User's Guide

M-4289/0206
PCL120 Loop Calibrator

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PCL120

1. Introduction

The Omega PCL120 is designed to be a complete 4 to 20mA current calibrator for both trouble-shooting and calibrating current loops. Very high accuracy combined with several unique features makes the PCL120 an easy to use and highly flexible calibration tool.

The PCL120 can source, simulate (2-wire) or measure loop currents up to 24mA. It can also measure process signal voltages up to 28VDC with the same 0.015% of reading accuracy. A digital knob user interface combined with decade output control allows the user to make both large or small output changes with ease. Several unique functions such as the auto-step/ramp modes allow the PCL120 to test valve actuators for smoothness and proper operation.

The PCL120 can also power two-wire transmitters while simultaneously reading the resultant loop current. All readings are displayed in both milliamps and % of span.

1.1 Customer Service

Omega Engineering

One Omega Drive
Box 4047
Stamford, CT 06907-0047

Tel: (203) 359-1660
Fax: (203) 359-7811

www.omega.com
email: cservice@omega.com

1.2 Unpacking

Remove the packing list and verify that all equipment has been received. If there are any questions about the shipment please call Omega at 1-800-826-6342. When the shipment is received inspect the container and equipment for any signs of damage. Note any evidence of rough handling in transit. Immediately report any damage to the shipping agent.
NOTE: The carrier will not honor any claims unless all shipping material is saved for their examination. After examining and removing contents, save packing material and carton in the event reshipment is necessary.

1.3 Safety information

Symbols Used
The following table lists the International Electrical Symbols. Some or all of these symbols may be used on the instrument or in this manual.

Symbol	Description
	AC (Alternating Current)
	AC-DC
	Battery
	CE Complies with European Union Directives
	DC
	Double Insulated
	Electric Shock
	Fuse
	PE Ground
	Hot Surface (Burn Hazard)
	Read the User's Manual (Important Information)
	Off
	On
	Canadian Standards Association

The following definitions apply to the terms "Warning" and "Caution".

- "Warning" identifies conditions and actions that may pose hazards to the user.
- "Caution" identifies conditions and actions that may damage the instrument being used.

Use the calibrator only as specified in this manual, otherwise injury and damage to the calibrator may occur.

⚠ *Warning*

To avoid possible electric shock or personal injury:

- Do not apply more than the rated voltage. See specifications for supported ranges.
- Follow all equipment safety procedures.
- Do not use the calibrator if it is damaged. Before you use the calibrator, inspect the case. Look for cracks or missing plastic. Pay particular attention to the insulation surrounding the connectors.
- Select the proper function and range for your measurement.
- Make sure the battery cover is closed and latched before you operate the calibrator.
- Remove test leads from the calibrator before you open the battery door.
- Inspect the test leads for damaged insulation or exposed metal.
- When using the probes, keep your fingers away from the probe contacts. Keep your
  fingers behind the finger guards on the test leads.
- Do not use the calibrator if it operates abnormally. Protection may be impaired. When in doubt, have the calibrator serviced.
- Do not operate the calibrator around explosive gas, vapor, or dust.
- Disconnect test leads before changing to another measure or source function.
- When servicing the calibrator, use only specified replacement parts.
- To avoid false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the battery indicator appears.

⚠ *Caution*

To avoid possible damage to calibrator or to equipment under test:

- Use the proper jacks, function, and range for your measurement or sourcing application.

