

5502 Differential Analog Input Module

Installation, Operation and Maintenance
Setup Manual

5/19/2011



The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof. Neither Schneider Electric nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information contained herein. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

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All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed. Failure to use Schneider Electric software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

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Safety Information

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a Danger or Warning safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, **will result in** death or serious injury.

WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, **can result in** death or serious injury.

CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, **can result in** minor or moderate.

CAUTION

CAUTION used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, **can result in** equipment damage..

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and the installation, and has received safety training to recognize and avoid the hazards involved.

BEFORE YOU BEGIN

Do not use this product on machinery lacking effective point-of-operation guarding. Lack of effective point-of-operation guarding on a machine can result in serious injury to the operator of that machine.

 **CAUTION****EQUIPMENT OPERATION HAZARD**

Verify that all installation and set up procedures have been completed.

Before operational tests are performed, remove all blocks or other temporary holding means used for shipment from all component devices.

Remove tools, meters, and debris from equipment.

Failure to follow these instructions can result in injury or equipment damage.

Follow all start-up tests recommended in the equipment documentation. Store all equipment documentation for future references.

Software testing must be done in both simulated and real environments.

Verify that the completed system is free from all short circuits and grounds, except those grounds installed according to local regulations (according to the National Electrical Code in the U.S.A, for instance). If high-potential voltage testing is necessary, follow recommendations in equipment documentation to prevent accidental equipment damage.

Before energizing equipment:

- Remove tools, meters, and debris from equipment.
- Close the equipment enclosure door.
- Remove ground from incoming power lines.
- Perform all start-up tests recommended by the manufacturer.

OPERATION AND ADJUSTMENTS

The following precautions are from the NEMA Standards Publication ICS 7.1-1995 (English version prevails):

- Regardless of the care exercised in the design and manufacture of equipment or in the selection and ratings of components, there are hazards that can be encountered if such equipment is improperly operated.
- It is sometimes possible to misadjust the equipment and thus produce unsatisfactory or unsafe operation. Always use the manufacturer's instructions as a guide for functional adjustments. Personnel who have access to these adjustments should be familiar with the equipment manufacturer's instructions and the machinery used with the electrical equipment.
- Only those operational adjustments actually required by the operator should be accessible to the operator. Access to other controls should be restricted to prevent unauthorized changes in operating characteristics.

About The Book

At a Glance

Document Scope

This manual describes the operation and maintenance of the 5502 Differential Analog Input module.

Validity Notes

This document is valid for all versions of the 5502 Differential Analog Input module.

Product Related Information

 WARNING
UNINTENDED EQUIPMENT OPERATION
The application of this product requires expertise in the design and programming of control systems. Only persons with such expertise should be allowed to program, install, alter and apply this product.
Follow all local and national safety codes and standards.
Failure to follow these instructions can result in death, serious injury or equipment damage.

User Comments

We welcome your comments about this document. You can reach us by e-mail at technicalsupport@controlmicrosystems.com.

Overview

The Model 5502 Differential Analog input module adds eight Differential analog inputs to the 5000 input/output system. Up to sixteen model 5502 modules may be connected to the I/O bus, for a total of 128 analog inputs per bus. The 5502 module can be used to measure $\pm 10V$ analog signals and 0-20mA analog signals.

The 5502 module uses a 13 bit plus sign analog to digital converter (ADC). A single chip microcontroller with integral watchdog timer operates the module and communicates over the I/O bus.

Inputs are fuse and transient protected and optically isolated from the main logic power and the other analog inputs.

Installation

The installation of the 5502 module requires mounting the module on the 7.5mm by 35mm DIN rail and connecting the module to the system I/O Bus. Refer to the **System Configuration Guide**, at the beginning of this manual, for complete information on system layout, I/O Bus cable routing and module installation.

Field Wiring

The 5502 module provides eight Differential analog inputs. **Figure 1: Typical 5502 Field Wiring** shows how to wire the inputs.

Screw termination style connectors are used for termination of field wiring. They accommodate solid or stranded wires from 22 to 12 AWG.

The connectors are removable. This allows module replacement without disturbing the field wiring. Leave enough slack in the wiring for the connector to be removed.

Remove power before servicing unit.

To remove the connector:

- Pull the connector upward from the board. Apply even pressure to both ends of the connector.

To install the connector:

- Line up the pins on the module with the holes in the connector.
- Push the connector onto the pins. Apply even pressure to both ends on the connector.

