to manual and manual to auto or forced output. Manual output variable from output 1, minimum to maximum, on single output only instruments and output 2 maximum to output 1 maximum on dual output instruments.
Local/Remote	Selection of Full Scale Local or Remote S/P or add external Trim to Full Scale Local (internal) or Full Scale external to local Trim Setpoint.
Setpoint Rate Limit	When enabled, will ramp the setpoint from the current measured value towards the entered setpoint at a rate set in the commissioning values.

Commissioning Parameters

Proportional Band	0.1 to 999% based on the range 'display max.'- 'display min.'
Integral Time	0 to 9999 seconds or 150.0 minutes. (0 is equivalent to 'off').
Manual Reset	-100 or 0 to +100% (automatically selected if integral time is 'off').
Derivative Time	0 to 999.9 seconds or 15.0 minutes. (0 is equivalent to 'off').
Cutback (low & high)	0 to display range.
O/P1 (heat) Max. Limit	Output min. limit to 100%.
O/P1 (heat) Min. Limit	0 to max. limit. (Single output instrument only).
O/P2 (cool) Max. Limit	0 to 100%.
O/P1 (heat) Cycle Time	0.1 to 999 seconds (relay, 3 seconds minimum)
O/P2 (cool) Cycle Time	0.1 to 999 seconds (relay, 3 seconds minimum)
Relative Cool Gain	0.1 to 10.0% of proportional band.
Heat-cool deadband	-5 to +5% of proportional band.
Sensor Break Power	0-100% (O/P1 only) or -100% to +100% (O/P1/O/P2), activated by 0-10% of span over or under range, customer settable.

Digital Communications (Isolated)

Protocol	Variable speed link, ASCII format RS232 or RS422. Protocol ANSI x 3.28(1976) 2.5 A4 at baud rates of 300, 1200, 2400, 4800 and 9600. JBus and Modbus also available
Transmit Capability	Capable of driving 32 unit loads maximum.
Receive Capability	Presents 1 unit load to the line.
Format	One start bit - seven data bits - even parity bit - one stop bit.
Address	Two digits (00 - 99)

Microprocessor Board 2 Logic Inputs (Unisolated)

		To activate, the following are necessary conditions:
	Logic levels	(a) Volt Free, Closed with <100R = Active. Opened with >28K = inactive (b) Volt Driven Closed with <2.0 volts = Active. Opened with > 6.0 volts All inputs active when closed, Sample period, 50 mS (including Debounce)
	Isolation	Microprosessor board logic inputs are electrically connected to the instrument earth.
	Input current	0·5mA maximum

Program Logic Outputs (Isolated)

(16 maximum)	4 Logic Module	Up date period 50 mS - 100 mS under programmer control Maximum output current 6 standard TTL loads Maximum output voltage 5·0 volts Transition 1·0 mS (either direction)
(15 maximum)	3 Logic Open Collector Module	Up date period 50 mS - 100 mS under programmer control Current Rating, 10·0 mA maximum Voltage Rating, 24·0 volts dc at 20·0 mA

Logic Inputs (Isolated)

(12 maximum)	4 Logic Module	To activate the following are necessary conditions: a) Volt Free, Closed: terminate with less than 100R Open: terminate with greater than 28K b) Volt Driven, Closed: drive with less than 0·7 volts Open: drive with greater than 4·0 volts All inputs active when closed Sample period, 50 mS (including Debounce)

Self Tune

Auto Tune	A single shot tuning system to automatically set the P.I.D. and other parameters.
Adaptive Tune	A continuous tuning system that trims the P.I.D. parameters whenever the Disturbance Response Analysis or Model Reference Optimiser calculates a new value.
Gain Scheduling	One of five sets of manually entered P.I.D. values are automatically entered into the three term algorithm at preset levels of setpoint, P.V. or output power.

