3 YEAR WARRANTY

MADE IN USA

User's Guide

Shop online at

omega.com®

OMEGA®

omega.com
e-mail: info@omega.com
For latest product manuals:
omegamanual.info

ISO 9001 CERTIFIED CORPORATE QUALITY — STAMFORD, CT

ISO 9002 CERTIFIED CORPORATE QUALITY — MANCHESTER, UK

CL531
mA Loop Calibrator

omega.com®
OMEGA®

OMEGAnet® Online Service omega.com	Internet e-mail info@omega.com

Servicing North America:

U.S.A.:
ISO 9001 Certified
One Omega Drive, Box 4047
Stamford, CT 06907-0047
Tel: (203) 359-1660 FAX: (203) 359-7700
e-mail: info@omega.com

Canada:
976 Bergar
Laval (Quebec) H7L 5A1, Canada
Tel: (514) 856-6928 FAX: (514) 856-6886
e-mail: info@omega.ca

For immediate technical or application assistance:

U.S.A. and Canada: Sales Service: 1-800-826-6342 / 1-800-TC-OMEGA®
Customer Service: 1-800-622-2378 / 1-800-622-BEST®
Engineering Service: 1-800-872-9436 / 1-800-USA-WHEN®

Mexico: En Español: (001) 203-359-7803 e-mail: espanol@omega.com
FAX: (001) 203-359-7807 info@omega.com.mx

Servicing Europe:

Benelux:
Postbus 8034, 1180 LA Amstelveen, The Netherlands
Tel: +31 (0)20 3472121 FAX: +31 (0)20 6434643
Toll Free in Benelux: 0800 0993344
e-mail: sales@omegaeng.nl

Czech Republic:
Frystatska 184, 733 01 Karviná, Czech Republic
Tel: +420 (0)59 6311899 FAX: +420 (0)59 6311114
Toll Free: 0800-1-66342 e-mail: info@omegashop.cz

France:
11, rue Jacques Cartier, 78280 Guyancourt, France
Tel: +33 (0)1 61 37 2900 FAX: +33 (0)1 30 57 5427
Toll Free in France: 0800 466 342
e-mail: sales@omega.fr

Germany/Austria:
Daimlerstrasse 26, D-75392 Deckenpfronn, Germany
Tel: +49 (0)7056 9398-0 FAX: +49 (0)7056 9398-29
Toll Free in Germany: 0800 639 7678
e-mail: info@omega.de

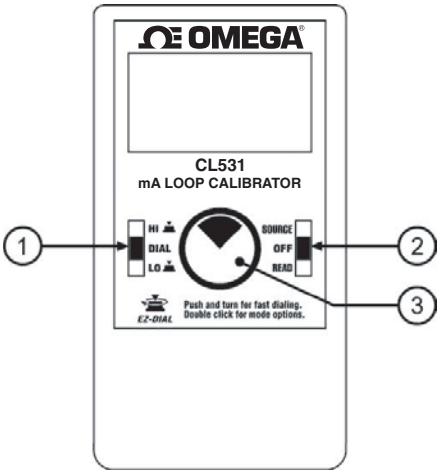
United Kingdom:
ISO 9002 Certified
One Omega Drive, River Bend Technology Centre
Northbank, Irlam, Manchester
M44 5BD United Kingdom
Tel: +44 (0)161 777 6611 FAX: +44 (0)161 777 6622
Toll Free in United Kingdom: 0800-488-488
e-mail: sales@omega.co.uk

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 resister in series with the output of the CL531. This internal resister eliminates the need to add an external load resister 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:

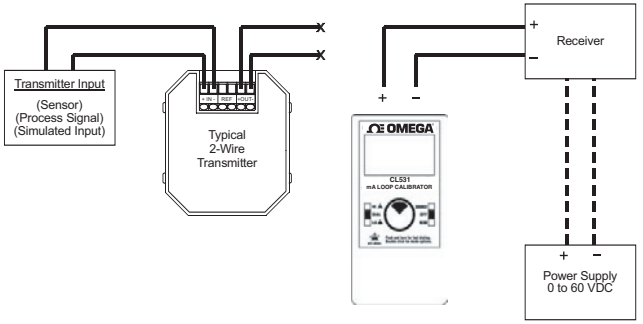
Slide the EZ-Check™ switch to the HI and LO positions to recall the preset settings (Hi=20.00mA & Lo=4.00mA).

