TECHNICAL DATASHEET

SIM-G2

Serial Interface Module (2x Gasguard controller comms bridge)

Summary

The iMAC SIM-G2 Serial Interface Module provides an intrinsically safe communication bridge between the iMAC System and two Gasguard controllers. The SIM-G2 operates as Modbus RS485 RTU Master device and uses Modbus commands to retrieve data from two multi-dropped slave connected Gasguard controllers. This data is then packaged into 16 iMAC registers which are forwarded onto the iMAC controller via the iMAC fieldbus.

The SIM-G2 RS485 interface requires a local intrinsically safe power supply, however, the main CPU of SIM-G2 is powered directly from the iMAC fieldbus allowing the device to communicate information about its status regardless of whether the local power supply is available or not.

The RS485 interface is fully electrically isolated from the iMAC fieldbus, eliminating the possibility of ground loops between the Gasguard systems and the iMAC system. The RS485 interface is intrinsically safe with an assigned set of entity parameters which must be matched accordingly when connecting to other intrinsically safe devices.

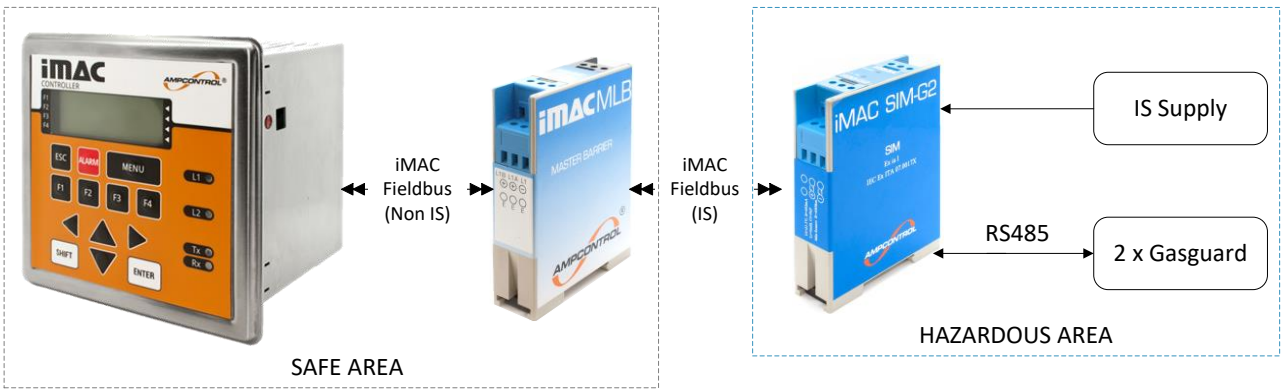
Data Register(s)

16 (Alarm Flags, Analogue Values, RS485 Error Counter, Serial Number)

Features

- Intrinsically Safe IECEx Ex ia Group I Ma
- Provides communication bridge between iMAC system and two Gasguard controllers
- Partially down-line powered from the iMAC L1 Fieldbus
- Multifunction iMAC fieldbus diagnostic status LED
- RS485 activity LED
- RS485 port electrically isolated
- Remotely monitored and configured via the iMAC Controller
- Standard DIN rail mounting

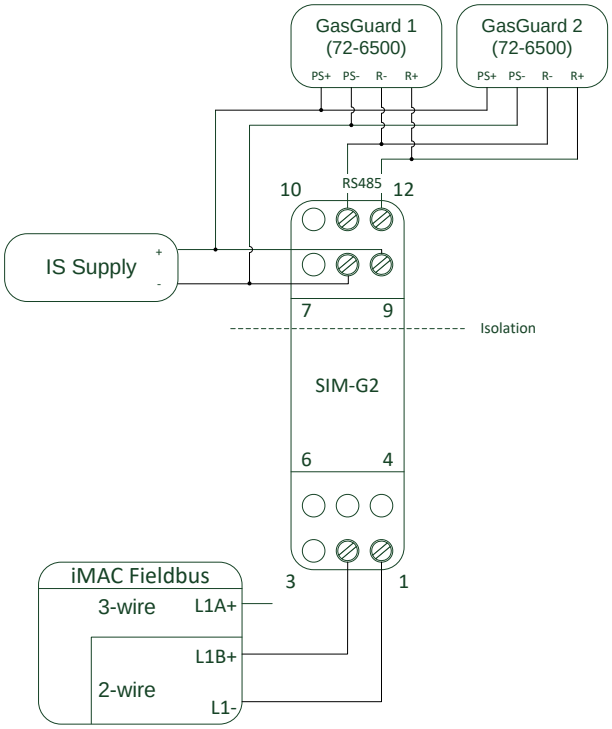
Minimum System



CAUTION!

