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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:

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2. Model and serial number of the product, and
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MODEL CL530 FIELD CALIBRATION PROCEDURE CONTINUED

Source mA Calibration:
Verify the Model CL530 is in source mA mode by press the SOURCE Button until mA SOURCE appears on the bottom right side of the display.

Source mA:
LO Calibration:

1. Connect the Model CL530 terminals to a Current Meter.
2. Slide the EZ-Check™ switch to the LO Position indicated by displaying a LO on the left side of the display.
3. Dial the Model CL530 so the meter reads 0.000mA.
4. Press the STORE/CLEAR button.
5. The display will flash “STORED” to confirm that the displayed 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 display.
2. Dial the Model CL530 so the meter reads 20.000mA.
3. Press the STORE/CLEAR button.
4. The display will flash “STORED” to confirm that the displayed value was stored.

Two Wire Simulation Calibration:
Verify the Model CL530 is in Two Wire Simulation mode by press the SOURCE Button until mA 2W SIM appears on the bottom right side of the display.

Two Wire Simulation:

LO Calibration:

1. Connect the Model CL530 terminals in series to a Voltage Source (Set at 10V) and Current Meter.
2. Slide the EZ-Check™ switch to the LO Position indicated by displaying a LO on the left side of the display.
3. Dial the Model CL530 so the meter reads 4.000mA.
4. Press the STORE/CLEAR button.
5. The display will flash “STORED” to confirm that the displayed value was stored.

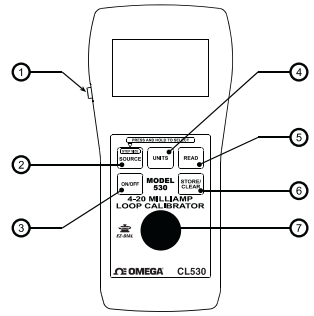
HI Calibration:

1. Slide the EZ-Check™ switch to the HI position indicated by displaying a HI on the left side of the display.
2. Dial the Model CL530 so the meter reads 20.000mA.
3. Press the STORE/CLEAR button.
4. The display will flash “STORED” to confirm that the displayed value was stored.

Completion of Calibration:
Turn the Model CL530 off. Next time the unit is turned on the Model CL530 will be Calibrated and in normal operational mode.

A. Basic Keypad Operations

① EZ-Check™ Switch/EZ-Step™ Pushbutton
Slide the switch to select the user stored values for calibration points. Press the button to adjust the output by the user defined step size. Press and hold the button to activate the auto step/ramp mode.



② SOURCE/STEP SIZE Button
Press **SOURCE** to change source modes. These are:

Source Milliamps
2-Wire Transmitter Simulate

③ ON/OFF Button
Press **ON/OFF** to turn the Model CL530 on or off.

④ UNITS Button
Press **UNITS** to change how current is displayed – either in milliamperes or % of 4-20 mA. Voltage is only displayed in Volts.

⑤ READ Button
Press **READ** button to change read modes. These are:

Read Milliamps
Power and Measure 2-Wire Transmitter
Read Volts

⑥ STORE/CLEAR Button
In any source mode:

Press **STORE/CLEAR** to save the current reading in the EZ-Check™ HI or LO position. The EZ-Check™ switch must be set to HI or LO. The display will flash “STORED” to confirm.

In any read mode:

Press **STORE/CLEAR** to clear the values saved in the EZ-Check™ HI and LO positions. The display will flash “CLEARED” to confirm.

⑦ EZ-Dial™ Knob
Turn the EZ-Dial™ knob to adjust the output level. Press and turn to adjust 100X faster.

B. EZ-Dial™ Knob

Adjust the output up and down with the EZ-Dial™ knob. The increment is 0.001 mA (or 0.01 % if display units are % of 4-20 mA.) Press while turning to adjust 100X faster – 0.100 mA (or 1.00 %.)

