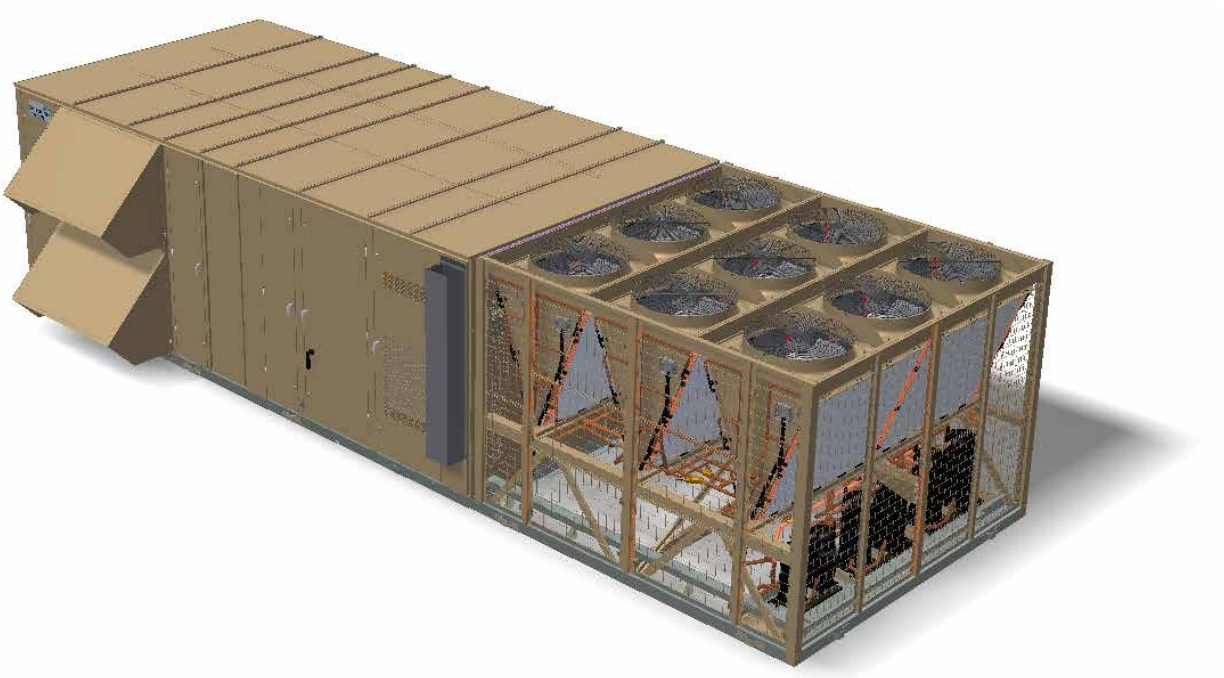
Johnson Controls	PACKAGED ROOFTOP AIR CONDITIONING UNITS	
INSTALLATION, OPERATION, MAINTENANCE	Supersedes 100.50-NOM11 (1115)	Form 100.50-NOM11 (116)

035-21779-050

SERIES 100
SINGLE PACKAGED UNITS
YPAL DESIGN LEVEL G



LD17804

120 THROUGH 150 TONS

Issue Date:
January 7, 2016

IMPORTANT!

READ BEFORE PROCEEDING!

GENERAL SAFETY GUIDELINES

This equipment is a relatively complicated apparatus. During rigging, installation, operation, maintenance, or service, individuals may be exposed to certain components or conditions including, but not limited to: heavy objects, refrigerants, materials under pressure, rotating components, and both high and low voltage. Each of these items has the potential, if misused or handled improperly, to cause bodily injury or death. It is the obligation and responsibility of rigging, installation, and operating/service personnel to identify and recognize these inherent hazards, protect themselves, and proceed safely in completing their tasks. Failure to comply with any of these requirements could result in serious damage to the equipment and the property in which it is situated, as well as severe personal injury or death to themselves and people at the site.

This document is intended for use by owner-authorized rigging, installation, and operating/service personnel. It is expected that these individuals possess independent training that will enable them to perform their assigned tasks properly and safely. It is essential that, prior to performing any task on this equipment, this individual shall have read and understood the on-product labels, this document and any referenced materials. This individual shall also be familiar with and comply with all applicable industry and governmental standards and regulations pertaining to the task in question.

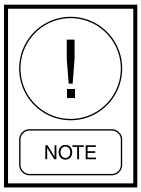
SAFETY SYMBOLS

The following symbols are used in this document to alert the reader to specific situations:

Indicates a possible hazardous situation which will result in death or serious injury if proper care is not taken.

Identifies a hazard which could lead to damage to the machine, damage to other equipment and/or environmental pollution if proper care is not taken or instructions and are not followed.

Indicates a potentially hazardous situation which will result in possible injuries or damage to equipment if proper care is not taken.



Highlights additional information useful to the technician in completing the work being performed properly.

External wiring, unless specified as an optional connection in the manufacturer's product line, is not to be connected inside the control cabinet. Devices such as relays, switches, transducers and controls and any external wiring must not be installed inside the micro panel. All wiring must be in accordance with Johnson Controls' published specifications and must be performed only by a qualified electrician. Johnson Controls will NOT be responsible for damage/problems resulting from improper connections to the controls or application of improper control signals. Failure to follow this warning will void the manufacturer's warranty and cause serious damage to property or personal injury.

CHANGEABILITY OF THIS DOCUMENT

In complying with Johnson Controls' policy for continuous product improvement, the information contained in this document is subject to change without notice. Johnson Controls makes no commitment to update or provide current information automatically to the manual or product owner. Updated manuals, if applicable, can be obtained by contacting the nearest Johnson Controls Service office or accessing the Johnson Controls QuickLIT website at http://cgproducts.johnsoncontrols.com.

It is the responsibility of rigging, lifting, and operating/service personnel to verify the applicability of these documents to the equipment. If there is any question regarding the applicability of these documents, rigging, lifting, and operating/service personnel should verify whether the equipment has been modified and if current literature is available from the owner of the equipment prior to performing any work on the chiller.

CHANGE BARS

Revisions made to this document are indicated with a line along the left or right hand column in the area the revision was made. These revisions are to technical information and any other changes in spelling, grammar or formatting are not included.

ASSOCIATED LITERATURE

MANUAL DESCRIPTION	FORM NUMBER
Shipping Damage Claims	50.15-NM
Installation Instructions	100.50-N15
Start-Up Guide	100.50-SU5
Literture Supplement	100.40-NO4 (LS02)

NOMENCLATURE

BASE MODEL NUMBER

1 2 3 4 BASE PRODUCT TYPE
- Y : YORK
- P : Packaged Rooftop
- A : Air-Cooled
- L : Scroll

5 6 7 NOMINAL CAPACITY
- 1 2 0 : 120-ton
- 1 3 0 : 130-ton
- 1 5 0 : 150-ton

8 9 APPLICATION
- C : Cooling Only
- N : Natural Gas Heat
- G : Natural Gas Heat SS HX
- M : Modulating Gas Heat
- E : Electric Heat
- S : Steam Heat
- H : Hot Water Heat
- R : Hot Gas Reheat

- C : Constant Volume
- V : VAV, VFD
- F : FlexSys

10 REFRIGERANT
- E : R-410A

11 12 VOLTAGE
- 4 6 : 460 / 3 / 60
- 5 8 : 575 / 3 / 60

13 14 DUCT LOCATIONS
- B : Bottom Supply
- L : Left Supply
- R : Right Supply

- B : Bottom Return
- R : Rear Return
- S : Side Return

15 16 DESIGN SPECIAL
- G

- A : Std. Product, Simplicity Elite
- B : Special Product, Simplicity Elite
- X : Std. Product, IPU
- S : Special Product, IPU

17 GAS HEAT CAPACITY
- N : No Gas Heat
- L : Low (375 MBH)
- M : Med (750 MBH)
- H : High (1125 MBH)

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SECTION 1 – INTRODUCTION

ECOLOGICAL AND ECONOMICAL DESIGN

Lower Total Cost of Ownership

- Fully modulating gas heat and greater steps of capacity control offer superior off-design performance while maintaining optimum occupant comfort.
- Accurate ventilation control ensures that no more than the proper amount of ventilation air is utilized. This avoids the energy cost of conditioning excess outside air and simultaneously monitors all other unit functions for maximized energy efficiency.
- Flexible design configurations simplify the design process and allow the YPAL to be applied to virtually any building application.
- Accessibility through double-wall access doors, spacious compartments and supportive floors improves serviceability.

INDOOR AIR QUALITY (IAQ)

Indoor Air Quality Features for the Indoor Environment

- A double-sloped stainless steel drain pan with a single drain connection ensures that all condensate is voided from the drain pan. It is also visible and accessible for periodic inspection and cleaning required by the ASHRAE 62 IAQ standard.
- Double-wall construction of the roof, floor, doors, and walls prevents insulation fibers from entering the conditioned air. The inner liner also facilitates periodic cleaning of the unit to prevent harmful build-up of bacteria or contaminants.
- The rooftop unit controller control center uses microprocessor logic to analyze and optimize ventilation decisions and perform demand ventilation, and airflow compensation.

FIGURE 1 - PACKAGED ROOFTOP AIR CONDITIONING UNIT

Condensing Section

Scroll Compressors – Reliable, efficient, trouble-free operation is the true measure of a packaged rooftop's value. That's why JCI YPAL Packaged Rooftop Air Conditioners use established scroll-compressor technology to deliver dependable, economical performance in a wide range of applications. With the YPAL Packaged Rooftop, you get the latest generation of compressor enhancements added to the scroll's inherent strengths. The simplicity of a hermetic scroll compressor allows the use of fewer moving parts to minimize breakdown.

