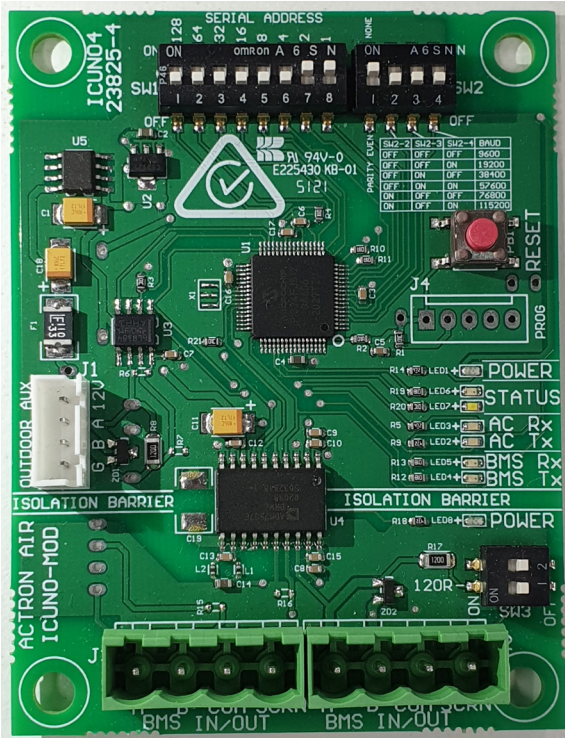# BMS MODBUS 485

Installation and Commissioning Guide

ICUNO-MOD

BMS Modbus is available for compatible units with an UNO Outdoor Board Series* such as:

Variable Capacity

Commercial (VCC)	Classic 2	Advance	Aires
CRV290T	CRA100S	CRV140S	CRS10AS
CRV330T	CRA130S	CRV160S	CRS13AS
CRV720T	CRA130T	CRV180S	CRS15AS
CRV850T	CRA150S	CRV160T	CRS17AS
CRV960T	CRA150T	CRV180T	CRS13AT
PKV160T-T	CRA170S	CRV210T	CRS15AT
PKV180T-T	CRA170T	CRV240T	CRS17AT
PKV210T-T	CRA200T	CRV13AS	
PKV240T-T	CRA230T	CRV15AS	
PKV290T-T		CRV17AS	
PKV290T-L/R		CRV13AT	
PKV330T-T		CRV15AT	
PKV330T-L/R		CRV17AT	
PRV15AT			
PRV17AT			
PKV720T			
PKV850T			
PKV960T			

* UNO Outdoor Board Series refers to UNO/UNOPRO/UNOJR

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

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 and 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.
- 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 Customer Care Department immediately on: **1300 522 722.**
- 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 and 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 and Tag Out procedures to ensure that power supply is not re-energised accidentally.
- Ensure that all safety work procedures and 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 for OUTDOOR and Packaged unit use only.** Install your BMS away from excessive dust, heat and moisture.
- The air conditioning electrical panel and the ActronAir BMS kit contain static sensitive electronic components. Careful handling and 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 sensitive electronic circuitry and components. Please ensure all Instructions are followed accurately so as to prevent damage to these fragile and delicate components.
- WH&S rules and regulations must be observed and will take precedence during installation process.

01.03. Codes, Regulations and Standards
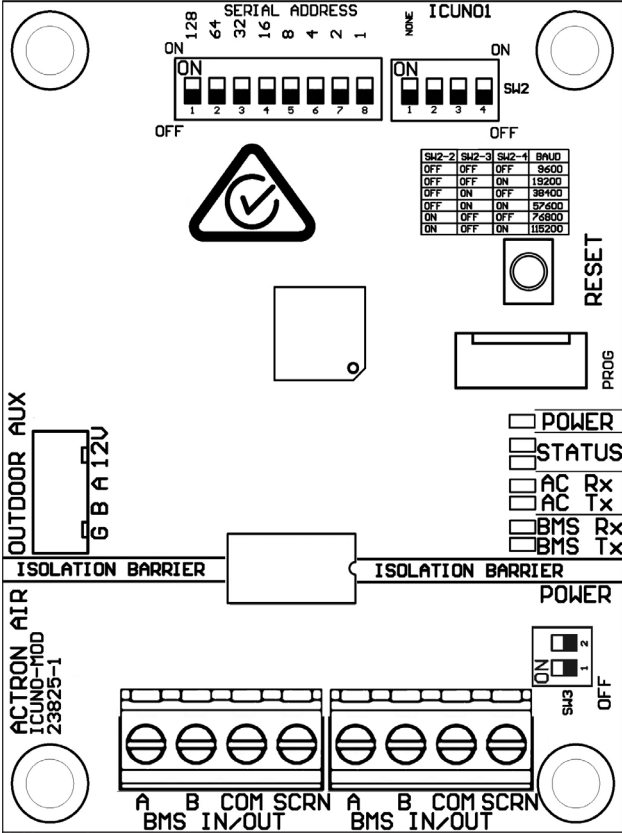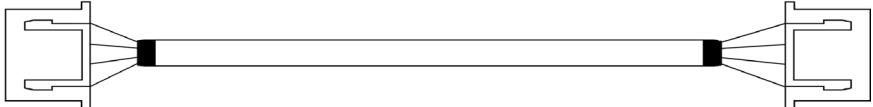
The installer and/or contractor assumes responsibility to ensure that ActronAir BMS installation and commissioning comply with the relevant council, state/federal codes, regulations and building code standards. **All electrical wiring must be in accordance with current electrical authority regulations and must follow electrical diagrams provided with the unit.**

01.04. Waste Electrical and Electronic Equipment Disposal Guidelines

- Do not dispose of the waste electrical and 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 ICUNO-MOD

Items	Images	Quantity
ICUNO-MOD Modbus 485 Card		1
DATA Cable (P/N 26117-1)		1
BMS Connectors		2
PCB Mounts		4

03. ICUNO-MOD

The UNO Modbus RS-485 BMS Card allows the ActronAir Air Conditioners control system to interface with a BMS System. The card allows communication from the UNO Outdoor Board to the customers' BMS system through the Modbus RTU protocol over RS-485. Each unit on the Modbus RS-485 network has a unique address.

ICUNO-MOD Cable Requirements

Recommended Cable Size: 0.5mm² (7/0.30)
Use two twisted pair shielded data cable to connect the data lines of the RS-485 bus
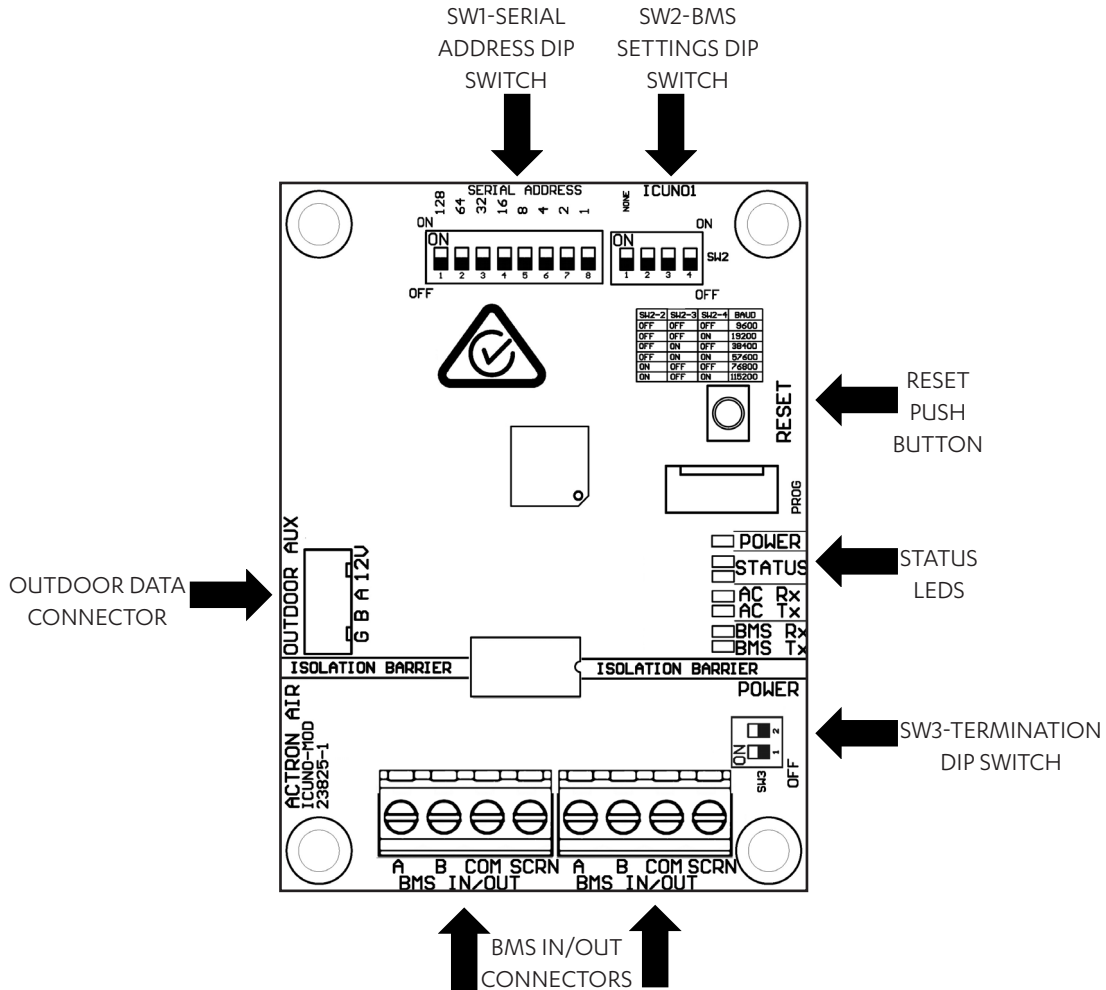
04. ICUNO-MOD Installation Procedure

