

SLC100+

Loop Calibrator



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User Manual

MAN-DE-0056 EN REV. 09

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User Notes

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Intro

The information contained in this document applies to the SLC100+ loop calibrators. All components and processes involved in the manufacture of our products are subject to strict quality criteria, in accordance with our ISO 9001:2015 certification.

Objective

The purpose of this document is to present the features of the SLC100+ loop calibrators and to explain how to access and use these features correctly.

Anyone wishing to use an SLC100+ loop calibrator must first read and understand the information contained in this document, especially the safety information (see the "Safety" section).

About SLC100+

The SLC100+ loop calibrator enables the simultaneous and accurate measurement and sourcing of electrical signals such as current and voltage. The SLC100+ calibrators are ideal for integrating into processes involving the testing or calibration of measurement and control instruments that have input or output signals in electrical variables.

The SLC100+ is operated using silicone keys, which allow you to select the type of electrical variable to be measured and sourced, as well as change the calibrator's settings. Electrical signals are measured and generated via four terminals for 4-mm banana plugs located on the top of the unit.

The SLC100+ features a color IPS LCD screen, on which both generated and measured values can be viewed simultaneously. Finally, the SLC100+ calibrators are equipped with lithium batteries that can be recharged via a USB port located on the bottom of the device.

Typographical Conventions

The following typographical conventions were used in the preparation of this document:

Menu sequences or commands involving sequential user interaction are shown in bold, and each step in the sequence is separated by an arrow.	Go to Settings → Brightness
Buttons or symbols in the user interface are displayed in bold, with their names in square brackets.	Select the [Enter] option to confirm the change

Physical buttons are represented by icons that resemble the shape of the buttons or by the button's name in bold between curly brackets.	Press  to access de device menu. Press {MENU} to access de device menu.
Simultaneous interaction with two or more buttons is represented by icons depicting their shapes connected by plus signs. The interaction can also be represented by the button names in bold between curly braces, connected by plus signs.	Press  +  for 3 seconds to restore the device. Press {IN} + {OUT} for 3 seconds to restore the device.

Symbols

The symbols below are used throughout this document to provide context for the information presented.



This symbol is used to indicate a potentially dangerous situation that, if not avoided, could result in serious injury or death.



This symbol is used to indicate useful information, tips, or important information regarding the installation and operation of the product.

Related Documents

- Technical Specifications (datasheet) for the SLC100+ (**DAS-DE-0135**).

Contact

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Safety

Before turning on and operating the SLC100+ calibrator, read and understand all relevant information. This includes all workplace safety protocols, general safety standards, and this document.

The SLC100+ loop calibrators should be used only by qualified professionals. The user is responsible for the proper transport, storage, installation, operation, and maintenance of the loop calibrators.

For more information on the operating limits of the SLC100+, see the "Specifications" section.

To prevent damage, fires, explosions, and injuries:

- **Use the equipment only as specified in this document.**
- **Do not make any modifications to the equipment beyond the scope defined in this document. Doing so will void the product warranty and may cause harm to users and damage to the product.**
- **Improper replacement of components may compromise the equipment's operation and cause injury to the user.**
- **Do not use the equipment if it is not operating correctly.**
- **Do not use the equipment if it has been modified or damaged.**
- **If the equipment is subjected to conditions outside its safety limits, check for any damage to the equipment. If necessary, send the equipment to Sensycal for inspection and repair.**
- **Avoid any action that could generate an electrostatic charge. Electrostatic discharges can cause explosions.**
- **Always use appropriate personal protective equipment.**

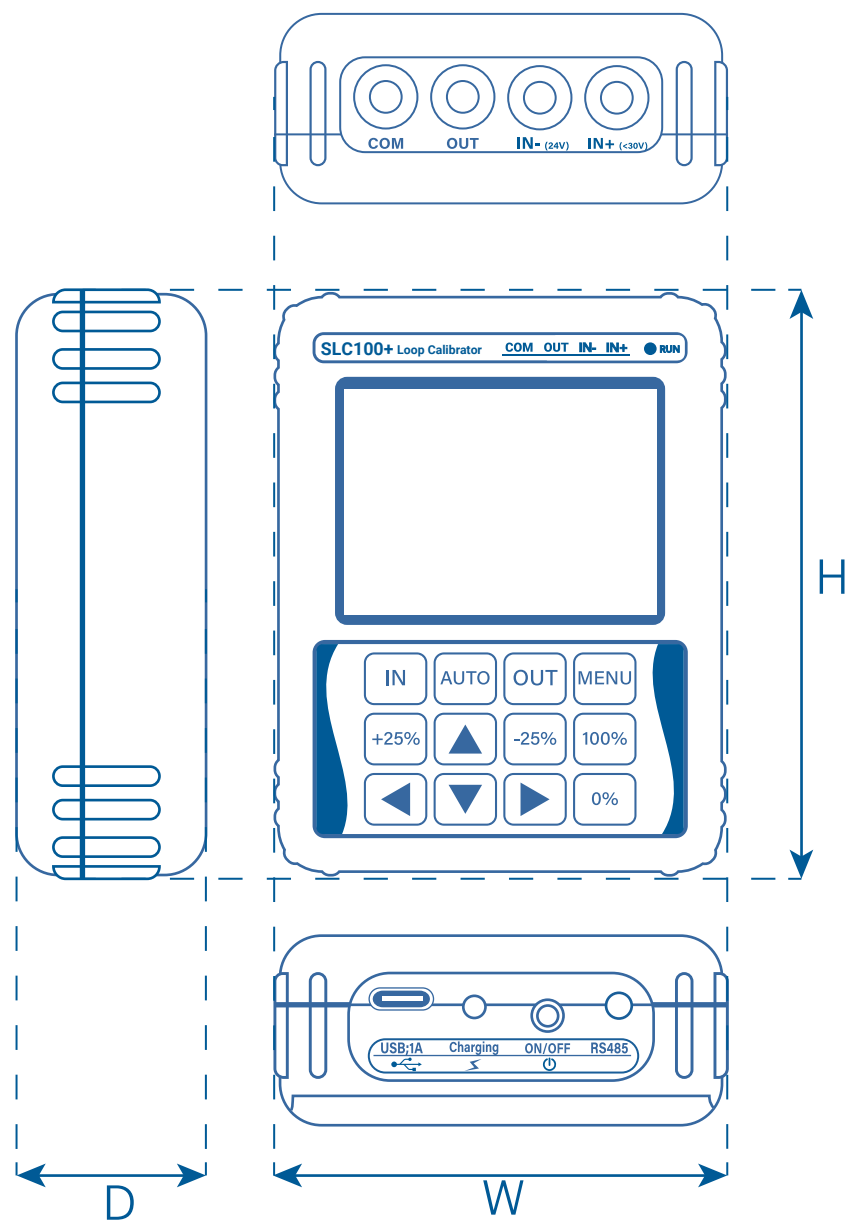


Operation

This section explains how to operate the SLC100+ calibrators. It includes a description of their parts, inputs, and buttons; instructions on how to take measurements and source electrical signals; and information on how to change settings and use the automatic output functions.

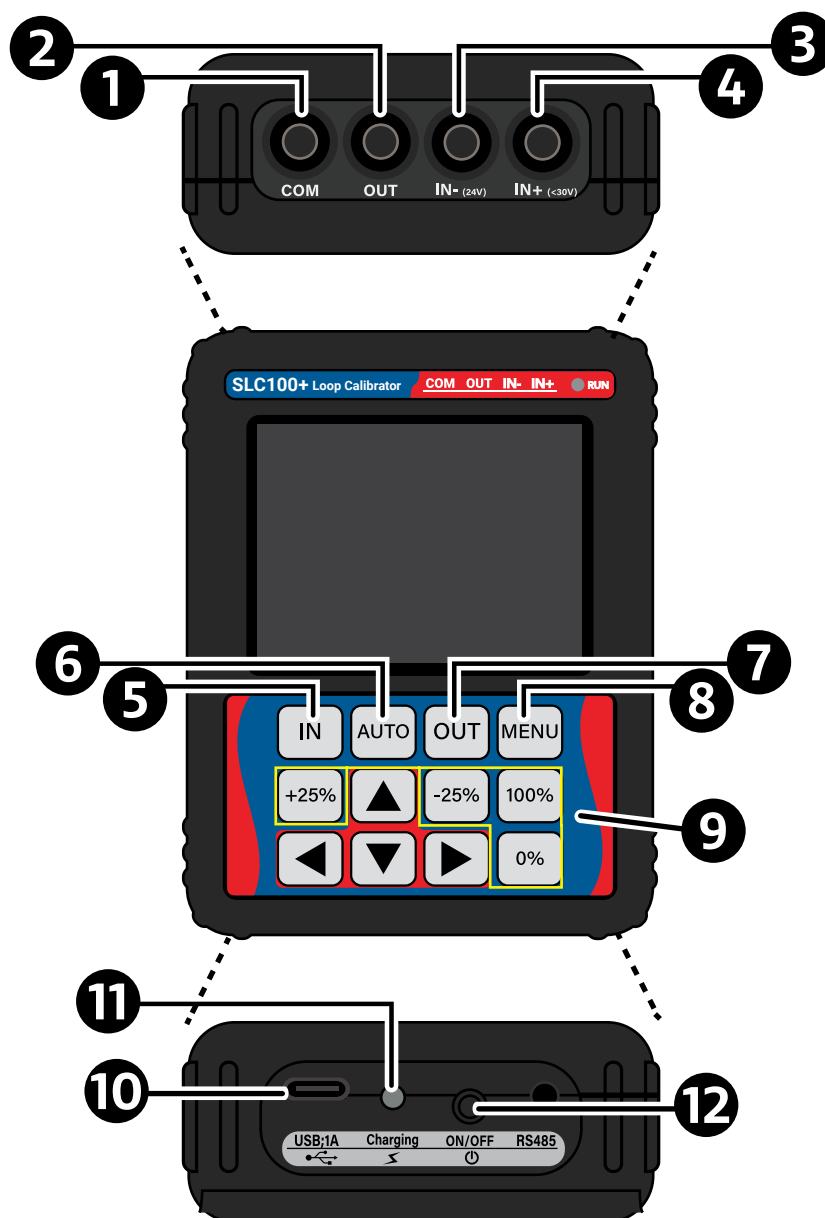
Before reading this section, make sure you have read and understood the “Safety” section.

Dimensions



Dimension	Length
H	(92,0 ± 0,2) mm
W	(71,0 ± 0,2) mm
D	(30,4 ± 0,2) mm

Device Interface



Item	Description	Item	Description
1	Common negative output terminal (COM).	7	Output mode selection button.
2	Positive voltage/current/frequency output terminal (OUT).	8	Menu access button.
3	Negative input terminal (IN- 24V) or input terminal with 24 V power supply.	9	Quick output adjustment buttons: 0%: Sets the output to 0% of the range (4 mA or 0 V). +25%: Increases the output by 25% (+4 mA or +2.5 V). -25%: Reduces the output by 25% (-4 mA or -2.5 V). 100%: Sets the output to 100% of the range (20 mA or 10 V).
4	Positive input terminal (IN+).	10	USB-C input for power (5V, 1A).
5	Input mode selection button.	11	Charging indicator LED.
6	Button to activate automatic output mode.	12	On/off button.

Startup and Function Menu

To use the SLC100+ calibrator, you must first turn it on. To turn on the device, simply press the power button (**{ON/OFF}**) located on the bottom of the device (see the "Device Interface" section).

As soon as the SLC100+ is turned on, the boot screen appears for a few seconds on the device's display, as shown in the figure below.

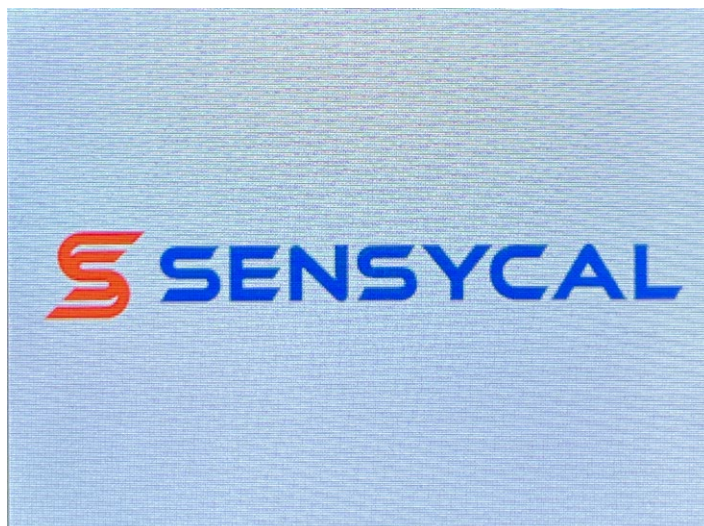


Figure 1 - Boot Screen

After the boot screen, the function menu will appear, as shown in the image below:

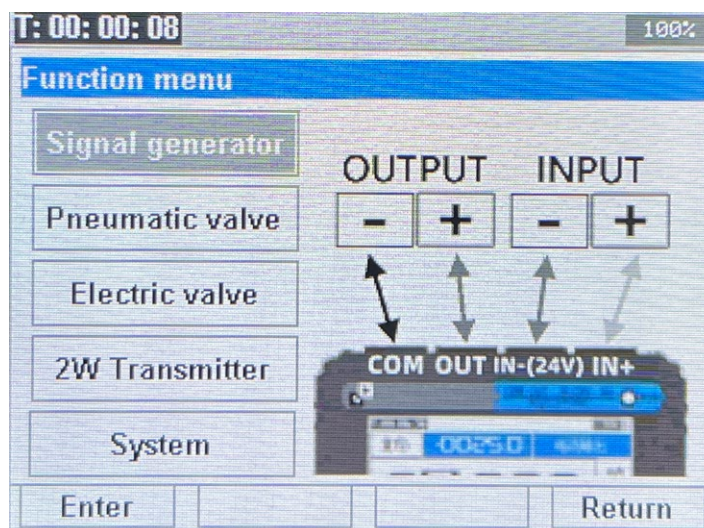


Figure 2 - Function Menu

The function menu includes the following options:

- **Signal generator:** Selects the general mode for sourcing/generating and measuring electrical signals, allowing the equipment to be configured to simultaneously measure and generate current, voltage, or frequency signals.
- **Pneumatic valve:** Selects the control mode for electropneumatic valves/positioners. In this mode, the calibrator will simultaneously generate a current output to

control the electropneumatic valve/positioner and can also read a current output signal corresponding to the valve's position feedback, providing a 24 V power supply to this valve/positioner output.

- **Electric valve:** Selects the control mode for electric valves/positioners. In this mode, the calibrator will simultaneously generate a current output to control the electric valve/positioner and can also read a current output signal corresponding to the valve's position feedback, without supplying 24 V power to the valve/positioner output.
- **2W Transmitter:** Selects the measurement mode for 4 to 20 mA transmitters. In this mode, the SLC100+ will supply the transmitter with 24 V and, at the same time, read the device's current output.
- **System:** Provides access to the SLC100+ settings menu.

To navigate between options, use the arrow keys. To select an option, press the **{IN}** button, or press the **{MENU}** button to exit the menu.

