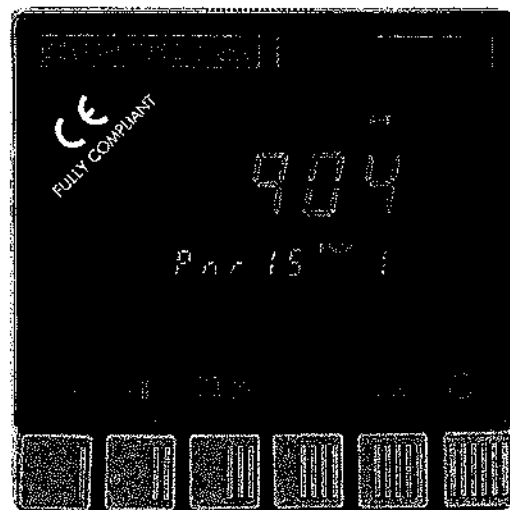


902-904

SERIES

Programmer/Controllers



**EUROTHERM
CONTROLS**

**Product
data**

902 Temperature Controller

902-904 Programmer Controller

The 902, 903 and 904 are a range of advanced controller/programmers which combine simplicity of operation with clear concise display of programme state.

The 902S is a high accuracy temperature controller designed to meet the exacting requirements of today's industry. The combination of features available has been carefully selected to allow the 902 to be specially adapted to individual process requirements. All operational functions are configurable from selections resident in the instrument software and all hardware options are made with the use of plug-in modules.

Programmer

The 902P provides the facility of storing a single programme, of 16 segments (8 Ramps and 8 Dwells) for use where only limited changes are made to a basic process recipe.

The 903P provides storage for 4 programmes of the same size (16 segments) and the 904P can store up to 15 such programmes. This allows the system builder to select a programmer tailored to the needs of the process and the number of recipe changes anticipated.

The 902P/903P/904P range of programmers is designed to be usable in a wide range of industries in vastly varying environments. All include the ability to drive program event outputs.

Operator interface - The innovative use of the front panel keys of the controller has made operation and configuration easy to use. Separate scroll lists for the operator and commissioning engineer highlight only the information the user requires. The display used is a high brightness, high contrast, vacuum fluorescent indicator panel which is clearly viewable even in high ambient light. Also the front panel is sealed to IP65 so that operation in environments where large amounts of dust or moisture are present is easily achieved.

Inputs/outputs - Four channels can be configured with a number of different output types. This includes alarm relay outputs, program event outputs, parameter retransmission outputs, remote inputs and valve position indicator in addition to PID control outputs. Three separate digital inputs are fitted as standard and can be configured to activate a particular function when external contacts are closed.

Communications - Digital communications are available and include MODBUS® and JBUS® support. Analogue communications can be installed as a monitoring and control access for SCADA systems.

TECHNICAL SPECIFICATION

Input

General	Input range	-10 to +100mV or -1 to +10V
	Minimum span	5.0mV
	Maximum zero offset	20% of span
	Common mode rejection	140 db
	Series mode rejection	60 db
	Input impedance	> 1M ohm resistance (includes 0.5µA open circuit sensor current)
	Resolution	14 bit for all ranges (20 000 counts)
	Sample period	125 milliseconds
	Linearity error	Better than ±0.1% of input span
	Calibration error	Better than ±0.25% of span
Thermocouple	Standards	British BS4937 (1973) German DIN 43710 US ASTM E230 (1972)
	Linearisation	Better than ±0.2°C for standard thermocouple
	Source resistance error	0.5µV/ohm
	CJC	Internal or 0°C, 45°C, 50°C external
RTD	Internal CJC error	Typically 0.04°C/°C ambient change (30:1)
	Standards	British BS1904 German DIN43760 PT 100
	Linearisation	Better than ±0.05°C
	Connection	3 wire automatic lead compensation
	Bulb current	0.2mA
Volts	Lead compensation error	With up to 22 ohms in all three leads no change in display indication
	Range	-1.0 to +10.0V
Current	Input impedance	> 10M ohms
	Range	0-20mA or 4-20mA. 5 ohm burden resistors are mounted on the rear terminals

