Altek

Thermocouple Calibrator
Model 222A

- Select one of 10 T/C types plus mV
  J, K, T, E, R, S, B, N, C, L & mV
- Temperature input & output
  Reads directly in degrees
- "Quik-Chek™" switch
  Instantly recall three outputs; HI, LO & Set
- Multi-speed digital pot
  Fast, accurate setting
- Accuracy ±(0.008% of reading+0.006 mV)
  Typical accuracy of 0.4°C or 0.7°F
  Field selectable 0.1° or 1µV resolution

General description

Calibrate thermocouple instruments

Source and read T/C's over the entire industrial temperature range with Altek's Model 222A Thermocouple Calibrator. Use with transmitters, recorders, controllers, alarms, indicators, data acquisition and computer systems.

Built-in flexible T/C leads let you connect directly using the proper T/C materials. Automatic, linearized cold junction compensation virtually eliminates temperature drift.

Field customize the Model 222A to lock-in 0.1° or 1° resolution, fixed °F or °C or front panel selectable °F/°C operation. Built in protection guards the Model 222A against mis-connection to 120 Volts AC or DC, in any mode.

Calibrate thermocouple inputs

Select resolution of 0.1° or 1° for the full listed range of all thermocouple types. Millivolts allows 10 microvolt resolution from -999.90 to 999.90 mV. The Model 222A simulates key temperatures for repetitive calibrations. "Quik-Chek" function stores three output temperatures for real convenience. Three memories are retained for each thermocouple type even when the power is off.

Turn the knob to check trip points, controller action or hysteresis. The fast response 222A sets quickly without overshoot but allows slow changes at your own rate.

Measure thermocouple sensors

The Model 222A display gives you fast, accurate temperature measurement with 0.1 and 1 degree or with 0.01 millivolt resolution. High resistance or open T/Cs and leads are detected and indicated on the LCD display. Two readings per second track fast moving temperatures.

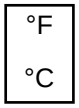
"MAX" and "MIN" memories are continuously updated from turn-on or whenever the "RESET" pushbutton is pressed. The Model 222A gives you a handy tool to monitor temperatures for drift or control deviation. Just flip the "Quik-Chek" switch to display the minimum and maximum temperature since reset.

Turn-on sequence

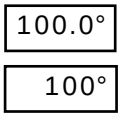
Each time the Model 222A is turned on, the LCD will display all segments for 1 second. If °C/°F operation has been selected the currently selected temperature scale of °C or °F will display.

General instructions

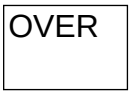
Initial setup
The Model 222A is internally configurable for ease of use. Simply remove the four corner screws, flip a few DIP switches and follow the simple instructions given below (a condensed guide is found within the calibrator housing). The choices are based on the type of instruments in your shop or plant. For instance if your plant has only instruments that display to 1°C, choose full time °C and display with 1° resolution.

Configuring temperature scales


The Model 222A may be internally set-up for full time use of °C, full time use of °F or selectable °C/°F operation. The selectable mode lets you choose °C or °F each time the unit is turned on (see Setting Operating Mode below).

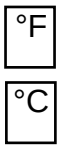
Locking in 1º resolution


The Model 222A may be internally configured for 0.1° or 1° resolution. Select 1° resolution for less critical applications or 0.1° for increased resolution when necessary.

Over range/under range


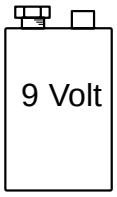
Out-of-range temperatures are indicated by OVER and UNDER on the display. If out-of-range is displayed during READ mode check for proper connections and T/C type.

Turn-on

Each time the Model 222A is turned on, the LCD will display all segments for about 1 second. It then displays the currently selected thermocouple type for approximately 3 seconds. The currently selected temperature scale of °C or °F will then display for about 3 seconds.
1) Move the power switch to SOURCE or READ
2) All segments on the LCD are turned on during self test
3) The display will indicate the selected temperature scale for 3 seconds. Press the SCROLL pushbutton to switch between °C & °F (based on configuration).

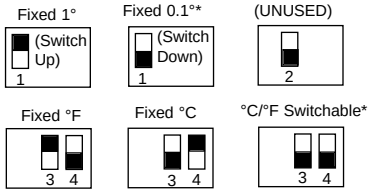
If fixed °C or fixed °F have been selected, the user prompts for this selections will be skipped.
The three “QUIK-CHEK” temperature values will be the same as previously stored. Each time a different T/C type is selected, the three “QUIK-CHEK” values for that type will be recalled.

