



User Manual

PCE-LOC 10 Loop Calibrator



User manuals in various languages (français, italiano, español, português, nederlands, türk, polski, русский, 中文) can be found by using our product search on: www.pce-instruments.com

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1 Safety notes

Please read this manual carefully and completely before you use the device for the first time. The device may only be used by qualified personnel and repaired by PCE Instruments personnel. Damage or injuries caused by non-observance of the manual are excluded from our liability and not covered by our warranty.

- The device must only be used as described in this instruction manual. If used otherwise, this can cause dangerous situations for the user and damage to the meter.
- The instrument may only be used if the environmental conditions (temperature, relative humidity, ...) are within the ranges stated in the technical specifications. Do not expose the device to extreme temperatures, direct sunlight, extreme humidity or moisture.
- Do not expose the device to shocks or strong vibrations.
- The case should only be opened by qualified PCE Instruments personnel.
- Never use the instrument when your hands are wet.
- You must not make any technical changes to the device.
- The appliance should only be cleaned with a damp cloth. Use only pH-neutral cleaner, no abrasives or solvents.
- The device must only be used with accessories from PCE Instruments or equivalent.
- Before each use, inspect the case for visible damage. If any damage is visible, do not use the device.
- Do not use the instrument in explosive atmospheres.
- The measurement range as stated in the specifications must not be exceeded under any circumstances.
- Non-observance of the safety notes can cause damage to the device and injuries to the user.

We do not assume liability for printing errors or any other mistakes in this manual.

We expressly point to our general guarantee terms which can be found in our general terms of business.

If you have any questions please contact PCE Instruments. The contact details can be found at the end of this manual.

2 Specifications

Current simulation (active)		
(max. burden 1 kOhm)		
Area	Resolution	Accuracy
0 ... 22-mA	0.001-mA	± 0.05% of sim. value + 4 µA
Current simulation (passive)		
(max. burden 1 kOhm / max. 5 ... 25V DC)		
Area	Resolution	Accuracy
0 ... 22-mA	0.001-mA	± 0.05% of sim. value + 4 µA
Voltage transmitter f. current loop		
Area	Resolution	Accuracy
24V DC / 25-mA		± 10%
Voltage measurement		
Area	Resolution	Accuracy
-0.2 ... 28V	1 mV	± 0.02% of meas. + 2 mV
Current measurement		
Area	Resolution	Accuracy
-1 ... 22-mA	0.001-mA	± 0.02% of meas. + 4 µA
Current measurement (Loop current with voltage transmitter function)		
Area	Resolution	Accuracy
0 ... 22-mA	0.001-mA	± 0.02% of meas. + 4 µA
More specifications		
Power supply	2 x 1.5V AA batteries	
Max. Tension	30V	
Operating conditions	0 ... 50°C / 32 ... 122°F, < 80% RH	
Storage conditions	-10 ... 60°C / 14 ... 140°F, < 95% RH	
Dimensions	180 x 90 x 47 mm / 7.1 x 3.5 x 1.9 in	
Weight	Approx. 500 g / 1.1 lbs	

