Advanced Process Controller/Programmer
Specification Sheet

The 2704 is a highly accurate and stable process controller available in a single, dual or triple loop format. Features include setpoint programming and comprehensive selection of maths and logic functions.

Its user interface incorporates a bright dot matrix display, providing extreme flexibility and ease of use. It is a highly configurable product offering many features previously found only in programmable logic controllers. This enables 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.
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 stable 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.

Trending enables the user to view, both current and historical information on the process variable and setpoint of each control loop.

Setpoint programmer

- 60 Programs
- 3 Profiled setpoints/program
- 600 Segments
- 16 Event outputs
- Program mimic display

Ideal for applications such as atmosphere or vacuum furnaces, and environmental chambers. The 2704 user interface offers the user an extremely easy method of editing, selecting and running programs.

IO Hardware

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

The 2704 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 inputs, along with 10 digital IO are included as standard. Additionally, a further 5 IO modules may be fitted providing very flexible input/output combinations. The series 2000IO expander unit can provide an additional 20 digital inputs and 20 digital outputs.
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. 32 analogue and 32 digital operations are available. Other functions are available including timers, totalisers and a real time clock.

I/O Expander
- 20 Logic inputs
- 20 Relay outputs

The 2000IO expander can increase the digital IO providing the option for greater remote operation of the programmer and expands the 2704 logic capability.

Slave communications
- Modbus™ RTU protocol
- Ethernet Modbus/TCP protocol
- Profibus DP
- DeviceNet® communications
- EI-Bisync

The 2704 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 2704 is created using Eurotherm’s GSD file editor.

Master communications
- Modbus protocol
- 100 read/write parameters
- Expands available hardware
- Interfaces to most Modbus slaves

Master modbus communications significantly increases the applications open to 2704. In its simplest form it can be used to retransmit a setpoint to a number of slave controllers in a multi-zone furnace. Alternatively, it can be integrated with an 8 loop blind controller to provide a remote operator interface with SP programmer functions.
**Vacuum**
- Direct interface to vacuum gauges
- Auto Hi/Lo gauge selection
- 6 Vacuum setpoints
- Pump timeout alarm
- Leak detection routine

At the heart of the vacuum controller is a specially designed function block capable of accepting up to three vacuum inputs. The 2704 is capable of being used solely to control the vacuum pump down sequence of a furnace, or as an integral furnace controller where both temperature and vacuum are controlled.

**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 ensure a smooth transition from auto to manual mode.

**Carbon potential**
- %CP, O₂ or Dewpoint measurement
- CO correction
- Probe burn off and impedance monitoring
- 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.

**Customisable display**

By using flexible User Pages, the user has the option of defining how the process screens are viewed.

A maximum of eight user pages can be configured.
SPECIFICATION

General

Environmental performance
Temperature limits
Operation: 0 to 50°C
Storage: -10 to 70°C
Humidity limits
Operation: 5 to 85% RH non condensing
Storage: 5 to 85% 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), Gost
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, PHI, 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