Multiple Compressor Staging – Through the use of the scroll compressor, the YPAL has the ability to stage it's cooling by enabling and disabling multiple single stage compressors on multiple circuits. These compressors are manifolded together in three independent circuits.

Compressor Circuiting – The YPAL is designed so that only 2 scroll compressors are in tandem within one refrigeration circuit. This means more reliable compressors, and less equipment down time. With multiple circuits, if a compressor should ever fail on one circuit, the other circuit/s will remain operational to work to maintain occupied loads. The YPAL system has 3 circuits in a unit.

Compressor Sound Blankets – Optional factory installed sound blankets can be installed to further reduce compressor sound attenuation.

Replaceable Core Filter Driers – The optional replaceable core filter driers on the YPAL provides a convenient means for maintaining and optimizing the units' refrigeration system. Eliminating additional field penetrations into the refrigerant circuit, which could lead to potential problems, reduce the worry of refrigerant circuit contamination.

Low Ambient – The S100 unit will come standard with mechanical cooling operation down to 50 deg F. For mechanical cooling operation below 50 deg F, a low ambient kit is required.

Condenser Fan Motors – The condenser fan motors used on the YPAL unit are Totally Enclosed Air Over (TEAO) to provide maximum durability through any season.

Condenser Coils – Condenser coils are microchannel type and made of a single material to avoid galvanic corrosion due to dissimilar metals. Coils and headers are brazed as one piece. Integral sub cooling is included. The design working pressure of the coil is 650 PSIG (45 bar).

Condenser Coil Protection – The YPAL is available with either a wire mesh covering or louvered panels for optimum coil protection. In applications where unauthorized personnel may have access to the units, or the units may be susceptible to severe weather conditions such as hail, the louvered panel provides protection around the entire condensing section giving the maximum protection to the coils and refrigerant components.

Heating Section

Gas Heat Design and Control Options – Includes an unsurpassed 24:1 turndown modulating gas furnace, and staged heating control. A Staged furnace is also available in six step furnaces.

Staged Gas Heat – The YPAL rooftop gas furnace is an induced-draft gas furnace designed for high efficiency and reliability. The furnace uses an aluminized steel tubular heat exchanger and operates at temperatures sufficient to prevent acidic exhaust gases from condensing in the heat exchanger at low fire rates, unlike drum and tube style furnaces that generate condensation formation.

Electric – The YPAL is also available with an electrical heater that can range from 80kW up to 240kW. Depending on the size of the heat required, the YPAL can have three to six steps of control helping to provide tighter control of the supply and zone conditioned air. With the utilization of this multi step function, the YPAL can effectively reduce energy consumption by bringing on smaller stages of heat while maintaining the maximum level of comfort.

AIR MANAGEMENT

The JCI FlexSys Underfloor Air system provides a cutting edge, cost competitive alternative to conventional overhead air distribution systems based on the performance and system flexibility benefits that it can provide. When combined with a JCI YPAL Packaged Rooftop Unit, the system offers a complete package that provides an optimum solution for building comfort control.

FlexSys technology uses the open space between the structural concrete slab and the underside of a raised access floor system to deliver conditioned air directly into the occupied zones of office and other commercial buildings. This underfloor plenum incorporates the air distribution system with the building power, telecommunication, and data cabling in one easily accessed service plenum. The raised access floor concept is a proven design ideal for office buildings that house today's modern business that relies on critical information technologies to maintain high productivity levels. The unmatched flexibility offered by raised floor systems allows for significant costs savings and reduced downtimes when a fast-paced economy demands office space reconfiguration.

DWDI Airfoil Fans – High efficiency fans are used to improve application flexibility, and address sound and application concerns.

Building Pressure Control – Return fans, exhaust fans, and barometric relief dampers are available to meet building pressure control requirements. Select the most appropriate option for a given application.

Low Sound Options – Allows for application of the YPAL unit in sound-sensitive applications such as theaters and downtown areas. Contact JCI for more details on site-specific requirements.

Variable Frequency Drives – When a VAV unit is ordered, the YPAL comes standard with variable frequency drives (vfd's). The VFD can optimize a systems performance by modulating the supply fan motor speed to reduce energy consumption by as much as 40% while maximizing occupant comfort.

Fan Spring Isolation – Two-inch spring isolation is used to prevent vibration transmission from the rooftop unit's supply fan to the building.

CONTROLS

Rooftop Controller – The ColdFire™ processor-based controller uses the latest in processor technology to provide the highest level of rooftop control with BACnet open protocol communication capabilities. An 80-character display and keypad are standard for simple, and easy to understand manipulation of control setpoints and readout of operating parameters and diagnostics. Shutdown and alarm faults are all recorded in memory, and include a time and day stamp for easy troubleshooting.

BACnet – The YPAL can be adapted to operate with any building automation system that is BACnet compatible making it the most flexible large commercial rooftop units on the market.

INDOOR AIR QUALITY

Double Sloped Stainless Steel Drain Pan – The YPAL's standard Stainless Steel drain pan meets ASHRAE 62 requirements for condensate drainage to improve indoor air quality. Solid wall liners encase insulation and prevent moisture from damage. Additional benefits include easy cleanability and isolates insulation from conditioned airstream.

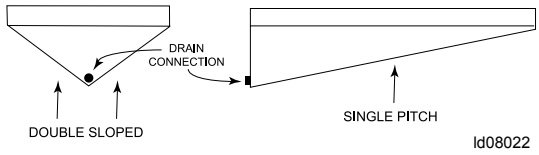


FIGURE 2 - DOUBLE SLOPED SS DRAIN PAN

NOTE

This is a visual reference only. Actual drain pan pitch will vary.

Double Wall Construction – This is the standard construction of the YPAL and incorporates powder coated pre-fabricated outer panels and corner post for maximum exterior surface protection.

Factory Shrinkwrap – All YPAL rooftop units can be ordered from the factory with factory-fresh shrinkwrap packaging. No longer does the contractor need to worry about dirt and debris clogging up condenser coils or moisture leaking into the air handler on the units way to the job site or rigging yard.

Demand Ventilation – This can be incorporated into the unit to improve indoor air quality and help manage indoor pollutants such as CO_2 or other harmful airborne contaminates out of the occupied spaces for maximum comfort and safety. Activation of this sequence can easily be accomplished using CO_2 sensors connected to the unit. The rooftop unit controller includes two analog inputs for sensors to sense indoor and/or outdoor CO_2 levels to maintain optimum occupant comfort and safety. The CO_2 sensors are typically used with demand ventilation, however other sensors may be applied to control indoor contaminants such as volatile organic compounds (VOCs).

Smoke Purge – This is also available through the User Interface to evacuate smoke due to fire from a room or zone.

Filtration – The Series 100 unit can be ordered with various types of filtration to meet the different needs and requirements of todays buildings. Filtration types include; 2" pleated filters, 2" carbon filters, 2" cleanable filters and a combination of 2" pleated pre-filters with 12" pleated filters in different MERV ratings. The units can also be ordered with post filters with the extended cabinet option.

ELECTRICAL

Single Point Power – The YPAL unit comes standard with single point power connections to make installation quick and easy.

Dual Point Power – This can be factory installed for applications that require the mechanical heating and cooling functions to be separated from the air handling functions. This enables the unit to be operated in an emergency condition while minimizing power consumption.

Unit-Mounted Disconnect – This is available as an option to minimize time at installation of equipment and to reduce necessary field installed items.

SERVICE AND INSTALLATION

Access Doors – Full-sized access doors provide easy access into the unit for routine maintenance and inspection.

Service Valves – Oversized service valves to provide isolation and quick reclamation and charging of system refrigerant are available to minimize downtime and simplify the service and repair task.

Convenience Outlet – For maintenance tasks requiring power tools, an optional 110V GFCI power supply can power lights, drills or any other power hand tool needed.

Factory Run-Tested – Each unit is subjected to a series of quality assurance checks as well as an automated quality control process before being run-tested. Fans and drives are balanced at the factory during testing. The factory run-test ensures safe proper operation when the unit is installed, and reduces installation and commissioning time.

Rain Hoods Rotate Into Place – No bulky, field-installed rain hoods here. YPAL rain hoods ship flush against the unit, and move into position with the insertion of a few screws and caulk along the side seams.

Replaceable Core Filter Drier Option – This provides a means to remove moisture, dirt and debris from the refrigeration circuit in the event it is opened.

Split Ship Option – Series 100, 120-150 ton units, have the option of being shipped in a split arrangement, air handling and condensing sections separate for ease of rigging into place.

SECTION 2 – INSTALLATION

APPROVALS

Design certified by ETL, CETL as follows:

- For use as a forced air furnace with cooling unit (gas heat models).
- For outdoor installation only.
- For installation on combustible material and may be installed directly on combustible flooring over Class A, Class B or Class C roof covering materials.
- For use with natural gas or LP.
- When used with LP propane gas one of the following conversion kits must be installed before the gas heat section is fired:

  1,125,000 BTU Input - 385-01866-003

Not suitable for use with conventional venting systems.

LIMITATIONS

The installation of this unit must conform to local building codes, or in the absence of local codes, with ANSI 223.1 Natural Fuel Gas Code and /or CAN/CGA B149 installation codes.

In U.S.A.:

- National Electrical Code ANSI/NFPA No. 70, latest edition.
- National Fuel Gas Code Z223.1, latest edition.
- Gas-Fired Central Furnace Standard ANSI Z21.47, latest edition.
- Local gas utility requirements.

Refer to *Table 1* for voltage limitations.

TABLE 1 - VOLTAGE LIMITATIONS

NOMINAL VOLTAGE	UNIT POWER SUPPLY	VOLTAGE VARIATIONS	
		MIN. VOLTS	MAX VOLTS
480	460V/3Ph/60Hz	414	506
600	575V/3Ph/60Hz	518	632

If the VAV boxes in the conditioned space have hydronic heating coils installed, it is the responsibility of the installing contractor to take appropriate measures to protect the hydronic coils against low unit supply air temperatures that could result in the freeze up and rupture of the coils.