Outputs (2)

Relay		Maximum of 264V 2A ac into resistive load, with spark suppression	
		Minimum switched voltage 30V rms or dc.	
		On/off or time proportional	
		Leakage current through spark suppression network = 2mA at 264V ac 50Hz	
	Triac		Maximum of 264V 1A ac into resistive load
			Minimum voltage 85V rms
		On/off or time proportional	
Isolated logic		Leakage current through spark suppression = 2mA at 264V ac 50Hz	
		20mA at 15V min. On/off or time proportional	
		0.3 to 100 seconds at 50% power (relay 10 to 100 seconds)	
		Normally fitted to any of the above when using channel 1 as heat	
Power feedback		Isolated dc 0-10V at 20mA max or 0-20mA at 12 volts. Offsets provided as software option	
		i.e. 4-20mA. Output impedance on voltage ranges is < 1.1 ohms (including connectors)	
Analogue		Both output 1 and 2 are isolated from each other and the remainder of the instrument	
		Time proportioning and analogue in channel 1 (heat) can be configured either reverse or direct.	
		Channel 2 (cool), if time proportioning or analogue, is configured as acting opposite to output 1.	
Outputs general	Isolation	Channel 2 (cool), when not on/off, can be configured as either linear or non-linear characteristic.	
	Reverse/direct	The non linear characteristic is ideal for controlling water which may flash off to steam.	
	Non-Linear		

Alarms (2)

Relays		Maximum loading 264V 2A into resistive load, with spark suppression
		Minimum switching voltage 30 volt rms or dc
		Leakage current through spark suppression = 2mA at 264V ac 50Hz
Hysteresis		0.1-10.0% variable, in 0.1% resolution
	Type	Full scale high and low, deviation high and low; deviation band
	Range	Alarms may be set over the complete instrument range

Analogue communications

	Isolation	The analogue communication link and all other inputs and outputs are isolated as defined under 'Electrical Safety' in the Environmental section
Range input	Voltage	Max 10V range lying between -5.0 to +10.0V Input impedance > 75k ohms
	Current	0-20mA or 4-20mA Input impedance 50 ohms mounted on rear terminals
	Configuration	Remote setpoint, remote trim, heat or cool output power limit, motor valve position
	Resolution	12 bit
	Accuracy	Better than 0.5%
	Sample period	625 milliseconds
	Potentiometer supply	10V 10mA max. potentiometer supply available (0.5 for motor valve position)
Retransmission	Voltage	Max. 10V range lying between -5V to +10V Internal impedance < 0.1 ohms (including connectors) Load impedance must be > 500 ohms
	Current	0-20mA or 4-20mA at 12V min
	Configuration	Setpoint, measured value, error, or output power
	Resolution	12 bit
	Accuracy	Better than 0.5%

Digital communications

	Isolation	The digital communication link and all other inputs and outputs are isolated as defined under General Electrical Safety
	Protocol	Variable speed link. ASCII format RS232 or RS422/485 protocol ANSI X 3.28 (1976) at variable baud rates of 300, 600, 1200, 2400, 3600, 4800 and 9600, alternatively Modbus® RTD or 2.5 A4 J-Bus® RTD at variable rates of 600, 1200, 2400, 3600, 4800 and 9600.
	Format	Start bit - seven data bits - even parity bit one stop bit (ANSI protocol) Start bit - eight data bits - one stop bit (Modbus® or J-Bus® protocol)
	Address	Two digits

Logic inputs (3) Standard for all instruments

	Isolation	Logic inputs are not isolated from one another or the process variable input Logic inputs are isolated from all other inputs and outputs as defined under General Electrical Safety
	Drive	Volt free contact operation. The input is non-active in the rest state, active when closed with an impedance of < 100ohms
	Voltage level limits	For logic active level must be less than 0.7V For logic input non-active the input level must be greater than 4V Input current 0.5mA maximum
	Configuration (one only per logic input)	Auto/Manual, Remote/Local, SP2, Dual PID, Adaptive Tune, Self Tune, Remote Up/Down Key, Parameter Modification Security, Keylock, Run, Hold, Run/Hold, Hold/Run

