MEPNN Supplier Scouting Opportunity Synopsis

Section 1: General Information

Scouting Number	2025-150
Item to be Scouted	Variable Refrigerant Flow (VRF) HVAC System
Days to be scouted	15
Response Due By	05/22/2025
Description	DEW Construction (GC) and our trade partner (Thomas Mechanical, Inc.) need assistance sourcing a variable refrigerant flow HVAC system, both the indoor and outdoor units for a project in South Burlington, VT. The specified Trane

Section 2: Technical Information

Type of supplier being sought	Manufacturer
Reason	Variable Refrigerant Flow (VRF) HVAC System BABA Vermont
Describe the manufacturing processes (elaborate to provide as much detail as possible)	May include but is not limited to component fabrication (compressors, coils, circuit boards), precision assembly of indoor and outdoor units, electrical and refrigerant system integration, pressure and performance testing, and quality assurance inspections.
Provide dimensions / size / tolerances / performance specifications for the item	See attached contract drawing "M002 Mechanical Schedules", contract specification section #238129, and engineer of record approved submittal "238129-001-0 VRF System PD & SD_NET."
List required materials needed to make the product, including materials of product components	Unknown, this is not standard information listed in a product data submittal and has no bearing on the engineer of record's acceptance of this product.
Are there applicable certification requirements?	Yes
Certification(s) required	UL
Are there applicable regulations?	No
Are there any other stndards, requirements, etc.?	Yes
Details	AHRI 210 / 240, AHRI 1230, ASCE 7, ASHRAE Std 15, ITS (DIR), NEMA 250, NFPA 70, UL 1995.
Additional Technical Comments	

Section 4: Business Information

Estimated potential business volume	Qty 1, One-Time Order
Estimated target price / unit cost information (if unavailable explain)	$4,375.00= total cost for 1 unit.
When is it needed by?	Immediate.
Describe packaging requirements	Packaging up to the manufacturer. Best available. Delivered undamaged. Specifics discussed in negotiation.
Where will this item be shipped?	South Burlington, VT 05495

Additional Comments

Is there other information you would like to include?	Funding Agency: Department of Commerce, National Institute of Standards and Technology. Attached for reference is the grant award letter provided to Burlington High School for this project. DEW Construction, BABA Contact: Michael Snyder, Cell: (802) 798-4976, Email: msnyder@dewconstruction.com.

SECTION 23 8129

VARIABLE REFRIGERANT FLOW HVAC SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air-source outdoor units.

B. Refrigerant piping.

C. Refrigerant branch units.

D. Indoor units.

1.02 REFERENCE STANDARDS

A. AHRI 210/240 - Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment.

B. AHRI 1230 - Performance Rating of Variable Refrigerant Flow (VRF) Multi-Split Air-Conditioning and Heat Pump Equipment.

C. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures.

D. ASHRAE Std 15 - Safety Standard for Refrigeration Systems.

E. ITS (DIR) - Directory of Listed Products.

F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

G. NFPA 70 - National Electrical Code.

H. UL 1995 - Heating and Cooling Equipment.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Pre-Bid Submittals: For proposed substitute systems/products, as defined in PART 2, and alternate systems/products, as defined above, proposer shall submit all data described in this article, under the terms given for substitutions stated in PART 2.

C. Product Data: Submit manufacturer's standard data sheets showing the following for each item of equipment, marked to correlate to equipment item markings indicated in Contract Documents:

1. Outdoor Units:
    a. Refrigerant Type and Size of Charge.
    b. Output and Input Cooling Capacity: Btu/h.
    c. Output and Input Heating Capacity: Btu/h.
    d. Operating Temperature Range, Cooling and Heating.
    e. Fan Capacity: Flow in cfm with respective fan curves.
    f. External Static Pressure (ESP): In-wc.
    g. Sound Pressure Level: dB(A).
    h. Electrical Data: Complete including motor size.
    i. Maximum number of indoor units that can be served.
    j. Maximum refrigerant piping run from outdoor unit to indoor unit(s).
    k. Maximum height difference between outdoor unit to Indoor unit(s), both above and below.
2. Indoor Units:
    a. Output and Input Cooling Capacity: Btu/h.
    b. Output and Input Heating Capacity: Btu/h.
    c. Fan Capacity: Flow in cfm with respective fan curves.
    d. External Static Pressure (ESP): In-wc.
    e. Electrical Data: Complete including motor size.

f. Maximum Lift of Built-in Condensate Pump.

3. Control Panels: Complete data of controllers, input-output points, and zones.

D. Shop Drawings: Installation drawings custom-made for this project; include as-designed HVAC layouts, locations of equipment items, refrigerant piping sizes and locations, condensate piping sizes and locations, remote sensing devices, control components, electrical connections, control wiring connections. Include:
1. Detailed piping diagrams, with branch balancing devices.
2. Condensate piping routing, size, and pump connections.
3. Detailed power wiring diagrams.
4. Detailed control wiring diagrams.
5. Locations of required access through fixed construction.
6. Drawings required by manufacturer.

E. Operating and Maintenance Data:
1. Manufacturer's complete standard instructions for each unit of equipment and control panel.
2. Custom-prepared system operation, troubleshooting, and maintenance instructions and recommendations.
3. Identification of replaceable parts and local source of supply.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, and handle equipment and refrigerant piping according to manufacturer's recommendations.

1.05 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Mitsubishi Electric Trane HVAC US, LLC; _____: www.metahvac.com/#sle.

2.02 VARIABLE REFRIGERANT FLOW SYSTEM

A. Minimum System Requirements:
1. System Testing, Capacity Rating, and Performance:
a. AHRI 1230 when cooling capacity is equal or greater than 65,000 Btu/h.
b. AHRI 210/240 when cooling capacity is below 65,000 Btu/h.
2. Safety Certification: Bear UL 1995 tested and ITS (DIR) listed certification label.
3. Outdoor Units: Furnish installation and surface support hardware products in accordance with ASCE 7 for wind restraint.
4. Cooling Mode Interior Performance:
a. Daytime Setpoint: 68 degrees F, plus or minus 2 degrees F.
b. Setpoint Range: 57 degrees F to 77 degrees F.
c. Night Setback: 78 degrees F.
d. Interior Relative Humidity: 20 percent, maximum.
5. Heating Mode Interior Performance:
a. Setpoint: 68 degrees F, plus or minus 2 degrees F.
b. Setpoint Range: 59 to 80 degrees F.
c. Night Setback: 60 degrees F.
d. Minimum Interior Relative Humidity: 10 percent RH.

B. System Design and Installation Considerations:
1. Conditioned spaces and zones are indicated on drawings.
2. Required equipment unit capacities are indicated on drawings.
3. Refrigerant piping sizes are not indicated on drawings.

4. Condensate piping to nearest drain is indicated on drawings.
5. Provide calculations showing ASHRAE Std 15 guideline compliance.

2.03 AIR-SOURCE OUTDOOR UNITS

A. Manufacturers:
   1. Air Conditioner, Cooling Outdoor Units:
   2. Heat Recovery, Cooling and Heating Outdoor Units:
      a. Mitsubishi Electric Trane HVAC US, LLC: www.metahvac.com/#sle.

B. Air Conditioning Type:
   1. DX refrigeration unit piped to one or more compatible indoor units either directly or indirectly through one or more intermediate refrigeration branch units.

C. Unit Cabinet:
   1. Capable of being installed with wiring and piping to the left, right, rear or bottom.
   2. Designed to allow side-by-side installation with minimum spacing and vibration isolation.
   3. Weatherproof and corrosion resistant; rust-proofed mild steel panels coated with baked enamel finish.
   4. Sound Pressure Level: 55 dB measured at 3 feet from front of unit.

D. Heat Sink Side:
   1. Condenser Fans:
      a. Provide minimum of 2 fans for each condenser within the outdoor unit.
      b. Minimum External Static Pressure: Factory set at 0.12 in-wc.
      c. Fan Type: Vertical discharging, direct-driven propeller type with variable speed operation using DC-controlled ECM motors mechanically connected using permanently lubricated bearings having whole assembly protected with fan guards.
   2. Condenser Coils:
      a. Hi-X seamless copper tubes expanded into aluminum fins to form mechanical bond; waffle louver fin and rifled bore tube design to ensure high efficiency performance.

E. Refrigeration Side:
   1. Factory assembled and wired with instrumentation, switches, and controller(s) to handle unit specifics with direct coordination of remote controller(s) from indoor unit(s).
   2. Refrigeration Circuit: ECM driven dual scroll compressors, fans, condenser heat sink coil, expansion valves, solenoid valves, distribution headers, capillaries, filters, shutoff valves, oil separators, service ports, and refrigerant regulator.
   3. Refrigerant: R-410a factory charged. Controller to alarm when charge is below capacity.
   4. Variable Volume Control: Modulate compressed refrigerant capacity automatically to maintain constant suction and condensing pressures under varying refrigerant volume required to handle remote loads. Include defrost control.
   5. Provide refrigerant subcooling to ensure the liquid refrigerant does not flash when supplying to use indoor units.
   6. Capable of heating operation at low end of operating range as specified, without additional low ambient controls or auxiliary heat source; during heating operation, reverse cycle, oil return, or defrost is not permitted due to potential reduction in space temperature.
   7. Power Failure Mode: Automatically restarts operation after power failure without loss of programmed settings.
   8. Safety Devices: High pressure sensor with cut-out switch, low pressure sensor with cut-out switch, control circuit fuses, crankcase heaters, fusible plug, overload relay, inverter overload protector, thermal protectors for compressor and fan motors, overcurrent protection for the inverter and antirecycling timers.
   9. Oil Recovery Cycle: Automatic, occurring 2 hours after start of operation and then every 8 hours of operation; maintain continuous heating during oil return operation.

F. Local Controls:
   1. Include factory-wired instruments, sensors, switches, and safeties for unit control.
   2. Configured to coordinate internal unit operation with remote indoor units and with built-in capacity to coordinate other manifolded outdoor units and remote refrigerant branch unit(s).
   3. Include screen and button interface to setup operating schedules, setpoints, alarms, and remote unit setpoint coordination. Also used for system troubleshooting.

G. Power:
   1. Electrical Requirement: 208 to 230 VAC, 3-phase, 60 Hz.
   2. Outdoor Mounted: Provide fused NEMA 250 Type 4X disconnect switch.

2.04 REFRIGERANT PIPING

A. Two-Pipe Run: Provide low-pressure vapor and high-pressure vapor gas pipes for each indoor unit selected for seasonal heating or cooling service.

B. Three-Pipe Run: Provide low-pressure vapor, high-pressure vapor gas, and liquid pipes for each indoor unit selected for off-season heating and cooling changeover service.

C. Refrigerant Flow Balancing: Provide refrigerant piping joints and headers specifically designed to ensure proper refrigerant balance and flow for optimum system capacity and performance; T-style joints are prohibited.

2.05 REFRIGERANT BRANCH UNITS

A. Outdoor unit interface to handle two or more indoor units required to do automatic off-season heating and cooling changeover.

B. Concealed box consisting internally-piped refrigeration loops, subcooling heat exchanger, and other devices coordinated by electronic valves to facilitate off-season load management between outdoor and indoor units.

C. Minimum Requirements:
   1. Control direction of refrigerant flow using electronic expansion valves; use of solenoid valves for changeover and pressure equalization is not permitted due to refrigerant noise; use of multi-port branch selector boxes is not permitted unless spare ports are provided for redundancy.
   2. Provide one electronic expansion valve for each downstream indoor unit served except when multiple indoor units are connected, provide balancing joints in downstream piping to keep total capacity within branch unit capacity.
   3. Energize subcooling heat exchanger during simultaneous heating and cooling service.
   4. Casing: Galvanized steel sheet with flame and heat resistant foamed polyethylene sound and thermal insulation.
   5. Refrigerant Connections: Braze type.
   6. Condensate Drainage: Provide unit that does not require condensate drainage.

2.06 INDOOR UNITS

A. Manufacturers:

B. Minimum Unit Requirements:
   1. DX Evaporator Coil:
      a. Copper tubes expanded into aluminum fins to form a mechanical bond; waffle louver fin and high heat exchange, rifled bore tube design; factory tested.
      b. 2-, 3-, or 4-row cross fin design with 14 to 17 fins per inch and flare end-connections.
      c. Provide thermistor on liquid and gas lines wired into local controller.
      d. Refrigerant circuits factory-charged with dehydrated air for field charging.
   2. Fan Section:

a. Variable or three-speed ECM fan with automatic airflow adjustment; external static pressure selectable during commissioning.
b. Thermally protected, direct-drive motor with statically and dynamically balanced fan blades.
c. Minimum-adjustable external static pressure 0.32 in-wc; provide for mounting of field-installed ducts.

3. Local Unit Controls:
   a. Temperature Control: Return air control using thermistor tied to computerized Proportional-Integral-Derivative (PID) control of superheat.
   b. Temperature Zones:
      1) Single Indoor Unit: Set served space(s) as the local temperature zone.
      2) Multiple Indoor Units: For large zones, group and coordinate related indoor units with served spaces as the local temperature zone with each indoor unit as sub-zone.
4. Return Air Filter:
   a. Washable long-life net filter with mildew proof resin, unless otherwise indicated.
5. Condensate:
   a. Built-in condensate drain pan with PVC drain connection for drainage.
   b. Units With Built-In Condensate Pumps: Provide condensate safety shutoff and alarm.
   c. Units Without Built-In Condensate Pump: Provide built-in condensate float switch and wiring connections.
6. Cabinet Insulation: Sound absorbing foamed polystyrene and polyethylene insulation.

C. Ceiling-Recessed Cassette, Indoor Units:
1. Ceiling mount, 4-way, 2-way, or 1-way supply air flow units with central return air grill, DX coil, tubed drain pan, and built-in controls with thermostat remotely coordinated by outdoor air unit to maintain local air temperature setpoint.
2. Cabinet Height: Maximum of 10 inches above face of ceiling.
3. Exposed Housing: White, impact resistant, with washable decoration panel.
4. Supply Airflow Adjustment:
   a. Horizontally and vertically adjustable dampers with electronic actuators.
   b. Four-way distribution field-modifiable to 3-way and 2-way airflow.
   c. Three auto-swing positions, including standard, draft prevention and ceiling stain prevention.
5. Return Air Filter: Manufacturer's standard.
6. Sound Pressure Range: Between 28 to 33 dB(A) at low speed measured at 5 feet below the unit.
7. Fan: Direct-drive turbo type, with motor output range of 1/16 to 1/8 hp.
8. Condensate Pump: Built-in with minimum lift of 21 inches.
9. Fresh Air Intake: Provide side-mounted outdoor air intake duct connection.

D. Ceiling-Concealed Ducted Indoor Units:
1. Type: Ducted unit with DX coil, tubed drain pan, and built-in controls with thermostat remotely coordinated by outdoor air unit to maintain local air temperature setpoint.
2. Ducted horizontal discharge and side or back-end return; galvanized steel cabinet.
3. Variable or three-speed ECM fan with automatic airflow adjustment; external static pressure selectable during commissioning.
4. Return Air Filter: Manufacturer's standard.
5. Sound Pressure: Measured at low speed at 5 feet below unit.
6. Provide external static pressure switch adjustable for high efficiency filter operation
7. Condensate Pump: Built-in, with lift of 9 inches, minimum.
8. Switchbox accessible from side or bottom.

E. Wall Mounted, Indoor Units:
   1. DX coil, tubed drain pan, and built-in controls with thermostat remotely coordinated by outdoor air unit to maintain local air temperature setpoint.
   2. Variable or three-speed ECM cross-flow fan with automatic airflow adjustment; external static pressure selectable during commissioning.
   3. Return Air Filter: Manufacturer's standard.
   4. Provide exposed unit casing with removable front grille; foamed polystyrene and polyethylene sound insulation; wall mounting plate; polystyrene condensate drain pan.
   5. Airflow Control: Auto-swing louver that closes automatically when unit stops; five (5) steps of discharge angle, set using remote controller; upon restart, discharge angle defaults to same angle as previous operation.
   6. Sound Pressure Range: Measured at low speed at 3.3 feet below and away from unit.
   7. Condensate Drain Connection: Back, with piping concealed in wall.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install refrigerant piping in accordance with equipment manufacturer's instructions.

C. Perform wiring in accordance with NFPA 70, National Electric Code (NEC).

D. Coordinate with installers of systems and equipment connecting to this system.

3.02 SYSTEM STARTUP

A. Prepare and start equipment and system in accordance with manufacturer's instructions and recommendations.

B. Adjust equipment for proper operation within manufacturer's published tolerances.

3.03 PROTECTION

A. Protect installed components from subsequent construction operations.

B. Replace exposed components broken or otherwise damaged beyond repair.

END OF SECTION

McFarland Johnson

Received By MJ on:

(Receipt Stamp)

SUBMITTAL COVER SHEET

PROJECT NAME: BSD Aviation Technology Center

SUBMITTAL NO.: 23 8129-1.0

CONTRACTOR: DEW Construction Corp.

DATE: _____

FUNDING AGENCY NO.: Burlington School District

M-J PROJ. NO.: 18715.02

TECH SPECIFICATION NO.: 23 8129

NOTE: ONLY ONE TECH SPEC. PER SUBMITTAL PLEASE.

COMPONENT NO.	DESCRIPTION	M-J ACTION
23 8129	VARIABLE REFRIGERANT FLOW HVAC SYSTEMS	MCN

M-J ACTION:

NET – NO EXCEPTION TAKEN
R&R – REVISE AND RESUBMIT
MCN – MAKE CORRECTIONS NOTED
REJ – REJECTED
SSI – SUBMIT SPECIFIED ITEM

REVIEW COMMENTS:

- **Conform the submittal has documentation to meet BABA requirements.**

APPROVAL DEPENDANT UPON THE ACCEPTANCE OF THE DE MINIMIS WAIVER

CONTRACTOR'S CERTIFICATION:

THE CONTRACTOR CERTIFIES THAT THEY HAVE REVIEWED THE ENCLOSED DOCUMENTS AND THEY ARE IN GENERAL CONFORMANCE WITH THE PROJECT DOCUMENTS.

Date _____

By _____

Title _____

THIS REVIEW IS ONLY FOR GENERAL CONFORMANCE WITH THE DESIGN CONCEPT AND THE INFORMATION GIVEN IN THE CONSTRUCTION DOCUMENTS. CORRECTIONS OR COMMENTS MADE ON THE SHOP DRAWINGS DURING THIS REVIEW DO NOT RELIEVE THE CONTRACTOR FROM COMPLIANCE WITH THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS. APPROVAL OF A SPECIFIC ITEM SHALL NOT INCLUDE APPROVAL OF AN ASSEMBLY OF WHICH THE ITEM IS A COMPONENT. THE CONTRACTOR IS RESPONSIBLE FOR; DIMESIONS TO BE CONFIRMED AND CORRELATED AT THE JOBSITE: INFORMATION THAT PERTAINS SOLELY TO THE FABRICATION PROCESS OR TO THE MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES OF CONSTRUCTION; COORDINATION OF THE WORK WITH THAT OF ALL OTHER TRADES AND PERFORMING ALL WORK IN A SAFE AND SATISFACTORY MANNER

McFarland Johnson

Date 01/13/25 By WH

DEW Construction
277 Blair Park Road, Suite 130
Williston, Vermont 05495
P: (802) 872-0505

Project: 10424 Burlington Tech Center Aviation
200 DaVinci Drive
South Burlington, Vermont 05403

Submittal #238129-1.0 - VRF System - PD & SD
238129 - Variable Refrigerant Flow HVAC Systems

Revision	0	**Submittal Manager**	Becky St. George (DEW Construction)
Status	Open	**Date Created**	Dec 11, 2024
Issue Date		**Spec Section**	238129 - Variable Refrigerant Flow HVAC Systems
Responsible Contractor	Thomas Mechanical, Inc.	**Received From**	Leslie Davis (Thomas Mechanical, Inc.)
Received Date	Dec 18, 2024	**Submit By**	
Final Due Date	Jan 2, 2025	**Lead Time**	
		Cost Code	
Location		**Type**	Product Information

Approvers Michael Snyder (DEW Construction), William Howland (McFarland Johnson), Michael Martin (McFarland Johnson)

Ball in Court Michael Snyder (DEW Construction)

Distribution Adam Frosino (McFarland Johnson), Becky St. George (DEW Construction), Deanna Utter (Sheet Metal Specialists), Leslie Davis (Thomas Mechanical, Inc.), Liza MacAuley (Thomas Mechanical, Inc.), Marty Spaulding (PCI - Capital Project Consulting), Michael Martin (McFarland Johnson), Michael Snyder (DEW Construction), Neil Valley (Thomas Mechanical, Inc.), Ron Snyder (PCI - Capital Project Consulting), Sara Bosworth (DEW Construction), William Howland (McFarland Johnson)

Description

2024-12-19: R0

Included in this submittal are the following:

1. Substitution Form for Carrier VRF #38MARB (AC-130 in schedule)
2. Carrier #38MARB Outdoor Unit, Single Zone Ductless VRF System - PD (**substitution, not B.O.D. manuf.**)
3. Shop Drawings
4. Wiring Diagrams
5. Carrier #40MAHB High Wall Ductless Units - PD
6. Carrier Connect WiFi Thermostat - Install Guide
7. Carrier 24V Interface Kit - Install Guide
8. Intesis BACnet MS/TP Server - User Manual
9. DiversiTech Mini Split Stand - SD

Notes:
1. This system is **not** BABAA compliant. There are currently zero VRF systems manufactured that meet BABAA regulations. System value is $4,375.00.

Submittal Workflow

Name	Sent Date	Due Date	Returned Date	Response	Attachments
General Information Attachments					
Michael Snyder		Dec 19, 2024			
William Howland		Jan 2, 2025			
Michael Martin		Jan 2, 2025			

DEW CONSTRUCTION **SHOP DRAWING / SUBMITTAL REVIEW**

Checking is only for conformity to the design concept of the project and compliance with the information given in the contract documents and specifications. The Trade Partner is responsible for dimensions, to be confirmed and correlated at the project site, for information that pertains solely to the fabrication, the techniques of construction and for the coordination of their work with all trades.

Project #: 10424 – Burlington Tech Center Aviation @ BTV

Reviewed By: Michael Snyder, LEED AP BD+C **Date:** 2024-12-19

Thomas Mechanical Inc.
90 Ethan Allen Drive
South Burlington, VT 05403
Phone (802) 865-9119
Fax (802) 865-9501

Submittal Cover Sheet:

Project Name: **BSD Aviation Technical Center**

Date: **12/18/2024**

Architect: **Freeman French Freeman, Inc.**

Contractor: **DEW Construction**

Engineer: **MCFarland - Johnson**

Specification Section: **Mechanical 22/23**
Revision:
Submitted per Specification Section: **VRF System**
Drawing #/Detail Reference:

Supplier: **R.J. Murray**
Manufacturer: **Various**
Substitution:
Color Selection Required:
Lead Time Upon Approval:
IOM Included:

Items Submitted:

VRF System

SECTION 016200

SUBSTITUTION REQUEST FORM

No substitutions will be considered without this completed substitution request form and supporting documentation. Substitutions made without completion of this form will be considered defective work as stated in AIA A201.

Date: 12/18/2024 Number: 02

Re: Request for Substitution

The Contractor proposes the following substitution in accordance with the requirements of the Contract Documents:

Scope of Substitution: Carrier Variable Refrigerant System

Specification Reference: 23 8129

Drawing Reference: M002

Reason for Proposed Substitution: Performance

Benefit to Owner: Cost

Impact on Project Cost

Impact on Project Schedule

Impact on Guarantees and Warranties

Coordination and Compatibility Required with Adjacent Materials and System

List Deviations From Specified Requirements _____

_____

_____

Building Energy Performance: For substitutions of materials and products used for backstop and de-rated calculations, provide an updated envelope backstop and de-rating calculations based on the product being proposed for substitution and demonstrate the equivalence or difference with the original product[s]. Substitutions which, in the opinion of the architect, modify the energy design, and which are submitted without the required evidence of compliance with the code and the original design will be returned without review and are by definition not permitted.

Attachments: Attach supporting documentation sufficient for Architect to evaluate substitution. Substitution Request Forms submitted without adequate documentation will be returned without review.

Attachments _____

_____

_____

Response Date: List date by which response by Architect is requested to maintain project schedule and allow sufficient time for inclusion of proposed substitution.

Response Date _____

Submitted By _____

Firm and Address _____

_____

Signature below signifies acceptance of responsibility for accuracy and completeness of information included in this Substitution Request Form.

Authorized Signature _____

ARCHITECT'S RESPONSE

Notations listed below shall have same meaning as on Architect's approval stamp. Clarifications to or changes in project schedule or time shall be processed using standard project forms.

Architect's Response

_____ Approved

_____ Approved as Corrected

_____ Revise and Resubmit

_____ Rejected

_____ Returned Without Review

Remarks _____

_____

_____

_____

_____

_____

Date _____

Signed _____

END OF FORM

7 Northway Lane
Latham, NY 12110
(518) 690-4455
Fax (518) 690-4990

www.rjmurray.com
mail@rjmurray.com

79 Holly Court
Williston, VT 05495
(802) 862-8608
Fax (802) 862-8344

Date: 12/04/2024

TRANSMITTAL OF DRAWINGS, BULLETINS, CATALOGS, ETC.

TO: Thomas Mechanical

ATTN: Liza McAuley **RE: Burlington Aviation Technical Center**

We are transmitting herewith the following:

COPIES	TYPE OF INFORMATION	REMARKS
1	**Submittal for VRF System** **Specification Section 23 8129**	

The above items are being transmitted for:

✓ Your Approval
Your Review
Your Record
With Your Approval
Your Correction
Corrected as Noted

Please Return 1 Copy (ies) With Your Comments

Very truly yours,
BY:_____

Mike Bronder

R. J. MURRAY CO., INC.

Equipment Submittal

Project Location	**Burlington Aviation Technical Center South Burlington, Vermont**
Architect	**Freeman French Freeman**
Engineer	**McFarland Johnson**
Contractor P.O.	**Thomas Mechanical PO# 5484-24**
Submitted by	**Mike Bronder R. J. Murray Co., Inc. Date: 12/04/2024 Latham, NY 12110**

Distributor for
Heating, Ventilating and
Air Conditioning Equipment

Contents

Submittal for VRF System-Specification Section 23 8129

R. J. MURRAY CO., INC.

7 NORTHWAY LANE
LATHAM, NY 12110
TEL.: (518) 690-4455
FAX: (518) 690-4990

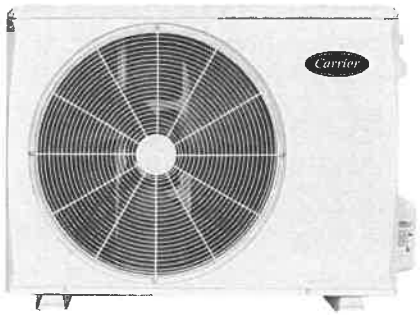
WEBSITE: WWW.RJMURRAY.COM

79 HOLLY COURT
WILLISTON, VT 05495
TEL: (802) 862-8608
FAX: (802) 862-862-8344

38MARB
Outdoor Unit Single Zone Ductless System
Sizes 06 to 36

Carrier

Product Data



A220408

Fig. 1 —Sizes 06K - 36K

NOTE: Images are for illustration purposes **only**. Actual models may differ slightly.

TABLE OF CONTENTS

INDUSTRY LEADING FEATURES / BENEFITS

A PERFECT BALANCE BETWEEN BUDGET LIMITS, ENERGY SAVINGS AND COMFORT.

The **38MARB** series ductless systems are a matched combination of an outdoor condensing unit and an indoor fan coil unit connected only by refrigerant tubing and wires.

The ductless system permits creative solutions to design problems such as:

- Add-ons to current space (an office or family room addition)
- Special space requirements
- When changes in the load cannot be handled by the existing system
- When adding air conditioning to spaces that are heated by hydronic or electric heat and have no ductwork
- Historical renovations or any application where preserving the look of the original structure is essential.

The ideal compliment to your ducted system when it is impractical or prohibitively expensive to use ductwork.

The compact indoor fan coil units take up very little space in the room and do not obstruct windows. The fan coils are attractively styled to blend with most room decors. Advanced system components incorporate innovative technology to provide reliable cooling performance at low sound levels.

Inverter Technology

The inverter driven compressor is designed to run at various input power frequencies (Hz) which controls the compressor's motor speed.

Even Temperature – The control package, including the inverter, monitors the outdoor and indoor temperatures as they relate to the selected indoor set point and adjusts the compressor speed to match the load and keep the system operating continuously rather than cycling and creating temperature swings. This translates to higher comfort levels for the occupants.

Rapid Pull Down/Warm-Up – Comfort is increased by the inverter system's ability to ramp up the compressor speed enabling the system to reach the user selected room temperature set point quicker.

Humidity Control – Running the system for longer periods and continuously varying the compressor speed enhances the humidity control.

Individual Room Comfort

Maximum comfort is provided because each space can be controlled individually based on the usage pattern.

Low Sound Levels

When noise is a concern, ductless systems are the answer. The indoor units are whisper quiet. There are no compressors indoors, either in the conditioned space or directly over it, and there is none of the noise usually generated by air being forced through the ductwork.

When sound ordinances and proximity to neighbors demand quiet operation, the **38MARB** unit is the right choice. With the inverter technology, these units run at lower speeds most of the time resulting in reduced sound levels.

Inverter Technology – Enhanced Economical Operation

Ductless systems are inherently economical to operate. Individual rooms are heated or cooled only when required, and since the air is delivered directly to the space, there is no need to use additional energy to move the air in the ductwork. This economical operation is enhanced further when the inverter system output matches the load resulting in a more efficient system.

Easy-To-Use Controls

The systems have microprocessor-based controls to provide the ultimate in comfort and efficiency. The user friendly wired and wireless remote controls provide the interface between the user and the unit.

Secure Operation

If security is an issue, outdoor and indoor units are connected only by refrigerant piping and wiring to prevent intruders from crawling through ductwork or wall openings. In addition, since the **38MARB** can be installed close to an outside wall, coils are protected from vandals and severe weather.

Fast Installation

This compact ductless system is simple to install. Only wires and piping need to run between the indoor and outdoor units. These units are fast and easy to install ensuring minimal disruption to customers in homes or the workplace. This makes the **38MARB** systems the equipment of choice for retrofit applications.

Simple Servicing and Maintenance

Removing the top panel of the outdoor unit provides immediate access to the control compartment, providing the service technician access to the diagnostic LEDs to facilitate the troubleshooting process. In addition, the draw-thru design of the outdoor unit means that dirt accumulates on the outside surface of the coil. Coils can be cleaned quickly from the inside using a pressure hose and detergent.

On the indoor units, service and maintenance expense is reduced due to the permanent easy to clean filters. Also, error codes are displayed on the front panel to alert the user to certain system malfunctions.

Built-in Reliability

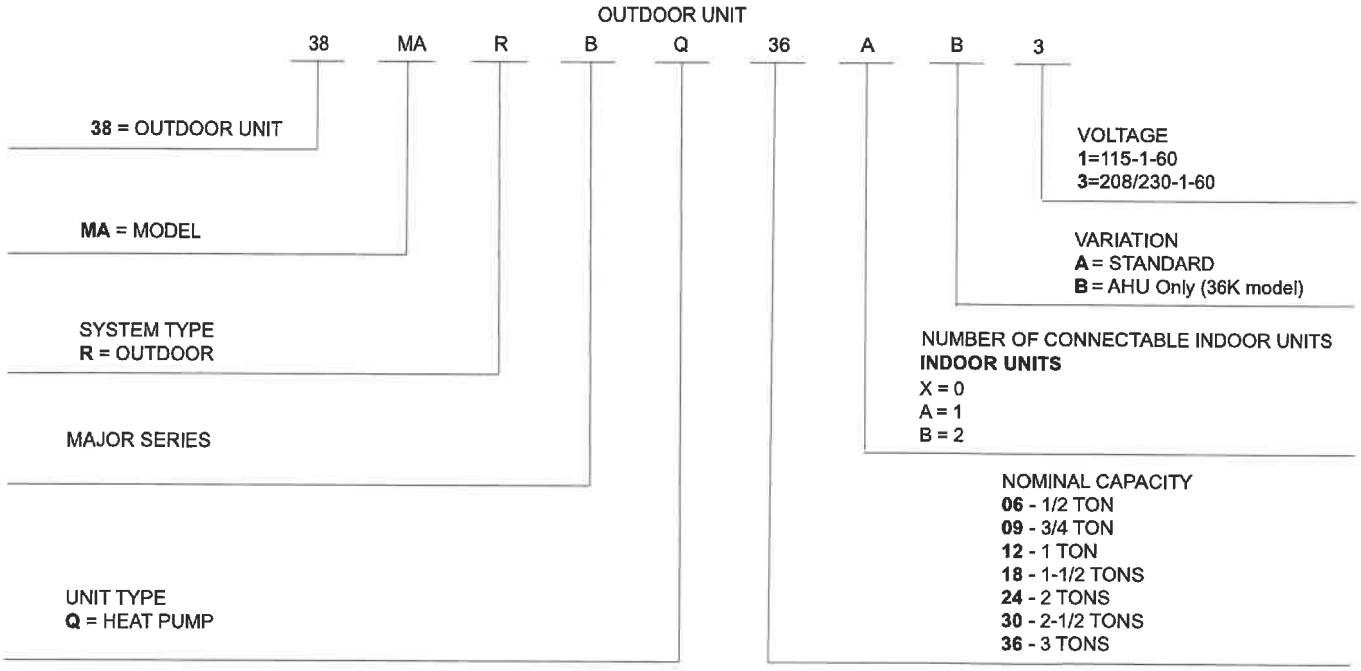
Ductless system indoor and outdoor units are designed to provide years of trouble-free operation. Both the indoor and outdoor units are well protected. Whenever the microprocessor detects abnormal conditions, the unit stops and an error code appears.

Inverter systems provide additional reliability due to the soft start. This refers to the ability of the inverter to start the compressor motor using reduced voltage and reduced current. This feature is beneficial from an electrical standpoint (eliminates current spikes) as well as an overall reliability standpoint due to reduced stress on all associated system components.

Agency Listings

All systems are listed with AHRI (Air conditioning, Heating, and Refrigeration Institute) and are UL certified per UL 60335-2-40 standard.

MODEL NUMBER NOMENCLATURE



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Use of the AHRI Certified TM Mark indicates a manufacturer's participation in the program For verification of certification for individual products, go to www.ahridirectory.org.

A220412

STANDARD FEATURES AND ACCESSORIES

Ease Of Installation	
Low Voltage Controls	S
Comfort Features	
Microprocessor Controls	S
Auto Restart Function	S
Auto Changeover	S
Energy Saving Features	
Inverter Driven Compressor	S
46° F Heating Mode (Heating Setback)	S
Safety And Reliability	
3 Minute Time Delay For Compressor	S
High Compressor Discharge Temperature	S
Low Voltage Protection	S
Compressor Overload Protection	S
Compressor Over Current Protection	S
IPM Module Protection	S
Condenser High Temp Protection in Cooling Mode	S
Aluminum Hydrophilic pre-coated fins	S
Ease Of Service And Maintenance	
Diagnostics	S
Liquid Line Pressure Taps	S
Application Flexibility	
Crankcase Heater	S
Base pan Heater	S

Legend

- **S - Standard**
- **A - Accessory**

Accessories

Outdoor Unit Model Number	Base Pan Base Rubber Plugs RCD Part No.	Quantity per Unit
38MARBQ12AA1 38MARBQ06AA3 38MARBQ09AA3 38MARBQ12AA3	12600801A00077	13
38MARBQ18AA3	12600801A00077	25
38MARBQ24AA3 38MARBQ30AA3 38MARBQ36AA3 38MARBQ36AB3	12600801A00117	5

NOTE: The base pan is built in with multiple holes for proper draining during the defrost process. For applications where it is required to seal these holes, and re-direct the condensate drain, rubber plugs are available through RCD.

Outdoor Units

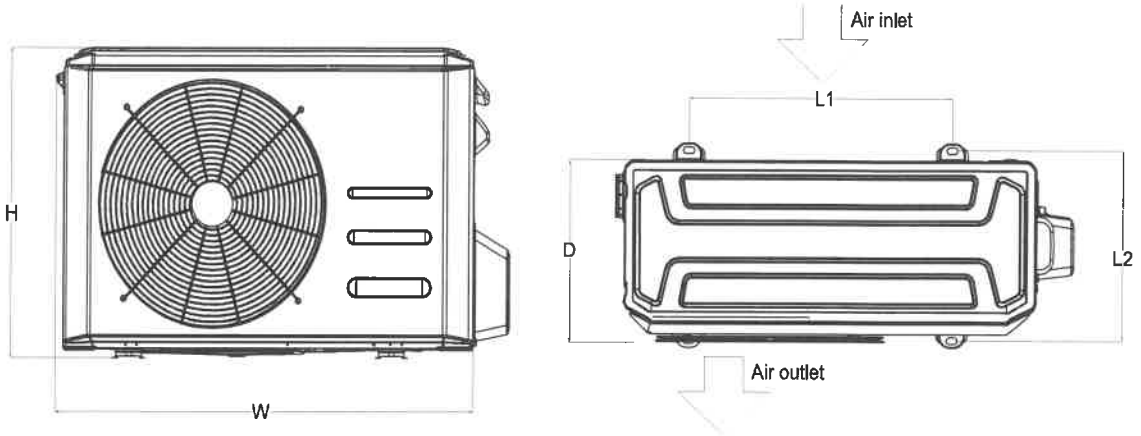
Crankcase Unit

The crankcase heater is standard on all unit sizes. Heater clamps must be placed around the compressor oil stump.

Base pan Heater

The base pan heater is standard on all unit sizes.

DIMENSIONS



A220414

Fig. 2 — Outdoor Unit

SYSTEM SIZE			12K (115V)	6K (208/230V)	9K (208/230V)	12K (208/230V)	18K (208/230V)	24K (208/230V)	30K (208/230V)	36K (208/230V)
OUTDOOR UNIT	**UNIT**									
	Height (H)	in (mm)	21.85 (555)	21.85 (555)	21.81 (554)	21.81 (554)	26.50 (673)	31.89 (810)	31.89(810)	31.89 (810)
	Width (W)	in (mm)	30.12 (765)	30.12 (765)	31.69 (805)	31.69 (805)	35.04 (890)	37.24 (946)	37.24(946)	37.24 (946)
	Depth (D)	in (mm)	11.93 (303)	11.93 (303)	12.99 (330)	12.99 (330)	13.46 (342)	16.14 (410)	16.14(410)	16.14 (410)
	Weight - Net	lbs. (kg)	66.80 (30.3)	63.71(28.9)	74.07 (33.6)	73.63 (33.4)	100.97 (45.8)	134.48 (61)	141.76(64.3)	150.13 (68.1) 155.42 (70.4) ǂ
	L1	in. (mm)	17.81 (452)	17.81 (452)	20.10 (511)	20.10 (511)	26.10 (663)	26.50 (673)	26.50 (673)	26.50 (673)
	L2	in. (mm)	11.25 (286)	11.25 (286)	12.50 (317)	12.50 (317)	13.70 (347)	15.85 (403)	15.85 (403)	15.85 (403)
	PACKAGING									
	Height	in (mm)	24.02 (610)	24.02 (610)	24.21 (615)	24.21 (615)	29.13 (740)	34.84 (885)	34.84(885)	34.84 (885)
	Width	in (mm)	34.92 (887)	34.92 (887)	36.02 (915)	36.02 (915)	39.17 (995)	42.91 (1090)	42.91(1090)	42.91 (1090)
	Depth	in (mm)	13.27 (337)	13.27 (337)	14.57 (370)	14.57 (370)	15.67 (398)	19.69 (500)	19.69(500)	19.69 (500)
	Weight - Gross	lbs. (kg)	72.31 (32.8)	69(31.3)	80.25 (36.4)	79.37 (36)	108.03 (49)	144.40 (65.5)	151.90(68.9)	158.95 (72.1) 166.23 (75.4)ǂ
	Carton Drawing No.	--	877*327*590	877*327*590	905*360*590	905*360*590	985*388*720	1075*485*86	1075*485*86	1075*485*86
	Carton Material	--	Carton Box							
	Material Thickness	in (mm)	0.197 (5)	0.197 (5)	0.197 (5)	0.197 (5)	0.197 (5)	0.295 (7.5)	0.295(7.5)	0.295 (7.5)

NOTE: ǂ AHU only

DIMENSIONS (CONT)

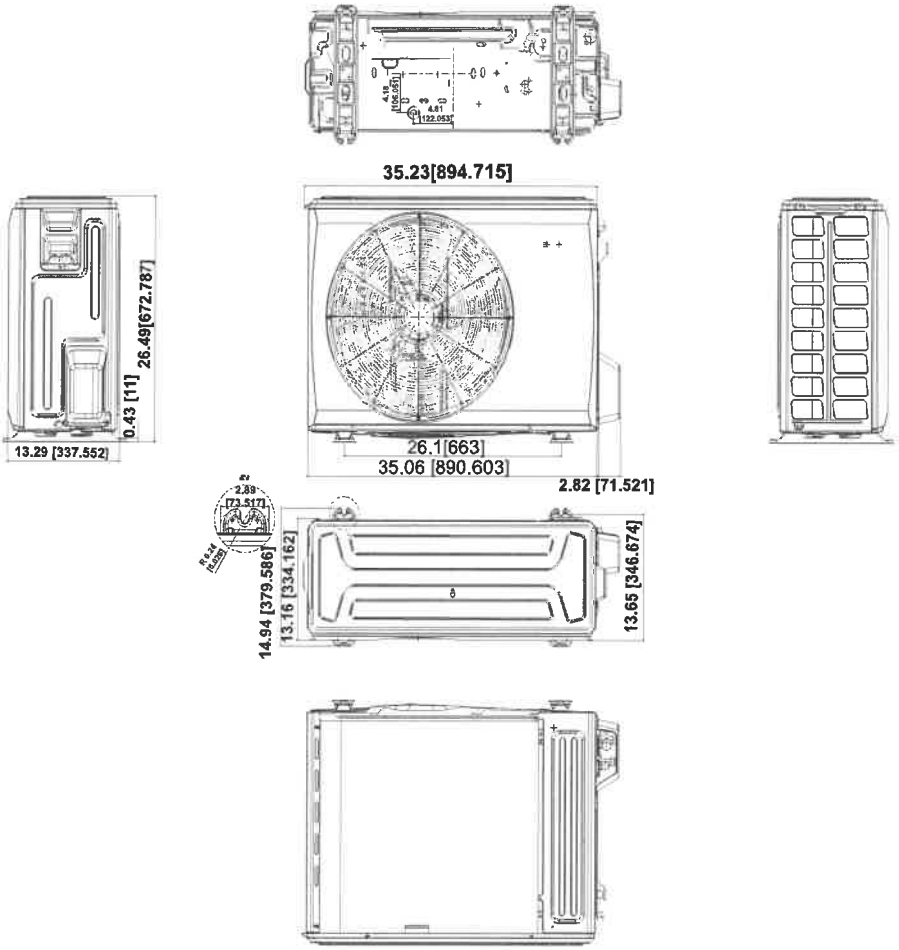


Fig. 5 —Dimension Size 18K

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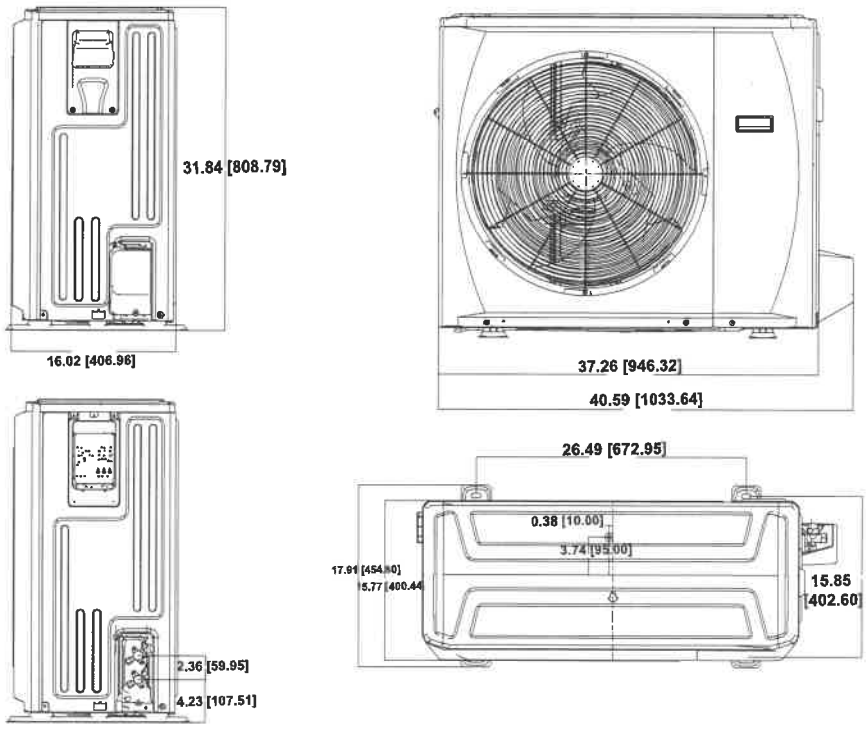

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Fig. 6 —Dimension Sizes 24K, 30K, and 36K

CLEARANCES

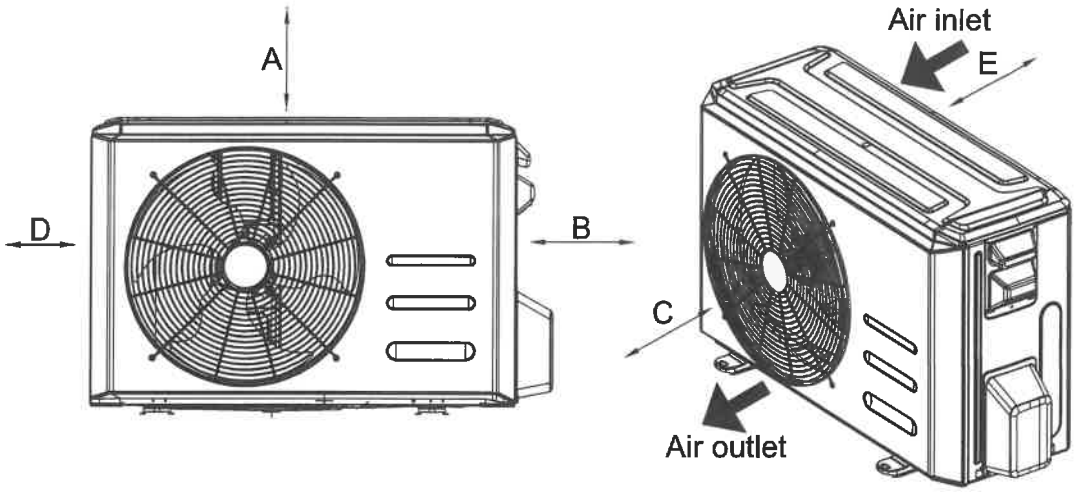

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Fig. 7 —Clearances

UNIT	MINIMUM VALUE in. (mm)
A	24 (610)
B	24 (610)
C	24 (610)
D	4 (101)
E	4 (101)

NOTE: The outdoor unit must be mounted at least 2in (50mm) above the maximum anticipated snow depth.

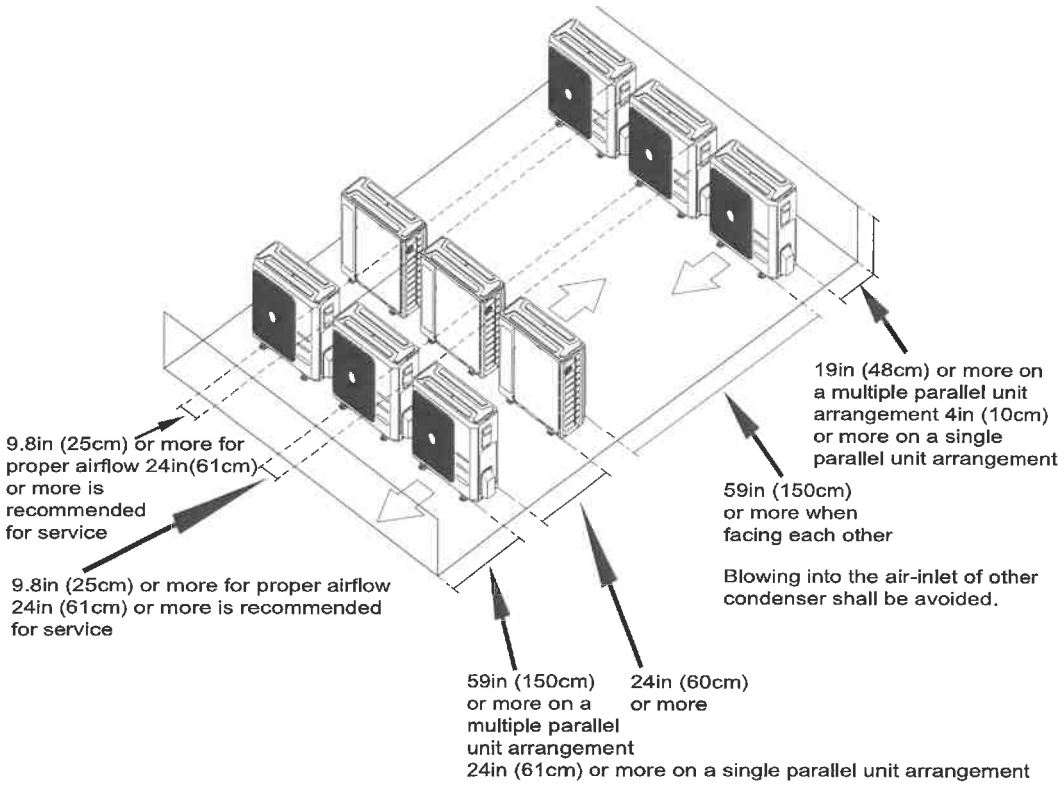

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Fig. 8 —Clearances for multiple units

SPECIFICATIONS

System	Size		12K - 115V	6K	9K	12K - 208/230V	18K	24K	30K	36K	36K - AHU Only
	Outdoor Model		38MARBQ12AA1	38MARBQ06AA3	38MARBQ09AA3	38MARBQ12AA3	38MARBQ18AA3	38MARBQ24AA3	38MARBQ30AA3	38MARBQ36AA3	38MARBQ36AB3
Electrical	Voltage, Phase, Cycle	V/Ph/Hz	115-1-60	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60
	MCA	A.	19	13	15	15	16	25	23	28	30
	Recommended Fuse Size	A.	20	15	15	15	20	30	25	30	35
	MOCP - Fuse Rating	A.	25	15	15	15	25	35	30	35	45
	Short Circuit Current Rating (SCCR)	kA	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Operating Range	Cooling Outdoor DB Min - Max	°F(°C)	-22 ~ 122 (-30 ~ 50)	-22 ~ 122 (-30 ~ 50)	-22 ~ 122 (-30 ~ 50)	-22 ~ 122 (-30 ~ 50)	-22 ~ 122 (-30 ~ 50)	-22 ~ 122 (-30 ~ 50)	-22 ~ 122 (-30 ~ 50)	-22 ~ 122 (-30 ~ 50)	-22 ~ 122 (-30 ~ 50)
	Heating Outdoor DB Min - Max	°F(°C)	-22 ~ 86 (-30 ~ 30)	-22 ~ 86 (-30 ~ 30)	-22 ~ 86 (-30 ~ 30)	-22 ~ 86 (-30 ~ 30)	-22 ~ 86 (-30 ~ 30)	-22 ~ 86 (-30 ~ 30)	-22 ~ 86 (-30 ~ 30)	-22 ~ 86 (-30 ~ 30)	-22 ~ 86 (-30 ~ 30)
Piping	Total Piping Length	ft (m)	82 (25)	82 (25)	82 (25)	82 (25)	98 (30)	164 (50)	164 (50)	213 (65)	213 (65)
	Piping Lift*	ft (m)	32 (10)	32 (10)	32 (10)	32 (10)	65 (20)	82 (25)	82 (25)	98 (30)	98 (30)
	Pipe Connection Size - Liquid	in (mm)	1/4 (6.35)	1/4 (6.35)	1/4 (6.35)	1/4 (6.35)	1/4 (6.35)	3/8 (9.52)	3/8 (9.52)	3/8 (9.52)	3/8 (9.52)
	Pipe Connection Size - Suction	in (mm)	1/2 (12.7)	3/8 (9.52)	3/8 (9.52)	1/2 (12.7)	1/2 (12.7)	5/8 (16)	5/8 (16)	5/8 (16)	5/8 (16)
Refrigerant	Refrigerant Type		R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A
	Charge	lbs (kg)	2.47 (1.12)	2.38 (1.08)	2.6 (1.18)	2.6 (1.18)	4.08 (1.85)	5.73 (2.6)	6.06 (2.75)	7.50 (3.40)	7.05 (3.2)
	Additional Refrigerant (between Std & Max Piping Lengths)	Oz/ft (g/m)	0.161 (15)	0.161 (15)	0.161 (15)	0.161 (15)	0.161 (15)	0.322 (30)	0.322 (30)	0.322 (30)	0.322 (30)
	Metering Device		EEV	EEV	EEV	EEV	EEV	EEV	EEV	EEV	EEV
Outdoor Coil	Face Area	Sq. Ft.	4.04	4.04	4.67	4.67	5.9	8.16	8.14	8.14	8.16
	No. Rows		2	2	2	2	2	2	3	3	2
	Fins per inch		21	21	20	20	20	20	18	18	20
	Circuits		4	4	4	4	6	4	6	6	4
Compressor	Type		Rotary Inverter	Rotary Inverter	Rotary Inverter	Rotary Inverter	Rotary Inverter	Rotary Inverter	Rotary Inverter	Rotary Inverter	Rotary Inverter
	Model		KSK103D33UEZ3	KSK103D33UEZ3	KTN110D42UFZ	KTN110D42UFZ	KTM240D43UKT	KTM240D43UKT	KTF250D22UMT	KTF250D22UMT	KTF310D43UMT
	Oil Type		VG74	VG74	VG74	VG74	VG74	VG74	VG74	VG74	VG74
	Oil Charge	Fl. Oz.	10.48	10.48	11.84	11.84	20.97	20.97	22.66	22.66	33.8
	Rated Current	RLA	11.5	6.4	6	8.5	14.25	14.8	15	18	20
Airflow & Sound	Airflow	CFM	794.12	1324	1323.53	1323.53	1764.71	2235.29	2235.29	2235.29	3000
	Sound Pressure	dB(A)	54	54.5	54.5	56	59	62	63	61.5	64

* Condensing unit above or below the indoor unit

NOTE: See the current compatibility chart for list of indoor unit and outdoor unit match ups.

