BMS MODBUS 485

Installation & Commissioning Guide
For Split Ducted Units

ICAMIB-MOD

BMS Modbus is available for ESP Plus, ESP Ultima, ESP Platinum Plus, ESP Platinum Ultima and selected Classic models (except SRA230 and SRA260) manufactured after October 2013.

ActronConnect not available when using BMS Modbus 485.
Compatible with 8 zone cards only (8Z-24V, 8Z-VAV)
Not compatible with 4 zone cards (4Z-24V and AMZ)

IMPORTANT NOTE:
Please read this manual carefully before installing the module on to the air conditioning unit.

That's better. That's Actron.

ActronAir

Table of Contents

01. Introduction

CONGRATULATIONS on your purchase of an ActronAir BMS kit. This kit has been designed and engineered to give you total control flexibility for the integration of your ActronAir ducted air conditioner into a central or remote Building Management System. Such integration provides better control and monitoring of your air conditioning system for optimum comfort, efficient operation and energy savings.

The procedures outlined in this guide are provided to correctly & safely install the ActronAir BMS kit to an appropriate ActronAir ducted air conditioning system. Failure to follow these procedures may result in personal injury, damage to the air conditioner, damage to the BMS card or incorrect operation of the air conditioning system. Such failure could render your warranty null and void.

01.01. Items to Consider

- Carefully unpack the ActronAir BMS kit from its packaging and ensure that all parts are included.
- Fully check the contents of your kit against the content list upon receiving your shipment. Inspect the components and accessories for any sign of shipping damage. If there is any damage to the contents, contact ActronAir Technical Support Department immediately on: **1800 119 229.**
- Make certain that the ActronAir BMS kit is compatible with the ActronAir air conditioning system you plan to install it on.
- Take time to thoroughly read the installation & commissioning instructions before proceeding with the installation.

01.02. Safety Instructions

Safety instructions and warnings provided in this installation manual are non-exhaustive and given as a guide only. Prevailing WH&S regulations must be observed and will take precedence to the safety instructions contained in this manual. Safe work practices and environment must be of paramount importance in the performance of all service procedures.

- Read all instructions in this manual before operating the air conditioning unit. Failure to do so may result in damage to the unit and void your warranty.
- Turn-Off power from mains supply by removing fuse or switching the circuit breaker to the "OFF" position before performing the installation procedures.
- Follow sound Lock Out & Tag Out procedures to ensure that power supply is not re-energised accidentally.
- Ensure that all safety work procedures & Instructions are adhered to at all times in order to prevent personal injury or damage to the equipment.
- Only licensed technicians are allowed to perform the procedures described in this guide.
- **The ActronAir BMS is NOT FOR OUTDOOR USE.** Install your BMS away from excessive dust, heat and moisture.
- The air conditioning electrical panel & the ActronAir BMS kit contain static sensitive electronic components. Careful handling & correct anti-static procedures must be followed to prevent damage of the equipment. Failure to protect the electronic components from static electricity may cause unrepairable damage, that is NOT COVERED for replacement under Warranty.
- The instructions herein refer to work involving a Computer CPU Chip & Electronic CPU Board. Please ensure all Instructions are followed accurately so as to prevent damage to these fragile & delicate components.
- WH&S rules and regulations must be observed and will take precedence during installation process.

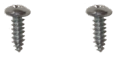
01.03. Codes, Regulations & Standards

The installer and/or contractor assumes responsibility to ensure that ActronAir BMS installation and commissioning comply with the relevant council, state/federal codes, regulations and building code standards. **All electrical wiring must be in accordance with current electrical authority regulations and all wiring connections to be as per electrical diagram provided with the unit.**

01.04. Waste Electrical & Electronic Equipment Disposal Guidelines

- Do not dispose of the waste electrical & electronic equipment with local council waste. These must be disposed through the council designated hazardous waste collection centre.
- The equipment may contain hazardous substances. Improper or incorrect disposal may have a negative effect on human health and on the environment.

02. Parts Included In This Kit

Items	Images	Quantity
ICAMIB-MOD Modbus Card		1
Data Cable		1
BMS Connectors		2
Screws		2