2. Nomenclature

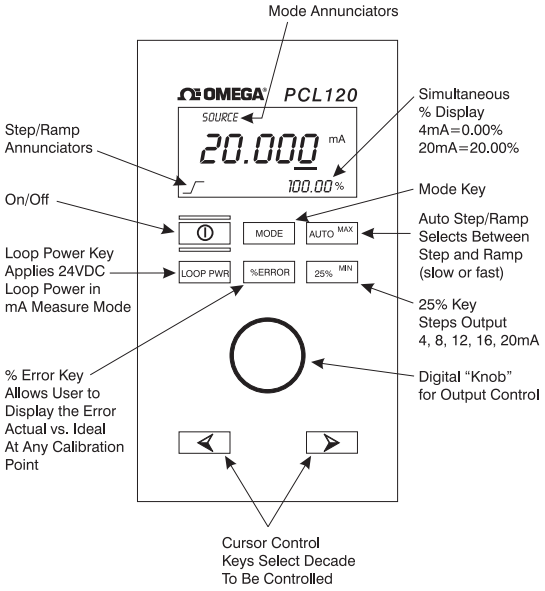

Figure 1

3. Getting Started

A. Battery Save Feature

After unpacking the PCL120, it should be ready for use. A 9 volt alkaline battery comes pre-installed. The "Battery Save" feature is enabled and set to 30 minutes in case the unit is accidentally turned on in transit. The battery save feature will turn off the PCL120 automatically if no keys are pressed after 30 minutes. To change the length of time on the battery save feature or to disable it completely perform the following steps during power up:

1) Turn off the PCL120.

2) Hold the **AUTO** key down firmly.

3) Turn on the PCL120.

4) After power up, wait about 1 second and release the **AUTO** key.

5) The display will now indicate the amount of time the battery save feature is set for (off to 30 minutes).

6) Using the knob, set the desired time (off to 30 minutes).

7) Press AUTO again to store the value and return the unit to normal mode. The stored value will remain in memory until changed by the operator.

B. HART™ Resistor Setup

The PCL120 incorporates an internal 250 ohm resistor to facilitate using a Rosemount 275 Communicator during calibration or installation of HART™ transmitters. The internal resistor takes the place of the 250 ohm resistor normally installed during the use of the model 275 Communicator. An internal jumper can be removed to enable this feature if desired. The unit is shipped with the jumper in place. To remove the jumper open the case and refer to **Figure 2** to locate the jumper, then pull off the jumper to enable the resistor. The jumper can be stored outside of the unit or re-installed only on one pin so that the circuit remains open.

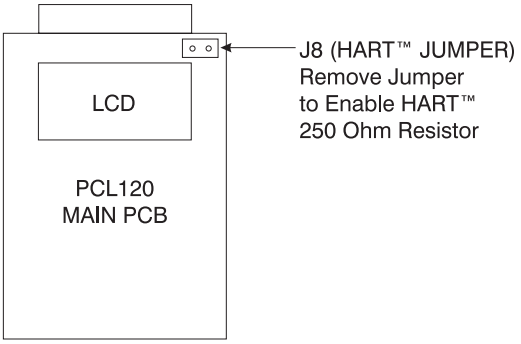

Figure 2

Note: When the 250 ohm resistor is enabled the load driving capability is reduced from 1200 ohms to 950 ohms. In most cases this should not be a problem when calibrating Non-HART™ compatible products.

4. Basic Operating Modes

The PCL120 offers 4 modes of milliamp operation and one voltage measure mode. The following text and figures explain the various operating modes:

A. Milliamp Source

Figure 3 shows a typical application where the PCL120 is sourcing 4 to 20 mA into a device under test.

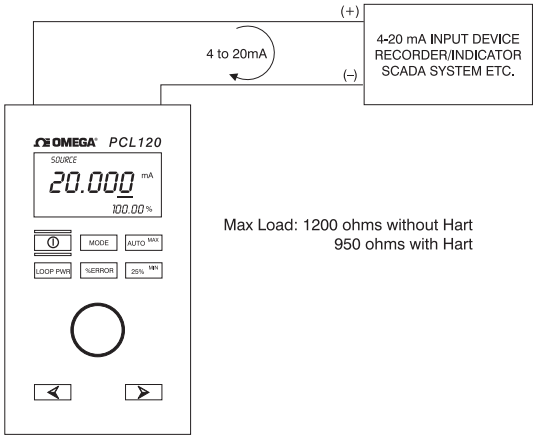

Figure 3 - Sourcing 4 to 20 mA

1) Turn on the PCL120. It will default to the mA source mode.
2) Connect the device to be calibrated.

Warning: The loop must be closed for the PCL120 to source current. If an open loop occurs "OL" will flash on the LCD indicating an overload or open condition.

3) The output can be adjusted to the desired value by using the knob interface and selecting the decade to be adjusted.

4) The output can also be stepped in 4 mA steps (25%) using the **25%** key.

5) The auto step feature provides automated output changes. Refer to the Auto Modes Section of the manual for more information.

