

# Eurotherm®

## 2604 Controller

### Advanced Process Controller/Programmer



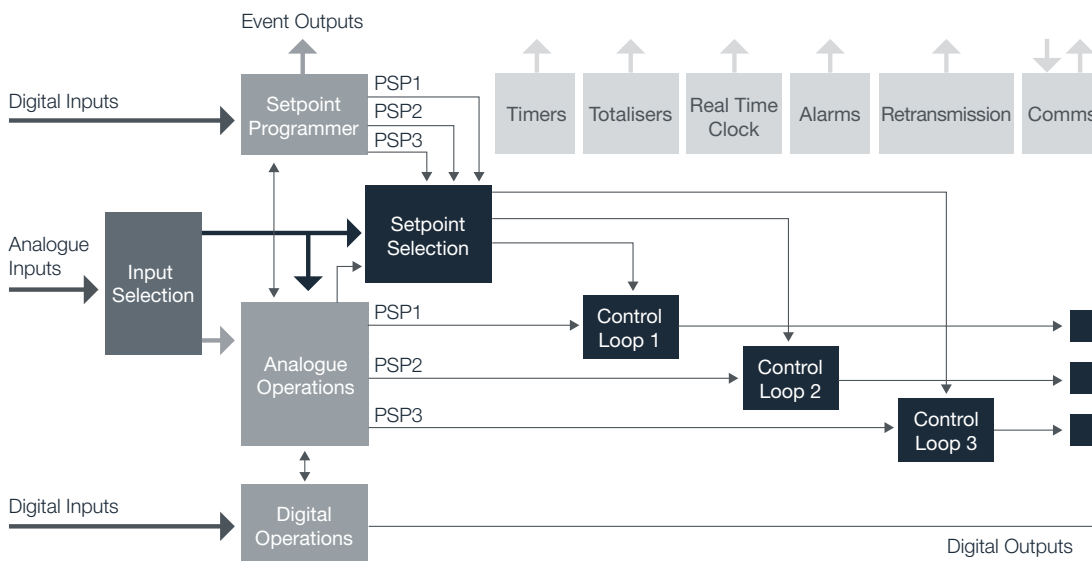
#### Product at a glance

The 2604 controller is a highly accurate, high stability process controller available in a single, dual or triple loop format. Features include setpoint programming and comprehensive selection of maths and logic functions.

It has a dual 5-digit display of process value and setpoint with an LCD panel for display of alarm messages, programmer and loop status information. User defined messages in the LCD panel simplify operation. The 2604 controller is a highly configurable product offering many features previously found only in programmable logic controllers. This allows systems to be implemented integrating the process control and logic functions of a machine, therefore simplifying system complexity and reducing the total system costs.

Configuration is achievable either via the front panel or using Eurotherm's iTools configuration software.

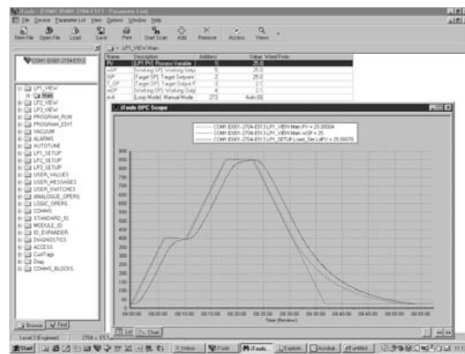
- 3 Control loops
- SP Programmer
- Customisable user interface
- Maths and logic functions
- Open communications



# 2604 Advanced Process Controller/Programmer Specifications

## Control functions

- 3 Control loops
- PID, VP or ON/OFF
- Cascade, ratio or override
- Gain scheduling
- Configurable control strategies

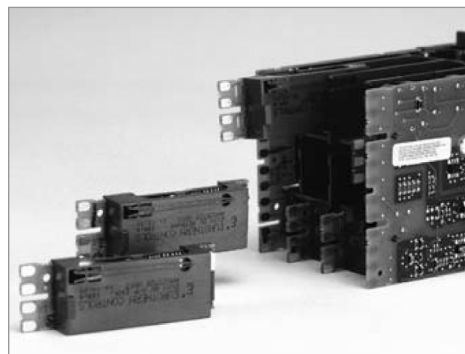


Eurotherm's advanced control algorithm gives precise straight-line control. Automatic tuning simplifies the commissioning procedure by performing a one shot tune to calculate the optimum PID values. To further optimise control especially in programmer applications, gain scheduling can be used to transfer control between up to six sets of PID values.