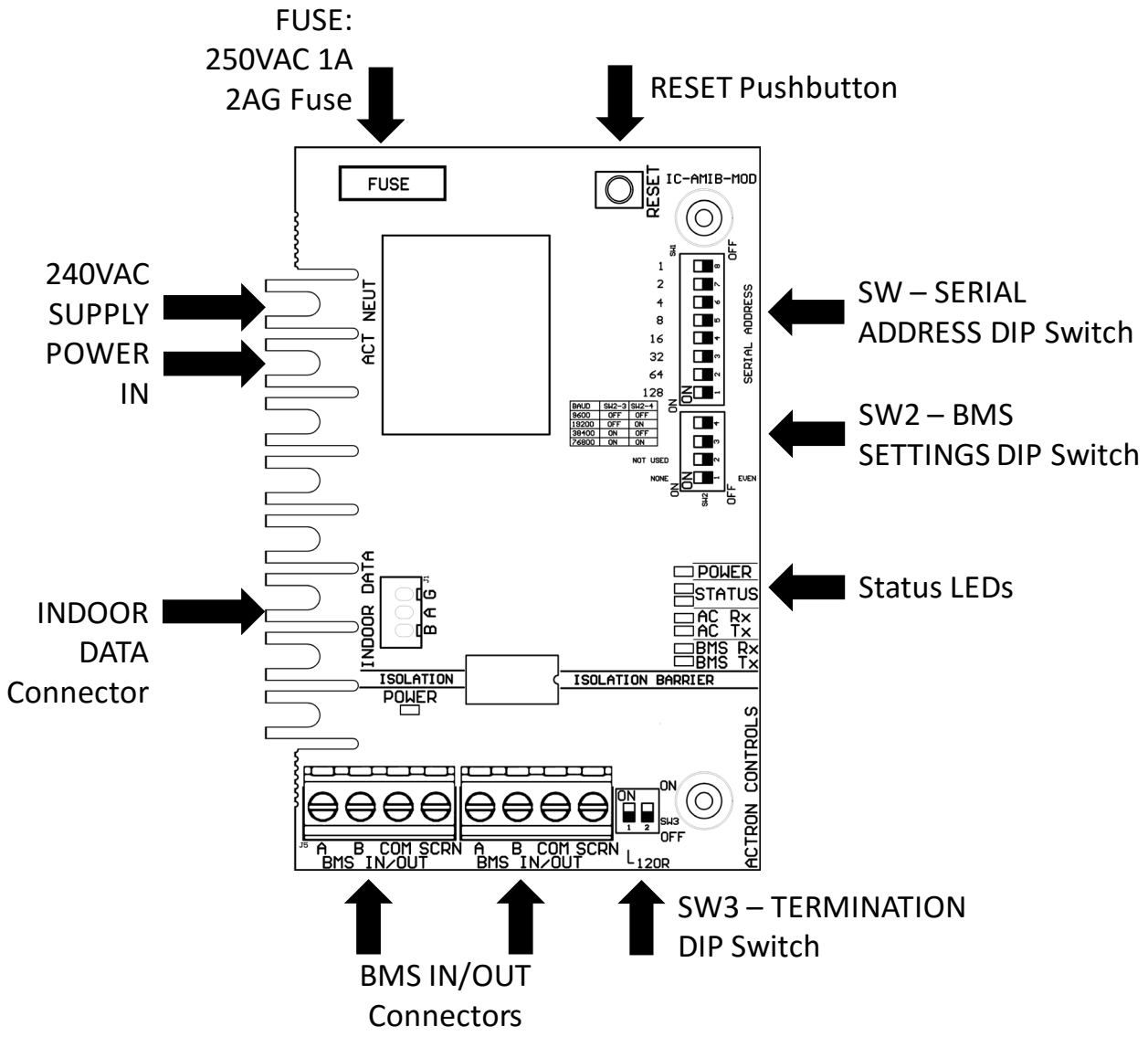
03. ICAMIB-MOD

The AMIB Modbus 485 BMS Card allows the Air Conditioners control system to interface with the wider BMS System. The card allows communication from the AMIB Indoor Board to the customers' BMS system through the Modbus RTU protocol over RS485. Each unit on the Modbus 485 has a unique address.

NOTE: The AMIB Modbus 485 BMS Card can not be used with the 4 Zone 24V Zone Kit (4Z-24V, AMZ), or the ActronConnect Module. An 8-Zone module (8Z-24V, 8Z-VAV) will need to be used to control zones.

03.01. Modbus 485 Card and Cable Requirements

Recommended Cable Size: 0.5mm² (7/0.30)
Use two twisted pair shielded data cable to connect the data lines of the RS485 bus



04. BMS Modbus 485 Installation Procedure

To install ICAMIB-MOD Interface Board into the AMIB Indoor Board

Step 1. **Isolate and fit electrical lockout device and TAG to the main circuit breaker for the system you are working on, before removing the Electrical Panel Cover**.

Step 2. Open Electrical Panel Cover

Step 3. Test unit with multimeter to ensure there is no power, before starting installation of the BMS card.

Step 4. Bend up the mounting tabs at the top of the electrical box.

← Bend Mounting Tab

← Bend Mounting Tab

NOTE: If a **4 Zone 24V Zone** (Part Number: 4Z-24V) card is currently connected on to the Indoor board, this module has to be removed and replaced by the ICAMIB-MOD card. If zoning is requred, an 8-Zone module (Part Number: 8Z-24V) will need to be purchased and used to control zones.

Step 5. Loosen AMIB Indoor Board screw terminals then insert the BMS Board screw terminal tabs into the corresponding screw terminals on the AMIB Indoor Board. Ensure that the NEUT tab is aligned with the top screw terminal. Do Not tighten the screw terminals yet.

