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K-20 Programmable Temperature Controller

Introduction

Designed with the user and ease of use in mind, the K-20 Programmable Temperature Controller offers a flexible platform for experiments using the cryogenic cooling and Joule Thompson thermal stage systems of MMR Technologies. The controller provides:

- ◊ Accurate temperature measurement
- ◊ Precise and highly stable temperature control
- ◊ An easy to use data acquisition and control software interface
- ◊ Wide range of temperature operation control
- ◊ Ability to programmable temperature ramping and cycling experiments



Features and Benefits

Several unique features of the K-20 Programmable Temperature Controller provide significant user benefits:

- ◊ **Excellent temperature setability and stability** - the electronic temperature controller enables the user to set temperature with an accuracy of +/- 0.5K, achieves a temperature stability of better than +/- 0.05K when used with the Joule Thompson thermal stages in the range of 70K to 400K.
- ◊ **Temperature monitor** - temperature readout is in Kelvin. The temperature monitor may also be used as a 16-bit voltage monitor.
- ◊ **Monitors platinum RTD temperature sensors** - covering operating temperatures of 70K to 730K.
- ◊ **Heater power monitor** - refrigerator cooling capacity or sample power dissipation on the sample mounting stage can be measured to within 5%.
- ◊ **Analog signal output port** - the analog output port can supply a programmable voltage of +/- 1.250 VDC, +/- 0.002 Volts
- ◊ **Analog signal input ports** - two analog input ports are provided for use in data acquisition. Each can measure a voltage of +/- 2.5 VDC, with a precision of +/- 0.010 VDC under operator or software control.



- ◊ **Digital signal input port** - an 8-bit digital input port is provided to reach switch positions, etc.
- ◊ **Digital signal output port** - an 8-bit digital output port is provided for the control of the system support devices such as gas valve, solenoid, compressor, relay, etc.

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K-20 Programmable Temperature Controller

◊ **Computer interface** - Computer interface for integrated software control through RS-232C, USB or IEEE-488 connections.

◊ **Data as a function of time** - The K-20 Programmable Temperature controller is supplied with data acquisition and control software to log and display data as a function of time.

◊ **PID constant setting** - a single PID constant can be varied from 1 to 255, with a default setting at 100.

◊ **Circuit Breakout Box** - included with every K-20 Programmable Temperature Controller, this enables customized electrical connections between the Joule Thompson thermal stages and external devices.



Applications

The Temperature Controller can be used for a variety of applications, including:

◊ Providing very precise, very stable controlled temperature in the range of 70K to 730K.

◊ Record temperature, system operating parameters, and experimental data as a function of time.

◊ Provide a programmable voltage source.

Specifications*

Operating Temperature Range:	Available between 70K and 730K
Temperature Accuracy:	< 0.5K at 80K
	+/- 0.5K between 80K and 400K
	< 1.5K from 400K to 730K
Temperature Stability:	+/- 0.05K
Additional Power Supply Required:**	Not required for operation on the full temperature range of 70K to 730K.
Temperature Sensor Compatibility:	Platinum Resistance Thermometer
Maximum Cooling Rate:	No load cool down time from 300K to 80K in less than 20 min.
	No load cool down time from 730K to 300K in less than 20 min.
Maximum Heating Rate:	15 K/minute
	No load warm-up time from 80K to 300K is less than 5 min.
	No load warm-up time from 300K to 730K is less than 5 min.
Software Control:	K-20 Data Acquisition and Control Software
Data Output Options:	Reports can be generated directly through the K-20 Software.
	Raw data can be exported in a CSV format for any data processing and analysis software.
Computer Requirements:	Windows® based computer
Operating System:	Windows® XP or Windows® 7 Ultimate with XP Emulator
Computer Connections:	USB or Serial Port Available
IEEE-488 Compatibility:	National Instruments or Capital Equipment GPIB
Dimensions:	Width 17 inches (43.5 cm); Depth 15.5 inches (40 cm); Height 3.5 inches (9cm)
Weight:	12 pounds (5.44 kg)
Rack Mount:	Optional
Electrical Requirements:	For North America: 110 - 120V, 50 - 60 Hz, 10 amp.
	For Japan: 100V, 50 - 60 Hz, 10 amps.
	For Europe and Asia: 220 - 230V, 50 - 60 Hz, 10 amps.

* The specifications for temperature range measurements are described here based on usage with the MMR Technologies' Joule-Thompson Thermal stages. Actual temperature range abilities are dependent on the installed Joule-Thompson Thermal stage and upon proper operating conditions. The K-20 Programmable Temperature Controller specifications may be changed at any time by the manufacturer. Please contact the manufacturer for the latest information and specifications.

** On older models of the K-20 programmable temperature controller (shipped prior to May 2009 - serial numbers lower than 2000), the auxilliary power supply and revised firmware chip within the K-20 are needed to operate above 580K, up to a maximum temperature of 730K when a Joule Thompson Thermal Stage is installed that operates up to 730K. To verify if your K-20 Temperature Controller is capable of interfacing with the auxilliary power supply and operating above 580K, please contact MMR Technologies at support@mmr-tech.com.

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