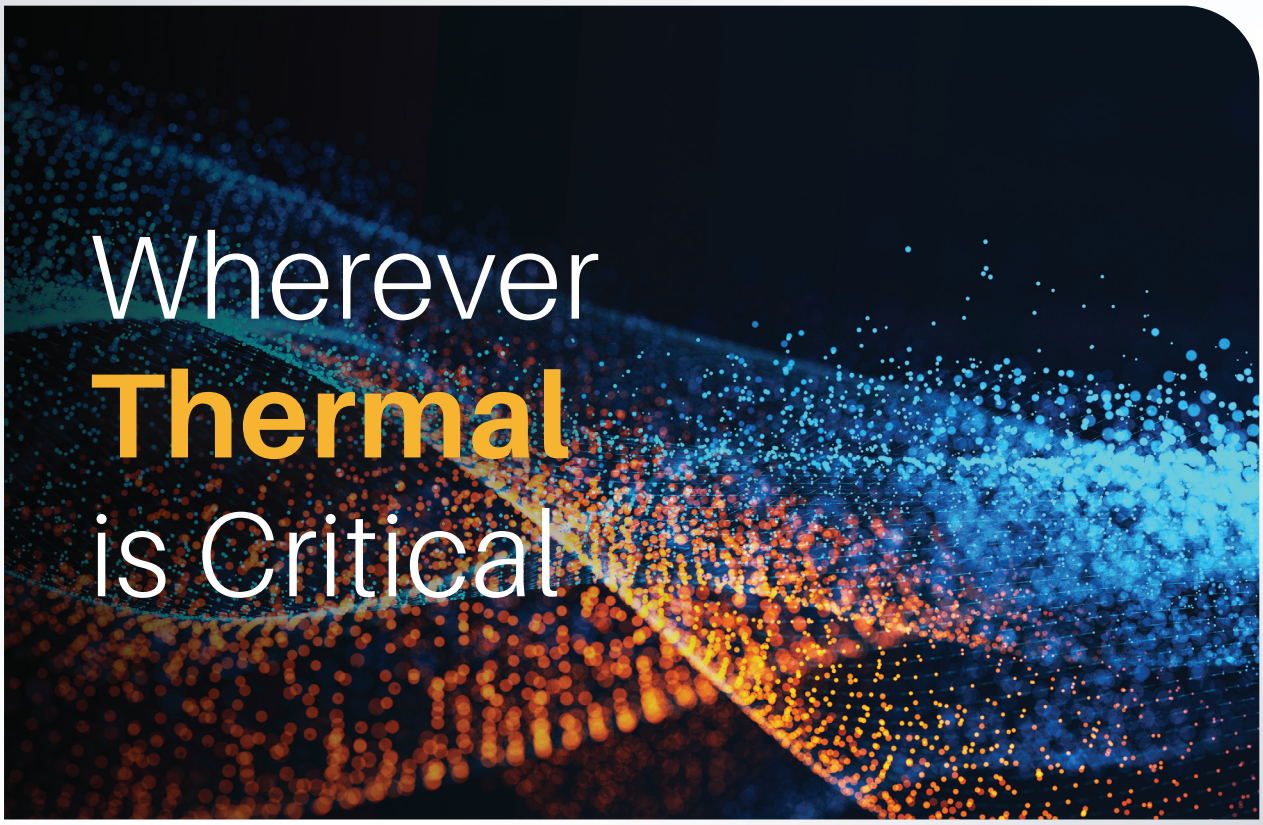
WATLOW®
Powered by Possibility

# Over 100 Years of Solving the World's Most Demanding Thermal Problems




Solutions, Products and Services

watlow.com

For over 100 years, Watlow has grown in product capability, market experience and global reach. The company holds over 1000 patents and employs about 4000 team members working in our Manufacturing Centers of Excellence, Technology and Development Centers and Sales Offices in critical regions all over the world.

Watlow continues to grow, while the commitment remains the same:

# Pioneering thermal solutions that power a thriving future.

Eurotherm by Watlow

Watlow has enhanced capabilities to better serve our customers with the acquisition of Eurotherm, a market leader in machine automation solutions, applications, power and process control systems with support software and services.

# Contents


Watlow is a global industrial technology company that provides advanced thermal systems to many of the world's leading companies, offering high-impact solutions that help our customers thrive. Customers leverage our technology in critical applications.

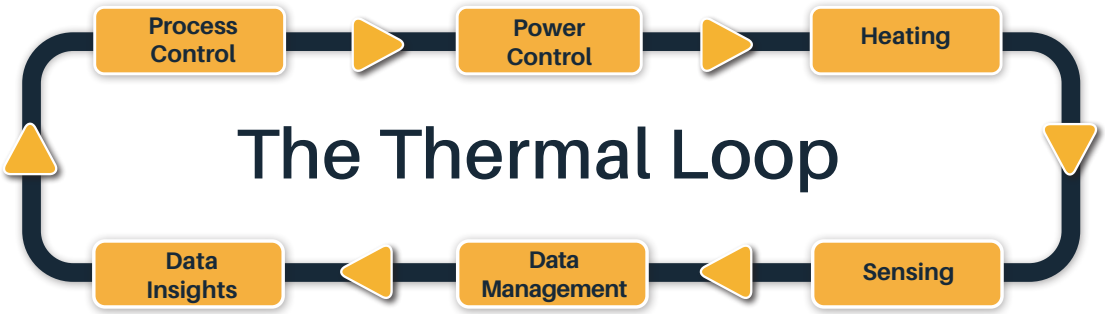
## Watlow manufactures thermal solutions across a broad range of industries:

- Semiconductor processing
- Glass, steel and cement processing
- Power generation
- Oil and gas
- Petrochemical
- Diesel emissions
- Heat treatment
- Aerospace and defense
- Industrial materials processing
- Life sciences
- Food and beverage
- Medical, clinical and analytical equipment

# Closing the Thermal Loop

## A Path to Improved Performance, Sustainability and Compliance

For Watlow, the underlying concept behind everything we do is that of the thermal loop. Every solution we offer, and every project we work on, is ultimately about the creation and control of thermal energy in an application.




This brochure will introduce you to our offerings and application expertise across the entire thermal loop:

- Controlling
- Power
- Heating
- Sensing
- Managing the Integrity of the Data
- Obtaining Data Insights

These components work together to optimize process performance in our targeted industries. At Watlow, all these components are equally important in our work to help power the globe, connect family and friends, develop life-saving therapies, feed the world and electrify carbon-heavy processes.