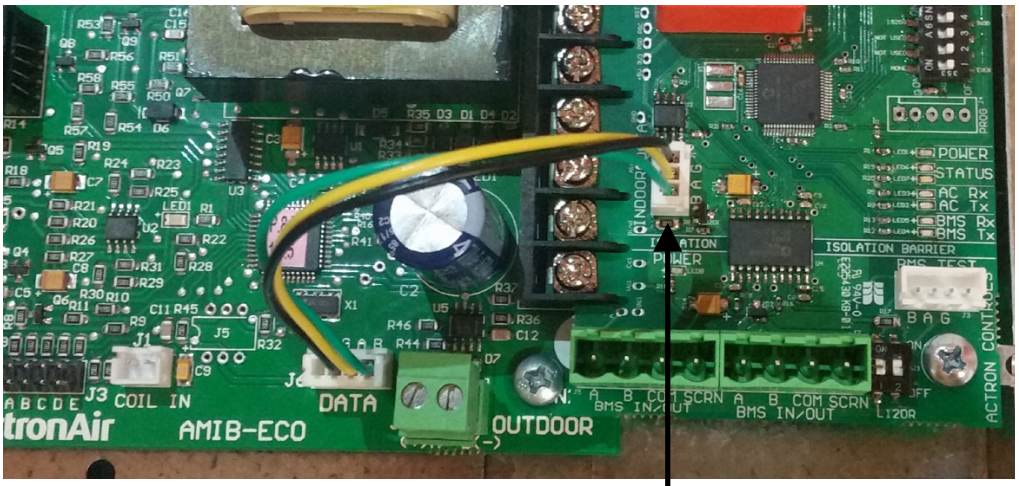
Step 6. Use the supplied screws to secure the BMS Board to the mounting tabs

6a. Screw to Mounting Tab (Screw supplied)

6b. Screw to Mounting Tab (Screw supplied)

Step 7. Ensure BMS card is aligned with the indoor board screw terminals and tighten all 8 screws to secure BMS card.

Step 8. Use the Data Cable provided to connect the INDOOR DATA port on the BMS card to the 4 Pin socket labelled "J6 DATA" (J4 DATA on Digital and Classic Units) port on the AMIB Indoor Board.



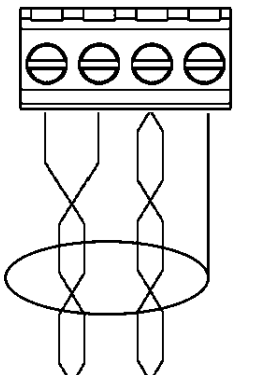
J6 DATA (Indoor Board)

INDOOR DATA (BMS Card)