Meter/Signal Generator Mode

In the function menu (see previous section), when you select the **Signal Generator** option, the signal meter/generator mode will be selected, and the screen shown below will appear:

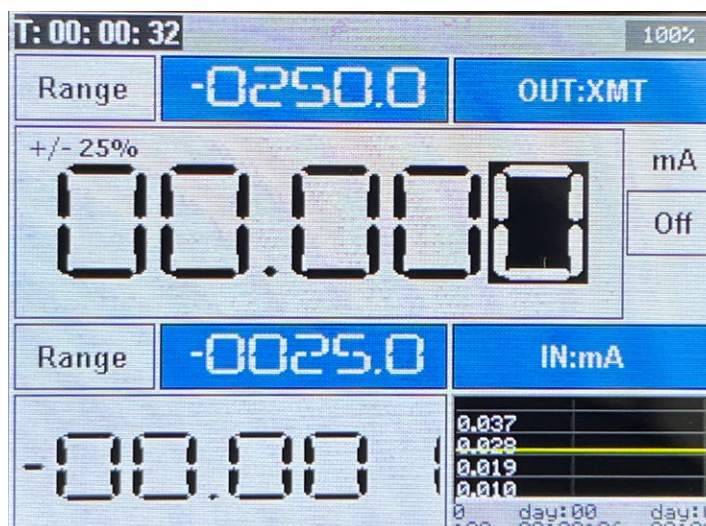


Figure 3 - Signal generator/meter function screen

In this configuration, the SLC100+ can be set up to measure a current, voltage, or frequency signal while simultaneously sourcing one of these signals. The value and type of the generated signal are displayed at the top of the screen, indicated by the word "**OUT**," while the measured value is displayed at the bottom of the screen, indicated by the word "**IN**." In addition, a graph showing the history of the measured values (in white) and generated values (in yellow) is displayed.

In the following subsections, we will describe how to use each of the SLC100+'s signal measurement and source settings.

Voltage Measurement

After selecting **Signal Generator** mode (see the “Meter/Signal Generator Mode” section), you can configure the SLC100+ to take voltage measurements by pressing the {IN} button. The menu for selecting the type of electrical input will appear, as shown in the figure below:

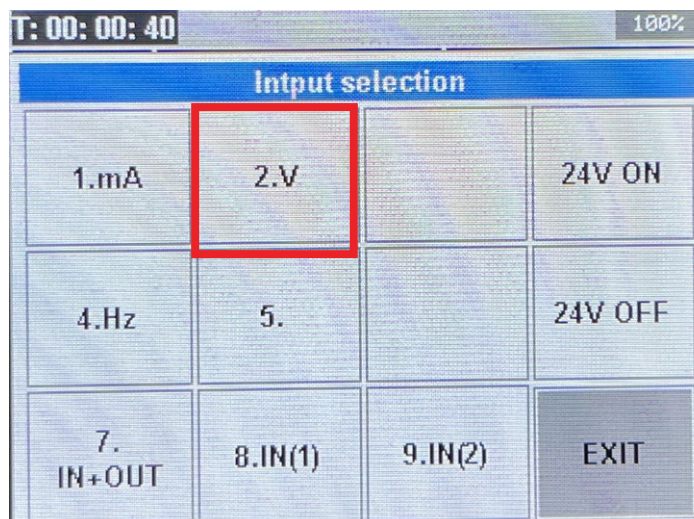


Figure 4 - Menu for selecting the type of electrical input - voltage option

The voltage measurement option is represented by option 2, which can be selected by pressing the corresponding button on the SLC100+ keypad. In this case, the button to select voltage measurement is **{AUTO}**.

After selecting the voltage measurement option, the SLC100+ will return to the signal measurement and source screen. The voltage measurement mode will be indicated by the symbol **IN: V** at the bottom of the screen. The voltage value in volts measured by the SLC100+ will also be displayed at the bottom of the screen, as shown in the figure below.

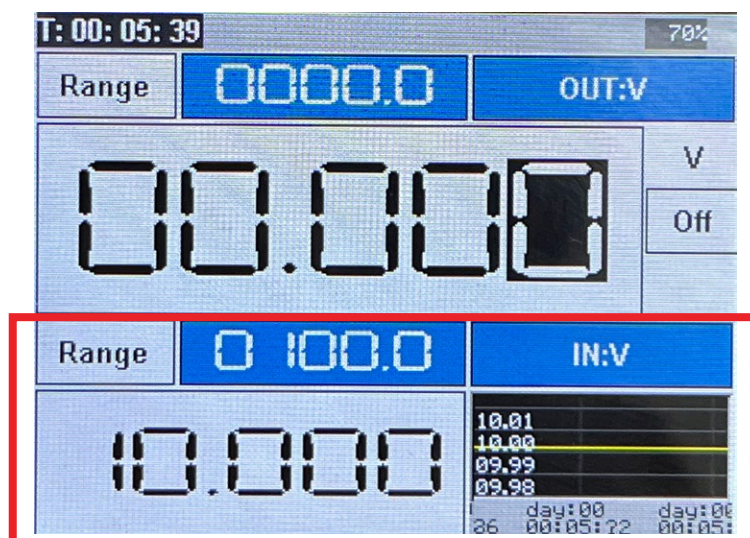


Figure 5 - Screen in voltage measurement mode

To measure a voltage using the SLC100+, you must connect the SLC100+ to the device under test whose voltage you want to measure via the **IN-** and **IN+** pins on the electrical terminal, as shown in the figure below:

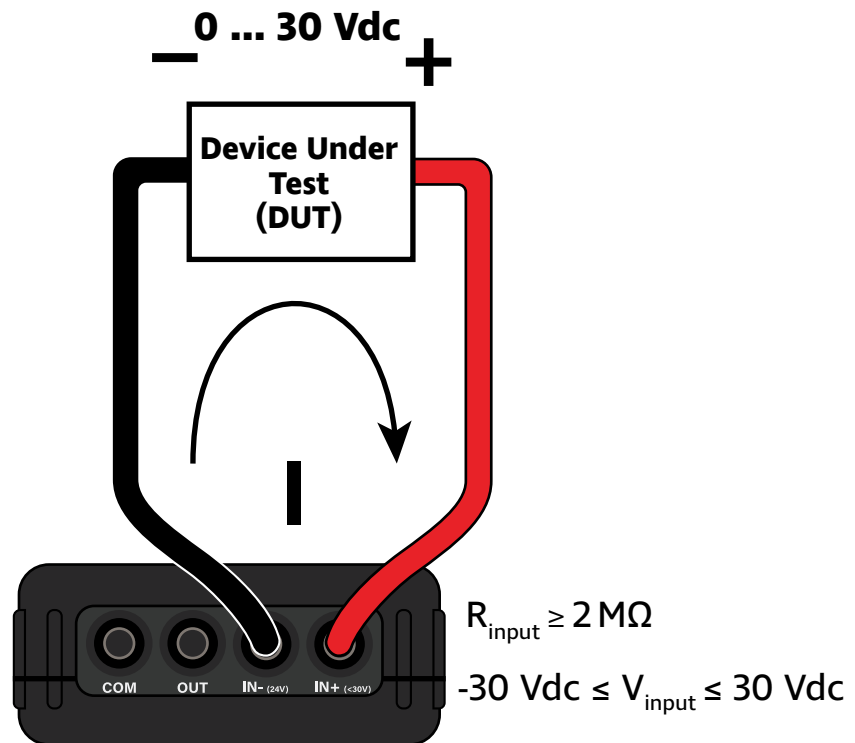


Figure 6 - SLC100+ Connection configuration for voltage measurement

To change the voltage measurement mode settings, press and hold the **{IN}** button for a few seconds. The electrical input configuration screen will appear, as shown in the image below:

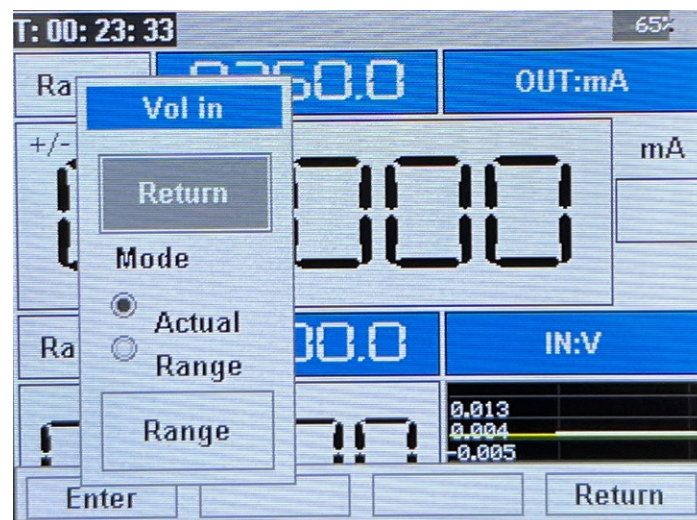


Figure 7 - Voltage Input Configuration Screen

On this screen, you'll find the **[Mode]** setting, which allows you to choose whether the displayed measurement value will be in volts (**[Actual]** option) or as a percentage of the range (**[Range]** option). In addition, by selecting the **[Range]** button at the bottom of the screen, you can configure the range limits in volts and the corresponding values as a percentage, as shown in the image below:

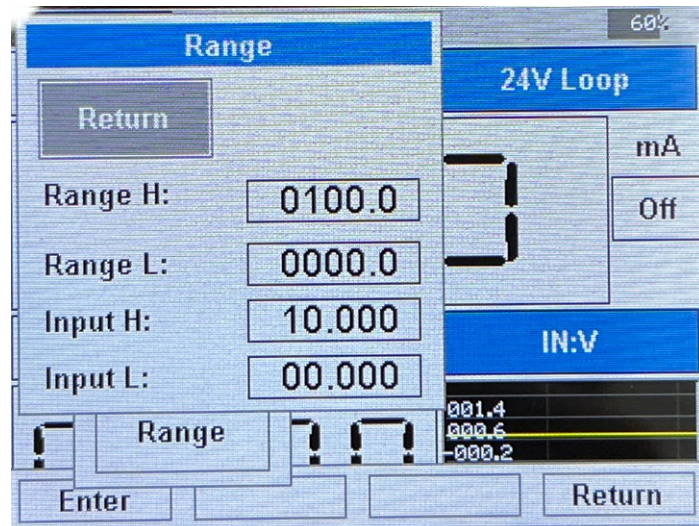


Figure 8 - Electrical Input Range Configuration Screen

The **[Range H]** and **[Range L]** parameters correspond to the maximum and minimum values of the range, expressed as percentages, respectively. They are normally set to 100.0 and 000.0. The **[Input H]** and **[Input L]** parameters represent the electrical input values that will correspond to the range values entered in the **[Range H]** and **[Range L]** parameters. For voltage measurements, these values are typically set to 0.000 and 10.000, indicating that a reading of 0 volts corresponds to 0% of the measurement range, and 10 volts corresponds to 100% of the measurement range. You can change these values using the navigation buttons.

Current Measurement

After selecting **Signal Generator** mode (see the “Meter/Signal Generator Mode” section), you can configure the SLC100+ to take current measurements by pressing the **{IN}** button. The menu for selecting the type of electrical input will appear, as shown in the figure below:

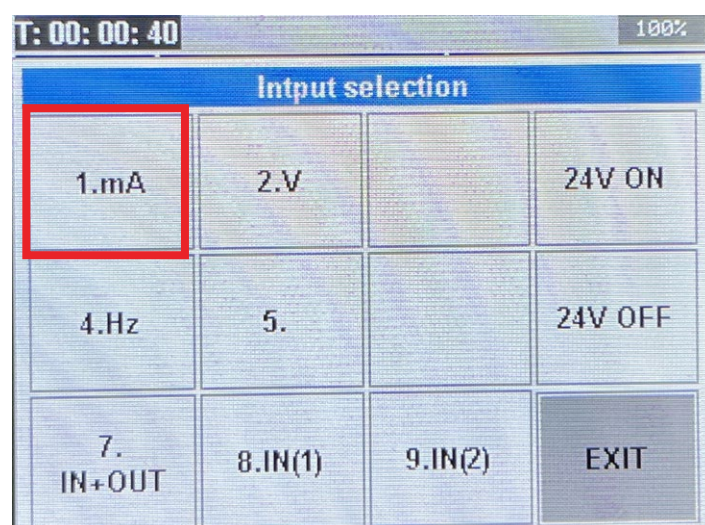


Figure 9 - Menu for selecting the type of electrical input - current option

The current measurement option is represented by option 1, which can be selected by pressing the corresponding button on the SLC100+ keypad. In this case, the button to select current measurement is **{IN}**.

After selecting the current measurement option, the SLC100+ will return to the measurement and signal source screen. The current measurement mode will be indicated by the **IN: mA** symbol at the bottom of the screen. The current value in milliamperes measured by the SLC100+ will also be displayed at the bottom of the screen, as shown in the figure below.

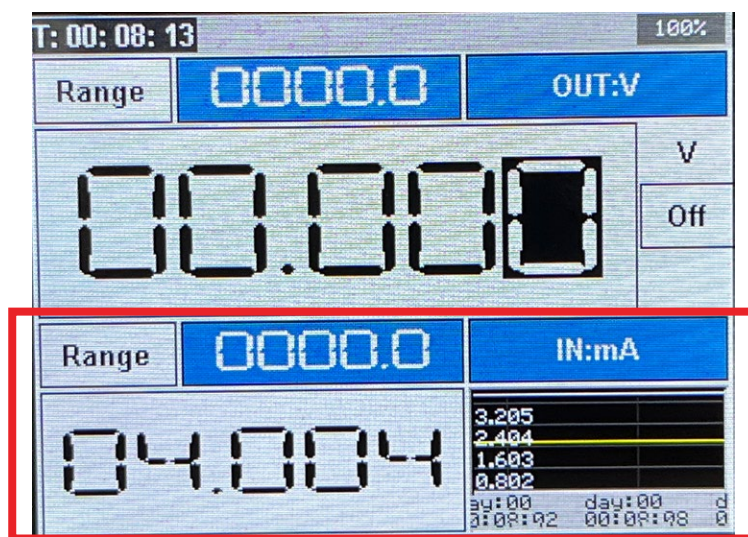


Figure 10 - Screen in current measurement mode

The SLC100+ calibrator has two current measurement modes:

- **Passive current measurement:** In this mode, the SLC100+ will measure current in the same way as a multimeter, without supplying power. The SLC100+ must be connected in series with the circuit whose current is to be measured.
- **Active current measurement:** In this mode, the SLC100+ will supply 24 V to the circuit to which it is connected and will measure the circuit's current. The SLC100+ must be connected in parallel to the circuit whose current is to be measured.

To use passive mode, after selecting the current measurement mode, press the **{IN}** button to reopen the input selection menu. Then press the **{100%}** button to select the **[24V OFF]** option, which will turn off the SLC100+'s 24 V power output.