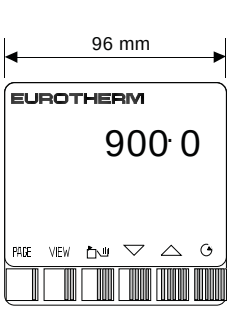
Environmental

The 900 EPC series are compliant with 'Low Voltage Equipment Directive' and EMC Directive when installation instructions are followed

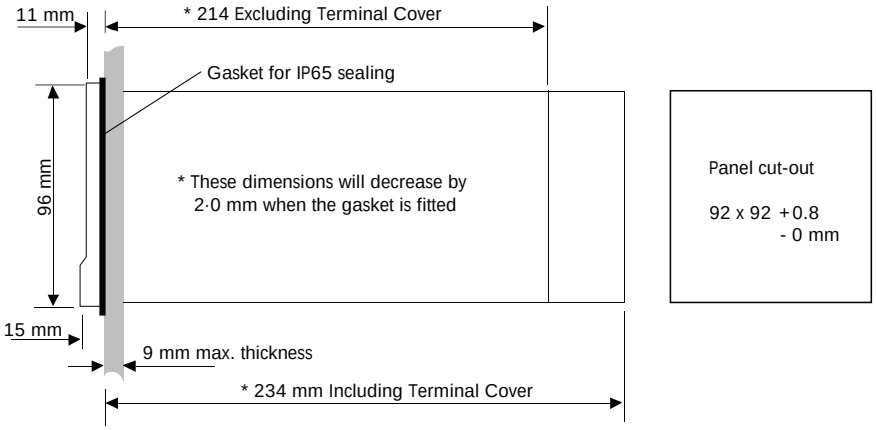
Supply Voltage	85 - 264Vac
Supply Frequency	48-62 Hz or 360-440Hz (Over limited voltage range).
Power Consumption	Typically 20W in operation
Relative Humidity	5 to 95% (non condensing)
Operating Temperature	0 to 50°C. When more than 4 modules used 0-45°C
Storage Temperature	-10 to +75°C
Panel Sealing	The instrument facia meets IP65 when fitted with supplied gasket and mounted to a cut out as defined on page 7

Mounting	Plug-in with panel mounting sleeve. Panel cut-out 92 x 92mm +0.8 -0.0mm to DIN 43710.
Terminals	Screw terminals with terminal cover
Rear Cover	Gives electrical safety to rear terminals
Weight	1.1Kg (2.5lbs) typical
Electrical safety	EN61010 Installation category II, pollution degree 2
Installation category	Voltage transients on any mains power connected to the instrument must not exceed 2.5kV
Pollution degree 2	Conductive pollution must be excluded from the cabinet in which the instrument is mounted.
Isolation	All isolated inputs and outputs have a reinforced isolation between PV, mains I/P and all other I/O. These I/O have basic isolation to earth. This provides protection against electric shock. The two logic inputs on the microprocessor board are electrically connected to earth.

DIMENSIONAL DETAILS



The instrument is supplied with a terminal cover which provides electrical safety.



Input coding table (see Instrument Code over page)

Lin Type		Min & Max Ranges	Recommended Range	Code
Iron Constantan	J	-210 to 1200°C	0 to 600°C	01
Fe/Konst (DIN)	L	-200 to 900°C	0 to 600°C	02
Ni Cr/Ni Al	K	-270 to 1370°C	-250 to 1200°C	03
Cu/Con	T	-270 to 400°C	-250 to 400°C	04
Pt13% Rh/Pt	R	-50 to 1760°C	0C to 1600°C	05
Pt10% Rh/Pt	S	-50 to 1760°C	0 to 1600°C	06
Pt30% Rh/Pt6% Rh	B	40 to 1820°C	200 to 1820°C	08
W/W 26% Re		0 to 2320°C	0 to 2300°C	09
W5%Re/W26%		0 to 2320°C	0 to 2300°C	11
Ni Cr/Con	E	-270 to 1000°C	0 to 780°C	12
Pt10% Rh/Pt40% Rh		0 to 1880°C	200 to 1800°C	23
W5% Re/W 26% Re	C	0 to 2320°C	0 to 2300°C	24
Pt20% Rh/Pt40% Rh		0 to 1880°C	0 to 1600°C	25
Platinel II		-0 to 1370°C	0 to 1200°C	28
W/W 26% Re		0 to 2320°C	0 to 2200°C	29
Ni/Ni 18% Molybdenum		0 to 1400°C	0 to 1100°C	33
Moly5%Re/Moly41%Re		0 to 2000°C	0 to 2000°C	34
W3% Re/W 25% Re D		-0 to 2400°C	0 to 2400°C	35
W/Re 5% W/Re 26%		0 to 2000°C	0 to 2000°C	38
Nicrosil/Nisil		0 to 1300°C	0 to 1300°C	45
Pt100 ohm at 0°C		-200 to 1000°C	-200 to 800°C	70
RTD JIS 100		-200 to 650°C	-200 to 650°C	78