04.01. BMS Installation Procedure

BMS IN/OUT

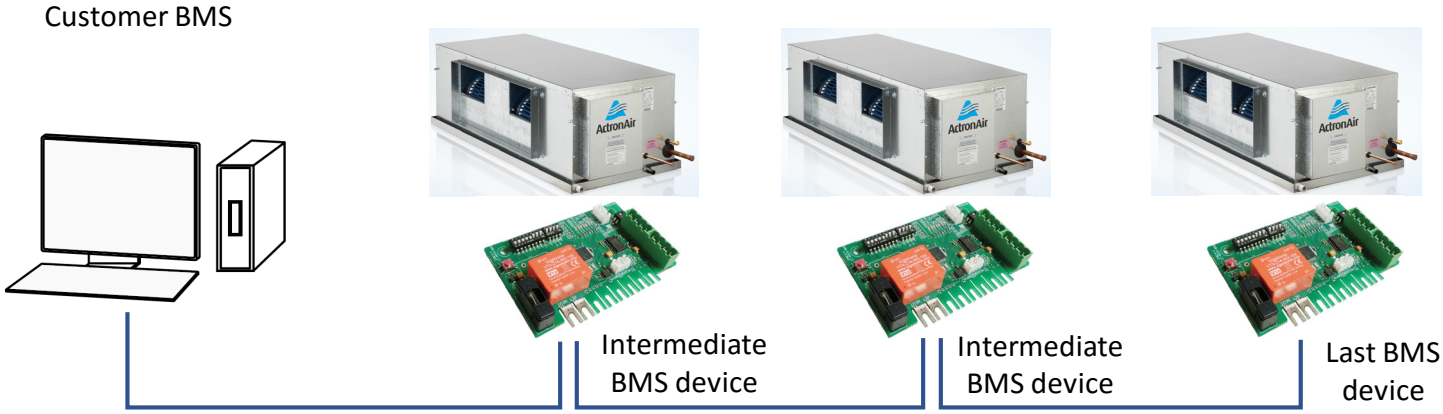
A B COM SCRN

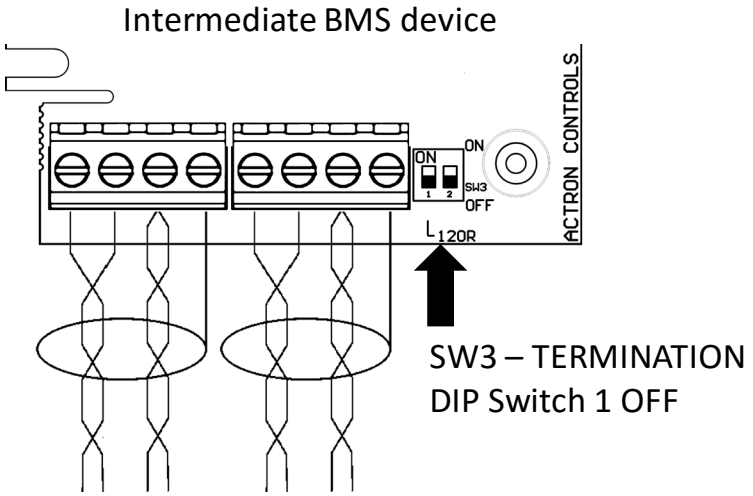


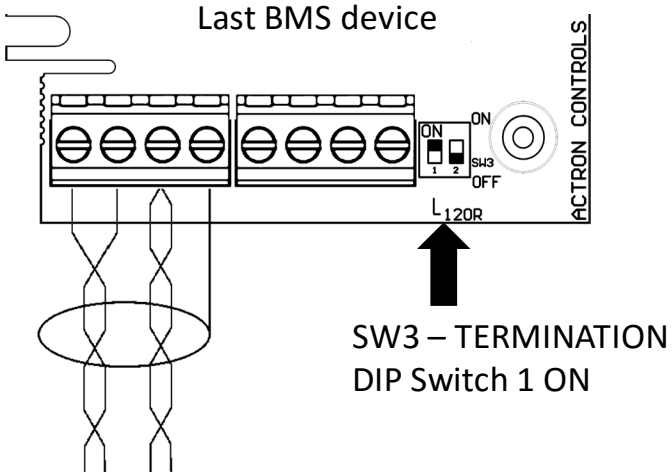
Step 1. Recommended Cable Size: 0.5mm² (7/0.30)
Use 0.5mm² (7/0.30) two twisted pair shielded data cable to connect to the 'A','B','COM' and 'SCRN' terminals of either of the two BMS connectors.
-One of the twisted pair cables must be used to connect the 'A' terminals of each of the Modbus 485 devices on the network. The other cable, from the same twisted pair, must be used to connect all the 'B' terminals.
-The other twisted pair should be joined together and connected to the 'COM' terminal.
-Connect the Screen wires to the SCRN terminal of the connector.

Step 2. If another Modbus 485 device is to be connected on the same network, then use the other BMS Connector to daisy chain additional devices.

Step 3. If the BMS device is connected at the start or the end of the Modbus 485 network, the 120Ω termination resistor DIP switch must be turned on.





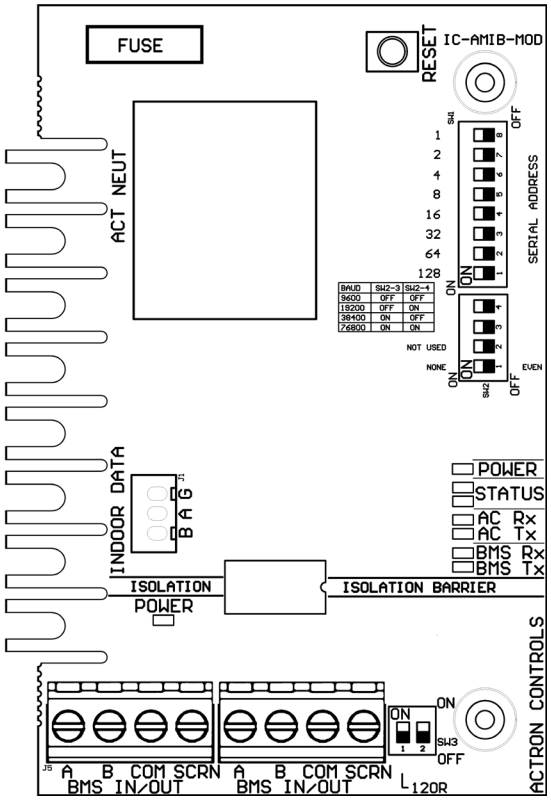


04.02. BMS Configuration of Modbus 485 Card

NOTE: Consult Project BMS commissioner for the correct Modbus 485 configuration for this unit.

Use the DIP switches on the BMS Card to configure the Modbus 485 card parameters. New BMS configuration will take effect when the BMS card initializes, either by RESET button or power cycle.

04.02.01. Configure Serial Address



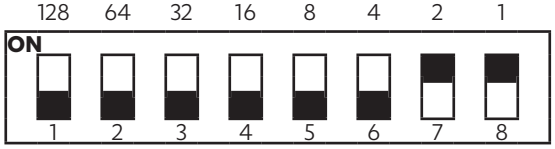
SW – SERIAL ADDRESS DIP Switch

NOTE: The Serial Address is a number that uniquely identifies a device on the local RS485 network. If two units have the same Serial Address, identification errors will be generated. There will be no indication on the BMS card of any error, however the BMS system will not communicate with these devices. Series Address can be any number between 1-247.

Modbus 485 Serial address can be configured using SW1 – SERIAL ADDRESS DIP switch.