## We are Wherever Thermal is Critical

# A Deeper Level of Understanding of Customer Applications Within our Strategic Industries

At Watlow, our precision control, advanced heater, sensor and high integrity data management products are developed into comprehensive thermal solutions for a wide range of industries and market segments and have designed-in features based on experience and knowledge of how they perform in mission-critical applications.

## Electrification and Decarbonization

Watlow plays a pivotal role as a partner in lowering carbon emissions by understanding your most critical processes and equipment. Our innovative electric thermal solutions include the full thermal loop of reliable heat exchangers and control systems to help transition you away from fossil fuels for cleaner and more efficient performance.

By integrating cutting-edge thermal management solutions, Watlow helps you achieve your sustainability goals and aids compliance with stringent environmental regulations. Our solutions improve operational efficiency and contribute to a cleaner, greener future.

Our thermal solutions help you reduce energy usage, decrease equipment downtime and lower operating costs.
We offer efficient solutions that help meet zero emissions for a cleaner, more sustainable environment.

Watlow offers a complete range of made-to-order, standard process heaters that can be used to electrify virtually all industrial applications.

Watlow's deep-domain knowledge spans many industries, drawing from decades of experience in electrifying industrial applications with a complete thermal loop perspective.

With our end-to-end design approach, complex systems can be optimized for energy efficiency, tighter control and improved system performance.

Read more about Watlow's technologies and how we are helping others to improve their impact on the environment: Electrification

## Sustainable Energy

Watlow's thermal technologies provide a crucial step towards a more sustainable and electrified world, aligning with global efforts to combat climate change and promote decarbonization.

Innovating with energy-efficient, electrified systems, Watlow provides cutting-edge technology that minimizes energy consumption and reduces your carbon footprint. When access to renewable power sources are available, customers can achieve true net-zero emissions through our electrification solutions.

### Real-World Application

**Replacing fossil-fuel based systems** with our clean and efficient electrical air heating systems enabled a large gypsum producer to significantly reduce their carbon footprint and improve plant productivity.

## Semiconductor Processing

Click here

Our thermal technologies are used in most of the critical stages of semiconductor processing to provide consistent process parameters, which are essential for maintaining the integrity of the process.

For example, contamination at any stage of the process is detrimental not only to the final product but also to the equipment used to develop the integrated circuits. Watlow's thermal solutions monitor temperature at every stage – from deposition to abatement – to minimize contaminates and ensure uniformity and repeatability and contribute to higher yields.

## Heat Treatment Solutions

Click here

We provide advanced electric heating and control solutions for autoclaves, environmental chambers, industrial furnaces and ovens, paint ovens and thermal presses. Heat treatment industry professionals are always under pressure to manage:

- Energy efficiency and cost
- Operational productivity and data security to Industry 4.0
- Regulatory compliance and evolving industry standards such as AMS2750H and CQI9

## Industrial Materials Processing

Our solutions are designed to provide the best outcomes in many heating applications for materials processing, helping reduce plant downtime and maintenance costs.

Our expertise will help you:

- Increase equipment availability using products with high Mean Time Between Failures (MTBF), redundant control strategies, online re-configuration and hardware 'Hot Swap' capability
- Utilize up-to-date proven technology designed for evolving international standards
- With total life cycle support including commissioning, training and on-site support
- Manage phased migration from legacy systems

### Real-World Application

**Optimizing thermal performance of process tools** in the manufacture of integrated circuits is critical. Electrostatic chucks (ESC) are used extensively to securely support and clamp the silicon substrate during processing and Watlow's polyimide heaters are used in many ESCs to help optimize the thermal performance of the process tools.

## Glass Manufacturing Process Solutions

Click here

Our technology has been at the forefront of power and process control within the glass industry for more than 50 years, providing scalable, engineered solutions with a proven return on investment.

Our products, services and solutions are specifically designed with the flexibility that enables you to buy what you need now and expand later.

## Life Sciences

Click here

Designed with regulatory compliance at the core, and leveraging a host of proven, turnkey, control and power management solutions, our Digital Engineered Solutions (DES) can be tailored to ensure that pharmaceutical production challenges are safe, efficient and sustainable. We offer solutions that target electrification, control and monitoring of the thermal loop such as our Environmental Monitoring System (EMS) Solution.

A DES for life sciences combines:

- In-depth application knowledge
- Cybersecurity and regulatory compliance
- Engineering development and change management methodologies
- Documentation (ISPE and GAMP templates)
- Analytics (including AI / LLM)
- Digital twin (Industry 4.0) technology

### 5 Reasons that differentiate our Environmental Monitoring System (EMS) solution:

1. Accurate monitoring of data with ±0.01 °C input accuracy
2. Lower validation costs
3. Designed to meet regulations and best practices
4. Optional redundancy offering high availability of the process
5. High integrity data management with store and forward technology

## Medical Devices and Clinical Diagnostic Equipment

Click here

Patient safety is critical in clinical equipment design. Safety considerations include electrical (low leakage current), touch safe characteristics and thermal stability. Watlow has developed a broad product offering, including all the components in an integrated thermal system, where uniform operating temperature is critical for effective performance: To incubate cultures; add constant warm humidity to respiratory equipment, heat fluids before injection into the body, stabilize equipment performance, enhance surgical procedures, sterilize instruments and amongst many other applications.

Leading equipment manufacturers rely on our thermal solutions for clinical application needs because of our proven experience in solving the most complex thermal challenges.

## Food and Beverage Industry

Click here

Food and beverage processors consider us a trusted advisor because we understand the importance and difficulty of efficient validation, and can help reduce the costs and complexity of implementation in accordance with the applicable regulations within the food and beverage industry.

We will help you increase efficiency by moving from paper to digital data management, creating high integrity tamper resistant digital data records that aid compliance to regulatory and guidance standards for good practice such as:

- FDA 21 CFR Part 11 and EudraLex Annex 11
- Hazard Analysis and Critical Control Points (HACCP)
- Data Integrity ALCOA+ guidelines
- FDA Dairy Pasteurized Milk Ordinance (PMO)

## Foodservice Equipment

Click here

Watlow has been working with the world's leading companies in foodservice equipment for decades. Our thermal solutions meet the needs of the most demanding commercial kitchens to ensure that your equipment is ready to go when customers are ready to eat.

We approach our customers with a different mindset right from the start. Our technology and long standing legacy within foodservice equipment provides us with the enviable position of knowing the thermal environment at a deeper level than traditional competitors. We enable benefits such as energy efficient cooking, reduced maintenance and faster cooking times.

# Watlow *SELECT* Visual Designer

**Watlow SELECT Visual Designer** is an intuitive product configuration tool that uses imagery to communicate the features of the product quickly and effectively while being designed via the tool.