Programming (902P, 903P, 904P)

	Timing accuracy	Better than (0.5sec ± 0.1% of duration) per segment						
	Number of programs	One (902P), four (903P), fifteen (904P)						
	Program length	Maximum of 8 ramps + 8 dwells per program: <table border="0" style="margin-left: 20px;"> <tr> <td>ramp</td> <td>1 - 6000 units/min(hr)</td> </tr> <tr> <td></td> <td>0.1 - 6000.0 units/min(hr)</td> </tr> <tr> <td>Dwell</td> <td>0.1 - 999.9 mins(hrs)</td> </tr> </table>	ramp	1 - 6000 units/min(hr)		0.1 - 6000.0 units/min(hr)	Dwell	0.1 - 999.9 mins(hrs)
ramp	1 - 6000 units/min(hr)							
	0.1 - 6000.0 units/min(hr)							
Dwell	0.1 - 999.9 mins(hrs)							
	Program cycles	Maximum of 999						
	Holdback	Deviation low, high or band which can be configured for whole program						
	Run/Hold	Operation by single push button						
	Programme controlled outputs (3)	One or both alarm outputs plus O/P2 can be driven from segments of the program						

Tuning

	Self-tune (ST)	A single shot approach which calculates the three term parameters after a defined period
	Adaptive tune (AT)	A continuous appraisal and redefining of three term parameters
	Dual PID	An alternative set of PID parameters may be selected by digital input

General

Front panel	Upper display	5 x 7 segment 12mm high fluorescent indicator. Display range + 19999 to -9999
	Resolution	±1 least significant digit
	Lower display	5 x 7 segment 5mm high fluorescent indicator
	Resolution	±1 least significant digit
Modes of operation	Auto/Manual	Bumpless procedure auto to manual to auto Manual output variable from 0 to 100% for heat only outputs and from -100 to +100% for heat/cool outputs
	Local/Remote	A selection of: <ol style="list-style-type: none"> 1) Full scale local or full scale remote setpoint or 2) Add an external trim to full scale local setpoint or 3) Add an external full scale setpoint to local trim
	Dual PID	The instrument may be configured so that separate values of Pb, ti td and rES are installed when setpoint 2 (SP2) is selected or by use of a digital input
Commissioning parameters		
	Integral time (ti)	Off, 1 to 9999 secs or 1 to 150 mins
	*Proportional band (Pb)	0.1 to 999.9% based on the range 'display max' - 'display min' or 1 to span in Engineering Units
	Heat-Cool deadband (db)	-5 to +5% of input range
	Manual reset (rES)	0 to 100% or -100 or 100% (automatically selected if integral time is 'off')
	Derivative time (td)	Off, 0.1 to 999.9 secs or 0.1 to 150 mins
	Cut-back (cbL/cbH)	Off, 0.1 to display range for both low and high
	Heat output limit (HL)	0 to 100%
	Cool output limit (CL)	0 to -100%
	Heat cycle time (Hc)	0.3 to 100 seconds (10 to 100 secs for relay)
	Cool cycle time (Cc)	0.3 to 100 seconds (10 to 100 secs for relay)
	Relative cool gain (Cr)	0.1 to 10.0 of proportional band (PB)
	Setpoint rate limit (SPr)	1 to 60000 units per min or hour with decimal position as display e.g. XX.XXX display gives 0.001 to 19.999
	Emmissivity (PE)	0.01 to 1.00
	Sensor break power (SBP)	0 to 100% (heat only) or -100% to 100% (heat/cool) or open/closed (VP) Activated by 10% over or under range
	** Travel time (tt)	10-1000 secs
	** Pot min limit PL	0-100%
	** Pot max limit Ph	0-100%
	* For on/off outputs proportional band is replaced by Deadband. ** Parameters for VP output only	