04.01. Installation for Variable Capacity Commercial

To install ICUNO-MOD Interface Board into the Outdoor Electrical Panel and to UNO Outdoor 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: Use supplied PCB Mounts to mount ICUNO-MOD into correct location.

NOTE: Location will differ between ActronAir systems.

PKV (15kW - 24kW)

PCB MOUNTS

ICUNO-MOD
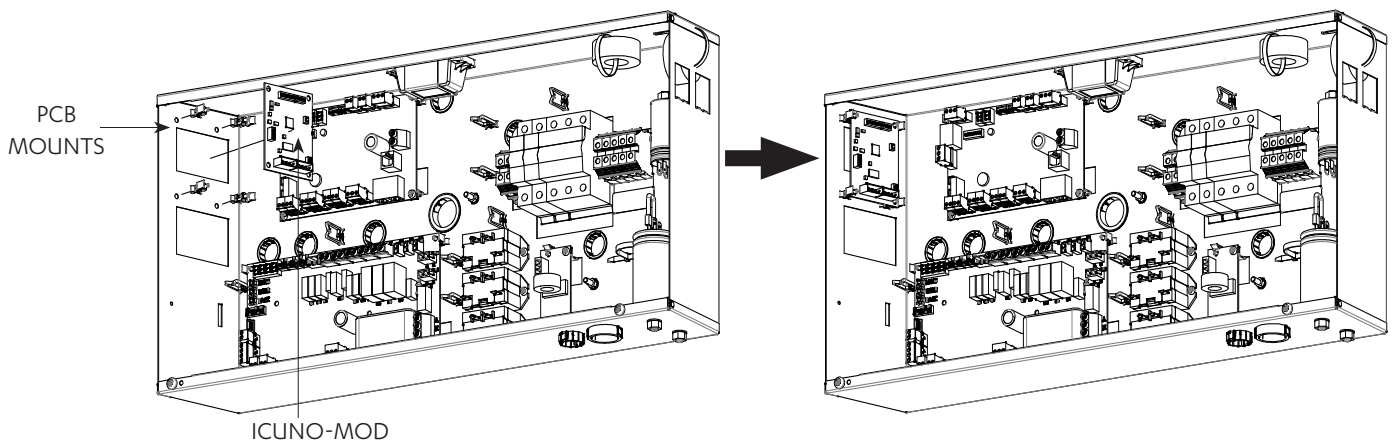
PKV/CRV (72kW - 96kW) Below image is for PKV850/960T

STAGE 1 ODB
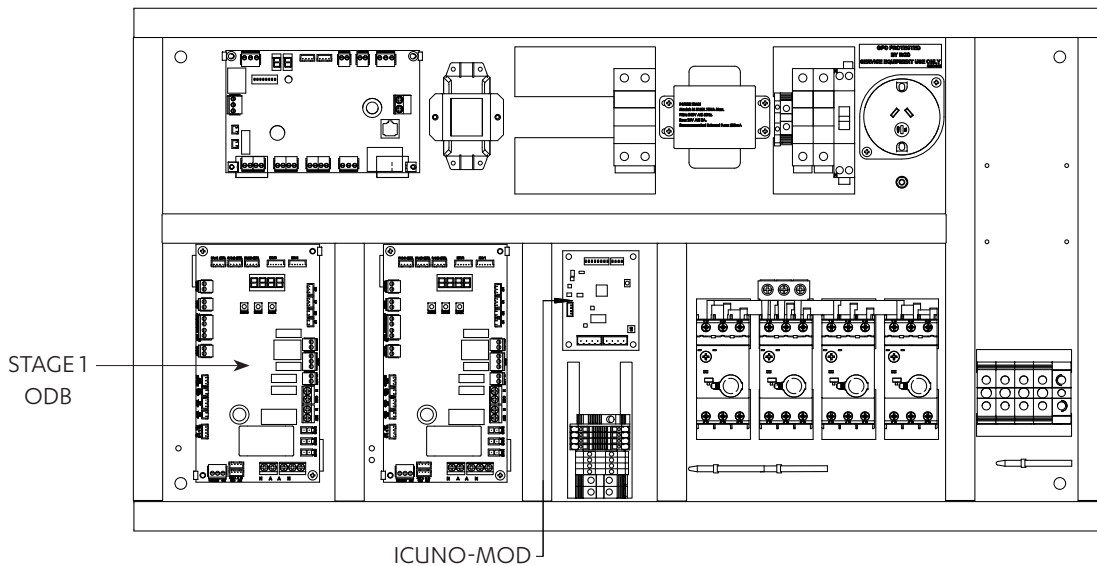
ICUNO-MOD

Step 5. Use the Data Cable provided to connect the BMS card (marked **OUTDOOR AUX**) 4 Pin socket port to the OUTDOOR BOARD (marked **AUX 485**) 4 Pin socket port.
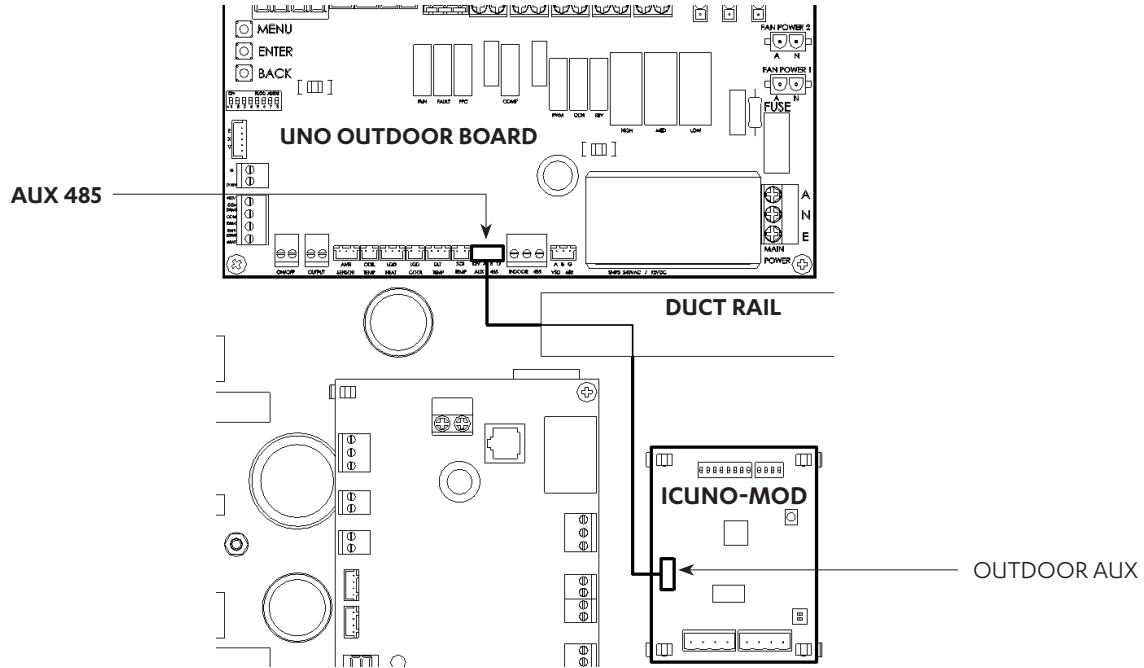
NOTES:

- Pass the cable through to the Duct Rail when connecting the Outdoor Board from the ICUNO-MOD.
- The layout is for illustration purposes only, it will differ between ActronAir systems.

