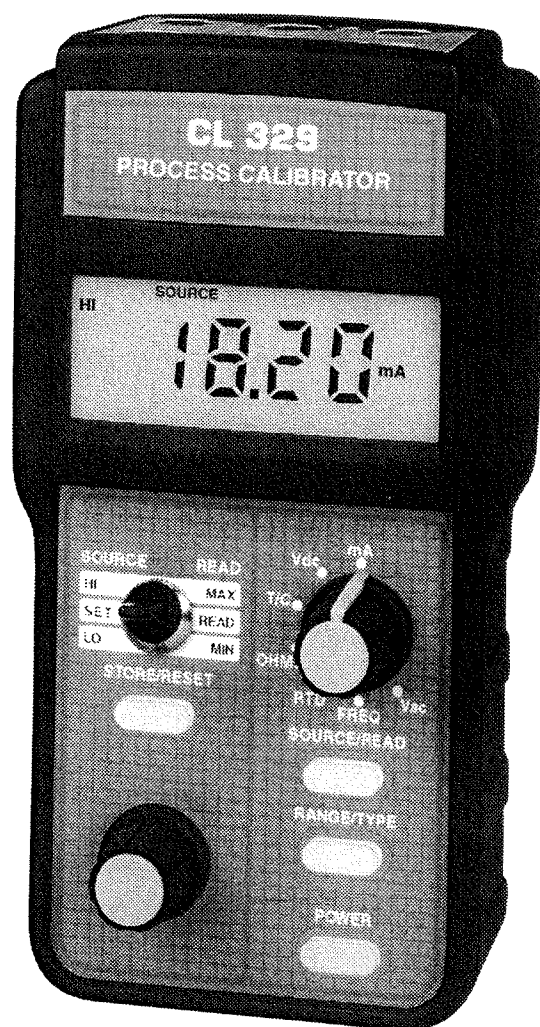


CE



User's Guide



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CL 329 Process Calibrator

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It is the policy of OMEGA to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

The information contained in this document is believed to be correct but OMEGA Engineering, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not designed for use in, and should not be used for, patient connected applications.

GENERAL INFORMATION

Lighten your load by taking the CL329 to every site. It's like bringing a cartload of test equipment from the shop to the control room or the field. The CL329 sources & reads DC like a milliamp or voltage calibrator, simulates and measures T/Cs & RTDs like a temperature calibrator and generates and counts frequency & Counts-Per-Minute like a frequency calibrator. Your CL329 can also help you trouble shoot like a multimeter! It checks continuity and measures AC line voltage without carrying a separate instrument.

The CL329 is easy to use. Select a function, choose a range, and turn the knob for the precise output you need. Plus, you can store three output values per range for instant recall with the QUIK-CHEK[®] switch.

MILLIAMP CALIBRATION

Use at every point in your 4 to 20 mA loop. You can Source & Read 0.00 to 24.00 mA, Simulate a Two-Wire Transmitter or the use the CL329 to simultaneously Power & Measure your Two-Wire Transmitters.

VOLTAGE CALIBRATION

Calibrate all your DC millivolt and voltage instrumentation. Source from 0.00 to 110.00 mV and 0.00 to 10.25 V. Read up to 110.00 mV, 10.25 V and 200.0 VDC.

THERMOCOUPLE CALIBRATION

Source and read directly in °C and °F for T/C types J, K, T & E with 1° resolution. Cold junction compensation automatically adjusts for ambient temperature changes.

RTD CALIBRATION

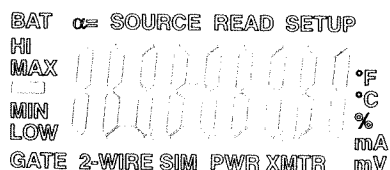
Built-in Platinum 100 Ohm DIN/IEC 751 table displays in °C or °F. No more decade box and hard-to-read tables. Also reads and sources in Ohms.

OPERATING INSTRUCTIONS

GENERAL

TURN-ON

BAT α SOURCE READ SETUP
HI
MAX
MIN
LOW
GATE 2-WIRE SIM PWR XMTR



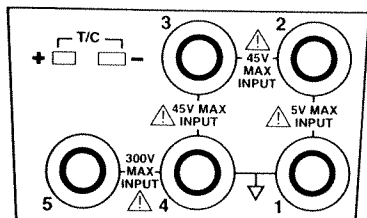
°F
°C
mA
mV

Each time you turn on the CL329 the LCD will display all segments for about 1 second. It then displays the most recently selected Source or Read Setting.

SOURCE - The three QUIK-CHEK outputs will be the same as previously stored. Each time a different function is selected, the three QUIK-CHEK outputs will be recalled.

READ - The CL329 is ready to measure the same signal as the last time it was turned on and is automatically updating the MAX & MIN readings for recall at any time.

CONNECTIONS



CL329 has protected banana jacks compatible with standard and safety banana plugs. **Included with your CL329 are:** a pair of safety test leads with test probes, safety alligator clips standard alligator clips and spade lugs for attachment to a wide variety of instruments. An additional safety test lead and spade lug are also included for 3-Wire RTD connections. Thermocouple connections are made through a miniature thermocouple socket.

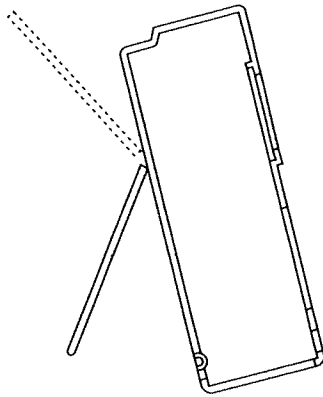
Optional KIT-1 includes T/C wires for Type J, T, E & K with miniature T/C plugs (not included).

To prevent accidentally overloading the instrument being tested, it is important to correctly set up the outputs before connecting CL329 to any instruments to be calibrated.

OPERATING INSTRUCTIONS

GENERAL

FIELD & BENCH USE



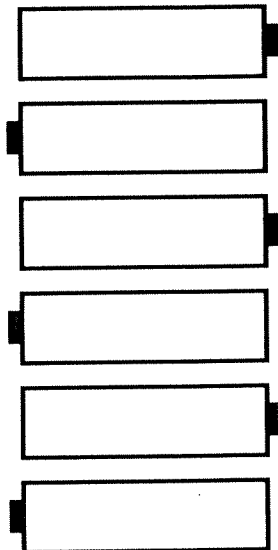
CL329 comes with a carrying case and a built-in tilt stand/hanger. The CL329 is held securely in the case by VELCRO® for use with the carrying case open. The carrying case also has a snap-on belt loop which can be looped around a pipe or rail.

The tilt stand is easily raised by pulling the stand until it locks into place. The stand can also be reversed for use as a hanger to suspend the CL329.

AUTOCAL CAL

To maintain accuracy the CL329 periodically recalibrates its measuring circuitry against internal references. While this is occurring the word CAL will appear on the display for less than 2 seconds.

CHANGING BATTERIES



Low battery is indicated by BAT on the display. Approximately four hours of operation remain before the LCD blanks and CL329 shuts itself down. Turn the CL329 off, loosen the captive screw securing the battery compartment and lift off the cover from the bottom of the case. The six "AA" batteries are easily removed and replaced (alkaline supplied and recommended). Replace the battery compartment cover by inserting the tabs and tightening the screw.

OPERATING INSTRUCTIONS

GENERAL - USER OPTIONS

CONFIGURING TEMPERATURE SCALES

The thermocouple and RTD ranges may be configured for full time use of °C, full time use of °F or selectable °C and °F operation. This configuration is part of the DEFAULT SETTINGS below.

AUTO-OFF

CL329 can be set up to turn itself off after 30 minutes of inactivity. The internal timer is reset to 30 minutes each time the digital pot is turned or a pushbutton is pressed. This configuration is part of the DEFAULT SETTINGS below.

DEFAULT SETTINGS - USER OPTIONS (°C or °F and AUTO-OFF)

CL329 may be restored to the factory settings. This will reset the HI and LO "QUIK-CHEK" memories according to the table below and the SET memory to midrange between HI and LO. Prompts also guide you for selection of temperature scale(s) and AUTO-OFF.

- 1) Press and hold the STORE/RESET push-button while turning the CL329 on.
- 2) Keep pressing the STORE/RESET push-button until the display flashes (about 5 seconds) then release.
- 3) The °C & °F symbols will flash on the display.
- 4) Press the RANGE/TYPE push-button to make your selection. With °C flashing the unit will only display in °C, With °F flashing the unit will only display in °F and with both flashing you can select °C and °F for each T/C & RTD type. °C/°F is selected if no push-buttons are pressed.
- 5) After five seconds the CL329 will automatically store your choice and the words BAT and ON will appear on the display indicating that AUTO-OFF is selected.
- 6) To toggle the AUTO-OFF function on and off press the RANGE/TYPE push-button and the words oN and oFF will display.
- 7) After five seconds the CL329 will automatically store your choice and the CL329 will begin normal operation.

