

Accutech™

Smart Process Instrumentation

MODEL
SC-1000

Two-Wire “Programmable” Signal Conditioner

For Industrial Measurements



Performance Highlights

- Fast, simple setup
- Microprocessor performance
- Accuracy to 0.05%
- Automatic self-calibration
- Isolation to 850 volts
- Milliamp, volt, millivolt, potentiometer, or resistance input
- Versatile outputs with full-scale adjustment
- Normal or reverse acting
- No minimum span
- Negligible ambient temperature effect
- Automatic self-diagnostics
- Hardened to EMI/RFI interference
- Rugged, sealed, industrial construction

Description

The Model SC-1000 brings microprocessor capabilities to the world of industrial signal conditioners. It is simple to use. Yet it has capabilities that are not available even in the finest analog-based signal conditioners. Just one model is needed. It will accommodate DC milliamp, volt, millivolt, potentiometer, or resistance inputs. With the SC-1000, accuracy, stability, versatility, and isolation are unmatched in comparably priced products. The SC-1000 can be used nearly anywhere that signal conditioning is called for.

Installation and operation are simple. Calibrate with conventional tools, or choose the optional display and program the transmitter just like setting the time on a digital watch. The zero and full-scale values are independent of one another and have no interaction. They can be set anywhere within the range for normal or reverse acting without regard to a minimum span limitation.

The microprocessor-based SC-1000 achieves a level of stability and reliability not possible in any analog transmitter. Continuous self-diagnostics, self-calibration, and internal temperature compensation virtually eliminate drift and periodic maintenance.

The SC-1000 is designed for the harsh industrial environment. It is completely sealed in a nickel-plated, corrosion-resistant housing. There are no dip switches, no jumpers, or potentiometers which can corrode or vibrate out of calibration. Extreme care has been taken to shield the transmitter from the effects of RFI, EMI, power surges, electrical spikes, moisture condensation, shock, and vibration. For hazardous or outdoor environments, the SC-1000 will fit within an available explosion-proof housing which is rated for Division 1 and 2, Class I, Groups B, C, D, and Class II, Groups E, F, and G; NEMA 4x and NEMA 7; with CSA certification and FM approval.



Applications

The SC-1000 is the ideal replacement for a conventional 4-20 mA signal conditioner in field or panel-mount installations. It is designed for use in the industrial environment and will convert a voltage, millivolt, current, potentiometer, or resistance input to a 4-20 mA output signal. (For thermocouple or RTD input, use the Accutech AI-1000 or AI-2000 temperature transmitter.)

The SC-1000 is frequently used to isolate signals or reduce noise pick-up. It is also ideal where low output ripple or low line voltage effects would be beneficial, such as an interface to a computer control system or to a digital multiplexer.

Where a 4 to 20 mA Signal is Necessary

The SC-1000 will convert most electrical signals to 4 to 20 mA.

Where Isolation is Essential

The SC-1000 isolates input and output and effectively removes ground loop currents from control systems.

Where Electrical Noise is Troublesome

Electrical noise is difficult to pinpoint and often produces extremely undesirable results in process control systems. The SC-1000, with its internal noise filters, isolation, and current loop output, is very effective in eliminating electrical noise in industrial installations.

Where Ambient Temperatures Change

The SC-1000 is ideal in environments where the ambient temperature changes. The temperature compensation in the SC-1000 virtually eliminates the measurement drift due to changes in the ambient temperature over the full operating temperature range of the instrument.

Where Better Measurements Mean Tighter Control

The automatic calibration in the SC-1000 means greater measurement stability with almost no drift. This translates into more consistency in process conditions, greater throughput, higher quality, lower waste, and lower production costs.

Where Reduced Maintenance Saves Costs

The SC-1000 has built-in zero and full-scale calibration checks performed every three seconds. These continuous corrections virtually eliminate periodic transmitter recalibration. The SC-1000 also checks for input and transmitter failures—significantly reducing your periodic maintenance requirements.