PERFORMANCE

High Wall

System Size		12K(115V)	6K(208/230V)	9K(208/230V)	12K(208/230V)	18K(208/230V)	24K(208/230V)	30K(208/230V)	36K(208/230V)
Energy Star*		YES	YES	YES	YES	YES	YES	NO	NO
Cooling System Tons	Ton	1.00	0.50	0.75	1.00	1.50	2.00	2.50	3.00
Cooling Rated Capacity	Btu/h	12,000	6,000	9,000	12,000	18,000	24,000	30,000	36,000
Cooling Cap. Range Min - Max	Btu/h	3,500~13,200	3,400~12,000	3,300~14,300	3,300~14,300	8,900~19,400	6,850~27,000	8,900~32,600	9,300~38,800
SEER2		23.0	26.5	28.1	25.5	21.5	21.5	20.1	17.5
EER2		13.0	15.8	16.2	14.0	12.5	13.0	11.5	8.5
Heating Rated Capacity (47°F)	Btu/h	12,000	7,000	12,000	12,000	18,000	29,000	30,000	36,000
Heating Rated Capacity (17°F)	Btu/h	8,400	8,500	9,500	10,000	15,000	19,800	19,000	22,400
Heating Rated Capacity (5°F)	Btu/h	7,100	7,500	10,500	12,000	18,000	25,200	20,600	20,400
Heating Maximum Capacity (17°F)	Btu/h	8,500	9,000	12,000	12,000	20,270	27,200	21,200	22,500
Heating Cap. Range Min - Max	Btu/h	5,000~12,200	3,500~11,500	5,000~15,200	5,000~15,300	15,100~19,500	11,600~33,000	12,300~34,100	11,550~37,000
HSPF2		9.9	13.0	11.5	10.4	10.7	11.4	9.0	8.0
COP (47°F)	W/W	3.52	3.92	3.81	3.88	3.10	3.40	2.90	2.51
COP (17°F)	W/W	2.80	2.90	2.53	2.41	2.35	2.87	2.30	2.18
COP (5°F)	W/W	2.18	2.10	1.80	1.80	1.80	1.80	1.94	1.80
Capacity Maintenance (5°F)	%	59%	107%	88%	100%	100%	87%	69%	57%
Capacity Maintenance (17°F)	%	70%	121%	79%	83%	83%	68%	63%	62%

*** Includes Cold Climate Designation**

Cassette

System Size		9K(208/230V)	12K(208/230V)	18K(208/230V)	24K(208/230V)
Energy Star*		YES	YES	YES	YES
Cooling System Tons	Ton	0.75	1.00	1.33	2.00
Cooling Rated Capacity	Btu/h	9,000	12,000	16,000	24,000
Cooling Cap. Range Min - Max	Btu/h	2,850~11100	3,000~13,700	5,600~17,000	8,000~25,000
SEER2		20.5	22.3	20.0	20.5
EER2		13.0	12.7	12.5	11.0
Heating Rated Capacity (47°F)	Btu/h	9,800	12,000	17,000	25,000
Heating Rated Capacity (17°F)	Btu/h	9,000	9,900	15,900	21,000
Heating Rated Capacity (5°F)	Btu/h	10,000	11,300	16,000	25,800
Heating Maximum Capacity (17°F)	Btu/h	11,800	14,000	17,000	25,800
Heating Cap. Range Min - Max	Btu/h	2,250~12,500	2,000~15,300	8,700~21,000	11,800~27,000
HSPF2		10.3	10.2	9.5	11.5
COP (47°F)	W/W	3.09	3.26	2.95	3.5
COP (17°F)	W/W	1.91	2.54	2.44	2.64
COP (5°F)	W/W	1.8	1.9	1.75	2
Capacity Maintenance (5°F)	%	102%	94%	94%	103%
Capacity Maintenance (17°F)	%	92%	83%	94%	84%

*** Includes Cold Climate Designation**

HIGH WALL (Sheet 2 of 2)

MODEL	COOLING Indoor Conditions DB	WB		OUTDOOR CONDITIONS (DB) (-22°F) (-25°C)	-13°F (-25°C)	-4°F (-20°C)	0°F (-17°C)	5°F (-15°C)	17°F (-8°C)	47°F (8°C)	77°F (25°C)	86°F (30°C)	95°F (35°C)	104°F (40°C)	113°F (45°C)	122°F (50°C)
24K (208-230V)	69.8°F (21°C)	59°F (15°C)	TC	25.33	25.02	24.71	21.71	23.65	21.89	28.18	25.19	24.00	22.65	21.45	18.45	15.41
			SC	18.11	17.89	17.67	15.85	16.72	15.78	19.00	17.47	16.85	16.20	15.56	14.06	12.58
			Input	1.26	1.33	1.40	1.41	1.46	1.79	1.53	1.86	2.04	2.23	2.43	2.31	2.27
	75.2°F (24°C)	62.6°F (17°C)	TC	26.11	25.80	25.49	22.49	24.43	22.67	28.96	25.97	24.78	23.43	22.24	19.23	16.19
			SC	18.93	18.70	18.48	16.31	17.71	16.43	21.00	18.83	17.96	16.99	16.12	13.94	11.73
			Input	1.28	1.34	1.41	1.42	1.48	1.81	1.54	1.87	2.05	2.24	2.44	2.32	2.28
	80.6°F (27°C)	66.2°F (19°C)	TC	26.97	26.66	26.35	23.36	25.29	23.53	29.83	26.84	25.64	24.30	23.10	20.09	17.05
			SC	19.48	19.25	19.03	16.87	18.26	16.99	21.54	19.38	18.51	17.54	16.68	14.51	12.31
			Input	1.29	1.36	1.43	1.44	1.49	1.82	1.55	1.89	2.07	2.26	2.46	2.34	2.30
	89.6°F (32°C)	73.4°F (23°C)	TC	28.76	28.45	28.13	25.14	27.08	25.32	31.61	28.62	27.42	26.08	24.88	21.87	18.83
			SC	20.86	20.63	20.40	18.23	19.64	18.36	22.93	20.76	19.89	18.91	18.05	15.86	13.66
			Input	1.32	1.39	1.46	1.47	1.52	1.85	1.59	1.92	2.10	2.29	2.49	2.37	2.33
30K (208-230V)	69.8°F (21°C)	59°F (15°C)	TC	33.23	32.10	30.97	29.76	28.98	27.43	25.33	20.49	18.99	24.71	23.41	15.64	6.52
			SC	24.05	23.23	22.42	20.12	19.71	18.99	18.02	15.53	14.82	17.89	16.92	13.36	6.52
			Input	0.99	1.08	1.17	1.18	1.27	1.40	1.69	1.34	1.51	3.01	3.31	2.34	1.52
	75.2°F (24°C)	62.6°F (17°C)	TC	36.69	35.56	34.43	33.23	32.44	30.89	28.79	23.96	22.45	28.17	26.87	19.10	9.98
			SC	22.88	22.17	21.47	20.72	20.23	19.26	17.95	14.94	14.00	17.57	16.75	11.91	6.22
			Input	1.96	2.05	2.13	2.15	2.24	2.37	2.66	2.31	2.47	3.98	4.28	3.31	2.49
	80.6°F (27°C)	66.2°F (19°C)	TC	39.85	38.72	37.59	36.38	35.60	34.05	31.95	27.11	25.61	31.33	30.03	22.26	13.14
			SC	23.50	22.83	22.17	21.46	20.99	20.08	18.84	15.99	15.10	18.48	17.71	13.13	7.75
			Input	2.62	2.71	2.79	2.81	2.90	3.03	3.32	2.97	3.13	4.64	4.94	3.97	3.15
	89.6°F (32°C)	73.4°F (23°C)	TC	45.88	44.76	43.63	42.42	41.64	40.09	37.98	33.15	31.64	37.37	36.06	28.29	19.17
			SC	23.96	23.38	22.79	22.16	21.75	20.94	19.84	17.31	16.53	19.52	18.84	14.78	10.01
			Input	3.59	3.68	3.77	3.79	3.87	4.00	4.30	3.94	4.11	5.62	5.92	4.94	4.12
36K (208-230V)	69.8°F (21°C)	59°F (15°C)	TC	34.73	33.79	32.85	31.66	31.22	25.11	29.92	28.89	28.36	29.08	23.61	19.48	7.62
			SC	23.26	22.63	22.01	21.00	20.74	17.58	20.03	19.48	19.16	19.48	16.68	14.65	7.35
			Input	1.23	1.34	1.45	1.31	1.38	1.69	1.97	2.48	2.95	4.20	3.15	2.83	1.49
	75.2°F (24°C)	62.6°F (17°C)	TC	37.72	36.79	35.85	34.66	34.22	28.11	32.91	31.89	31.36	32.07	26.61	22.48	10.62
			SC	24.67	24.05	23.44	22.66	22.38	18.38	21.52	20.85	20.50	20.97	17.40	14.70	6.94
			Input	1.38	1.49	1.61	1.46	1.53	1.84	2.13	2.63	3.10	4.35	3.30	2.98	1.65
	80.6°F (27°C)	66.2°F (19°C)	TC	40.77	39.83	38.90	37.70	37.27	31.16	35.96	34.94	34.41	35.12	29.66	25.52	13.67
			SC	25.89	25.29	24.70	23.94	23.66	19.78	22.83	22.18	21.85	22.30	18.83	16.21	8.68
			Input	1.52	1.64	1.75	1.60	1.68	1.99	2.27	2.78	3.25	4.49	3.44	3.13	1.79
	89.6°F (32°C)	73.4°F (23°C)	TC	46.49	45.55	44.62	43.42	42.99	36.88	41.68	40.66	40.13	40.84	35.38	31.24	19.39
			SC	26.58	26.05	25.51	24.83	24.58	21.09	23.83	23.25	22.94	23.35	20.23	17.87	11.09
			Input	1.80	1.91	2.02	1.88	1.95	2.26	2.54	3.05	3.52	4.77	3.72	3.40	2.06

LEGEND

DB - Dry Bulb
WB - Wet Bulb
TC - Total Net Capacity (1000 Btu/hour)
SC - Sensible Capacity (1000 Btu/hour)
Input - Total Power (kW)

NOTE: Values in grey are extrapolated based on tested performance.

WIRING

All wires must be sized per NEC (National Electrical Code) or CEC (Canadian Electrical Code) and local codes. Use Electrical Data table MCA (minimum circuit amps) and MOCP (maximum over current protection) to correctly size the wires and the disconnect fuse or breakers respectively.

Recommended Connection Method for Power and Communication Wiring:

The main power is supplied to the outdoor unit. The field supplied 14/3 power/communication wiring, from the outdoor unit to the indoor unit, consists of four (4) wires and provides the power for the indoor unit. Two wires are high voltage AC power, one is communication wiring and the other is a ground wire. Wiring between indoor and outdoor unit is polarity sensitive. The use of BX wire is **NOT** recommended.

If installed in a high Electromagnetic field (EMF) area and communication issues exists, a 14/2 stranded shielded wire can be used to replace L2 and (S) between outdoor unit and indoor unit landing the shield onto ground in the outdoor unit only.

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage or improper operation.

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage or improper operation.

Be sure to comply with local codes while running wire from the indoor unit to the outdoor unit.

Every wire must be connected firmly. Loose wiring may cause the terminal to overheat or result in unit malfunction. A fire hazard may also exist. Ensure all wiring is tightly connected.

No wire should touch the refrigerant tubing, compressor or any moving parts.

Disconnecting means must be provided and shall be located within sight and readily accessible from the air conditioner.

NOTE: Matches with Multi-Family and Residential Fan Coils require separate power for the indoor and outdoor unit. A 24V interface kit is required for compatibility. Refer to the 24V Interface Kit Installation Manual.

Sound Pressure in Octave Bands

	Frequency (Hz)	63	125	250	500	1000	2000	4000	8000
12 K (115 V)	Cooling dB(A)	58.5	55.9	58.1	51.1	46.0	41.4	34.8	28.6
	Heating dB(A)	58.8	57.4	57.4	53.6	47.3	43.5	37.2	31.9
	Indoor dB(A)	40.8	33.0	34.3	34.1	33.7	26.6	19.4	14.1
6K (208V)	Cooling dB(A)	57.5	53.2	56.9	49.6	45.2	41.4	36.5	31
	Heating dB(A)	57.3	53.2	58.4	51.2	46.1	43.6	38.5	34.9
	Indoor dB(A)	38.1	30.9	33.6	33.5	31.7	25.9	22.6	16.7
9K (208V)	Cooling dB(A)	53.1	51.2	52.6	49.5	40.1	36.5	29.1	26.3
	Heating dB(A)	57.6	55.0	52.3	50.1	45.5	42.2	36.8	30.0
	Indoor dB(A)	45.2	38.8	38.1	40.8	38.9	35.1	24.0	14.8
12K (208V)	Cooling dB(A)	54.4	55.4	51.6	52.6	42.1	37.9	31.5	30.1
	Heating dB(A)	63.7	59.9	55.4	52.2	48.7	45.1	39.1	34.8
	Indoor dB(A)	39.5	31.0	33.3	32.5	31.5	23.9	17.9	14.4
18K (208V)	Cooling dB(A)	56.5	60.8	56.2	53.3	51.8	46.0	38.1	33.2
	Heating dB(A)	58.8	63.5	57.9	54.3	51.7	45.0	38.9	31.2
	Indoor dB(A)	39.5	41.5	41.9	41.6	43.0	37.5	33.5	21.4
24K (208V)	Cooling dB(A)	68.3	69.2	62.9	56.3	54.6	50.4	46.5	41.3
	Heating dB(A)	65.9	68.6	65.3	58.7	57.5	53.8	48.5	44.5
	Indoor dB(A)	44.3	38.8	42.9	39.4	40.5	34.5	26.2	25.6
30K (208V)	Cooling dB(A)	62.4	58.3	56.8	55.4	51.4	45.5	42.5	35.1
	Heating dB(A)	62.5	58.4	57.5	54.6	52.4	48.4	45.0	38.7
	Indoor dB(A)	47.2	38.9	45.8	42.3	42.2	37.6	28.4	23.8
36K (208V)	Cooling dB(A)	56.8	61.8	61.4	54.4	50.7	45.3	43.2	37.1
	Heating dB(A)	58.4	65.0	62.9	57.0	54.9	50.5	46.9	42.3
	Indoor dB(A)	43.5	40.6	45.6	42.2	41.9	37.3	28.6	21.5

Outdoor Unit Sound Pressure Test Conditions

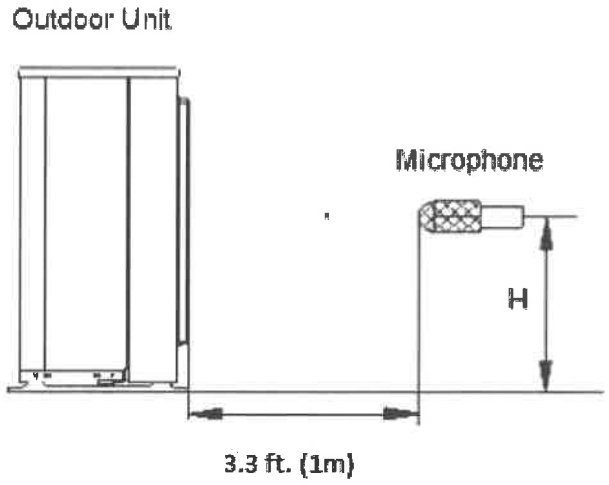

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Fig. 9 —Outdoor Unit Sound Pressure Test

NOTE: H=0.5 x Height of outdoor unit

	INDOOR CONDITION		OUTDOOR CONDITION	
	DB	WB	DB	WB
Cooling	80.6°F (27°C)	66.2°F (19°C)	95°F (35°C)	75.2°F (24°C)
Heating	68°F (20°C)	59°F (15°C)	44.6°F (7°C)	42.8°F (6°C)

ELECTRICAL DATA

SYSTEM SIZE	12 K	9K/6K	12K	18K	24K	30K	36K
V-Ph-Hz	115-1-60	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60
Power supply	3Wires: includes ground wire (Outdoor); 115V-1Ph-60Hz, 208/230V-1Ph-60Hz						
Interconnection to Indoor Unit	Yes						
Shielded Wire (Yes/No)	Yes						

*Permissible limits of the voltage range at which the unit will operate satisfactorily.

LEGEND

FLA - Full Load Amps
MCA - Minimum Circuit Amps
RLA - Rated Load Amps

Fan and Motor Specifications

SYSTEM SIZE		12K	6K	9K	12K	18K	24K	30K	36K
		(115 V)	(208/230 V)	(208/230 V)	(208/230 V)	(208/230 V)	(208/230 V)	(208/230 V)	(208/230 V)
Material	-	Acrylonitrile Styrene +20%GF	Acrylonitrile Styrene +20%GF	Acrylonitrile Styrene +20%GF	Acrylonitrile Styrene +20%GF	Acrylonitrile Styrene +20%GF	Acrylonitrile Styrene +20%GF	Acrylonitrile Styrene +20%GF	Acrylonitrile Styrene +20%GF
Type	-	ZL-421*133*8-3KN	ZL-421*133*8-3KN	ZL-434*144*8-3KN	ZL-434*144*8-3KN	ZL-535*133*12-3KFN	ZL-560*139*12-3KN	ZL-560*139*12-3KN	ZL-560*139*12-3KN
Diameter	inch	16.58 (421)	16.58 (421)	17.09 (434)	17.09 (434)	21.06 (535)	22.05 (560)	22.05 (560)	22.05 (560)
Height	inch	5.24 (133)	5.24 (133)	5.67(144)	5.67(144)	5.24 (133)	5.47 (139)	5.47 (139)	5.47 (139)
Model	-	ZKFN-34-10-1	ZKFN-34-10-1	ZKFN-34-10-1	ZKFN-34-10-1	ZKFN-80-8-3	ZKFN-120-8-2	ZKFN-120-8-2	ZKFN-120-8-2
FLA	A	0.4	0.4	0.4	0.4	0.76	0.5	1.0	1.35
Rated HP	HP	0.045	0.045	0.045	0.045	0.11	0.16	0.16	0.16
Output	W	34	34	34	34	80	120	120	120
Type	-	DC	DC	DC	DC	DC	DC	DC	DC
Insulation class	-	B	B	B	B	E	E	E	E
Safe class	-	IP24	IP24	IP24	IP24	IPX4	IPX4	IPX4	IPX4
Input	W	100.3	100.3	100.3	100.3	120	173	173	173
Range of current	Amps	0.823±10%	0.823±10%	0.823±10%	0.823±10%	1±20%	1.48±10%	1.39±10%	1.39±10%
Rated current	Amps	0.89	0.89	0.89	0.89	0.82	1.21	1.21	1.21
Capacitor	μF	NA	NA	NA	NA	NA	NA	NA	NA
Speed	rev/min	800/700/600	800/700/600	730/660/560	730/660/560	780/700/550	950/800/500	900/700/500	950/700/500 950/700/500‡
Rated RPM	rev/min	800	800	730	730	780	950	900	950
Max. input	W	100.3	100.3	100.3	100.3	120.0	170.0	170.0	170.0

NOTE: ‡ Only Compatible with AHU

CONNECTION DIAGRAMS

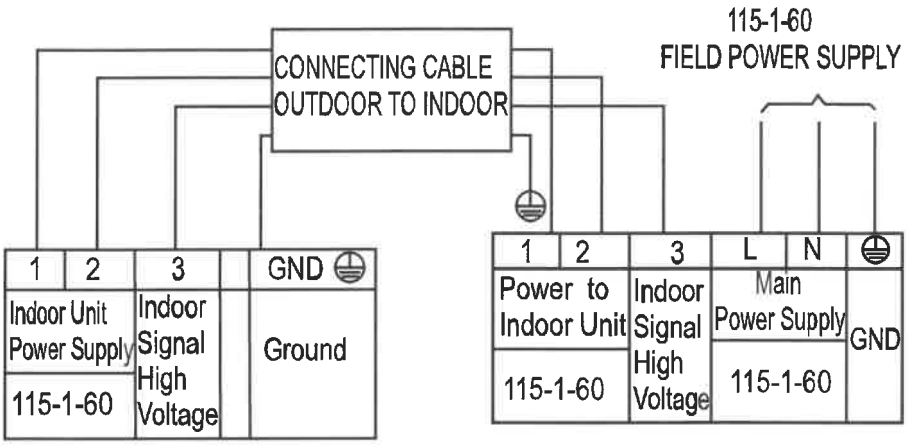

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Fig. 10 —Connection Diagram 12K (115V)

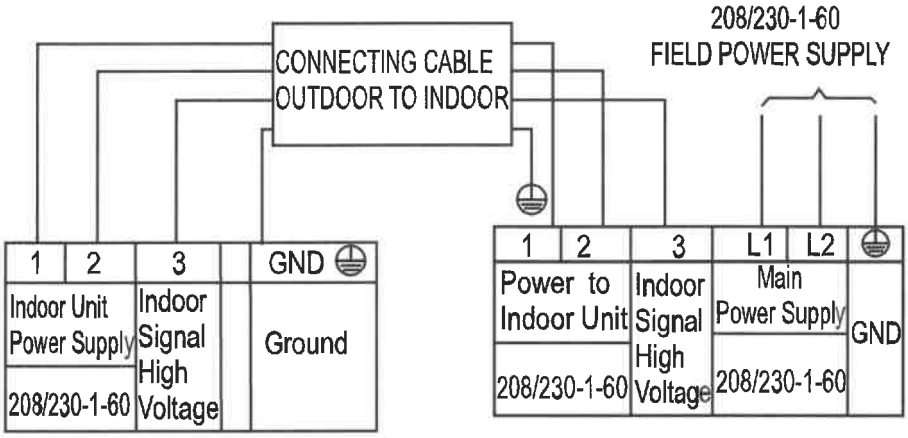

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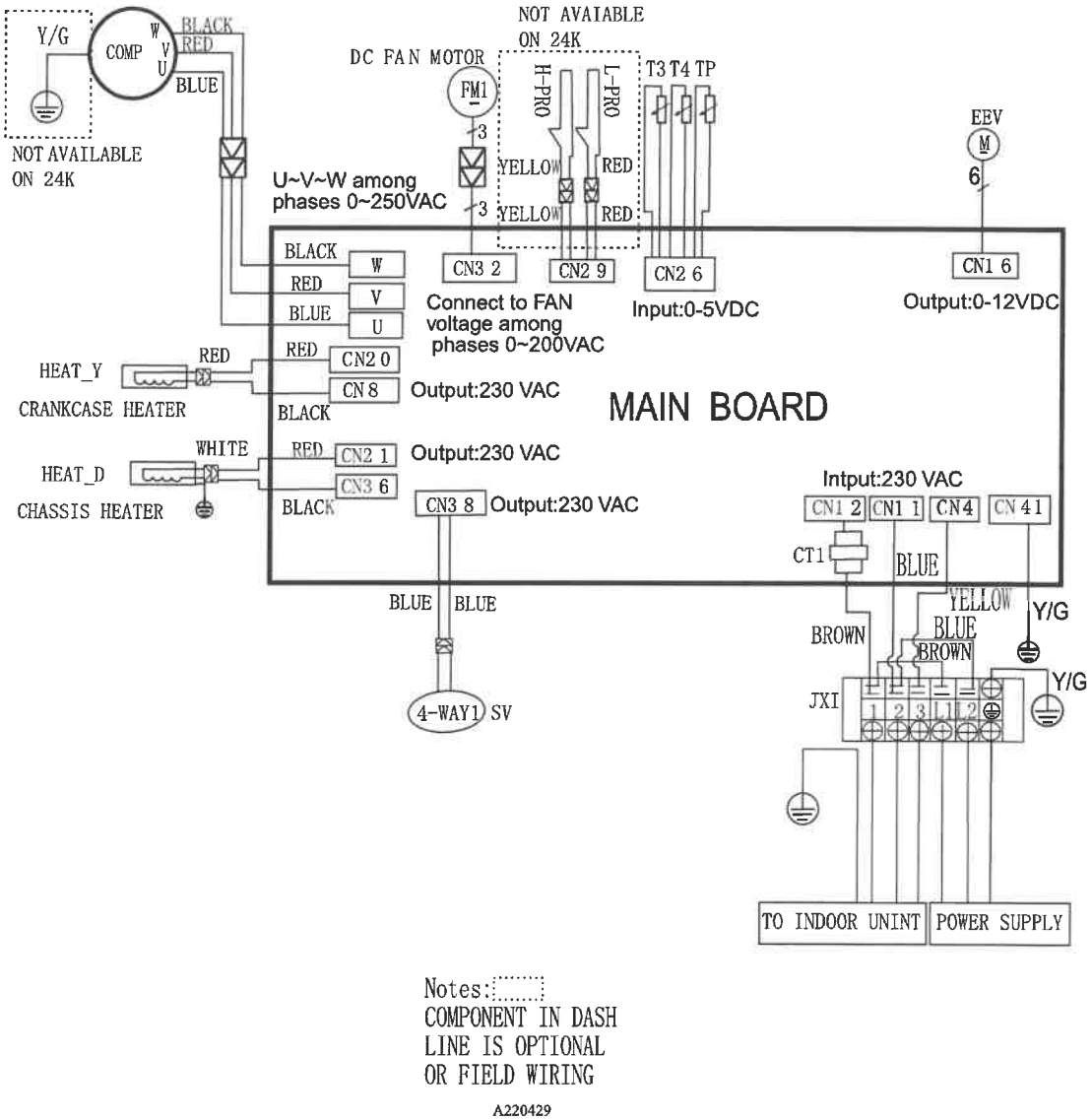
Fig. 11 —Connection Diagram Sizes 6K-36K (208/230-1-60V)

WIRING DIAGRAMS (CONTINUED)



Notes:
COMPONENT IN DASH
LINE IS OPTIONAL
OR FIELD WIRING

A220429

Fig. 15 — Wiring Diagram Sizes 24-36K (208/230V)

CODE	PART NAME
JX1	TERMINAL BLOCK
COMP_TOP	COMP. TOP OLP TEMP. SENSOR
EEV	ELECTRIC EXPANSIVE VALVE
FM1	DC FAN MOTOR
COMP	COMPRESSOR
HEAT_Y	CRAKCASE HEATER
CT1	AC CURRENT DETECTOR
H-PRO	HIGH PRESSURE SWITCH
L-PRO	LOW PRESSURE SWITCH
SV	REVERSE VALVE
TP	COMP. DISCHARGE TEMP. SENSOR
T3	COIL TEMP. SENSOR
T4	OUTDOOR AMBIENT TEMP. SENSOR
HEAT_D	CHASIS HEATER

40MAHB
High Wall Ductless System
Sizes 06 to 36

Carrier

Product Data

Fig. 1 —Sizes 06K - 36K

Fig. 2 — Remote Controller

NOTE: Images are for illustration purposes only. Actual models may differ slightly.

TABLE OF CONTENTS

INDUSTRY LEADING FEATURES / BENEFITS

A PERFECT BALANCE BETWEEN BUDGET LIMITS, ENERGY SAVINGS AND COMFORT.

The **40MAHB** series ductless systems are a matched combination of an outdoor condensing unit and an indoor fan coil unit connected only by refrigerant tubing and wires.

The fan coil is mounted on the wall, near the ceiling. This selection of fan coils permits creative solutions to design problems such as:

- Add-ons to current space (an office or family room addition)
- Special space requirements
- When changes in the load cannot be handled by the existing system
- When adding air conditioning to spaces that are heated by hydronic or electric heat and have no ductwork
- Historical renovations or any application where preserving the look of the original structure is essential.

The ideal compliment to your ducted system when it is impractical or prohibitively expensive to use ductwork. These compact indoor fan coil units take up very little space in the room and do not obstruct windows. The fan coils are attractively styled to blend with most room decors.

Advanced system components incorporate innovative technology to provide reliable cooling performance at low sound levels.

LOW SOUND LEVELS

When noise is a concern, the ductless systems are the answer. The indoor units are whisper quiet. There are no compressors indoors, either in the conditioned space or directly over it, and there is none of the noise usually generated by air being forced through ductwork.

SECURE OPERATION

If security is an issue, outdoor and indoor units are connected only by refrigerant piping and wiring to prevent intruders from crawling through ductwork. In addition, since the outdoor units can be installed close to an outside wall, coils are protected from vandals and severe weather.

FAST INSTALLATION

This compact ductless system is simple to install. A mounting bracket is standard with the indoor units and only wire and piping need to be run between the indoor and outdoor units. These units are fast and easy to install ensuring minimal disruption to customers in the home or workplace. This makes the 40MAHB ductless systems the equipment of choice, especially in retrofit situations.

SIMPLE SERVICING AND MAINTENANCE

Removing the top panel on outdoor units provides immediate access to the control compartment, providing a service technician access to check unit operation. In addition, the draw-thru design of the outdoor section means that dirt accumulates on the outside surface of the coil. Coils can be cleaned quickly from the inside using a pressure hose and detergent.

On all indoor units, the New Removable Blower assembly and Hood Style cover make maintenance and service less complicated. Additionally, due to Newly Designed, easy-to-use and cleanable filters, service and maintenance expense is reduced. In addition, these high wall systems have extensive self-diagnostics to assist in troubleshooting.

BUILT-IN RELIABILITY

Ductless system indoor and outdoor units are designed to provide years of trouble-free operation.

The high wall indoor units include protection against freeze-up and high evaporator temperatures on heat pumps.

The condensing units on heat pumps are protected by a three minute time delay before the compressor starts the over-current protection and the high temperature protection.

INDIVIDUAL ROOM COMFORT

Maximum comfort is provided because each space can be controlled individually based on usage pattern. The air sweep feature provided permits optimal room air mixing to eliminate hot and cold spots for occupant comfort. Each unit is equipped with a New Humidity Sensor to keep your space comfortable. Year-round comfort can be provided with heat pumps.

ECONOMICAL OPERATION

The ductless system design allows individual room heating or cooling when required. Equipped with a New Occupancy Sensor, the system can be set to only operate when the room is being utilized. There is no need to run large supply-air fans or chilled water pumps to handle a few spaces with unique load patterns. In addition, because air is moved only in the space required, no energy is wasted while air moves through the ducts.

EASY-TO-USE CONTROLS

The high wall units have microprocessor-based controls to provide the ultimate in comfort and efficiency. The user friendly wireless remote control provides the interface between the user and the unit.

ACCESSORIES

Customizing these ductless systems to your application is easily accomplished. Adding a condensate pump accessory to the high wall fan coil provides installation flexibility.

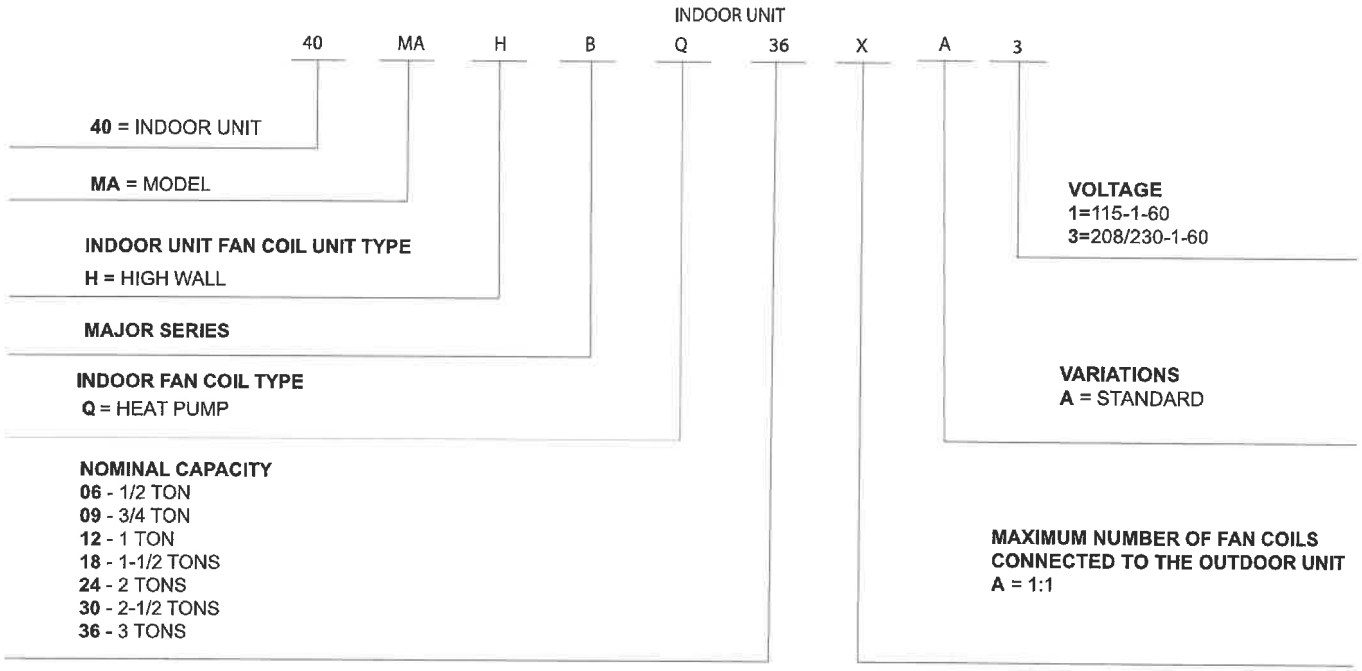
OPTIONAL WIRED CONTROLLER

Optional 24V Interface for 3rd Party Control
Optional Wi-Fi Kit for Smart Phone Control

AGENCY LISTING

All systems are listed with AHRI (Air Conditioning, Heating & Refrigeration Institute), and ETL.

MODEL NUMBER NOMENCLATURE



AHRI CERTIFIED www.ahridirectory.org

Use of the AHRI Certified TM Mark indicates a manufacturer's participation in the program For verification of certification for individual products, go to www.ahridirectory.org.

STANDARD FEATURES AND ACCESSORIES

Ease Of Installation	
Mounting Brackets	S
Low Voltage Controls	S
Comfort Features	
Microprocessor Controls	S
Wired Remote Controller	A
Wireless Remote Controller	S
Automatic Up-Down Airflow Louver Swing	S
Air Direction Control	S
Auto Restart Function	S
Cold Blow Protection On Heat Pumps	S
Freeze Protection Mode on Heat Pumps	S
Turbo Mode	S
Silence Mode	S
Auto Changeover on Heat Pumps	S
Follow Me	S
Energy Saving Features	
Sleep Mode	S
Stop/Start Timer	S
46° F Heating Mode (Heating Setback)	S
Safety And Reliability	
Indoor Coil Freeze Protection	S
Indoor Coil High Temp Protection in Heating Mode	S
Aluminum Hydrophilic pre-coated fins	S
Ease Of Service And Maintenance	
Cleanable Filters	S
Diagnostics	S
Carbon Filter	S
Application Flexibility	
Condensate Pumps	A

Legend
S - Standard
A - Accessory

Accessories

Accessory No.	Description	For Models
KSACN0801AAA	WIRED REMOTE CONTROL 7 DAY PROGRAMMABLE	All Sizes
KSACN0101AAA	WIRED REMOTE CONTROL WITH TIMER FUNCTION	All Sizes
KSAIC0301230	24V INTERFACE KIT 230V	208/230V MODELS
KSAIF0601AAA	Wi-Fi Kit High Wall Mid-Tier	All Sizes

DIMENSIONS - INDOOR

UNIT SIZES		12K	6K	9K	12K	18K	24K	30K	36K
Voltages		115V	208/230V	208/230V	208/230V	208/230V	208/230V	208/230V	208/230V
Height (H)	in (mm)	11.61 (295)	11.61 (295)	11.61 (295)	11.61 (295)	12.56 (319)	14.57 (370)	14.57 (370)	14.57 (370)
Width (W)	in (mm)	31.3 (795)	31.3 (795)	31.3 (795)	31.3 (795)	37.99 (965)	44.88 (1140)	44.88 (1140)	44.88 (1140)
Depth (D)	in (mm)	8.86 (225)	8.86 (225)	8.86 (225)	8.86 (225)	9.41 (239)	10.83 (275)	10.83 (275)	10.83 (275)
Net Weight	lbs (kgs)	22.93 (10.4)	22.71 (10.3)	22.71 (10.3)	22.93 (10.4)	27.12 (12.3)	43.65 (19.8)	43.65 (19.8)	43.65 (19.8)

CLEARANCES

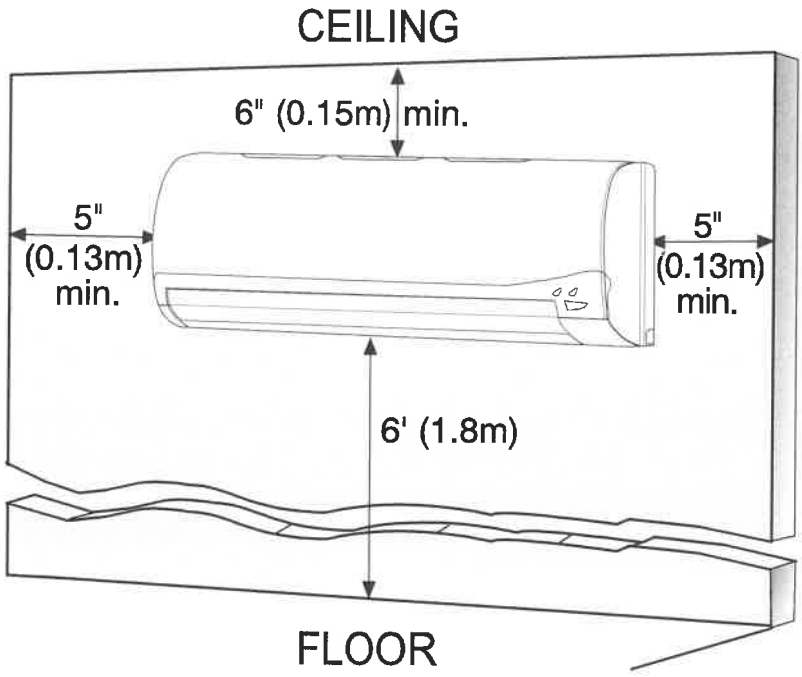


Fig. 3 — Indoor Unit Clearances

NOTE: The top clearance recommended for proper return airflow is 5.9in (15cm). Reduction of this clearance may decrease unit performance. This may be reduced to 2.0in (80mm) as long as the right and left clearances are achieved.

SPECIFICATIONS

System	Size		12	6	9	12	18	24	30	36
	Indoor Model		40MAHBQ12XA1	40MAHBQ06XA3	40MAHBQ09XA3	40MAHBQ12XA3	40MAHBQ18XA3	40MAHBQ24XA3	40MAHBQ30XA3	40MAHBQ36XA3
Electrical	Voltage, Phase, Cycle	V/Ph/Hz	115-1-60	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60
	Power Supply		Indoor unit powered from outdoor unit							
	MCA	A.	0.2500	0.3125	0.3125	0.3125	0.1625	0.6250	0.6250	0.6250
Controls	Wireless Remote Controller (°F/°C Convertible)		Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard
	Wired Remote Controller (°F/°C Convertible)		Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional
	24V Interface for 3rd Part Thermostat Control		Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional
	Wi-Fi Control for Phone App Control		Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional
Operating Range	Cooling Indoor DB Min - Max	°F(°C)	63~90 (17~32)	63~90 (17~32)	63~90 (17~32)	63~90 (17~32)	63~90 (17~32)	63~90 (17~32)	63~90 (17~32)	63~90 (17~32)
	Heating Indoor DB Min -Max	°F(°C)	32~86 (0~30)	32~86 (0~30)	32~86 (0~30)	32~86 (0~30)	32~86 (0~30)	32~86 (0~30)	32~86 (0~30)	32~86 (0~30)
Piping	Pipe Connection Size - Liquid	in (mm)	1/4 (6.35)	1/4 (6.35)	1/4 (6.35)	1/4 (6.35)	1/4 (6.35)	3/8 (9.52)	3/8 (9.52)	3/8 (9.52)
	Pipe Connection Size - Suction	in (mm)	1/2 (12.7)	3/8 (9.52)	3/8 (9.52)	1/2 (12.7)	1/2 (12.7)	5/8 (16)	5/8 (16)	5/8 (16)
Indoor Coil	Face Area	Sq. Ft.	2.15	2.15	2.15	2.15	2.75	3.60	3.60	3.60
	No. Rows		2	2	2	2	2	3	3	3
	Fins per inch		20	20	20	20	20	20	20	20
	Circuits		3	3	3	3	4	7	7	7
Indoor	Unit Width	in (mm)	31.3 (795)	31.3 (795)	31.3 (795)	31.3 (795)	37.99 (965)	44.88 (1140)	44.88 (1140)	44.88 (1140)
	Unit Height	in (mm)	11.61 (295)	11.61 (295)	11.61 (295)	11.61 (295)	12.56 (319)	14.57 (370)	14.57 (370)	14.57 (370)
	Unit Depth	in (mm)	8.86 (225)	8.86 (225)	8.86 (225)	8.86 (225)	9.41 (239)	10.83 (275)	10.83 (275)	10.83 (275)
	Net Weight	lbs (kg)	22.93 (10.4)	22.71 (10.3)	22.71 (10.3)	22.93 (10.4)	27.12 (12.3)	43.65 (19.8)	43.65 (19.8)	43.65 (19.8)
	Fan Speeds Numbers		4	4	4	4	4	4	4	4
	Airflow (lowest to highest)	CFM	235/294/353/412	176/229/335/382	176/229/335/382	176/229/335/382	306/376/524/635	319/414/611/719	382/505/646/843	382/506/639/843
	Sound Pressure (lowest to highest)	dB(A)	24/30/41/47	32/34/38/47	32/34/38/47	30/32/37/47	37/40/46/48	37/39/44/52	38/41/46/52	39/41/46/52
	Air throw Data	ft (m)	27.9 (8.5)	21.3 (7.1)	24.9 (7.6)	26.2 (8.0)	27.9 (8.5)	31.5 (9.6)	33.8 (10.3)	33.8 (10.3)
	Moisture removal	Pint/h (L/h)	58(1.16)	16 (0.32)	18(0.35)	56(1.11)	110(2.18)	132(2.6)	188(3.7)	291(5.75)
	Field Drain Pipe Size O.D.	in (mm)	0.625 (16)	0.625 (16)	0.625 (16)	0.625 (16)	0.625 (16)	0.625 (16)	0.625 (16)	0.625 (16)

* Performance may vary based on the Outdoor unit matched to. See compatible Outdoor Units pages for Performance Data

COMPATIBILITY

Indoor Unit	40MAHBQ12XA1	40MAHBQ06XA3	40MAHBQ09XA3	40MAHBQ12XA3	40MAHBQ18XA3	40MAHBQ24XA3	40MAHBQ30XA3	40MAHBQ36XA3
Outdoor Unit Single Zone	38MARBQ12AA1		38MARBQ09AA3	38MARBQ12AA3	38MARBQ18AA3	38MARBQ24AA3	38MARBQ30AA3	38MARBQ36AA3
Outdoor Unit Multi-zone		38MGRQ18B–3						
		38MGRQ24C–3						
		38MGRQ30D–3						
		38MGRQ36D–3						
		38MGRQ48E–3						

Backward compatible with 38MAR Single Zone Systems.

WIRING

All wires must be sized per NEC (National Electrical Code) or CEC (Canadian Electrical Code) and local codes. Use Electrical Data table MCA (minimum circuit amps) and MOCP (maximum over current protection) to correctly size the wires and the disconnect fuse or breakers respectively.
Per the caution note, only stranded copper conductors with a 600 volt insulation rating wire must be used.

Recommended Connection Method for Power and Communication Wiring:

The main power is supplied to the outdoor unit. The field supplied 14/3 stranded wire with ground with a 600 volt insulation rating, power/ communication wiring from the outdoor unit to indoor unit consists of four (4) wires and provides the power for the indoor unit. Two wires are line voltage AC power, one is communication wiring (S) and the other is a ground wire. Wiring between indoor and outdoor unit is polarity sensitive. The use of BX wire is NOT recommended.

If installed in a high Electromagnetic field (EMF) area and communication issues exists, a 14/2 stranded shielded wire can be used to replace L2/N and (S) between outdoor unit and indoor unit landing the shield onto ground in the outdoor unit only.

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage or improper operation.

Wires should be sized based on NEC and local codes.

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this caution may result in equipment damage or improper operation.

Be sure to comply with local codes while running wire from the indoor unit to the outdoor unit.

Every wire must be connected firmly. Loose wiring may cause the terminal to overheat or result in unit malfunction. A fire hazard may also exist. Ensure all wiring is tightly connected.

No wire should touch the refrigerant tubing, compressor or any moving parts.

Disconnecting means must be provided and shall be located within sight and readily accessible from the air conditioner.

Control System

The indoor unit is equipped with a microprocessor control to perform two functions:

1. Provide safety for the system
2. Control the system and provide optimum levels of comfort and efficiency.

The main microprocessor is located on the control board of the fan coil unit (outdoor units also have a microprocessor) with thermistors located in the fan coil air inlet and on the indoor coil. Heat pump units have a thermistor on the outdoor coil. These thermistors monitor the system operation to maintain the unit within acceptable parameters and controls the operating mode.

Wireless Remote Controller

Fig. 5 — Wireless Remote Controller

24 Interface (Optional)

P/N KSAIC0301230 for 208-230V models
Allows the Ductless System to be controlled using a Third Party Thermostat.

Wi-Fi Kit for Smart Phone Control (Optional)

P/N KSAIF0601AAA
Allows the Ductless System to be controlled using a connected smart phone application.

AIRFLOW DATA

SYSTEM SIZE		12K (115 V)	6K (208/230 V)	9K (208/230 V)	12K (208/230 V)	18K (208/230 V)	24K (208/230 V)	30K (208/230 V)	36K (208/230 V)
Indoor (CFM)	Turbo	411.76	382.35	382.35	382.35	635.29	718.82	842.94	842.94
	High	352.94	335.29	335.29	335.29	523.53	611.18	646.47	639.41
	Medium	294.12	229.41	229.41	229.41	376.47	414.12	505.29	505.88
	Low	235.29	176.47	176.47	176.47	305.88	318.82	382.35	382.35

AIR THROW DATA

HIGH WALL UNIT CAPACITY	MAX. APPROXIMATE AIR THROW FT. (M)
12K (115)	27.9(8.5)
6K (230)	21.3 (7.1)
9K (230)	24.9(7.6)
12K (230)	26.2(8.0)
18K (230)	27.9(8.5)
24K (230)	31.5(9.6)
30K (230)	33.8(10.3)
36K (230)	33.8(10.3)

AIR MOISTURE

Size		12	6	9	12	18	24	30	36
Voltage, Phase, Cycle	V/Ph/Hz	115-1-60	208/230-1-60						
Dehumidifying Volume	Liter/hr.	1.16	0.32	0.35	1.11	2.18	2.6	3.7	5.75
Dehumidifying Volume	PINT/D	58	16	18	56	110	132	188	291

* The dehumidifying volumes for the 6K unit will be available in a future release.

SOUND PRESSURE

SIZE		12K (115 V)	6K (208/230 V)	9K (208/230 V)	12K (208/230 V)	18K (208/230 V)	24K (208/230 V)	30K (208/230 V)	36K (208/230 V)
Cooling Operation Indoor	dB(A) at (Turbo /High(100%) / Med(60%) /Low(40%) CFM)	46.8/41.3/ 30.2/24.4	47.2/37.9/ 33.7/31.5	47.2/37.9/ 33.7/31.5	46.7/37/ 32.3/29.8	48.4/46/39.8/ 36.5	52.1/43.5/ 39.2/36.7	52.3/46/40.9/ 38.3	52.1/45.7/ 41.1/38.6
Heating Operation Indoor Sound Pressure	dB(A) at (Turbo /High(100%) / Med(60%) /Low(40%) CFM)	46.1/38.1/ 32.5/30.2	46.1/39/ 34.5/32.4	46.1/39/ 34.5/32.4	46.2/37.4/ 32.9/30.5	46.9/44.7/ 38.7/35.5	52/44.1/38.2/ 36.5	50.4/43.5/ 39/36.5	50.6/48.9/ 43.0/36.6

FAN AND MOTOR SPECIFICATIONS

HIGH WALL UNIT SIZE			12K (115 V)	6K (208/230 V)	9K (208/230 V)	12K (208/230 V)	18K (208/230 V)	24K (208/230 V)	30K (208/230 V)	36K (208/230 V)
High Wall fan	Material		Acrylontrile Styrene +30%GF							
	Type		GL-98*638-IN	GL-98*638-IN	GL-98*638-IN	GL-98*638-IN	GL-98*758-IN	GL-121*883-IN	GL-121*883-IN	GL-121*883-IN
	Diameter	In (mm)	3.86(98)	3.86(98)	3.86(98)	3.86(98)	3.86(98)	4.76(121)	4.76(121)	4.76(121)
	Height	In (mm)	25.12(638)	25.12(638)	25.12(638)	25.12(638)	29.84(758)	34.76(883)	34.76(883)	34.76(883)
High Wall fan motor	Model		ZKFP-20-8-113	ZKFP-20-8-6-21	ZKFP-20-8-6-21	ZKFP-20-8-6-21	ZKFP-30-8-3-10	ZKFP-58-8-1-6	ZKFP-58-8-1-6	ZKFP-58-8-1-6
	Volts	V	115	208/230	208/230	208/230	208/230	208/230	208/230	208/230
	Phase		1	1	1	1	1	1	1	1
	FLA		0.2	0.25	0.25	0.25	0.13	0.5	0.5	0.5
	MCA		0.25	0.31	0.31	0.31	0.16	0.63	0.63	0.63
	Type		DC	DC	DC	DC	DC	DC	DC	DC
	Insulation class		E	E	E	E	E	E	E	E
	Safe class		IP20 (Welling, Dayang)/ IPX0(Tongda)	IPX0	IPX0	IPX0	IPX4	IP20(Welling)/ IP40(Dayang)	IP20(Welling)/ IP40(Dayang)	IP20(Welling)/ IP40(Dayang)
	Input	W	65.8 (Welling,Tongda)/ 68(Dayang)	24.6	24.6	36	36	113.5(Welling)/ 125(Dayang)	113.5(Welling)/ 125(Dayang)	113.5(Welling)/ 125(Dayang)
	Output	W	20	20	20	20	30	58	58	58
	Range of current	Amps	0.467±10% (Welling,Tongda)/ 0.486±10% (Dayang)	0.182±10%	0.182±10%	0.182±10%	0.11±10%	0.364±10% (Welling)/ 0.4±10% (Dayang)	0.364±10% (Welling)/ 0.4±10% (Dayang)	0.364±10% (Welling)/ 0.4±10% (Dayang)
	Rated current	Amps	0.467 (Welling,Tongda)/ 0.486(Dayang)	0.182	0.182	0.182	0.11	0.364(Welling)/ 0.4(Dayang)	0.364(Welling)/ 0.4(Dayang)	0.364(Welling)/ 0.4(Dayang)
	Capacitor	μF	NA	NA	NA	NA	NA	NA	NA	NA
	Rated HP	HP	0.027	0.027	0.027	0.027	0.04	0.077	0.077	0.077
	Speed	rev/min	1200/910/720	1100/850/700	1100/850/700	1050/930/870	1240/1024/916	1000/850/700	1050/880/630	1050/880/630
	Rated RPM	rev/min	1200	1100	1100	1050	1240	1000	1050	1050
	Max. input	W	65.8	24.6	24.6	24.6	36	113.5	113.5	113.5

NOTE: Refer to the outdoor unit installation instructions (indoor unit powered by the outdoor unit).

