The Mini8® Controller offers high performance control usually only found in Eurotherm® panel mount PID controllers. It is also a very competitive and compact data acquisition device. Its modular design enables its I/O and feature set to be selected to cater for a wide range of applications from simple to complex.

The Mini8 controller is an ideal partner to a programmable logic controller. Able to multi-drop on either Serial, Fieldbus or Ethernet communications. It offers a cost effective alternative to performing analogue measurement or loop control in a PLC. Implementing these functions in the Mini8 controller reduces the hardware cost of the PLC, relieving it of the burden of performing analogue functions, often allowing a lower specification processor to be used.

The feature set is comparable with the Eurotherm 3000 series panel controllers including its high performance PID control and SP programming functions together with a range of features such as Maths, Logic and Timing blocks.

When used in a data acquisition installation the controller’s high density analogue I/O can be combined with Eurotherm’s 6000 series paperless graphic recorder.
Setpoint programming
The Mini8 controller can run up to 8 programmer function blocks, to follow a user defined series of ramp and dwell segments. Each programmer is capable of running a program of up to 16 segments with 8 event outputs. The event outputs can be used internally within the configuration soft wiring or to external digital or relay outputs. (Note that this depends on the type and number of the hardware outputs fitted).

Recipes
Using a PC tool, recipes can be created that can be used to change the operating parameters of the Mini8 controller simply by selecting a new recipe via the HMI. This is very useful where multiple products are processed using the same controller but require different parameters to be set.

Heater failure detection
The Mini8 controller with a CT3 input card fitted, has the capability of detecting failures in heater loads connected to its time proportioned outputs. By measuring the current flowing through the heaters via 3 current transformer inputs the Mini8 controller can, for up to 8 loops, detect Partial Load failure, Over Current, as well as SSR short or open circuit. Individual load current parameters indicate the measurement for each heater. The current monitor block utilises a cyclic algorithm to measure the current flowing through one heater per measurement interval.

Toolkit blocks
A range of toolkit functions, including Maths, Logic and Timing blocks can be used to create custom solutions and small machine controllers.

Eurotherm iTools Graphical Wiring Editor
The GWE is an extremely easy way to create applications. It allows users to select the function blocks they wish to use in their application then connect them together using “Soft Wiring”. The GWE gives the user a pictorial view of exactly what he has configured and can also be used to monitor runtime conditions.

Specification

<table>
<thead>
<tr>
<th>General</th>
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<tbody>
<tr>
<td><strong>Environmental performance</strong></td>
</tr>
<tr>
<td>Power supply voltage:</td>
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<tr>
<td>Supply ripple:</td>
</tr>
<tr>
<td>Power consumption:</td>
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<tr>
<td>Operation temperature:</td>
</tr>
<tr>
<td>Storage temperature:</td>
</tr>
<tr>
<td>Operating humidity:</td>
</tr>
<tr>
<td>Applied voltage any terminal:</td>
</tr>
<tr>
<td>The Mini8 controller must be mounted in a protective enclosure.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Electromagnetic compatibility (EMC)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>EMC: EN61326 for Industrial Environments</td>
</tr>
<tr>
<td>This controller conforms with the essential protection requirements of the EMC Directive 2004/108/EC, by the application of EMC standard EN61326.</td>
</tr>
<tr>
<td>This instrument satisfies the general requirements of the industrial environment defined in EN 61326.</td>
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</table>

