

AIRSYS

M A N U A L

TELECOOL DC Series

Cabinet Air Conditioner

Installation, Maintenance & Operation Manual

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Safety Instruction

Important

All installation and service work must be done by qualified professional technicians. Always wear protective gear and comply with all general and local safety standards and codes. Adhere to all warnings and safety instructions on the units and in this manual. AIRSYS shall not be held liable for any damage to persons or property due to improper operation or servicing of this equipment.

Warning

Risk of electric shock. Switch off all electric breakers before servicing the units. Failure to comply can cause serious injury or death.

Warning

Risk of contact with high-speed rotating fan blades. Turn off the unit and verify that the fan blades have stopped rotating before working around the fans. Failure to comply can cause serious injury or death.

Caution

The surfaces of compressors, motors, and discharge lines may become extremely hot during operation. Allow enough time for the components to cool before working on these components. Wear protective gear and exercise caution when working near hot surfaces. Failure to comply can cause injury.

Caution

Risk of contact with sharp edges. Always wear protective gloves when handling panels and other components. Failure to comply can cause injury.

1. Introduction

The AIRSYS line of DC Telecool Cabinet Air Conditioner is an all DC powered system that incorporates variable speed air conditioning (mechanical cooling) which is able to continuously modulate cooling capacity to meet cooling demand. Depending on system configuration, the system may also include electrical heater to meet heating requirements.

When the operating conditions for mechanical cooling are met, a variable frequency drive changes to compressor speed to adjust compressor throughput and in turn, cooling capacity to match heat load. By precisely matching the headload at all times, the variable speed units minimize the times of turning on/off as well as sudden loading and unloading of the compressor, vastly extending the life time and reliability of the entire cooling system.

1.1 Model Identification

	1	2	3	4	5	6	7	8
	A	C	A	040	E	D1	.	XXX
1	A		AIRSYS					
2	C		Cabinet Size Code					
3	A		A: Air Conditioner. A-FC: Air Conditioner with Free Cooling					
4	040		Cooling Capacity (x100W)					
5	E		E=Embedded; S=Side Mount					
6	D1		Power Supply. D1=48VDC					
7	.		Separator Character “.”					
8	XXX		Product Code for Customized Product					

Tab 1 - Model Identification

2. Installation

2.1 Installation Preparation

2.1.1 Delivery

When your units are delivered, be sure to inspect them to verify that they have not been damaged during transportation. Also verify that all requested accessories listed on the purchase order have been included.







Important. If packages show **any** sign of shipping damage or potential shipping damage, it is very important to annotate shipping damage on the Bill of Lading prior to signing for the freight. In order to claim for any damage, please take detailed pictures of all packaging before the packaging is removed. Once detailed pictures of the packaging have been taken, then the external packaging may be removed, so the unit can be inspected further. Please document any damage to the unit with pictures which relates directly to the damage observed on the external packaging.

Without the detailed photos, it will be very difficult to claim unit loss.

2.1.2 Unpacking

Unpack the unit carefully. Several parts are packed loosely and will be free moving as the packaging is opened. Before discarding the box, check the packaging carefully for any parts or documents inside.

List of symbols and their meaning that may appear on the external packaging are tabulated below:

Symbol	Description	Symbol	Description
	THIS SIDE UP Shows the orientation of the unit.		NO HOOKS Do not use hooks to lift the packed unit.
	FRAGILE Handle with care.		KEEP AWAY FROM HEAT The unit must be kept away from heat sources.
	PROTECT AGAINST RAIN: The packaged unit must be stored in a dry place.		DO NOT STACK

Tab 2 - Packaging Symbols

2.1.3 Moving the Unit

Forklifts are recommended for moving, loading, unloading, and positioning the unit for installation. If bands or ropes are used to create a sling, make sure that excessive force is not applied to the upper edges of the machines or the package to avoid cosmetic or material damage. When using spacing bars, protective materials are required around the units to prevent damage.

To avoid damage to the units, ensure the units always remain in the upright position.

2.1.4 Verify Power Source

Verify the DC Power Supply meets the minimum requirements: 42VDC~57VDC.

2.2 AIRSYS Supplied Material

2.2.1 Air Conditioner

No.	Item	Qty	Comments
1	Shipping list	1	
2	Air Conditioner	1	Refer to 1.1 Model Identification
3	Drainpipe	1	4.9ft
4	Drain connection tube	1	
5	Pipe clamp	1	
6	M3x8 screw	3	For securing drain connection
7	Manual	1	This document

Tab 3 - Material included with Air Conditioner

2.3 Installer Supplied Material

Note: This material list can be customized based on project. Subject to change without notice.

No.	Item	Qty	Comments
1	M6×16 Screw	20	Suggested mounting material
2	φ6 Flat washer	20	Suggested mounting material
3	φ6 Spring washer	20	Suggested mounting material
4	M6 Hex nuts	20	Suggested mounting material
5	Sealant	As needed	
6	DC breaker	1	See nameplate for current rating.
7	DC power supply cable, AC	1	1 conductor cable from power source to unit or door splice. See nameplate for current rating.
8	RS-485 communication cable	1	1 conductor shielded cable from unit to customer remote monitoring device or door splice.
9	Alarm cable	1	1 output signal cable
10	Ground cable	1	

Tab 4 - Installer Supplied Material

2.4 Physical Installation

2.4.1 Clearance

There should be a minimum of 300mm (12") in front of supply and return vent as well as 500mm (20") on the outside to allow proper airflow

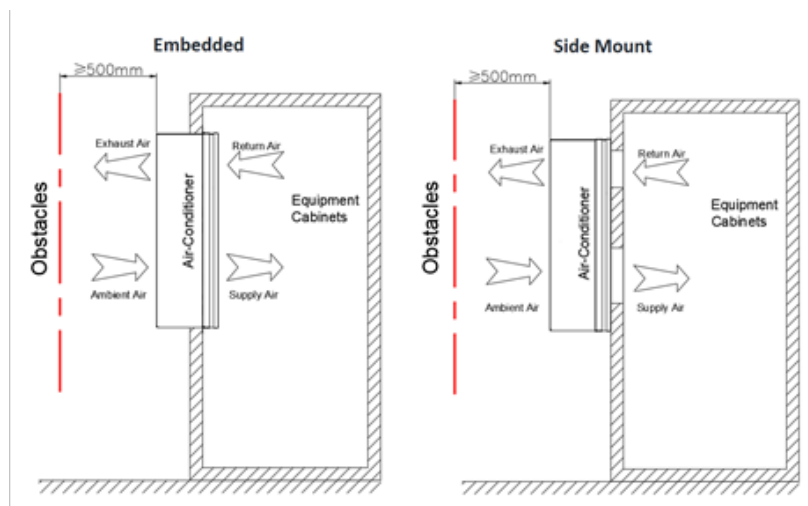


Fig 1 - Clearances

2.4.2 Dimensions

Refer to physical drawing for specific model. 3D drawing file also available upon request to facilitate cabinet integration.