QUIK-CHEK DEFAULTS

| RANGE | LO | SET | HI |
|-------|---------------------|-------|-------|
| mA | 4.00 | 12.00 | 20.00 |
| mV | 1.00 | 5.00 | 10.00 |
| V | 1.00 | 5.00 | 10.00 |
| T/C | All points 0°C/32°F | | |
| Ohms | 100.0 | 200.0 | 400.0 |
| RTD | All points 0°C/32°F | | |
| kHz | 1.00 | 5.00 | 10.00 |
| Hz | 100 | 500 | 1000 |
| CPM | 100 | 500 | 1000 |

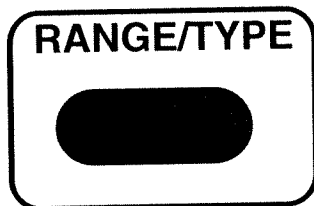
OPERATING INSTRUCTIONS

GENERAL

SELECTING FUNCTIONS

Turn the selector switch to choose among mA, VDC, T/C, OHMs, RTD, FREQ and VAC.

SELECTING RANGES



For some functions there are two or more ranges or scales. Press the RANGE/TYPE pushbutton to scroll through the ranges and scales. The ranges will scroll in the order listed below and will go back to the beginning after the last choice.

SOURCE RANGES

Milliamp: mA, %mA, 2-Wire Sim, %2-Wire Sim, Pwr Xmtr, %Pwr X

VDC: mV, V

T/C: J°F, J°C, T°F, T°C, E°F, E°C, K°F, K°C

Ohms: Ohms

RTD: Pt °F, Pt °C

Frequency: KHz, Hz, CPM

READ RANGES

Milliamp: mA, %mA

VDC: mV, 10V, 200V

T/C: J°F, J°C, T°F, T°C, E°F, E°C, K°F, K°C

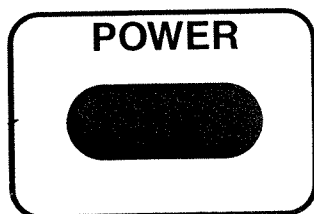
Ohms: Ohms, Continuity

RTD: Pt °F, Pt °C

Frequency: KHz, Hz, CPM

VAC: VAC

TURN OFF



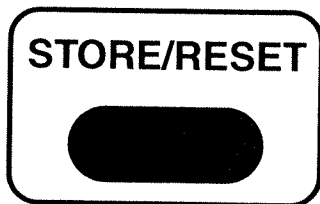
Press the POWER push-button to turn CL329 off. If AUTO-OFF is enabled CL329 will turn itself off after 30 minute inactivity.

OPERATING INSTRUCTIONS SOURCE MODE

SOURCE MODE

Select source by pressing the SOURCE/READ pushbutton until the word SOURCE appears on the LCD display. To change the output value, turn the speed sensitive digital pot. Turning the knob slowly will cause a gradual change in the output. A faster rate of change will occur when the knob is turned faster. This function operates in all three output positions (HI, SET & LO).

STORING QUIK-CHEK OUTPUTS



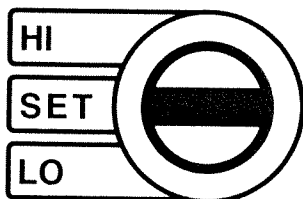
- 1) Switch to HI or LO
- 2) Turn the knob to desired value
- 3) Press the STORE push-button

The LCD will flash once to show that the value was saved

If a value is in the SET position and you want that value stored in HI or LO, press and hold the STORE push-button while moving the switch to HI or LO. The display will flash once to indicate the value has been stored. Then release the STORE push-button.

RECALLING QUIK-CHEK OUTPUTS

SOURCE



When you need a stored value just flip the QUIK-CHEK switch. Any value for the selected range may be stored in HI & LO. The CL329 remembers the HI, LO and SET values for each function with the power on or off. Each time a different function is selected, the last three QUIK-CHEK values for that function will be recalled.

OPERATING INSTRUCTIONS SOURCE MODE

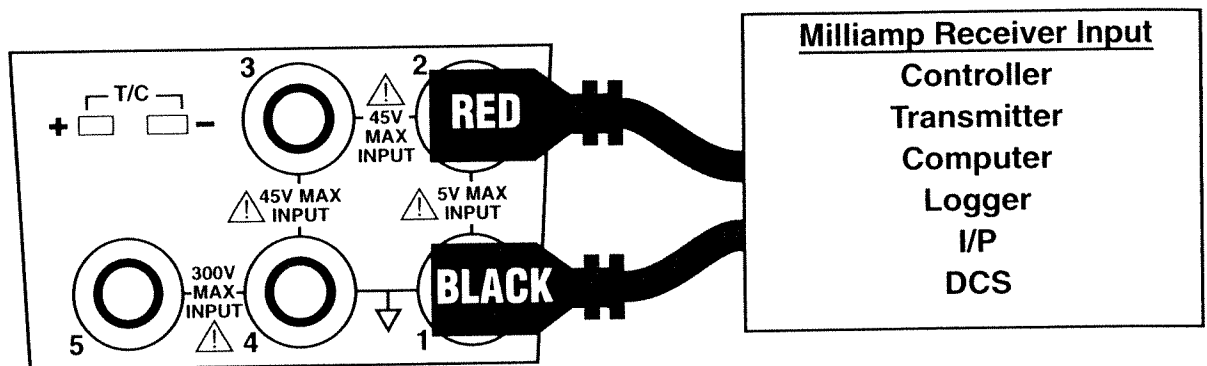
CALIBRATE MILLIAMP INPUTS

mA, mA % (Percent of 4 to 20 mA)

Choose this function to provide an output from 0.00 to 24.00 milliamps. The compliance voltage is a nominal 25 VDC to provide the driving power to your milliamp receivers.

- 1) Disconnect one or both input wires from the device to be calibrated.
- 2) Connect the red SOURCE lead of the calibrator to the plus (+) input of the device and the black SOURCE lead to the minus (-).
- 3) Repeatedly press the RANGE/TYPE push-button until the word SOURCE and mA or SOURCE and % are displayed.

Output current is continuously adjustable with the "QUIK-CHEK" switch in the SET position. Zero & Span (or any other values) are available by using the LO and HI "QUIK-CHEKS".