Mechanical Details
### Hardware coding

<table>
<thead>
<tr>
<th>Basic Product</th>
<th>4.0 IO Slots 1, 3, 4, 5, 6</th>
<th>16 J Comms Slot</th>
</tr>
</thead>
<tbody>
<tr>
<td>2664 Standard</td>
<td>XX None fitted</td>
<td>XX Not fitted</td>
</tr>
<tr>
<td>2664f Profibus</td>
<td>R4 Change over relay</td>
<td>A2 EIA232 Modbus</td>
</tr>
<tr>
<td>2704 Standard</td>
<td>R2 2 Pin relay</td>
<td>Y2 2-wire EIA485 Modbus</td>
</tr>
<tr>
<td>2704f Profibus</td>
<td>RR Dual relay</td>
<td>F2 4-wire EIA485 Modbus</td>
</tr>
<tr>
<td></td>
<td>T2 Triac</td>
<td>M1 232 Master</td>
</tr>
<tr>
<td></td>
<td>TT Dual triac</td>
<td>M2 2W 485 Master</td>
</tr>
<tr>
<td></td>
<td>D4 DC Control</td>
<td>M3 4W 485 Master</td>
</tr>
<tr>
<td></td>
<td>D6 DC retransmission</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PV PV input (Slots 3 &amp; 6 only)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TL Triple logic input</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TK Triple contact input</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TP Triple logic output</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MS 24Vdc transmitter PSU</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VU Pot. input</td>
<td></td>
</tr>
<tr>
<td></td>
<td>G3 5Vdc transducer PSU</td>
<td></td>
</tr>
<tr>
<td></td>
<td>G5 10Vdc transducer PSU</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AM Analogue input module (not in slot 5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DP Dual DC (probe) input (Note 4) (Slots 3 and 6 only)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DO Dual 4-20mA OP/24Vdc PSU (Slots 1, 4 and 5 only)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LO Isolated single logic OP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HR Hi Resolution DC retrans and 24Vdc PSU (Slots 1, 4 and 5 only)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TD TDS input (Note 7)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PH 4W PRT input (100R) (Note 7) (Slots 3 and 6 only)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PL 4W PRT input (25.5K) (Note 7) (Slots 3 and 6 only)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1 Supply Voltage</th>
<th>9 H Comms Slot</th>
</tr>
</thead>
<tbody>
<tr>
<td>VH 85-264V ac</td>
<td>XX Not fitted</td>
</tr>
<tr>
<td>VL 20-29V ac or dc</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A2 EIA232 Modbus</td>
</tr>
<tr>
<td></td>
<td>Y2 2-wire EIA485 Modbus</td>
</tr>
<tr>
<td></td>
<td>F2 4-wire EIA485 Modbus</td>
</tr>
<tr>
<td></td>
<td>M1 232 Master</td>
</tr>
<tr>
<td></td>
<td>M2 2W 485 Master</td>
</tr>
<tr>
<td></td>
<td>M3 4W 485 Master</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2 Loop/Programs</th>
<th>12 Toolkit Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 1 - One loop</td>
<td>XX Standard</td>
</tr>
<tr>
<td>2 - 2 - Two loops</td>
<td>U1 Toolkit level 1 (Note 2)</td>
</tr>
<tr>
<td>3 - 3 - Three loops</td>
<td>U2 Toolkit level 2 (Note 3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3 Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>XX Standard</td>
</tr>
<tr>
<td>ZC Zirconia</td>
</tr>
<tr>
<td>V1 1 Gauge V ac (Note 7)</td>
</tr>
<tr>
<td>V3 3 Gauge V ac (Note 7)</td>
</tr>
<tr>
<td>BC Boiler (Note 7)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>XX Not fitted</td>
</tr>
<tr>
<td>A2 EIA232 Modbus</td>
</tr>
<tr>
<td>Y2 2-wire EIA485 Modbus</td>
</tr>
<tr>
<td>F2 4-wire EIA485 Modbus</td>
</tr>
<tr>
<td>AE EIA232 El-Bisynch (Note 5)</td>
</tr>
<tr>
<td>YE 2-wire EIA485 El-Bisynch (Note 5)</td>
</tr>
<tr>
<td>FE 4-wire EIA485 El-Bisynch (Note 5)</td>
</tr>
<tr>
<td>ET Ethernet Modbus TCP (incl RJ45 Assy) (Note 7)</td>
</tr>
<tr>
<td>PB Profibus DP</td>
</tr>
<tr>
<td>DN DeviceNet</td>
</tr>
</tbody>
</table>

**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. EL-Bisynch includes only a subset of parameters.
6. The HR module has 1 high resolution DC output and 1 24Vdc power supply.
7. Only available on 2704
1. Loop 1 PV defaults to main PV input on microboard.
2. Loop 2 and 3 PV inputs must be fitted in I/O slots 3 or 6 or be assigned to the analogue input.
3. Alarm configuration refers to loop alarms only. One selection is allowed per loop. Additional alarms are available for the user to configure.
4. Thermocouple and RTD inputs assume sensor min and max values with no decimal point.
5. Linear inputs are ranged 0-100%, no decimal point.
6. Temperature units will be °C unless ordered by USA where °F will be used.
7. Remote setpoints assume loop min & max ranges.
8. VP1, VP2, VP3 and VP4 are not available with override function.
9. For Cascade and Override inputs only.

