groov UNIVERSAL I/O MODULE

Features

> 10 channels per module: 8 multifunction, mixed signal; 2 mechanical relays

> Module cover with LED indicates module status

> Touch-sensitive pad triggers display of module information on *groov* EPIC® processor's display

> Channel-specific LEDs simplify troubleshooting

> Operating temperature: -20 to 70 °C

> UL Hazardous Locations approved and ATEX compliant

GRV-MM1001-10

DESCRIPTION

groov I/O modules are part of the *groov* EPIC® (Edge Programmable Industrial Controller) system. Wired directly to field devices (sensors and actuators), *groov* I/O translates the electrical signals from those devices into the digital language computers understand—so you can monitor and control devices and use their data wherever you need it, in your local computer network or in cloud services.

The **GRV-MM1001-10** is a 10-channel, multi-signal, multifunction module that supports thousands of unique field I/O combinations. Configurable through PAC Control, CODESYS, custom control programs, or through *groov* Manage, you select a channel, configure its I/O signal, select any function supported by the selected channel—such as counting, latching, clamping, and more—and then save your configuration.

Wiring is simplified with a top-mounted connector, which provides spring-clamp terminals for common, power, and field wiring. The connector is held in place by a single, captive retention screw but can be removed with the field wiring intact for wiring in advance or easier module field replacement.

A swinging, two-position cover protects wiring from inadvertent contact, as does the dead-front design. The two positions of the cover offer the option of more space to accommodate larger wire. The module cover provides a touch-sensitive pad; touch the pad and the *groov* EPIC processor displays information about the module, including specifications and a wiring diagram.

The module pivots into place and is held securely in place by a captive hold-down (retention) screw.

groov I/O modules are hot swappable (which means they can be installed or removed without turning off power to the unit) and self-identifying—as soon as you mount the module to the chassis, it communicates to the processor and identifies itself.

Each *groov* I/O module cover provides a large module LED to indicate module health at a glance.

Part Numbers

Part	Description
GRV-MM1001-10	8 multifunction, mixed signal channels; 2 form C electromechanical relay output channels

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FEATURES AND SPECIFICATIONS

Features

Specifications listed starting on page 4.

GRV-MM1001-10	Signal Type					
	DI: • Discrete • Switch Input, Powered	**DO:** • DC Sinking	**DO:** • Form C Mechanical Relay	**AI:** • Voltage • ICTD • Thermistor • Resistor	**AI:** • Current • Thermocouple • Millivolt	**AO:** • Voltage • Current
Channels	**0–7**	**0–7**	**8–9**	**0–7**	**0–3**	**4–7**
Features						
On/Off State	●	●	●			
On/Off Latching	●					
Counting	●					
On/Off Totalization	●					
Frequency Measurement	●					
Period Measurement	●					
Pulse Measurement	●					
Scaling				●	●	●
Offset and Gain				●	●	
Minimum/Maximum Values				●	●	
Average Filter Weight				●	●	
Simple Moving Average				●	●	
Analog Totalizing				●	●	
Output Pulsing / TPO		●				
Ramping						●
Clamping						●
Watchdog Timeout Value		●	●			●
Quality Indication[a]				●	●	●

a. The Quality Indication feature enables a channel to provide a numerical code that describes a characteristic of the signal entering or leaving the channel. For a list of numerical codes and what characteristic they describe, see "Quality Indication" on page 3.

Quality Indication

The following table lists the quality codes the indicated signal type(s) may report.

Code	Reportable by	
4	All analog inputs	Analog input is not in range; firmware cannot determine if above or below range.
5	All analog inputs	Analog input above operating limits.
6	All analog inputs	Analog input below operating limits.
7	All analog inputs	Module isolated field circuitry in reset; part of module firmware to auto-recover field circuitry that may be in an undefined state.
8	All analog inputs and outputs	Module failed communication with isolated field circuitry like analog to digital and digital to analog converters.
15	All analog inputs	Analog input is 10% above the highest range. Applicable to unipolar (zero and positive values only) and bipolar (can include negative and positive values) signal ranges. To determine the highest range value, see the specification table.
16	All analog inputs	Analog input is 10% below the lowest range. Applicable only to bipolar (can include negative and positive values) signal ranges. To determine the lowest range value, see the specification table.
18	All analog outputs	Analog output fault. • When configured for voltage, indicates the load resistance is too low (that is, the load is drawing too much current to maintain the voltage). • When configured for current, indicates very high resistance or possible open circuit.
19	All analog outputs	Analog output driver over temperature condition, output may cycle on and off.
20	• Switch input, powered • ICTD input • Thermistor input (for curves: 2252, 3K, 10K type 2, 10K type 3, and Custom) • 0–400 kOhm input	Field excitation/loop voltage fault
23	• ICTD input • Thermocouple input	Isolated field compensation circuitry or calculation does not give valid data.
30	Any channel reporting quality	Channel not present.