C. EZ-Check™ Switch

The EZ-Check™ switch has three positions -- high, set, 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 settings stored in those positions. While in the HI and LO positions, dial the EZ-Dial™ knob to change the display. Press **STORE/CLEAR** to save new settings in the HI and LO positions. The display will flash “STORED” to confirm.
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 Model CL530 display. This is also useful in poor lighting or under difficult operating conditions.

Read Modes:

In read modes, the Model CL530 calibrator records the maximum and minimum readings observed in each mode. Slide the EZ-Check™ switch to the HI and LO positions to display the readings. Press **STORE/CLEAR** to clear the readings. The display will flash “CLEARED” to confirm.

By default, the Model CL530 has EZ-Check™ HI/LO Readings OFF. Refer to Model CL530 Configuration, section H.

D. EZ-Step™ Pushbutton

The EZ-Step™ pushbutton is a feature only in source modes.

Press and hold the EZ-Step™ pushbutton for less than one second to cause the output to step up or down by the EZ-Step™ size. The EZ-Step™ direction is indicated on the display (or). Press the EZ-Dial™ knob to change the step direction.

Press the EZ-Step™ pushbutton for more than one second to activate auto step/ramp mode. The Model CL530 will automatically step by the EZ-Step™ size. Press the EZ-Step™ pushbutton again to deactivate auto step/ramp mode.

Stepping and auto step/ramp limits are defined by the EZ-Check™ HI and LO settings. The step direction changes when a limit is reached.

By default, the Model CL530 has EZ-Step™ OFF. Refer to Model CL530 Configuration, section H.

E. EZ-Step™ Size and Direction

To Change the EZ-Step™ Size:

1. Press and hold the **SOURCE/STEP SIZE** button for more than ¾ of a second.
2. The display will indicate "EZ-STEP SIZE".
3. Turn the EZ-Dial™ knob to select other step sizes. The choices are:
   mA display - 0.001, 0.010, 0.100, 1.000, 4.000, 8.000
   % display - 0.01, 0.10, 1.00, 10.00, 25.00, 50.00
4. Press the **SOURCE/STEP SIZE** button again return to the normal display.

Note: If the EZ-Step™ option is turned off, the display will indicate "EZ-STEP OFF"*. Refer to Model CL530 Configuration, section H.*

To Change the EZ-Step™ Direction:

1. Press the EZ-Dial™ knob.
2. The display will change to show the EZ-Step™ direction selected (or).

F. Auto Step / Ramp

Auto step/ramp times are given in Table 1. In step modes (EZ-Step™ sizes 8, 4, and 1 mA or 50, 25 and 10 %) the output will change in discrete steps. In ramp modes, the output is approximately continuous.

Table 1 assumes the default EZ-Check™ LO/HI of 4/20 mA and scales ratiometrically with the EZ-Check™ span. Soak Time does not change with EZ-Check™ span.

The Model CL530 will detect high loop resistance/low supply in step modes. In ramp modes, these error conditions are not detected.

Table 1

Auto	EZ-Step™ Size		Step Time	Ramp Time (4-20 mA or 0-100 %)	Soak Time
STEP	8.000 mA	50.00 %	10 seconds	(30 seconds)	20 seconds
	4.000 mA	25.00 %	10 seconds	(50 seconds)	20 seconds
	1.00 mA		1.9 seconds	(34 seconds)	3.8 seconds
		10.00 %	1.8 seconds	(21 seconds)	3.6 seconds
Ramp		1.00 %		20 seconds	
		0.10 %		25 seconds	
	0.100 mA			32 seconds	
	0.010 mA			40 seconds	
		0.01 %		83 seconds	
	0.001 mA			134 seconds	

MODEL CL530 FIELD CALIBRATION PROCEDURE

Suggested Equipment:

1. Precision Current Meter with accuracy of ±0.008% at 20mA.
2. Precision Current Source with accuracy of ±0.008% at 20mA
3. Precision Voltage Source with accuracy of ±0.07% at 60V.