UNIT INSPECTION

Immediately upon receiving the unit, it should be inspected for possible damage, which may have occurred during transit. If damage is evident, it should be noted in the carrier's freight bill. A written request for inspection by the carrier's agent should be made at once. *S*ee Shipping Damage Claims Service Policy, Form 50.15-NM, for more information and details.

To ensure warranty coverage, this equipment must be commissioned and serviced by an authorized Johnson Controls service mechanic or a qualified service person experienced in packaged rooftop installation. Installation must comply with all applicable codes, particularly in regard to electrical wiring and other safety elements such as HP cut-out settings, design working pressures, and ventilation requirements consistent with the amount and type of refrigerant charge.

Lethal voltages exist within the control panels. Before servicing, open and tag all disconnect switches.

SPLIT SHIP OPTION

For units ordered as a split ship, please refer to the Split Ship Instructions provided (Form 100.50-N26).

DOOR HANDLES

Due to a shipping width requirement, some of the door handles must be removed from the unit before leaving the factory. The handles will be shipped loose for field installation. Please refer to *Figure 3 on page 18* for handle locations. The handles will be in a ship loose bag located inside the control panel.

Using the handles provided, place the handles on the door closures, using the screws and caps provided to secure the handles to the door closures.

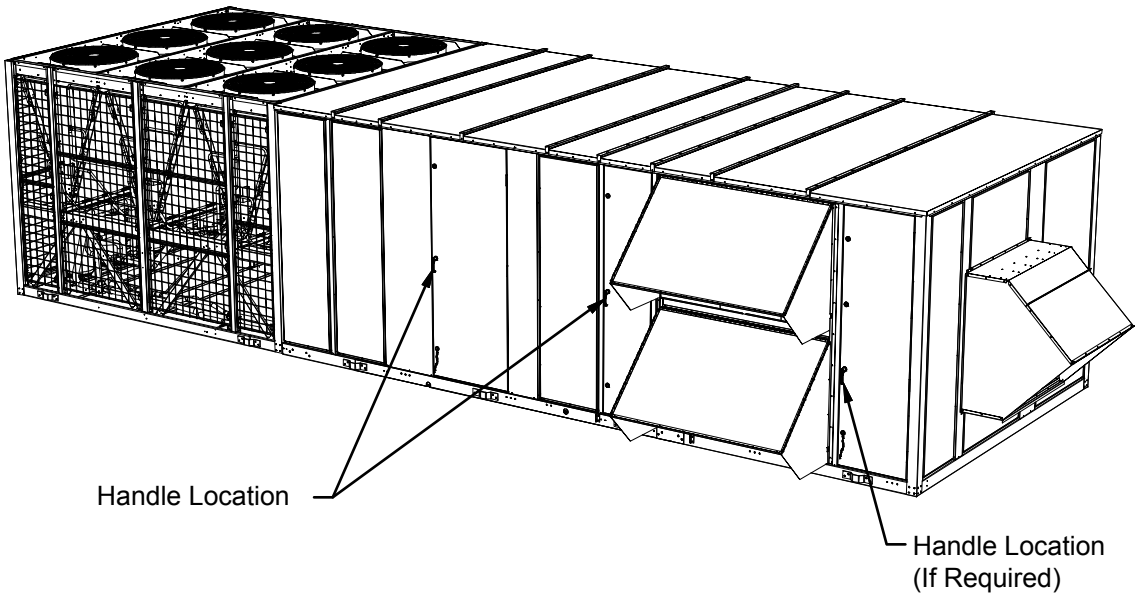
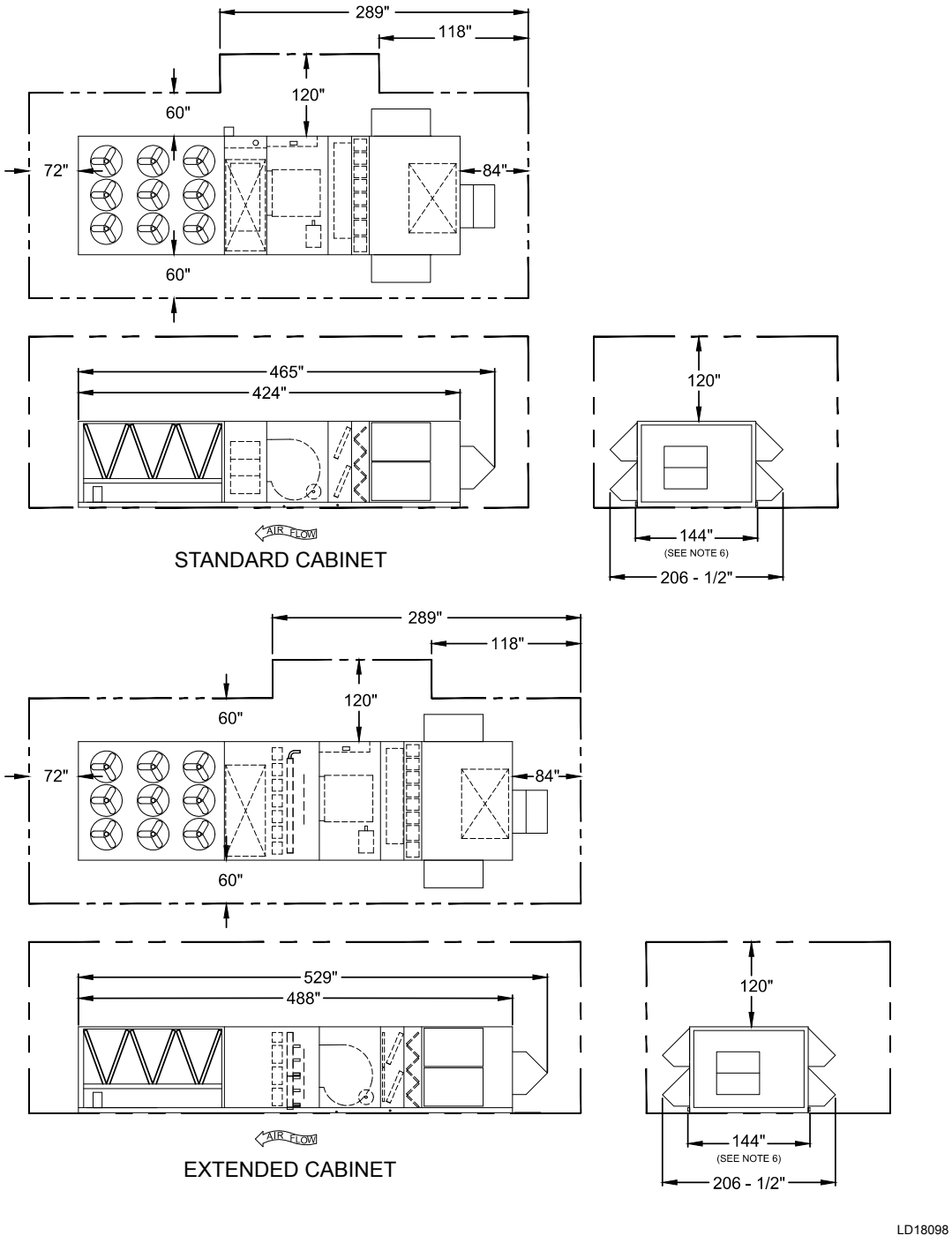


FIGURE 3 - HANDLE LOCATION

LOCATIONS AND CLEARANCES

The following guidelines should be used to select a suitable location for unit installation:

- Unit is designed for outdoor installation only.
- Condenser coils must have an unlimited supply of air. Where a choice of location is possible, position the unit on either north or east side of building.
- Suitable for roof mount on curb.
- Roof structures must be able to support the weight of the unit and its accessories. Unit must be installed on a solid level roof curb or appropriate angle iron frame.
- Maintain level tolerance to 1/2 inch across width and 2 inches along the length.



NOTES:

1. 10' clearance minimal over the top of the condensing unit.
2. Only one adjacent wall can exceed unit height.
3. 12' clearance required to adjacent units.
4. 10' clearance required where shown for coil pull.
5. Outside air hoods are folded for shipment.
6. Dim. is to outside of lifting lugs.

FIGURE 4 - UNIT CLEARANCES

Unit clearances are shown in *Figure 4 on page 19*.

NOTE

The clearances shown are to provide adequate condenser airflow and service access to inside the unit. Additional clearance should be considered for component replacement such as compressors, evaporator coils, and supply or exhaust fans.

CAUTION

While it is a common practice to operate the fan as soon as possible (air movement during construction) on the job site, the incomplete ductwork and missing diffuser grilles will greatly reduce air resistance and will allow the fan to operate beyond design parameters. This practice may result in water carry over and flooding of the unit. Also, the supply fan motor may overamp and become damaged.

RIGGING, HANDLING AND LIFTING

Rigging and lifting should only be done by a professional rigging company in accordance with a written rigging and lifting plan. The most appropriate rigging and lifting method will depend on job specific factors, such as the rigging equipment available and job site needs. Therefore, a professional rigging company must determine the rigging and lifting method to be used, and it is beyond the scope of this manual to specify rigging and lifting details.

Care must be taken to keep the unit in the upright position during rigging, handling and lifting, and to prevent damage to the water tight seams in the unit casing. Avoid unnecessary jarring or rough handling.

Please refer to Warning label on the unit shrink-wrap as well as the exterior of the unit for further precautions and information. See *Figure 7 on page 22*.

Lifting lug locations are shown in *Table 2 and Figure 6 on page 21*.

Approximate unit weights can be found in *Table 3 on page 23*. For corner loads, unit centers of gravity, and unit weight, please refer to the Performance Specification sheet. If you do not have the Performance Specification sheet, please contact your JCI sales representative.

