Mini8®

Controller

World class control and versatility

Eurotherm®

by **Schneider** Electric

Control Optimise Simplify

Mini8®

Controller

Our ranges of controllers provide world class control and versatility with clear, user friendly, configuration tools. Add to this, a strong sales team of qualified engineers who understand your process, an absolute commitment to innovation by continuously re-investing in research and development.

Features and benefits

- Ideal partner to your PLC
- World class control algorithm
- Accurate analogue measurement
- Flexible communications
- Guaranteed performance
- Modular build, compact size
- Reduction in panel real estate
- Reduces total system costs
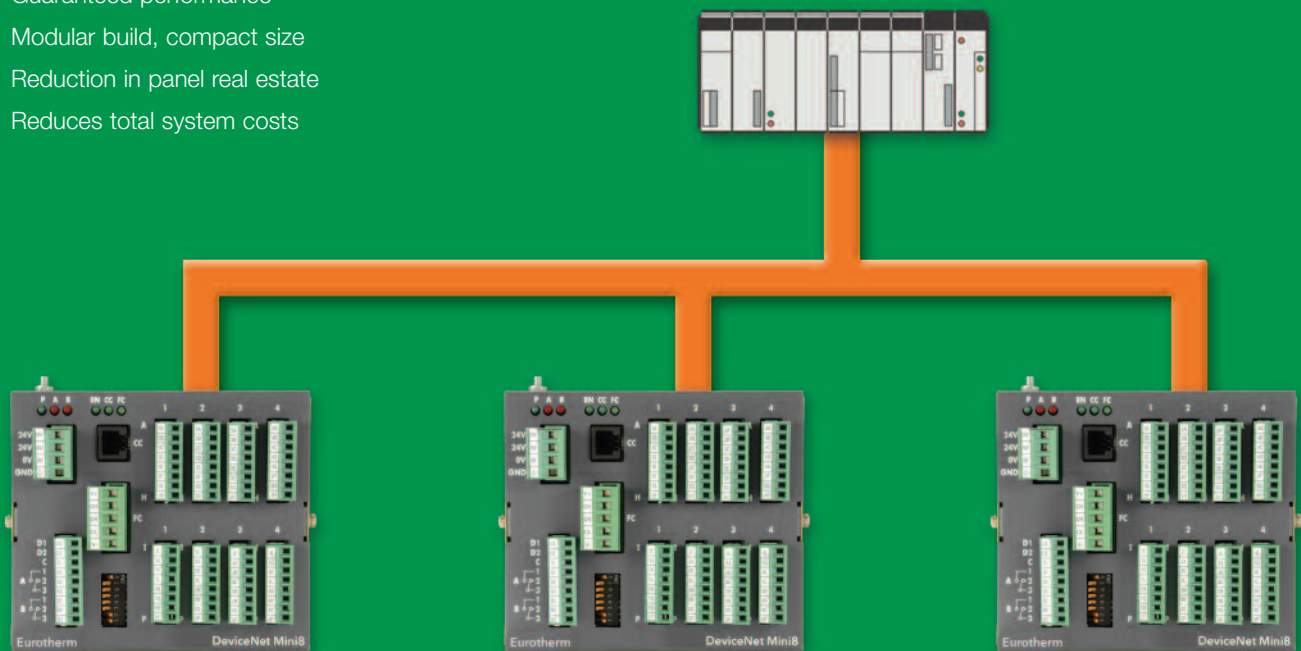
- Multi-zone ovens and furnaces • Textile machinery •
- Semiconductor CVD and MBE • Packaging machine •

Maximise your process with the Mini8® Controller

Designed to integrate seamlessly with programmable logic controllers, and other supervisory control and monitoring systems, the Eurotherm Mini8® controller offers a compact high performance solution at an affordable cost. The Mini8 controller offers modularity both in terms of hardware and software functions. Its four plug-in slots can accommodate a variety of IO modules, and its feature set is ranged to suit simple multi-loop and data acquisition applications up to complex strategies including setpoint programming, mathematical and logical operations.

The Mini8 controller can multi-drop on either serial, fieldbus or Ethernet and offers a real cost effective alternative to performing analogue measurement or control loops in a PLC. By implementing these functions in the Mini8 controller the PLC hardware cost is reduced and is relieved of the extra processing burden of analogue control, often improving its digital performance or enabling a lower specification processor to be used.