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Specifications

Specification	GRV-MM1001-10
Voltage Input	
Available Channels	0–7
Input Range	0–10 V DC
Over-range Limits	0–11 V DC
Resolution	0.5 mV
Accuracy	±0.05% of range (±5 mV)
Gain Temperature Coefficient	10 ppm/°C
Offset Temperature Coefficient	1 ppm/°C
Input Impedance	> 425 kOhms
Data Refresh Time	550 ms x SMA value (1.1 s @ 2 SMA, Default SMA = 2)
50 / 60 Hz rejection	> 90 dB
Current Input	
Available Channels	0–3
Input Range	0–20 mA
Over-range Limits	0–20.8 mA
Recommended Fuse	32–40 mA, Fast Acting (for example, Eaton S500-32-R)
Resolution	1.0 µA
Accuracy	±0.075% (±15 µA)
Gain Temperature Coefficient	25 ppm/°C
Offset Temperature Coefficient	1 ppm/°C
Input Voltage Drop (±10%)	0.9 V @ 4 mA, 2.0 V @ 20 mA, 25 °C
Equivalent Input Impedance (±10%)	225 Ohms @ 4 mA, 100 Ohms @ 20 mA, 25 °C
Data Refresh Time	550 ms x SMA value (1.1 s @ 2 SMA, Default SMA = 2)
50 / 60 Hz rejection	> 90 dB
ICTD Input	
Available Channels	0–7
Input Range with ICTD Probe	-40 to +100 °C
Resolution	0.04 °C
Accuracy with ICTD Probe	±0.5 °C (0.9 °F)
Gain Temperature Coefficient	2 ppm/°C
Offset Temperature Coefficient	175 ppm/°C
Data Refresh Time	550 ms x SMA value (1.1 s @ 2 SMA, Default SMA = 2)
50 / 60 Hz rejection	> 90 dB

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Specification	GRV-MM1001-10
Thermocouple Input	
Available Channels	0–3 (see **Note** below)
Input Range	-75 to +75 mV
Over-range Limits	-78 to +78 mV
Input Resolution	3 microvolts
Input Impedance	> 1 megohm
Data Refresh Time	550 ms x SMA value (1.1 s @ 2 SMA, Default SMA = 2)
50 / 60 Hz rejection	> 90 dB
Thermocouple ITS90 Types	**± Accuracy / Resolution**
B: 90 °C to 1,820 °C	7 °C / 0.4 °C
E: -80 °C to 1,000 °C	2 °C / 0.1 °C
J: -100 °C to 1,200 °C	2 °C / 0.1 °C
K: -80 °C to 1,372 °C	2 °C / 0.1 °C
N: -100 °C to 1,300 °C	3 °C / 0.1 °C
R: 100 °C to 1,768 °C	7 °C / 0.3 °C
S: 100 °C to 1,768 °C	7 °C / 0.3 °C
T: -60 °C to 400 °C	3 °C / 0.1 °C

NOTE: To achieve the best thermocouple accuracy when also using current outputs or discrete outputs, always configure thermocouples on the lowest channel numbers and outputs on the highest channel numbers.

Millivolt Input	
Available Channels	0–3
Input Ranges	±150 mV, ±75 mV, ±25 mV
Over-range Limits	±165.0 mV, ±78.0 mV, ±27.5 mV
Resolution	10 µV, 3 µV, 2 µV
Accuracy	±0.05% of Full Scale (±75 µV), ±0.05% of Full Scale (±37.5 µV), ±0.05% of Full Scale (±12.5 µV)
Gain Temperature Coefficient	10 ppm/°C, 10 ppm/°C, 10 ppm/°C
Offset Temperature Coefficient	1 ppm/°C, 1 ppm/°C, 4 ppm/°C
Input Impedance	> 1 MOhms
Data Refresh Time	550 ms x SMA value (1.1 s @ 2 SMA, Default SMA = 2)
50 / 60 Hz rejection	> 90 dB

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Specification	GRV-MM1001-10
Thermistor Input	
Available Channels	0–7 (see **Note** below)
Input Range (Ohms)	0-400 k
Accuracy (Ohms @ Range)	greater of 3 Ohms or 0.5%@0-25k, 400@25k–50k, 900@50k–75k, 1.5k@75k–100k, 5k@100k–200k, 20k@200k–400k
Gain Temperature Coefficient	500 ppm/℃
Resolution (Ohms @ Range)	0.5@0–1k, 1@1k–5k, 2@5k–10k, 5@10k–25k, 50@25k–100k, 200@100k–200k, 700@200k–400k
Power Dissipation @ Resistance (µW@Ohms)	375@1k, 950@5k, 1075@10k, 875@25k, 600@50k, 450@75k, 350@100k, 200@200k, 100@400k
Predefined Thermistor Curves	**Accuracy (℃) @ Range (℃)**
2252	0.2@-40 to 70,2.5@ 70 to 150
3K	0.2@-40 to 70,2.5@ 70 to 150
10K type 2	0.75@-40 to -20,0.2@-20 to 120,0.6@ 120 to 150
10k type 3	0.5@-40 to -20,0.3@-20 to 120,0.6@ 120 to 150
Custom	depends on curve
Gain Temp Coefficient	0.015/(℃ * Ohm)
Data Refresh Time	550 ms x SMA value (1.1 s @ 2 SMA, Default SMA = 2)

NOTE: To achieve the best thermistor accuracy when also using current outputs, always configure thermistors on the lowest channel numbers and current outputs on the highest channel numbers.

0–400 kOhm Input	
Available Channels	0–7 (see **Note** below)
Input Range (Ohm)	0–400k
Accuracy (Ohm @ Range)	greater of 3 Ohm or 0.5%@0-25k, 400@25k–50k, 900@50k–75k, 1.5k@75k–100k, 5k@100k–200k, 20k@200k–400k
Gain Temperature Coefficient	500 ppm/℃
Resolution (Ohm @ Range)	0.5@0–1k, 1@1k–5k, 2@5k–10k, 5@10k–25k, 50@25k–100k, 200@100k–200k, 700@200k–400k
Power Dissipation @ Resistance (µW@Ohm)	375@1k, 950@5k, 1075@10k, 875@25k, 600@50k, 450@75k, 350@100k, 200@200k, 100@400k
Data Refresh Time	550 ms x SMA value (1.1 s @ 2 SMA, Default SMA = 2)

NOTE: To achieve the best resistance accuracy when also using current outputs, always configure the 0-400 kOhm channel type on the lowest channel numbers and current outputs on the highest channel numbers.