WIRING DIAGRAM

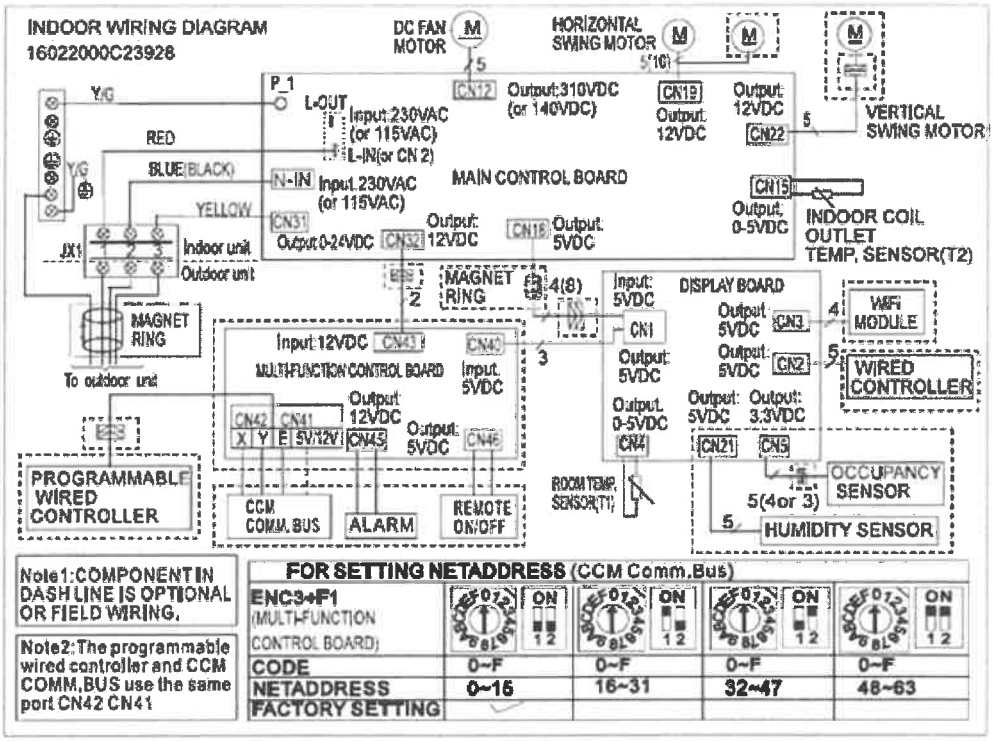


Fig. 6 — Wiring Diagram Sizes 6K - 36K (115V and 208/230V)

Carrier Connect™ Wi-Fi Thermostat 33CONNECTSTAT43FX

Installation Guide

 • Catalog No. 11-808-872-01 • 4/17/2024

 Verify that you have the most current version of this document from **www.hvacpartners.com**, the **Carrier Partner Community** website, or your local Carrier office.

Important changes are listed in **Document revision history** at the end of this document.

Contents

What is the Carrier Connect™ 33CONNECTSTAT43FX Thermostat?

The Carrier Connect 33CONNECTSTAT43FX thermostat has:

- Space and remote temperature sensing
- Space and remote humidity sensing
- BACnet MS/TP communications
- Wi-Fi connectivity

The Carrier® Connect™ Wi-Fi Thermostat package includes:

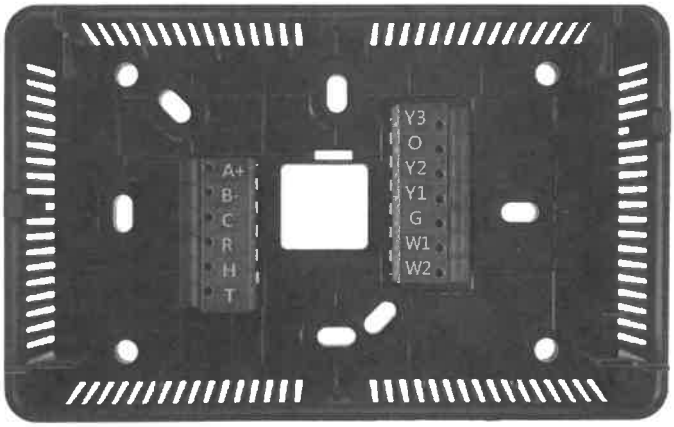
- Thermostat
- Mounting Hardware - two screws with drywall anchors and one security screw
- Quick Start Guide - Catalog No. 11-808-873-01

Some of the features:

- Control of heating, cooling, and fan solid state 24 Vac outputs
- Space temperature sensing (> 0.5 °F accuracy from 60 °F to 90 °F)
- Outdoor temperature sensing using a 10K @ 25 °C J Curve (type II) thermistor connected to **T** and **C** terminals or Wi-Fi outdoor temperature, available by GPS location services, determined when the thermostat is installed
- Humidity sensing and control
- Remote humidity sensing from a 33ZCSENDRH-02 Humidity Duct Sensor or 33ZCSENSRH-02 wall sensor
- Remote CO2 sensing from a 0-10 vdc or 4-20 mA sensor
- Wi-Fi connectivity (supports 802.11 a/b/g/n standards and utilizes a Broadcom chipset)
- Cloud Connectivity using the Carrier Connect mobile app (iOS and Android).
- Optimized installation ("finger friendly" spring-loaded connectors that accept 16 to 24 AWG wire and NO screwdriver required for wire insertion and removal)
- Optimized boot time (5 seconds total boot time until temperature displays and thermostat is fully operational)
- 4.3" segment display
- Thirteen touch points for display buttons
- OTA functionality (reprogrammable via Wi-Fi)

Specifications

Power requirements	24 Vac +/- 10% @ 3VA
Network Requirements	Wi-Fi connectivity supports Wi-Fi: 802.11 a/b/g/n standards on 2.4 GHz networks
Environmental temperature range	Operating: 32° to 104°F (0° to 40°C) Storage: -40° to 135°F (-40° to 57°C)
Humidity range	Operating: 10% to 95%, non-condensing, 32° to 104°F (0° to +40°C) Storage: 10% to 95%, non-condensing
Connections	Connectors P104 and P105. 2 banks of "finger friendly" spring type terminal blocks intended to be wired by the end-user or installer
Inputs	• **C** - connection • **R** - connection • **H** - 0-10 Volt input • **T** - remote thermistor
Outputs	Connections: **Y3**, **O/B**, **Y2**, **Y1**, **G**, **W1**, and **W2**
Communications	485 signal: **A+** and **B**
Mounting	Standard 4 x 2 in. electrical box using the 6-32 x 1/2 in. mounting screws and plastic wall anchors provided
Overall dimensions	Width: 5.15 in. (13.1 cm) Height: 3.25 in. (8.2 cm) Depth: 0.95 in. (2.4 cm)
BACnet Support	Conforms to the BACnet Application Specific Controller (B-ASC) Device Profile as defined in ANSI/ ASHRAE Standard 135-2012 (BACnet) Annex L, Protocol Revision 14
Listed by	FCC Part 15, Subpart J compliant



Programmable and non-programmable installations

The thermostat combines all 24 Vac output demand control functions needed for the following types of thermostat programmable and non-programmable installations:

Cool only (up to 3 stages of cooling)

- Cooling
  - **Y1** - first stage cooling
  - **Y2** - second stage cooling
  - **Y3** - third stage cooling

Heat only with gas heat (up to 2 stages of heating)

- Heating
  - **W1** - first stage heat
  - **W1** + **W2** - second stage heat

Heat only with electric heat (up to 3 stages of heating)

- Heating
  - **W1** - first stage heat
  - **W2** - second stage heat
  - **W1** + **W2** - third stage heat

AC with gas heat (up to 3 stages of cooling and 2 stages heating)

- Cooling
  - **Y1** - first stage cooling
  - **Y2** - second stage cooling
  - **Y3** - third stage cooling
- Heating
  - **W1** - first stage heat
  - **W1** + **W2** - second stage heat

AC with electric heat (up to 3 stages of cooling and 3 stages heating)

- Cooling
  - **Y1** - first stage cooling
  - **Y2** - second stage cooling
  - **Y3** - third stage cooling
- Heating
  - **W1** - first stage heat
  - **W2** - second stage heat
  - **W1** + **W2** - third stage heat

HP with electric heat (up to 2 stages of cooling and 5 stages of heating with 3 stages auxiliary)

- Cooling
  - **Y1** + **O/B** - first stage cooling
  - **Y1** + **Y2** + **O/B** - second stage cooling
- Heating
  - **Y1** - first stage HP heating
  - **Y1** + **Y2** - second stage HP heating
  - **Y1** + **Y2** + **W1** - HP heating + first stage aux heat
  - **Y1** + **Y2** + **W2** - HP heating + second stage aux heat
  - **Y1** + **Y2** + **W1** + **W2** - HP heating + third stage aux heat

HP with gas heat (up to 2 stages of cooling and 4 stages of heating with 2 stages auxiliary)

- This system is known as a dual fuel system.
- When gas heat turns on, the HP heat turns off unless defrost is active.
- Once the gas is turned on, the heating demand is satisfied with gas heat. The thermostat does not stage down from gas to heat pump heat.
- Cooling
  - **Y1** + **O/B** - first stage cooling
  - **Y1** + **Y2** + **O/B** - second stage cooling
- Heating

- **Y1** - first stage HP heating
- **Y1** + **Y2** - second stage HP heating
- **W1** - first stage aux heat
- **W1** + **W2** - second stage aux heat

Definitions	
Heat demand	The space temperature is less than the heat setpoint (HEAT TO setting).
Cool demand	The space temperature is greater than the cool setpoint (COOL TO setting).
Heat demand satisfied	The space temperature is greater than the heat setpoint (HEAT TO setting).
Cool demand satisfied	The space temperature is less than the cool setpoint (COOL TO setting).
Heating equipment	If the Y1, W1, or W2 (W2 in electric heat systems only) outputs are energized when the mode is set to HEAT, EHEAT, or AUTO, operating in Heat, then the heating equipment is on. When all of these outputs are off, the heating equipment is off.
Cooling equipment	If the Y1 output is energized when the mode is set to **COOL** or **AUTO** operating in Cool, then the cooling equipment is on. When Y1 is off, the cooling equipment is off.

Inputs

Power supply

Class II transformer secondary voltage supplied to the thermostat is 18.0 to 30.0 Vac, 50/60 Hz. Voltage is applied between **R** and **C** connector.

Space air temperature

The space air temperature measurement is supplied by an NTC "**J**" curve (type II) thermistor. The resistance of the thermistor is 10K ohm nominal at +25 °C with an accuracy of ±0.20 °C from +15.6 °C to +32.2 °C (approximately 0.5 °F accuracy from 60 °F to 90 °F).

If the thermistor reading is invalid, the space temperature is measured by the Sensirion SHT21 humidity and temperature sensor.

Remote temperature sensor

The remote temperature measurement is supplied by a NTC "**J**" curve (type II) thermistor connected between **T** and **C**. This thermistor is supplied by the installer to use for Space, Outdoor, Supply Air, or an average with the space air temperature. When used for the space temperature sensor, up to 9 remote space sensors can be averaged (1, or multiples of 4, or 9). The **T** input allows for remote occupancy override with T55 style sensor.

- If the **Occupancy Input** installer setting is set to **OCCUPIED**, when a short in the circuit from 2 up to 5 seconds in duration is sensed, a change is made from the unoccupied heating and cooling setpoints to the occupied

heating and cooling setpoints for the current time period, for the configured allowable time.

- If the **Occupancy Input** installer setting is set to **UNOCCUPIED**, when a short in the circuits sensed for more than 2 seconds, the occupied heating and cooling setpoints change to the unoccupied heating and cooling setpoints for the current time period.
- Alternatively, you can use the remote temperature sensor input as a remote occupied/unoccupied selection as well as an indicator of economizer fault or Filter Reminder.
- Alternatively, Wi-Fi outdoor temperature is available by GPS location services – determined when the thermostat is installed and registered through a Wi-Fi connection.

Remote humidity or CO2 sensor (0-10 volt or 4-20 mA)

The remote measurement is calculated from the 0-10 volt or the 4-20 mA signal applied between **H** and **C**. When the output of the sensor is the 4-20 mA signal, a 500 ohm load resistor must be connected between **H** and **C**.

Space humidity sensor

The humidity is read via synchronous communications from a Sensirion SHT21 Humidity and Temperature Sensor. The Sensirion humidity is accurate to +/- 2 % relative humidity between 20 and 80 % relative humidity.

Outputs

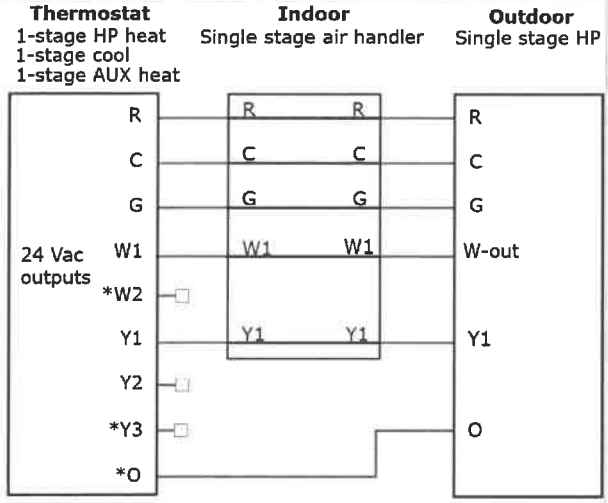
Connections are made via a compact and robust single pole, "finger friendly" spring-type terminal block. All outputs have a max rating of 1.25 Amp @ 24 Vac.

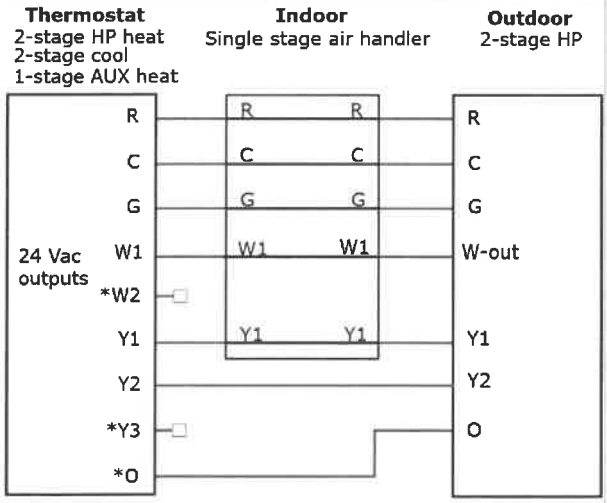
Terminal	Output for...	Is energized when the thermostat has a...
G	Fan	fan demand
W1	First Stage Heat or AUX Heat	first stage heat or aux heat demand
W2	Second stage heat or AUX heat	second stage heat or aux heat demand
Y1	First stage cooling or HP heating output	first stage cooling or HP heating output
Y2	Second Stage Cooling or HP Heating Output	second stage cooling or HP heating demand
O	Reversing Valve Output	reversing valve demand
Y3	Third Stage AC Cooling	third stage AC cooling demand

Terminal	Output for...	Is energized when the thermostat has a...
O or **Y3** or **W2**	Humidifier Output	humidification demand **NOTE** You can connect to any of these 3 outputs that are unused and select it in the system settings menu.
O, **Y3**, and **W2**	HumidiMiZer™	HumidiMiZer™ demand **NOTE** You can connect to any of these 3 terminals that are unused and select it in the system settings menu.
O, **Y3**, and **W2**	Economizer or Occupancy	the thermostat is running in occupied mode, as determined by the program, the occupancy input, BMS occupancy, or an override condition **NOTE** You can connect to any of these 3 terminals that are unused and select it in the system settings menu.

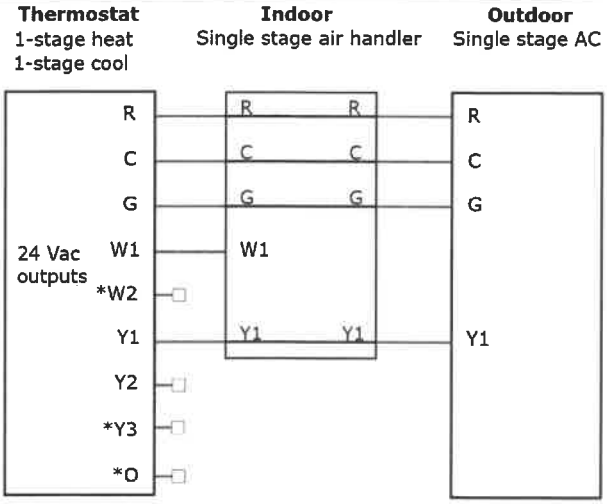
To wire an air handler with heat pump or with AC

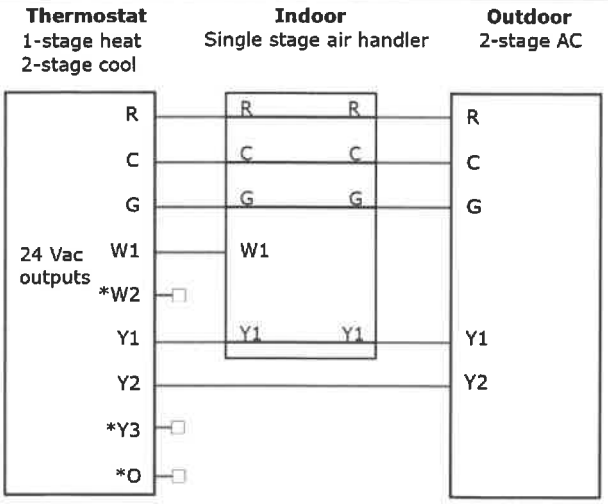
Air handler / heat pump systems



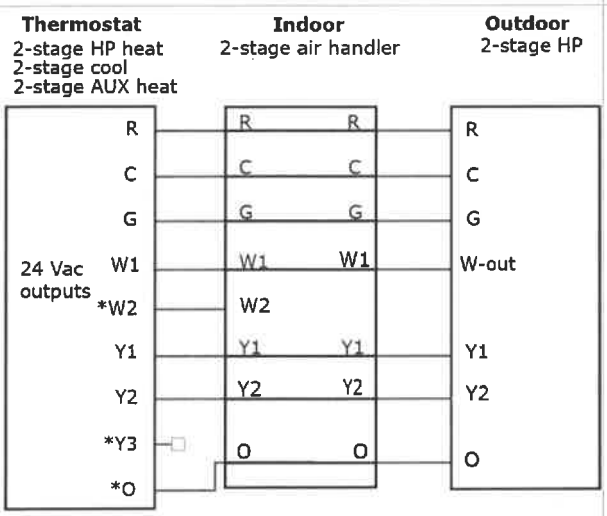


Air handler / AC systems

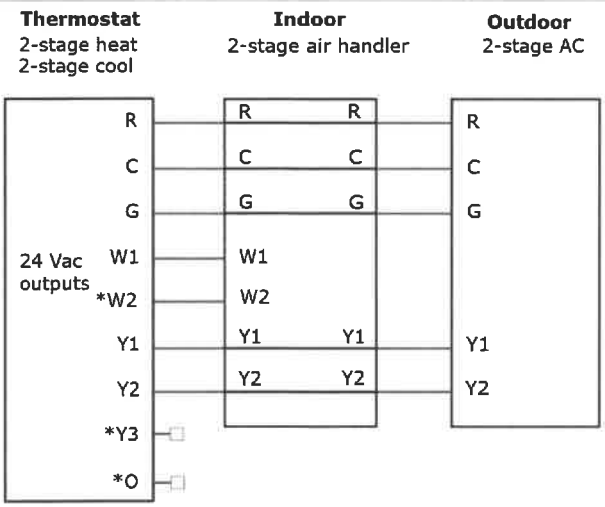


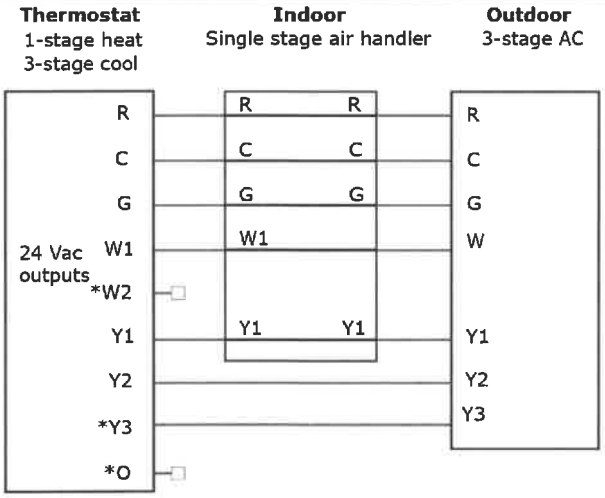


Air handler / heat pump systems

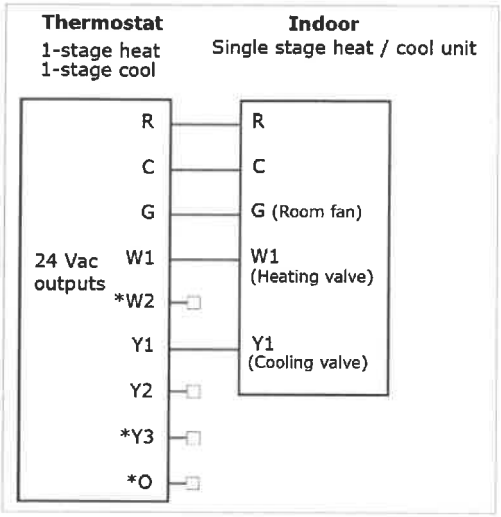


Air handler / AC systems





To wire hotel systems



To connect a remote input (sensor or contacts)

NOTE Use the specified type of wire and cable for maximum signal integrity.

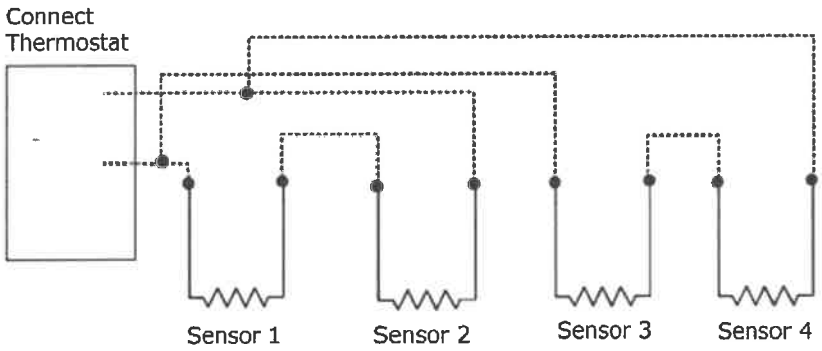
Power	N/A
Description	Stranded, twisted pair
Conductor	If < 100 ft (30.5 meters) 22 AWG, unshielded If > 100 ft (30.5 meters) 22 AWG, shielded
Maximum length	500 feet (152 meters)
Insulation	Plenum rated
Thermistor	10K Type II (CP/MCI)

Use Remote Sensor input terminals S1 and S2 for the following inputs:

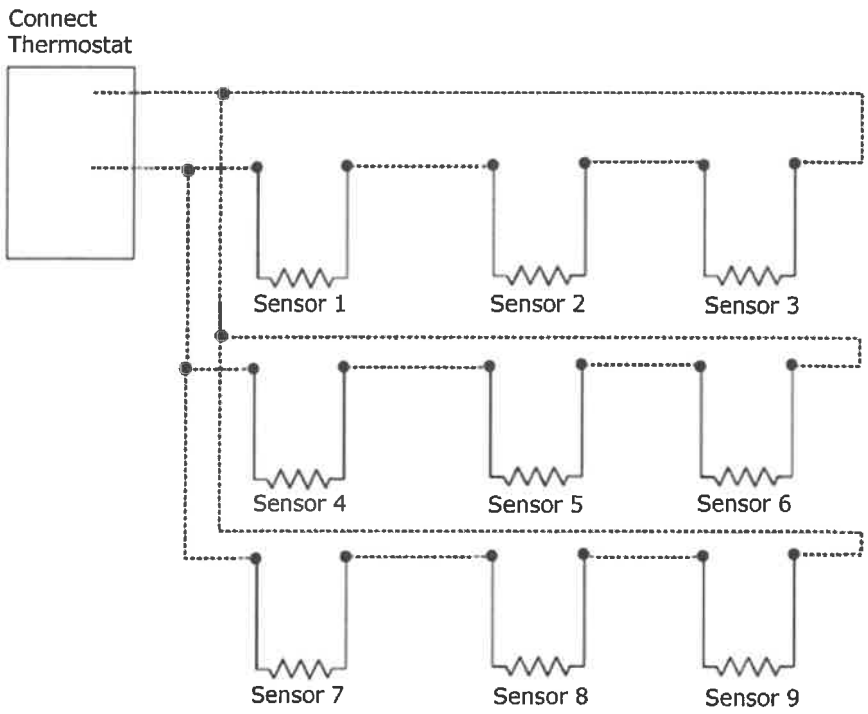
- OAT
- T55
- SAT
- Occupancy contacts
- Econ Fault

Wiring for space temperature sensor averaging

4 sensors



9 sensors



To wire for BACnet communication

NOTE Use the specified type of wire and cable for maximum signal integrity.

Cable	22 or 24 AWG, low-capacitance, twisted, stranded, shielded copper wire
Maximum length	2000 feet (610 meters) per segment
Baud rate	9600 bps, 19.2 kbps, 38.4 kpbs, or 76.8 kbps, 115.2 kbps

Connect communication wiring to terminals **A+** and **B-**. Do not terminate shield at the thermostat.

CAUTION Maintain the same polarity.

NOTE For more networking details, see the *Open Controller Network Wiring Installation Guide*.

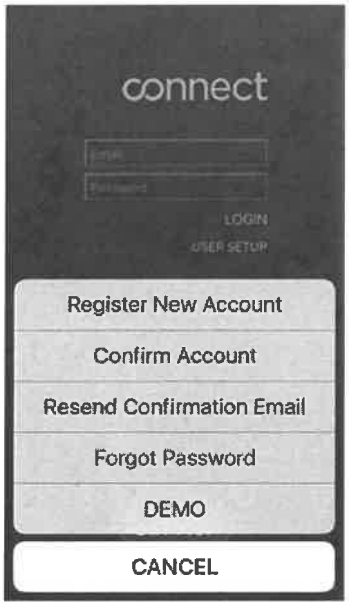
Registering and setting up a mobile device for enhanced access

Downloading the Connect™ App provides enhanced access to your device. The Connect™ App is available for Apple IOS® at App Store® or at Google Play® for Android devices. Search for **Carrier Connect™ Thermostat**.

NOTE Device compatibility: Apple IOS® 7.0 or later or Android 4.2 or later

1 After downloading Connect™ App, select **USER SETUP** and **Register New Account**.

NOTE You can also register new accounts using the website connectstat.carrier.com.



2 Enter an email address that you can access on your mobile device and receive the confirmation email to complete the registration process.

3 Select **SETUP NEW THERMOSTAT** and follow the Connect™ App instructions.

4 After registering the thermostat, enter servicing contractor's name and phone number on the **SERVICE INFO** screen.

5 On the **THERMOSTATS** screen, select the thermostat from list and the mobile app's **HOME** screen appears.

Using the Connect website or app

After you register for an account, you can access the thermostat by using the app directly or through the Web at connectstat.carrier.com.

You can:

- Monitor the thermostat operation
- Set up occupied and unoccupied (holiday) schedules
- Adjust setpoints
- Share thermostat access with other users
- Create groups of thermostats that you have registered
- Create groups of thermostats that other owners have shared with you
- Get online product information
- Find local dealer support

To navigate

- On a touchscreen device, use any of the following:
  - swipe the screen
  - tap the arrow on the side
  - tap a dot on the bottom of the screen on either side of the HOME button
- On a non-touchscreen device, click on the gray arrow  on either the side of the screen.
- You can press or click  to access the following drop-down list:
  - **My Systems**
  - **My Account**
  - **Shared Systems**
  - **Product Information**
  - **Find and Expert**
  - **Logout**

1 After logging in, a list appears of thermostats that you have registered and that have been shared with you.

2 Click 

3 Swipe or click to navigate to the **SETTINGS** screen.

NOTES

- Navigate by clicking or pressing the buttons such as **SETPOINTS**, **FAN**, **PROGRAM**, etc...
- Grayed out function buttons indicate that feature is not being used on the thermostat.

Screens	Use to...
SETPOINTS	Adjust the occupied and unoccupied setpoints by selecting each temperature.
FAN	View and modify fan settings. • The default setting for fan operation is **AUTO** for both Occupied and Unoccupied periods. When operating in **AUTO MODE**, the fan only runs when there is an active heating or cooling demand. • When you select **ON**, the fan runs continuously, except during the **Blower On Delay** when a heat cycle is starting. There is a 30-second minimum on/off timer when changing the **FAN MODE**.

NOTE The following selections are not available if the thermostat has been configured for non-programmable operation.

HUMIDITY	Adjust the thermostat's humidify and dehumidify setpoints.
PROGRAM	You can: • Set Occupied and Unoccupied start times, depending on the configured number of periods and the user's security level. • Select the time at the bottom of the screen to adjust the start or stop time of each period in 15 minute increments. • Select **Copy** to apply that schedule to other days of the week. • Adjust the setpoints for each period.

Screens	Use to...
HOLIDAY	Set **HOLIDAY** (same as unoccupied) periods with the following options: • Length of time from 1 to 365 days • Same day of each week of the month • Specific day of specific week(s) of the month **NOTE** Requires advanced security level to edit these settings • Select **+ADD HOLIDAY** to add start month, day, and number of days. • Select **ADVANCED** to configure same day of each week(s) of that month. • To delete a holiday on the: o Mobile app - swipe the selected holiday to the left and select **Delete** o Web app - select **x** on right side of the holiday
SETTINGS	Enter the name and location of the thermostat for the user's reference. The user can enter an email address for alerts and a mobile phone number to receive text alert messages. **NOTE** Requires advanced security level to edit these settings.
ALERTS	Displays a list of alerts that have been flagged in the thermostat.
SERVICE	Displays the name and phone number of the service company or individual who is responsible for servicing the system. **NOTE** Requires advanced security level to edit these settings.
CO2	Displays the graph for up to 30 days of CO2 history. Presents the high and average for today as well as the last 30 days.

Getting to know the user interface

Dormant screen

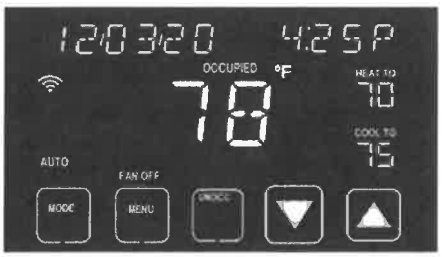
The dormant screen is displayed when not interacting with the thermostat.

The banner scrolls through date and time, humidity, outdoor air temperature, if configured, and any active faults or system events. The room temperature is prominently displayed.

There are no buttons on this screen, but the 13 touch locations are active, so when the display is touched, the thermostat transitions to the **LOCK** screen, if lockout is enabled, or the home screen, if lockout is disabled.

Home screen

You interact with the thermostat primarily from the Home screen.



The center portion of the screen displays the current space temperature in whole degrees. The default temperature scale is °F, but can be changed to °C in the *Installer settings* (page 32).

The top of the screen displays a banner that cycles system information every 3 seconds. To see the scrolling messages faster than 3 seconds, press the banner area of the screen to advance to the next message.

The  icon indicates the current Wi-Fi signal strength by the number of bars. A strong signal has 3 arched bars.  indicates the thermostat is not connected to a router.

Above the space temperature, the current state of occupied or unoccupied displays, unless you have temporarily overridden the program schedule settings. When overridden, the banner displays **PAUSED** and shows the time remaining in the override.

From the home screen, you can:

- *change the mode* (page 23)
- *force an occupied or unoccupied override* (page 22)
- *change the setpoints* (page 22)
- *set the filter reminder* (page 40)
- *enter the menu for more advanced functionality* (page 24)

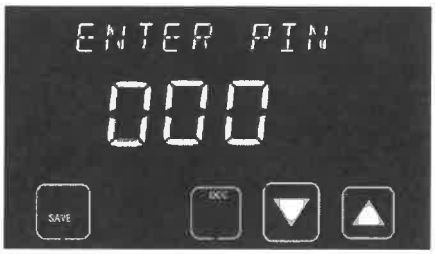
You access the program schedule by holding the bottom middle button (labeled **OCC**, **UNOCC**, or **RESUME SCHEDULE**) for 3 seconds.

Access the installer configurations by setting the **MODE** to **OFF** and holding the **MENU** button for 5 seconds.

Occupancy/Enter PIN screen

The Occupancy/ENTER PIN screen is displayed when you touch the dormant screen with lockout enabled.

To enter the PIN that unlocks the thermostat, press 1 of the 3 digits in the center of the display and then use the up or down arrows to adjust to the correct value. Repeat with the remaining 2 digits. When the 3-digit PIN is correct, press **SAVE**.



This screen has an **OCC/UNOCC** button to temporarily override the program schedule settings without knowing the PIN. The PIN must be entered for all other thermostat changes. Pressing the **OCC/UNOCC** button temporarily overrides the program schedule settings with the occupied or unoccupied settings. This override remains active until the next time range in the program schedule or until the **MAX HOLD** time expires.

If the correct PIN is entered, the thermostat displays the home screen. The thermostat remains unlocked until no interaction results in the dormant screen. When the dormant screen displays, the thermostat is locked.

If the correct PIN is not entered, an **INVALID PIN** message displays for 3 seconds and the thermostat transitions to the dormant screen.

If an invalid PIN is entered 5 consecutive times, the thermostat is completely locked out for 15 minutes. The top banner displays **LOCKOUT** and shows the time remaining until another unlock can be attempted.

Changing the setpoints

You can change the setpoints from the home screen using the up and down arrows.

If the mode is:

- **OFF**—the setpoints, occupancy button, and the up and down arrows do not display
- **HEAT** or **EHEAT**—only the heat setpoint displays
- **COOL**—only the cool setpoint displays
- **AUTO**—both setpoints display

When changing the setpoints in **AUTO** mode, the setpoint modified by the up and down arrows is the last setpoint that was changed. To adjust the opposite mode setpoint, touch the setpoint value on the display. **HEAT TO** or **COOL TO** flashes above the setpoint and can be changed by using the up and down arrows. The setpoints enforce a 2-degree deadband. Setpoints in °F are displayed in whole degrees. Setpoints in °C are displayed with half degree resolution.

Pressing once on the center button at the bottom of the display changes the setpoints to either the program schedule's occupied or unoccupied settings. The label on this button shows the opposite of the word above the space temperature.

Example If the thermostat is in an occupied program period, the middle button displays **UNOCC** so you can change the thermostat settings to the unoccupied values. Overriding the program schedule using the **OCC/UNOCC** button modifies both the setpoint values and the fan setting.

A program schedule override is treated the same whether you manually change the setpoints or use the **OCC/UNOCC** button. When an override is active, the center button label changes to **RESUME SCHEDULE**, the period icon above the space temperature is not displayed, and the amount of time remaining in the override is displayed in the banner. The thermostat returns to the program schedule value at the next programmed period, when the max hold timer expires or if you press the **RESUME SCHEDULE** button.

NOTE If the thermostat is setup as a non-programmable thermostat or them **MAX HOLD** time is set to **OFF**, then the bottom middle button is not displayed.

The installer designates and clamps setpoints within a range.

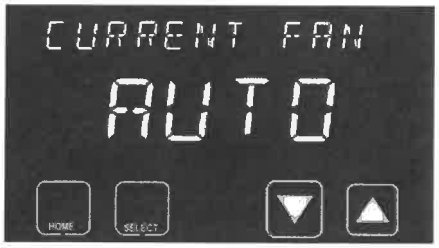
Changing the fan

The fan's current state is displayed on the home screen above the **MENU** button.

You can change the fan setting by pressing **MENU** and then the current fan setting is displays.

To change the fan setting, press **SELECT** and then use the up and down arrows to toggle the fan setting between **AUTO** and **ON** and then press **SAVE**.

- **ON** specifies continuous fan that is always running.
- **AUTO** specifies that the fan only runs while actively heating or cooling.



When the fan setting differs from the program schedule setting for the current period, the banner displays **FAN OVERRIDE**. The override remains active for the rest of the current program schedule.

Changing the mode

You can change the mode from the home screen by pressing the **MODE** button.

Changing from one mode to another does not affect the thermostat's operation until the mode selection has remained constant for at least 5 seconds. Changing from one mode to another (e.g. **HEAT** mode to **COOL** mode) requires the thermostat to first satisfy any **MINIMUM ON** timer requirements and then restarts the **MINIMUM OFF** timer that must expire before equipment is turned on in the new mode.

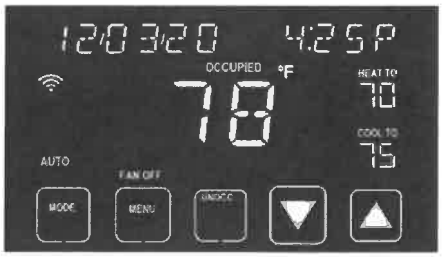
Going from any heating or cooling mode to **OFF** mode immediately shuts off any equipment that is active (after the 5-second mode button). See *Timers* (page 56) for additional descriptions of the **MINIMUM OFF** timer and the **MINIMUM ON** timer.

NOTE Some modes may not be available, based on the **INDOOR EQUIPMENT TYPE** or the **COMPRESSOR TYPE** selections made in Installer Settings.

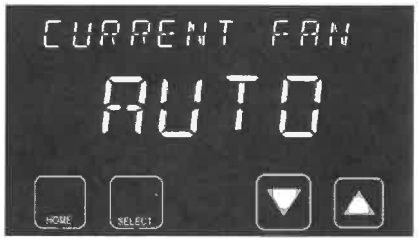
Using the menu for advanced features

The menu allows the user to access more advanced features of the thermostat.

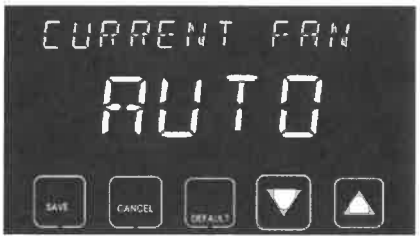
1 When you press the **MENU** button, the first menu option is **CURRENT FAN**.



2 Press **SELECT** to activate the up and down arrows.



3 Press the up or down arrows to advance through the menu options to view or change the value for each setting.



- You must **SAVE** to store the current value and return to the **SELECT** screen.
- Press **CANCEL** to revert the value to the last saved value and return to the **SELECT** screen.

NOTES

- Press **DEFAULT** to set the value to the factory default and press **SAVE** to store the value.

To adjust date and time

Screen settings	Default/Range
SET YEAR—The current year	D: 2020 R: 2020 to 2099
SET MONTH—The current month	D: Jan R: Jan to Dec
SET DAY OF MONTH—The current day of the month	D: 1 R: 1 to 31
SET HOUR—The hour of the day using 12 hour a.m. (A) / p.m. (P) format	D: 12 A R: 12 A - 11 P
SET MINUTE—The current minute	D: 0 R: 0 to 59
SYNC TIME TO SERVER—When the thermostat is first registered and connected to a Wi-Fi router, both the date and time are synced with the server, based on the geographic location of the phone or tablet connecting the thermostat to a router or based on the ISP location if a PC is used. The time and date are updated/synced automatically at the top of each hour, unless **SYNC TIME TO SERVER** is set to **NO**.	D: YES R: YES NO
DST ENABLE—Enable or disable automatic Daylight Saving Time change in the thermostat	D: YES R: YES NO

To adjust occupancy settings

Setting	Default/Range
SET OCC FAN—Operates the fan in **AUTO** or **ON** during occupied periods **NOTE** If the installer configured the thermostat for non-programmable operation and remote occupancy is disabled, this setting is not available. **REMINDER!** The **AUTO** setting is a violation of ASHRAE 90.1 and Title 24 but is a feature of the thermostat for building owners that mandate auto fan operation during occupied periods for energy conservation purposes.	D: AUTO R: AUTO ON
SET UNOC FAN—Operates the fan in **AUTO** or **ON** during unoccupied periods **NOTE** If the installer has configured the thermostat for non-programmable operation and remote occupancy is disabled, this setting is not available.	D: AUTO R: AUTO ON
UNOCC COOL—The cool setpoint during unoccupied periods **NOTES** • The minimum value you can set is limited by the unoccupied heat setpoint (cool setpoint cannot be less than the heat setpoint) and the installer setting for **MIN COOL SETPOINT**. • If the installer has configured the thermostat for non-programmable operation and remote occupancy is disabled, this setting is not available.	D: 85°F R: 52 to 90°F
UNOCC HEAT—The heat setpoint during unoccupied periods **NOTES** • The maximum value is limited by the unoccupied cool setpoint (heat setpoint cannot be greater than the cool setpoint) and the installer setting for **MAX HEAT SETPOINT**. • If the installer has configured the thermostat for non-programmable operation and remote occupancy is disabled, this setting is not available.	D: 62°F R: 50 to 88°F
OCC COOL—The cool setpoint during occupied periods **NOTES** • The minimum value is limited by the occupied heat setpoint (cool setpoint cannot be less than the heat setpoint) and the installer setting for **MIN COOL SETPOINT**. • If the installer has configured the thermostat for non-programmable operation and remote occupancy is disabled, this setting is not available.	D: 75°F R: 52 to 90°F
OCC HEAT—The heat setpoint during occupied periods **NOTES** • The maximum value is limited by the occupied cool setpoint (heat setpoint cannot be greater than the cool setpoint) and the installer setting for **MAX HEAT SETPOINT**. • If the installer has configured the thermostat for non-programmable operation and remote occupancy is disabled, this setting is not available.	D: 70°F R: 50 to 88°F
DAY PARTS—The number of programmable periods in a single day. The setting is adjustable as either 2 (default) or 4 periods in a day. Typically, commercial or light commercial products use 2. **NOTE** If the installer has configured the thermostat for non-programmable operation and remote occupancy is disabled, this setting is not available.	D: 2 R: 2 or 4

Setting	Default/Range

PROGRAM SCHEDULE—The program schedule specifies the programmed start times for the thermostat to control the space to the occupied or unoccupied fan and setpoint values.

1 From the **SET PROGRAM** screen, press **SELECT** to view the program schedule for **SUNDAY P1**.

2 From the **SUNDAY P1** screen, use the up and down arrows to advance through the program schedule to the next period (**SUNDAY P2**), or press **SELECT** again to change the start time or occupancy setting.

NOTE

NOTES

- **BACK** returns to the menu
- Use up and down arrows to change start time
- Use **OCC/UNOCC** to change occupancy
- The bottom middle button is labeled the opposite of the current occupancy selection

To adjust the display settings

Setting		Default/Range
SOUND EFFECT—Select the sound feedback when you press a button.		D: CLCK (Click) R: OFF CLCK (Click) BEEP
BACKLIGHT—There are two backlight settings, one for interacting with the thermostat and another for the dormant screen.		
	BACKLIGHT ACTIVE—Set the active backlight to 10% to 100% of the full backlight capability.	D: 75% R: 10 to 100% (5% increments)
	BACKLIGHT SLEEP—Set the inactive backlight for the dormant screen to 0% to 25% of the full backlight capability.	D: 25% R: to 25% (5% increments)
LOCKOUT ENABLE—Enable or disable adjustments to prevent unauthorized changes from the touchscreen interface. When **LOCKOUT** is changed from **NO** to **YES**, the user must enter a 3-digit PIN. After setting the **LOCKOUT** to **YES** and entering a PIN, the thermostat locks when the user returns to the home or the dormant screen. When **LOCKOUT** is enabled: • The user must enter the 3-digit PIN after pressing any button on the home screen. • If the PIN is entered successfully, the thermostat is unlocked until the dormant screen displays. • After 5 failed attempts to unlock the thermostat, a notification (fault) is sent through the Wi-Fi to the registered owner of the thermostat. Additional unlock attempts are not allowed for 15 minutes. **NOTE** If the user enables **LOCKOUT** but does not save a PIN, **LOCKOUT** automatically disables (sets back to **NO**).		D: NO R: YES NO
SET LOCK PIN—The end user can choose or modify their own 3-digit lock PIN for the thermostat. One digit of the 3-digit PIN flashes to indicate which digit is changeable using the up and down arrows. To change which digit is adjustable, touch the digit on the display. **NOTE** If **LOCKOUT ENABLE** is set to **NO**, the **SET LOCK PIN** screen does not appear.		D: N/A - no default R: 000 - 999
CLEAN SCREEN—Completely disables touch functionality for 10 seconds so the screen can be cleaned with a dry nonabrasive cloth. During this time, a 10-second countdown value shows and then normal touchscreen function resumes.		
Two screens display the thermostat software versions. They are for informational purposes only. • **APP VERSION** displays the application. • **BOOT VERSION** displays the bootloader.		

Setting	Default/Range
HUMIDIFY SETPOINT—Sets the humidify setpoint. When the heating equipment is energized and the humidity level is more than 2% below the humidify setpoint, the humidifier turns on. When the heating equipment turns off or the humidity level is more than 2% above the humidify setpoint, the humidifier turns off. **NOTES** • If the installer set **HUMIDIFIER** to **NO**, this setting is not available. • If the installer did not set the **HUM OUTPUT** to 1 of the 3 configurable outputs, this setting is not available.	D: 15%rh R: 15 – 5%rh
DEHUMIDIFY SETPOINT—Sets the dehumidify setpoint. When the humidity level is greater than the dehumidify setpoint, dehumidification operates according to the installer configuration for the dehumidifier. **NOTE** If cooling equipment is not available (based on the **OUTDOOR EQUIPMENT TYPE** selection, then dehumidification is not available in the thermostat.	D: 65%rh R: 35 to 65%rh

HOLIDAYS—View or edit all holidays for the current year. When the current date in the thermostat is the same as a day in the holiday list, the setpoints for the first **UNOCCUPIED** time range are used for the entire day unless you later change them.

When the **HOLIDAYS** screen displays, press **SELECT** to view the holidays. The up and down arrows scroll through the holidays, displaying one per screen.

Maximum number of holidays in the holiday list is 24.

There are two different holiday formats.

- Standard holidays are the same every year, such as Jan 1st and Dec 25th.
- Special holidays are occurrences of a day of the week such as Memorial Day, Labor Day, and Thanksgiving. The day of the week is shown in the heat setpoint location.
- For both types of holidays, the duration of the holiday is shown in the cool setpoint location.
- The top banner scrolls the holiday details.

To program holidays:

- Press **SELECT** to display the **SAVE** and **CANCEL** buttons
- When the month flashes, use the up and down arrows to change it.
- To change the day of the month, touch the screen location that shows the day of the month and it flashes.
- To change the duration, touch the duration value and it flashes.
- To delete a holiday, set the duration field to zero and press **SAVE**. The banner scrolls **DELETE HOLIDAY**.
- To add a holiday, scroll through the list of holidays to the end. The last entry is the **ADD HOLIDAY** screen. Press **SELECT** to add a new holiday. The new holiday is initialized to 1/01 with a duration of one day.
- The day of the month advances from 1 to the last day of the month and then Su, Mo, Tu, We, Th, Fr and Sa, and then back to 1. When the days of the week are displayed, an occurrence value is shown in the heat setpoint. This allows the user to enter a special holiday.

NOTE If the thermostat has been configured for non-programmable operation, the **HOLIDAY** screen is not available in the Menu settings.

Setting	Default/Range
SCREEN TIMEOUT—Set the number of seconds you want the home screen to stay active without any user interactions before transitioning to the dormant screen. Banner displays **SCREEN TIMEOUT**.	D: 15 seconds R: 5 to 30 seconds (5 second increments)
WI-FI ENABLE—Enable (yes) or disable (no) the Wi-Fi functionality for the thermostat. If disabled, the Wi-Fi radio in this product is turned off and Wi-Fi functionality is unavailable, including **SYNC TIME TO SERVER**, **OUTDOOR TEMPERATURE** via Wi-Fi geolocation, **SERVER & WI-FI ERRORS** and **REMOTE ACCESS SERVICES** via APP or WEB.	D: YES R: YES NO
FLTR HRS LEFT xxxx—The number of hours left before the filter reminder displays **RESET FILTER**—Reset the filter hours to the installer-specified number if the filter is changed prior to the timer counting down to zero. Press **SELECT**, use up and down arrows to display **YES**, and press **SAVE**. **NOTE** Decrements to the timer happen each hour of total equipment runtime. The accumulated run time hours are stored to non-volatile memory, but the minutes are not, so a power cycle does not retain partial hour runtime. **FILTER REMINDER** displays on the home screen and dormant screen banners when the filter timer counts down to zero. If you touch the home screen banner when the **FILTER REMINDER** message displays, the thermostat transitions directly to **FLT HRS LEFT** screen. The banner message button is a shortcut to the **FLT HRS LEFT** screen when the filter timer has expired. You can access the **FLT HRS LEFT** screen at any time through the menu.	D: NO R: YES NO

To adjust the banner text

These settings allow you to customize the information shown on the top banners of the home and dormant screens.

The **FAN STATUS**, **HEAT SETPOINT**, and **COOL SETPOINT** selections only apply to the dormant screen banner because this information is already displayed in other areas of the home screen.

Setting	Default/Range
DATE AND TIME • When the date and time setting is **NO**, the date and time information are not displayed on the home or dormant screen banners. • When the date and time setting is **YES**, the date, in month/day/year format, and the time, in 12 hour AM/PM format, display in both the home and dormant screen banners.	R: YES NO
FAN STATUS • When set to **NO**, the state of the fan output (the G relay) is not displayed on the dormant screen banner. • When set to **YES**, the dormant screen banner displays either **FAN OFF** or **FAN ON**, based on the state of the fan output.	R: YES NO

Setting	Default/Range
OUTDOOR TEMP • When set to **NO**, the outdoor temperature is not displayed on the home and dormant screen banners. • When set to **YES**, the home and dormant screen banners display the outdoor air temperature. If there is not a source for the outdoor air temperature, **OUTDOOR N/A** shows.	R: YES NO
COOL SETPT When set to: • **NO** - The cool setpoint is not displayed on the dormant screen banner. • **YES** - The cool setpoint is displayed on the dormant screen banner. **NOTES** • The cool setpoint is not displayed on the home screen banner. • The cool setpoint is displayed on the dormant screen when the mode is set to **COOL** or **AUTO**.	R: YES NO
HEAT SETPT • When set to **NO**, the heat setpoint is not displayed on the dormant screen banner. • When set to **YES**, the heat setpoint is displayed on the dormant screen banner. **NOTES** • The heat setpoint is not displayed on the home screen banner. • The heat setpoint is displayed on the dormant screen when the mode is set to **HEAT**, **EHEAT** or **AUTO**.	R: YES NO
HUMIDITY • When set to **NO**, the humidity level is not displayed on the home and dormant screen banners. • When set to **YES**, the home and dormant screen banners display the relative humidity percent.	R: YES NO
SAT TEMP (Supply Air Temperature) • When set to **NO**, the supply air temperature is not displayed on the home and dormant screen banners. • When set to **YES**, the home and dormant screen banners display the supply air temperature. • **SAT TEMP** setting is only displayed if the **REMOTE SENSOR** (Installer Settings) is set to **SAT**	R: YES NO
CO2 • When set to **NO**, the CO2 value is not displayed on the home and dormant banners. • When set to **YES**, the home and dormant screen banners will display the CO2 value. • This option is only available if the CO2 sensor input is enabled.	

Using installer settings

To reach the Installer Settings screens, set the mode to **OFF** and press and hold the **MENU** button for 5 seconds.

Scrolling though the installer settings:

- The **HOME** button returns the installer to the home screen.
- The **UP** and **DOWN** arrows scroll through the settings.
- The **SELECT** button allows the installer to change the value of the setting.
- Press **DEFAULT** to set the value to the factory default. Press **SAVE** to store the value.
- Press **SAVE** to store the current value and return to the **SELECT** screen.
- Press **CANCEL** to return the setting value to the last saved value and then return to the **SELECT** screen.

Setting	Default/Range
HEAT EQUIP—Set the type of heating equipment being used. If you set the **COMPRESSOR** to **HP**, the heading of this screen is **EHEAT EQUIP** instead **HEAT EQUIP**.	D: GAS R: GAS ELEC (Electric Heat)
HEAT STAGES • If the **COMPRESSOR EQUIPMENT TYPE** is set to **HP**, the heading of this screen is **EHEAT STAGES**. • The option of **0** heat stages is only available if the **HEATING EQUIPMENT** is set to electric heat (**ELEC**). • If set to **2**, the **W2 RELAY OUTPUT** is not available for optional functions such as **HUMIDIFIER**, **DEHUMIDIFICATION**, and **OCCUPANCY OUTPUT**	D: 1 R: 0 to 2
COMPRESSOR When set to **NONE**: • **COOL** mode is disabled • **DEHUMIDIFY** setting is not available • **COOL STAGES** setting is not available • **AUTO ALLOWED** setting is not available When set to **HP**, the **O** output is not available for optional functions such as **HUMIDIFIER**, **DEHUMIDIFICATION**, and **OCCUPANCY OUTPUT**.	D: AC R: NONE AC HP

Setting	Default/Range
COOL STAGES—The numbers of stages define the number of **HP** or **AC** cooling stages that are present in the compressor equipment. The numbers of stages chosen also define the number of HP heating stages that are present in the compressor equipment if the **COMPRESSOR** selection is **HP**. **NOTES** • This setting is not available to the installer if the **COMPRESSOR** is set to **NONE**. • The maximum number of stages is 2 if **HP** is selected. • The maximum number of stages is 3 if **AC** is selected. If **COOL STAGES** is set to **3**, the Y3 relay output is used for the third-stage compressor cooling and is not available for optional functions such as **HUMIDIFIER**, **DEHUMIDIFICATION**, and **OCCUPANCY OUTPUT**.	D: 1 R: 1 to 3
AUTO ALLOWED—Enable or disable the selection of **AUTO** mode when the mode button is pressed. **AUTO** mode allows the thermostat to automatically switch from heating to cooling to maintain the conditioned temperature between the heating and cooling setpoints. NOTE **AUTO ALLOWED** is only available if both a heating source and a cooling source are available (**HEAT STAGES** greater than **0** and **COMPRESSOR** equal to **AC** or **HP**).	D: YES R: YES (Auto mode is available) NO (Auto mode is not available)
AUTO CHANGEOVER—Defines an auto changeover of the minimum number of minutes of equipment off-time before switching from heat-to-cool or from cool-to-heat, when operating in **AUTO** Mode. This setting is only available if **AUTO ALLOWED** is set to **YES**. The top line in this screen scrolls to display **AUTO CHANGEOVER**. If the setpoint or the mode is changed, the auto changeover time is bypassed to provide a timely response to the user's request. The auto changeover time becomes active the next time the system is operating in heat and there is a cool demand, or the system is operating in cooling and there is a heating demand.	D: 30 minutes R: 5 to 30 minutes

<table>
<tr><th>Setting</th><th>Default/Range</th></tr>
<tr><td>

PROGRAMMABLE OR NON-PROGRAMMABLE—Set the thermostat to operate as a non-programmable (simplified) thermostat or a programmable thermostat.