Improve your PLC with the Mini8® Controller

Reduces PLC hardware

- Easy and quick set-up
- Improves control performance
- Improves PLC performance
- Minimises signal conditioning hardware

The Mini8 controller is an ideal partner to a PLC in multi-loop PID applications such as plastics extrusion and multi-zone furnaces. By devolving loop control to the Mini8 controller the PLC can concentrate on providing fast and effective logic control without the burden of running complex control algorithms. The Mini8 controller is a very cost effective alternative to implementing control loops in PLC. Providing not only better control performance and easy configuration the Mini8 controller offers the same deterministic response and autotune feature as Eurotherm panel mount controllers. The Eurotherm open approach to communication, supporting serial, fieldbus and Ethernet protocols, makes it easy to interface to intelligent masters such as a PLC.

Plastics extrusion • Glass lehrs •
Thermoforming • Baking ovens •

Control
- 4, 8 or 16 PID Loops
- Dual Channel Output
- Autotune

Data Acquisition
- 32 Thermocouple, mV
- 16 RTD

8 SP Programmer
- 1 Ch./Programmer
- 8 Events/Programmer
- 16 Segments/Programmer

Communications
- Modbus RTU
- DeviceNet® network
- Profibus DP network
- Modbus TCP
- EtherNet/IP
- EtherCAT

Toolkit Functions
- Maths
- Combinational Logic
- Timers
- Totalisers
- Counters
- Real Time Clock
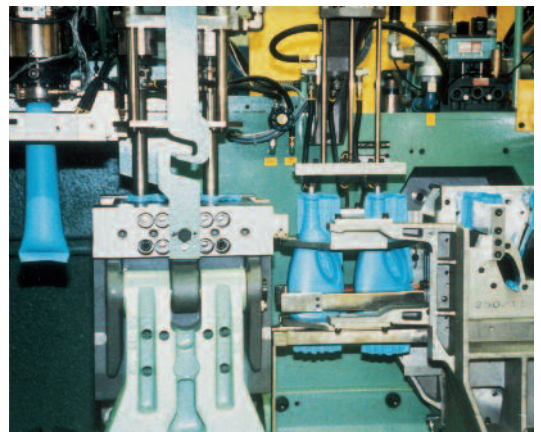- Multiple Input (Avg, Max, Min)

4 IO Modules
- 4 Channel Thermocouple/mV
- 8 Channel Thermocouple/mV
- 4 Channel RTD
- 8 Channel Logic Output
- 8 Channel Logic Input
- 3 Channel CT input
- 8 Channel Relay Output
- 4 Channel 4-20mA Output
- 8 Channel 4-20mA Output

Alarms
- High, Low Deviation
- Heater Failure
- Sensor Break

Special Functions
- Humidity
- 8 Recipes
- Load Failure Detectioner

Maximise PID control with the Mini8® Controller

- 16 PID control loops
- Flexible and standard configurations
- 110ms PV sampling
- Setpoint programmer
- Maths and logic functions
- Process alarms
- Heater failure detection
- OEM security

Control and measurement

Combining high quality multi-channel analogue measurement with Eurotherm's proven PID algorithm the Mini8 controller achieves performance equal to that normally reserved for conventional discrete controllers. The same analogue input circuitry and control features found in the Eurotherm range of nanodac™ panel mount controllers are also available in the Mini8 controller.

Setpoint programmer

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.

Heater failure detection

Utilising a unique cycling algorithm and current transformer input module, the Mini8 controller can automatically scan electrical heaters connected to its logic or relay control outputs and indicate heater partial load failure, over current or SSR short and open circuit. Heater current readings are also available within the controller to calculate power delivered to the load and make this information available to a supervisory system. Heater failure detection is compatible with both single or three phase load installations.

Creating custom solutions

A wide range of toolkit functions, including Maths and Logic blocks, can be used to create custom solutions and small machine controllers. Timing functions include a range of timers, counters and totalisers as well as a non-volatile real time clock. Using the Eurotherm iTools graphical wiring editor these strategies can easily be created and documented.

OEM security

Users can protect their intellectual property by using the OEM security feature. This prevents unauthorised copying of configurations without first entering a user defined password. This ensures that the full commercial benefit of a custom solution can be realised.

