

Efficient power control for electrical heating applications

Eurotherm®



E-Pack™ Compact SCR Power Controllers

eurotherm.com/epack

 **WATLOW®**
Powered by Possibility

Discover the EPack™ Power Controller, an all-in-one solution for easy integration and cost effective operation

When energy efficiency is important to the process, end-users, machine builders and system integrators need to choose solutions that offer the best performance, ease-of-use and reliability. Whether replacing an existing product or building a new process, the Eurotherm EPack Power Controller range is IoT-ready and has been carefully designed for fast integration and optimum efficiency in industrial systems.

How carefully designed is the EPack Power Controller range?

Design compliance gives you confidence that equipment will function correctly: Tested at 100kA SCCR with high speed fuses and in compliance with current standards - CE, UL, cUL.

How well does the EPack Power Controller perform?

Numerical control aids precision and repeatability. The controller delivers sustainable performance and durability of the process.

How does the EPack Power Controller monitor your process?

Designed to continuously monitor and detect process fault conditions and notify the operator either through an alarm relay, the display and/or communication. Real-time parameters, alarms and diagnostics are integrated, offering accurate load fault detection functionality.



What is the EPack Power Controller?

A highly configurable compact range of DIN rail or panel mounting SCR power controllers, for 1, 2 or 3 phase control. From 4 to 125A, up to 500V, suitable for heating applications from 400W to 62.5kW (1PH) to 108kW (3PH).

How is the EPack Power Controller adaptable to your application?

As a software based solution, it is configurable and scalable, offering a wide range of control and firing modes to fit a range of loads.

How is the EPack Power Controller simple to install and operate?

A fanless design, either DIN rail or panel mounted, simplifies installation. The controller has intuitive features such as a Quick-Code start-up, integrated screen and communications plus the capacity and ability to duplicate configurations.

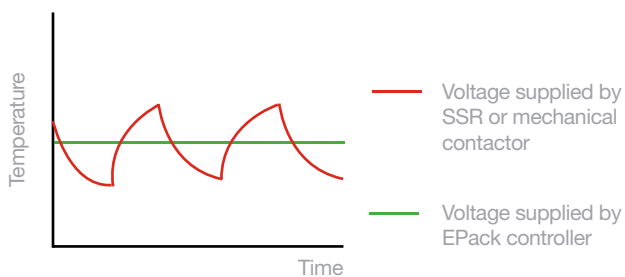
How can the EPack Power Controller reduce your energy costs?

Advanced firing modes allow harmonic noise reduction and power factor optimization on the electrical network. In turn, this can reduce penalty charges imposed by energy suppliers. A fanless design improves durability, offering better cost-effectiveness and reliability.



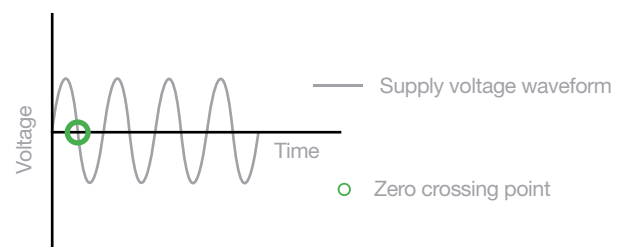
How can the EPack Power Controller help process performance?

Stability of heating element temperature



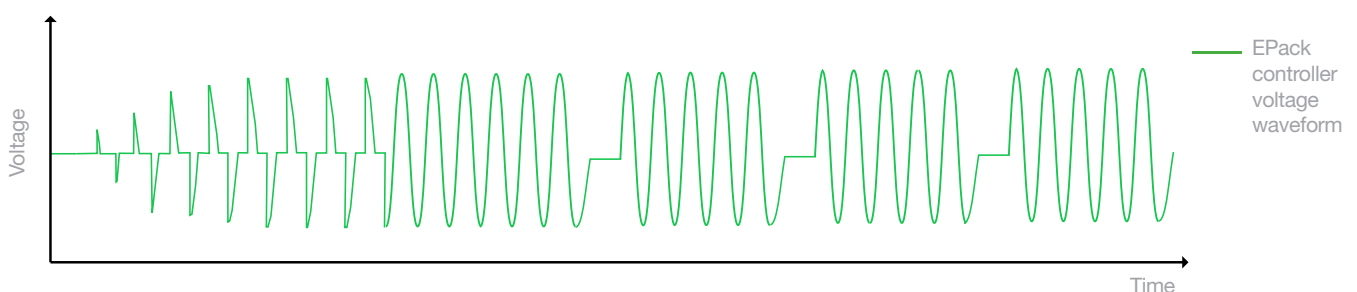
Compared to a standard SSR or mechanical contactor, the EPack Controller adjusts the energy delivered to the heating element, reducing temperature fluctuation and helping to extend the life of the heater.