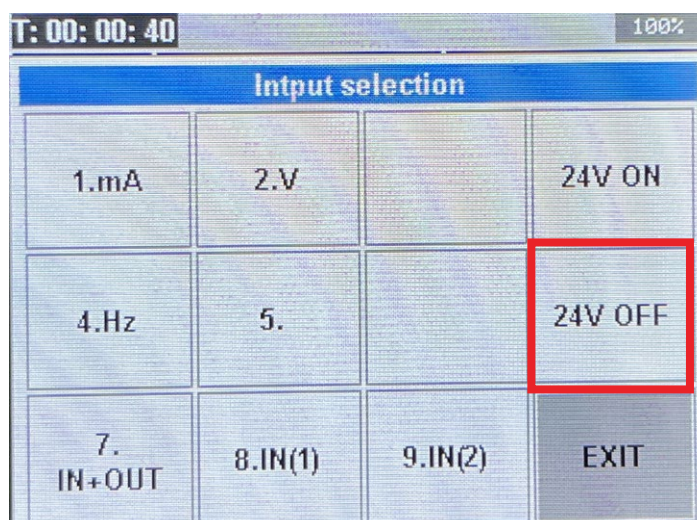


Figure 11 - Electrical input type selection menu - passive current option

To measure a current passively (without a 24 V power supply) using the SLC100+, you must connect the SLC100+ in series with the circuit whose current you want to measure, using the **IN-** and **IN+** pins on the electrical terminal, as shown in the figure below:

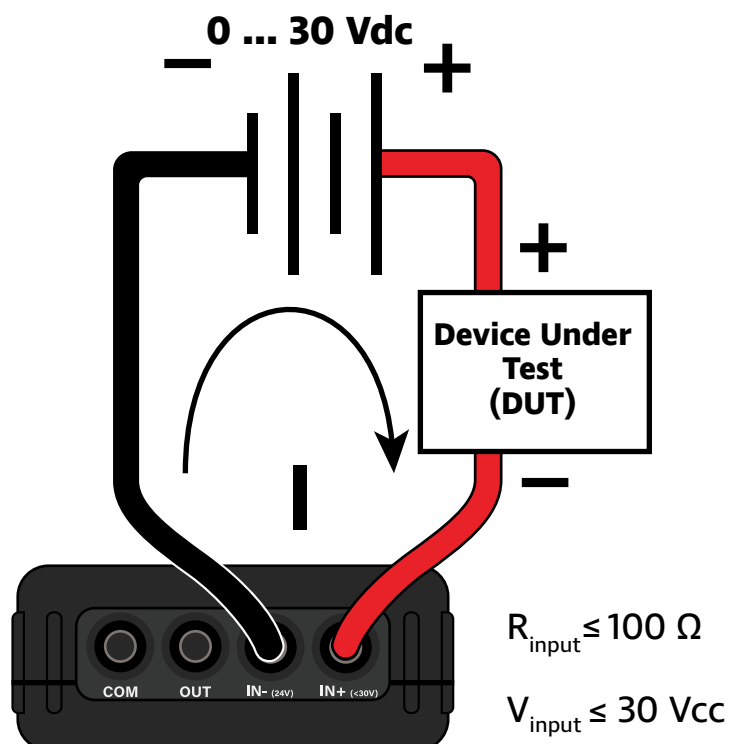


Figure 12 - SLC100+ connection configuration for passive current measurement

To use active mode, after selecting the current measurement mode, press the **{IN}** button to reopen the input selection menu. Then press the **{MENU}** button to select the **[24V ON]** option, which will turn on the SLC100+'s 24 V power output.

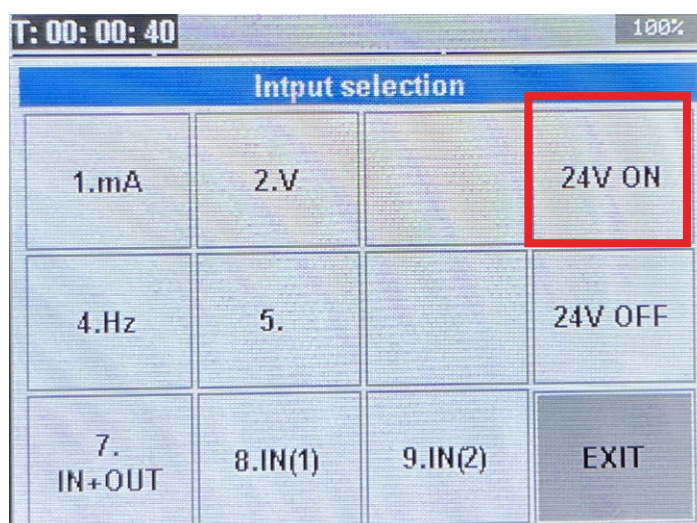


Figure 13 - Electrical input type selection menu - active current option

After selecting the active current measurement mode, the SLC100+ will return to the measurement/source screen, and the **24 V** symbol will flash at the top of the screen, indicating that the 24-volt power supply is enabled, as shown in the figure below:

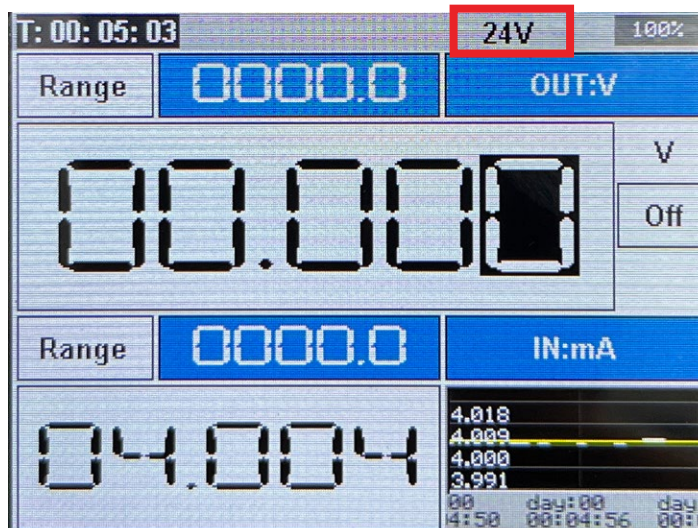


Figure 14 - Screen in active current measurement mode

To actively measure a current (using a 24 V power supply) with the SLC100+, you must connect the SLC100+ in parallel with the equipment or circuit that you will be powering and whose current you want to measure. The connection is made via the **IN-** and **IN+** pins on the electrical terminal, as shown in the figure below:

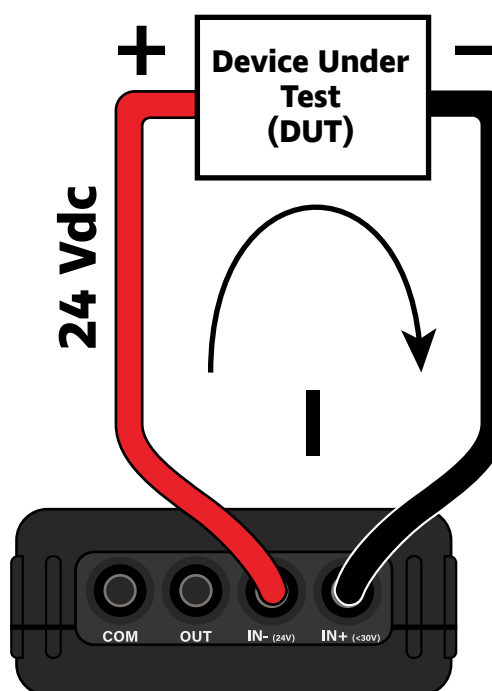


Figure 15 - SLC100+ connection diagram for active current measurement

To change the current measurement mode settings, press and hold the **{IN}** button for a few seconds. The electrical input configuration screen will appear.

On this screen, you will find the **[Mode]** setting, which allows you to choose whether the displayed measurement value will be in volts (**[Actual]** option) or as a percentage of the range (**[Range]** option). In addition, by selecting the **[Range]** button at the bottom of the screen, you can configure the range limits in volts and the corresponding values as a percentage.

The configuration screen is shown in the figure below:

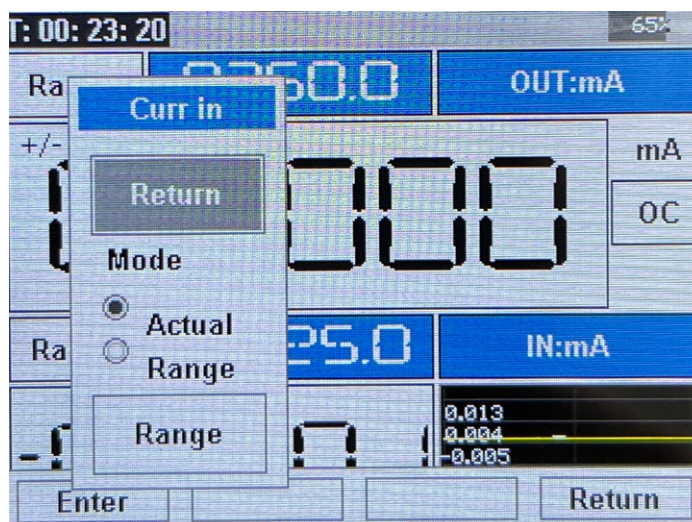


Figure 16 - Current input configuration screen

Frequency Measurement

After selecting **Signal Generator** mode (see the “Meter/Signal Generator Mode” section), you can configure the SLC100+ to perform frequency measurements by pressing the **{IN}** button. The menu for selecting the type of electrical input will appear, as shown in the figure below:

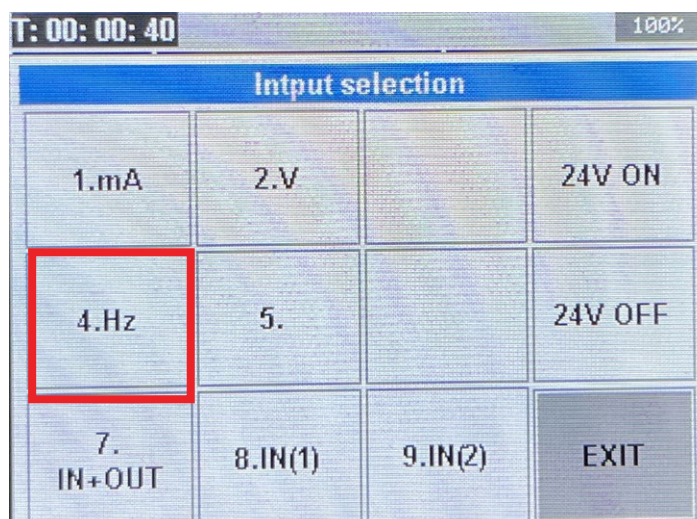


Figure 17 - Electrical input type selection menu - frequency option

The frequency measurement option is represented by option 4, which can be selected by pressing the corresponding button on the SLC100+ keypad. In this case, the button to select frequency measurement is **{+25%}**.

After selecting the frequency measurement option, the SLC100+ will return to the signal measurement and source screen. The frequency measurement mode will be indicated by the symbol **IN: Hz** at the bottom of the screen. Also at the bottom of the screen, the frequency value in **Hz** or **kHz** measured by the SLC100+ will be displayed, as shown in the figure below.

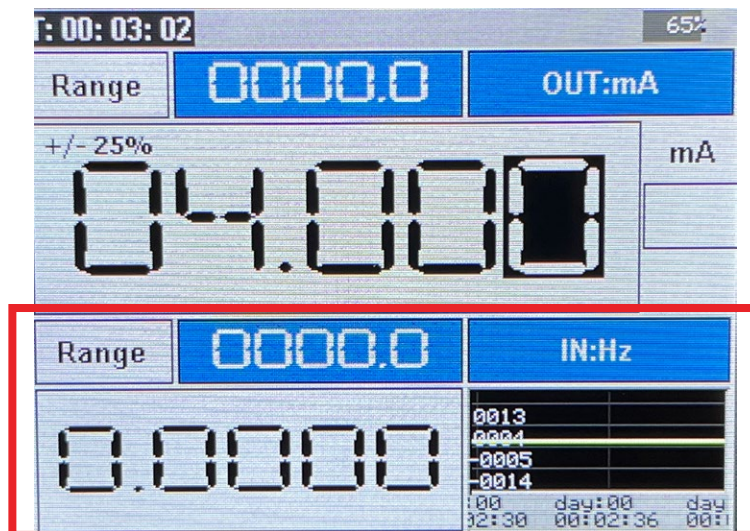


Figure 18 - Screen in frequency measurement mode

To measure a frequency using the SLC100+, you must connect the SLC100+ to the device under test whose frequency output you want to measure via the **IN-** and **IN+** pins on the electrical terminal, as shown in the figure below:

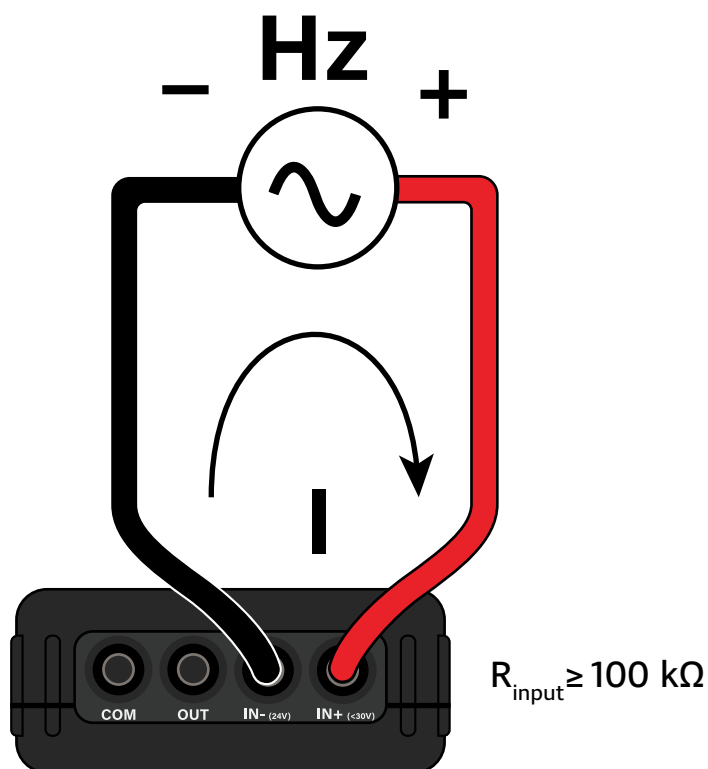


Figure 19 - SLC100+ connection diagram for frequency measurement

To change the frequency measurement mode settings, press and hold the **{IN}** button for a few seconds. The electrical input settings screen will appear as shown in the image below:

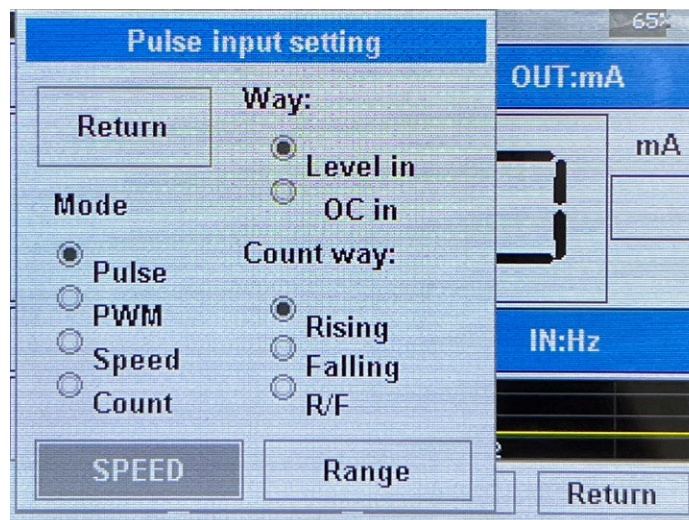


Figure 20 - Frequency input configuration screen

On this screen, you'll find the **[Mode]** setting, which lets you choose the type of frequency input. The options are:

- **[Pulse]**: Standard frequency measurement. The frequency value in hertz or kilohertz will be displayed on the screen.
- **[PWM]**: PWM (pulse width modulation) measurement. The duty cycle value will be displayed on the screen.
- **[Speed]**: Measurement of speed in revolutions per hour (rph), revolutions per minute (rpm), or revolutions per second (rps).
- **[Count]**: Measurement of the number of frequency pulses. The pulse count will be displayed on the screen.

