

Recording, Reporting, and Thermal Control Solutions

AMS2750G - Compliant Heat Treatment

AMS2750G - Compliant Heat Treatment

Aerospace Material Specification AMS2750, rev G defines the requirements for thermal processing equipment used in metal heat treatment applications. It covers temperature sensors, control and recording instrumentation, system accuracy tests, and temperature uniformity surveys.



Shops that adhere to the standard can confidently heat treat components used in a wide range of aerospace, transportation, and other industries that demand traceable quality procedures for heat treatment.



Yokogawa provides a range of recording, reporting, and control solutions for the heat treatment industry that meet the requirements of AMS2750G.

Our products provide highly reliable and accurate measurement, electronic recording and control of heat treatment processes in batch and continuous process operations. Fully custom thermal control and recipe management systems are also available.

Yokogawa paperless electronic recording systems also perform temperature uniformity survey (TUS) work and reporting. Our electronic recording instruments provide far greater recording accuracy and much faster operator access to historical data than paper recorders. Standard network connectivity supports a host of convenience features such as web browser data monitoring, file transfers, and email messaging. Optional TUS reporting software produces custom survey reports from the secure data files saved by these instruments.



This document will explain how these products comply with the accuracy and temperature uniformity requirements of AMS2750G and it will help you select the best solution for your heat treat application.



Meeting & Proving AMS2750G Accuracy Requirements



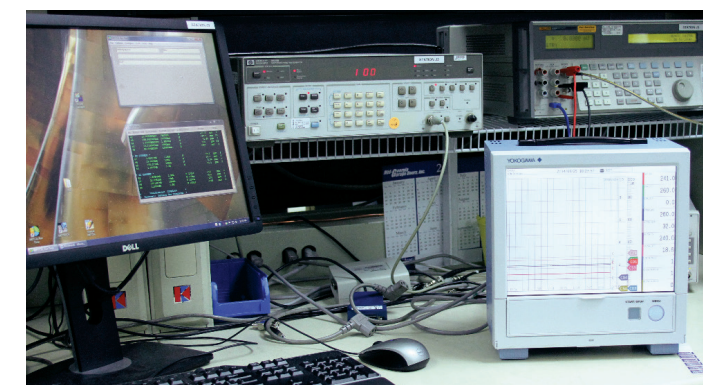
Yokogawa SMARTDAC+ GX/GP Series Paperless Recorders, GM Series Data Acquisition System, Daqstation DXAdvanced Series Paperless Recorders, and UTAdvanced Series Digital Indicating Controllers meet the measurement accuracy requirements stated in AMS2750G Table 7 for Controlling, Monitoring, or Recording Instruments.

Additionally, SMARTDAC+ GX/GP Series Paperless Recorders, GM Series Data Acquisition System, and Daqstation DXAdvanced Series Paperless Recorders meet the accuracy requirements stated in AMS2750G Table 7 for Field Test Instruments.

When these models are specified for TUS work and for Nadcap auditing purposes, a calibration certificate and AMS2750G thermocouple accuracy certificate should be ordered with the equipment to prove accuracy.

Instrument Calibration

The calibration certificate validates the instrument measurement calibration for all supported measurement ranges. NIST and ISO 17025 calibration certificates are available. All calibration work is performed in Yokogawa's Newnan, GA ISO 17025-accredited calibration lab. AMS2750G requires a three month calibration interval for Field Test Instruments. Equipment can be returned to Yokogawa for this purpose or it can be performed by a local accredited calibration lab.

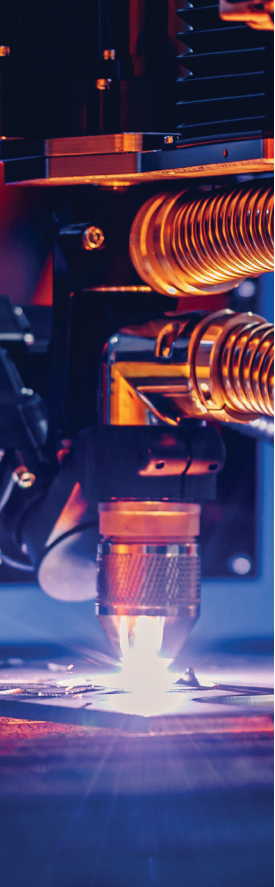


GX90 series I/O modules are removable to allow for easy wiring changes and routine calibration checks

Calibration Certificate Sample Data:
Yokogawa Corporation of America
Calibration Laboratory Data Sheet