OPERATING INSTRUCTIONS SOURCE MODE

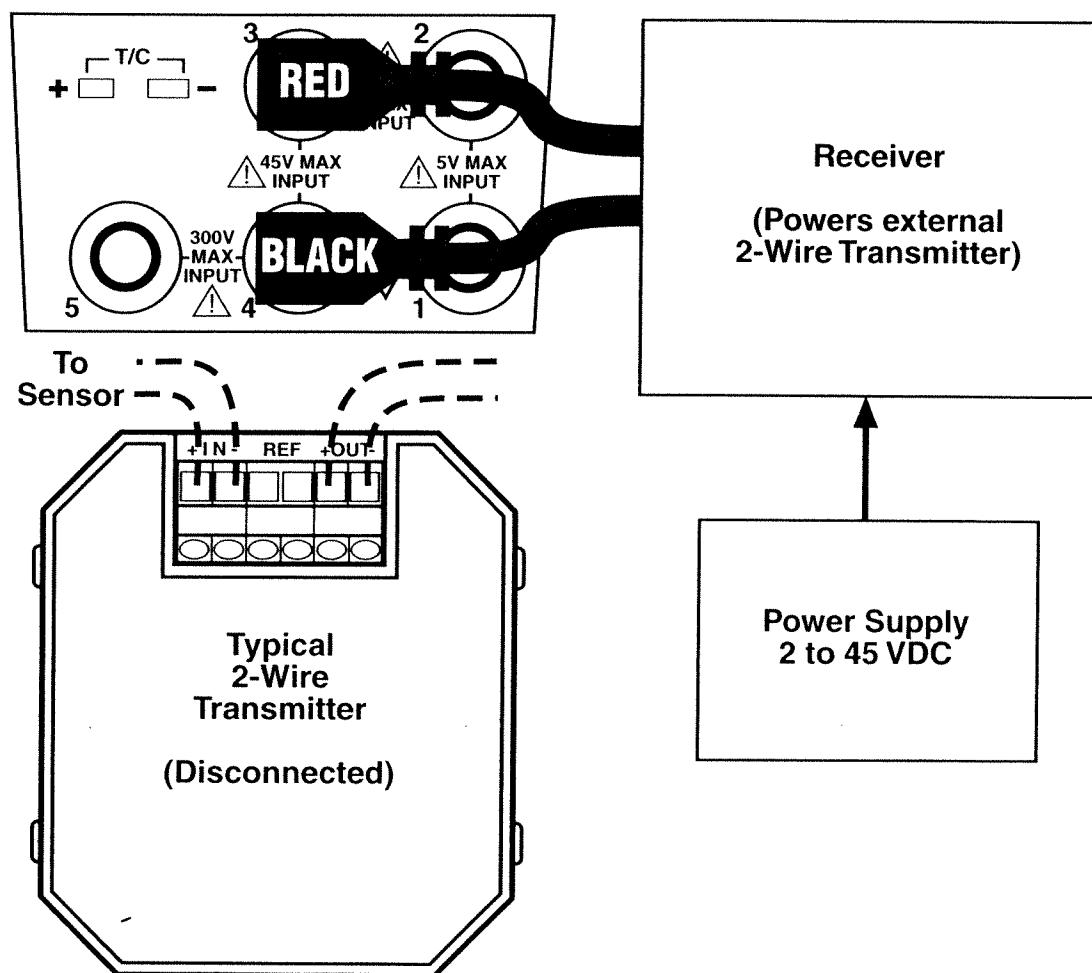
SIMULATE 2-WIRE TRANSMITTERS

2-WIRE SIM mA, 2-WIRE SIM % (Percent of 4 to 20 mA)

Choose this function to simulate a 2-Wire Transmitter output from 1.00 to 24.00 milliamps. Operates in loops with power supply voltages from 3 to 45 VDC.

- 1) Disconnect existing 2-Wire Transmitter from the loop
- 2) Connect the red SOURCE lead of the calibrator to the plus (+) input of the field connections and the black SOURCE lead to the minus (-)
- 3) Repeatedly press the RANGE/TYPE push-button until the words SOURCE, 2-WIRE SIM and mA or SOURCE, 2-WIRE SIM and % are displayed.

The simulated output of the 2-Wire Transmitter is continuously adjustable from 1.00 to 24.00 mA with the "QUIK-CHEK" switch in the SET position. Zero & Span (or any other values) are available by using the LO and HI "QUIK-CHEKs".



OPERATING INSTRUCTIONS SOURCE MODE

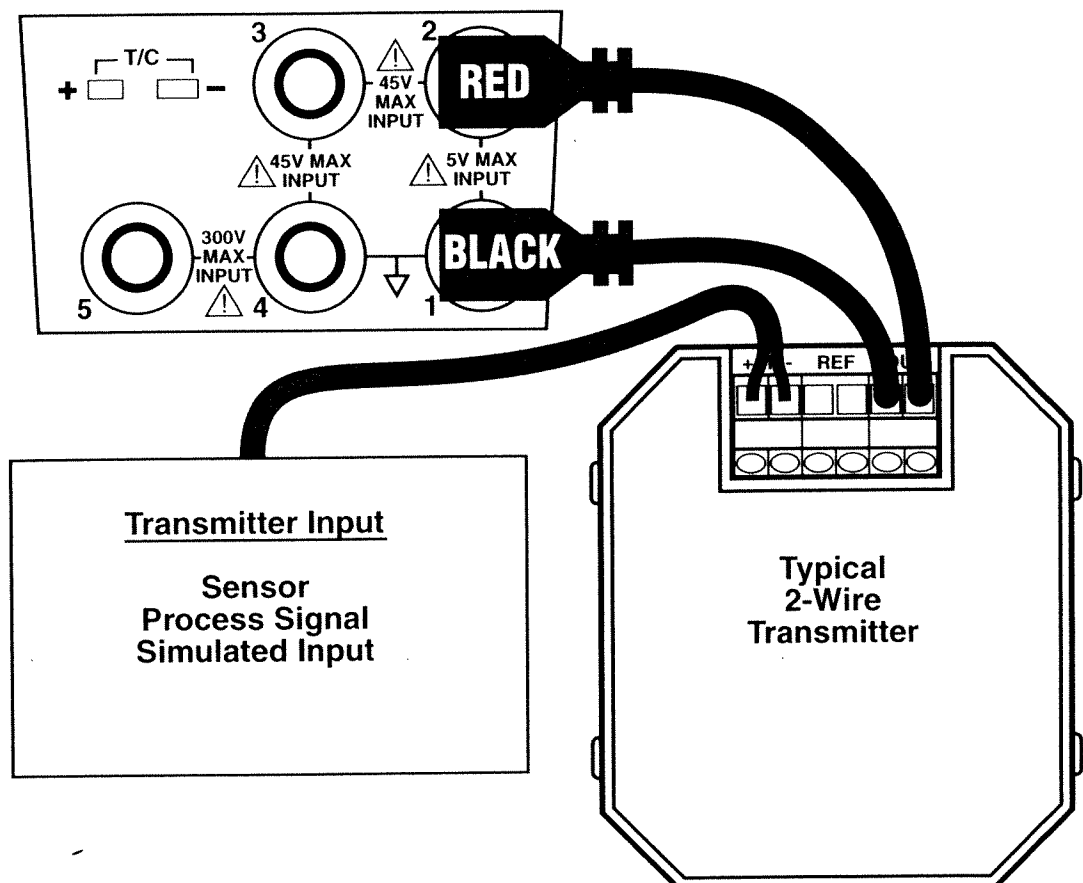
POWER & MEASURE 2-WIRE TRANSMITTERS

PWR XMTR mA, PWR XMTR %

Choose this function to simultaneously supply power to a 2-Wire transmitter while displaying the 4-20 mA output of the transmitter.

- 1) Disconnect one or both input wires from the 2-Wire Transmitter to be calibrated
- 2) Connect the red SOURCE lead of the calibrator to the plus (+) input of the device and the black SOURCE lead to the minus (-) input of the device
- 3) Connect an appropriate sensor or calibrator to the input of the 2-Wire Transmitter
- 3) Repeatedly press the RANGE/TYPE push-button until the words SOURCE, PWR XMTR and mA or SOURCE, PWR XMTR and % are displayed.

CL329 supplies a nominal 24 Volts DC at 24 mA to the 2-Wire transmitter. The current passed by the transmitter will be accurately displayed by the CL329. Calibrate the Transmitter in the usual manner and disconnect the CL329.



OPERATING INSTRUCTIONS SOURCE MODE

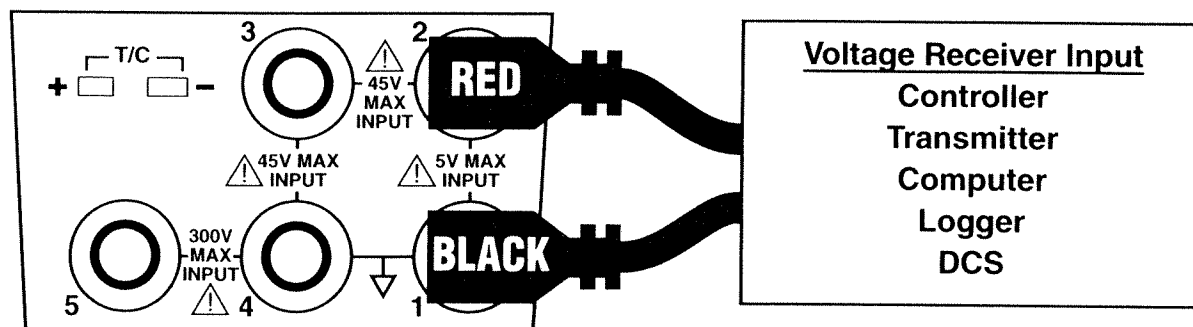
CALIBRATE VOLTAGE INPUTS

V, mV

Choose this function to provide an output from 0.00 mV to 110.00 mV and from 0.00 to 10.25 VDC. Source current is a nominal 20 mA to provide the driving power to your voltage receivers.

- 1) Disconnect one or both input wires from the device to be calibrated
- 2) Connect the red SOURCE lead of the calibrator to the plus (+) input of the device and the black SOURCE lead to the minus (-)
- 3) Press the RANGE/TYPE push-button to switch the display between mV and V.

Output voltage is continuously adjustable with the "QUIK-CHEK" switch in the SET position. Zero & Span (or any other values) are available by using the LO and HI "QUIK-CHEKs".