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Specification	GRV-MM1001-10
Switch Input, Powered	
Available Channels	0–7
Open Circuit Voltage (Switch Open)	10.5 V (minimum)
Channel Current Limit	1.1 mA max.
Channel Operating Current	0.63 mA typical
Minimum Off Resistance	3300 Ohms
Maximum On Resistance	1200 Ohms
Minimum ON Voltage	5 V
Maximum OFF Voltage	1.5 V
Maximum Continuous Survivable Input Voltage	32 V
Input Impedance	> 425 kOhms
Max. Freq. (50% square wave)	10000 Hz
Discrete Counter Input	
Available Channels	0–7
Input Voltage Range	5–30 V DC
ON Threshold	5 V
OFF Threshold	1.5 V
Input Impedance	> 425 kOhms
Max. Frequency (50% square wave): State, Latches, Counter	10000 Hz
Max. Frequency (50% square wave): On/Off Pulse Width, Period, Frequency	2000 Hz
Max. Frequency (50% square wave): On/Off Totalization	750 Hz
Pulse Width Measurement Resolution	100 microseconds
Pulse Width Measurement Error (50% square wave)	0.1% 0 to 20 Hz 1% 21 to 200 Hz 5% 201 to 2000 Hz
Period/Frequency Error (50% square wave)	0.05% 0 to 20 Hz 0.1% 21 to 200 Hz 1% 201 to 2000 Hz

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Specification	GRV-MM1001-10
Discrete DC Sinking Output	
Available Channels	0–7 (4–7 if using any thermocouple inputs)
Line Voltage Range	5–30 V DC
Maximum Continuous Current	1.0 A
Peak Current (< 10 ms)	4.0 A
Recommended Fuse / Circuit Breaker	1 A at 30 V DC
Output Voltage Drop	175 mV at 1 A
Off-state Leakage (per channel)	< 80 µA at 24 V, -20 to +70 °C
Peak Blocking Voltage	32 V
TPO Period (min, max, resolution)	0.004 seconds, 4294967 seconds, 0.001 seconds
Turn On/Off Time	20 ms nominal
Form C Relay Output	
Available Channels	8, 9
Line Voltage Range	0–250 V AC or 5–30 V DC
Clamp Voltage	440 V nominal
Current Rating	3.5 A per channel
Surge Current	6 A peak for 1 second
Recommended Fuse / Circuit Breaker	5 A at 250 V AC / > 30 V DC per channel
Initial Contact Resistance	< 100 mOhms
Turn On Time	8 ms
Turn Off Time	4 ms
Operating Life (to specification)	Min. 30,000 cycles at max. ratings
Mechanical Life	Min. 10,000,000 cycles
Voltage Output	
Available Channels	4–7
Range	0–10 V
Resolution	2.5 mV
Accuracy	±0.35% of range (±35 mV)
Gain Temperature Coefficient	20 ppm/°C
Offset Temperature Coefficient	3 ppm/°C
Output Slew Rate	> 15 V/ms
Minimum Load Resistance	7.5 kOhms
Output Impedance	< 10 Ohms
Short-circuit Current	20 mA
Data Refresh Time	Nominal 20 ms. Proportional to I/O scan time.

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Specification	GRV-MM1001-10
Current Output	
Available Channels	4–7
Output Range	0–20 mA
Resolution	5 µA
Accuracy	±0.4% of range (±80 µA)
Offset Temperature Coefficient	5 ppm/°C
Output Slew Rate	> 10 mA/ms
Maximum Loop Resistance	700 Ohms
Data Refresh Time	Nominal 20 ms. Proportional to I/O scan time.
Common Specifications	
Power Consumption	5 W
Max. Survivable Input (channels 0–7)	32 V DC
Isolation (between channels 0–7)	None
Isolation (between channel 8 or 9 and all others)	3000 V AC_{rms} 1 min.
Isolation (field to Ethernet / power input)	1500 V AC_{rms} 1 min.
Minimum *groov* EPIC Firmware Version	3.3.0
Minimum PAC Project Version	10.4000
Minimum Library Package for CODESYS Version	2.0.4.0
Wire Size	28–14 AWG
Wire Strip Length	0.315–0.354 inches (8–9 mm)
Torque, connector screw	2.5 in-lb (0.28 N-m)
Torque, hold-down screw	3.5 in-lb (0.4 N-m)
Temperature (operating)	-20 °C to +70 °C
Temperature (storage)	-40 °C to +85 °C
Relative Humidity (non-condensing)	5–95%
MTBF (minimum, 25 °C)	1.2 Mhrs
Agency Approvals	UL/cUL (Class 1, Div 2)[a]; CE: ATEX (Category 3, Zone 2) and RoHS; DFARS; CB Scheme; UKCA
Warranty	30 months

a. For use in hazardous locations, equipment must be mounted in an enclosure that meets the requirements of the National Electrical Code, ANSI/NFPA 70, and ANSI/ISA-61010-1 (82.02.01).

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MOUNTING

Mount *groov* I/O modules onto a *groov* EPIC chassis (see the *groov* EPIC Chassis Data Sheet (form 2247) for instructions). To learn the names and physical features of the parts of the module, see "Description of Module Parts" on page 16.

Mounting the Module

The numbers on the diagrams correspond to the numbered steps in these instructions.

CAUTION: *For electrical safety, de-energize field devices wired to the terminal connector before starting.*

1. Orient the *groov* EPIC chassis so that the module connector numbers are right-side up, with **0** on the left as shown in the diagram.
2. Hold the module at a 45° angle, and line up the alignment tab on the back tip of the module with the slot at the back of the chassis.
3. Pivot the front of the module down to the module connector on the chassis, and push to snap the module into the connector.
4. Lift the module cover up to access the module hold-down (retention) screw, and tighten the screw to secure the module into position.