2.4.3 Positioning the Unit

Note: The unit must be installed in a level position. (+/- 1 degree level)

- Lift the unit from below with lifting equipment or tools, and then move the unit to the intended location.
- **For embedded mounting:** Position the unit next to the interior using a forklift or leveling system. Push the unit through the cabinet door and secure unit with mounting screws and bolts.
- **For exterior (side) mounting:** Position the unit next to the exterior using a forklift or leveling system. Line the unit with cabinet door mounting holes and secure unit with mounting screws and bolts.

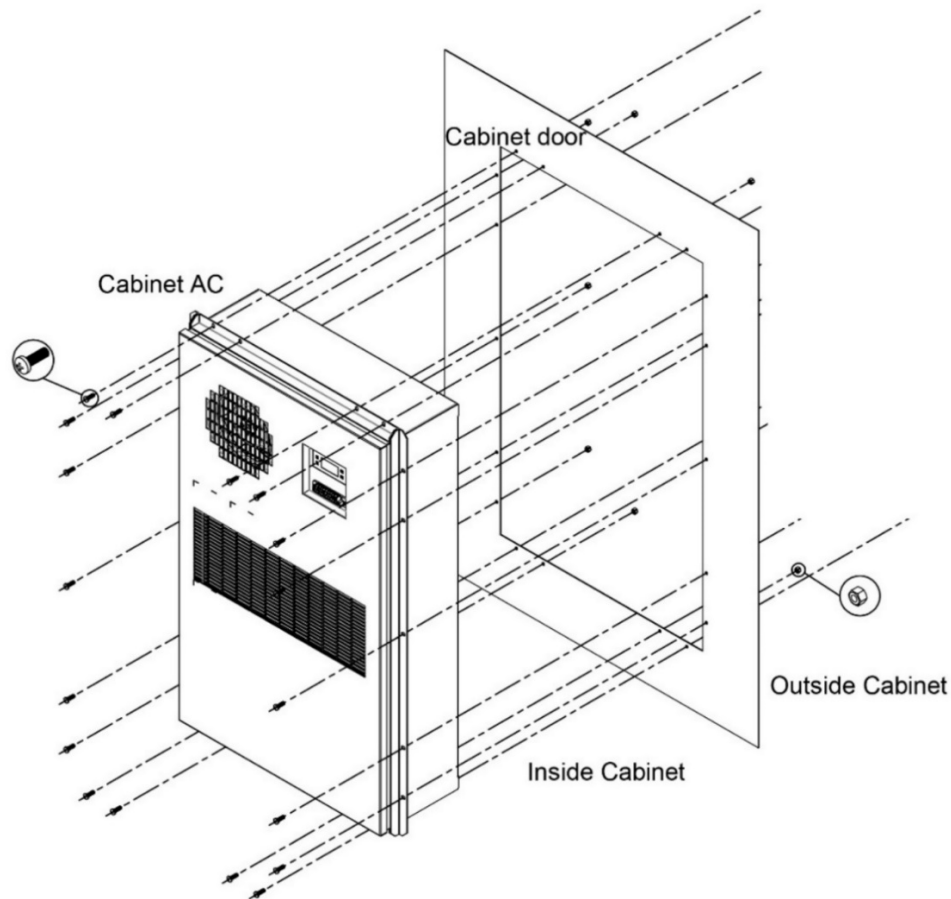


Fig 2 - Embedded Mounting

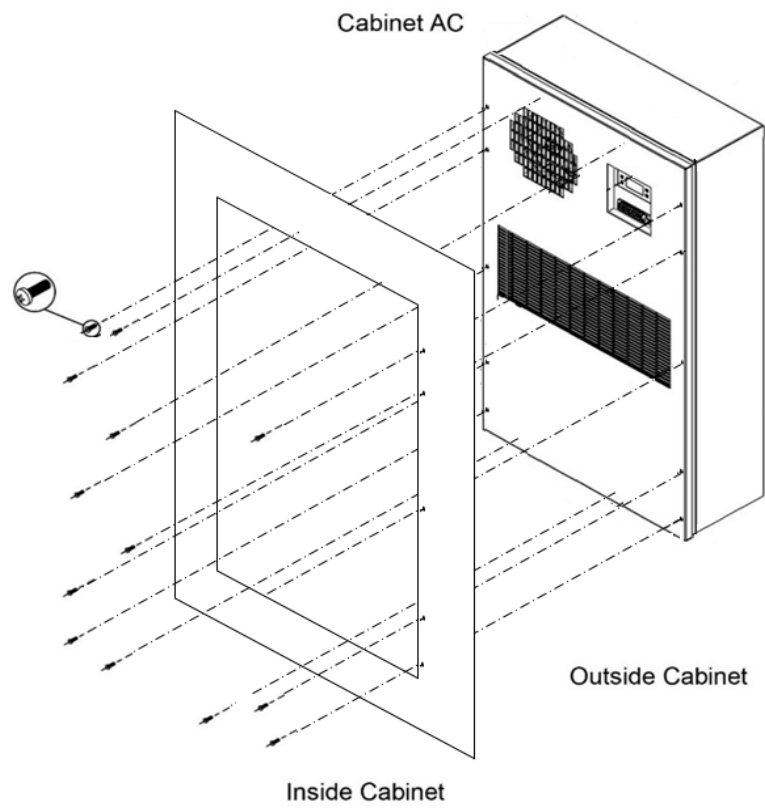


Fig 3 - Side (Exterior Mounting)

2.4.4 Install drainpipe

Install drainpipe according to diagram below:

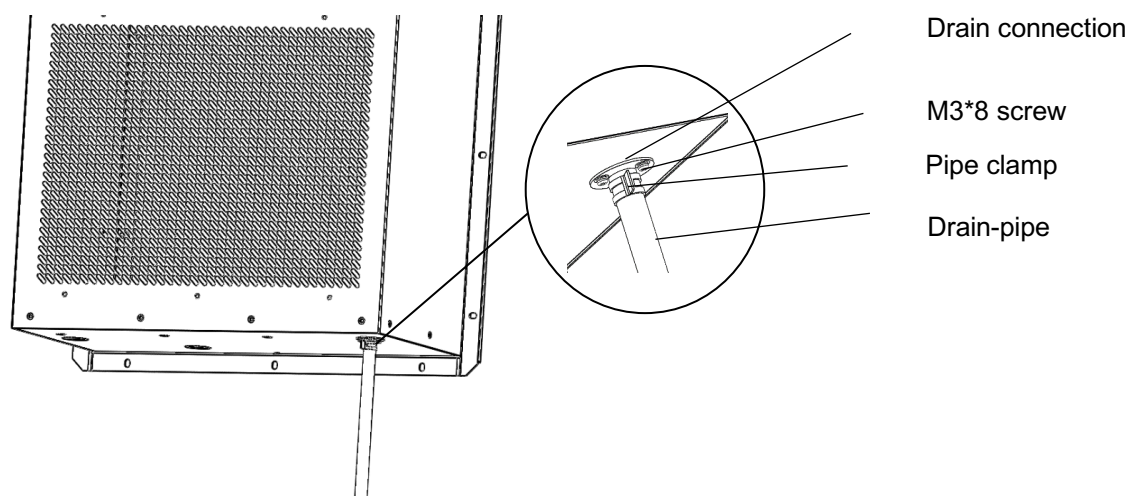


Fig 4 - Drain Installation

2.5 Electrical Installation

2.5.1 List of Electrical Connection

#	Connection	Description
1	48 VDC	Supplies operating power to the unit. Minimum 10AWG
2	Ground Connection	Grounding must meet local regulations
3	Alarm Connection	(Optional) Output Signal → Indicates unit has a fault (NC)
4	Modbus Connection	RS485 connection for remote remoting and control

Tab 5 - List of Electrical Connection



Warning

Risk of electric shock. Switch off electric power source before electrical installation. Failure to comply can cause serious injury or death.

2.5.2 DC Power Connections

Connect RTN, -48V on each AC unit to the power source. Each unit shall have its own separate breaker position on the power source.

Connect grounding cable to PE (protective earth) terminal on each AC unit. See nameplate for model/configuration specific electrical rating.

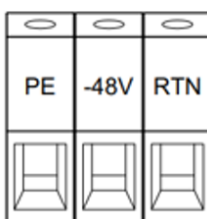


Fig 5 - Power Connection for AC unit

2.6 Installation Checklist

You should now have completed all of the physical and electrical installation steps. Before starting the system, ensure that no steps have been omitted by completing this installation and wiring checklist.

Note: Remote monitoring is not included in the physical and electrical checklist. See Remote Monitoring chapter on setting up remote monitoring.

Date: _____ **Unit Serial Number(S):** _____ (refer to name plate)

PHYSICAL	√ or X
----------	--------

Unit is securely mounted to the door

Sealant has been applied to seal ALL sides with NO gaps

Drainpipe installed

ELECTRICAL

RS485 line 22AW G/2C is connected

Ground is connected

Power lines is connected to AC unit. Ensure positive is connected to RTN and negative is connected to -48V.

Tab 6 - Installation Checklist

2.7 System Commissioning

System commissioning is vital to ensure all components are operating correctly after the installation.

Important: The installation checklist must be completed prior to commissioning system.

2.7.1 Turn on Primary Power

Important: If any point the system is not upright during the installation, the unit must stay in upright position for a minimum of 30 minutes before power is applied to it.

2.7.2 Automatic Self-Test

Once power is applied to the AC unit, it will automatically perform a series of self-test. If a failure is detected, it will automatically enter alarm with alarm code displaying on screen. If no failure is detected, the system will enter normal operation.

Step	Duration	Description	Failure Condition	Failure Action	Alarm Recovery Condition
0	5s	Standby	N/A	N/A	N/A
1	10s	Verify DC Voltage	<42V or >59V	Exit self test and display alarm	44V - 57V for 10s
		Verify Return, Supply and Condenser Sensor Reading	<-40°C or >140°C which indicate to short or open sensor	Continue test. Display alarm after test ends.	-40 ° c --+140 ° c for 10s
2	30s	Verify Internal Fan	Difference between speed signal and feedback >30% or no feedback within 30s	After the testing the external fan, end test and display alarm	Difference between speed signal and feedback <25% for 3 minutes
3	30s	Verify External Fan	Difference between speed signal and feedback >30% or no feedback within 30s	Exit self test and display alarm	Difference between speed signal and feedback <25% for 3 minutes
4	35s	Verify Heater	Difference between return air temperature and supply air temperature <2°C	Continue test. Display alarm after test ends	Supply air temp is 2°C higher than return air temp
5	70s	Compressor Standby	N/A	N/A	N/A
6	3-6min	Verify Compressor (Compressor must start within 3min and have minimum 3 min run time. Skipped if outdoor temp is less than -20°C)	Compressor unable to start within 3 minutes	Exit self test and display alarm	Compressor start when called

Tab 7 - Self-Test Detail

If any alarm is displayed during or after self-test, refer to System Alarms section in the Operations Chapter. All alarms must be cleared before the system is considered to be fully operational.

Once the installation checklist is complete and no alarm has occurred during automatic self-test, the system is considered to be commissioned and operational.

3. Operation

3.1 User Interface

The local user interface is composed of a display panel and 4 buttons (**Up**, **Down**, **Menu**, and **Set**). The display panel shows supply temperature by default. If there is an alarm, the display will alternate between alarm code and supply temperature. If the supply temperature sensor itself is in alarm, it will display 4 dashes (----



Fig 6 - Display Panel

3.1.1 Display LED Icons

Tab 8 - List of Display Icons

LED	Description
	Flashes when in Self Diagnose mode or in Parameter Menu
	On when cooling
	On when heating
	Dehumidification. (Not applicable)
	On when exterior fan is running
	On if an alarm is present

3.2 Information Display

From the default supply temperature display, some system information can be quickly accessed:

Information	To Access Information	To Return to Supply Temp
System Voltage	Press Set	Press Menu
Condensing Temperature	Press Up	Press Menu
return air temperature	Press Down	Press Menu
Ambient temperature	Press Menu	Press Menu
Compressor Speed	Press Up and Down simultaneously	Press Menu
External Fan Speed	Press Down and Set simultaneously	Press Menu
Internal Fan Speed	Press Up and Set simultaneously	Press Menu
Compulsory Self-Test	Long Press Down and Set simultaneously	Press Menu

Tab 9 - Display Information Access

3.3 Parameter Menu

Hold **Menu** key for 5 seconds to enter Parameter Menu. The first parameter (F01) will be displayed. Use the **Up** or **Down** button to scroll through the menu.