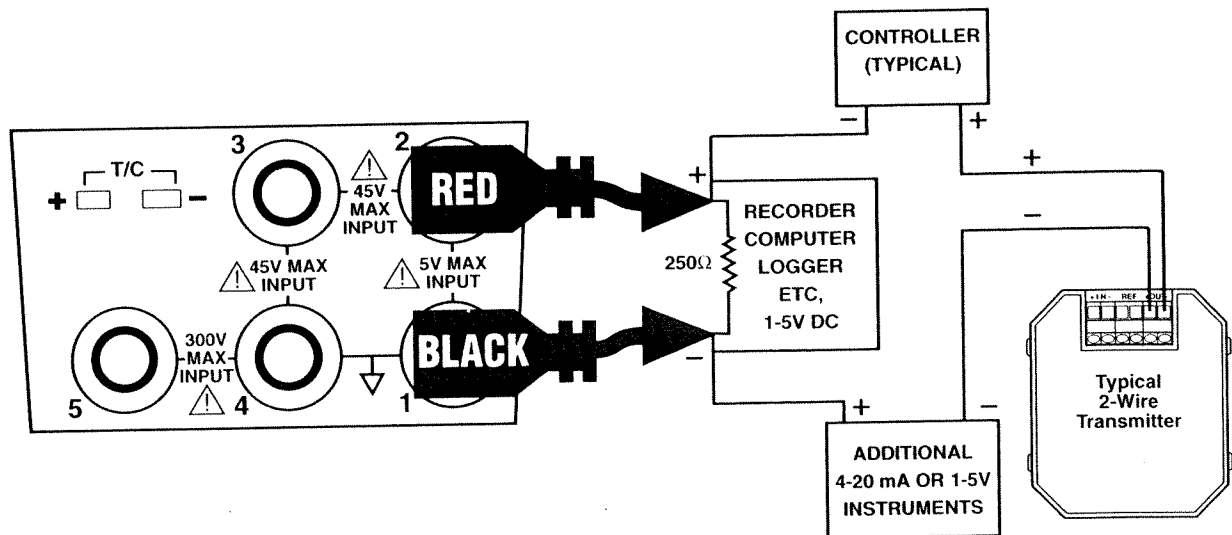
OPERATING INSTRUCTIONS SOURCE MODE

CHECK 1-5 VOLT INPUTS WITHOUT DISCONNECTING WIRES

Most 1-5 Volt receivers in 4-20mA loops have a 250 Ohm resistor across the input of the receiver. This resistor may be mounted internally or externally. CL329 is connected directly across the input of the 1-5 Volt receiver without disconnecting any field wiring. This saves a great deal of time when a large number of voltage receivers, such as chart recorders or computer systems, require calibration.

Make certain that changing the signal input will not disturb the process or cause unexpected alarms when checking on-line instruments. ***It is important to remember the CL329 drives only the device to which it is connected.*** It has no effect on other devices in the 4 to 20 mA loop. CL329 will clamp the selected value in the mV and V Ranges to the maximum sink current of >16 mA.

- 1) Connect the red SOURCE lead of the calibrator to the plus (+) input of the device and the black SOURCE lead to the minus (-). Any associated 250 Ohm resistor must not be disconnected.



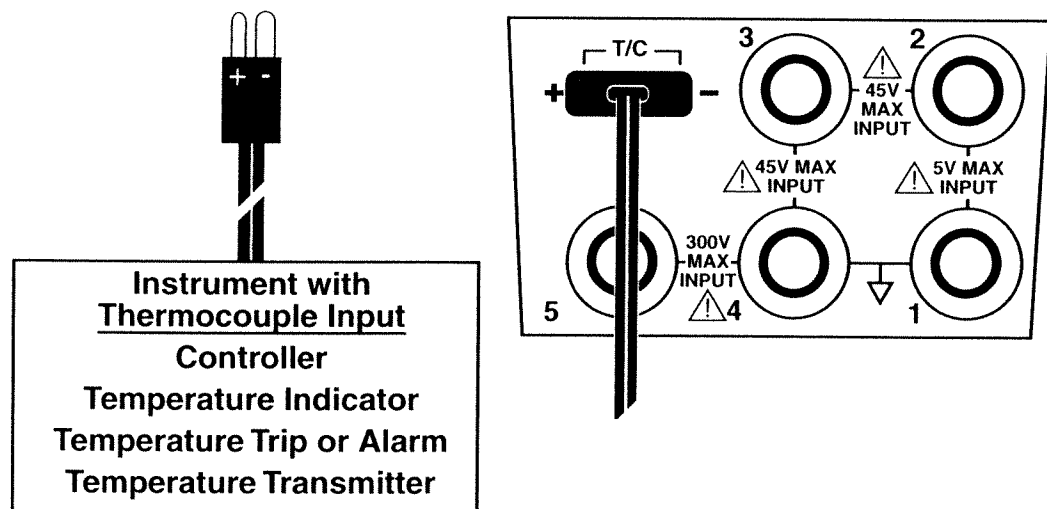
OPERATING INSTRUCTIONS SOURCE MODE

CALIBRATE THERMOCOUPLE INPUTS

Choose this function to simulate a thermocouple signal into any instrument requiring a thermocouple input. The output of the CL329 is automatically cold junction compensated.

- 1) Disconnect the thermocouple from the instrument being calibrated.
- 2) Press the RANGE/TYPE push-button until the desired T/C type and temperature scale appear.
- 3) Use a thermocouple wire and corresponding miniature thermocouple connector to connect the CL329 to the instrument.

Output temperature is continuously adjustable with the "QUIK-CHEK" switch in the SET position. Zero & Span (or any other values) are available by using the LO and HI "QUIK-CHEKs"

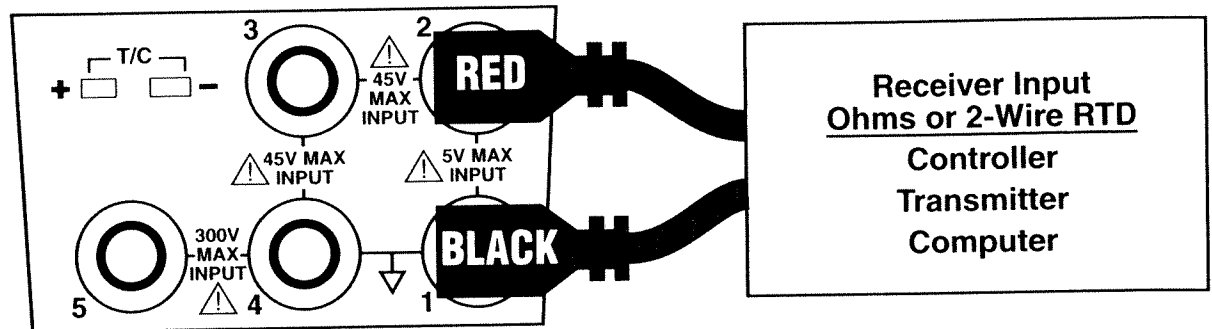


OPERATING INSTRUCTIONS SOURCE MODE

CALIBRATE RESISTANCE INPUTS

Choose this function to simulate a resistance into a variety of instruments.

- 1) Disconnect one or both input wires from the device to be calibrated.
- 2) Connect the red SOURCE lead of the calibrator to the plus (+) input of the device and the black SOURCE lead to the minus (-).



OPERATING INSTRUCTIONS SOURCE MODE

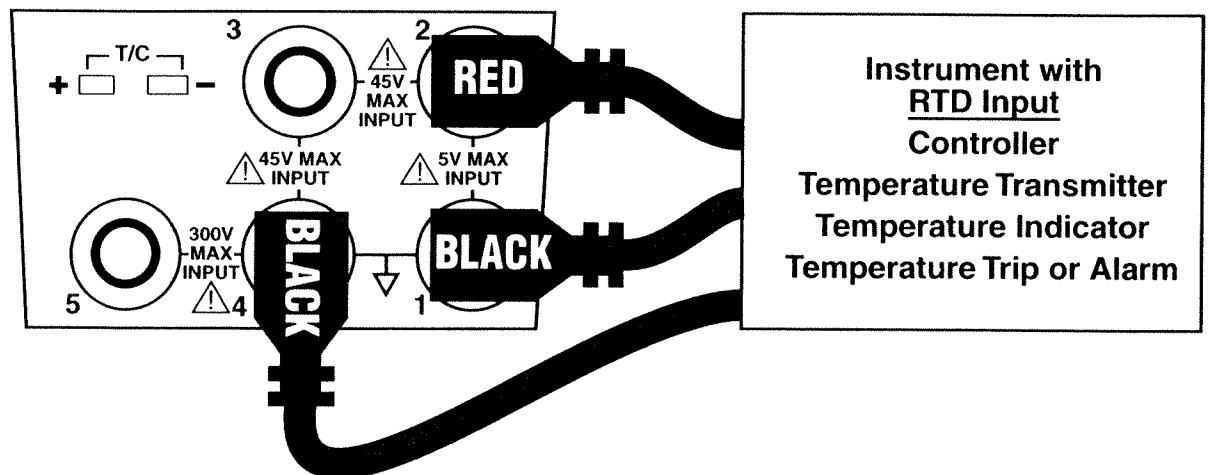
CALIBRATE RTD INPUTS

Choose this function to simulate a temperature signal into any instrument requiring an RTD input.

