



SEMAPHORE

## Semaphore G3 Remote I/O Module



The Semaphore G3 Remote I/O Module enables remote monitoring and control in a broad range of applications. Fitted with an onboard, license-free, spread spectrum radio, the G3 allows users to reach end devices or process units that would prove too difficult or costly using traditional connections.

The G3 is also highly versatile. It can be operated as remote I/O or in a back-to-back mode. Remote I/O modes support Modbus and Kingfisher protocols, which readily drop into practically all SCADA systems. In back-to-back mode, two G3 Modules make up a system that operates as a wire replacement, which is ideal for secure I/O transfer in any application.

## Semaphore G3 at a glance

The G3 Remote I/O Module uses a friendly, compact package to provide ease in configuration and rapid startup. The G3 includes:



### Wireless Effective Range\*

900 MHz  
20 miles/32 kms

2.4 GHz  
5 miles/8 kms

\*(Line of sight) Effective range is subject to local conditions and antenna selection.

#### Award-winning, compact package

Very small footprint, rugged enclosure is readily accommodated in instrument cabinets.

#### Color OLED display

Color organic light-emitting diode (OLED) screen displays important system parameters and status information in real time and in easy-to-read, high-contrast, 16-bit color.

#### Onboard I/O

The G3 includes a total of eight I/O points in an effective mixture: 2 AI, 2 DI, 2 AO, and 2 DO. Analog I/O points can operate as discrete points, if required. A pluggable terminal block eases wiring and installation.

#### Logic functions

Built-in logic functions allow basic control of inputs and outputs.

#### Serial or wireless communications

The G3 provides a selection of optional RS-232, RS-485, or license-free, spread spectrum radios that eliminate hard wiring.

#### Event logging

The G3 captures events as they happen and includes time and date stamping.

#### Free software utility

Using a Windows-based PC, G3Manager software provides for rapid setup of a G3. Event logs can also be downloaded from the G3 for archiving.

#### Mini-USB connector

An onboard USB connector is provided for programming via a laptop/PC.

## Applications

The G3 Remote I/O Module extends the reach of controllers and SCADA systems to remote locations in Semaphore's traditional end-use industries and more. Users in the agriculture, broadcast/telecom, infrastructure management, oil & gas, power, transportation, and water/wastewater industries will find the G3 cost-effective for sites that require up to eight I/O points.

## Versatile operating modes

While the G3 is normally used as a remote I/O module, it also effectively supports back-to-back operation. This very flexible product can be used in a number of ways:

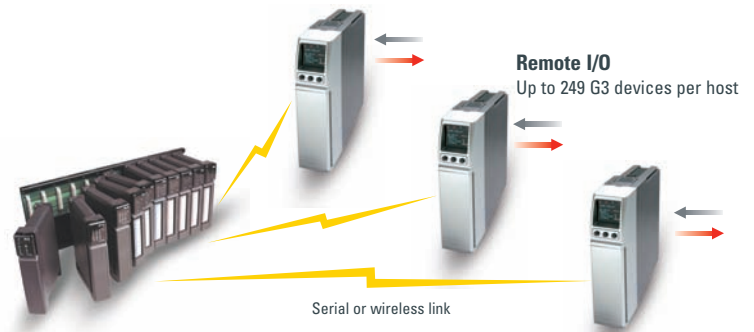
### 1 Back-to-back mode

Two G3 modules operating in this mode collectively function as a wire replacement for all eight I/O points. This configuration is typical of many tone telemetry applications. The two modules start up very quickly in the mode and eliminate the need for installation of cables, phone lines, conduits, etc.



### 2 Kingfisher remote I/O mode

The Kingfisher remote I/O mode allows connection of up to 249 G3 Modules to a Kingfisher Series II or Kingfisher Plus+ SCADA system. The G3 Modules extend the reach of an RTU to remote areas with or without wiring.



### 3 Modbus remote I/O mode

Since it supports Modbus RTU slave, the G3 can readily be added to a broad array of existing PLCs, RTUs, and SCADA HMIs using RS-232 or RS-485, or via wireless with the proven Maxstream spread spectrum radio.



# SEMAPHORE G3 REMOTE I/O SPECIFICATIONS

## Processing

Microprocessor type	TI MSP430 (16-bit)
Memory flash + RAM	48 KB+10 KB

## Communications

Serial comms (optional)	RS-232/RS-485
Wireless comms (optional)	License-free, frequency-hopping spread spectrum (900 MHz & 2.4 GHz)
Communications strategy	RBE (report-by-exception) & polled. User configurable.
Transmit power (spread spectrum)	900 MHz — 1 W 2.4 GHz — 50 mW
Line-of-sight range (spread spectrum)	Subject to local conditions and antenna selection 900 MHz — up to 20 miles/32 kms 2.4 GHz — up to 5 miles/8 kms
Receiver sensitivity (spread spectrum)	900 MHz — 110 dBm 2.4 GHz — 105 dBm
Frequency (spread spectrum)	900 US/CAN: ISM 902 — 928 MHz 900 AU: ISM 915 — 928 MHz 2.4: ISM 2.4000 — 2.4835 GHz
Data rate (spread spectrum)	Normal 9600 bps. High-speed mode 115 kbps.

## I/O capability

Analog inputs	Two 0-20 mA or 4-20 mA inputs. 12-bit resolution. Terminating resistance: 100 $\Omega$ . Input impedance 250 $\Omega$ . Overcurrent and overvoltage protected. Surge and transient protected.
Analog outputs	Two 0-20 mA or 4-20 mA outputs. 12-bit resolution. Maximum load 1275 $\Omega$ @ 30 V. Designed for field voltages of 9 V to 30 V. Overvoltage and reverse voltage protected. Surge and transient protected
Discrete inputs	Two inputs accepting levels up to 24 V, with a low-to-high threshold of approx 2.5 V. Surge and transient protected.
Discrete outputs	Two open collector outputs, switch voltages of up to 30 V to ground. Switched supply voltage is available for driving inputs and outputs. Surge and transient protected.
I/O fail-safe	Yes. Programmable fail-safe setpoints on all analog and digital outputs.

## Onboard display

Display	96 $\times$ 64 pixel OLED with navigation keys Shows status, I/O values, configuration details, etc.
Status LEDs	4 $\times$ status LEDs. Power, scan, comms, and error.
Control mode	Yes, user can toggle/change inputs and outputs via front keypad for testing purposes

## Power

Supply voltage	9 to 30 V dc, nominally 12 V or 24 V Fuse protected (1A resettable). Overvoltage and reverse voltage protected. Input voltage is monitored.
Supply current (@ 12 V dc)	Up to 400 mA TX on, 20 mA operating, <5 mA in sleep mode
Output power	Supply voltage up to 200 mA

## General

Programming port	Mini-USB 2.0 port for configuration and diagnostics. ESD protected to 20 kV.
Operating modes	Stand-alone, back-to-back, remote I/O (maximum 249 devices per SCADA host), Modbus RTU (slave)
Real-time clock (RTC)	Yes, onboard real-time clock
Security	Password protected menus, encrypted communications, and configurable network ID
Event logging	Last 1000 events with time and date stamping
Counters	2 $\times$ general-purpose 32-bit counters with programmable events for use in functions

## Programming

Programming software	Kingfisher G3Manager configuration and programming software
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## Environment

Environmental	-40° to +70°C (-20° to +70°C for OLED display)
Relative humidity	5-95% noncondensing
Approvals	UL, CSA, C-Tick, FCC, CE, Class 1/Division 2

[www.cse-semaphore.com](http://www.cse-semaphore.com)

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