Lin Type	Min & Max Ranges	Recommended Range	Code
Pyrometer (Q004 Land)	700 to 1600°C	800 to 1550°C	48
Pyrometer (Q003 Land)	600 to 1500°C	700 to 1400°C	51
Pyrometer RO 26	0 to 500°C	100 to 500°C	54
Pyrometer IVDI	500 to 2500°C	1000 to 2500°C	61
Pyrometer DTI	750 to 2500°C	1200 to 2500°C	62
Pyrometer RO 23	700 to 1700°C	800 to 1700°C	64
Pyrometer FP/GP 10	450 to 900°C	500 to 900°C	82
Pyrometer FP/GP 11	600 to 1300°C	700 to 1300°C	83
Pyrometer FP/GP 12	750 to 1850°C	1000 to 1850°C	84
Pyrometer FP/GP 20	300 to 750°C	400 to 750°C	85
Pyrometer FP/GP 21	500 to 1100°C	500 to 1100°C	86
Linear	-9999 to 19999	-9999 to 19999	00
Square Root	-9999 to 19999	-9999 to 19999	92

900 EPC Single Loop Programmer Ordering code - Hardware

The complete 900 Series instrument code consists of two parts:
a) Hardware coding beginning with the instrument type and ending with the Controller 'Plus' field.
b) Configuration coding beginning with the input field on single loop instruments or LP1 on dual loop instruments
Both parts are required when ordering an instrument.

Example:
If a function is not required the complete field should be omitted from the code;

906S - IS - HLO - CRE - ADR - ESV - VH - XM - LE - PLUS IT - HAP - CR - AAB - EAA - XA - 0/1000 - C - 03

This code delivers an instrument as:
(906S) Single loop temperature controller
Thermocouple input (IS) type K (03) range 0 to 1000°C (0/1000)
Logic heat (HLO) Reverse acting PID logic (HAP)/relay cool (CRE) Fan (CR)
Two alarms (ADR) full scale high and full scale low (AAB)
Remote analogue voltage input (ESV) configured for setpoint (EAA)
Operating from 240Vac supply (VH)
RS422 digital communications (XM), EI-Bisynch (XA)
Display in English (LE)
This is a Controller 'Plus' (PLUS), for a standard controller leave this field blank.

1 Input	Code
Standard	S
Current	C
Volts	V

1a Input	Code
Current	C
Volts	V

2 Output 1	Code
Relay	RE
Logic	LO
Triac	TR
DC Volts	DV
DC Current	DC
VP Relay (Dual)	VR
VP Triac	VT

3 Burner OP	Code
Dual Relay	BR
Dual Triac	BT
Triple Logic Output	B3
Quad Logic Output	B4

4 Option A	Code
Relay	RE
Logic	LO
Triac	TR
DC Volts	DV
DC Current	DC
VP Relay	VR
VP Triac	VT
Dual Relay (Alarms)	DR
Dual Triac	DT
Quad Logic Input	LI
Quad Logic Output	L4
Triple Logic Output	L3
Dual Relay (Logic)	L2
Pot. Position	PP
Burner Relay (1)	BR
Burner Triac (1)	BT
Burner 3 Logic (1)	B3
Burner 4 Logic (1)	B4

5 Option B	Code
Dual Relay (Alarms)	DR
Dual Triac	DT
Quad Logic Input	LI
Quad Logic Output	L4
Triple Logic Output	L3
Dual Relay (Logic)	L2
Retrans. Voltage	RV
Retrans. Current	RC
Retrans. Digital	RD
Burner Relay (1)	BR
Burner Triac (1)	BT
Burner 3 Logic (1)	B3
Burner 4 Logic (1)	B4

6 Option C	Code
Dual Relay (Alarms)	DR
Dual Triac	DT
Quad Logic Input	LI
Quad Logic Output	L4
Triple Logic Output	L3
Dual Relay (Logic)	L2
Single Relay (1)	SR
Burner Relay (1)	BR
Burner Triac (1)	BT
Burner 3 Logic (1)	B3
Burner 4 Logic (1)	B4

7 Option D	Code
Dual Relay (Alarms)	DR
Dual Triac (Alarms)	DT
Quad Logic Input	LI
Quad Logic Output	L4
Triple Logic Output	L3
Dual Relay (Logic)	L2
Retrans. Voltage	RV
Retrans. Current	RC
Transducer 5V	GA
Transducer 10V	GB
Transducer 24V	GC

