

Models GMTC, GMRTD, GMINI, GMINV - Graphite® Analog Input Modules

Installation Guide



- Dedicated high density input modules for the Graphite products
- Models available to accept ± 10 V, 0/4-20 mA, thermocouple and RTD inputs
- ± 10 V and 0/4-20 mA input versions fully scalable
- Unused inputs can be disabled to increase overall reading rate
- Ideal for data-acquisition applications



UL **US** FOR USE IN HAZARDOUS LOCATIONS:
 LISTED Class I, Division 2, Groups A, B, C, and D
 IND.CONT. EQ. T4
 E302106
 E317425



II 3 G Ex nA IIC T4 Gc
 $-40^{\circ}\text{C} \leq T_{\text{AMB}} \leq 75^{\circ}\text{C}$
 DEMKO 14 ATEX 1387X
 IECEx UL 15.0035X
 UL23UKEX2879X

GENERAL DESCRIPTION

The Model GMTC, GMRTD, GMINI, and GMINV are 16-bit analog input modules designed for use with the Graphite products. These modules provide a means of high-density signal measurement for data acquisition applications. The GMTC module accepts a wide range of thermocouple types, while the GMRTD accepts various RTD inputs. The GMINI and GMINV accept 0/4-20 mA and ± 10 V process signals, respectively.

The modules connect and communicate via proprietary USB connection to the various Graphite host devices. The Graphite host devices, equipped with serial ports as well as an Ethernet port(s), allows the system to share data with PCs, PLCs, and SCADA systems. The maximum number of modules varies for each Graphite host device, see specific models for details.

Once programmed, the module will continue to operate/control independent of the Graphite host device as long as power is applied. Remove power from the host device before installing or replacing any modules.

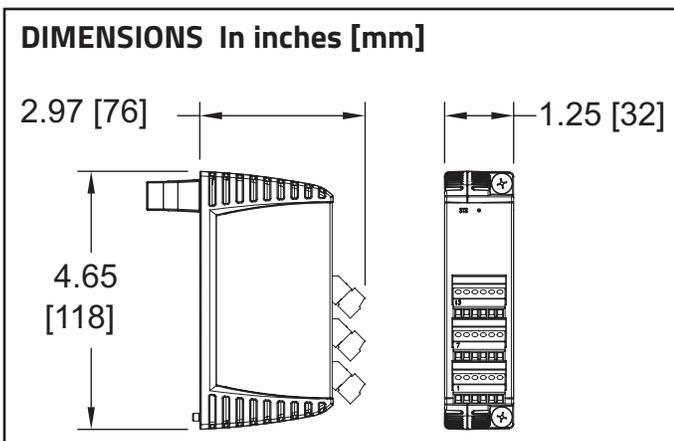
CONFIGURATION

The Graphite is configured with Windows® compatible Crimson® software. The software is an easy to use, graphical interface which provides a means of configuration and commissioning of new systems, as well as routine module re-calibration.

SAFETY SUMMARY

All safety related regulations, local codes as well as instructions that appear in this document or on equipment must be observed to ensure personal safety and to prevent damage to either the device or equipment connected to it.

Do not use these products to replace proper safety interlocking. No software-based device (or any other solid-state device) should ever be designed to be responsible for the maintenance of personnel safety or consequential equipment not equipped with safeguards. Red Lion disclaims any responsibility for damages, either direct or consequential, that result from the use of this equipment in a manner not consistent with these specifications.



CAUTION: Risk of Danger.
 Read complete instructions prior to installation and operation of the unit.

WARNING - EXPLOSION HAZARD - Do not disconnect equipment unless power has been switched off or area is known to be non-hazardous.