CAUTION

There are eight shipping support rails and spacers installed under the base of the unit on the standard cabinet and nine shipping support rails and spacers on the extended cabinet. The rails are required for shipping because the unit is wider than the trailer bed and the side rails of the unit are not supported. THESE RAILS MUST BE REMOVED BEFORE THE UNIT IS PLACED ON THE CURB. Labels, Figure 6, are attached to the base rails to identify the locations of the support rails. The labels are located on both sides of the unit. A single screw positioned six inches in from each side fastens the support rail and spacer to the unit. The best time to remove the screws holding the support and spacer in place is just before the unit is lifted from the trailer bed to the curb.

NOTE

The support rails and spacers should not be removed if the unit is not going to be installed on a curb.

CAUTION

On units with bottom supply, the two shipping support rails in the area of the supply air opening are used to secure a shipping closure panel. The shipping closure panel is attached to the rails and will detach from the unit with the shipping support rails.

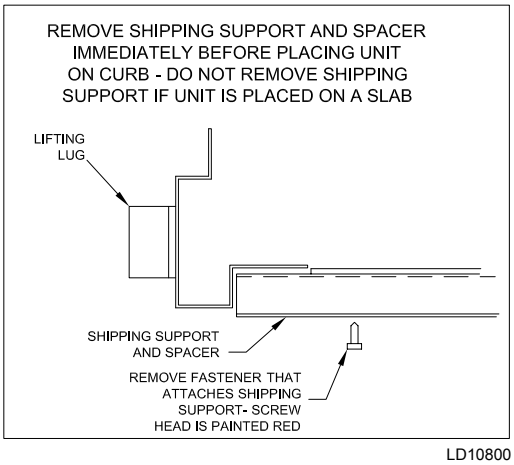
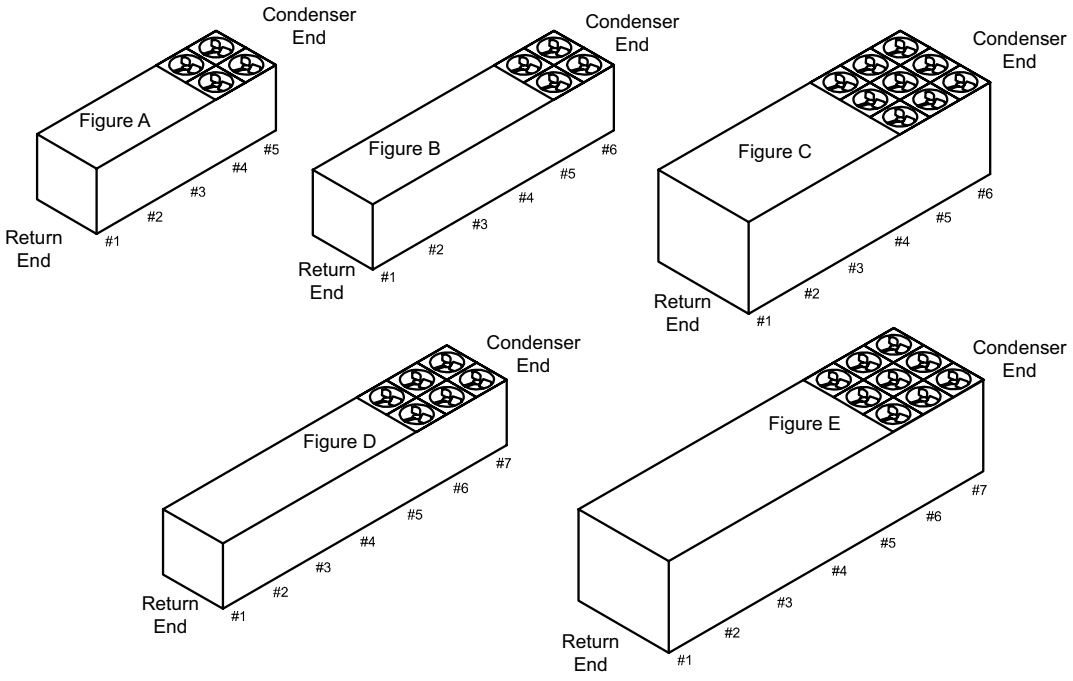


FIGURE 5 - SHIPPING SUPPORT LABEL

TABLE 2 - LIFTING LUG LOCATIONS

See 035-13469-002 For Rigging	Model	Cabinet	Lift Points Dimensions Taken From End Opposite Condenser													
Use Figure			#1		#2		#3		#4		#5		#6		#7	
			Inch	Metric	Inch	Metric	Inch	Metric	Inch	Metric	Inch	Metric	Inch	Metric	Inch	Metric
A	050	STANDARD	16.9	430	72.9	1852	147.9	3757	207.8	5278	315.0	8802	-	-	-	-
	051	STANDARD	16.9	430	72.9	1852	147.9	3757	207.8	5278	315.0	8802	-	-	-	-
	060	STANDARD	16.9	430	72.9	1852	147.9	3757	207.8	5278	315.0	8802	-	-	-	-
	061	STANDARD	16.9	430	72.9	1852	147.9	3757	207.8	5278	315.0	8802	-	-	-	-
B	050	EXTENDED	16.9	430	72.9	1852	147.9	3757	207.8	5278	254.6	6467	361.9	9191	-	-
	051	EXTENDED	16.9	430	72.9	1852	147.9	3757	207.8	5278	254.6	6467	361.9	9191	-	-
	060	EXTENDED	16.9	430	72.9	1852	147.9	3757	207.8	5278	254.6	6467	361.9	9191	-	-
	061	EXTENDED	16.9	430	72.9	1852	147.9	3757	207.8	5278	254.6	6467	361.9	9191	-	-
C	120	STANDARD	22.8	578	117.6	2981	181.9	4591	239.4	6172	296.3	7526	406.4	10323	-	-
	130	STANDARD	22.8	578	117.6	2981	181.9	4591	239.4	6172	296.3	7526	406.4	10323	-	-
	150	STANDARD	22.8	578	117.6	2981	181.9	4591	239.4	6172	296.3	7526	406.4	10323	-	-
D	070	STANDARD	29.9	759	77.0	1956	197.0	5004	270.5	6871	318.6	8093	373.8	9493	428.9	10894
	070	EXTENDED	29.9	759	77.0	1956	197.0	5004	270.5	6871	381.6	9693	436.8	11093	491.9	12494
	075	STANDARD	29.9	759	77.0	1956	197.0	5004	270.5	6871	318.6	8093	373.8	9493	428.9	10894
	075	EXTENDED	29.9	759	77.0	1956	197.0	5004	270.5	6871	381.6	9693	436.8	11093	491.9	12494
	080	STANDARD	29.9	759	77.0	1956	197.0	5004	270.5	6871	318.6	8093	373.8	9493	428.9	10894
	080	EXTENDED	29.9	759	77.0	1956	197.0	4826	270.5	6871	381.6	9693	436.8	11093	491.9	12491
	090	STANDARD	29.9	759	99.0	2515	190.0	4826	302.5	7684	353.1	8970	408.3	10370	463.4	11770
	090	EXTENDED	29.9	759	99.0	2515	190.0	4826	302.5	7684	422.1	10722	477.3	12122	532.4	13522
	105	STANDARD	29.9	759	99.0	2515	190.0	4826	302.5	7684	353.1	8970	408.3	10370	463.4	11770
	105	EXTENDED	29.9	759	99.0	2515	190.0	4826	302.5	7684	422.1	10722	477.3	12122	532.4	13522
E	120	EXTENDED	22.8	578	117.6	2981	181.9	4591	239.4	6172	307.0	7798	360.3	9151	470.4	11949
	130	EXTENDED	22.8	578	117.6	2981	181.9	4591	239.4	6172	307.0	7798	360.3	9151	470.4	11949
	150	EXTENDED	22.8	578	117.6	2981	181.9	4591	239.4	6172	307.0	7798	360.3	9151	470.4	11949



035-13469-002
Rev -

Notes
1. This Label To Be Used In Conjuction With 035-13469-001.

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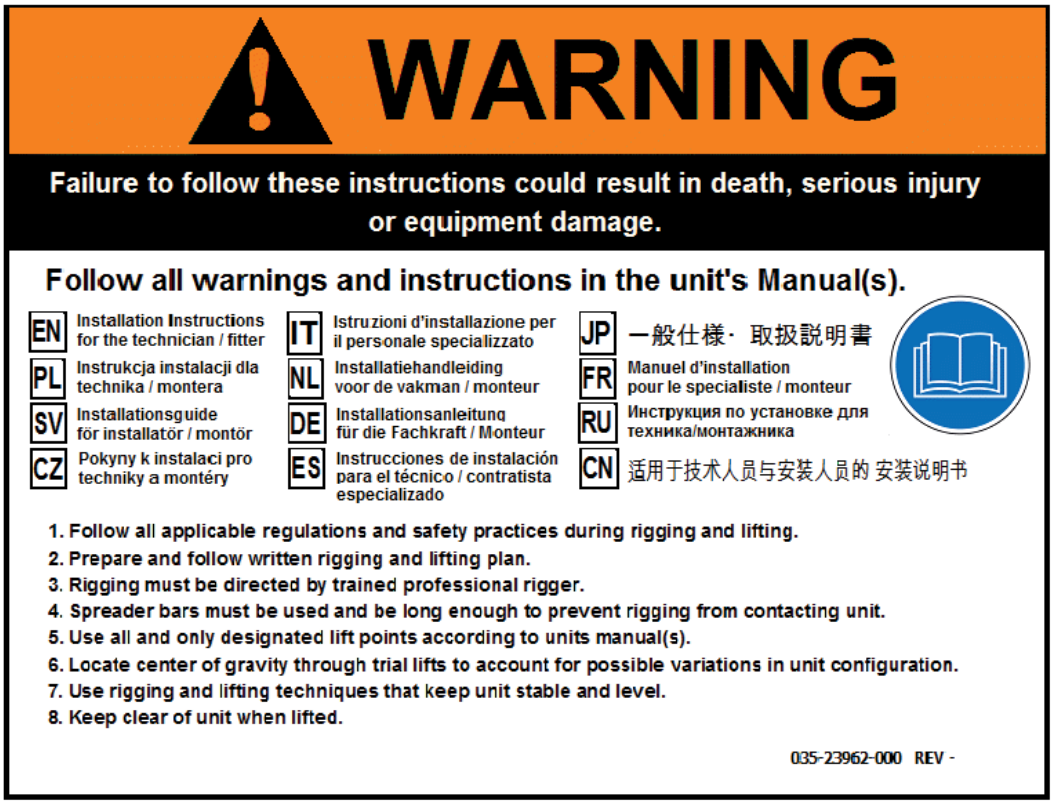
FIGURE 6 - LIFTING LUG LOCATIONS



