



Reference Manual
Compact Signal Calibrator
AMETEK JOFRA CSC100

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temperature
pressure
signal
software



1. Introduction

The Ametek Jofra CSC100 is designed to calibrate and verify 4 to 20mA process loops and precision voltage signal conditioning equipment. The CSC100 can both source and measure current over a 0 to 24mA range and voltage from millivolt levels to 20VDC. A unique digital "knob" along with selectable decade control allows quick and easy adjustment of the desired output. All input and output jacks are protected through internal self resetting fuses providing protection to 240VAC.

1.1 Contacting Ametek

US, Canada, Latin America
Europe, Africa, Middle East
Asia

AMETEK TCI at **1-800-527-9999**
AMETEK Denmark A/S at + 45 4816 8000
AMETEK Singapore Pte. Ltd. at
+ 65 (64) 842 388

1.2 Standard Equipment

Inspect the unit carefully upon receipt. Save packing carton in case re-shipment is necessary. If there appears to be any damage, equipment missing or if there are any questions about the unit, contact AMETEK.

Check to see if your calibrator is complete. It should include:

- CSC100 Calibrator
- Instruction Manual
- Test Leads
- Carrying Case

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

 This calibrator must be recycled or disposed of properly (2002/95/EC).

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. Check test leads continuity. Replace damaged test leads before you use the calibrator.
- When using the probes, keep your fingers away from the probe contacts. Keep your fingers behind the finger guards on the probes.
- 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.
- To avoid false readings, which could lead to possible electric shock or personal injury, replace the battery as soon as the battery indicator appears.
- To avoid personal injury or damage to the calibrator, use only the specified replacement parts and do not allow water into the case.



Caution

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

- Disconnect the power and discharge all high-voltage capacitors before testing resistance or continuity.
- Use the proper jacks, function, and range for your measurement or sourcing application.
- To avoid damaging the plastic lens and case, do not use solvents or abrasive cleansers.

Clean the calibrator with a soft cloth dampened with water or water and mild soap.

2. Calibrator Interface

2.1 Display and Inputs

The Calibrator has two numeric displays. The top or main display area displays the signal which is being sourced or measured. The lower or small numeric display area is used in the mA modes to display the percent of range (4mA - 20mA). Values in the 4mA to 20mA range correspond to a percentage from 0% to 100%.

The CSC100 has two sets of input terminals located on the top of the unit. Two terminals are provided for all milliamp functions and two additional terminals are provided for all voltage functions. Both sets of terminals will accommodate standard banana plugs.

2.2 Key Functions

Figure 1 shows the layout of the calibrator keypad while Table 1 lists the calibrator keys and their functions.

Table 1: Key Functions

Key	Function
1	Turns the unit on and off.
2	V/mA selects between voltage and mA functions.
3	Loop Power key turns on loop power (24V) when CSC100 is operated in mA measure mode.
4	Mode key selects input/output mode.
5	Steps the output in the mA source or simulate mode in 25% increments (4mA).
6	Enables automatic step functions.
7	Left/Right arrow keys move the decade adjust cursor to the desired decade.
8	Digital adjustment of output

