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CL531 mA Loop Calibrator



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

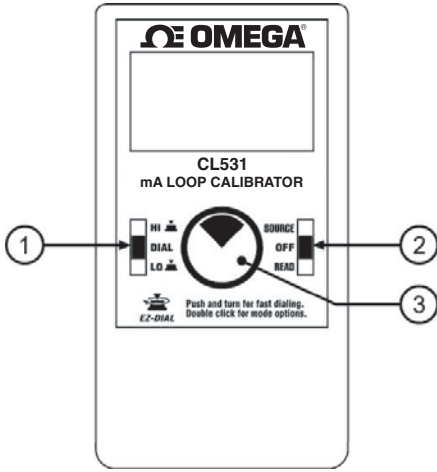
WARNING: These products are not designed for use in, and should not be used for, human applications.

Basic Keypad Operations

1 EZ-Check™ Switch

SOURCE mode: Slide the switch to select from Hi and low range pre-set values and the mid ranger (Dial) is selectable. Dial the mid range value and it will store the value with-in 5 seconds automatically.

READ mode: Slide the switch to recall minimum and maximum readings. Press the **EZ-Dial™ Knob** to clear the stored values.



2 SOURCE/OFF/READ Switch

Slide the **SOURCE/OFF/READ Switch** to **SOURCE** to output a mA signal and to do 2 - wire transmitter simulation. Use the **READ** position to read mA signal and power & measure 2 - wire transmitter.

3 EZ-Dial™ Knob

Turn the knob to change display in 0.01mA increments. Push and turn for faster dialing. Push without turning to clear EZ-Check™ HI/LO points in READ mode.

Press twice to select options:

In **Source** mode select -
% or mA
2-Wire Transmitter Simulate
% or mA
low power (15V) or High power (24V)

In **Read** mode select -
% or mA
Power and Measure 2-Wire Transmitter
% or mA
low power (15V) or High power (24V)

HART® Protocol

An internal jumper enables the Power & Measure 2 - wire transmitter mode to be compatible with HART® communicators and transmitters.

EZ-Dial™ Knob

Adjust the output up and down with the EZ-Dial™ knob. The increment is 0.01 mA (or 0.1 % if display units are % of 4-20 mA.) Press while turning to adjust 10X faster - 0.10 mA (or 1.00 %.)

Quick Reference Bar Graph

The Quick Reference Bar Graph indicates the input and output level to the CL531 in % of 4-20 mA with 1.0% resolution. If the input or output signal is outside the normal operating range of the CL531 the Quick Reference Bar Graph in source mode will flash, in Read mode display over range when above 24.5mA.

Error Conditions

Bar Graph will flash when any error conditions exist.

HART® Protocol

Remove the back of the case and remove the jumper that is located in position J6 on the PC board. By doing so it places a 250Ω resistor in series with the output of the CL531. This internal resistor eliminates the need to add an external load resistor when communicating with a HART® transmitter. This reduces the typical drive capability to 950 Ω.

EZ-Check™ Switch

The EZ-Check™ switch has three positions -- high, dial, and low. Its position is shown at the left edge of the display with "HI" and "LO" indicators. Neither indicator indicates the middle position. Use of the EZ-Check™ switch depends on mode.

Source Modes:

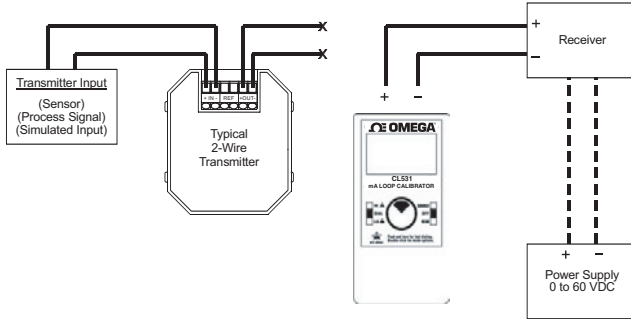
Slide the EZ-Check™ switch to the HI and LO positions to recall the preset settings (Hi=20.00mA & Lo=4.00mA).

Hint: For faster calibrations, the position of the switch can be felt. This feature allows continuous monitoring of the device being calibrated without looking back at the CL531 display. This is also useful in poor lighting or under difficult operating conditions.

