



EPC2000 Programmable Controllers

Precision at the heart of your process

Simplify integration of fast-acting control while easing cybersecurity worries

Whatever your process, the EPC2000
controller delivers outstanding
performance precisely where it is needed

Easily providing required stability,
accuracy and repeatability



EPC2000 Controller

Precision at the Heart of Your Process

The EPC2000 programmable controller delivers fast acting precision control with **easy-to-integrate** Ethernet communications

It offers high **performance-enhanced** Eurotherm PID control, either as part of a stand-alone machine or as a control loop in a multi-zone application



Efficient, Consistent Results

Improve Quality, Reduce Scrap and Increase Profits

Enhanced Eurotherm PID control reaches operating temperature **fast**, minimizing overshoot, increasing plant utilization

Precise repeatable control improves quality and reduces waste

Independent single loop controllers continue to maintain zone conditions, independently of supervisory system or PLC operation



Networked Applications

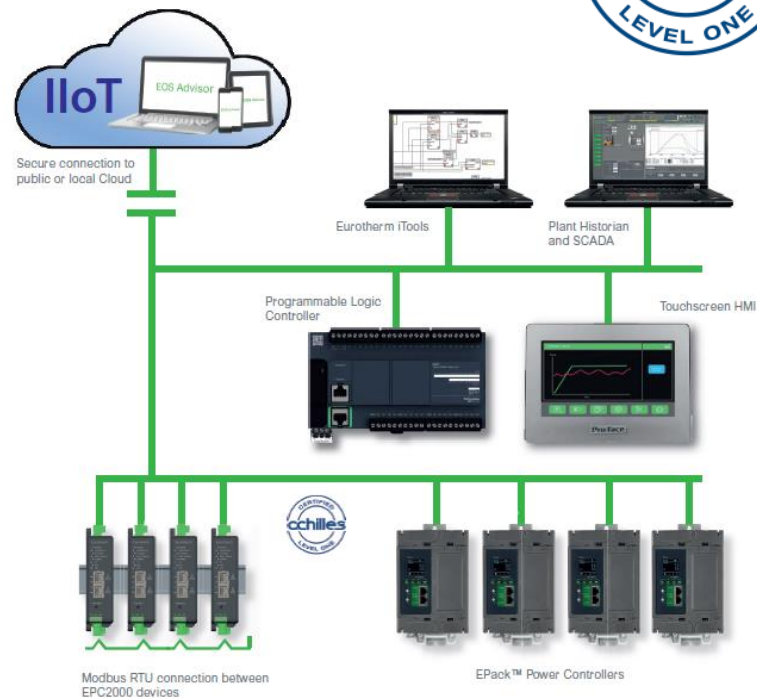
Distributed, Communicating
Controllers

DIN rail or screw mounting format

Distributed, **Ethernet-based**
controllers

Install close to the **point-of-use**,
reducing cabling run and wiring
costs

Achilles® Communications
Robustness Testing Level 1
Cybersecurity certification



Life Is On

Eurotherm.
by **Schneider Electric**

Easy-to-Deploy Format

Reduce Equipment and
Maintenance Costs

Easy to install, commission and
replace

Robust **battery-free** design

Adapt easily to changing needs &
machine integration functions with
flexible user function block wiring

Instant function **upgrades** available
online - only pay for what you need
now

Extended standard warranty and
free online **support**

©Schneider Electric. All rights reserved. | Page 6 HA033314 Iss 1 August 2018



Life Is On

Eurotherm.
by Schneider Electric

Global Acceptability

World Class Certification

Cybersecurity certification to
Achilles® CRT Level 1

Wide range of international **standards**

Suitable for use in demanding
automotive and **aerospace**
applications

International sales and support
network



Green
Premium™
Product



EUROTHERM PROCESS CONTROLLER CERTIFIED TO ACHILLES CRT LEVEL 1



The Eurotherm EPC2000 **Ethernet-enabled** controller is
designed and certified to meet the stringent requirements of

Achilles® Communications Robustness Testing Level 1



By **David Gilbert** on Nov 4, 2016



Millions of people in the eastern U.S. woke up on a Friday morning in October to find large parts of the internet not working. No Twitter. No Netflix. No Spotify. The issue, as we later learned, was an ominous new kind of cyberattack, where “smart” household devices were marshaled into a zombie army capable of choking critical infrastructure of the web. It was the biggest distributed denial of service (DDoS) attack in history.