<table>
<thead>
<tr>
<th><strong>Electrical safety</strong></th>
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<tbody>
<tr>
<td>Safety: Meets EN61010, installation category II, pollution degree 2</td>
</tr>
<tr>
<td>INSTALLATION CATEGORY II</td>
</tr>
<tr>
<td>This controller complies with the European Low Voltage Directive 73/23/EEC, by the application of the safety standard EN 61010.</td>
</tr>
<tr>
<td>POLLUTION DEGREE 2</td>
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<tr>
<td>Normally, only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation shall be expected.</td>
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<tr>
<th><strong>Physical</strong></th>
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<tbody>
<tr>
<td>Dimensions:</td>
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<tr>
<td>Weight:</td>
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<td>Mounting:</td>
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<tr>
<th><strong>Approvals</strong></th>
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<tr>
<td>CE, cUL listed (file E57766)</td>
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<table>
<thead>
<tr>
<th><strong>Communications</strong></th>
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<tbody>
<tr>
<td><strong>Network communications support</strong></td>
</tr>
<tr>
<td>Modbus RTU:</td>
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<tr>
<td>Baud rates:</td>
</tr>
<tr>
<td>DeviceNet:</td>
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<tr>
<td>Baud rates:</td>
</tr>
<tr>
<td>Profibus DP:</td>
</tr>
<tr>
<td>Baud rates:</td>
</tr>
<tr>
<td>Ethernet: Standard Ethernet RJ45 connector</td>
</tr>
<tr>
<td>Baud rates:</td>
</tr>
<tr>
<td>EtherNet/IP: Standard Ethernet RJ45 connector</td>
</tr>
<tr>
<td>Baud rates:</td>
</tr>
<tr>
<td>EtherCAT: Standard Ethernet RJ45 connector</td>
</tr>
<tr>
<td>Baud rates:</td>
</tr>
<tr>
<td>Modbus /DeviceNet /Profibus /Ethernet/EtherNet/IP /EtherCAT are mutually exclusive options; refer to the Mini8 controller Order Code.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Configuration communications support</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Modbus RTU:</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Fixed I/O resources</strong></th>
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</thead>
<tbody>
<tr>
<td>The PSU card supports 2 independent and isolated relay contacts.</td>
</tr>
<tr>
<td>Relay output types:</td>
</tr>
<tr>
<td>Contact current:</td>
</tr>
<tr>
<td>Terminal voltage:</td>
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<tr>
<td>Contact material:</td>
</tr>
<tr>
<td>Snubbers:</td>
</tr>
<tr>
<td>Contact isolation:</td>
</tr>
<tr>
<td>The PSU card supports 2 independent and isolated logic inputs</td>
</tr>
<tr>
<td>Input types:</td>
</tr>
<tr>
<td>Input logic 0 (off):</td>
</tr>
<tr>
<td>Input logic 1 (on):</td>
</tr>
<tr>
<td>Input current:</td>
</tr>
<tr>
<td>Detectable pulse width:</td>
</tr>
<tr>
<td>Isolation to system:</td>
</tr>
</tbody>
</table>

OEM Security
An OEM or reseller can protect their intellectual property by preventing unauthorised cloning of the configuration.
**Input/Output cards**

**TC8 8-channel and TC4 4-channel TC input card**

The TC8 supports 8 independently programmable and electrically isolated channels, catering for all standard and custom thermocouple types. The TC4 supports 4 channels to the same specification.

- **Channel types:** TC, mV
- **Input Range:** –77mV to +77mV
- **Resolution:** 20 bit (A/D converter), 1.6V/µA with 1.6s filter time
- **Temperature coefficient:** < ±0.5ppm (0.005%) of reading/°C
- **Cold junction range:** –10°C to +70°C
- **CJ rejection:** > 30:1
- **CJ accuracy:** ±1°C
- **Linearity**: C, J, K, L, R, B, N, T, S, LINEAR mV, custom
- **Total accuracy:** ±0.1% of reading (using internal CJ/C)
- **Channel PV filter:** 0.0 seconds (off) to 999.9 seconds, 1st order low-pass
- **Sensor Break:** AC detector: Off, Low or High resistance trip
- **Input resistance:** >100MΩ
- **Max number of loads:** 16 Time Proportioned Outputs
- **Requires CT3 module:**
- **Load failure detection:** Requires CT3 module.

- **Input types:** Logic (0V dc)
- **Input logic 0 (off):** –28.9V to +5V dc
- **Input logic 1 (on):** +10.8V to +28.8V dc
- **Input current:** 2.5mA (approx.) at 10.8V; 10mA max at 28.8V supply
- **Detectable pulse width:** 110µs min.
- **Isolation channel-channel:** 42V pk max.
- **Isolation to system:** 42V pk max.

