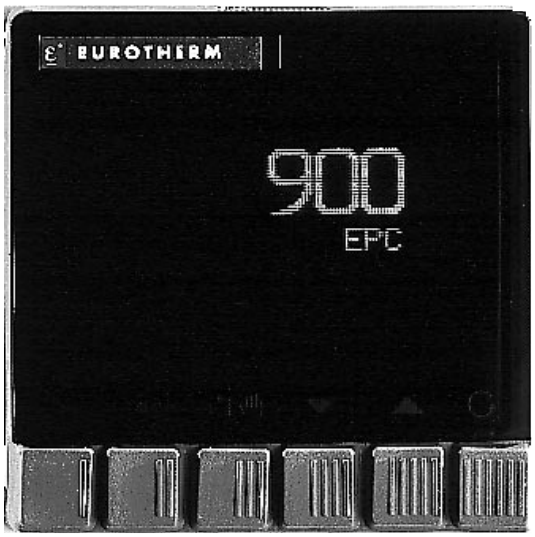
900 EPC

SERIES

EUROTHERM
CONTROLS

900 EPC Controllers



Product data

Fast sample rate - Ensures that even rapidly changing processes are controlled reliably
Custom linearisation - 16 point custom table for specialised sensors
Single or dual loop versions - Ideal for interactive processes
High accuracy, high stability - Repeatable high performance control
User wiring and programmable logic - Reduces external hardware and wiring
Panel sealing to IP65 - Ensures correct operation in dirty or damp environments

General description

The 900 EPC range of Eurotherm 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 Controllers 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.

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

Gain Scheduling - Gain scheduling permits modification of the PID, relative cool gain, and cutback parameters as a function of a dependent variable. This variable can be selected to be either the setpoint, measured value or the output level. Up to 5 sets of PID parameters, separated by 4 boundaries, can be implemented. As the dependent variable traverses one of these boundaries, the transition is made smoothly and bumplessly.

User wiring - The 900 EPC PLUS user can connect internal and external values together with various operators (+, -, X, etc.) to create networks of user wiring. These networks allow the user to:

- Modify the instrument outputs possibly using a combination of analogue and digital outputs.
- Design special machine controllers combining calculated values with totalizers and programmable logic.

User wiring can solve many control problems:

- Averaging of inputs.
- Automatic selection of control input during a program.
- Modulation of a PID output by the remote input signal.
- Incremental power control of several mechanical contactors and an SCR contactor.

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.

CASCADE INSTRUMENTS
Why use cascade control?

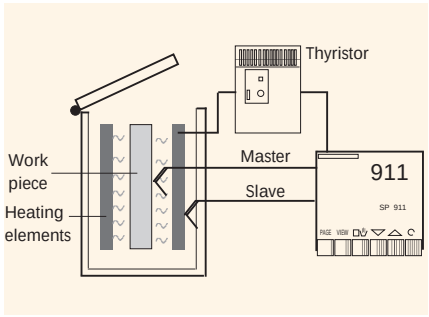
Cascade control is a technique used to enable processes with long lags to be controlled with the fastest possible response to process disturabances including setpoint changes, whilst still minimising the potential for overshoot. This is achieved by controlling a secondary, more responsive process that influences the main process. The main process is controlled using a master PID loop, the output of which is used to determine the setpoint of the secondary process which is controlled by a second PID loop. This second loop is referred to as the slave loop.

For example, in a vacuum heat treatment furnace the workpiece temperature can be controlled by using a cascade configuration where the furnace workpiece is the master and the heating elements form the slave loop.

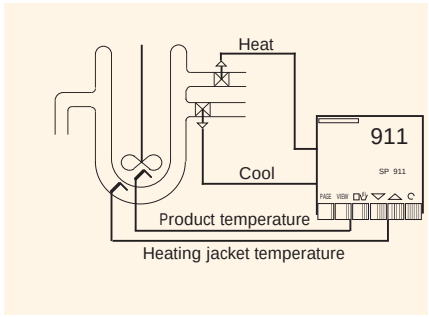
The 900 EPC cascade control instruments offer the following:

Simple commissioning - Cascade loops are difficult to tune manually.