Stuxnet [2010] – The game changer

Coordinated and targeted attack of Siemens PLCs used in Iranian nuclear installations

Resulted in the destruction of centrifuges used in the enrichment process

Stuxnet is **freely available to download** and modifiable to target other devices

Stuxnet **destroyed one in five** of Iran's Nuclear Centrifuges



German Steelworks attack [2014]

A denial-of-service (DoS) attack on the control network

Operators unable to perform a clean shutdown

Blast Furnace suffered 'massive damage'

Achilles® CRT Level 1 Tested

IIoT and Industry 4.0 Cybersecurity

Achilles® Communications Robustness Testing Level 1 recognizes products that meet **industry benchmarks** for robustness including security.

- Improve device **cybersecurity** protection
- OEMs- **Differentiate** product offering and company
- Meet industry **standards** for device security
- Meets the needs of customers whose equipment need to be Achilles **Certified**



“The Achilles certification program is clearly the de facto cybersecurity standard for critical infrastructure sectors and is already adopted by the world’s largest suppliers and end-users of industrial control and safety systems.”

US Department of Homeland Security, Cybersecurity

The background of the slide is a blurred industrial scene. In the upper right, two workers wearing orange safety vests are visible. The foreground and middle ground show various pieces of industrial machinery, including metal frames and conveyor systems, with some components in sharp focus and others blurred.

EPC2000 Controller Product Walkthrough

Features and Functions

EPC2000 Controller

Cost-effective Single Loop Control

High speed, high **precision**, high stability
process measurement with 0.1%
accuracy

SSR Drive, Relay and dc **control** outputs

Enhanced PID overshoot protection with
Fourier autotune

Integrated programmer and **soft logic**
with maths, logic, totalizers and
specialized blocks

Direct 100BASE-T Ethernet connection
for IIoT and **Industry 4.0**, security
certified to Achilles® CRT Level 1



