SLM-AI4-AO2-V Analog Input/Output

The SLM-AI4-AO2-V Voltage Analog Input/Output Module provides four 13 bit input channels at 0-10 VDC and two 12 bit output channels at 0-10VDC for use with Synergy Logic Micro systems.

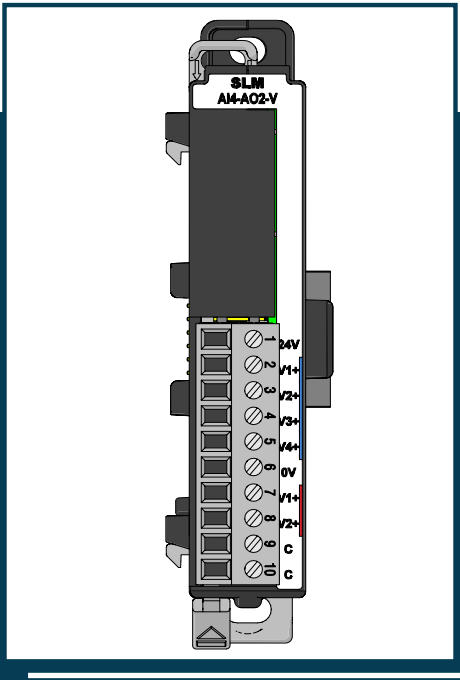


Table of Contents

Technical Specifications

Input Specifications	
Inputs per Module	4
Module Signal Input Range	0–10 VDC
Signal Resolution	13-bit
Resolution Value of LSB (least significant bit)	0–10 VDC = 1.22 mV per count (1LSB = 1 count)
Data Range	0–8191 counts
Input Type	Single-ended (1 common)
Maximum Continuous Overload	±100VDC
Input Impedance	200kΩ
Filter Characteristics	Low Pass, -3dB @ 100Hz
Sample Duration Time	4ms per channel (does not include ladder scan time)
All Channel Update Rate	20ms
Conversion Method	Successive approximation
Accuracy vs. Temperature	±75PPM / ºC maximum
Maximum Inaccuracy	0.5% of range (including temperature drift)
Linearity Error (end to end)	±0.036% of range Monotonic with no missing codes
Input Stability and Repeatability	±0.03% of range
Maximum Full Scale Calibration Error (Including Offset)	±0.097% of range
Maximum Offset Calibration Error	±0.097% of range
Max Crosstalk at DC, 50Hz and 60Hz	±0.049% of range
External Power Supply Required	24VDC (-20% / + 25%), 100mA

Technical Specifications

Output Specifications	
Outputs per Module	2
Output Range	0–10 VDC
Signal Resolution	12-bit
Resolution Value of LSB (least significant bit)	0–10 VDC = 2.44 mV / count 1 LSB = 1 count
Data Range	0–4095 counts
Output Type	Voltage @ 10mA
Output Value in Fault Mode	0V
Load Impedance	1000Ω
Maximum Capacitive Load	0.01 µF
Allowed Load Type	Grounded
Maximum Inaccuracy	0.5% of range
Full Scale Calibration Error	±0.2% of range maximum
Offset Calibration Error	±0.2% of range maximum
Accuracy vs. Temperature	±75 PPM / °C maximum full-scale calibration change (±0.0025% of range / °C)
Max Crosstalk at DC, 50Hz and 60Hz	-72dB, 1 LSB
Linearity Error (end to end)	±4 LSB max., (±0.1% of full scale) Monotonic with no missing codes
Output Stability and Repeatability	±2% LSB after 10 min. warm up (typical)
Output Ripple	±0.2% of full scale
Output Settling Time	0.3 ms max., 5µs min. (full scale range)
All Channel Update Rate	4ms
Maximum Continuous Overload	Outputs current limited to 40mA typical Continuous overloads on multiple outputs can damage the module.
Type of Output Protection	0.1 µs Transient Suppressor
Output Signal at Power Up and Power Down	0V

General Specifications

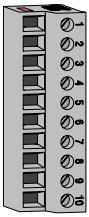
General Specifications

Operating Temperature	0° to 50°C (32° to 122°F)
Storage Temperature	-20° to 70°C (-4° to 158°F)
Humidity	5 to 95% (non-condensing)
Altitude	2,000 meters max
Pollution Degree	2
Environmental Air	Pollution Degree 2 environment, no corrosive gases permitted
Vibration	IEC60068-2-6 (Test Fc)
Shock	IEC60068-2-27 (Test Ea)
Overvoltage Category	II
Field to Logic Side Isolation	1800VAC applied for 1 second
Insulation Resisitance	>10MΩ @ 500VDC
Heat Dissipation	1950mW
Enclosure Type	Open Equipment
Module Location	Any I/O position in a Synergy Logic Micro System
Field Wiring	Removable Terminal Block (included)
Terminal Type	10-Position Removable Terminal Block
Weight	60g (2.1 oz)
Agency Approvals	UL 61010 and UL 61010-2-201 File E139594, Canada and USA CE (EN 61131-2 EMC, EN 61010-1 and EN 61010-2-201 Safety)*

*See CE Declaration of Conformance for details.