The 900EPC overcomes this by offering a unique 'single button push' autotuner for cascade loops. The autotuner first tunes the slave loop at the selected setpoint, allows control to settle and tunes the master loop with full cascade control. This not only significantly reduces the commissioning time, but also makes it easy for the operator to perform, even between batches if necessary.



Vacuum heat treatment furnace



Reactor vessels

RATIO INSTRUMENTS
Why use ratio control?

Ratio control is a technique used to control a process variable at a setpoint that is calculated as a proportion of a second input. The Ratio Setpoint determines the proportion of the second input or Lead Value, that is to be used as the Setpoint. The Ratio Setpoint can be applied as either a multiplier or as a divisor to the second input.

The classic ratio configuration is single loop ratio control, an example of which is shown in figure 1.

The ratio setpoint value can be set in the range 0.001 to 99.999, although this range can be restricted using the ratio setpoint limits.

An addition to the ratio canfiguration description is to have a second PID loop to control the lead value (PV2) as well as using it to derive the setpoint for the first loop. This referred to as 'Ratio and Normal control'.

If a remote input (configured as PV3) is used for the lead value instead of PV2, the second process value PV2 can be controlled independently of the ratio contol loop, loop 1. This is referred to as 'Ratio and Independent control' and is illustrated in figure 2.

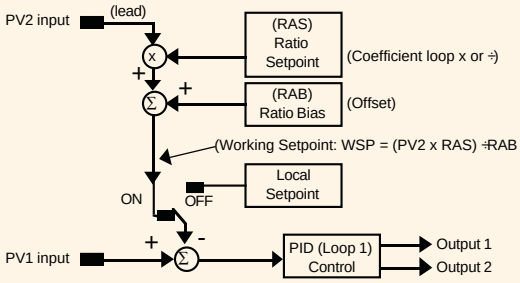


Figure 1 Classic ratio configuration

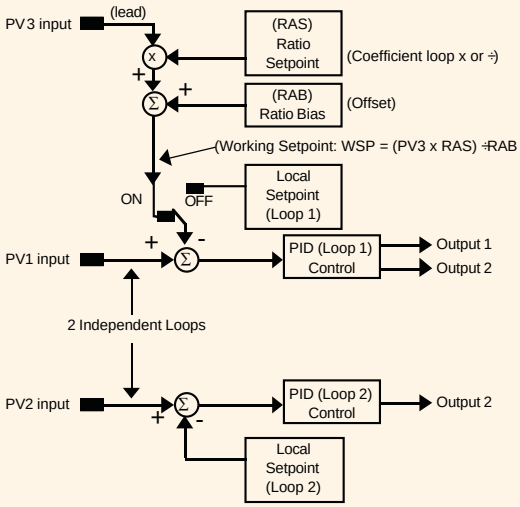


Figure 2 Ratio and Independent control configuration

900 EPC range summary of instrument types:

Type	Function	Single Loop	pages	Dual Loop	pages
905	Temperature controller	905S	8/9	905D	10 /11
907	Humidity controller	907S	8/9	-	-
909	Temperature and humidity controller	-	-	909D	10/11
911	Temperature cascade controller	911S	8/9	-	-
913	Temperature and process controller	-	-	913D	10/11
915	Pulsed Burner temperature controller	915S	8/9	-	-
940	Process controller	940S	8/9	940D	10/11
942	Pressure controller	942S	8/9	942D	10/11
944	Process cascade controller	944S	8/9	-	-
950	Gravimetric controller	950S	8/9	950D	10/11
951	Gravimetric and haul off controller	-	-	951D	10/11
960	Furnace atmosphere/kiln atmosphere controller	960S	8/9	-	-
962	Furnace atmosphere/kiln atmosphere & independent controller	-	-	962D	10/11
964	Ratio controller	964S	8/9	-	-
965	Ratio/normal controller	-	-	965D	10/11
967	Ratio/Independent controller	-	-	967D	10/11
969	Computed input controller	969S	8/9	-	-
971	Derived input controller	971S	8/9	971D	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

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

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.