Life Is On

Eurotherm.
by **Schneider Electric**



Detachable Wiring Connectors

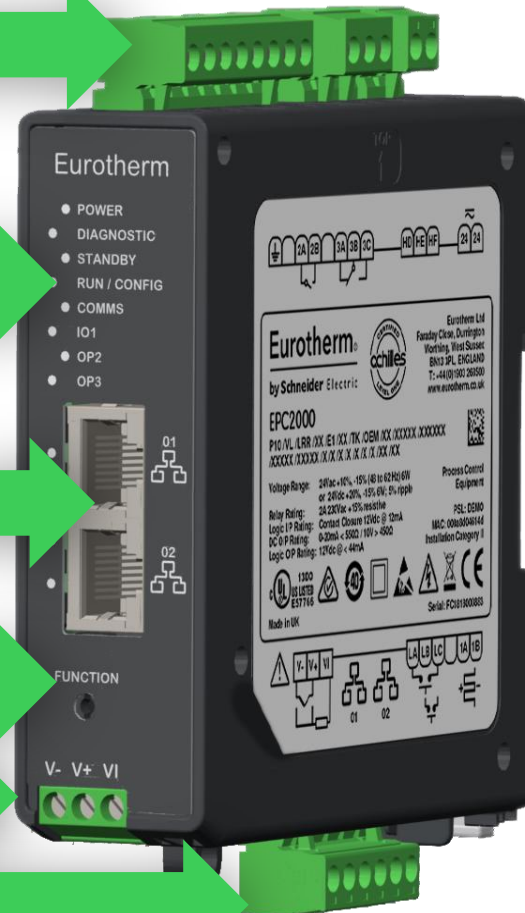
Status and Diagnostic LEDs

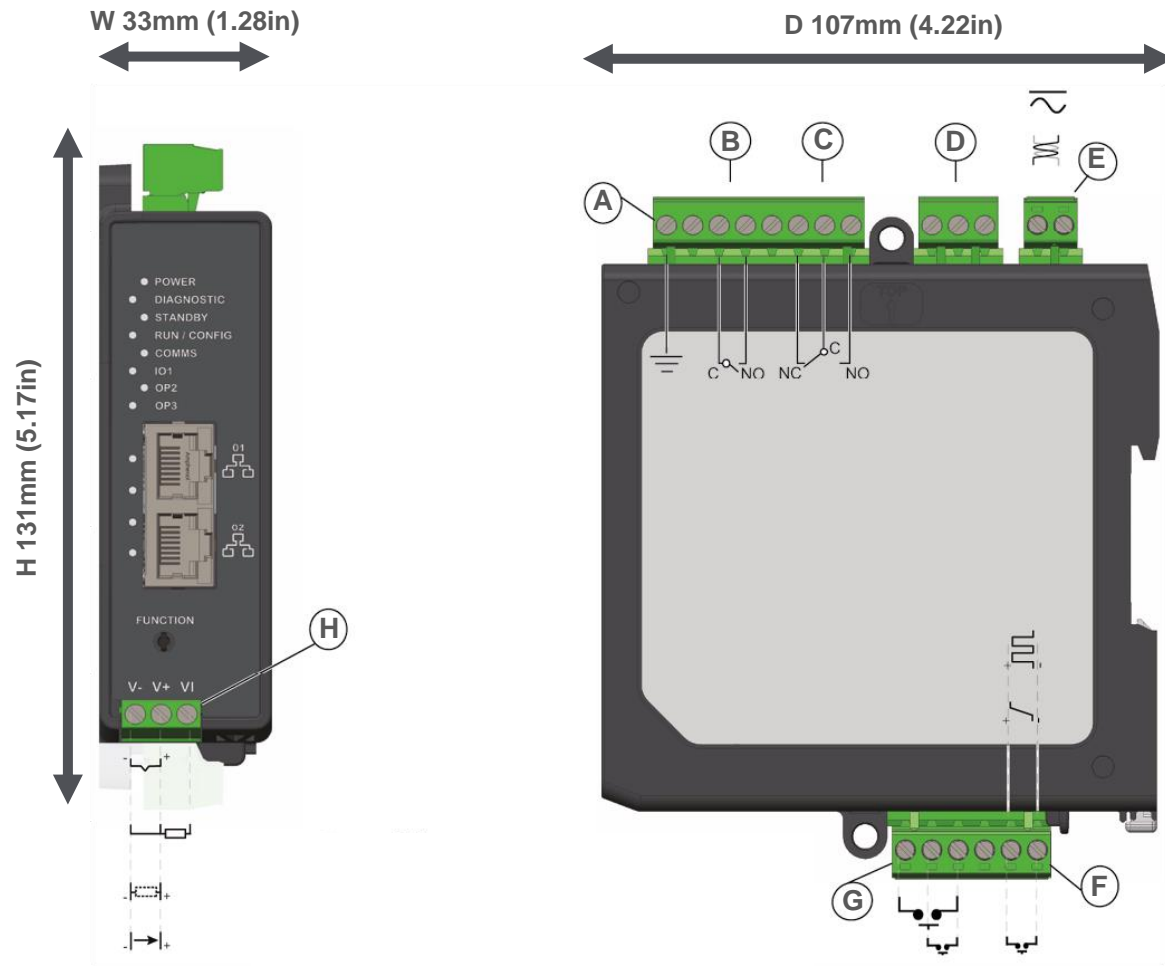
RJ45 Ethernet with Integrated Switch

Communications Settings Button

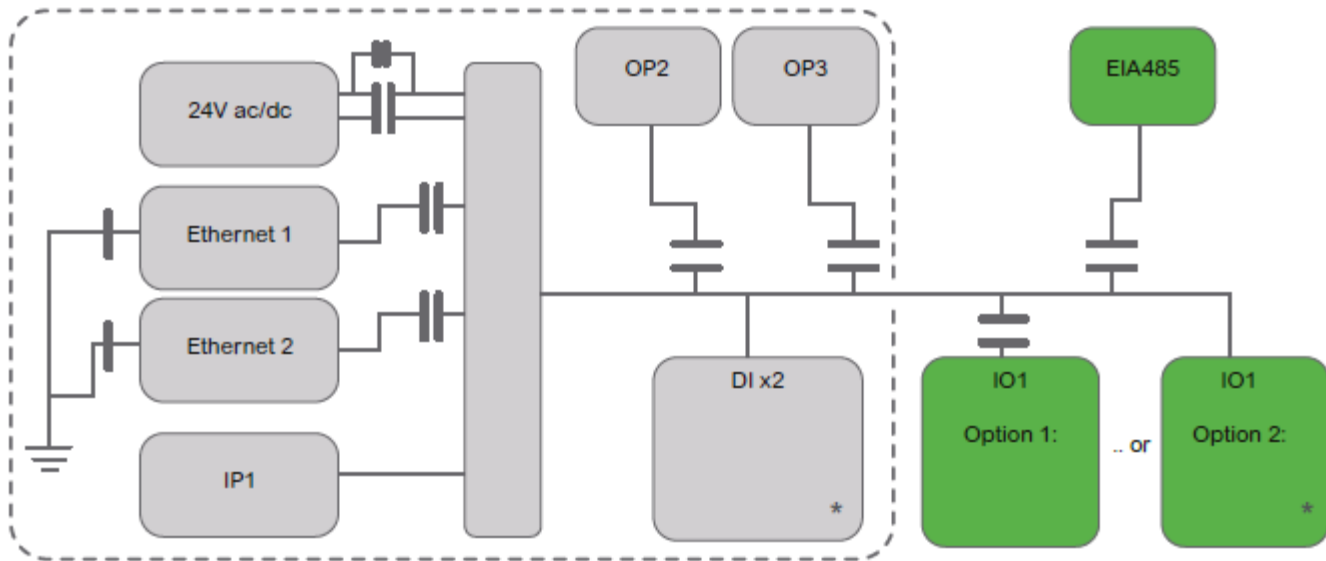
Fixed Main Measurement Input

Detachable Wiring Connectors





Key	Title	Function
A	Ground	Functional Ground Connection Point
B	OP2	Relay Form A (Normally Open)
C	OP3	Relay Form C (Changeover)
D	Serial Comms	EIA-485 Modbus RTU Slave and Broadcast Master
E	Power	24Vac/Vdc
F	IO1	(1) Analog Output (2) Non-Isolated SSR Drive Logic Output or Contact Closure Digital Input
G	DI x 2	2x Contact Closure Digital Input, Non-Isolated
H	IP1	Universal Process Input



Key							
	300Vac DOUBLE insulation		300Vac BASIC insulation		Contact In/ Logic out - not isolated from each other		Standard for all variants

EPC2000 Programmable Controller Key Features

General

Format	Compact DIN rail mounting units, no display, 24V ac/dc PSU connection. Operating range 0°C to 55°C (32°F to 131°F).
Size	Approx (H)131mm (5.17in) x (D)107mm (4.22in) x (W)33mm (1.28in)
IP Rating	IP20
PV Accuracy and Control Cycle Time	Single 0.1% full scale precision input with exceptional thermal stability, 50ms sample time. Control Cycle time 50ms process inputs, 62.5ms thermocouples, 100ms resistance thermometer. Automatic cycle time selection with optimized mains cycle rejection.
Outputs	SSR drive logic output or 0-20mA DC linear output (SCR drive or valve), plus 1 Form A and 1 Form C relay.
Logic Inputs	2 contact closure logic inputs for interlocks and events.
Alarms	Six freely configurable alarms with manual, automatic, non-latching and event types plus alarm delay function and blocking. Alarms may be inhibited in standby. Other process and sensor break alarms available.