B. Milliamp Simulation

Figure 4 shows how to connect the PCL120 to act as a two-wire transmitter using an external power supply. In this application the power for the loop comes from the external supply and the PCL120 simply controls the current flow through the loop. The procedure for controlling the output is the same as the milliamp source.

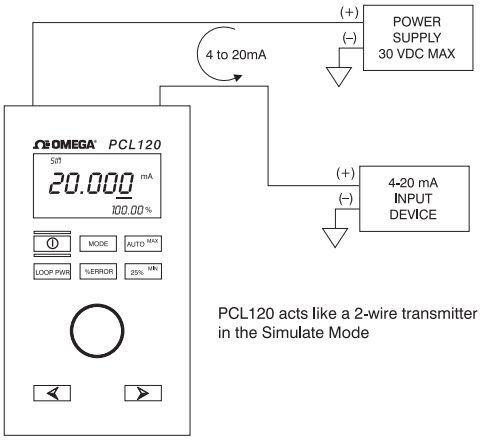

Figure 4 - Simulating 4 to 20 mA

C. Milliamp Measure

Figure 5 shows how to connect the PCL120 to measure a 4-20 mA loop. In this application the PCL120 is simply reading the loop current and displaying the current in mA on the main display. The lower (smaller) display area is showing percentage relative to a 4 to 20 mA span.

D. Milliamp Measure with Loop Power

Again, **Figure 5** shows the proper connections. But in this case the device under test is a two-wire transmitter that requires an external power supply to generate an output current. In this application the PCL120 will supply 24 volts to the loop while simultaneously measuring the resultant loop current.

To turn on the loop power supply press the **LOOP PWR** key while in the mA measure mode.

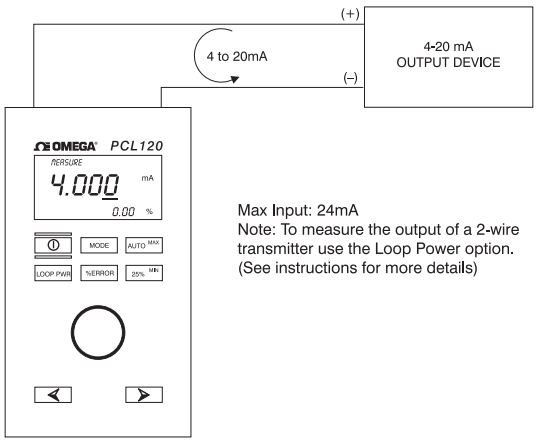

Figure 5 - Measuring 4 to 20 mA

NOTE: The loop power mode can only be enabled while in the mA measure mode.

E. Voltage Measure

Figure 6 shows how to connect the PCL120 to measure DC voltage up to 28 volts. To activate the volts measure function simply press the **MODE** key to toggle through the functions until the volts measure mode is reached. The input impedance of the PCL120 ≥ 1 meg ohm while in this mode.

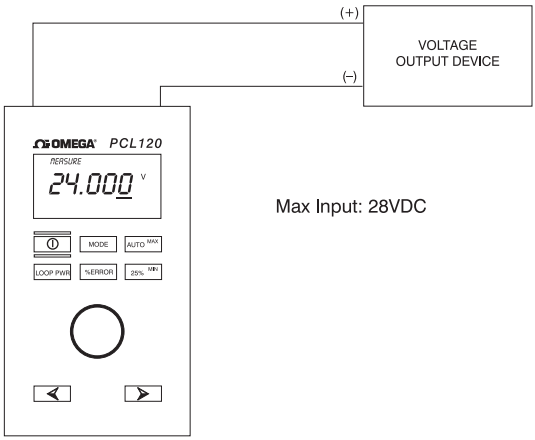

Figure 6 - Measuring 0 to 28 VDC

5. Advanced Operating Modes

A. Auto Step/Ramp Mode

The PCL120 has the ability to step the mA output in 25% steps automatically in 5 second intervals. It can also ramp the mA output from 4 mA to 20 mA then back to 4 mA in a linear fashion automatically.

To activate the Auto-Step/Ramp mode use the following procedure:

1) The Auto Step/Ramp function can be used in either the source mA or simulate mA mode. Place the PCL120 in one or the other mode.

2) Connect the PCL120 to the device under test.