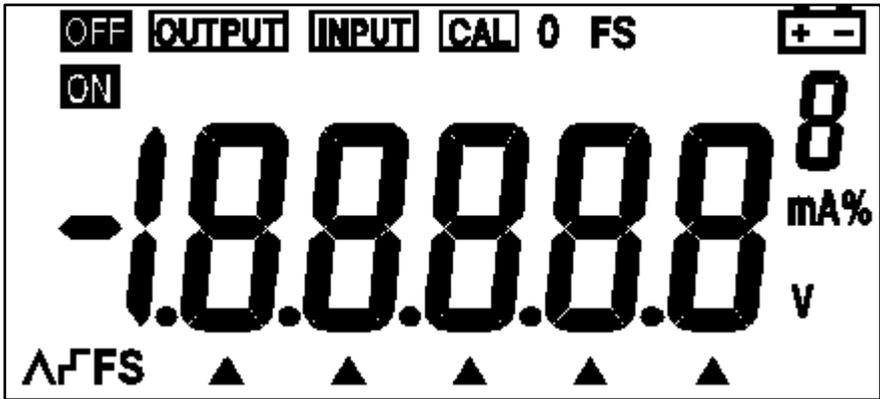
3 Layout and Functions

3.1 Device layout



1. LCD Display
2. Power
3. Output/Input toggle
4. mA% unit select
5. Single step/Auto toggle

6. 25% single step/Auto-ramp
7. 0%-100% of setting/Auto-ramp start
8. Output value set
9. Input digit select
10. Input/Output terminal



- **OUTPUT** - press the output/input button (3) until the **OUTPUT** symbol appears. The device is now in an output state.
- **INPUT** - press the output/input button (3) until the **INPUT** symbol appears. The device is now in an input state.
- **CAL** - The calibration symbol denotes that the device is in a state of calibration.
- **0** **FS** - When the symbols **0** or **FS** appear during the calibration process, it denotes that the device is now calibrating the zero point or the full scale point respectively.
- - When the battery symbol appears, it denotes that the battery is almost depleted and needs replacement.
- **▲** - this symbol denotes that the output digits need setting.
- **mA%/V** - These symbols denote the units of both present input and output values.
- **ON** / **OFF** - These symbols denote the status of the input/output signals.
- **▲** **∇** **FS** - These symbols denote the high and low-speed of the auto-ramp and auto-step ramp.

4 Device Maintenance

This section provides some basic maintenance procedures. Repair, calibration, and servicing not covered in this manual must be performed by qualified personnel. For maintenance procedures not described in this manual, please contact Support.

4.1 General maintenance

- Periodically wipe the case down with a damp cloth and detergent; do not use abrasives or solvents.
- Remove the batteries if the device is not to be used for a prolonged period of time.
- Dirt or moisture in the terminals can affect the readings and should be avoided. Clean the terminals as follows:
 - Turn the device off and remove all test leads.
 - Shake out any dirt, accumulated in the terminals.
 - Soak a cotton swab with alcohol and clean each terminal.

4.2 Battery replacement

This Instrument is powered by two AA batteries (IEC LR6).

⚠ Warning

To avoid electrical shock or personal injury:

- Remove all test leads before opening the battery cover.
- Close the battery cover and tighten the screw before using the device again.

⚠ Note

- New and old batteries should not be mixed.
- Make sure to match the polarity of the batteries with the polarity on the device.
- Remove the batteries if the device is not to be used for a prolonged period of time.
- Dispose of the old batteries according to local regulations and law.

Replace the batteries as follows (refer to Figure 3.1):

- Remove all test leads before opening the battery cover.
- Remove the device protector.
- Remove the battery cover by unscrewing the screw with a screwdriver.
- Replace with two new batteries;
- Reinstall the battery case, tighten the screws and replace the device protector.