Special Functions

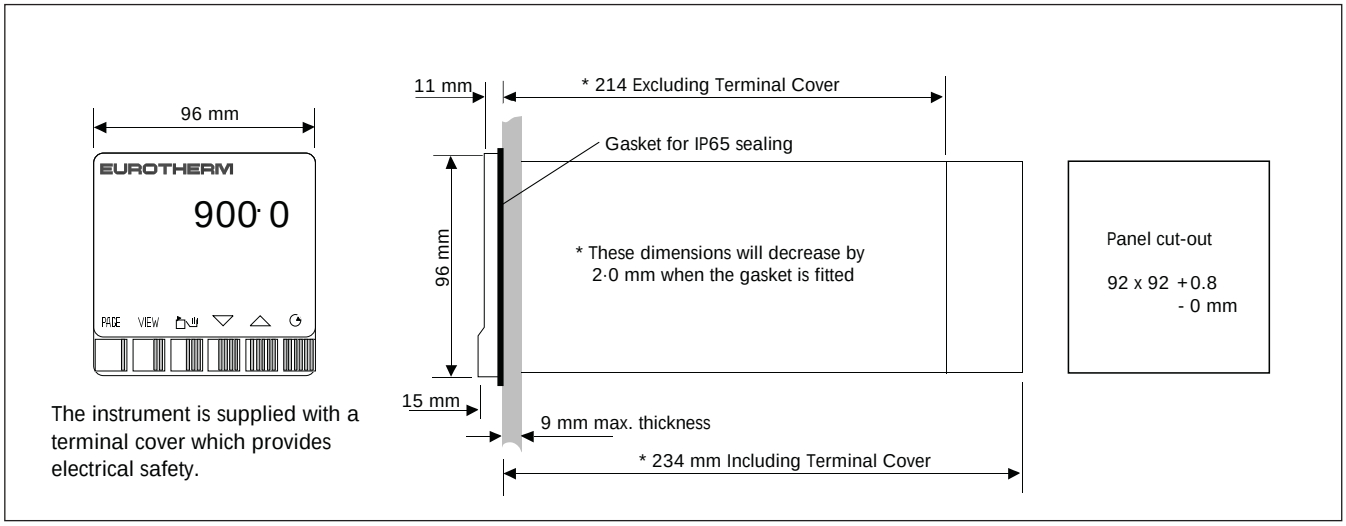
User Screens	Up to 8 pages of parameters and textual description chosen by you for your application.
User Wiring	8 internal calulations to derive process values, setpoints or outputs
Programmable Logic	12 steps of combinational logic (AND, OR, XOR, LATCH functions).
Timers	4 timers or delays that select functions at a particular time of day or after an elapsed period of time
Totalisers	4 totalisers used to sum inputs or outputs

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

905S - 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:
(905S) 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 Output	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)	ADR
Dual Triac	ADT
Quad Logic Input	ALI
Quad Logic Output	AL4
Triple Logic Output	AL3
Dual Relay (Logic)	AL2
Retrans. Voltage	ARV
Retrans. Current	ARC
Retrans. Digital	ARD
Burner Relay (1)	ABR
Burner Triac (1)	ABT
Burner 3 Logic (1)	AB3
Burner 4 Logic (1)	AB4

6 Option C	Code
Dual Relay (Alarms)	SDR
Dual Triac	SDT
Quad Logic Input	SLI
Quad Logic Output	SL4
Triple Logic Output	SL3
Dual Relay (Logic)	SL2
Single Relay (1)	SSR
Burner Relay (1)	SBR
Burner Triac (1)	SBT
Burner 3 Logic (1)	SB3
Burner 4 Logic (1)	SB4