3.3.1 Reading A Parameter

When a parameter is displayed on screen, press **Set** to view the current value. Press **Menu** to return to the menu.

3.3.2 Writing Over A Parameter

Important: To ensure proper operation of the lead/lag setup, any setpoint, hysteresis, and rotation schedule change must be applied to both lead and lag units.

When a parameter is displayed on screen, press **Set** to view the current value. Use the **Up** or **Down** key to change the value. Then press **Set** and you will be prompted to enter the passcode. Quickly enter the passcode and press **Set**. If the Password is correct, "End" will be displayed and the value will be changed. You may press **Menu** at any time to return to the menu.

3.3.3 List of Parameters

Note: Default setting provided for reference only. Default settings can be changed or locked depending on project requirements.

Parameter	Description	Range	Default	Unit
F01-F22	Reserved Factory Parameter			
F23	Heater Start Temperature	-450~150	140	0.1°C
F24	Heater Dead Band	30~200	50	0.1°C
F25	Reserved Factory Parameter			
F26	Reserved Factory Parameter			
F27	Enable Electric Heater	1=Yes, 0=No	1	N/A
F28	Rs485 Address Note: Leave At 1 When Protocol Converter Is Used		1	N/A
F29	High Temp Alarm Setpoint	300~1000	550	0.1°C
F30	Low Temp Alarm Setpoint	-450~200	-420	0.1°C
F31	Reserved Factory Parameter			
F32	Reserved Factory Parameter			
F33	Reserved Factory Parameter			
F34	Return Temp Sensor Calibration	-100~100	0	0.1°C
F35	Supply Temp Sensor Calibration	-100~100	0	0.1°C
F36	Reserved Factory Parameter			
F37	Dc Voltage Calibration	-100~100	0	0.1V
F38	Reserved Factory Parameter			
F39	Reserved Factory Parameter			
F40	High Voltage Alarm Value	540~700	600	0.1V
F41	Low Voltage Alarm Value	240~470	420	0.1V
F42	Temperature Setpoint	180~(F63+F43-70)	270	0.1°C
F43	Compressor Hysteresis	(F42+80-F63)~150	30	0.1°C
F44	Reserved Factory Parameter			
F45	Password Setting	0000-9999	1111	N/A
F46	Reset Default	1=Yes, 0=No	0	N/A

Tab 10 - List of Parameters

3.4 Sequence of Operation

Important: To ensure proper operation of the lead/lag setup, any setpoint, hysteresis, and rotation schedule change must be applied to both lead and lag units.

3.4.1 Self-Test Mode

At power up, the system will perform self-test. It will automatically run through operating all main components of the system including fans, heater, and compressor as well as verify that the sensors are reading correctly. An alarm will be generated if any fault is detected. For more details, see 2.7.2 Automatic .

3.4.2 Standby

If the system is not already running and the supply air temperature is below compressor starting temperature (F42) and above heater starting temperature (F23), the system will standby with internal fan running at low speed.

If the system is heating it will continue to heat until the supply temperature reaches above heater starting temperature + dead band (F23+F24) before engaging standby.

If the system is cooling it will continue to cool until the supply temperature reaches below compressor starting temperature – hysteresis (F42-F43) before engaging standby.

3.4.3 Heater Operation

When the indoor temperature drops to heater starting temperature (F23), the heater will turn on. When the indoor temperature rises to heater stop temperature (F23+F24), the heater will turn off.

3.4.4 Compressor Operation

The compressor turns on at compressor starting temperature (F42+F43) and turns off at compressor stop temperature (F42-F43). If Free cooling is not available, the compressor will modulate to keep the indoor temperature at cooling setpoint (F42).

3.5 System Alarms

If there is an alarm detected, the display panel will alternate between the supply temperature and the alarm code. If the supply temperature itself is in alarm, it will display 4 dashes (----)

Note: Some alarm may not be available depending on unit configuration

3.5.1 Alarm Codes

Code	Description	Response	Possible Cause	Component to Check	Recommended Action
E01	Internal Fan Alarm	Heating And Cooling Disabled. Auto-Reset	1. Controller board damaged	Check if there is a signal output of internal fan at controller port (0-10VDC)	Replace the controller board
			2. Cable connection is loose	Check if cables are connected properly	Connect cables properly
			3. Internal fan has failed	If internal fan does not run with power and speed signal with no physical	Replace with a new fan

Code	Description	Response	Possible Cause	Component to Check	Recommended Action
				obstruction, the fan has failed	
			4. Software settings	Check the parameter setting or refresh software	Reset to factory default or update software
E02	Ambient Temperature Sensor Alarm	Auto-Reset	1. Temperature sensor cable is damaged	Check if the sensor cable is damaged	Replace the sensor or reconnect the cable.
			2. Temperature sensor cable connection is loose	Check if connection between sensor and AC unit is loose	Connect cables properly
E03	External Fan Alarm	Cooling Disabled. Auto-Reset	1. Controller board damaged	Check if there is signal of external output at controller port (0-10VDC)	Replace the controller board
			2. Cable connection is loose	Check if cables are connected properly	Connect cables properly
			3. External fan has failed	If external fan does not run with power and speed signal with no physical obstruction, the fan has failed	Replace with a new fan
			4. Software settings	Check the parameter setting or refresh software	Reset to factory default or update software
E05	Compressor Fault Alarm	Cooling Disabled. Auto-Reset	1. Compressor overheat protection	Check if overheat protection is engaged (engages at 115C, disengage at 80C)	Wait until compressor cools down or replace with a overheat protection
			2. Controller board failure	Check if there is a signal output of compressor at controller port	Replace the controller board
			3. Compressor contactor has failed	Check if compressor contactor has coil voltage and if it is closed.	If contactor is not closed with coil voltage, replace contactor
			4. Cable connection is loose	Check if cables are connected properly	Connect cables properly
			5. Software settings	Check the parameter setting or refresh software	Reset to factory default or update software
			6. Compressor has failed	Check all above components, if compressor still doesn't work or the compressor is obviously damaged	Replace the unit