WARNING - EXPLOSION HAZARD - Substitution of components may impair suitability for Class I, Division 2

GENERAL SPECIFICATIONS

1. **POWER:** Power will be supplied by the Graphite host device. Some modules, depending on usage may consume high levels of power. This may limit the total number of modules that can be installed on a single Graphite host. Check the Graphite module and Graphite host data sheets for specific usage and power requirements.
GMINI8, GMINV8, GMRTD6 and GMTC8 Max Power: 1.4 W
2. **LEDs:**
 STS - Status LED shows module condition.
 ALM - Alarm LED is lit during any internal alarm condition.
3. **MEMORY:** Non-volatile memory retains all programmable parameters.
4. **ISOLATION LEVEL:** 500 Vrms @ 50/60 Hz for 1 minute between the Signal Inputs and the Host Power Supply Input.
5. **COMMUNICATIONS:** Provided by the Graphite host device
6. **ENVIRONMENTAL CONDITIONS:**
 Operating Temperature Range: -40 to 75 °C T_{AMB}, or lowest range among equipment used in your Graphite system.
 Consult the user manual or www.redlion.net/OpTemp for further details.
 Storage Temperature Range: -40 to +85 °C T_{AMB}
 Operating and Storage Humidity: 85% max relative humidity, non-condensing
 Altitude: Up to 2000 meters

7. CERTIFICATIONS AND COMPLIANCES:

- CE Approved**
 EN 61326-1 Immunity to Industrial Locations
 IEC/EN 61010-1
 RoHS Compliant
- ATEX/UKEX Approved**
 II 3 G Ex nA IIC T4 Gc
 DEMKO 14 ATEX 1387X
 EN 60079-0, -11, -15 -31
 UL23UKEX2879X
- IECEX Approved**
 Ex nA IIC T4 Gc
 IECEX UL 15.0035X
 IEC 60079-0, -11, -15 -31
- India PESO Approved:**
 A/P/HQ/MH/104/7441 (P549599)
- UL Listed:** File #E302106
- UL Hazardous:** File #E317425
- ABS Type Approval for Shipboard Applications**
- 8. **CONSTRUCTION:** Case body is all metal construction.
- 9. **CONNECTIONS:** Removable wire clamp screw terminal blocks
 Wire Gage: 28-16 AWG (0.32 mm - 1.29 mm) terminal gage wire
 Torque: 1.95-2.21 inch-lbs (0.22-0.25 N-m)
- 10. **MOUNTING:** Screws to host
- 11. **WEIGHT:** 8 oz (224 g)

GMTC8 SPECIFICATIONS

12. INPUTS:

Channels: 8 single-ended
 Effective Resolution: Full 16-bit
 Sample Time: 50 msec - 400 msec, depending on number of enabled inputs.

ENABLED INPUTS	SCAN TIME (READING RATE)
1	50 msec (20 Hz)
2	100 msec (10 Hz)
3	150 msec (6.7 Hz)
4	200 msec (5 Hz)
5	250 msec (4 Hz)
6	300 msec (3.3 Hz)
7	350 msec (2.9 Hz)
8	400 msec (2.5 Hz)

Common Mode Rejection: >110 dB, 50/60 Hz
 Normal Mode Rejection: >90 dB, 50/60 Hz
 Temperature Coefficient: 0.01%/°C
 Step Response Time: One scan time (to within 99% of final value)
 Types: T, E, J, K, R, S, B, N, C
 Slope & Offset: Provides sensor error correction
 Input Impedance: 20 M Ω
 Lead Resistance Effect: 0.25 μV/Ω
 Cold Junction Compensation: Less than ±1 °C typical (±1.5 °C max) over -40 to 75 °C ambient temperature
 Resolution: 0.1°