8 Option E	Code
Quad Logic Input	LI
Quad Logic Output	L4
Triple Logic Output	L3
Dual Relay (Logic)	L2
Remote I/P Volts	SV
Remote I/P Current	SC
Transducer 5V	GA
Transducer 10V	GB
Transducer 24V	GC

9 Communications	Code
RS232	S
RS422/485	M

10 Language	Code
English	E
French	F
German	G

11 Probe Option	Code
Carbon Pot. Accucarb	CA
Carbon Pot. Drayton Corning	CD
Oxygen Log	OL
Oxygen %	OP
Oxygen VPM	OV
Dewpoint	PD

12 Plus Option	Code
Standard	-
PLUS	PLUS

Notes
(1) 916 only
(2) 961, 970, 972 only
(3) 961 only

General
If either Quad Input, Quad Output, Triple Logic Output, Pot. Position or Transducer PSU hardware options are selected, then these require no Configuration code.

Product	Loop	Input	Input	Output 1/ Burner OP	Option A	Option B	Option C	Option D	Option E	Loop	Input	Output	Option A	Supply	Comms	Language	Probe Option	Plus Option
906S	-	IS	-	H (2)	C (4)	A (5)	S (6)	R (7)	E (8)	-	-	-	-	VH	X (9)	L (10)	-	(12)
908S	-	IS	-	H (2)	D (4)	A (5)	S (6)	R (7)	E (8)	-	-	-	-	VH	X (9)	L (10)	-	(12)
912S	LP1	IS	-	-	-	A (5)	S (6)	R (7)	E (8)	LP2	IS	H(2)	C (4)	VH	X (9)	L (10)	-	(12)
916S	-	IS	-	H (3)	C (4)	A (5)	S (6)	R (7)	E (8)	-	-	-	-	VH	X (9)	L (10)	-	(12)
941S	-	I (1a)	-	P (2)	O (4)	A (5)	S (6)	R (7)	E (8)	-	-	-	-	VH	X (9)	L (10)	-	(12)
943S	-	I (1a)	-	P (2)	O (4)	A (5)	S (6)	R (7)	E (8)	-	-	-	-	VH	X (9)	L (10)	-	(12)
945S	LP1	I (1a)	-	-	-	A (5)	S (6)	R (7)	E (8)	LP2	I (1)	P (2)	O (4)	VH	X (9)	L (10)	-	(12)
961S	-	IS	IV	P (2)	O (4)	A (5)	S (6)	R (7)	E (8)	-	-	-	-	VH	X (9)	L (10)	(11)	(12)
970S	-	I (1)	I (1)	P (2)	O (4)	A (5)	S (6)	R (7)	E (8)	-	-	-	-	VH	X (9)	L (10)	-	(12)
972S	-	I (1)	I (1)	P (2)	O (4)	A (5)	S (6)	R (7)	E (8)	-	-	-	-	VH	X (9)	L (10)	-	(12)

900 EPC Single Loop Programmer Ordering code - Software

1 Input	Code
T/C	T
RTD	R
Pyrometer	Y

2 Input	Code
0-5V	A
1-5V	B
0-10V	C
2-10V	D
0-20mA	E
4-20mA	F
-10 to 10V	G
0-100mV	H
T/C (2)	T
RTD (2)	R
Pyrometer (2)	Y

3 Output 1		Code
Type	**1**	**2**
reverse	A	
Direct O/P	B	
PID (RE, LO,TR)		P
PID 0-5V		A
PID 1-5V		B
PID 0-10V		C
PID 2-10V		D
PID 0-20mA		E
PID 4-20mA		F
Burner (1)		G
VP (RE, LO, TR)		V
Code = 1 + 2		

4 Option AA		Code
Cool Output		
Fan	R	
Oil	O	
water	W	
VP	V	
Burner (1)	G	
Lin 0-5V	A	
Lin 1-5V	B	
Lin 0-10V	C	
Lin 2-10V	D	
Lin 0-20mA	E	
Lin 4-20mA	F	
or		
Dual Alarms	**1**	**2**
Full scale HI	A	A
Full scale LO	B	B
Deviation HI	C	C
Deviation LO	D	D
Deviation band	E	E
Sensor break	F	F
Loop break	G	G
Rate of change	H	H
Code = 1 + 2		