7 Option D	Code
Dual Relay (Alarms)	RDR
Dual Triac	RDT
Quad Logic Input	RLI
Quad Logic Output	RL4
Triple Logic Output	RL3
Dual Relay (Logic)	RL2
Retrans. Voltage	RRV
Retrans. Current	RRC
Transducer 5V	RGA
Transducer 10V	RGB
Transducer 24V	RGC

8 Option E	Code
Quad Logic Input	ELI
Quad Logic Output	EL4
Triple Logic Output	EL3
Dual Relay (Logic)	EL2
Remote I/P Volts	ESV
Remote I/P Current	ESC
Transducer 5V	EGA
Transducer 10V	EGB
Transducer 24V	EGC

9 Communications	Code
RS232	XS
RS422/485	XM

10 Language	Code
English	LE
French	LF
German	LG

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

12 Plus Option	Code
Standard	-
PLUS	PLUS

Notes
(1) 915 only
(2) 960, 969, 971 only
(3) 964 only
(4) 960 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 1	Option A	Supply	Comms	Language	Probe Option	Plus Option
905S	-	IS	-	H (2)	C (4)	(5)	(6)	(7)	(8)	-	-	-	-	VH	(9)	(10)	-	(12)
907S	-	IS	-	H (2)	D (4)	(5)	(6)	(7)	(8)	-	-	-	-	VH	(9)	(10)	-	(12)
911S	LP1	IS	-	-	-	(5)	(6)	(7)	(8)	LP2	IS	H(2)	C (4)	VH	(9)	(10)	-	(12)
915S	-	IS	-	H (3)	C (4)	(5)	(6)	(7)	(8)	-	-	-	-	VH	(9)	(10)	-	(12)
940S	-	I (1a)	-	P (2)	O (4)	(5)	(6)	(7)	(8)	-	-	-	-	VH	(9)	(10)	-	(12)
942S	-	I (1a)	-	P (2)	O (4)	(5)	(6)	(7)	(8)	-	-	-	-	VH	(9)	(10)	-	(12)
944S	LP1	I (1a)	-	-	-	(5)	(6)	(7)	(8)	LP2	I (1)	P (2)	O (4)	VH	(9)	(10)	-	(12)
950S	-	IV	-	P (2)	O (4)	(5)	(6)	(7)	(8)	-	-	-	-	VH	(9)	(10)	-	(12)
960S	-	IS	IV	P (2)	O (4)	(5)	(6)	(7)	(8)	-	-	-	-	VH	(9)	(10)	(11)	(12)
964S	-	I (1)	I (1)	P (2)	O (4)	(5)	(6)	(7)	(8)	-	-	-	-	VH	(9)	(10)	-	(12)
969S	-	I (1)	I (1)	P (2)	O (4)	(5)	(6)	(7)	(8)	-	-	-	-	VH	(9)	(10)	-	(12)
971S	-	I (1)	I (1)	P (2)	O (4)	(5)	(6)	(7)	(8)	-	-	-	-	VH	(9)	(10)	-	(12)

900 EPC Single Loop Controller 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
TC [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	
Burner [1]	G	
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		

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		AG

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		SG

7 Option DD		Code
Dual Alarms	**1**	**2**
Full scale HI	RA	A
Full scale LO	RB	B
Deviation HI	RC	C
Deviation LO	RD	D
Deviation band	RE	E
Sensor break	RF	F
Loop break	RG	G
Rate of change	RH	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	
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		

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 Grav. Display	Code

These should be in the range -99999 to 99999.