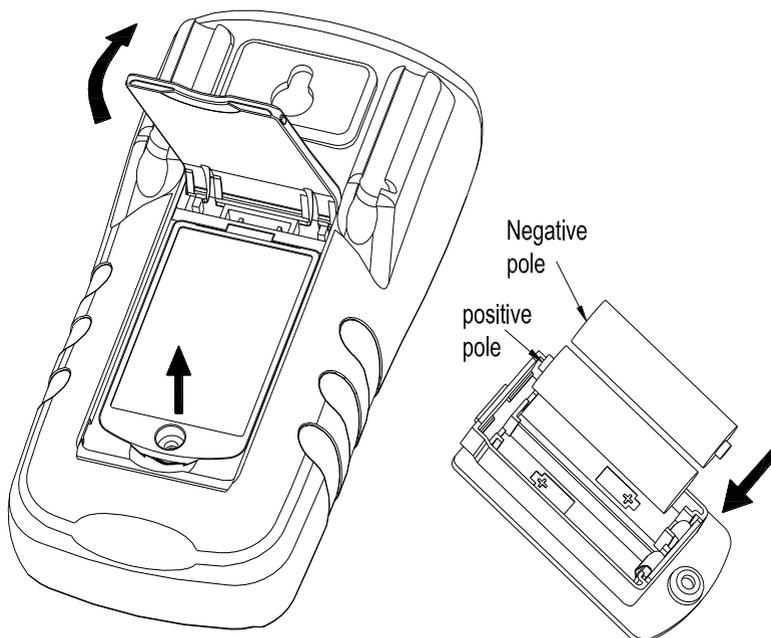


Figure 3.1 Battery replacement

4.3 Fuse replacement

Warning

To avoid personnel injury or damage to the device, use only the specified fuse (63mA 250V fast-melt).

Replace the fuse as follows (refer to Figure 3.2):

- Turn the device off and remove all test leads.
- Remove the device protector.
- Remove the back cover by unscrewing the four screws with a screwdriver.
- Replace the blown fuse(s).
- Reinstall the cover.
- Reinstall the device protector.

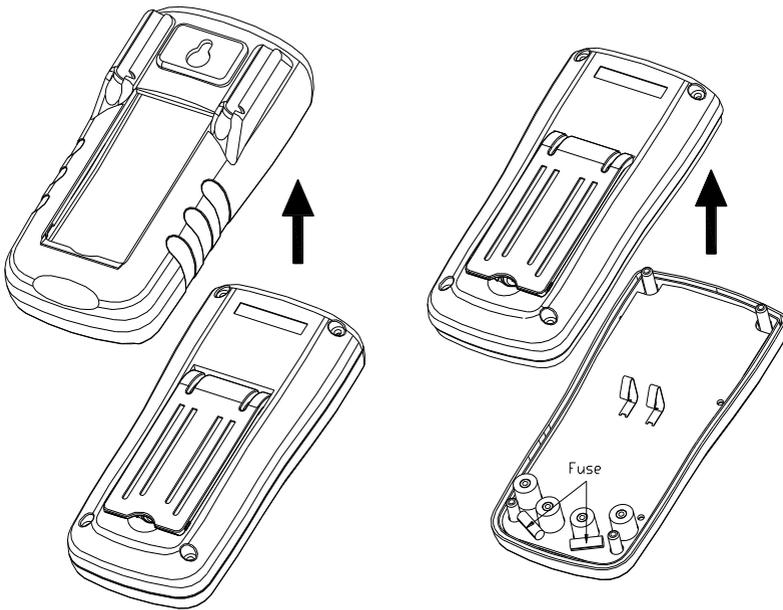


Figure 3.2 Fuse replacement

5 Operating Instructions

5.1 Power on/off

- Press the power button to turn the device on.
- Press and hold the power button for 1 second to turn the device off.
- After turning the device on, an internal self-diagnosis procedure is carried out before the display is turned on.

Note

To prevent damage to the device, it is recommended to wait 5 seconds after turning the device off, before turning it on again.

5.2 Automatic power-off

As per factory default, the device turns off automatically after 15 minutes of inactivity. This feature can be adjusted by the user as follows:

- With the device turned off, press the mA%/V and the power button simultaneously to turn the device on.
- Release the power button as soon as the display shows all of the content.
- The device is now in calibration mode and the symbols AP-XX are shown on the display.
- Use the ▲ or ▼ buttons to toggle between AP-OFF and AP-ON.
- Press the 100%/START button to store the changes.
- Press the power button to exit.

5.3 Device output

The device produces a DC current from its appropriate output terminal (OUTPUT) set by the user or it can simulate transmitter output.

Caution

Do not apply voltage to the output terminal during the operation. If any improper voltage is applied to the output terminal, it will cause damage to the internal circuitry.

