

# IIM

## Input and Indication Module

### Summary

The iMAC IIM is an Intrinsically Safe digital input and LED indication module. The IIM provides five (5) voltage free contacts, four (4) user programmable LED outputs, three (3) status LEDs, and monitors the integrity of the L1A+ signal line in 3-wire iMAC Fieldbus systems.

All five inputs can be configured as normally open or closed contacts.

The IIM module is typically used for use in Ampcontrol lanyard/pullkey systems and longwall systems for monitoring and control of E/stop and Remote Isolation systems.



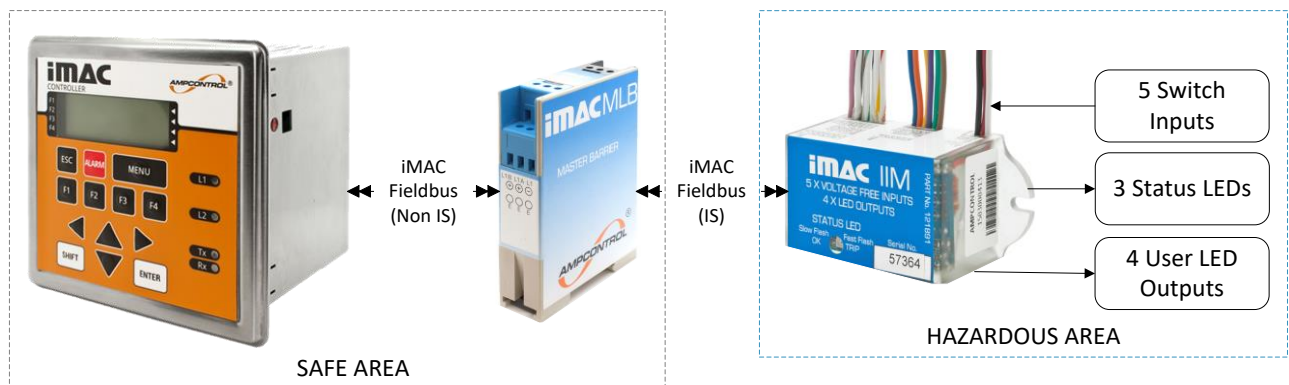
### Data Register(s)

2 (Input, Output)

### Features

- Intrinsically Safe IECEx Ex ia Group I Ma
- 5 voltage free contacts (configurable N/O or N/C)
- 4 controllable LED outputs
- Compact encapsulated design
- Down-line powered from the iMAC L1 Fieldbus
- Multifunction diagnostic status LEDs
- Remotely monitored and configured via iMAC Controller
- Optional DIN rail mounting kit available

### Minimum System

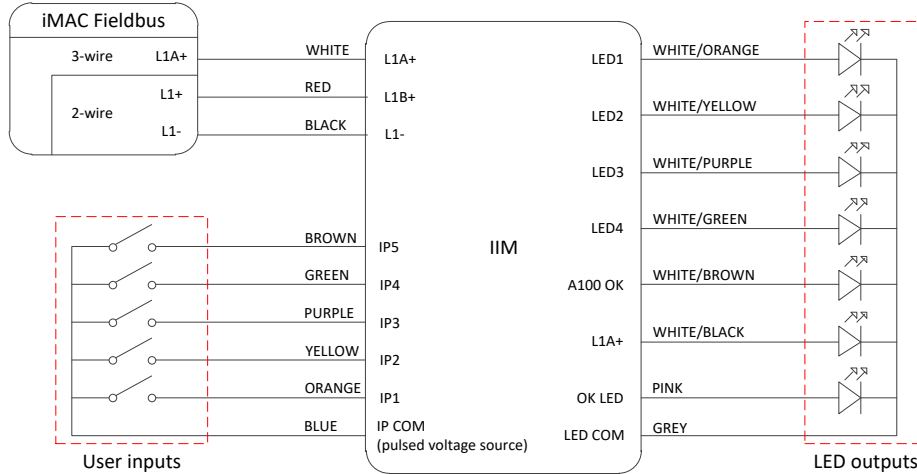


### CAUTION!



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**



Maximum length of lead between switch inputs and voltage free contacts should not exceed 10 metres.