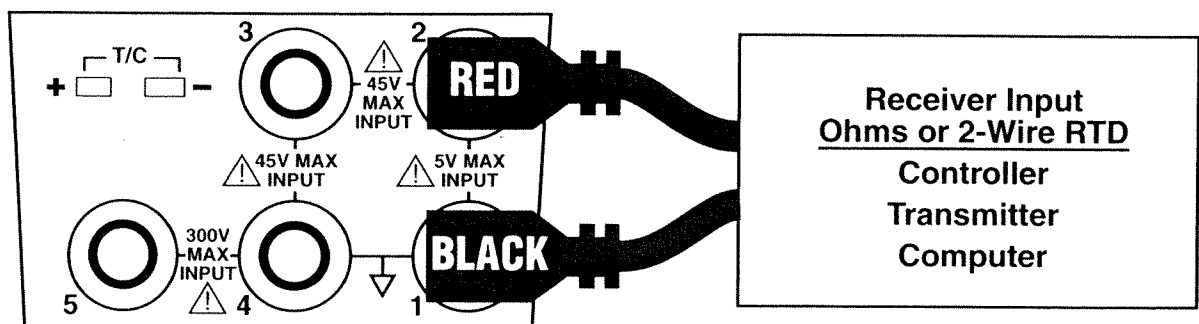
- 1) Disconnect the sensing RTD from the instrument being calibrated.
- 2) Press the RANGE/TYPE push-button until the desired RTD type and temperature scale appear.
- 3) Connect using 3 or 2 wires as in the diagrams below. Spade lugs are recommended to minimize any contact resistance.

Output temperature is continuously adjustable with the "QUIK-CHEK" switch in the SET position. Zero & Span (or any other values) are available by using the LO and HI "QUIK-CHEK" positions.

Three Wire RTD Connection



Two Wire RTD Connection



OPERATING INSTRUCTIONS SOURCE MODE

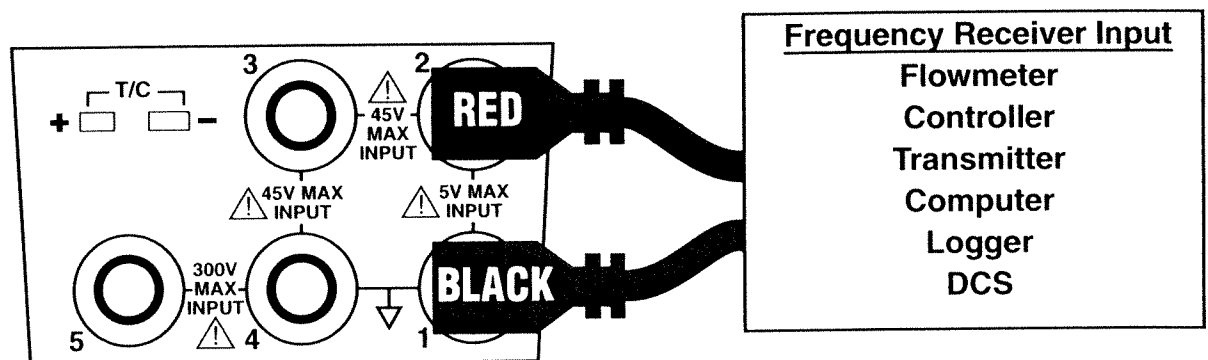
CALIBRATE FREQUENCY INPUTS

Choose this function to provide pulses into frequency measuring instruments. The CL329 output is a zero crossing square wave from -1V to +5V amplitude. Available ranges are from 0.01 to 10.00 kHz, 1 to 1000 Hz and from 1 to 1000 CPM (Counts-Per-Minute).

CPM is used to simulate extremely slow frequency signals with greater resolution. For example, 10 Hz is equivalent to 600 CPM. To convert from CPM to Hz Divide by 60. To convert from Hz to CPM multiply by 60.

- 1) Disconnect any input from the instrument being calibrated.
- 2) Press the RANGE/TYPE push-button until the desired frequency range appears.
- 3) Connect the red SOURCE lead of the CL329 to the plus (+) input of the device and the black SOURCE lead to the minus (-).

Output frequency is continuously adjustable with the "QUIK-CHEK" switch in the SET position. Zero & Span (or any other values) are available by using the LO and HI "QUIK-CHEKs"

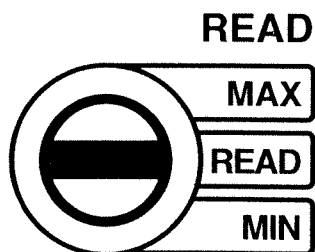


OPERATING INSTRUCTIONS READ MODE

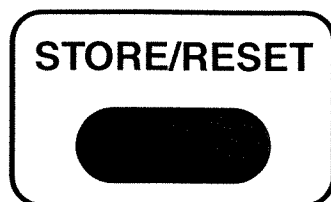
READ FUNCTIONS

Select read by pressing the SOURCE/READ pushbutton until the word READ appears on the LCD display. The READ functions measure the desired signal. Multiple scales are available for some functions.

MIN/MAX



To read the Maximum or Minimum INPUT since READ 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.



STORE/RESET

MIN/MAX

Pressing the STORE/RESET push-button will cause the CL329 to store the present reading into the MAX and MIN memories. Upon releasing the STORE/RESET push-button the CL329 will resume reading the input and update the MAX & MIN values as the measured signal changes.

RESTARTING



SIGNALS

Signals above or below those available for the currently selected range will be indicated by Or and Ur on the display.

OUT OF RANGE

OPERATING INSTRUCTIONS READ MODE

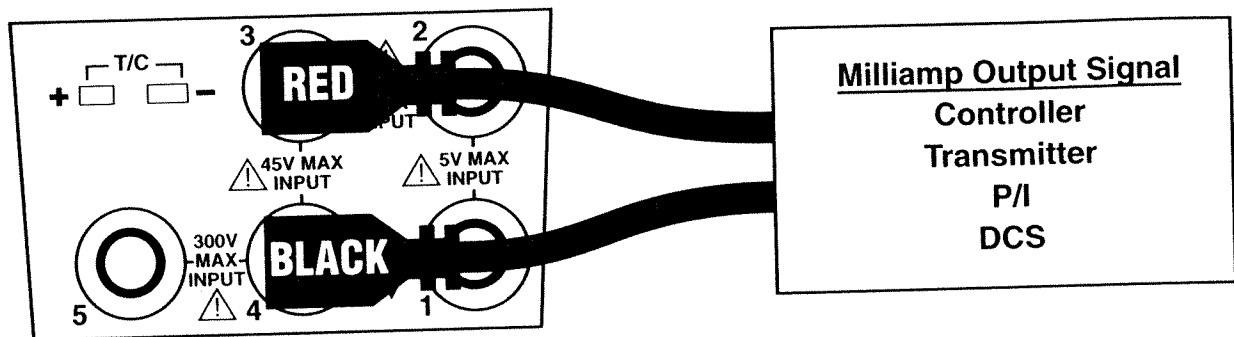
READ MILLIAMP OUTPUTS

mA, mA % (Percent of 4 to 20 mA)

Choose this function to measure from 0.00 to +24.00 milliamps or -25.0 to 125.0%.

- 1) Open the current loop at any convenient point along the signal path
- 2) Connect the red READ (+) lead of the calibrator to the more positive point of the break and the black READ (-) lead to the more negative

Display the present reading, Maximum or Minimum by moving the toggle switch from READ to MAX or MIN. If CL329 is connected in the wrong polarity, the word POLARITY will appear in the display. Simply reverse the leads for correct indication.