Accuracy of synchronization and firing



The EPack Controller can accurately detect a zero crossing on the voltage waveform and is able to trigger the thyristor at that moment. This results in less harmonic distortion and RFI, reduction of the dc component, and accurate response to the power demand.

Optimization of firing mode and energy consumption

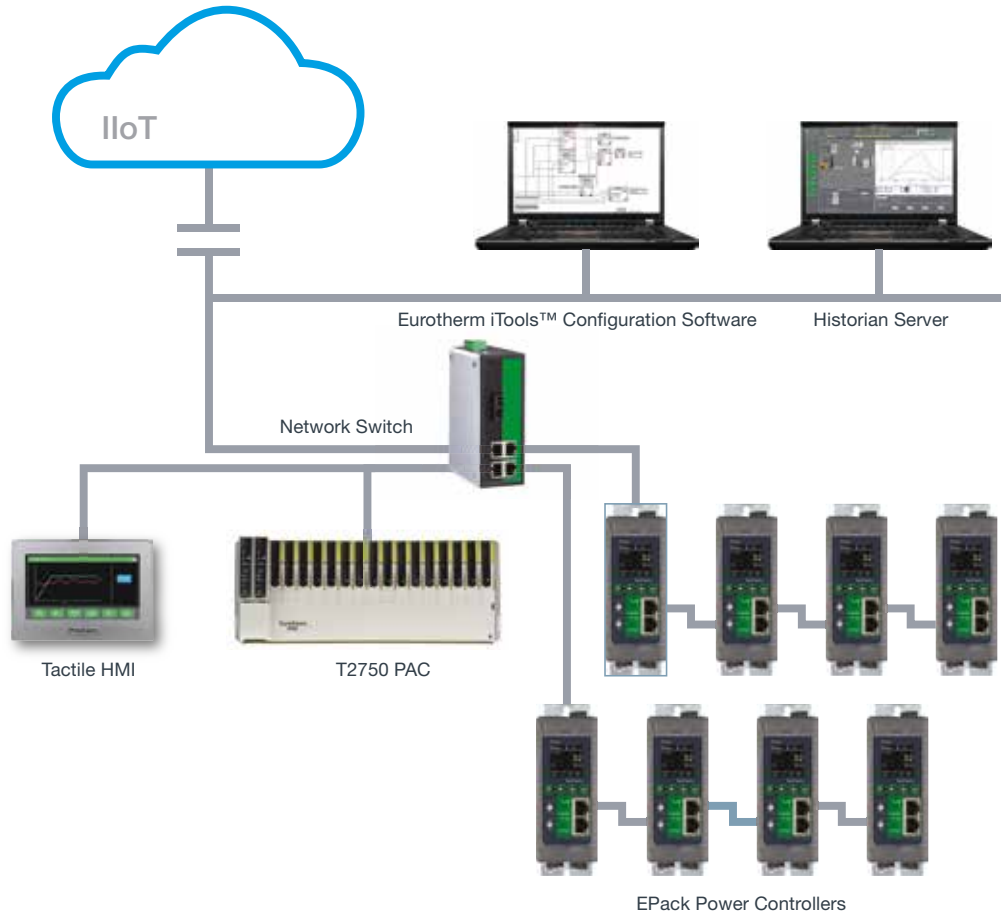


The EPack power controller automatically switches from phase angle to burst firing mode depending upon the ohmic value of the load, for example, during the period of stress when the load is cold. The advanced start-up feature allows smooth start-up with less stress on the load.