LD18108

FIGURE 7 - WARNING LABEL

PHYSICAL DATA

TABLE 3 - PHYSICAL DATA - MODEL 120, 130, 150

MODEL SIZE		120	130	150
COMPRESSOR DATA				
QUANTITY/SIZE (NOMINAL HP)	SYS 1	2 x 15 HP	2 x 15	2 x 15
	SYS 2	2 x 15 HP	1 x 20 1 x 25	2 x 20
	SYS 3	2 x 25 HP	2 x 25	2 x 32
TYPE		SCROLL	SCROLL	SCROLL
CAPACITY STEPS (QTY X %)		14 Steps between 15% and 100%	14 Steps between 13% and 100%	14 Steps between 12% and 100%
STANDARD CABINET REFRIGERANT CHARGE (R-410A)				
SYS 1 - LB (KG)		41 (18.6)	41 (18.6)	41 (18.6)
SYS 2 - LB (KG)		73 (33.1)	82 (37.2)	77 (34.9)
SYS 3 - LB (KG)		97 (44.0)	98 (44.4)	106 (48.1)
EXTENDED CABINET REFRIGERANT CHARGE (R-410A)				
SYS 1 - LB (KG)		43 (19.5)	43 (19.5)	43 (19.5)
SYS 2 - LB (KG)		75 (34.0)	84 (38.1)	79 (35.8)
SYS 3 - LB (KG)		100 (45.4)	101 (45.8)	109 (49.4)
SUPPLY FAN AND DRIVE				
QUANTITY		1	1	1
TYPE		AF	AF	AF
SIZE		40"X40"	40"X40"	40"X40"
MOTOR SIZE RANGE (MIN. TO MAX. HP)		10-100	10-100	10-100
AIR FLOW RANGE (MIN. TO MAX. CFM)		30,000-52,000	32,000-52,000	36,000-52,000
STATIC PRESSURE RANGE (MIN. TO MAX. ESP)		0-4”	0-4”	0-4"
EXHAUST FAN				
QUANTITY		1	1	1
TYPE		FC	FC	FC
SIZE		32-32	32-32	32-32
MOTOR SIZE RANGE (MIN. TO MAX. HP)		7.5-60	7.5-60	7.5-60
AIR FLOW RANGE (MIN. TO MAX. CFM)		0-52,000	0-52,000	0-52,000
STATIC PRESSURE RANGE (MIN. TO MAX. ESP)		0-2”	0-2”	0-2”
RETURN FAN				
QUANTITY		1	1	1
TYPE		PLENUM	PLENUM	PLENUM
SIZE		445	445	445
MOTOR SIZE RANGE (MIN. TO MAZ. HP)		10-60	10-60	10-60
AIR FLOW RANGE (MIN. TO MAX. CFM)		0-52,000	0-52,000	0-52,000
STATIC PRESSURE RANGE (MIN. TO MAX. ESP)		0-2.5”	0-2.5”	0-2.5”
EVAPORATOR COIL				
SIZE (SQUARE FEET)		81.7	81.7	81.7
NUMBER OF ROWS / FINS PER INCH		5/11	6/11	6/11
TUBE DIAMETER / SURFACE		"1/2” / ENHANCED"	"1/2” / ENHANCED"	"1/2” / ENHANCED"

TABLE 3 - PHYSICAL DATA - MODELS 120,130, 150 (CONT'D)

MODEL SIZE	120	130	150
CONDENSER COIL (AL & MICRO CHANNEL)			
SIZE (SQUARE FEET)	261.9	261.9	261.9
NUMBER OF ROWS / FINS PER INCH	1/21	1/21	1/21
CONDENSER FANS			
QUANTITY	9	9	9
TYPE	PROP	PROP	PROP
DIAMETER (INCHES)	36	36	36
POWER (HP EACH)	2	2	2
FILTERS - 2" CLEANABLE (PRE-FILTER POSITION)			
QUANTITY	36 / 12	36 / 12	36 / 12
SIZE (LENGTH X WIDTH) (IN.)	"16 X 20 / 20 X 20"	"16 X 20 / 20 X 20"	"16 X 20 / 20 X 20"
TOTAL FILTER FACE AREA (SQUARE FEET)	113.3	113.3	113.3
FILTERS - 2" PLEATED, 30% EFFICIENT (PRE-FILTER POSITION) MERV8			
QUANTITY	36 / 12	36 / 12	36 / 12
SIZE (LENGTH X WIDTH) (IN.)	"16 X 20 / 20 X 20"	"16 X 20 / 20 X 20"	"16 X 20 / 20 X 20"
TOTAL FILTER FACE AREA (SQUARE FEET)	113.3	113.3	113.3
FILTERS - 2" CARBON (PRE-FILTER POSITION) MERV7			
QUANTITY	36 / 12	36 / 12	36 / 12
SIZE (LENGTH X WIDTH) (IN.)	"16 X 20 / 20 X 20"	"16 X 20 / 20 X 20"	"16 X 20 / 20 X 20"
TOTAL FILTER FACE AREA (SQUARE FEET)	113.3	113.3	113.3
FILTERS - 12" RIGID 65% (MERV11); 30% PRE-FILTER (PRE-FILTER POSITION) (MERV 8)			
QUANTITY	7 / 21	7 / 21	7 / 21
SIZE (LENGTH X WIDTH) (IN.)	"20 X 16 / 20 X 25"	"20 X 16 / 20 X 25"	"20 X 16 / 20 X 25"
TOTAL FILTER FACE AREA (SQUARE FEET)	88.5	88.5	88.5
FILTERS - 12" RIGID 95% (MERV14); 2" 30% PRE-FILTER (PRE-FILTER POSITION) (MERV8)			
QUANTITY	7 / 21	7 / 21	7 / 21
SIZE (LENGTH X WIDTH) (IN.)	"20 X 16 / 20 X 25"	"20 X 16 / 20 X 25"	"20 X 16 / 20 X 25"
TOTAL FILTER FACE AREA (SQUARE FEET)	88.5	88.5	88.5
FILTERS - 12" RIGID 95% (POST-FILTER POSITION) (EXTENDED CABINET ONLY) (MERV14)			
QUANTITY	"5/3/3 4/6/7"	"5/3/3 4/6/7"	"5/3/3 4/6/7"
SIZE (LENGTH X WIDTH) (IN.)	"12X24/16X20/ 16X25/ 20X20/ 20X24/20X25"	"12X24/16X20/ 16X25/20X20/ 20X24/20X25"	"12X24/16X20/ 16X25/20X20/ 20X24/20X25"
TOTAL FILTER FACE AREA (SQUARE FEET)	80.4	80.4	80.4

TABLE 3 - PHYSICAL DATA - MODELS 120,130, 150 (CONT'D)

MODEL SIZE	120	130	150
APPROXIMATE BASE OPERATING WEIGHTS (LBS)			
Single Piece Unit	18,238	18,847	18,938
Two Piece Unit			
Air Handler Section	12,131	12,325	12,332
Condenser Section	6,096	6,510	6,597

NOTES:
Weights above are total weight excluding the curb
Standard Cabinet
Cooling Only
60HP Supply Fan with VFD
Comparative Enthalpy Economizer
Barometric Relief Exhaust
Bottom Supply and Return
2" pleated filters
Condenser Section Wire Guards
Weights represent approximate operating weights and have a +/- 10% accuracy. To obtain unit weight for a specific configuration, please refer to the Performance Specification Sheet. If you do not have a copy of this sheet, please contact your Johnson Controls sales representative.

MODEL SIZE	120	130	150
COMPONENT WEIGHTS (LBS)			
Cabinet, Air Handling Section			
Sheet Metal (Note 1)		6,310	
Control Panel (Note 2)		705	
REFRIGERANT			
Refrigerant Charge (R410A)	210	230	230
COMPRESSORS			
Compressors	826	1,661	1,738
CONDENSER ASSEMBLY			
Sheet Metal		2,477	
Coils		864	
Condenser Fans		90	
Condenser Motors		450	
Condenser Grills		90	
Wire Guards		266	
Louvered Panel Guards		432	
Supply Fan Skid Without Motor (Note 3)		1,696	
Supply Fan Motor Drive		80	
MOTOR (SUPPLY/EXHAUST/RETURN)			
7.5 HP		178	
10 HP		231	
15 HP		255	
20 HP		303	
25 HP		427	
30 HP		471	
40 HP		604	
50 HP		676	
60 HP		821	
75 HP		908	
100 HP		1,243	

TABLE 3 - PHYSICAL DATA - MODELS 120,130, 150 (CONT'D)

MODEL SIZE	120	130	150
VFD (SUPPLY/EXHAUST/RETURN)			
5 -10 HP		16	
12 - 25 HP		27	
30 - 40 HP		51	
50 - 75 HP		77	
100 HP		110	
EVAPORATOR COILS			
Evaporator Coils	921	1,106	1,106
FILTERS			
2" Cleanable Alum		74	
2" Pleated		40	
2" Carbon		94	
Return Filter - 2" Throwaway (Note 4)		30	
Return Filter - 12" 60-65% (Note 4)		393	
Return Filter - 12" 90-95% (Note 4)		388	
Final Filters		327	
ECONOMIZER			
Outside Air Dampers		255	
Outside Air Hoods		291	
Outside Air Filters		103	
Exhaust Fan Skid without motor		1,147	
Return Fan Skid without motor		1,574	
EXHAUST			
No Exhaust - End Panels		332	
Exhaust Fan (Damper & Hood)		516	
Return Fan (Damper & Hood)		539	
HEATING OPTIONS			
Electric Heat - 80kW		660	
Electric Heat - 108kW		680	
Electric Heat - 150kW		700	
Electric Heat - 200kW		720	
Electric Heat - 250kW		740	
Gas Heat - 1125 MBH		1,455	
Hot Water Coil (2R x 14FPI)		417	
Steam Coil (1R x 10FPI)		534	
MISCELLANEOUS			
Open Perimeter Curb		684	
Enclosed Perimeter Curb		1,110	
Airflow Measurement Option		45	

NOTES:

1. Sheet Metal, Air Handling Cabinet Cooling only.
2. Includes all options.
3. Motor Base is included in fan skid.
4. Filters only. Does not include the filter rack.

