

4-20 mA (milli-Amp)

Current Simulator

2-Wire Loop-Powered Current Simulator

Contegra's mACS (pronounced "Max") is a loop powered two wire current simulator. (Batteries are not required.)

The mACS provides a convenient means to simulate a 4-20 mADC transmitter. The mACS connects to the process loop in the same manner as a pressure or flow transducer. (The mACS' input is polarity insensitive, it does not matter which input terminal is positive or negative.)

Pressing either the Increase or Decrease pushbuttons causes the mACS' output to step from end-to-end (i.e. 4-20mA) in 0.25 mADC¹ increments. Pressing and holding a pushbutton causes the mACS to step quickly up/down through the full process output.

The mACS output may be monitored by connecting a DMM (digital multimeter²) to the two test points. The test points are polarity sensitive. Insert the DMM's positive lead to the + (positive) test point and negative lead to the—(negative) test point.

Specifications:

Dimensions: 2"W X 4"H X 1.25"D

Voltage at the Input Terminals:

Minimum 12 VDC

Maximum 28 VDC

Current Draw:

Min / Max: 4 / 20 mADC

Steps: 64 over 4-20 mADC span

Internal Calibration: Potentiometers (Qty 2)

Weight:

Standard: 3 oz (nominal)

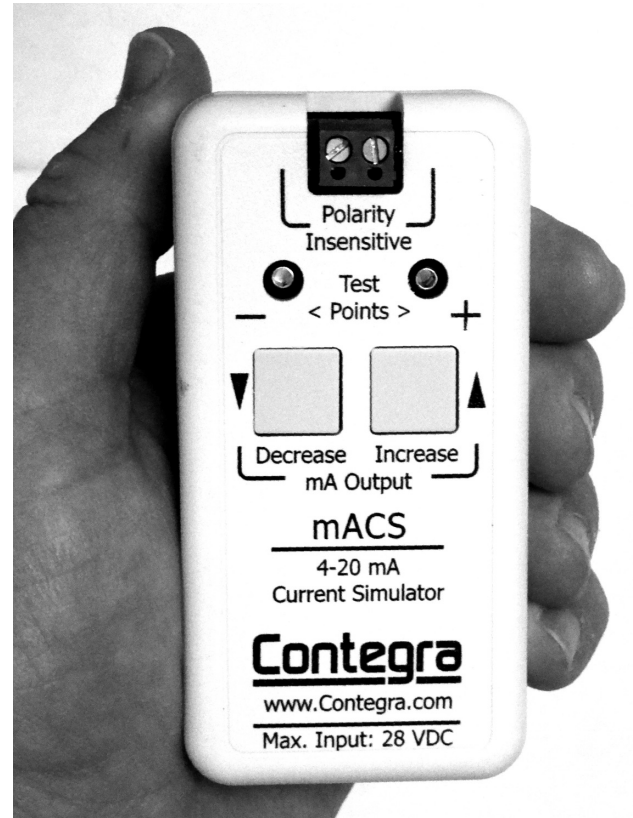
Magnetic: 4 oz (nominal)

Wakeup: Previous Output

Ordering Information:

mACS-P (w/o magnetic backing)

mACS-M (w/magnetic 'attachment'³)



mACS

**milli-Amp
Current Simulator**

Features:

- 2-Wire Loop Powered Current Simulator (i.e. no batteries required)
- 64 steps over 4-20 mADC
- Magnetic 'attachment' (optional³) secures the simulator to a ferrous object (e.g. enclosure or inner panel).
- Ideal for checking calibration and as a current source for setting up engineering units on a process indicator or controller