Environmental

The 902, 903 and 904 are compliant with 'Low Voltage Equipment Directive' and EMC Directive when installation instructions are followed

Supply voltage	85-264V ac, 17-40V ac or 20-40V dc
Supply frequency	48-62Hz
Power consumption	8.5 watts
Supply fuse	500mA (anti-surge)
EMC	Emissions: EN50081-2 (94) Immunity: Follows the general requirements of EN50082-2 (95). Radiated fields may cause PV to deviate by 1% of span. see Technical Construction File for details
Relative humidity	5-90% non-condensing
Operating temperature	0 to 55°C
Storage temperature	-40 to 70°C
Altitude	Not for use above 2000m
Atmosphere	Not suitable for use in explosive or corrosive atmospheres without further protection
Panel sealing	The instrument fascia meets IP65 when mounted into a cut-out as defined
Customer connections	Screw terminals with terminal cover
Ambient temperature coefficient	Typically ±50ppm/°C of instrument input span. Excluding CJC on the thermocouple instruments
Warm-up drift	< ±0.5% of display range (from 1 to 30 mins)
Supply voltage coefficient	< ±0.1% of display range over full supply voltage range
Mounting	Plug-in with panel mounting sleeve. Panel cut-out to DIN 43710
Weight	1.2Kg (2.6lbs) including sleeve and clamp
Rear cover	Gives electrical safety to rear terminals
Electrical safety	EN61010(95) 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

ORDERING CODE

902/904 HARDWARE

Basic Product	Input	Channel 1	Channel 2	Channel 3	Channel 4	Supply Voltage	Digital Comms	Analogue Comms or VP	Language
Basic Product		Code		Channel 4		Code		Recommended	
Basic Controller		902S		Relay (Alarm 2, Prog)		SRE		Lin Type	Range Code
1 Programmer/Controller		902P		Logic (Alarm 2)		SLO		Iron Constantan J	0C to 600C 01
4 Programmer/Controller		903P		Remote I/P (1)		MV		Fe/Const (DIN) L	0C to 600C 02
15 Programmer/Controller		904P		Remote I/P Current (1)		MC		Ni Cr/Ni AL K	-250C to 1200C 03
Input				Supply Voltage				Ci/Con T	-250C to 400C 04
T/C, RTD, Volts, mV		IS		85V to 264V		VH		Pt13% Rh/Pt R	0C to 1600C 05
Current		IC		24V ac/dc		VL		Pt10% Rh/Pt S	0C to 1600C 06
Pyrometer		IP		Digital Comms				Pt30% Rh/Pt6% Rh B	200C to 1820C 08
Channel 1				None		XN		W/W26%/Re	0C to 2300C 09
Relay		HRE		RS232		XS		W5%Re/W26%	10C to 2300C 11
Logic		HLO		RS422/485		XM		Ni Cr/Con E	0C to 780C 12
Triac		HTR		Analogue Comms or VP Pot.				Pt10%Rh/Pt40%Rh	200C to 1800C 23
DC Current		HDC		Analogue				W5%Re/W26%Re C	0C to 2300C 24
DC Volts		HDV		Input Type (3)				Pt20%Rh/Pt40%Rh	0C to 2000C 25
Channel 2				Voltage		QV		Platinel 11	0C to 1200C 28
Relay (Cool, Alarm 1, Prog)		CRE		Current		QC		W/W26%Re	0C to 2200C 29
Logic (Cool, Alarm 1)		CLO		Output Type (3)				Ni/Ni18%Molybdenum	0C to 1100C 33
Triac (Cool)		CTR		Voltage		ZV		W3%Re/25%Re D	0C to 2400C 35
DC Volts (Cool)		CDV		Current		ZC		W/Re5%W/Re26%	0C to 2000C 38
DC Current (Cool)		CDC		VP. Pot. (4)		QP		Nicrosil/Nisil N	0C to 1300C 45
Remote I/P Volts (1)		EV		Language				Pt100 ohm at 0°C	-200C to 800C 70
Remote I/P Current (1)		EC		English		LE		Pyrometer (Q004 Land)	800C to 1550C 48
Retrans Volts (2)		RV		French		LF		Pyrometer (Q003 Land)	700C to 1400C 51
Retrans Current (2)		RC						Pyrometer RO 26	100C to 500C 54
Channel 3								Pyrometer IVDI	1000C to 2500C 61
Relay (Alarm 1, Prog)		ARE						Pyrometer DTI	1200C to 2500C 62
Logic (Alarm 1)		ALO						Pyrometer RO 23	800C to 1700C 64
Retrans Volts (2)		TV						Pyrometer FP/GP 10	500C to 900C 82
Retrans Current (2)		TC						Pyrometer FP/GP 11	700C to 1300C 83
								Pyrometer FP/GP 12	1000C to 1850C 84
								Pyrometer FP/GP 20	400C to 750C 85
								Pyrometer FP/GP 21	500C to 1100C 86
								Linear	-9999 to 19999 00*
								Square Root	-9999 to 19999 92*