EPC2000 Programmable Controller Key Features

Control and Specialist Functions

Control Algorithm	Eurotherm Enhanced PID with Fourier autotune, offering fast disturbance response and overshoot minimization. 2 PID sets with gain scheduling.
Standard Applications	Basic Heat and Heat/Cool applications available pre-wired via order code or parameter selection.
User Wiring	User Function Block Wiring of standard maths and special function blocks, to permit I/O pre and post processing and interlock logic.
Function Blocks	Linearization, Maths, Logic, Multiplexing 32 bit totalizers, Counter/Timer.
Setpoint Ramp Programmer	Maximum 20 program sequences of 8 segments. Options for 1x8, 1x24, 10x24, with textual program and segment names.

EPC2000 Programmable Controller Key Features

Network Integration

Ethernet Communications	100BASE-T with plug and play “Bonjour” connection. Maximum separation 100m with CAT 5 cable. IIoT and Industry 4.0 ready.
Ethernet Connection Type	RJ45 with integral switch permitting daisy chain connection.
Ethernet Protocols	Modbus/TCP Slave.
Cybersecurity Qualification	Achilles® CRT Level 1.
Serial Communications	EIA-485 Modbus RTU Slave, Broadcast Master. Up to 32 devices on a single network segment, may be increased with repeaters. Serial communications are independent of Ethernet and may be run concurrently.
HMI Connection	Via Ethernet or Serial Communications. Eurotherm recommends HMI solutions from Pro-face by Schneider Electric.
Comms Selection	Simple configuration of basic Ethernet communications via a recessed button on the instrument front. Select from fixed IP address and plug and play operation.
Programming Software	Eurotherm iTools

A woman with blonde hair, wearing a blue uniform, is shown in profile, interacting with a control panel. She is pointing at a screen with her right index finger. The background is a blurred industrial environment with yellow vertical pipes and a red overhead structure.