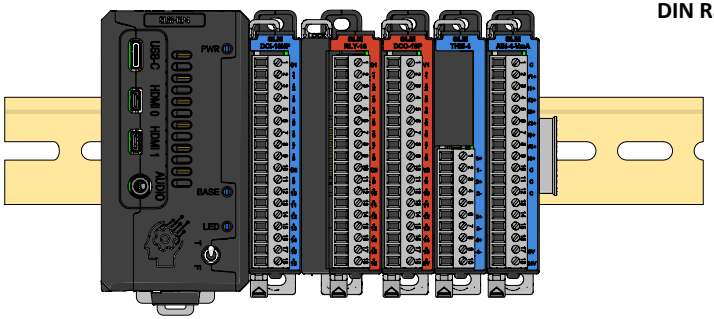
Removable Terminal Block Specifications

Part Number	Dinkle EC381F-S1672210P
Number of Positions	10 screw terminals
Pitch	3.5 mm
Wire Range	30–16 AWG (0.051–1.31 mm²) Solid / Stranded Conductor 3/64 in (1.2 mm) Insulation Max. 1/4 in (6–7 mm) Strip Length
Conductors	“USE COPPER CONDUCTORS, 75ºC” or equivalent.
Screw Driver Width	0.1 in (2.5 mm) Maximum*
Screw Size	M2
Screw Torque	2.5 lb·in (0.28 N·m)

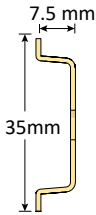


Mounting Clearances

The Synergy Logic Micro System can be secured within an enclosure or cabinet using mounting rails. Use rails that conform to DIN EN standard 50022. The rails are approximately 35mm high, with a depth of 7.5 mm.



DIN Rail Dimensions

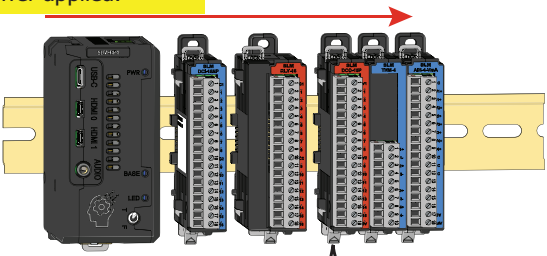


- Provide a minimum clearance of 2 inches (50mm) on all sides of the assembled system to allow proper airflow.
- Allow extra clearance for door-mounted operator panels, push buttons, lights, and other items.
- Maintain a minimum of 3 inches (76mm) of vertical clearance between the module(s) and any wire duct.
- Ensure a minimum of 7.2 inches (183mm) of vertical distance from chassis to chassis in a multiple unit installation.

Installation

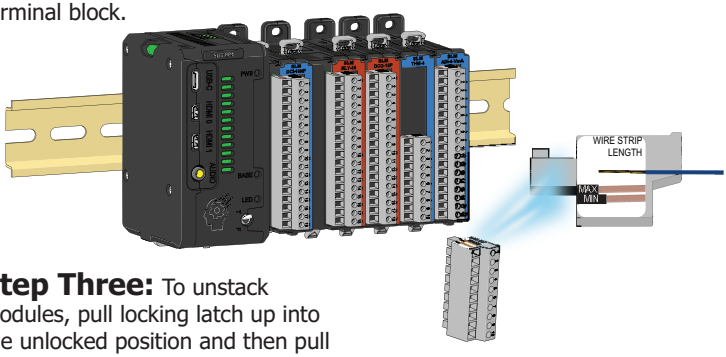
WARNING: Do not add or remove modules with field power applied.

Step One: With latch in "locked" position, align connectors on the side of each module and stack by pressing together.

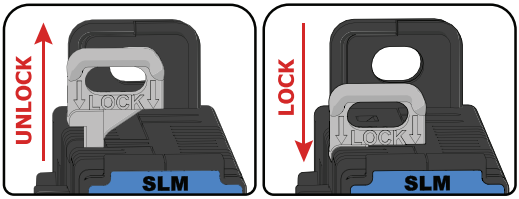


Ensure all latches are secure after modules are connected.