OPERATING INSTRUCTIONS READ MODE

READ DC VOLTAGE OUTPUTS

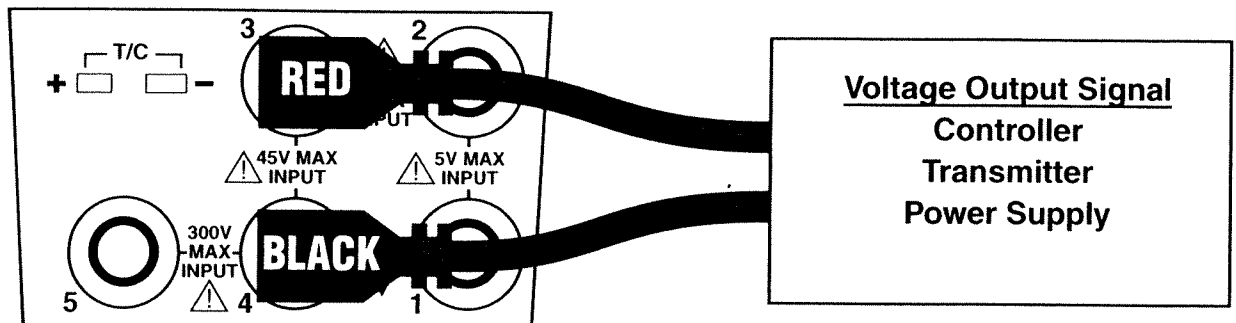
V, mV

Choose this function to measure from 0.00 to 10.25 DC Volts. For checking low level sensor outputs and other low levels change the input range to display from 0.00 to 110.00 millivolts. Use the high voltage connection to read from 0.0 to 200.0 VDC

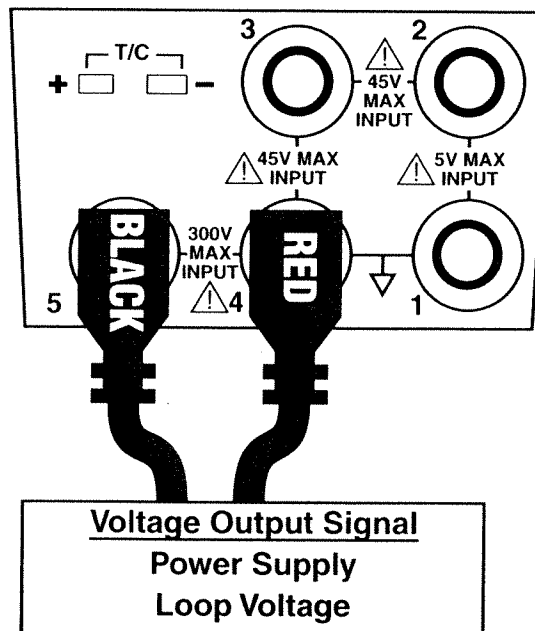
1) Connect the red READ (+) lead and the black READ (-) lead of the calibrator across the voltage to be measured.

Signals above or below those available for the currently selected range will be indicated by Or and Ur on the display.

Connection for millivolts and Volts below 10.25 VDC



Connection for Volts to 200.0 VDC

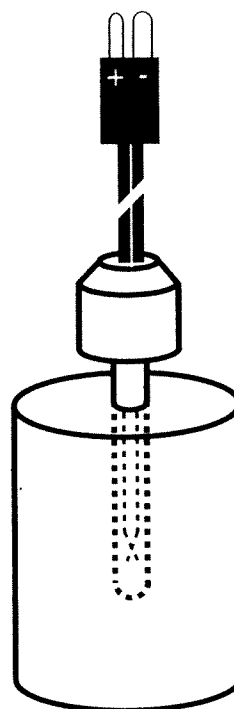
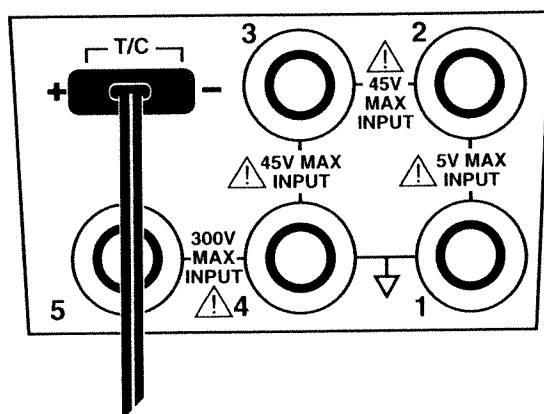


OPERATING INSTRUCTIONS READ MODE

MEASURE THERMOCOUPLE SENSORS

Choose this function to read a thermocouple. The input of the CL329 is automatically cold junction compensated.

- 1) Disconnect the thermocouple from any instrument.
- 2) Press the RANGE/TYPE push-button until the desired T/C type and temperature scale appear.
- 3) Use the proper thermocouple wire and corresponding miniature thermocouple connector to connect CL329 to the thermocouple.



OPERATING INSTRUCTIONS READ MODE

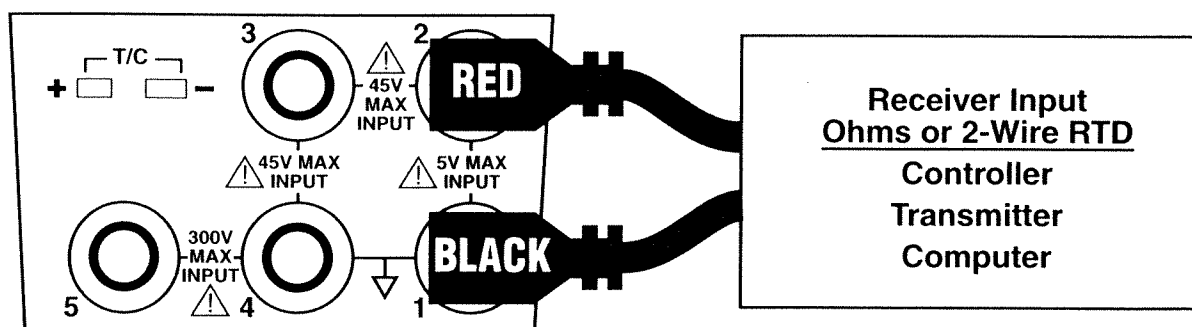
READ RESISTANCE

Ohms

Choose this function to measure resistance from 0.0 to 1000.0 Ohms.

1) Connect the red READ (+) lead and the black READ (-) lead of the calibrator across the resistance to be measured.

Signals above or below those available for the currently selected range will be indicated by OVER and UNDER on the display.

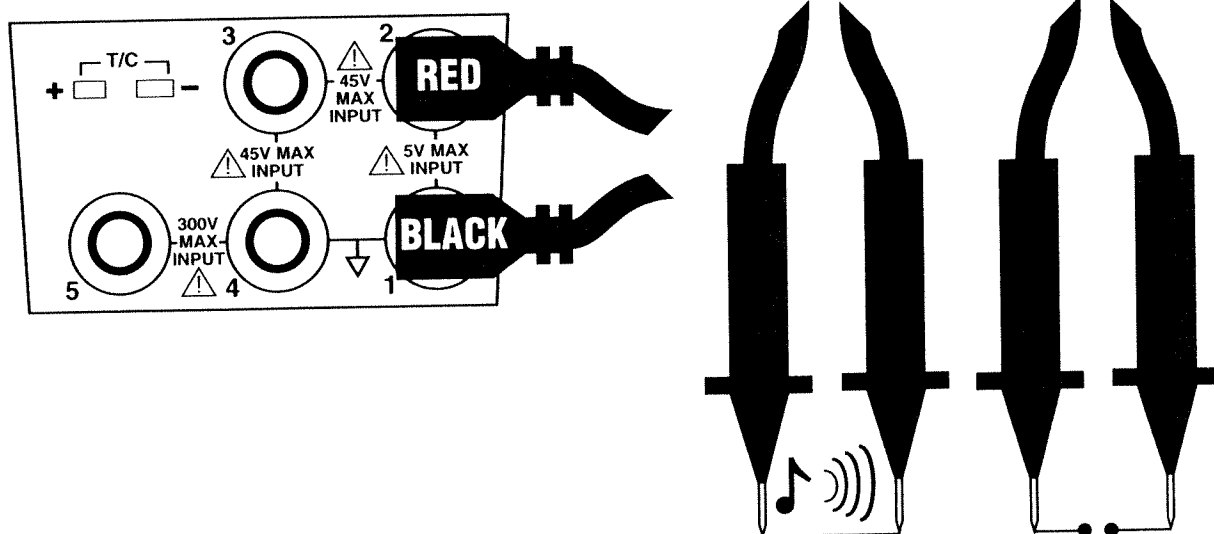


OPERATING INSTRUCTIONS READ MODE

CHECK CONTINUITY

Choose this function to check continuity. A tone will sound and a sound symbol will appear on the display when the resistance between the leads is less than 100 Ohms.

