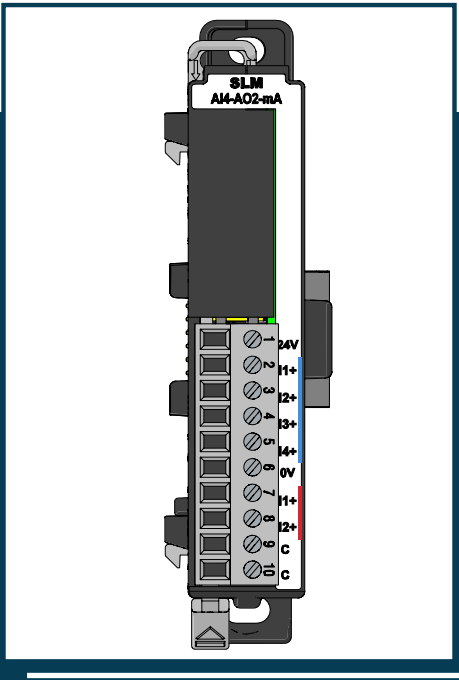
SLM-AI4-AO2-mA Analog Input/Output

The SLM-AI4-AO2-mA Current Analog Input/Output Module provides four 13 bit input channels at 0-20 mA and two 12 bit output channels at 4-20 mA for use with Synergy Logic Micro systems.



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Revision: 1st Edition	8/6/2025

Technical Specifications

Input Specifications	
Inputs per Module	4
Module Signal Input Range	0–20 mA
Signal Resolution	13-bit
Resolution Value of LSB (least significant bit)	0–20 mA = 2.44µA per count (1LSB = 1 count)
Data Range	0–8191 counts
Input Type	Sinking, Single-ended (1 common)
Maximum Continuous Overload	±31mA
Input Impedance	243Ω, ±1%, 1/8W Current Input
Filter Characteristics	Low Pass, -3dB @ 120Hz
Sample Duration Time	4ms per channel (does not include ladder scan time)
All Channel Update Rate	20ms
Open Circuit Detection Time	Zero reading within 100ms
Conversion Method	Successive approximation
Accuracy vs. Temperature	±75PPM / ºC maximum
Maximum Inaccuracy	0.5% of range (including temperature drift)
Linearity Error (end to end)	±0.037% of range Monotonic with no missing codes
Input Stability and Repeatability	±0.024% of range
Maximum Full Scale Calibration Error (Including Offset)	±0.098% of range
Maximum Offset Calibration Error	±0.098% of range
Max Crosstalk at DC, 50Hz and 60Hz	±0.049% of range
Protection Circuit	Not built into module – Install protection elements such as external fuse. Edison S500-32-R, 0.032 A fuse
External Power Supply Required	24VDC (-20% / + 25%), 140mA (Loop Power Included)

Technical Specifications

Output Specifications	
Outputs per Module	2
Output Range	4–20 mA
Signal Resolution	12-bit
Resolution Value of LSB (least significant bit)	4–20 mA = 3.9 µA / count 1 LSB = 1 count)
Data Range	0–4095 counts
Output Type	Current sourcing at 20mA max
Output Value in Fault Mode	Less than 4mA
Load Impedance	0–570 (19.2 VDC), 0–690 (21.6 VDC), 0–810 (24.0 VDC), 0–930 (26.4 VDC), 0–1100 (30.0 VDC) Minimum Load: 0 @ 0–45 °C 125 @ 45–60 °C ambient temperature
Maximum Inductive Load	1mH
Allowed Load Type	Grounded
Maximum Inaccuracy	1% 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 (±0.005% of range / °C)
Max Crosstalk at DC, 50Hz and 60Hz	-72dB, 1 LSB
Linearity Error (end to end)	±4 counts max., (±0.1% of full scale)
Output Stability and Repeatability	±2% counts 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 (max)
Maximum Continuous Overload	Outputs open circuit protected
Type of Output Protection	Electronically current limited to 20mA or less
Output Signal at Power Up and Power Down	4mA

General Specifications

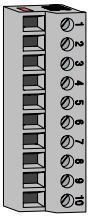
General Specifications

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	2470mW
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.