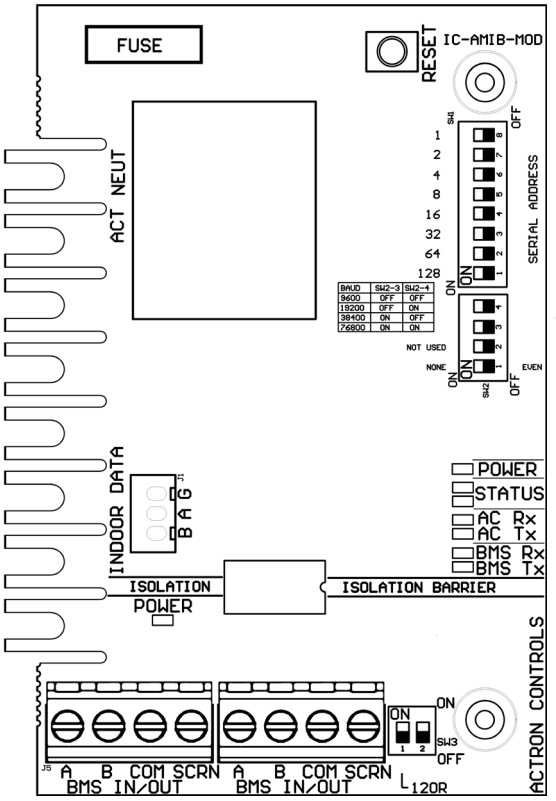
Serial Address	Value	SW1-SERIAL ADDRESS DIP Switch							
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1	1	OFF	OFF	OFF	OFF	OFF	OFF	OFF	**ON**
2	2	OFF	OFF	OFF	OFF	OFF	OFF	**ON**	OFF
3	2 + 1	OFF	OFF	OFF	OFF	OFF	OFF	**ON**	**ON**
...									
245	128 + 64 + 32 + 16 + 4 + 1	**ON**	**ON**	**ON**	**ON**	OFF	**ON**	OFF	**ON**
246	128 + 64 + 32 + 16 + 4 + 2	**ON**	**ON**	**ON**	**ON**	OFF	**ON**	**ON**	OFF
247	128 + 64 + 32 + 16 + 4 + 2 + 1	**ON**	**ON**	**ON**	**ON**	OFF	**ON**	**ON**	**ON**
		128	**64**	**32**	**16**	**8**	**4**	**2**	**1**
		DIP Switch Value							

Serial Address 3 shown:



04.02.02. Configure Baud Rate and Data Parity

Modbus 485 Baud Rate and Data Parity can be configured using SW2.



SW2 – BMS SETTINGS DIP Switch

Function		SW2 - DIP Switch			
		1	2	3	4
Data Parity	NONE	ON			
	EVEN	OFF			
Baud Rate	9600			OFF	OFF
	19200			OFF	ON
	38400			ON	OFF
	76800			ON	ON

NOTE: The Data Parity and Baud Rate must be the same for all the devices connected on the local RS485 network, otherwise the exchange of data will generate communication errors. If the BMS card has the incorrect data parity or baud rate, then the Status 2 LED (white) will FLASH slowly (once every 2 seconds). See Section 04.04 for BMS Troubleshooting. Data Parity can be set to None or Even, Baud Rate can be set to 9600, 19200, 38400 or 76800.

04.03. Initialization

Step 1. Once all installation steps have been completed, power can be turned ON from mains supply by removing electrical lockout device and switching isolator switch to the "ON" position at the Outdoor Board.

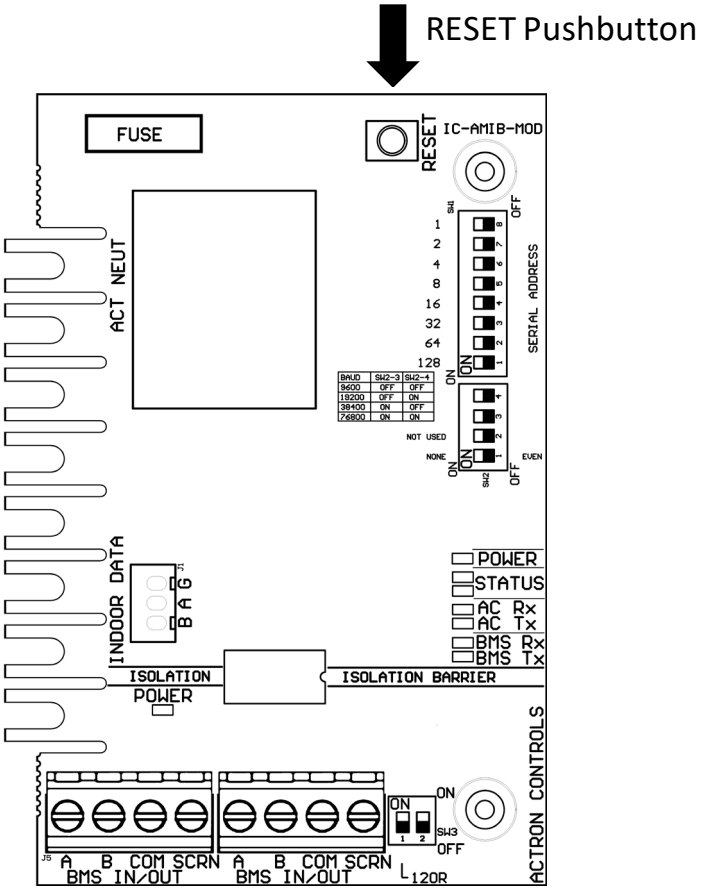
Step 2. BMS card will take 60s to initialize with the Air Conditioning system and the BMS configuration. While the BMS card is initializing, the Status 2 LED (white) will FLASH (once every 2 seconds). The BMS card will not accept any BMS commands during this time.