EPC2000 Programmable Controller and Pro-face

Updating the Control/HMI

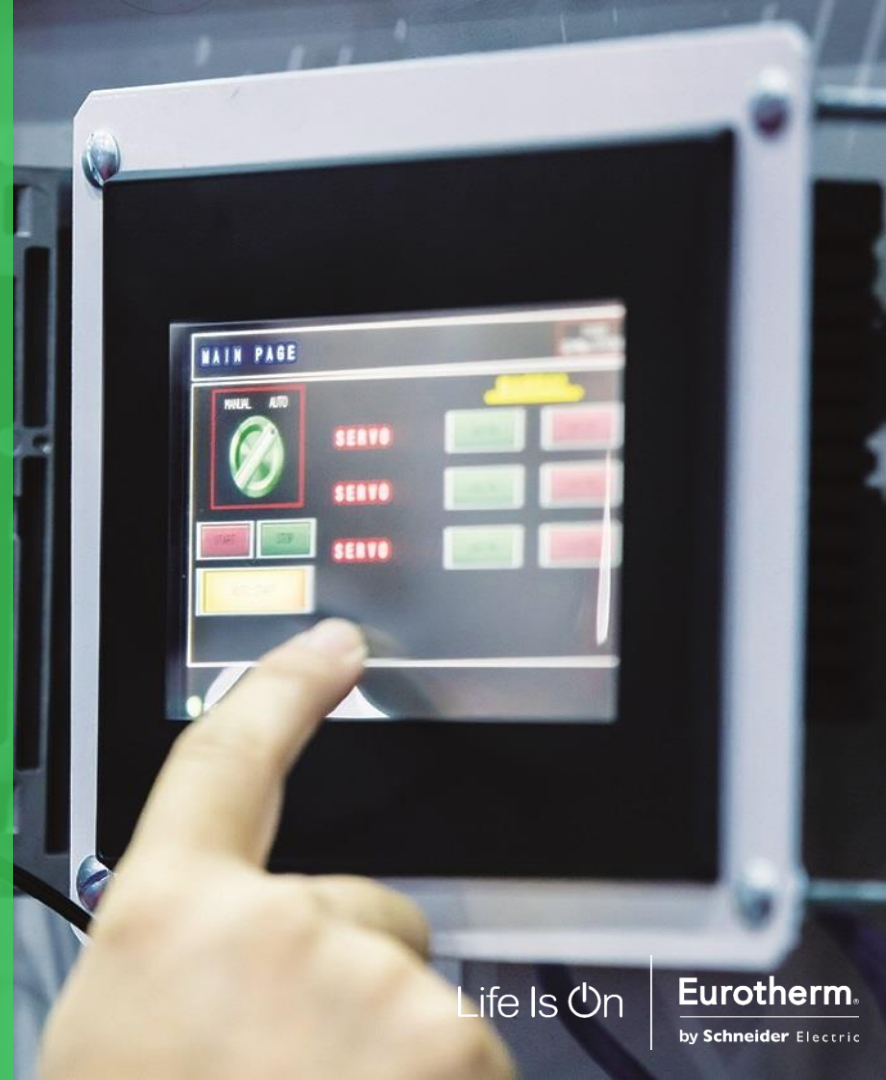
Machine HMI Futures

Users of industrial equipment now demand a great user experience

Smartphone culture drives “task driven HMI” and graphical touchscreen interfaces.

Users are often young and expect simplicity and ease-of-use. They are not instrumentation engineers!

“Prosumer” interfaces allow OEMs to differentiate their products with a “wow factor” in an increasingly crowded competitive landscape



Pro-face GP4114T

Eurotherm is partnering with Pro-face to provide cost effective touchscreen HMI solutions

Widescreen Colour 480x272

Resistive Touchscreen TFT Display

10/100BASE-T Ethernet

Data Logging with Real Time Clock

User Management with Passwords

12 to 24Vdc Power supply

0 to 50°C Operating Temperature

IP65 Protection when Panel Mounted

Small, but **Powerful** and Easy-to-Use



EPC2000 and Pro-face

Eurotherm Precision Control Excellence with a Customizable HMI

Precision control in a compact, cost effective and easy-to-apply package

Valuable functions to simplify machine development including setpoint programmer and user wiring

Differentiate your product with a customizable touchscreen HMI designed around your requirements

Eurotherm is a proven partner for long-term product supply and support





Real World Applications

Updating the Control/HMI

Muffle Furnace with Touchscreen HMI

What is the application?

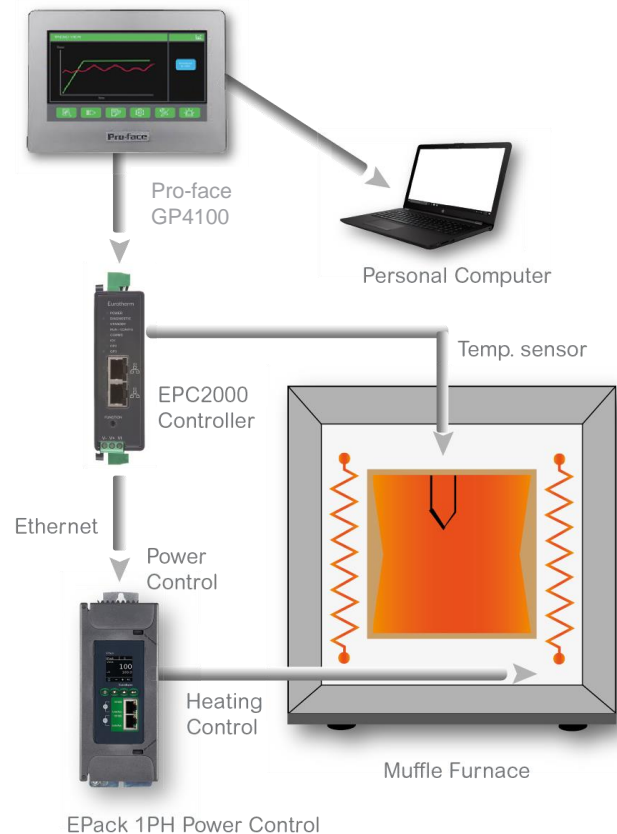
A muffle furnace separates the workpiece from the heat source by means of a “muffle”, a removable and sometimes adjustable component used to aid temperature uniformity.