The tool uses pictures for product option menus and provides a constantly updated drawing of the product being configured. Users simply click on the features needed and watch them appear in the drawing.

This is a buying experience that enables customers to quickly identify, configure and purchase some of our most popular electric heater, temperature controller, sensor and power controller products.

- Easily find the best performing products for your application
- Quickly configure the product to fit the application
- Readily access drawings and technical content

*Note: Some selections may require further assistance. Contact us for more help.*

Let us help you choose your product with Watlow *SELECT*


Visual Designer

# Control

## Single-Loop Control

High accuracy controllers improve process efficiency and product quality and minimize waste. Our range of temperature and process controllers include one or more sensor inputs and a wide variety of outputs for control and alarms.

Features include multiple communication protocol options, auxiliary analog inputs, automatic tuning, set point programmer/ramp and soak profiling, user-customizable menus, failed heater/load detection, NEMA 4X (up to IP67) and power control.


EPC2000
Programmable Controllers


EPC3000
Programmable Controllers


PM LEGACY™
Panel Mount Controller

## Real-World Application

**Improving patient comfort** with a Watlow thermal system containing a polycarbonate heater, RTD and custom controller. The system is designed to heat and maintain the contrast media used in angiograms or CAT scans. By making this possible at body temperature for the patient, they are more comfortable and test results are improved.

Single Loop Control

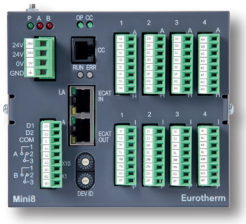
## Multi-Loop Control

Multi-loop controllers are used to control a thermal process in systems that need more than one control loop within a single system. Supporting between two and 152 loops of control, they are capable of small machine control with advanced features. Flexible I/O options control and measure a multitude of processes including temperature, carbon potential, humidity, flow, pressure, level, viscosity and additive dosing.

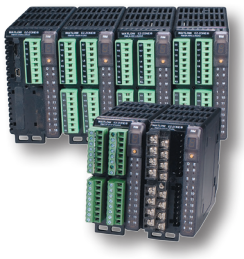
Features include communication protocol options, cascade with auto-tune, adaptive control, timer and counter application blocks, on-board data management, user-customizable menus, sensor backup, AUTO CLONE configuration restore, NEMA 4X (up to IP67), Class 1 Div 2 and free configuration software.


3500 Advanced Temperature Controller and Programmer


nanodac™ Recorder/Controller




Mini8™ Loop Controller



EZ-ZONE RM Modules


F4T Temperature and Process Controller

## Real-World Applications

**Accurate control and monitoring of liquid cryogen** is vital in advanced neutron science and the Eurotherm 3504 controller is the preferred choice at a world renowned research facility, combining expert measurement and control with a comprehensive and clear user interface. At the facility, neutron beams can be tailored to probe the fundamental processes that help explain how our universe came into being, why it looks the way it does today, and how it can sustain life.

Multi-Loop Control

## Power Control

Our range features multiple advanced microprocessor-based firing and control mode algorithms, combined with diagnostics and several communication options. Some unique features, including Load Tap Changing (LTC) and Predictive Load Management (PLM), are designed to address energy challenges.

Read more about PLM – Power Management

Controller firing modes include zero cross, burst firing, single cycle, delayed triggering and phase angle. These smart algorithms enable the products to easily control a wide base of heater loads including nichrome, molybdenum disilicide, silicon carbide, graphite, infrared lamps and transformer-coupled loads. Each range offers a comprehensive list of modular options that deliver space and time savings including controlled legs (1, 2, 3-phase control and up to 4 zone control), semiconductor fusing, load current measurement and user interface.


POWERGLIDE Controller

EPower™ Controller

EPack™ Compact SCR Power Controllers

ASPYRE Intelligent Power Controller

EPack™ Lite Compact SCR Power Controllers


EFit™ SCR Power Controller

### Real-World Application

**Immense power control with no loss of stability or accuracy** was required by a solar panels manufacturer. The EPower Load Tap Changing (LTC) block application helps enable manufacture of thin film solar modules and the result is best-in-class with huge energy cost savings that exceeded government savings targets.

Power Control

# Heating

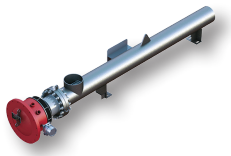
## Industrial Process Heaters

Industrial organizations can push decarbonization forward by shifting process heater systems from burning fossil fuels to electric. Higher (and safer) watt densities and more have all contributed to heat exchangers with a smaller footprint, less fouling and better safety features. Besides reducing the use of fossil fuels, electric heaters and heat exchangers have other well documented advantages.

- Less thermal lag: Temperature is controlled through direct application of electricity
- Safer operation: No fossil fuels to burn or combust
- More uniform distribution of heat:  More control of the current means more heat control
- Smaller overall footprint: No need for storage/transporting of heating oil, from stage to stage

### Duct Heater

Duct heaters are easily adapted to many non-pressurized air-heating systems. Duct heaters are easily installed in applications requiring a wide range of temperature versus air flow combinations.



### OPTIMAX Heat Exchanger

OPTIMAX heat exchangers achieve world-class pressure drop performance. Developed with technology to provide advanced flow for more efficient heat transfer and CAPEX.

### ANSI Flange Immersion Heater

ANSI flange tubular heaters ideal for heating liquids, gases, tanks and pressure vessels requiring higher kilowatts.

## Typical Applications

- Medium voltage heating
- Industrial materials processing
- Immersion heating
- Electric Vehicle (EV) battery manufacture
- Gas regeneration
- Steam superheating
- Syngas heating
- Mole sieve regeneration
- Dry gas seal heating
- Catalytic regeneration

## Real-World Application

**Electric heaters are widely used in many applications including oil and gas, petrochemical, catalyst regeneration, etc**. They have a proven track record, continually meeting the required 100,000 hours of continuous service. Electric heating systems are designed and manufactured to stringent industry standards and meet the requirements set by third-party agencies such as UL, CSA, ASME, ATEX, ICE, NACE and more. They can be installed in hazardous and non-hazardous environments

# Flexible and High-Performance Heaters

Watlow's line of flexible and high-performance heaters are used in a wide range of applications where their low mass, customizable shape and optimized circuit designs enhance thermal uniformity and can simplify system design or support device miniaturization.

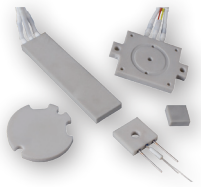
Specific configurations offer unique benefits such as ultra-high watt densities for fast ramp rates, superior electrical isolation for low leakage current, no outgassing for improved cleanliness and integrated temperature sensing for better thermal control.