5 Option BB		Code
Dual Alarms	**1**	**2**
Full scale HI	AA	A
Full scale LO	AB	B
Deviation HI	AC	C
Deviation LO	AD	D
Deviation band	AE	E
Sensor break	AF	F
Loop break	AG	G
Rate of change	AH	H
Code = 1 + 2		
or		
Retransmission	**1**	**2**
PV	RA	
Setpoint	RB	
Error	RC	
Power	RD	
Digital	RE	
0-5V		A
1-5V		B
0-10V		C
2-10V		D
0-20mA		E
4-20mA		F
Digital		T
Code = 1 + 2		
or		
Burner Output (1)		
Burner Gas		G

6 Option CC		Code
Dual Alarms	**1**	**2**
Full scale HI	SA	A
Full scale LO	SB	B
Deviation HI	SC	C
Deviation LO	SD	D
Deviation band	SE	E
Sensor break	SF	F
Loop break	SG	G
Rate of change	SH	H
Code = 1 + 2		
or		
Burner Output (1)		
Burner Gas		G

7 Option DD		Code
Dual Alarms	**1**	**2**
Full scale HI	MA	A
Full scale LO	MB	B
Deviation HI	MC	C
Deviation LO	MD	D
Deviation band	ME	E
Sensor break	MF	F
Loop break	MG	G
Rate of change	MH	H
Code = 1 + 2		
or		
Retransmission	**1**	**2**
PV	RA	
Setpoint	RB	
Error	RC	
Power	RD	
0-5V		A
1-5V		B
0-10V		C
2-10V		D
0-20mA		E
4-20mA		F
Code = 1 + 2		

8 Option EE		Code
Remote Input	**1**	**2**
Setpoint	EA	
Trim	EB	
Power limit	ED	
Power Limit/Value	EE	
Feedforward	EG	
CO Correction (3)	EH	
0-5V		A
1-5V		B
0-10V		C
2-10V		D
0-20mA		E
4-20mA		F
Code = 1 + 2		

9 Comms	Code
EI-BISYNC®	XA
JBUS/MODBUS®	XB

10 I/P Range LO/HI

These should be selected from within the range selected for the input. See field 2. This field should be blank if field 1 or 2 is IT, IR or IY.

11 I/P Range Units	Code
Millivolts	mV
Volts	V
Milliamps	mA

This field should be blank if field 1 or 2 is IT, IR or IY.

12 Display LO/HI

These should be selected from the recommended ranges shown in Lin type coding table on page 7.

13 Display Units	Code
Deg C	C
Deg F	F
Kelvin	K

Specify up to 8 Alpha/Numeric characters

14 Lin Type

Refer to Lin type coding table on page 7.

15 Fraction of IP1

A value in the range -1.00 to 1.00

16 Fraction of IP2

A value in the range -1.00 to 1.00

17 Derived Input LO/HI

These should be in the range -99999 to 99999

18 Function	Code
Switchover	SWT
Maximum	MAX
Minimum	MIN
Select Input	SEL

Product	Loop	Input	Function	Output 1	Option AA	Option BB	Option CC	Option DD	Option EE	Comms	Input Range LO/HI	Range Units	Display LO/HI	Display Units	Lin Type	Fraction of IP1	Fraction of IP2	Derived Input LO/HI
906S	-	I (1)	-	H (3)	C (4)	(5)	(6)	(7)	(8)	(9)	-	-	(12)/(12)	(13)	(14)	-	-	-
908S	- -	IR IR	- -	H (3) -	D (4) -	(5) -	(6) -	(7) -	(8) -	- (9)	- -	- -	(12)/(12) (12)/(12)	(13) (13)	70 70	- -	- -	- -
912S	LP1 LP2	I (1) I (1)	- -	- H (3)	- C (4)	(5) -	(6) -	(7) -	(8) -	- (9)	- -	-	(12)/(12) (12)/(12)	(13) (13)	(14) (14)	- -	- -	-
916S	-	I (1)	-	H (3)	C (4)	(5)	(6)	(7)	(8)	(9)	-	-	(12)/(12)	(13)	(14)	-	-	-
941S	-	I (2)	-	P (3)	O (4)	(5)	(6)	(7)	(8)	(9)	(10)/(10)	(11)	(12)/(12)	(13)	(14)	-	-	-
943S	-	I (2)	-	P (3)	O (4)	(5)	(6)	(7)	(8)	(9)	(10)/(10)	(11)	(12)/(12)	(13)	(14)	-	-	-
945S	LP1 LP2	I (2) I (2)	- -	- P (3)	- O (4)	(5) -	(6) -	(7) -	(8) -	- (9)	(10)/(10) (10)/(10)	(11) (11)	(12)/(12) (12)/(12)	(13) (13)	(14) (14)	- -	- -	- -
961S	IP1 IP2	IT IC	- -	P (3) -	O (4) -	(5) -	(6) -	(7) -	(8) -	- (9)	- 0.0, 2.0	- -	(12)/(12) (12)/(12)	(13) (13)	(14) (14)	- -	- -	- -
970S	IP1 IP2	I (2) I (2)	(18) -	H (3) -	C (4) -	(5) -	(6) -	(7) -	(8) -	- (9)	(10)/(10) (10)/(10)	(11) (11)	(12)/(12) (12)/(12)	(13) (13)	(14) (14)	- -	- -	- 17)/(17)
972S	IP1 IP2	I (2) I (2)	- -	P (3) -	O (4) -	(5) -	(6) -	(7) -	(8) -	- (9)	(10)/(10) (10)/(10)	(11) (11)	(12)/(12) (12)/(12)	(13) (13)	(14) (14)	(15) -	(16) -	- -