**RT4 resistance thermometer input card (PT100)**

The RT4 supports 4 independently programmable and electrically isolated resistance input channels. Each channel may be connected as 2 wire, 3 wire or 4 wire.

- **Channel types:** Resistance/PT100
- **Input range:** 0 to 420 ohms; –242.02°C to +850°C for PT100
- **Calibration error:** ±0.1ohms ±0.1% of reading, 22 to 420 ohms
  ±0.3°C ±0.1% of reading, -200°C to +850°C
- **Resolution:** 0.006 ohms, 0.02°C
- **Measurement noise:** 0.016 ohms, 0.04°C peak to peak, 1.6s channel filter
- **Linearity:** >30:1
- **Temp coefficient:** ±0.002% of ohms reading per °C ambient change relative to normal ambient 25°C
- **Lead resistance:** 22 ohms max in each leg. Total resistance including leads is restricted to the 420 ohm maximum limit. 3 wire connection assumed matched leads.
- **Bulb current:** 300µA
- **Isolation channel-channel:** 42V pk max
- **Isolation to system:** 42V pk max

**DO8 8-channel digital output card**

The DO8 supports 8 independently programmable channels, the output switches requiring external power supply. Each channel is current and temperature protected, foldback limiting occurring at about 100mA.

- **Isolation line is protected to limit total card current to 200mA.**
- **The 8 channels are isolated from the system (but not from each other). To maintain isolation it is essential to use an independent and isolated PSU.**

**Channel types:** On/Off, Time Proportioned

- **Input supply (Vcc):** 15V dc to 30V dc
- **Logic 1 voltage output:** > (Vcc - 3V) (not in power limiting)
- **Logic 0 voltage output:** < 1.2V dc no-load, 0.9V typical
- **Logic 1 current output:** 100mA max. (not in power limiting)
- **Min. pulse time:** 20µs
- **Channel power limiting:** Current limiting capable of driving shortcircuit load
- **Terminal supply protection:** Card supply is protected by 200mA selfhealing fuse
- **Isolation (channel-channel):** N/A (Channels share common connections)
- **Isolation to system:** 42V pk max.

**RL8 8-channel relay output card**

The RL8 supports 8 independently programmable channels. This module may only be fitted in slot 2 or 3, giving a maximum of 16 relays in a Mini8 controller.

- **The Mini8 controller chassis must be earthed (grounded) using the protective earthing stud.**

**Channel types:** On/Off, Time Proportioned

- **Maximum contact voltage:** 254V ac
- **Maximum contact current:** 2 amps ac
- **Contact snubber:** Fitted on module
- **Minimum contact welding:** 5V dc, 10mA
- **Min. pulse time:** 220µs
- **Isolation (channel-channel):** 24V pk max.
- **Isolation to system:** 42V pk max.

**CT3 3-channel current-transformer input Card**

The CT3 supports 3 independent channels designed for heater current monitoring. A scan block allows periodic test of nominated outputs to detect load (failure) changes.

- **Channel types:** A (current)
- **Factory set accuracy:** Better than ±2% of range
- **Current input range:** 0mA to 50mA rms, 50/60Hz nominal
- **Transformer ratio:** 10:3.05 to 1000:0.05
- **Input load burden:** 1W
- **Isolation:** None (provided by CT)

**Load failure detection**

- **Requires CT3 module.**
- **Max number of loads:** 16 Time Proportioned Outputs
- **Max loads per CT:** 6 loads per CT input
- **Alarms:** 1 in 8 Partial load failure, Over current, SSR short circuit, SSR open circuit
- **Commissioning:** Automatic or manual
- **Measurement interval:** 1 sec – 60 sec
Software features

