

BEST IN CLASS SOLUTIONS TO IMPROVE AEROSPACE HEAT TREATMENT PROCESSES



HEAT TREATMENT PRODUCT LINE

Neal Systems Inc. (NSI) can provide you with a complete product solution to help your process comply with AMS2750.



NSI Provides Customers With:

- High Accuracy Data Recording Devices
- Custom Reporting Packages
- High Accuracy Temperature Control
- Efficiency Optimization

Data Recording Devices:

AMS2750 requires aerospace suppliers to adopt rigorous procedures for oven and furnace maintenance. Our Temperature Recording and Control Solution is designed to help you comply with Aerospace industry standards with ease.



The 6000 Series recorders offer industry-leading input accuracy with a 125ms total sample rate for up to 48 freely configurable input channels.

Each instrument has an intuitive touch screen display, onboard Flash data storage capability, Ethernet communication, and removable media.

Data is stored in a tamper-resistant, binary format that can be used for long-term records of your process.

The 6000 Series is designed for today's networked world and can be accessed via a Local Area Network, dial-up connection, Intranet, or Internet.

Features of the 6000 series include the following:

Recording Accuracy

The 6180AeroDAQ meets $\pm 2.0^{\circ}\text{F}$, $\pm 1.1^{\circ}\text{C}$, or $\pm 0.2\%$ of temperature, whichever is greatest. For field test instruments, the 6180AeroDAQ with TUS, external CJC, and fast-acting accuracy meets $\pm 1.0^{\circ}\text{F}$, $\pm 0.6^{\circ}\text{C}$, $\pm 0.1\%$ of temperature, whichever is greatest.

Thermocouple Life Monitoring

The 6180 AeroDAQ provides thermocouple life monitoring to help assure that thermocouples are not used beyond their maximum life – a requirement for AMS2750. Knowing the life span of your thermocouples helps save energy, eliminates operator error, and reduces outages due to non-compliance.

Automated Scheduling

Using a furnace when it has exceeded the allowable calibration period, TUS, or SAT can result in audit non-compliance and monetary loss.

The 6000 series provides notification of due dates for:

- Calibration
- TUS (Thermal Uniformity Survey)
- SAT (System Accuracy Test)



Custom Reporting

The 6180 AeroDAQ reporting package is easily customized to meet your specific requirements, transforming securely archived data into batch information critical to you and your customers.

The reporting package provides a standard batch reporting functionality including:

- Customer Information
- Batch Information
- Alarm Summary
- Trending

Historical analysis of all data sorted by batch ID or date and time is available through Eurotherm's Reviewer software, which allows you to display, analyze, print, and share historical data files in an easy-to-examine trend format. The source data is recorded in a tamper-evident file format and is conveniently organized by group and batch. Reviewer can be installed remotely for centralized data management, even in a different country.

Audit Trail

The following table shows how the 6000 series complies with AMS2750 requirements.

Electronic Records	AMS2750 Clause	CQI-9 4th Ed.	Eurotherm Solutions
Tamper evident	3.2.4.2a	P3.2.6	Records unalterable without detection. Eurotherm 6000 series recorders, Nanodac recorder/controller, Versadac scalable recorder, E+PLC controller, and T2750 PAC controller create write-once, read-only data records in a tamper-evident binary file format with the file extension .UHH.
Record playback	3.2.4.2b	P3.2.6	Source data unalterable in reviewing tool. Eurotherm Data Reviewer software utility enables playback of the data in an easy to examine trend format. The source data is recorded in a tamper-evident file format.
Records in readable form	3.2.4.2c	Section 4 job audit	Accurate, complete records for inspection, review, and copying. Eurotherm Data Reviewer and AVEVATM Reports for Operations software generates accurate copies of records in human-readable and electronic form, suitable for inspection, review, and duplication.
Record review	3.2.4.2d	Section 4 job audit	Evidence of record reviews in electronic or printed format. Eurotherm Data Reviewer has an embedded annotation function to provide evidence that the record was reviewed - this review then becomes a part of the permanent record. The record can be printed as a PDF file (for electronic review) or a hard-copy for physical marking to verify review.
Protection of records	3.2.4.2e	IATF16949:2016 defines retention periods	Retrieval of accurate records throughout the retention period. Eurotherm Data Reviewer is a 2nd generation software utility that also accepts Eurotherm .UHH file formats created 15+yrs ago. Redundant archiving of the source data provides additional retention assurance. 6000 series recorders support secure FTP when transferring files to Eurotherm Data Reviewer. Eurotherm 'store and forward' feature automatically backfills data to servers if communications are temporarily lost.
Hardware and software operation	3.2.4.2f		Operate throughout retention period (min. 5 years). The Eurotherm established obsolescence program ensures both hardware and software are supported throughout stated retention periods.
System access	3.2.4.2g		Authorization methods of record access. Data acquisition products have an optional user management feature that is used to manage password access.
Software revisions	3.2.4.3		Eurotherm Data Reviewer software revisions do not impact process parameters. Setpoint cycle revisions in PLC's or programmers is controlled by authorized access and quality procedures. Eurotherm control products have passcode protection on configuration. Eurotherm Data Reviewer operates independently to cycle setpoint programmers and will not impact process parameters on revision updates.