Enabling Calibration:

Install a fresh battery and allow one hour for the Model CL530 to stabilize to the ambient temperature. Remove the battery cover and the six screws holding the housing together. While holding the Model CL530 face down in one hand, carefully separate the top and bottom of the housing. Place the unit into calibration mode by holding down the ON/OFF button and shorting the calibration via labeled on the PCB with tweezers. Verify the Model CL530 is in Calibration mode by viewing the bottom Right of the LCD for the word CAL.

Read mA Calibration:

Verify the Model CL530 is in Read mA mode by pressing the READ Button until mA Read appears in the bottom right corner of the display.

Read mA:

LO Calibration:

1. Connect the Model CL530 terminals to a Current Source.
2. Slide the EZ-Check™ switch to the LO Position indicated by displaying a LO on the left side of the display.
3. Set the Current Source to 0.000mA
4. Press the STORE/CLEAR button.
5. The display will flash "STORED" to confirm that the displayed 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 display.
2. Set the Current Source to 20.000mA.
3. Press the STORE/CLEAR button.
4. The display will flash "STORED" to confirm that the displayed value was stored.

Read Voltage Calibration:

Verify the Model CL530 is in Read Volts mode by press the READ Button until V Read appears on the bottom right side of the display.

Read Voltage Calibration:

LO Calibration:

1. Connect the Model CL530 terminals to a Voltage Source.
2. Slide the EZ-Check™ switch to the LO Position indicated by displaying a LO on the left side of the display.
3. Set the Voltage Source to 0.000V.
4. Press the STORE/CLEAR button.
5. The display will flash "STORED" to confirm that the displayed 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 display.
2. Set the Voltage Source to 60.000V.
3. Press the STORE/CLEAR button.
4. The display will flash "STORED" to confirm that the displayed value was stored.

Specifications Continued

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	0.000 to 24.000 mA, -25.00 to 125.00% of 4-20 mA
Accuracy	≤ ± (0.012 % of Reading + 0.004 mA)
Temperature effect	≤ ± 50 ppm/°C of Range
Resolution(s)	0.001 mA and 0.01 %
Source/Power and Measure 2-Wire Transmitter Specifications:	
Loop compliance voltage	≥ 24 Volts
Loop drive capability	1200 Ω at 20 mA for entire battery life
Miscellaneous	Open loop or out of compliance conditions are indicated by appropriate error display
	Battery life in:
	Source mode ≥ 18 hrs at 12mA typical (HART® disabled)
	Power measure ≥ 10 hrs at 12mA typical
	HART® protocol mode is a selectable option at turn on. HART® protocol mode places a 250Ω resistor in series with the output
	Selectable EZ-Step™(s) for Source Mode/2-Wire Transmitter Simulation:
	In mA mode: 0.001, 0.010, 0.100, 1.000, 4.000(default), 8.000 mA
	% of 4-20 mA mode: 0.01, 0.10, 1.00, 10.00, 25.00(default), 50.00 %
Read mA Specifications:	
Voltage burden	≤ 2V 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	2-60 VDC
Miscellaneous	Open loop or out of compliance conditions are indicated by appropriate error display
	Battery life ≥ 40 hour typical
	Selectable EZ-Step™(s) for Source Mode/2-Wire Transmitter Simulation:
	In mA mode: 0.001, 0.010, 0.100, 1.000, 4.000(default), 8.000 mA
	% of 4-20 mA mode: 0.01, 0.10, 1.00, 10.00, 25.00(default), 50.00 %
Voltage Read Specifications:	
Range	0.00 to 60.00 VDC (with 2X over range)
Accuracy	≤ ± (0.1 % of Reading ±0.1 V)
Temperature effect	≤ ± 200 ppm/°C of Reading
Resolution	0.01 V
Input resistance	≥ 1 MΩ
	Battery life > 40 hour typical
	Flashing indicator for over range
Available Options:	
Option:	Part Number:
AC adaptor	CL530-ADAPTOR
Carrying Case	SC530

G. Quick Reference Bar Graph

The Quick Reference Bar Graph indicates the input and output level to the Model CL530 in % of 4-20 mA with 1% resolution. If the input or output signal is outside the normal operating range of the Model CL530 the Quick Reference Bar Graph is replaced by an error message (see section I for errors.)