Step Two: Attach field wiring using the removable terminal block.



Step Three: To unstack modules, pull locking latch up into the unlocked position and then pull modules apart.



Installation

Mounting within an Enclosure:

Your selection of a proper enclosure is important to ensure the safe and proper operation of your Synergy Logic Micro System. Applications for the system vary and may require additional hardware considerations. The minimum considerations for enclosures include:

- Conformance to electrical standards
- Protection from the elements in an industrial environment
- Common ground reference
- Not exceeding the specified maximum ambient temperature
- Access to the equipment
- Security or restricted access
- Sufficient space for proper installation and maintenance of the equipment.

Mounting Position:

Mount the Synergy Logic Micro system horizontally, as shown in the cabinet illustration on the following page, to provide proper ventilation. Do NOT mount vertically, upside down, or on a flat horizontal surface.

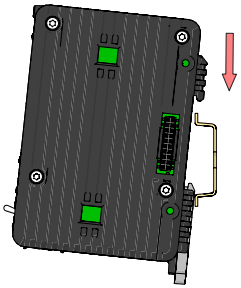
Temperature Considerations:

The Synergy Logic Micro System enclosure should be installed in an environment that falls within the specified equipment operating temperature range. If the environment temperature deviates above or below the specified operating temperature range, measures such as cooling or heating the enclosure should be taken to remain within the range specification.

Installation

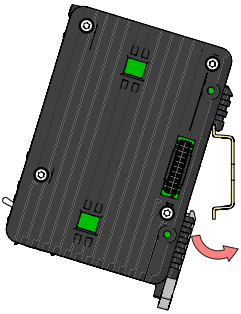
Follow the steps below to mount Synergy Logic Micro System modules onto DIN rail.

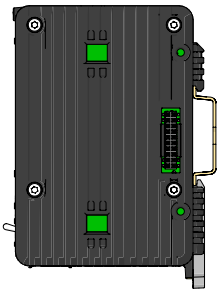
STEP 1



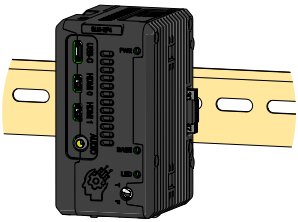
Insert DIN rail in mounting slots.

STEP 2



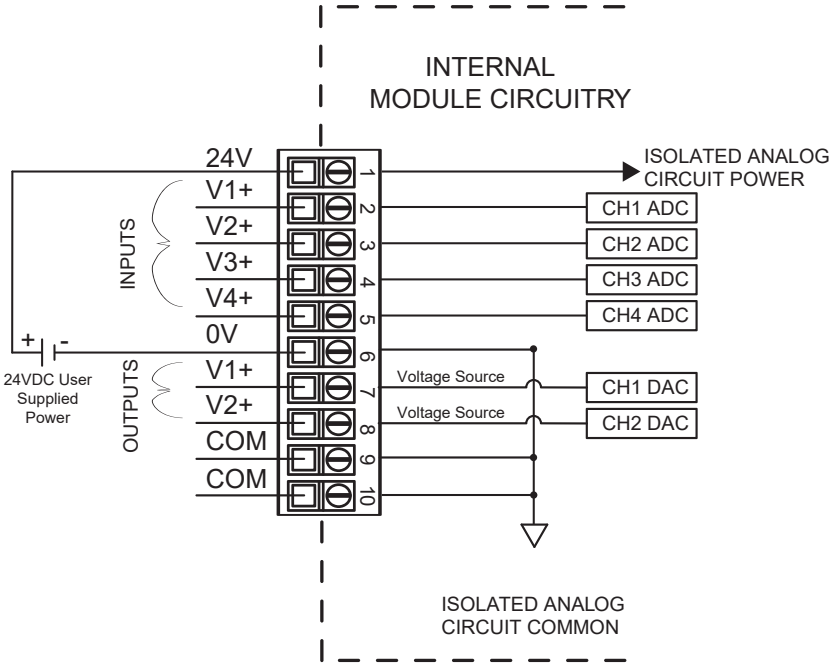


Rotate module ensuring clip snaps onto rail.



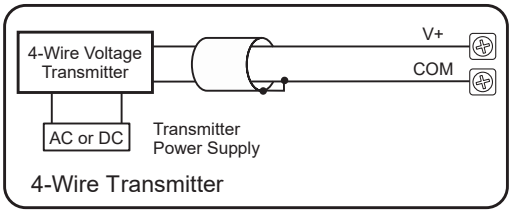
Module securely mounted on DIN rail.