Security:

Secure data archiving is a fundamental requirement in the aerospace industry. Secure data logging, data archiving and user access are all designed to give you peace of mind while still providing 'ease of use'.

Process data and Metadata values are continually logged to the large, internal, non-volatile FLASH memory. Records are stored in a secure, binary, check-summed format to protect data integrity.



Integral Audit Trail

- Every time a user logs on, completes an operation or makes a change to the configuration, it is recorded. The Audit Trail is time-stamped and incorporates the operator details along with the changes made. It is stored with the process data and cannot be modified or removed.

- **Specific user access permissions, configurable for each user including password aging, password length definition and signing privileges**

High Accuracy Temperature Control:

For high-accuracy temperature control, Eurotherm products cover a variety of application sizes and complexities. Simple single-zone control is cost-effective and easy to implement, meanwhile, complex multi-zone ovens and furnaces are controlled by Eurotherm's flagship products with ease. All products are powered by Eurotherm's industry-leading precision PID algorithm, which delivers:

- Fast-reacting and repeatable control
- Reduced overshoot amplitude and time
- Reduced time below target temperature

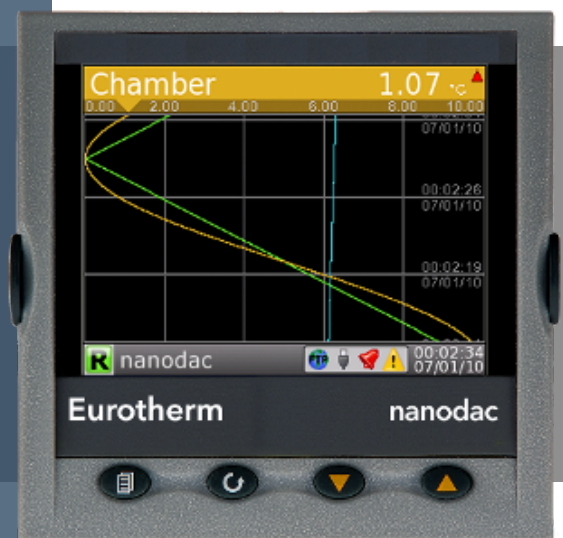
The following table helps determine which solution would be the best one to choose:

Functionality							
Controller		Batch	Audit Trail	Active Directory	PID	Custom graphics	# T/C's
	Eycon	✓	✓	✓	✓	Yes	N/A
	T2750	✓	x	x	✓	No	100
	Nanodac	✓	✓	X	✓	No	8
	EPC3000	X	X	X	✓	No	1



The EPC Series are single-loop PID controllers with built-in Ethernet communications. They come in 1/4, 1/8, and 1/16 DIN sizes aiding in precise and consistent control over long periods with minimal calibration drift. Process inputs are fast and accurate, with exceptional thermal stability. Recalibration and user calibration correction functions are available to further improve accuracy.

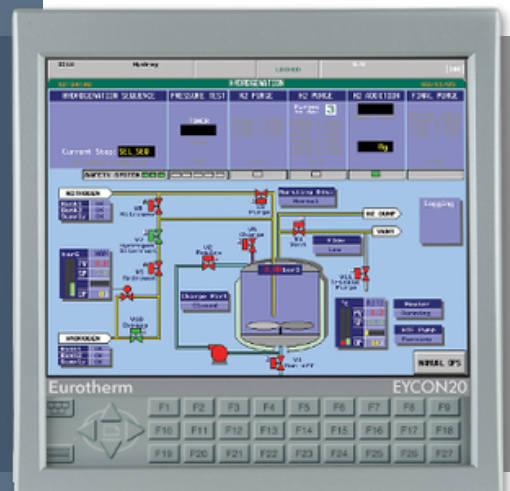
The Nanodac is a two loop, two-profile controller with up to eight T/C inputs available as well as secure data recording and built in Ethernet communications. The universal input channels provide high accuracy (suitable for use in Nadcap applications) and 125ms parallel sampling. An additional 30 virtual channels can be utilized to provide maths, counter, slave communications and totalizer functionality within the instrument.