The **[Way]** setting allows you to select the type of frequency signal being measured. In the **[Level]** option, the frequency signal is active and corresponds to voltage variations. In the **[OC in]** (Open Collector In) option, the frequency signal is passive, and the SLC100+ supplies the necessary power to the circuit.

The **[Count way]** setting allows you to select how the frequency pulses are counted. The available options are:

- **[Rising]**: Frequency pulses are counted during the rising edge of the signal (during the transition from the low voltage level to the high voltage level).
- **[Falling]**: Frequency pulses are counted during the falling edge of the signal (during the transition from the high voltage level to the low voltage level).
- **[R/F]**: Frequency pulses are counted during both the rising and falling edges of the signal.

The **[SPEED]** button allows you to select revolutions as the unit for the frequency measurement mode.

The **[Range]** button provides access to range limit settings in hertz (Hz) and the corresponding values as percentages.

Voltage Sourcing

After selecting **Signal Generator** mode (see the "Meter/Signal Generator Mode" section), you can configure the SLC100+ to source voltages by pressing the **{OUT}** button. The menu for selecting the type of electrical output will appear, as shown in the figure below:

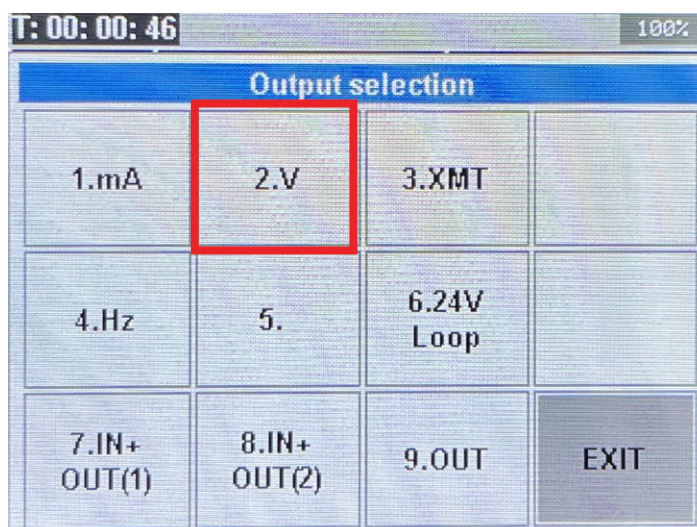


Figure 21 - Electrical output type selection menu - voltage option

The voltage sourcing option is represented by option 2, which can be selected by pressing the corresponding button on the SLC100+ keypad. In this case, the button for selecting voltage generation is **{AUTO}**.

After selecting voltage generation mode, the SLC100+ will return to the measurement and signal sourcing screen. Current generation mode will be indicated by the symbol **OUT: V** at the top of the screen. The current value in volts generated by the SLC100+ will also be displayed at the top of the screen, as shown in the figure below.

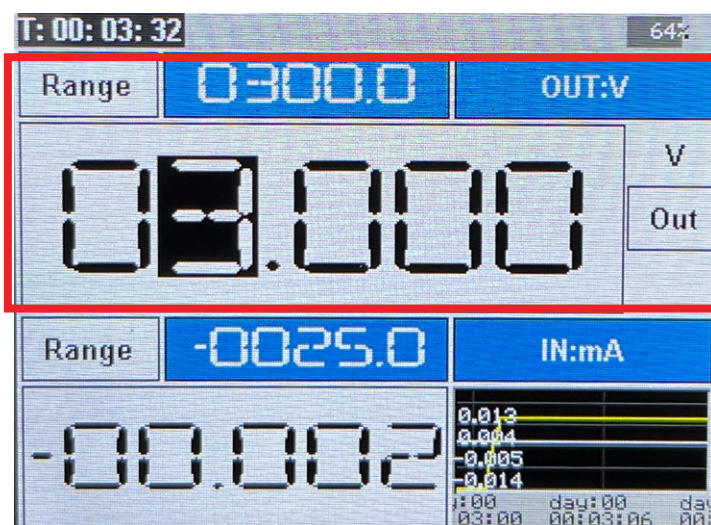


Figure 22 - Screen in voltage source mode

To change the value sourced by the calibrator, we can use the buttons **◀** and **▶** to select one of the digits of the generated number, and then we can use the buttons **▲** and **▼** to change the digit's value.

In addition, we can use the **{+25%}** and **{-25%}** buttons to increase or decrease, respectively, the voltage output generated by the SLC100+ by 2.5 V. Finally, the **{100%}** button will set the generated voltage to 10 V, while the **{0%}** button will set the output to 0 V.

To source voltages using the SLC100+, you must connect the SLC100+ to the device under test, which will receive the voltage through the **COM** and **OUT** pins on the terminal block, as shown in the figure below:

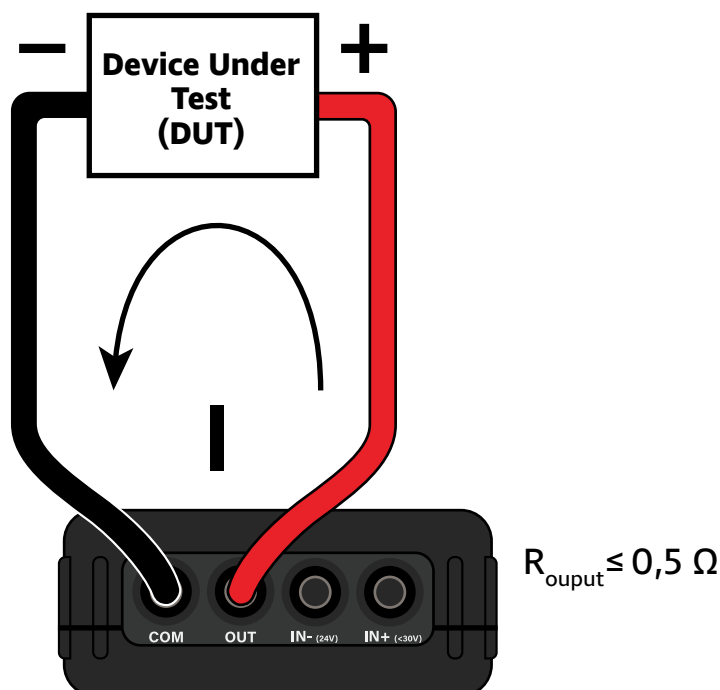


Figure 23 - SLC100+ connection diagram for voltage sourcing

To change the current generation mode settings, press and hold the **{OUT}** button for a few seconds. The current output settings screen will appear as shown in the image below:

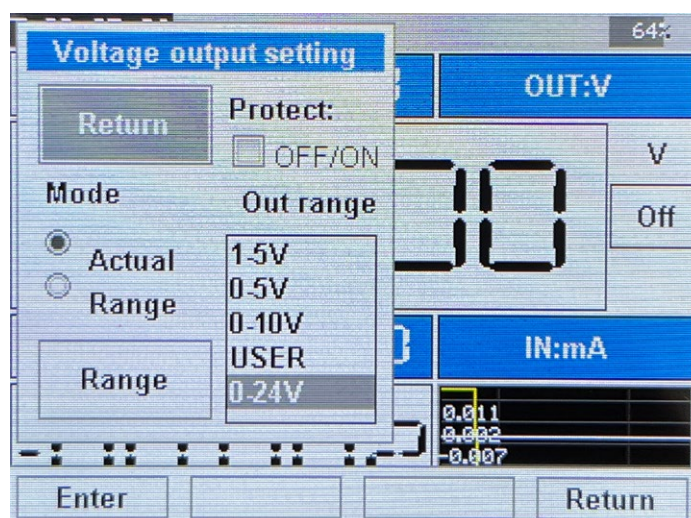


Figure 24 - Voltage output configuration screen

On this screen, you'll find the **[Mode]** setting, which lets you choose whether the displayed output value will be in volts (**[Actual]** option) or within the configured range (**[Range]** option).

Next is the **[Range]** button. When you select this button, the output range settings screen will open, as shown in the image below:

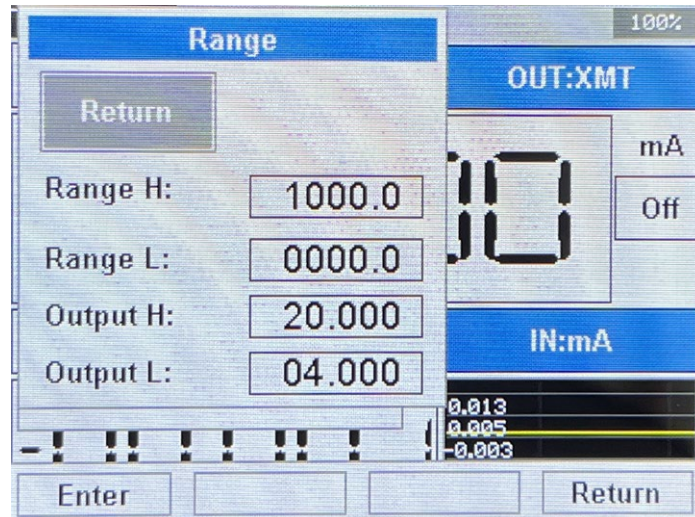


Figure 25 - Electrical input range configuration screen

The **[Range H]** and **[Range L]** parameters correspond to the maximum and minimum values of the range, expressed as percentages, respectively. They are typically set to 100.0 and 000.0.

The **[Output H]** and **[Output L]** parameters represent the electrical output values that will correspond to the range values entered in the **[Range H]** and **[Range L]** parameters. In the case of voltage generation, these values are normally set to 0.000 and 10.000, indicating that a measurement of 0 volts corresponds to 0% of the generation range, and 10 volts corresponds to 100% of the generation range. You can change these values using the navigation buttons.

Returning to the main voltage output settings screen (Figure 24), we find the **[Protect]** setting, which allows us to enable or disable short-circuit protection for the voltage output.

Finally, the **[Out range]** setting allows you to define the voltage output limits. The available options are: 0 to 12 volts, 1 to 5 volts, 0 to 5 volts, 0 to 10 volts, and the **[USER]** option, which will set the limits based on the values of the electrical output parameters on the **[Range]**, and 0 to 24 volts.

Once the **[Out range]** setting is changed, voltage generation will be limited to the selected values; it will not be possible to generate voltages below the lower limit or above the upper limit. To generate voltages outside the selected range, you must change the **[Out range]** parameter setting again.

Current Sourcing

After selecting **Signal Generator** mode (see the “Meter/Signal Generator Mode” section), you can configure the SLC100+ to actively source currents by pressing the **{OUT}** button. The menu for selecting the electrical output type will appear, as shown in the figure below:

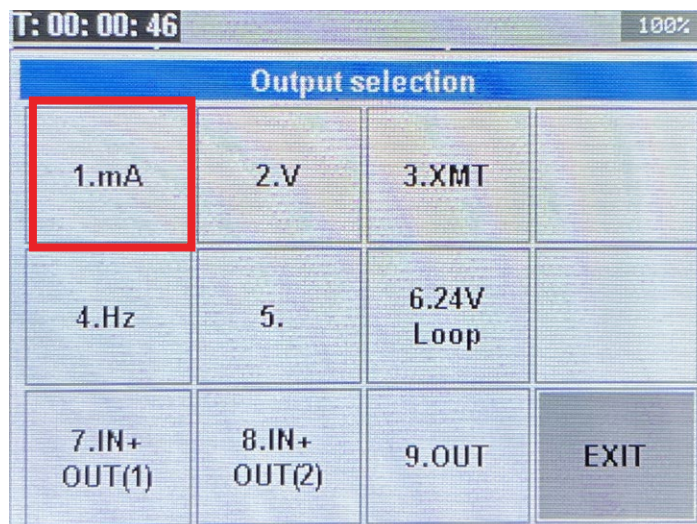


Figure 26 - Electrical output type selection menu - active current option

The current sourcing option is represented by option 1, which can be selected by pressing the corresponding button on the SLC100+ keypad. In this case, the button to select current sourcing is **{IN}**.

After selecting current source mode, the SLC100+ will return to the measurement and signal generation screen. Current generation mode will be indicated by the **OUT: mA** symbol at the top of the screen. Also at the top of the screen, the current value in milliamperes sourced by the SLC100+ will be displayed, as shown in the figure below.

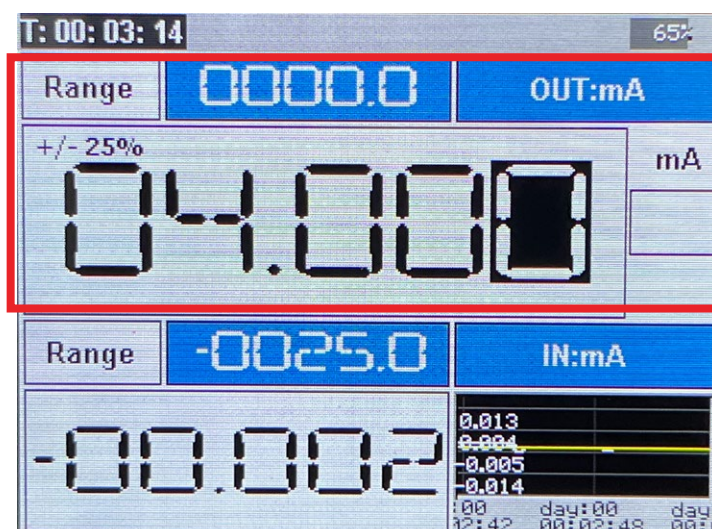


Figure 27 - Screen in current source mode

To change the value sourced by the calibrator, we can use the buttons ◀ and ▶ to select one of the digits of the generated number, and then we can use the buttons ▲ and ▼ to change the digit's value.

In addition, we can use the **{+25%}** and **{-25%}** buttons to increase or decrease, respectively, the current value generated by the SLC100+ by 4 mA. Finally, the **{100%}** button will set the generated value to 20 mA, while the **{0%}** button will set the output to 4 mA.