900 EPC Dual Loop Programmer Ordering code - Hardware

The complete 900 Series instrument code consists of two parts:

a) Hardware coding beginning with the instrument type and ending with the Controller 'Plus' field.

b) Configuration coding beginning with the input field on single loop instruments or LP1 on dual loop instruments

Both parts are required when ordering an instrument.

Example:

If a function is not required the complete field should be omitted from the code;

941D - LP1 - IC - PDC - ORE - GGC - LP2 - IV - PVR - OPP - ADR - VH - XS - LF

LP1 - IF - PBF - OR - - 4 - 20 - mA - 0.0 - 100.0 - % - 00

LP2 - IC - PBV - - ABB - XA - 2 - 8 - V - 0.0 - 100.0 - % - 00

This code delivers an instrument as:

(941D) Dual loop process programmer controller

Loop 1:
Process input 4-20mA (IC, IF) range 0.0 to 100.0%
DC control output (PDC), 4-20mA direct acting (PBF)
Relay opposite output (ORE, OR)
24V transmitter PSU, (GGC)

Loop 2:
Process input 0-10V nominally (IV, IC) scaled to 2-8V for 0.0 to 100.0%
Dual relay valve output (PVR), direct acting (PBV)
Valve position input (OPP)
Two alarms (ADR) full scale high + low (AAB)

General:
Operating from 240Vac supply (VH)
RS232 digital communications (XS)
Display in French (LF) EI-Bisynch (XA)

1 Input	Code
Standard	S
Current	C
Volts	V

1a Input	Code
Current	C
Volts	V

2 Output 1	Code
Relay	RE
Logic	LO
Triac	TR
DC Volts	DV
DC Current	DC
VP Relay	VR
VP Triac	VT

3 Option A	Code
Relay	RE
Logic	LO
Triac	TR
DC Volts	DV
DC Current	DC
VP Relay	VR
VP Triac	VT
Dual Relay (Alarms)	DR
Dual Triac	DT
Quad Logic Input	LI
Quad Logic Output	L4
Triple Logic Output	L3
Dual Relay (Logic)	L2
Pot. Position	PP

4 Option B	Code
Dual Relay (Alarms)	ADR
Dual Triac	ADT
Quad Logic Input	ALI
Quad Logic Output	AL4
Triple Logic Output	AL3
Dual Relay (Logic)	AL2
Remote I/P Voltage	ESV
Remote I/P Current	ESC
Retrans. Voltage	RRV
Retrans. Current	RRC
Retrans. Digital (1)	RRD
Transducer PSU 5V	GGA
Transducer PSU 10V	GGB
Transducer PSU 24V	GGC

Note
(1) Available on loop 1 only

5 PV3	Code
PV volts	ESV
PV current	ESC

6 Communications	Code
RS232	S
RS422/485	M

7 Language	Code
English	E
French	F
German	G

8 Probe Option	Code
Carbon Pot. Accucarb	CA
Carbon Pot. Drayton Corning	CD
Oxygen Log	OL
Oxygen %	OP
Oxygen VPM	OV
Dewpoint	PD