Operating the thermostat in a programmable mode allows the end user to setup heating and cooling setpoints for 2 or 4 periods of each day of the seven days of the week.

The thermostat has default heating and cooling setpoints outlined in the **Default Setpoint Times and Temperature Settings** table shown below.

The program heating and cooling setpoints and transition times for the 2 or 4 periods can be viewed or modified in *PROGRAM SCHEDULE* (page 26) on the thermostat.

Choosing the non-programmable mode for the thermostat allows it to run in a simplified mode that will satisfy heating or cooling setpoints based on the setpoint value and mode.

When the thermostat is set to **NP** (non-programmable):

- **OCC/UNOCC/RESUME SCHEDULE** button is not displayed on the home screen.
- **OCCUPIED**, **UNOCCUPIED**, and **SCHEDULE PAUSED** icons are not displayed on the home screen.
- The program schedule cannot be viewed.

When the **REMOTE SENSOR** setting is set to **OCC** (Occupancy), this setting is forced to **NP** and is not displayed to the installer.

Default setpoint times and temperature settings

Setting	Start time	Heat setpoint	Cool setpoint
1st Period	7 AM	70°F	75°F
2nd Period	5 PM.	62°F	85°F
3rd Period	10 PM	70°F	75°F
4th Period	11 PM	62°F	85°F

</td><td>

D: PROG

R: PROG (programmable thermostat)

NP [non-programmable (simplified) thermostat]

</td></tr>
<tr><td>

MAXIMUM HOLD HOURS—Set the amount of time, in hours, that a setpoint change overrides the program schedule.

Range

- **OFF** - When set to **OFF**, the setpoints cannot be changed from their program schedule values.
- **1** to **6** - User setpoint change remains active for this number of hours and then the setpoint returns to the **PROGRAM SCHEDULE** setpoints.

NOTE This selection is not available if the thermostat has been configured as non-programmable.

</td><td>

D: 2 Hours

R: OFF
1 - 6

</td></tr>
<tr><td>

F OR C UNITS—Sets the temperature units to either F (Fahrenheit) or C (Celsius).

</td><td>

D: F

R: F/C

</td></tr>
</table>

Setting	Default/Range
SMART RECOVERY – Transitions the conditioned space from one programmable temperature period to the next with 1°F increments of the heating setpoint or 1°F decrements of the cooling setpoint, so that by the time the next period starts, the setpoints are at the desired temperature. The purpose of the gradual transition is to use less energy by preventing staging up (because of a higher demand) to higher stages. The transitions occur in a linear fashion over the smart recovery time period. • If you start a temporary hold in the middle of a smart recovery, the setpoints of the temporary hold are used. • If a temporary hold is already active during the time that smart recovery would have been started, a smart recovery does not start. If the temporary hold ends in the middle of what would have been a smart recovery, the smart recovery starts where it would have been in the linear progression at the same time as when the temporary hold was not active. **NOTE** The smart recovery setting is only available if the thermostat is configured as a programmable thermostat.	D: 30 R: NO 30 minutes 60 minutes 90 minutes
FAN ON WITH W—Sets the fan to turn on with any **W** output when the fan is set to **AUTO**. Range • **YES** - The **G** output is turned on by the thermostat when the **W1** or **W2** outputs are energized. • **NO** - The **G** output is not turned on by the thermostat when the **W1** or **W2** outputs are energized.	D: YES R: YES NO
REVERSING VALVE – Defines whether the **ON** state of the reversing valve (**O/B**) is used for heat pump heating or heat pump cooling if **OUTDOOR EQUIPMENT TYPE** is set to **HP**. • When the **ON** state of the reversing valve is used for cooling, the signal is typically referred to as a **O**. • When the **ON** state of the reversing valve is used for heating, the signal is typically referred to as a **B** demand.	R: HEAT COOL
SPACE TEMP OFFSET—Sets an offset to the displayed space temperature, which gives the end user the convenience of matching the actual sensed temperature to a different perceived temperature or a different temperature measuring device.	D: OFF R: -5 to - 1 OFF 1 to 5°F -2.7 to - 0.5 OFF 0.5 to 2.7°C

Setting	Default/Range
REMOTE SENSOR—Set the functionality of the remote sensor input that is connected to the **T** and **C** terminals. Range • **NONE** - Any input on the remote sensor is ignored by the thermostat. • **ID** - The remote sensor input is used for the space temperature. • **ODT** - The remote sensor input is used for the outdoor air temperature. • **AVG** - The space temperature is calculated as the average of the local thermistor and the remote thermistor. • **OCC** - The remote sensor input determines if the occupied or unoccupied setpoints are used. When a short is detected, the occupied settings are used. • **SAT** - The remote sensor input determines the supply air temperature as displayed in the BACnet SAT Analog Value object. • **ECFL** - The remote sensor input is used to detect an Economizer fault. When the input is shorted, the home screen banner indicates an alarm is detected by displaying the words **ECONOMIZER FAULT**. This fault is logged into the fault history as well. • **FLTR** - The remote input can be configured to detect a dirty filter. When the input is shorted, the message **FILTER REMINDER** is displayed on the home screen banner. The message is cleared when the remote input is not shorted. This selection disables the timed air filter reminder. **NOTES** • If the remote sensor is set to **NONE** or **ID**, the outdoor temperature is acquired via Wi-Fi through the server (based on the geolocation of the phone/tablet used to connect the thermostat to a router). • The outdoor temperature is available if the thermostat is not connected to Wi-Fi and the **ODT** option is not selected for the **REMOTE SENSOR**. • If you select **OCC**, the non-programmable (**NP**) setting is set automatically and not displayed in the installer settings until this setting is changed.	D: NONE R: NONE ID ODT AVG OCC SAT ECFL FLTR
SAT OFFSET—Sets an offset to the supply air temperature, which allows the value read from the SAT_TEMP BACnet object to be calibrated to match other presentations of this measurement. This setting is only available if the **REMOTE SENSOR** is set to **SAT**.	D: OFF R: -5 to 1, OFF, 1° - 5°F -2.7 to -0.5, OFF, 0.5° - 2.7°C
COOL LOCKOUT—Sets an outdoor air temperature below which the cooling equipment is held off. **NOTE** If the **REMOTE SENSOR** is set to something other than **ODT**, there is no outdoor air temperature being provided by the server and the **COOL LOCKOUT** is set to a temperature, the message **OUTDOOR N/A** is displayed on the home and dormant screen banners to indicate an outdoor sensor is required but there is no outdoor temperature information available. If there is no valid outdoor temperature in the system, the cooling is not inhibited.	D: OFF R: OFF 0°F - 80°F (in 5°F increments)

Setting	Default/Range
LOW COOL LOCKOUT TEMPERATURE Range • **OFF** - Functionality disabled. Cooling always starts with first stage compressor (**Y1**) and stages up to second stage (**Y1** and **Y/Y2**) when the demand is sufficient and staging and cycle timer constraints have been satisfied. • **80° – 110°F** - (5°F increments) Outdoor temperature above which both the first and second stages of the compressor are energized to satisfy all cooling demands. This check is performed when the first stage of the compressor is energized. If at the time the compressor is energized the outdoor air temperature is greater than or equal to the low cool lockout temperature, then the second stage of the compressor is energized also. When a cycle starts under a low cool lockout condition, it finishes the cooling cycle on high speed. If the cooling equipment is energized to satisfy a dehumidify demand only (no cooling demand), the low cool lockout is not applied. • **ON** - The **Y1** and **Y/Y2** outputs are simultaneously energized to satisfy all cooling demands. **NOTES** • If there is no valid outdoor temperature and the **LOW COOL LOCKOUT** is set to a temperature (not **OFF** or **ON**), the message **OUTDOOR N/A** is displayed in the banner and the low cool lockout setting is ignored (acts as if the setting is **OFF**). • If the system does not have a 2-stage heat pump, this selection is not available.	D: OFF R: OFF 80° - 110°F (5°F increments) ON
LOW HEAT LOCKOUT TEMPERATURE—Sets an outdoor air temperature below which low speed compressor heating is locked out. Below the specified air temperature, all heating demands that use the compressor use high speed compressor heating. Range • **OFF -** Functionality disabled. Compressor heating always starts with first stage compressor **Y1** and stages up to second stage **Y1** and **Y/Y2** when the demand is sufficient and staging and cycle timer constraints have been satisfied. • **20° – 50°F -** Outdoor temperature below which both the first and second stages of the compressor are energized to satisfy all heating demands. This check is performed when the first stage of the compressor is energized. If at the time the compressor is energized, the outdoor air temperature is less than or equal to the **LOW HEAT LOCKOUT TEMPERATURE**, then the second stage of the compressor is energized also. When a cycle starts under a low heat lockout condition, it will finish the heating cycle on high speed. • **ON** - The **Y1** and **Y/Y2** outputs are simultaneously energized to satisfy all compressor heating demands, regardless of outdoor air temperature. **NOTES** • If there is no valid outdoor temperature and the **LOW HEAT LOCKOUT** is set to a temperature (not **OFF** or **ON**), the message **OUTDOOR N/A** displays in the banner and the low heat lockout setting is ignored (acts as if the setting is **OFF**). • If the system does not have a 2-stage heat pump, this selection is not available.	D: OFF R: OFF 20° – 50°F ON

Setting	Default/Range
TIME BETWEEN FUEL TYPES (ELECTRIC TO GAS)—Sets a minimum amount of time that the system runs on compressor heat before transitioning to the furnace. Range - The minimum number of minutes the compressor is energized to satisfy a heating demand before transitioning to gas heat. **NOTES** • This selection is only available if the **HEATING EQUIPMENT** is set to **GAS** and the **COMPRESSOR** is set to **HP**. • The minimum number of minutes the compressor runs in heating before staging up to gas heat is the larger of this setting and the **STAGE DELAY** setting.	D: 15 minutes R: 10, 15, 20, 25 minutes
CYCLES PER HOUR—Sets a maximum number of equipment cycles per hour. Based on selecting 2, 4, 6 or 8 cycles per hour, this timer is set to 30, 15, 10 or 8 minutes. This time must elapse from the start of one cycle before another cycle can start. The Range - The maximum number of times the equipment can turn on per hour. **NOTE** When the equipment is off and the user changes the setpoint to create a heating or cooling demand, the cycles per hour requirement is ignored to provide a timely response to the user's request. The cycles per hour limitation become active again when the **Y1**, **Y2**, **W1** or **W2** outputs transition from **ON** to **OFF**.	D: 4 R: 2, 4, 6, or 8
MAX HEAT SETPOINT—Sets a maximum heating setpoint. This is the maximum heat setpoint value that can be used in the program schedule or when the user adjusts the setpoint to temporarily override the program schedule. **NOTE** This setting is not available if **HEATING EQUIPMENT** is set to **NONE**. (**HEAT EQUIP** = **ELEC** and **HEAT STAGES** = **0**)	D: 88°F R: 50° – 88°F (1°F increments)
MIN COOL SETPOINT—Sets a minimum cooling setpoint that can be used in the program schedule or when the user adjusts the setpoint to temporarily override the program schedule. **NOTE** This setting is not available if the **COMPRESSOR** is set to **NONE**.	D: 52°F R: 52 – 90 °F (1°F increments)

Setting	Default/Range
AUX HEAT LOCKOUT—Sets an outdoor temperature above which the **AUX HEAT** (**W1** and **W2**) outputs are not energized in **HEAT** mode. If the selected mode is **EMERGENCY HEAT**, the auxiliary heat is allowed to turn on. The auxiliary heat lockout is checked when there is sufficient demand to energize **W1**, but the output has not been turned on. Once the output has been energized, it remains energized until the demand algorithm no longer requires the capacity of the auxiliary heat, regardless of the value of the outdoor air temperature. **NOTES** • The **AUX HEAT LOCKOUT** functionality is not available (and is set to the **OFF** setting) with the **OUTDOOR EQUIPMENT TYPE** of **NONE** or **AC** selected, because the **AUX HEAT LOCKOUT** functionality needs HP heating to operate. • If the **REMOTE SENSOR** is set to something other than **ODT**, there is no outdoor air temperature being provided by the server and **AUX HEAT LOCKOUT** is set to a temperature, the message **OUTDOOR N/A** is displayed in the home and dormant screen banners to indicate an outdoor sensor is required but there is no outdoor temperature information available. • In a dual fuel unit, the auxiliary heat lockout temperature is set to a value less than the heat pump lockout temperature. This is to prevent the condition where the range of outdoor air temperatures between the auxiliary heat lockout and the heat pump lockout temperature result in no equipment operation. Below the heat pump lockout temperature, the air source attempts to turn on but the auxiliary heat lockout temperature prevents it from doing so. If the auxiliary heat lockout temperature is changed so that it is less than the heat pump lockout temperature, the heat pump lockout temperature is set equal to auxiliary heat lockout temperature value. This change to the heat pump lockout temperature is not visible to the user while the auxiliary heat lockout temperature is being changed.	D: OFF R: OFF 5° – 55 °F (5°F increments)

Setting	Default/Range
HP LOCKOUT—Sets an outdoor temperature below which the heat pump does not operate. If set to **OFF**, the heating equipment cycle always starts with the heat pump, regardless of the outdoor air temperature. If a lockout temperature is selected and the outdoor air temperature is less than the selected temperature, the heating cycle is started with the **AUX HEAT SOURCE**. If the outdoor air temperature is equal to or greater than the selected temperature, the heating cycle is started with the heat pump. If the outdoor temperature is not available, all heating cycles with compressor heat. When the heat pump is not energized but there is demand sufficient to request heat pump heating, the heat pump lockout temperature is checked against the outdoor air temperature and if the outdoor air temperature is greater than the heat pump lockout temperature the heat pump is energized. Once the heat pump is energized, it remains energized until the heating demand no longer requires heat pump heating, regardless of the outdoor air temperature. NOTES • The **HP LOCKOUT** functionality is not available if the **OUTDOOR EQUIPMENT TYPE** is set to **NONE** or **AC**, because the **AUX HEAT LOCKOUT** functionality is only applicable to heat pump systems. • If the **REMOTE SENSOR** is set to something other than **ODT**, there is no outdoor air temperature is provided by the server and the **HP LOCKOUT** is set to a temperature, the message **OUTDOOR N/A** is displayed in the home screen and dormant screen banners to indicate an outdoor sensor is required but there is no outdoor temperature information available. • Do not set the heat pump lockout temperature to a value greater than the auxiliary heat lockout temperature unless the auxiliary heat lockout temperature setting is **OFF**. This prevents the condition where the range of outdoor air temperatures between the auxiliary heat lockout and the heat pump lockout temperature result in no equipment operation. Below the heat pump lockout temperature, the AUX heat source attempts to turn on, but the auxiliary heat lockout temperature prevents it from doing so. If the heat pump lockout temperature is changed so that it is greater than the auxiliary heat lockout temperature, the auxiliary heat lockout temperature value is set equal to the heat pump lockout temperature.	D: OFF R: OFF 5° – 55°F (5°F increments)
STAGE DELAY—Sets the minimum amount of time the current stage must be energized before staging up to the next stage of capacity. **NOTE** Multiple heating stages or multiple cooling stages must exist to use this feature.	D: 10 minutes R: 2 to 15 minutes (1 minute decrements)

Setting	Default/Range
FORCED STAGE UP—Sets the maximum number of minutes that the equipment runs at the current stage before forcing the equipment to stage up. The forced stage up occurs even if the differential demand is not met. **NOTE** Multiple heating stages or multiple cooling stages must exist to use this feature.	D: 30 minutes R: OFF 10 to 120 minutes (10 minute decrements)
DIFFERENTIAL—Sets a value that specifies the required difference between the current space temperature and the setpoint that results in the equipment being energized to satisfy the demand. This value is additive for each additional stage of equipment being demanded. (e.g. A chosen differential value of 0.5°F requires 0.5° difference between setpoint and space temperature before first stage is turned on. Then a value of 1.0 degree of difference between setpoint and space temperature before second stage is turned on.)	D: 1°F R: 0.3° to 2.0°F (0.1°F increments)
AIR FILTER REMINDER—Sets a value that specifies the number of equipment run hours before a **FILTER REMINDER** message is displayed on the home and dormant screen banners to remind the user to change the indoor air filter. No message is displayed to the user if the setting is **OFF**. Decrements to the timer occur each hour total equipment runtime is accumulated. Minute counts within each hour are not stored in non-volatile memory, so a power reset clears out the minutes within each hour of run time. The filter reset reminder hour timer value is stored in non-volatile memory. The top line in this screen scrolls to display AIR FILTER REMINDER HRS x 100 **NOTE** If the **REMOTE SENSOR** is set to **FLTR** to detect a dirty filter, this setting is disabled and not available to the installer.	D: 3000 hours R: OFF 500 to 15,000 hours (100 hour increments)
OCCUPANCY OUTPUT—Select which output relay to use for the Occupancy Output. The choices only include outputs that are not already assigned to another function. The output that you select (**Y3**, **O/B**, or **W2**) is energized when in the occupied state and de-energized when in the unoccupied state. **NOTE** The occupancy output option is not available if the **Y3**, **O/B**, and **W2** relays are already being used for other functions. The **Y3** output is used for 3 stages of cooling, the humidifier, and the dehumidifier setting of HumidiMiZer™. The **O/B** output is used for heat pump equipment, the humidifier, and the dehumidifier setting of HumidiMiZer™. The **W2** output is used for 2 stages of heating, the humidifier, and the dehumidifier setting of HumidiMiZer™. Any output that is already being used is not shown in the **OCCUPANCY OUTPUT** selections.	D: OFF R: OFF Y3 O/B W2
OCCUPANCY INPUT—Select what to do when a short on the remote temperature sensor is detected. The **OCC** (occupied) setting changes the current heat and cool setpoints to the occupied setpoints for the current time range for the maximum hold time when a short is detected on the remote temperature sensor for the duration of 2 to 5 seconds. The **UNOCC** (unoccupied) setting changes the current heat and cool setpoints to the unoccupied setpoints for the current time range for the maximum hold time when a short is detected on the remote temperature sensor for the duration of 2 to 5 seconds.	D: OCC R: OCC UNOCC

Setting	Default/Range
ANALOG INPUT—This setting allows the installer to specify the sensor that is connected to the Analog Input terminals (H and C) Range • **NONE** - no sensor is connected • **RH** - a remote humidity sensor is connected • **CO2** - A remote CO2 sensor is connected Default • **NONE**	D: STAT R: STAT RMT
ANALOG INPUT SCALING—Specify the type of electrical signal that is output by the remote sensor configured for use in the **ANALOG INPUT** setting. This setting is not available if the **ANALOG INPUT** is set to **NONE**. Range • **0 to 10** - When using a 0-10 V signal from sensor • **2 to 10** - When using a 4-20ma signal with 500 ohm resistor Default • **2 to 10**	D: 2 to 10 R: 0 to 10 2 to 10
HUIDITY OFFSET—Set an offset to the displayed humidity. This functionality offers the end user the convenience of matching the actual sensed humidity to a different perceived humidity or a different humidity measuring device.	D: OFF R: OFF -9 to 9%rh
HUMIDIFIER—Enables humidifier control functionality. When humidifier control is enabled, the humidifier is energized if there is humidity demand and any heating equipment is energized. The output (**Y3**, **O/B** or **W2**) is a 24 Vac output only (sourced from **R**) and must be isolated with a relay at the indoor equipment if 120 Vac is needed to interface to a humidifier unit. NOTE Humidifier functionality is not available if **HEATING STAGES** is set to **NONE**.	D: NO R: NO YES
HUM OUTPUT—Select which output relay to use for the humidifier. The choices only include outputs that are not already assigned to another function. The output that is selected (**Y3**, **O/B** or **W2**) is used to control the humidifier equipment. NOTE **HUM OUTPUT** is only available if the **HUMIDIFIER** setting is **YES**. The **HUM OUTPUT** option is not available if the Y3, O/B and W2 relays are already being used for other functions. • The **Y3** output is used for 3 stages of cooling, the humidifier, and the dehumidifier setting of HumidiMiZer™. • The **O/B** output is used for heat pump equipment, the humidifier, and the dehumidifier setting of the HumidiMiZer™. • The **W2** output is used for 2 stages of heating, the humidifier, and the dehumidifier setting of HumidiMiZer™.	D: OFF R: OFF Y3 O/B W2

<table>
<tr><th>Setting</th><th>Default/Range</th></tr>
<tr><td>

DEHUMIDIFIER—Enable the dehumidification functionality.

Range:

- **NO** – Dehumidification is disabled
- **YES** – When the humidity is above the dehumidify target, the cooling setpoint is adjusted downward, increasing the cooling demand according to the following equations. The system uses the first stage of cooling to satisfy the dehumidify demand.

<table>
<tr><th>Cooling setpoint</th><th>Algorithm</th></tr>
<tr><td><= 70°F</td><td>Use the cooling setpoint only</td></tr>
<tr><td>70.1°F – 74.9°F</td><td>Cooling setpoint = Cooling Setpoint – (Cooling Setpoint - 70°F) x (Dehumidify Error / 10) with maximum dehumidify Error of 6% (i.e. use 6% if >6%)</td></tr>
<tr><td>>= 75°F</td><td>Cooling setpoint = Cooling Setpoint – (Dehumidify Error / 2) with maximum dehumidify Error of 6%</td></tr>
</table>

- **OVCL** - Commands the system to operate the compressor, within limits, when there is a dehumidification demand, even if there is no cooling demand. The system uses first stage of cooling to overcool up to 2°F and no more, when satisfying a dehumidification demand.
- **HMZR** - When configured as a HumidiMiZer™ output, and the humidity level is above the dehumidify target, 24V is output at the selected terminal. When the humidity level is below the dehumidify target, 0 Vac is output on the selected terminal. There is a +1/-4% hysteresis around the dehumidify target to prevent rapid on/off cycling of the selected output.

This output may be connected to compressor outputs on commercial equipment. If the selected output is energized without any compressors being energized, the 5-minute time guard must be enforced.

NOTE If the **COMPRESSOR TYPE** is set to **NONE**, dehumidification is not available.

</td><td>

D: NO

R: NO
YES
OVCL
HMZR

</td></tr>
<tr><td>

DEHUM OUTPUT— Select which output relay to use for the HumidiMiZer™ function of the dehumidifier. The choices only include outputs that aren't already assigned to another function and is only available if the dehumidifier selection is set to HumidiMiZer™.

When dehumidifier setting is HumidiMiZer™, the selected relay controls the HumidiMiZer™ equipment.

This setting is not available if the configurable outputs (**Y3**, **O/B**, and **W2**) are already assigned to other functions.

Any configurable output that is already assigned to another function is not shown in the **DEHUM OUTPUT** selections.

</td><td>

D: OFF

R: OFF
Y3
O/B
W2

</td></tr>
</table>

Setting	Default/Range
CO2 FAULT THRESHOLD - Allows the installer to specify the threshold for the High CO2 fault. The **ANALOG INPUT** parameters must be set to CO2 for this setting to be available. Range • **900 to 1600 PPM** Default • **1100 PPM**	
CO2 CALIBRATION - The **CO2 CALIBRATION** screen can be used to compensate for the variability of the components in the analog input circuitry. If the CO2 level is known from a reference or by measuring the DC voltage out of the sensor (PPM=200 x VDC), the calibration screen can be used to increase or decrease the value until it matches the reference. The Analog Input parameter must be set to CO2 for this setting to be available. Range • +/- 30% of uncalibrated value Default • Raw, uncalibrated value	

To set up BACnet

There are two points that act as gateways, allowing or prohibiting BACnet writes to configuration items (**BACNET CONFIG WRITE**) and occupancy control (**BACNET BMS OCC**). These variables are only accessible via the local screen.

A write to the Active Heat or Cool Setpoint (AV:409 or AV:410) places the thermostat into temporary override. This override will remain in effect until the MAX Temperature Hold Time (AV:502) expires. Default is 2 hours.

Long-term setpoint adjustment is accomplished by writing to the baseline setpoints (AV:400- AV:403).

Setting	Default/Range
BACNET ENABLE—Enable or disable the BACnet communications. After restoring factory defaults, the user is prompted to decide whether or not to enable BACnet. Until this choice is made, the installer menu loads after every restart and the installer menu goes directly to the **BACNET ENABLE** setting where **?** is displayed. NOTE Changing the **BACNET ENABLE** requires the thermostat to be restarted. When the installer exits the configuration settings after making changes to the BACnet settings, there is a prompt to either cancel those settings or save the new settings which force a thermostat reset.	D: NO (disabled) R: YES (enabled) NO (disabled)

Setting	Default/Range
MSTP MAX MASTER—Set the maximum MAC address for BACnet MS/TP master devices. BACnet MS/TP MAC addresses for master devices exist in the range from 0 to 127. Each BACnet MS/TP device periodically looks for other devices (sends Poll for Master message) with addresses from its own address, plus one, to the next known address (wrapping to 0 after 127). Performance gains can be made on a BACnet MS/TP network by not leaving any gaps in MAC address and setting the MS/TP Max Master parameter of the device with the highest MAC address to a value equal to its MAC address. The downside to setting the MS/TP Max Master to a value less than 127 is, if new devices are added to the network with addresses above the Max Master value, they won't be discovered or added to the network. NOTES • Changing the MS/TP Max Master requires restarting the thermostat. When the installer exits the configuration settings after making changes to the BACnet settings, there is a prompt to either cancel those settings or save the new settings, which forces a thermostat reset • The Max Master parameter should be set to a value equal to or greater than the MS/TP MAC Address. This setting is not displayed if BACnet is disabled	D: 127 R: 1 to 127
MSTP BAUD RATE—Set the baud rate for the BACnet MS/TP communications to one of the following values: 9600, 19.2K (19200), 38.4K (38400), 76.8K (76800) or 115k (115200). The BACnet MS/TP baud rate must be set to match the other devices on the BACnet MS/TP network. NOTE Changing the MS/TP baud rate requires restarting the thermostat. When the installer exits the configuration settings after making changes to the BACnet settings, there is a prompt to either cancel those settings or save the new setting, which forces a thermostat reset. This setting is not be displayed if BACnet is disabled.	D: 76.8K R: 9600 19.2K (19200) 38.4K (38400) 76.8K (76800) 115k (115200).
MSTP MAC—Set the BACnet MS/TP MAC addresses for master devices. Each BACnet MS/TP device on a MS/TP segment, must have a unique MAC address. Performance gains can be made on a BACnet MS/TP network by not leaving any gaps in MAC addresses, eliminating the need for each device to continuously check the addresses above its address and up to the next known device for new devices. Although the BACnet standard does not limit the use of MAC address zero, it is often reserved for an MS/TP router. NOTES • Changing the MS/TP baud rate requires the thermostat to be restarted. When the installer exits the configuration settings after making changes to the BACnet settings, there is a prompt to either cancel those settings or save the new settings, which forces a thermostat reset. • The MSTP MAC is set to a value less than or equal to the MSTP Max Master setting. This setting is not displayed if BACnet is disabled.	D: 1 R: 0-127 (increments of 1)

Setting	Default/Range
BACNET UTC OFFSET—Specify a UTC offset to be set from -13 to +13 hours in increments of 15 minutes. When a BACnet UTC Time synchronization message is received by the device, the value in UTC Offset is subtracted from the UTC Time to determine the local standard time. The Daylight Saving time logic is then applied to the standard time to get the local time with Daylight Saving. NOTE For reception of the UTC Time synchronization service to be enabled (and UTC offset used) on the device, the **SYNCH TIME TO SERVER** option has to be set to **NO** and **DST** must be set to **ENABLED**. This setting is not displayed if BACnet is disabled.	D: 5:00 (5 hours 0 minutes) R: -13:00 to 13:00 (15 minute increments)
DEVICE ID—Specify a Device ID from 0 to 4194302. The Device ID can also be updated over BACnet when the **BACNET CONFIG WRITE** configuration is set to **YES**. Device IDs on BACnet devices must not only be unique on MS/TP segment like the MAC address, but must also be unique internetwork-wide. Each device broadcasts its Device ID using the I-Am service upon power up and in response to the Who-Is service. Changing the Device ID triggers a new I-Am message to be sent including the new Device ID. The top line in this screen scrolls to display the **DEVICE ID** and the ID value. The **SELECT** button changes the screen to the Device ID editor. Initially the first non-zero is flashing, indicating that it can be changed by the up and down arrows. There are left and right arrows in the middle row of the screen that can be pressed to move the cursor left and right to change each digit individually. Changing the Device ID triggers an I-Am message to be sent over BACnet and will increment the Database Revision property in the Device object. This setting is not displayed if BACnet is disabled.	D: 16xxxx where xxxx is the last four digits of the thermostat serial number. R: 0 to 4,194,302 (increments of 1)
DEVICE NAME This setting can be viewed but not modified from the display. The **DEVICE NAME** can be updated over BACnet when the **BACNET CONFIG WRITE** is set to **YES**. Device Object Names on BACnet devices must not only be unique on MS/TP segment like the MAC address, but must also be unique internetwork-wide. The top line in this screen scrolls to display **DEVICE NAME** and the name. NOTE Changing the Device Object Name causes the Database Revision property of the Device to be incremented. This setting is not be displayed if BACnet is disabled.	D: DEVICE 16xxxx (last 4 digits of the serial number) R: Any printable string with a maximum length of 16 characters
DEVICE LOCATION—To view, but not modify from the display, the Device Location, which is an optional property used to describe the physical location of the BACnet device. The **DEVICE LOCATION** can be updated over BACnet when the **BACNET CONFIG WRITE** configuration is set to **YES**. The top line in this screen scrolls to display the **DEVICE LOC** and the location. This setting is not displayed if BACnet is disabled.	D: LOCATION R: The display is limited to showing only the first 28 characters of the maximum 32 characters allowed.

Setting	Default/Range
DEVICE DESCRIPTION—To view, but not modify from the display, the Device Description. Description is an optional property used to add descriptive information about the BACnet device. The Device Description can be updated over BACnet when the **BACNET CONFIG WRITE** configuration is set to **YES**. The top line in this screen scrolls to display the **DEVICE DES** and the description. NOTE This setting is not displayed if BACnet is disabled.	D: DESCRIPTION R: The display is limited to showing only the first 28 characters of the maximum 32 characters allowed.
BACnet BMS OCC—Enable or disable occupancy scheduling through the BACnet BMS by enabling or disabling the connection between the Present Value of the BACnet Binary Object Value named **BMS_OCC** and the occupancy state of the controller. **NOTE** Occupancy is determined using 1 of 3 methods. **BACnet BMS OCC** is mutually exclusive with both **PROGRAMMABLE MODE** and **REMOTE SENSOR** set to **OCCUPANCY**. Setting **BACnet BMS OCC** to **Yes** forces **PROG** or **NON-PROG** to **NON-PROG** and switches **REMOTE SENSOR** to **None** if set to **OCCUPANCY**. This setting is not displayed if BACnet is disabled.	D: YES (enabled) R: YES (enabled) NO (disabled)
BACNET CONFIG WRITE—Allow (**YES**) or disallow (**NO**) BACnet writes to modify system settings. Many of the configuration items are exposed as BACnet objects. These BACnet objects can be read to verify the thermostat's configuration. If **BACnet Config Write** is set to **YES**, these objects can also be written to change the thermostat's configuration. If set to **NO**, these objects are read-only. **NOTE** This setting is not displayed if BACnet is disabled.	D: YES R: YES NO
NET GP OUT TIMEOUT—Set the timeout associated within network general purpose outputs. If this value is set to 2 minutes, 20 minutes, or 60 minutes, this number represents the maximum time that can lapse between writes to the Present Value property of the output object before the value returns to the inactive state. **NOTE** This setting is not displayed if BACnet is disabled.	D: 2 minutes R: 2 – 2 minutes 20 – 20 minutes 60 – 60 minutes UNLM - Unlimited

Setting	Default/Range
NET GP Y3 MODE—Select Network General Purpose Output **Y3** for control over the BACnet network. Setting the mode to: • **OFF** (disabled) sets the Present Value of the BACnet object to inactive and read-only and the corresponding output relay will be in a de-energized state. • **ACTV** (energized active) allows BACnet writes to the Present Value and energizes the output relay when the Present Value is active • **INAC** (energized inactive) allows BACnet writes to the Present Value and energizes the output relay when the Present Value is inactive. If a Network General Purpose Output timeout occurs, the Present Value goes to the inactive state and the relay is either energized **ACTV** or de-energized **INAC** depending on the mode. The outputs have primary assignments: • **Y3** - 3rd stage cooling • **W2** - 2nd stage heating • **OB** - Heat pump reversing valve If any of these outputs are required by the system configuration for their primary function, they are available for optional equipment (humidifier, dehumidifier, and occupancy output). Any output that is still available after configuring primary and optional equipment can be made available as a BACnet network-controlled output. This setting is not displayed if BACnet is disabled.	D: OFF (disabled) R: OFF (disabled) ACTV (energized active) INAC (energized inactive)
NET GP W2 MODE—Select the Network General Purpose Output **W2** mode for control over the BACnet network. Setting the mode to OFF (disabled) sets the Present Value of the BACnet object to Inactive and read-only and the corresponding output relay will be in a de-energized state. Setting the mode to: • **OFF** (disabled) sets the Present Value of the BACnet object to inactive and read-only and the corresponding output relay will be in a de-energized state. • **ACTV** (energized active) allows BACnet writes to the Present Value and will energize the output relay when the Present Value is active. • **INAC** (energized inactive) allows BACnet writes to the Present Value and will energize the output relay when the Present Value is inactive. If a Network General Purpose Output timeout occurs, the Present Value goes to the inactive state and the relay is either energized ACTV or de-energized INAC depending on the mode. The outputs have primary assignments: • **Y3** - 3rd Stage cooling • **W2** - 2nd Stage heating • **OB** - Heat Pump reversing valve If any of these outputs are required by the system configuration for their primary function, they are available for optional equipment (humidifier, dehumidifier and occupancy output). Any output that is still available after configuring primary and optional equipment can be made available as a BACnet network-controlled output. This setting is not displayed if BACnet is disabled.	D: OFF (disabled) R: OFF (disabled) ACTV (energized active) INAC (energized inactive)

Setting	Default/Range
NET GP OB MODE—Select the Network General Purpose Output **OB** mode for control over the BACnet network. Setting the mode to **OFF** (disabled) sets the Present Value of the BACnet object. Setting the mode to: • **OFF** (disabled) sets the Present Value of the BACnet object to inactive and read-only and the corresponding output relay will be in a de-energized state. • **ACTV** (energized active) allows BACnet writes to the Present Value and energizes the output relay when the Present Value is active. • **INAC** (energized inactive) allows BACnet writes to the Present Value and energizes the output relay when the Present Value is inactive. If a Network General Purpose Output timeout occurs, the Present Value goes to the inactive state and the relay is either energized ACTV or de-energized INAC depending on the mode. The outputs have primary assignments: • **Y3** - 3rd stage cooling • **W2** - 2nd stage heating • **OB** - Heat pump reversing valve If any of these outputs are required by the system configuration for their primary function, they are available for optional equipment (humidifier, dehumidifier, and occupancy output). Any output that is still available after configuring primary and optional equipment can be made available as a BACnet network-controlled output. This setting is not displayed if BACnet is disabled.	D: OFF (disabled) R: OFF (disabled) ACTV (energized active) INAC (energized inactive)
DISCONNECT WI-FI—Allows the installer to disconnect from the Wi-Fi network. **NOTE** This setting is not displayed if the thermostat is already disconnected from the Wi-Fi network. If the user choses to disconnect the Wi-Fi, the control advances to the next setting since this one should not be displayed anymore.	D: NO R: YES NO
MAXIMUM SETPOINT ERROR—Select the number of degrees that cause an ID TEMP RANGE HIGH or ID TEMP RANGE LOW fault between the space temperature and the heat setpoint, if heating, or the cool setpoint, if cooling. **NOTE** This value is added to the cooling setpoint or subtracted from the heating setpoint.	D: 10°F R: 2 to 30°F
INDOOR TEMP FAULT INHIBIT—Select the time delay applied to the ID TEMP RANGE HIGH and ID TEMP RANGE LOW faults. The fault condition must be present for the selected number of minutes for the fault to become active. This allows for recovery time when transitioning from unoccupied to occupied periods The top line in this screen scrolls to display ID TEMP FLT INHIBIT.	D: 60 minutes R: 10 to 240 minutes (10 minute increments)

To test the HVAC system

The installer uses this setting to test the HVAC system.

1 Press **SELECT** to open **INSTALLER TEST.**

NOTE The **HOME** and **SELECT** buttons are replaced with **MODE** and **CANCEL** buttons.

2 Press **MODE** to cycle through **OFF**, **COOL**, **HEAT**, and **EHEAT.**

NOTES

- The availability of the modes are based on the installer configuration settings.
- The selected **MODE** operates each equipment stage for 3 minutes.
- The center of the display counts down the number of seconds remaining for the current stage of equipment operation.
- When the countdown reaches zero, if another stage exists, the banner text changes to **2ND STAGE** and a new 180-second countdown timer starts. If no other stage exists, the test cycle ends and the **MODE** is set to **OFF.**
- When **HEAT** or **EHEAT** modes are running and there is a configured humidifier, the output that controls the humidifier is energized.
- When **COOL** mode is running and a dehumidifier has been configured for operating a HumidiMiZer™, the output configured for the dehumidifier output is energized.

3 Press **CANCEL** to turn off the currently running equipment and transition the screen to the installer menu selections.

After 20 minutes of inactivity (no button presses by the installer), **INSTALLER TEST** terminates, and the home screen displays.

NOTES

- **EHEAT** is only a choice when a heat pump is selected in the configuration.
- **HEAT** is not available in a cooling-only configuration.
- **COOL** is not available in a heating-only configuration.

To restore factory default settings

This setting allows the installer to reset all system settings back to factory default values.

From the **RESTORE DEFAULTS** screen, press and hold the **DEFAULT** button to start a 5-second countdown.

NOTES

- At the end of 5 seconds, the factory settings are restored.
- Release the **DEFAULT** button to cancel the countdown at any time before the 5 seconds elapse.
- After the factory settings are restored, the control returns to **BACNET ENABLE** to allow the installer to properly configure the thermostat.

Screen	Factory defaults
HEATING EQUIP TYPE	GAS
HEATING EQUIP STAGES	1
COMPRESSOR EQUIP TYPE	A/C
COMPRESSOR EQUIP STAGES	1
AUTO ALLOWED?	YES
AUTO CHANGEOVER	30 MIN
PROG OR NON-PROG	PROG
MAX TEMP HOLD TIME	2
FAHRENHEIT OR CELSIUS	°F
SMART RECOVERY	30
FAN ON WITH W	YES
REVERSING VALVE	COOL
SPACE TEMP OFFSET	OFF
SPACE HUM OFFSET	0%
HUM SOURCE	STAT
REMOTE HUM SCALING	2-10
REMOTE SENSOR	NONE
COOL LOCKOUT	OFF
LOW COOL LOCKOUT TEMP	OFF

Screen	Factory defaults
LOW HEAT LOCKOUT TEMP	OFF
TIME B/W FUEL TYPES	15 MIN
CYCLES PER HOUR	4
HUMIDIFIER	NO
DEHUMIDIFIER	NO
MAX HEAT SETPOINT -	88°F
MIN COOL SETPOINT	52°F
AUX HEAT LOCKOUT	OFF
HP LOCKOUT	OFF
STAGE DELAY	10 MIN
FORCED STAGE UP	30 MIN
DIFFERENTIAL	1.0°F
AIR FILTER REMINDER	3000 HRS
OCCUPANCY OUTPUT	OFF
OCCUPANCY INPUT	OCCUPIED
BACNET ENABLE	NO
MSTP BAUD RATE	76.8k
MSTP MAC	1
BACNET UTC OFFSET	5h, 0min (EST)
MSTP MAX MASTER	127
DEVICE ID	160000 + last 4 of S/N
DEVICE NAME	DEVICE16 + last 4 of S/N
DEVICE LOCATION -	LOCATION
DEVICE DESCRIPTION	DESCRIPTION
BACNET BMS OCCUPANCY	NO
BACNET CONFIG WRITE ENABLE	NO

Screen	Factory defaults
NETWORK GP OUT TIMEOUT	2 MIN
NETWORK GP Y3 MODE	OFF
NETWORK GP W2 MODE	OFF
NETWORK GP OB MODE	OFF

Setting up Wi-Fi

To display the **SETUP WI-FI** screen, press:

-  if the thermostat is connected to a Wi-Fi network
-  if the thermostat is not connected to a Wi-Fi network

Except for the **SETUP WI-FI** screen, which can be changed from **NO** to **YES**, the information in the Wi-Fi settings screens is read-only and cannot be changed.

The Wi-Fi screens have a fixed timeout of 60 seconds.

Connect to a network

If the thermostat is not connected to a Wi-Fi network and **NO** is displayed on the **SETUP WIFI** screen, follow these steps to connect the thermostat to a network:

1 Press the **SELECT** button.

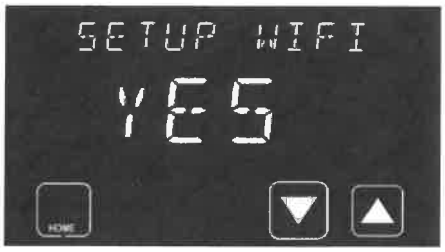
2 Change **NO** to **YES**.

3 Press **SAVE.**

NOTE This puts the thermostat into the setup mode and ready to receive Wi-Fi join commands.

The thermostat is already in the setup mode if **SETUP WI-FI** was changed from **NO** to **YES** in the past 2 minutes or if the installer disconnected from a Wi-Fi network in the past 2 minutes.

The following screen indicates that the thermostat is ready to join a Wi-Fi network. If the thermostat is connected to a Wi-Fi network, the **SETUP WI-FI** screen is not displayed.



NOTE The **SELECT** button is not displayed because the thermostat is already in the setup mode.

SSID

When the thermostat is not connected to a Wi-Fi network, the SSID is a factory-configured value that starts with **CMML** followed by 12 numbers. The SSID scrolls across the top of the display for 5 seconds and then displays only the 12 digits for the remainder of the screen timeout time. The user needs these 12 digits to connect to the Carrier Connect Mobile App.

SSID - Scrolls for the first 5 seconds

CMML- Scrolls after 5 seconds

When the thermostat is connected to a Wi-Fi network, the network SSID is displayed.

MAC address

The MAC address is a unique 12-digit identifier associated with the Wi-Fi radio chip that contains the letters A through F and the numbers 0 through 9.

DSN

The DSN is the name used to identify the thermostat in the Carrier Connect Mobile App. The name starts with the letters **AC** followed by 13 letters and numbers. The DSN scrolls across the top of the display.

Registration

When the thermostat has been successfully registered to a user account with the Carrier Connect mobile app, the registered status displays **YES**.

When the thermostat is not registered to a Carrier Connect user account, the status is **NO**.

Timers, memory, and deadband

MINIMUM OFF timer

Once a heating or cooling demand is satisfied on the thermostat, the **MINIMUM OFF** timer is set to a 300-second value (5 minutes) and then begins to count down each second. Heating and cooling outputs are de-energized the entire time that this timer has a value greater than 0.

MINIMUM ON timer

Once a heating or cooling output becomes active, the 5-minute **MINIMUM ON** timer begins to count down. The output will not de-energize until the timer reaches zero and the demand is satisfied. If the user changes the setpoint to satisfy the demand, the 5 minute minimum on time is ignored and the heating or cooling equipment turns off.

Non-volatile memory

The thermostat can store settings in non-volatile memory to ensure that settings remain the same after a power outage (either intentional or unintentional). Items stored in non-volatile memory include:

- Installer settings
- Menu settings
- Program schedule
- Date and time
- Software information
- Dealer information
- Fault and system event information

Deadband

The thermostat controls the number of degrees (°F or °C) between the heating and cooling setpoints. If the user changes a setpoint that violates the deadband requirement, the opposite mode setpoint is "pushed" to enforce the deadband. The deadband setting is fixed at 2°F.

Faults and system events

The faults and system events are displayed in the home and dormant screen banners. Faults and system events include:

- Startup
- Software Update Events
- Power Cycle Events
- Parameter Out-of-Range Events
- Server Connectivity Events
- Non-Volatile Memory Faults
- Temperature Faults

The Faults and System events display in the banner while fault condition exists. You can see a history of the faults and system events in Carrier Connect mobile app under **Alerts.** The history is comprised of the 5 most recent logged items, with the most recent event being listed at the top.

Faults	
ID TEMP SENSOR HIGH	Fault becomes active when main thermistor (P102 or RT1) reads > 100°F. Fault is cleared when temperature <= 99°F. When this fault occurs, the thermostat uses the temperature reading from the temperature/humidity sensor as the space temperature.
ID TEMP SENSOR LOW	Fault becomes active when main thermistor (P102 or RT1) reads < 39°F. Fault is cleared when temperature >= 40°F. When this fault occurs, the thermostat uses the temperature reading from the temperature/humidity sensor as the space temperature.
REMOTE SENSOR HIGH	Remote temperature > 122°F; only flagged if remote sensor set to use as indoor temperature (REMOTE SENSOR setting set to INDOOR or AVERAGE)
REMOTE SENSOR LOW	Remote temperature = 0°F; only flagged if remote sensor set to use as indoor temperature (REMOTE SENSOR setting set to INDOOR or AVERAGE)
ID TEMP RANGE HIGH	If the mode is cooling (Cool or Auto operating in Cool), the space temperature is greater than the cool setpoint plus the Maximum Setpoint Error and this condition exists for the number of minutes specified by the INDOOR TEMP FAULT INHIBIT time.
ID TEMP RANGE LOW	If the mode is heating (**HEAT, EHEAT** or **AUTO** operating in **HEAT**), the space temperature is less than the heat setpoint minus the Maximum Setpoint Error and this condition exists for the number of minutes specified by the INDOOR TEMP FAULT INHIBIT time.
HUM SENSOR FAILURE	Humidity sensor timed out • humidity reading is > 99% • humidity reading is 0%.
HUMIDITY RANGE HIGH	Humidity reading is > 90%

Faults	
HUMIDITY RANGE LOW	Humidity reading is < 10%
OUTDOOR TEMP FAILURE	OD temp > 127 °F or < -60 °F
NO WI-FI SERVER	Not connected to Ayla server
NO WI-FI ROUTER	Router signal strength is  (not connected)
WI-FI HARDWARE FAULT	Communications error occurred with Wi-Fi module (resets after valid message received)
LOCKOUT 5 WRONG PINS	An incorrect PIN was entered consecutive times.
ECONOMIZER FAULT	Remote sensor is set to ECFL and there is a short between terminals T and C.
HIGH CO2	CO2 is above the programmed threshold (default 1100 PPM).
System Events	
FILTER REMINDER	Filter change reminder is active (run hours have expired or remote input shorted).