Weights represent approximate operating weights and have a +/- 10% accuracy. To calculate weight for a specific configuration, use YORK-works or contact a Johnson Controls sales representative.

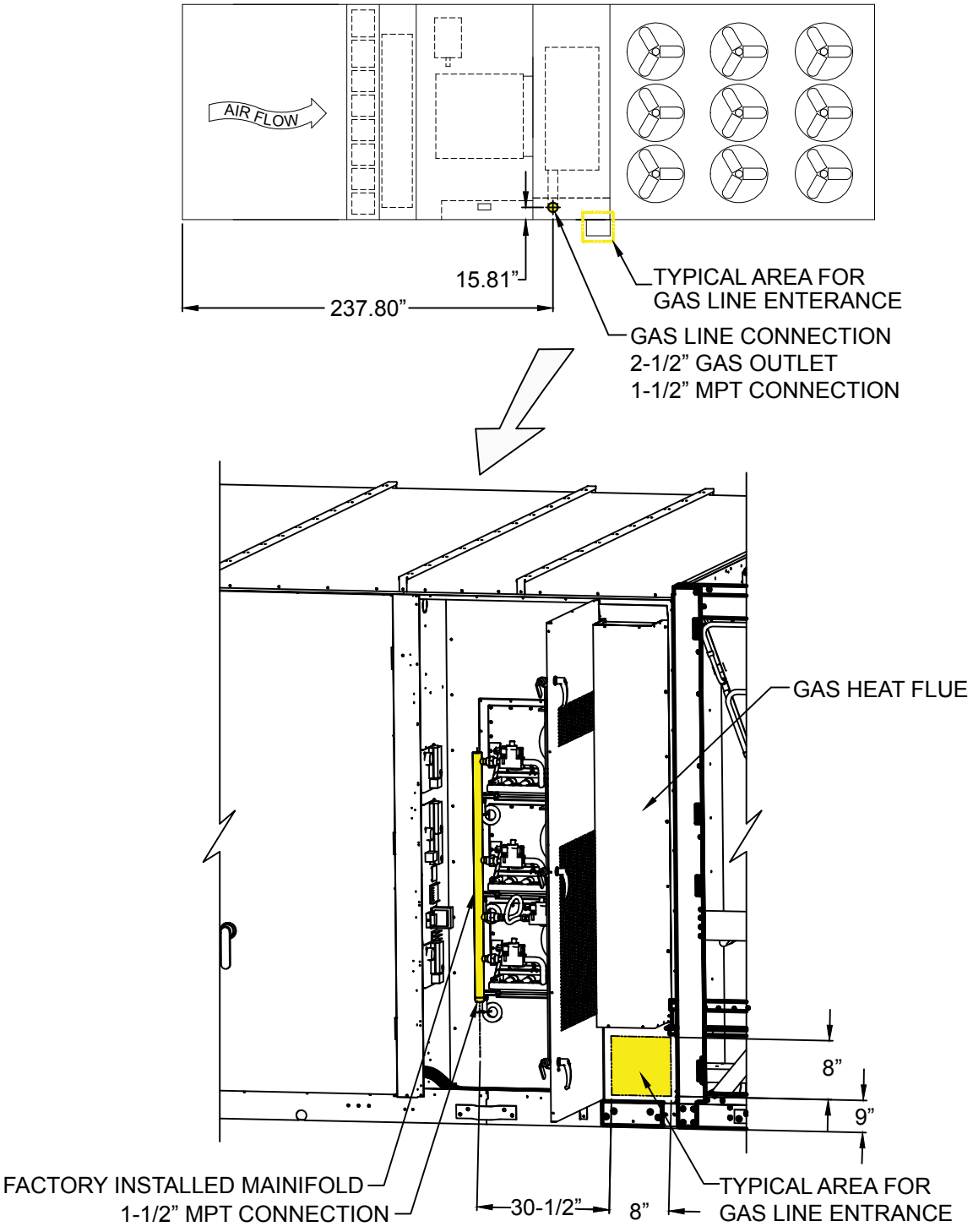
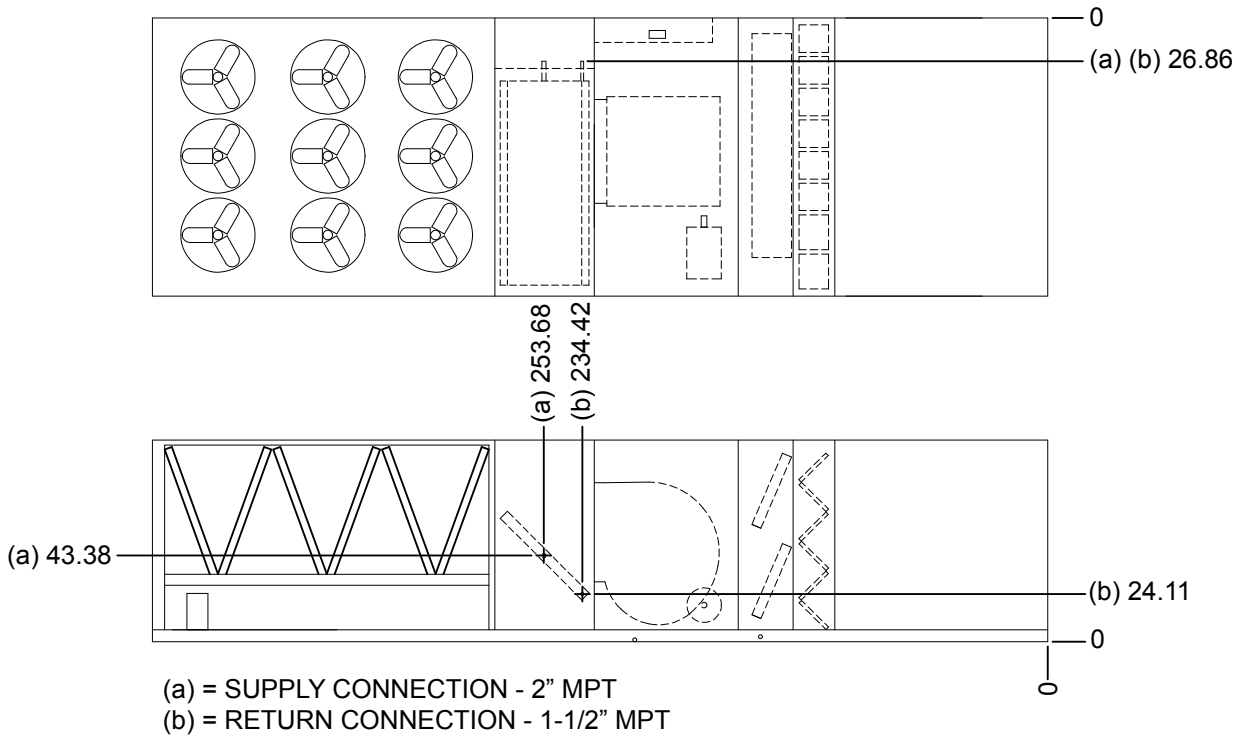
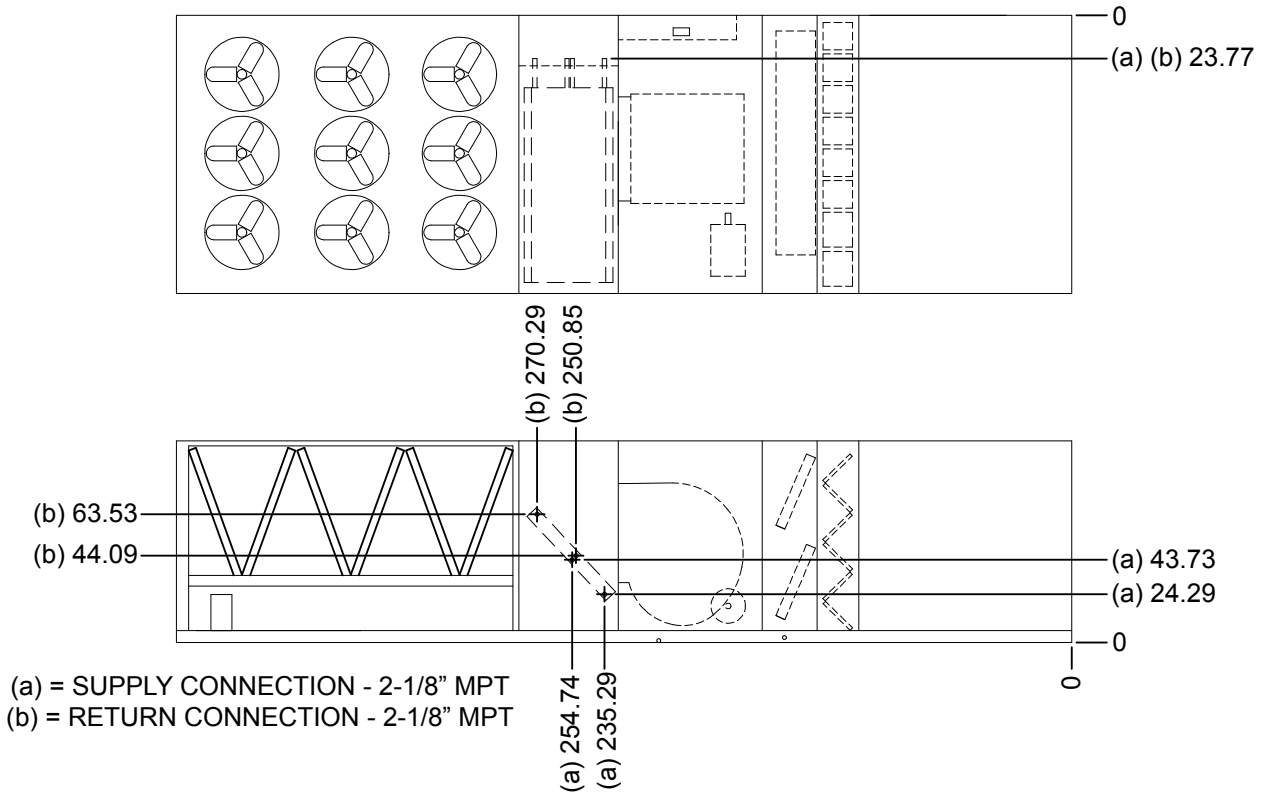


