Automation & Control Solutions

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MultiTherm™ 2000

MODULAR TEMPERATURE CONTROLLER

The MultiTherm™ 2000 provides a modular architecture for temperature control that can be easily configured for single zone or multi-zone temperature control applications. The MultiTherm 2000 can be used as a stand-alone temperature controller or easily integrated with a PLC or control system, with support for standard fieldbus and control networks, such as EtherCAT or Modbus TCP/IP.

The MultiTherm 2000 boasts precision sensor input channels, accepting RTDs, all thermocouple types, as well as voltage and current inputs. Highly configurable, fast acting PID or model base control makes the MultiTherm ideal for dynamic control applications where tight temperature stability is required. The unit is also capable of providing superior performance for tight coordination across multiple zones.

Additionally, the MKS Controls Workbench™ (CWB) software application is provided with the MultiTherm 2000. The CWB software is a simple, customizable integrated solution for device configuration, process monitoring, data storage, system diagnostics, and auto-tuning. The MKS auto-tuning algorithms in the CWB have been proven to provide improved performance in temperature control compared to existing market solutions. The MultiTherm 2000 is an all-in-one solution for multi-zone temperature control while minimizing system cost, complexity, and space.

Features & Benefits

- Modular architecture improves flexibility, serviceability, and scalability
- Standalone control or seamless integration with a PLC or control network for programmability
- Controls Workbench software included for interface or Labview options
- Ease of integration with a wide variety of heaters, drivers, and sensors
- Supports standard fieldbuses and control networks such as EtherCAT and Modbus TCP/IP
- Incorporates Current Transformer (CT) inputs for heater diagnostics
- Off-the-shelf availability for faster time to market
- Advanced control capabilities and programmability via:
  - — Flexible for Model Based Control (MBC) or standard PID control
  - — Advanced auto-tuning algorithm for specific application requirements
  - — Cascading loops for applications requiring extremely fast recovery from disturbances
  - — PID gain scheduling for strict process requirements over a broad temperatures range
  - — Full programmability option via IEC 61131-3 programming environment

Controls Workbench Software

The Controls Workbench software included with purchase can be downloaded from the MKS website to connect and control the MultiTherm product family. This powerful interface provides a simple, complete solution for device configuration along with the ability to view, data log, chart and export process data, perform manual process control, process troubleshooting, and advanced auto-tuning of the MKS controllers (PAC 1000, PAC 100, Communications Module, MultiTherm 2000 and MultiTherm 1000).

The benefits of using the CWB software with the MultiTherm product family include:

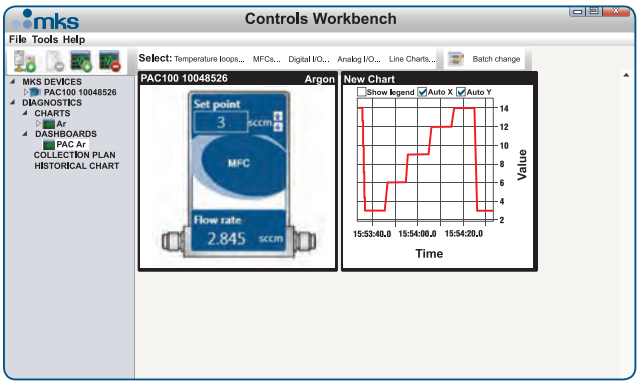
- Ease of system configuration
- Remotely configure and access all MKS controllers current simultaneously from one central interface
- Perform data collection, logging, process monitoring, and data exporting
- Create views and charts of all temperature zones from multiple MKS devices
- Standard and advanced auto-tuning

Modularity & Scalability

The MultiTherm 2000 can be configured to meet the requirements of almost any application, ranging from standalone single zone temperature control all the way up to multi-zone (48+) applications while also supporting additional supervisory functions. Also, due to its modular architecture, the control system can be easily scaled up or down as temperature control requirements change.

The MultiTherm 2000 can be customized with various modules based on each application's requirements. Below is a list of some of the MKS modules compatible with the MultiTherm 2000:

- Standard Temperature Input Module – supports 8 RTD or Thermocouple (all TC and RTD types) inputs
- Standard PWM Output module – supports 12 PWM outputs to external Solid State Relays (SSRs)
- Analog Input/Output Module – supports 8 analog inputs and 4 analog outputs, supporting ±5V, 0–5V, ±10V, 0–10V, 4-20mA and 0-20mA
- Digital Input/Output Module – supports 12 digital inputs and 12 outputs (0-24V)
- Power module or power extender when additional power requirements are needed



MKS User Interface for Stand-alone Temperature Control —

The MultiTherm 2000 can be configured, controlled, and monitored using the MKS Controls Workbench Software

Connectivity & Communication

The MultiTherm 2000 can be utilized as a standalone temperature controller with direct programmability features or easily interfaced to an existing control system utilizing standard fieldbus connectivity.

The MKS Controls Workbench software application can be used to configure, perform auto-tuning, adjust temperature set points, provide process monitoring, create and monitor alarms, etc. The CWB can also be used to interface multiple MultiTherm 2000 (or any other MKS controllers) units from a single interface, which makes setup and programming of an entire plant or fab simple and seamless.