9 Plus Option	Code
Standard	-
PLUS	PLUS

Product	Loop	Input	Output 1	Option A	Option B	Loop	Input	Output	Option A	Option B	PV3	Supply Volts	Comms	Language	Probe Option	Plus Option
906D	LP1	IS	H (2)	C (3)	(4)	LP2	IS	H (2)	C (3)	(4)	-	VH	X (6)	L (7)	-	(9)
910D	LP1	IS	H (2)	D (3)	(4)	LP2	IS	H (2)	C (3)	(4)	-	VH	X (6)	L (7)	-	(9)
914D	LP1	IS	H (2)	C (3)	(4)	LP2	I (1a)	P (2)	O (3)	(4)	-	VH	X (6)	L (7)	-	(9)
941D	LP1	I (1a)	P (2)	O (3)	(4)	LP2	I (1a)	P (2)	O (3)	(4)	-	VH	X (6)	L (7)	-	(9)
943D	LP1	I (1a)	P (2)	O (3)	(4)	LP2	I (1a)	P (2)	O (3)	(4)	-	VH	X (6)	L (7)	-	(9)
963D	LP1	IS	P (2)	O (3)	ESV	LP2	I (1)	P (2)	O (3)	(4)	-	VH	X (6)	L (7)	(8)	(9)
966D	LP1	I (1a)	P (2)	O (3)	(4)	LP2	I (1)	P (2)	O (3)	-	(5)	VH	X (6)	L (7)	-	(9)
968D	LP1	I (1)	P (2)	O (3)	(4)	LP2	I (1)	P (2)	O (3)	(4)	-	VH	X (6)	L (7)	-	(9)
972D	LP1	I (1)	P (2)	O (3)	(4)	LP2	I (1)	P (2)	O (3)	(4)	-	VH	X (6)	L (7)	-	(9)

900 EPC Dual Loop Programmer Ordering code - Software

1 Input	Code
T/C	T
RTD	R
Pyrometer	Y

2 Input	Code
0-5V	A
1-5V	B
0-10V	C
2-10V	D
0-20mA	E
4-20mA	F
-10 to 10V	G
0-100mV	H
T/C (2)	T
RTD (2)	R
Pyrometer (2)	Y

3 Output 1		Code
Type	**1**	**2**
Reverse	A	
Direct O/P	B	
PID (RE, LO,TR)		P
PID 0-5V		A
PID 1-5V		B
PID 0-10V		C
PID 2-10V		D
PID 0-20mA		E
PID 4-20mA		F
VP (RE, LO, TR)		V
Code = 1 + 2		

4 Option AA		Code
Cool Output		
Fan	R	
Oil	O	
Water	W	
VP	V	
Lin 0-5V	A	
Lin 1-5V	B	
Lin 0-10V	C	
Lin 2-10V	D	
Lin 0-20mA	E	
Lin 4-20mA	F	
or		

Dual Alarms	1	2
Full scale HI	A	A
Full scale LO	B	B
Deviation HI	C	C
Deviation LO	D	D
Deviation band	E	E
Sensor break	F	F
Loop break	G	G
Rate of change	H	H
Code = 1 + 2		
or		
Retransmission (1)	1	2
PV (1)	RA	
Setpoint (1)	RB	
Error (1)	RC	
Power (1)	RD	
Digital (1)	RE	
0-5V		A
1-5V		B
0-10V		C
2-10V		D
0-20mA		E
4-20mA		F
Digital		T
Code = 1 + 2		

5 Option BB		Code
Dual Alarms	1	2
Full scale HI	AA	A
Full scale LO	AB	B
Deviation HI	AC	C
Deviation LO	AD	D
Deviation band	AE	E
Sensor break	AF	F
Loop break	AG	G
Rate of change	AH	H
Code = 1 + 2		
or		
Remote Input	1	2
Setpoint	EA	
Trim	EB	
Power Limit	ED	
Pwr Limit/Value	EE	
Feedforward	EG	
Ratio Trim (3)	EF	
CO Correction (4)	EH	
0-5V		A
1-5V		B
0-10V		C
2-10V		D
0-20mA		E
4-20mA		F
Code = 1 + 2		
Retransmission	1	2
PV	RA	
Setpoint	RB	
Error	RC	
Power	RD	
Digital	RE	
0-5V		A
1-5V		B
0-10V		C
2-10V		D
0-20mA		E
4-20mA		F
Digital		T
Code = 1 + 2		

5a PV3	Code
0-5V	EVA
1-5V	EVB
0-10V	EVC
2-10V	EVD
0-20mA	EVE
4-20mA	EVF

6 Comms	Code
EI-BISYNC®	XA
JBUS/MODBUS®	XB

7 I/P Range LO/HI — Code

These should be selected from within the range selected for the input See field 2. This field should be blank if field 1 or 2 is IT, IR or IY.