< iTools configuration software

## IO Hardware

- 0.25uV PV input resolution
- Fixed and modular IO
- 250Vac isolation
- Expandable IO
- Easily upgraded



The 2604 controller incorporates a self correcting input circuit (INSTANT ACCURACY) to maximise accuracy and performance during initial warm up and changes in ambient temperature.

One universal and one high level analogue input, along with 10 digital IO are included as standard. Additionally, a further 5 IO module may be fitted providing very flexible input/output combinations.

## Setpoint programmer

- 50 Programs
- 3 Profiled setpoints/program
- 500 Segments
- 16 Event outputs

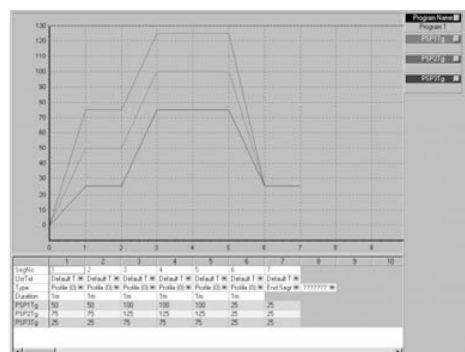


Ideal for applications such as atmosphere or vacuum furnaces, and environmental chambers. The 2604 controller user interface offers the user an extremely easy method of editing, selecting and running programs.

< Dual temperature/carbon programmer

## iTools setpoint program editor

- Offline or online editing on PC
- Graphical representation
- Advanced editing functions
- Storage and retrieval of program files

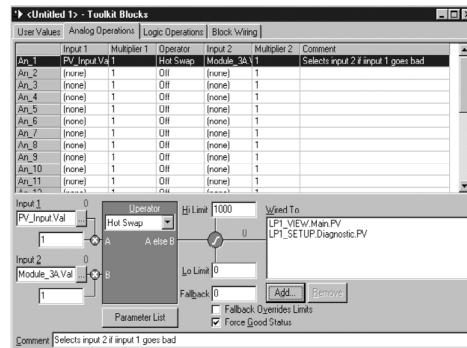


< iTools setpoint program editor

# 2604 Advanced Process Controller/Programmer Specifications

## Toolkit functions

- Mathematical calculations
- Combinational logic
- Real time clock
- Timer functions



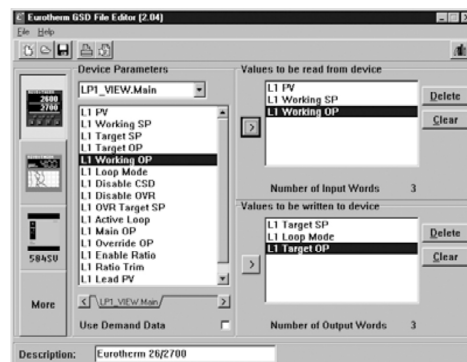
Operators include: Add, Subtract, Log, Exp, SQRT, AND, OR Max, Min, Select and many more.

ToolKit blocks allows the user to create custom solutions by internally wiring analogue and digital operations together in flexible ways. 24 analogue and 32 digital operations are available. Other functions are available including timers, totalisers and a real time clock.

< iTools toolkit block editor

## Slave communications

- Modbus™ RTU
- Profibus® DP
- DeviceNet®
- El-Bisync



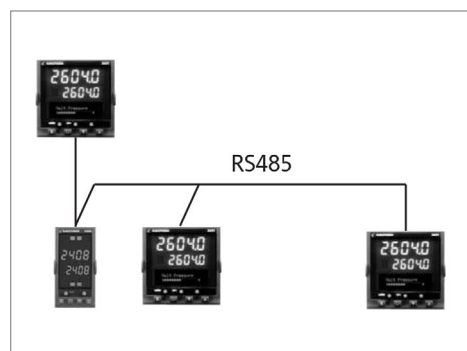
The 2604 controller supports two slave communication ports. Its modular build provides the user with a selection of communication protocols allowing easy integration into both PLC and PC supervisory systems.