The ability to use the most suitable firing mode at the right moment helps to improve the load lifetime and improves energy consumption with less harmonic disturbances and better power factor.

Help to reduce integration time and costs

Native communications, ready for IIoT and industry 4.0



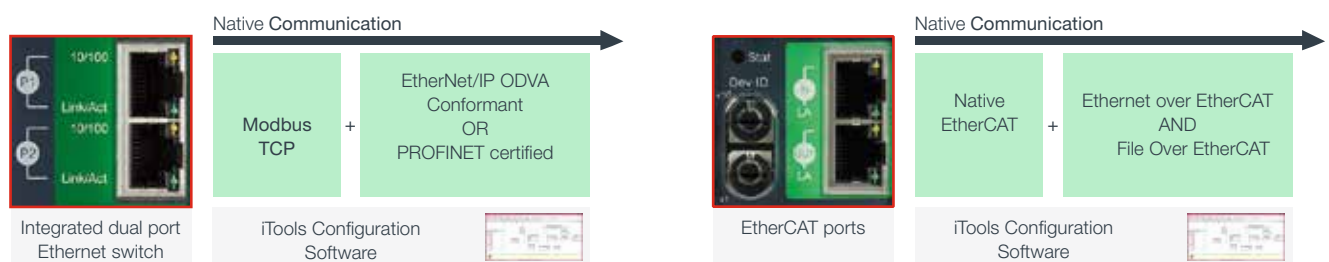
Plug and play communications

With integrated native Ethernet communication for all major protocols, EPack controllers offer a high level of performance in terms of speed and time responsiveness. They provide easy connection to PLCs, networked devices and industry 4.0/IIoT technologies.

Certified to Achilles® communications robustness testing level 1, offering enhanced cybersecurity (for Modbus TCP, EtherNet/IP and PROFINET only).

The integrated dual port Ethernet switch allows the user to daisy-chain communications, which simplifies the architecture for easy integration into an enterprise management system. Less inputs and outputs are needed, helping to save the cost and installation time of equipment and external wiring.

Communication options



Optimize your process throughout the product lifecycle

A powerful solution, from selection to maintenance

SIMPLIFIED SELECTION

- Reduced hardware variant options
- Upgrade options at anytime
- Compact dimensions
- Pre-configured unit



1

FAST COMMISSIONING

- Quick-Code start-up from product screen
- Advanced configuration software
- FDT-DTM & Zeroconf standard
- Backup & Restore



2

EFFICIENT OPERATION

- Monitoring information
- Visualize real-time data using OPC Scope
- Energy meter
- Swift action with flexible communication and I/O



3

QUICK MAINTENANCE

- Fanless design
- High speed fuse blown detection
- Load Status monitoring
- HMI text messages
- Fast diagnostics over communications



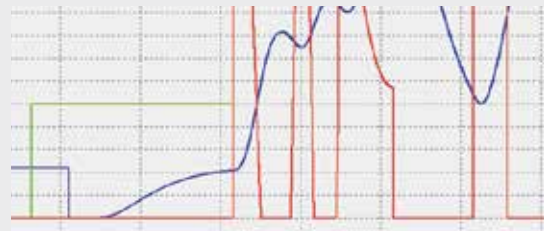
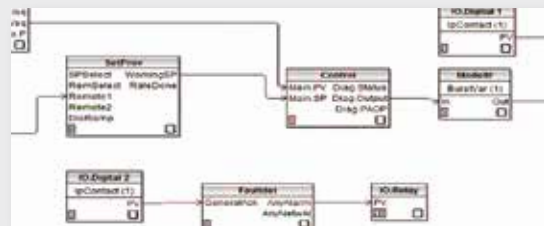
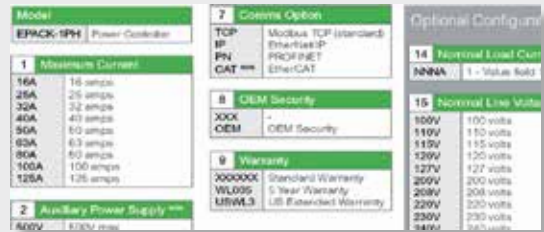
4