Product Features

Simple Installation

Installation requires only two, low-voltage wires. Set up, calibrate, and rerange without changing jumpers or dip switches. It never has to be opened for reconfiguration.

No Hand-Held Terminal Required

The SC-1000 is the first microprocessor-based signal conditioner that can be configured without a hand-held terminal. All input and output configurations may be selected using the patented "Tap Mode." The available "Smart Display" and tactile keyboard make the job of setting up the SC-1000 even easier. With menu-driven programming, it's even simpler than setting the time on a digital watch.

Input, Output Versatility

The SC-1000 allows for a large variety of inputs and a range of outputs. In new installations where conditions never exactly match the design and where unknowns always crop up, the SC-1000 lets you cope. Just set it up and go ahead. You can change it when you need to. No need to order a new transmitter or a different option from the factory.

Factory Calibration

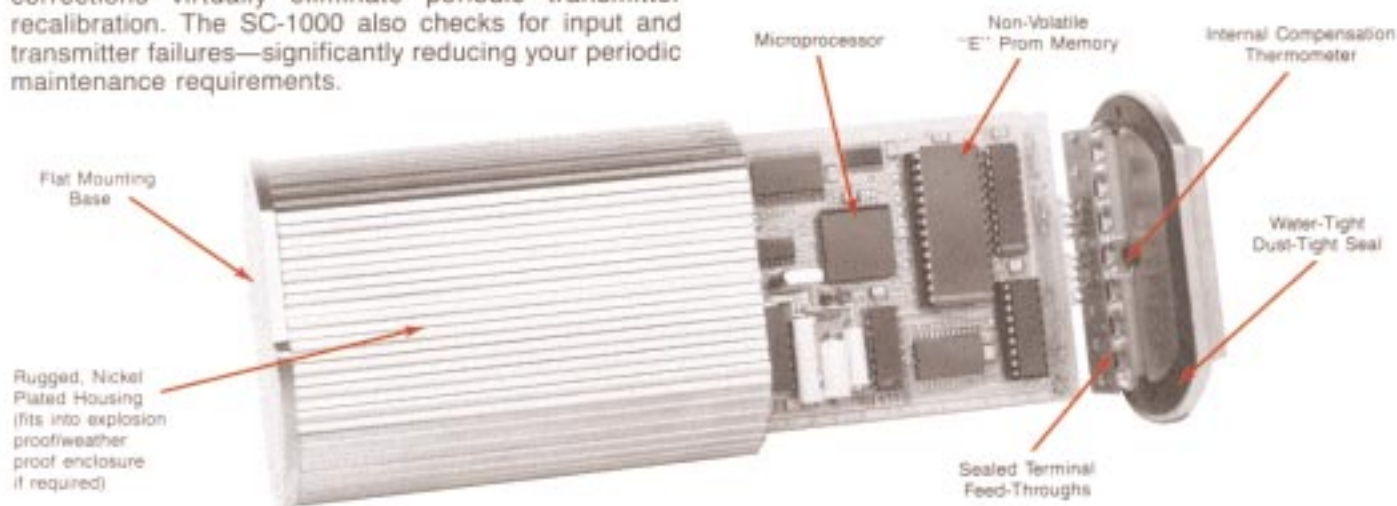
The SC-1000 is completely characterized for ambient operating temperatures from -40 to $+167^{\circ}\text{F}$ (-40 to $+75^{\circ}\text{C}$) using fully automated manufacturing test equipment. This factory calibration data is stored in the non-volatile memory of each transmitter.

On-Line Calibration

In its normal operating mode, the SC-1000 checks its zero and full-scale measurements every 3 seconds against its internal standards and the factory calibration data stored in its memory. Any necessary corrections are made to maintain stable operation without disturbing the steady loop current.