04.02.   Installation for Classic Series 2 (Reverse Cycle - CRA Models)

To install ICUNO-MOD Interface Board into the Outdoor Electrical Panel and to UNOJR Outdoor 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. Use supplied PCB Mounts to mount ICUNO-MOD into correct location.
NOTE: Location will differ between ActronAir systems.

Step 5. Install BMS ICUNO-MOD as shown below.

Step 6. Use the Data Cable provided to connect the BMS card (marked **OUTDOOR AUX**) 4 Pin socket port to the OUTDOOR BOARD (marked **AUX 485**) 4 Pin socket port.

NOTE: The layout is for illustration purposes only, it will differ between ActronAir systems.

Single Phase (10kW - 17kW)
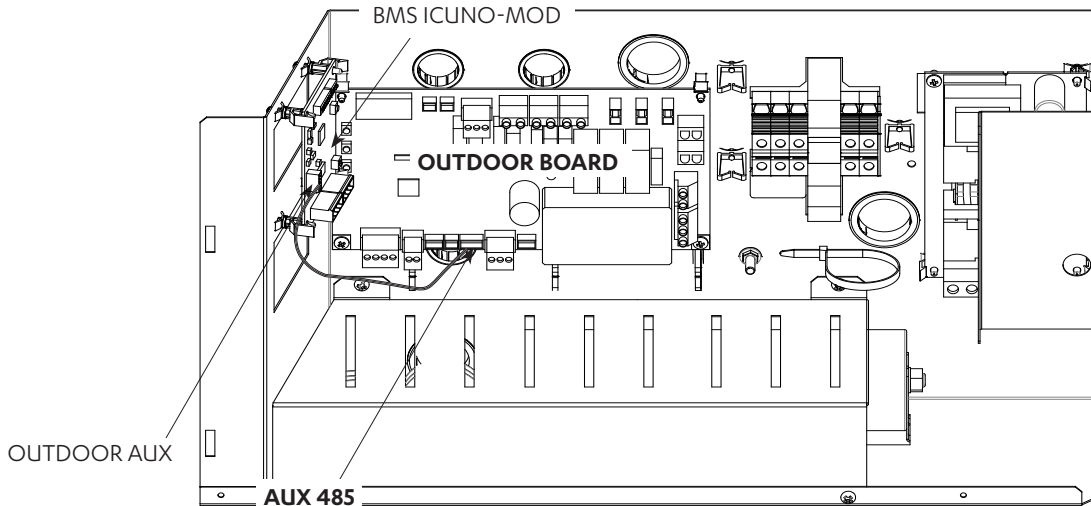
Three Phase (13kW - 23kW)
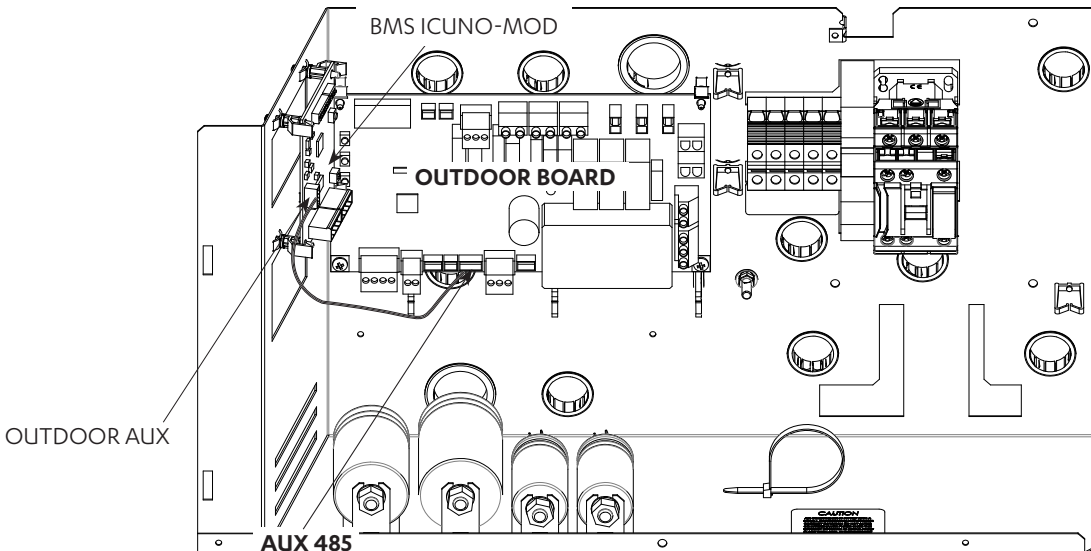
04.03. Installation for Advance (CRS / CRV / PRV Models)

To install ICUNO-MOD Interface Board into the Outdoor Electrical Panel and to UNOPRO Outdoor 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. Use supplied PCB Mounts to mount ICUNO-MOD into correct location.
NOTE: Location will differ between ActronAir systems.

Step 5. Install BMS ICUNO-MOD as shown below.

Step 6. Use the Data Cable provided to connect the BMS card (marked **OUTDOOR AUX**) 4 Pin socket port to the OUTDOOR BOARD (marked **AUX 485**) 4 Pin socket port.

NOTE: The layout is for illustration purposes only, it will differ between ActronAir systems.

Single Phase (13kW - 17kW)

BMS ICUNO-MOD   OUTDOOR AUX

AUX 485

Three Phase (13kW - 17kW)

BMS ICUNO-MOD   OUTDOOR AUX

AUX 485

04.04.   BMS Installation Procedure

INTERMEDIATE BMS DEVICE

INTERMEDIATE BMS DEVICE

LAST BMS DEVICE

CUSTOMER BMS MASTER

SHIELD/DRAIN WIRE

ICUNO-MOD   ICUNO-MOD   ICUNO-MOD
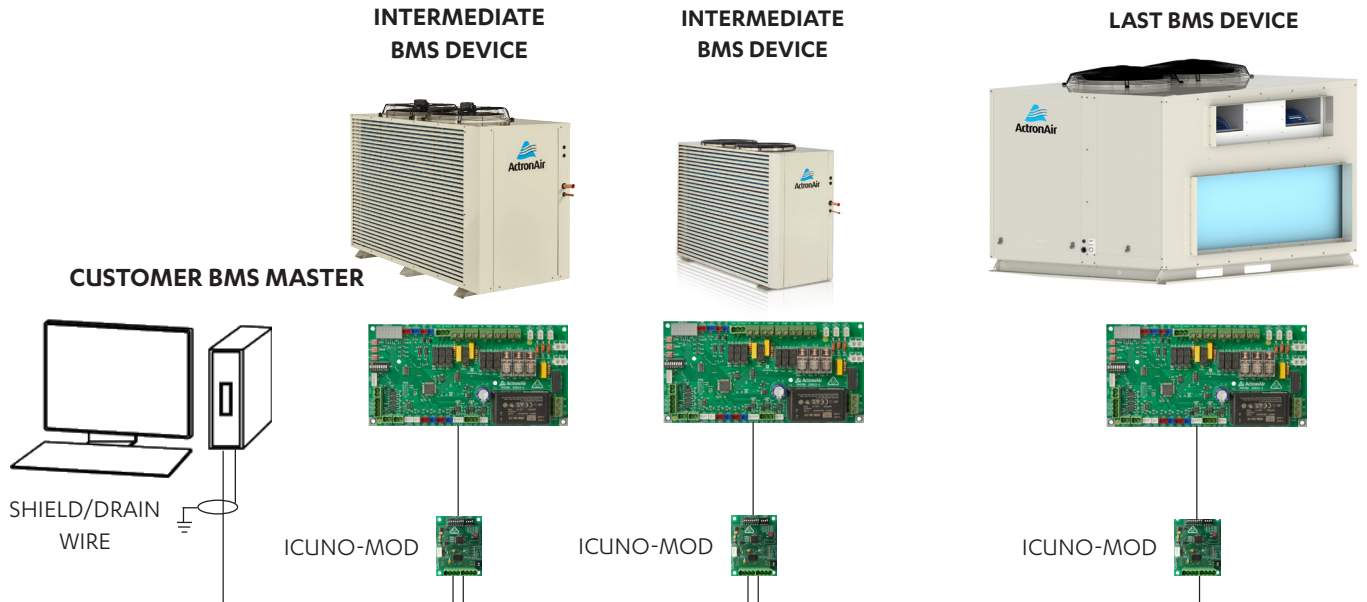
Step 1. Recommended Cable Size: 0.5mm² (7/0.30)

BMS IN/OUT

A   B   COM SCRN

- 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 RS-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.