- 1) Plug the leads into the CL329 as shown below.
- 2) Turn the selector knob to OHMs
- 3) Press the SOURCE/READ pushbutton until the word READ appears on the display.
- 4) Press the RANGE/TYPE pushbutton until the word CONTINUITY appears on the display

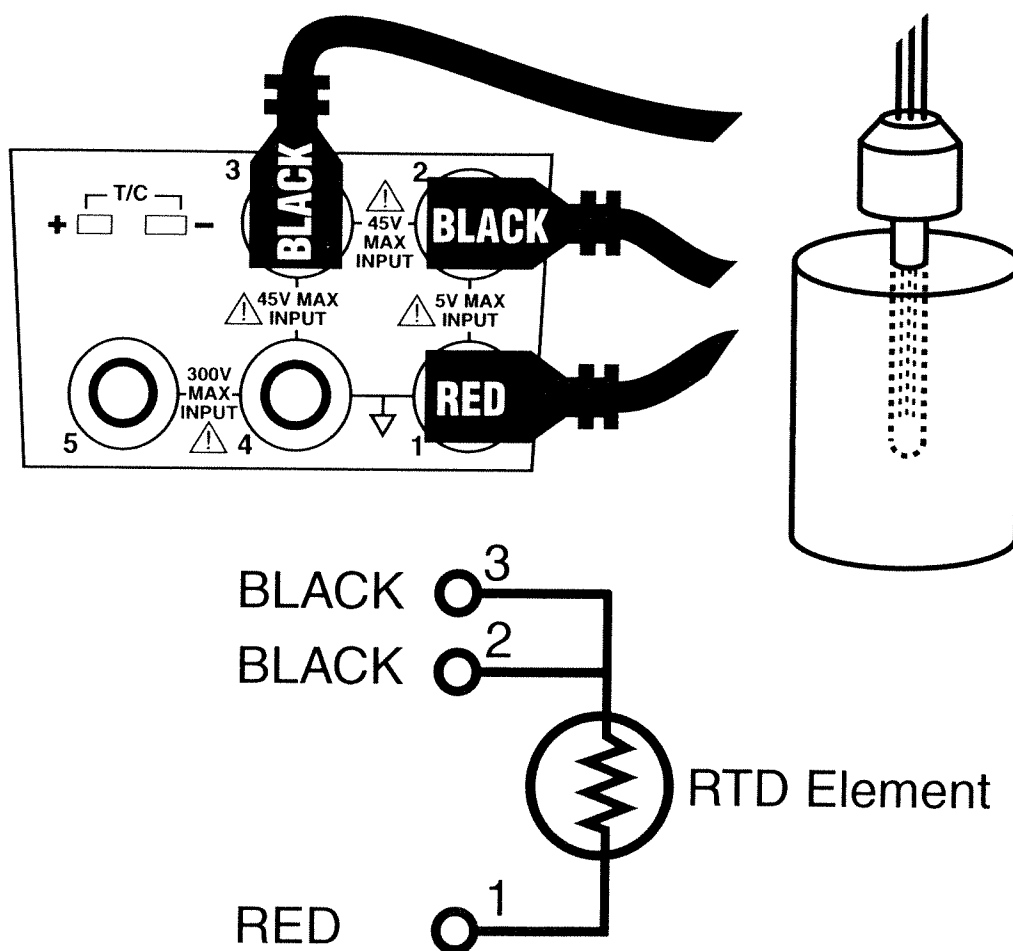


OPERATING INSTRUCTIONS READ MODE

MEASURE RTD SENSORS

Choose this function to read an RTD. Three wires must be use for both 2 and three wire RTDs.

- 1) Disconnect the RTD from any instrument.
- 2) Press the RANGE/TYPE push-button until the desired RTD type and temperature scale appear.
- 3) Connect using 3 wires as in the diagrams below. Spade lugs are recommended to minimize any contact resistance.



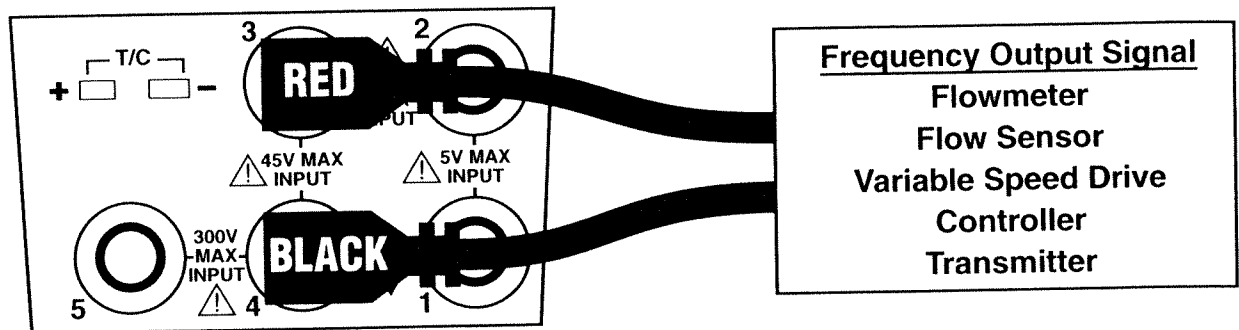
OPERATING INSTRUCTIONS READ MODE

COUNT FREQUENCIES

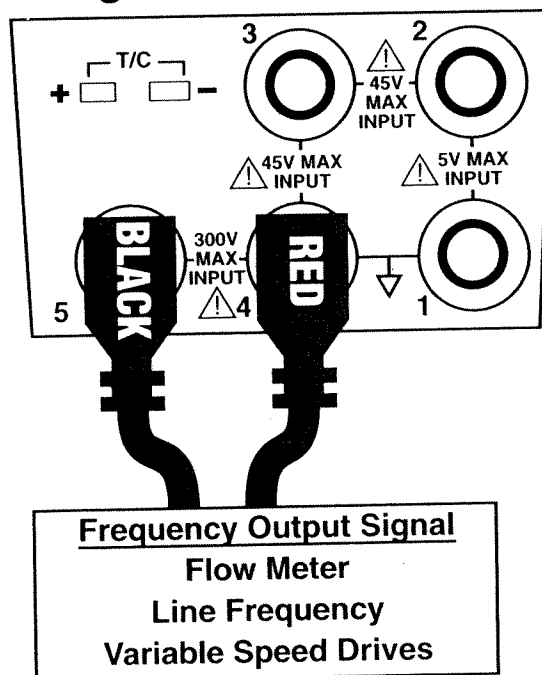
Choose this function to use the CL329 as a frequency counter. Available ranges are from 0.01 to 10.00 kHz, 1 to 1000 Hz and from 1 to 1000 CPM (Counts-Per-Minute).

To measure waveforms with amplitudes between 1 V and 10.25 V RMS use the low level inputs. Use the high voltage connection to read waveforms with amplitudes from 10.25 to 250.0 V RMS

Connection for signals with amplitudes below 10.25 V RMS



Connection for signals with amplitudes to 250 V RMS

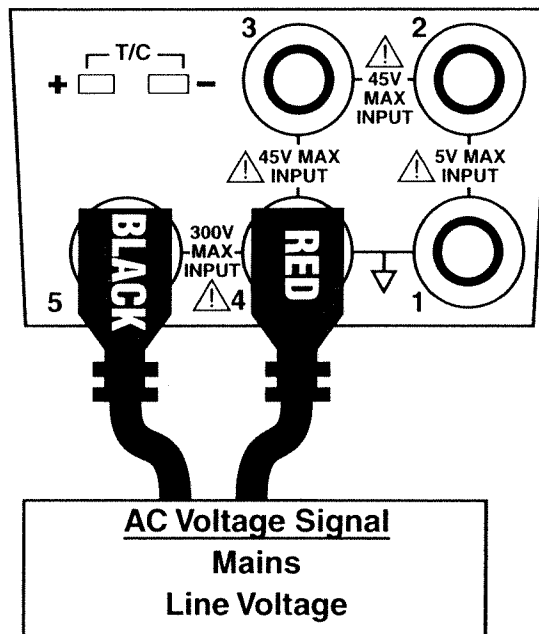


OPERATING INSTRUCTIONS READ MODE

READ AC VOLTAGES

Choose this function to measure from 0.0 to 250.0 V True RMS.