When using Profibus DP a GSD file has to be created, containing the information relating to the instruments' parameters, that a Profibus master needs in order to communicate with its slave device. The GSD file for a 2604 controller is created using Eurotherm's GSD file

< Profibus GSD editor

## Master communications

- Modbus protocol
- 25 read/write parameters
- Expands available hardware
- Interfaces to most Modbus slaves



Master Modbus communications significantly increases the applications open to the 2604 controller. In its simplest form it can be used to retransmit a setpoint to a number of slave controllers in a multi-zone furnace.

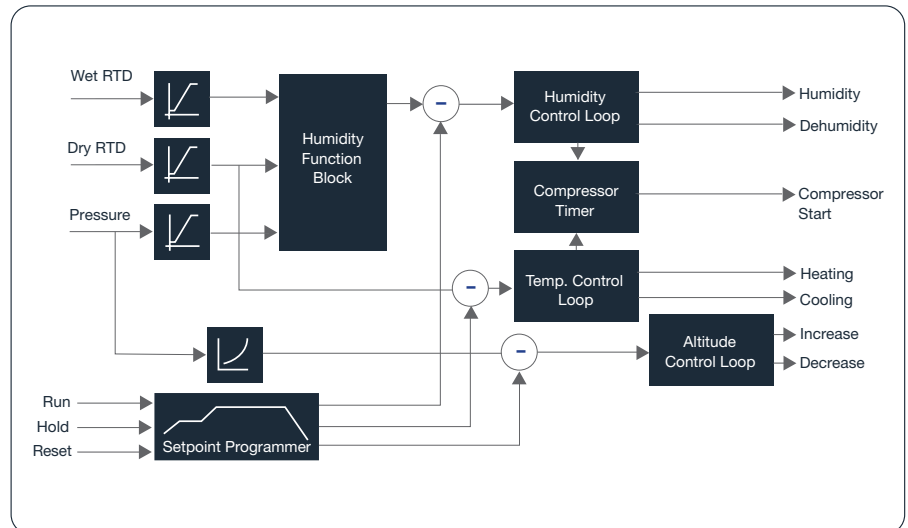
# 2604 Advanced Process Controller/Programmer

## Specifications

### % Relative humidity

- %RH or Dewpoint Measurement
- Pressure compensation
- Boost heat/cool
- Compressor timer
- Cooling bypass output

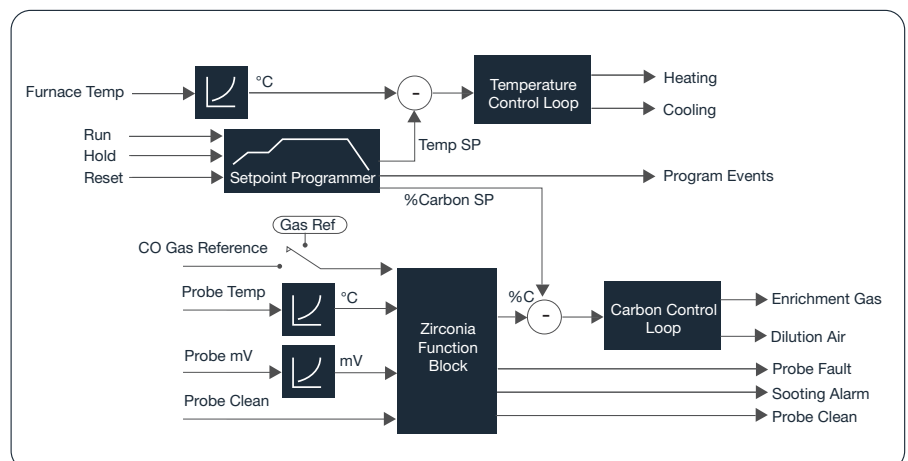
Ideal for use in applications where it is necessary to simulate the environmental conditions of temperature, humidity, altitude or light. The setpoint programmer is used to generate synchronised profiles of up to three variables. Other options allow configuration of signals to turn on a compressor, operate a bypass or operate further stages of heating and cooling.