* For linear inputs sensitivity must not be less than 5µ V/digit

Notes:

- (1) Only one Remote Input option may be specified.
- (2) Only one Retransmission Output may be specified.
- (3) If Analogue Comms is specified, Remote Input and Retransmission Output are not available in channels 2, 3, or 4.
A 1.0V supply is available for Pot. excitation.
- (4) If VP Pot. Input is specified then a Remote Input is not possible.
- (5) Maximum of 2 alarms can be specified in either channels 2, 3, 4
- (6) In Programmer/Controller. Up to 3 Prog Drive Relays can be fitted in channels 2, 3, 4

Example:

Hardware -

902S/IS/HRE/CLO/ARE/SRE/VH/XM/QV/ZC/LE

Configuration -

IT/HAP/COL/AA/SA/XA/QAA/ZCF/0/600/C/01

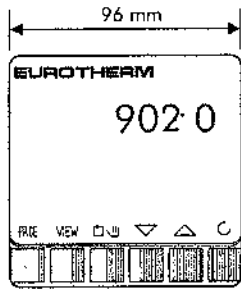
T/C Type J 0 to 600°C - Reverse PID Heat relay -

ON/OFF Cool Logic - Two FSH alarm relays -

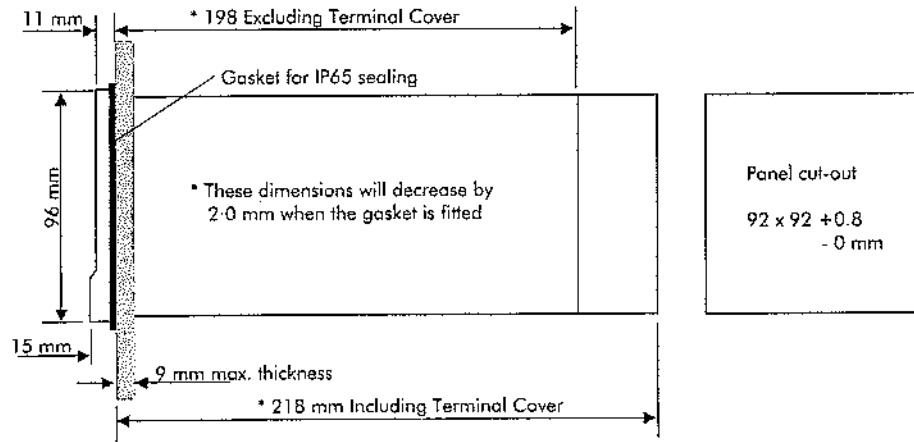
Dig comms EI-BISYNC - Remote Setpoint input 0-5V

- Retrans of error 4-20mA - 240V - English

DIMENSIONAL DETAILS



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



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