3) Press the **AUTO** key once for the step mode, twice for the slow ramp mode and three times for the fast ramp mode. With each press a small annunciator will appear on the lower left side of the LCD indicating

which one of the step/ramp modes has been selected.
4) Once enabled the step/ramp mode will run continuously until another key is pressed.

B. Percent Error Mode

This unique feature will calculate error as a percentage of span (4 mA to 20 mA yields a 16 mA span). The percent error feature allows the user to "Zero Out" the %mA display so that the deviation from the ideal value can be displayed on the % error display. The procedure is as follows:

1) Connect the PCL120 to the unit under test.

2) Place the PCL120 in one of the mA output modes (source or simulate).

3) Adjust the PCL120 to the desired output.

4) If the unit under test does not read exactly as it should, hold down the **%ERROR** key and adjust the knob unit until the unit under test reads correctly. Continue to hold down the **%ERROR** key.

5) The reading in the % display area will be the error or deviation calculated as a percentage of span.

6) When the **%ERROR** key is released the % display will return to normal operation.

C. Min/Max Datalogging

When the PCL120 is in any of the measure modes (mA, mA w/loop power or voltage) it will continuously monitor and store the minimum and maximum values for that particular input mode. To operate the datalogging feature use the following procedure:

1) Place the PCL120 in one of the measure modes.
2) Connect the PCL120 to the unit under test.
3) Clear the min/max memory by pressing both keys (min and max) simultaneously. The LCD will display "CLR" when the memory is cleared.
4) Allow the unit to log min. and max. for as long as required.

Warning: You may want to disable the Battery Save feature before using the Dataloggiong Mode to prevent the PCL120 from turning off prematurely.

5) At any time press the min. or max. to display the value stored.
6) Turning off the PCL120 or changing modes will clear the memory. Be sure to record your data before turning off the unit.

6. Maintenance

A. Battery Selection

The PCL120 operates on a standard 9V alkaline battery or an optional rechargeable 9V Ni-Cd battery. For most applications the 9V alkaline battery will suffice; however, in heavy use applications the 9V Ni-Cd may be a better choice. The 9V Ni-Cd battery supplied by Omega will offer approximately 3 hours of continuous use at 12 mA output on a full charge (the alkaline battery will yield about 12 hours). The charger supplied by Omega will provide an overnight charge rate (10-12 hours) and will also power the PCL120 for bench use while maintaining a float charge on the Ni-Cd battery.

Warning: Never connect the AC adapter/ charger with the 9V alkaline battery installed.

To order the 9V Ni-Cd battery or AC adapter/charger contact Omega Engineering at 800-826-6342.

B. Input Protection

The PCL120 incorporates a fuseless input protection and will tolerate most misconnections up to 250 VAC or 250 VDC for up to 30 seconds duration. Because of this protection no maintenance is required.

C. Calibration

The PCL120 is designed to hold its rated accuracy for a minimum of one (1) year. It is therefore recommend that an annual re-calibration be done to ensure operation within specification. Contact Omega's Customer Service Department for re-calibration information at 1-800-826-6342 or www.omega.com.

7. Specifications

Input Range:	0.000 to 24.000 –25.00% to 125.00%
Output Range **Source/Simulate:**	0.000 to 24.000 –25.00% to 125.00%
Read VDC:	0 to 30 VDC
Accuracy :	±0.015% of reading ±2 counts
Resolution:	.001 mA; .001 volts
Loop Supply Voltage:	24 VDC
Typical Drive Capability:	1200Ω w/o Hart 950Ω w/ Hart
Auto % Error Function:	Yes
Selectable Decade Adjustment:	Yes
Auto Step/Ramp:	Yes
Preset Outputs:	5
Loop Power Measure **Capability:**	Yes
Operating Temperature:	–10 to 55°C
Power Supply:	(1) 9V Battery
Rechargeable Battery Option:	Yes
AC Adapter:	Yes
Size:	5.7 x 3.15 x 1.43
Weight:	12 oz.

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Toll Free in United Kingdom: 0800-488-488
e-mail: sales@omega.co.uk

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of 13 months from date of purchase. OMEGA's Warranty adds an additional one (1) month grace period to the normal one (1) 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 which wear are not warranted, including but 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.

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