

## Scanning Thermometer



- Scan 9 thermocouple inputs
- Expand to 81 inputs
- Thermocouple types J, K, T, E, R, S, or B
- °C, °F, or mV readings
- Store temperature profiles
- Record temperature trends



**740**  
System Scanning Thermometer with Instruction Manual  
**740/7402**  
Scanning Thermometer with 9 Input Channels and Instruction Manual

This product is available with an Extended Warranty. See page 221 for complete ordering information, or call 1-800-552-1115 (U.S. only).

The Model 740 Programmable Thermometer has a built-in reference junction and will linearize any of 7 different thermocouple types. The Model 740/7402 combination includes nine channels of thermocouple input. An IEEE-488 interface port is included for easy system integration or connection to an IEEE-488 printer for data logging.

### Input Expansion

The Model 740/7402 can be expanded up to 81 inputs by selecting a Model 705 or 706 Scanner and configuring these with additional 7402 or 7057A thermocouple scanner cards, each xvith 9 inputs. The control for these expansion units is through a serial loop connected by standard coaxial cable, thereby allowing expansion without using additional IEEE-488 addresses.

### Input Programming

Each input can be selected for any of J, K, T, E, R, S, or B type thermocouples, or for voltage readback up to 100mV with 1 uV sensitivity. Any input can also be turned off, allowing the instrument to skip that channel in the scan sequences. Open thermocouple conditions are detected and displayed.

### Monitor Temperature Trends

A single input can be read at programmable intervals to monitor temperature trends. Rates up to 20 readings/second are available for determining rapid temperature variations, and the data can be stored in the internal memory. Data can also be transferred to a computer file over the built-in IEEE-488 bus.

Locate hot spots and examine time-dependent thermal characteristics. Scan intervals are programmable, and the maximum rate of 20 readings/second assures a minimum of time skew between input samples for monitoring temperature changes.

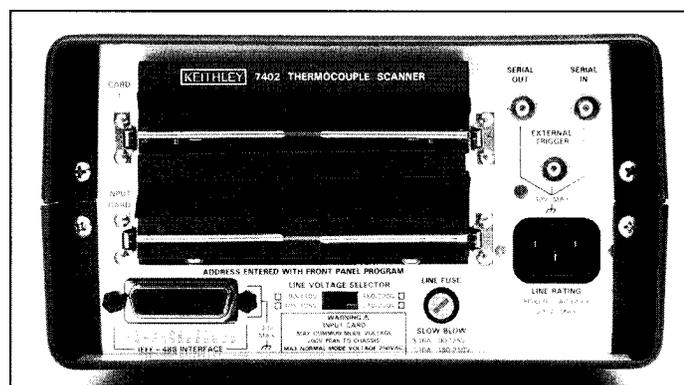
A SMART PRINT feature can locate the address and send data to any IEEE-488 printer for data logging of results in a bench configuration.

### Non-Volatile Memory

An internal memory stores up to 100 readings. Data can be recalled from the front panel or transferred in a block transfer to a controller. The Model 740 will also give HI, LO, and AVERAGE of the data memory.

### Simple, Reliable Calibration

Calibration of the Model 740 is easy-there are no mechanical adjustments. Simply present the calibration voltages to the input and tell the instrument to calibrate. Constants are stored in non-volatile memory, to maintain the instrument's accuracy.



### CABLES

- 7007-1 Shielded IEEE-488 Cable, 1m (3.2 ft.)
- 7007-2 Shielded IEEE-488 Cable, 2m (6.5 ft.)
- 7008-3 IEEE-488 Digital Cable, 0.9m (3 ft.)
- 7008-6 IEEE-488 Digital Cable, 1.8m (6 ft.)
- 7051-2 BNC Interconnect Cable, 0.6m (2 ft.)
- 7051-5: BNC Interconnect Cable, 1.5m (5 ft.)

### RACK MOUNT KITS

- 1019A-1 Single Fixed Rack Mount Kit
- 1019A-2 Dual Fixed Rack Mount Kit
- 1019S-1 Single Slide Rack Mount Kit
- 1019S-2 Dual Slide Rack Mount Kit

### OTHER

- 7057A Thermocouple Scanner Card
- 7401 Thermocouple Wire Kit, 30m (100 ft.), Type K
- 7402 Thermocouple Scanner Card

See page 163 for descriptions of all accessories.

# Scanning Thermometer

mV	-99.999 to 100.000 mV	±(0.02% + 3 μV)
J	-100.0 °C to +760.0 °C -148.0 °F to +1000.0 °F	±0.4 °C ±0.8 °F
K	-100.0 °C to +1372.0 °C -148.0 °F to +2501.0 °F	±0.5 °C ±0.9 °F
T	-100.0 °C to +400.0 °C -148.0 °F to +752.0 °F	±0.5 °C ±0.8 °F
E	-100.0 °C to +1000.0 °C -148.0 °F to +1832.0 °F	±0.5 °C ±0.9 °F
R	0 °C to +1780 °C +32 °F to +3236 °F	±1 °C ±2 °F
S	0 °C to +1780 °C +32 °F to +3236 °F	±1 °C ±2 °F
B	+350 °C to +1820 °C +602 °F to +3368 °F	±1 °C ±2 °F
	-200.0 °C to -100.1 °C -328.0 °F to -148.0 °F	±0.6 °C ±1.0 °F

mV INPUT RESISTANCE: >1GΩ.