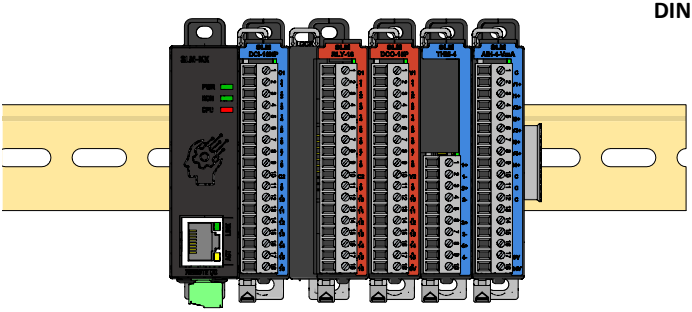
Removable Terminal Block Specifications

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)

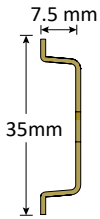


Mounting Clearances

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



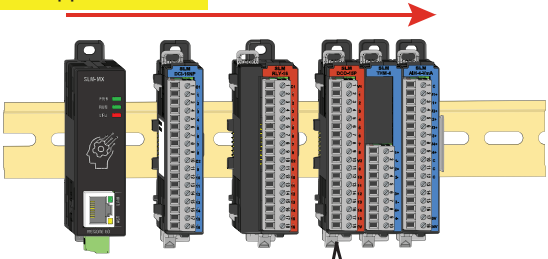
- Provide a minimum clearance of 2 inches (50mm) on all sides of the assembled system to allow proper airflow.
- Allow extra clearance for door-mounted operator panels, push buttons, lights, and other items.
- Maintain a minimum of 3 inches (76mm) of vertical clearance between the module(s) and any wire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

Diagnostic/Status	
Under Range Error	1 bit per channel
Over Range Error	1 bit per channel
Module Failed	1 bit per module
Missing 24V	1 bit per module

Installation

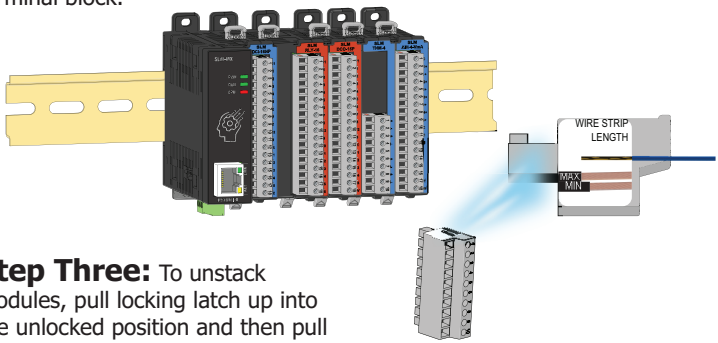
WARNING: Do not add or remove modules with field power applied.

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

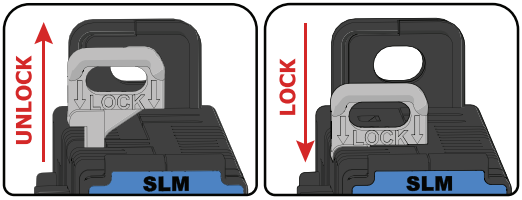


Ensure all latches are secure after modules are connected.

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.

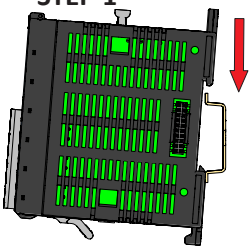
Temperature Considerations:

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

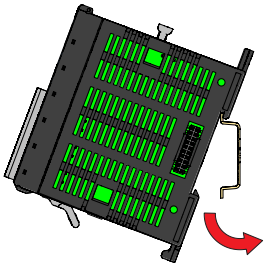
Follow the steps below to mount Synergy Logic Micro System modules onto DIN rail.

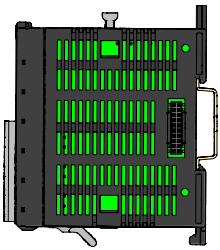
STEP 1



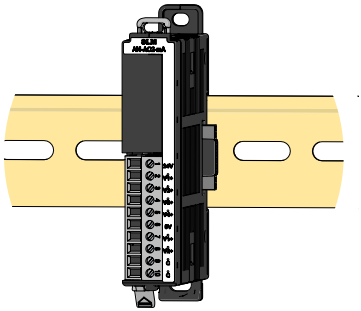
Insert DIN rail in mounting slots.