Step 3. After 60s the Amber Status LED should be ON, indicating a stable connection to the Air Conditioning System.

Step 4. If the Client BMS system is active and sending commands to this device, then the White Status LED should also be ON.

NOTE: See Section 04.04 for BMS Troubleshooting.

Step 5. If any BMS configurations need to be changed, then make the applicable changes outlined in section 04., and press the RESET button on the BMS Card

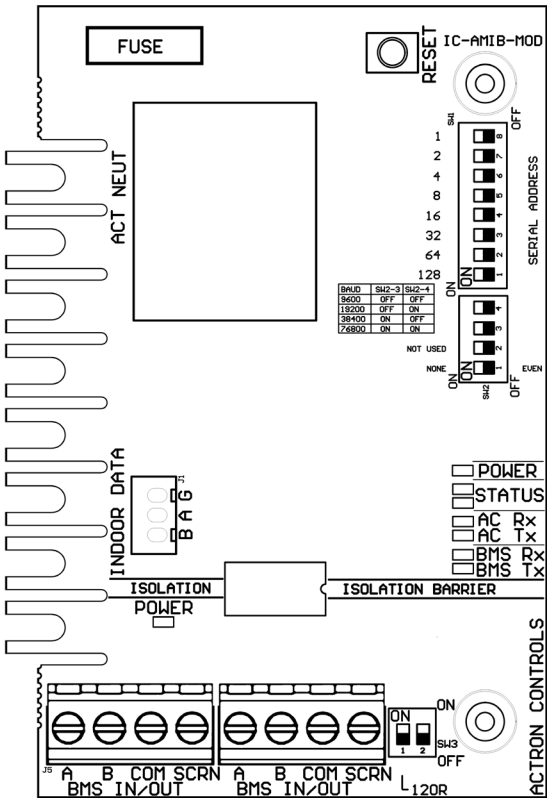


Step 6. BMS card will take 60s to initialize with the new BMS configuration

NOTE: New BMS configurations will only take affect once the BMS card has been reset

04.04. Troubleshooting

The LEDs on the board indicate the status of the BMS Card. Use the troubleshooting table on the following page to resolve any issues.



Status LEDs

TROUBLESHOOTING TABLE:

Symptom	Probable Cause	Suggested Resolution
Power LED (RED) is OFF	No Power to BMS Card	• Confirm power to Indoor Unit by checking LED1 on the AMIB • Check screw terminal connections between Indoor Board and BMS Card • Check the fuse on the BMS Card
	BMS Card is faulty	• If there is power to the AMIB, the screw terminal connections are secure, and the fuse is intact then BMS Card may be faulty.
Isolated Power LED (RED) is OFF	BMS Card is faulty	• Ensure that Power LED (RED) is ON, otherwise perform steps above • Check client BMS network for any short-circuits • Replace BMS Card
Status 1 LED (Amber) Flashing	AC Rx (Blue) LED Off No Connection to Air Conditioning System	• Check data harness connection between AMIB and BMS Card.
	AC Rx (Blue) LED Flashing Poor Communications with Air Conditioning System	• Disconnect data harness from BMS Card and check for E05 errors on Wall Controllers and Outdoor Board. If there are E05 errors resolve these faults before re-connecting the BMS card. • Re-Connect data harness and Cycle Power to Air Conditioning System. • Check for E05 Errors on Wall Controllers and Outdoor Board. If E05 errors are present when BMS card is connected, and absent when card is disconnected, then Contact ActronAir Technical Support on 1800 119 229
Status 2 LED (White) Off	BMS Rx (Amber) Off No Communication from BMS Master	• Confirm that BMS Master is currently operating • Check RS485 connections from the BMS Master to this BMS Card
	BMS Rx (Amber) Flashing Incorrect Serial Address	• Confirm correct Serial Address with BMS Commissioner and change DIP switch settings as required. • Reset the BMS Card following any DIP Switch changes on the board, by pressing the RESET button
Status 2 LED (White) Flashing Slowly. (once every 2 seconds)	Incorrect Baud Rate or Data Parity	• Confirm correct Baud Rate and Data Parity with BMS Commissioner and change DIP switch settings as required. • Reset the BMS Card following any DIP Switch changes on the board, by pressing the RESET button
Status 2 LED (White) Flashing Rapidly. (twice every second)	BMS Card has detected a CRC error	• Check for any noise or interruptions on the BMS RS485 bus
Air Conditioning Unit won't run	Unit error is preventing Air Conditioner from running	• Disconnect data harness from BMS Card and check if Air Conditioning Unit will run. • If Air Conditioning unit still fails to run, then use unit troubleshooting guide to resolve issue. • Re-Connect data harness. If unit fails to run with BMS card connected, then check all BMS Installation connections described in section 4. • If Air Conditioning unit fails to run when BMS card is connected, and runs normally when card is disconnected, then Contact ActronAir Technical Support on 1800 119 229

If the above steps fail to fix the problem. Contact ActronAir Technical Support on 1800 119 229 for further details.