Read Modes:

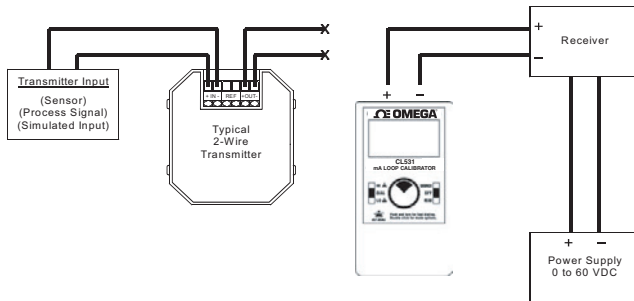
In read mode, the CL531 calibrator records the maximum and minimum readings observed in each mode. Slide the EZ-Check™ switch to the Dial position to read the loop. Then Slide the EZ-Check™ switch to the HI and LO positions to display the max and min readings. Press **EZ-Dial™ knob** to clear the readings. The display will flash "CLEARED" to confirm.

Source Mode



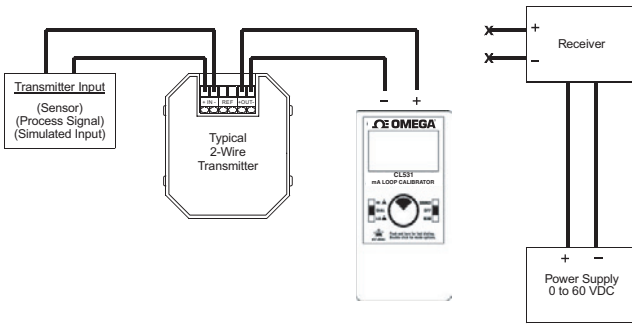
Source mode uses internal power to supply current from 0.00-24.00 mA into as much as 1200Ω until the end of battery life. The calibrator Graph will flash if connected improperly. The three-position EZ-Check™ switch provides instant preset 4mA at zero, 12mA at mid range and 20mA at full scale outputs. The output is adjusted in 0.01 or 0.10 mA increments (0.1 or 1.0) % display units with the EZ-Dial knob.

2-Wire Transmitter Simulation Mode



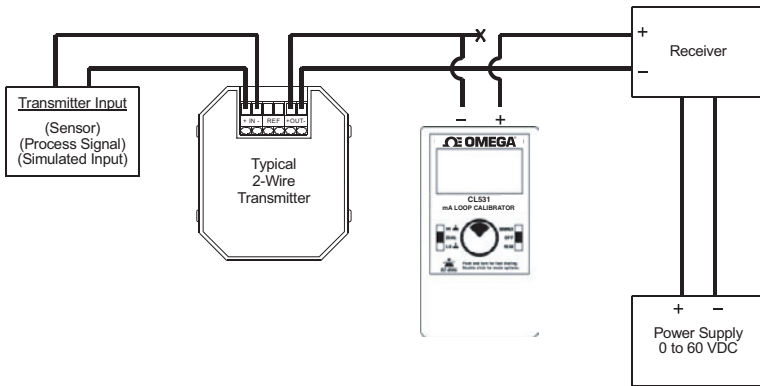
The CL531 can simulate a 2-wire transmitter in the 4-20 mA or % process loop. In source mode press the EZ-Dial™ Knob twice to get into the feature options. Then press the EZ-Dial™ Knob to select mA 2 - wire. The EZ-Check switch and EZ-Dial knob allow rapid and fine control of loop current.

Power and Measure Transmitter Mode



The CL531 supplies 15Volts or 24 Volts to the transmitter and displays the output in mA or % on the CL531 display. In read mode press the EZ-Dial™ Knob twice to get into the feature options. Then press the EZ-Dial™ Knob to select mA PWR - M. Then turn EZ-Dial™ Knob to select power range (15V or 24V). The EZ-Check switch and EZ-Dial knob allow rapid and fine control of loop current.

Read Mode



The CL531 can read loop currents from 0-24 mA. The CL531 limits current in read mode to 25mA to protect the devices in the loop from over voltage or over current conditions.