Function Operation	% Operation	Display	Setting Range
DCI 20mA	20 mA † %	00.000 mA -025.00 mA %	00.000~22.000 mA -025.00~112.50 mA %

5.3.1 Current output

- Insert one end of the test lead to the + mA – output jack (OUTPUT) of the device and connect the other end with the input of the device as shown in Figure 5.1.
- Press the output/input toggle button (3) so that the **OUTPUT** symbol appears on the display. The device is now in an output state.
- Press the mA%/V unit select button (4) so the device displays mA or mA%; where 0% is 4mA and 100% is 20mA.
- Use the ◀ or ▶ buttons to select the output digits.
- Use the ▲ or ▼ buttons to change the value of the set digits. The value can be rounded or decremented automatically. Press and hold the button for one second to change the value continuously.

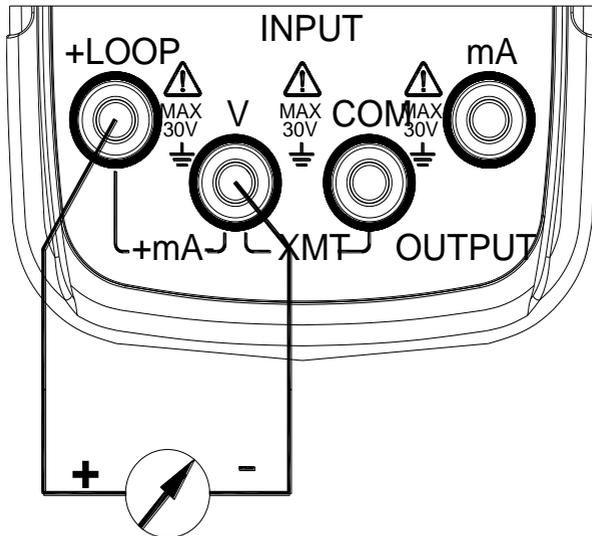


Figure 5.1 Current output

5.3.2 25% step current output

- Connect the test leads to the device as in Figure 5.1.
- Press the output/input toggle button (3) so that the **OUTPUT** symbol appears on the display. The device is now in an output state.
- Press the 25%/RAMP button, the **1** or **▲** symbols will be displayed.
- Press the mA%/V unit select button (4) so the device displays mA or mA%.
- Use the **▲** or **▼** buttons to change the output value in 25% increments; where 0% is 4mA and 100% is 20mA.
- Press the 25%/RAMP button again to exit the step current output.

5.3.3 Current Output Set for Zero Point & Full Scale

- Connect the test leads to the device as in Figure 5.1.
- Press the output/input toggle button (3) so that the **OUTPUT** symbol appears on the display. The device is now in an output state.
- Press the 100%/START button and the **1**, **▲**, 0 and FS symbols will be displayed.
- Use the **▲** or **▼** buttons to change the output value from 100% (20mA) and 0% (4mA).
- Press the 100%/START button again to exit the step current output.

5.3.4 Auto ramp output

- Connect the test leads to the device as in Figure 5.1.
- Press the output/input toggle button (3) so that the **OUTPUT** symbol appears on the display. The device is now in an output state.
- Press the STEP/AUTO button, the **OUTPUT**, **OFF** and 4mA symbols will be displayed. The device is now in ramp mode.
- Press the 25%/RAMP key again to change the type of output slope, which is displayed at the lower left of the display. The types are displayed as **Λ S**, **Γ**, **Λ F** in the correct order. These symbols indicate low-speed ramps and high-speed ramps, respectively. The former has a maximum cycle of 60s, the latter has a maximum cycle of 30s, and the auto-step ramp pauses for 5s at each step.
- When the **ON** symbol is displayed, press the 100%/START button to start setting the waveform output.
- Press the 100%/START button again, the output will be paused at the current value and the **OFF** symbol will be displayed.
- Press the button again, to continue the stepped output from the paused value.
- When the **OFF** symbol appears, press any of the buttons **▲**, **▼**, **◀**, **▶** to return the output to 0%. Then, the value of 4 mA will be displayed.