## Typical Applications

- Semiconductor processing
- Aerospace and automotive manufacturing
- Life sciences and pharmaceutical manufacturing
- Medical, clinical and analytical equipment
- Food and beverage processing
- 3D printing and additive manufacturing
- EV battery manufacture

### FLUENT™ Inline-Heater

Integrated solution saves space and install time by replacing multiple components in a system.



### ULTRAMIC™ Advanced Ceramic Heaters

High performance AIN heater. Operates up to 600°C (1112°F) with an ultra-fast ramp rate of up to 150°C (270°F) per second.

### Polyimide Heaters

Polyimide provides excellent tensile strength, tear resistance and dimensional stability. Offers high-temperature resilience and rapid, uniform heat distribution.

### Silicone Rubber Heaters

Rugged, yet thin, lightweight and flexible. For rapid, efficient heat transfer, fast warm ups and decreased wattage requirements.

## Real-World Application

**ULTRAMIC™ heaters provide safe, warm, moist air for patients** because ULTRAMIC™ advanced ceramic heaters are designed to meet the challenging requirements of a high flow oxygen therapy device. Safely providing conditioned air, high flows can be delivered comfortably through nasal cannula versus traditional masks.

Heaters

## Gas Delivery Heaters

Watlow gas delivery heaters are designed for reliability and temperature uniformity in complex applications. Our expert application knowledge is ideal for any application requiring a flexible shape or design.

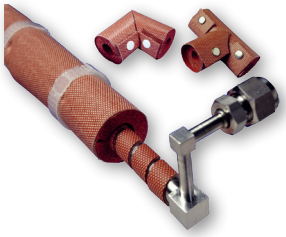
Offering precise temperature control for process gas management, diagnostics for fault detection, point-of-use heating, high temperature capabilities and minimal to no outgassing. For example, in semiconductor processes, condensation may build up in the gas line and puddle in the shower head before being injected into the vacuum chamber. A substantial number of wafer defects will occur if liquefied gases (condensation) are injected into the chamber. Uniform heating with our solution prevents condensation.

## Typical Applications

- Semiconductor processing
- Gas processing
- Abatement and exhaust line heating
- Life sciences
- Medical, clinical and analytical equipment
- Foodservice equipment

STREAMLINE™ with ATS™ Technology Gas Delivery System

Provides temperature uniformity, a reduced footprint, extensive diagnostics and fast development times.



STRETCH-TO-LENGTH™ Heater

Ideal for applications requiring precise temperatures to prevent condensation or over-temperature breakdown of critical process chemistries.

ASSURANT™ Heater

Efficient, easy-to-install. Maximizes thermal uniformity and coverage. Ideal for downstream exhaust line applications.

## Real-World Application

**STREAMLINE with ATS technology provides temperature uniformity, a reduced footprint, extensive diagnostics and fast development times** when compared to typical systems on a semiconductor tool. Heating and controlling the thermal processes on the gas lines, forelines and exhaust lines are typically complex with many components and maze of wiring. With STREAMLINE this is integrated into the EZ-ZONE RMT controller offering closed-loop control with integrated over-temperature safety protection for each heater with just two wires, reducing installation errors, offering easier troubleshooting, with fewer controllers to integrate, installation is quicker and easier by cutting heater connections by up to two-thirds. It also reduces costs and provides a more spatially-efficient system.

Heaters

# Sensing

## Temperature Sensors

Temperature sensor accuracy, repeatability and stability are critical for most industrial processing applications. Our advanced sensor technologies around fiber optics, thermocouples and RTDs and thermistor sensor assemblies are specially designed to ensure precise and repeatable temperature feedback in challenging environments.

For example, within semiconductor processing, fiber optic sensing offers superior accuracy in RF plasma conditions.

## Types of Sensors

Resistance Temperature Detectors (RTDs)

EZ-ZONE™ RMZ Fiber Optic Temperature Measurement and Control Systems

EXACTSENSE™ Thermocouples

## Real-World Application

**EXACTSENSE™ sensors help reduce pollution** because they measure engine temperatures, which are critical to the performance of the emissions aftertreatment systems that reduce pollution. Today, it takes a total of 65 trucks to emit the same amount of pollution as one truck did in 1988.

Sensors

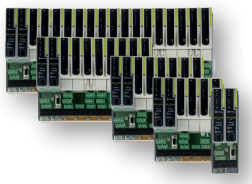
# Process Automation and Control Solutions

Our thermal solutions are fully scalable from a single control loop to a large, enterprise-wide automation network and minimize initial engineering costs with consistent, flexible tool sets.

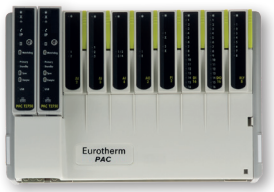
We bring a wealth of expertise in process automation across many industries and offer high performance solutions to improve operational efficiency. With numerous successful installations around the world, the more challenging your control problem, the more value we bring.

This expertise is what separates us from the typical system integrator. We can help you reduce engineering effort with systems that are delivered on time and that work the first time.

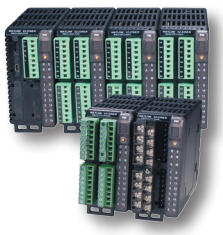
E+PLC400
Combination PLC



T2550 PAC



T2750 PAC



EZ-ZONE™ RM
Rail Mount Controller

Silver Series EM

Eycon™ 10/20
Visual Supervisor Controllers

Process Automation

## Engineering Services

In addition to expertise in process automation and machine control products, we also offer a broad range of engineering services to implement a complete solution for your application.

### Custom engineered solutions

- From discrete instrumentation up to medium distributed control systems (DCS)
- Creating collaborative specifications
- System design
- System engineering
- Panel and cabinet building
- System Accuracy Test (SAT)
- Factory Acceptance Testing (FAT)

### On-site system installation

- Wiring, commissioning and start-up services
- Validation IQ, OQ, PQ
- Comprehensive project management (including GAMP® and FDA 21 CFR Part 11 methodologies)
- Complete project documentation
- Network analysis
- Custom reports
- Analytics

### Real-World Application

**Providing a retrofit laboratory machine control solution** that easily integrates with an existing installation. Our solution adds precision control and visualization with the T2750 PAC and HMI. They sought our expertise within highly regulated life sciences applications and FDA traceability.

Process Automation

# Data Management

Comprehensive security and data integrity make our data recorders ideal for use in regulated industries, such as pharmaceutical or heat treatment, or for any application where loss of data during a manufacturing process would result in loss of revenue through scrap or rework.

