

5302 Analog Output 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

UNINTENDED EQUIPMENT OPERATION

- 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 death, serious 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 5302 Four Channel Analog Output module.

Validity Notes

This document is valid for all versions of the 5302 Four Channel Analog Output 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 5302 analog output module adds four analog outputs to the 5000 input/output (I/O) system. Up to sixteen Model 5302 modules may be connected to the 5000 I/O bus for a total of 64 analog outputs.

The 5302 outputs can control valve actuators; motor speed controllers; temperature controllers; or any device requiring an analog control signal.

The 5302 module generates either 4 to 20mA outputs or 0 to 20mA outputs. A configuration switch selects the output range. The output resolution is 12 bits in both cases. Outputs are isolated from logic circuits, for protection against voltage transients and high common mode voltages.

Voltage outputs are obtained by connecting a load resistor to the output. The resistor value selects the voltage range. Virtually any output voltage can be obtained, within the limits of the current loop supply voltage.

The 5302 module requires an external 24 volt DC power supply to power current loops. The supply voltage can be as low as 12 volts DC, for solar or battery powered applications, provided the total load resistance does not exceed 400 Ω .

Installation

The installation of the 5302 analog output module requires mounting the analog output module on the 7.5mm by 35mm DIN rail and connecting the analog output 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 analog output installation.

Field Wiring

The 5302 Analog Output module provides 20mA analog outputs. These outputs are isolated from the I/O Bus 5V power supply. These outputs are not isolated from each other as they share a common return.

An external 24V supply powers the isolated output circuits. This is usually the same power supply that powers current loop transmitters in the system. A power supply normally sources this power. A wide range of voltages is tolerated. Refer to section **Specifications** section of this manual for details.

Recommended field wiring for the 5302 modules is shown in **Figure 1: 5302 Typical Field Wiring**.

- The 24V supply connects to terminals 1 and 2. Observe correct polarity.
- The first output connects to terminals 3 and 4. Observe correct polarity.
- The second output connects to terminals 5 and 6. Observe correct polarity.
- The third output connects to terminals 7 and 8. Observe correct polarity.
- The fourth output connects to terminals 9 and 10. Observe correct polarity.

Controller, modem and I/O modules use screw termination style connectors 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 away 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.

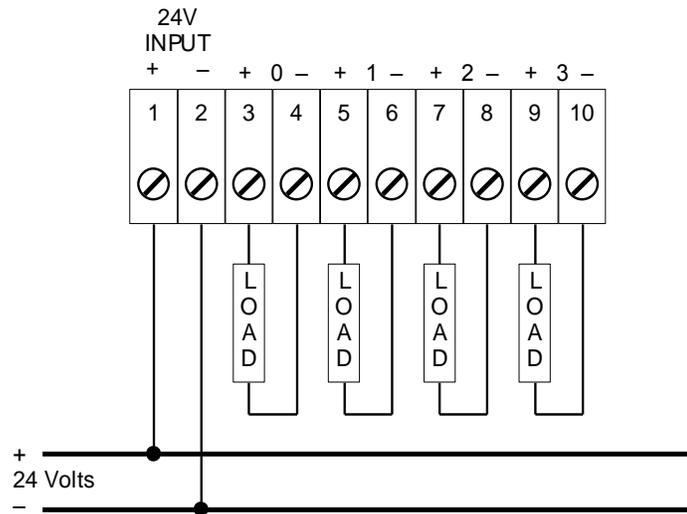


Figure 1: 5302 Typical Field Wiring

Voltage Outputs

To obtain voltage outputs, connect a load resistor as shown in **Figure 1: 5302 Typical Field Wiring**. Connect the voltage device across the load resistor. The table below list resistance values and output range settings for common voltage ranges. The resistance value listed is the parallel resistance of the device and the load resistor.

Voltage Range	Resistance	Output Range
0 to 5 volts	250 Ω	0-20mA
1 to 5 volts	250 Ω	4-20mA
0 to 10 volts	500 Ω	0-20mA

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 four address switches labeled 1, 2, 4, and 8 set the base channel.

To set the address:

- Open the four switches by pressing down the bottom side of the switch.
- Close the switches that total to the desired address by pressing down the upper side of the switch.