To generate active currents using the SLC100+, you must connect the SLC100+ to the device under test, which will receive the active current through the **COM** and **OUT** pins on the electrical terminal, as shown in the figure below:

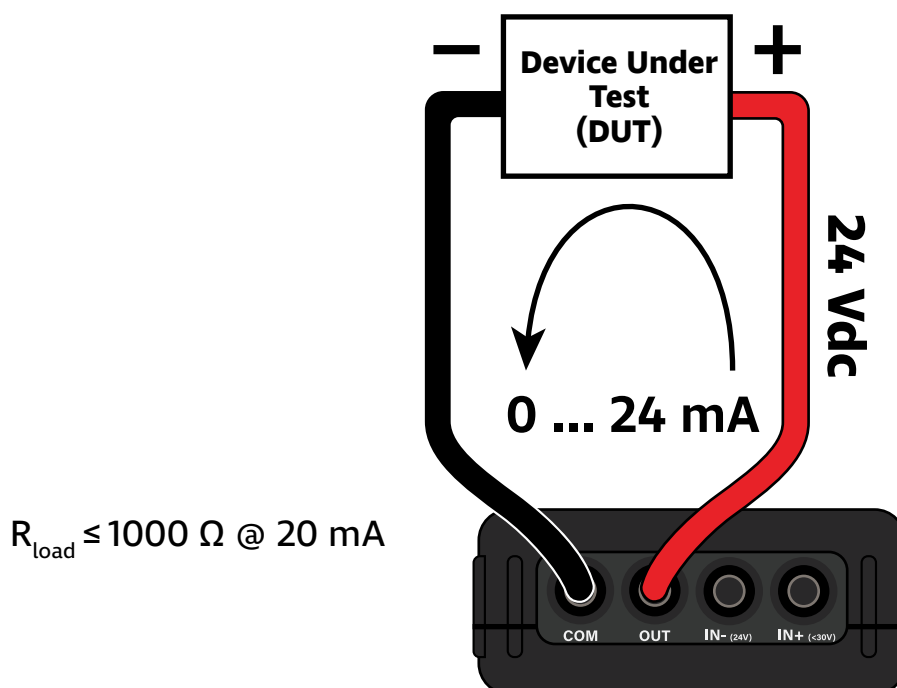


Figure 28 - SLC100+ Connection configuration for active current sourcing

It is important to note that if the circuit to which the SLC100+ is connected is open or has very high resistance, current generation will not be possible. In this case, the failure to generate current will be indicated by the **OC** symbol, which will flash in the right corner of the screen next to the generated current value, as shown in the image below:

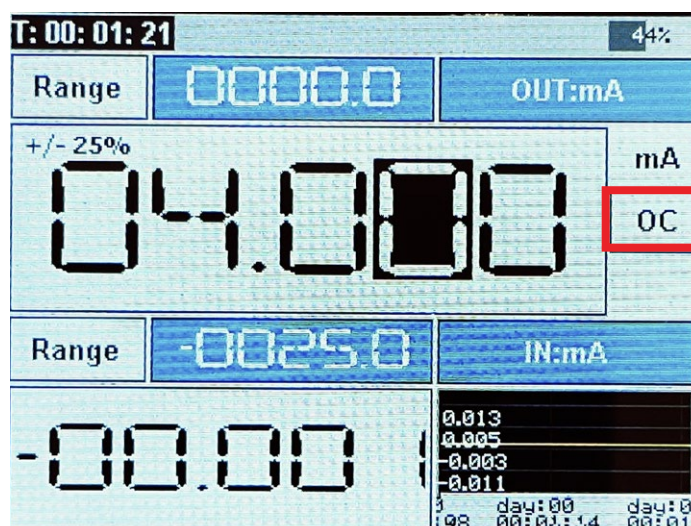


Figure 29 - Indication of a fault in active current sourcing

To change the current generation mode settings, press and hold the **{OUT}** button for a few seconds. The current output settings screen will appear as shown in the image below:

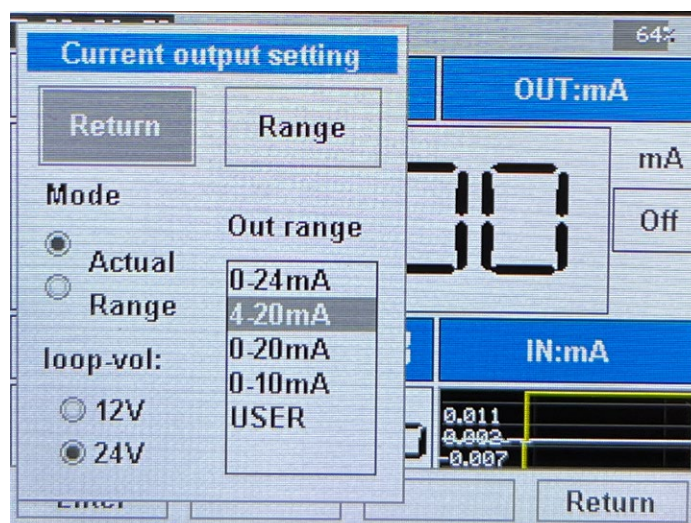


Figure 30 - Current output configuration screen

On this screen, you will find the **[Mode]** setting, which allows you to choose whether the displayed current value will be in milliamperes (**[Actual]** option) or within the configured range (**[Range]** option).

Next is the **[loop-vol]** setting, which allows you to choose whether the voltage used for current generation will be 12 volts or 24 volts.

At the top of the screen, the **[Range]** button gives you access to the current generation range settings in milliamperes and the corresponding values as percentages.

Finally, the **[Out range]** setting allows you to define the current generation limits. The available options are: 0 to 24 milliamperes, 4 to 20 milliamperes, 0 to 20 milliamperes, 0 to 10 milliamperes, and the **[USER]** option, which sets the limits based on the electrical output parameter values from the **[Range]** screen.

Once the **[Out range]** setting is changed, the output will be limited to the selected values; it will not be possible to generate currents below the lower limit or above the upper limit. To generate currents outside the selected range, you must change the **[Out range]** setting again.

Current Simulation/ Transmitter (XMT)

After selecting **Signal Generator** mode (see the "Meter/Signal Generator Mode" section), you can configure the SLC100+ to passively simulate transmitters by pressing the **{OUT}** button. The menu for selecting the type of electrical output will appear, as shown in the figure below:

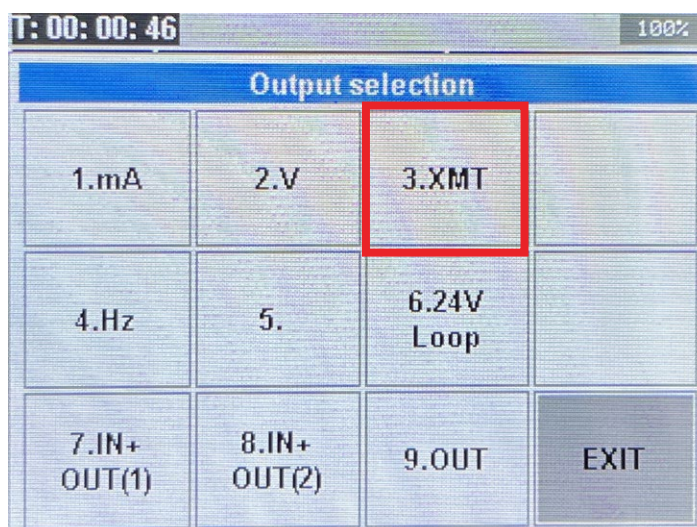


Figure 31 - Electrical output type deletion menu - transmitter simulation option

The transmitter simulation option (also known as XMT) is represented by option 3, which can be selected by pressing the corresponding button on the SLC100+ keypad. In this case, the button for current simulation is **{OUT}**.

After selecting current simulation mode, the SLC100+ will return to the signal measurement and generation screen. Current simulation mode will be indicated by the **OUT: XMT** symbol at the top of the screen. Also at the top of the screen, the current value in milliamperes controlled by the SLC100+ will be displayed, as shown in the figure below:

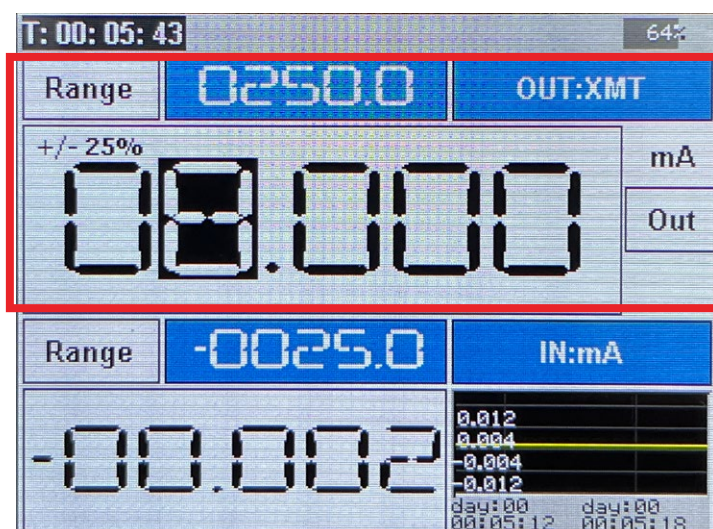


Figure 32 - Screen in current/transmitter simulation mode

To change the value sourced by the calibrator, we can use the buttons and to select one of the digits of the generated number, and then we can use the buttons and to change the digit's value.

In addition, we can use the **{+25%}** and **{-25%}** buttons to increase or decrease, respectively, the simulated current value generated by the SLC100+ by 4 mA. Finally, the **{100%}** button will set the generated value to 20 mA, while the **{0%}** button will set the output to 4 mA.

To simulate currents or transmitters using the SLC100+, you must connect the SLC100+ to the circuit under test, whose current will be controlled via the **COM** and **OUT** pins on the electrical terminal, as shown in the figure below:

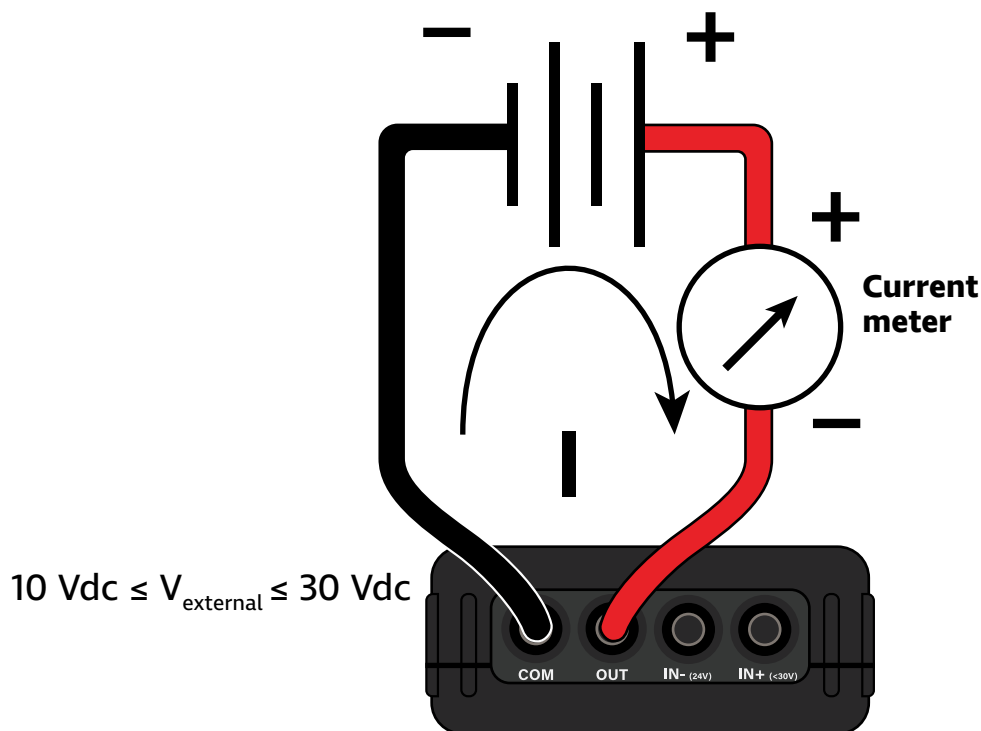


Figure 33 - SLC100+ connection configuration for transmitter/current simulation

It is important to note that if the circuit to which the SLC100+ is connected is open or has very high resistance, current simulation will not be possible. In this case, a failure in the current/transmitter simulation will be indicated by the OC symbol, which will flash in the right corner of the screen next to the current value.

To change the settings for the transmitter/current simulation mode, press and hold the **{OUT}** button for a few seconds. The output configuration screen will appear as shown in the image below:

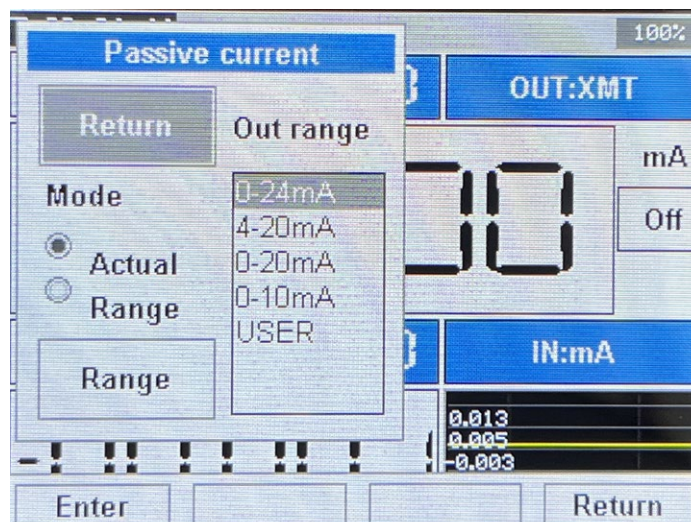


Figure 34 - Current simulation configuration screen

On this screen, you will find the **[Mode]** setting, which allows you to choose whether the controlled value displayed will be the value in milliamperes (**[Actual]** option) or the value within the configured range (**[Range]** option).

At the bottom of the screen, the **[Range]** button provides access to the settings for the current simulation range in milliamperes and the corresponding values in percentages.

Finally, the **[Out range]** setting allows you to define the current simulation limits. The available options are: 0 to 24 milliamps, 4 to 20 milliamps, 0 to 20 milliamps, 0 to 10 milliamps, and the **[USER]** option, which will set the limits based on the values of the electrical output parameters on the **[Range]** screen.

Once the **[Out range]** setting is changed, the output values will be limited to the selected values, and it will not be possible to control currents below the lower limit or above the upper limit. To simulate currents outside the selected range, you must change the **[Out range]** setting again.

Frequency Sourcing

After selecting Signal Generator mode (see the "Meter/Signal Generator Mode" section), you can configure the SLC100+ to generate frequencies by pressing the {OUT} button. The menu for selecting the type of electrical output will appear, as shown in the figure below:

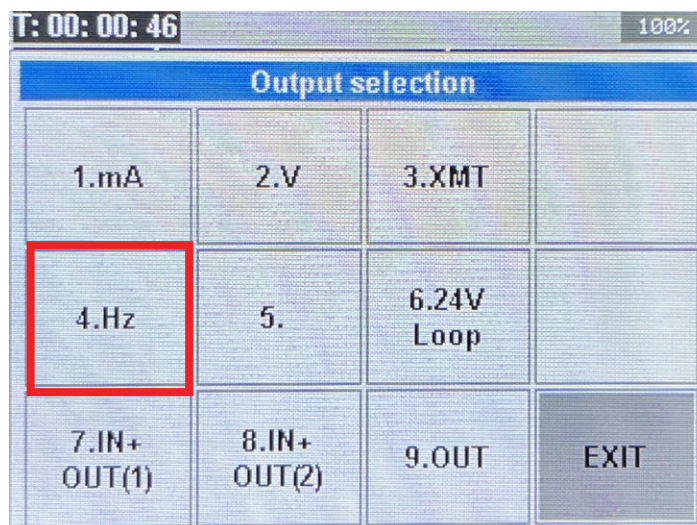


Figure 35 - Electrical output type selection menu - frequency sourcing option

The frequency generation option is represented by option 4, which can be selected by pressing the corresponding button on the SLC100+ keypad. In this case, the button for frequency generation is **{+25%}**.

After selecting the frequency generation mode, the SLC100+ will return to the measurement and signal generation screen. The current simulation mode will be indicated by the symbol **OUT: Hz** at the top of the screen. Also at the top of the screen, the frequency value in hertz or kilohertz controlled by the SLC100+ will be displayed, as shown in the figure below.