Toolkit blocks
User wires: Orderable options of 30, 60, 120 or 250
User values: 32 real values
2 input maths: 24 blocks Add, subtract, multiply, divide, absolute difference, maximum, minimum, hot swap, sample and hold, power, square root, Log, Ln, exponential, switch
2 input logic: 24 blocks AND, OR, XOR, latch, equal, not equal, greater than, less than, greater than or equal to, less than or equal to
8 input logic: 4 blocks AND, OR, XOR
8 input multiple operator: 4 blocks Maximum, Minimum, Average. Input/Outputs to allow cascading of blocks
8 input multiplexer: 4 blocks 8 sets of 8 values selected by input parameter
BCD input: 2 blocks 2 decades (8 inputs giving 0 to 99)
Input monitor: 2 blocks Max, min, time above threshold
16 point linearisation: 2 blocks 16-point linearisation fit
Polynomial fit: 2 blocks Characterisation by poly fit table
Switchover: 1 block Smooth transition between two input values
Timer blocks: 8 blocks OnPulse, OnDelay, OneShot, MinOn Time
Counter blocks: 2 blocks Up or down, Directional Flag
Totaliser blocks: 2 blocks Alarm at Threshold value
Real time clock: 1 block Day & time, 2 time based alarms
Transducer scaling: 2 blocks Transducer Auto-tare, calibration & comparison

PID control loop blocks
Number of Loops: 0, 4, 8 or 16 Loops (order options)
Control modes: On/Off, single PID, Dual channel OP
Control outputs: Analogue 4-20mA, Time proportioned logic
Cooling algorithms: Linear, water, fan, or oil
Tuning: 3 sets PID, One-shot auto-tune
Auto manual control: Bumpless transfer or forced manual output available
Setpoint rate limit: Ramp in units per sec, per min or per hour
Output rate limit: Ramp in % change per second
Other features: Feedforward, Input track, Sensor break OP, Loop break alarm, remote SP, 2 internal loop setpoints

Process alarms
Number of alarms: 32 analogue, 32 digital, 32 Sensor break
Alarm types: Absolute high, absolute low, deviation high, deviation low, deviation band, sensor break, logic high, logic low, rising edge, falling edge, edge
Alarm modes: Latching or non-latching, blocking, time delay

Setpoint programmer
The Setpoint Programmer is a software orderable option.
Number of programs: 8
Number of segments: 128
Number of event outputs: 64 per program (64 total)
Digital inputs: Run, Hold, Reset, Run/Hold, Run/Reset, Program Advance, Skip, Segment, Sync
Power failure action: Ramp, Reset, Continue
Servo start: PV, SP

Recipes
Recipes are a software orderable option.
Number of recipes: 8
Tags: 24 tags in total

Mechanical Details
Allow min 25mm above and below each unit
Allow min 25mm for terminals and cables

Mounting Information
The Mini8 controller is intended to be horizontally mounted on symmetrical DIN Rail to EN50022-35 or 35 x 35 x 15
Communications Interface LEDs

<table>
<thead>
<tr>
<th>LED</th>
<th>Colour</th>
<th>Function</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>RUN</td>
<td>Green</td>
<td>Run mode</td>
<td>Blinking – Standy/Config</td>
</tr>
<tr>
<td>RUN (EtherCAT only)</td>
<td>Green</td>
<td>Configuration activity</td>
<td>Blinking – Config Traffic</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Blinking - N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Blinking – DeviceNet Ready</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Blinking – DeviceNet Off</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Blinking – DeviceNet Modbus, Profibus, and Ethernet Traffic</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Blinking – DeviceNet Comms Traffic</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Blinking – DeviceNet Non-enhanced DeviceNet*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Blinking – DeviceNet N/A</td>
</tr>
</tbody>
</table>

**Note:**
- Channel to system: 42V pk.
- Channel to Channel: 42V pk.

Thermocouple Input

TC8/TC4

<table>
<thead>
<tr>
<th>Thermocouple Input</th>
<th>TC8/TC4</th>
</tr>
</thead>
</table>

2, 3, 4 Wire RTD Input

RT4

<table>
<thead>
<tr>
<th>RT4</th>
<th>Wire Connections</th>
</tr>
</thead>
<tbody>
<tr>
<td>2, 3, 4 Wire RTD Input</td>
<td>2 3 4</td>
</tr>
</tbody>
</table>