Switch settings for each of the 16 module addresses are shown in **Figure 2: 5302 Analog Output Module Address Switches**

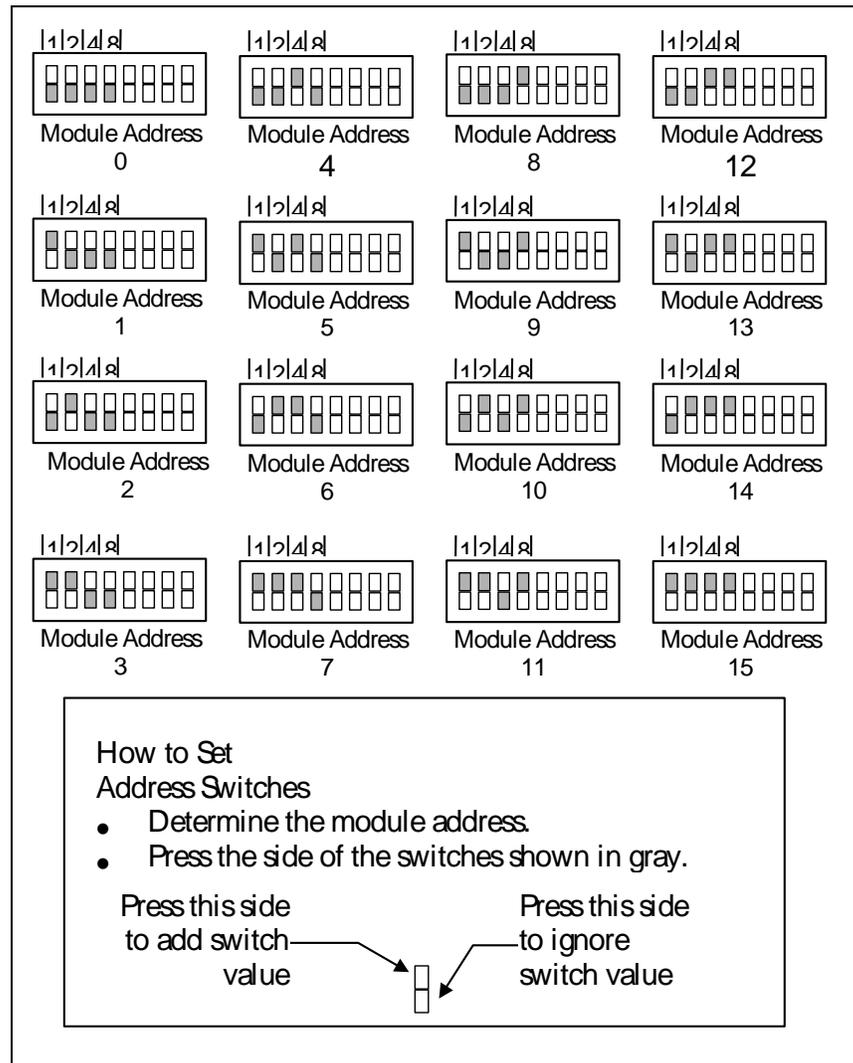


Figure 2: 5302 Analog Output Module Address Switches

Output Range Selection

The 5302 Analog Output module outputs a 0-20mA signal or a 4-20mA signal. The range switch selects the signal range. Both output channels are set to the same range.

To select the 0-20mA range:

- Press down the side of the range switch labeled 0-20mA.

To select the 4-20mA range:

- Press down the side of the range switch labeled 4-20mA.

The output of the module will be 0mA during a system reset, regardless of the range setting. When the system reset is over, the output will go to 0mA or 4mA as configured by the range setting.

The switch setting for the output range is shown in **Figure 3: 5302 Output Range Switch**.