### Carbon potential

- %CP, O<sub>2</sub> or Dewpoint measurement
- CO correction
- Probe burn off and sooting alarm
- Sooting alarm

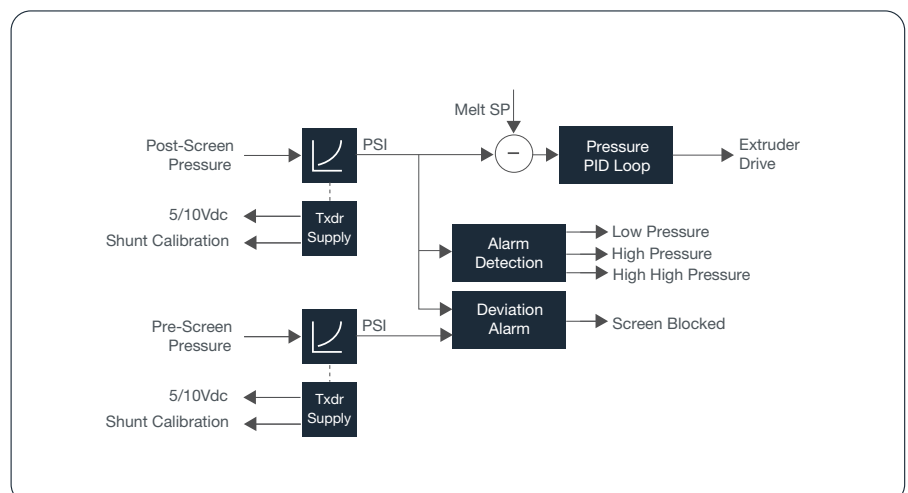
Ideal for use in gas carburising furnaces where Zirconia probes are used to measure Carbon Potential. A three loop controller can be used to control furnace temperature, carbon potential and quench. The setpoint programmer is used in batch applications to generate synchronised temperature and carbon profiles.



### Melt pressure

- 350Ω Strain gauge input
- Transducer excitation
- Pressure alarms
- Screen blockage alarm
- Simple user calibration with shunt

Suitable for precision pressure control in the plastic extrusion industries. Additionally a second pressure transducer can be used to provide a differential pressure alarm when the screen starts to block. Various machine start up strategies can be used to perform a smooth transition from auto to manual mode.



# 2604 Advanced Process Controller/Programmer

## Specifications

### Technical Specifications

GENERAL		
Environmental performance	Temperature limits	<b>Operation:</b> 0 to 50°C <b>Storage:</b> -10 to 70°C
	Humidity limits	<b>Operation:</b> 5 to 95% RH non condensing <b>Storage:</b> 5 to 95% RH non condensing
	Panel sealing	IP65, Nema 4X
	Vibration	2g peak, 10 to 150Hz
	Altitude	<2000 metres
	Atmospheres	Not suitable for use in explosive or corrosive atmosphere
Electromagnetic compatibility (EMC)	Emissions and immunity	BS EN61326
	Suitable for domestic, commercial and light industrial as well as heavy industrial. (Domestic/light (Class B) emissions. Industrial (Class A) environmental immunity emissions. With Ethernet module fitted product only suitable for Class A emissions.	
Electrical safety	BS EN61010	Installation cat. II; Pollution degree 2
	INSTALLATION CATEGORY II: The rate impulse voltage for equipment on nominal 230V mains is 2500V. POLLUTION DEGREE 2: Normally, only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation shall be expected.	
Physical	Panel mounting	1/4 DIN
	Dimensions and weight	96W x 96H x 150D mm, 600g
	Panel cut-out dimensions	92W x 92Hmm
Control options	No. of loops	1, 2 or 3 loops
	Options	Cascade, Ratio or Override
	Modes	PID, ON/OFF or Valve Position
	Applications	Carbon Potential, Humidity
Approvals	CE, cUL listed (file E57766), EAC suitable for use in Nadcap and AMS2750D applications under System Accuracy Test calibration conditions	

STANDARD I/O		
Precision PV input Accuracy	±0.1%	
Ranges	mV, mA, volts or RTD (PT100)	
Thermocouple types	J, K, I, N, R, S, B, PII, C, plus others	
Cold junction	Ext 0°C, 45°C or 50°C	
Analogue input	Allocation	1 fitted
	Accuracy	±0.1%
	Ranges	-10V to 10V or 0 to 20mA
Digital I/O	Types:	1 digital input, 7 Bi-directional input/outputs, 1 Changeover relay