FIGURE 8 - GAS FURNACE CONNECTIONS



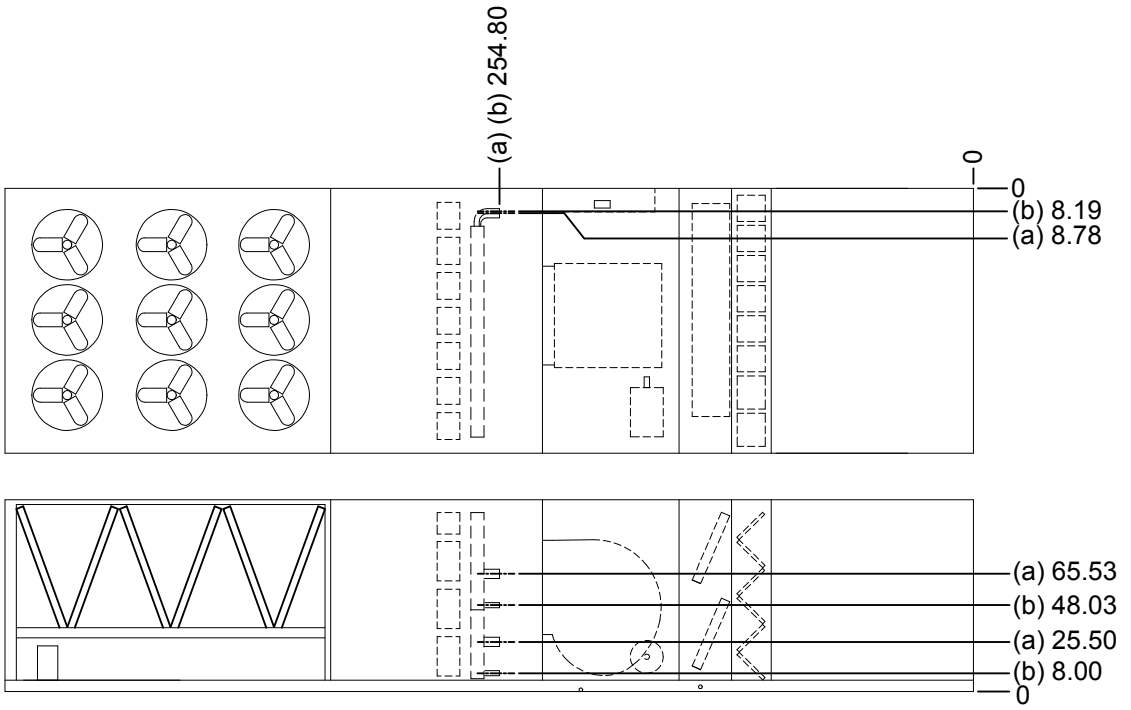
STEAM HEAT - STANDARD CABINET



HOT WATER HEAT - STANDARD CABINET

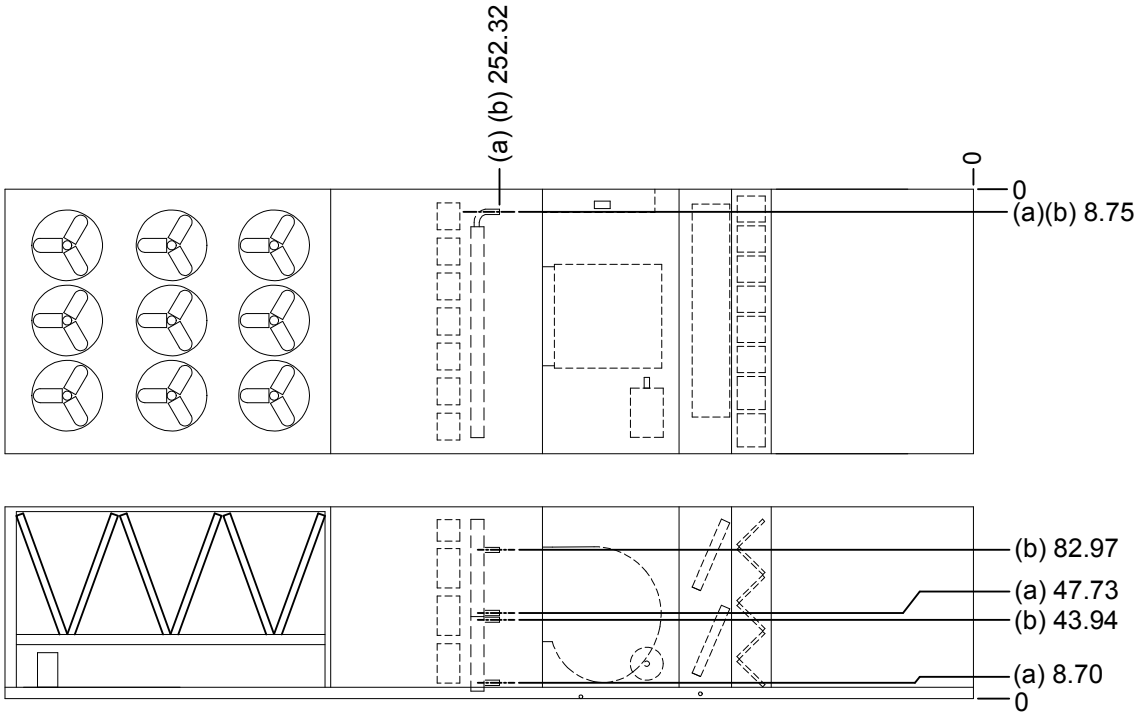
LD18100

FIGURE 9 - HYDRONIC HEAT CONNECTIONS - STANDARD CABINET



(a) = SUPPLY CONNECTION - 2” MPT
(b) = RETURN CONNECTION - 1-1/2” MPT

STEAM HEAT - EXTENDED CABINET



(a) = SUPPLY CONNECTION - 2-1/8” MPT
(b) = RETURN CONNECTION - 2-1/8” MPT

HOT WATER HEAT - EXTENDED CABINET

LD18101

FIGURE 10 - HYDRONIC HEAT CONNECTIONS - EXTENDED CABINET

ELECTRICAL DATA

ELECTRICAL SERVICE SIZING

In order to use the electrical service required for the cooling only YPAL rooftop, use the appropriate calculations listed below from U.L. 1995. Based on the configuration of the rooftop, the calculations will yield different MCA (minimum circuit ampacity), and MOP (maximum overcurrent protection).

Using the following load definitions and calculations, determine the correct electrical sizing for your unit. All concurrent load conditions must be considered in the calculations, and you must use the highest value for any combination of loads.

Load Definitions

- **LOAD1** is the current of the largest motor, compressor or fan motor.
- **LOAD2** is the sum of the remaining motor currents that may run concurrently with LOAD1.
- **LOAD3** is the current of the electric heaters (zero for cooling only units).
- **LOAD4** is the sum of any remaining currents greater than or equal to 1.0 amp.

Use the following calculations to determine MCA and MOP for units supplied with a single-point power connection:

MCA = (1.25 x LOAD1) + LOAD2 + LOAD3 + LOAD4

MOP = (2.25 x LOAD1) + LOAD2 + LOAD3 + LOAD4

If the MOP does not equal a standard current rating of an overcurrent protective device, then the marked maximum rating is to be the next lower standard rating. However, if the device selected for MOP is less than the MCA, then select the lowest standard maximum fuse size greater than or equal to the MCA.