Specifications

General Specifications:

(Unless otherwise indicated all specifications are rated from a nominal 23 °C, 70 % RH for 1 year from calibration)

Operating Temperature Range	-20 to 60 °C (-5 to 140 °F)
Storage Temperature Range	-30 to 60 °C (-22 to 140 °F)
Relative Humidity Range	10 % ≤RH ≤90 % (0 to 35 °C), Non-condensing 10 % ≤RH ≤ 70 % (35 to 60 °C), Non-condensing
Battery	2 AA Alkaline
Miscellaneous	Low battery indication with nominal 1 hour of operation left Over-voltage protection to 120 Vrms (rated for 30 seconds) or 240 Vrms (rated for 15 seconds) Bar graph display with 1% resolution of 4-20 mA signal scale High contrast graphic liquid crystal display with 0.45" (11.4 mm) high digits

Common Specifications for all current modes

Ranges	0.00 to 24.00 mA, 25.0 to 125.0% of 4-20 mA
Accuracy	≤ ± (0.05 % of Reading + 0.01 mA)
Temperature effect	≤ ± 50 ppm/°C of Range
Resolution(s)	0.01 mA and 0.1 %

Source/Power and Measure 2-Wire Transmitter Specifications:

Loop compliance voltage	≥ 15 Volts or ≥ 24 Volts
Loop drive capability	1200 Ω at 20 mA for entire battery life @ 24 Volts 600 Ω at 20 mA for entire battery life @ 15 Volts

Read mA Specifications:

Voltage burden	≤ 1V at 20 mA
Overload/Current limit protection	nominal ≤24 mA
Battery life	Typical ≥ 40 Hours

2-Wire Transmitter Simulation Specifications:

Voltage burden	≤ 2V at 20 mA
Overload/Current limit protection	nominal ≤ 24 mA
Loop voltage limits	2-42 VDC
Miscellaneous	Open loop or out of compliance conditions are indicated by appropriate error display Battery life ≥ 40 hour typical

CL531 Field Calibration Procedure

Equipment Needed:

1. Precision Current Meter with accuracy of $\pm 0.025\%$ at 20mA.
2. Precision Current Source with accuracy of $\pm 0.025\%$ at 20mA

Enabling Calibration:

Place in fresh batteries and allow one hour for the CL531 to stabilize to the ambient temperature. Remove the battery cover and the Phillips head screws. While holding the CL531 face up in one hand, carefully separate the top and bottom of the housing. Place the unit into calibration mode by putting the switch into the OFF position and shorting the calibration via labeled on the PCB with a shorting jumper or tweezers. Verify the CL531 is in calibration mode by viewing the LCD for the words "CALIBRATION REQUIRED".

Read mA Calibration:

Turn the CL531 on by moving the on/off switch to either "Read" or "Source". Connect the CL531 terminals to a Current Source.

LO Calibration:

1. Slide the EZ-Check™ Switch to the LO position indicated by displaying a "LO" on the left side of the LCD.
2. Set the current source to 0.000 mA.
3. Press and hold the EZ-Dial in for a few seconds.
4. The display will flash "STORED" to confirm that the displayed calibration constant value was stored.

HI Calibration:

1. Slide the EZ-Check™ Switch to the HI position indicated by displaying a "HI" on the left side of the LCD.
2. Set the current source to 20.000 mA.
3. Press and hold the EZ-Dial in for a few seconds.
4. The display will flash "STORED" to confirm that the displayed calibration constant value was stored.

Source mA Slope Calibration:

This must be done right after read calibration or the CL531 will dial incorrectly in source mode.

Turn the unit off then back on to source mode by putting the on/off switch in the high position. Connect the Model 531 terminals to a Current Meter.

LO Calibration:

1. Slide the EZ-Check™ Switch to the LO position indicated by displaying a "LO" on the left side of the LCD.
2. Allow the current meter to settle and for the microprocessor to store 4mA.

HI Calibration:

1. Slide the EZ-Check™ Switch to the HI position indicated by displaying a "HI" on the left side of the LCD.
2. Allow the current meter to settle and for the microprocessor to store 20mA.

Check the linearity calibration in source mode by dialing the Model 531 from 4.00mA to 4.01mA. If the linearity is calibrated correctly the unit will go from 4.00mA to 4.01mA. If this fails, repeat the calibration from the start.

This is the completion of calibration.

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's 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 malfunctions, 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 having been 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 in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

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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. Purchase Order 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. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the 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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