Changing the battery


Low battery is indicated by BAT on the LCD display. Approximately 10 hours of operation remain before the LCD goes blank and the Model 222A shuts itself down. Turn the 222A off, remove the four corner screws and lift the unit out of the case. The battery is fastened to the bottom printed circuit board and is easily removed. Replace screws and turn on when ready to use.

Setting operating mode

Setting DIP Switches
1) Turn the Model 222A OFF.
2) Remove the 4 corner screws and lift faceplate assembly out of the case.
3) Set the DIP switches for your options as diagrammed.



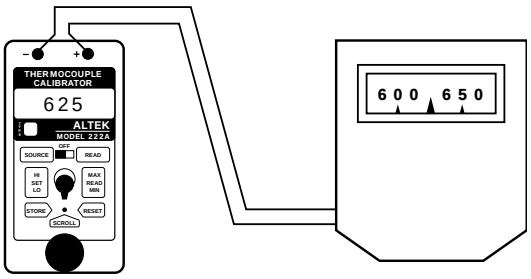
*Factory Settings (All switches down)

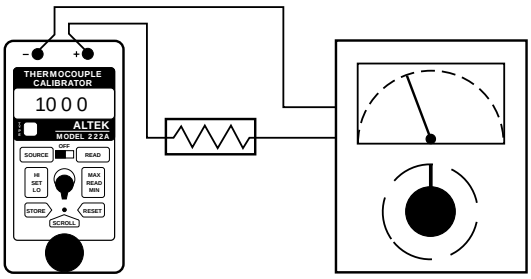
Pyrometer calibration

Some thermocouple input pyrometers and controllers operate on the D’Arsonval meter movement principle. Millivolts from the thermocouple input drive a low resistance coil directly. For example, a coil may have a typical resistance of 60 ohms. Since the pyrometer resistance is so low, resistance of the input thermocouple leads must be taken into account. Pyrometers of this type have fixed or adjustable series resistance which corrects for lead length resistance.
To use the Model 222A to drive low resistance loads:
1) Disconnect the sensing thermocouple leads at the thermocouple head.
2) Connect leads from the Model 222A to the extension wires going to the pyrometer, using the screw connectors in the head. (If the sensing thermocouple sheath is within 1/4 to 2 times the length of the Model 222A lead length, the error due to resistance will be negligible).
3) Set the temperatures to be used for calibration per the recommendation of the pyrometer manufacturer.

If the thermocouple head cannot be accessed:
1) Determine the installed length of extension wire between the head and the pyrometer.
2) Select thermocouple extension wire of the same type, wire size and length as the installed wire between the head and the pyrometer to make up a calibrating wire.
3) Replace the active thermocouple extension wire with the calibrating wire at the pyrometer terminals.
4) Connect the other ends of the calibrating wire to the Model 222A and calibrate the pyrometer.

Note: A resistor of the same ohm value as the wire between the head and the pyrometer may be used in series with one lead instead of a length of calibrating wire. Make certain that both input and output leads to the resistor are the same temperature.

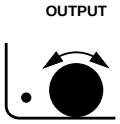




Simulate a thermocouple

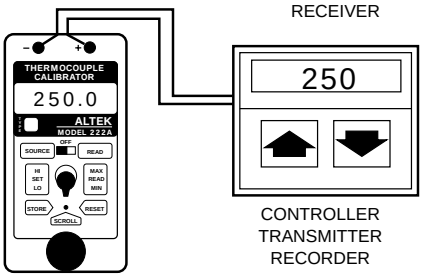
Source

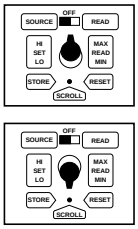
1) Set up the Model 222A for the correct temperature scale (°C or °F).
2) Disconnect the input wires from the device to be calibrated or checked.
3) Connect the Model 222A to the device to be calibrated, being careful to observe proper polarity and T/C type
4) Adjust the digital pot to the desired output value.



Output

Whenever SOURCE mode is selected the word SOURCE will appear on the LCD. To change the output value, turn the speed sensitive digital pot. Turning the pot slowly will cause a gradual change in the output. A faster change will occur when the pot is turned faster. A filter circuit limits response when the pot is turned too fast. This function operates in all three output positions (HI, SET & LO).





Store

1) Switch to HI (or LO).
2) Turn the digital pot to desired value.
3) Press STORE. The LCD will flash once indicating that the value has been stored

If a value is in the SET position and you want that value in HI or LO, press and hold the STORE button while moving the switch to HI or LO. The LCD will flash once indicating that the value has been stored. Release the STORE button.