TYPE	MEASUREMENT RANGE	WIRE COLOR	
		ANSI	BS 1843
T	-200 to +400 °C -328 to +752 °F	(+) Blue (-) Red	(+) White (-) Blue
E	-200 to +730 °C -328 to +1346 °F	(+) Violet (-) Red	(+) Brown (-) Blue
J	-200 to +760 °C -328 to +1400 °F	(+) White (-) Red	(+) Yellow (-) Blue
K	-200 to +1350 °C -328 to +2462 °F	(+) Yellow (-) Red	(+) Brown (-) Blue
R	0 to +1768 °C +32 to +3214 °F	No Standard	(+) White (-) Blue
S	0 to +1768 °C +32 to +3214 °F	No Standard	(+) White (-) Blue
B	+149 to +1820 °C +300 to +3308 °F	No Standard	No Standard
N	-200 to +1300 °C -328 to +2372 °F	(+) Orange (-) Red	(+) Orange (-) Blue
C W5/W6	0 to +2315 °C +32 to +4199 °F	No Standard	No Standard
Millivolt	-10.00 to +56.00 mV	No Standard	No Standard

13. **TEMPERATURE INDICATION ACCURACY:** ± (0.3% of span, +1 °C). Includes NIST conformity, cold junction effect, A/D conversion errors, temperature coefficient and linearization conformity at 23 °C after 20 minute warm up.
14. **PROBE BREAK RESPONSE:** Upscale drive, Input Fault Alarm bit set high, ALM LED illuminates.

GMRTD6 SPECIFICATIONS

15. RTD INPUTS:

Channels: 6 single-ended
 Effective Resolution: Full 16-bit
 Sample Time: 67 msec - 400 msec, depending on enabled inputs.

ENABLED INPUTS	SCAN TIME (READING RATE)
1	67 msec (14.9 Hz)
2	133 msec(7.5 Hz)
3	200 msec (5 Hz)
4	267 msec (3.8 Hz)
5	333 msec (3 Hz)
6	400 msec (2.5 Hz)

Common Mode Rejection: >110 dB, 50/60 Hz
 Normal Mode Rejection: >90 dB, 50/60 Hz
 Temperature Coefficient: 0.01%/°C
 Step Response Time: One scan time (to within 99% of final value)
 Type: 2 or 3 wire
 Excitation: 150 µA
 Lead Resistance: 15 Ω Max
 Resolution: 0.1°

Slope & Offset: Provides sensor error correction

TYPE	INPUT TYPE	RANGE	ACCURACY 18 TO 28°C	ACCURACY -40 TO 75°C
385	100 Ω platinum, Alpha = .00385	-200 to +600 °C -328 to +1100 °F	± (0.1% of span)	± (0.2% of span)
392	100 Ω platinum, Alpha = .003919	-200 to +600 °C -328 to +1100 °F	± (0.1% of span)	± (0.2% of span)
672	120 Ω nickel, Alpha = .00672	-80 to +215 °C -112 to +419 °F	± (0.1% of span)	± (0.2% of span)
Ohms	Linear resistance	0 Ω to 300 Ω	± (0.1% of span)	± (0.2% of span)
428	50 Ω copper, Alpha = .00428	-50 to +200 °C -58 to +392 °F	± (0.6% of span)	± (1.2% of span)

16. TEMPERATURE INDICATION ACCURACY: Includes NIST conformity, A/D conversion errors, temperature coefficient and linearization conformity at 23 °C after 20 minute warm up.
17. PROBE BREAK RESPONSE: If channel is enabled: upscale drive, Input Fault Alarm bit set high, ALM LED illuminates.

GMINI8 SPECIFICATIONS

18. INPUTS:

Channels: 8 single-ended
 Ranges: 0-20 mA or 4-20 mA
 Effective Resolution: Full 16-bit
 Programmable Scaling: ±30,000
 Sample Time: 50 msec - 400 msec, depending on number of enabled inputs.