Appendix A: BACnet Points List

Point Name	Point Access	Units	BACnet Point Name	BACnet Object ID
Indoor Space Temperature	WRITE_WHEN_OOS	DEGREES_FAHRENHEIT	ID_SPACE_TEMP	AI:100
Indoor Space Humidity	WRITE_WHEN_OOS	PERCENT_RELATIVE_HUMIDITY	ID_SPACE_HUM	AI:101
Indoor Space CO2	WRITE_WHEN_OOS	PARTS_PER_MILLION	ID_SPACE_CO2	AI: 102
Remote Space Temperature	READ_ONLY	DEGREES_FAHRENHEIT	REM_SPACE_TEMP	AV:100
Outdoor Temperature	READ_ONLY	DEGREES_FAHRENHEIT	OD_TEMP	AV:101
Supply Air Temperature	READ_ONLY	DEGREES_FAHRENHEIT	SAT	AV:102
Network Space Temperature	READ_WRITE	DEGREES_FAHRENHEIT	NET_SP_TEMP	AV:103
Space Temperature for Control	READ_ONLY	DEGREES_FAHRENHEIT	SP_TEMP_CTRL	AV:104
Network Space Humidity	READ_WRITE	PERCENT_RELATIVE_HUMIDITY	NET_SP_HUM	AV:105
Space Humidity for Control	READ_ONLY	PERCENT_RELATIVE_HUMIDITY	SP_HUM_CTRL	AV:106
Air Filter Hours Left	READ_ONLY	HOURS	AIR_FLTR_HRS_LFT	AV:300
Override Time Remaining	READ_ONLY	HOURS	OVRD_TIME	AV:301
Occupied Heat Setpoint	READ_WRITE	DEGREES_FAHRENHEIT	OCC_HT_SP	AV:400
Occupied Cool Setpoint	READ_WRITE	DEGREES_FAHRENHEIT	OCC_CL_SP	AV:401
Unoccupied Heat Setpoint	READ_WRITE	DEGREES_FAHRENHEIT	UNOCC_HT_SP	AV:402
Unoccupied Cool Setpoint	READ_WRITE	DEGREES_FAHRENHEIT	UNOCC_CL_SP	AV:403
Dehumidification Setpoint	READ_WRITE	PERCENT_RELATIVE_HUMIDITY	DEHUM_SP	AV:406
Humidification Setpoint	READ_WRITE	PERCENT_RELATIVE_HUMIDITY	HUM_SP	AV:407
Screen Timeout	READ_WRITE	SECONDS	SCRN_TMT	AV:408
Heat Setpoint	READ_WRITE	DEGREES_FAHRENHEIT	HEAT_SP	AV:409
Cool Setpoint	READ_WRITE	DEGREES_FAHRENHEIT	COOL_SP	AV:410
Active Backlight	READ_WRITE	PERCENT	ACTV_BCKLT	AV:411
Dormant Backlight	READ_WRITE	PERCENT	DRMNT_BCKLT	AV:412
Indoor Equip Stages	GATED_WRITE		ID_STAGES	AV:500
Outdoor Equip Stages	GATED_WRITE		OD_STAGES	AV:501
Max Temperature Hold Time	GATED_WRITE	HOURS	MAX_HOLD_TIME	AV:502
Auto Changeover Delay	GATED_WRITE	MINUTES	AUTO_XOVR	AV:503
Cool Lockout Temperature	GATED_WRITE	DEGREES_FAHRENHEIT	COOL_LOCKOUT	AV:504
Low Cool Lockout (HP only)	GATED_WRITE	DEGREES_FAHRENHEIT	LO_CL_LCKOUT	AV:505
Low Heat Lockout (HP only)	GATED_WRITE	DEGREES_FAHRENHEIT	LO_HT_LCKOUT	AV:506
Delay Between Fuel (HP only)	GATED_WRITE	MINUTES	DLY_BW_FUEL	AV:507
Cycles Per Hour	GATED_WRITE	CYCLES_PER_HOUR	CYCLES_HR	AV:508
Max Heat Setpoint	GATED_WRITE	DEGREES_FAHRENHEIT	MAX_HT_SP	AV:509
Min Cool Setpoint	GATED_WRITE	DEGREES_FAHRENHEIT	MIN_CL_SP	AV:510

Appendix A: BACnet Points List

Point Name	Point Access	Units	BACnet Point Name	BACnet Object ID
Aux Heat Lockout (HP only)	GATED_WRITE	DEGREES_FAHRENHEIT	AUX_HT_LCKOUT	AV:511
Heat Pump Lockout	GATED_WRITE	DEGREES_FAHRENHEIT	HP_LCKOUT	AV:512
Stage Delay	GATED_WRITE	MINUTES	STG_DELAY	AV:513
Forced Stage Up Delay	GATED_WRITE	MINUTES	FRCD_STG_UP	AV:514
Stage Change Temp Differential	GATED_WRITE	DELTA_DEGREES_FAHRENHEIT	DIFFERENTIAL	AV:515
Indoor Temperature Offset	GATED_WRITE	DELTA_DEGREES_FAHRENHEIT	ID_TEMP_OFF	AV:517
Indoor Humidity Offset	GATED_WRITE	PERCENT_RELATIVE_HUMIDITY	ID_HUM_OFF	AV:518
SAT Temp Offset	GATED_WRITE	DELTA_DEGREES_FAHRENHEIT	SAT_OFFSET	AV:519
Air Filter Hours	READ_ONLY	HOURS	AIR_FLT_HRS	AV:520
Max Setpoint Error	GATED_WRITE	DELTA_DEGREES_FAHRENHEIT	MAX_SP_ERR	AV:521
Indoor Temp Fault Inhibit	GATED_WRITE	MINUTES	ID_TMP_FLT_INHBT	AV:522
CO2 Fault Threshold	GATED_WRITE	BACNET_UNITS_PPM	CO2_FLT_THRESHOLD	AV:523
1st Stage Cooling Out Status	READ_ONLY	0=OFF 1=ON	Y1_OUT	BV:200
2nd Stage Cooling Out Status	READ_ONLY	0=OFF 1=ON	Y2_OUT	BV:201
3rd Stage Cooling Out Status	READ_ONLY	0=OFF 1=ON	Y3_OUT	BV:202
1st Stage Heating Out Status	READ_ONLY	0=OFF 1=ON	W1_OUT	BV:203
2nd Stage Heating Out Status	READ_ONLY	0=OFF 1=ON	W2_OUT	BV:204
Fan Out Status	READ_ONLY	0=OFF 1=ON	G_OUT	BV:205
Reversing Valve Out Status	READ_ONLY	0=OFF 1=ON	OB_OUT	BV:206
Occupancy Out Status	READ_ONLY	0=OFF 1=ON	OCC_OUT	BV:208
Humidifier Out Status	READ_ONLY	0=OFF 1=ON	HUM_OUT	BV:209
Dehumidifier Out Status	READ_ONLY	0=OFF 1=ON	DEHUM_OUT	BV:210
Network General Purpose Out Y3	READ_WRITE	0=OFF 1=ON	NET_GP_Y3_OUT	BV:211
Network General Purpose Out W2	READ_WRITE	0=OFF 1=ON	NET_GP_W2_OUT	BV:212
Network General Purpose Out OB	READ_WRITE	0=OFF 1=ON	NET_GP_OB_OUT	BV:213
Wi-Fi Time Synchronization	READ_WRITE	0=DISABLED 1=ENABLED	WIFI_TIME_SYNC	BV:400
Auto DST Time Shift	READ_WRITE	0=DISABLED 1=ENABLED	AUTO_DST	BV:402

Point Name	Point Access	Units	BACnet Point Name	BACnet Object ID
Wi-Fi Enable	READ_WRITE	0=DISABLED 1=ENABLED	WIFI_ENABLE	BV:403
Setpoint Override	READ_WRITE	0=DISABLED 1=ENABLED	SETPT_OVERRIDE	BV:404
BACnet BMS Occupancy	GATED_WRITE	0=UNOCCUPIED 1=OCCUPIED	BMS_OCC	BV:405
Filter Timer Reset	READ_WRITE	0=INACTIVE 1=ACTIVE	FLTR_TMR_RST	BV:406
Network Space Temp Enable	READ_WRITE	0=DISABLED 1=ENABLED	NET_SP_TEMP_EN	BV:407
Network Space Humidity Enable	READ_WRITE	0=DISABLED 1=ENABLED	NET_SP_HUM_EN	BV:408
Occupancy Input Polarity	GATED_WRITE	0=OCCUPIED 1=UNOCCUPIED	OCC_IN_POL	BV:500
Auto Mode Allowed	GATED_WRITE	0=NO 1=YES	ALLOW_AUTO	BV:501
Prog Mode Allowed	GATED_WRITE	0=NO 1=YES	ALLOW_PROG	BV:502
Celsius Display	GATED_WRITE	0=F° 1=C°	CELSIUS_DISP	BV:503
Fan On with W	GATED_WRITE	0=NO 1=YES	FAN_WITH_W	BV:504
Rvs Vlv Energized Ht	GATED_WRITE	0=ENERGIZED FOR COOL 1=ENERGIZED FOR HEAT	RVS_VLV_DIR	BV:505
Humidifier Installed	GATED_WRITE	0=NO 1=YES	HUM_INST	BV:506
BMS Occupancy Enable	GATED_WRITE	0=DISABLED 1=ENABLED	BMS_OCC_EN	BV:507
BACnet Config Write Enable	GATED_WRITE	0=DISABLED 1=ENABLED	CFG_WR_EN	BV:511
CO2 Sensor Connected	GATED_WRITE	0=DISABLED 1=ENABLED	CO2_CONNECTED	BV:512
ID TEMP SENSOR HIGH	READ_ONLY	0=DISABLED 1=ENABLED	ID_TEMP_SENS_HI	BV:900
ID TEMP SENSOR LOW	READ_ONLY	0=INACTIVE 1=ACTIVE	ID_TEMP_SENS_LO	BV:901
REMOTE SENSOR HIGH	READ_ONLY	0=INACTIVE 1=ACTIVE	REM_TEMP_HI	BV:902
REMOTE SENSOR LOW	READ_ONLY	0=INACTIVE 1=ACTIVE	REM_TEMP_LO	BV:903
HUM TEMP SENSOR HIGH	READ_ONLY	0=INACTIVE 1=ACTIVE	HUM_TEMP_HI	BV:904
HUM TEMP SENSOR LOW	READ_ONLY	0=INACTIVE 1=ACTIVE	HUM_TEMP_LO	BV:905
ID TEMP RANGE HIGH	READ_ONLY	0=INACTIVE 1=ACTIVE	ID_TEMP_RNG_HI	BV:906

Point Name	Point Access	Units	BACnet Point Name	BACnet Object ID
ID TEMP RANGE LOW	READ_ONLY	0=INACTIVE 1=ACTIVE	ID_TEMP_RNG_LO	BV:907
HUM SENSOR FAILURE	READ_ONLY	0=INACTIVE 1=ACTIVE	HUM_SENS_FAIL	BV:908
HUMIDITY RANGE HIGH	READ_ONLY	0=INACTIVE 1=ACTIVE	HUM_TOO_HI	BV:909
HUMIDITY RANGE LOW	READ_ONLY	0=INACTIVE 1=ACTIVE	HUM_TOO_LO	BV:910
OUTDOOR SENSOR FAILURE	READ_ONLY	0=INACTIVE 1=ACTIVE	OD_TEMP_FAIL	BV:911
NOT CONNECTED TO SERVER	READ_ONLY	0=INACTIVE 1=ACTIVE	SRVR_CONN_FAIL	BV:912
NOT CONNECTED TO ROUTER	READ_ONLY	0=INACTIVE 1=ACTIVE	RTR_CONN_FAIL	BV:913
WIFI HARDWARE FAULT	READ_ONLY	0=INACTIVE 1=ACTIVE	WIFI_CONF_FAIL	BV:914
ECONOMIZER FAULT	READ_ONLY	0=INACTIVE 1=ACTIVE	ECON_FAULT	BV:915
LOCKOUT-5 BAD PIN ENTRIES	READ_ONLY	0=INACTIVE 1=ACTIVE	LOCKOUT_FAIL	BV:916
HIGH CO2	READ_ONLY	0=INACTIVE 1=ACTIVE	HIGH_CO2	BV:917
Current Mode Status	READ_ONLY	1=OFF 2=HEAT 3=COOL	CURRENT_MODE	MSV:300
User Mode	READ_WRITE	1=OFF 2=HEAT 3=COOL 4=AUTO 5=E-HEAT	USER_MODE	MSV:400
IR Proximity Sensitivity	READ_WRITE	1=HIGH 2=MEDIUM 3=LOW	PROX_SENS	MSV:401
Sound Effect	READ_WRITE	1=OFF 2=CLICK 3=BEEP	SOUND	MSV:402
Number of Parts in Schedule Day	READ_WRITE	1=2 PARTS 2=4 PARTS	SCHED_DAY_PARTS	MSV:403
Occupied Fan Mode	READ_WRITE	1=AUTO 2=ON	OCC_FAN	MSV:404
Unoccupied Fan Mode	READ_WRITE	1=AUTO 2=ON	UNOCC_FAN	MSV:405

Point Name	Point Access	Units	BACnet Point Name	BACnet Object ID
Current Fan Mode	READ_WRITE	1=AUTO 2=ON 3=OVERRIDE AUTO 4=OVERRIDE ON	FAN MODE	MSV:406
Indoor Equipment Type	READ_ONLY	1=NO INDOOR 2=FURNACE 3=AIR HANDLER	ID_EQUIP_TYPE	MSV:500
Outdoor Equipment Type	GATED_WRITE	1=NO OUTDOOR 2=A/C 3=HEAT PUMP	OD_EQUIP_TYPE	MSV:501
Remote Sensor Type	GATED_WRITE	1=NONE 2=OUTDOOR 3=SPACE 4=AVERAGE 5=OCCUPANCY 6=FAULT_INPUT 7=SAT	REMOTE_SENSOR	MSV:502
Dehumidification Type	GATED_WRITE	1=NO 2=YES 3=OVRCRL(2F) 4=HUMIDIMIZER	DEHUM_TYPE	MSV:503
Occupancy Output Terminal	GATED_WRITE	1=OFF 2=Y3 3=O/B 4=W2	OCC_OUTPUT	MSV:504
Humidification Output Terminal	GATED_WRITE	1=OFF 2=Y3 3=O/B 4=W2	HUM_OUTPUT	MSV:505
Dehumidification Output Terminal	GATED_WRITE	1=OFF 2=Y3 3=O/B 4=W2	DEHUM_OUTPUT	MSV:506
Smart Recovery	GATED_WRITE	1=NO 2=30 MIN 3=60 MIN 4=90 MIN	SMART_RECVRY	MSV:507
Network GP W2 Mode	GATED_WRITE	1=DISABLED 2=ENERGIZED_ACTIVE 3=ENERGIZED_INACTIVE	NET_GP_W2_MODE	MSV:510
Network GP OB Mode	GATED_WRITE	1=DISABLED 2=ENERGIZED_ACTIVE 3=ENERGIZED_INACTIVE	NET_GP_OB_MODE	MSV:511
Analog Input	GATED_WRITE	NONE 1=HUMIDITY 2=CO2	ANALOG_INPUT	MSV:512

Appendix A: BACnet Points List

Point Name	Point Access	Units	BACnet Point Name	BACnet Object ID
Analog Input Scaling	GATED_WRITE	1=2-10V (4-20mA w/ext 500 Ohm)	ANALOG_IN_SCALE	MSV:513

Appendix B: BACnet Functionality

BACnet Communication

BACnet MS/TP

Baud Rates: 9600, 19200, 38400, 76800, 115200

BACnet Objects

Device Object
Analog Input Objects
Analog Value Objects
Binary Value Objects
Multistate Value Objects

BACnet Interoperability Building Blocks (BIBBs)

Data Sharing BIBBs

Execute Read Property (DS-RP-B)
Execute Read Property Multiple (DS-RPM-B)
Execute Write Property (DS-WP-B)
Execute Write Property Multiple (DS-WPM-B)

Device Management BIBBs

Execute Who-Is and Initiate I-Am (DM-DDB-B)
Execute Who-Has and Initiate I-Have (DM-DOB-B)
Execute TimeSynchronization (DM-TS-B)
Execute UTCTimeSynchronization (DM-UTC-B)
Execute ReinitializeDevice (DM-RD-B)
Execute DeviceCommunicationControl (DM-DCC-B)

Appendix C: BACnet Constraints

UTC Time Synchronization

If the device is to support UTCTimeSynchronization, time syncs with Local Time is disabled to avoid ambiguity, Daylight Saving calculations are enabled and the UTC_Offset is set according to the local time zone.

The following settings are in the Advanced menu:

SYNCH TIME TO SERVER—NO

DST—ENABLED

The following setting is in the installer settings menu:

BACNET UTC OFFSET—Xh Xm (5h 0m – U.S. Eastern Time Zone)

BACnet Reliability Property

In addition to indicating sensor issues, the BACnet Reliability property of the BACnet Objects conveys when the configuration does not support a given point.

Reliability Value	Meaning
No-fault-detected	Configuration matches the object description and value is in range.
Shorted-loop	The Present_Value of this object indicates a shorted sensor.
Open-loop	The Present_Value of this object indicates an open sensor.
Under-range	The Present_Value of this object is below normal.
Over-range	The Present_Value of this object is above normal.
No-output	The output is not used in the current configuration.
Unreliable-other	This object is not relevant with the current configuration.
No-sensor	The sensor is not used in the current configuration.

Appendix D: BACnet Object Instance Ranges

Instance Range	Object Type
1XX	Device Inputs
2XX	Device Outputs
3XX	Status
4XX	User Configuration
5XX	Installer Configuration
9XX	Faults

Appendix E: BACnet Object Notes

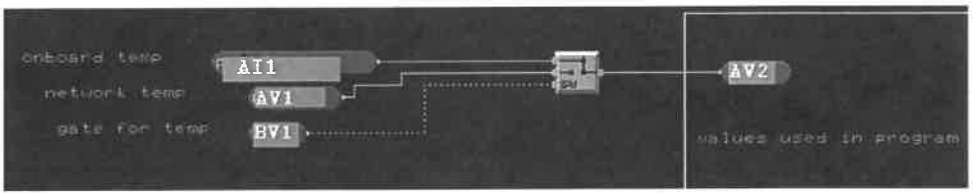
Gated Installer Configuration

After the installer enables BACnet in the installer menu, they will have the opportunity to also select BACNET CONFIG WRITE. Enabling BACNET CONFIG WRITE allows the installer to write to all the installer configuration BACnet Objects (AV5XX, BV5XX and MSVXX) remotely over the BACnet network. When the installer has completed configuring the device, they may write Inactive to CFG_WR_EN (BV511) to disable writes to installer configuration objects.

NOTE Re-enabling BACNET CONFIG WRITE must be done from the installer menu at the thermostat.

Multiplexed Inputs

Each analog input has a corresponding multiplexer that is used to select between the measured input value (AI1 in the figure below) and a network object value (AV1 in the figure below). The output of the multiplexer (AV2 in the figure below) is used in the equipment control algorithms. When the gate object (BV1 in the figure below) is active the network object's value is passed on to the output of the multiplexer, when the gate object is inactive the measured input value is passed on to the output of the multiplexer. The gate object value is a configuration object and is backed up to non-volatile memory. If the network object's value has not been written to within 5 minutes, the output of the multiplexer defaults to the measured input value.



Input	Meas. Input Object	Network Object	Object Used for Equip. Control
Space Temp	ID_SPACE_TEMP (AI100)	NET_SP_TEMP (AV103)	SP_TEMP_CTRL (AV104)
Space Humidity	ID_SPACE_HUM (AI101)	NET_SP_HUM (AV105)	SP_HUM_CTRL (AV106)

Network Controlled Outputs

The thermostat has 3 outputs (**Y3**, **W2**, and **OB**) that can be assigned to optional equipment when the default assignment is not required for the equipment configuration. When any of these 3 outputs are left unassigned, they can be configured to be network controlled outputs by changing their mode from **DISABLED/OFF** to **ENERGIZED_ACTIVE** or **ENERGIZED_INACTIVE** in the installer menu or through the network configuration objects. There are 3 BV objects that control whether an output is active or inactive. These objects must be repeatedly written to over the network within the time configured in the GP_OUT_TIMEOUT (MSV508) configuration object or the output goes to the configured inactive state. The following truth table describes the action of the physical outputs as they relate to the controlling object, Mode Object, and the timeout status.

Controlling Object Value	Mode Object Value	Timed out?	Physical Output State
*	DISABLED	*	De-energized
*	ENERGIZED_ACTIVE	Yes	De-energized

Controlling Object Value	Mode Object Value	Timed out?	Physical Output State
*	ENERGIZED_INACTIVE	Yes	Energized
Inactive	ENERGIZED_ACTIVE	No	De-energized
Inactive	ENERGIZED_INACTIVE	No	Energized
Active	ENERGIZED_ACTIVE	No	Energized
Active	ENERGIZED_INACTIVE	No	De-energized

The following table shows the three outputs and the objects that configure and control them.

Controlling Object	Mode Object	Physical Output
NET_GP_Y3_OUT (BV211)	NET_GP_Y3_MODE (MSV509)	Y3
NET_GP_W2_OUT (BV212)	NET_GP_W2_MODE (MSV510)	W2
NET_GP_OB_OUT (BV213)	NET_GP_OB_MODE (MSV511)	OB

Document revision history

Important changes to this document are listed below. Minor changes such as typographical or formatting errors are not listed.

Date	Topic	Change description	Code*
4/16/24	To set up BACnet	Added section above table	SE

* For internal use only

KSAIC0301230

24V Interface Kit for Ductless Systems and Hybrid Solutions

Installation Instructions

Fig. 1 — 24V Interface

NOTES: Images are for illustration purposes only. Actual models may differ slightly.

Read and become familiar with these instructions before beginning the installation.

TABLE OF CONTENTS

SAFETY CONSIDERATIONS

Read these instructions thoroughly and follow all warnings or cautions included in the literature and attached to the unit. Consult the local building codes and National Electrical Code (NEC) for special requirements. Recognize safety information.

This is the safety-alert symbol ⚠. When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury. Understand these signal words: **DANGER**, **WARNING**, and **CAUTION**. These words are used with the safety-alert symbol.

DANGER identifies the most serious hazards which may result in severe personal injury or death. **WARNING** signifies hazards which could also result in personal injury or death. **CAUTION** is used to identify unsafe practices which may result in minor personal injury or product and property damage. **NOTE** is used to highlight suggestions which result in enhanced installation, reliability, or operation.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury or death.

Before beginning any modification or installation of this kit, ensure the main electrical disconnect is in the **OFF** position. Ensure the power is not connected to the fan coil unit. On some systems, both the fan coil and the outdoor unit may be on the same disconnect. Tag the disconnect switch with a suitable warning label. There may be more than one disconnect.

⚠ CAUTION

EQUIPMENT DAMAGE HAZARD

Failure to follow this warning may result in equipment damage.

DO NOT install the wired controller in an area subjected to excessive steam, oil or sulfide gas. Doing so may cause the controller to deform and/or fail.

⚠ CAUTION

INSTALLATION

Entrust a licensed contractor to install the unit. Installation by unskilled persons may lead to improper installation, electric shock, or fire. Reinstallation must be performed by authorized professionals. Non-compliance may lead to electric shock or fire.

INTRODUCTION

The 24V Interface provides further flexibility, functionality and control which allows for a single zone or a multi-zone ductless system to be controlled by any 3rd party single-stage conventional thermostat* keeping the Inverter compressor operating as a variable-speed system, making adjustments to maintain more consistent operation.

Additionally the 24V interface provides compatibility between a ductless single zone outdoor unit, an approved residential conventional fan coil and a 3rd party single-stage conventional thermostat*.

Features:

- Keeps the Inverter compressor operating as a variable-speed system
- One 24V Interface Kit per indoor head is required
- Rated for outdoor and indoor mounting
- 24V transformer built-in (for ductless applications)
- Dry mode contact for active dehumidification control (for ductless applications)
- Remote on/off contact
- Auxiliary heat control through the third party conventional thermostat**
- Diagnostic code display LEDs

NOTES:

- ***A conventional 5-wire thermostat is required.**
- ****A secondary output is necessary for auxiliary heat control**

⚠ WARNING

EXPLOSION HAZARD

Failure to follow this warning could result in death, serious personal injury, and/or property damage.

Never use air or gases containing oxygen for leak testing or operating refrigerant compressors. Pressurized mixtures of air or gases containing oxygen can lead to an explosion.

⚠ WARNING

INSTALLATION

Entrust a licensed contractor to install the unit. Installation by unskilled persons may lead to improper installation, electric shock, or fire.

Re-installation must be performed by authorized professionals.

Non-compliance may lead to electric shock or fire.

ACCESSORIES

The system is shipped with the following accessories (see Table 1). Use all of the installation parts and accessories to install the system. Improper installation may result in, electrical shock and fire, or cause the equipment to fail. Keep the installation manual in a safe place and do not discard any accessories until the installation has been completed.

Table 1 — Accessories

No.	Description	Qty	Remarks
1	24V Interface Control box	1	N/A
2	Installation Manual	1	N/A
3	Screws	3	M4X20 (for wall mounting)
4	Wall Anchors	3	For wall mounting
7	Return Air Thermistor Assembly (Hybrid Solutions) (RCD part number 11201007003448)	1	Required and installed near or on the unit and on the air inlet side
8	16ft. (5m) Return Air Thermistor Assembly Extension Wires (RCD part number 17401204010126)	1	For a Return Air Temperature Sensor T1 on Conventional Fan Coil Solutions

Table 2 — Accessories

No.	Description	Qty	Type	Remarks
1	Switch Box	1	N/A	N/A
2	Wiring Tube (insulating sleeve and tightening screw)	1	N/A	N/A

⚠ WARNING

Wires must be properly sized according to the NEC/NFPA 70, CEC and all prevailing codes, ordinances and standards.

All conductors must be installed with a strain relief eliminating stress on the wire following installation which may result in wire damage and/or overheating with a potential for fire.

Installation must be performed in accordance with the requirement of NEC and CEC by authorized personnel only.

All wiring to be rated for the control box amperage rating.

All wiring installed to meet general industry standards and practices.

Do not install near flammable liquids or gases.

Do not operate the unit with wet hands, as this could lead to electrical shock.

⚠ CAUTION

When connecting with RS 485 communication to the outdoor unit, shielded wire must be used and grounded at one end only.

When using shielded wire the cable should be grounded at one end to reduce EMI.

Return Air Temperature Sensor T1 cable shall not exceed 23ft (7m).

DIMENSIONS

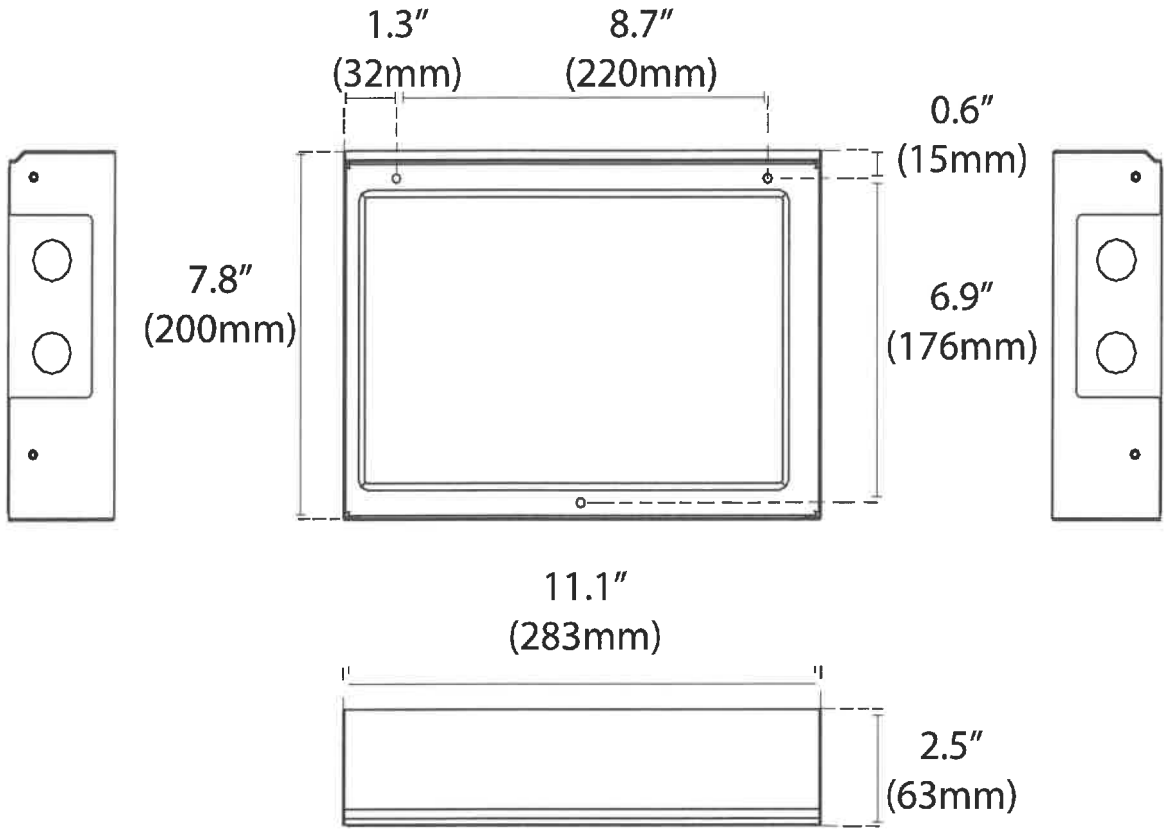


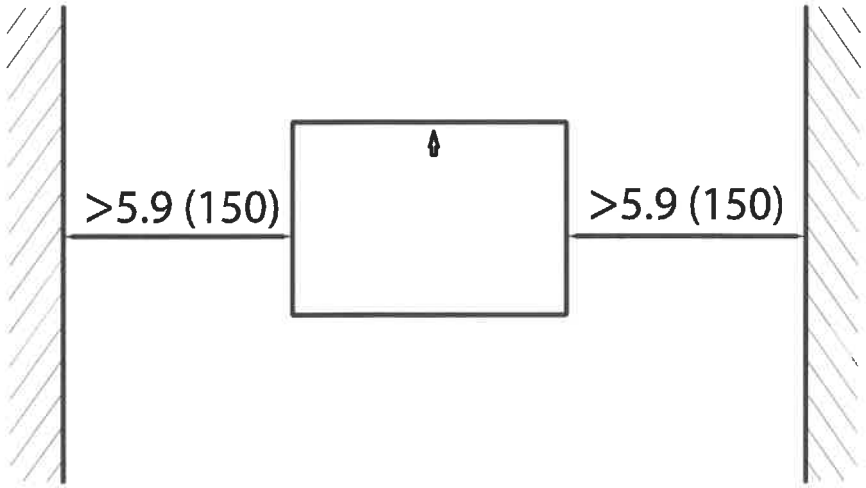
Fig. 2 — 24V Interface Structure Size

CLEARANCES

Table 3 — 24V Interface Clearance Dimensions

Clearances	
Unit	Minimum Value In (mm)
Sides	5.9 (150)
Front	24 (610)*
Top and Bottom	3 (76.2)

NOTE: *24 in (610mm) minimum for service access or use local code.



NOTE: ALL DIMENSIONS ARE IN INCH (MM)

Fig. 3 — Clearances

INSTALLATION

Installation Location

The 24V INTERFACE KIT is rated for outdoor and indoor mounting (depending on the application). It is recommended that the kit installation be as close as possible to the indoor unit and the thermostat.

IMPORTANT: Follow the recommended clearances (see "CLEARANCES" on page 3) and install in an area above the ground away from locations where water could enter.

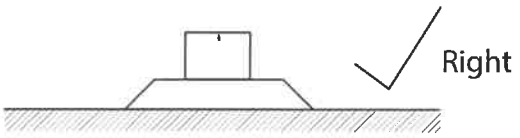


Fig. 4 — Installation Floor Mount View (right way)

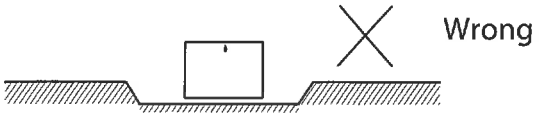


Fig. 5 — Installation Floor Mount View (wrong way)

⚠ CAUTION

DO NOT install the 24V INTERFACE KIT near flammable liquids or gases such as gasoline or hydrogen sulfide. Doing so creates a fire hazard.

1. Remove the cover of the **24V INTERFACE KIT.** Remove the six screws of the **24V INTERFACE KIT** with a screwdriver or similar tool. Rotate the lid along the hem to disassemble.

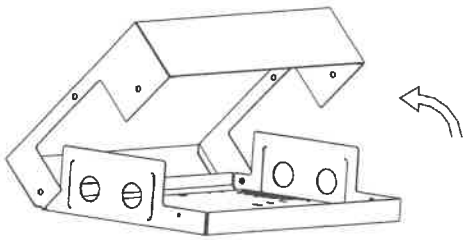


Fig. 6 — Remove the cover

NOTE: Minimum free space required around the kit is 7" (180 mm) for service purposes.

2. Mount the **24V INTERFACE KIT** horizontally (see Fig. 7), by fastening the back plate to the wall with 3 screws (M4x20) and anchors.

⚠ CAUTION

The 24V Interface kit cover has a directional arrow on the cover. In case of an outdoor installation be sure to verify, during the mounting process, that this arrow points **UP** upon installation. Failure to mount the kit correctly can cause water ingress into the box which may compromise the electrical component integrity.

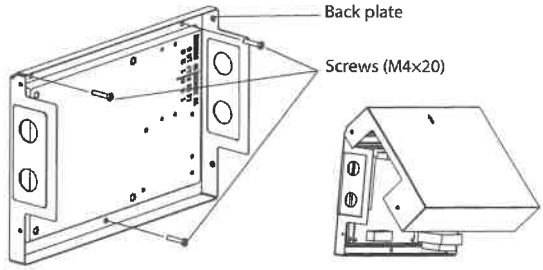


Fig. 7 —24V Interface Kit

NOTE: Place the unit on a flat surface. Be careful not to distort the back plate of the 24V INTERFACE KIT by over-tightening the screws.

3. **WIRING** - Based on the system used, wire the unit as described in "SYSTEM CONFIGURATION SCENARIOS" on page 4).
4. Cover the **24V INTERFACE KIT** lid, and lock back in place using the six screws previously removed.

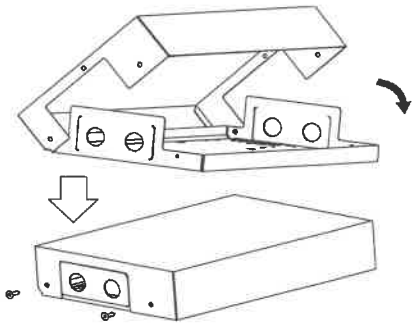


Fig. 8 — Cover the screw

SYSTEM CONFIGURATION

NOTES:

- The thermostat should be configured for use with as a single stage **COOLING** and **HEATING (DO NOT** configure the thermostat as a Heat Pump).
- The wireless remote controller, wired controller KSACN and Wi-Fi kits KSAIF cannot be used with this 24V interface Kit at the same time. The **SWING** and **LED** function may be accessed with the wireless remote controller.

Table 4 — Connection Wiring Specification

Connection Wiring	Outdoor L1, L2, S & G, S1, S2	Indoor L1, L2, S & G, S1, S2	R,C	Y/W/G/G1/ G2/G3/Dry
Size	Refer to the outdoor connecting wires size	Refer to the indoor connecting wires size	18AWG (minimum)	18AWG (minimum)

SYSTEM CONFIGURATION SCENARIOS

Based on the system, utilize the appropriate configuration scenario:

Scenario 1: Single Zone Ductless System with 38MPRA, 38MARB, 38MHR

Scenario 2: Single Zone Ductless System with 38MBR/38MBRB

Scenario 3: Multi-zone Ductless System with 38MGR

Scenario 4: Single Zone Fan Coils FMA/FX4D/FB4C with 38MARB

Scenario 5: Single Zone Fan Coils FV4C with 38MARB

Scenario 6: Compatible Single Zone Furnace with 38MARB

SCENARIO 1: SINGLE ZONE OUTDOOR UNITS (38MPRA, 38MARB, 38MHR) WITH APPROVED DUCTLESS INDOOR UNITS

- High Wall (sizes 6K-36K)[208-230V]**
- Cassette (sizes 9K-24K)
- Ducted (sizes 9K-24K) (*refer to **NOTES** in the adjacent column)
- Console (sizes 18K-24K)

⚠ CAUTION

Refer to the Compatibility Charts on hvacpartners.com for the proper matches and serial number compatibility. Units built prior to the generation of this serial number require a Control Board Replacement on the indoor unit.

Installation Steps:

1. Run the interconnecting piping from the indoor to the outdoor unit using the correct indoor piping size.
2. Run the interconnecting wiring from the outdoor unit to the 24V interface using terminal connections L1(1), L2(2), S(3) and G.
3. Run the interconnecting wiring from the 24V interface to the indoor unit using terminal connections L1(1), L2(2), S(3) and G.
4. Run the thermostat wiring from the thermostat to the 24V interface using connections R and C on CN15 and Y, W, G on CN19.
5. Configure the dip switches on the 24V interface accordingly.
6. Configure the thermostat to operate in single stage cooling and heating scenarios **(DO NOT configure the thermostat as a Heat Pump).**

NOTES:

Follow the indoor and outdoor unit's general installation instructions.

*For the Ducted units, in order to initially setup the static pressure, the 24V interface must be bridged. Temporarily connect the communication wires L1, L2, S and G from the indoor to the outdoor unit until the static pressure settings are complete (refer to the Ducted unit installation manual).

On selected indoor units, the Up-Down Swing Louver functions as a control to turn off the indoor unit display (LED) and is available on the unit's wireless remote controller. The Wi-Fi KSAIF and wired remote controllers KSACN are not functional when using the 24V interface.

**For 115V Ductless applications, the 24V transformer must be replaced in the field. This part is available through RCD (part number 11203103000393).

⚠ CAUTION

The conventional thermostat must be configured for use with a single stage air conditioner (Y output **ONLY**) and a single stage heating (W) system.

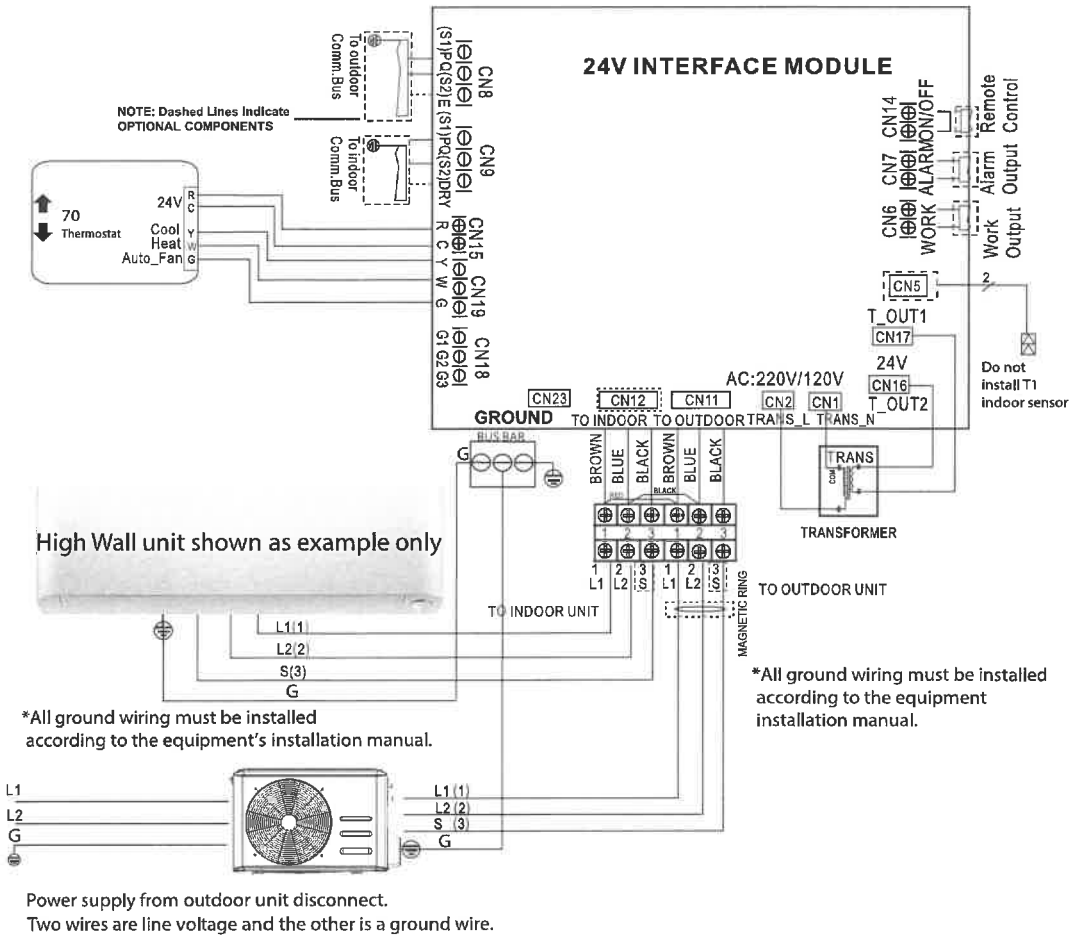


Fig. 9 — Wiring Diagram

IMPORTANT: All ground wiring must be installed according to the equipment's installation manual.

SCENARIO 2: SINGLE ZONE OUTDOOR UNITS (38MBRC) WITH APPROVED DUCTLESS INDOOR UNITS

- Cassette (sizes 36K-48K)
- Ducted (sizes 36K-58K) (*refer to **NOTES** in the adjacent column)
- Console (sizes 36K-58K)

⚠ CAUTION

Refer to the Compatibility Charts on hvacpartners.com for the proper matches and serial number compatibility. Units built prior to the generation of this serial number would require a Control Board Replacement on the Indoor unit.

Installation Steps:

1. Run the interconnecting piping from the indoor unit to the outdoor unit using the correct indoor piping size.
2. Run the interconnecting wiring from the outdoor unit to the 24V interface using terminal connections L1(1), L2(2), and G. Connect the wiring for the S1 and S2 outdoor interface to CN8.
3. Run the interconnecting wiring from the 24V interface to the indoor unit using terminal connections L1(1), L2(2) and G. Connect the wiring for the S1 and S2 outdoor interface to CN9.
4. Run the thermostat wiring from the thermostat to the 24V interface using connections R and C on CN15 and Y, W, G on CN19.
5. Configure the dip switches on the 24V interface accordingly.
6. Configure the thermostat to operate in single stage cooling and heating scenarios (**DO NOT** configure the thermostat as a **Heat Pump**).

NOTES:

Follow the indoor and outdoor unit's general installation instructions.

*For Ducted units, in order to initially setup the static pressure, the 24V interface must be bridged. Temporarily connect the communication wires, S1 and S2, from the indoor unit to the outdoor unit until the static pressure settings are complete (see the Ducted unit installation manual). When the static pressure is adjusted, connect S1 and S2 to CN8 and CN9 (see Fig. 21).

On selected indoor units, the Up-Down Swing Louver functions as a control to turn off the indoor unit display (LED) and is available on the unit's wireless remote controller. The Wi-Fi accessories KSAIF and wired remote controllers KSACN are not functional when using the 24V interface.

⚠ CAUTION

The conventional thermostat must be configured for use with a single stage air conditioner (Y output **ONLY**) and a single stage heating (W) system.

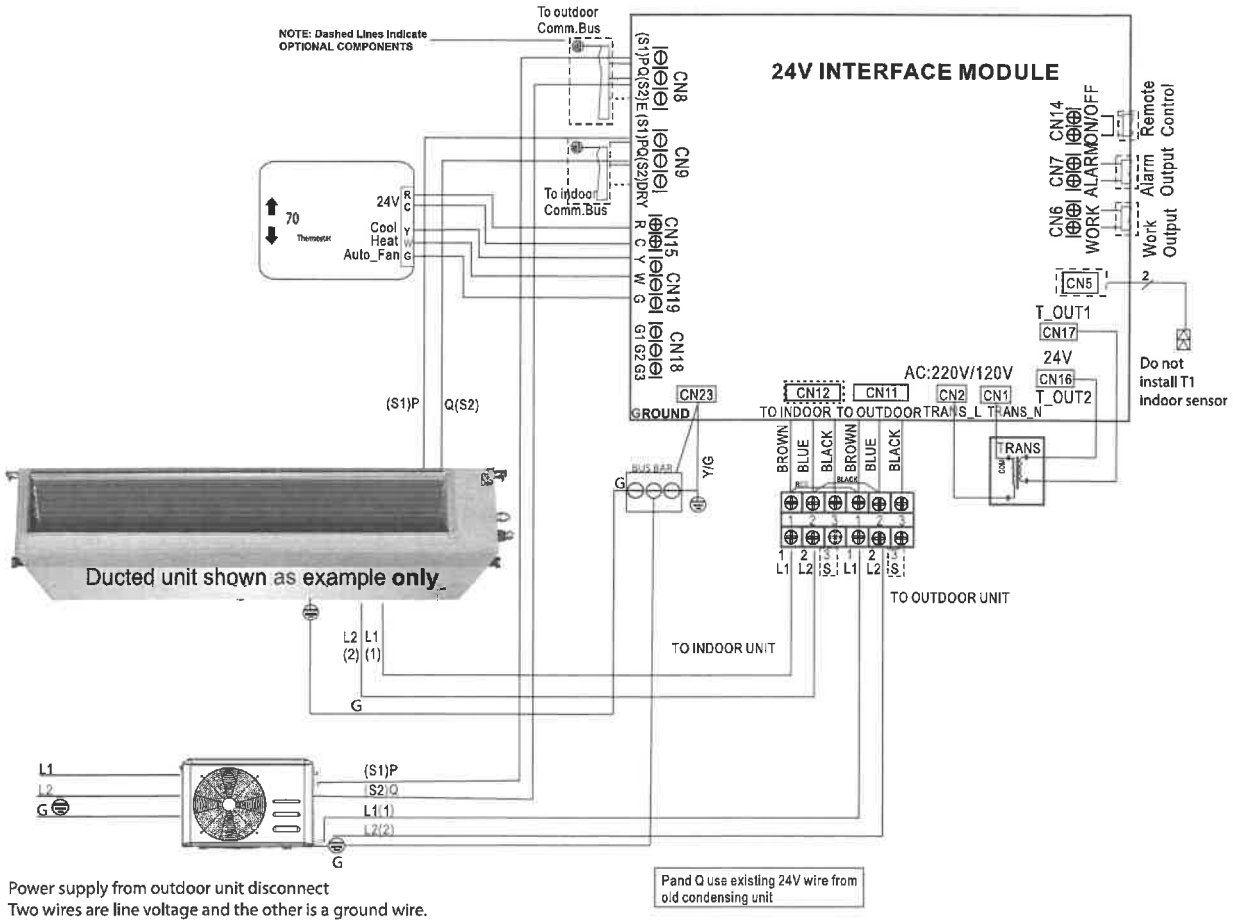


Fig. 10 — Wiring Diagram

Intesis™
BY HMS NETWORKS

BACnet MS/TP Server

For Ductless Indoor units

USER MANUAL

Issue date: 06/2020 r1.0 ENGLISH

HMS Connecting Devices™

Important User Information

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Gateway for the integration of a Ductless air conditioning unit in BACnet MSTP enabled monitoring and control systems.

Compatibility:
Only specific Carrier DLS indoor product families are tested for compatibility with the Intesis BACnet MS/TP 1:1 gateway INBACMID001I100. Ductless indoor unit backward compatibility as well as future versions' compatibility is not guaranteed.

Phased Out
Not Compatible
Current Model

Net dimensions (DxWxH): (3.7 x 2.1 x 2.3 in) (93 x 53 x 58 mm)

Compatibility between the Intesis BACnet gateway and the factory wired wall controller.

Carrier Model Number	Indoor Unit Type	Size:	Midea protocol	Compatible	Phased Out		KSACN0101AAA	KSACN0601AAA	KSACN0701AAA	KSACN0801AAA
40 MPHA	HighWall	All	V4	YES			No	No	No	No
40 MAQ	HighWall	All	V4	YES* See Note 1	Yes Q1, 2021		Yes	No	No	No
40 MAHB	HighWall	All	V4	YES** See Note 2			Yes	No	No	No
40MHHQ	HighWall	All	V4	Yes			Yes	No	No	No
40 MHHC	HighWall	All	Forced / V4	YES*** See Note 3			Yes	No	No	No
40 MBCQ	Cassette	All	V4	Yes			Yes	No	Yes	No
40 MBAA	Ducted	N/A	N/A	Not Compatible			N/A	N/A	N/A	N/A
40 MBDQ	Ducted	All	V4	Yes			Yes	No	Yes	No
40 MBFQ	Underceiling / Floor	N/A	N/A	Not Compatible			N/A	N/A	N/A	N/A

Notes:
* 1: 40MAQ The mid-tier Ductless High Wall 40MAQB**B---3 indoor unit type, will need to have the display and adaptor board replaced to function with the Intesis MS/TP BACnet gateway.
The 40MAQ Adapter Board, P/N 17222000A50275, and Display Board Assembly, P/N 17222000A17852, can be ordered from RC.

** 2: The 40MAHB Indoor unit requires that a multi function board and 7 pin wiring harness are added to the indoor unit at the time of installation.
The multifunction board P/N 17122000A38610 and wiring harness P/N 17401204A02537 can be ordered as an accessory.

*** 3: The 40MHHC is a cooling only system. Please consider this when completing the integration. The only Modes that should be mapped to the BACnet controls system should be Cooling & Fan.

The wireless infrared controller that comes with the indoor unit can be used at the same time as the Intesis BACnet gateway or disabled by configuration.

ORDER CODE:

INBACMID001I100: Ductless to BACnet MSTP Interface - 1 Indoor Unit

ORDER CODE	LEGACY ORDER CODE
INBACMID001I100	-

INDEX

1 Description

1.1 Introduction

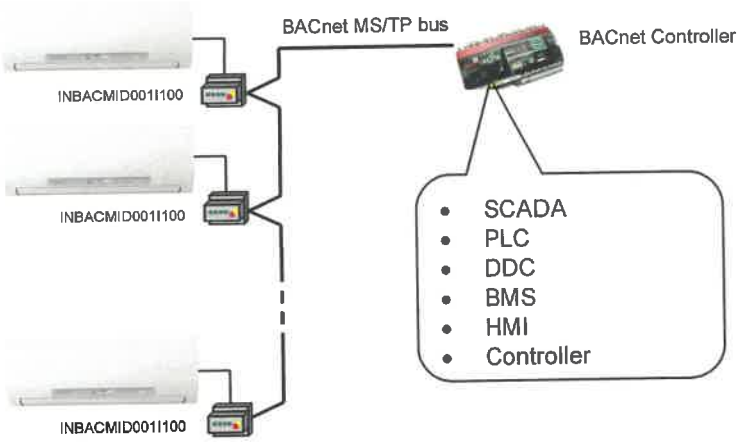
This document describes the integration of Ductless air conditioning systems into BACnet MS/TP compatible devices and systems using gateway *INBACMID001I100*.

The aim of this integration is to monitor and control your Ductless air conditioning system, remotely, from your Control Center using any commercial SCADA or monitoring software that includes a BACnet driver or connect it to other BACnet devices to do any automation. To do it so, Intesis allows BACnet communication allowing polling or subscription requests (COV).

Intesis makes available the Ductless air conditioning system indoor units through independent BACnet objects.

Abstraction of Ductless air conditioning system properties and functionalities as fixed BACnet Objects. Intesis allows fixed BACnet object IDs mapping. Simple configuration is needed: just select the appropriate communication parameters (MAC address, baud rate...).

This document assumes that the user is familiar with BACnet and Ductless technologies and their technical terms.



BACnet MS/TP installation sketch

1.2 Functionality

Intesis continuously read the Ductless AC unit and keeps the updated status of all objects in its memory, ready to be served when requested from the BACnet side.

The role of Intesis consists in associate the elements of the Ductless AC unit with BACnet objects.

The control of the indoor units through the INBACMID001I100 is permitted, so commands toward the Ductless AC unit are permitted too.

The indoor unit is offered in a set of BACnet objects and extra functionality.

1.3 Capacity of Intesis

Intesis is capable of integrate one single Ductless AC unit and its associated elements.

Element	Max.	Notes
Number of indoor units	1	Number of indoor units that can be controlled through Intesis
Number of Objects	30	Number of Ductless AC signals available as objects into Intesis.

1.4 Quick Setup

1. Install Intesis in the desired installation site (DIN rail mounting inside a metallic industrial cabinet connected to ground is recommended).
2. Connect the communication cables. Details in section 6 CONNECTIONS AND SWITCHES.
3. Check the BACnet objects list for its integration to your BACnet project. Details in section 5.3 OBJECTS AND PROPERTIES.
4. Check if there is communication between BACnet and AC system through device LED. Details in section 7.3 LED STATUS.
5. The Intesis is ready to be used in your system.

2 Protocol Implementation Conformance Statement

BACnet Protocol Implementation Conformance Statement (PICS)

Date: *2015-04-01*
Vendor Name: *HMS Industrial Networks S.L.U*
Product Name: *INBACMID001I100*
Product Model Number: *INBACMID001I100*
Application Software Version: *1.0*
Firmware Revision: *1.0.0.0*
BACnet Protocol Revision: *12*

Product Description:

Ductless air conditioning systems – BACnet MS/TP

Abstraction of Ductless air conditioning system properties and functionalities as BACnet Objects.