Customer: YOKOGAWA			Test Result: PASS	
Model No. : GP20/GX90XA			Data Status: FOUND/LEFT	
Serial No. : S5P601228/S5PC05118			Temperature: 23.2°C	
Description: RECORDER			Relative Humidity: 40%	
Date Tested: 7/15/2020			Procedure Used: DS_GP10	
Date Due:			Standard/s Used: 2113901	
RANGE	INPUT	MEASUREMENT VALUE (CH 1)	TOLERANCE	UNCERTAINTY (MV)
200mV	-200.00mV	-200.02	±0.13	0.01159
	0.00mV	0.00	±0.03	0.00659
	+200.00mV	200.04	±0.13	0.01277
1V	-1.0000V	-1.0001	±0.0017	0.06631
	0.0000V	0.0000	±0.0012	0.06533
	+1.0000V	1.0002	±0.0017	0.09754
Type T	0.0V Input Ext RJC	0.0	0°C ±0.5	N/A
Type K	0.0V Input Ext RJC	0.0	0°C ±0.7	N/A



AMS2750G Thermocouple Accuracy Certificate:
To prove thermocouple measurement accuracy for a specific TUS thermocouple type, span and temperature set points, an AMS2750G accuracy certificate can be provided. AMS2750G thermocouple accuracy certificate indicates actual measured performance of set point temperature values input by a precision calibration instrument, using the same thermocouple type and units used in the customer’s application. Thermocouple type, units and range must be supplied with the order to obtain this certificate.

AMS2750G thermocouple accuracy certificate using customer-supplied thermocouple type and test points:

Type K Thermocouple Accuracy Certification			
Date:	7/15/2020	Calibration Inst.	Fluke 5522A
Calibration Engineer:	Jeff Ayers	Instrument S/N:	2113901
Ambient Temp:	23.2°C		
Relative Humidity:	40%		
Hardware Type		Input Module	
Model	S/N	Type	S/N
GP20	S5P601228	GX90XA	S5PC05118

Reference Temp.	Observed	Observed Error	Max Allowed Error ¹	In Spec?
°F	Temp	°F	1°F	Yes/No
200	200.4	0.4	1	Yes
400	400.4	0.4	1	Yes
600	600.4	0.4	1	Yes
800	800.5	0.5	1	Yes
1000	1000.6	0.6	1	Yes
1200	1200.6	0.6	1	Yes
1400	1400.6	0.6	1	Yes

Calibration Correction

TDXAdvanced and GX/GP models provide a post-measurement calibration correction function that allows thermocouple sensor and measurement errors to be zeroed across multiple temperature points. This function uses the thermocouple (TC) correction factors supplied by the TC wire manufacturer and the observed DX or GX measurement error from the thermocouple accuracy certificate to precisely correct the measured value.

When these models are used for TUS work, the Yokogawa TUS Report software will separately show TC and recorder correction factors, and allow either corrected or non-corrected data to be used in the report calculations.

Calibration Certificate Ordering Information

The following model codes are used to order calibration certificates and AMS2750G test data reports for new DX, GX and GP models in these popular channel configurations:

NIST LEVEL B CALIBRATION Includes certificate and test data	Model Code	Description
	M1223UE-A-10	DX; 6, 10 or 12 channel NIST calibration
	M1223UE-A-19	DX; 20 channel NIST calibration
	M1223UE-A-12	GX; 10 channel NIST calibration
	M1223UE-A-21	GX; 20 channel NIST calibration
	M1223UE-A-13	GP; 10 channel NIST calibration
	M1223UE-A-22	GP; 20 channel NIST calibration
ISO 17025 CALIBRATION Includes certificate and "as found/as left" test data	M1223UE-A-58	DX; 6, 10 or 12 channel ISO17025 calibration
	M1223UE-A-67	DX; 20 channel ISO17025 calibration
	M1223UE-A-60	GX; 10 channel ISO17025 calibration
	M1223UE-A-69	GX; 20 channel ISO17025 calibration
	M1223UE-A-61	GP; 10 channel ISO17025 calibration
	M1223UE-A-70	GP; 20 channel ISO17025 calibration
AMS2750G Thermocouple Accuracy Certificate	M1223UE-A-82	AMS2750G thermocouple accuracy certificate



Ordering Instructions & Notes

- 1. This certificate must be ordered with a NIST level B or ISO 17025 calibration certificate; sold as a separate item
- 2. Specify thermocouple type
- 3. Specify temperature span and units (i.e. 0-1000 °F)
- 4. Ten temperature set points are included in the AMS2750G Thermocouple Accuracy Certificate

Sample Order Information

M1223UE-A-82; AMS2750G thermocouple accuracy certificate; type K thermocouple; 200-1100°F

Yokogawa Data Acquisition and Recording Systems

Yokogawa provides a range of highly reliable and secure electronic recording systems that are ideal for continuous and batch recording, as well as Temperature Uniformity Survey work. Panel mount and portable models are available and all include universal inputs that measure a wide range of thermocouple and RTD temperature sensor types, plus DCV, mA, and DI process inputs.