19 Grav. Function	Code
Gravimetric	GRA
Dosing	DOS

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

Product	Loop	Grav. Function	Input	Function	Output 1	Option AA	Option BB	Option CC	Option DD	Option EE	Comms	I/P Range LO/HI	I/P Range Units	Display LO/HI	Display Units	Lin Type	Fraction of IP1	Fraction of IP2	Derived Input LO/HI	Grav. Display
905S	-	-	1 (1)	-	H (3)	C (4)	(5)	(6)	(7)	(8)	(9)	-	-	(12)/(12)	(13)	(14)	-	-	-	-
907S	-	-	IR	-	H (3)	D (4)	(5)	(6)	(7)	(8)	-	-	-	(12)/(12)	(13)	70	-	-	-	-
	-	-	IR	-	-	-	-	-	-	-	(9)	-	-	(12)/(12)	(13)	70	-	-	-	-
911S	LP1	-	1 (1)	-	-	-	(5)	(6)	(7)	(8)	-	-	-	(12)/(12)	(13)	(14)	-	-	-	-
	LP2	-	1 (1)	-	H (3)	C (4)	-	-	-	-	(9)	-		(12)/(12)	(13)	(14)	-	-	-	-
915S	-	-	1 (1)	-	H (3)	C (4)	(5)	(6)	(7)	(8)	(9)	-	-	(12)/(12)	(13)	(14)	-	-	-	-
940S	-	-	1 (2)	-	P (3)	O (4)	(5)	(6)	(7)	(8)	(9)	(10)/(10)	(11)	(12)/(12)	(13)	(14)	-	-	-	-
942S	-	-	1 (2)	-	P (3)	O (4)	(5)	(6)	(7)	(8)	(9)	(10)/(10)	(11)	(12)/(12)	(13)	(14)	-	-	-	-
944S	LP1	-	1 (2)	-	-	-	(5)	(6)	(7)	(8)	-	(10)/(10)	(11)	(12)/(12)	(13)	(14)	-	-	-	-
	LP2	-	1 (2)	-	P (3)	O (4)	-	-	-	-	(9)	(10)/(10)	(11)	(12)/(12)	(13)	(14)	-	-	-	-
950S	-	(19)	1 (2)	-	P (3)	O (4)	(5)	(6)	(7)	(8)	(9)	(10)/(10)	(11)	(12)/(12)	(13)	(14)	-	-	-	(18)/(18)
960S	IP1	-	IT	-	P (3)	O (4)	(5)	(6)	(7)	(8)	-	-	-	(12)/(12)	(13)	(14)	-	-	-	-
	IP2	-	IC	-	-	-	-	-	-	-	(9)	0.0, 2.0	-	(12)/(12)	(13)	(14)	-	-	-	-
964S	IP1	-	1 (2)	-	P (3)	O (4)	(5)	(6)	(7)	(8)	-	(10)/(10)	(11)	(12)/(12)	(13)	(14)	-	-	-	-
	IP2	-	1 (2)	-	-	-	-	-	-	-	(9)	(10)/(10)	(11)	(12)/(12)	(13)	(14)	-	-	-	-
969S	IP1	-	1 (2)	(20)	H (3)	C (4)	(5)	(6)	(7)	(8)	-	(10)/(10)	(11)	(12)/(12)	(13)	(14)	-	-	-	-
	IP2	-	1 (2)	-	-	-	-	-	-	-	(9)	(10)/(10)	(11)	(12)/(12)	(13)	(14)	-	-	(17)/(17)	-
971S	IP1	-	1 (2)	-	P (3)	O (4)	(5)	(6)	(7)	(8)	-	(10)/(10)	(11)	(12)/(12)	(13)	(14)	(15)	(16)	-	-
	IP2	-	1 (2)	-	-	-	-	-	-	-	(9)	(10)/(10)	(11)	(12)/(12)	(13)	(14)	-	-	-	-

900 EPC Dual Loop Controller 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;

940D - 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 - - AAB - XA - 2 - 8 - V - 0.0 - 100.0 - % - 00
This code delivers an instrument as:
(940D) 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), EI-Bisynch (XA)
Display in French (LF)

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

5 PV3	Code
PV volts	ESV
PV current	ESC

6 Communications	Code
RS232	XS
RS422/485	XM

7 Language	Code
English	LE
French	LF
German	LG

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

9 Controller Plus	Code
Standard	-
PLUS	PLUS

Notes

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

(1) Loop 1 only
(2) 967 and 971 only.
(3) Ignore defined single letter i.e, C + 1 + 2 = RA + 2
(4) 965, 966 and 967 only and loop 1 only.
(5) 962 only.
(6) Loop 2 of 951D only.