8 I/P Range Units	Code
Millivolts	mV
Volts	V
Milliamps	mA

This field should be blank if field 1 or 2 is IT, IR or IY.

9 Display LO/HI — Code

These should be selected from the recommended ranges shown in Lin type coding table on page 7.

10 Display Units	Code
Deg C	C
Deg F	F
Kelvin	K

Specify up to 8 Alpha/Numeric characters

11 Lin Type — Code

Refer to Lin type coding table on page 7.

12 Fraction of IP1

A value in the range -1.00 to 1.00

13 Fraction of IP2

A value in the range -1.00 to 1.00

14 Derived Input LO/HI

These should be in the range -99999 to 99999

Notes

If either Quad Input, Quad Output, Triple Logic Output, Pot. Positioner or Transducer PSU hardware options are selected, then these require no Configuration code.

(1) Ignore defined single letter
i.e, C + 1 + 2 = RA + 2

(2)968 and 972 only.

(3)966, 968 only & loop 1 only.

(4) 963 only.

Product	Loop	Input	Output 1	Option AA	Option BB	Comms	Input range LO/HI	Range Units	Display LO/HI	Display Units	Lin Type	Fraction of IP1	Fraction of IP2	Derived Input LO/HI
906D	LP1	I (1)	H (3)	C (4)	(5)	-	-	-	(9)/(9)	(10)	(11)	-	-	-
	LP2	I (1)	H (3)	C (4)	(5)	(6)	-	-	(9)/(9)	(10)	(11)	-	-	-
910D	LP1	IR	H (3)	O (4)	(5)	-	-	-	0/100	(10)	(70)	-	-	-
	LP2	IR	H (3)	C (4)	(5)	(6)	-	-	0/100	(10)	(70)	-	-	-
914D	LP1	I (1)	H (3)	C (4)	(5)	-	(7)/(7)	(8)	(9)/(9)	(10)	(11)	-	-	-
	LP2	I (1)	P (3)	O (4)	(5)	(6)	(7)/(7)	(8)	(9)/(9)	(10)	(11)	-	-	-
941D	LP1	I (2)	P (3)	O (4)	(5)	-	(7)/(7)	(8)	(9)/(9)	(10)	(11)	-	-	-
	LP2	I (2)	P (3)	O (4)	(5)	(6)	(7)/(7)	(8)	(9)/(9)	(10)	(11)	-	-	-
943D	LP1	I (2)	P (3)	O (4)	(5)	-	(7)/(7)	(8)	(9)/(9)	(10)	(11)	-	-	-
	LP2	I (2)	P (3)	O (4)	(5)	(6)	(7)/(7)	(8)	(9)/(9)	(10)	(11)	-	-	-
963D	LP1	I (2)	P (3)	O (4)	(5)	-	(7)/(7)	(8)	(9)/(9)	(10)	(11)	-	-	-
	LP2	I (2)	P (3)	O (4)	(5)	(6)	(7)/(7)	(8)	(9)/(9)	(10)	(11)	-	-	-
966D	LP1	I (2)	P (3)	O (4)	(5)	-	(7)/(7)	(8)	(9)/(9)	(10)	(11)	-	-	-
	LP2	I (2)	P (3)	O (4)	(5)	(6)	(7)/(7)	(8)	(9)/(9)	(10)	(11)	-	-	-
968D	LP1	I (2)	P (3)	O (4)	(5)	-	(7)/(7)	(8)	(9)/(9)	(10)	(11)	-	-	-
	LP2	I (2)	P (3)	O (4)	(5a)	(6)	(7)/(7)	(8)	(9)/(9)	(10)	(11)	-	-	-
972D	LP1	I (1)	P (3)	O (4)	(5)	-	(7)/(7)	(8)	(9)/(9)	(10)	(11)	(12)	(13)	(14)
	LP2	I (1)	P (3)	O (4)	(5)	(6)	(7)/(7)	(8)	(9)/(9)	(10)	(11)	(12)	(13)	(14)

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