STEP 2



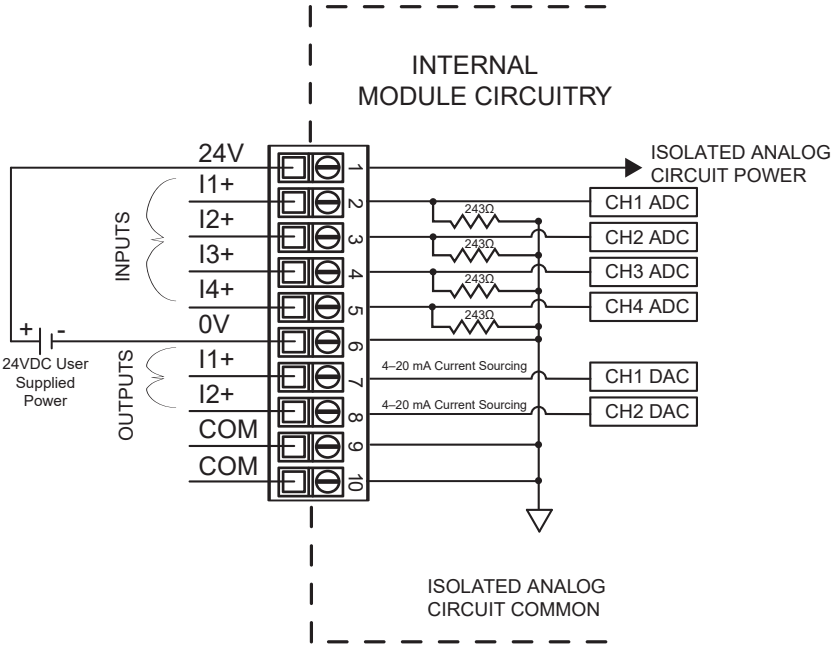


Rotate module ensuring clip snaps onto rail.



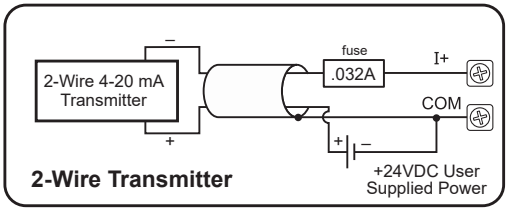
Module securely mounted on DIN rail.

Schematic

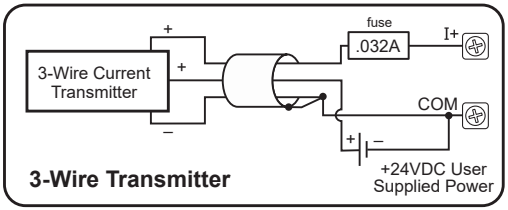

INTERNAL
MODULE CIRCUITRY
24V
I1+
I2+
I3+
I4+
0V
I1+
I2+
COM
COM
INPUTS
OUTPUTS
1
2
3
4
5
6
7
8
9
10
+
-
24VDC User
Supplied
Power
ISOLATED ANALOG
CIRCUIT POWER
243Ω
243Ω
243Ω
243Ω
CH1 ADC
CH2 ADC
CH3 ADC
CH4 ADC
4–20 mA Current Sourcing
4–20 mA Current Sourcing
CH1 DAC
CH2 DAC
ISOLATED ANALOG
CIRCUIT COMMON

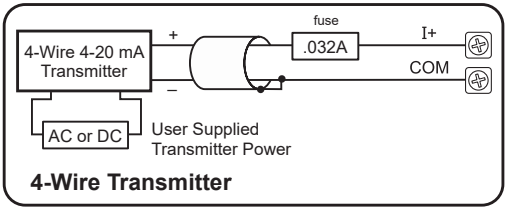
Wiring Diagram

Current Input Circuits



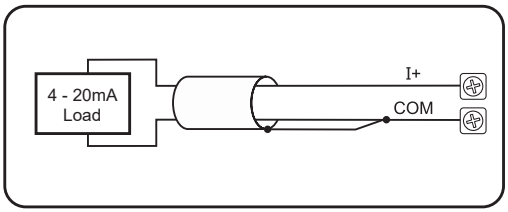
An Edison S500-32-R 0.032A fast-acting fuse is recommended for all 4-20 mA current loops.





Note: Do not connect both ends of shield.

Current Output Circuits



Note: Shield is connected to common at the source device.

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.

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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.