The T2750 is a multi PID rack based controller (25+ loops) with up to 16 I/O cards available in order to handle even the largest of systems. It is often used in conjunction with the Eycon to provide visualization and data recording functionality required for high-end systems.

The Eycon is a graphic recorder with multi PID control, batch, audit trail, security, active directory integration, customer graphics, alarming and several communications ports for integration to other devices such as PLC's. It has no I/O and is typically configured in conjunction with the T2750.



Power Efficiency Optimization:

As utility costs rise, the cost of running an electric oven or furnace has become a major concern. Neal Systems delivers two solutions to help reduce that cost back to more manageable levels: Eurotherm's intelligent power controllers and M-System's power monitoring devices.

Eurotherm's EPack and Epower SCR power controllers deliver real savings and can significantly help reduce energy costs.

- Single and multi-phase control options available (up to 4 phases)
- Partial or full load break detection alarming reduces running with faulty elements
- Improve process reliability with advanced information
- Reduce scrap and energy costs by minimizing reactive power losses
- Reduce commissioning time with easy integration and installation



- Available complex configurations with iTools software
- Help save energy with a >0.5% measurement accuracy and load management feature
- Selection of advanced firing modes to best suit load type
- Available integration with any industrial protocol e.g. Modbus TCP, ProfiNet, Ethernet IP, BacNET



M-System's Multi Power Monitors/Transducers and CT Transmitters help make better decisions around power consumption, saving energy; therefore bringing costs down and improving environmental reporting.

The 53/54U series have a built-in screen whilst the M5 is a back-of-panel DIN mount. Both come with Modbus communications for integration into the control or monitoring system.

More features include:

- Advanced warnings of element failures in single-phase 2-wire and 3-wire, and three-phase 3-wire and 4-wire systems owing to an out of balance power factor
- Monitor and store data in real-time using built in Modbus RTU communications
- Input current up to 720 Amps is supported
- Local screen (53/54U) or back of panel mount devices (M5)
- PC configurable



53/54U Power Monitor



**M5 CT
Transmitter**

M-System's has an innovative range of hinged CTs, which are easy to handle and reduce installation time considerably. These CTs are available with primary side up to 600A.



Neal Systems' engineers specialize in designing and implementing systems that:

- Record, control, and optimize the use of resources such as electrical power, saving money over the lifetime of the system
- Track the status of process-critical components, such as electrical heater elements, either explicitly or implicitly
- Generate customized maintenance warnings or alarms to allow predictive rather than reactive maintenance, increasing system uptime
- Utilize an intuitive operator interface that allows for faster and easier operations and diagnostics

In the heat treat industry, operational efficiency and reliability is essential to maintaining furnaces and ovens while keeping them profitable. Maintenance techs, operators, and supervisors need to know when and how critical components become damaged or degraded, and process engineers require insight into how their systems utilize resources.

Baked into our designs are industry-leading products and over 40 years of experience in implementing control systems for our valued customers. NSI engineers will work with you at every step to create a system that fits your needs and your budget. Read on to see how NSI can help you develop a turnkey solution to improve your process.



Our Solutions

- **Cyber Security Solutions**
- **Centralized SCADA Management**
- **Industrial Networking**
- **Custom Enclosure Design and Installation**

Cyber Security

Do you know if you have cyber insurance? What requirements do your customers put on you to keep your systems and their data secure?

NSI has been securing industrial networks for 15 years using managed switches and dedicated cyber security hardware. We use the zones and conduits approach, as defined in ISA 62443, which involves segmenting networks into areas of similar security requirements. This allows us, for example, to secure the plant floor network from the business network whilst still allowing traffic to flow.