Reduce Back-Up Inventory

The versatility of the SC-1000 allows for a significant reduction in back-up inventory. New transmitter setup can be done in minutes for a large variety of applications. This means that just one SC-1000 is necessary for back-up spares—dramatically cutting your investment in spare parts.

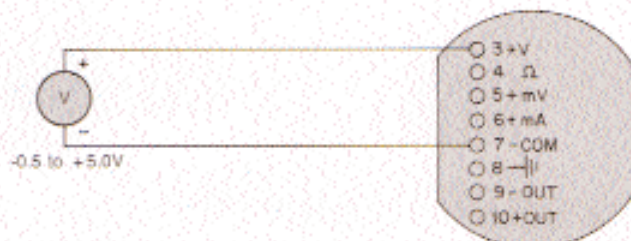


Inputs

The SC-1000 accepts the most popular electrical inputs. Selection is easily made in the field using conventional tools via the patented "Tap Mode" or with the optional "Smart Display" as shown in the section entitled "Operation." Input and output can be grounded at different potentials with the SC-1000 providing isolation to 850 V.

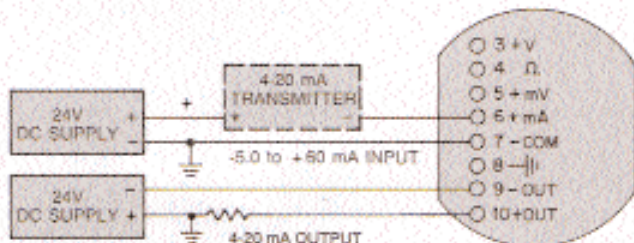
DC Volt Input

The SC-1000 will accept DC voltage inputs from -0.5 to $+5.0$ V. With voltage input, the input impedance is $1\text{ M}\Omega$.



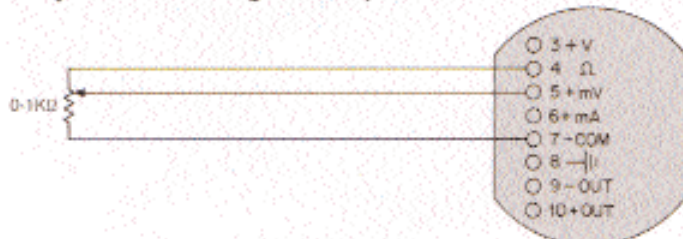
Milliamp Input

Milliamp inputs from -5.0 to $+60$ mA can be accommodated. This allows both 4 to 20 mA, as well as 10 to 50 mA inputs. Input resistance $2.7\ \Omega$.



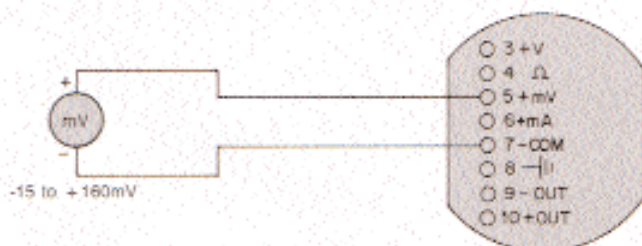
Potentiometer Input

For potentiometer, slidewire, and resistance input up to $1\text{ K}\Omega$ with low excitation current (0.33 mA pulsed) and very low self-heating of the input device.



DC Millivolt Input

The millivolt input range extends from -15 to $+160$ mV. With millivolt input, impedance is greater than $10\text{ M}\Omega$.