5.3.5 Simulating transmitter output (XMT)

- Insert one end of the test lead to the XMT output jack of the device and connect the other end with the input of the device as shown in Figure 5.2.
- The key-operation is the same as that of the current output.

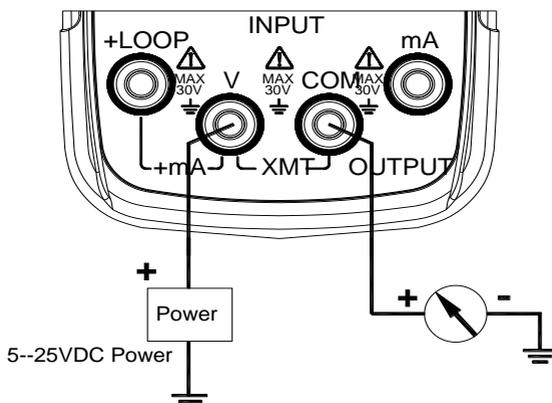


Figure 5.2 XMT output connection

⚠ Note

- Range of power supply: 5 to 25VDC
- Connect a 24V DC power supply to the device while operating the current output, to prolong the working life of the battery.

5.4 Measurement procedure

⚠ Warning

During operation, do not apply more than 30V between any two terminals or between any terminal and the ground. Any voltage exceeding 30V can not only damage the instrument, but can also cause personal injury.

⚠ Caution

- **Do not** apply a voltage or current to the input terminals exceeding the measurement range during operation, as it can cause damage to the device.
- Cut off the power supply to the device before connecting any test leads, as it may cause damage to the device.

Input procedure

Function Operation	%Operation	Display	Measurement Range
DCI 20 mA	20 mA	00.000 mA	-1.000~22.000 mA
↑ ↓	↑	-25.00 mA %	-31.25~112.50 mA %
DCV 28 V	%	0.000 V	-0.2000~28.000 V

5.4.1 DC current measurement

- Insert one end of the test lead to the mA jack (INPUT) of the device and connect the other end with the input of the device as shown in Figure 5.3.
- Press the output/input toggle button (3) so that the **INPUT** symbol appears on the display. The device is now in an input state.
- Press the mA%/V unit select button (4) so the device displays mA or mA%; where 0% is 4mA and 100% is 20mA.
- The device now begins to measure. **ON** and the measured result are now shown on the display.
- The measurement refresh rate is twice per second. If the measured result exceeds the measuring range, OL will be shown on the display.

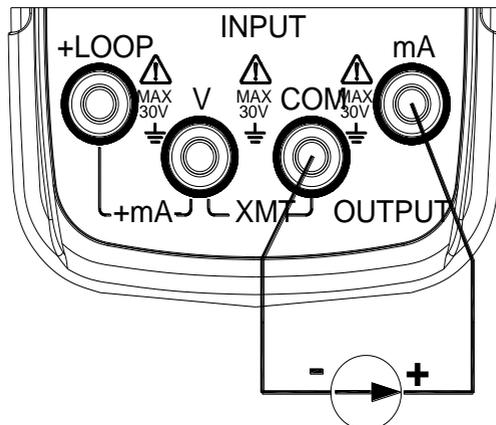


Figure 5.3 DC current measurement input

5.4.2 DC voltage measurement

- Insert one end of the test lead to the V jack (INPUT) of the device and connect the other end with the input of the device as shown in Figure 5.4.
- Press the output/input toggle button (3) so that the **INPUT** symbol appears on the display. The device is now in an input state.
- Press the mA%/V unit select button (4) so the device displays V.
- The device now begins to measure. **ON** and the measured result are now shown on the display.
- The measurement refresh rate is twice per second. If the measured result exceeds the measuring range, OL will be shown on the display.