2.1 BACnet Standardized Device Profile (Annex L):

- ☐ BACnet Operator Workstation (B-OWS)
- ☐ BACnet Building Controller (B-BC)
- ☐ BACnet Advanced Application Controller (B-AAC)
- ☒ BACnet Application Specific Controller (B-ASC)
- ☐ BACnet Smart Sensor (B-SS)
- ☐ BACnet Smart Actuator (B-SA)

Additional BACnet Interoperability Building Blocks Supported (Annex K):
Reference of BIBBs List

2.2 Segmentation Capability:

Segmented request supported	☐ No	☒ Yes	Window Size · *16* ·
Segmented responses supported	☐ No	☒ Yes	Window Size · *16* ·

2.3 Data Link Layer Options:

- ☐ BACnet IP, (Annex J)
- ☐ BACnet IP, (Annex J), Foreign Device
- ☐ ISO 8802-3, Ethernet (Clause 7)
- ☐ ANSI/ATA 878.1, 2.5 Mb. ARCNET (Clause 8)
- ☐ ANSI/ATA 878.1, RS-485 ARCNET (Clause 8), baud rate(s) ____
- ☒ MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400, 76800
- ☐ MS/TP slave (Clause 9), baud rate(s):
- ☐ Point-To-Point, EIA 232 (Clause 10), baud rate(s):
- ☐ Point-To-Point, modem, (Clause 10), baud rate(s):
- ☐ LonTalk, (Clause 11), medium: _____
- ☐ Other:

2.4 Device Address Binding:

Is static device binding supported? (This is currently necessary for two-way communication with MS/TP slaves and certain other devices.) ☐ Yes ☒ No

2.5 Networking Options:

☐ Router, Clause 6 - List all routing configurations, e.g., ARCNET-Ethernet, Ethernet-MS/TP, etc.
☐ Annex H, BACnet Tunneling Router over IP
☐ BACnet/IP Broadcast Management Device (BBMD)
Does the BBMD support registrations by Foreign Devices? ☐ Yes ☐ No

2.6 Character Sets Supported

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

☒ ANSI X3.4
☐ IBM™/Microsoft™ DBCS
☐ JIS C 6226
☐ ISO 10646 (UCS-4)
☐ ISO 10646 (UCS-2)
☐ ISO 8859-1

2.7 Gateway

If this product is a communication gateway, describe the types of non-BACnet equipment/network(s) that the gateway supports:

Ductless **Air Conditioning Units .**

3 BACnet Interoperability Building Blocks Supported (BIBBs)

3.1 Data Sharing BIBBs

BIBB Type		Active	BACnet Service	Initiate	Execute
DS-RP-A	Data Sharing-ReadProperty–A	☐	ReadProperty	☒	☐
DS-RP-B	Data Sharing-ReadProperty–B	☒	ReadProperty	☐	☒
DS-RPM-A	Data Sharing-ReadPropertyMultiple–A	☐	ReadPropertyMultiple	☒	☐
DS-RPM-B	Data Sharing-ReadPropertyMultiple–B	☒	ReadPropertyMultiple	☐	☒
DS-RPC-A	Data Sharing-ReadPropertyConditiona–A	☐	ReadPropertyConditional	☒	☐
DS-RPC-B	Data Sharing-ReadPropertyConditional–B	☐	ReadPropertyConditional	☐	☒
DS-WP-A	Data Sharing-WriteProperty–A	☐	WriteProperty	☒	☐
DS-WP-B	Data Sharing-WriteProperty–B	☒	WriteProperty	☐	☒
DS-WPM-A	Data Sharing-WritePropertyMultiple–A	☐	WritePropertyMultiple	☒	☐
DS-WPM-B	Data Sharing-WritePropertyMultiple–B	☒	WritePropertyMultiple	☐	☒
DS-COV-A	Data Sharing-COV–A	☐	SubscribeCOV	☒	☐
		☐	ConfirmedCOVNotification	☐	☒
		☐	UnconfirmedCOVNotification	☐	☒
DS-COV-B	Data Sharing-COV–B	☒	SubscribeCOV	☐	☒
		☒	ConfirmedCOVNotification	☒	☐
		☒	UnconfirmedCOVNotification	☒	☐
DS-COVP-A	Data Sharing-COVP–A	☐	SubscribeCOV	☒	☐
		☐	ConfirmedCOVNotification	☐	☒
		☐	UnconfirmedCOVNotification	☐	☒
DS-COVP-B	Data Sharing-COVP–B	☐	SubscribeCOV	☐	☒
		☐	ConfirmedCOVNotification	☒	☐
		☐	UnconfirmedCOVNotification	☒	☐
DS-COVU-A	Data Sharing-COV-Unsolicited–A	☐	UncofirmedCOVNotification	☐	☒
DS-COVU-B	Data Sharing-COV-Unsolicited-B	☐	UncofirmedCOVNotification	☒	☐

3.2 Alarm and Event Management BIBBs

BIBB Type		Active	BACnet Service	Initiate	Execute
AE-N-A	Alarm and Event-Notification–A	☐	ConfirmedEventNotification	☐	☒
		☐	UnconfirmedEventNotification	☐	☒
AE-N-I-B	Alarm and Event-Notification Internal–B	☐	ConfirmedEventNotification	☒	☐
		☐	UnconfirmedEventNotification	☒	☐
AE-N-E-B	Alarm and Event-Notification External–B	☐	ConfirmedEventNotification	☒	☐
		☐	UnconfirmedEventNotification	☒	☐
AE-ACK-A	Alarm and Event-ACK–A	☐	AcknowledgeAlarm	☒	☐
AE-ACK-B	Alarm and Event-ACK–B	☐	AcknowledgeAlarm	☐	☒
AE-ASUM-A	Alarm and Event-Summary–A	☐	GetAlarmSummary	☒	☐
AE-ASUM-B	Alarm and Event-Summary–B	☐	GetAlarmSummary	☐	☒
AE-ESUM-A	Event-Summary–A	☐	GetEnrollmentSummary	☒	☐
AE-ESUM-B	Event-Summary–B	☐	GetEnrollmentSummary	☐	☒
AE-INFO-A	Alarm and Event-Information–A	☐	GetEventInformation	☒	☐
AE-INFO-B	Alarm and Event-Information–B	☐	GetEventInformation	☐	☒
AE-LS-A	Alarm and Event-LifeSafety–A	☐	LifeSafetyOperation	☒	☐
AE-LS-B	Alarm and Event-LifeSafety–B	☐	LifeSafetyOperation	☐	☒

3.3 Scheduling BIBBs

BIBB Type		Active	BACnet Service	Initiate	Execute
SCHED-A	Scheduling–A *(must support DS-RP-A and DS-WP-A)*	☐			
SCHED-I-B	Scheduling-Internal–B *(shall support DS-RP-B and DS-WP-B)* *(shall also support ether DM-TS-B or DS-UTC-B)*	☐			
SCHED-E-B	Scheduling-External–B *(shall support SCHED-I-B and DS-WP-A)*	☐			
T-VMT-A	Trending - Viewing and Modifying Trends–A	☐	ReadRange	☐	☒
T-VMT-I-B	Trending - Viewing and Modifying Trends Inernal–B	☐	ReadRange	☐	☒
T-VMT-E-B	Trending - Viewing and Modifying Trends External–B	☐	ReadRange	☐	☒
T-ATR-A	Trending - Automated Trend Retrieval–A	☐	ConfirmedEventNotification	☐	☒
		☐	ReadRange	☒	☐
T-ATR-B	Trending - Automated Trend Retrieval–B	☐	ConfirmedEventNotification	☒	☐
		☐	ReadRange	☐	☒

3.4 Trending BIBBs

BIBB Type		Active	BACnet Service	Initiate	Execute
T-VMT-A	Trending - Viewing and Modifying Trends–A	☐	ReadRange	☒	☐
T-VMT-I-B	Trending - Viewing and Modifying Trends Inernal–B	☐	ReadRange	☐	☒
T-VMT-E-B	Trending - Viewing and Modifying Trends External–B	☐	ReadRange	☐	☒
T-ATR-A	Trending - Automated Trend Retrieval–A	☐	ConfirmedEventNotification	☐	☒
		☐	ReadRange	☒	☐
T-ATR-B	Trending - Automated Trend Retrieval–B	☐	ConfirmedEventNotification	☒	☐
		☐	ReadRange	☐	☒

3.5 Network Management BIBBs

BIBB Type		Active	BACnet Service	Initiate	Execute
NM-CE-A	Network Management - Connection Establishment–A	☐	Establish-Connection-To-Network	☒	☐
		☐	Disconnect-Connection-To-Network	☒	☐
NM-CE-B	Network Management - Connection Establishment– B	☐	Establish-Connection-To-Network	☐	☒
		☐	Disconnect-Connection-To-Network	☐	☒
NM-RC-A	Network Management - Router Configuration–A	☐	Who-Is-Router-To-Network	☒	☐
		☐	I-Am-Router-To-Network	☐	☒
		☐	I-Could-Be-Router-To-Network	☐	☒
		☐	Initialize-Routing-Table	☒	☐
		☐	Initialize-Routing-Table-Ack	☐	☒
NM-RC-B	Network Management - Router Configuration–B	☐	Who-Is-Router-To-Network	☒	☒
		☐	I-Am-Router-To-Network	☒	☒
		☐	Initialize-Routing-Table	☐	☒
		☐	Initialize-Routing-Table-Ack	☒	☐

3.6 Device Management BIBBs

BIBB Type		Active	BACnet Service	Initiate	Execute
DM-DDB-A	Device Management - Dynamic Device Binding–A	☐	Who-Is	☒	☐
		☐	I-Am	☐	☒
DM-DDB-B	Device Management - Dynamic Device Binding–B	☒	Who-Is	☐	☒
		☒	I-Am	☒	☐
DM-DOB-A	Device Management - Dynamic Object Binding–A	☐	Who-Has	☒	☐
		☐	I-Have	☐	☒
DM-DOB-B	Device Management - Dynamic Object Binding–B	☒	Who-Has	☐	☒
		☒	I-Have	☒	☐
DM-DCC-A	Device Management - DeviceCommunicationControl–A	☐	DeviceCommunicationControl	☒	☐
DM-DCC-B	Device Management - DeviceCommunicationControl–B	☒	DeviceCommunicationControl	☐	☒
DM-PT-A	Device Management - PrivateTransfer–A	☐	ConfirmedPrivateTransfer	☒	☐
		☐	UnconfirmedPrivateTransfer	☒	☐
DM-PT-B	Device Management - PrivateTransfer–B	☐	ConfirmedPrivateTransfer	☐	☒
		☐	UnconfirmedPrivateTransfer	☐	☒
DM-TM-A	Device Management - Text Message–A	☐	ConfirmedTextMessage	☒	☐
		☐	UnconfirmedTextMessage	☒	☐
DM-TM-B	Device Management - Text Message–B	☐	ConfirmedTextMessage	☐	☒
		☐	UnconfirmedTextMessage	☐	☒
DM-TS-A	Device Management - TimeSynchronization–A	☐	TimeSynchronization	☒	☐
DM-TS-B	Device Management - TimeSynchronization–B	☐	TimeSynchronization	☐	☒
DM-UTC-A	Device Management - UTCTimeSynchronization–A	☐	UTCTimeSynchronization	☒	☐
DM-UTC-B	Device Management - UTCTimeSynchronization–B	☐	UTCTimeSynchronization	☐	☒
DM-RD-A	Device Management - ReinitializeDevice–A	☐	ReinitializeDevice	☒	☐
DM-RD-B	Device Management - ReinitializeDevice–B	☒	ReinitializeDevice	☐	☒
DM-BR-A	Device Management - Backup and Restore–A	☐	AtomicReadFile	☒	☐
		☐	AtomicWriteFile	☒	☐
		☐	CreateObject	☒	☐
		☐	ReinitializeDevice	☒	☐
DM-BR-B	Device Management - Backup and Restore–B	☐	AtomicReadFile	☐	☒
		☐	AtomicWriteFile	☐	☒
		☐	ReinitializeDevice	☐	☒
DM-R-A	Device Management - Restart–A	☐	UnconfimedCOVNotification	☐	☒
DM-R-B	Device Management - Restart–B	☐	UnconfimedCOVNotification	☒	☐
DM-LM-A	Device Management - List Manipulation–A	☐	AddListElement	☒	☐
		☐	RemoveListElement	☒	☐
DM-LM-B	Device Management - List Manipulation–B	☐	AddListElement	☐	☒
		☐	RemoveListElement	☐	☒
DM-OCD-A	Device Management - Object Creation and Deletion–A	☐	CreateObject	☒	☐
		☐	DeleteObject	☒	☐
DM-OCD-B	Device Management - Object Creation and Deletion–B	☐	CreateObject	☐	☒
		☐	DeleteObject	☐	☒
DM-VT-A	Device Management - Virtual Terminal–A	☐	VT-Open	☒	☐
		☐	VT-Close	☒	☒
		☐	VT-Data	☒	☒
DM-VT-B	Device Management - Virtual Terminal–B	☐	VT-Open	☐	☒
		☐	VT-Close	☒	☒
		☐	VT-Data	☒	☒

4 Service Types

Service type	Service name	Supported	Remarks
Alarm and Event Services	AcknowledgeAlarm	☐	
	ConfirmedCOVNotification	☐	
	ConfirmedEventNotification	☐	
	GetAlarmSummary	☐	
	GetEnrollmentSummary	☐	
	SubscribeCOV	☒	
File Access Services	AtomicReadFile	☐	
	AtomicWriteFile	☐	
Object Access Services	AddListElement	☐	
	RemoveListElement	☐	
	CreateObject	☐	
	DeleteObject	☐	
	ReadProperty	☒	
	ReadPropertyConditional	☐	
	ReadPropertyMultiple	☒	
	ReadRange	☐	
	WriteProperty	☒	
	WritePropertyMultiple	☒	
Remote Device Management Services	DeviceComminicationControl	☐	
	ConfirmedPrivateTransfer	☐	
	ConfirmedTextMessage	☐	
	ReinitializeDevice	☒	
Virtual Terminal Services	VtOpen	☐	
	VtClose	☐	
	VtData	☐	
Security Services	Authenticate	☐	
	RequestKey	☐	
Unconfirmed Services	I-Am	☒	
	I-Have	☒	
	UnconfirmedCOVNotification	☐	
	UnconfirmedEventNotification	☐	
	UnconfirmedPrivateTransfer	☐	
	UnconfirmedTextMessage	☐	
	TimeSynchronization	☐	
	UtcTimeSynchronization	☐	
	Who-Has	☒	
	Who-Is	☒	
	LifeSafetyOperation	☐	
	SubscribeCOVProperty	☒	
	GetEventInformation	☐	

5 Objects

5.1 Supported Object Types

The objects supported are shown in the table below.

Object Type	ID	Supported	Management Point
Analog-Input	0	☒	SetPoint_status Room Temperature_status ErrorCode DIP_SW_S1_status DIP_SW_S2_status SerialNumber
Analog-Output	1	☒	SetPoint_command RoomTemperature_command
Analog-Value	2	☒	OnTimeCounter OccupiedCoolSetPoint OccupiedHeatSetPoint UnoccupiedCoolSetPoint UnoccupiedHeatSetPoint
Averaging	18	☐	
Binary-Input	3	☒	OnOff_status ErrorActive
Binary-Output	4	☒	OnOff_command
Binary-Value	5	☒	OccupancyContinousCheck UnnoccupiedDeadBandAction
Calendar	6	☐	
Command	7	☐	
Device	8	☒	INBACMID001I100
Event-Enrollment	9	☐	
File	10	☐	
Group	11	☐	
Life-Safety-Point	21	☐	
Life-Safety-Zone	22	☐	
Loop	12	☐	
Multistate-Input	13	☒	Mode_status FanSpeed_status AirDirectionUD_status ErrorCodeM RemoteControllerProhibit_status Midea_setting
Multistate-Output	14	☒	Mode_command FanSpeed_command AirDirectionUD_command RemoteControllerProhibit_command
Multistate-Value	19	☒	Occupancy AC_IU_address
Notification-Class	15	☐	
Program	16	☐	
Schedule	17	☐	
Trend-Log	20	☐	

5.2 Member objects

5.2.1 Type: Gateway

Object-name	Description	Object-type	Object-instance
INBACMID001I100	Ductless AC Interface	Device	246000*

* This is the default value.

5.2.2 Type: Indoor Unit

Object-name	Description	Object-type	Object-instance
OnOff_status		BI	0
OnOff_command		BO	0
Mode_status		MI	0
Mode_command		MO	0
SetPoint_status		AI	0
SetPoint_command		AO	0
FanSpeed_status		MI	1
FanSpeed_command		MO	1
AirDirectionUD_status		MI	2
AirDirectionUD_command		MO	2
RoomTemperature_status		AI	1
RoomTemperature_command		AO	1
ErrorCode		AI	2
ErrorCodeM		MI	4
ErrorActive		BI	1
OnTimeCounter		AV	0
Occupancy		MV	0
OccupiedCoolSetPoint		AV	1
OccupiedHeatSetPoint		AV	2
UnoccupiedCoolSetPoint		AV	3
UnoccupiedHeatSetPoint		AV	4
OccupancyContinuousCheck		BV	0
UnoccupiedDeadbandAction		BV	1
RemoteControllerProhibit_status		MI	6
RemoteControllerProhibit_command		MO	5
DIP_SW_S1_status		AI	9
DIP_SW_S2_status		AI	10
SerialNumber		AI	11
AC_IU_address		MV	1
Midea_setting		MI	11

5.3 Objects and properties

5.3.1 Ductless AC Gateway (Device Object Type)

Below you can find relevant information about the properties of the object type.

Object_Identifier: identifying the device in the BACnet MSTP network can be done automatically or manually:

- Automatical addressing. This is the device factory mode. Automatic addressing is based on using a base address of 246000 and adding to this number the address selected in SW2 P1...P7.
- Manual addressing. Device will switch into manual addressing mode once a value is received from BACnet side in this property. During manual addressing mode, SW2 P1...P7 address is not considered.

⚠ ***Important***: If **Object_Identifier** is overwritten from BACnet, SW2 configuration will not be considered for device instance calculation until a **Restore factory Settings** reset is performed.

Object_Name: In the **Device Object**, is configurable writing directly on this property.

Description: In the **Device Object**, is configurable writing directly on the property, length maximum 63 chars.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Device, 246000*)	R	W
Object_Name	CharacterString	"INBACMID001I100"	R	W
Object_Type	BACnetObjectType	DEVICE (8) (Device Object Type)	R	R
System_Status	BACnetDeviceStatus	OPERATIONAL (0)	R	R
Vendor_Name	CharacterString	"HMS Industrial Networks S.L.U"	R	R
Vendor_Identifier	Unsigned16	246	R	R
Model_Name	CharacterString	"INBACMID001I100"	R	R
Firmware_Revision	CharacterString	"1.0.0.0"	R	R
Application_Software_ Version	CharacterString	"1.0.0.0"	R	R
Location	CharacterString	""	O	-
Description	CharacterString	"Ductless AC interface"	O	W
Protocol_Version	Unsigned	1	R	R
Protocol_Revision	Unsigned	12	R	R
Protocol_Services_ Supported	BACnetServiceSupported	Refer to section 4 [Service Types]	R	R
Protocol_Object_Types_ Supported	BACnetObjectTypes Supported	Refer to section 5.1 [Object Types]	R	R
Object_List	BACnetArray[N] of BACnetObjectIdentifier	BACnetARRAY[N]	R	R
Structured_Object_List	BACnetArray[N] of BACnetObjectIdentifier	-	O	-
Max_APDU_Length_ Accepted	Unsigned	480	R	R
Segmentation_Supported	BACnetSegmentation	SEGMENTED-BOTH (0)	R	R
Max_Segments_accepted	Unsigned	16	O	R
VT_Classes_Supported	List of BACnetVTClass	-	O	-
Active_VT_Sessions	List of BACnetVTSession	-	O	-

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Local_Date	Date	-	O	-
Local_Time	Time	-	O	-
UTC_Offset	INTEGER	-	O	-
Daylight_Savings_Status	BOOLEAN	-	O	-
APDU_Segment_Timeout	Unsigned	3000	R	R
APDU_Timeout	Unsigned	3000	R	R
Number_of_APDU_ Retries	Unsigned	3	R	R
List_Of_Session_Keys	List of BACnetSessionKey	-	O	-
Time_Synchronization_ Recipients	List of BACnetRecipient	-	O	-
Max_Master	Unsigned	32	R	W
Max_Info_Frames	Unsigned	1	O	R
Device_Address_Binding	List of BACnetAddressBinding	NULL (empty)	R	R
Database_Revision	Unsigned	0	R	R
Configuration_Files	BACnetArray[N] of BACnetObjectIdentifier	-	O	-
Last_Restore_Time	BACnetTimeStamp	-	O	-
Backup_Failure_Timeout	Unsigned16	-	O	-
Active_COV_ Subscriptions	List of BACnetCOVSubscription	List of BACnetCOVSubscription	O	R
Slave_Proxy_Enable	BACnetArray[N] of BOOLEAN	-	O	-
Manual_Slave_Address_ Binding	List of BACnetAddressBinding	-	O	-
Auto_Slave_Discovery	BACnetArray[N] of BOOLEAN	-	O	-
Slave_Address_Binding	BACnetAddressBinding	-	O	-
Last_Restart_Reason	BACnetRestartReason	-	O	-
Time_Of_Device_Restart	BACnetTimeStamp	-	O	-
Restart_Notification_ Recipients	List of BACnetRecipient	-	O	-
UTC_Time_ Synchronization_ Recipients	List of BACnetRecipient	-	O	-
Time_Synchronization_ Interval	Unsigned	-	O	-
Align_Intervals	BOOLEAN	-	O	-
Interval_Offset	Unsigned	-	O	-
Profile_Name	CharacterString	-	O	-

* This is the default value.

5.3.2 OnOff_status (Binary Input Object Type)

It indicates if the indoor unit is in On or Off status.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Binary Input, 0)	R	R
Object_Name	CharacterString	"OnOff_status"	R	R
Object_Type	BACnetObjectType	BINARY_INPUT (3)	R	R
Present_Value	BACnetBinaryPV	INACTIVE (0) / ACTIVE (1)	R	R
Description	CharacterString	-	O	-
Device_Type	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE/TRUE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0), UNRELIABLE_OTHER (7)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Polarity	BACnetPolarity	NORMAL (0)	R	R
Inactive_Text	CharacterString	"Off"	O	R
Active_Text	CharacterString	"On"	O	R
Change_Of_State_Time	BACnetDatetime	-	O	-
Change_Of_State_Count	Unsigned	-	O	-
Time_Of_State_Count_Reset	BACnetDatetime	-	O	-
Elapsed_Active_Time	Unsigned	-	O	-
Time_Of_Active_Time_Reset	BACnetDatetime	-	O	-
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
Alarm_Value	BACnetBinaryPV	-	O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-

5.3.3 OnOff_command (Binary Output Object Type)

It sets the indoor unit to On or Off.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Binary Output, 0)	R	R
Object_Name	CharacterString	"OnOff_command"	R	R
Object_Type	BACnetObjectType	BINARY_OUTPUT (4)	R	R
Present_Value	BACnetBinaryPV	INACTIVE (0) / ACTIVE (1)	W	W
Description	CharacterString	-	O	-
Device_Type	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Polarity	BACnetPolarity	NORMAL (0)	R	R
Inactive_Text	CharacterString	"Off"	O	R
Active_Text	CharacterString	"On"	O	R
Change_Of_State_Time	BACnetDatetime	-	O	-
Change_Of_State_Count	Unsigned	-	O	-
Time_Of_State_Count_Reset	BACnetDatetime	-	O	-
Elapsed_Active_Time	Unsigned	-	O	-
Time_Of_Active_Time_Reset	BACnetDatetime	-	O	-
Minimum_Off_Time	Unsigned32	-	O	-
Minimum_On_Time	Unsigned32	-	O	-
Priority_Array	BACnetPriorityArray	BACnetPriorityArray	R	R
Relinquish_Default	BACnetBinaryPV	INACTIVE (0)	R	R
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
Feedback_Value	BACnetBinaryPV	-	O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-

5.3.4 Mode_status (Multistate Input Object Type)

It indicates the active mode for the indoor unit.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Multi-state Input, 0)	R	R
Object_Name	CharacterString	"Mode_status"	R	R
Object_Type	BACnetObjectType	MULTISTATE_INPUT (13)	R	R
Present_Value	Unsigned	1 ~ 5	R	R
Description	CharacterString	-	O	-
Device_Type	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE/TRUE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0), UNRELIABLE_OTHER (7)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Number_Of_States	Unsigned	5	R	R
State_Text	BACnetArray[N] of CharacterString	*Check **Mode Status setting table** below.*	O	R
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
Alarm_Values	List of Unsigned	-	O	-
Fault_Values	List of Unsigned	-	O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-

Mode status setting table

Mode status interpretation is possible using the value in the following correspondence table.

Pesent_Value	Contents displayed in State_Text
1	Heat
2	Cool
3	Fan
4	Dry
5	Auto

5.3.5 Mode_command (Multistate Output Object Type)

It allows control over the indoor unit's mode.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Multi-state Output, 0)	R	R
Object_Name	CharacterString	"Mode_command"	R	R
Object_Type	BACnetObjectType	MULTISTATE_OUTPUT (14)	R	R
Present_Value	Unsigned	1 ~ 5	W	W
Description	CharacterString	-	O	-
Device_Type	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Number_Of_States	Unsigned	5	R	R
State_Text	BACnetArray[N] of CharacterString	*Check **Mode Command setting table** below*	O	R
Priority_Array	BACnetPriorityArray	BACnetPriorityArray	R	R
Relinquish_Default	Unsigned	1	R	R
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
Feedback_Value	Unsigned	-	O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-

Mode Command setting table

Mode commands can be set using the values in the following correspondence table.

Pesent_Value	Contents displayed in State_Text
1	Heat
2	Cool
3	Fan
4	Dry
5	Auto

5.3.6 Setpoint_status (Analog Input Object Type)

It indicates the current setpoint temperature in the indoor unit.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Analog Input, 0)	R	R
Object_Name	CharacterString	"SetPoint_status"	R	R
Object_Type	BACnetObjectType	ANALOG_INPUT (0)	R	R
Present_Value*	REAL	16...32 °C // 61...90 °F	R	R
Description	CharacterString	-	O	-
Device_Type	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE/TRUE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0), UNRELIABLE_OTHER (7)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Update_Interval	Unsigned	-	O	-
Units *	BACnetEngineeringUnits	Degrees Celsius (62), Degrees Fahrenheit (64)	R	R
Min_Pres_Value *	REAL	16ºC / 61 ºF	O	R
Max_Pres_Value *	REAL	32ºC / 90ºF	O	R
Resolution	REAL	-	O	-
COV_Increment	REAL	0	O	W
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
High_Limit	REAL	-	O	-
Low_Limit	REAL	-	O	-
Deadband	REAL	-	O	-
Limit_Enable	BACnetLimitEnable	-	O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-

* Use of Celsius or Fahrenheits units can be selected throught the switch configuration. Check section 6.1 for more information.

5.3.7 Setpoint_command (Analog Output Object Type)

It sets the desired temperature in the indoor unit.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Analog Output, 0)	R	R
Object_Name	CharacterString	"SetPoint_command"	R	R
Object_Type	BACnetObjectType	ANALOG_OUTPUT (1)	R	R
Present_Value *	REAL	16...32 ºC // 61...90 ºF	R	R
Description	CharacterString	-	O	-
Device_Type	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Update_Interval	Unsigned	-	O	-
Units *	BACnetEngineeringUnits	Degrees Celsius (62), Degrees Fahrenheit (64)	R	R
Min_Pres_Value	REAL	16ºC / 61 ºF	O	R
Max_Pres_Value	REAL	32ºC / 90ºF	O	R
Resolution	REAL	-	O	-
COV_Increment	REAL	0	O	W
Priority_Array	BACnetPriorityArray	BACnetPriorityArray	R	R
Relinquish_Default	Unsigned	22	R	R
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
High_Limit	REAL	-	O	-
Low_Limit	REAL	-	O	-
Deadband	REAL	-	O	-
Limit_Enable	BACnetLimitEnable	-	O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-

* Use of Celsius or Fahrenheits units can be selected throught the switch configuration. Check section 6.1 for more information.

5.3.8 FanSpeed_status (Multistate Input Object Type)

It indicates the fan speed status of the indoor unit.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Multi-state Input, 1)	R	R
Object_Name	CharacterString	"FanSpeed_status"	R	R
Object_Type	BACnetObjectType	MULTISTATE_INPUT (13)	R	R
Present_Value	Unsigned	1 ~ 4	R	R
Description	CharacterString	-	O	-
Device_Type	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE/TRUE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0), UNRELIABLE_OTHER (7)	O	R
Out_Of_Service	BOOLEAN	FALSE/TRUE	R	R
Number_Of_States	Unsigned	4	R	R
State_Text	BACnetArray[N] of CharacterString	*Check **Fan Speed status setting table** below.*	O	R
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
Alarm_Values	List of Unsigned	-	O	-
Fault_Values	List of Unsigned	-	O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-

Fan Speed status setting table

Fan speed interpretation is possible using the value in the following correspondence table.

Pesent_Value	Contents displayed in State_Text
1	Auto
2	Fan Speed 1
3	Fan Speed 2
4	Fan Speed 3

5.3.9 FanSpeed_command (Multistate Output Object Type)

It allows control over the fan speed for the indoor unit.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Multi-state Output, 1)	R	R
Object_Name	CharacterString	"FanSpeed_command"	R	R
Object_Type	BACnetObjectType	MULTISTATE_OUTPUT (14)	R	R
Present_Value	Unsigned	1 ~ 4	W	W
Description	CharacterString	-	O	-
Device_Type	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Number_Of_States	Unsigned	4	R	R
State_Text	BACnetArray[N] of CharacterString	*Check **Fan Speed command setting table** below*	O	R
Priority_Array	BACnetPriorityArray	BACnetPriorityArray	R	R
Relinquish_Default	Unsigned	1	R	R
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
Feedback_Value	Unsigned	-	O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-

Fan Speed command setting table

Fan speed interpretation is possible using the value in the following correspondence table.

Pesent_Value	Contents displayed in State_Text
1	Auto
2	Fan Speed 1
3	Fan Speed 2
4	Fan Speed 3

5.3.10 AirDirectionUD_status (Multistate Input Object Type)

It indicates the status of the vertical vane (Up/Down) for the indoor unit.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Multi-state Input, 2)	R	R
Object_Name	CharacterString	"AirDirectionUD_status"	R	R
Object_Type	BACnetObjectType	MULTISTATE_INPUT(13)	R	R
Present_Value	Unsigned	1 ~ 2	R	R
Description	CharacterString	-	O	-
Device_Type	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE/TRUE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0), UNRELIABLE_OTHER (7)	O	R
Out_Of_Service	BOOLEAN	FALSE/TRUE	R	R
Number_Of_States	Unsigned	2	R	R
State_Text	BACnetArray[N] of CharacterString	*Check **Air Direction Status setting table** below.*	O	R
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
Alarm_Values	List of Unsigned	-	O	-
Fault_Values	List of Unsigned	-	O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-

Air direction Up/Down status setting table

Air direction interpretation is possible using the value in the following correspondence table.

Pesent_Value	Contents displayed in State_Text
1	Stop
2	Swing

5.3.11 AirDirectionUD_command (Multistate Output Object Type)

It allows control over the vertical air direction (Up/Down) for the indoor unit.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Multi-state Output, 2)	R	R
Object_Name	CharacterString	"AirDirectionUD_command"	R	R
Object_Type	BACnetObjectType	MULTISTATE_OUTPUT (14)	R	R
Present_Value	Unsigned	1 ~ 2	W	W
Description	CharacterString	-	O	-
Device_Type	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Number_Of_States	Unsigned	2	R	R
State_Text	BACnetArray[N] of CharacterString	*Check **Air Direction Command setting table** below*	O	R
Priority_Array	BACnetPriorityArray	-	R	R
Relinquish_Default	Unsigned	-	R	R
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
Feedback_Value	Unsigned	-	O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-

Air direction Up/Down Command setting table

Air direction commands can be set using the values in the following correspondence table.

Pesent_Value	Contents displayed in State_Text
1	Stop
2	Swing

5.3.12 RoomTemperature_status (Analog Input Object Type)

It indicates the room temperature from the sensor in the indoor unit.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Analog Input, 1)	R	R
Object_Name	CharacterString	"RoomTemperature_status"	R	R
Object_Type	BACnetObjectType	ANALOG_INPUT (0)	R	R
Present_Value	REAL	-20...100ºC // -4...212 ºF	R	R
Description	CharacterString	-	O	-
Device_Type	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE/TRUE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0), UNRELIABLE_OTHER (7)	O	R
Out_Of_Service	BOOLEAN	FALSE/TRUE	R	R
Update_Interval	Unsigned	-	O	-
Units	BACnetEngineeringUnits	Degrees Celsius (62) Degrees Fahrenheit (64)	R	R
Min_Pres_Value	REAL	-20ºC / -4ºF	O	-
Max_Pres_Value	REAL	100ºC / 212ºF	O	-
Resolution	REAL	-	O	-
COV_Increment	REAL	0	O	W
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
High_Limit	REAL	-	O	-
Low_Limit	REAL	-	O	-
Deadband	REAL	-	O	-
Limit_Enable	BACnetLimitEnable	-	O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-

5.3.13 RoomTemperature_command (Analog Output Object Type)

It sets the desired temperature in the indoor unit.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Analog Output, 1)	R	R
Object_Name	CharacterString	"RoomTemperature_command"	R	R
Object_Type	BACnetObjectType	ANALOG_OUTPUT (1)	R	R
Present_Value *	REAL	-20...100ºC // -4...212 ºF	R	R
Description	CharacterString	-	O	-
Device_Type	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Update_Interval	Unsigned	-	O	-
Units *	BACnetEngineeringUnits	Degrees Celsius (62), Degrees Fahrenheit (64)	R	R
Min_Pres_Value	REAL	-20ºC / -4ºF	O	R
Max_Pres_Value	REAL	100ºC / 212ºF	O	R
Resolution	REAL	-	O	-
COV_Increment	REAL	0	O	W
Priority_Array	BACnetPriorityArray	BACnetPriorityArray	R	R
Relinquish_Default	Unsigned	22	R	R
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
High_Limit	REAL	-	O	-
Low_Limit	REAL	-	O	-
Deadband	REAL	-	O	-
Limit_Enable	BACnetLimitEnable	-	O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-

* Use of Celsius or Fahrenheits units can be selected throught the switch configuration. Check section 6.1 for more information.

5.3.14 ErrorCode (Analog Input Object Type)

It indicates the current error present in the AC system.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Analog Input, 2)	R	R
Object_Name	CharacterString	"ErrorCode"	R	R
Object_Type	BACnetObjectType	ANALOG_INPUT (0)	R	R
Present_Value	REAL	-1... 6846	R	R
Description	CharacterString	-	O	-
Device_Type	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Update_Interval	Unsigned	300	O	-
Units	BACnetEngineeringUnits	NO_UNITS (95)	R	R
Min_Pres_Value	REAL	-	O	-
Max_Pres_Value	REAL	-	O	-
Resolution	REAL	-	O	-
COV_Increment	REAL	0	O	W
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
High_Limit	REAL	-	O	-
Low_Limit	REAL	-	O	-
Deadband	REAL	-	O	-
Limit_Enable	BACnetLimitEnable	-	O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-

5.3.15 ErrorCodeM (Multistate Input Object Type)

It indicates the current error present in the AC system.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Multi-state Input, 4)	R	R
Object_Name	CharacterString	"ErrorCodeM"	R	R
Object_Type	BACnetObjectType	MULTISTATE_INPUT(13)	R	R
Present_Value	Unsigned	1 ~ 34	R	R
Description	CharacterString	-	O	-
Device_Type	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Number_Of_States	Unsigned	34	R	R
State_Text	BACnetArray[N] of CharacterString	*Check **Error Code table** below.*	O	R
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
Alarm_Values	List of Unsigned	-	O	-
Fault_Values	List of Unsigned	-	O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-

Error Code table

In the table below you will find the error correspondence value.

Pesent_Value	State_Text	Pesent_Value	State_Text
1	-	19	P1
2	CommError	20	P2
3	E0	21	P3
4	E1	22	P4
5	E2	23	P5
6	E3	24	P6
7	E4	25	P7
8	E5	26	P8
9	E6	27	P9
10	E7	28	PA
11	E8	29	PB
12	E9	30	PC
13	EA	31	PD
14	EB	32	PE
15	EC	33	PF
16	ED		
17	EE		
18	EF		

5.3.16 ErrorActive (Binary Input Object Type)

It indicates if there is an error active in the indoor unit.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Binary Input, 1)	R	R
Object_Name	CharacterString	"ErrorActive"	R	R
Object_Type	BACnetObjectType	BINARY_INPUT (3)	R	R
Present_Value	BACnetBinaryPV	INACTIVE (0) / ACTIVE (1)	R	R
Description	CharacterString	-	O	-
Device_Type	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Polarity	BACnetPolarity	NORMAL (0)	R	R
Inactive_Text	CharacterString	"No"	O	R
Active_Text	CharacterString	"Error"	O	R
Change_Of_State_Time	BACnetDatetime	-	O	-
Change_Of_State_Count	Unsigned	-	O	-
Time_Of_State_Count_Reset	BACnetDatetime	-	O	-
Elapsed_Active_Time	Unsigned	-	O	-
Time_Of_Active_Time_Reset	BACnetDatetime	-	O	-
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
Alarm_Value	BACnetBinaryPV	-	O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-

5.3.17 OnTimeCounter (Analog Value Object Type)

It indicates the current Setpoint when Cool mode is selected and Occupany is enabled.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Analog Value, 0)	R	R
Object_Name	CharacterString	"OnTimeCounter"	R	R
Object_Type	BACnetObjectType	ANALOG_VALUE (2)	R	R
Present_Value	REAL	0 .. 65535	R	R
Description	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Update_Interval	Unsigned	-	O	-
Units	BACnetEngineeringUnits	Hours (71)	R	R
Min_Pres_Value	REAL	-	O	-
Max_Pres_Value	REAL	-	O	-
Resolution	REAL	-	O	-
COV_Increment	REAL	0	O	W
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
High_Limit	REAL	-	O	-
Low_Limit	REAL	-	O	-
Deadband	REAL	-	O	-
Limit_Enable	BACnetLimitEnable	-	O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-

5.3.18 Occupancy (Multistate Value Object Type)

It indicates the use or not of the occupancy function.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Multi-state Output, 0)	R	R
Object_Name	CharacterString	"Occupancy"	R	R
Object_Type	BACnetObjectType	MULTISTATE_VALUE (19)	R	R
Present_Value	Unsigned	1 ~ 3	W	W
Description	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Number_Of_States	Unsigned	3	R	R
State_Text	BACnetArray[N] of CharacterString	*Check **Occupancy setting table** below*	O	R
Priority_Array	BACnetPriorityArray	-	R	-
Relinquish_Default	Unsigned	-	R	-
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
Alarm_Value	Unsigned	-	O	-
Fault_Value	Unsigned		O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-

Occupancy values table

Check possible Occupancy values in the following correspondence table.

Pesent_Value	Contents displayed in State_Text
1	Occupied
2	Unoccupied
3	Disabled

5.3.19 OccupiedCoolSetPoint (Analog Value Object Type)

It indicates the current Setpoint when Cool mode is selected and Occupancy is enabled and the room is occupied.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Analog Value, 1)	R	R
Object_Name	CharacterString	"OccupiedCoolSetPoint"	R	R
Object_Type	BACnetObjectType	ANALOG_VALUE (2)	R	R
Present_Value	REAL	0 .. 65535	R	R
Description	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Update_Interval	Unsigned	-	O	-
Units	BACnetEngineeringUnits	Degrees Celsius (62)	R	R
Min_Pres_Value	REAL	-	O	-
Max_Pres_Value	REAL	-	O	-
Resolution	REAL	-	O	-
COV_Increment	REAL	0	O	W
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
High_Limit	REAL	-	O	-
Low_Limit	REAL	-	O	-
Deadband	REAL	-	O	-
Limit_Enable	BACnetLimitEnable	-	O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-

5.3.20 OccupiedHeatSetPoint (Analog Value Object Type)

It indicates the current Setpoint when Heat mode is selected, and Occupancy is enabled and the room is occupied.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Analog Value, 2)	R	R
Object_Name	CharacterString	"OccupiedHeatSetPoint"	R	R
Object_Type	BACnetObjectType	ANALOG_VALUE (2)	R	R
Present_Value	REAL	0 .. 65535	R	R
Description	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Update_Interval	Unsigned	-	O	-
Units	BACnetEngineeringUnits	Degrees Celsius (62)	R	R
Min_Pres_Value	REAL	-	O	-
Max_Pres_Value	REAL	-	O	-
Resolution	REAL	-	O	-
COV_Increment	REAL	0	O	W
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
High_Limit	REAL	-	O	-
Low_Limit	REAL	-	O	-
Deadband	REAL	-	O	-
Limit_Enable	BACnetLimitEnable	-	O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-

5.3.21 UnoccupiedCoolSetPoint (Analog Value Object Type)

It indicates the current Setpoint when Cool mode is selected, Occupancy is enabled, and the room is unoccupied.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Analog Value, 3)	R	R
Object_Name	CharacterString	"UnoccupiedCoolSetPoint"	R	R
Object_Type	BACnetObjectType	ANALOG_VALUE (2)	R	R
Present_Value	REAL	0 .. 65535	R	R
Description	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Update_Interval	Unsigned	-	O	-
Units	BACnetEngineeringUnits	Degrees Celsius (62)	R	R
Min_Pres_Value	REAL	-	O	-
Max_Pres_Value	REAL	-	O	-
Resolution	REAL	-	O	-
COV_Increment	REAL	0	O	W
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
High_Limit	REAL	-	O	-
Low_Limit	REAL	-	O	-
Deadband	REAL	-	O	-
Limit_Enable	BACnetLimitEnable	-	O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-

5.3.22 UnoccupiedHeatSetPoint (Analog Value Object Type)

It indicates the current Setpoint when Heat mode is selected, and Occupancy is enabled, and the room is unoccupied.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Analog Value, 4)	R	R
Object_Name	CharacterString	"UnoccupiedHeatSetPoint"	R	R
Object_Type	BACnetObjectType	ANALOG_VALUE (2)	R	R
Present_Value	REAL	0 .. 65535	R	R
Description	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Update_Interval	Unsigned	-	O	-
Units	BACnetEngineeringUnits	Degrees Celsius (62)	R	R
Min_Pres_Value	REAL	-	O	-
Max_Pres_Value	REAL	-	O	-
Resolution	REAL	-	O	-
COV_Increment	REAL	0	O	W
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
High_Limit	REAL	-	O	-
Low_Limit	REAL	-	O	-
Deadband	REAL	-	O	-
Limit_Enable	BACnetLimitEnable	-	O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-

5.3.23 OccupancyContinuousCheck (Binary Value Object Type)

It indicates if the system is continuously checking the setpoint and occupancy conditions.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Binary Value, 0)	R	R
Object_Name	CharacterString	"OccupancyContinuousCheck"	R	R
Object_Type	BACnetObjectType	BINARY_VALUE (5)	R	R
Present_Value	BACnetBinaryPV	INACTIVE (0) / ACTIVE (1)	W	W
Description	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Inactive_Text	CharacterString	"Disabled"	O	R
Active_Text	CharacterString	"Enabled"	O	R
Change_Of_State_Time	BACnetDatetime	-	O	-
Change_Of_State_Count	Unsigned	-	O	-
Time_Of_State_Count_Reset	BACnetDatetime	-	O	-
Elapsed_Active_Time	Unsigned	-	O	-
Time_Of_Active_Time_Reset	BACnetDatetime	-	O	-
Minimum_Off_Time	Unsigned32	-	O	-
Minimum_On_Time	Unsigned32	-	O	-
Priority_Array	BACnetPriorityArray	BACnetPriorityArray	R	-
Relinquish_Default	BACnetBinaryPV	INACTIVE (0)	R	-
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
Alarm_Value	BACnetBinaryPV	-	O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-

5.3.24 UnoccupiedDeadbandAction (Binary Value Object Type)

It indicates the action to be performed by the system when Unoccupancy is enabled and Room Temperature is within the deadband.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Binary Value, 1)	R	R
Object_Name	CharacterString	"UnoccupiedDeadbandAction"	R	R
Object_Type	BACnetObjectType	BINARY_VALUE (5)	R	R
Present_Value	BACnetBinaryPV	INACTIVE (0) / ACTIVE (1)	W	W
Description	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Inactive_Text	CharacterString	"Off"	O	R
Active_Text	CharacterString	"CurrentMode"	O	R
Change_Of_State_Time	BACnetDatetime	-	O	-
Change_Of_State_Count	Unsigned	-	O	-
Time_Of_State_Count_Reset	BACnetDatetime	-	O	-
Elapsed_Active_Time	Unsigned	-	O	-
Time_Of_Active_Time_Reset	BACnetDatetime	-	O	-
Minimum_Off_Time	Unsigned32	-	O	-
Minimum_On_Time	Unsigned32	-	O	-
Priority_Array	BACnetPriorityArray	BACnetPriorityArray	R	-
Relinquish_Default	BACnetBinaryPV	INACTIVE (0)	R	-
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
Alarm_Value	BACnetBinaryPV	-	O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] ofBACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-

5.3.25 RemoteControllerProhibit_status (Multistate Input Object Type)

It indicates the status prohibition of the remote controller.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Multi-state Input, 6)	R	R
Object_Name	CharacterString	"RemoteControllerProhibit_status"	R	R
Object_Type	BACnetObjectType	MULTISTATE_INPUT(13)	R	R
Present_Value	Unsigned	1 ~ 2	R	R
Description	CharacterString	-	O	-
Device_Type	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE/TRUE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0), UNRELIABLE_OTHER (7)	O	R
Out_Of_Service	BOOLEAN	FALSE/TRUE	R	R
Number_Of_States	Unsigned	2	R	R
State_Text	BACnetArray[N] of CharacterString	*Check **Remote Controller Prohibit Status table** below.*	O	R
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
Alarm_Values	List of Unsigned	-	O	-
Fault_Values	List of Unsigned	-	O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-

Remote controller prohibit status table

Remoe controller prohibit interpretation is possible using the value in the following correspondence table.

Pesent_Value	Contents displayed in State_Text
1	Unlocked
2	Locked

5.3.26 RemoteControllerProhibit_command (Multistate Output Object Type)

It allows control over the vertical air direction (Up/Down) for the indoor unit.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Multi-state Output, 5)	R	R
Object_Name	CharacterString	"RemoteControllerProhibit_command"	R	R
Object_Type	BACnetObjectType	MULTISTATE_OUTPUT (14)	R	R
Present_Value	Unsigned	1 ~ 2	W	W
Description	CharacterString	-	O	-
Device_Type	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Number_Of_States	Unsigned	2	R	R
State_Text	BACnetArray[N] of CharacterString	*Check **Remote Controller Prohibit Command setting table** below.*	O	R
Priority_Array	BACnetPriorityArray	-	R	R
Relinquish_Default	Unsigned	-	R	R
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
Feedback_Value	Unsigned	-	O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-

Remote controller prohibit command setting table

Remoe controller prohibit interpretation is possible using the value in the following correspondence table.

Pesent_Value	Contents displayed in State_Text
1	Unlocked
2	Locked

5.3.27 DIP_SW_S1_status (Analog Input Object Type)

It indicates the status of the DIP switch 1 in decimal value. To get the micro-switch position, just translate the value into binary. It is only read after booting the device.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Analog Input, 9)	R	R
Object_Name	CharacterString	"DIP_SW_S1_status"	R	R
Object_Type	BACnetObjectType	ANALOG_INPUT (0)	R	R
Present_Value	BACnetBinaryPV	0...255*	R	R
Description	CharacterString	-	O	-
Device_Type	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0)	O	R
Out_Of_Service	BOOLEAN	FALSE / TRUE	R	R
Polarity	BACnetPolarity	NORMAL (0)	R	R
Inactive_Text	CharacterString		O	R
Active_Text	CharacterString		O	R
Change_Of_State_Time	BACnetDatetime	-	O	-
Change_Of_State_Count	Unsigned	-	O	-
Time_Of_State_Count_Reset	BACnetDatetime	-	O	-
Elapsed_Active_Time	Unsigned	-	O	-
Time_Of_Active_Time_Reset	BACnetDatetime	-	O	-
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
Alarm_Value	BACnetBinaryPV	-	O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-
Units	BACnetEngineeringUnits	No units (95)	R	R
COV_Increment	REAL	0	O	W

5.3.28 DIP_SW_S2_status (Analog Input Object Type)

It indicates the status of the DIP switch 2 in decimal value. To get the micro-switch position, just translate the value into binary. It is only read after booting the device.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Analog Input, 10)	R	R
Object_Name	CharacterString	DIP_SW_S2_status	R	R
Object_Type	BACnetObjectType	ANALOG_INPUT (0)	R	R
Present_Value	BACnetBinaryPV	0...255*	R	R
Description	CharacterString	-	O	-
Device_Type	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Polarity	BACnetPolarity	NORMAL (0)	R	R
Inactive_Text	CharacterString		O	R
Active_Text	CharacterString		O	R
Change_Of_State_Time	BACnetDatetime	-	O	-
Change_Of_State_Count	Unsigned	-	O	-
Time_Of_State_Count_Reset	BACnetDatetime	-	O	-
Elapsed_Active_Time	Unsigned	-	O	-
Time_Of_Active_Time_Reset	BACnetDatetime	-	O	-
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
Alarm_Value	BACnetBinaryPV	-	O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-
Units	BACnetEngineeringUnits	No units (95)	R	R
COV_Increment	REAL	0	O	W

5.3.29 SerialNumber (Analog Input Object Type)

It indicates the serial number of the device. Serial number follows the next rule **000KXXXXX**, where:

- **000K** is constant and no included in Present Value property.
- **XXXXX** is the unique serial number of the device. It is the information provided through the Present Value.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Analog Input, 11)	R	R
Object_Name	CharacterString	SerialNumber	R	R
Object_Type	BACnetObjectType	ANALOG_INPUT (0)	R	R
Present_Value	BACnetBinaryPV	00000...99999	R	R
Description	CharacterString	-	O	-
Device_Type	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Polarity	BACnetPolarity	NORMAL (0)	R	R
Inactive_Text	CharacterString		O	R
Active_Text	CharacterString		O	R
Change_Of_State_Time	BACnetDatetime	-	O	-
Change_Of_State_Count	Unsigned	-	O	-
Time_Of_State_Count_Reset	BACnetDatetime	-	O	-
Elapsed_Active_Time	Unsigned	-	O	-
Time_Of_Active_Time_Reset	BACnetDatetime	-	O	-
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
Alarm_Value	BACnetBinaryPV	-	O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-
Units	BACnetEngineeringUnits	No units (95)	R	R
COV_Increment	REAL	0	O	W

5.3.30 AC IU address (Multistate Value Object Type)

It indicates the address of the indoor unit in the Ductless system.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Multi-state Output, 1)	R	R
Object_Name	CharacterString	"AC IU address"	R	R
Object_Type	BACnetObjectType	MULTISTATE_VALUE (19)	R	R
Present_Value	Unsigned	1 ~ 64	W	W
Description	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0)	O	R
Out_Of_Service	BOOLEAN	FALSE	R	R
Number_Of_States	Unsigned	64	R	R
State_Text	BACnetArray[N] of CharacterString	*Check **AC IU address setting table** below*	O	R
Priority_Array	BACnetPriorityArray	-	R	-
Relinquish_Default	Unsigned	-	R	-
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
Alarm_Value	Unsigned	-	O	-
Fault_Value	Unsigned		O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-

AC IU address values table

Check AC indoor unit address values in the following correspondence table.

Pesent_Value	Contents displayed in State_Text	AC Indoor unit address
1	0	0
2	1	1
3	2	2
...	...	...
62	61	61
63	62	62
64	63	63

5.3.31 Ductless_DIP_SW_setting (Multistate Input Object Type)

It indicates the DIP-SW-setting for the Ductless system.

Property Identifier	Property Datatype	Value	ASHRAE	IBOX
Object_Identifier	BACnetObjectIdentifier	(Multi-state Input, 11)	R	R
Object_Name	CharacterString	"Ductless _DIP_SW_setting"	R	R
Object_Type	BACnetObjectType	MULTISTATE_INPUT(13)	R	R
Present_Value	Unsigned	1 ~ 5	R	R
Description	CharacterString	-	O	-
Device_Type	CharacterString	-	O	-
Status_Flags	BACnetStatusFlags	{FALSE, FALSE/TRUE, FALSE, FALSE}	R	R
Event_State	BACnetEventState	STATE_NORMAL (0)	R	R
Reliability	BACnetReliability	NO_FAULT_DETECTED (0), UNRELIABLE_OTHER (7)	O	R
Out_Of_Service	BOOLEAN	FALSE/TRUE	R	R
Number_Of_States	Unsigned	5	R	R
State_Text	BACnetArray[N] of CharacterString	*Check* Ductless ***DIP SW setting table*** *below.*	O	R
Time_Delay	Unsigned	-	O	-
Notification_Class	Unsigned	-	O	-
Alarm_Values	List of Unsigned	-	O	-
Fault_Values	List of Unsigned	-	O	-
Event_Enable	BACnetEventTransitionBits	-	O	-
Acked_Transitions	BACnetEventTransitionBits	-	O	-
Notify_Type	BACnetNotifyType	-	O	-
Event_Time_Stamps	BACnetArray[N] of BACnetTimeStamp	-	O	-
Profile_Name	CharacterString	-	O	-

Ductless DIP SW setting table

Ductless DIP SW setting table interpretation is possible using the value in the following correspondence table.

Pesent_Value	Contents displayed in State_Text
1	Auto (detecting)
2	Auto V4
3	Auto V6
4	V4
5	V6

5.4 Considerations on Temperature Objects

The behavior of the temperature objects is described in detail in this section.

- **Setpoint_command (Analog Output Object Type)**
  This is the adjustable temperature setpoint value that must be required by the user.

  Present value can be read or written.

- **RoomTemperature_status (Analog Input Object Type)**
  This object reports the temperature that is currently used by the Ductless indoor unit as the reference of its own control loop. Depending on the configuration of the indoor unit, this value can be the temperature reported by the sensor on the return path of the Ductless indoor unit or the sensor of its remote controller.

  Present value can be read only.

- **RoomTemperature_command (Analog Output Object Type)**
  This object allows us to provide an external temperature's sensor from the BACnet side. Ductless indoor unit does not allow, on devices like INBACMID001I100 connected to XYE bus, to provide directly a temperature to be used as a reference of the control loop of the AC indoor unit. To overcome this limitation and enable the usage of an external temperature sensor, INBACMID001I100 applies the following mechanism called "Virtual Temperature":

  - After receiving ***RoomTemperature_command*** and ***Setpoint_command***, INBACMID001I100 is going to estimate the appropriate temperature setpoint.

Example. If a **Setpoint_command = 22ºC**, and **RoomTemperature_command = 20ºC** are received, INBACMID001I100 will assume that the user is demanding a **+2ºC** increase in temperature.

  - By knowing at any time, the reference temperature currently used by the indoor unit (the return temperature), INBACMID001I100 can calculate the required temperature setpoint needed to apply the decrease/increase on the real temperature and reach the temperature chosen by the user.

Following the example, if INBACMID001I100 reads a **RoomTemperature_command = 24ºC** in the indoor unit, it will apply a final setpoint of **24ºC + 2ºC = 26ºC.**

  - At this moment, every time that INBACMID001I100 detects a change on the ambient temperature reported by the indoor unit, it will also change the required setpoint to keep the temperature required by the user at any time.

If we follow the example, if INBACMID001I100 receives a new temperature value coming from the indoor unit of **25ºC**, INBACMID001I100 will automatically adjust the temperature setpoint required of the AC indoor unit to **25ºC + 2ºC = 27ºC**.

  - In general, INBACMID001I100 is constantly applying the "Virtual Temperature" formula:

$$S_{AC} = S_u - (T_u - T_{AC})$$

Where:
S_{AC} - setpoint value currently applied to the indoor unit
S_u - setpoint value
T_u - external temperature reference written at BACnet side
T_{AC} - ambient temperature that the indoor unit is using as the reference of its own control loop

    When INBACMID001I100 detects a change in any of the values of {S_u, T_u, T_{AC}}, it will send the new setpoint (S_{AC}) to the indoor unit.

  - After a device booting, Present value for **RoomTemperature_command** has a value 0 and the property "Realibility" is dislayed as *Unreliable Other* (7). This "Realibility" status means that no external temperature reference has being provided to the object, so the system is not applying the Virtual

temperature function. However, after receiving the first value, "Realibility" wil change into *Nofault Detected (0)*. After that, any value can be used in the temperature range, including 0.

- **Setpoint_status (Analog Input Object Type)**
- This register will show the real temperature sent to the indoor unit. It is the temperature that the AC unit is applying as a setpoint. Its behavior depends on virtual temperature function:
  - If virtual temperature in not in use, its value will be the same that **Setpoint_command** or the one sent by different means (IR remote, wall-mounted remote, etc.).
  - If virtual temperature is being used, the value will be the real setpoint modified by this function according to the formula explained above.

Present value can be read only.

Moreover, notice that temperature's values of all these four objects are expressed according to the temperature´s format configured through its onboard DIP-Switches (See 6 CONNECTIONS AND SWITCHES). The following formats are possible:

- **Celsius value**: Value in BACnet object is the temperature value in Celsius (i.e. a value "22" in the BACnet object must be interpreted as 22ºC).

- **Fahrenheit value**: Value in BACnet object is the temperature value in Fahrenheit (i.e. a value "72" in the BACnet object must be interpreted as 72ºF (~22ºC).

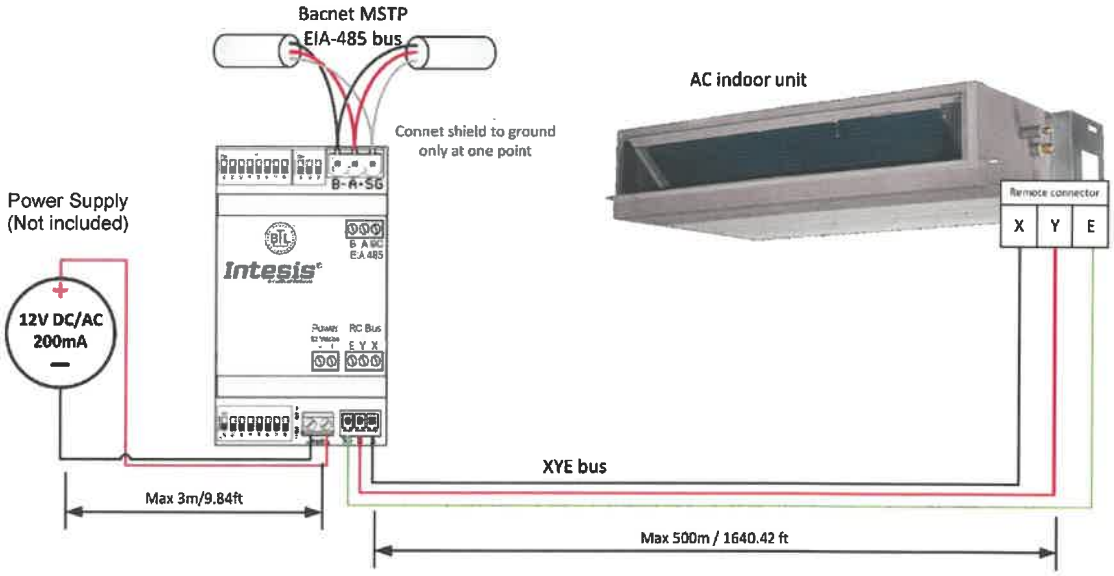
6 Connections and switches

6.1 Connect to the XYE terminals

Disconnect mains power from the AC unit.

Connect the interface to XYE terminals in the indoor unit. The XYE is a three-wires bus of the Ductless system. Respect the XYE polarity when connecting the interface.

⚠ ***Important***: Remember that switch changes are only applied after an Intesis power cycle.



The power supply must comply with NEC Class 2 or Limited Power Source (LPS) and SELV rated power supply. Respect the polarity. Apply always a voltage within the range admitted and of enough power (12V DC/AC, min. 200 mA).