ENABLED INPUTS	SCAN TIME (READING RATE)
1	50 msec (20 Hz)
2	100 msec (10 Hz)
3	150 msec (6.7 Hz)
4	200 msec (5 Hz)
5	250 msec (4 Hz)
6	300 msec (3.3 Hz)
7	350 msec (2.9 Hz)
8	400 msec (2.5 Hz)

Common Mode Rejection: >110 dB, 50/60 Hz
 Normal Mode Rejection: >90 dB, 50/60 Hz
 Step Response Time: One scan time (to within 99% of final value)
 Input Impedance: 10 Ω
 Max. Continuous Overload: 100 mA

19. ACCURACY: ±0.1% of span
20. INPUT FAULT RESPONSE: Upscale Drive, Input Fault Alarm bit set high, ALM LED illuminates below -3 mA, and above 23 mA for 0-20 mA range; below +3 mA and above 23 mA for 4-20 mA signals.

GMINV8 SPECIFICATIONS

21. INPUTS:

Channels: 8 single-ended
 Ranges: 0-10 VDC or ± 10 VDC
 Effective Resolution: Full 16-bit
 Programmable Scaling: $\pm 30,000$
 Sample Time: 50 msec - 400 msec, depending on number of enabled inputs.

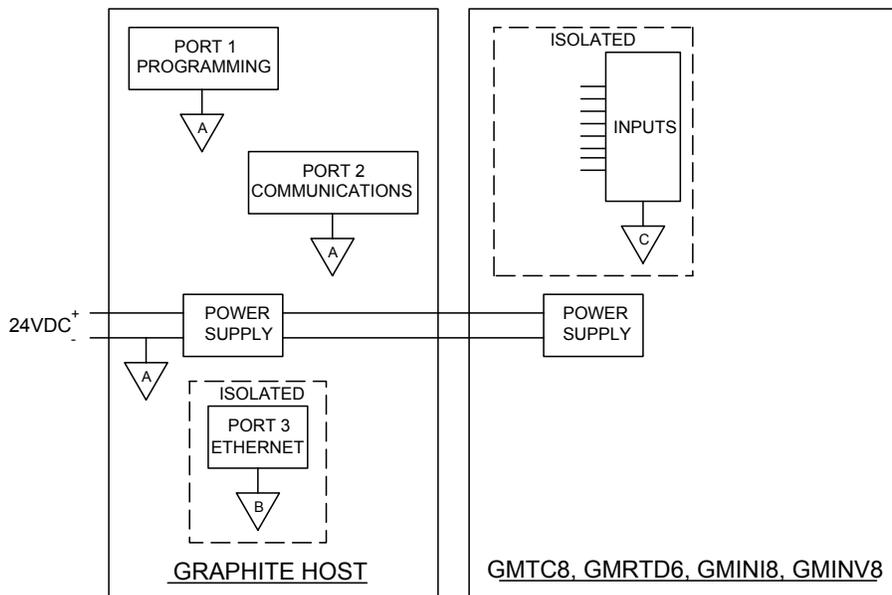
ENABLED INPUTS	SCAN TIME (READING RATE)
1	50 msec (20 Hz)
2	100 msec (10 Hz)
3	150 msec (6.7 Hz)
4	200 msec (5 Hz)
5	250 msec (4 Hz)
6	300 msec (3.3 Hz)
7	350 msec (2.9 Hz)
8	400 msec (2.5 Hz)

Common Mode Rejection: >110 dB, 50/60 Hz
 Normal Mode Rejection: >90 dB, 50/60 Hz
 Step Response Time: One scan time (to within 99% of final value)
 Input Impedance: 10 M Ω
 Max. Continuous Overload: 50 V

22. ACCURACY: $\pm 0.1\%$ of span

23. **INPUT FAULT RESPONSE:** Upscale Drive, Input Fault Alarm bit set high, ALM LED illuminates below -10.4 VDC and above +10.4 VDC.