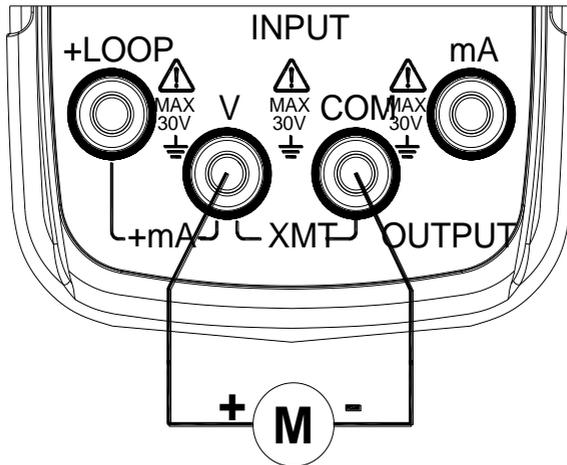


Figure 5.4 DC voltage measurement input

5.4.3 24V power supply connection for measuring loop current

- Insert the test leads into the V and mA input jacks (INPUT) of the device as shown in Figure 5.5.
- The key-operation is the same as that of the DC current measurement.

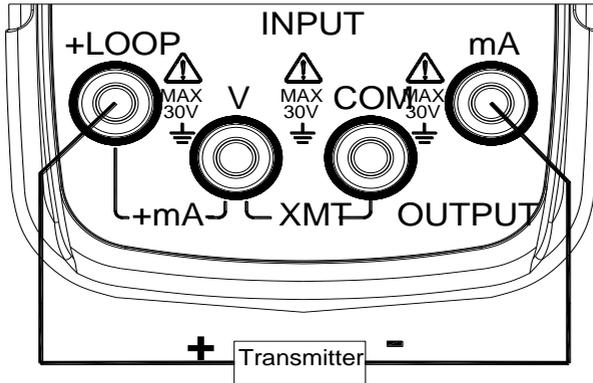


Figure 5.5 24V power supply connection

6 Performance Index

Output Performance Index (applicable to temperature range from 18°C to 28°C, within one year after calibration)

Output	Range	Output Range	Resolution	Accuracy	Remark
DCA	20mA	0.000~22.000mA	0.001mA	±0.05% set value ±4µA	Max. load 1KΩat 20mA.
Simu-transmitter (absorption current)	-20mA	0.000~-22.000mA	0.001mA	±0.05% set value ±4µA	Max. load 1KΩat 20mA. Note: power supply range: 5~25VDC
Loop Power Supply	24V			±10%	Max. output current up to 25mA.

Input Performance Index (applicable to temperature range from 18°C to 28°C, within one year after calibration)

Input	Range	Output Range	Resolution	Accuracy	Remark
Voltage	28V	-0.200~28.000V	1mV	±0.02% reading±2mV	Input resistance about 1MΩ
Current	20mA	-1.000~22.000mA	0.001mA	±0.02% reading±4µA	resistance about 20Ω
Loop Current	20mA	0.000~22.000mA	0.001mA	±0.02% reading±4µA	providing 24V loop power

7 Calibration

Each PCE-LOC 10 is delivered factory calibrated. To have the device recalibrated, please contact PCE Deutschland GmbH.

Unintentional changes in the internal calibration menu can cause problems, e.g. inaccuracies.

8 Warranty

You can read our warranty terms in our General Business Terms which you can find here: <https://www.pce-instruments.com/english/terms>.

9 Disposal

For the disposal of batteries in the EU, the 2006/66/EC directive of the European Parliament applies. Due to the contained pollutants, batteries must not be disposed of as household waste. They must be given to collection points designed for that purpose.

In order to comply with the EU directive 2012/19/EU we take our devices back. We either re-use them or give them to a recycling company which disposes of the devices in line with law.

For countries outside the EU, batteries and devices should be disposed of in accordance with your local waste regulations.

If you have any questions, please contact PCE Instruments.





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