SW1 – Device and AC settings

Binary value b1...b5	Switches 1 2 3 4 5 6 7 8	Description
00xxxxxx	↓ ↓ x x x x x x	Auto Midea V4/V6 detection (valor por defecto - default value)
01xxxxxx	↓ ↑ x x x x x x	Reserved
10xxxxxx	↑ ↓ x x x x x x	Force Midea V4
11xxxxxx	↑ ↑ x x x x x x	Force Midea V6
xx0xxxxx	x x ↓ x x x x x	Not used (valor por defecto - default value)
xx1xxxxx	x x ↑ x x x x x	Not used
xxx0xxxx	x x x ↓ x x x x	Not used (valor por defecto - default value)
xxx1xxxx	x x x ↑ x x x x	Not used
xxxx0xxx	x x x x ↓ x x x	Low Power Mode
xxxx1xxx	x x x x ↑ x x x	High Performance mode (valor por defecto - default value)

⚠ ***Important***: *This switch determines the performance and consumption of the device. Running in **High Performance Mode** means maximum consumption and maximun device performance. This should be the mode stablished. If it is necessary to decrease device consumption, change the mode to **Low Power Mode**.*

SW2 – Temperature magnitude (ºC/ºF)

Binary value $b_0...b_7$	Switches 1 2 3 4 5 6 7 8	Description
xxxxxxx0	x x x x x x x ↓	Temperature values in Bacnet are represented in Celsius degrees (Default value)
xxxxxxx1	x x x x x x x ↑	Temperature values in Bacnet are represented in Fahrenheit degrees

6.2 Connect to BACnet MS/TP

Connect the EIA485 bus wires to the plug-in terminal block (EIA485) of INBACMID001I100; respect the polarity on this connection (A+ and B-). Connect the ground signal to the plug-in terminal block (SG).

Respect the maximum distance of 1.200 meters for the bus, no loop or star topologies are allowed for EIA485 bus.

Remember that a terminator resistor of 120 Ω must be present at each end of the bus to avoid signal reflections and a polarization mechanism. Please, use switch **SW3** to configure these parameters.

Binary value $b_2...b_0$	Switches 1 2 3	Description
0xx	↓ x x	EIA485 bus without termination resistor. The gateway is not at one end of the EIA485 bus (default value)
1xx	↑ x x	120 Ω termination resistor active. The gateway is at one end of the EIA485 bus
x00	x ↓ ↓	No bus polarization (Default value)
x11	x ↑ ↑	Bus polarization active

Please, check configuration on **SW2** and **SW3** before connecting to BACnet MS/TP.

6.2.1 MS/TP MAC address switch configuration

MAC address can be configured using switch **SW2**

Binary value $b_0...b_7$	Switches 1 2 3 4 5 6 7 8	MAC address
0000000x	↓ ↓ ↓ ↓ ↓ ↓ ↓ x	0 (Default value)
1000000x	↑ ↓ ↓ ↓ ↓ ↓ ↓ x	1
0100000x	↓ ↑ ↓ ↓ ↓ ↓ ↓ x	2
1100000x	↑ ↑ ↓ ↓ ↓ ↓ ↓ x	3
....	....	...
1011111x	↑ ↓ ↑ ↑ ↑ ↑ ↑ x	125
0111111x	↓ ↑ ↑ ↑ ↑ ↑ ↑ x	126
1111111x	↑ ↑ ↑ ↑ ↑ ↑ ↑ x	127

The MAC address selected my affect on the Device Instance. If the "Auto Device Instance" is used, keep in mind that the Device Instance will be build using the "Device Instance Base" + the address selected in SWP2 P1-P7. Please, check section 5.3.1 DUCTLESS AC GATEWAY (DEVICE OBJECT TYPE) for more information.

6.2.2 BACnet MS/TP baudrate

Select the right baudrate for BACnet MS/TP communication using switch **SW1**.

Binary value $b_5...b_4$	Switches 1 2 3 4 5 6 7 8	Description
xxxxx000	x x x x x ↓ ↓ ↓	Autobaudrate (default value) *
xxxxx100	x x x x x ↑ ↓ ↓	9600 bps
xxxxx010	x x x x x ↓ ↑ ↓	192000 bps
xxxxx110	x x x x x ↑ ↑ ↓	38400 bps
xxxxx001	x x x x x ↓ ↓ ↑	57600 bps
xxxxx101	x x x x x ↑ ↓ ↑	76800 bps
xxxxx011	x x x x x ↓ ↑ ↑	115200 bps
xxxxx111	x x x x x ↑ ↑ ↑	Autobaudrate *

* Note: If Autobaudrate is selected, the INBACMID001I100 will look for another BACnet MS/TP device with a fixed baudrate to match this value. Once detected, the baudrate will not be modified until a device reset is produced.

6.3 Connect to an external power supply

It is necessary to use an external power supply connected to PWR terminals. Respect the polarity (- +).
The power supply must comply with NEC Class 2 or Limited Power Source (LPS) and SELV rated power supply. Respect the polarity. Apply always a voltage within the range admitted and of enough power (12V DC/AC, min. 200 mA).

7 Set-up process and troubleshooting

7.1 Pre-requisites

For a BACnet MS/TP integration, it is necessary to have the BACnet MS/TP Master device operative and well connected to the BACnet MS/TP port of the INBACMID001I100.

Items supplied by HMS Networks for this integration are:

- Intesis INBACMID001I100 interface with Ductless AC external protocol firmware loaded.
- Product documentation.

7.2 Physical checking

First point to check are the gateway physical connections:

1.- Make sure that the gateway is correctly connected to the AC unit.

2.- Check that the AC unit is connected to mains.

3.- Check the EIA485 connection from the gateway to the BACnet MS/TP. Remember to verify polarity and terminal resistors configuration.

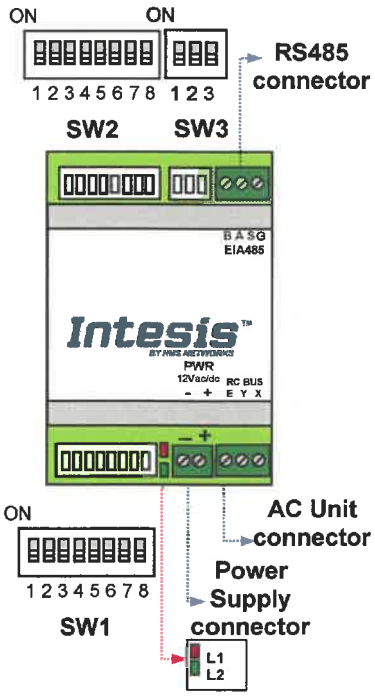
4.- Check that the interface is properly connected to an external power supply verifying the polary.

7.3 LED status

There are three leds at the bottom of the device. On start up, all leds blink once and then turn off. After that booting, LED status will be updated.

Please, check the table below for more information:

LED	Status	Description
L1 (red)	ON Steady	BACnet MS/TP link
	Blinking	Activity on the BACnet MS/TP bus
	Flashing	BACnet MS/TP link not performed
L2 (green)	ON Steady	Communication error
	Blinking	AC Error
	OFF	Communication OK



7.4 Occupancy

Each indoor unit has its own occupancy signal. Remember that this signal needs to be feed by an external sensor which indicates if there is presense or not (occupancy). This signal is processed directly in the INBACMID001I100.

When occupancy mode is active, according to current room temperature it will set the mode, setpoint and on/off, for example:

- Room Temperature > OCS: Setpoint = OCS, Mode = Cool, On/Off = On
- Room Temperature < OHS: Setpoint = OHS, Mode = Heat, On/Off = On
- OCS < Room Temperature > OHS: Setpoint = OCS/OHS depending on current mode (if Fan or Dry mode is active => no setpoint is sent), On/Off = On

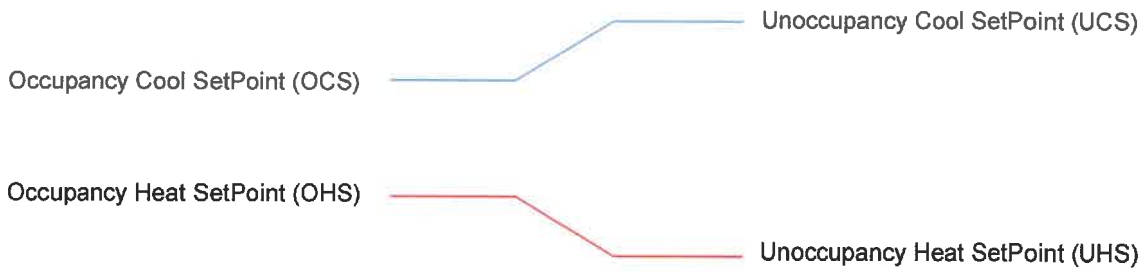
When unoccupancy mode is active, according to current room temperature it will set the mode, setpoint and on/off, for example:

- Room Temperature > UCS: Setpoint = UCS, Mode = Cool, On/Off = On
- Room Temperature < UHS: Setpoint = UHS, Mode = Heat, On/Off = On
- UCS < Room Temperature > UHS: Setpoint = UCS/UHS depending on current mode (if Fan or Dry mode is active => no setpoint is sent), On/Off = On (if Unoccupancy Deadband Action is = 1)

These checks will be done each time the indoor unit occupancy status is changed, and if ***check continuously*** checkbox is checked, also each time the room temperature changes.

The configuration set on the occupany signals is applied from the very first moment the occupancy signal is enabled until the user changes the setpoint, mode or the On/Off signal, which disables occupancy functionality.

The minimum difference between Cool and Heat SetPoints must be 2ºC/4ºF.



8 Restore factory Settings

8.1 Restore factory Settings

To restore device factory settings, it is necessary to complete the following process:

1. Set **SW1** and **SW2** DIP switches to ON position.
2. Reset the device performing a POWER OFF and a POWER ON.
3. After booting, the leds (green+red+yellow) should be blinking in S.O.S morse sequence.
4. At this moment, a 30 seconds countdown will start to set all SW1 and SW2 switches to OFF position.
5. By completing these previous steps, the device will be restored to Factory Settings.

To continue working with the device, remember to proceed as usual:
1. Set again switches to reach user desired configuration
2. Reset the device (POWER OFF + POWER ON).

9 AC Unit Types compatibility

Please, check compatibility list to know which Ductless units are compatible with our gateway.

Compatibility:
Only specific Carrier DLS indoor product families are tested for compatibility with the Intesis BACnet MS/TP 1:1 gateway INBACMID001I100. Ductless indoor unit backward compatibility as well as future versions' compatibility is not guaranteed.

Phased Out
Not Compatible
Current Model

Net dimensions (DxWxH): (3.7 x 2.1 x 2.3 in) (93 x 53 x 58 mm)

Compatibility between the Intesis BACnet gateway and the factory wired wall controller.

Carrier Model Number	Indoor Unit Type	Size:	Midea protocol	Compatible	Phased Out		KSACN0101AAA	KSACN0601AAA	KSACN0701AAA	KSACN0801AAA
40 MPHA	HighWall	All	V4	YES			No	No	No	No
40 MAQ	HighWall	All	V4	YES* See Note 1	Yes Q1, 2021		Yes	No	No	No
40 MAHB	HighWall	All	V4	YES** See Note 2			Yes	No	No	No
40MHHQ	HighWall	All	V4	Yes			Yes	No	No	No
40 MHHC	HighWall	All	Forced / V4	YES*** See Note 3			Yes	No	No	No
40 MBCQ	Cassette	All	V4	Yes			Yes	No	Yes	No
40 MBAA	Ducted	N/A	N/A	Not Compatible			N/A	N/A	N/A	N/A
40 MBDQ	Ducted	All	V4	Yes			Yes	No	Yes	No
40 MBFQ	Underceiling / Floor	N/A	N/A	Not Compatible			N/A	N/A	N/A	N/A

Notes:
* 1: 40MAQ The mid-tier Ductless High Wall 40MAQB**B---3 indoor unit type, will need to have the display and adaptor board replaced to function with the Intesis MS/TP BACnet gateway.
The 40MAQ Adapter Board, P/N 17222000A50275, and Display Board Assembly, P/N 17222000A17852, can be ordered from RC.

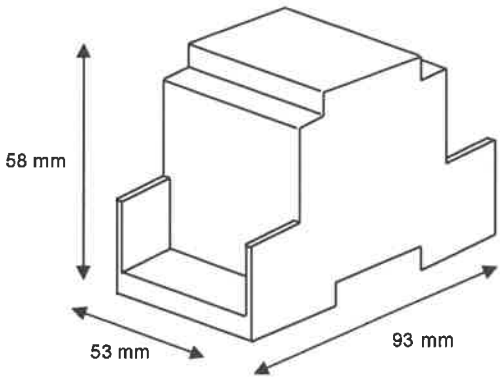
** 2: The 40MAHB Indoor unit requires that a multi function board and 7 pin wiring harness are added to the indoor unit at the time of installation.
The multifunction board P/N 17122000A38610 and wiring harness P/N 17401204A02537 can be ordered as an accessory.

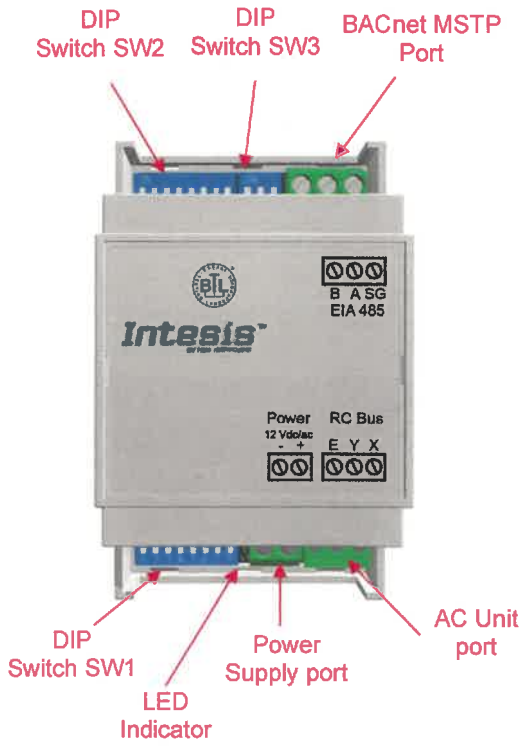
*** 3: The 40MHHC is a cooling only system. Please consider this when completing the integration. The only Modes that should be mapped to the BACnet controls system should be Cooling & Fan.

The wireless infrared controller that comes with the indoor unit can be used at the same time as the Intesis BACnet gateway or disabled by configuration.

10 Mechanical & electrical characteristics

Enclosure	Plastic, type PC (UL 94 V-0) Net dimensions (dxwxh): 93 x 53 x 58 mm / 3.7" x 2.1" x 2.3" Color: Light Grey. RAL 7035	Operation Temperature	0ºC to +60ºC
Weight	85 g.	Stock Temperature	-20ºC to +85ºC
Mounting	• Wall • DIN rail EN60715 TH35.	Operational Humidity	5% to 95% RH, with no condensation
Terminal Wiring (for low-voltage signals)	For terminal: solid wires or stranded wires (twisted or with ferrule) 1 core: 0.5mm²... 2.5mm² 2 cores: 0.5mm²... 1.5mm² 3 cores: not allowed	Stock Humidity	<95% RH, with no condensation
BACnet MS/TP port	1 x Serial EIA485 Plug-in screw terminal block (3 poles): B, A, SG SELV	Isolation voltage	1500 VDC. between RS485 and RC5 bus
AC unit port	1 x RC5 or Serial EIA-485 Plug-in screw terminal block (3 poles): SG, B, A SELV	Isolation resistance	1000 MΩ
Switch 1 (SW1)	1 x DIP-Switch for AC features and RC5 bus baud rate	Protection	IP20 (IEC60529)
Switch 2 (SW2)	1 x DIP-Switch for bus device address and temperature information	External power supply	12VDC/AC 0.2A NEC Class 2 or Limited Power Source (PS2) and SELV rated PS. Max. 3 meters between device and external PS
Switch 3 (SW3)	1 x DIP-Switch for primary EIA bus configuration	LED indicators	2 x Onboard LED - Operational status





11 Error codes

Below you can find a list of error codes from Ductless air conditioning system.

Error Code	Error in Remote Controller	Error description
0	N/A	No active error
1	E0	Phase error or error in the phase sequence
2	E1	Communication error
3	E2	T1 sensor error
4	E3	T2A sensor error
5	E4	T2B sensor error
6	E5	T3 temperature and T4 temperature Compressor discharge temperature sensors error
7	E6	Zero cross error detection
8	E7	EEPROM memory error
9	E8	Indoor fan speeds out of control
10	E9	Communication error between the main panel and the visualization panel
11	EA	Compressor's current overload error (4 times)
12	EB	Inverter module protection
13	EC	Cooling error
14	ED	Outdoor unit fault protection
15	EE	Water level fault detection
16	EF	Other errors
17	P0	Vaporizer temperature protection
18	P1	Thawing or cold air protection
19	P2	Condenser high temperatures protection
20	P3	Compressor temperature protection
21	P4	Evacuation duct temperature protection
22	P5	Discharge high pressure protection
23	P6	Discharge low pressure protection
24	P7	Current overload or under load protection
25	P8	Compressor's current overload protection
26	P9	Reserved
27	PA	Reserved
28	PB	Reserved
29	PC	Reserved
30	PD	Reserved
31	PE	Reserved
32	PF	Other protection measures
65535 (-1)	N/A	Error in the communication of INMBSMID--I000 with the AC unit

In case you detect an error code not listed, contact your nearest technical support service for more information on the error meaning.

53DS–900–––117 (115 v)
53DS–900–––118 (230 v)

Accessory Condensate Pump
for Ductless Split System
Cooling Only and Heat Pump High Wall Units
(Size 009–036)

Installation Instructions

NOTE: Read and become familiar with these instructions before beginning installation.

SAFETY CONSIDERATIONS

Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock, or other conditions which may cause death, personal injury, or property damage. Consult a qualified installer, service agency, or your distributor or branch for information or assistance. The qualified installer or agency must use factory-authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing.

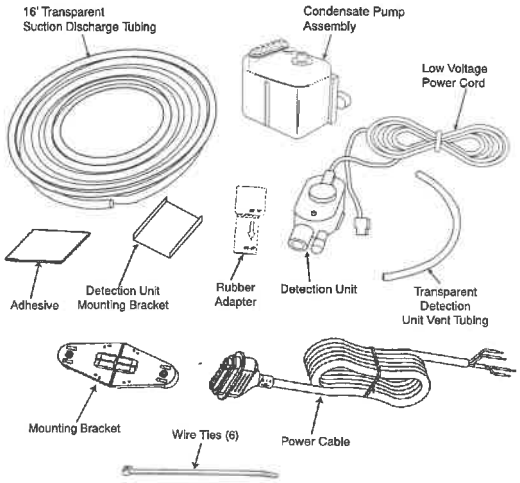
Follow all safety codes. Wear safety glasses, protective clothing, and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions included in literature and attached to the unit. Consult local building codes and current editions of the National Electrical Code (NEC) NFPA 70. In Canada, refer to current editions of the Canadian electrical code CSA 22.1.

Recognize safety information. This is the safety-alert symbol ⚠ When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury. Understand these signal words; DANGER, WARNING, and CAUTION. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies hazards which **could** result in personal injury or death. CAUTION is used to identify unsafe practices which **would** result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

⚠ CAUTION

UNIT OPERATION HAZARD

Failure to follow this caution may result in unit failure and/or damage.
Always follow instructions properly.



A12227

Fig. 1 – Accessory Condensate Pump Kit

Table 1—Accessory Condensate Pump Kit Contents

ITEM	QTY
16–ft Transparent Suction/Discharge Tubing	1
Condensate Pump Assembly	1
Low–Voltage Power Cord	1
Transparent Detection Unit Vent Tubing	1
Power Cable	1
Wire Ties	6
Wall Mount Bracket	1
Adhesive	1
Detection Unit Mounting Bracket	1
Rubber Adapter	1
Detection Unit	1

⚠ WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury or death.

Before beginning any modification or installation of this kit, be sure the main electrical disconnect is in the OFF position. Ensure power is disconnected to the fan coil unit. On some systems both the fan coil and the outdoor unit may be on the same disconnect. Tag the disconnect switch with a suitable warning label. There may be more than one disconnect.

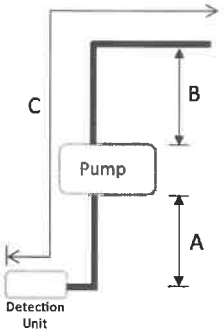
Table 2—Accessory Package Usage

BASE UNIT	ACCESSORY MODEL NUMBER	
	53DS-900---117 (115-1-60)	53DS-900---118 (208/230-1-60)
	WIRING FIG. NO.	WIRING FIG. NO.
40GVC009---1	16	
40GVQ009---1	17	
40GVC012---1	16	
40GVQ012---1	17	
40GVC012---3		18
40GVQ012---3		18
40GVC018---3		19
40GVQ018---3		19
40GVC024---3		19
40GVQ024---3		19
40GVQ030---3		19
40GVC036---3		19
40GVQ036---3		19
40GVM009---3		20
40GVM012---3		20
40GVM018---3		20
40GXC(Q)009---1	11	
40GXC(Q)012---1	11	
40GXC(Q)018---3	14	15
40GXC(Q)024---3	14	15
40GXM009---3	14	15
40GXM012---3	14	15
40GXM018---3	14	15
40MVC(Q)009---1	8	
40MVC(Q)012---1	8	
40MVC(Q)012---3	9	10
40MVC(Q)018---3	14	15
40MVC(Q)024---3	14	15
40QNC(Q)030---3		13
40QNC(Q)036---3		13
40QNC018024---3		12
40QNQ018---3		12
40QNQ024---3		12
PW3C(H)AM009	8	
PW3C(H)AM012	8	
PW3C(H)NM018	14	15
PW3C(H)NM024	14	15
RAS-09LKV-UL	14	15
RAS-12LKV-UL	14	15
RAS-15LKV-UL	14	15
RAS-17LKV-UL	14	15
RAS-22LKV-UL	14	15
RAV-SP180KRT-UL	14	15
RAV-SP240KRT-UL	14	15

GENERAL

Use the two-part accessory kit (condensate pump and detection unit) with high wall fan coils. The pump operates whenever the condensate level in the detection unit is high enough to cause the magnetic float switch to send a signal to start the pump.

The float switch in the detection unit also prevents overflow and can act as a safety device by shutting down the system. The detection unit comes with normally closed (NC) alarm contacts (user optional, but recommended). The normally closed alarm contact is a dry contact rated for 8 amps at 250 volts. In the event of a problem such as a clogged drain or pump discharge line, the alarm contact can be wired to shut down the entire system. The condensate pump provides 10 ft (3.0 m) maximum suction lift (A)-Fig. 2.



A12134

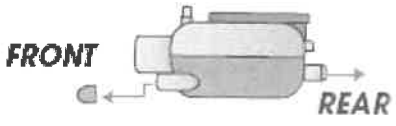
Fig. 2 – Maximum Lengths

INSTALLATION

Refer to Fig. 1 and Table 1 for kit content.

NOTE: To make the installation easier, install the detection unit assembly before installing the fan coil unit.

1. Unpack the contents of the condensate pump accessory package. Attach the rubber adapter and transparent vent tubing to the detection unit (see Fig. 6). Rubber adapter may be cut to size if 5/8" connection is required. If 7/8" connection to unit drain pipe is required, use rubber adapter as shipped. Do not use a vent tube longer than 2.95" (75 mm). Slide the mounting bracket onto the bottom of the detection unit. Uncoil the low voltage power cord.
2. Remove the fan coil mounting bracket from the back of the unit. Connect the detection unit with the rubber adapter, to the condensate drain line (see Fig. 6).
3. Peel the adhesive cover on the back of the detection unit mounting bracket and attach it to the inside of the unit adjacent to the fan coil drain as shown in Fig. 6. **Make sure the detection is installed horizontally for proper operation of the float switch.**
4. Attach one end of the transparent tubing to the detection unit. The tube can be connected to either the front or the rear as shown in Fig. 3. block the unused outlet with the plug supplied.



A09398

Fig. 3 – Detection Unit

5. Connect one end of the low voltage power cord to the telephone jack socket in the detection unit and route the cord and transparent drain tubing through the knockout on the side of the unit enclosure (see Fig. 6).
6. Determine the mounting location of the pump assembly. **The pump assembly must always be above the level of the detection unit.** For best operation, it is recommended that the pump assembly be mounted in a vertical position with the flow arrow on the pump pointing up (see Fig. 7). **Do not exceed 10 ft. (3.0 m) maximum suction lift.**

NOTE: in most applications, the pump will need to be mounted outside of the high wall unit for proper orientation (i.e. above drop ceiling).

7. Screw the bracket to the wall and attach the pump to the bracket as shown in Fig. 4 and Fig. 5.

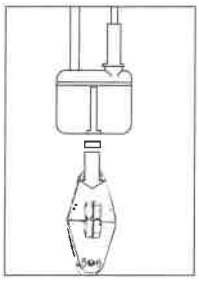


Fig. 4 – Pump Assembly Vertical

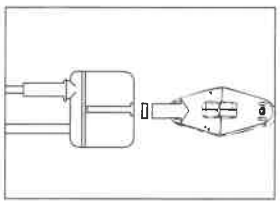


Fig. 5 – Pump Assembly Horizontal

A12228

If the pump is not mounted in the vertical position, make sure that plug on the pump is above the refrigerant tubing. This is required to avoid water leaking onto the pump causing a short circuit. **The pump cannot be splashed nor located in a damp environment.**

8. Connect the other end of the low voltage power cord from the detection unit to the telephone jack socket in the pump assembly.
9. Cut the suction, transparent drain tubing after determining where it will connect to the inlet side of the pump mounted on the wall. Remove the cap on the pump inlet and connect draining tubing.
10. Attach the remaining transparent tubing to the discharge side of the pump. Keep the pipe vertical for at least 4 or 5 inches and do not exceed the 33 ft (10 m) limit or the value shown in (B) of Table 3 and Table 4. **In order to avoid siphoning action and running the pump dry, always connect the discharge tube to the drain at a higher level than the pump itself (pump should be higher than detection unit).** Be sure the condensate is discharged to a safe location where the presence of water does not pose any safety or health hazards.
11. Install the transparent vent tube (provided) on top of the detection unit. Route tube so it will stay vertical (see Fig. 6).
12. Wire the pump and the alarm circuit using the appropriate wiring diagram listed in Table 2.
13. Prime the pump at start-up and after each maintenance operation. To ensure proper operation, the suction pipe and part of the discharge pipe must be slowly filled with water using a squeeze bottle.
14. Test the unit. When the unit is mounted in place, the condensate pump system must be tested.
    a. Be sure the Hi-Wall unit is installed on a level plane. Remove the front cover of the unit.
    b. Slowly fill the condensate drain pan with water. Observe the pump discharge tubing to be sure that the pump is operating. If condensate is not being discharged through the discharge tubing, check to be sure that the lines are not kinked or obstructed, and installation parameters have been followed. If the optional alarm contact is wired, continue to pour water until the alarm circuit triggers.

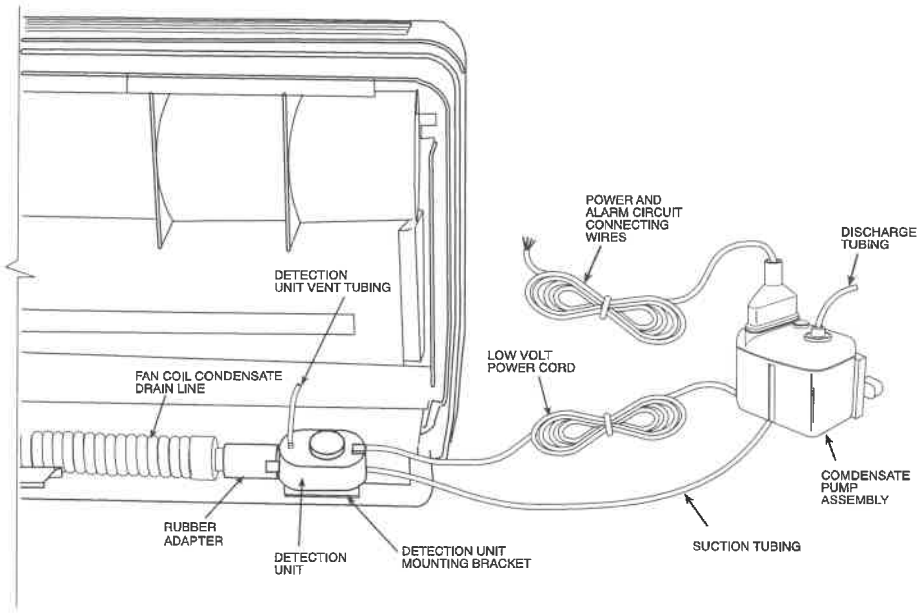
Table 3—True Flow Rates (Gallons / Hr)

53DS–900– – –117, 118 Condensate Pump Flow Rates					
Refer to Fig. 2 for (A), (B), (C)		Total tube length, 1/4" flexible hose (C) ft			
Suction Head (A) ft	Discharge Head (B) ft	15	30	60	100
0	0	5.0	4.7	4.5	4.2
	6	4.2	3.9	3.7	3.5
	13	3.0	2.9	2.8	2.6
	20		2.5	2.0	1.7
	26		1.6	1.3	1.1
	33		1.1	0.9	0.7
3.3	0	3.7	3.4	3.2	2.9
	6	2.9	2.6	2.4	2.1
	13	0.5	1.8	1.6	1.3
	20		1.2	1.1	
6.6	0	2.9	2.6	2.4	2.1
	6	2.4	2.1	1.8	1.6
	13		1.5	1.3	1.2
10	0	2.6	2.4	2.1	1.8
	6	2.1	1.8	1.6	1.3
	13		1.3	1.1	

Table 4—True Flow Rates (Liters / Hr)

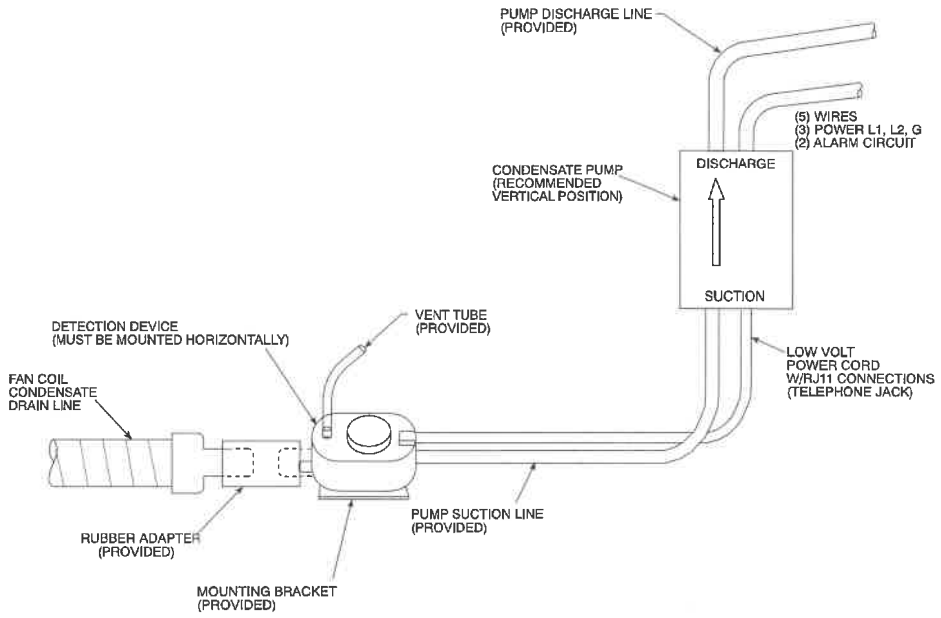
53DS–900– – –117, 118 Condensate Pump Flow Rates					
Refer to Fig. 2 for (A), (B), (C)		Total tube length, 1/4" flexible hose (C) ft			
Suction Head (A) ft	Discharge Head (B) ft	15	30	60	100
0	0	18.9	17.8	17.0	15.9
	6	15.9	14.8	14.0	13.2
	13	11.4	11.0	10.6	9.8
	20		9.5	7.6	6.4
	26		6.1	4.9	4.2
	33		4.2	3.4	2.6
3.3	0	14.0	12.9	12.1	11.0
	6	11.0	9.8	9.1	7.9
	13	1.9	6.8	6.1	4.9
	20		4.5	4.2	
6.6	0	11.0	9.8	9.1	7.9
	6	9.1	7.9	6.8	6.1
	13	0.0	5.7	4.9	4.5
10	0	9.8	9.1	7.9	6.8
	6	7.9	6.8	6.1	4.9
	13		4.9	4.2	

NOTE: Maximum suction plus discharge head is 33 ft (10 m). Longer lengths indicate horizontal condition.