Logic Input

DI8

Transformer Input

CT3

Logic Output

DO8

Relay Output

RL8

Analog Output

AO8/A04

Power Supply

<table>
<thead>
<tr>
<th>Power Supply</th>
<th>Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>24V 24V dc</td>
<td>Ground</td>
</tr>
</tbody>
</table>

Standard I/O Connections

<table>
<thead>
<tr>
<th>Standard I/O Connections</th>
<th></th>
<th></th>
</tr>
</thead>
</table>

AO8/A04 Analog Output

AO8/A04 (slot 4 only)

Output current - 0 to 20mA 350 ohm max load.

ISO/OS (264V ac Basic)

- Channel to Channel: 264V ac Basic
- Channel to system: Reinforced

Note:
- Protective earth conductor MUST be used if RL8 module is fitted.

RELAY 5 A

RELAY 3 A

RELAY 2 A

RELAY 7 B

RELAY 4 B

RELAY 4 A

RELAY 3 B

RELAY 2 B

RELAY 1 B

RELAY 1 A

RELAY 8 A

RELAY 8 B

AO8/A04 Supports Channels 1 to 4 only.

**Note:**
- Requires 24V dc supply.
  - Linked internally.
### Order Code

<table>
<thead>
<tr>
<th>MINI8</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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</tbody>
</table>

#### Basic Product
- MINI8: Mini8 Controller

#### Control Loops
- ACQ: IO Acquisition only
- 4LP: 4 Control loops
- 8LP: 8 Control loops
- 16LP: 16 Control loops

#### Programs
- 0PRG: No programs
- 1PRG: 1 profile – 50 programs
- XPRG: Multi-profiles – 50 programs

#### PSU
- VL: 24V dc

#### Communications
- MODBUS: Non isolated Modbus Slave
- ISOLMODBUS: Isolated Modbus RTU Slave
- DEVICECON: DeviceNet Slave
- PBUSRJ45: Profibus Slave RJ45 (Note 2)
- PBUS9PIN: Profibus Slave 9 Pin D type (Note 2)
- ENETM8BUS: Ethernet Modbus TCP/IP Slave
- DNETM12: DeviceNet M12 Connector Slave
- ENETIP: EtherCAT Slave
- ETHERCAT: EtherCAT

#### Temperature Units
- C: Centigrade
- F: Fahrenheit

#### Wires
- 30: 30 30 User Wires
- 60: 60 User Wires
- 120: 120 User Wires
- 250: 250 User Wires

#### Warranty
- XXXX: Standard
- WL005: Extended

#### Calibration Certificates
- XXXX: None
- CERT1: Certificate of Conformity
- CERT2: Factory input calibration per input (Note 7)

#### Recipes
- NONE: No recipes
- SCP: 8 Recipes

#### Manual Language
- ENG: English
- FRA: French
- GER: German
- SPA: Spanish
- ITA: Italian

#### Configuration Software
- ENG: English
- NONE: No DVD
- ITOOLS: Eurotherm iTools DVD & Mini8 Controller documentation

#### Applications
- STD: No configuration
- EDB: 8 Loop extrusion controller (Note 6)
- 8 Loops fitted and modules placed in the following slots:
  - Slot 1 = TC8
  - Slot 2 = CT3 or XXX
  - Slot 3 = DO8
  - Slot 4 = DO8
- FC8: 8 Loop furnace controller
  - Requires 8LP or 250 wires and modules placed in the following slots:
    - Slot 1 = TC8
    - Slot 4 = DO8

#### Accessories
- HA031260: Engineering/DVD manual
- SUBMINI8/SHUNT/249R.1: 2.49R Precision resistor
- RES250: 250R resistor for 0-5V dc OP
- RES500: 500R resistor for 0-10V dc OP
- CTR100000/000: 10A Current transformer
- CTR200000/000: 25A Current transformer
- CTR400000/000: 50A Current transformer
- CTR500000/000: 100A Current transformer
- IT0OLS/None/3000CK: Configuration clip
- SUB21/V10: 0-10V input adapter