Modules used in non-I.S. systems shall not be re-used in I.S. systems (as the integrity of internal components upon which intrinsic safety depends may have been compromised).

Electrical Connections



Note: refer to iMACB094 – iMAC Installation Requirements

Terminal	Label	Type	Description
1	L1-	L1 comms	iMAC Fieldbus (2 wire)
2	L1+		
3 - 7	-	-	-
8	PS-	Power supply input	DC
9	PS+		
10	-	-	-
11	RS485 TR-	RS485 comms	Interface for up to two Gasguard controllers
12	RS485 TR+		

Data Register(s)

Register 1 – Controller 1 Flags (iMAC SIM-G Address+0)				
Bit	**Description**	**Bit Value**	**R / W**	**Modbus Register**
15	Zone 4	1 = Active	r	10036
14	Zone 3	1 = Active	r	10035
13	Relay 2	1 = Active	r	00002
12	Channel 2 – High Fault	1 = Alarm	r	10013
11	Channel 2 – Alarm 3	1 = Alarm	r	10012
10	Channel 2 – Alarm 2	1 = Alarm	r	10011
9	Channel 2 – Alarm 1	1 = Alarm	r	10010
8	Channel 2 – Low Fault	1 = Alarm	r	10009
7	Zone 2	1 = Active	r	10034
6	Zone 1	1 = Active	r	10033
5	Relay 1	1 = Active	r	00001
4	Channel 1 – High Fault	1 = Alarm	r	10005
3	Channel 1 – Alarm 3	1 = Alarm	r	10004
2	Channel 1 – Alarm 2	1 = Alarm	r	10003
1	Channel 1 – Alarm 1	1 = Alarm	r	10002
0	Channel 1 – Low Fault	1 = Alarm	r	10001

Register 2 – Controller 1 Flags (iMAC SIM-G Address+1)				
Bit	**Description**	**Bit Value**	**R / W**	**Modbus Register**
15	RS485 Comms Status Error	1 = Error	r	-
14	Not used	X	r	-
13	Relay 4	1 = Active	r	00004
12	Channel 4 – High Fault	1 = Alarm	r	10029
11	Channel 4 – Alarm 3	1 = Alarm	r	10028
10	Channel 4 – Alarm 2	1 = Alarm	r	10027
9	Channel 4 – Alarm 1	1 = Alarm	r	10026
8	Channel 4 – Low Fault	1 = Alarm	r	10025
7	Zone 6	1 = Active	r	10038
6	Zone 5	1 = Active	r	10037
5	Relay 3	1 = Active	r	00003
4	Channel 3 – High Fault	1 = Alarm	r	10021
3	Channel 3 – Alarm 3	1 = Alarm	r	10020
2	Channel 3 – Alarm 2	1 = Alarm	r	10019
1	Channel 3 – Alarm 1	1 = Alarm	r	10018
0	Channel 3 – Low Fault	1 = Alarm	r	10017

Register 3 – Controller 2 Flags (iMAC SIM-G Address+2)				
Bit	**Description**	**Bit Value**	**R / W**	**Modbus Register**
15	Zone 4	1 = Active	r	10036
14	Zone 3	1 = Active	r	10035
13	Relay 2	1 = Active	r	00002
12	Channel 2 – High Fault	1 = Alarm	r	10013
11	Channel 2 – Alarm 3	1 = Alarm	r	10012
10	Channel 2 – Alarm 2	1 = Alarm	r	10011
9	Channel 2 – Alarm 1	1 = Alarm	r	10010
8	Channel 2 – Low Fault	1 = Alarm	r	10009
7	Zone 2	1 = Active	r	10034
6	Zone 1	1 = Active	r	10033
5	Relay 1	1 = Active	r	00001
4	Channel 1 – High Fault	1 = Alarm	r	10005
3	Channel 1 – Alarm 3	1 = Alarm	r	10004
2	Channel 1 – Alarm 2	1 = Alarm	r	10003
1	Channel 1 – Alarm 1	1 = Alarm	r	10002
0	Channel 1 – Low Fault	1 = Alarm	r	10001