Note: COM and SCRN must be connected to ICUNO-MOD. On the BMS control end, ensure COM and SCRN are connected to the same earth as the BMS controller. The RS485 on the ICUNO-MOD is isolated to prevent ground loops.

Step 2. If another Modbus RS-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 unit, wherein the BMS device is connected, is at the start or the end of the Modbus RS-485 network, the SW3 DIP 1 (120R) switch must be turned on.

Note: It is required to earth the shield wire of the data cable at the BMS Master end.

INTERMEDIATE BMS DEVICE

120R-

SW3 TERMINATION DIP SWITCH

FIRST OR LAST BMS DEVICE

120R-

SW3 TERMINATION DIP SWITCH
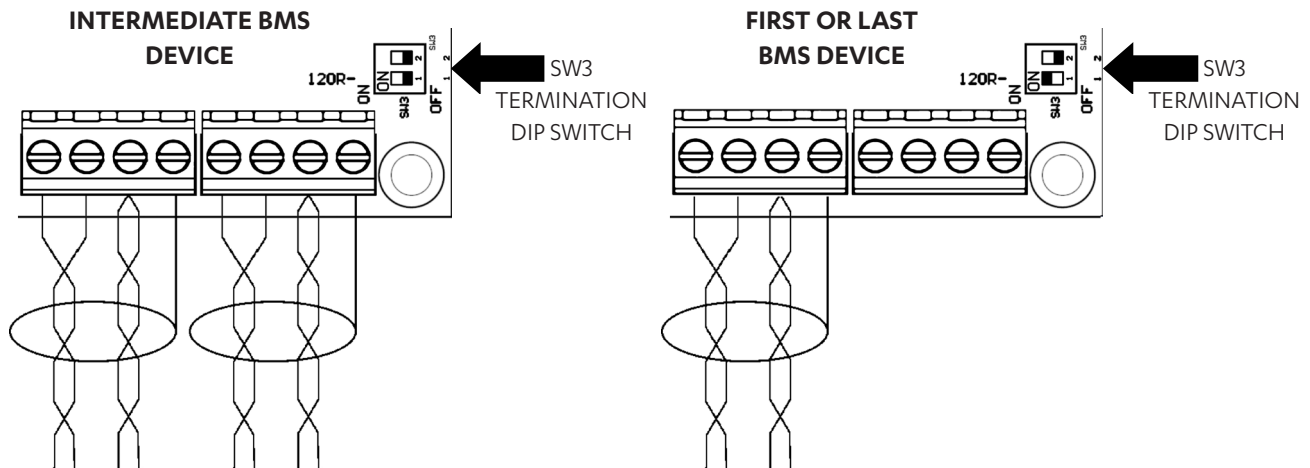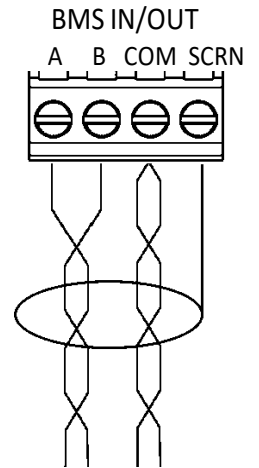
04.05. BMS Configuration of ICUNO-MOD Card

Consult project system designer (BMS engineer or similar role) for the correct Modbus RS-485 configuration for this unit.

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

04.05.01. Configure Serial Address

SW1-SERIAL ADDRESS DIP SWITCH

NOTE: The Serial Address is a number that uniquely identifies a device on the local RS-485 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.
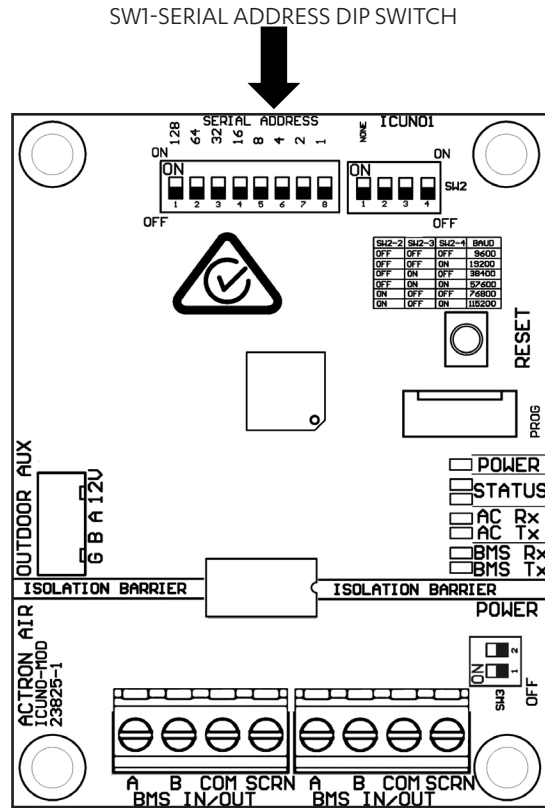
Modbus RS-485 Serial address can be configured using SW1 – SERIAL ADDRESS DIP switch.

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:
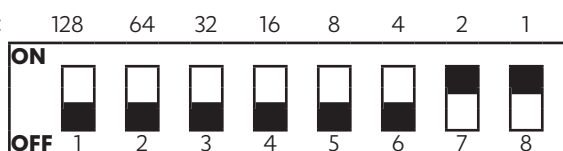
04.05.02.   Configure Baud Rate and Data Parity

SW2-BMS SETTINGS DIP SWITCH
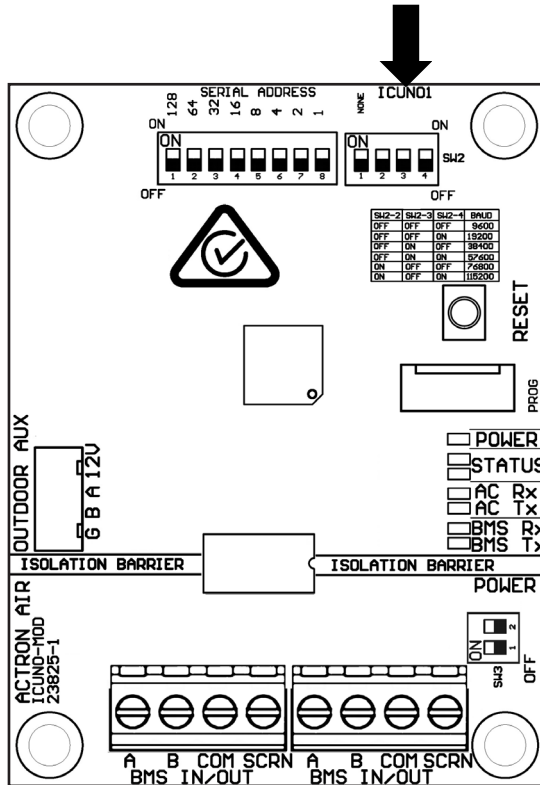
Modbus RS-485 Baud Rate and Data Parity can be configured by setting SW2 as per the table below.

Function		SW2 - DIP Switch			
		1	**2**	**3**	**4**
Data Parity	**NONE**	ON			
	EVEN	OFF			
Baud Rate	**9600**		OFF	OFF	OFF
	19200		OFF	OFF	**ON**
	38400		OFF	**ON**	OFF
	57600		OFF	**ON**	**ON**
	76800		**ON**	OFF	OFF
	115200		**ON**	OFF	**ON**

NOTE: The Data Parity and Baud Rate must be the same for all the devices connected on the local RS-485 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 04.08 for BMS Troubleshooting.