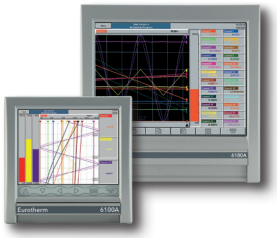
Data can be recorded in tamper-resistant binary check-summed files, and stored within an onboard flash memory. Flexible archiving strategies ensure long-term data is kept secure for later retrieval and analysis if required.


nanodac™
Recorder/Controller


F4T™ Temperature and
Process Controller

RMA PLUS
Remote Access Module


versadac™ Scalable
Data Recorder



6000 Series
Graphic Recorder

Data
Management

# Software

Watlow software tools provide an interface to controllers and other automation equipment that is more powerful and flexible than standardized interfaces.

Configuration software simplifies setting up, saving and copying configurations from one controller to another. Process data can be used to give insights into your production processes, identifying areas where improvements may be made.

## Engineering and Operations Tools for Configuration, Visualization and Reporting

Human machine interface (HMI) software is easy-to-use and ideal for data recording, trending, managing recipes, monitoring alarms and creating customized user interfaces for machines and systems with Watlow controllers.

Remote monitoring software provides a view into the process regardless of where in the world you are, or what type of browsing device you have available to you. The ability to browse and analyse your process data at any time, without the need for application or database expertise, is essential for agility and continuous improvement, empowering you to display, analyze, print and share historical data files, however you want, whenever you want.

QR1 Controller Software

QR2 Recorder Software

QR3 E+PLC Software

QR4 PAC Software

QR5 Composer Software

While competitors are just talking now about connecting to the enterprise, our tools have been doing this for many years with a versatile suite of software tools including system platform technologies.

## Engineering Tools

- **COMPOSER™** (QR 5) For configuring and customizing controllers. Use it to optimize Watlow F4T, EZ-ZONE™ RM and EZ-ZONE PM products for specific applications
- **Project Studio/Developer** (QR 4) Engineering tools for process automation with single point configuration and integrated development environment
- **CODESYS™** (QR 3) For E+PLC controllers (open industry standard IEC61131-3). Enables simplified engineering via integrated programming and visualization development environment. With OEM customization and user level access to help safeguard engineering intellectual property
- **Security Manager** (QR 2, 4) A PC based application for managing user access and device permissions
- **C-Edit™** (QR 2 ) Windows-based off-line configuration editor for Eurotherm 6000 series configuration
- iTools (QR 1, 2) Versatile and complete engineering studio for configuration, data logging, communication and monitoring for Eurotherm process controllers, power controllers and recorders

# Operational Tools

## Visualization

- **Bridge** (QR 2) Online remote, powerful but easy to use configuration and visualization tool for Eurotherm™ 6000 series. With security access, users can view multiple networked devices using LAN intranet or internet
- **Process Viewer** (QR 4) Low cost HMI, contains iTools and EuroMBUS OPC Server, LINtools, LIN OPC Server
- **Operation Server/Viewer** (QR 4) Comprehensive user authorization, tamper-resistant with Security Manager. Supports Ethernet, ARCnet and serial connectivity. Auditor features meet FDA 21 CFR Part 11

## Data Reporting

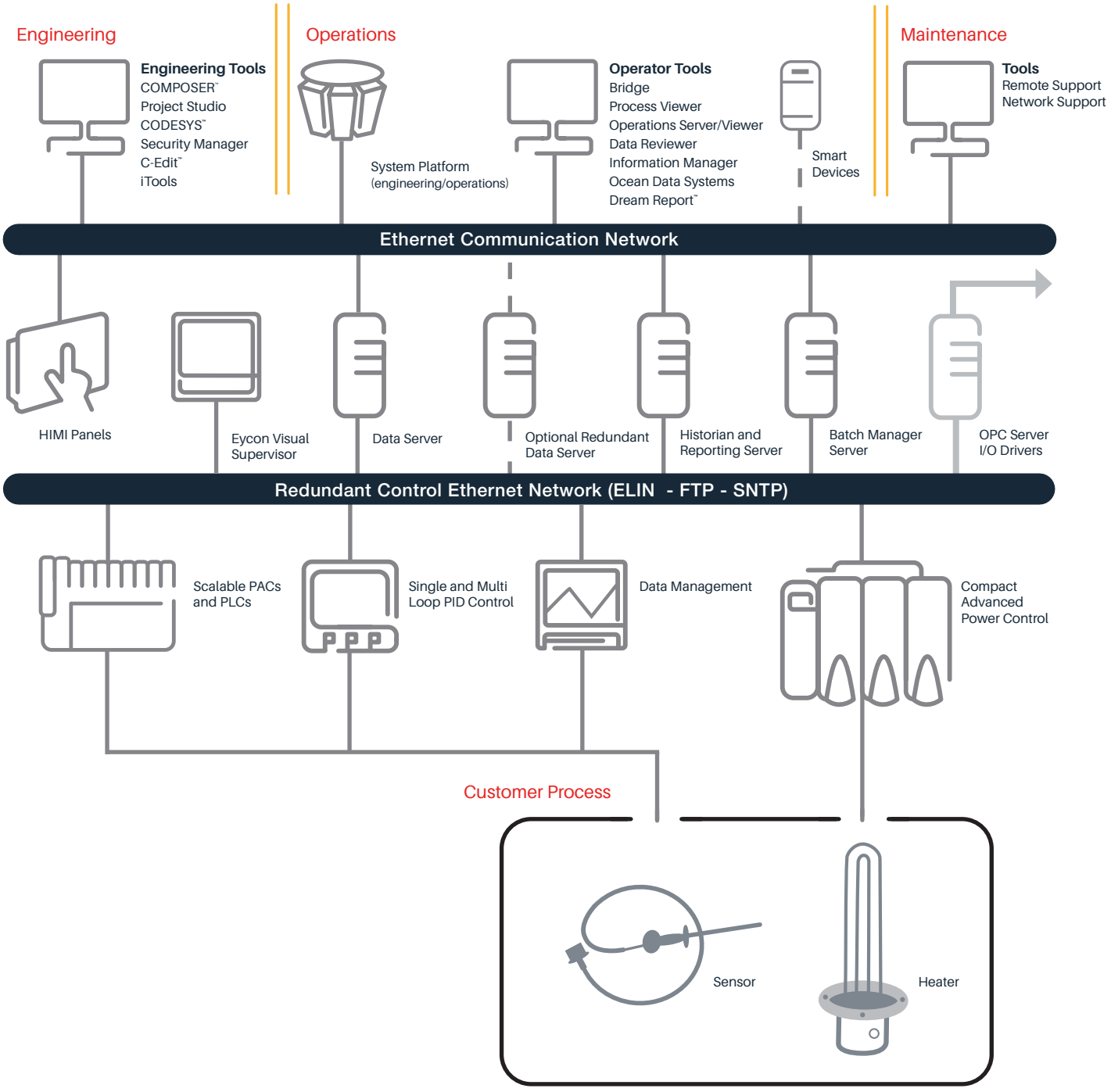
- **Data Reviewer** (QR 1, 2, 4) Viewing, analysis and print of historical data files from proprietary Eurotherm™ controllers, PAC and data acquisition devices
- **Information Manager** (QR 4) Connects the control network to the enterprise. Captures and stores all plant data 24/7. Obtains data from our proprietary UHH files with Store & Forward technology
- **Ocean Data Systems Dream Report™** (QR 2) Customized integrated reporting solution for industrial automation. Extracts data from almost any data source and can provide reports remotely 24/7. Ideal for both continuous and batch process applications