Communications

The Mini8 controller utilises a fixed Modbus address table providing easy integration into PLC, SCADA and other 3rd party systems. This fixed table makes communication to intelligent masters very easy to accomplish. Parameter addresses are fixed in one location and do not move depending on how the unit is configured. Modbus RTU, DeviceNet®, Profibus, EtherNet/IP EtherCAT and Modbus TCP/IP. protocols are supported. The Mini8 controller can be supplied with pre-loaded configurations to suit standard applications. It is also a very flexible controller capable of implementing complex control strategies. Eurotherm iTools software provides a graphical function block view of strategies making creation, editing and debugging easy to accomplish

Setpoint Program Editor

Eurotherm iTools

nanodac recorder/controller

Eurotherm iTools Graphical Editor
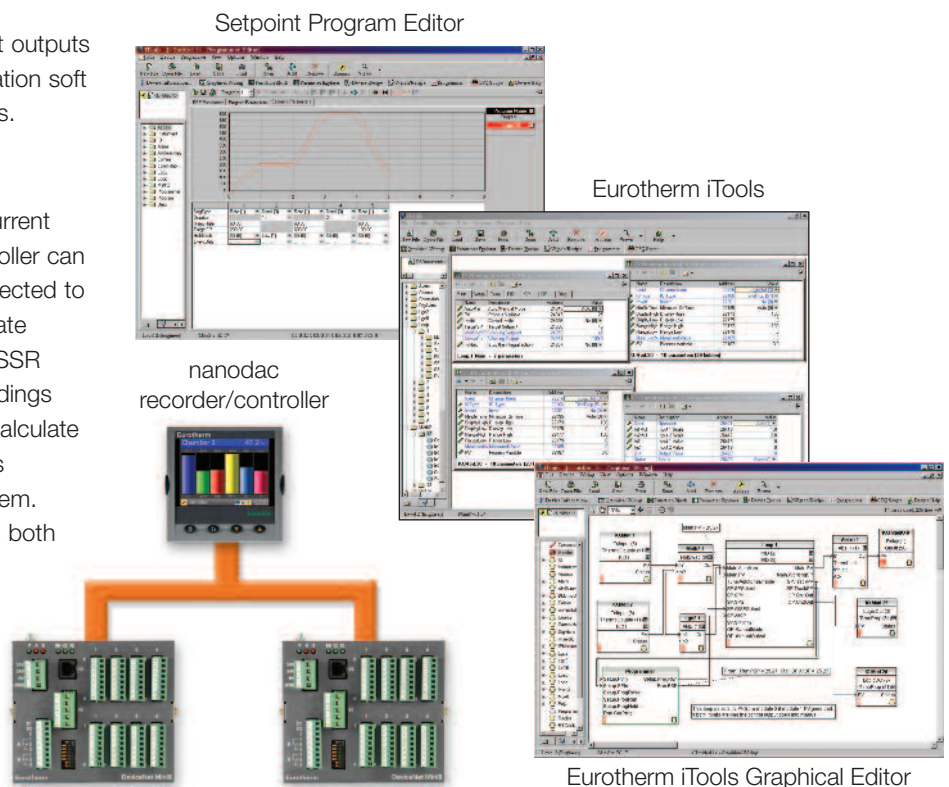
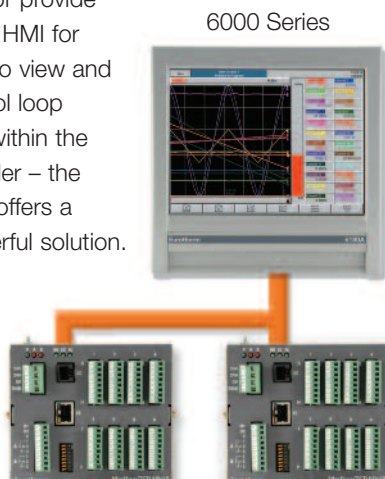# Data Acqusition with the Mini8® Controller

The Mini8 controller high density analogue inputs combined with the Eurotherm 6000 Series paperless graphics recorders provide unsurpassed local and network access to your process.

The 6000 Series offers remote viewing capability and acts as an HMI for the Mini8 controller utilising Master Communications. The user can control and view information from the Mini8 controller from either the 6000 TFT touch screen display or from any PC connected to the network.

- 32 Analogue channels per Mini8 controller
- Multiple batch functionality
- Master communications
- Alarm notification via Email
- Secure storage of data
- Easy to use networking
- Auditor features
- Up to 48 universal inputs direct into the 6000