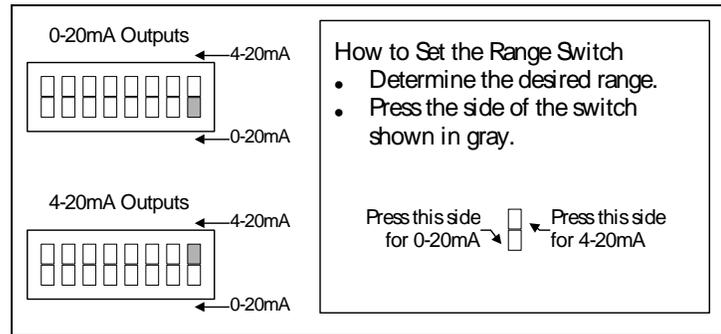


Figure 3: 5302 Output Range Switch

Operation and Maintenance

Data Format

5000 analog output modules use 16 bit, signed numbers. Modules with less than 16 bit resolution normalize the data into the 16 bit format.

The 5302 module has a 12 bit, unipolar, digital to analog (D/A) converter. There are 4096 D/A counts in the output signal range.

The module can be configured for a 0-20mA or 4-20mA output range. The output resolution is better for 4-20mA signals, due to the smaller range.

0-20mA Output Range

The 0-20mA output range resolution is 4.88uA/count. The table below shows the output current for several D/A values.

D/A Value	Current
0	0mA
8192	5mA
16384	10mA
24576	15mA
32760	19.995mA

4-20mA Output Range

The 4-20mA output range resolution is 3.91uA/count. The table below shows the output current for several D/A values.

D/A Value	Current
0	4mA
8192	8mA
16384	12mA
24576	16mA
32760	19.996mA

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
Outputs are always 0mA	Check the 24V power.
The full scale output is less than 20mA.	Check the 24V power. Check that the load resistance is within specification.
Reading is constant.	Check that the analog input is not forced.
The output is 4mA when a value of 0 is output. 0mA was expected.	The 4-20mA output range is selected. Select the 0-20mA range.
The output is 0mA when a value of 0 is output. 4mA was expected.	The 0-20mA output range is selected. Select the 4-20mA range.
The output seems to be uncalibrated at small output values. This improves as larger values are output.	Check the setting of the output range switch. The wrong output range is probably selected.

5302 Analog Output Calibration

The 5302 Analog Output module is calibrated at the factory and should not require periodic calibration. Calibration may be necessary if the module has been repaired as the result of damage.

There are four potentiometers for calibration of the analog outputs – one for each channel. Potentiometers R1 through R4 adjust the gain of channels 0 through 3 respectively.

Calibration requires that you write values to the analog output module. Refer to the documentation for the controller module for details. To calibrate the 5302 Analog Output module:

1. Connect the 5302 to a controller module. Apply 24 volts to the 5302 terminal block on terminals 1 and 2.
2. Set the output range to 0-20mA.
3. Output a data value of 32760 to the channels.
4. Measure the channel 0 output current in series with a 250 Ω load resistor. Adjust the GAIN0 potentiometer for an output of 19.995mA.

Repeat step 4 for outputs 1, 2 and 3 using the GAIN1, GAIN2 and GAIN3 potentiometers.

Specifications

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

Output Points	Four
Output Signal Ranges	0-20mA or 4-20mA, switch configurable
Maximum Load Resistance	1000 Ω with 24 volts DC loop power 400 Ω with 12 volts DC loop power 250 Ω with 9 volts DC loop power
Output Type	Single ended regulation on positive side with common negative return
Isolation	1500VAC field to logic
D/A Resolution	12 bits
Absolute Accuracy	+/- 0.05 % of full scale at 25°C (77°F) with 250 Ω load +/- 0.2 % of full scale over temperature range, 0-1000 Ω load
Noise and Ripple	0.04% maximum
Transient Protection	2.5kV SWC as per ANSI/IEEE C37.90.1-1989
Response Time	250ms typical for 10% to 90% signal change
Addressing	DIP switch configurable
Power Requirements	5V at 45mA 9 to 30V at 95mA (with all outputs at 20mA, 15mA quiescent)
Terminations	5302 – 10 pole, removable terminal block 12 to 22 AWG, 15 amp contacts
Dimensions	4.25 inch (108 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

Certifications

UL Listed to the following standards:

- CSA Std. C22.2 No. 213-M1987 - Hazardous Locations.
- CSA Std. C22.2 No. 142-M1987 - Process Control Equipment.
- UL Std. No. 1604 - Hazardous (Classified) Locations.
- UL Std. No. 508 - Industrial Control Equipment.