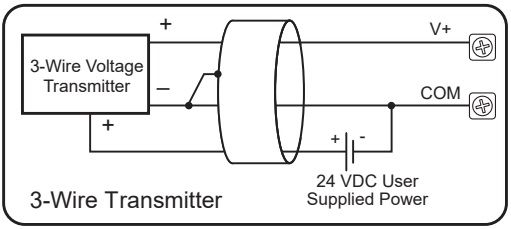
Schematic


INTERNAL
MODULE CIRCUITRY
24V
V1+
V2+
V3+
V4+
0V
V1+
V2+
COM
COM
INPUTS
OUTPUTS
1
2
3
4
5
6
7
8
9
10
+
-
24VDC User
Supplied
Power
ISOLATED ANALOG
CIRCUIT POWER
CH1 ADC
CH2 ADC
CH3 ADC
CH4 ADC
Voltage Source
Voltage Source
CH1 DAC
CH2 DAC
ISOLATED ANALOG
CIRCUIT COMMON

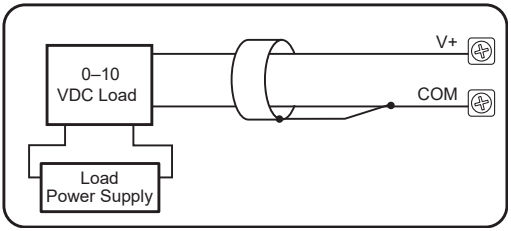
Wiring Diagram

Voltage Input Circuits

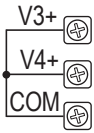




Voltage Output Circuits



Notes for maximum accuracy:
1. Jumper unused inputs to common.



Safety Precautions

Follow the manufacturer's guidelines for thermal management to prevent overheating.

WARNING: Thank you for choosing Synergy Logic equipment. Prior to installation or operation, carefully read this publication and any relevant materials. To mitigate potential safety risks, comply with local and national codes governing equipment installation and operation. Ensure adherence to the National Fire Code, National Electrical Code, and codes from the National Electrical Manufacturer's Association (NEMA) at a minimum. Local regulatory offices can provide additional guidance on codes and standards. Failure to comply may result in equipment damage or serious injury. Our products are not intended for High Risk Activities and do not come with a warranty for such applications. For warranty and safety details, refer to our Limited Warranty and Limitation of Liability statement which can be found at www.synergy-logic.com. For inquiries or additional information, contact us at support@synergy-logic.com. Synergy Logic reserves the right to modify products and publications without notice.

Limited Warranty and Limitation of Liability

Synergy Logic, LLC ("SYNERGY") warrants to the original purchaser that products manufactured by SYNERGY are free from defects in material and workmanship under normal use and service. The obligation of SYNERGY under this warranty shall be limited to the repair or exchange of any part or parts which may prove defective under normal use and service within two years from the date of manufacture or eighteen (18) months from the date of installation by the original purchaser whichever occurs first, such defect to be disclosed to the satisfaction of SYNERGY after examination by SYNERGY of the allegedly defective part or parts. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR USE AND OF ALL OTHER OBLIGATIONS OR LIABILITIES AND SYNERGY NEITHER ASSUMES, NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR SYNERGY, ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF OUR PRODUCTS. THIS WARRANTY SHALL NOT APPLY TO ANY PRODUCT OR ANY PART THEREOF WHICH HAS BEEN SUBJECT TO ACCIDENT, NEGLIGENCE, ALTERNATION, ABUSE, OR MISUSE. SYNERGY MAKES NO WARRANTY WHATSOEVER IN RESPECT TO ACCESSORIES OR PARTS NOT SUPPLIED BY SYNERGY. THE TERM "ORIGINAL PURCHASER," AS USED IN THIS WARRANTY, SHALL BE DEEMED TO MEAN THAT PERSON FOR WHOM OUR PRODUCT IS ORIGINALLY INSTALLED.

In no event, whether as a result of breach of contract, warranty, tort (including negligence) or otherwise, shall SYNERGY or its suppliers be liable for any special, consequential, incidental or penal damages including, but not limited to, loss of profit or revenues, loss of use of the products or any associated equipment, damage to associated equipment, cost of capital, cost of substitute products, facilities, services or replacement power, down time costs, or claims of original purchaser's customers for such damages.

To obtain warranty service, techincal support, product inquires and additional information, please email us at **support@synergy-logic.com**

NOTE: Do not return parts directly to Synergy Logic without first obtaining return authorization.

Unauthorized returns can result in unavoidable delays.