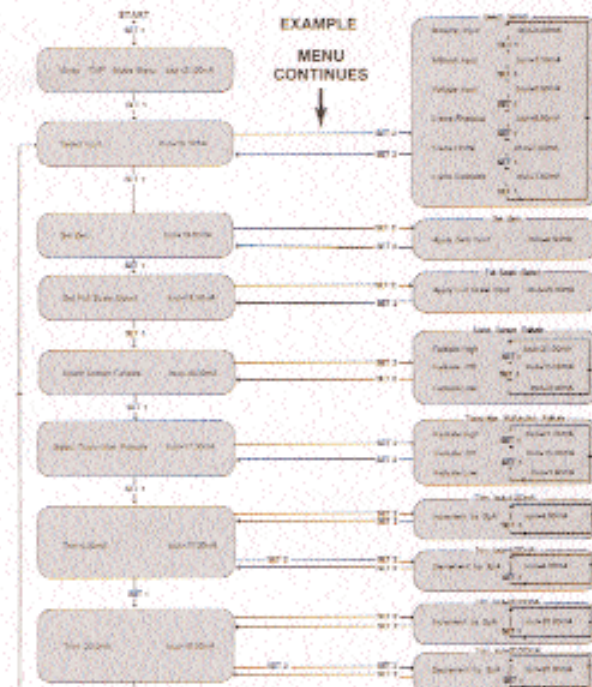


Simple, Reliable Operation

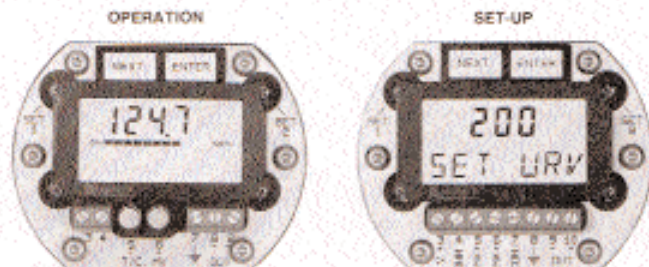
The SC-1000 lets you choose how best to configure and set up the transmitter.

- Set Up with Conventional Tools in the "Tap Mode"**
 Select an input, rerange, or change a failsafe setting with just a millimeter and an input simulator, utilizing the patented "Tap Mode" menu. The "Tap Mode" gets its name from tapping the transmitter's Set 1 and Set 2 terminals with a shorting clip lead. With each "Tap," the transmitter output changes to a certain milliamp value. Each milliamp value corresponds to a selected function or input. For example, a milliamp output of 20.5 mA gives access to the "Input Selection," menu.

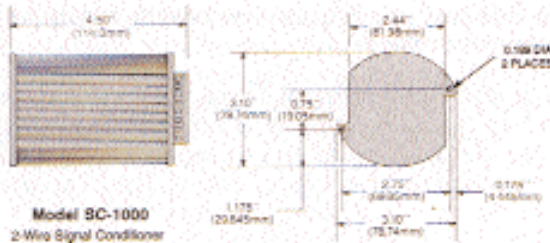
To set the range in the "Tap Mode," the input simulator is used to fix the upper and lower range values, in the same manner as calibrating a conventional analog transmitter. No special tools are required.



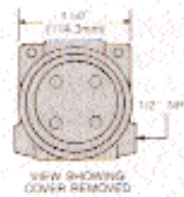
- Set Up with the Optional Display**
 In normal operation, the optional "Smart Display" shows the input value. When setting up the SC-1000, the alphanumeric display and tactile pushbuttons let you make all your selections. Even the range is selected with the keyboard. The upper and lower range values are set directly on the display, like setting the time on a digital watch.



Physical Dimensions

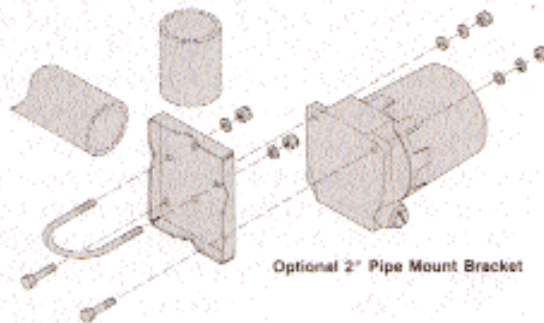
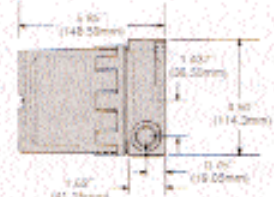