GUARD INTELLECTUAL PROPERTY

Unique tamper-resistant option (OEM Security feature) helps protect OEM expertise and Intellectual Property



5



Available with Eurotherm iTools software, a powerful and free comprehensive PC tool for intuitive configuration and straightforward monitoring of Eurotherm products for advanced strategies.

Case studies

Maximize energy efficiency in glass applications

Customer challenge

One of the most demanding glass manufacturing processes is gravity bending, required for windscreen forming. The flat windscreen enters a tunnel furnace on a very precise mold. When it reaches the right temperature, the softened glass sags, bending to the shape of the mold by gravity.

The tunnel furnace has hundreds of sub zones (100 to 300) requiring precise and stable temperature control running multiple recipes to allow maximum production flexibility.

Solution

- The EPack power controller provides each sub-zone with real power control feedback, compensating for any disturbance at the heater
- Control setpoints can be offset (in kW) to achieve the desired homogeneity
- Realtime control, measurement and diagnostics via Ethernet communications enable faster response times

Customer benefits

- Measurement accuracy and control precision help to maintain quality and consistency of the bending process
- Intelligent half-cycle firing for infra-red elements, minimizes visual fatigue while retaining high power factor
- Ethernet communications help to reduce wiring and use of I/O



Fast communications and configuration for the heat treatment of metals



Customer challenge

A leading helicopter manufacturer needed a power control system for an autoclave. The equipment was used for bonding repair patches on to rotor blades. Multi-zone control was required to achieve temperature accuracy and consistent, high quality treatment

Solution

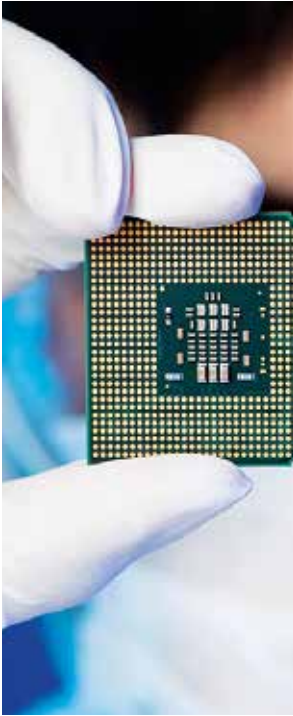
Eurotherm Engineering Projects Team provided a multizone power control cabinet solution utilizing 42 EPack devices, offering:

- Modbus communication with PLC style daisy chain wiring, no need for a network switch
- Compact dimensions allowed maximum use of space
- Straightforward configurability to adapt the process

Customer benefits

- Improved reliability of hot bonding process
- Fully integrated solution with flexible communications
- Tailored solution adapted to the specific needs of the customer
- Eurotherm global service capability for support and peace of mind

Precise control for OEM customers within semiconductor industry



Customer challenge

An OEM customer designing and manufacturing high energy UV laser equipment for the Semiconductor industry required a three zone temperature control solution with precise PID control for the end-user.

Their equipment is used for fast and thin annealing of semiconductor materials such as Silicon, Germanium and Silicon Carbide (SiC). The materials are used to manufacture components such as digital memory devices, power transistors, and CMOS image sensors for digital cameras.

Solution

The temperature of the wafers is maintained using three PID control loops in the E+PLC¹⁰⁰ combination PLC, and the EPack power controller with Ethernet communications. The electrical parameters and diagnostics are provided through Ethernet Modbus TCP.