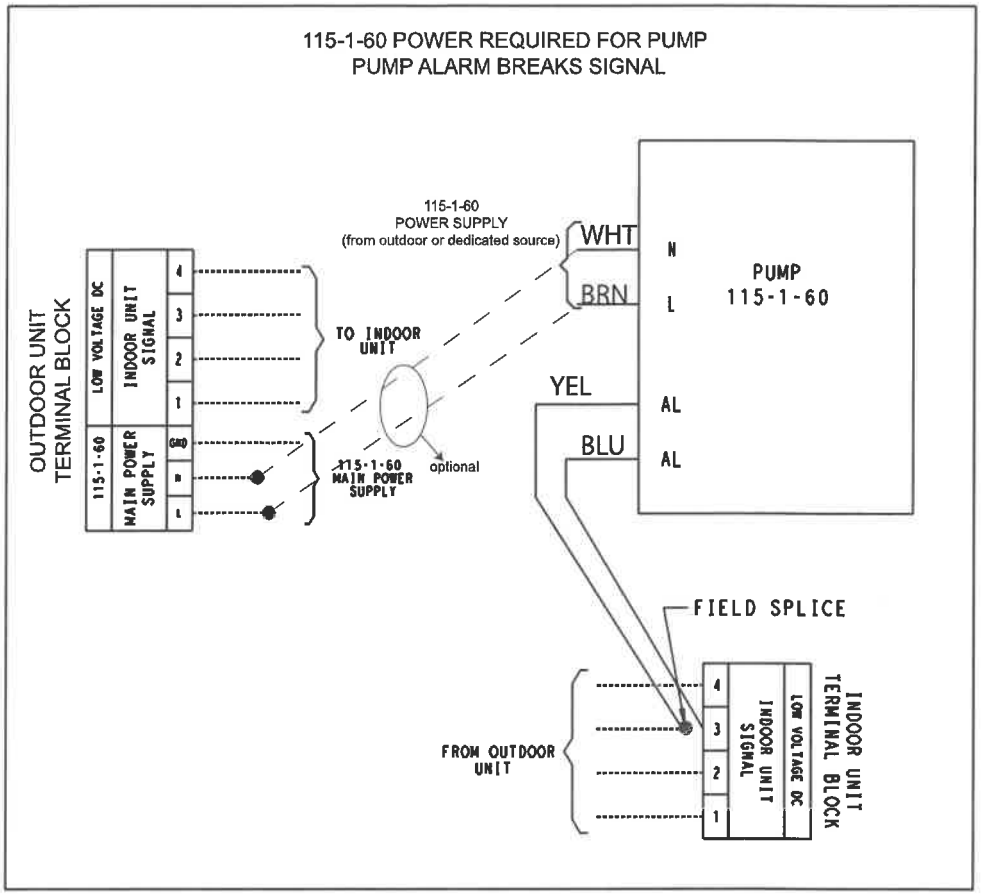
A12229

Fig. 6 – Rear of High Wall Unit with Mounted Condensate Pump



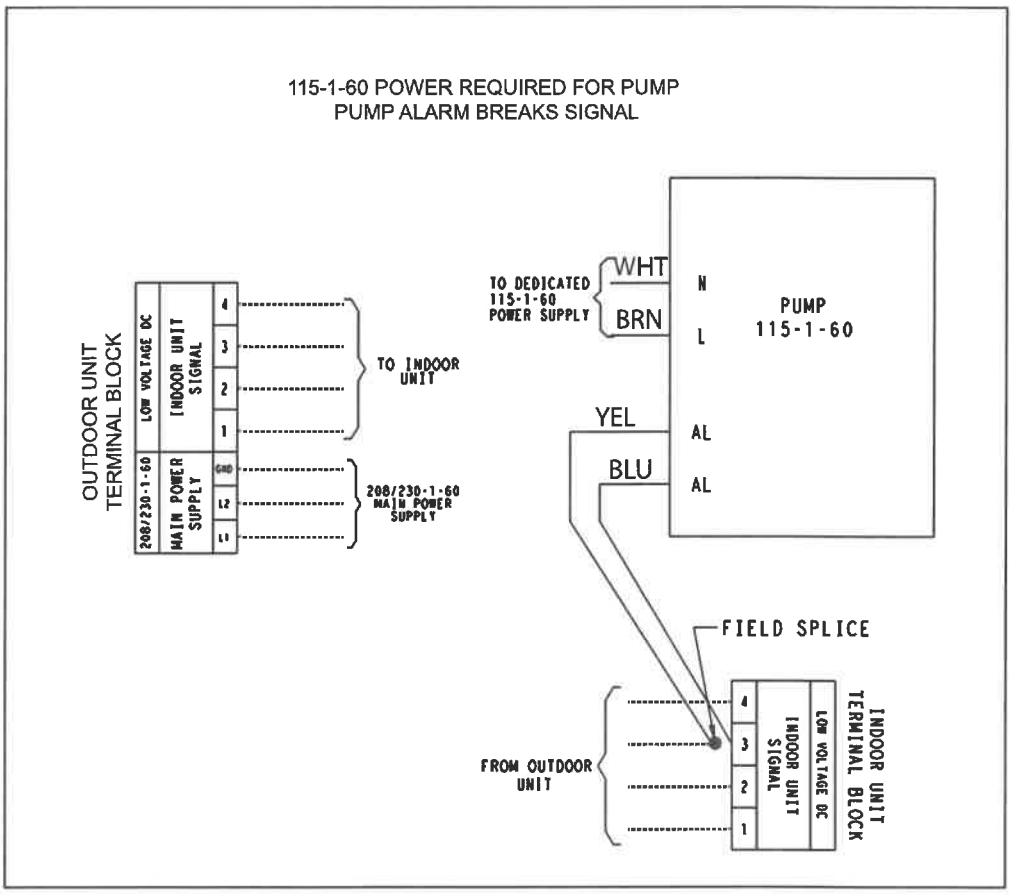
A12230

Fig. 7 – Accessory Condensate Pump Connections



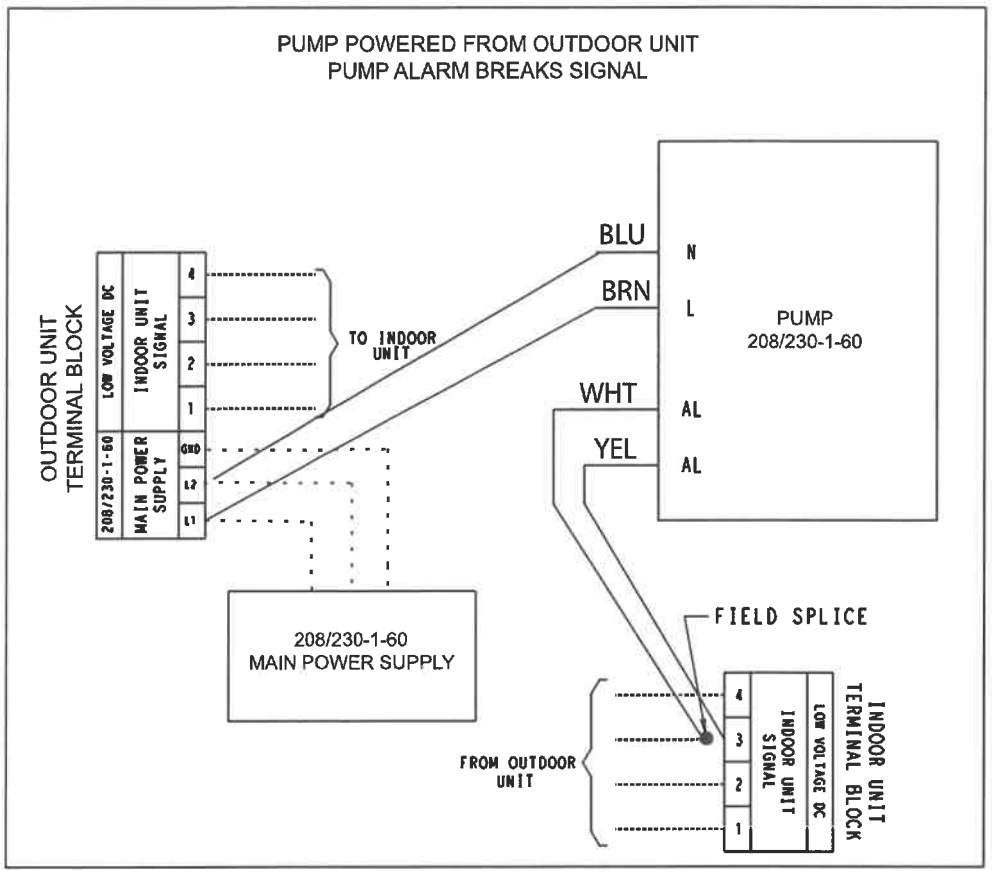
A12393

Fig. 8 – 009, 012 (115-1-60) WIRING SCHEMATIC



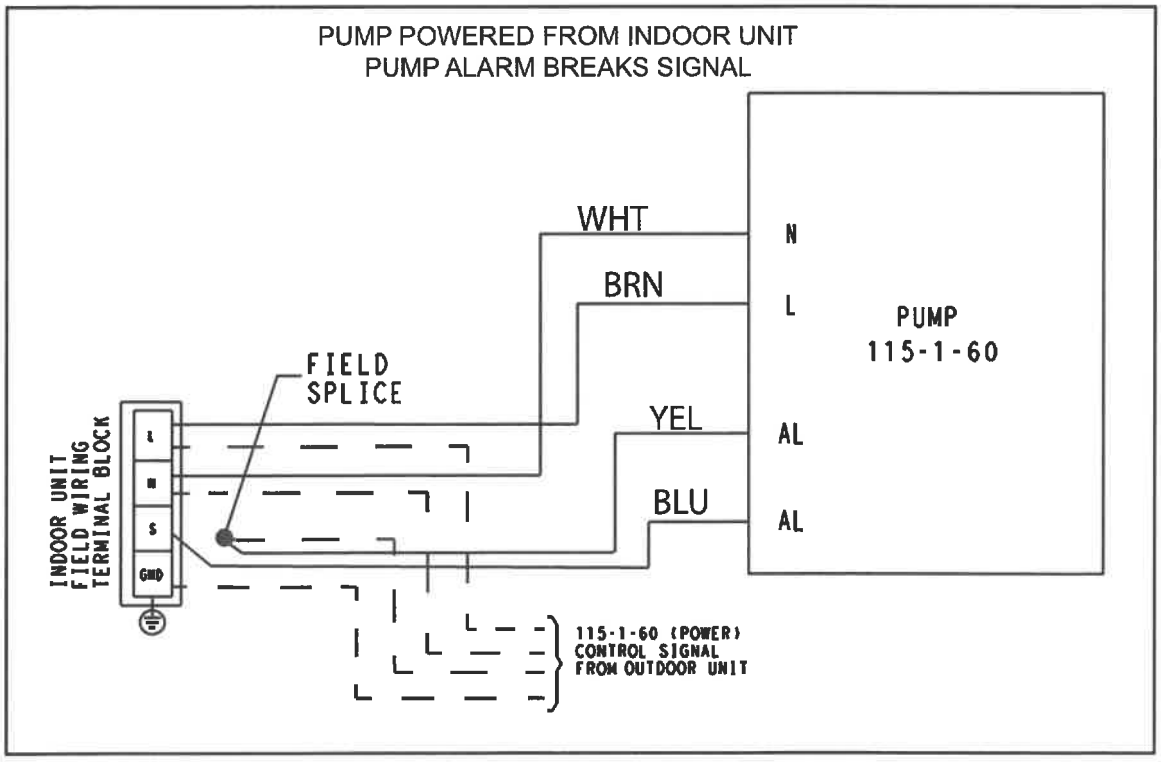
A12136

Fig. 9 – (208/230-1-60) WIRING SCHEMATIC



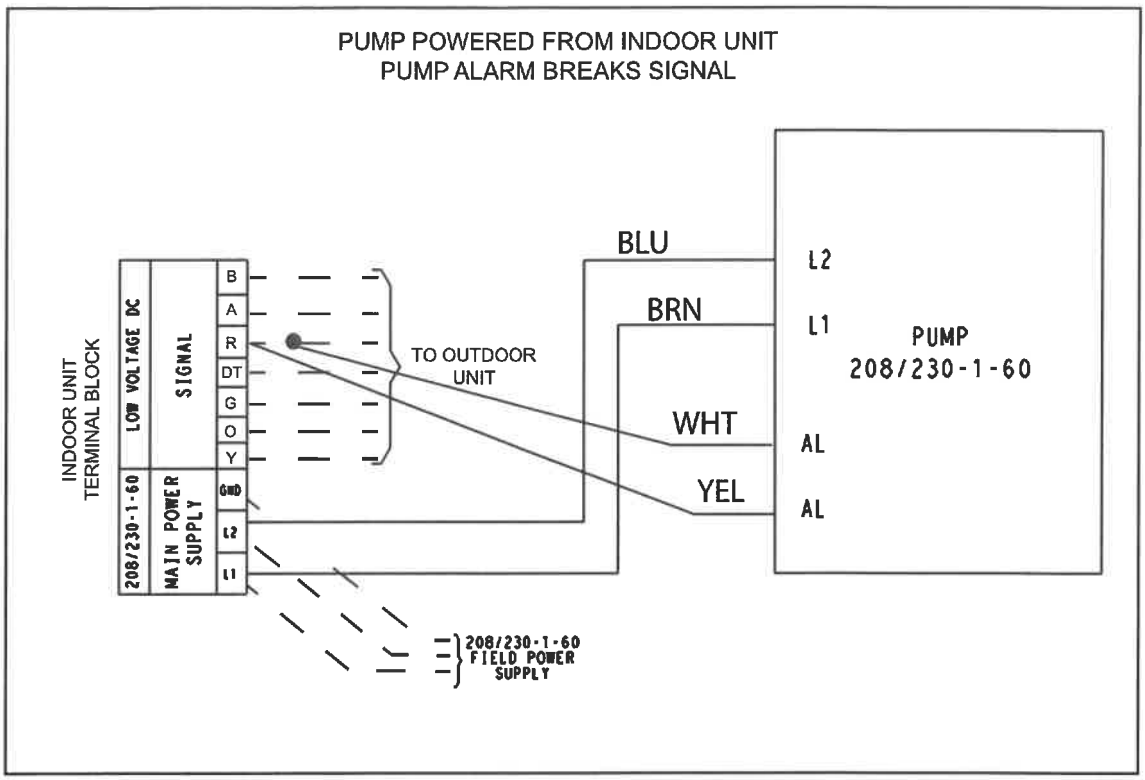
A13106

Fig. 10 – (208/230-1-60) WIRING SCHEMATIC



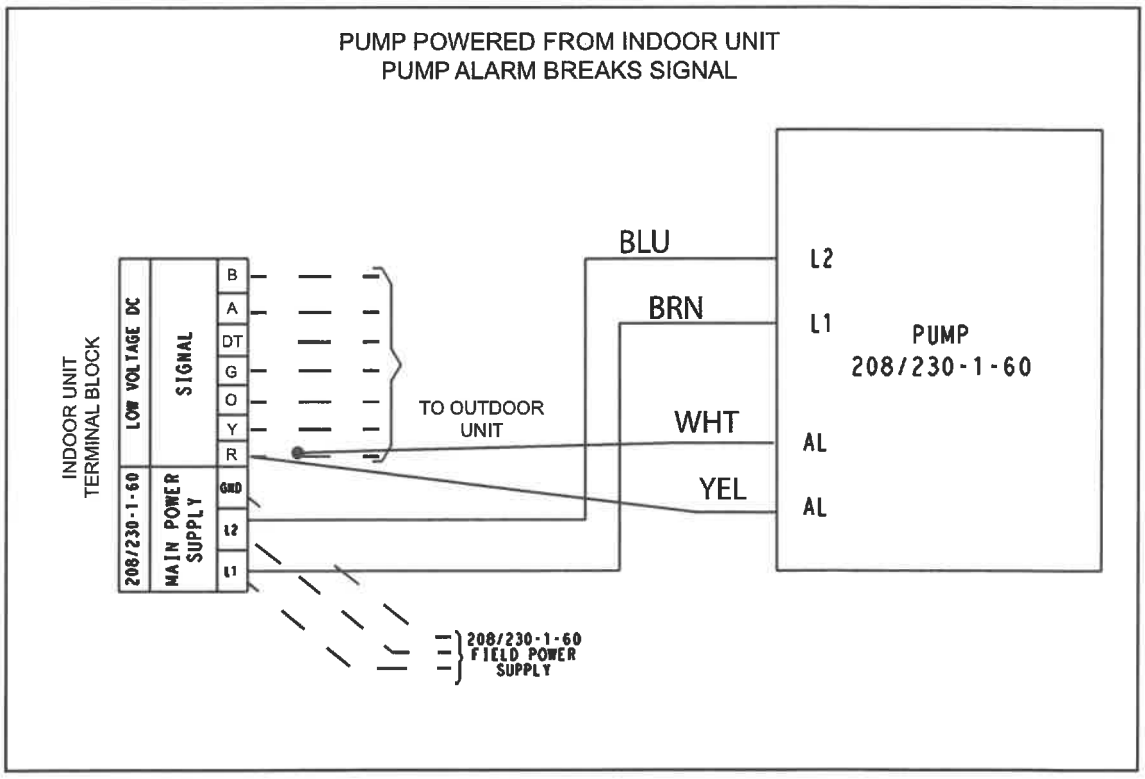
A12395

Fig. 11 – (115-1-60) WIRING SCHEMATIC



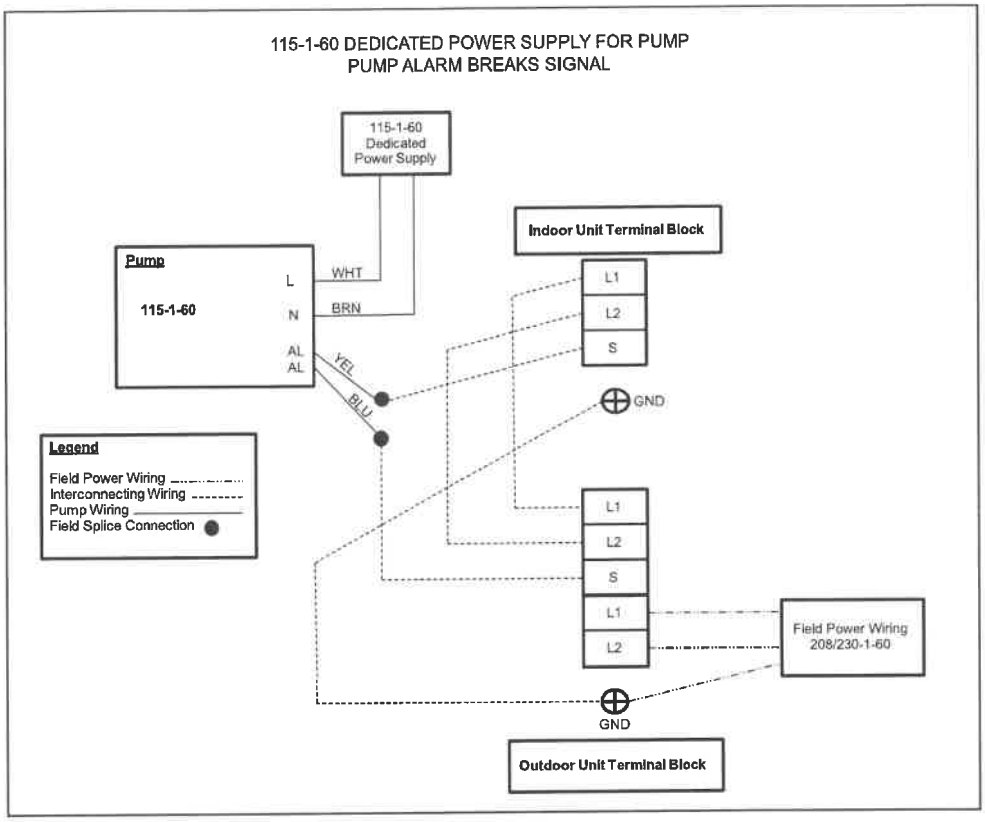
A12396

Fig. 12 – (208/230-1-60) WIRING SCHEMATIC



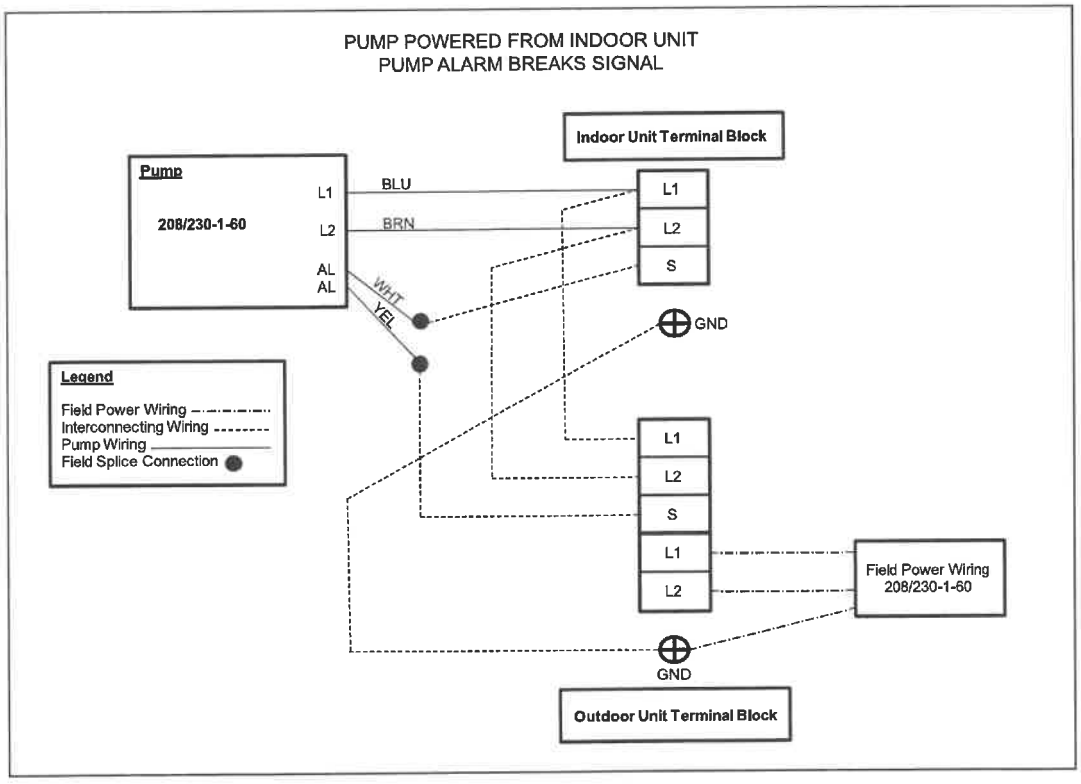
A12430

Fig. 13 – (208/230-1-60) WIRING SCHEMATIC



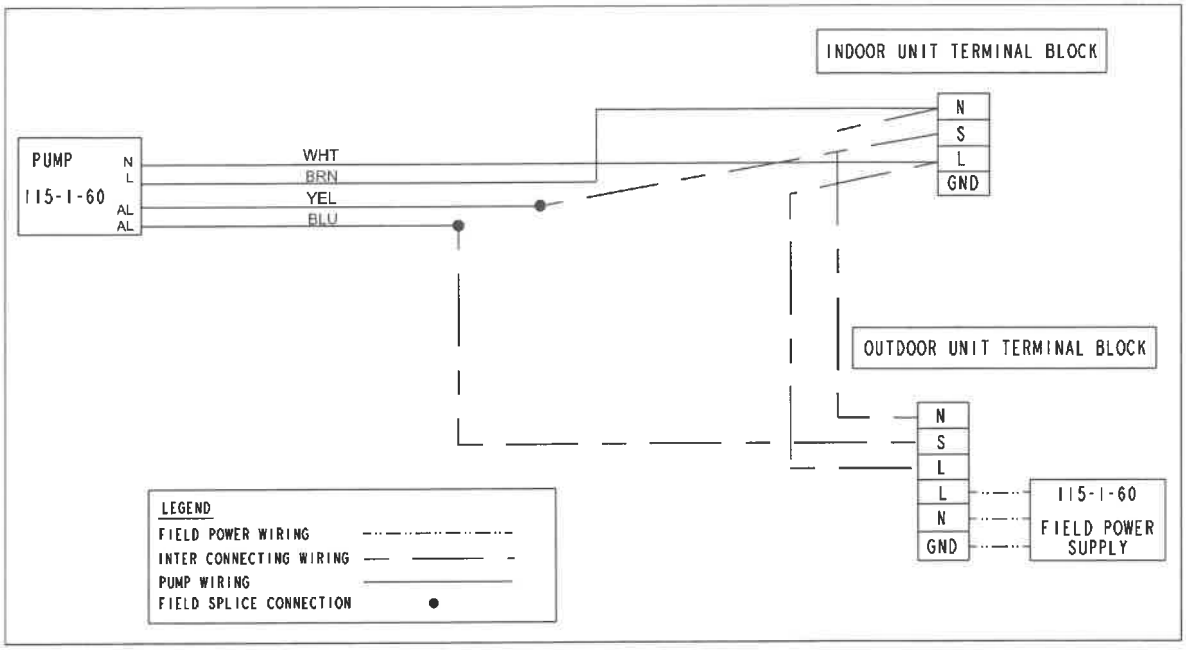
A13107

Fig. 14 – (115-1-60) WIRING SCHEMATIC



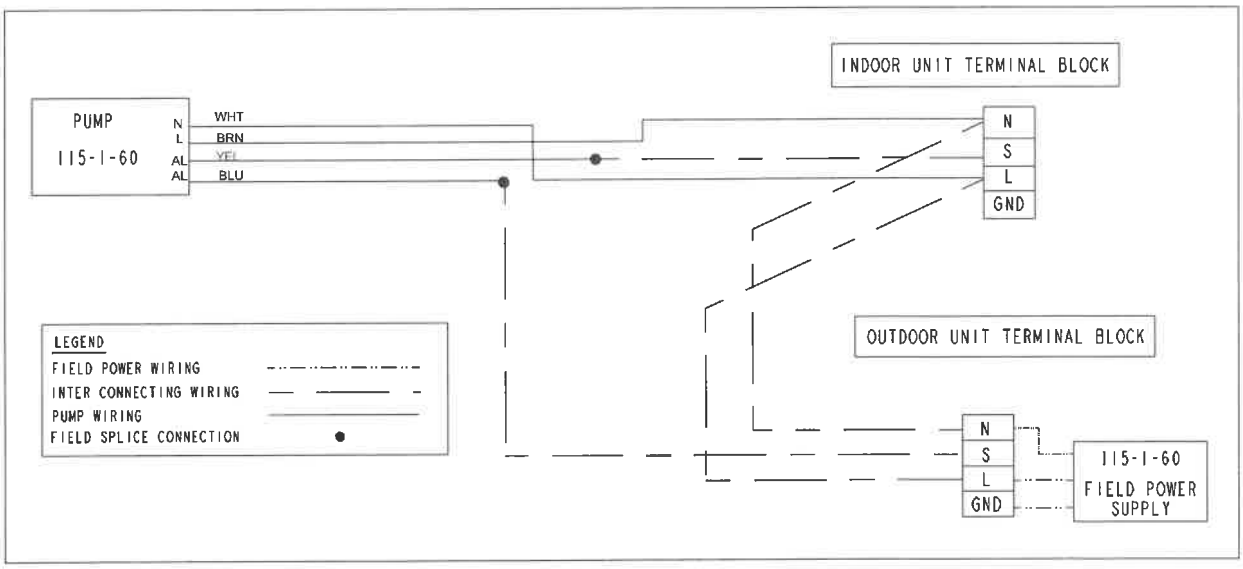
A13108

Fig. 15 – (208/230-1-60) WIRING SCHEMATIC



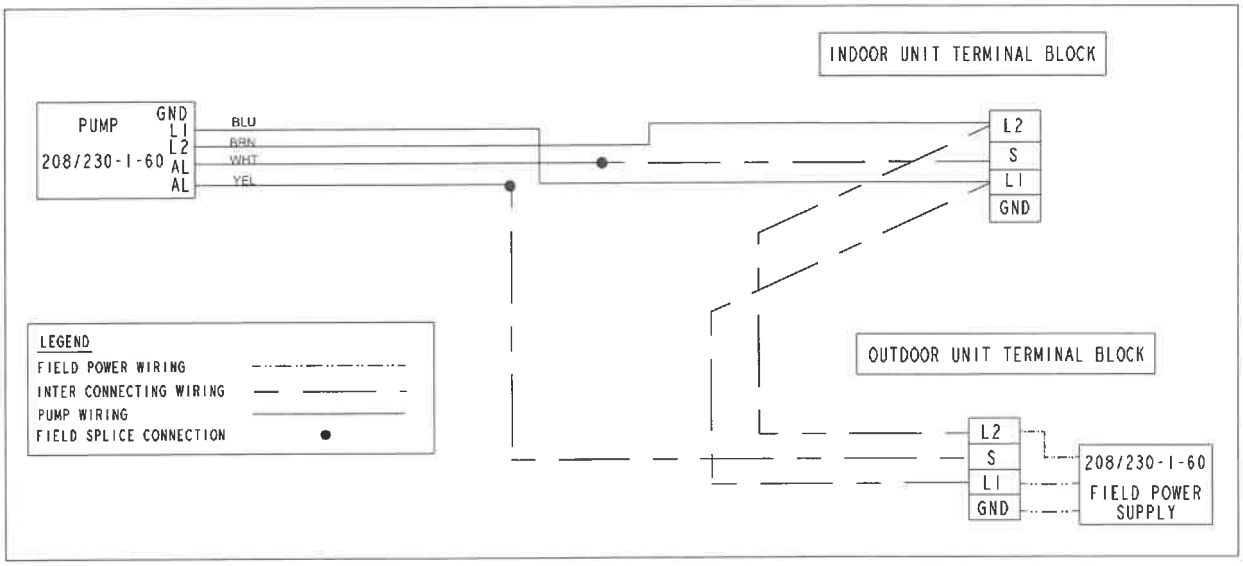
A13098

Fig. 16 – 40GVC 9k, 12k (115-1-60) WIRING SCHEMATIC



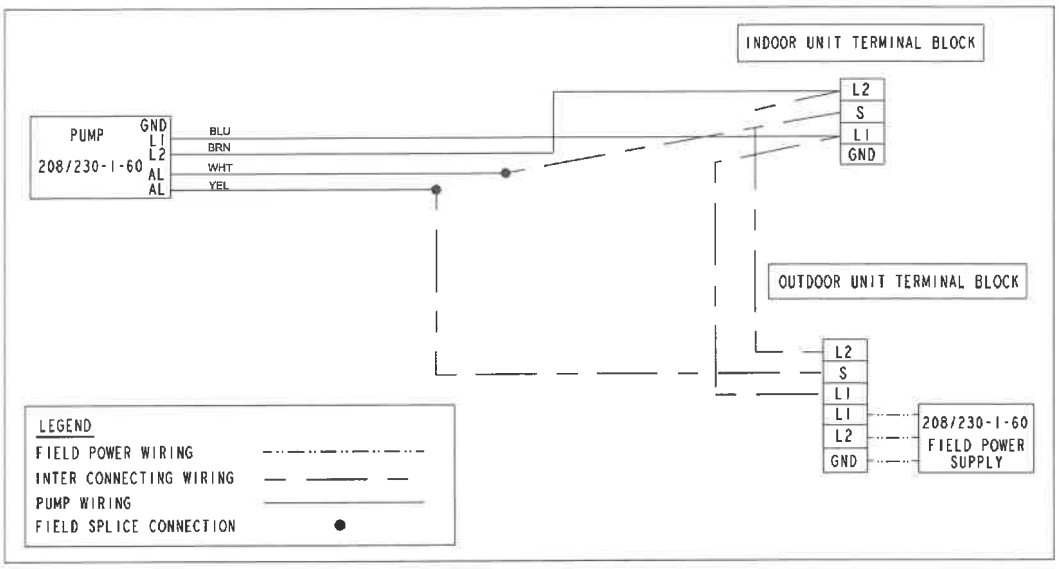
A13099

Fig. 17 – 40GVQ 9k, 12k (115-1-60) WIRING SCHEMATIC



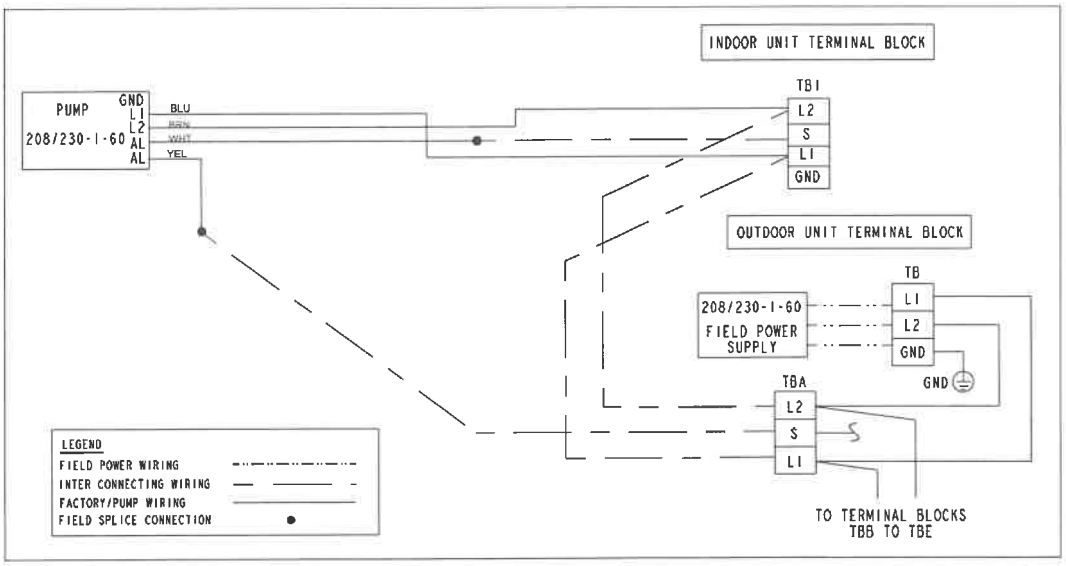
A13100

Fig. 18 – 40GVC/Q 12k (208/230-1-60) WIRING SCHEMATIC



A13101

Fig. 19 – 40GVC/Q 18k, 24k, 30k, 36k (208/230-1-60) WIRING SCHEMATIC



A13102

Fig. 20 – 40GVM 9k, 12k, 18k (208/230-1-60) WIRING SCHEMATIC

CLEANING AND MAINTENANCE

⚠ WARNING

ELECTRICAL SHOCK HAZARD

Failure to follow this warning could result in personal injury or death.

Disconnect all power to unit to avoid possible electrical shock during cleaning or maintenance. Set unit power switch to OFF position.

At the beginning of each season clean the detection unit.

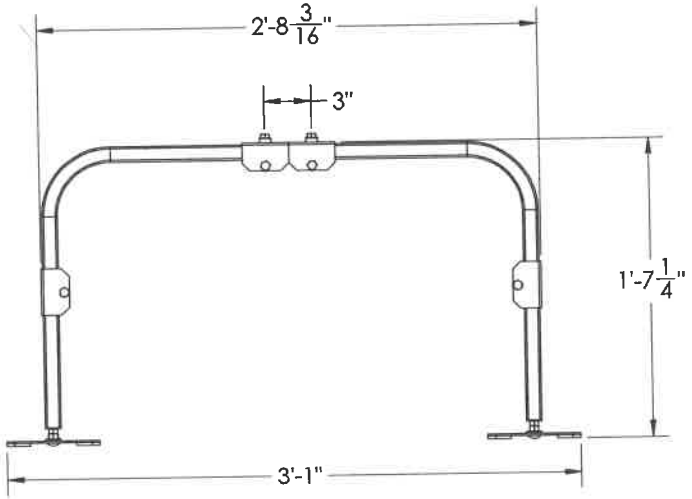
1. Disconnect tubing and low voltage power cord from the detection unit and slide unit out of mounting bracket
2. Remove the top of the detection unit and take out the float.
3. Clean the detection unit and the float using a solution of water containing 5% bleach.
4. Replace the float in its original position with the magnet side facing up.
5. Snap cover back into place.
6. Perform an operational test (see item 13 under installation section).

N730-03-Edition 13/11

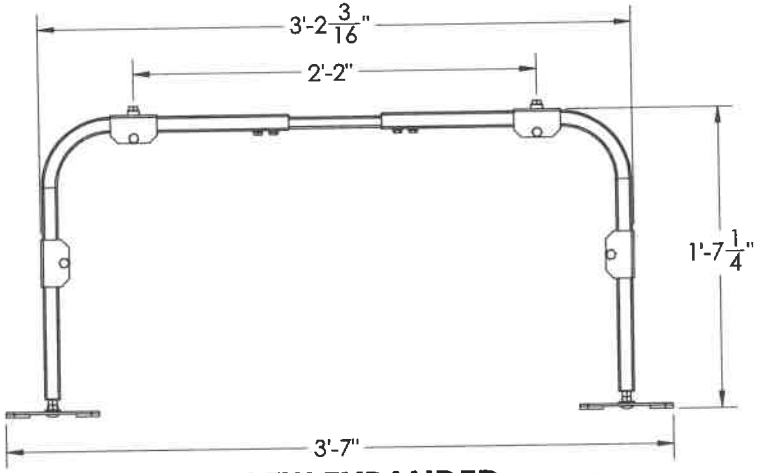
Edition Date: 10/13

Catalog No: IIK-53DS900-CP-06

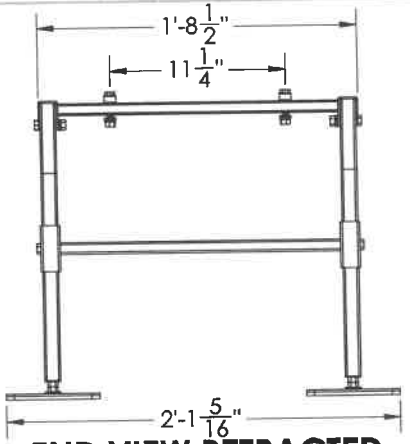
Replaces: IIK-53DS900-CP-05



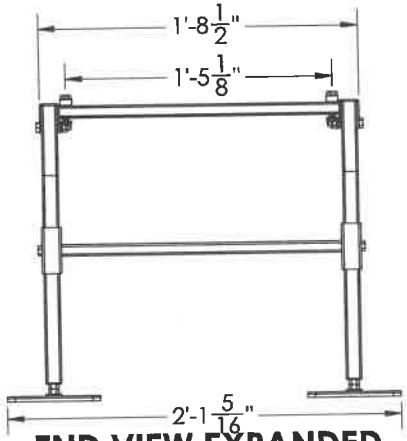
SIDE VIEW RETRACTED



SIDE VIEW EXPANDED



END VIEW RETRACTED



END VIEW EXPANDED

(*) - WIDTH IS ADJUSTABLE IN 1" INCREMENTS

IMPORTANT NOTE: THE INSTALLER IS RESPONSIBLE FOR THETHERING AND BOLTING UNITS TO WITHSTAND WIND AND/OR SEISMIC LOADS.

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES [MILLIMETERS]
TOLERANCES ARE: ANGLES ±1.0°
FRACTIONAL SIZES X/Y ±1/64

INCHES	[MILLIMETERS]
.X = ±0.1	[.X = ± 2.5]
.XX = ±0.01	[.X = ± 1.3]
~~.XXX = ±0.060~~	~~[.XX = ±0.10]~~

THIRD ANGLE PROJECTION

DIVERSITECH

DO NOT SCALE DRAWING

MATERIAL:

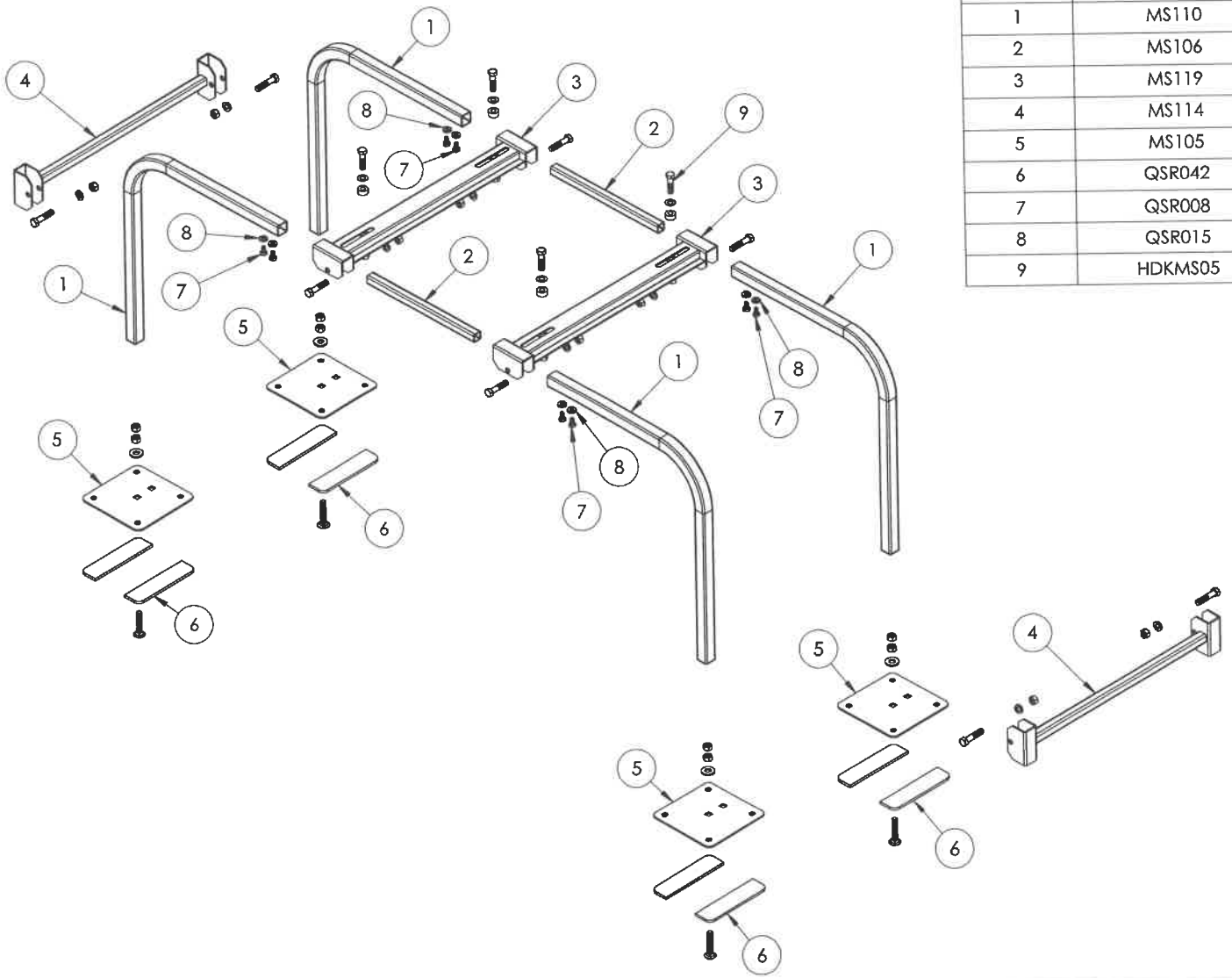
DWG. NO. MINI SPLIT STAND - 1801
MODEL NO. QSMS1801

DESCRIPTION

WEIGHT: GMS.

REV.

SHEET 1 OF 2



ITEM NO.	PART NUMBER	DESCRIPTION	Default/ QTY.
1	MS110	Mini Split 18in J-Bar	4
2	MS106	Mini Split Extension Bar	2
3	MS119	Mini Split Long Saddle Arm	2
4	MS114	Mini Split Wide Stability Arm	2
5	MS105	Mini Split 6x6 Feet	4
6	QSR042	Mini Split Rubber Foot	8
7	QSR008	1/4-20x1/2in Zinc Hex Bolt	8
8	QSR015	1/4in Bonded Washers	8
9	HDKMS05	Hardware kit for QSMS1802, 2402	1

NOTE - ALL ASSEMBLY HARDWARE IS INCLUDED

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES [MILLIMETERS]
TOLERANCES ARE: ANGLES ±1.0°
FRACTIONAL SIZES X/Y ±1/64

INCHES	[MILLIMETERS]
.X = ±0.1	[X = ± 2.5]
.XX = ±0.01	[.X = ± 1.3]
.XXX = ±0.005	[.XX = ±0.13]

THIRD ANGLE PROJECTION

DIVERSITECH

DO NOT SCALE DRAWING

MATERIAL:

DWG. NO. MINI SPLIT STAND - 1801
MODEL NO. QSMS1801

DESCRIPTION

WEIGHT: GMS.

REV.

SHEET 2 OF 2

VRF SYSTEM INDOOR UNIT SCHEDULE

UNIT NO.	AREA SERVED	MAX SUPPLY C.F.M	ELECTRICAL					HEATING MBH	COOLING MBH	PHYSICAL PROPERTIES				DESIGN BASIS	NOTES
			MCA	MOP	VOLTS/PHASE	kW	CONN. POINTS			LENGTH"	DEPTH"	HEIGHT"	WEIGHT LBS.		
AC-130	RM. 130	755	N/A	N/A	208/1	N/A	1	N/A	24	46-1/16	11-5/8	14-3/8	46	TRANE - TPKA0A0241KA70A	1

NOTES:
1. UNIT POWERED BY OUTDOOR UNIT.

VRF SYSTEM OUTDOOR UNIT SCHEDULE

UNIT NO.	LOCATION	SYSTEM SERVED	EER/ SEER	COP	NOMINAL CAPACITY		ELECTRICAL				PHYSICAL PROPERTIES				DESIGN BASIS	NOTES
					MBH HEAT	MBH COOL	VOLTS/PHASE	UNIT MCA	UNIT MOP	CONN. POINT	WIDTH"	DEPTH"	HEIGHT"	WEIGHT LBS.		
OSHP-1	SITE	AC-130	0/21.4	3.7	N/A	24	208/1	19	26	1	37-13/32	14-3/16	37-1/8	151	TRANE - TRUYA0241HA70NA	-

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91 Maple Street • Burlington VT 05401
802•864•6844 • www.fffinc.com
Architecture • Planning • Interiors

PROJECT MILESTONE
CONSTRUCTION PLANS

NO.	DATE	DESCRIPTION

CLIENT:
BURLINGTON SCHOOL DISTRICT
BURLINGTON, VERMONT

PROJECT:
BURLINGTON AVIATION TECHNICAL CENTER
200 DAVINCI DRIVE, SOUTH BURLINGTON, VT 05403

DRAWN WH
DESIGNED MM
CHECKED PP
SCALE
DATE 11/04/24
PROJECT T-18715.02

STATE OF VERMONT
CHRISTOPHER S. KNOX
NO. 84079
MECHANICAL
PROFESSIONAL ENGINEER

DRAWING TITLE
MECHANICAL SCHEDULES

DRAWING NUMBER
M002

Job #10424
Cost #
Construction Set
Received 11/4/2024
DEW CONSTRUCTION

FORM CD-450 (REV. 10/18)	U.S. DEPARTMENT OF COMMERCE	X GRANT	COOPERATIVE AGREEMENT
FINANCIAL ASSISTANCE AWARD		**FEDERAL AWARD ID NUMBER** 60NANB23D159	
RECIPIENT NAME Burlington School District		**PERIOD OF PERFORMANCE** 09/01/2023 - 08/31/2026	
STREET ADDRESS 150 Colchester Ave		**FEDERAL SHARE OF COST** $9,900,000.00	
CITY, STATE ZIP Burlington, VT 05401-1422		**RECIPIENT SHARE OF COST** $0.00	
AUTHORITY Consolidated Appropriations Act, 2022		**TOTAL ESTIMATED COST** $9,900,000.00	
CFDA NO. AND NAME 11.617 Congressionally-Identified Projects			
PROJECT TITLE: Burlington Aviation Technology Center Facility			

This Award Document (Form CD-450) signed by the Grants Officer constitutes an obligation of Federal funding. By signing this Form CD-450, the Recipient agrees to comply with the Award provisions checked below and attached. Upon acceptance by the Recipient, the Form CD-450 must be signed by an authorized representative of the Recipient and returned to the Grants Officer. If not signed and returned without modifications by the Recipient within 30 days of receipt, the Grants Officer may unilaterally withdraw this Award offer and de-obligate the funds.

X DEPARTMENT OF COMMERCE FINANCIAL ASSISTANCE STANDARD TERMS AND CONDITIONS

R & D AWARD

FEDERAL-WIDE RESEARCH TERMS AND CONDITIONS, AS ADOPTED BY THE DEPT. OF COMMERCE

X SPECIFIC AWARD CONDITIONS

X LINE ITEM BUDGET

X 2 CFR PART 200, UNIFORM ADMINISTRATIVE REQUIREMENTS, COST PRINCIPLES, AND AUDIT REQUIREMENTS, AS ADOPTED PURSUANT TO 2 CFR § 1327.101

48 CFR PART 31, CONTRACT COST PRINCIPLES AND PROCEDURES

MULTI-YEAR AWARD. PLEASE SEE THE MULTI-YEAR SPECIFIC AWARD CONDITION.

X OTHER(S): U.S. DEPARTMENT OF COMMERCE, NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY STANDARD TERMS AND CONDITIONS FOR EXTRAMURAL CONSTRUCTION PROJECTS, MAY 11, 2023

SIGNATURE OF DEPARTMENT OF COMMERCE GRANTS OFFICER	DATE
Shiou Liu SHIOU YUN LIU Digitally signed by SHIOU YUN LIU Date: 2023.09.15 08:23:32 -04'00'	
PRINTED NAME, PRINTED TITLE, AND SIGNATURE OF AUTHORIZED RECIPIENT OFFICIAL Tom Flanagan, Superintendent	DATE 9/18/23

Award Number: 60NANB23D159, Amendment Number 0

Federal Program Officer: Robert Slocum

Requisition Number: 195161

Employer Identification Number: 471351664

UEI Number: VCCSKXGSMEJ5

Recipient ID: 1155128

Requestor ID: 1155128

Award ACCS Information

Bureau	FCFY	Project-Task	Organization	Object Class	Obligation Amount
57	2023	1959000-000	10-19-0195-00-00-00-00	41-98-00-00	$9,900,000.00

Award Contact Information

Contact Type	Contact Name	Email	Phone
Administrative	Mr. Barry Gruessner	bgruessn@bsdvt.org	8028648462

NIST Grants Officer:

Shiou Liu
100 Bureau Drive, MS 1650
Gaithersburg, MD 20899-1650
(301) 975-8245

NIST Grants Specialist:

LaShae Green
100 Bureau Drive, MS 1650
Gaithersburg, MD 20899-1650
(301) 975-3070

NIST Financial Assistance Award Number: 60NANB23D159
Amendment: NEW
Recipient: Burlington School District

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
2022 CONGRESSIONALLY IDENTIFIED CONSTRUCTION GRANT PROGRAM
FINANCIAL ASSISTANCE
SPECIFIC AWARD CONDITIONS

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1. Description of Work:

The National Institute of Standards and Technology (NIST) hereby enters into this grant number 60NANB23D159 with Burlington School District to support the work described in the proposal entitled "Burlington Aviation Technology Center Facility" dated November 17, 2022, and any revisions received during the application review, which are hereby incorporated into this award by reference.

The scope of work for this project is anticipated to provide a total building space in the range of 30,000 to 45,000 gross SF to include classrooms, offices, shops/tech areas, storage, hangar space and general building facilities with the intent to educate up to 150 high school students and adults each year with the technical center housing aviation for 11th and 12th graders as well as adult programs that finishes the airframe and powerplant training.

Work will be completed in accordance with the schedule submitted by Burlington School District in the Project Management and Schedule dated November 17, 2022.

The Burlington School District shall diligently pursue the development of the project to ensure completion within this time schedule and shall promptly notify NIST in writing of any event that could substantially delay meeting any of the prescribed time limits for the project as set forth above. The Burlington School District further acknowledges that failure to meet the development time schedule may result in NIST taking action to suspend or terminate the Award in accordance with the regulations set forth at 2 CFR § 200.339.

Where the terms of this award and the proposal differ, the terms of this award shall prevail.

2. Recipient Contact Information:

Administrative:
Barry Gruessner
Grants Director
Burlington School District
150 Colchester Avenue
Burlington, VT 05401-1422
Telephone: 802-864-8462
Email: bgruessn@bsdvt.org

Authorized Representative:
Tom Flanagan
Superintendent
Burlington School District
150 Colchester Avenue
Burlington, VT 05401-1422
Telephone: 802-865-5332
Email: tflanagan@bsdvt.org

3. NIST Award Contact Information:

Grants Officer:
Michelle Shiouyun Liu
National Institute of Standards and Technology
100 Bureau Drive, Mail Stop 1650
Gaithersburg, MD 20899-1650
Telephone: 301-975-8245
Email: shiouyun.liu@nist.gov

Grants Specialist:
LaShae Green
National Institute of Standards and Technology
100 Bureau Drive, Mail Stop 1650
Gaithersburg, MD 20899-1650
Telephone: 301-975-3070
Email: lashae.green@nist.gov

Federal Program Officer:
Robert Slocum
National Institute of Standards and Technology
100 Bureau Drive
Gaithersburg, MD 20899
Email: robert.slocum@nist.gov

4. Award Payments:

This award is hereby funded through advanced payments using the Department of Treasury's Automated Standard Application for Payments (ASAP) system. Payments will be issued in accordance with 2 CFR § 200.305 and the Department of Commerce Financial Assistance Standard Terms and Conditions, B.02, dated November 12, 2020.

Payments for allowable costs may be drawn down as needed by the Recipient enrolled in ASAP. Funds may be requested through ASAP by the authorized *Payment Requestor* who is the individual designated by the Recipient to access Federal funds.

This award has the following control or withdrawal limits set in ASAP:

_____ None
_____ Agency Review required for all withdrawals (see explanation below)
_____ Agency Review required for all withdrawal requests over
$_____ (see explanation below)
__X__ Maximum Draw Amount controls (see explanation below)
$_____ each month
$_____ each quarter
$0.00_____ Max drawdown amount

Explanation:

Environmental & Historic Compliance Requirements
A total of $9,900,000.00 in Federal funding is hereby withheld until the requirements identified in Specific Award Condition (SAC) #17 Environmental and Historic Review is satisfied. A Six-Month Expenditure Plan may be submitted to request funding for expenditures limited to Environmental and Historic Requirement compliance as identified in SAC #17.

In addition, the final site selection for the Burlington Aviation Technology Center Facility must be provided to NIST and approved by NIST prior to advertisement of construction. All federal funding is hereby withheld until this requirement is satisfied, as identified in SAC #19 Final Site Selection, below.

5. Return Payments for Funds Withdrawn through ASAP:

Funds that have been withdrawn through ASAP may be returned to ASAP via the Automated Clearing House (ACH) or via FEDWIRE. The ACH or FEDWIRE transaction may only be completed by the Recipient's financial institution. Full or partial amounts of payments received by a Payment Requestor/Recipient Organization may be returned to ASAP. All funds returned to the ASAP system will be credited to the ASAP Suspense Account. The Suspense Account allows the Regional Financial Center to monitor returned items and ensure that funds are properly credited to the correct ASAP account. Returned funds that cannot be identified and classified to an ASAP account will be dishonored and returned to the originating depositary financial institution (ODFI). The Payment Requestor/Recipient Organization should notify the NIST Grants Office and provide a reason whenever return payments are made.

It is essential that the Payment Requestor/Recipient Organization provide its financial institution with ASAP account information (ALC, Recipient ID and Account ID) to which the return is to be credited. Additional detailed information is accessible at: https://www.fiscal.treasury.gov/asap/.

6. Period of Performance and Funding Limitations:

The period of performance and budget incorporated into this award cover a 3-year period of performance and provide for a maximum total amount of $9,900,000.00 in Federal funding. This award is being fully funded via this award action.

The maximum amount of NIST funding in support of this award will not exceed the amount specified in the award documents, unless otherwise amended in writing by the NIST Grants Officer. The Department of Commerce is not liable for any obligations, expenditures, or commitments which involve any amount in excess of the Federal funds being made available pursuant to this award.

7. Request for Application - 2022 Congressionally Identified Construction Grant Program:

The Department of Commerce, National Institute of Standards and Technology Request for Application (RFA) No. 2022-NIST-RFA-CICGP-01, dated October 18, 2022, is incorporated by reference into this award. It is accessible at: https://www.grants.gov/web/grants/view-opportunity.html?oppId=344108

8. Department of Commerce Pre-Award Notification Requirements for Grants and Cooperative Agreements:

The Department of Commerce Pre-Award Notification Requirements for Grants and Cooperative Agreements as published in the *Federal Register* on December 30, 2014 (79 FR 78390) is incorporated by reference into this award. It is accessible at: http://www.gpo.gov/fdsys/pkg/FR-2014-12-30/pdf/2014-30297.pdf.

9. Uniform Administrative Requirements, Cost Principles and Audit Requirements

Through 2 C.F.R. § 1327.101, the Department of Commerce adopted Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards at 2 C.F.R. Part 200, which apply to awards in this program. Refer to http://go.usa.gov/SBYh and http://go.usa.gov/SBg4. Awards issued pursuant to this program may be subject to specific award conditions as authorized by 2 C.F.R. § 200.208.

10. Deviation to the Department of Commerce Financial Assistance Standard Terms and Conditions, Section A.01 "Reporting Requirements":

The Recipient must submit a Federal Financial Report (SF-425) and Performance Progress Report on a quarterly basis for the periods ending March 31, June 30, September 30, and December 31, or any portion thereof.

Reports are due no later than 30 calendar days following the end of each reporting period. A final SF-425 and Performance Progress Report must be submitted within 120 days after the expiration of the period of performance.

All SF-425 and Performance Progress Reports must be submitted to: GReports@nist.gov, within the prescribed timeframes identified in the terms and conditions of the award.

The Recipient organization name, NIST award number, and reporting period must be included in the email subject line. The Recipient contact information should be included in the body of the message. To the greatest extent possible, SF-425 and Performance Progress Reports should be submitted together in the same email.

SF-425 and Performance Progress Reports must not be sent directly to NIST personnel (e.g. Grants Specialist, Grants Officer, Administrative Assistant, GMD Division Chief, Federal Program Officer, etc.).

Any SF-425 or Performance Progress Reports sent directly to NIST personnel will be returned to the sender with instructions on how to submit through the GReports@nist.gov mailbox.

No other correspondence may be sent through this mailbox; timely responses to any other inquiries received in this mailbox are not guaranteed. The mailbox will not be used for any other purpose ***except*** for purposes identified above.

11. Department of Commerce Financial Assistance Standard Terms and Conditions:

As indicated on the Form CD-450 for this award, the Department of Commerce Financial Assistance Standard Terms and Conditions (ST&C) issued November 12, 2020, are incorporated by reference into this award. The Department's ST&C, as well as a link to 2 CFR Part 200, are accessible at: https://www.commerce.gov/oam/policy/financial-assistance-policy.

12. NIST Standard Terms and Conditions for Extramural Construction Projects:

As indicated on the Form CD-450 for this award, the National Institute of Standards and Technology Standard Terms and Conditions for Extramural Construction Projects (Construction ST&Cs) dated May 11, 2023 are incorporated by reference into this award. The Construction ST&Cs are accessible at NIST Standard Terms and Conditions for Extramural Construction Projects | NIST.

13. Unfunded Grant Actions Mailbox (UGAM):

Requests for unfunded award actions, which include, but are not limited to, requests for no-cost extension, change in key personnel, change in scope of work, and budget revisions must be submitted to: UGAM@nist.gov, within the prescribed timeframes identified in the terms and conditions of the award.

Unfunded award action requests and related correspondence, including justification to support the request, sent to the mailbox ***must*** contain the following information in the email subject line: (1) Recipient name; (2) NIST award number; (3) Principal Investigator/Project Director; and (4) Action being requested (e.g. no cost extension, change in key personnel, etc.).
Unfunded award action requests must not be sent directly to NIST personnel (e.g. Grants Specialist, Grants Officer, Administrative Assistant, GMD Director, Federal Program Officer, etc.).

Any requests sent directly to NIST personnel will be returned to the sender with instructions on how to submit through the UGAM@nist.gov mailbox.

No other correspondence may be sent through this mailbox; timely responses to any other inquiries received in this mailbox are not guaranteed. The mailbox will not be used for any other purpose ***except*** for purposes identified above.

Requests that are processed will be authorized via a Form CD-451 Amendment to the Financial Assistance Award or a Non-Funded Administrative Change Letter.

14. Supervision of the Recipient's Staff and Associates and Compliance with NIST Policies on Use of Federal Facilities and Equipment:

Consistent with Department of Commerce Financial Assistance Standard Terms and Conditions, Section A.05, nothing in this award will be construed as authorizing the Recipient or its employees, agents, or assigns to act as an agent or assign of NIST, and the Recipient must exercise all diligence to ensure that no third party construes the Recipient as an actual, ostensible, or apparent agent of NIST. For purposes of this award, the use of the term "personnel" herein includes all third parties, such as contractors, subrecipients, students, fellows, or others participating under the direction of the Recipient's programs. The Recipient acknowledges that it is independent of NIST in the performance of the approved projects, and that the Recipient assumes full and sole responsibility for all benefits and protections of the Recipient's personnel and agents whose services are utilized by the Recipient in the execution of this award.

Accordingly, the Recipient must control the means and manner of its personnel's activities on the project, including those conducted on a NIST campus, on Recipient property, and at other locations for the project. The Recipient must directly provide a salary, stipend, or other funding to the personnel, and must establish the work schedule and tenure for the personnel. The Recipient is the supervisor of record for the personnel and will coordinate with NIST as needed to ensure that the research remains consistent with NIST program objectives.

15. Estimated Useful Life:

The estimated useful life of the building renovation portion of this project is 15 years from when the date on which the Certificate of Occupancy for the renovations is issued.

16. Property Trust Relationship and Public Notice Filings for Grant-Acquired Property:

In accordance with 2 CFR § 200.316 (Property trust relationship), real property, equipment, and intangible property, that are acquired or improved with a Federal award must be held in trust by the non-Federal entity (*i.e.*, Recipient or Subrecipient) as trustee for the beneficiaries of the project or program under which the property was acquired or improved. This trust relationship exists throughout the duration of the property's estimated useful life, as determined by the Grants Officer in consultation with the Program Office, during which time the Federal Government retains an undivided, equitable reversionary interest in the property (Federal Interest). The non-Federal entity must comply with all use and disposition requirements and restrictions as set forth in 2 C.F.R. §§ 200.310 (Insurance coverage) through 200.316 (Property trust relationship), as applicable, and in the terms and conditions of the Federal award.

The Grants Officer may require a non-Federal entity (*i.e.*, a Recipient or Subrecipient) to execute and to record (as applicable) a statement of interest, financing statement (Form UCC-1), lien, mortgage or other public notice of record to indicate that real or personal property acquired or improved in whole or in part pursuant to this award is subject to the Federal Interest, and that certain use and disposition requirements apply to the property. The statement of interest, financing statement (Form UCC-1), lien, mortgage or other public notice must be acceptable in form and substance to the NIST Grants Officer and must be placed on record in accordance with applicable State and local law, with continuances re-filed as appropriate. In such cases, the NIST Grants Officer may further require the non-Federal entity to provide a written statement from a licensed attorney in the jurisdiction where the property is located, certifying that the Federal Interest has been protected, as required under the award and in accordance with applicable State and local law. The attorney's statement, along with a copy of the instrument reflecting the recordation of the Federal Interest, must be promptly returned to the Grants Officer.

Without releasing or excusing the non-Federal entity from these obligations, the non-Federal entity, by execution of the financial assistance award or by expending Federal financial assistance funds (in the case of a subrecipient), authorizes the NIST Grants Officer to file such notices and continuations as it determines to be necessary or convenient to disclose and protect the Federal Interest in the property. The NIST Grants Officer may elect not to release any or a portion of the Federal award funds until the non-Federal entity has complied with this provision and any other applicable award terms or conditions, unless other arrangements satisfactory to the NIST Grants Officer are made.

17. Environmental and Historic Review:

The Recipient must comply with all applicable requirements, environmental and historic preservation laws, Executive Orders, regulations, standards, and guidance, and identify to NIST any impact a project may have on the environment or historic resources.

Project implementation may not begin prior to the completion of a review of potential environmental impacts, per the National Environmental Policy Act of 1969 (42 U.S.C. 4321, et. seq.) (NEPA) and Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. § 470, et. seq.).

The completion of NEPA compliance activities will result in one of the following: a Categorical Exclusion, an Environmental Assessment/Finding of No Significant Impact (EA/FONSI), or an Environmental Impact Statement. A decision document will not be issued until all required consultations, including, Section 7 of the Endangered Species Act (16 U.S.C. §1531, et. seq.), and any other required consultations are complete. The Recipient must also address compliance with all other applicable federal, state, and local environmental laws and regulations.

Under Section 106 of the NHPA, federal agencies, and by extension recipients of federal grant funds, must evaluate the potential effects of any proposed projects ("undertakings") on properties listed on, or eligible for listing on, the National Register of Historic Places. Grant recipients are encouraged to initiate Section 106 consultation with relevant State Historic Preservation Offices (SHPOs) or, in the case of institutions located on tribal lands, the proper Tribal Historic Preservation Office (THPO) as directed by NIST. NIST will remain involved in resolution in the event of an adverse effect determination.

A Environmental and Historic Review, to include any required consultations under NEPA and Section 106 of the NHPA, must be completed no later than six months after the award start date; unless a formal request for extension is submitted and approved by the Grants Officer. The Recipient must comply with all conditions placed on the project as the result of the consultation processes. The Recipient may not expend any federal grant funds, except as authorized by the Grants Officer pursuant to approval of the 6-month expenditure plan (discussed below).

The Recipient is required to provide the following information that will enable NIST to make a preliminary determination regarding the potential impact of the proposed project on environmental and historic resources:

1. A thorough description of all proposed project activities, particularly buildings and other capital improvement activities that will be conducted. Include: (i) the area and extent of earthwork (drilling, excavation, fill, blasting, dredging, etc.), (ii) environmental communication, documentation, or permitting (planned, pending, or in place), (iii) any determination upon the project by any department of environment or other agency or office, (iv) floodplain mapping on the site itself or any adjacent or contiguous property, (v) any special interest in the project or the site, (vi) any public meetings planned or held regarding the on the site itself or adjacent or contiguous property, (vii) any threatened or

endangered species or any migratory birds or bald or golden eagles on the site itself or adjacent or contiguous property, or (viii) any essential fish habitat or any portion of the National Wild and Scenic River System or Coastal Barrier System or navigable waters on the site itself or adjacent or contiguous property, (ix) any waters of any stream or other body of water "proposed or authorized, permitted or licensed to be impounded, diverted, or otherwise controlled or modified", (x) any identified or potential wetland on the site itself or any adjacent or contiguous property, (xi) any hazardous or regulated substances or Superfund activity on the site itself or adjacent or contiguous property, and/or (xii) any invasive species on the site itself or adjacent or contiguous property.

2. Maps of the project area and ground-level and aerial photographs with installation/renovation locations clearly marked on the buildings impacted. Free online resources, such as Google maps or similar images, are acceptable.

3. For the list of buildings, referenced in Item #1, state the year those buildings were first constructed as well as the dates of any subsequent major renovations. For buildings that are 45 years old or older, provide photos of installation sites, as well as exterior and interior photos of the building. Provide any property relevant to this application which is (i) within the viewshed of a registered historic property or (ii) within a historic district or (iii) registered as historic itself or (iv) noted to be historically or architecturally significant in any study or article of public interest. Provide any communication, documentation, or permitting under the project, e.g., determination upon the project by a SHPO and/or THPO.

NOTE: The Recipient must submit a draft Environmental and Historic Review with all initial required project information listed above in Items #1 – #3 to NIST via UGAM@nist.gov no later than 60 calendar days after award start date, unless an extension has been requested in writing by the Recipient and approved by the Grants Officer.

Follow-on information may be required for NIST to determine the level of impacts of the project on environmental and historic resources. If consultation is required, grantees are encouraged to initiate consultation as referenced above and must provide NIST with relevant documentation of the consultation process. Once appropriate and applicable consultations have been completed, and environmental review documentation has been completed, NIST will review all documentation and determine whether the review sufficiently addresses all resource areas and whether the project may qualify for an approval decision.

Once the above information is provided, NIST will review and provide guidance on the next steps that the recipient should take regarding required consultations and/or environmental and historic preservation documentation required to make environmental determinations. Next steps may include, but are not limited to, the submittal and completion of the following:

1. The completion of any required consultations as described above where applicable and directed by NIST, to include consultations with the SHPO and/or THPO and the appropriate federally-recognized Native American tribes (if applicable), under Section 106 of the NHPA, and/or consultations with the USFWS under Section 7 of the ESA;

2. The completion of environmental review and issuance by NIST of a decision document, as described above, that meets the requirements of NEPA; and

3. Compliance with all other applicable federal, state, and local environmental laws and regulations.

The Recipient is required to provide any information requested by NIST in a timely and effective manner to ensure both initial and ongoing compliance with environmental and historic preservation laws, regulations, and best practices. All such information must be sent to the FPO.

The Recipient shall notify NIST within 24 hours upon receipt of any notices of foreclosure; notices for continuing consultation received from the SHPO, THPO or other consulting party; or notices of noncompliance received from consulting authorities or regulatory agencies. These notices shall be sent to the FPO. Projects which, after consultation with appropriate agencies, are determined to be ineligible for a CE will require the development of an EA/FONSI. The Recipient may wish to coordinate with NIST to rescope or descope the proposed project to avoid or minimize impacts to environmental and historic resources.

Any change to the approved project scope, resulting from consultations or for other reasons, that have the potential for altering the nature or extent of environmental or cultural resources impacts must immediately be brought to the attention of NIST and will be re-evaluated for compliance with applicable regulatory requirements.

For all ground disturbing activities in the vicinity of known archaeological sites or suspected or known burials, the Recipient must ensure that an archaeologist who meets the Secretary of the Interior's Professional Qualification Standards monitors ground disturbance, and if any potential archeological resources or buried human remains are discovered, then the Recipient must immediately cease construction in that area and notify NIST and the interested SHPO, THPO, and tribes. Such construction activities may then only continue with the written approval of NIST.

6-Month Expenditure Plan

While this SAC is in effect, the Recipient shall submit, in advance of any program fund drawdowns from ASAP.gov, a 6-month expenditure plan that presents the proposed expenditure of award funds prior to the completion of the environmental review process, including any preliminary procurement activities. The NEPA Coordinator and the Federal

Preservation Officer will review the plan and provide recommendations to the Federal Program Officer and the Grants Officer for final approval to ensure that the proposed activities and expenditures are reasonable and necessary in the context of environmental and historical compliance. Approval of the Grants Officer is required prior to fund drawdowns of the 6-Month Expenditure Plan through ASAP.gov.

The allowable use of funds for preliminary expenditures prior to beginning project implementation includes, but is not limited to, the initiation of activities necessary to meet the project completion requirements as specified in the award including environmental and historic preservation requirements:

1. Required environmental and historic preservation consultation activities;
2. Purchase or lease of equipment, or entering into binding contracts to do so; and
3. Purchase of applicable or conditional insurance.

The allowable use of preliminary expenditure funds is limited; must not result in an irrevocable commitment of resources; and is only allowed after inclusion in and approval of a 6-month expenditure plan.

18. Signage and Public Acknowledgement Requirements:

a. Signs - The Recipient is encouraged to include project signage, satisfactory in form and content to NIST, that identifies the nature of the project and indicates that "the project is funded by the Consolidated Appropriations Act, 2022." In addition, guidelines for project signage, including an emblem and corresponding logomark, is available in the Official Investing in America Emblem Style Guide: https://www.whitehouse.gov/wp-content/uploads/2023/02/Investing-in-America-Brand-Guide.pdf. Costs associated with signage must be reasonable and limited. The Recipient is encouraged to use recycled or recovered materials when procuring signs. Signs should not be produced or displayed if doing so results in unreasonable cost, expense, or recipient burden. Any construction site sign should be displayed throughout the construction phase of the project in an easily visible location directly linked to the work taking place. The Recipient is responsible to maintain the sign in good condition throughout the construction period.

b. Plaque - Any plaque installed at the discretion of the Recipient, citing the origins or history of the project, should identify the project as a "project funded by Consolidated Appropriations Act, 2022."

c. Communications - Any banner or other message intended for public display on the project site should remain within the spirit of transparency and public information provided herein.

19. Final Site Selection:

Within 60 calendar days of the award start date, the Recipient must provide to the Federal Program Officer and Grants Specialist identified in this award, a final site selection for the Burlington Aviation Technology Center Facility. The site selection must be approved by NIST prior to advertisement of construction. All grant funding will be withheld until this Specific Award Condition is deemed satisfied in writing by the NIST Grants Officer.

End of Specific Award Conditions

OMB Number: 4040-0008
Expiration Date: 02/28/2025

BUDGET INFORMATION - Construction Programs

NOTE: Certain Federal assistance programs require additional computations to arrive at the Federal share of project costs eligible for participation. If such is the case, you will be notified.

COST CLASSIFICATION	a. Total Cost	b. Costs Not Allowable for Participation	c. Total Allowable Costs (Columns a-b)
1. Administrative and legal expenses	$	$	$
2. Land, structures, rights-of-way, appraisals, etc.	$	$	$
3. Relocation expenses and payments	$	$	$
4. Architectural and engineering fees	$ 947,427.00	$ 547,427.00	$ 400,000.00
5. Other architectural and engineering fees	$ 50,000.00	$	$ 50,000.00
6. Project inspection fees	$ 600,000.00	$	$ 600,000.00
7. Site work	$ 7,050,000.00	$	$ 7,050,000.00
8. Demolition and removal	$	$	$
9. Construction	$	$	$
10. Equipment	$	$	$
11. Miscellaneous	$	$	$
12. SUBTOTAL *(sum of lines 1-11)*	$ 8,647,427.00	$ 547,427.00	$ 8,100,000.00
13. Contingencies	$ 1,800,000.00	$	$ 1,800,000.00
14. SUBTOTAL	$ 10,447,427.00	$ 547,427.00	$ 9,900,000.00
15. Project (program) income	$	$	$
16. TOTAL PROJECT COSTS *(subtract #15 from #14)*	$ 10,447,427.00	$ 547,427.00	$ 9,900,000.00

FEDERAL FUNDING

17. Federal assistance requested, calculate as follows: (Consult Federal agency for Federal percentage share.) Enter the resulting Federal share.	Enter eligible costs from line 16c Multiply X 100 %	$ 9,900,000.00