Model SC-1000
2-Wire Signal Conditioner



NOTE:
Allow 9.0" for
cover removal

Model XP-HDC2-L
Optional Explosion-Proof Housing



Optional 2" Pipe Mount Bracket

Connection Diagram



SC-1000 Specifications

Input:

Input Type	Range
DC Milliamp	-5.0 to 60.0 mA
DC Millivolt	-15.0 to +160 mV
DC Volt	-0.5 to +5.0 V [†]
Potentiometer, 3-wire	0.0 to 1.0 K Ω^2
Resistance, 2- or 3-wire	0.0 to 1.0 K Ω^2

[†]10.0 VDC available, consult factory

²10 K Ω available, consult factory

Isolation: 850 VDC or peak AC

Output: Two-wire, 4 to 20 mA

Output Ranging Adjustments:

Zero: } {100% of sensor range—noninteracting
Full-scale: } {Normal or Reverse Acting

Minimum Output Range: None

Output Resolution: 2.5 μ A

Accuracy: $\pm 0.05\%$ of the Reading, or the accuracy from the table below, whichever is greater; plus 0.05% of Span.

Input	Accuracy
Milliamp	± 0.008 mA
Millivolt	± 0.01 mV
Volt	± 0.005 V
Resistance	± 0.15 Ω

Transmitter accuracy includes repeatability, hysteresis, linearity, load, and ambient temperature effects.

Transmitter Repeatability: One-half of accuracy specification.

Reference Condition Accuracy: Equal to transmitter repeatability. When

set up in the "Tap Mode," the SC-1000 is then referenced to the prevailing conditions. Accuracy at this reference condition will include repeatability, linearity, and hysteresis effects. (Reference condition accuracy is comparable in scope to that generally specified for analog-based signal conditioners.)

Dynamic Response

Turn-On Time: Less than 5 seconds after power-up

Changing Ambient Temperature: Automatic compensation to 20°C/hour change

Update Time: 0.15 second

Response to Step Input: 0.25 second, typical

Operating Temperature Range: -40 to +167°F (-40 to +75°C) Ambient

Storage Temperature Range: -56 to +185°F (-50 to +85°C) Ambient

Ambient Temperature Stability: Self-correcting over the operating temperature range.

Long-Term Stability: Less than 0.05% of reading ± 5 μ A per year

Automatic Diagnostics: Every 3 seconds, self-checks for zero, span, open resistance input, and transmitter malfunction.

Failsafe: User settable to 21 mA, 3.9 mA, or "OFF."

Interchangeability: All units interchangeable without field calibration.

EMI/RFI Immunity: Less than 0.5% of reading (SAMA PMC 33.1c test method) 20 kHz to 1000 MHz, 10 V/meter

Common Mode Rejection: 120 dB

Reverse Polarity Protection: 42 VDC applied with either polarity

Power and Load: Supply Voltage (No Load): 12 to 42 VDC

Supply Voltage (Under Load):

$$V_{\text{SUPPLY}} = (12) + (R_{\text{LOAD}} \text{ in } K\Omega) \times (21 \text{ mA})$$

Supply Voltage Effect: Less than $\pm 0.005\%$ of Span per volt

Options and Accessories: LD-2, two-line "Smart Display", KB-2 tactile keyboard and explosion-proof housings.

Weight: 12 oz

Standard Configuration: Factory configured for direct acting 4 to 20 milliamp input. Custom factory configurations are available to suit your requirements. See Price List.

AccutechTM
Smart Process Instrumentation

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Specifications subject to change without notice. Warranty: Adaptive Instruments Corporation warrants this equipment to be free from defects in material and workmanship, under normal conditions of use and service, and will replace free of charge any component found to be defective, if returned to AIC with transportation prepaid, within one year of its original purchase. In some cases a nominal recalibration fee may apply. Printed in USA
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