    CAUTION: *Do not over-tighten. See the torque specs in the "Specifications" table.*

5. If the module does not have a terminal connector, install one.
6. Secure the terminal connector by tightening the terminal connector screw.
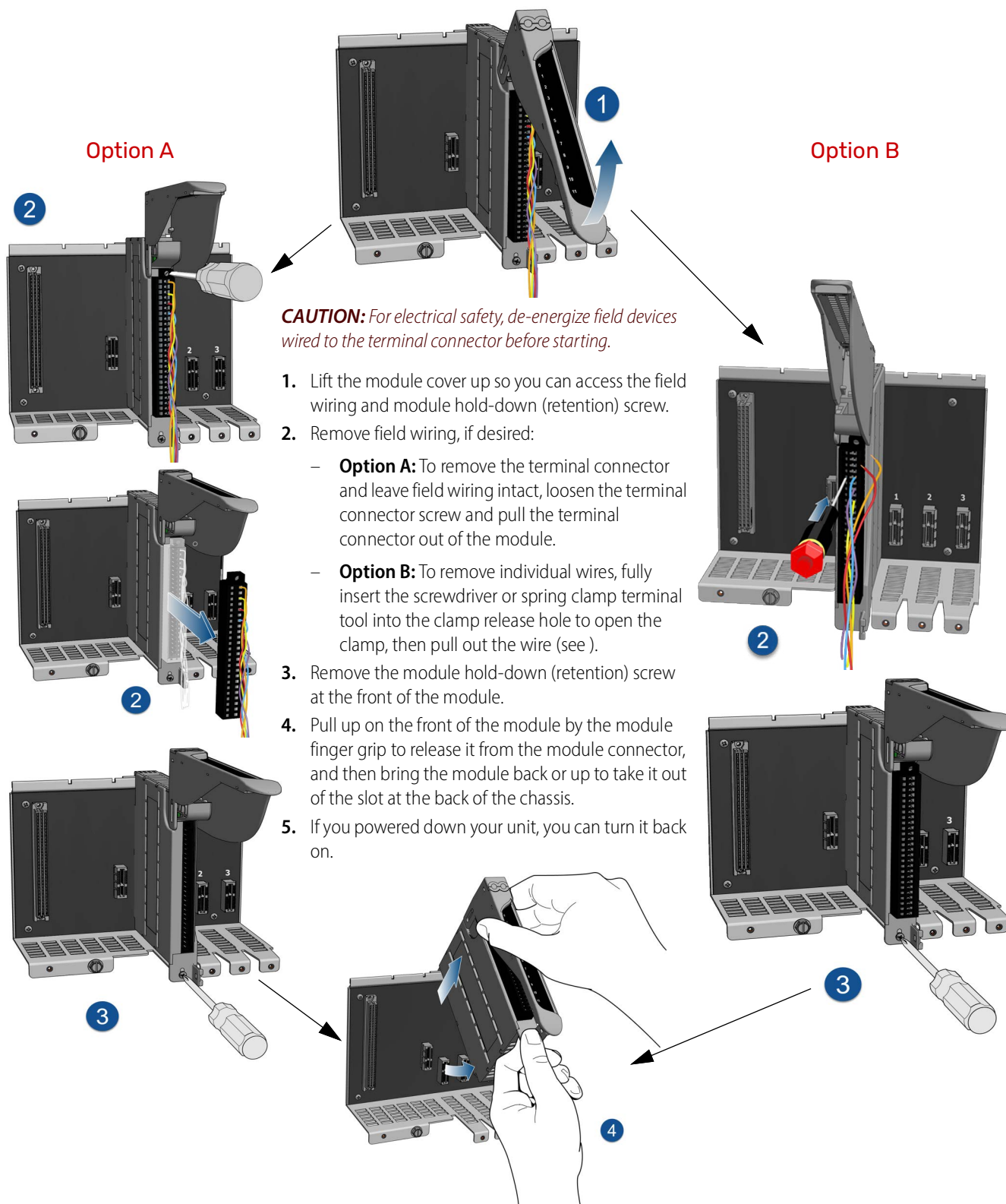
    CAUTION: *Do not over-tighten. See the torque specs in the "Specifications" table.*

7. Follow the wiring instructions in the "Pinout and Wiring" section to wire your field devices to the channels on the terminal connector.
8. When wiring is complete, bring the module cover back down to cover the wires. If the wires are too thick to close the module cover easily, lift the module cover, raise the back of the module cover up to the higher position, and then bring the module cover back down to cover the wires.

If you powered down your unit, you can turn it back on when you are done installing modules and wiring.

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Un-mounting the Module

Option A

Option B

CAUTION: For electrical safety, de-energize field devices wired to the terminal connector before starting.

1. Lift the module cover up so you can access the field wiring and module hold-down (retention) screw.
2. Remove field wiring, if desired:
   - **Option A:** To remove the terminal connector and leave field wiring intact, loosen the terminal connector screw and pull the terminal connector out of the module.
   - **Option B:** To remove individual wires, fully insert the screwdriver or spring clamp terminal tool into the clamp release hole to open the clamp, then pull out the wire (see).
3. Remove the module hold-down (retention) screw at the front of the module.
4. Pull up on the front of the module by the module finger grip to release it from the module connector, and then bring the module back or up to take it out of the slot at the back of the chassis.
5. If you powered down your unit, you can turn it back on.

WIRING AND PINOUT

Before you begin wiring your field devices to your *groov* I/O module, make sure you select and prepare the appropriate wires and review how to use the spring clamps on terminal connectors:

Select and prepare the appropriate wire. The terminal connectors are rated for 28–14 AWG wire. Strip the wire according to the Wire Strip Length listed in the Common Specifications section of the Specifications table on page 4. If you're using stranded wire, twist or tin the strands or add ferrules to make it easier to insert the wire and create a stronger connection.