Note: refer to iMACB094 – iMAC Installation Requirements

Label	Wire colour	Type	Description
L1A+	White	L1 Comms	iMAC Fieldbus (3 wire) - iMAC Fieldbus (2 wire)
L1B+	Red		
L1-	Black		
IP1	Orange	Switch Inputs	User (5)
IP2	Yellow		
IP3	Purple		
IP4	Green		
IP5	Brown		
IP COM	Blue		Common (pulsed voltage source)
EXT IIM LED	Pink		Status / Ok
LED1	White/Orange	LED Outputs	User (4)
LED2	White/Yellow		
LED3	White/Purple		
LED4	White/Green		
A100 LED	White/Brown		
L1A+ MON LED	White/Black		
LED COM	Grey		
			Address 100 status / LED 5
			A-line monitor status / LED 6
			Common (cathodes)

**Data Register(s)**

Input Register (Address: 1 - 255, excluding 100)				
Bit	Description	Bit Value	R / W	Invert Bit
15	-	X	r	-
14	-	X	r	-
13	-	X	r	-
12	-	X	r	-
11	-	X	r	-
10	-	X	r	-
9	-	X	r	-
8	-	X	r	-
7	Random data bit	0 / 1	r	-
6	-	X	r	-
5	A-line monitor input	0 = valid LA+ connection	r	-
4	Input 5 (I5)	0 / 1	r	4 (000Fh)
3	Input 4 (I4)	0 / 1	r	3 (0008h)
2	Input 3 (I3)	0 / 1	r	2 (0004h)
1	Input 2 (I2)	0 / 1	r	1 (0002h)
0	Input 1 (I1)	0 / 1	r	0 (0001h)

Output Register (Address: Fixed at 100)				
Bit	Description	Bit Value	R / W	Invert Bit
15	-	X	r	-
14	-	X	r	-
13	-	X	r	-
12	-	X	r	-
11	-	X	r	-
10	-	X	r	-
9	-	X	r	-
8	-	X	r	-
7	-	X	w	-
6	-	X	w	-
5	-	X	w	-
4	-	X	w	-
3	LED4	1 = On (flash)	w	-
2	LED3	1 = On (flash)	w	-
1	LED2	1 = On (flash)	w	-
0	LED1	1 = On (flash)	w	-

### Configuration Parameters

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

Input Register Parameters (roll-call name: IIM Module)					
No	Description	Range	Default	Units	R/W
1	Input register address	1 - 255 (excluding 100)	-	-	r / w
2	Input register Ix bits invert	0000h - 000Fh	0000h	-	r / w
3	Output register address	64h	64h	-	r
4	Not used (Factory use)	-	-	-	r

#### Parameter Details...

Parameter 1: IIM Input Register Address – Selecting 0 will put the IIM offline. Since address 100 is used for the LED output data, the IIM Input address cannot be programmed to 100.

Parameter 2: Invert bits - specify whether received digital input state sets the output data bit to 0 or 1. If invert bit is 0, then corresponding digital input register is set when the input switch is closed. Alternatively, if invert bit is 1, then corresponding digital input register is set when the input switch is open.



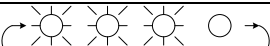

Input Register Status		
Input Switch	Input register parameter – invert bit value	Input register – Ix bit value
Open	0 (N/C)	1
Closed	0 (N/C)	0
Open	1 (N/O)	0
Closed	1 (N/O)	1

Parameter 3: IIM Output Register Address – Fixed at address 100.

### Functional Logic

Input Register – Random data bit: The random data bit was introduced in the IIM data word to ensure clash indication when two IIM modules are connected to an iMAC system with the same addresses. iMAC does not generate clash indication for two modules programmed with the same address that are transmitting the same data. The random data bit improves clash detection as two modules with the same address will eventually have a data miss-match due to a difference in random bit state even though they may be transmitting identical input data. This allows addressing mistakes to be quickly identified.