TEMPERATURE COEFFICIENT (0°-18°C & 28°-50°C): <(0.1 × rated accuracy)/°C.

INPUT CURRENT: 800pA maximum during measurement; 60μA maximum during open thermocouple check.

COMMON MODE REJECTION RATIO (at DC, 50 and 60Hz, 100Ω unbalance)\*\*: <0.0003°C/V with filter enabled (160dB); <0.003°C/V with filter disabled (140dB).

NORMAL MODE REJECTION RATIO (at 50 and 60Hz)\*\*: <0.003°C/mV with filter enabled (80dB); <0.03°C/mV with filter disabled (60dB).

\*Excludes thermocouple errors (specifications include Model 7057A errors).

\*\*Based on >36μV/°C slope.

MULTILINE COMMANDS: DCL, I.O., SDC, GET, GTL, UNT, UNL, SPE, SPD, MLA, MTA.

UNILINE COMMANDS: IFC, REN, EOI, SRQ, ATN.

INTERFACE FUNCTIONS: SH1, AH1, T6, TE0, I4, LE0, SR1, RI1, PP0, DC1, DT1, E1, C28.

PROGRAMMABLE PARAMETERS: EOI, Terminator, SRQ, Status, Trigger, Self Test, Calibration, Filter, Function, Scan Interval, Log Interval, Time & Date, Time of Day Trigger, Date Format, Alarm Limits, Output Format, Channel Number, Data Buffer, Scale, Display, Channel Type.

MAXIMUM ALLOWABLE INPUT: 250V rms, 350V peak (for one minute).

MAXIMUM COMMON MODE VOLTAGE: 200V peak to earth.

MAXIMUM THERMOCOUPLE LOOP RESISTANCE: 1kΩ.

FILTER SETTling TIME: 100ms (typical).

SCANNING RATE: >20 channels/second, filter disabled; >5 channels/second, filter enabled.

BENCH READING RATE: 8 readings/second, filter disabled; 4 readings/second, filter enabled.

LOGGING INTERVAL: One of 12 selectable rates from 50ms to 1 hour, or triggered.

SCANNING INTERVAL: One of 10 selectable rates from 500ms to 1 hour, or triggered.

DISPLAY: Eight 0.5-inch alphanumeric LED digits with decimal point and polarity. Function, Filter, Channel, Location, Overflow, Open Thermocouple, and IEEE bus status also displayed.

INTERNAL CLOCK: Displays hour/minute/second; <1 minute/month error (typical).

WARM-UP: 1 hour to rated accuracy.

CONNECTORS: 3 BNC: External Trigger, Serial-In, Serial-Out (TTL compatible). Quick disconnect connectors on input card.

CHANNEL CONFIGURATION: Types J, K, T, E, R, S, B, mV, or Off for each channel.

DATA MEMORY: Battery backed up one week minimum.

Single Channel Log: 100 locations (reading, location, time taken).

Multi-Channel Scan: 90 locations (reading, channel number, time taken)

Configuration: 81 locations (channel type selected).

CAPACITY: Single channel or 10 channels (including reference junction) using one 7402 or 7057A thermocouple scanner card. Up to 90 channels (including reference junctions) using 8 additional thermocouple scanner cards and one Model 706 or four Model 705 scanners.

OPERATING ENVIRONMENT: 0 -50 °C; <80% relative humidity up to 35 °C; linearly derate 3% RH/°C, 35 - 50 °C.

STORAGE ENVIRONMENT: 25 to +60 °C.

POWER: 105-125V or 210-250V (external switch selected), 20VA, 90-110V available; 50-60Hz.

DIMENSIONS, WEIGHT: 127mm high × 216mm wide × 359mm deep (5 in. × 8½ in. × 14¼ in.). Net weight 4.0kg (9 lbs.).

ACCESSORY SUPPLIED: Instruction manual.

## Temperature Measurements

Keithley provides instruments that allow temperature measurements to be made using RTDs or thermocouples. RTDs are generally more accurate, while thermocouples are often less expensive. In two instruments, the 195A and 193A, temperature capability is built into high performance DMMs. In the 740 Scanning Thermometer, multiple inputs for high quality data acquisition are provided.

## TEMPERATURE MEASUREMENTS SELECTOR GUIDE

Number of Inputs	1 to 9 standard Up to 81 using scanner	1	1
Temperature Span		-328° to +630°C	-100° to +630°C
Basic Resolution		0.01°C	0.01°C
Basic Accuracy		1°C	0.18°C
RTD Type		100Ω platinum, DIN 43760 or IPTS-68, programmable alpha & delta	100Ω platinum, DIN 43760 or IPTS-68
Temp. Span	-148° to +1820°C		-100° to +1372°C
Basic Resolution	0.1°C		0.1°C
Basic Accuracy	0.4°C		0.5°C
Ref. Junction	Internal		External
TC Types	J K T E R S B		J K T E
Display Units	°F, °C, mV	°F, °C	°F, °C
Reading Rate	8/second	1.2/second	5/second
Overload Protection	250V peak	360V peak	350V peak
Max. Common Mode Voltage	200V peak	500V peak	500V peak
Special Features	Scanning interval real-time clock		
Data Memory	100 points (incl. channel no. and time)	100 points	500 points