Use the right tool. To open the spring clamps, make sure to use either:

- a flathead screwdriver with a tip dimension of 2.5 mm x 0.4 mm, ***or***
- the *groov* spring-clamp terminal tool, typically supplied with a *groov* EPIC chassis. You can order a replacement spring-clamp terminal tool on our website www.opto22.com. Search for GRV-TEX-SCTOOL.

Familiarize yourself with the spring clamps. On the terminal connector, each terminal number has a corresponding **clamp release hole** and **field wiring hole**.
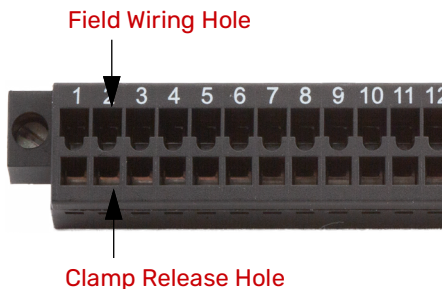
A spring-powered clamp sits between the clamp release hole and the field wiring hole (**A**). When you push the correct screwdriver (see above for dimensions) or the *groov* spring-clamp tool straight down into the clamp release hole, the diameter of the screwdriver or tool displaces the spring laterally, which exposes the hole through which you can insert the wire (**B**). When you pull the screwdriver or spring-clamp tool straight up, the spring returns to its original position, which causes the clamp to hold the wire. (**C**). You can view a video that explains how to wire your field devices and demonstrates how the spring clamp works on our website, www.opto22.com.
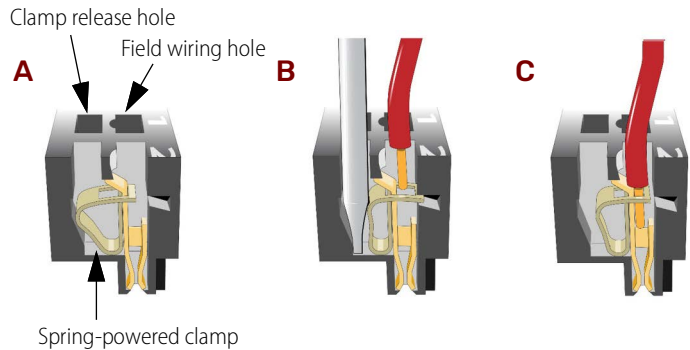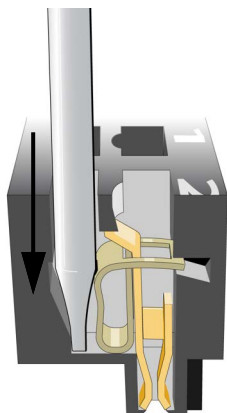
Inserting Wires

1. Orient the module or terminal connector to match the wiring diagrams on .

2. To make it easier to handle the screwdriver or the spring-clamp terminal tool and the field wires, secure the module or terminal connector:
   - If you are working with the terminal connector while it is attached to the module, make sure the module is screwed securely to the chassis.
   - If you are working only with the terminal connector, secure the terminal connector with a clamp.

3. Open the spring clamp:
   a. Insert the screwdriver or spring-clamp terminal tool into the clamp release hole, pressing the tool against the side of the hole furthest from the terminal numbers.
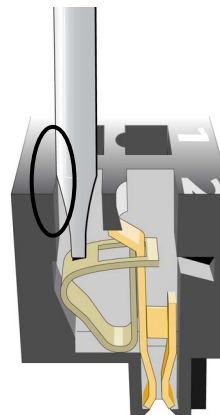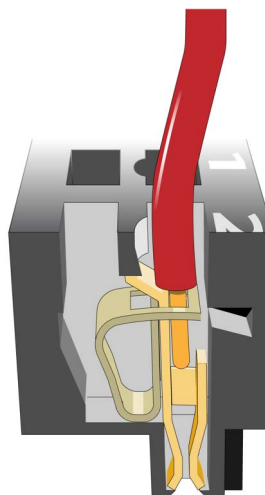
b. Press straight down firmly until you feel the screwdriver or tool reach the bottom.

Important: Let the shape of the tool, as it is pressed straight down, open the clamp. Do not rock or wiggle the tool because it may damage the clamp.


c. You can confirm that the clamp is open by looking into the field wiring hole.
- If the hole is dark, the clamp is open. You can go to the next step.
- If you see a shiny surface, repeat steps a through c. **Important:** Do not rock or wiggle the tool to try to open the clamp because it may damage the clamp.

4. Insert the wire into the field wiring hole.

5. Pull out the screwdriver or spring-clamp terminal tool. The spring returns to its original position and clamps down on the wire.
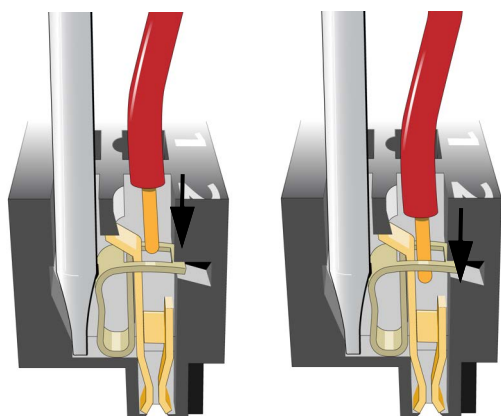
6. Test that the wire is secure by gently pulling on it. If the wire pulls out, repeat steps 3 and 4.

Removing Wires

1. Insert the screwdriver or spring-clamp terminal tool into the clamp release hole, pressing the tool against the side of the hole furthest from the terminal numbers.