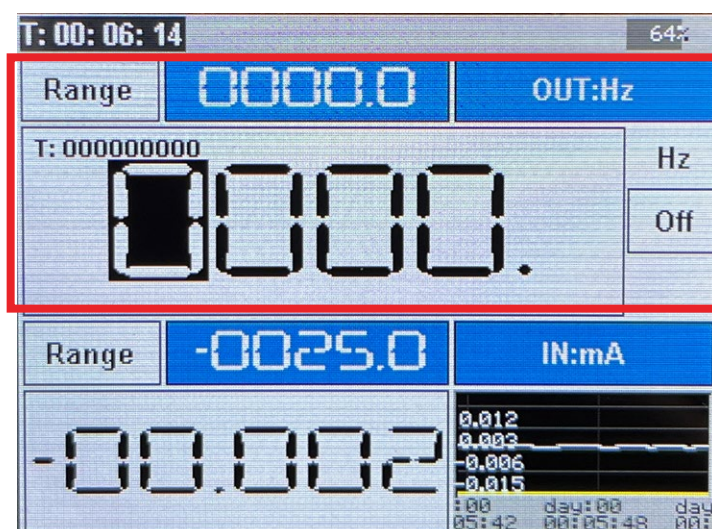


Figure 36 - Screen in frequency sourcing mode

To change the value sourced by the calibrator, we can use the buttons ◀ and ▶ to select one of the digits of the generated number, and then we can use the buttons ▲ and ▼ to change the digit's value.

In addition, we can use the **{+25%}** and **{-25%}** buttons to increase or decrease, respectively, the frequency generated by the SLC100+ by 25%.

To change the frequency generation mode settings, press and hold the **{OUT}** button for a few seconds. The output settings screen will appear as shown in the image below:

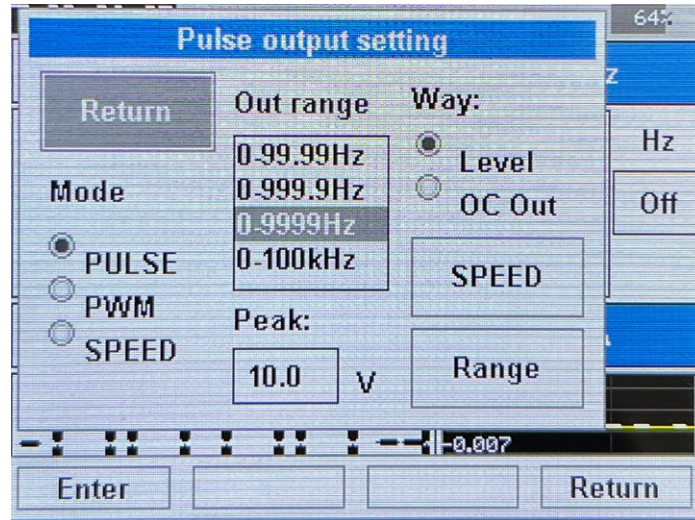


Figure 37 - Frequency sourcing configuration screen

On this screen, you'll find the **[Mode]** setting, which lets you choose the type of frequency generation. The options are:

- **[Pulse]**: Standard frequency generation using pulses. You can choose the frequency value in hertz or kilohertz to be generated.
- **[PWM]**: PWM (pulse width modulation) generation. You can choose the duty cycle and the signal frequency.
- **[Speed]**: Frequency generation in revolutions per hour (rph), revolutions per minute (rpm), or revolutions per second (rps).

The **[Out range]** setting allows you to choose the frequency generation range, from 0 to 99.999 Hz up to 0 to 100 kHz. You can also change the frequency generation range on the measurement screen by pressing the **{0%}** button.

The **[Peak]** setting lets you select the peak voltage of the generated frequency signal. By default, this setting is set to 10 volts.

The **[Way]** setting allows you to select the type of generated frequency signal. In the **[Level]** option, the generated frequency signal is active and corresponds to voltage variations.

In the **[OC out]** (Open Collector Out) option, the frequency signal is passive, and the SLC100+ must be connected to a circuit with an external power supply.

The **[SPEED]** button at the bottom of the screen allows you to select revolutions as the unit for the frequency generation mode.

Also at the bottom of the screen, the **[Range]** button provides access to the range limit settings in hertz (Hz) and the corresponding values as percentages.

To generate frequencies using the SLC100+, you must connect the SLC100+ to the circuit under test that will receive the frequency signal; this connection is controlled via the **COM** and **OUT** pins on the electrical terminal. With the **[Way]** setting in **[Level]** mode, the connection must be made as shown in the figure below:

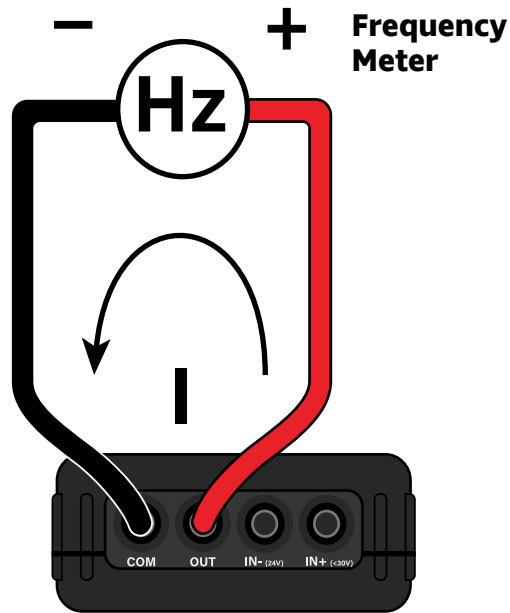


Figure 38 - SLC100+ connection for frequency sourcing (level mode)

With the **[Way]** setting in **[OC out]** mode, the connection must be made as shown in the figure below:

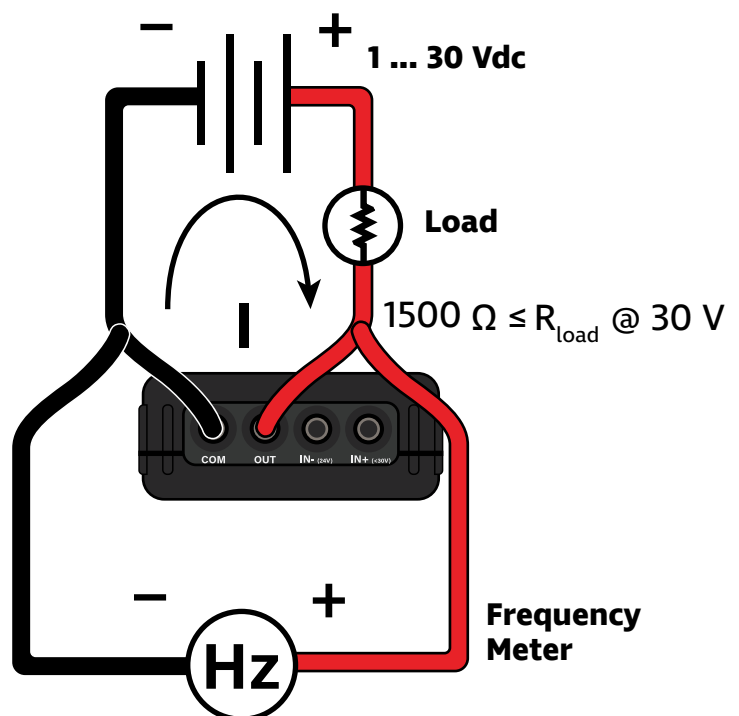


Figure 39 - SLC100+ connection diagram for frequency sourcing (OC out)

Automatic Output Mode

After selecting **Signal Generator** mode (see the “Meter/Signal Generator Mode” section) and choosing one of the output signal options, you can configure the SLC100+ to automatically generate ramp-shaped signals.

To access the automatic generation menu, simply press the **{AUTO}** button. The automatic output configuration screen will appear as shown in the figure below:

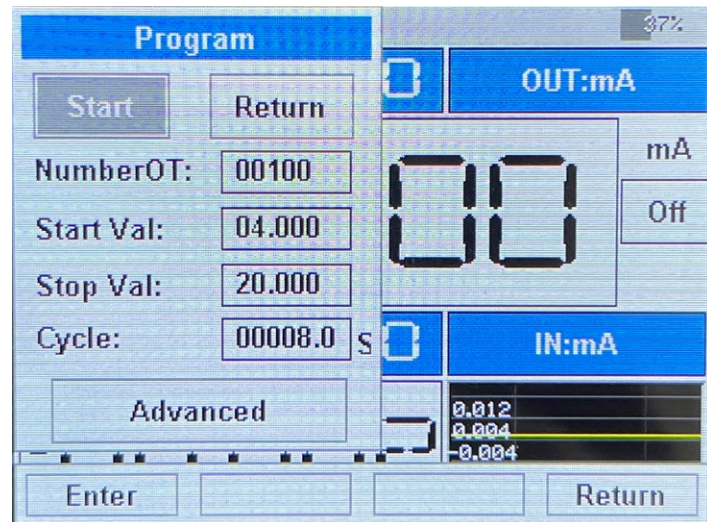


Figure 40 - Automatic output configuration screen

On this screen, you'll find the default settings for automatic generation. The default parameters are:

- **[NumberOT]**: Number of automatic generation cycles. The SLC100+ will stop automatic generation when this number of cycles is reached.
- **[Start Val]**: Initial value of the generation cycle in milliamps, volts, hertz, or kilohertz, depending on the output mode.
- **[Stop Val]**: Final value of the generation cycle in milliamperes, volts, hertz, or kilohertz, depending on the output mode.
- **[Cycle]**: Cycle time in seconds for standard generation mode. This is the time it will take for the SLC100+ to complete a generation cycle, starting from the initial value, reaching the final value, and returning to the initial value.

In standard generation mode, the SLC100+ will set the output increment value based on the **[Start Val]**, **[Stop Val]**, and **[Cycle]** parameters to ensure that the output signal completes a full rise-and-fall cycle exactly within the time defined by the **[Cycle]** parameter. In standard mode, the automatic output waveform will be triangular, and the increments and dwell times will be the same for both the rising and falling edges.

To customize the output increment values and dwell times, you can access the advanced menu using the **[Advanced]** button located at the bottom of the automatic output screen. The following screen will appear:

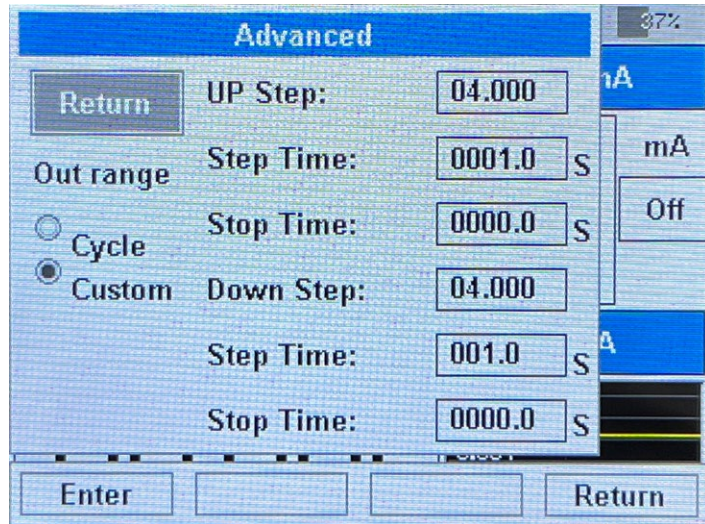


Figure 41 - Advanced automatic output configuration screen

On the advanced settings screen, you'll find parameters that allow you to customize the automatic shutdown mode.

The first setting, labeled **[Out range]**, lets you select the automatic shutdown mode. The options are as follows:

- **[Cycle]**: Default mode. In this mode, the SLC100+ will use the cycle time set on the previous screen (see Figure 40) to define the increments and dwell times.
- **[Custom]**: Custom mode. In this mode, the SLC100+ will use the parameters from the advanced settings to define the increments and dwell times.

The parameters for the custom automatic exit mode are, in order:

- **[UP step]**: Value of the generation rise increments in milliamperes, volts, hertz, or kilohertz, depending on the output mode.
- **[Step Time]**: Duration at the rise values of the cycle.
- **[Stop Time]**: Additional dwell time at the final value of the cycle.
- **[Down step]**: Value of the generation downstep increments in milliamperes, volts, hertz, or kilohertz, depending on the output mode.
- **[Step Time]**: Dwell time at the downstep values of the cycle.
- **[Stop Time]**: Additional dwell time at the initial value of the cycle.

After setting the parameters for automatic output mode, we can start the generation by selecting the **[Start]** button on the main configuration screen (shown in Figure 40). After selecting **[Start]**, the SLC100+ will return to the measurement and generation screen, but with additional information related to automatic generation mode, as shown in the figure below:

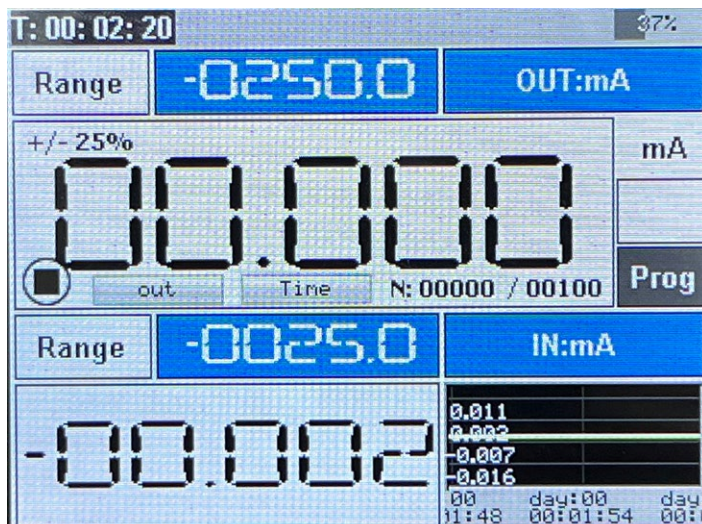


Figure 42 - Measurement and source screen with automatic generation enabled

In the upper-right corner of the screen, we can see the **[Prog]** symbol, indicating that automatic output mode is enabled. In addition, below the output value, we can see various pieces of additional information. Starting from the left, we can see a square, which indicates that automatic output mode is paused.

Next to this symbol, there are two progress bars. The first is labeled **[out]** and represents the progress of the output value during the rise and fall cycle. When the cycle reaches the final value or maximum value, this progress bar will be full, and when the cycle returns to the initial value, the bar will be empty. The second bar is labeled **[Time]** and represents the remaining time at the current automatic output value.

Finally, in the right-hand corner is the **[N:]** symbol followed by two numbers separated by a slash. The first number represents the number of automatic generation cycles that have already been completed, while the second number represents the total number of cycles configured in the automatic generation settings.