Data is securely saved in a proprietary binary file format to non-volatile flash memory and convenient Compact Flash, SD memory or USB media is used to transport these files to the PC environment for reporting.

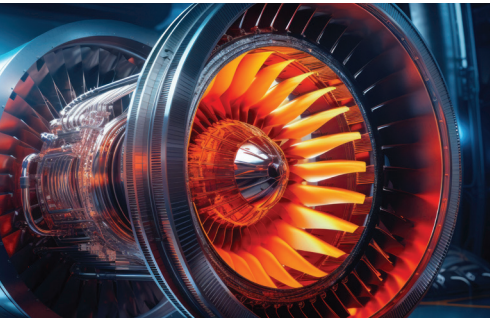
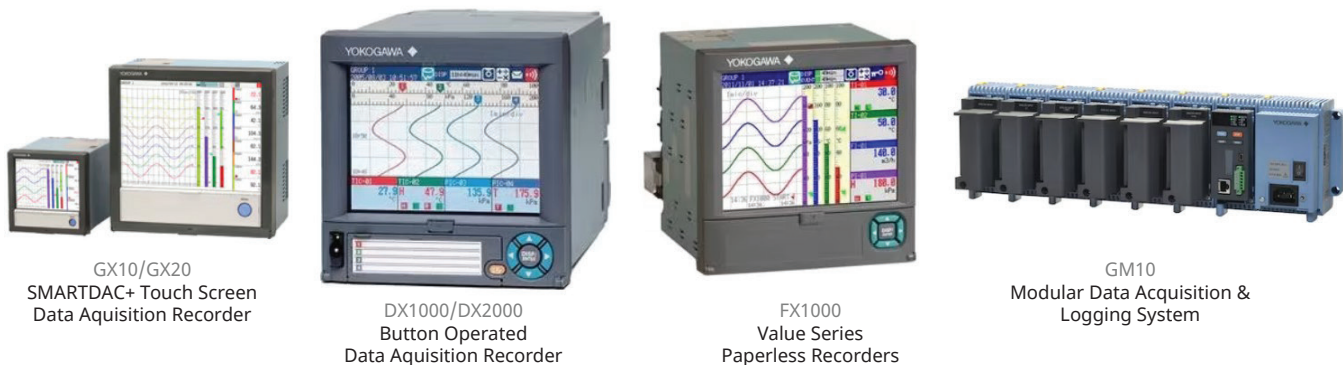
All models include standard Ethernet connectivity that supports automatic file transfers to an FTP transfer, email messaging, web browser viewing and more. Connectivity to popular PLC systems is also supported via serial Modbus RTU or Ethernet via Modbus TCP or EtherNet/IP. PLC process values can be displayed and recorded, or DAQ system data can be sent to the PLC for control purposes.

Free software is included that supports system configuration, file viewing and printing, and file conversion to ASCII and Excel file formats.

Optional software is available for real-time data acquisition and temperature uniformity survey report generation. DX and GX series data acquisition stations feature an Advanced Security option that provides system access log-in, audit trail, and electronic signature functions. As standard, they provide batch recording and extensive text message entry functions that allow operators to apply useful text information to the saved data records.

Connectivity

Yokogawa TUS software supports the following lineup of Yokogawa's data acquisition system, each of which complies with AMS2750G instrumentation standards.



Temperature Uniformity Survey (TUS) Equipment

Combined with Yokogawa's accurate and reliable data acquisition system, end users can easily perform temperature uniformity surveys. Based on the stability criteria and survey measurement, the software algorithm will automatically determine the survey result and generate a printable report that can be used for audit and data analysis. In addition, the software allows users to save multiple profiles.

The report is broken into 6 sections:

1. Metadata Information
2. Summary Table
3. Furnace Information
4. Overview Data Trend
5. Setpoint Data Trend
6. Raw Process Data

Watch the video to learn about the features of our product that have made Yokogawa paperless recorders the most chosen in the industry.