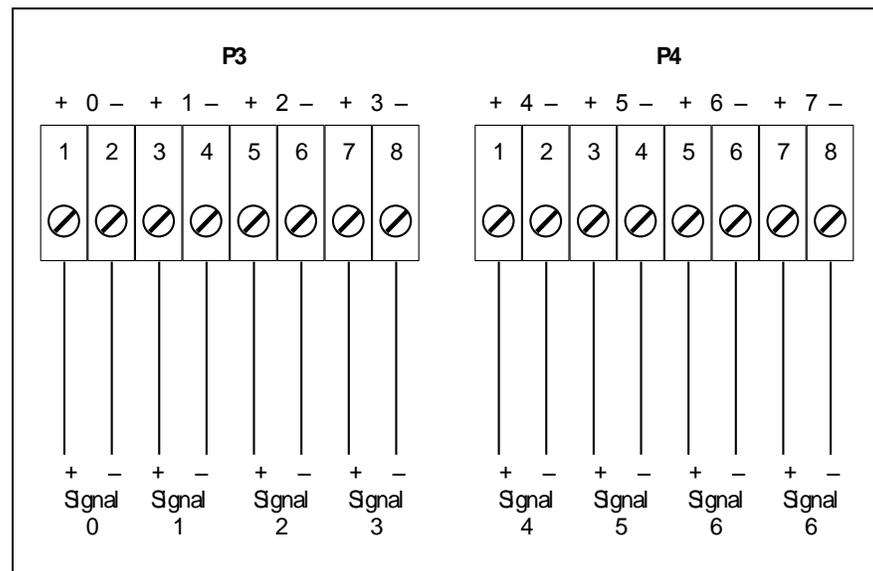


Figure 1: Typical 5502 Field Wiring

Address Selection

The 5000 I/O bus will support a maximum of twenty I/O (input/output) modules. 5000 I/O module types may be combined in any manner to the maximum supported by the controller used. The types of input and output modules available are:

- Digital Input modules
- Digital Output modules
- Analog Input modules
- Analog Output modules
- Counter Input modules

Each type of I/O module, connected to the I/O bus, has a unique I/O module address. Different types of I/O modules may have the same module address.

The address range supported by the SCADAPack controller module may restrict the I/O module address range. Refer to the controller manual for the maximum address supported.

The three address switches in the dip switch package SW1 labeled 1, 2, 4 and 8 set the module address. To set the address:

- Open the four switches by sliding the actuators to the left side of the switch.
- Close the switches by sliding the actuators to the right such that they total the desired address.

Figure 2: 5502 Differential Analog Input Module Address Switches shows the switch setting for the 16 possible module addresses.

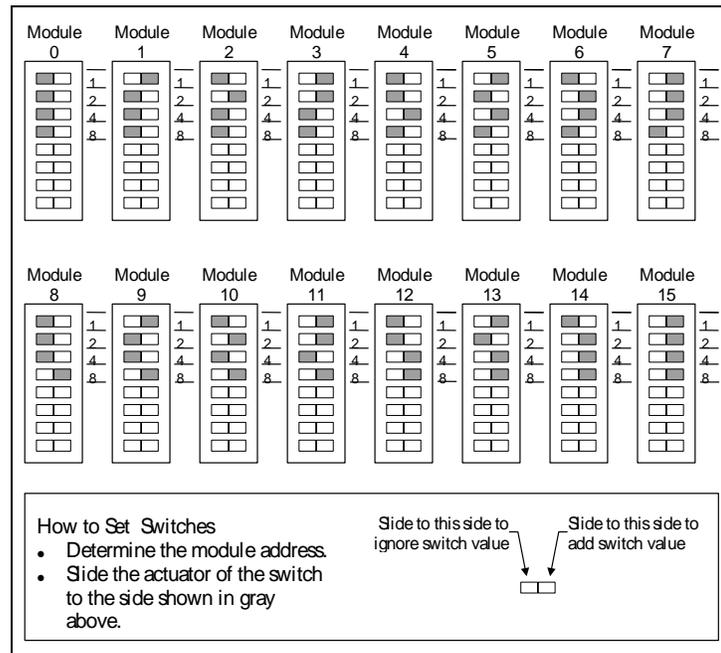


Figure 2: 5502 Differential Analog Input Module Address Switches

Voltage or Current Range Selection

The 5502 module measures voltages in the range of -10V to $+10\text{V}$ with respect to the $-ve$ input of the measuring channel. Currents in the range of -20mA to $+20\text{mA}$ can be measured by on any of the inputs by inserting an onboard 250Ω resistor in current loop. The resulting voltage input will be -5V to $+5\text{V}$. This resistor is added by closing the appropriate switch labeled 0 through 7 in the dip switch package SW2. Close the switch by sliding the actuator up to the ON position.

AC Rejection Selection

The 5502 module samples the analog inputs several times for optimum rejection of AC noise. 60 Hz. AC rejection is obtained when the actuator for the switch labeled 50/60 is in the left position. 50 Hz. AC rejection is obtained when the actuator for the switch labeled 50/60 is in the right position.