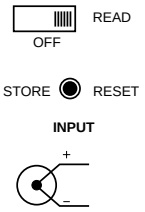
Instantly recall temperatures

Any time you need a stored value just throw the Quik-Chek switch. Any value in the T/C range may be stored in HI & LO. The Model 222A remembers the HI, LO and SET values for you with the power on or off.

Overload

The Model 222A will indicate OVER and blank the digits on the display when the output leads have been shorted or when the device being calibrated requires more than 10 mA.

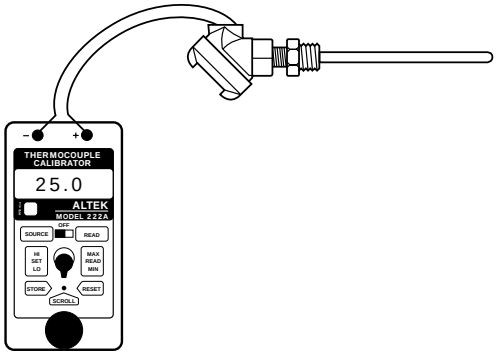
Read a thermocouple sensor

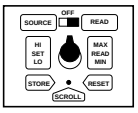


Read

1) Set up the Model 222A for the correct T/C type and temperature scale (°C or °F)
2) Disconnect the wires from the thermocouple to be read or checked.
3) Connect the Model 222A to the sensor, being careful to observe proper polarity & T/C type
4) Display present reading, Maximum or Minimum temperatures

Whenever READ mode is selected the word READ will appear on the LCD. The Model 222A can measure temperatures for all T/C types with resolutions of 0.1° and 1°. The display is updated twice per second to continuously track fast moving temperatures.





MIN/MAX

To read the Maximum or Minimum temperature since INPUT mode was entered, simply switch to MAX or MIN. The value will appear on the LCD along with the word MAX or MIN. The MAX/MIN values are automatically updated and may be viewed at any time without disturbing the other values. Pressing the RESET/SCROLL pushbutton will transfer the present temperature into both MAX and MIN and will update them as the measured temperature changes.

Open thermocouples

The Model 222A checks for open or high resistance thermocouples. Open or burned out T/Cs are indicated by "— — — —" on the display. Temperatures out of range for the T/C TYPE selected will be indicated by OVER and UNDER on the display.

222A-mV (Millivolt Model)

222A-mV (Millivolt Model)
Source and Read millivolts to calibrate and checkout recorders, mV transmitters and other millivolt input instruments with the Model 222A-mV. Resolution is 10 microvolts from -999.90 to +999.90mV.

Specifications

(Unless otherwise indicated, specifications are in % Span@ 23° C)

General

Accuracy: ±(0.016% of reading + 0.006 mV)
Cold junction compensation: Built-in for specified thermocouple type, characterized to T/C curve
Cold junction temperature effect: Within 0.05° per °C change in ambient temperature over operating range
Operating temperature range: -5 to +140°F (-20 to +60°C)
Storage temperature range: -22 to + 175°F (-30 to +80°C)
Relative humidity: 10 to 90%, non-condensing
Zero stability: Included in cold junction effect
Warm up time: 1 minute to full rated accuracy
Overload protection: 120 volts AC/DC for 30 seconds on connecting leads, in any mode
Battery life: 9 Volt Alkaline: Nominal 40 hours
Low battery: "BAT" indication on LCD at 7 Volts nominal, approximately 10 hours left. Batteries should be removed when storing the unit >3 months.
Reference drift: <20 PPM/°C
Overall size: 2 1/2 x 2 5/8 x 5 1/8 inches (63.5 x 66.7 x 130 mm)
Weight: 10.9 oz. (0.31kg)

Thermocouple Simulator (Source)

Output impedance: <0.1 ohms
Source current: up to 8 mA (drives 80mV into 10 ohms)
Output noise: <4 microvolts p-p for frequencies of 10 Hz or below
Overload: Indicates OVER and blanks digits on the display

Read a thermocouple

Input impedance: >10 Megohms
Open thermocouple detection: 450 millisecond check pulse. Nominal threshold, 10 K Ohms. Displays " — — — —" for open circuit
Normal mode rejection: 50/60 Hz, 50 dB
Common mode rejection: 50/60 Hz, 120 dB

Ranges and accuracy

The following table was computed for each thermocouple type base on the accuracy of ±(0.016% of reading + 0.006 mV)