Code	Description	Response	Possible Cause	Component to Check	Recommended Action
E11	Return Temperature Sensor Alarm	Heating Disabled. Auto-Reset	1. Temperature sensor cable is damaged	Check if the sensor cable is damaged	Replace the sensor or reconnect the cable.
			2. Temperature sensor cable connection is loose	Check if connection between sensor and AC unit is loose	Connect cables properly
E12	Condenser Temperature Sensor Alarm	Cooling Disabled. Auto-Reset	1. Temperature sensor cable is damaged	Check if the sensor cable is damaged	Replace the sensor or reconnect the cable.
			2. Temperature sensor cable connection is loose	Check if connection between sensor and AC unit is loose	Connect cables properly
E13	Dc Power Over Voltage Alarm	Heating And Cooling Disabled. Auto-Reset	1. Power Failure at site	Check the power supply voltage	Change power supply or adjust input power voltage
			2. Controller board damaged	Check if the DC voltage reading on board matches with actual DC voltage	If significant deviation exists with no calibration, replace controller board
			3. Overvoltage limit setting is too low	Check if the limit setting point (F40) is reasonable (default 60v)	Reset voltage limit setting
E14	Dc Power Under Voltage Alarm	Heating And Cooling Disabled. Auto-Reset	1. Power failure at site	Check the power supply voltage	Change power supply or adjust input power voltage
			2. Controller board damaged	Check if the DC voltage reading on board matches with actual DC voltage	If significant deviation exists with no calibration, replace controller board
			3. Undervoltage limit setting is too high	Check if the low limit setting point (F41) is reasonable (default 42v)	Reset undervolt limit setting
E15	High Temperature Alarm	Auto-Reset	1. Supply air temperature sensor is not at a proper position	Check if the temperature sensor is loose or positioned properly	Re-locate the supply air temperature sensor
			2. A/C unit is not cooling properly	Check if A/C unit works in cooling mode and cooling performance	Replace with a new A/C unit
			3. Heat load is too high or A/C unit is not large enough	Check if the headload in the cabinet is abnormal	If not, replace with a larger A/C unit
			4. High temperature alarm setting point is low	Check if the high temperature alarm setting point is too low (default 55 °c)	Reset the high temperature alarm setting point

Code	Description	Response	Possible Cause	Component to Check	Recommended Action
E16	Low Temperature Alarm	Auto-Reset	1. Heater not operating	Heater contactor, heater switch, thermal fuse	Replace component
			2. Low temperature alarm set point is high	Check if the low temperature alarm setting point is too high for environment insulation	Adjust low temperature alarm setting point
			3. Heater too small for environment and/or insulation	Outdoor temperature, insulation, and heater wattage	Change heater size, add additional supplemental heaters, improve insulation
			4. Supply air temperature sensor is not at a proper position	Check if the temperature sensor is loose or positioned properly	Re-locate the supply air temperature sensor
E17	System High Pressure Alarm	Cooling Disabled. Auto-Reset	1. Blockage at condenser side affecting heat exchange	Check for any blockage at condenser side	Clean the condenser
			2. Indoor or outdoor temperature is too high.	Check if the indoor or outdoor temperature is too high	Check again when the outdoor/ambient temperature goes down.
			3. A/C unit failure	Check if A/C system has failed	Replace with a new A/C unit
E18	System Low Pressure Alarm	Cooling Disabled. Auto-Reset	1. Airflow blockage ³	Check internal fan for airflow	See E01
			2. Low refrigerant	Check for low pressure and leak	Repair leak and recharge refrigerant
			3. Bad low pressure switch	Check if low pressure switch is engaged when actual pressure is normal	Replace the switch
			4. Loose low pressure switch connection	Check for low pressure switch connection	Reconnect the cable
E22	Supply Temperature Sensor Alarm	Cooling Disabled. Auto-Reset	1. Temperature sensor cable is damaged	Check if the sensor cable is damaged	Replace the sensor or reconnect the cable.
			2. Temperature sensor cable connection is loose	Check if connection between sensor and AC unit is loose	Connect cables properly

Tab 11 - System Alarms and Resolution

4. Remote Monitoring

The air conditioner configured for Modbus communication protocol, please refer to <http://www.modbus.org> for further detail about the protocol.

The AC unit transmits data through RS485, the transmitting mode is: RTU mode, 8 bit data, no parity, CRC check, and 9600 baud rate. Timeout: 50ms.

4.1 MODBUS Function Code

The controller supports the following function code

Function Code	Description	Definition
01 (0x01)	Read Coils	This function code reads status from 1 to 2000 contiguous coils in a remote device.
02 (0x02)	Read Discrete Inputs	This function code reads status from 1 to 2000 contiguous discrete inputs in a remote device.
03 (0x03)	Read Holding Registers	This function code reads the contents of a contiguous block of holding registers in a remote device.
04 (0x04)	Read Input Registers	This function code reads from 1 to approx. 125 contiguous input registers in a remote device.
05 (0x05)	Write Single Coil	This function code writes a single output to either ON or OFF in a remote device.
06 (0x06)	Write Single Register	This function code writes a single holding register in a remote device.
16 (0x10)	Write Multiple Register	This function code writes a block of contiguous registers (1 to approx. 120 registers) in a remote device.

Tab 12 - Modbus Function Codes

4.2 Exception Code

The controller supports the following exception code

Error Code	Description	Definition
01 (0x01)	Illegal Function	The function code received in the query is not an allowable action for the controller
02 (0x02)	Illegal Data Address	The data address received in the query is not an allowable address for the controller
03 (0x03)	Illegal Data Value	A value contained in the query data field is not an allowable value for the controller
04 (0x04)	Slave Device Failure	Fail to read or write the register
05 (0x05)	Controller Busy	The master should retransmit the data later when the controller is free
06 (0x06)	Too Much Data	The received data is more than 255 bytes
12 (0x0c)	CRC Check Error	CRC Check Error

Tab 13 - Modbus Exception Codes

4.3 Data Type

The data has two types: bit data and word data. The bit data include discrete input data that is read-only and Coil data that is readable and writable. The word data include input register that is read-only and holding register that is readable and writable.