CAUTION: *Care should be used when measuring AC voltage. The included safety test probes or safety alligator clips should be used. Do not exceed voltage limits shown on calibrator.*



SPECIFICATIONS

GENERAL

TYPICAL 90 DAY ACCURACY: $\pm(0.025\%$ of Full Scale + 1 LSD)¹

1 YEAR ACCURACY: $\pm(0.05\%$ of Full Scale + 1 LSD)

WARM UP TIME: 10 seconds to specified accuracy, 2 minutes to maximum accuracy

TEMPERATURE EFFECT: $\pm 0.01\%/^{\circ}\text{C}$ based on $23^{\circ}\pm 25^{\circ}\text{C}$

BATTERIES: Six "AA", (R6) batteries (Alkaline supplied and recommended)

BATTERY LIFE:

MILLIAMP SOURCE & 2-WIRE MODES: Nominal 50 hours at 12 mA, 20 hours at 20 mA with 250 Ohm load

OTHER FUNCTIONS: Nominal 50 hours

LOW BATTERY INDICATION: "BAT" indication on the display at approximately 4 hours left

OVERLOAD PROTECTION: Three fuses, 5 x 20 mm, 63 mA, 250V

NOISE: "1 LSD at frequencies less than 10 Hz

NORMAL MODE REJECTION RATIO: 50 dB @ 50/60 Hz

OPERATING TEMPERATURE RANGE: -5 to +130 °F (-20 to +55°C)

STORAGE TEMPERATURE RANGE: -13 to +130°F (-25 to +55°C)

RELATIVE HUMIDITY: 10 to 90%, non-condensing for 24 hours from 0 to 35°C

OVERALL SIZE: 158.1 x 83.1 x 49.3 mm (6.23 x 3.27 x 1.94 inches)

WEIGHT: 0.6 kg (1 lb, 5 oz)

MILLIAMP SOURCE

RANGES:

0.00 to 24.00 mA; -25.0 to 125.0 % of 4 to 20 mA

ACCURACY: $\pm(0.05\%$ of 24 mA Span + 0.01 mA) = 0.02mA

TYPICAL DRIVE CAPABILITY: 1200 Ohms @ 20.00 mA

COMPLIANCE VOLTAGE: nominal 25 V @ 20 mA

¹ Typical 90 day accuracy can be estimated by dividing the 1 year % of full scale accuracy by 2. Additions to the specification, such as + 1 LSD, remain constant.

SPECIFICATIONS

POWER & MEASURE 2-WIRE TRANSMITTERS

RANGES & ACCURACY: Same as for MILLIAMP SOURCE

OUTPUT CURRENT: up to 24.00 mA

TYPICAL DRIVE CAPABILITY: 1200 Ohms @ 20.00 mA

COMPLIANCE VOLTAGE: nominal 25 VDC @ 20 mA

2-WIRE TRANSMITTER SIMULATOR

RANGES:

1.00 to 24.00 mA; -18.8 to 125.0% of 4 to 20 mA

ACCURACY: Same as for MILLIAMP SOURCE

LOOP VOLTAGE LIMITS: Minimum, 3 VDC; Maximum 45 VDC

OVERLOAD PROTECTION: Current limited to 25 mA nominal

MILLIAMP READ

RANGES:

0.00 to 24.00 mA; -25.0 to 125.0 % of 4 to 20 mA

ACCURACY: Same as for MILLIAMP SOURCE

OVERLOAD PROTECTION: Current limited to 25 mA nominal

VOLTAGE BURDEN: 0.9V at 4 mA, 1.2V at 20 mA, 1.9V at 24 mA

DC VOLTAGE SOURCE

RANGES:

0.00 to 110.00 mV; 0.00 to 10.25V

ACCURACY:

$\pm(0.05\% \text{ of } 110 \text{ mV} + 0.01\text{mV}) = \pm 0.07 \text{ mV}$

$\pm(0.05\% \text{ of } 10.25 \text{ V} + 0.01\text{V}) = \pm 0.02\text{V}$

SOURCE CURRENT: >20 mA

SINK CURRENT: >20 mA

OUTPUT IMPEDANCE: <0.3 Ohms

SHORT CIRCUIT DURATION: Infinite

MEASURE AC VOLTS

RANGE: 0.0 to 250.0 V True RMS

ACCURACY: From 10 to 250 VAC $\pm(2\% \text{ of } 250 \text{ V} + 0.1 \text{ VAC}) = \pm 5.1 \text{ VAC}$

MAXIMUM CREST FACTOR: < 3

FREQUENCY RANGE: 45 to 800 Hz

SPECIFICATIONS

MEASURE DC VOLTS

RANGES:

0.00 to 110.00 mV; 0.00 to 10.25 V; 0.0 to 200.0 V

ACCURACY:

$\pm(0.05\% \text{ of } 110 \text{ mV} + 0.01\text{mV}) = \pm 0.07 \text{ mV}$

$\pm(0.05\% \text{ of } 10.25 \text{ V} + 0.01\text{V}) = \pm 0.02\text{V}$

$\pm(2\% \text{ of } 200.0 \text{ V} + 0.1\text{V}) = \pm 4.1 \text{ V}$

INPUT RESISTANCE: >1 Meg Ohm to 10.25V, >5 Meg Ohm to 200V

SOURCE RESISTANCE EFFECT: 0.01% per 100 Ohms

SOURCE THERMOCOUPLES

RANGES:

Type J -100 to 1200°C; -148 to 2192°F

Type K -100 to 1371°C; -148 to 2500°F

Type T -100 to 400°C; -148 to 752°F

Type E -100 to 1000°C; -148 to 1832°F

ACCURACY:

1°C for temperatures above 0°C

2°C for temperatures below 0°C

COLD JUNCTION ACCURACY: $\pm 1^\circ\text{C}$

COLD JUNCTION EFFECT: within 0.05°C per °C change

OVERLOAD PROTECTION: Fused

OUTPUT IMPEDANCE: <0.3 Ohms

SOURCE CURRENT: >5 mA

READ THERMOCOUPLES

RANGES & ACCURACY: Same as for SOURCE THERMOCOUPLES

INPUT IMPEDANCE: > 1 Meg Ohm

OPEN THERMOCOUPLE DETECTION: 450 millisecond pulse.
Nominal threshold, 10 K Ohms.

SOURCE RTD & OHMS

RANGE OHMS: 0.0 to 400.0 Ohms

ACCURACY: $\pm 0.05\%$ of Full Scale + 0.075 mV/mA Excitation Current

ACCURACY OHMS: $\pm(0.05\% \text{ of } 400.0 \text{ Ohms} + 0.1 \text{ Ohm}) = \pm 0.3 \text{ Ohms}$ (At 1 mA Excitation Current)

ACCURACY RTD: $\pm 1^\circ\text{C}$ (At 1 mA Excitation Current)

SPECIFICATIONS

RTD Type: Pt 100 Ohm DIN/IEC 751, Alpha = 1.3850 (0.00385)

RANGE RTD: -100 to 850°C; -148 to 1562°F

TEMPERATURE EFFECT: $\pm((0.035 \text{ mV}/^{\circ}\text{C}) * (1/\text{mA Excitation Current}))$

ALLOWABLE EXCITATION CURRENT: 0.125 to 2.0 mA continuous DC

READ RTD & OHMS

RANGE OHMS: 0.0 to 1000.0 Ohms

ACCURACY: $\pm(0.05\% \text{ of } 1000.0 \text{ Ohms} + 0.1 \text{ Ohm}) = \pm 0.6 \text{ Ohms}$

RTD RANGE & ACCURACY: Same as for SOURCE RTDs

EXCITATION CURRENT SUPPLIED: 1 mA, nominal

FREQUENCY SOURCE

RANGES: 1 to 1000 CPM (Count-Per-Minute); 1 to 1000 Hz,
0.01 to 10.00 kHz

ACCURACY:

$\pm(0.05\% \text{ of } 1000 \text{ CPM} + 1 \text{ CPM}) = \pm 2 \text{ CPM}$

$\pm(0.05\% \text{ of } 1000 \text{ Hz} + 1 \text{ Hz}) = \pm 2 \text{ Hz}$

$\pm(0.05\% \text{ of } 10.00 \text{ kHz} + 0.01 \text{ kHz}) = \pm 0.02 \text{ kHz}$

OUTPUT WAVEFORM: Square Wave, Zero Crossing, -1V to +5V
 $\pm 10\%$

RISETIME: Hz <5 microseconds; CPM <100 microseconds

OUTPUT IMPEDANCE: <100 Ohms

SOURCE CURRENT: >1 mA at 10 kHz

SHORT CIRCUIT DURATION: Infinite

MEASURE FREQUENCY

RANGES & ACCURACY: Same as for FREQUENCY SOURCE

TRIGGER LEVEL: 1 V RMS, DC coupled

MINIMUM PULSE WIDTH: 20 milliseconds

INPUT IMPEDANCE: > 1Meg Ohm + 60 pF

CONTINUITY CHECKING

TEST CURRENT: Nominal 1 mA

THRESHOLD: 100 Ohm $\pm 20\%$

INDICATION: Steady tone & Symbol on LCD plus Ohm Reading

Specifications subject to change without notice

NOTES

NOTES

NOTES



WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **37 months** from date of purchase. OMEGA Warranty adds an additional one (1) month grace period to the normal **three (3) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit should malfunction, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

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RETURN REQUESTS / INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. P.O. number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. P.O. number to cover the COST of the repair,
2. Model and serial number of product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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