# Maintenance and Integration

Our distributed control system (DCS) is designed for better integration, maintenance and long-term support (network and remote) as a fully integrated solution. Its architecture reduces wiring and engineering costs while providing excellent build accuracy and simplified maintenance of a single database structure.

- **OPC Server** (QR 4) To interface LIN networks to any 3rd party OPC client OPC DA server. Open communication is available with other Eurotherm systems products
- **Customized I/O drivers** (QR 4) For world-leading software packages, such as AVEVA™ (Wonderware™) and GE™ iFIX SCADA systems, along with configuration for Modbus® devices and diagnostic and monitoring tools

# Watlow Thermal Solution Architecture



# Expert Technical and Global Application Support

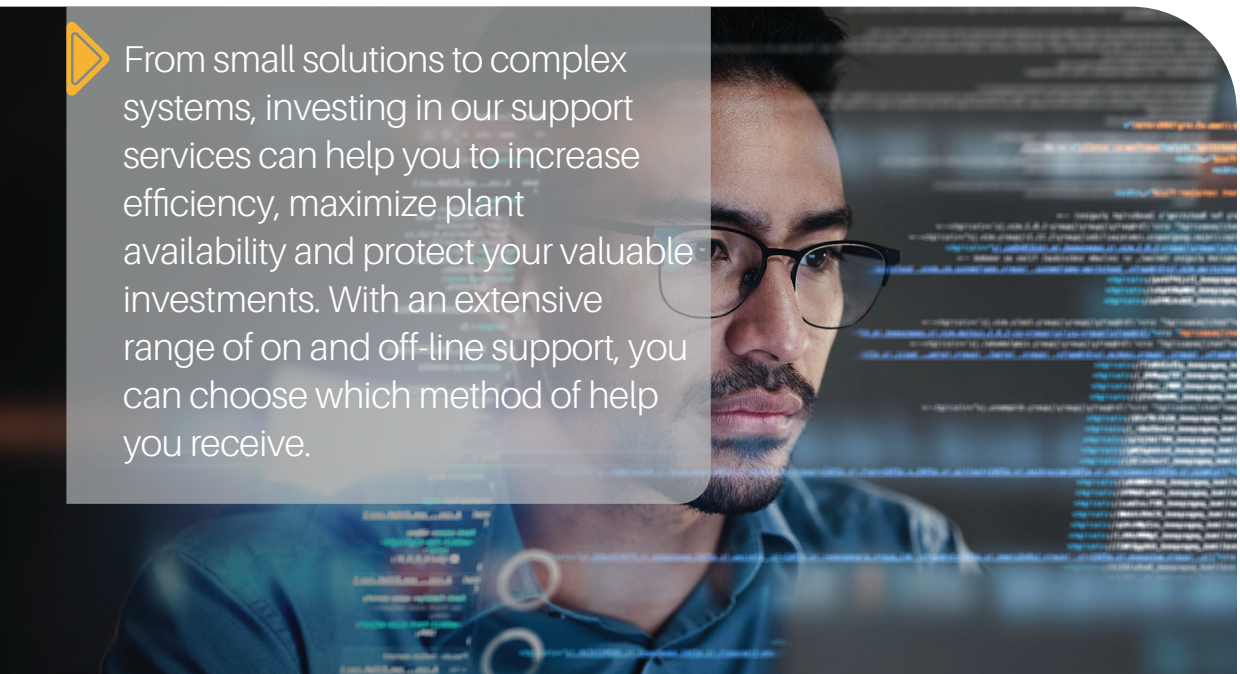
We leverage our knowledge to solve the world's toughest thermal problems by asking the right questions. No matter how complex or challenging, Watlow excels in thermal problem solving: It is important to know how materials being heated relate to temperature, watt density requirements, temperature sensing, control systems and the process environment itself. Technical support is available throughout the project to optimize performance.

## Technical Compliance and Agency Approvals

We leverage our regulatory know how directly into products, systems and solutions to meet the specialized requirements of industrial standards. Consistent, regulatory compliance is embedded into every aspect of our organization, from our engineering teams through our operations, to the products and thermal systems we design, build and support throughout their lifecycle.

## Supporting the Entire Thermal Loop

Unlike most suppliers that sell discrete thermal components, Watlow designs and manufactures all parts of the thermal loop providing fully integrated thermal systems. Watlow's expertise is designing, testing, building and delivering complete thermal solutions. Choosing Watlow as a single source supplier allows one-stop access to more than 100 years of thermal expertise for all your thermal needs.



From small solutions to complex systems, investing in our support services can help you to increase efficiency, maximize plant availability and protect your valuable investments. With an extensive range of on and off-line support, you can choose which method of help you receive.

Contact Us

# Service and Optimization

With expertise across a wide span of industrial processes, we know that many of these require a high degree of precision, attention to detail and specialized knowledge. Managing operations can be a challenging task, and expert technicians are trained to help overcome these challenges.

Refurbishing existing control panels to upgrade equipment is becoming increasingly popular. Our engineer will take control of the complete project including control panel and wiring modifications. This can provide a cost-efficient method of gaining compliance to regulatory standards such as ANSI, NADCAP and FDA.