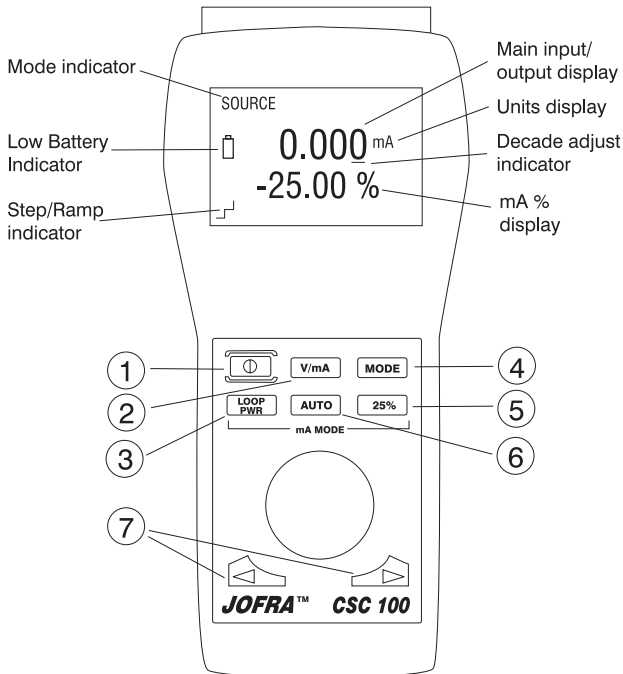


Figure 1

2.3 Power Saver

The calibrator has an adjustable power saver option that allows it to shut down after being dormant for a period of 1 to 30 minutes. To set the shutoff time, perform the following:

1. With the CSC100 turned off, hold down the left arrow key and turn on the power. Continue to hold down the left arrow key until the power-up sequence is complete (about 5 seconds) then release.
2. Using the knob, adjust the time from 1 to 30 minutes or disable completely.
3. Press the left arrow again to return to normal operation. The new auto-shutoff setting will be saved in non-volatile memory.

3. Operation in the Current Mode (4mA to 20mA)

The CSC100 offers four (4) different operational functions when operated in the current or milliamp mode. These functions are:

1. Sourcing Current - Current can be sourced from the CSC100 over a 0 to 24mA range into loads of up to 1000 ohms.
2. Simulating Current - Also known as a 2-wire function, the CSC100 can act like a 2-wire transmitter by controlling the loop current when power comes from an external power supply.
3. Measuring Current - The CSC100 displays input current over a range of 0 to 24mA.
4. Measuring Current with Loop Power - Current is measured while simultaneously supplying 24 volts to the loop.

3.1 Sourcing Current

Figure 2 shows how to connect the CSC100 to source current.

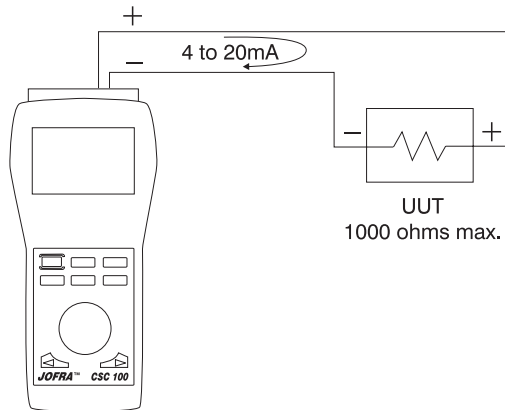


Figure 2

3.2 Simulating Current

Figure 3 shows how to connect the CSC100 to simulate current (2-wire mode) using an external power supply.

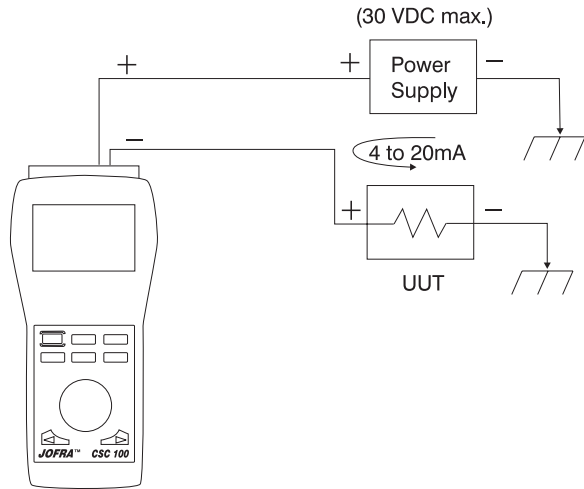


Figure 3

3.3 Measuring Current

Figure 4 shows how to connect the CSC100 to measure 4 to 20mA.