To start automatic generation, simply press the  button. As soon as the button is pressed, the symbol in the lower-left corner will change to a triangle, indicating that automatic generation is in progress, as shown in the figure below:

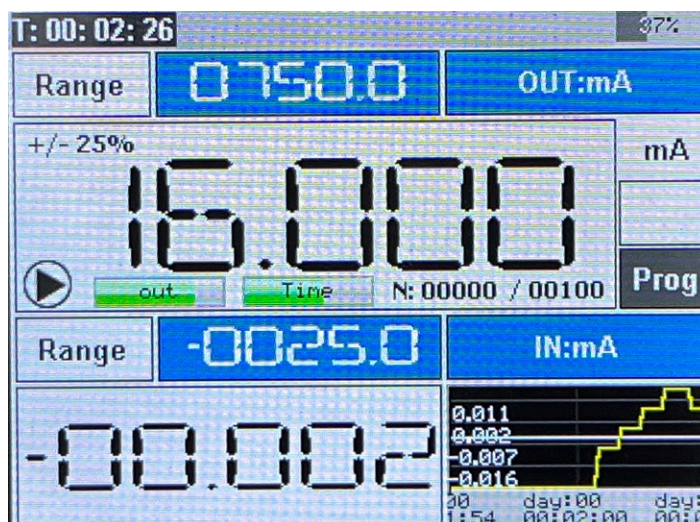


Figure 43 - Measurement and source screen with automatic output running

Automatic output will continue until the total number of configured cycles is reached. You can also pause automatic generation by clicking the button . When automatic output/generation is paused, the icon in the lower-left corner of the screen will change to two rectangles, as shown in the figure below:

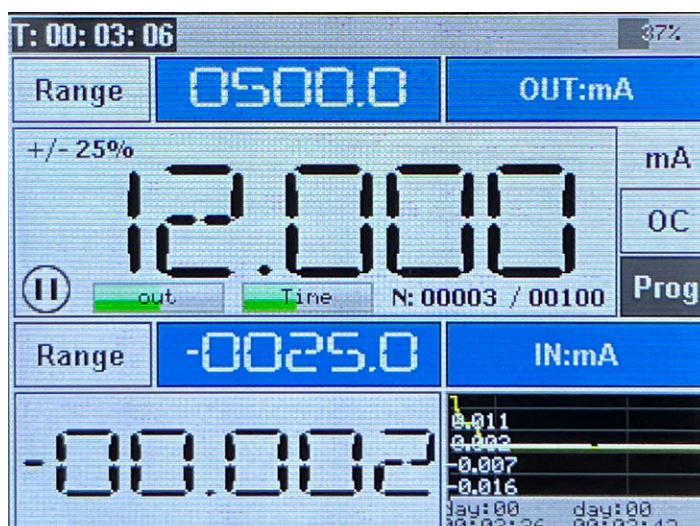


Figure 44 - Measurement and source screen with automatic output on pause

To resume automatic generation, press the button . Finally, to exit automatic generation mode, simply press the **{AUTO}** button.

Change Display Mode

After selecting **Signal Generator** mode (see the "Meter/Signal Generator Mode" section), the SLC100+ will display the measurement and generation screen as shown in the figure below:

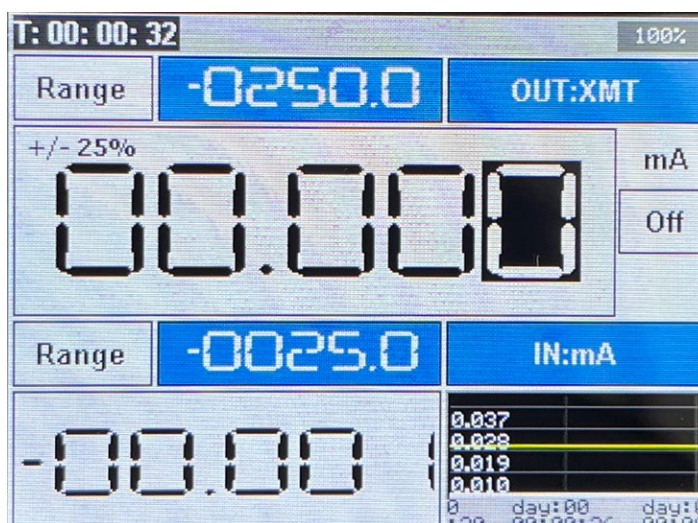


Figure 45 - Measurement and source screen with default display

By default, the information will be organized as follows:

- The top of the screen will display the signal value generated by the SLC100+.
- The bottom left of the screen will display the signal value measured by the SLC100+.
- In the lower right corner of the screen, a graph will be displayed showing the values measured and generated by the SLC100+, with the generated value in yellow and the measured value in white.

You can change the display mode for the SLC100+'s measurement and generation information. There are 5 display modes:

1. **[IN+OUT (1)] mode:** Default, as shown in figure 45.
2. **[IN+OUT (2)] mode:** The graph showing the measured and generated values is highlighted and occupies the top portion of the screen, while the measurement and generation values are displayed in the bottom portion of the screen.
3. **[OUT] mode:** Only the SLC100+ generation value is shown, making it stand out.
4. **[IN (1)] mode:** The signal value measured by the SLC100+ is highlighted at the top of the screen, while the graph appears at the bottom of the screen.
5. **[IN (2)] mode:** The graph showing measured and generated values is highlighted and appears at the top of the screen, while the value measured by the SLC100+ appears at the bottom.

You can change the SLC100+ display modes using the input and output signal selection menus. To select the **[IN+OUT (2)]** mode, press the **{OUT}** button and select option 8, which corresponds to the ▼ button.

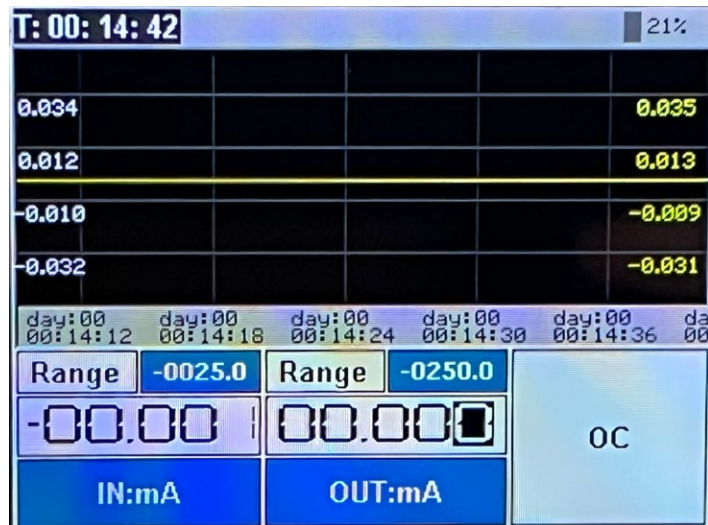


Figure 46 - Measurement and source screen in [IN+OUT (2)] display mode

To select **[OUT]** mode, press the **{OUT}** button and select option 9, which corresponds to the ► button.

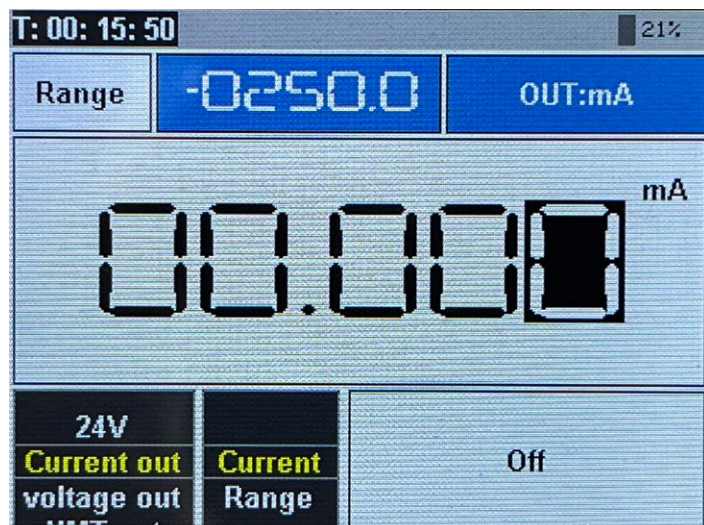


Figure 47 - Measurement and source screen in [OUT] display mode

To select **[IN (1)]** mode, press the **{IN}** button and select option 8, which corresponds to the ▼ button.

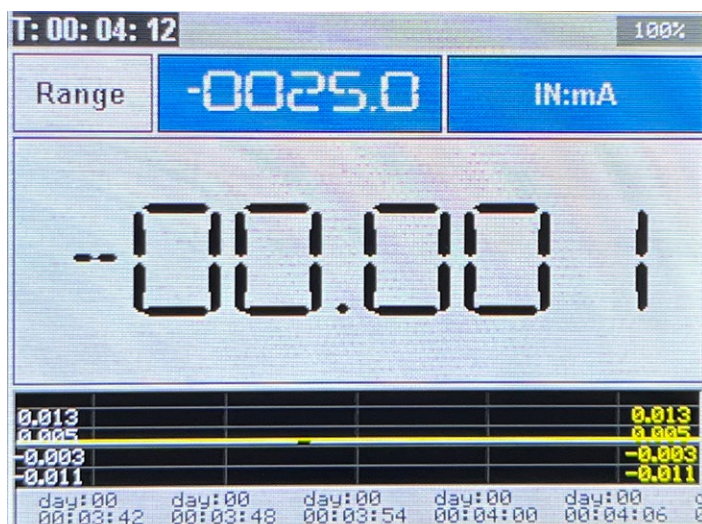


Figure 48 - Measurement and source screen in [IN (1)] display mode

To select **[IN (2)]** mode, press the **{IN}** button and select option 9, which corresponds to the  button.

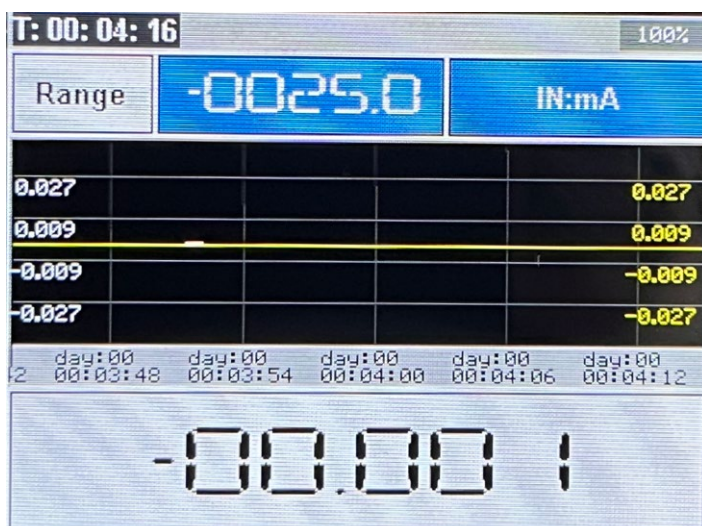


Figure 49 - Measurement and source screen in [IN (2)] display mode

Finally, to return to the default display mode (labeled **[IN+OUT (1)]**), press the **{IN}** button or the **{OUT}** button and select option 7, which corresponds to the  button.

Pneumatic Positioner Test Mode

In the function menu (see the “Initialization and Functions Menu” section), selecting the “**Pneumatic Valve**” option activates the test mode for pneumatic positioners.

In this mode, the SLC100+ can be connected to a pneumatic positioner to control its position via a 4 ... 20 mA signal, while simultaneously reading a 4 ... 20 mA signal relayed by the positioner.

When the pneumatic positioner test mode is activated, the screen below is displayed:

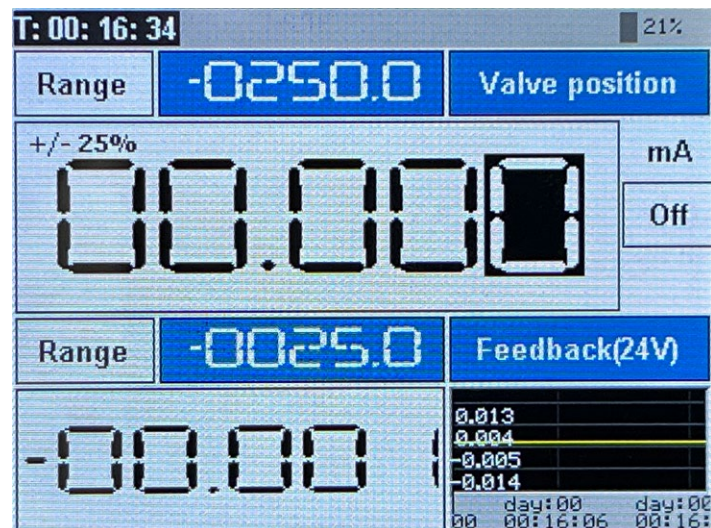


Figure 50 - Screen in the test mode for pneumatic positioners

At the top of the screen, indicated by the label **[Valve position]**, the SLC100+ will display the current value in milliamperes. This value will be used to control the positioner's position.

At the bottom of the screen, indicated by the label **[Feedback (24V)]**, the SLC100+ will display the measured current value in milliamps. This current value corresponds to the position feedback provided by the positioner. It is important to note that in the pneumatic positioner test mode, this current input already includes a 24 Vdc power supply, so no external power supply is required.

To change the current value generated by the calibrator, we can use the buttons ◀ and ▶ to select one of the digits of the generated number, and then we can use the buttons ▲ and ▼ to change the digit's value.

In addition, we can use the **{+25%}** and **{-25%}** buttons to increase or decrease, respectively, the current value simulated by the SLC100+ by 4 mA. Finally, the **{100%}** button will set the generated value to 20 mA, while the **{0%}** button will set the output to 4 mA.

To perform the pneumatic positioner test using the SLC100+, you must connect the calibrator to the positioner via the **COM**, **OUT**, **IN-**, and **IN+** pins on the electrical terminal, as shown in the figure below:

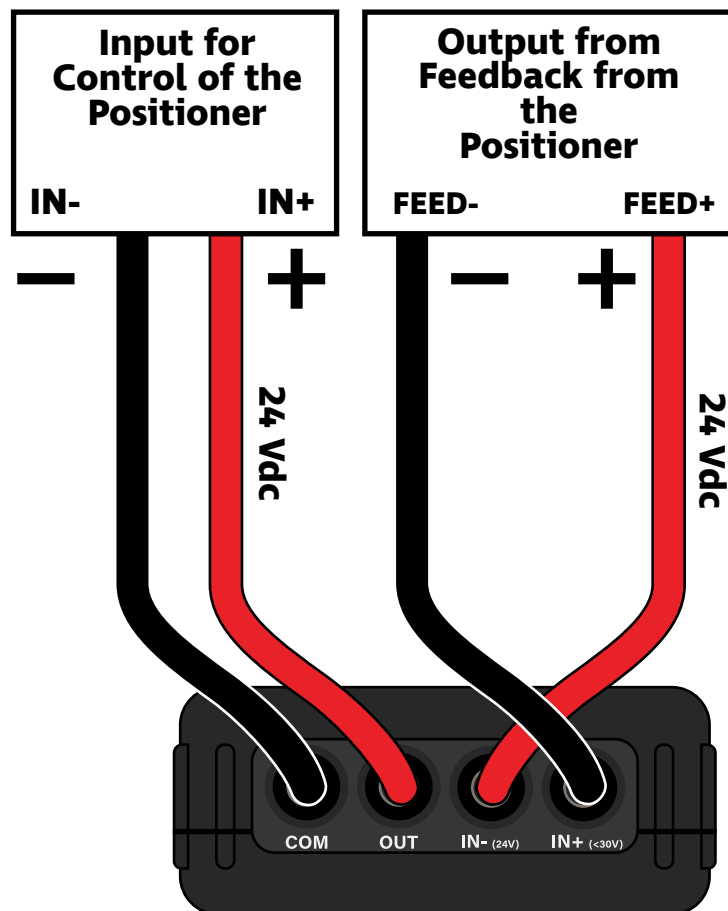


Figure 51 - Wiring diagram for testing pneumatic positioners

As shown in the figure above, we must connect the **COM** terminal to the negative control input of the positioner, and the **OUT** terminal to the positive control input of the positioner. In addition, we can connect the **IN-** terminal to the positive feedback output of the positioner, and the **IN+** terminal to the negative feedback output if we want to measure the positioner's feedback current.

Furthermore, it is important to note that in both the control input circuit and the feedback output circuit, the SLC100+ will supply 24 Vdc power, so an external power supply is not required.

Electric Positioner Test Mode

In the function menu (see the "Initialization and Functions Menu" section), selecting the "**Electric Valve**" option will activate the test mode for electric positioners.