4.4 Data List

Data address of the controller register follows Modbus communication protocol, which start from 0 and the maximum address is 65535. If the master request data from an undefined address, the controller will return error. The defined data points are as follows:

4.4.1 MODBUS Coil Data Points List

Tab 14 - Modbus Coil Data Points

Network Control Property	Read Or Write	Data Type	Id	Description
Internal Fan Status	R	Coil	00	1=Run, 0=Stop
External Fan Status	R	Coil	02	1=Run, 0=Stop
Compressor Status	R	Coil	04	1=Run, 0=Stop
Heater Status	R	Coil	05	1=Run, 0=Stop
Self-Test Status	R	Coil	11	1=Run, 0=Stop
System Status	R/W	Coil	12	1=Run, 0=Stop
Linkage Status	R	Coil	14	1=Run, 0=Stop

4.4.2 MODBUS Discrete Input Data Points List

Network Control Property	R/W	Data Type	Id	Description	Alarm Code
Internal Fan Alarm	R	Discrete Input	00	1=Alarm ,0=No Alarm	E01
External Fan Alarm	R	Discrete Input	02	1=Alarm ,0=No Alarm	E03
Compressor Alarm	R	Discrete Input	04	1=Alarm ,0=No Alarm	E05
Return Temp Sensor Alarm	R	Discrete Input	10	1=Alarm ,0=No Alarm	E11
Cond. Temp Sensor Alarm	R	Discrete Input	11	1=Alarm ,0=No Alarm	E12
High DC Voltage Alarm	R	Discrete Input	12	1=Alarm ,0=No Alarm	E13
Low DC Voltage Alarm	R	Discrete Input	13	1=Alarm ,0=No Alarm	E14
High Temp Alarm	R	Discrete Input	14	1=Alarm ,0=No Alarm	E15
Low Temp Alarm	R	Discrete Input	15	1=Alarm ,0=No Alarm	E16
High Pressure Alarm	R	Discrete Input	16	1=Alarm ,0=No Alarm	E17
Ambient Temp Sensor Alarm	R	Discrete Input	21	1=Alarm ,0=No Alarm	E02
Low Pressure Alarm	R	Discrete Input	27	1=Alarm ,0=No Alarm	E18
Supply Sensor Alarm	R	Discrete Input	32	1=Alarm ,0=No Alarm	E22

Tab 15 - Modbus Discrete Input Data Points

4.4.3 MODBUS Input Register Data Points List

Network Control Property	R/W	Data Type	ID	Unit
Internal Fan RPM	R	Input Register	00	
External Fan RPM	R	Input Register	02	
Return Temperature	R	Input Register	04	0.1°C
Ambient Temperature	R	Input Register	05	0.1°C
DC Voltage	R	Input Register	06	0.1°V
Compressor RPM	R	Input Register	07	
Condenser Temperature	R	Input Register	13	0.1°C
1th and 2th bit of the software version	R	Input Register	15	ASCII
3th and 4th bit of the software version	R	Input Register	16	ASCII
5th and 6th bit of the software version	R	Input Register	17	ASCII
7th and 8th bit of the software version	R	Input Register	18	ASCII
9th and 10th bit of the software version	R	Input Register	19	ASCII
11th and 12th bit of the software version	R	Input Register	20	ASCII
13th and 14th bit of the software version	R	Input Register	21	ASCII
15th and 16th bit of the software version	R	Input Register	22	ASCII
17th and 18th bit of the software version	R	Input Register	23	ASCII
Supply Temperature	R	Input Register	30	0.1°C

Tab 16 - Modbus Input Register Data Points

4.4.4 MODBUS Holding Register Data Points List

Note: Default setting provided for reference only. Default settings can be changed or locked depending on project requirements.

Network Control Property	R/W	Data Type	ID	Range	Default	Unit
Heater Start Temperature	R/W	Holding Register	22	-450~150	140	0.1°C
Heater Dead Band	R/W	Holding Register	23	30~200	50	0.1°C
Enable Electric Heater	R/W	Holding Register	26	1=Yes, 0=No	1	N/A
Rs485 Address Note: Leave At 1 When Protocol Converter Is Used	R/W	Holding Register	27	0~255	1	N/A
High Temp Alarm Setpoint	R/W	Holding Register	28	300~1000	550	0.1°C
Low Temp Alarm Setpoint	R/W	Holding Register	29	-450~200	-420	0.1°C
Return Temp Sensor Calibration	R/W	Holding Register	33	-100~100	0	0.1°C
Supply Temp Sensor Calibration	R/W	Holding Register	34	-100~100	0	0.1°C
DC Voltage Calibration	R/W	Holding Register	36	-100~100	0	0.1V
High Voltage Alarm Value	R/W	Holding Register	39	540~700	600	0.1V
Low Voltage Alarm Value	R/W	Holding Register	40	240~470	420	0.1V
Temperature Setpoint	R/W	Holding Register	41	180~(ID62+ID42-70)	270	0.1°C
Compressor Hysteresis	R/W	Holding Register	42	(ID41+70-F62)~150	30	0.1°C

Tab 17 - Modbus Holding Register Data Points

5. Maintenance

5.1 Preventive Maintenance Schedule

This section provides guidelines for the owner of an AIRSYS unit to ensure that the unit perform well continuously. Following these guidelines for a regular maintenance will help to avoid serious damage on components and expensive repairs by service technician.

Task	Recommended Frequency	Comments
Condenser Cleaning	Based on Local Conditions	Generally, at least every 12 months. Harsh environment may require more frequent cleaning, especially if condenser screen is not installed
Condenser Screen Cleaning (If installed)	Based on Local Conditions	Generally, at least every 12 months. Harsh environment may require more frequent cleaning.
Indoor Filter Cleaning	Based on Local Conditions	Generally, at least every 6 months. Harsh environment may require more frequent cleaning.
Verify System Operation	12 Months	Re-powering the unit will engage system self-test. Ensure no alarm is reported, otherwise resolve alarm. See section 3.5 for more details on alarms.
Inspect Wiring and Connection For Signs of Wear	12 Months	May require more frequency in areas with active rodent or insect populations

Tab 18 - Preventive Maintenance Schedule

It is generally recommended to compare the operation parameter of the equipment with the results of the previous inspection. Any differences in operating characteristics can then be easily identified.