04.06. Initialisation

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 Main Supply at the Outdoor Unit.

Step 2. BMS card will take 60 seconds 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 60 seconds the Amber Status LED should be ON, indicating a stable connection to the ActronAir 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 04.08 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.
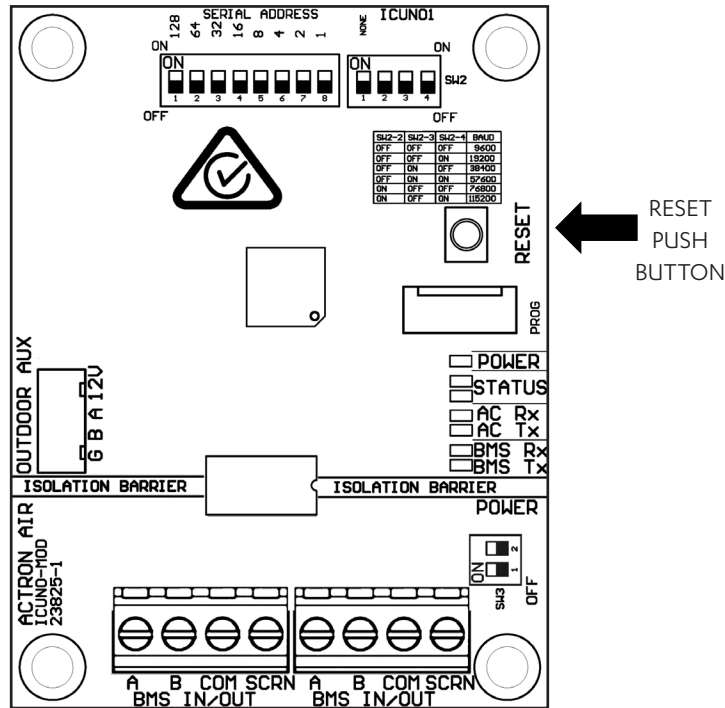
Step 6. BMS card will take 60 seconds to initialize with the new BMS configuration

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

04.07. Configure UNO Board for BMS Control

There are two modes for BMS operation (Basic BMS and Advanced BMS), the project system designer (BMS engineer or similar role) should understand the BMS operations and decide which is suitable for their application.

04.07.01. Basic BMS Control

Basic BMS Control is useful for applications looking for a relatively simple BMS solution. This BMS setup allows you to operate the ActronAir AC unit in the same way our wall controls do.

The system operating logic is controlled by the ActronAir on-board controls, providing a wide range of functions and features. This removes the need to have to re-write the HVAC or air conditioning logic into your BMS controller, as the system will take care of it for you.

With this setup, you can use the BMS to:

- Turn the system on/off
- Adjust room setpoint temperature
- Change the mode of operation: Auto/Cool/Heat/Fan Only
- Change the supply fan settings: Low/Medium/High/Auto
- Set the supply air filter notification timer
- Open and Close zones

The ActronAir AC system may be configured to operate in Basic BMS Control, or Basic BMS Control with a Wall Control. When operating in Basic BMS Control with a Wall Control, all settings changes from the BMS and Wall Control will be synchronized across the entire system.

Additional information for controlling the unit in Basic BMS Control can be found in Section 05.01.

04.07.02. UNO Board Series Configuration for Basic BMS Control

To configure the ActronAir AC system for Basic BMS Control, follow the procedure using the 7-segment display on the UNO Board below:

Step 1. Press the **MENU** button to navigate to **SEt** (Settings), press the **ENTER** button to enter sub-menu.

Step 2. Press the **MENU** button to navigate to **CtrS** (Control Source), press the **ENTER** button to enter sub-menu.

Step 3. Press the **MENU** button to navigate to **2** (Basic BMS), press the **ENTER** button to accept.

Step 4. Press the **BACK** button twice to return to Main Screen.

04.07.03. UNO Board Series Configuration for Basic BMS Control + Wall Control

To configure the ActronAir AC system for Basic BMS Control + Wall Control, follow the procedure using the 7-segment display on the UNO Board below:

Step 1. Press the **MENU** button to navigate to **SEt** (Settings), press the **ENTER** button to enter sub-menu.

Step 2. Press the **MENU** button to navigate to **CtrS** (Control Source), press the **ENTER** button to enter sub-menu.

Step 3. Press the **MENU** button to navigate to **3** (Basic BMS + Wall Control), press the **ENTER** button to accept.

Step 4. Press the **BACK** button twice to return to Main Screen.

04.07.04. Advanced BMS Control

Advanced BMS control is better suited to more complex or bespoke scenarios. This BMS setup is ideal for those applications where the air conditioning needs to link with other products, or if you require customized functions not included in the existing software and logic in the on-board controls.

Even with the highly customizable level of control, the ActronAir software ensures that the safety logics of operations are still in place to ensure that the ActronAir system will stop to prevent any problems from occurring.

With this setup, you can use the BMS to:

- Turn the system on/off
- Control compressor capacity
- Set supply fan speed
- Control Heat/Cool (reversing valve – on/off)
- Set the supply air filter notification timer
- Open and Close zones

A Wall Control can not be used if the ActronAir AC system is configured for Advanced BMS Control.

Additional information for controlling the unit in Advanced BMS Control can be found in Section 05.02.

04.07.05.   UNO Board Series Configuration

To configure the ActronAir AC system for Advanced BMS Control, follow the procedure using the 7-segment display on the UNO Board below:

Step 1. Press the **MENU** button to navigate to **SEt** (Settings), press the **ENTER** button to enter sub-menu.

Step 2. Press the **MENU** button to navigate to **CtrS** (Control Source), press the **ENTER** button to enter sub-menu,

Step 3. Press the **MENU** button to navigate to **4** (Advanced BMS), press the **ENTER** button to accept.

Step 4. Press the **BACK** button twice to return to Main Screen.

04.08.   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.
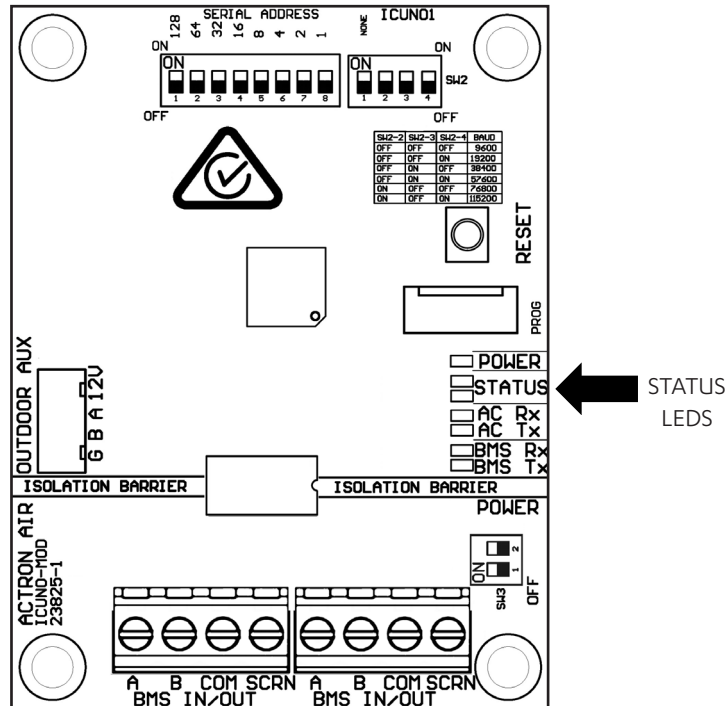
BMS CARD STATUS	LED INDICATION
Power to BMS Card	Red Power LED ON
Successful communication with A/C unit	Amber Status LED ON
Successful communication with BMS controller	White Status LED ON

Troubleshooting Table:

Symptom	Probable Cause	Suggested Resolution
Power LED (Red) is OFF	No Power to BMS Card	• Confirm Power to Outdoor Unit and power on the UNO Outdoor Board. • Check interconnect cable connection between UNO Outdoor Board and BMS Card. See Section 04 for correct installation procedure. • Check continuity of interconnect cable.
	BMS Card is Faulty	• If there is power to the UNO Outdoor Board, the interconnect cable is secure, then the BMS card may be faulty. • Replace the BMS Card.
Status 1 LED (Amber) Flashing **AC Tx (Blue) LED OFF**	BMS Card is Faulty	• Replace the BMS Card.
Status 1 LED (Amber) Flashing **AC Rx (Blue) LED OFF**	No Communication with UNO Outdoor Board	• Check the interconnect cable connection between UNO Outdoor Board and BMS Card. One or more cables/connections may be faulty. • If COM3 LED on the UNO Outdoor Board is flashing and all data harness connections are secure, then there may be a fault with the UNO Outdoor Board or BMS Card. • Replace the BMS Card. • If this fails to resolve the issue, replace the UNO Outdoor Board.
Status 2 LED (White) OFF **BMS Rx (Amber) OFF**	No Communication from BMS Master	• Confirm that BMS Master is currently operating. • Check BMS RS-485 connections from the BMS Master to this BMS Card.
Status 2 LED (White) OFF **BMS Rx (Amber) Flashing**	Incorrect Serial Address	• Confirm correct Serial Address Parity as per your installed BMS unit setup and change DIP switch settings as required. See Section 04.05.01 for Serial Address DIP switch settings. • 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 as per your installed BMS network setup and change DIP switch settings as required. • See Section 04.05.02 for Baud Rate and Parity DIP switch settings. • 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 RS-485 data corruption (CRC Cyclic Redundancy Check has failed)	• Check for any sources of noise or interruptions on the BMS RS-485 Network. • Ensure correct RS-485 grounding and shielding throughout BMS RS-485 Network. • Ensure correct cable specifications throughout BMS RS-485 Network.

Symptom	Probable Cause	Suggested Resolution
Air Conditioning Unit won't operate from BMS	Air Conditioner Fault Preventing AC from operating OR UNO Outdoor Board not configured correctly for BMS Control	• An Air Conditioner fault may prevent the unit from operating from a BMS command. • Or the UNO Outdoor Board may be incorrectly setup for BMS Control.
		• From the unit, check the UNO Outdoor Board 7-segment display for any Unit Fault Error Codes • Consult the Air Conditioner unit's troubleshooting guide to resolve the fault. • Confirm that the UNO Outdoor Board is setup for the correct BMS Control Mode as per your installed BMS network setup • See Section 05 for instructions on configuring UNO Outdoor Board for BMS Control.
		• From the BMS Controller, ensure that you are able to read data from the correct BMS Registers, and that there are no address base issues. • Try reading from Modbus Analogue Register 405 for BMS Card Software Version • If Modbus Register 405 reads a 0, then try read from Modbus Register 406 instead. If this returns a non-zero value, then plus one offset will need to be added to all Modbus registers. • Check for any Air Conditioner operation faults by reading the Alarm Output from Modbus Analogue Register 503. If this register is **1**, then the unit will not operate. • Check BMS Card to A/C unit communications by reading from Modbus Analogue Register 909. If this register reads a 1, then the BMS Card is not connected to the A/C unit correctly. • Inspect UNO Outdoor Board and BMS Card for faults • Check the unit fault error code by reading from Modbus Analogue Register 900. • Consult the Air Conditioner unit's troubleshooting guide to resolve the fault. • Once all faults are resolved, Modbus Analogue Register 503 should be cleared, indicating that the unit is no longer in a fault condition. • Confirm that the UNO Outdoor Board is setup for the correct BMS Control Mode by reading the BMS Control Mode from Modbus Analogue Register 505. • If operating in Basic BMS Control, then Modbus Analogue Register 505 should read 1. • If operating in Advanced BMS Control, then Modbus Analogue Register 505 should read 2. • See Section 05 for instructions on configuring UNO Outdoor Board for BMS Control.

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

05. BMS Control

This section of the document provides a guide to using the ActronAir BMS Table. This section explores the Modbus registers relevant to each BMS Operation Mode, their usage and meaning to control the various units.See "BMS Configuration of ICUNO-MOD Card" section for instructions on configuring your unit for BMS Control.

Additional information for status and setting of BMS can be found in "BMS Monitoring" section.

05.01. Basic BMS Control

If the Air Conditioning unit is setup for Basic BMS Control, then Modbus Analogue Register 505 should read a 1. If Register 505 reads any other value, then the unit has not been correctly setup to run in Basic BMS Control. See "Configure UNO Board for BMS Control" section for appropriate configuration of BMS Control.

05.01.01.   Operating unit in Basic BMS Control

The unit can be operated following the steps below:

Step	Operation
1.	Set the Fan Mode (Modbus Analog 4) 1 – Low 2 – Medium 3 – High
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 05.01.03 230 = 23.0°C 267 = 26.7°C

NOTE: Ensure that at least one zone is turned On whenever the system is On.

05.01.02.   Return Air Filter Notification

The Return Air filter can be monitored following the steps below:

Step	Operation
1.	Set the Indoor Filter Timer to the required time* (Modbus Analog 7). See installation and commissioning guide for more details.
2.	Read the Indoor Filter Run Hours (Modbus Analog 509) for the number of hours the indoor fan has run since the last time the filter was cleaned.
3.	The Air Filter Alarm (Modbus Analog 506) will be set when the run hours equal the filter timer.
4.	To reset the alarm, access the unit and clear the air filter, then reset the Filter Notification (Modbus Analog 6) 0 = Off 1 = Reset
5.	Once the Filter Notification has been reset, then the Indoor Filter Run Hours will reset to 0, and the Air Filter Alarm will clear.
6.	To disable the Air Filter Notification function, set the Indoor Filter Timer to **-1** (Modbus Analog 7)

*Setting the Indoor Filter timer will reset the Indoor Filter run hours and clear any Air Filter Alarm on the system.

05.01.03. Basic BMS Points Table

	Description	VCC	Advance	Aires	Classic 2	Modbus Register	Read/Write	UoM	Min	Max
Basic Unit Control	**Turns the AC On/OFF via BMS** (0=Off, 1=On)	●	●	●	●	1	R/W	1	0	1
	Set the Supply Fan Mode** (1=Low, 2=Medium, 3=High, 4=Auto)	●	●	●	●	4	R/W	1	1	4
	Reset Air Filter Notification (0=Off, 1=Reset)	●	●	●	●	6	R/W	1	0	1
	Set Air Filter Notification Timer (Hr)	●	●	●	●	7	R/W	1Hr	0Hr	10000Hr
	Mode of Operation (1=Heat Only, 2=Cool Only, 3=Auto Changeover, 4=Fan Only)	●	●	●	●	101	R/W	1	1	4
	Set Master Setpoint Temperature (0.1°C)	●	●	●	●	102	R/W	0.1°C	16.0°C	30.0°C
	Set Supply Fan Controls (0 = Standard, 1 = Continuous)	●	●	●	●	105	R/W	1	0	1
	Set Turbo Mode (0= Off, 1 = On)	●	●	●		109	R/W	1	0	1
	Set Quiet Mode (0= Off, 1 = On)	●	●	●		110	R/W	1	0	1
Unit Status	**Alarm Output (0=Off, 1=On)**	●	●	●	●	503	R	1	0	1
	BMS Demand Mode (0=No BMS, 1=Basic BMS, 2=Advanced BMS)	●	●	●	●	505	R	1	0	2
	Air Filter Notification (0=Off, 1=On)	●	●	●	●	506	R	1	0	1
	Air Filter Run Timer (Hr)	●	●	●	●	509	R	1Hr	0Hr	10000Hr
	Actual System Running Capacity (0.1%)	●	●	●	●	801	R	0.1%	0.0%	100.0%
	Room Temperature (0.1°C)	●	●	●	●	851	R	0.1°C	-99.9°C	99.9°C
Zone Control	**Set zone 1 (0=Off, 1=On)**		●	●	●	5001	R/W	1	0	1
	Set zone 2 (0=Off, 1 =On)		●	●	●	5002	R/W	1	0	1
	Set zone 3 (0=Off, 1=On)		●	●	●	5003	R/W	1	0	1
	Set zone 4 (0=Off, 1=On)		●	●	●	5004	R/W	1	0	1
	Set zone 5 (0=Off, 1=On)		●	●	●	5005	R/W	1	0	1
	Set zone 6 (0=Off, 1=On)		●	●	●	5006	R/W	1	0	1
	Set zone 7 (0=Off, 1=On)		●	●	●	5007	R/W	1	0	1
	Set zone 8 (0=Off, 1=On)		●	●	●	5008	R/W	1	0	1

**Fan speed PWM limits can be set from the ActronAir units service menu. Consult the Air Conditioner units installation guide for more information. If system has been configured as a single speed indoor fan Register 4 - Supply fan mode can only be set to MEDIUM speed. "4=Auto" is only available on Advance Units and after a self-learn is successful from the wall controller.