05. BMS Control

This section of the document provides a guide to using the ActronAir BMS Table. This section explores the relevant variables, their usage and meaning to control the various units.

05.01. Operating the Unit

Step	Operation
1.	Set the Fan Mode (Modbus Analog 4) 1 – Low 2 – Medium 3 – High 4 – ESP Auto Fan*
2.	Set Supply Fan Controls (Modbus Analog 105) 0 – Standard 1 – Continuous Fan
3.	Set the Mode of Operation (Modbus Analog 101) 1 – Heat Only 2 – Cool Only 3 – Auto Changeover 4 – Fan Only
4.	Set the Master Setpoint Temperature (Modbus Analog 102). Minimum and Maximum setpoint limits can be read in the BMS table in section 5.3 230 = 23.0°C 265 = 26.5°C
5.	For Zoned systems, set each zone OFF/ON ** (Modbus Analog 5001 – 5008) 0 – OFF 1 – On
6.	Turn the AC unit OFF/ON (Modbus Analog 1) 0 – Off 1 – ON

*Only available for ESP Plus, ESP Ultima, ESP Platinum Plus and ESP Platinum Ultima units.

**Ensure that at least one zone is turned ON whenever the AC unit is ON.

05.02. BMS Points Table: Control

	Description	Platinum Ultima	Platinum ESP+	ESP Ultima	ESP+	Classic	Type	Modbus Register	Read/Write	UoM	Min	Max
Unit Control	Turns the AC On/OFF via BMS (0=Off, 1=On)	●	●	●	●	●	Analog	1	R/W	1	0	1
	Set the Supply Fan Mode (0=Off, 1=Low, 2=Medium, 3=High, 4=ESP Auto*)	●	●	●	●	●	Analog	4	R/W	1	1	4
	Mode of Operation (1=Heat Only, 2=Cool Only, 3=Auto, 4=Fan Only)	●	●	●	●	●	Analog	101	R/W	1	1	4
	Set Master Setpoint Temperature (0.1°C)**	●	●	●	●	●	Analog	102	R/W	0.1°C**	16.0°C	30.0°C
	Set Supply Fan Controls (0 = Standard, 1 = Continuous)	●	●	●	●	●	Analog	105	R/W	1	0	1
Unit Status	System Capacity Demand (0.1%)	●	●	●	●	●	Analog	701	R	0.1%	0.0%	100.0%
	Supply Fan Speed Demand (0.1%)	●	●	●	●	●	Analog	703	R	0.1%	0.0%	100.0%
	Actual System Running Capacity (0.1%)	●	●				Analog	801	R	0.1%	0.0%	100.0%
	Demand Response (0 = No DRM, 1 = DRM1, 2 = DRM2, 3 = DRM3)	●	●				Analog	804	R	1	0	4
	Room Temperature (0.1°C)	●	●	●	●	●	Analog	851	R	0.1°C	0.0°C	50.0°C
	Communications with Indoor Unit (0=Ok, 1=Offline)	●	●	●	●	●	Analog	906	R	1	0	1

** Master Setpoint temperature will round down to 0.5°C. E.g. 224 (22.4°C) will round down to 220 (22.0°C)

* ESP Auto is only available on ESP Plus, ESP Ultima, ESP Platinum Plus and ESP Platinum Ultima, where self-learn mode has been set.