Block Diagram for GMTC8, GMRTD6, GMINI8 & GMINV8



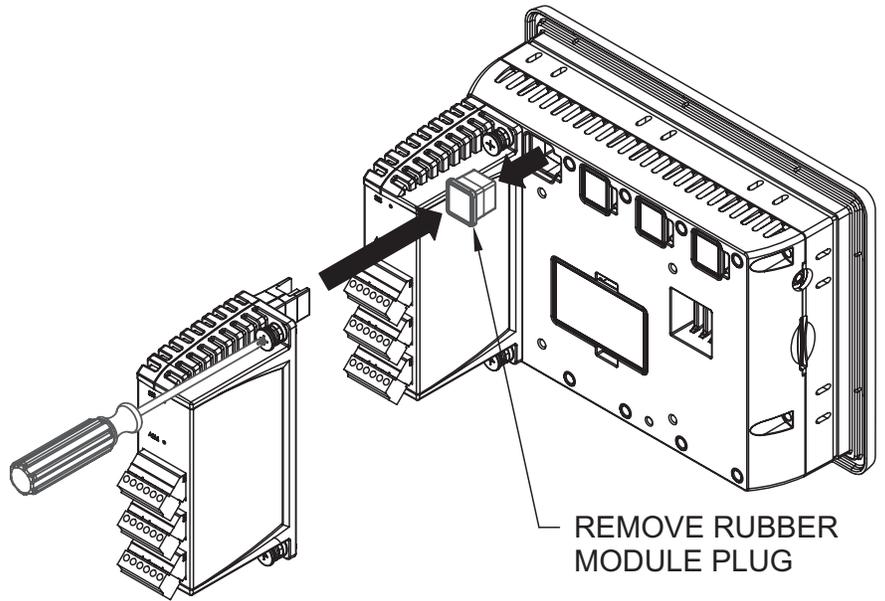
EMC INSTALLATION GUIDELINES

Visit <http://www.redlion.net/emi> for more information on EMI guidelines, Safety and CE issues as they relate to Red Lion products.

HARDWARE INSTALLATION

The physical order of all installed modules must match the modules order in Crimson. Torque screws to 6.0 pound-force inch [96 ounce-force inch] (0.68 Nm).

 **WARNING:** Disconnect all power to the unit before installing or removing modules.

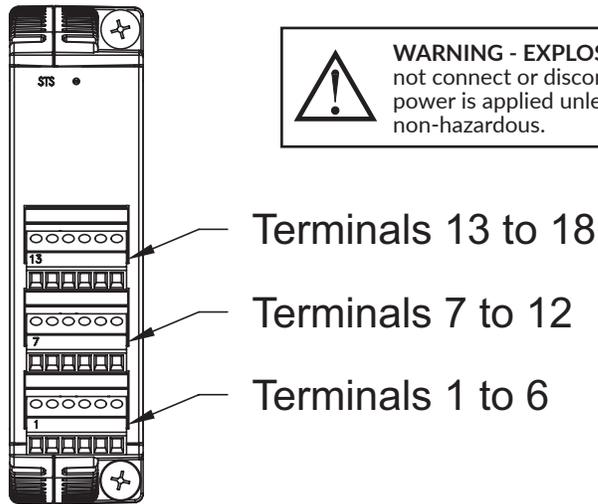


WIRING

Wiring Connections

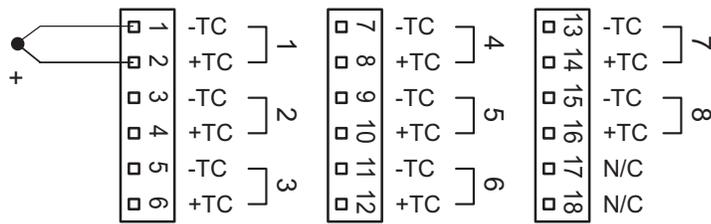
All conductors should meet voltage and current ratings for each terminal. Also, cabling should conform to appropriate standards of good installation, local codes and regulations and be suitably rated for the temperatures of the environment to which it is being installed. When wiring the module, use the numbers on the label to identify the position number with the proper function. Strip the wire, leaving approximately 1/4" (6 mm) of bare wire exposed. Insert the wire into the terminal, and tighten.