Closely following the recommend maintenance schedule will ensure the system always operates without impairment and ensure long term reliability of the system.

5.2 Wiring and Connections

For wiring and connections

- Check that the system has been installed correctly and all wiring are still snug
- Check that the wiring cable sections meet current capacity.
- Check that the grounding cables have been installed

5.3 Condenser Screen Cleaning

Your unit may come with condenser screen that helps blocking larger particle and debris from entering the condenser. If condenser screen is installed, follow these steps to clean the condenser screen.

- Remove condenser screen cover

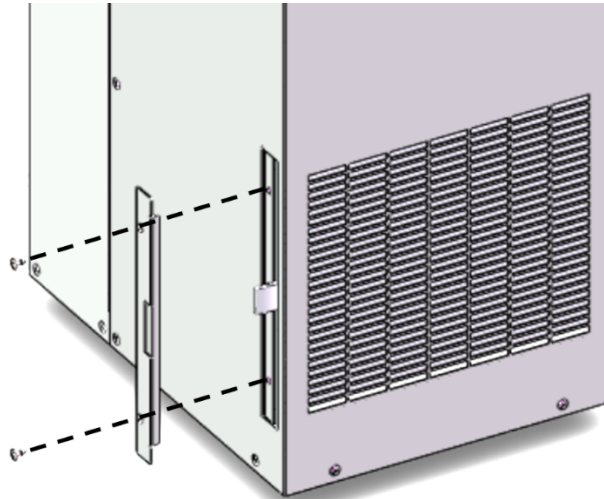


Fig 7 - Condenser Screen Cover

- Pull out condenser screen

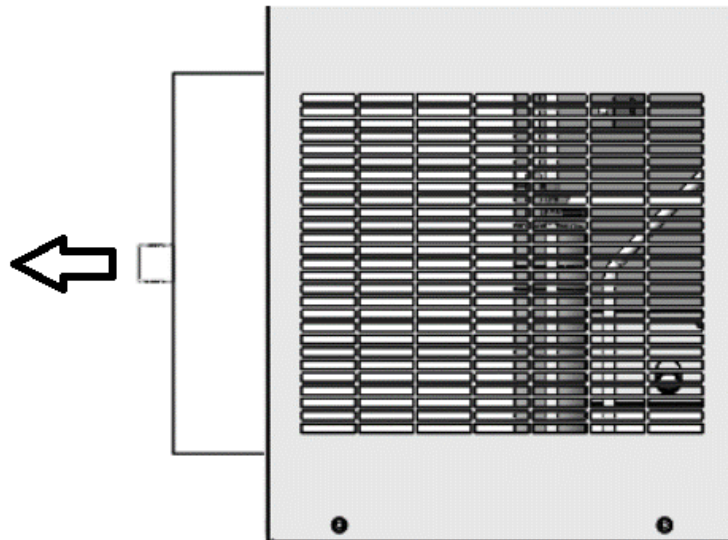


Fig 8 - Condenser Screen Removal

- Brush off larger loose particles and debris
- If screen is not clean after brushing, it can be wiped using paper towel with water

5.4 Wiring Diagram

Note: Reference Diagram. Specific and other options may not be available depending on configuration