Register 4 – Controller 2 Flags (iMAC SIM-G2 Address+3)				
Bit	**Description**	**Bit Value**	**R / W**	**Modbus Register**
15	RS485 Comms Status Error	1 = Error	r	-
14	Not used	X	r	-
13	Relay 4	1 = Active	r	00004
12	Channel 4 – High Fault	1 = Alarm	r	10029
11	Channel 4 – Alarm 3	1 = Alarm	r	10028
10	Channel 4 – Alarm 2	1 = Alarm	r	10027
9	Channel 4 – Alarm 1	1 = Alarm	r	10026
8	Channel 4 – Low Fault	1 = Alarm	r	10025
7	Zone 6	1 = Active	r	10038
6	Zone 5	1 = Active	r	10037
5	Relay 3	1 = Active	r	00003
4	Channel 3 – High Fault	1 = Alarm	r	10021
3	Channel 3 – Alarm 3	1 = Alarm	r	10020
2	Channel 3 – Alarm 2	1 = Alarm	r	10019
1	Channel 3 – Alarm 1	1 = Alarm	r	10018
0	Channel 3 – Low Fault	1 = Alarm	r	10017

Registers 5 to 16 – Analogue Data (iMAC SIM-G2 Address+4 to +15)			
Register	**Description**	**R / W**	**Modbus Register**
5	Controller 1 Channel 1 Analogue Input	r	30005
6	Controller 1 Channel 2 Analogue Input	r	30006
7	Controller 1 Channel 3 Analogue Input	r	30007
8	Controller 1 Channel 4 Analogue Input	r	30008
9	Channels Display Format Values (High Byte: Controller 2 / Low Byte: Controller 1)	r	30009
10	Controller 2 Channel 1 Analogue Input	r	30010
11	Controller 2 Channel 2 Analogue Input	r	30011
12	Controller 2 Channel 3 Analogue Input	r	30012
13	Controller 2 Channel 4 Analogue Input	r	30013
14	Error Count for RS485 Communication with Controller 1	r	-
15	Error Count for RS485 Communication with Controller 2	r	-
16	SIM-G2 serial number	r	-

Configuration Parameters

(Refer to document IMACB005 - iMAC module parameters programming procedure)

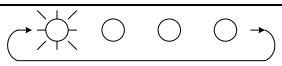
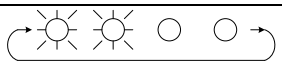
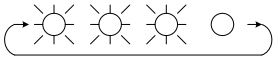
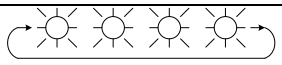
SIM-G2 Parameters (roll-call name: SIM-G2 Module)					
No	**Description**	**Range**	**Default**	**Units**	**R/W**
1	First Data register address of this SIM-G2 module	1 - 255	150	-	r / w
2	Gasguard controller 1 – Modbus slave address	01h – 1Fh (1 – 31)	01h	-	r / w
3	Gasguard controller 2 – Modbus slave address	01h – 1Fh (1 – 31)	02h	-	r / w
4	Not used (Factory use)	-	-	-	r

Functional Logic

The SIM-G2 issues four Master Modbus transactions to read required data from each slave Gasguard Controllers. It issues four transactions to Slave 1, then four to Slave 2, then repeats. The Master Modbus transactions occur at the rate of one every iMAC refresh cycle (the time it takes to read all 255 iMAC fieldbus addresses). The read Modbus data is repackaged into the SIM-G2 iMAC data registers and published onto the iMAC fieldbus. The approximate time taken to read and transfer all the specified data for both Gasguard Controllers to iMAC Controller is dictated by the iMAC Linespeed setting as follows:

iMAC Controller Linespeed (baud)	1000	500	300
SIM-G2 data transfer time (seconds)	72s (36s/slave)	144s (72s/slave)	240s (120s/slave)

If a RS485 Modbus error occurs, the corresponding RS485 flag is set and the corresponding RS485 Error Counter register is incremented. The RS485 error flag is cleared on the next successful RS485 Modbus transaction. Both the flag and error counters are cleared on a SIM-G2 Fieldbus power-up cycle.