## Accredited Services to International Standards

- Thermal Uniformity Surveys (TUS): Ovens, furnaces, freezers, chambers and System Accuracy Tests (SAT) to meet the requirements of AMS2750H pyrometry standard with thermal imaging
- Calibration (ISO 17025): Electrical, pressure, time, temperature, humidity
- Calibration (Traceable): humidity, Rh, PH, conductivity, mass, mechanical, infrared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## Validation Services (GAMP)

- Auditing and consultation
- Validation to latest GAMP® guidelines & 21 CFR Part 11
- Validation documentation services:
  - User requirements, functional and design specifications
  - System build
  - Installation, operational and performance qualifications
- Services to maintain the validated state including:
  - Calibration
  - Like-for-like parts management to minimize revalidation
  - Controlled installation of patches and upgrades
  - System operation and administration
  - Backup and recovery solutions
  - Training for system operators and administrators
  - Warehouse mapping

## Technical Services

- Help desk support
- Business continuity plans
- Customer First Service Level Agreements
  - On-site assistance and telephone support options
  - Parts management
  - Preventative maintenance and health checks
  - Remote diagnostic support
  - Disaster and recovery plan
  - Software and application support
  - Process diagnostics and predictive maintenance
  - Maintain asset compliance with latest software and hardware updates

## Repair and Support Services

- Hardware modifications
- Calibration to national standards in-house or on-site
- Product replacement/upgrade service on obsolete or beyond economical repair
- On-site repair service

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## Four Key Operational Objectives

At Watlow, quality defines our brand and is one of four key operational objectives. This foundational approach improves overall performance of our customers' applications and provides them with a competitive advantage.

### Innovation

We are committed to investment in new technologies such as AI and Industry 4.0 to digitize and accelerate our manufacturing environment through faster and more accurate data-driven decision making.

### Quality

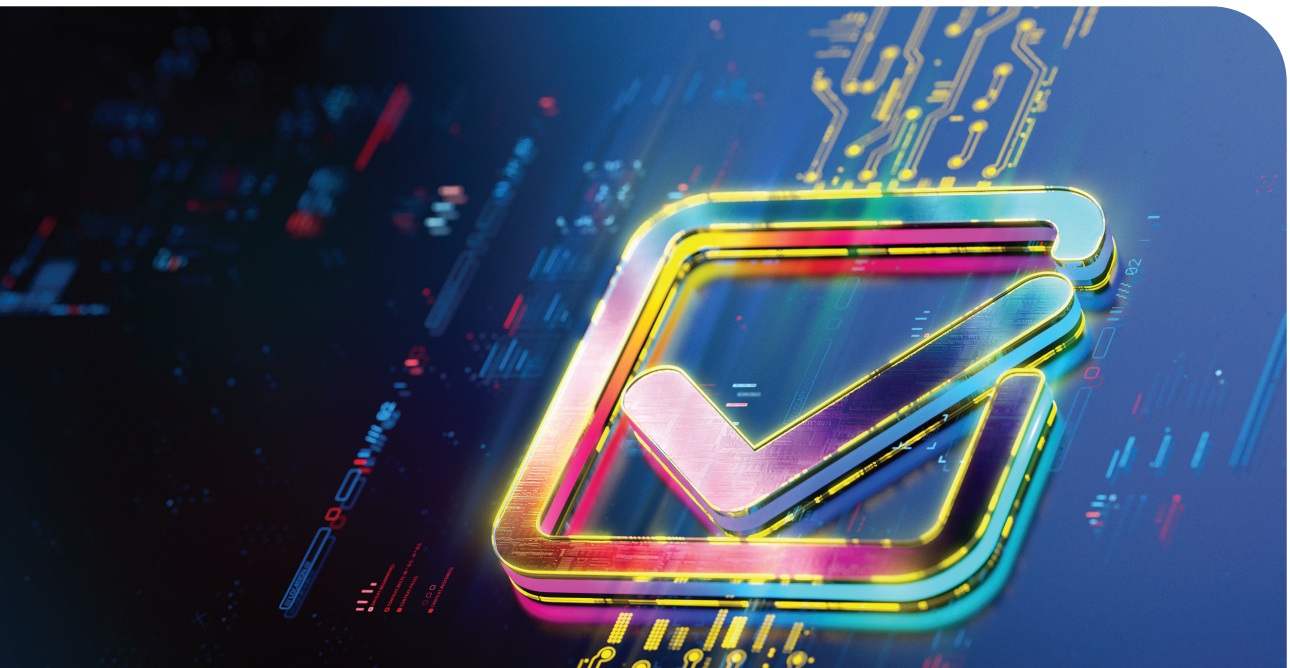
Our relentless pursuit of perfection drives our industry-leading quality across all of our manufacturing facilities worldwide.

### Cost

We empower our entire organization to learn and leverage continuous improvement and lean methodologies to eliminate waste, reduce lead times and aggressively manage our cost.

### Service

We are humbled knowing that our world-leading customers rely on us to help them thrive. We monitor customer satisfaction and take action where we find room for improvement.



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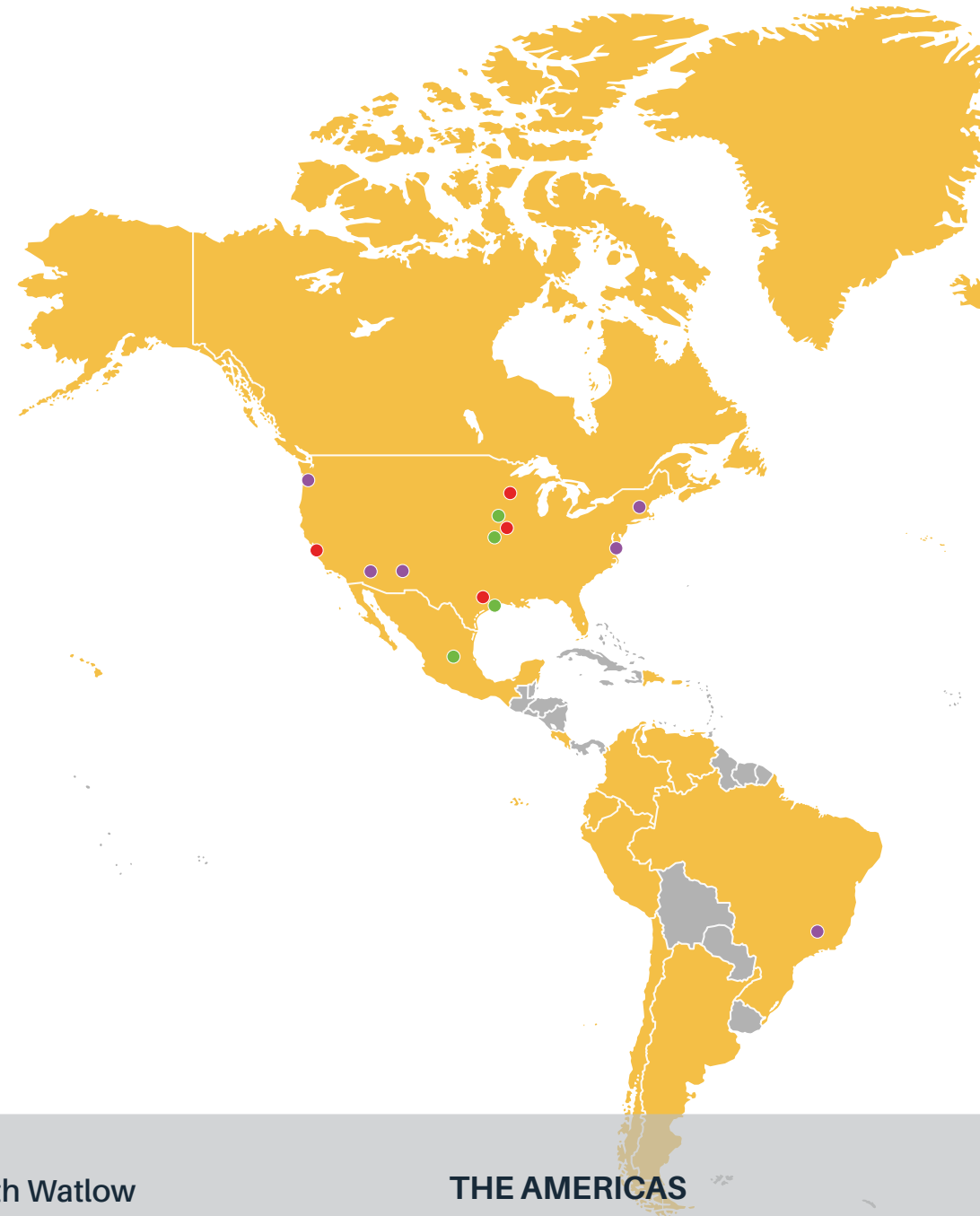
# Watlow Worldwide