The furnaces may be used for heat treatment of small components and laboratory testing of materials, and many other applications where uniformity and accuracy of temperature control is required.

How can the EPC2000 Controller help?

In this example, the Eurotherm EPC2000 device provides high accuracy temperature control, using the Eurotherm EPack™ SCR Power controller to manage the non-linear heating characteristics of the loads. A Pro-face GP4100 touchscreen is used as the primary operator interface.

This provides a high performance furnace control system with fast responding enhanced Eurotherm PID control with minimal overshoot. The touchscreen panel is easy-to-use and customize, and the furnace can be connected using Ethernet communication or via a WiFi router to data loggers or personal computers.



Baking Oven With Distributed Zones

What is the application?

Commercial biscuit or baking ovens arranged in long tunnels, through which the product being processed travels on a conveyor.

They are usually gas fired, and made up of separate zones. Typically a PLC and drive system is used to control the conveyor.

Accurate temperature control in each zone is essential to reduce wastage normally due to under or over-baking. The ovens may be many meters in length, and running cabling the length of the machine can be expensive.

How can the EPC2000 Controller help?

Using EPC2000 devices distributed along the machine allows each controller to be placed near to the point of use, reducing cable runs and maintaining operating temperature even if the PLC is offline.

Each EPC2000 controller may be daisy chained to the next with a fast Ethernet link to the PLC using standard industrial protocols.

Diagnostic information relating to the performance of each zone may be collected using the Ethernet connection for use in process improvements and predictive maintenance.



Semiconductor Etch Processes

What is the application?

The etching process is used to remove surface layers from a wafer during semiconductor fabrication. It is a critically important part of the manufacturing process and each wafer will undergo multiple etching steps.