T/C TYPE	°C RANGE	°C ACCURACY	°F RANGE	°F ACCURACY	T/C MATERIAL	ISA/ANSI COLOR
	360 to 1200	±0.3°	680 to 2192	±0.5°	+IRON	WHITE
J	-129.9 to 359.9	±0.2	-201.9 to 679.9	±0.4	-CONSTANTAN	RED
	-210 to -130	±0.4	-346 to -202	±0.7	JACKET	BLACK
	500 to 1371	±0.4°	932 to 2500	±0.8°	+CHROMEL®	YELLOW
K	-49.9 to 499.9	±0.2	-57.9 to 931.9	±0.4	-ALUMEL®	RED
	-200 to -50	±0.4	-328 to -58	±0.8	JACKET	YELLOW
	-237 to -200	±1.8	-395 to -328	±3.3	JACKET	YELLOW
	-29.9 to 400.0	±0.2	-21.9 to 752.0	±0.3°	+COPPER	BLUE
T	-220 to -30	±0.5	-364 to -22	±1.0	-CONSTANTAN	RED
	-260 to -220	±1.8°	-436 to -364	±3.2	JACKET	BLUE
	280 to 1000	±0.2	536 to 1832	±0.4°	+CHROMEL®	PURPLE
E	-149.9 to 279.9	±0.2	-237.9 to 535.9	±0.3	-CONSTANTAN	RED
	-230 to -150	±0.5	-382 to -238	±0.8	JACKET	PURPLE
	-243 to -230	±1.9°	-405 to -382	±3.5		
	150 to 1768	±0.7	302 to 3214	±1.3°	+Pt/13Rh	BLACK
R	0 to 150	±1.1	32 to 302	±2.0	-PLATINUM	RED
	-50 to 0	±1.6°	-58 to 32	±2.9	JACKET	GREEN
	1650 to 1768	±0.8	3002 to 3214	±1.5°	+Pt/10Rh	BLACK
S	200 to 1650	±0.7	392 to 3002	±1.3	-PLATINUM	RED
	0 to 200	±1.1	32 to 392	±2.0	JACKET	GREEN
	-50 to 0	±1.5°	-58 to 32	±2.7		

T/C TYPE	°C RANGE	°C ACCURACY	°F RANGE	°F ACCURACY	T/C MATERIAL	ISA/ANSI COLOR
	1100 to 1820	±0.7	2012 to 3308	±1.3°	+Pt/30Rh	GREY
B	700 to 1100	±1.0	1292 to 2012	±1.9	-Pt/6Rh	RED
	450 to 700	±1.3	842 to 1292	±2.5	JACKET	GREY
	350 to 450	±1.7°	662 to 842	±3.1		
	600 to 1300	±0.4	1112 to 2372	±0.7°	+NICROSIL	ORANGE
N	350.1 to 599.9	±0.2	662.1 to 1111.9	±0.4	-NISIL	RED
	-50 to 350	±0.2	-58 to 662	±0.4	JACKET	ORANGE
	-180 to -50	±0.5	-292 to -58	±1.0		
	-232 to -180	±1.5°	-385 to -292	±2.7		
	2100 to 2320	±1.2	3812 to 4208	±2.1°	+W5/Re	WHITE
C	1500 to 2100	±1.0	2732 to 3812	±1.7	-W26/Re	RED
(W5)	900 to 1500	±0.6	1652 to 2732	±1.1	JACKET	WHITE/RED
	-1 to 900	±0.4°	30 to 1652	±0.8		
						DIN COLORS
	350 to 750	±0.2	662 to 1382	±0.4°	+IRON	RED
L	-99.9 to 349.9	±0.2	-147.9 to 661.9	±0.3	-CONSTANTAN	BLUE
J DIN	-200 to -100	±0.2°	-328 to -148	±0.4	JACKET	BLUE

mV -99.999 to99.999 mV ±(0.008% of Reading +0.006 millivolts)

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PLATINEL® is a registered trademark of Engelhard Corporation.

Warranty

Altek products are warranted to be free from defects in material and workmanship (excluding fuses, batteries and leads) for a period of three years from the date of shipment. Warranty repairs can be obtained by returning the equipment prepaid to our factory. Products will be replaced, repaired, or adjusted at our option. *Altek gives no other warranties, including any implied warranty of fitness for a particular purpose.* Also, Altek shall not be liable for any special, indirect, incidental or consequential damages or losses arising from the sale or use of its products.

ORDERING INFORMATION

MODEL 222A - ☐*

*Select from T/C Types J, K, T, E, R, S, B, N, C, L, or mV

Carrying case: Included, zippered with belt loop and shoulder strap

PN 1886564 Rev A April 2002