MODULES		
Digital outputs	Types	Single Relay, Dual Relay, Single Triac, Dual Triac, Single Logic and Triple Logic module
	Allocation	Slot 1, 3, 4, 5 or 6 (Max 3 Triacs per unit)
Digital inputs	Types	Triple contact input, Triple logic input
	Allocation	Slot 1, 3, 4, 5 or 6
Analogue outputs	Types	DC Control or DC Retransmission (5 Max)
	Allocation	Slot 1, 3, 4, 5 or 6
	Range	0 to 20mA or 0 to 10Vdc

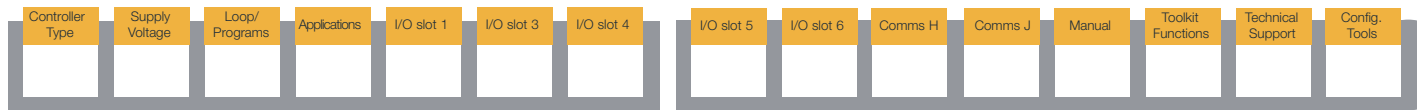
Dual Analogue outputs	Allocation	Slot 1, 4 or 5
	Range	4-20mA or 24Vdc transmitter PSU
High Resolution Analogue output	Allocation	Slot 1, 4 or 5
	Range	4-20mA and 24Vdc transmitter PSU
Transmitter PSU	Allocation	Slot 1, 3, 4, 5 or 6
	Transmitter	24Vdc @ 20mA
Transducer supply	Bridge voltage	Software selectable, 5 or 10Vdc
	Bridge resistance	300Ω to 15Kohms
Potentiometer input	Potentiometer resistance	330Ω to 150Kohms
Precision PV input (Module)	Allocation	Slot 3 or 6
	Accuracy	±0.1%
	Ranges	mV, mA, volts or RTD (PT100)
	Thermocouple types	J, K, T, L, N, R, S, B, PII, C, plus others
	Cold junction	Ext 0°C, 45°C or 50°C
Dual (Probe) input	Allocation	Slot 3 or 6
	Accuracy	±0.1%
	Ranges	mV, mA, volts or RTD (PT100)
	Thermocouple types	J, K, T, L, N, R, S, B, PII, C, plus others
	Cold junction	Ext 0°C, 45°C or 50°C
Analogue input (Module)	Allocation	Slot 1, 3, 4 or 6
	Accuracy	±0.2%
	Ranges	mV, mA, volts or RTD (PT100)
	Thermocouple types	J, K, T, L, N, R, S, B, PII, C, plus others
	Cold junction	Ext 0°C, 45°C or 50°C

SETPOINT PROGRAMMER	
No. of profiles	1, 2 or 3 profiles
No. of programs	50 programs max.
No. of segments	500 time to target segments (max.) or 400 ramp rate segments (max.)
Event outputs	Up to 16

ADVANCED FUNCTIONS		
Application blocks	32 digital operations, 24 analogue operations, 12 user values	
Timers	4 ON pulse, OFF delay, one shot and min-ON	
Totalisers	4, trigger level and reset input	
Pattern generators	16 patterns each with 16 bits	
Real time clock	Day of the week and time	
Customisable screens	8 user screens	
User switches	8, toggle and momentary function	
Slave communications	Allocation	Slot H or J (DeviceNet/Profibus slot H only)
	Types	Profibus DP RS485, Modbus RTU RS485 (2 wire), RS485 (4 wire) or RS232, DeviceNet, EI-Bisync (subset of parameters)
Master communications	Allocation	Slot J
	Types	Modbus RTU RS485 (2 wire), RS485 (4 wire) or RS232
	Parameters	25 read/write