2. Press straight down firmly until you feel the screwdriver or tool reach the bottom.

3. Pull the wire out.

4. Pull out the screwdriver or spring-clamp terminal tool. The spring returns to its original position.
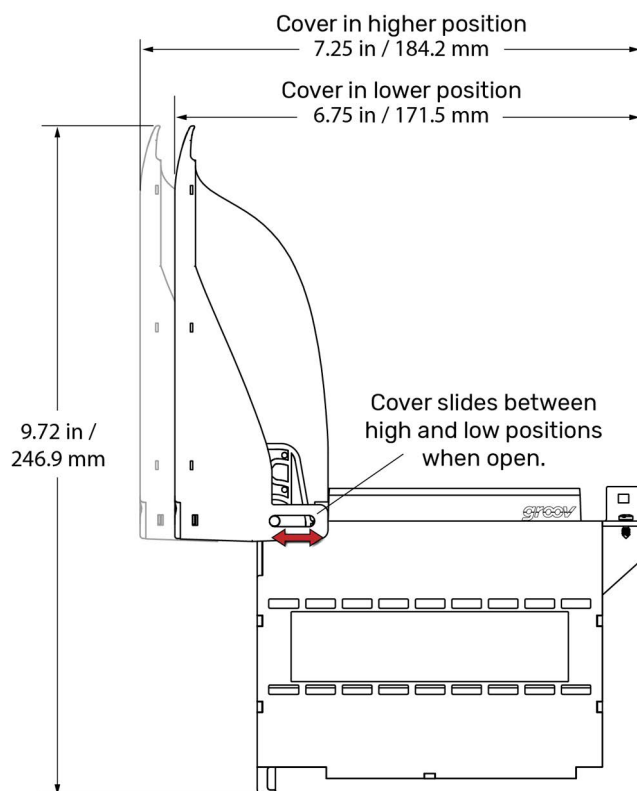
WIRING: GRV-MM1001-10

Notes:

1. You must supply external fusing.

2. Opto 22 recommends adding external fusing. Review the specification table for specific ratings. Compatible with an externally powered or self powered transmitter. Wiring for externally powered transmitter is shown on channels 0 and 1. Wiring for a self powered transmitter is shown on channels 2 and 3.

3. Thermocouple inputs and discrete sinking outputs cannot be mixed on channels 0-3.

4. Analog outputs configured as current on channels 4-7 provide excitation voltage for the loop; the excitation voltage cannot be disabled. Field power cannot be used, neither from a loop power supply nor a device that provides loop power.

DIMENSIONS: GRV-MM1001-10

Cover in higher position
7.25 in / 184.2 mm

Cover in lower position
6.75 in / 171.5 mm

9.72 in / 246.9 mm

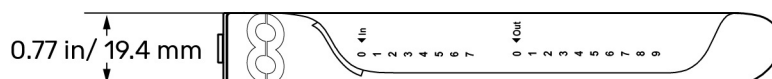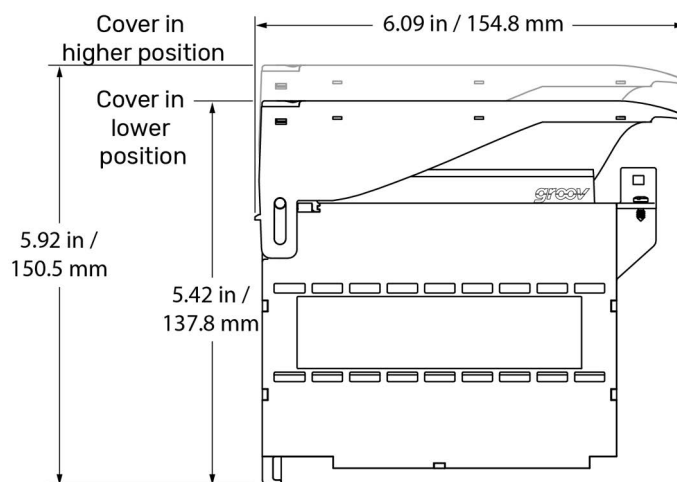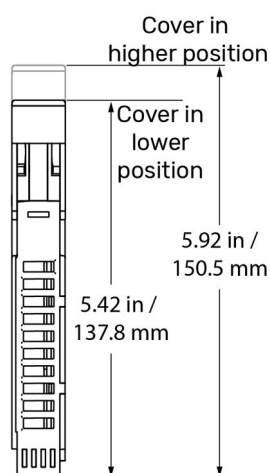Cover slides between high and low positions when open.

The module cover pivots and can be adjusted to two different heights (positions). The higher position provides more space to accommodate thicker wires.

To switch between higher and lower position, lift the cover to at least a 45° angle. Grasp the hinged end of the module cover and do one of the following:

- Pull up on the back hinge to slide it to the higher position.
- Push down on the back hinge to slide it to the lower position.

You cannot switch between the higher and lower positions while the cover is closed.