In this mode, the SLC100+ can be connected to a pneumatic positioner to control its position via a 4 ... 20 mA signal, while simultaneously reading a 4 ... 20 mA signal that is relayed by the positioner.

When the electric positioner test mode is activated, the screen below is displayed:

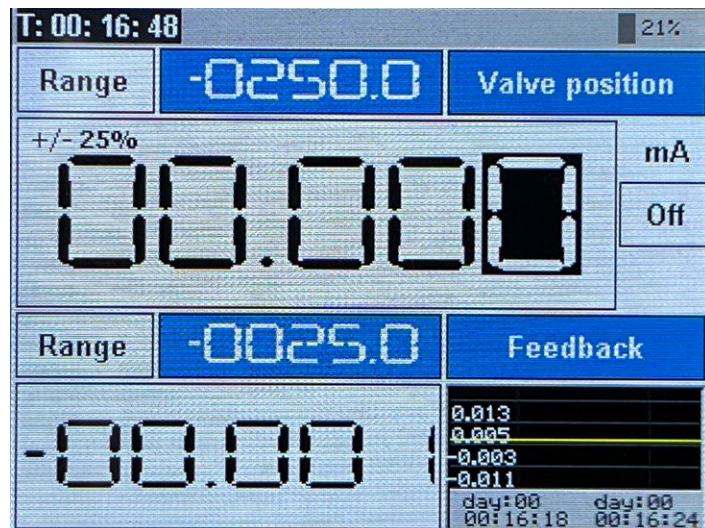


Figure 52 - Screen in the test mode for pneumatic positioners

At the top of the screen, under the heading **[Valve position]**, the SLC100+ will display the sourced current value in milliamperes. This value will be used to control the position of the positioner.

At the bottom of the screen, under the heading **[Feedback]**, the SLC100+ will display the measured current value in milliamperes. This current value corresponds to the position feedback provided by the positioner. It is important to note that in the electric positioner test mode, this current input does not include the 24 Vdc power supply, which must be provided by an external source or by the positioner itself.

To change the current value sourced by the calibrator, we can use the buttons ◀ and ▶ to select one of the digits of the sourced value, and then we can use the buttons ▲ and ▼ to change the digit's value.

In addition, we can use the **{+25%}** and **{-25%}** buttons to increase or decrease, respectively, the current value simulated by the SLC100+ by 4 mA. Finally, the **{100%}** button will set the sourced value to 20 mA, while the **{0%}** button will set the output to 4 mA.

To test electric positioners using the SLC100+, you must connect the calibrator to the positioner via the **COM**, **OUT**, **IN-**, and **IN+** pins on the electrical terminal, as shown in the figure below:

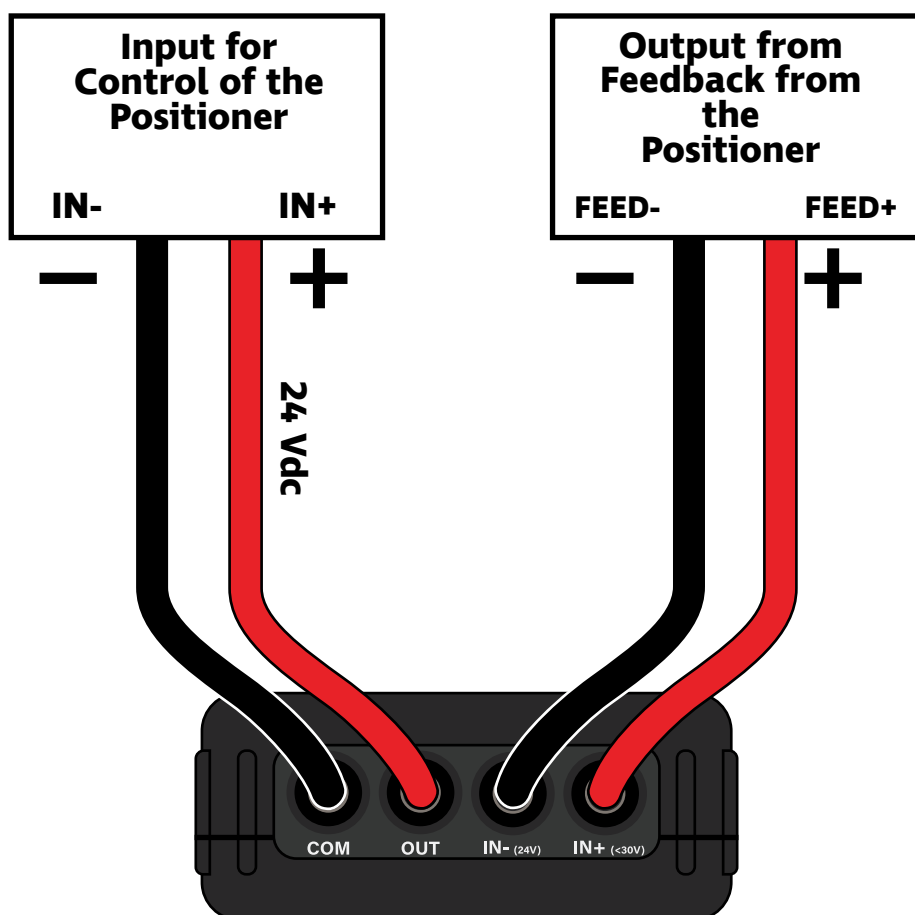


Figure 53 - Wiring diagram for testing electric positioners

As shown in the figure above, connect the **COM** terminal to the negative control input of the positioner, and the **OUT** terminal to the positive control input of the positioner. Additionally, if you wish to measure the positioner's feedback current, connect the **IN-** terminal to the negative feedback output of the positioner, and the **IN+** terminal to the positive feedback output.

It is also important to note that in the control input circuit, the SLC100+ will provide a 24 Vdc power supply, so no external power supply is required. However, in the positioner's feedback output circuit, the SLC100+ will read the current without a 24 Vdc power supply; therefore, an external power source is required, or the positioner must already provide the 4 ... 20 mA output with power.

Transmitter Test Mode

In the function menu (see the “Initialization and Function Menu” section), selecting the **2W Transmitter** option activates the test mode for transmitters with a 4 ... 20 mA output.

In this mode, the SLC100+ can be connected to a transmitter to measure a 4 ... 20 mA signal while simultaneously powering the transmitter.

When transmitter test mode is enabled, the screen below is displayed:

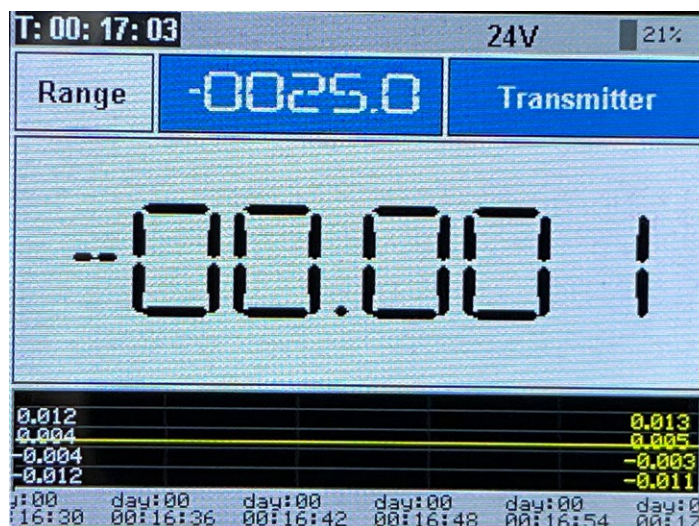


Figure 54 - Screen in transmitter test mode

At the top of the screen, under the **[Transmitter]** heading, the SLC100+ will display the current value in milliamperes at the transmitter output. It is important to note that in transmitter test mode, the SLC100+ already supplies 24 Vdc power to the transmitter, so an external power source is not required.

At the bottom of the screen, the SLC100+ will display a graph showing the history of the current values measured by the SLC100+, indicated by the white curve. You can focus on the measurement graph by pressing the **{IN}** button, which will move the graph to the top of the screen, while the measured current value will move to the bottom of the screen. When you press the **{IN}** button again, the SLC100+ will return to the default display mode, as shown in the figure above.

To test 4–20 mA transmitters using the SLC100+, you must connect the calibrator to the transmitter via the **IN–** and **IN+** pins on the electrical terminal, as shown in the figure below:

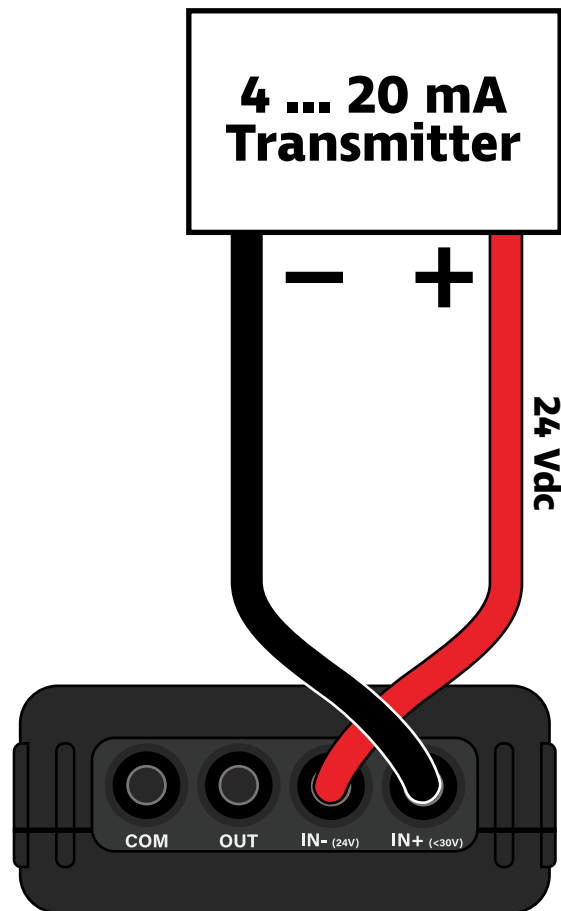


Figure 55 - Wiring diagram for testing 4 ... 20 mA transmitters

Settings Menu

In the function menu (see the “Startup and Function Menu” section), you can access the SLC100+’s general settings by selecting the System option. If the function menu is not open, press **{MENU}** from the measurement and source screen to access it.

When you select the **System** option, a new screen will open, as shown in the figure below:

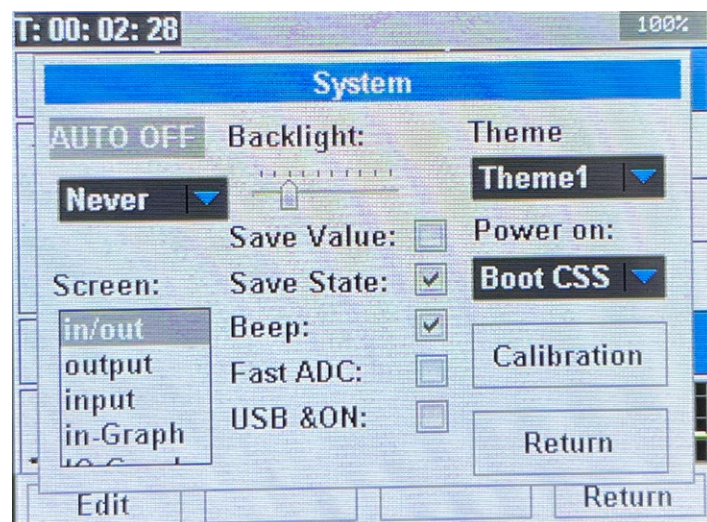


Figure 56 - SLC100+ general settings screen

On this screen, some of the available settings are:

- **[AUTOOFF]:** Allows you to set the device's auto-off time. The available options are: never (**[NEVER]**), 30 minutes, 60 minutes, 90 minutes, and 120 minutes.
- **[SCREEN]:** Allows you to change the display mode for the SLC100+ measurement and generation screen (see the "Change Display Mode" section).
- **[Backlight]:** Allows you to adjust the brightness of the SLC100+ LCD screen.
- **[Beep]:** Enables or disables the SLC100+ beep.
- **[Calibration]:** Provides access to the SLC100+ calibration/adjustment menu.

Specifications

General Specifications

Operação	
Display	
Characteristics	- Color LCD IPS - Backlight with adjustable brightness
Measurement units	mA, V, Hz, kHz, %
Power supply	
Battery	3,7 V / 2500 mAh rechargeable lithium battery.
Battery charge input	5 Vdc / 1 A

Physical Specifications	
Operating conditions	
Operation temperature	-10 ... 70 °C (14 ... 158 °F)
Storage temperature	-20 ... 85 °C (-4 ... 185 °F)
Relative Humidity (RH %)	0 ... 95 % without condensation
Weight	≈ 0,175 kg
Material	ABS

Performance

Inputs

Function	Range	Accuracy ¹	Resolution	Observations
Voltage (V)	0 ... 30 V	± 0,05 % FS	0,001 V	$R_{input} \geq 2 \text{ M}\Omega$
Passive current measurement	0 ... 20 mA	± 0,05 % FS	0,001 mA	$R_{input} \leq 100 \Omega$ $V_{input} \leq 30 \text{ V}$
Active current measurement (24 V)	0 ... 20 mA	± 0,05 % FS	0,001 mA	$R_{input} \leq 100 \Omega$ $23 \text{ V} \leq V_{output} \leq 26 \text{ V}$
Frequency Measurement	0 ... 50 kHz	± 0,1 % FS	Auto-range	$R_{input} \geq 100 \text{ k}\Omega$

Outputs

Function	Range	Accuracy ¹	Resolution	Observations
Voltage source (V)	0 ... 20 V	$\pm 0,05 \% \text{ FS}$	0,001 V	$R_{\text{output}} \leq 0,5 \Omega$
Current simulation / XMT	0 ... 20 mA	$\pm 0,05 \% \text{ FS}$	0,001 mA	$10 \text{ V} \leq V_{\text{external}} \leq 30 \text{ V}$
Current source (24 V)	0 ... 20 mA	$\pm 0,05 \% \text{ FS}$	0,001 mA	$R_{\text{loop}} \leq 1 \text{ k}\Omega$ @ 20 mA
Frequency source	0 ... 99,999 Hz	$\pm 0,5 \% \text{ FS}$	0,001 Hz	-
	0 ... 999,99 Hz		0,01 Hz	
	0 ... 9999 Hz		1 Hz	
	0 ... 100 kHz		100 Hz	

¹For operation between 17 °C and 25 °C for one year after calibration.

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Sensycal Instrumentos e Sistemas

was founded with the mission of driving the improvement of industrial processes through cutting-edge solutions in instrumentation, metrology, and automation that ensure safety, reliability, and productivity.

We value our customers' opinions, and we always strive to understand their needs and develop high-quality products that meet their expectations and promote the improvement of their processes.

We offer solutions in metrology—calibration services, pressure gauges, pneumatic and hydraulic pumps, calibrators, multi-calibrators, and pressure controllers—instrumentation—pressure, level, and temperature transmitters, seal manufacturing and maintenance, HART configurators, PROFIBUS PA and FOUNDATION Fieldbus—and automation—valve monitors, positioners, and other industrial control solutions.

We have a laboratory accredited under the ISO/IEC 17025:2017 standard by Inmetro's General Coordination for Accreditation to perform pressure calibrations with extremely low uncertainties, in accordance with international standards.

We are also certified to the ISO/IEC 9001:2015 standard, attesting to our commitment to continuous improvement and the creation of high-quality solutions.



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All specifications are subject to change without notice for the purpose of product improvement.