**Notes**

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

Understanding and providing local support is a key part of Eurotherm business. Complementing worldwide Eurotherm offices are a whole range of partners and a comprehensive technical support team, to ensure you get a service you will want to go back to.

AUSTRALIA Sydney
Eurotherm Pty Ltd.
T (+61 2) 9838 0099
F (+61 2) 9838 9288
E info.au@eurotherm.com

AUSTRIA Vienna
Eurotherm GmbH
T (+43 1) 7987601
F (+43 1) 7987605
E info.at@eurotherm.com

BELGIUM & LUXEMBOURG Mohe
Eurotherm S.A/N.V.
T (+32) 85 274080
F (+32) 85 274081
E info.be@eurotherm.com

BRAZIL Campinas-SP
Eurotherm Ltda.
T (+5519) 3707 5333
F (+5519) 3707 5345
E info.br@eurotherm.com

CHINA Eurotherm China
T (+86 21) 61451188
F (+86 21) 61452602
E info.cn@eurotherm.com

DENMARK Copenhagen
Eurotherm Danmark A/S
T (+45 70) 234670
F (+45 70) 234660
E info.dk@eurotherm.com

FINLAND Abo
Eurotherm Finland
T (+358) 22506300
F (+358) 22503201
E info.fi@eurotherm.com

FRANCE Lyon
Eurotherm Automation SA
T (+33 478) 645400
F (+33 478) 324900
E info.fr@eurotherm.com

GERMANY Limburg
Eurotherm Deutschland GmbH
T (+49 6431) 2980
F (+49 6431) 298119
E info.de@eurotherm.com

IRELAND Dublin
Eurotherm Ireland Limited
T (+353 1) 4691800
F (+353 1) 4691300
E info.ie@eurotherm.com

ITALY Como
Eurotherm S.r.l
T (+39 031) 975311
F (+39 031) 975312
E info.it@eurotherm.com

KOREA Seoul
Eurotherm Korea Limited
T (+82 31) 2738507
F (+82 31) 2738508
E info.kr@eurotherm.com

NETHERLANDS Alphen a/d Rijn
Eurotherm B.V
T (+31 172) 411752
F (+31 172) 412760
E info.nl@eurotherm.com

NORWAY Oslo
Eurotherm A/S
T (+47 67) 592170
F (+47 67) 118301
E info.no@eurotherm.com

POLAND Katowice
Invensys Eurotherm Sp z o.o.
T (+48 32) 2185100
F (+48 32) 2185108
E info.pl@eurotherm.com

SPAIN Madrid
Eurotherm España SA
T (+34 91) 6616001
F (+34 91) 6619093
E info.es@eurotherm.com

SWEDEN Malmö
Eurotherm AB
T (+46 40) 384500
F (+46 40) 384545
E info.se@eurotherm.com

SWITZERLAND Winterthur
Eurotherm Produkte (Schweiz) AG
T (+41 44) 7871040
F (+41 44) 7871044
E info.ch@eurotherm.com

UNITED KINGDOM Worthing
Eurotherm Limited
T (+44 1903) 268500
F (+44 1903) 265982
E info.uk@eurotherm.com

www.eurotherm.co.uk

U.S.A. Leesburg VA
Eurotherm Inc.
T (+1 703) 443 0000
F (+1 703) 669 1300
E info.us@eurotherm.com

www.eurotherm.com

ED57

Part No. HA026916 Issue 8
2704 Specification Sheet

www.eurotherm.com

info@email.com

E (English)