H. Model CL530 Configuration

Auto Off - ON (default)/OFF

If Auto Off is ON, the unit will turn off after 30 minutes to save battery life, if there is no user activity. If Auto Off is OFF the unit will stay on until it is turned off from the keypad. This is typically useful for manual loading or continuous use.

EZ-Step™ - ON/OFF (default)

If EZ-Step™ is ON the step size is adjustable as described in the instructions. If EZ-Step™ is OFF the EZ-Step™ pushbutton will be disabled and the step direction indicator will not be displayed.

HART® Compatibility Mode - ON/OFF (default)

The Model CL530 has a HART® compatibility mode. This mode is useful when the devices being powered communicate using the HART® protocol. In this mode the Model CL530 connects a 250 Ω load resistor in series with the output in both Source and Power Measure 2-Wire transmitter modes. This eliminates the requirement of an external 250 Ω load resistor. This resistor is typically shown in connection diagrams and manuals for HART® devices.

If HART® Compatibility Mode is ON, a 250 Ω load resistor is automatically switched in series with the output in Source and Power Measure 2-Wire Transmitter modes. The output compliance with HART® Compatibility Mode ON is 950 Ω at 20 mA.

If HART® Compatibility Mode is OFF there is no 250 Ω load resistor in series with the output. This will increase the output compliance voltage to drive 1200 Ω at 20 mA.

EZ-Check™ HI/LO Readings ON/OFF (default)

If the EZ-Check™ HI/LO Readings option is ON, the highest and lowest readings will automatically be saved in the HI and LO EZ-Check™ positions.

If this option is OFF the HI and LO positions will show the current reading.

Factory Reset ON/OFF (default)

If Factory Reset is ON, the unit will restore all factory defaults when the Model CL530 is turned OFF and back ON. This will reset any changes made in the Model CL530 Configuration options, returning the unit to its simplest factory configuration.

Instructions for Enabling and Disabling the Configuration options in the Model CL530

1. Turn the Model CL530 on.
2. Press the EZ-Dial™ knob while the "PRESS EZ-DIAL KNOB FOR CONFIGURATION" message is displayed.
3. Select options by turning the EZ-Dial™ knob until the arrow points to the desired option.
4. The option can be enabled or disabled by tapping the EZ-Dial™ knob.
5. Turning the Model CL530 off to exit configuration.

Error Conditions

Source Milliamps:
"HIGH Ω" flashes in place of bar graph

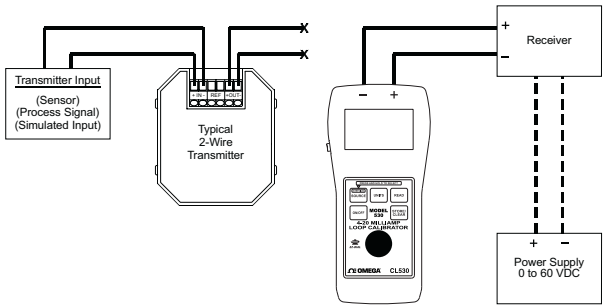
Power Measure:
"CURRENT LIMITED" flashes in place of bar graph

2-Wire Transmitter Simulate:
"LOW SUPPLY" flashes in place of bar graph

Read Milliamps:
"CURRENT LIMITED" flashes in place of bar graph

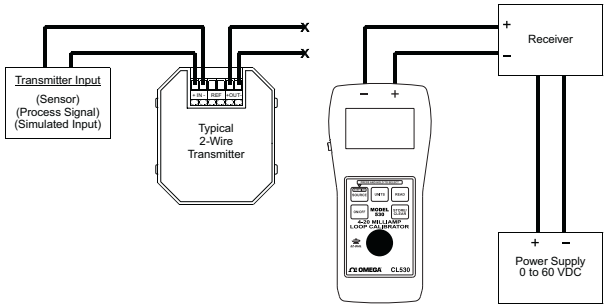
Read Volts:
"OVERRANGE" flashes in place of bar graph