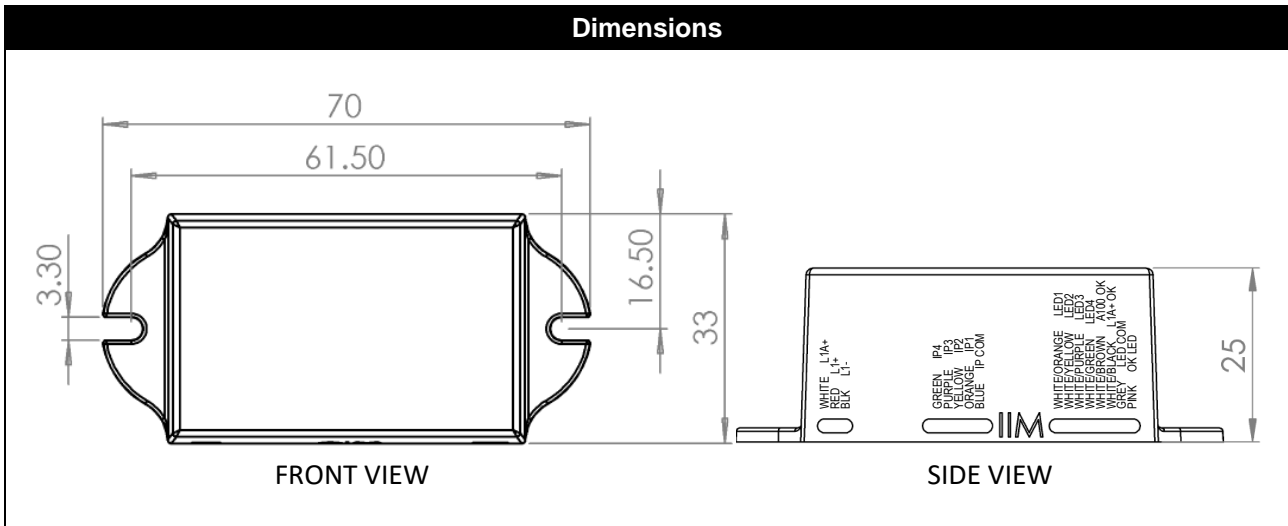
### LED Indicators

Status LED (OK / EXT IIM)			
Sequence		Module – iMAC Comms Status	Module – Function Status
Off	-	Unknown (check connections)	Unknown (check connections)
Slow Flash		Healthy	All input register Ix bits = 0
2 Flashes		Healthy (has been roll-called)	-
3 Flashes		Error (address clash)	-
Fast Flash		Warn (general)	Any input register Ix bit = 1
Address 100 LED (A100 / LED5)			
Off	Output register (A100) is offline		
Flash	Output register (A100) is online		
L1A+ monitor LED (L1A+ MON / LED6)			
Off	L1A+ inactive		
Flash	L1A+ active (healthy)		
Output LED1 to LED4			
Off	Output register LEDx bit = 0		
Flash (1Hz)	Output register LEDx bit = 1		

### Certification / Approvals

Type	Ex ia I Ma (for use in zone 0, 1 or 2)	
Certificate number	IECEX ITA 07.0017X	
Module type	GM1	
IP rating	Must be installed in an enclosure not less than IP20 (IP54 recommended)	
Other	Must be mounted in such a manner that the encapsulation is not exposed 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	L1A+ (white), L1B+ (red), L1- (black)	U <sub>i</sub> = 21.5V (44.65R source resistor) C <sub>i</sub> = Negligible L <sub>i</sub> = Negligible
	IP1 (orange), IP2 (yellow), IP3 (purple), IP4 (green), IP5 (brown), IP COM (blue), EXT IIM LED (pink), LED1 (white/orange), LED2 (white/yellow), LED3 (white/purple), LED4 (white/green), A100 LED (white/brown), L1A+ MON LED (white/black), LED COM (grey)	U <sub>o</sub> = 21.5V I <sub>o</sub> = 0.202A P <sub>o</sub> = 1.09W C <sub>o</sub> = 0.27uF L <sub>o</sub> = 11.4mH C <sub>i</sub> = 5.83uF L <sub>i</sub> = negligible
Ambient temperature (T <sub>a</sub> )	-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	
<b>Mechanical</b>	
Dimensions	33mm x 70mm x 25mm (See diagram below)
Weight	60g
IP Rating	Module is fully encapsulated
Mounting	Enclosure includes 2 mounting tabs, each with a 3mm slot (screws not supplied)
Electrical Connections	Individual 450mm flying leads (0.4mm <sup>2</sup> PVC insulated multi-strand flexible wire with an overall outside diameter of 1.5mm)
<b>Environmental</b>	
Operating Temperature	-10°C to +60°C
<b>Inputs</b>	
Digital	5 (self-wetting)
Limits	3VDC (pulsed) @ < 1mA
<b>Outputs</b>	
Status LED	Internally current limited 3VDC source - via 330R resistor
Limits	< 2mA (external resistor may be required)
All other LED	Internally current limited 3VDC source - via 100R resistor
Limits	< 2mA (external resistor may be required)
<b>Communications (iMAC L1)</b>	
Hardware interface	2/3 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	None
L1 Line Loading (baud)	0.66mA (300) / 0.82mA (500) / 1.64mA (1000)
<b>Find Out More</b>	
For more information on this product, contact Ampcontrol Customer Service on +61 1300 267 373 or <a href="mailto:customerservice@ampcontrolgroup.com">customerservice@ampcontrolgroup.com</a> or visit the Ampcontrol website: <a href="http://www.ampcontrolgroup.com">www.ampcontrolgroup.com</a>	



Equipment List	
Part Number	Description
121891	MODULE IMAC IIM IECEEx
142323	KIT IMAC DIN RAIL MOUNT

**DISCLAIMER**

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