## In-Region Manufacturing and Support

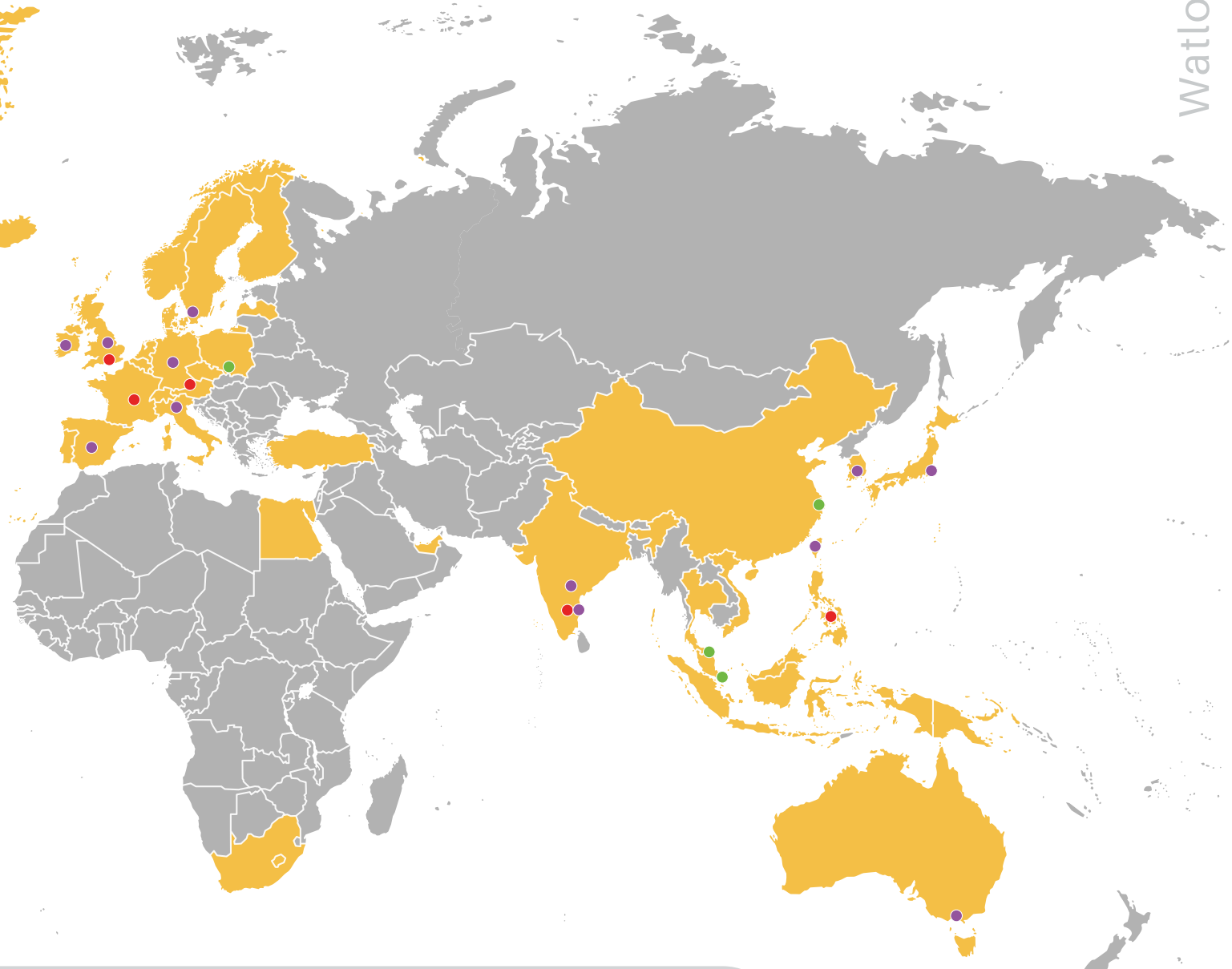


**Countries with Watlow Distributor Sales Offices**

- Technology and Development Center (TDC)
- Manufacturing Center of Excellence
- Sales Office / Customer Support

### THE AMERICAS

- Ashburn, VA
- Austin, TX
- Campinas, Brazil
- Columbia, MO
- Hannibal, MO
- Houston, TX
- Malta, NY
- Phoenix, AZ
- Portland, OR
- Queretaro, Mexico
- Rio Rancho, NM
- St. Louis, MO
- San Jose, CA
- Winona, MN



## EUROPE

- Dardilly, France
- Guanzate, Italy
- Kuchl, Austria
- Ledziny, Poland
- Limburg, Germany
- Longford, Ireland
- Lund, Sweden
- Madrid, Spain
- Nottingham, UK
- Worthing, UK

## APAC

- Bangalore, India
- Cebu, Philippines
- Chennai, India
- Hyderabad, India
- Kedah, Malaysia
- Notting Hill, VA, Australia
- Seoul, Korea
- Shanghai, China
- Singapore
- Taiwan
- Tokyo, Japan

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