All registers are Type: Analog. Unsigned or Signed 16-bit integers / U16 or I16.

05.02. Advanced BMS Control

If the Air Conditioning unit is setup for Advanced BMS Demand Mode, then Modbus Register 505 should read a 2. If Register 505 reads any other value, then the unit has not been correctly setup to run in Advanced BMS Control. See Section 04.07.04 for instructions on configuring your unit for Advanced BMS Control.

05.02.01. Operating unit in Advanced BMS Control

The unit can be operated following the steps below:

Step	Operation
1.	Set the Supply Fan Speed Demand (Modbus Analog 203)* 350 = 35.0%
2.	Set the Compressor Capacity Demand (Modbus Analog 201)* 800 = 80.0%
3.	Set the Heat Request (Modbus Analog 202) 0 – Cool Mode 1 – Heat Mode
4.	Turn the AC unit OFF/ON (Modbus Analog 1)** 0 – Off 1 - On

* ActronAir software ensures that system operational safety is retained by maintaining minimum and maximum safe compressor demand and fan speed demand. Consult the Air Conditioner units installation guide for safe operating limits.

** The AC unit must be turned ON to operate the Supply Fan and Compressor.

NOTE: Ensure that at least one zone is turned On whenever the system is On.

05.02.02. Return Air Filter Notification

The Return Air filter can be monitored following the steps below:

Step	Operation
1.	Set the Indoor Filter Timer to the required time* (Modbus Analog 7). See installation and commissioning guide for more details.
2.	Read the Indoor Filter Run Hours (Modbus Analog 509) for the number of hours the indoor fan has run since the last time the filter was cleaned.
3.	The Air Filter Alarm (Modbus Analog 506) will be set when the run hours equal the filter timer.
4.	To reset the alarm, access the unit and clear the air filter, then reset the Filter Notification (Modbus Analog 6) 0 = Off 1 = Reset
5.	Once the Filter Notification has been reset, then the Indoor Filter Run Hours will reset to 0, and the Air Filter Alarm will clear.
6.	To disable the Air Filter Notification function, set the Indoor Filter Timer to **-1** (Modbus Analog 7)

*Setting the Indoor Filter timer will reset the Indoor Filter run hours and clear and Air Filter Alarm on the system.

05.02.03. Advanced BMS Points Table

	Description	VCC	Advance	Aires	Classic 2	Modbus Register	Read/Write	UoM	Min	Max
Unit Control	**Turns the AC On/OFF via BMS** (0=Off, 1=On)	●	●	●	●	1	R/W	1	0	1
	Reset Air Filter Notification (0=Off, 1=Reset)	●	●	●	●	6	R/W	1	0	1
	Set Air Filter Notification Timer (Hr)	●	●	●	●	7	R/W	1Hr	0Hr	10000Hr
	Set System Capacity Demand (0.1%)[1,2]	●	●	●	●	201	R/W	0.1%	0.0%	100.0%
	Set Heat Request (0=Off, 1=On)	●	●	●	●	202	R/W	1	0	1
	Set Supply Fan Speed Demand (0.1%) [1]	●	●	●	●	203	R/W	0.1%	0.0%	100.0%
	Set Damper Output (0.1V)	●	●	●	●	204	R/W	0.1 V	0 V	10.0 V
Unit Status	**Alarm Output (0=Off, 1=On)**	●	●	●	●	503	R	1	0	1
	BMS Demand Mode (0=No BMS, 1=Basic BMS, 2=Advanced BMS)	●	●	●		505	R	1	0	2
	Air Filter Notification (0=Off, 1=On)	●	●	●	●	506	R	1	0	1
	Air Filter Run Timer (Hr)	●	●	●	●	509	R	1Hr	0Hr	10000Hr
	Actual System Running Capacity (0.1%)	●	●	●	●	801	R	0.1%	0.0%	100.0%
Zone Control	**Set zone 1 (0=Off, 1=On)**		●	●	●	5001	R/W	1	0	1
	Set zone 2 (0=Off, 1=On)		●	●	●	5002	R/W	1	0	1
	Set zone 3 (0=Off, 1=On)		●	●	●	5003	R/W	1	0	1
	Set zone 4 (0=Off, 1=On)		●	●	●	5004	R/W	1	0	1
	Set zone 5 (0=Off, 1=On)		●	●	●	5005	R/W	1	0	1
	Set zone 6 (0=Off, 1=On)		●	●	●	5006	R/W	1	0	1
	Set zone 7 (0=Off, 1=On)		●	●	●	5007	R/W	1	0	1
	Set zone 8 (0=Off, 1=On)		●	●	●	5008	R/W	1	0	1

*Applicable to Platinum and Advance Series

1. ActronAir software ensures that system operational safety is retained by maintaining minimum and maximum safe compressor demand and fan speed demand. Consult the Air Conditioner unit's installation guide for safe operating limits.

2. Actual system running capacity (Modbus Analog 801) and Indoor Fan1 Speed (Modbus Analog 1311) will reflect the Set System Capacity Demand and Supply Fan Speed Demand respectively

3. All registers are Type: Analog. Unsigned or Signed 16-bit integers / U16 or I16.

05.03. BMS Monitoring

Provides the data about unit operation like refrigerant low/high pressures, temperature sensor values, Electronic Expansion Valve (EEV) opening, fan speeds, zone status and digital inputs/outputs.

BMS Monitoring Points Table

	Description	VCC / Advance	Aires	Classic 2	Modbus Register	Read/ Write	UoM	Min	Max
Unit Status and Conditions	BMS Card Software Version	●	●	●	405	R	1	0	65535
	Alarm Output (0=Off, 1=On)	●	●	●	503	R	1	0	1
	BMS Demand Mode (0=No BMS, 1=Basic BMS, 2=Advanced BMS)	●	●	●	505	R	1	0	2
	Air Filter Notification (0=Off, 1=On)	●	●	●	506	R	1	0	1
	Air Filter Run Timer (Hr)	●	●	●	509	R	1Hr	0Hr	10000Hr
	Actual System Running Capacity (0.1%)	●	●	●	801	R	0.1%	0.0%	100.0%
	Demand Response (0 = No DRM, 1 = DRM1, 2 = DRM2, 3 = DRM3)	●	●		804	R	1	0	4
	Remote On/Off (0=Low, 1=High)	●	●	●	805	R	1	0	1
	Room Temperature (0.1°C)	●	●	●	851	R	0.1°C	-99.9°C	99.9°C
	Outside Air Temperature (0.1°C)	●	●		852	R	0.1°C	-99.9°C	99.9°C
Unit Faults	Current Error Code (Consult the Air Conditioner unit's installation guide for Error Code descriptions)	●	●	●	900	R	1	0	100
	Error History Log, 1 Error ago	●	●	●	901	R	1	0	100
	Error History Log, 2 Errors ago	●	●	●	902	R	1	0	100
	Error History Log, 3 Errors ago	●	●	●	903	R	1	0	100
	Error History Log, 4 Errors ago	●	●	●	904	R	1	0	100
	Error History Log, 5 Errors ago	●	●	●	905	R	1	0	100
	No Communications with Indoor Unit (0=No Error, 1=Off line)	●	●	●	906	R	1	0	1
	No Communications with Outdoor Unit (0=No Error, 1=Off line)	●	●	●	909	R	1	0	1
	Room Temperature Sensor Status (0 = OK, 1 = Error)	●	●	●	951	R	1	0	1
	Outside Air Temperature Sensor Status (0 = OK, 1 = Error)	●	●		952	R	1	0	1
Model	Outdoor Unit 1 Model	●	●	●	1001	R	1	0	65535
	Outdoor Unit 1 Software Version	●	●	●	1002	R	1	0	65535
	Compressor 1 Type	●	●	●	1004	R	1	0	100