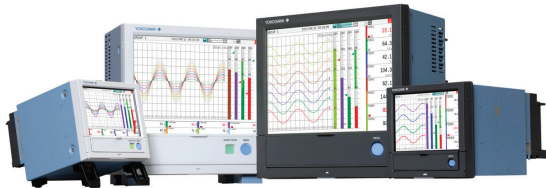
[WATCH VIDEO](#)

Data Acquisition Stations

These all-in-one measurement, display, and electronic recording systems are the ideal upgrade solution for a fully AMS2750G compliant batch or continuous process recording system. The Yokogawa SMARTDAC+ GX and GP series touchscreen operator interface allows operators to closely watch and react to process conditions and quickly review trend history data. They can also input batch information, descriptive text messages, and with the Advanced Security option, review and electronically sign batch records.

Free software is provided for analysis, reporting and printing of the secure, tamper-proof data records. Custom reports in PDF or Excel file formats that supplement primary data recording functions are supported, and optional data acquisition and reporting software with automatic printing is also available. SMARTDAC+ models also feature scalable, modular rear panel I/O for easy channel expansion, and include standard Ethernet connectivity with real-time web browser monitoring. Panel mount GX series models:

GX10- 5.7" display with up to 30 rear panel inputs
GX20- 12.1" display with up to 100 input channels



GP20, GP10, GX10, and GX20

Portable GP series models have a carry handle and plug-in power cord, and their portability makes them ideal for TUS work. Models are:

GP10- 5.7" display with up to 30 input channels
GP20- 12.1" display with up to 100 input channels



GX2000/GX1000

Currently installed DXAdvanced DX2000 and DX1000 units meet the AMS2750G standard; however, for new installations, Yokogawa recommends GX10/GX20 or GP10/GP20 recorders.

DXAdvanced data acquisition stations provide a traditional key-operated user interface and brilliant color display graphics. Panel mount models are:

DX1000- 5.5" display with up to 12 input channels
DX2000- 10.4" display with up to 48 input channels

Modular Data Acquisition

SMARTDAC+ GM10 is a new fully modular I/O data logging platform that shares I/O modules and data logging functions with the GX/GP series. This system is DIN-rail or surface mount with scalable input capacity from 10 to 100 channels on a single system. A multi-unit configuration can support as many as 420 input channels in one system. GM10 is easily configured using a web browser that also supports real-time data monitoring. GM10 is the ideal data acquisition choice for monitoring and data logging applications that do not require an integral display and user interface.



GM10

Temperature Uniformity Survey Software

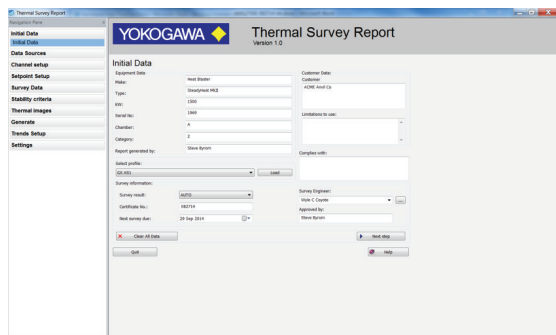
Yokogawa TUS software provides automated temperature uniformity report generation using the data files from the following products:

DX1000/DX2000
GX10/GX20/GP10/GP20

This time-saving software allows the user to specify the target survey temperature, limits, and uniformity period, and a host of other custom settings. It then reviews the target data file containing the temperature data and automatically calculates compliance with the assigned settings and limits. A pass or fail report is then generated that is ready for printing and submittal.

Yokogawa Temperature Survey software can be ordered using model code:

M1286VB (TUS Report Software License - Local PC)
M1286YK (TUS Report Software License - USB dongle)



Data Acquisition Software

GA10 software is a low cost and easy to use data logging software that connects to a range of Yokogawa data acquisition and controller products. Users can collect and manage data from as many as 100 devices and up to 2000 input channels. Color trend, digital, and bar graph displays clearly show data from projects that can each have independent recording properties.



GA10 Software

Temperature Controllers

Yokogawa UTAdvanced temperature controllers allow you to achieve tighter control precision, improved efficiency, and cost savings in a wide range of furnace and oven control applications from basic temperature control to carbon potential and furnace load control. Eight built in control modes and eight control types are provided, and ladder sequence control that performs the functions of a small PLC is available. Sequence and PID control functions can be performed simultaneously.