Source Mode



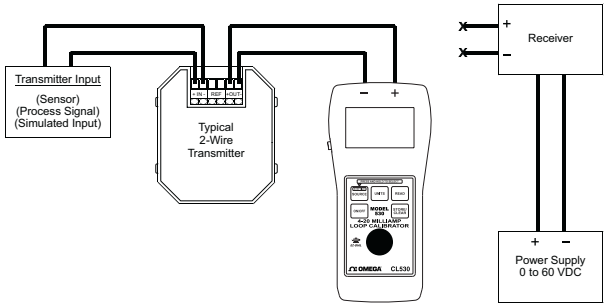
Source mode uses internal power to supply current from 0.000-24.000 mA into as much as 1200 Ω (with HART® resistor disabled) until the end of useful battery life. The calibrator will indicate "HIGH Ω" if connected improperly. The three-position EZ-Check™ switch provides instant zero and span calibration outputs. EZ-Checks™ from 0-24 mA can be stored in the zero and span switch positions. The output is adjusted in 0.001 or 0.100 mA increments (0.01 or 1.00 % in percent display units) with the EZ-Dial™ knob. Step the output by pressing the EZ-Step™ button. Six different user-selected step sizes are available. Hold the EZ-Step™ button to activate hands-free auto step/ramp function.

2-Wire Transmitter Simulation Mode



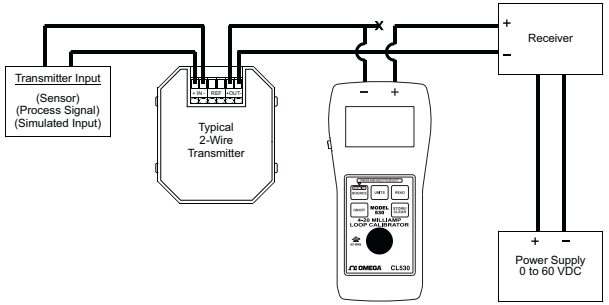
The Model CL530 can simulate a 2-wire transmitter in the 4-20 mA process loop. The calibrator will indicate "LOW SUPPLY" if improperly connected. The EZ-Check™ switch and EZ-Dial™ knob allow rapid and fine control of loop current. The EZ-Step™ button and hands-free auto step/ramp function allow a complete check of calibration points.

Power and Measure Transmitter Mode



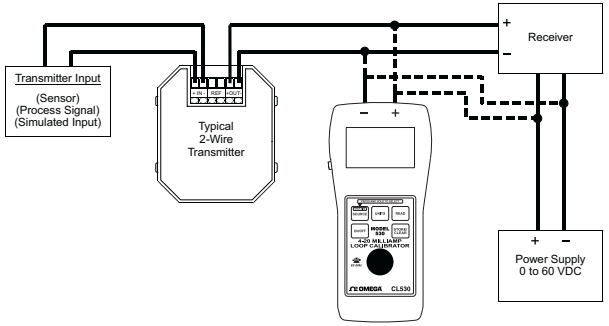
The Model CL530 supplies 24 Volts to the transmitter and displays the output in mA or % on the Model CL530 display. If the Model CL530's HART® protocol mode is selected, an internal 250 Ω load resistor is connected in series with the output as specified for proper communication by HART® devices. This eliminates the requirement of connecting a separate 250 Ω load resistor in the field as indicated in field hookup diagrams of HART® enabled devices.

Read Mode



The Model CL530 can read loop currents from 0-24 mA. The Model CL530 limits current in read mode to less than 24 mA to protect the devices in the loop from over voltage or over current conditions.

Measure DC Volts Mode



The Measure DC Volts Mode reads voltage from 0.00 to ±60.00 VDC. This mode can be used to check loop power, measure voltage drop across 250Ω load loop resistors, 1 to 5V signals, I/V converters and battery voltages.

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	9V Alkaline
	Optional 120 VAC 50/60 Hz AC adaptor available