The MultiTherm temperature control family currently supports interfacing to a control system or a PC using Modbus TCP/IP or EtherCAT connectivity. While the Modbus TCP/IP interface provides a standard, commonly used control network, for most general temperature control applications, the MultiTherm's EtherCAT connectivity is ideal for processes requiring precise repeatability.

Key features include supervisory control options such as model based temperature control, cascading loops and PID gain scheduling. User friendly diagnostic features such as front panel LED indicators for individual channels and heater health monitoring minimize system down time.

The MultiTherm 2000 can be configured with many different types of modules, all available from MKS, including Temperature input, Current input, PWM output, Voltage output, and CT inputs. Each module is available in a compact, DIN rail mounted enclosure.

Specifications

MultiTherm™ 2000 Modular Architecture —
The MultiTherm 2000 can be customized to meet any temperature control application

Controls Workbench Specifications

Operating System	Windows 7 (32-bit or 64-bit)
Processor	1 GHz or faster x86- or x64-bit processor
Memory	1 gigabyte (GB) RAM (32-bit); 2 GB RAM (64-bit)
Hard Disk	3.0 GB of hard drive space available
Graphics	Graphics hardware acceleration requires a DirectX 10 graphics card
Display	1024 x 576 or higher resolution monitor
.Net Version (optional)	3.5, 4.0 or 4.5
Other	Need at least one network interface card (NIC) on PC (one for connection to MultiTherm and second (optional) for external internet connection)

Specifications

Connectivity	TCP/IP, Modbus TCP EtherCAT Slave supporting PDO and Mailbox (CoE and FoE)
Temperature Range	0 to 850°C depending on type of sensor used
Input Channels per Temperature (Input Module)	8 sensor input channels supporting RTDs and Thermocouples RTDs (PT100, PT1000, 3-wire) T/Cs (J, K, T, E, R calibrated)
Input Accuracy	±0.8°C typical TCs excludes sensor accuracy ±0.1°C typical RTDs excludes sensor accuracy
Sensor Acquisition Time	10 - 625 ms (configurable)
Temperature Resolution	0.01°C
Input Repeatability	Better than 0.1°C depending on sensor type and temperature range
Factory Calibration	12 months typical - dependant on sensor type, temperature range and required accuracy
Control Methods	PID with offline auto-tuning (via Controls Workbench) Open loop manual control of outputs
Software	MKS Controls Workbench EtherCAT Configurators (i.e. TwinCAT, KPA Studio) (Configurators not included)
Environmental	0 to +50°C operating temperature 0 - 85% RH, no condensation
Mounting	DIN rail and wall mount options
Dimensions (W x H x D)*	35 mm x 125 mm x 92.3 mm (W x H x D)
Compliance	CE

* Dimensions listed are per module

Specifications and Ordering Information

DIO Module

PWM Outputs	12 channels @ 24V active high
Output Resolution	0.01% Full Scale power

AIO Module

Sampling Rate for AI	6.25kHz (160µSec, for all 8 channels)
Isolation	1.5kV rms
ADC Native Resolution	16-bits
Number of AI channels per AIO Module	8 differential
Input & Output Range	
Voltage	±5V, 0-5V, ±10V, 0-10V
Current	0-20mA, 4-20mA (Factory configurable between voltage and current)
Input Voltage Measurement Range	-10V to +9.9997V
Minimum Common Mode Voltage Range	±8V
Minimum Input CMRR	50dB, 0-1kHz
Minimum Input Impedance	10 mega-ohms
Anti-Alias HW Filtering	200Hz ±20%, 6 dB/octave minimum
Protection	ESD to IEC 61000-4-2 ±4kV contact, short to 24V, ±15V
DAC Native Resolution	16-bits
Number of Channels	4, differential/single ended
Output Voltage Range	-10V to 9.9997V
Output Accuracy at 25°C Ambient	±1.2mV measured at I/O connector with 2 kilo-ohms load
Output Accuracy Temp Drift (20°C – 35°C)	0.02% of output value
Maximum Output Current	5mA, into a 2 kilo-ohms, 10nF load

Ordering Information

AS11860G-40	Temperature Input - 8 TC or PT100 RTD Inputs
AS11860G-50	Temperature Input - 8 TC or PT1000 RTD
AS11860G-60	Temperature Input - 8 TC or PT100 RTD - Removable Terminal Block
AS11860G-70	Temperature Input - 8 TC or PT1000 RTD - Removable Terminal Block
AS11870G-02	CPU Module (Modbus tcp/ip)
AS11870G-04	CPU Module (Ethercat)
AS11893G-41	PWM Module (Source)
N/A	PWM Module (Sink)
CN02215	PWM/AIO Connector (Spare)
AS11880G-32	AIO (8 Analog Inputs/4 Analog Outputs) Current Inputs/Voltage Outputs MKS System Bus
AS11840G-02	Power Module

MKS Instruments, Inc.
Global Headquarters

2 Tech Drive, Suite 201
Andover, MA 01810

Tel: 978.645.5500
Tel: 800.227.8766 (in USA)
Web: www.mksinst.com

MKS Instruments, Inc.
Automation & Control Solutions

1321 Rutherford Lane, Suite 200
Austin, TX 78753

Tel: 512.719.8000

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