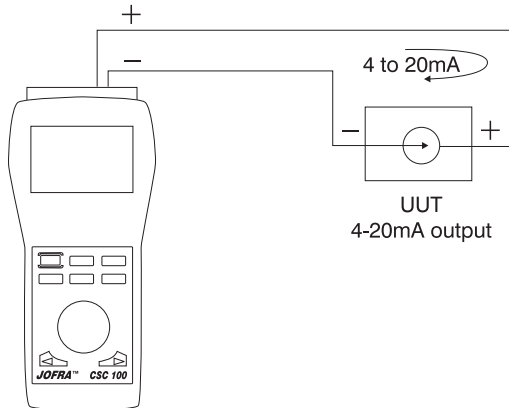


Figure 4

3.4 Measuring Current with Loop Power

Figure 5 shows the CSC100 connected to a 2-wire transmitter where the CSC100 is providing 24 volt loop power while reading the resultant current.

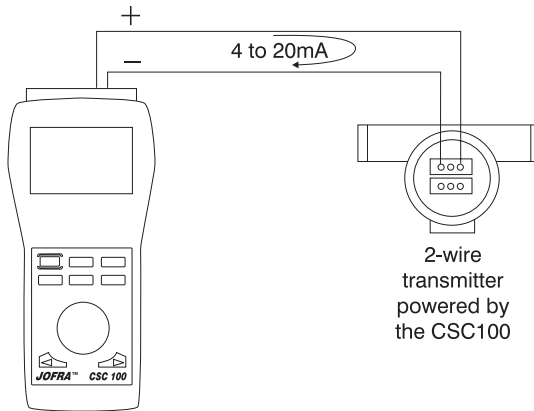


Figure 5

3.5 HART™ Resistor Selection

The CSC100 incorporates an internal 250 resistor to facilitate calibration of HART™ devices. The internal resistor takes the place of the 250 ohm series resistor that must be installed into a process loop to use a HART compatible communicator. To enable the internal HART resistor complete the following steps.

1. Remove the battery cover.
2. Remove the six (6) screws that secure the two halves of the case together.
3. Remove the top half of the case and locate the HART jumper, (see figure 6).
4. Select the desired position:
 - A. Jumper on left pin and center pin - HART resistor is enabled.
 - B. Jumper on right and center pin - HART resistor is disabled.
5. Close the case and replace the six (6) screws.

Note: When the HART resistor is enabled, the maximum load driving capability is reduced from 1000 ohms to 750 ohms.

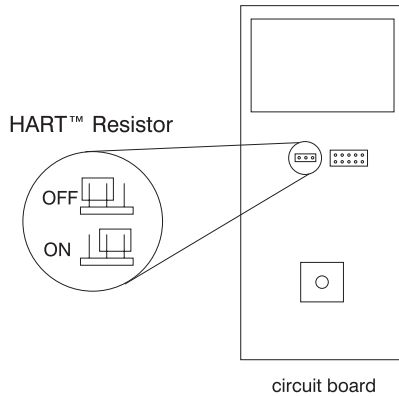


Figure 6

4. Setpoint and Ramp Operation

The CSC100 has several unique features that are helpful aids when doing milliamp calibrations. The "25%" key sets the output in 25% steps from 4 to 20 mA (e.g. 4, 8, 12, 16, 20mA). The "Auto"key has modes and allows hands free operation by automatically stepping or ramping the milliamp output.

4.1 Manual Stepping

1. Set the CSC100 to source or simulate current. See figures 2 & 3.
2. Press the "25%" key to step the output in 4mA (25%) increments from 4mA to 20mA and 20mA to 4mA.

4.2 Automatic Stepping & Ramping

1. Set the CSC100 to source or simulate current. See figures 2 & 3.
2. Press the "Auto" key once to activate auto step. The CSC100 will step the output in 4mA (25%) steps approximately every 5 seconds.
3. Press the "Auto" key again to activate the ramping (fast or slow) as indicated on the lower left corner of the LCD.

5. Operation in the Voltage Mode

The CSC100 offers several common ranges when operated in the voltage mode. These ranges are:

1. Millivolt - The CSC100 can source or measure very low level signals in the range of 0 to 200.00 mV.
2. Voltage - The CSC100 can source voltages up to 20 VDC and measure voltage up to 30 VDC.