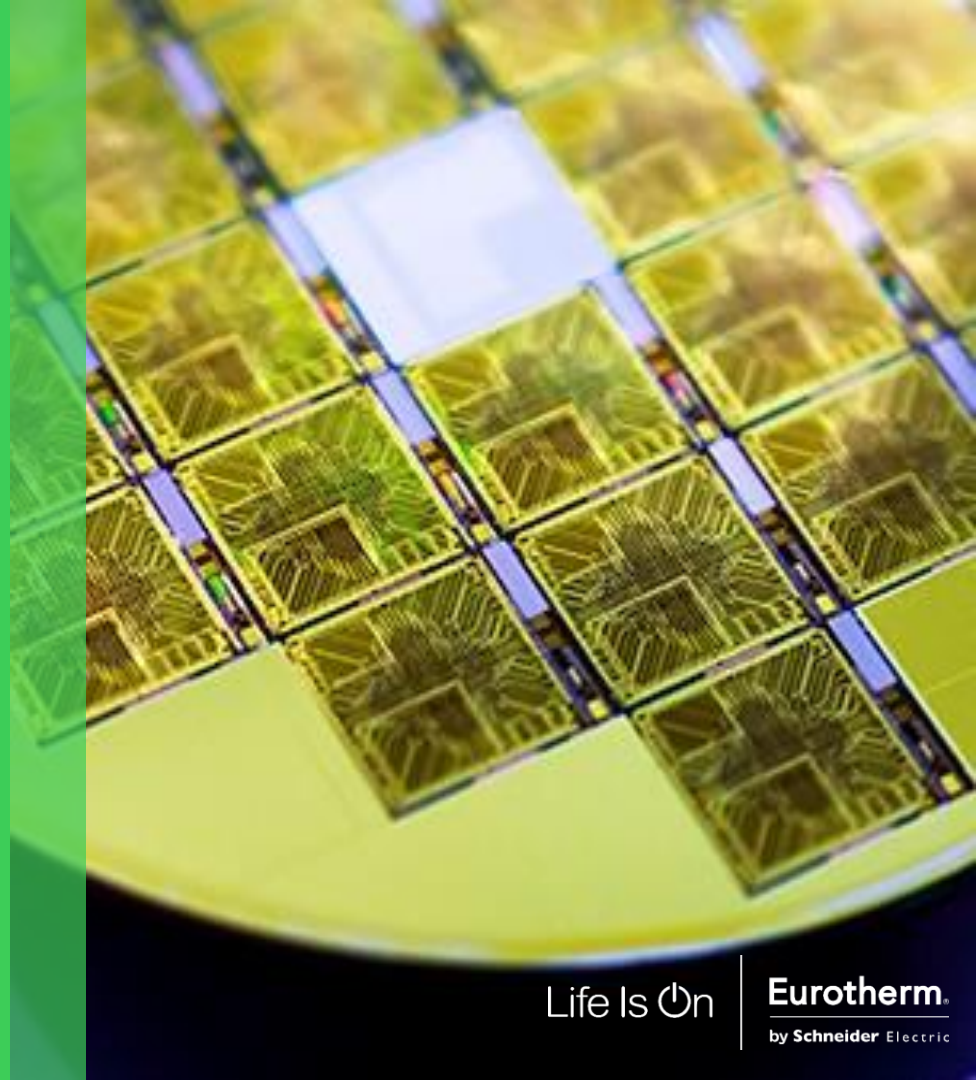
Successful etching relies on forming a high uniformity cavity in the surface using a combination of chemistry and precise control of temperature. As die sizes shrink, the performance of the temperature control system becomes increasingly important for yield.

Wafers have a limited tolerance to temperature fluctuations during the full fabrication cycle, and it is important in each process step to minimize temperature variation.

How can the EPC2000 Controller help?

The EPC2000 controller is a highly versatile and cost effective solution offering high stability precision measurement and control with Ethernet connectivity.

The enhanced Eurotherm PID algorithm is particularly well suited to critical process steps, with rapid mitigation of disturbances caused by chemical introduction and associated pressure and temperature fluctuations, minimizing overshoot.



Post Weld Heat Treatment (PWHT) of Pipes

What is the application?

Post weld heat treatment is a method of reducing residual stresses in welded joints. Joints are wrapped in ceramic pad heating elements and heated according to a specific ramp/soak sequence, often applied across multiple heating zones simultaneously.

How can the EPC2000 Controller help?

EPC2000 controllers provide a cost-effective method of clustering multiple single loops in a compact console built into a portable trolley. One unit is configured as a master programmer, broadcasting a setpoint to several slave units using Modbus RTU. Each slave uses a deviation alarm relay to close a digital input on the master unit if it has not yet approached setpoint, to provide a holdback or “guaranteed soak” function in each zone.

Using the recipe function on the EPC2000 instrument, units can be easily reconfigured with a digital input, permitting a console to be subdivided into switchable sets running different profiles at the same time for separate operations.

Connectivity via Ethernet or WiFi communications can be provided for logging of the treatment operation.



Whatever your process, the EPC2000
controller delivers outstanding
performance precisely where it is needed

Easily providing required stability,
accuracy and repeatability



A close-up photograph of a person's hand pouring molten metal from a ladle into a mold. The metal is bright orange-red, indicating it is very hot. The mold is made of a light-colored, textured material. The background is dark and out of focus.

THANK YOU.

Life Is On

Eurotherm.
by Schneider Electric

Life Is On

Schneider
Electric