Product	Loop	Input	Output 1	Option A	Option B	Loop	Input	Output 1	Option A	Option B	PV3	Supply Volts	Comms	Language	Probe Option	Controller Plus
905D	LP1	IS	H (2)	C (3)	(4)	LP2	IS	H (2)	C (3)	(4)	-	VH	(6)	(7)	-	(9)
909D	LP1	IS	H (2)	D (3)	(4)	LP2	IS	H (2)	C (3)	(4)	-	VH	(6)	(7)	-	(9)
913D	LP1	IS	H (2)	C (3)	(4)	LP2	I (1a)	P (2)	O (3)	(4)	-	VH	(6)	(7)	-	(9)
940D	LP1	I (1a)	P (2)	O (3)	(4)	LP2	I (1a)	P (2)	O (3)	(4)	-	VH	(6)	(7)	-	(9)
942D	LP1	I (1a)	P (2)	O (3)	(4)	LP2	I (1a)	P (2)	O (3)	(4)	-	VH	(6)	(7)	-	(9)
950D	LP1	IV	P (2)	O (3)	(4)	LP2	IV	P (2)	O (3)	(4)	-	VH	(6)	(7)	-	(9)
951D	LP1	IV	P (2)	O (3)	(4)	LP2	I (1)	P (2)	O (3)	(4)	-	VH	(6)	(7)	-	(9)
962D	LP1	IS	P (2)	O (3)	ESV	LP2	I (1)	P (2)	O (3)	(4)	-	VH	(6)	(7)	(8)	(9)
965D	LP1	I (1a)	P (2)	O (3)	(4)	LP2	I (1)	P (2)	O (3)	(4)	-	VH	(6)	(7)	-	(9)
967D	LP1	I (1)	P (2)	O (3)	(4)	LP2	I (1)	P (2)	O (3)	-	(5)	VH	(6)	(7)	-	(9)
971D	LP1	I (1)	P (2)	O (3)	(4)	LP2	I (1)	P (2)	O (3)	(4)	-	VH	(6)	(7)	-	(9)

900 EPC Dual Loop Controller 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 [3]	1	2
PV [3]	RA	
Setpoint [3]	RB	
Error [3]	RC	
Power [3]	RD	
Digital [3]	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 [4]	EF	
CO Correction [5]	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	EVV
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

15 Grav. Display — Code

These should be in the range -99999 to 99999.

16 Grav. Function	Code
Gravimetric	GRA
Dosing	DOS
Haul Off [6]	HAL

Product	Loop	Grav. Function	Input	Output 1	Option AA	Option BB	Comms	I/P Range LO/HI	I/P Range Units	Display LO/HI	Display Units	Lin Type	Fraction of IP1	Fraction of IP2	Derived Input LO/HI	Grav. Display
905D	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)	-	-	-	-
909D	LP1	-	IR	H (3)	O (4)	(5)	-	-	-	0/100	(10)	70	-	-	-	-
	LP2	-	IR	H (3)	C (4)	(5)	(6)	-	-	0/100	(10)	70	-	-	-	-
913D	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)	-	-	-	-
940D	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)	-	-	-	-
942D	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)	-	-	-	-
950D	LP1	(16)	I (2)	P (3)	O (4)	(5)	-	(7)/(7)	(8)	(9)/(9)	(10)	(11)	-	-	-	(15)/(15)
	LP2	(16)	I (2)	P (3)	O (4)	(5)	(6)	(7)/(7)	(8)	(9)/(9)	(10)	(11)	-	-	-	(15)/(15)
951D	LP1	(16)	I (2)	P (3)	O (4)	(5)	-	(7)/(7)	(8)	(9)/(9)	(10)	(11)	-	-	-	(15)/(15)
	LP2	(16)	I (2)	P (3)	O (4)	(5)	(6)	(7)/(7)	(8)	(9)/(9)	(10)	(11)	-	-	-	(15)/(15)
962D	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)	-	-	-	-
965D	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)	-	-	-	-
967D	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)	-	-	-	-
971D	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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