UTAdvanced

The bright and easy to read active color LCD display and easy to use operator interface allow operators to quickly interpret and change control parameters. Optional Ethernet interface with Modbus/TCP protocol allows for integration with data acquisition or data logging software systems, and also support remote setting changes.

Yokogawa recorder won the 1st place of the US CONTROL magazine's 27th Annual Readers' Choice Awards in recorders' category for 27 consecutive years!
[>> Control Magazine 2019 Readers' Choice Award](#)



Combined Control and Batch Recording

For applications requiring temperature control and data recording, the SMARTDAC+ GX and UTAdvanced controllers can be integrated together to provide a seamless control & recording system. The full range of advanced capabilities and convenience features of both products are made available to support the application- precision control functions are handled by the UTAdvanced, and all display, operator interface, recording and network data access functions are handled by the GX.

Modbus digital data communication between the controller and the GX minimizes wiring and ensures data accuracy. Custom display screens on the GX include controller faceplate view, tuning screen, digital and bar graph display, plus touch input of set point changes and pattern/profile selection.



UTAdvanced



GX10

Thermal Control, Monitoring and Recipe Management

Challenging oven, furnace, autoclave, kiln and cryogenic chamber thermal management applications demand a proven and fully-engineered solution that is tailored to the exact requirements of each installation. For these applications, Yokogawa now offers the **Y-HEAT Thermal Management System**.



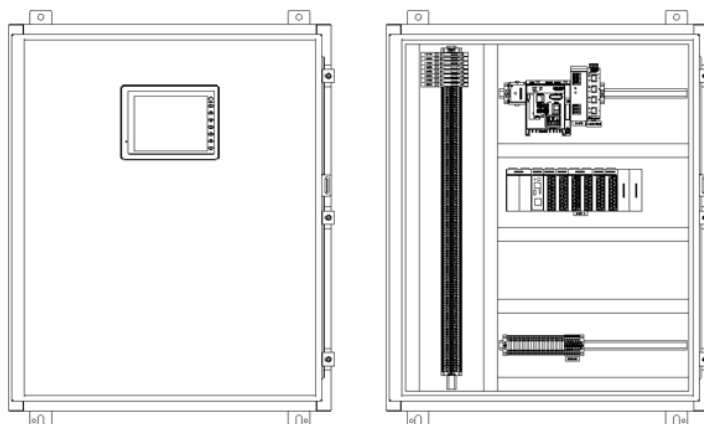
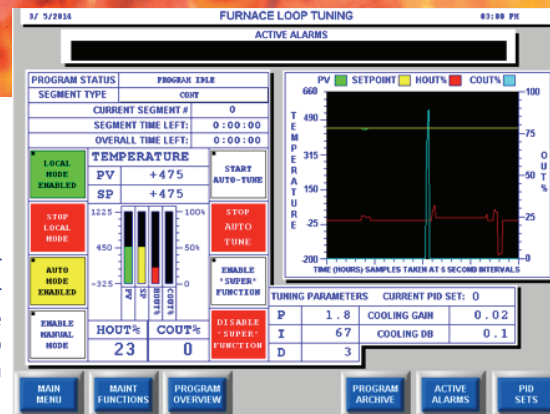
Y-HEAT Thermal Management System

Utilizing Yokogawa's proven best in class control hardware and engineering expertise, Y-HEAT is a ready to install system for applications ranging from basic temperature control to highly complex part curing oven systems.

The Y-HEAT core control algorithm provides program control featuring time or rate based ramp/soak profiles, configurable step types, high and low deviation alarm set points. Thermocouple management, atmosphere control (furnace pressure, carbon potential), part based control features (lead, lag, average, overdrive, and part thermocouple uniformity check), is supported. Recipe management, data logging, reporting and alarm email messaging functions are also included.

Y-HEAT is fully configured and ready to install and run when delivered. Your local Yokogawa representative will quote a custom Y-HEAT system that meets your exact application requirements.

Y-HEAT
Operator
Interface
Furnace Loop
Tuning Screen



Y-HEAT System Components and Enclosure

Contact Us

Yokogawa Corporation of America
12530 W. Airport Blvd.,
Sugar Land, TX 77478
www.yokogawa.com/us

Yokogawa Canada, Inc.
Bay 4, 11133 40th Street SE,
Calgary, AB T2C 2Z4
www.yokogawa.com/ca

Yokogawa de México, SA de CV
Urbina No. 18
Parque Industrial Naucalpan
Naucalpan de Juárez, Estado de México
C.P. 53370
www.yokogawa.com/mx

BU-P-20200925-02