Eurotherm 6000 Series

The 6000 Series is designed to provide powerful, yet easy to use, network and communication options. Whether a local connection is required or access from the other side of the world, the 6000 Series provides secure access to process data when and where you need it.
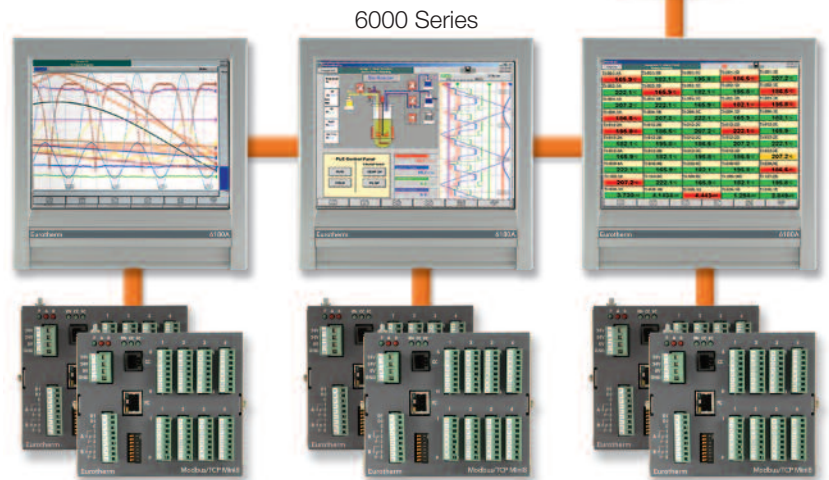
Industrail Stanard PC

6000 Series

The Mini8 Controller connected to a 6000 in a control system

The 6000 Series supports Modbus Master communications over Ethernet and Serial connections. Powerful features from within the 6000 Series - such as user defined screens, remote access and Auditor features – can now be applied to other plant equipment. Whether you need to securely record data from other instruments or provide a centralised HMI for an operator to view and modify control loop parameters within the Mini8 controller – the 6000 Series offers a simple, powerful solution.

6000 Series

The Mini8 Controller connection to SCADA

The Mini8 controller can be installed as a control or data acquisition component of larger installations. Eurotherm is able to provide solutions from 'simple' SCADA using Eurotherm iTools to more demanding applications using Wonderware® System Platform. The open communications nature of the Mini8 controller makes communication with third party equipment easy to achieve.

EurothermSuite®
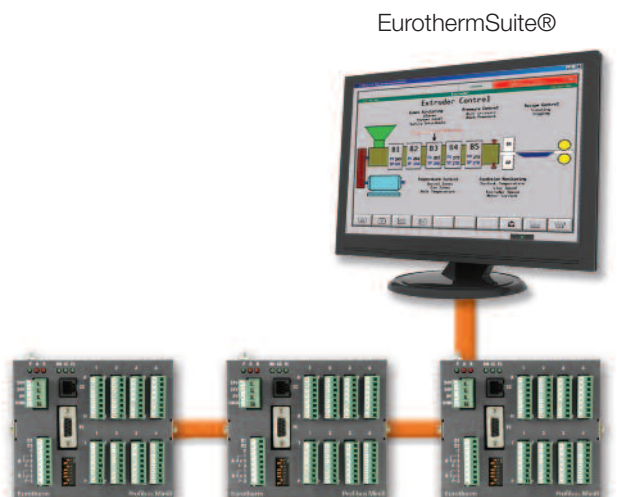
Real-world application

Heater Failure Detection

A typical process consisting of 16 heater loads wired in parallel to produce both the required heating rate and maximum temperature. A common recurring problem is that if any one or more heaters failed it was not noticed until the process was well under way. This means the run has to be abandoned whilst the broken heater is changed.

The Mini8 controller fitted with a CT3 card has the capability of detecting failures of any one of 16 heaters which can be repaired before the run is started. The failures that can be detected are: SSR Fault, Partial Load Fault (PLF) and Over Current Fault (OCF).

SSR Fault

If current is detected flowing through the heater when the controller is requesting it to be off then this indicates that the SSR has a short circuit fault. If current is not detected when the controller is requesting the heater to be on it indicates that the SSR has an open circuit fault.

Partial Load Fault (PLF)

If less current is detected flowing through the heater than the PLF threshold, which has been set for that channel, then this indicates that the heater has a fault. In applications that use multiple heater elements in parallel then it indicates that one or more of the elements may have an open circuit fault.

Over Current Fault (OCF)

If more current is detected flowing through the heater than the OCF threshold then this indicates that the heater has a fault. In applications that use multiple heater elements in parallel then it indicates that one or more of the elements has lower than expected resistance value.

EXAMPLE

Multiple SSR triggering

With this configuration, failure of a set of heater loads can be detected. For example, if the current detected flowing through Heater Set 1 is less than the PLF threshold of Load1 then this will be indicated as Load 1 fault. Further investigation will then be required to determine which heater within Set 1 has failed.

Benefits

- Reduced down time
- Less scrap
- Increased production
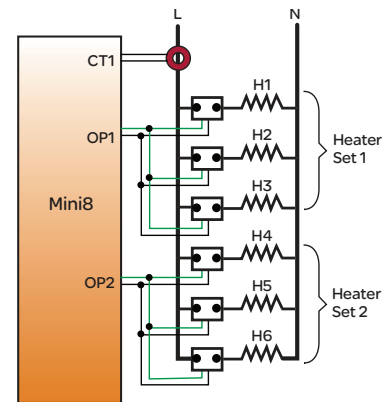
Success stories commercial benefits

CASE STUDY   Natural choice for Plastic Extrusion

Our plastics manufacturing customer needed accurate control for variables such as temperature and pressure during manufacture, and to minimise downtime between product changes.