Cover in higher position

Cover in lower position

5.92 in / 150.5 mm

5.42 in / 137.8 mm

Cover in higher position

Cover in lower position

6.09 in / 154.8 mm

5.92 in / 150.5 mm

5.42 in / 137.8 mm

0.77 in/ 19.4 mm

DESCRIPTION OF MODULE PARTS

The following diagram identifies the parts of the modules. The installation instructions in the documentation rely on these terms to describe how to handle the module.
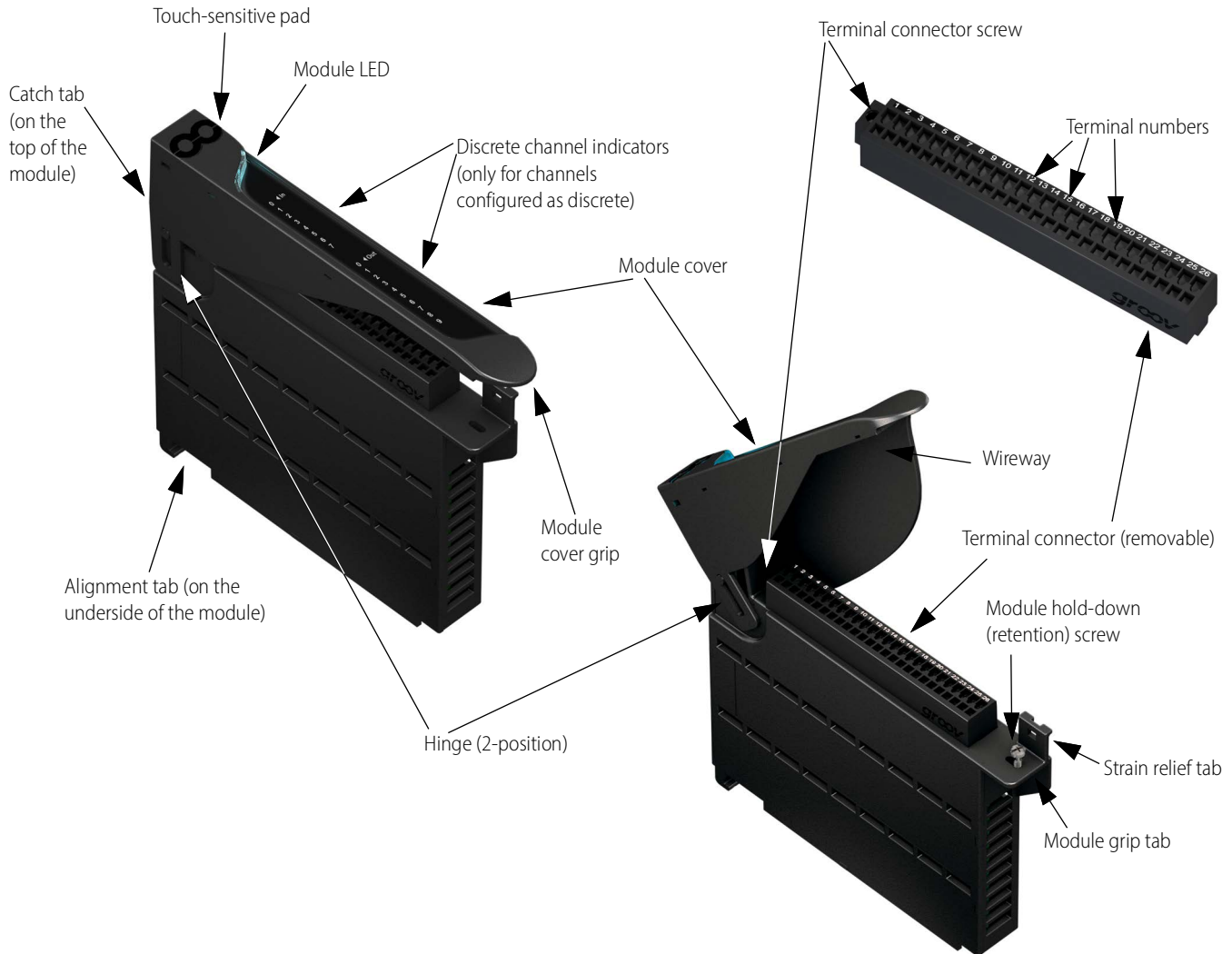

Some parts offer unique features:

- **Module LED**: Provides a visual indication of the health of the module. For example, if it is blue, the module is operating normally. If it is blinking blue, the module's information is being displayed on the *groov* EPIC processor's screen. For a complete list of the various colors that this LED might display, see the *groov* EPIC User's Guide (form 2267).

- **Hinge** and **Wireway**: These two features work together to provide more space for wires. The hinge can be adjusted between a lower position and a higher position. The wireway is the space underneath the module cover. To increase this space, you can raise the hinge to the higher position.

- **Touch-sensitive pad**: Offers a convenient way to display the module's information on the *groov* EPIC processor. Press on the pad for approximately two seconds and the processor displays that module's information on the screen, as well as changing the module LED to a blinking blue light.

- **Catch tab**: Located at the top of the module, the catch tab provides a place for the cover to "catch" or stop. This prevents the

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cover from closing so that you can work on attaching or detaching wires to the terminal connector.

Catch tab
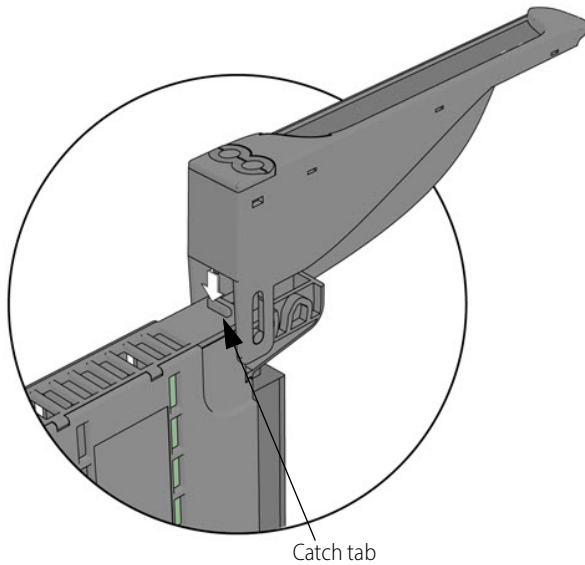
- **Strain relief tab**: This tab offers a way to collect wires into a bundle and secure them to the module. Attaching the wires to the strain relief tab can help hold the wires in a semi-fixed position, preventing them from interfering while you work on a nearby module. It also prevents strain on the part of the wire attached to the terminal connector.