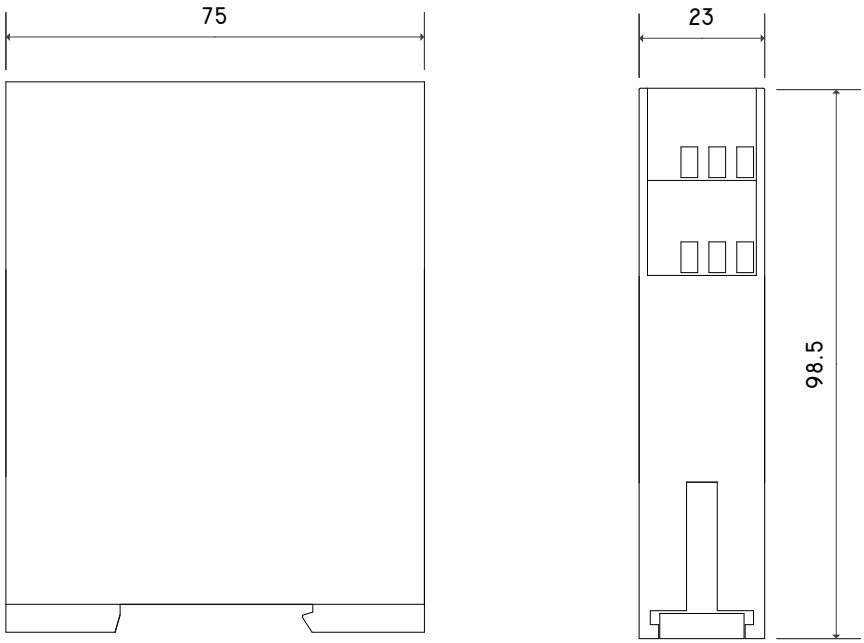
LED Indicators			
Status LED (L1 OK)			
Flash Sequence		**Module - iMAC Comms Status**	**Module - Function Status**
Off	-	Unknown (check connections)	Unknown (check connections)
Slow Flash		Healthy	-
2 Flashes		Healthy (has been roll-called)	-
3 Flashes		Error (address clash)	-
Fast Flash		Error (general)	RS485 is not functioning correctly
RS485 LED			
Off	Module is not currently receiving data from the Gasguard controller		
Flash	Module is transmitting or receiving data on the RS485 link (RS485 activity)		

Certification / Approvals		
Type	Ex ia I Ma (for use in zone 0, 1 or 2)	
Certificate number	IECEx ITA 07.0017X	
Module type	SIM	
IP rating	Must be installed in an enclosure not less than IP54	
Other	Must be connected in accordance with iMAC system drawing IMACZ032. L1+ L1- terminals must only connect to a single MLB (Master Line Barrier).	
I/O parameters	L1+, L1- (Terminals 1 & 2)	Ui = 21.5V (44.65R source resistor) Ci = Negligible Li = Negligible
	PS+, PS- (Terminals 8 & 9)	Ui = 16.5V Ii = 3.5A Ci = negligible Li = negligible
	TR+. TR- (Terminals 11 & 12)	Ui = 7.14V Ii = 2A Ci = negligible Li = negligible
	TR+, TR- (Terminals 11 & 12)	Ui = 7.14V Ii = 2A Ci = negligible Li = negligible
		Uo = 5.88V Io = 19.8mA Po = 29.1mW Co = 1000uF Lo = 1H L/R = 1600uH/Ω
Ambient temperature (Ta)	-20°C to +40°C (refer to operating environment specifications)	
This table is provided for quick reference purposes only: refer to latest issue of the Certificate of Conformity for all system designs.		

Specifications	
Mechanical	
Dimensions	23mm x 75mm x 98.5mm (See diagram below)
Weight	190g
IP Rating	IP20
Mounting	Standard 35mm DIN rail (Top hat rail – EN 50022)
Electrical Connections	ERNI Screw terminals (maximum wire size of 2.5mm^2, maximum tightening torque of 0.4Nm)
Environmental	
Operating Temperature	-10°C to +60°C

Power Supply (RS485)	
Voltage	9 - 16.5 VDC (I.S.) / 9 - 16.5 VDC (Non - I.S.)
Current (@ VDC)	9mA (9) / 18mA (12) / 29mA (16)
Communications (iMAC L1)	
Hardware interface	2 wire (+/-18VDC I.S. via MLB barrier or +/-21VDC non I.S. iMAC Fieldbus)
Line Speed	300 - 1000 baud
Bit protocol	iMAC proprietary
L1 Isolation	3.5kVAC (to RS485 Interface)
L1 Line Loading (baud)	1.92mA (300)) / TBC (500) / 4.16mA (1000)
Communications (Modbus)	
Modbus Master	Modbus RTU protocol (only compatible with Gasguard controllers)
Hardware interface	RS485
Baud Rate	2400 (fixed)
Bit protocol	8 data bits, parity none, 2 stop bits (fixed)
Isolation	3.5kVAC (to iMAC Fieldbus interface)
Find Out More	
For more information on this product, contact Ampcontrol Customer Service on +61 1300 267 373 or *customerservice@ampcontrolgroup.com* or visit the Ampcontrol website: www.ampcontrolgroup.com	

Dimensions



SIDE VIEW FRONT VIEW

Equipment List

Part Number	**Description**
121916	MODULE IMAC SIM-G2 IECEx