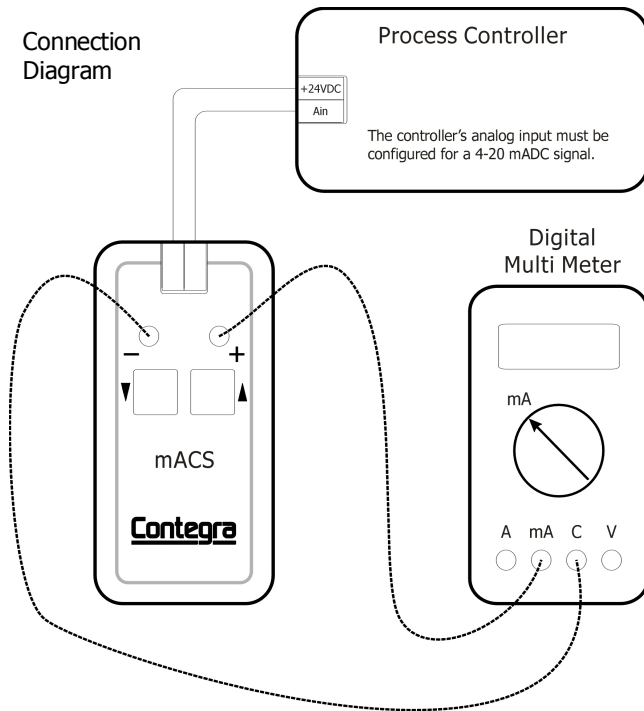
¹ Nominal step value

² The mACS does not require the use of a DMM/DVM (i.e. Digital Volt-Meter/Digital Multi-Meter). Monitoring the mACS' output requires a customer supplied meter. For proper operation the meter's burden voltage must be less than 0.25 VDC.

³ An optional magnetic, internal to the mACS, allows the user to magnetically 'attach' the mACS to a ferrous material such as an enclosure or inner panel.

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Using the mACS:



Input Voltage and Line Loss

The mACS requires a minimum of 12VDC (the lift-off voltage) and accepts a maximum of 28 VDC.

The power supply must be sized to accommodate the sum of the loop resistance and the in-circuit resistance of all connected controllers.

- The Min voltage (VDC) = 12 VDC + (resistance X 0.02)
- The Max voltage (VDC) = 28 VDC + (resistance X 0.02)
- The Max load (ohms) = (supply voltage - 12) X 50

The maximum load includes loop resistance (i.e. resistance of connected wire) and the resistance of all connected equipment.

Typical resistance for 1000 feet of wire:

AWG	Resistance/1,000 feet
16	3.25 ohms
18	6.51 ohms <- Recommended
20	10.4 ohms <- Recommended
22	16.5 ohms
24	26.2 ohms
26	41.6 ohms
28	66.2 ohms

Typically, smaller wires (i.e. a larger AWG number) are easier to pull through conduit. However, they may be stretched or broken if pulled with excessive force.

Initial Calibration:

The mACS is **factory calibrated** for a 4-20 mADC output. In the unlikely event that the mACS' output varies substantially from the 4-20 mA endpoints, the following steps lead the user through the process of "initial calibration".

- 1) Tools required:
 - a. Power supply (24 VDC recommended)
 - b. Small Phillips blade screwdriver (cover removal)
 - c. Small straight blade screwdriver (potentiometer adjustment)
 - e. Digital MultiMeter (DMM) capable of reading the current over a 4-20 mADC range
 - f. Interconnecting wire
- 2) Test Setup:
 - a. Select a clean surface.
 - b. Remove the mACS rear cover.
 - c. The mACS contains two potentiometers. The left-hand potentiometer is labeled "4mA Adj". The right-hand potentiometer is labeled "20mA Adj".
 - d. Connect 24 VDC to the mACS input terminals. (The mACS input terminals are polarity insensitive.)
- 3) DMM Setup
 - a. Configure the DMM for a mA (milliamp) measurement.
 - b. Insert the DMM's red (positive) lead into the mACS " + " testpoint
 - c. Insert the DMM's black (negative) lead into the mACS " - " testpoint
 - d. If the DMM does not operate correctly (i.e. does not indicate that the mACS has a current output in the 4-20 mADC range) check the DMM's fuse.

Caution: When testing for milliamps, DO NOT touch the DMM's leads to the power supply terminals or to the mACS input terminals. Doing so causes the DMM's fuse to open. Thereafter, measurement is not possible until the fuse is replaced.

- 4) Setting the 4mA output:
 - a. Press the "Decrease" pushbutton and observe the DMM's reading. The mACS output should rapidly decrease and stop at 4 mADC.
 - b. Turn the potentiometer labeled "4mA Adj" clockwise/ counterclockwise to increase/decrease the mACS output until the DMM reads 4mA.
- 5) Setting the 20mA output:
 - a. Press the "Increase" pushbutton and observe the DMM's reading. The mACS output should rapidly increase and stop at 20 mADC.
 - b. Turn the potentiometer labeled "20mA Adj" clockwise/ counterclockwise to increase/decrease the mACS output until the DMM reads 20 mA.
- 6) Following the calibration procedure:
 - a. Turn off the power supply
 - b. Disconnect the DMM's leads
 - c. Disconnect the mACS from the power supply
 - d. Reassemble the mACS

Warning: Magnetic Field

The mACS may contain an optional magnet. Magnets can interfere with the operation of an implanted heart pacemaker or cardiovascular defibrillator. Pacemaker and defibrillator users must maintain at least an **18 inch separation** between the mACS and the implanted device.