 **WARNING - EXPLOSION HAZARD -** Do not connect or disconnect cables while power is applied unless area is know to be non-hazardous.

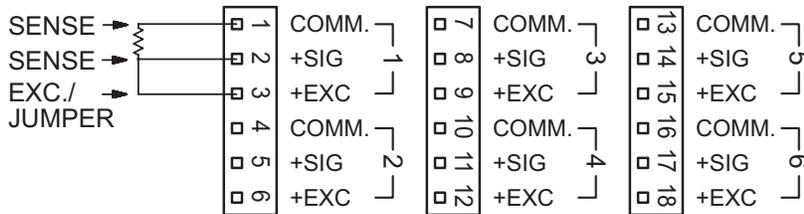


Input Connections

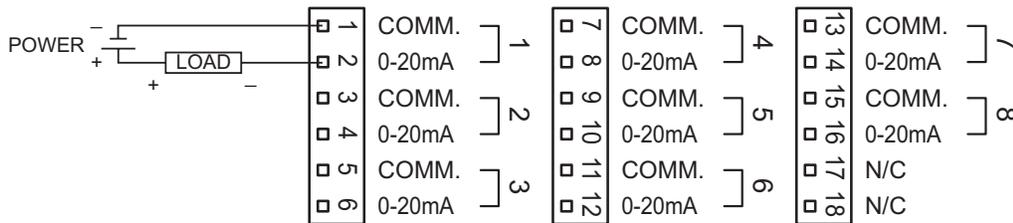
GMTC



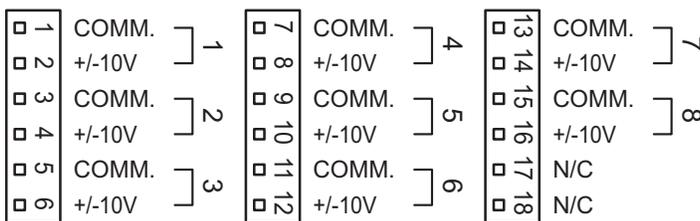
GMRTD



GMINI



GMINV



LEDs

STS – Status LED

The Status LED is a green LED that provides information regarding the state of the module. This includes indication of the various stages of the start-up routine (power-up), as well as any errors that may occur.

Startup Routine

LED	INDICATION
Off	Module is currently running the boot loader and/or being flash upgraded by Crimson.
Flashing Green	Module switching to configuration.
Green	Module performing normally.

Error States

LED	INDICATION
Flashing Green	Module is controlling properly, but has lost communication with the Host.

ALM – Alarm LED

The Alarm LED indicates the presence of an input fault condition. When one or more Input Fault Alarm bits is high, the LED turns on. The alarms may be disabled for unused inputs.

FIRMWARE UPGRADE

The module's firmware is stored in flash memory so that software/hardware conflicts are avoided, and so features can be added in the future.

During a download, Crimson compares its own library of firmware files with those stored in the module. If they do not match, Crimson will download the necessary firmware.

CONFIGURATION

Programming is done via Crimson® software, a Windows® compatible configuration interface. Please see the Crimson manual for more information.

RED LION CONTROLS TECHNICAL SUPPORT

If for any reason you have trouble operating, connecting, or simply have questions concerning your new product, contact Red Lion’s technical support.

Support: support.redlion.net

Website: www.redlion.net

Inside US: +1 (877) 432-9908

Outside US: +1 (717) 767-6511

Red Lion Controls, Inc.

35 Willow Springs Circle York, PA 17406

ORDERING INFORMATION

DESCRIPTION	PART NUMBER
Graphite Module, 8 DC Current Inputs	GMINI800
Graphite Module, 8 DC Voltage Inputs	GMINV800
Graphite Module, 8 Thermocouple Inputs	GMTC8000
Graphite Module, 6 RTD Inputs	GMRTD600

A listing of the entire Graphite family of products and accessories can be found at www.redlion.net.

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