- Precision PID loops and accurate power control
- Real-time measurement display with setpoint entry capability
- Recording necessary parameters for production quality control

Customer benefits

- E+PLC uses standard IEC 61131-3 programming languages, reducing the learning curve
- Native Ethernet communications in the E+PLC¹⁰⁰ and EPack devices
- Reduction of the overall cost of the solution
- Fast integration through simplified wiring
- Straightforward duplication of control strategies
- Accurate repeatable temperature control for the end-user

Repeatable control for food & beverage applications

Customer challenge

A leading Food & Beverage industry OEM, designs through-type ovens to bake biscuits in a continuous process. The main challenge is delivering repeatable high-quality end products, whatever the batch or recipe. The uniformity of baking is managed by 40 independent three-phase heating zones. A roller conveys different biscuit types from the oven entrance, through the managed zones to the exit.



Solution

The oven is managed by a Eurotherm E+PLC400 Combination PLC controller communicating through a single Modbus/TCP network to all 40 EPack 2PH power controllers. The 3 phase heating zones were controlled using EPack 2PH power controllers in 2 leg control configuration.

- Accurate, precision PID control of each zone by the E+PLC⁴⁰⁰ combination PLC with setpoint programmer
- Management of recipes, and data logging of the batches in proprietary tamper resistant .UHH file format
- History files transferred via FTP protocol to server for archiving
- Real-time electrical measurement on the EPack controller with load monitoring

Customer benefits

A complete solution to monitor, control and manage data-logging of the whole process.

- Repeatable biscuit baking process for the end-user
- Optimized network with reduced switches due to integrated dual port switch feature within EPack controllers
- Fast integration and flexible communication solution
- Optimized equipment cost using EPack 2PH controller to control 3 phases
- Diagnostics available for electrical behavior and energy consumption
- Flexible control of independent zones

Selection table

For straightforward system integration or complex load management, EPack Power Controllers provide advanced communication functionality and a range of valuable optional features.

For essential functionality or non-variable resistive loads, EPack™ Lite Compact Power Controllers offer you simplicity without compromise on performance.

Features	1PH		2PH		3PH	
	EPack™	EPack™ Lite	EPack™	EPack™ Lite	EPack™	EPack™ Lite
Control options						
V ² control - V2		✓		✓		✓
I ² control - I2		✓		✓		✓
Open loop - OL		✓		✓		✓
V ² control with current limitation - V2CL	✓	—		—	✓	—
Power control with current limit - PWRCL	✓	—	✓ (PWR only)	—	✓	—
Load configuration						
Star without neutral - 3S		NA		✓		✓
Closed delta - 3D		NA		✓		✓
Star with neutral - 4S		NA		—		✓
Open delta - 6D		NA		—		✓
Load type						
Resistive		✓		✓		✓
Transformer primary		✓		✓		✓
Heater type						
Resistive		✓		✓		✓
Molybdenum disilicide - MOSI	✓	—		—	✓	—
Silicon carbide - CSI	✓	—	✓	—	✓	—
Short-wave infrared - SWIR	✓	✓	✓	✓	✓	✓
Firing mode						
Phase angle - PA		✓		—		✓
Intelligent half cycle - IHC		✓		—	in 4S or 6D load configuration only	
Variable modulation burst firing - BF		✓		✓		✓
Fixed modulation period - FX		✓		✓		✓
Logic mode - LGC		✓		✓		✓
Communication						
Connection	Dual RJ45 Ethernet ports connected to internal switch except if EtherCAT option (dual port slave controller only)	—	Dual RJ45 Ethernet ports connected to internal switch	—	Dual RJ45 Ethernet ports connected to internal switch	—
Protocols	Modbus TCP, EtherNet/IP, PROFINET or EtherCAT	—	Modbus TCP, EtherNet/IP, PROFINET	—	Modbus TCP, EtherNet/IP, PROFINET	—
iTools Software support	Cloning, Advanced configuration	—	Cloning, Advanced configuration	—	Cloning, Advanced configuration	—
Features						
Standard features	Load fault detection, Measurements, Quick Start		Load fault detection, Measurements, Quick Start		Load fault detection, Measurements, Quick Start	
Optional upgradable features	Graphical wiring, OEM Security feature, Energy counter	—	Graphical wiring, OEM Security feature, Energy counter	—	Graphical wiring, OEM Security feature, Energy counter	—

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