# 2604 Advanced Process Controller/Programmer Specifications

## Hardware coding



Controller Type	Supply Voltage	Loop/Programs	Applications	I/O slots 1,3,4,5,6	Comms H	Comms J	Manual	Toolkit Functions	Technical Support	Config Tools
<b>2604</b> Standard <b>2604f</b> Profibus	<b>VH</b> 85-264Vac <b>VL</b> 20-29Vac/dc	<b>First digit</b> 1-- One loop 2-- Two loops 3-- Three loops <b>Second digit</b> --XX No programs --1 1 Profile --2 Twenty programs --5 Fifty programs <b>Third digit</b> --XX No programs --1 1 Profile --2 2 Profile --3 3 Profile	<b>XX</b> Standard <b>ZC</b> Zirconia	<b>XX</b> None fitted <b>R4</b> Change over relay <b>R2</b> 2 Pin relay <b>RR</b> Dual relay <b>T2</b> Triac <b>TT</b> Dual triac <b>D4</b> DC Control <b>D6</b> DC retransmission <b>PV</b> PV Input (Slots 3 & 6 only) <b>TL</b> Triple logic input <b>TK</b> Triple contact input <b>TP</b> Triple logic output <b>MS</b> 24Vdc t'mitter. PSU <b>VU</b> Pot. input <b>G3</b> 5Vdc t'ducer PSU <b>G5</b> 10Vdc t'ducer PSU <b>AM</b> Analogue input module (not in slot 5) <b>DP</b> Dual DC (probe) input (Slots 3 and 6 only) <b>DO</b> Dual 4-20mA OP/24Vdc PSU (Slots 1, 4 & 5 only) <b>LO</b> Iso. single logic OP <b>HR</b> Hi Resolution DC retrans & 24Vdc PSU (Slots 1, 4 & 5 only)	<b>XX</b> None fitted <b>A2</b> 232 Modbus <b>Y2</b> 2W 485 Modbus <b>F2</b> 4W 485 Modbus <b>AE</b> 232 Bisync <sup>®</sup> <b>YE</b> 2W 485 Bisync <sup>®</sup> <b>FE</b> 4W 485 Bisync <sup>®</sup> <b>PB</b> Profibus <b>DN</b> DeviceNet	<b>XX</b> None fitted <b>A2</b> 232 Modbus <b>Y2</b> 2W 485 Modbus <b>F2</b> 4W 485 Modbus <b>M1</b> 232 Master <b>M2</b> 2W 485 Master <b>M3</b> 4W 485 Master	<b>ENG</b> English <b>FRA</b> French <b>GER</b> German <b>SPA</b> Spanish <b>ITA</b> Italian <b>NED</b> Dutch <b>SWE</b> Swedish	<b>XX</b> Standard <b>U1</b> Toolkit level 1 <sup>®</sup> <b>U2</b> Toolkit level 2 <sup>®</sup>	<b>TS1</b> 1 Hour <b>TS2</b> 2 Hours <b>TS4</b> 4 Hours <b>TS8</b> 8 Hours <b>TS0</b> NONE	<b>XX</b> None <b>IT</b> iTools

## Example Ordering Code

**2604 - VH - 323 - XX - RR - PV - D4 - TP - PV - XX - A2 - XX - ENG - U1 - IT**

This code describes a 3 loop controller with capability to store 20 three profile programs.

Supply voltage is 85-264Vac.

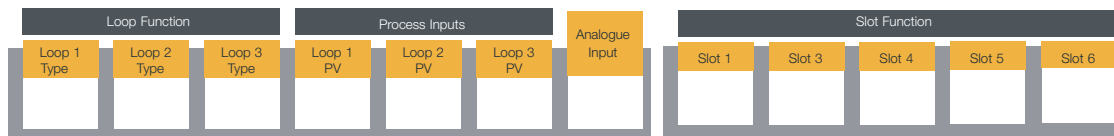
Modular hardware: 2 x PV input, 1 x Dual relay, 1 x DC control, 1 x Triple logic output, EIA-232 Comms. 16 analogue and 16 digital operations, iTools supplied with controller

### Hardware notes:

1. Basic Controller/Programmer includes 8 digital registers, 4 timers and 4 totalisers.
2. Toolkit 1 includes 16 analogue, 16 digital, pattern generator, digital programmer, analogue switch and 4 user values.
3. Toolkit 2 includes Toolkit 1 plus extra 8 analogue, 16 digital/operations and 8 user values.
4. Dual analogue input suitable for Carbon Probes. (Inputs not isolated from each other).
5. EI-Bisync includes only a subset of parameters.
6. The HR module has 1 high resolution DC output and 1 24Vdc power supply.