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:

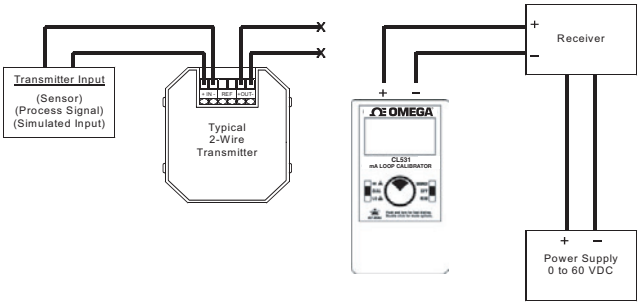
In read mode, the CL531 calibrator records the maximum and minimum readings observed in each mode. Slide the EZ-Check™ switch to the Dial position to read the loop. Then Slide the EZ-Check™ switch to the HI and LO positions to display the max and min readings. Press **EZ-Dial™knob** to clear the readings.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

Source Mode



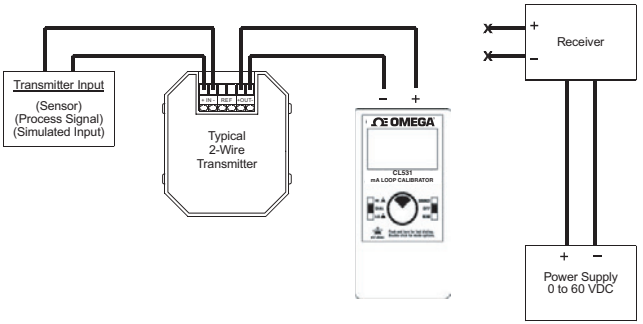
Source mode uses internal power to supply current from 0.00-24.00 mA into as much as 1200Ω until the end of battery life. The calibrator Graph will flash if connected improperly. The three-position EZ-Check switch provides instant preset 4mA at zero, 12mA at mid range and 20mA at full scale outputs. 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



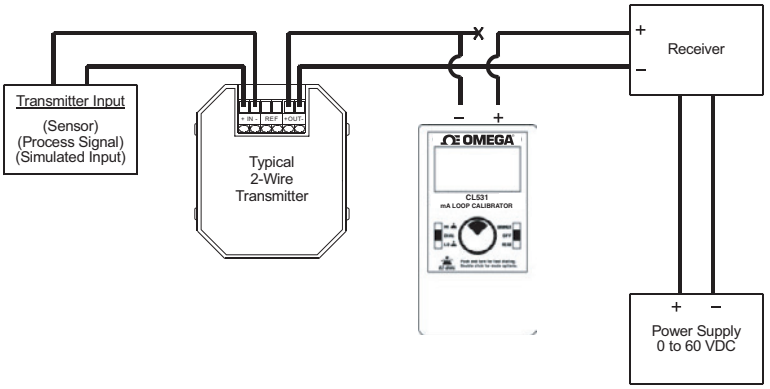
The CL531 can simulate a 2-wire transmitter in the 4-20 mA or % process loop. In source mode press the EZ-Dial™ Knob twice to get into the feature options. Then press the EZ-Dial™ Knob to select mA 2 – wire. The EZ-Check switch and EZ-Dial knob allow rapid and fine control of loop current.

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 ±0.025% at 20mA.
2. Precision Current Source with accuracy of ±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.

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 the company 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.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

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.

OMEGA is a registered trademark of OMEGA ENGINEERING, INC.

Where Do I Find Everything I Need for Process Measurement and Control? OMEGA...Of Course!

Shop online at omega.com

TEMPERATURE

- Thermocouple, RTD & Thermistor Probes, Connectors, Panels & Assemblies
- Wire: Thermocouple, RTD & Thermistor
- Calibrators & Ice Point References
- Recorders, Controllers & Process Monitors
- Infrared Pyrometers

PRESSURE, STRAIN AND FORCE

- Transducers & Strain Gages
- Load Cells & Pressure Gages
- Displacement Transducers
- Instrumentation & Accessories

FLOW/LEVEL

- Rotameters, Gas Mass Flowmeters & Flow Computers
- Air Velocity Indicators
- Turbine/Paddlewheel Systems
- Totalizers & Batch Controllers

pH/CONDUCTIVITY

- pH Electrodes, Testers & Accessories
- Benchtop/Laboratory Meters
- Controllers, Calibrators, Simulators & Pumps
- Industrial pH & Conductivity Equipment

DATA ACQUISITION

- Data Acquisition & Engineering Software
- Communications-Based Acquisition Systems
- Plug-in Cards for Apple, IBM & Compatibles
- Datalogging Systems
- Recorders, Printers & Plotters

HEATERS

- Heating Cable
- Cartridge & Strip Heaters
- Immersion & Band Heaters
- Flexible Heaters
- Laboratory Heaters

ENVIRONMENTAL MONITORING AND CONTROL

- Metering & Control Instrumentation
- Refractometers
- Pumps & Tubing
- Air, Soil & Water Monitors
- Industrial Water & Wastewater Treatment
- pH, Conductivity & Dissolved Oxygen Instruments

M4207/0605