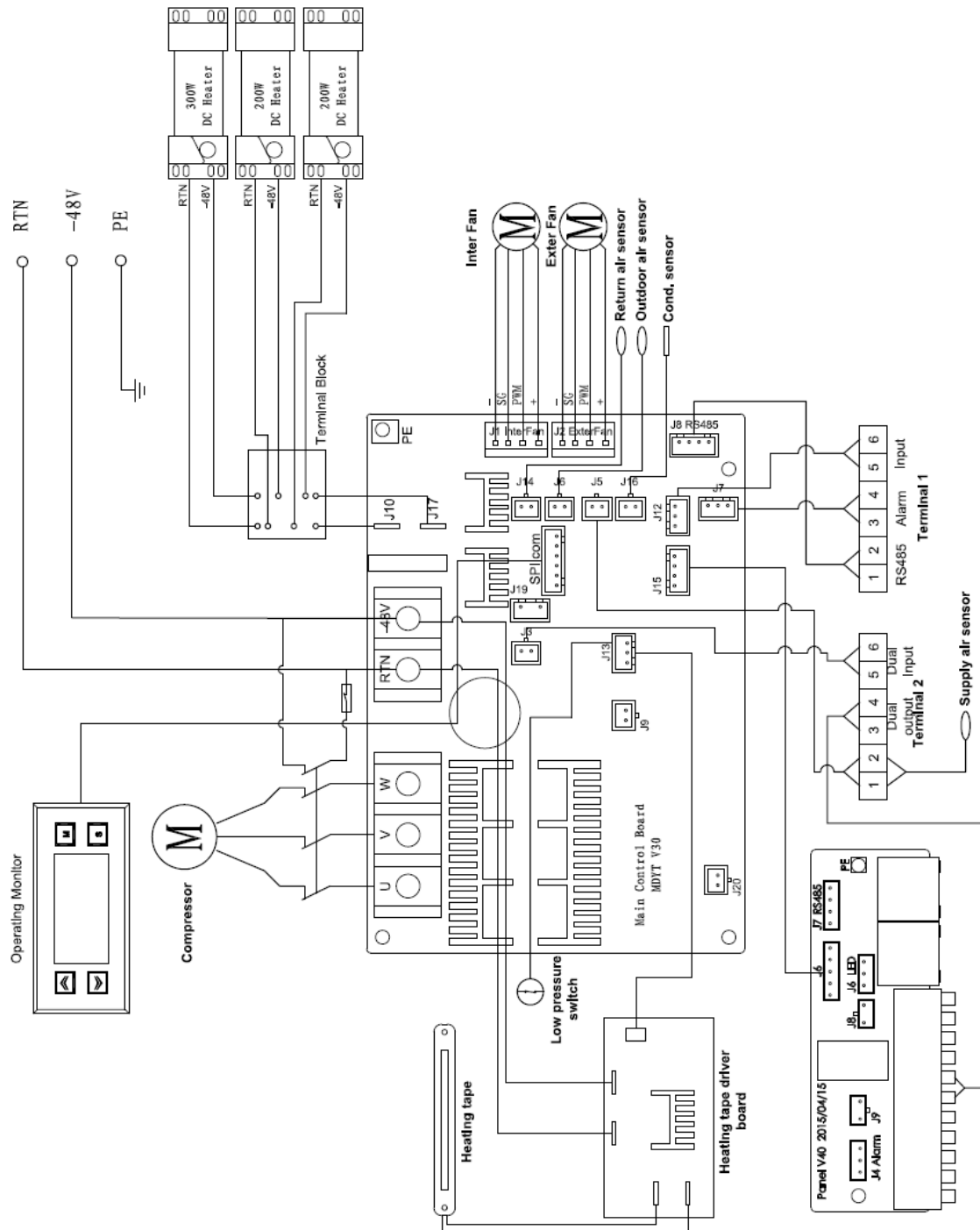


Fig 9 - Factory Wiring Diagram

6. Warranty

Unless separate extended warranty agreement is signed, the warranty duration is 12 months from the date of installation. AIRSYS warrants that its products will be free from defects in materials and workmanship for a period of 12 months after installation.

Warranty must be registered at airsysnorthamerica.com. If no warranty is registered, warranty period starts at date of shipment.

7. Appendix

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7.2 Appendix 2-Specification Sheet

48VDC Series Cabinet Air Conditioner (Embedded)

Unit Mode		ACA003ED1	ACA005ED1	ACA008ED1	ACA010ED1	ACA015ED1
Input Voltage		-48VDC				
Cooling Capacity L35/L35	W	300	500	800	1000	1500
Power Consumption L35/L35	W	130	150	180	280	395
Airflow	m ³ /h	100	150	350	400	440
Application Temperature	°C	-40°C~+70°C				
Working Temperature	°C	-20°C~+55°C				
Mounting Method		Embedded				
IP grade		IP55*				
Electrical Heater*	W	/				
Refrigerant		R134a				
Noise	dB (A)	60	55	65	65	65
Surface Treatment		Outdoor type powder coating RAL7035				
Dimensions* (Include flange)	mm	441*281*150	582*352*175		782*482*200	
Dimensions (Without flange)	mm	400*240*150	546*315*175		745*445*200	
Weight	kg	7	20	30	32	34

Unit Model		ACA020ED1	ACA025ED1	ACA030ED1	ACA035ED1	ACA040ED1
Input Voltage		-48VDC				
Cooling Capacity L35/L35	W	2000	2500	3000	3500	4000
Power Consumption L35/L35	W	570	700	860	1000	1150
Airflow	m ³ /h	450	800	800	1000	1050
Application Temperature	°C	-40°C~+70°C				
Working Temperature	°C	-20°C~+55°C				
Mounting Method		Embedded				
IP Grade		IP55*				
Electrical Heater*	W	/				
Refrigerant		R134a				
Noise	dB (A)	65	65	65	65	65
Surface Treatment		Outdoor type powder coating RAL7035				
Dimensions* (Include Flange)	mm	782*482*200	1201*536*225		1350*550*300	
Dimensions (Without Flange)	mm	745*445*200	1150*485*225		1300*500*300	
Weight	kg	35	55	55	75	75

Note:

1. Unit qualifying GR487 and IP65 is available upon request.
2. Flexible capacity of electrical heater integration based on the requirements of applications.
3. Customized dimension design available upon request.



AIRSYS Global Subsidiaries Contact:

AIRSYS REFRIGERATION ENGINEERING TECHNOLOGY (BEIJING) CO., LTD.

Add: 10th floor, Hongkun Shengtong building, 19, Ping Guo Yuan Xi Xiao Jie, Shijingshan, Beijing, China 100043
Tel: +86(0)10 68656161

GU'AN AIRSYS ENVIRONMENT TECHNOLOGY COMPANY LTD.

Add: 25, Dongfang Street, Gu'an Industry Park, Langfang City, Hebei Province, China
Tel: +86(0)10 68656161

SHANGHAI AIRSERVE HVAC SYSTEM SERVICE CO., LTD.

Add: Room 1701, Xinda building, No. 322 Xianxia Road, Changning District, Shanghai, China 200336
Tel: +86(0)21 62452626 Fax: +86 (0)21 6245962

AIRSYS BRASIL LTDA.

Add: Av. Moaci, 395 Conj 35/36 04083-000 – Planalto Paulista
SAO PAULO – SP
Tel: +55 (11) 25976817 / +55 (11) 21585560

AIRSYS COOLING TECHNOLOGIES, INC

Add: 7820 Reidville Rd.
Greer, SC 29651, USA
Tel: +1 (855) 874 5380

AIRSYS DEUTSCHLAND GMBH

Add: Feringastr. 6, 85774 Unterföhring / München, Germany
Tel: +49 89 9921 6510
Email: anfragen@air-sys.eu

AIRSYS KLIMA SANAYI VE TICARET A.Ş.

Add: Barbaros Mah. Evren Cad. Erzurumlular Sk. No:23
Ataşehir / Istanbul Turkey
Tel: +90(216) 4706280 Fax: +90(216) 4706290

AIRSYS (UK) LTD.

Add: 245 Europa Boulevard, Warrington, UK. WA5 7TN
Tel: +44 (0) 1925 377 272
Call Centre: +44(0)8456099950
Email: enquiries@air-sys.uk

AIRSYS AUSTRALIA SALES OFFICE

Add: PO BOX 1088, Flagstaff Hill, SA, 5159, Australia
Tel: +61 479151080
Email: sales@air-sys.sg

AIRSYS SINGAPORE PTE. LTD

Add: 50, Tagore Lane Entrepreneur Centre, #03-04 (F), Singapore 787494
Tel: +65 64991850
Fax: +65 68416301
Email: sales@air-sys.sg

AIRSYS PHILIPPINES CORPORATION

Add: Unit 1603 16th Floor 139 Corporate Centre Building
Valero St. Salcedo Village Bel-Air 1209 Makati, Philippines
Tel: +63 84581047
Fax: +63 88470496
Email: sales@air-sys.sg

AIRSYS MALAYSIA SDN. BHD.

NO. 7-1, Jalan 109F, Plaza Danau 2, Taman Danau Desa, 58100 Kuala Lumpur Wilayah Persekutuan Malaysia
Tel: +60 3 7982 2010
Fax: +60 3 7980 1242
Email: sales@air-sys.sg