Operation and Maintenance

Data Format

5000 analog input and output modules use 16 bit signed numbers (15 bits plus sign). The readings are to provide output data in the 16 bit signed format.

The table below shows output values for several voltages and currents.

Input	Condition	Output
+9.9988V	Voltage	32764
+5V	Voltage	16384
1.2mV	Voltage	4
0V	Voltage	0
-5V	Voltage	-16384
-10V	Voltage	-32768
20mA	Current	16384
4.88 μ A	Current	4
0mA	Current	0
-20mA	Current	-16384

Maintenance

This module requires no routine maintenance. If the module is not functioning correctly, contact Control Microsystems Technical Support for more information and instructions for returning the module for repair.

Troubleshooting

Condition	Action
Inputs read near 0.	Check and if necessary replace the input fuse.
Input voltages read slightly low.	Check SW2 and check the switch is in the voltage position.
Reading is constant.	Check that the analog input is not forced.

Fuses

Each input is has an 1/8A fuse. This fuse will blow when the input voltage exceeds approximately 12V. The fuse is Littelfuse NANO-SMF 1/8A Fast-Acting fuse. Replacement fuses are available from Control Microsystems.

Control Microsystems part number: TBUM297258

Littelfuse part number: R451.125

Calibration

The 5502 module is calibrated and burned in at the factory. It does not require periodic calibration. Calibration may be necessary if the module has been repaired as a result of damage.

There is one potentiometer for calibration of the analog inputs. The GAIN potentiometer (R14) adjusts the gain.

Calibration requires that you read the converted value from the module using a communication controller, SCADAPack or TeleSAFE Micro16 controller module. Refer to the controller module manual for details.

To calibrate the module:

- Select an input and check the associated switch in the dipswitch package SW2 is OFF.
- Short the selected analog input.
- Adjust the ZERO potentiometer (R20) until a reading of 0 is obtained.
- Apply a voltage between 9 and 10 Volts on the selected analog input.
- Calculate the correct reading for the applied voltage using the formula:
$$\text{reading} = (32768 \times \text{voltage} / 10)$$
- Adjust the GAIN potentiometer (R19) until the correct reading is obtained.

The calibration may be verified by applying other voltages or voltages of the opposite polarity to the other input terminals. Use the formula above to determine the correct reading for each input voltage.

Specifications

Disclaimer: Control Microsystems reserves the right to change product specifications. For more information visit www.controlmicrosystems.com.

Inputs	8 voltage or current inputs Each input is switch selectable as voltage or current.
Ranges	Voltage -10V to +10V Current -20mA to +20mA
Resolution	Voltage 1.22mV Current 4.88µA
Input Resistance	Voltage >10MΩ Current 250Ω
Converter type	13 bit plus sign successive approximation
Accuracy	+/- 0.1% of full scale at 25°C (77°F) +/- 0.2% of full scale over temperature range
Isolation	550 VAC from any input to the chassis or the system power supplies 140Vac/200Vdc between inputs
Common mode rejection	>96dB at 50/60 Hz. >50dB at 10KHz. with 1K ohm imbalance. >50dB at 1KHz. with 10K ohm imbalance.
Normal mode rejection	>45dB at 50/60 Hz.
Transient Protection	Transient suppressors and fuses on each input. 2.5kV surge withstand capability (SWC) as per ANSI/IEEE C37.90.1-1989
Over-scale Input Capacity	12Vdc maximum. Exceeding 12V will cause the fuse to blow.
Input fuses	1/8 Amp.
Reading Update Time	170ms with 60 Hz. rejection selected. 185ms with 50 Hz. rejection selected.
Power Requirements	5V at 100mA
Terminations	two 8 pole removable terminal blocks 12 to 22 AWG 15 amp contacts

Dimensions	4.17 inch (106 mm) wide 4.625 inch (118 mm) high 1.75 inch (44 mm) deep
Mounting	7.5 x 35 DIN rail
Packaging	corrosion resistant zinc plated steel with black enamel paint
Environment	5% RH to 95% RH, non-condensing -40°C to 60°C -40°F to 140°F

Approvals and Certifications

Hazardous Locations - North America	Suitable for use in Class I, Division 2, Groups A, B, C and D Hazardous Locations. Temperature Code T4 CSA certified to the requirements of: <ul style="list-style-type: none">• CSA Std. C22.2 No. 213-M1987 - Hazardous Locations.• UL Std. No. 1604 - Hazardous (Classified) Locations.
Safety	CSA (cCSAus) certified to the requirements of: CSA C22.2 No. 142-M1987 and UL508. (Process Control Equipment, Industrial Control Equipment) UL (cULus) listed: UL508 (Industrial Control Equipment)