  Collect the wires into a bundle, pull a zip tie through the hole in the tab, wrap the zip tie around the bundle and tab, and then clip the excess zip tie.

Strain relief tab

More about Opto 22
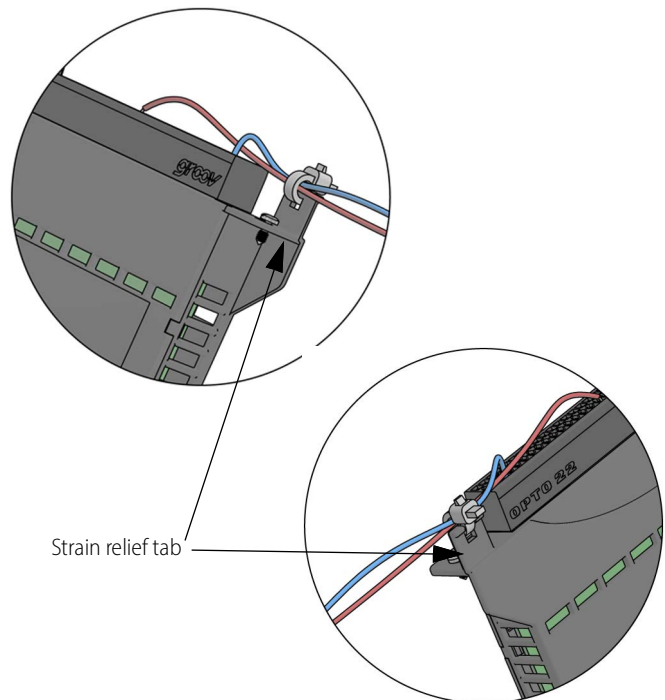
PRODUCTS

Opto 22 develops and manufactures reliable, easy-to-use, open standards-based hardware and software products. Industrial automation, process control, remote monitoring, data acquisition, and industrial internet of things (IIoT) applications worldwide all rely on Opto 22.

groov RIO®

groov RIO edge I/O offers a single, compact, PoE-powered industrial package with web-based configuration and IIoT software built in, support for multiple OT and IT protocols, and security features like a device firewall, data encryption, and user account control.

Standing alone, groov RIO connects to sensors, equipment, and legacy systems, collecting and securely publishing data from field to cloud. Choose a universal I/O model with thousands of possible field I/O configurations, with or without Ignition from Inductive Automation®, or a RIO EMU energy monitoring unit that reports 64 energy data values from 3-phase loads up to 600 VAC, Delta or Wye.

You can even write an IEC 61131-3 compliant control program to run on groov RIO, using CODESYS. You can also use groov RIO with a Modbus/TCP master or as remote I/O for a groov EPIC system.

groov EPIC® System

Opto 22's groov Edge Programmable Industrial Controller (EPIC) system gives you industrially hardened control with a flexible Linux®-based processor with gateway functions, guaranteed-for-life I/O, and software for your automation and IIoT applications.

groov EPIC Processor

The heart of the system is the groov EPIC processor. It handles a wide range of digital, analog, and serial functions for data collection, remote monitoring, process control, and discrete and hybrid manufacturing.

In addition, the EPIC provides secure data communications among physical assets, control systems, software applications, and online services, both on premises and in the cloud. No industrial PC needed.

Configuring and troubleshooting I/O and networking is easier with the EPIC's integrated high-resolution color touchscreen. Authorized users can manage the system locally on the touchscreen, on a monitor connected via the HDMI or USB ports, or on a PC or mobile device with a web browser.

groov EPIC I/O

groov I/O connects locally to sensors and equipment. Modules have a spring-clamp terminal strip, integrated wireway, swing-away cover, and LEDs indicating module health and discrete channel status. groov I/O is hot swappable, UL Hazardous Locations approved, and ATEX compliant.

groov EPIC Software

The groov EPIC processor comes ready to run the software you need:

- Programming: Choose flowchart-based PAC Control, CODESYS Development System for IEC61131-3 compliant programs, or secure shell access (SSH) to the Linux OS for custom applications
- Node-RED for creating simple IIoT logic flows from pre-built nodes
- Efficient MQTT data communications with string or Sparkplug data formats
- Multiple OPC UA server options
- HMI: groov View to build your own HMI viewable on touchscreen, PCs, and mobile devices; PAC Display for a Windows HMI; Node-RED dashboard UI
- Ignition or Ignition Edge® from Inductive Automation (requires license purchase) with OPC-UA drivers to Allen-Bradley®, Siemens®, and other control systems, and MQTT communications

Older products

From solid state relays, to world-famous G4 and SNAP I/O, to SNAP PAC controllers, older Opto 22 products are still supported and working hard at thousands of installations worldwide. You can count on us for the reliability and service you expect, now and in the future.

QUALITY

Founded in 1974, Opto 22 has established a worldwide reputation for high-quality products. All are made in the U.S.A. at our manufacturing facility in Temecula, California.

Because we test each product twice before it leaves our factory rather than testing a sample of each batch, we can afford to guarantee most solid-state relays and optically isolated I/O modules for life.

FREE PRODUCT SUPPORT

Opto 22's California-based Product Support Group offers free technical support for Opto 22 products from engineers with decades of training and experience. Support is available in English and Spanish by phone or email, Monday–Friday, 7 a.m. to 5 p.m. PST.

Support is always available on our website, including free online training at OptoU, how-to videos, user's guides, the Opto 22 KnowledgeBase, and OptoForums.

PURCHASING OPTO 22 PRODUCTS

Opto 22 products are sold directly and through a worldwide network of distributors, partners, and system integrators. For more information, contact Opto 22 headquarters at **800-321-6786** (toll-free in the U.S. and Canada) or **+1-951-695-3000**, or visit our website at www.opto22.com.

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