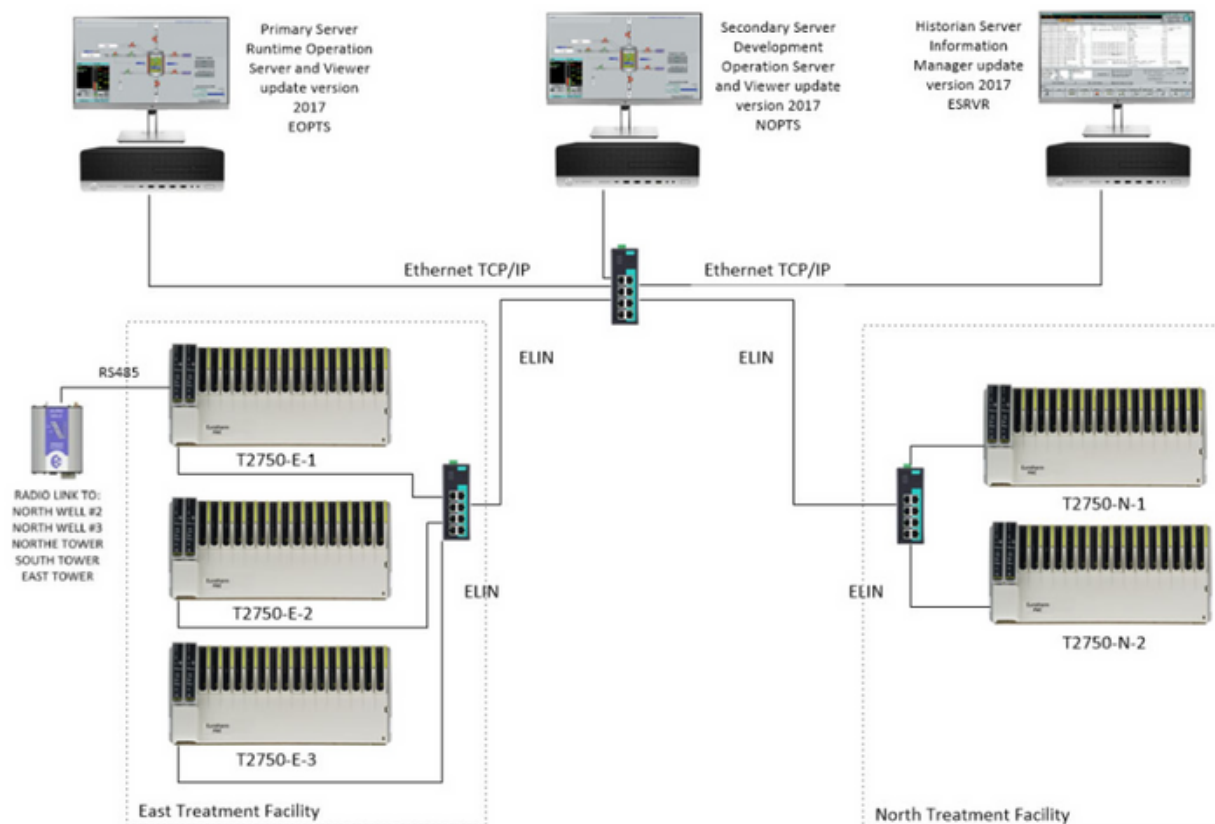


Denial of service prevention, MAC address filtering, deep packet inspection, encrypted configuration files and event logging (either locally or to a Syslog server) significantly hardens your industrial network.

Industrial Networking

Modbus TCP, EtherNet I/P, BacNet I/P, layer 2, layer 3, managed, unmanaged, fiber, Copper, cloud, MQTT, etc: What do all these terms mean for you, which are important, and which can you ignore?