05.03. BMS Points Table: Zoning

	Description	Platinum Ultima	Platinum ESP+	ESP Ultima	ESP+	Classic	Type	Modbus Register Number	Read/Write	UoM	Min	Max
Zone Operation	Set Zone 1 (0=Off, 1=On)	●	●	●	●	●	Analog	5001	R/W	1	0	1
	Set Zone 2 (0=Off, 1=On)	●	●	●	●	●	Analog	5002	R/W	1	0	1
	Set Zone 3 (0=Off, 1=On)	●	●	●	●	●	Analog	5003	R/W	1	0	1
	Set Zone 4 (0=Off, 1=On)	●	●	●	●	●	Analog	5004	R/W	1	0	1
	Set Zone 5 (0=Off, 1=On)	●	●	●	●	●	Analog	5005	R/W	1	0	1
	Set Zone 6 (0=Off, 1=On)	●	●	●	●	●	Analog	5006	R/W	1	0	1
	Set Zone 7 (0=Off, 1=On)	●	●	●	●	●	Analog	5007	R/W	1	0	1
	Set Zone 8 (0=Off, 1=On)	●	●	●	●	●	Analog	5008	R/W	1	0	1
Zone Status	Zone 1 Temperature Setpoint (0.1°C)	●		●			Analog	5501	R	0.1°C	16.0°C	30.0°C
	Zone 2 Temperature Setpoint (0.1°C)	●		●			Analog	5502	R	0.1°C	16.0°C	30.0°C
	Zone 3 Temperature Setpoint (0.1°C)	●		●			Analog	5503	R	0.1°C	16.0°C	30.0°C
	Zone 4 Temperature Setpoint (0.1°C)	●		●			Analog	5504	R	0.1°C	16.0°C	30.0°C
	Zone 5 Temperature Setpoint (0.1°C)	●		●			Analog	5505	R	0.1°C	16.0°C	30.0°C
	Zone 6 Temperature Setpoint (0.1°C)	●		●			Analog	5506	R	0.1°C	16.0°C	30.0°C
	Zone 7 Temperature Setpoint (0.1°C)	●		●			Analog	5507	R	0.1°C	16.0°C	30.0°C
	Zone 8 Temperature Setpoint (0.1°C)	●		●			Analog	5508	R	0.1°C	16.0°C	30.0°C
	Zone 1 Damper Opening (%)	●		●			Analog	5701	R	1%	0.0%	100.0%
	Zone 2 Damper Opening (%)	●		●			Analog	5702	R	1%	0.0%	100.0%
	Zone 3 Damper Opening (%)	●		●			Analog	5703	R	1%	0.0%	100.0%
	Zone 4 Damper Opening (%)	●		●			Analog	5704	R	1%	0.0%	100.0%
	Zone 5 Damper Opening (%)	●		●			Analog	5705	R	1%	0.0%	100.0%
	Zone 6 Damper Opening (%)	●		●			Analog	5706	R	1%	0.0%	100.0%
	Zone 7 Damper Opening (%)	●		●			Analog	5707	R	1%	0.0%	100.0%
	Zone 8 Damper Opening (%)	●		●			Analog	5708	R	1%	0.0%	100.0%
	Zone 1 Temperature (0.1°C)	●		●			Analog	5801	R	0.1°C	0.0°C	50.0°C
	Zone 2 Temperature (0.1°C)	●		●			Analog	5802	R	0.1°C	0.0°C	50.0°C
	Zone 3 Temperature (0.1°C)	●		●			Analog	5803	R	0.1°C	0.0°C	50.0°C
	Zone 4 Temperature (0.1°C)	●		●			Analog	5804	R	0.1°C	0.0°C	50.0°C
	Zone 5 Temperature (0.1°C)	●		●			Analog	5805	R	0.1°C	0.0°C	50.0°C
	Zone 6 Temperature (0.1°C)	●		●			Analog	5806	R	0.1°C	0.0°C	50.0°C
	Zone 7 Temperature (0.1°C)	●		●			Analog	5807	R	0.1°C	0.0°C	50.0°C
	Zone 8 Temperature (0.1°C)	●		●			Analog	5808	R	0.1°C	0.0°C	50.0°C

05.04. BMS Points Table: Monitoring

	Description	Platinum Ultima	Platinum ESP+	ESP Ultima	ESP+	Classic	Type	Modbus Register	Read/Write	UoM	Min	Max
Circuit 1 Status	Compressor 1 Demand (0.1%)	●	●	●	●	●	Analog	1104	R	0.1%	0.0%	100.0%
	Compressor 1 Speed (0.1%)	●	●				Analog	1105	R	0.1%	0.0%	100.0%
	Compressor 1 Speed in Hz (0.1Hz)	●	●				Analog	1106	R	0.1Hz	0.0Hz	99.9Hz
	Compressor 1 Unit Defrosting (0 = Off, 1 = Defrosting)	●	●				Analog	1107	R	1	0	1
	Compressor 1 Oil Return Mode (0 = Off, 1 = Oil Return)	●	●				Analog	1108	R	1	0	1
	Compressor 1 Suction Pressure (kPa)	●	●				Analog	1111	R	1kPa	0kPa	6000kPa
	Compressor 1 Discharge Pressure (kPa)	●	●				Analog	1112	R	1kPa	0kPa	6000kPa
	Compressor 1 Suction Superheat (0.1°K)	●	●				Analog	1115	R	0.1°K	0.0°K	99.9°K
	Outdoor Coil 1 Temperature (0.1°C)	●	●				Analog	1201	R	0.1°C	-50°C	99.9°C
	Indoor Coil Temperature (0.1°C)	●	●	●	●	●	Analog	1301	R	0.1°C	-50°C	99.9°C
	Indoor Coil 1 Fan 1 Speed (0.1%)	●	●				Analog	1311	R	0.1%	0.0%	100.0%
	Indoor Coil 1 Fan 1 Speed (RPM)	●	●				Analog	1312	R	1RPM	0RPM	9999RPM
	Compressor 1 EEV position (0.1%)	●	●	●	●	●	Analog	1401	R	0.1%	0.0%	100.0%

06. Modbus 485 Technical Data

Device Type	Slave
Baud Rates	9600 (Default), 19200, 38400, 76800
Data Parity	Even (Default), None
Unit Load	1/32
Device Address Range	1 – 247
Protocol	Modbus RTU
Electrical Interface	RS485, 2 Wire
Cable Type	Twisted Pair Shielded Cable
Recommended Wire Size	0.5mm² (7/0.30)
Connector type	Screw terminals
Supported function codes	03 – Read Holding Registers
	06 – Write Single Register
	16 – Write Multiple Registers
Broadcast	Yes
Maximum Network Cable Length	1000 meters (@9600 baud rate)
Standard	Modbus over serial line v1.0

That's better. That's Actron.

actronair.com.au
1300 522 722

Document: 9590-3012 Issue Date: 03/2018