	Description	VCC / Advance	Aires	Classic 2	Modbus Register	Read/ Write	UoM	Min	Max
Compressor 1 Status	Compressor 1 running status (0=Off, 1=On)	●	●	●	1101	R	1	0	1
	Compressor 1 Heating (0=Off, 1=On)	●	●	●	1102	R	1	0	1
	Compressor 1 Demand (0.1%)	●	●	●	1104	R	0.1%	0.0%	100.0%
	Compressor 1 Speed (0.1%)	●	●		1105	R	0.1%	0.0%	100.0%
	Compressor 1 Unit Defrosting (0 = Off, 1 = Defrosting)	●	●	●	1107	R	1	0	1
	Compressor 1 Suction Pressure (kPa)	●	●		1111	R	1kPa	0kPa	6000kPa
	Compressor 1 Discharge Pressure (kPa)	●	●		1112	R	1kPa	0kPa	6000kPa
	Compressor 1 Suction Temperature (0.1°C)	●	●		1113	R	0.1°C	-999.9°C	999.9°C
	Compressor 1 Discharge Temperature (0.1°C)	●	●		1114	R	0.1°C	-999.9°C	999.9°C
	Compressor 1 Suction Superheat (0.1°K)	●	●		1115	R	0.1°K	-99.9°K	99.9°K
	Compressor 1 Suction Superheat Target (0.1°K)	●	●		1117	R	0.1°K	-99.9°K	99.9°K
	Compressor 1 LP Switch Trip (0=Off, 1=Trip)	●	●	●	1118	R	1	0	1
	Compressor 1 HP Switch Trip (0=Off, 1=Trip)	●	●	●	1119	R	1	0	1
	Compressor 1 HP or LP Lockout (0=Off, 1=Lockout)	●	●	●	1122	R	1	0	1
OD Coil	Outdoor Coil 1 Temperature (0.1°C)	●	●	●	1201	R	0.1°C	-99.9°C	99.9°C
	Outdoor Coil 1 Fan Speed Setting (0=Off, 1=Low, 2=Med, 3=High)	●	●	●	1215	R	1	0	3
ID Coil	Indoor Coil Temperature (0.1°C)	●	●	●	1301	R	0.1°C	-99.9°C	99.9°C
	Indoor Coil 1 Fan 1 Speed (0.1%)	●	●	●	1311	R	0.1%	0.0%	100.0%
	Indoor Coil 1 Fan 1 Speed (RPM)	●	●	●	1312	R	1RPM	0RPM	9999RPM
EEV	Compressor 1 EEV position (0.1%)	●	●		1401	R	0.1%	0.0%	100.0%
Sensor	Compressor 1 Discharge Temp High (0=Off, 1=On)	●	●		1502	R	1	0	1
	Compressor 1 LP Status (0 = OK, 1 = Error)	●	●		1503	R	1	0	1
	Compressor 1 HP Status (0 = OK, 1 = Error)	●	●		1504	R	1	0	1
	Compressor 1 Suction Temperature Status (0 = OK, 1 = Error)	●	●		1505	R	1	0	1
	Compressor 1 Discharge Temperature Status (0 = OK, 1 = Error)	●	●		1506	R	1	0	1
	Outdoor Coil 1 Temperature Status (0 = OK, 1 = Error)	●	●	●	1507	R	1	0	1
	Indoor Coil Temperature Status (0 = OK, 1 = Error)	●	●	●	1508	R	1	0	1

	Description	VCC / Advance	Aires	Classic 2	Modbus Register	Read/ Write	UoM	Min	Max
Room Temperature Sensors	Wall Control 1 Temperature (0.1°C)	●	●	●	6001	R	0.1°C	-99.9°C	99.9°C
	Wall Control 2 Temperature (0.1°C)	●	●	●	6002	R	0.1°C	-99.9°C	99.9°C
	Wall Control 3 Temperature (0.1°C)	●	●	●	6003	R	0.1°C	-99.9°C	99.9°C
	Auxiliary Sensor 1 Temperature (0.1°C)	●	●	●	6011	R	0.1°C	-99.9°C	99.9°C
	Auxiliary Sensor 2 Temperature (0.1°C)	●	●	●	6012	R	0.1°C	-99.9°C	99.9°C
	Auxiliary Sensor 3 Temperature (0.1°C)	●**	●	●	6013	R	0.1°C	-99.9°C	-99.9°C

** For residential systems only.

All registers are Type: Analog. Unsigned or Signed 16-bit integers / U16 or I16.

05.04. Economy Cycle and Extended Indoor Settings

	Description	VCC / Advance	Modbus Register	Read/ Write	UoM	Min	Max
Economiser	Enable Outside Air Damper (0=Off, 1=On)	●	340	R/W	1	0	1
	Enable Economiser (0=Off, 1=On)	●	341	R/W	1	0	1
	Enable Humidity Control	●	342	R/W	1	0	1
	Humidity Sensor Configuration (0=Outdoor, 1=Outdoor & Indoor)	●	343	R/W	1	0	1
	Moisture Control Config (0=Moisture, 1=Enthalpy)	●	344	R/W	1	0	1
	Enable CO_2 Control (0=Off, 1=On)	●	345	R/W	1	0	1
	Economiser Temperature Difference (0.1°C)	●	351	R/W	0.1°C	0	10.0°C
	Economiser Outside Min Temperature (0.1°C)	●	352	R/W	0.1°C	0	22.5°C
	Economiser Outside Max Temperature (0.1°C)	●	353	R/W	0.1°C	0	26.0°C
	Economiser Minimum Damper	●	354	R/W	0.1 V	0 V	10.0 V
	Economiser Maximum Damper	●	355	R/W	0.1 V	0 V	10.0 V
	Economiser Outside Max Humidity (.1 %)	●	356	R/W	0.1%	0.0%	100.0%
	Economiser Outside Max Moisture (0.1 x g/kg)	●	357	R/W	0.1%	0.0 g/kg	100.0 g/kg
	Economiser Outside Max Dew Point (0.1 x kJ/kg)	●	358	R/W	0.1%	0.0 kJ/kg	100.0 kJ/kg
	Economiser Outside Max Enthalpy (0.1 x kJ/kg)	●	359	R/W	0.1%	0.0 kJ/kg	100.0 kJ/kg
	Economiser Enthalpy Delta (0.1°C)	●	360	R/W	0.1°C	0	10.0°C
	Economiser CO_2 Low Level	●	361	R/W	PPM	0	1000
	Economiser CO_2 High Level	●	362	R/W	PPM	0	1000
	Economiser CO_2 Minimum Damper	●	363	R/W	0.1 V	0 V	10.0 V
	Economiser CO_2 Maximum Damper	●	364	R/W	0.1 V	0 V	10.0 V

	Description	VCC / Advance	Modbus Register	Read/ Write	UoM	Min	Max
Extended Indoor Settings	Target Airflow	●	307	R/W	L/s	0	6000
	Enable Volumetric Airflow	●	308	R/W	L/s	0	6000
	Indoor Pressure Filter Level Warning	●	308	R/W	Pa	0	6000
	Reduced Airflow Speed (0.1%)	●	316	R/W	0.1%	0.0%	100.0%
	Enable Desuperheater (0=Off, 1=On)	●	320	R/W	1	0	1
	Desuperheater Inlet Temperature Cutout (0.1 °C)	●	321	R/W	0.1°C	0	26.0°C
	Enable Overflow Sensor (0=Off, 1=On)	●	322	R/W	1	0	1
	Desuperheater Active (0=Off, 1=On)	●	620	R	1	0	1
	De-superheater Water Inlet Temperature (0.1 °C)	●	621	R	0.1°C	-99.9°C	-99.9°C
	Enable Overflow Sensor (0=Off, 1=On)	●	622	R	1	0	1
	Reduced Airflow Active (0=Off, 1=On)	●	705	R	1	0	1
	Indoor Airflow	●	860	R	L/s	0	6000
	Indoor Static Pressure	●	861	R	Pa	0	6000
	Measured CO_2 Level	●	862	R	PPM	0	1000

06. Modbus RS-485 Technical Data

Device Type	Slave
Baud Rates	9600 (Default), 19200, 38400, 76800, 115200
Data Parity	Even (Default), None
Unit Load	1/32
Device Address Range	1 – 247
Protocol	Modbus RTU
Electrical Interface	RS-485, 4 Wire (2 pair)
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
Data Format	8-N-1 (Eight data bits, No parity bits and One stop bit)

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