# 2604 Advanced Process Controller/Programmer Specifications

## Configuration coding (optional)



Loop Function	Process Inputs (Input type)	Analogue Input	Slot Function
<b>Loop Function</b> XXXX None S Standard PID C Cascade R Ratio O Override (7) _PID PID control _ONF On/Off control _PIF PID/On/Off control _VP1 VP without feedback _VP2 VP with feedback	<b>Process Inputs (Input type)</b> X None J J Thermocouple K K Thermocouple T T Thermocouple L L Thermocouple N N Thermocouple R R Thermocouple S S Thermocouple B B Thermocouple P Platinell III C C Thermocouple Z RTD/Pt100 A 4-20mA linear Y 0-20mA linear W 0-5Vdc linear G 1-5Vdc linear V 0-10Vdc linear  <b>Custom downloads (replace C)</b> Q Custom curve D D Thermocouple E E Thermocouple 1 Ni/Ni18%Mo 2 Pt20%Rh/Pt40%Rh 3 W/W26%Re (Engelhard) 4 W/W26%Re (Hoskins) 5 W5%Re/W26%Re (Engelhard) 6 W5%Re/W26%Re (Bucose) 7 Pt10%Rh/Pt40%Rh 8 Exergen K80 I.R. pyrometer  <b>Table 1</b> A 4-20mA linear Y 0-20mA linear W 0-5Vdc linear G 1-5Vdc linear V 0-10Vdc linear	<b>Analogue Input</b> XXX None P2- PV Loop 2 P3- PV Loop 3 S1- SP Loop 1 S2- SP Loop 2 S3- SP Loop 3 A1- Aux. PV Loop 1 A2- Aux. PV Loop 2 A3- Aux. PV Loop 3 L1- Ratio Lead PV Loop 1 L2- Ratio Lead PV Loop 2 L3- Ratio Lead PV Loop 3 For input range select third digit from table 1	<b>Slot Function</b> XXX Unconfigured 1-- Loop no. 1 2-- Loop no. 2 3-- Loop no. 3 <b>Single relay, triac, logic</b> -HX Heat -CX Cool <b>Dual relay or triac</b> -HC PID Heat & Cool -VH VP Heat -AA FSH & FSH -AB FSH & FSL -AC DH & DL -AD FSH & DH -AE FSL & DL -AF FSL & FSL -AG FSH & DB -AH FSL & DB -AJ DB & DB HHX Heat output for loops 1 & 2 CCX Cool OP's loops 1 & 2 P12 Prog events 1 & 2 P34 Prog events 3 & 4 P56 Prog events 5 & 6 P78 Prog events 7 & 8 <b>Triple logic output</b> -HX CH1 Heat -CX CH1 Cool -HC CH1 Heat, CH2 Cool HHX Heat output 1 loops 1 & 2 HHH Heat output for loops 1, 2 & 3  <b>Single DC outputs</b> -H- PID Heat -C- PID Cool -T- PV retransmission -S- SP retransmission For output range select third digit from table 1 <b>Precision PV input</b> -PV PV input module -PA Aux PV input (8) -PL Ratio lead input <b>Analogue input</b> -R- Setpoint For input range select third digit from table 1 <b>Aux. &amp; lead PV inputs</b> -L- Ratio lead input -B- Aux. PV input For input range select third digit from table 1 <b>Potentiometer input</b> -VF VP Heat feedback -RS Remote SP <b>Dual DC 4-20mA/24Vdc PSU Output</b> HHX Heat output for loops 1 & 2 -HC Heat Cool -HT CH1 Heat, CH2 PSU TTX Both channels PSU <b>High Resolution DC OP</b> -TA 4-20mA PV Retrans -TV 0-10V PV Retrans -SA 4-20mA SP Retrans -SV 0-10V SP Retrans