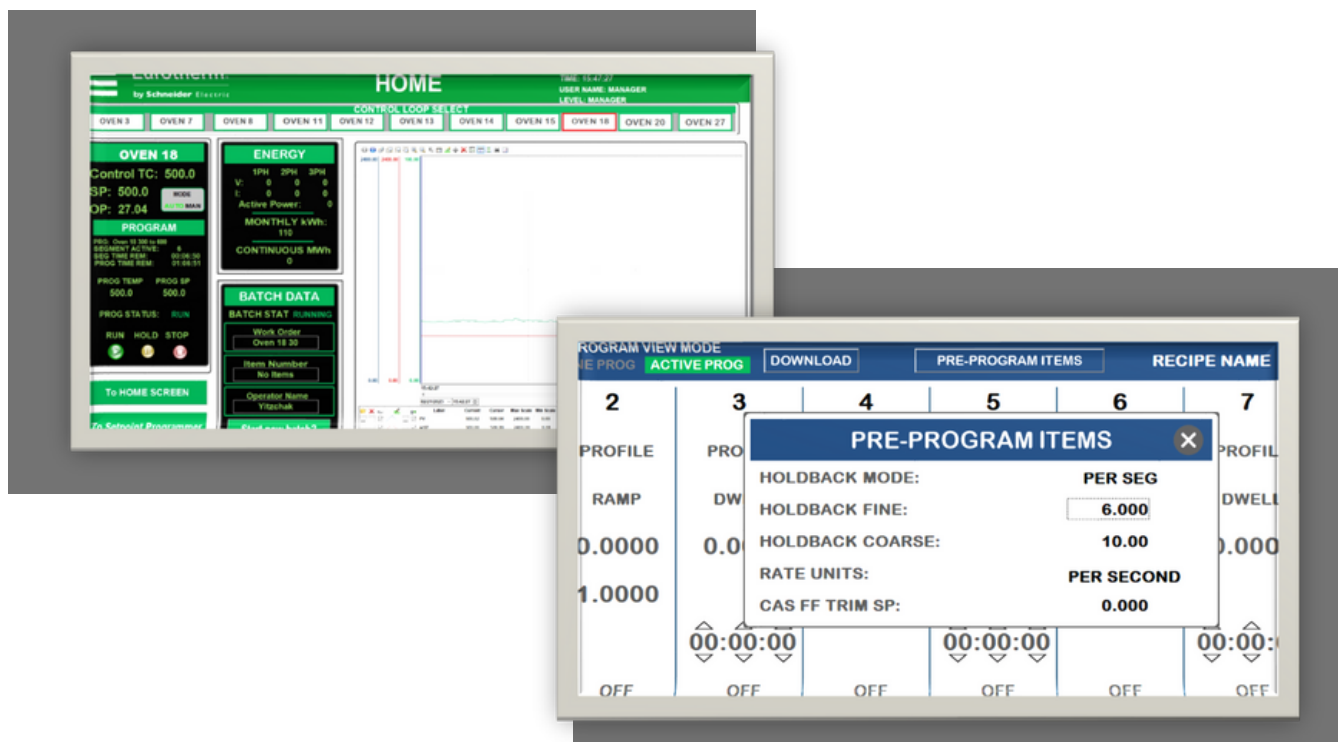
NSI designs and implements customized industrial networks for specific customer applications. Consulting services are provided to IT specialists to help them build, modify, and manage the IT/OT convergence. We use hardened industrial components with wide-ranged temperature specs and redundant power supplies. Our well-designed architectures can withstand the loss of one component and continue to work, while providing diagnostic alarms that alert the operators to the failed component. We ensure all 'single point of failure' components are identified and mitigated whenever possible.



Centralized SCADA Management

For multi oven / furnace systems, NSI offer a centralized monitoring recipe, control and alarm management system to connect wider plant and business level systems. This is based on the AVEVA platform and has been customized specifically for the heat treat industry.

- Connects to many Eurotherm controllers in the heat treat environment
- Standardized pre-configured screens for lower development costs
- Centralized access to and management of asset status availability and utilization
- Onward connection to MES and ERP systems
- Cloud connector for view-anywhere capability



SCADA Software Screens

Enclosures

NSI can design and build custom enclosures that follow the UL standard for the construction of industrial control panels.

Our Services:

- Custom Panel Creation
- Field Installation/Modification
- Custom Engineering drawings
- Integration with existing field devices
- Electrical Design
- Back-end Support



How can NSI help each member of your staff?

Senior management	• Distributed KPI's with cloud integration
Quality control	• Planned maintenance with highly qualified staff • ISO17025-complaint • Immediate reports are issued through our Beamex CMX software • NADCAP consulting
Production Supervisor	• Operational KPI's • Centralized alarming • Protected operational logs
Engineering	• Design consultation • Process optimization
Maintenance	• Predictive element failure • Thermocouple aging • Customizable alerts to conduct maintenance
Purchasing	• Reduce costs through visibility into upcoming failures allow for preventive rather than emergency maintenance • Reduce power consumption and therefore lifetime operational cost
Operators	• Easy to navigate screens • Central control stations



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