5.1 Sourcing Millivolts or Volts

Figure 7 shows how to connect the CSC100 to source millivolts or volts.

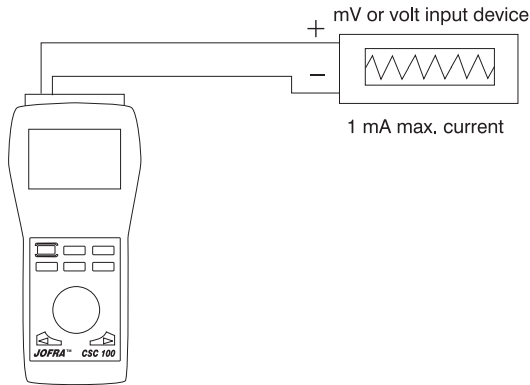


Figure 7

5.2 Measuring Millivolts or Volts (30VDC max)

Figure 8 shows how to connect the CSC100 to measure millivolts or volts.

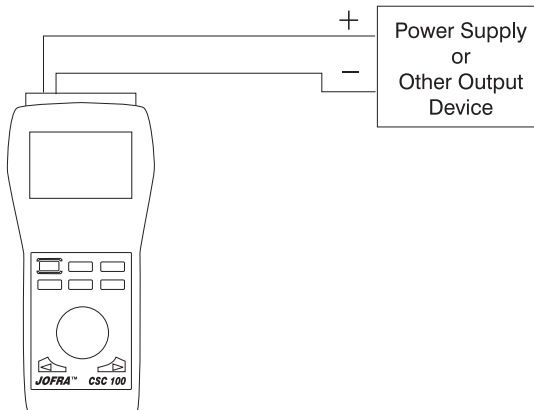


Figure 8

6. Specifications

Ranges:	
mA (Input/Output)	0 to 24.000mA -25.00% to 125.00%
mV (Input/Output)	0 to 200.00mV
Volts (output)	0 to 20.000V
Volts (Input)	0 to 28.000V
Accuracy: (23°C±5°C)	
mA	±0.015% of reading ±2μA
Volts	±0.015% of reading ±2mV
mV	±0.02% of reading ±20μV
Operating Temperature Range	-10°C to 50°C (14°F to 122°F)
Storage Temperature Range	-20°C to 60°C (-4°F to 140°F)
Stability	±0.005% F.S./°C outside 18 to 28°C ±0.003% F.S./°F outside 64 to 82°F
Display Update Rate	Approximately 4 times per second
Battery Requirement	1 x 9V Alkaline
Low Battery Indicator	7V (approximate)
Size	188mm x 84mm x 52mm / 7.37in x 3.31 in x 2.05in
Weight	400g / 14.1oz

7. Maintenance

7.1 Replacing Batteries

Replace batteries as soon as the battery indicator turns on to avoid false measurements.

Note: Use only 9 Volt alkaline battery.

7.2 Cleaning the Unit

Warning

To avoid personal injury or damage to the calibrator, use only the specified replacement parts and do not allow water into the case.

Caution

To avoid damaging the plastic lens and case, do not use solvents or abrasive cleansers.

Clean the calibrator with a soft cloth dampened with water or water and mild soap.

7.3 Service Center Calibration or Repair

Only qualified service personnel should perform calibration, repairs, or servicing not covered in this manual. If the calibrator fails, check the batteries first, and replace them if needed.

Verify that the calibrator is being operated as explained in this manual. If the calibrator is faulty, send a description of the failure with the calibrator. Be sure to pack the calibrator securely, using the original shipping container if it is available.

7.4 Replacement Parts & Accessories

<u>Order Number</u>	<u>Description</u>
SPK-CSC-001	Operating Manual
SPK-HHC-002	Soft carrying case
104203	Test Lead Set



*..because calibration is
a matter of confidence*

AMETEK

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