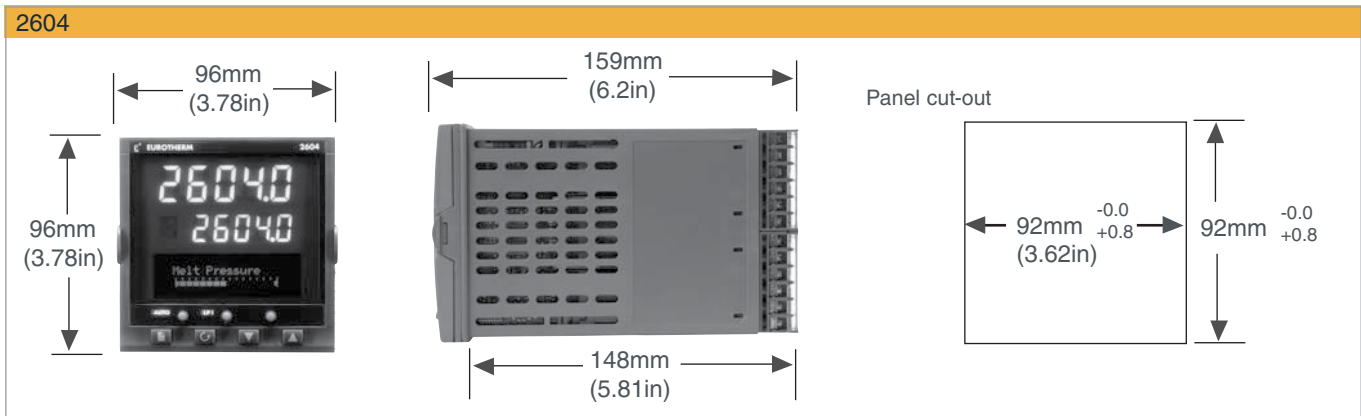
### General notes:

1. Loop 1 PV defaults to main PV input on microboard. Loop 2 and 3 PV inputs must be fitted in I/O slots 3 or 6 or be assigned to the analogue input.
2. Alarm configuration refers to loop alarms only. One selection is allowed per loop. Additional alarms are available for the user to configure.
3. Thermocouple and RTD inputs assume sensor min and max values with no decimal point.
4. Linear inputs are ranged 0-100%, no decimal point.
5. Temperature units will be °C unless ordered by USA where °F will be used.
6. Remote setpoints assume loop min & max ranges.
7. VP1, VP2, VP3 and VP4 are not available with override function.
8. For Cascade and Override inputs only.
9. HR module should be used in feedback mode, please refer to TIBC160.

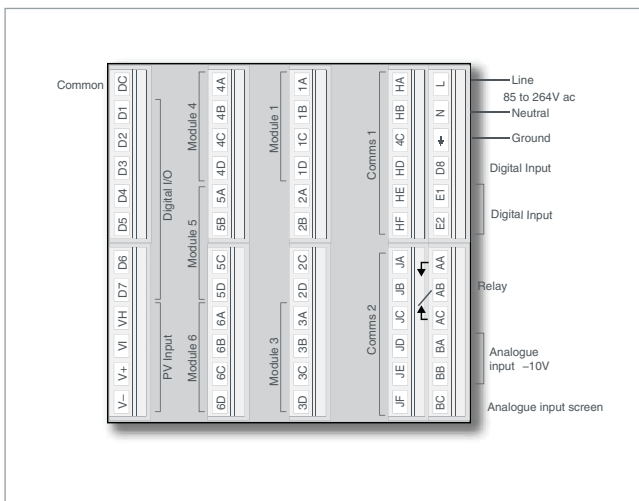


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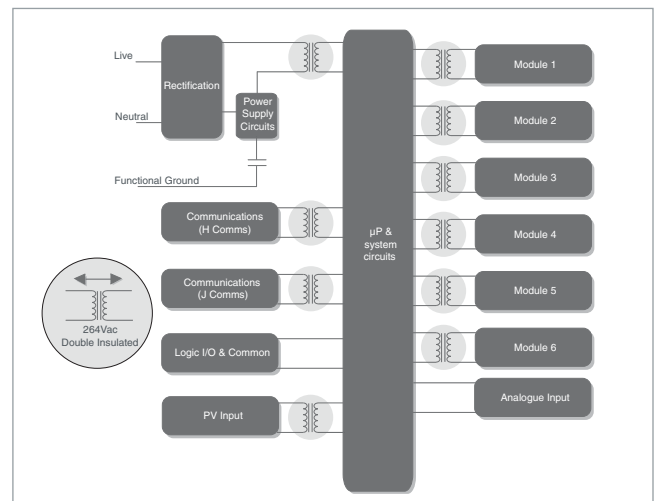
## Dimensional details



## Rear terminal connections



## Isolation



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