Customer Challenge

Downtime is critical as the industry is highly competitive: speed, quality and reliability of end products are vital for long term survival. To remain competitive it is necessary to manufacture a wide range of extrusion products often on the same machine which means many variables to enter: Doing this manually is time consuming and prone to error.

Solution

- Mini8 controller
- Recipe Storage

> "It now takes just a few minutes to switch from one production to another, making the equipment cost-efficient even for smaller production batches"

Customer Benefits

- Unique heat/cool algorithms, melt pressure and automatic screen changer control abilities
- Minimal panel space, saving wiring and mounting costs
- Cost effective alternative to control loops in a PLC; the Eurotherm algorithm is specifically designed for this purpose
- Highly flexible with 16 freely configurable loops so different machines can be individually set up
- 8 recipe storage - different products can be entered once and sent at the touch of a button
- Integrates easily with both PC and SCADA systems

Specifications

Control Features	4, 8 or 16 Loops with autotune, Dual Channel OP with various cooling modes, PID, OnOff, Auto/Man, Feedforward, 3 PID sets, Remote SP, Forced manual, Sensor break OP, SP ramp, OP rate limit, Heater failure detection
Communications	Network: Modbus RTU (EIA485), Modbus TCP, Profibus DP, DeviceNet®, EtherNet/IP, EtherCAT Config: Modbus RTU (EIA232), can be used as second network port
Standard IO	2off 24Vdc Logic inputs with 42V ac/dc system isolation, 2off 1 Amp Change over relays (42V ac/dc max)
TC4 /TC8 Module	4/8 Channels, Range: –77mV to 77mV, Accuracy ±1°C ±0.1% of reading, TC types: C, J, K, L, R, B, N, T, S, LINEAR, Custom, CJC >30:1, 42V ac/dc Channel isolation, Input impedance >100ohms
RT4 Module	2, 3, or 4 wire input, PT100 RTD or linear
DO8 Module	8 Channels, Supply: 15V dc to 30V dc, On/Off, Time Proportioning, Common 42V ac/dc system isolation
DI8 Module	8 Channel logic input with 42V ac/dc system isolation
CT3 Module	3 Channels, Range 0-50mA, Accuracy: ±2% of span, No isolation
RL8 Module	8 Channel form A relay (NO) max 2A @ 264V ac
AO4/AO8 Module	4 or 8 Channels, Range 0-20mA, 360R load, 42V ac/dc channel isolation
SP Programmer	8 Programmers, 16 Segments and 8 Events each, External Run, Hold, Reset, Skip Segment, Advance Segment
Maths & Logic	24 x 2 Input Maths, 24 x 2 Input Logic, 4 x 8 Input logic, 4 x 8 input multiplexor, 32 User Values, 4 x 8 Multiple Input
Recipes	8 Recipes, 24 tags in total
Timer Functions	8 Timers, 2 Counters, 2 Totalisers, Non-volatile real time clock
Power Supply	17.8V dc to 28.8V dc, Power consumption 15W max, 10W typical

Approvals	EMC: EN61326-1: 2006 Class A
	                  EN61326-1: 2006 Industrial Locations
	                  EN50581: 2012 RoHS
	Safety: EN61010, 1:2010, CuL

CASE STUDY   Consistency is critical in glass-to-metal seals manufacture

A compression hermetic seal is made with the metal housing material thermal expansion rate much higher than that of the glass. Upon solidification of the seal during the manufacturing process, the housing will contract around the glass, applying a desirable compression stress on the glass bead. Temperature is critical to ensure perfect glass consistency. The strength of the glass-to-metal seal is reinforced mechanically as well as chemically, creating a stronger, more reliable part.

Customer Challenge
This customer came to Eurotherm as they were having problems with their glass to metal compression seals manufacture.

They needed precise temperature control for product quality and consistency and repeatability.

Solution
- Mini8 controller
- 6000 data acquisition to meet industry regulations

Customer Benefits
Very accurate temperature control of the company's multi-zone furnaces. The Mini8 controller provides reliable operation, reduced wastage and maximises production.

For the full stories and all our successes go to www.eurotherm.com/success

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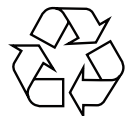www.eurotherm.com/worldwide

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