TABLE 4 - COMPRESSOR DATA

MODEL	COMPRESSOR					
	QUANTITY PER UNIT	MODEL	460/3/60		575/3/60	
			RLA*	LRA	RLA*	LRA
R-410A						
120	4	ZP182	26.9	173.0	23.7	132.0
	2	ZP296	37.8	320.0	34.6	250.0
130	2	ZP182	26.9	173.0	23.7	132.0
	1	ZP236	30.8	229.0	25.0	180.0
	3	ZP296	37.8	320.0	34.6	250.0
150	2	ZP182	26.9	173.0	23.7	132.0
	2	ZP236	30.8	229.0	25.0	180.0
	2	ZP385	54.5	310.0	49.4	239.0

NOTE: *RLA data is per compressor

TABLE 5 - SUPPLY, EXHAUST AND RETURN FAN MOTOR (ODP)

MOTOR	Premium Efficiency - ODP	
	Nominal Voltage	
	460/3/60	575/3/60
HP	FLA	FLA
7.5	9.7	7.8
10.0	12.5	10.0
15.0	17.7	14.1
20.0	23.5	18.9
25.0	29.0	24.2
30.0	35.0	28.0
40.0	49.0	40.0
50.0	57.0	46.0
60.0	68.0	56.0
75.0	87.0	N/A
100.0	118.0	N/A

TABLE 6 - SUPPLY, EXHAUST AND RETURN FAN MOTOR (TEFC)

MOTOR	Premium Efficiency - TEfc	
	Nominal Voltage	
	460/3/60	575/3/60
HP	FLA	FLA
7.5	9.4	7.6
10.0	12.0	9.6
15.0	18.5	14.8
20.0	24.0	19.2
25.0	30.0	23.9
30.0	38.0	29.0
40.0	48.0	39.0
50.0	58.0	46.0
60.0	68.0	54.4
75.0	84.9	N/A
100.0	112.0	N/A

TABLE 7 - CONDENSER FAN MOTOR RLA

MODEL	QUANTITY PER UNIT	Nominal Voltage	
		460/3/60	575/3/60
		RLA	RLA
120	9	2.8	2.5
130	9	2.8	2.5
150	9	2.8	2.5

TABLE 8 - ELECTRIC HEAT

kW	Nominal Voltage	
	480V	600V
	AMPS	AMPS
80	96.2	77.0
108	120.3	96.2
150	192.5	154.0
200	240.6	192.5
250	288.7	230.9

NOTES
1. Heaters will be sized as follows: 460V heaters rated at 480V, 575V heaters rated at 600V.

TABLE 9 - MISCELLANEOUS ELECTRICAL DATA

DESCRIPTION	Nominal Voltage	
	460V	575V
	AMPS	AMPS
Control Transformer, 1.5 kVA	3.3	2.6
Convenience Outlet, 2 kVA	4.4	3.5
Gas Heat, 1.5 kVA	3.3	2.6

FILTERS

Two-inch "pleated" filters are standard and factory installed in a filter rack located prior to the evaporator coil. Any optional pre-filters ordered with the unit will be shipped inside the unit, but must be field installed.

Pre-filters must always be installed ahead of the evaporator coil. Pre-filters must be kept clean and replaced with the same size and type as shipped with the unit. Dirty filters will reduce the capacity of the unit and may result in frosted coils and safety shutdowns. Required filter sizes and quantities are shown in *Table 3 on page 23*. The unit should never be operated for any length of time without the proper filters installed in the unit.

CONDENSATE DRAIN

Condensate Drain Piping

The Series 100 cooling coils are located in the units so that the supply air is drawn through them. This results in the condensate being subjected to negative (-) static pressure. Unless some means of pressure equalization is provided in the condensate drain, the air rushing back through the drainpipe will cause the condensate to build up in the drain pan. As the unit continues to operate, the accumulated water will be carried with the air stream, overfilling the drain pan causing possible water leaks into the supply duct and/or causing water damage in the building. A trap must be installed to prevent this condensate water build-up (see *Figures 11 ans 12 on page 32*).

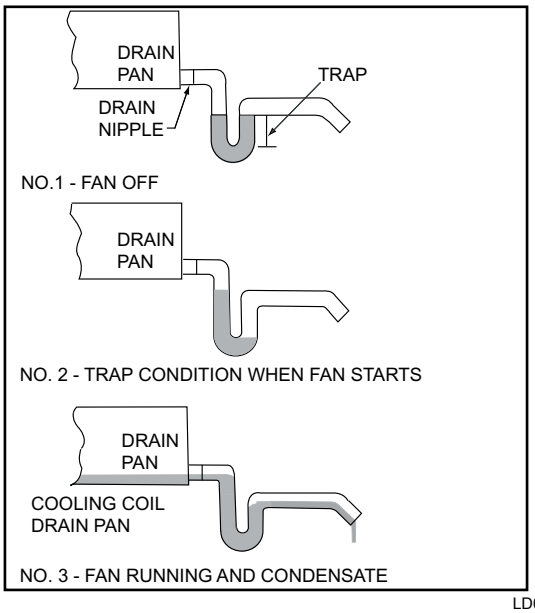


FIGURE 11 - DRAIN TRAP SHOWING WATER LOCATION DURING DRAW THROUGH OPERATION STAGES

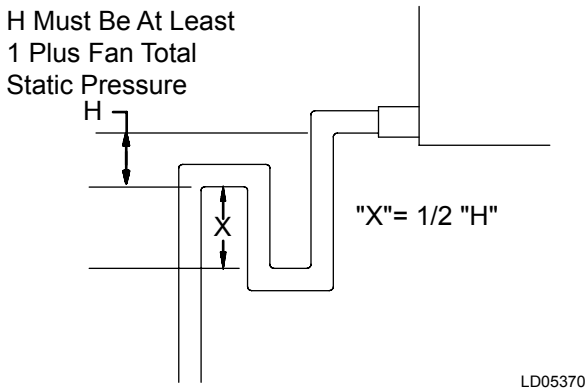


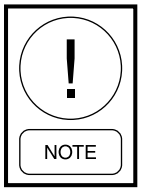
FIGURE 12 - TRAP DETAIL FOR DRAW THROUGH APPLICATION

Condensate Drain Trap

For *"Draw through"* applications, install a trapped condensate drain line at unit drain connection (*see Figure 11 on page 32*) according to all governing codes. "H" dimension must be at least 1 inch greater than design Total Static Pressure (TSP) of fan.

The Series 100 120-150 ton unit has a split condensate drain pan. There are condensate drain connections on both sides of the unit. Both of these drains must be utilized for proper condensate removal. There are also two base rails drains on these units, one on each side. Both of these base rail drains must be utilized for proper condensate removal from the base rail. Failure to install properly sized condensate traps at these four locations could cause water damage to the unit and/or the interior of the building.

The trap and drain lines should be protected from freezing. Plumbing must conform to local codes. Use a sealing compound on male pipe threads. Install condensate drain lines from the 1-1/4 inch NPT female connections on the unit to an open drain.



The unit must be properly trapped and ALL traps must be primed with water before the unit is started.

AIR HOODS FOR ECONOMIZER

There are four economizer outside air intake hoods provided with the unit. The hoods are made operational per the following instructions:

- Remove the screws holding the economizer hood shipping covers in place. Discard covers.

- Apply a bead of RTV sealer along the edge of both hoods and each pivot joint to prevent water leakage.
- Rotate the hoods out (each hood is hinged). Secure the hoods with screws along the top and sides.
- Seal any unused screw holes with RTV or by replacing the screw.

AIR HOODS FOR FIXED OUTSIDE AIR (UNITS WITHOUT ECONOMIZER)

These hoods are made operational per the above procedure. The dampers may be adjusted by loosening the thumb screw, turning the lever to the desired position, and retightening the thumb screw.

AIR HOODS FOR EXHAUST AIR

When furnished, these hoods and dampers are factory installed.

FIELD WIRING

Figures 13 and 14 starting on page 35 show the field control wiring to CTB1. All field control wiring is field supplied and installed.

Thermostat

A thermostat (2 stage cool or 2 stage heat) can be used on CV units. On CV units the thermostat is the primary means of control for the unit. The thermostat should be mounted on an inside wall approximately 56" above the floor where it will not be subject to drafts, sun exposure or heat from electrical fixtures or appliances.

Space Sensor

The space sensor (if used) can be used on either CV or VAV units. The space saver sensor can be used for unit control in lieu of a thermostat on CV units. For SZVAV units, only a space sensor can be used. This can be hardwired or a communicated signal. Even if a thermostat is wired to the rooftop unit, the space sensor will supply space air temperature values if connected. When mounting a space sensor, it should be located on an inside wall approximately 56" above the floor where it will not be subject to drafts, sun exposure or heat from electrical fixtures or appliances. **Shielded Wire must be used that is grounded at control panel only.**

CO_2 Sensor

The optional CO_2 sensor is used for demand ventilation. When ordered, a CO_2 sensor is installed in the outdoor and return air stream.

Occupied/Unoccupied Input

CTB1 provides a point for an occupied/unoccupied input from an external source. The 24 VAC MUST be provided from the S100 unit for proper operation. The S100 unit can also be given an Occ/Unocc command from a BAS.

Contact Closed=Occupied

Contact Open=Unoccupied

Shutdown Input

A contact-closure input is provided for emergency shutdown of the unit. When this circuit is open, the unit shuts down with supply fan, exhaust fan turned off, and outside air dampers are closed. This state is maintained until the input is activated (contacts closed).

Contact Closed = Normal Operation
Contacts Open = Shutdown

Note that a jumper is installed at the factory between terminals 3 (24VAC) and terminal 4 (SD) of the low voltage terminal block CTB1. When a field shutdown input is used, the jumper must be removed and the external dry contact connected between terminal 3 and 4. The connection of an external power supply to these terminals will result in damage to the Unit Controller.

Smoke Purge Input

There are three field connection points for Smoke Purge operation, “Smoke Purge l”, “Smoke Purge 2” and “Smoke Purge 3”. When a field supplied dry contact is closed between terminal 3 (24VAC) and terminal 6 (SMK1) the unit will initiate whatever smoke purge sequence has been programmed into the Unit Controller for Smoke Purge Sequence 1. When a field supplied dry contact is closed between terminal 3 (24VAC) and terminal 7 (SMK2) the unit will initiate whatever smoke purge sequence has been programmed into the Unit Controller for Smoke Purge Sequence 2. When a field supplied dry contact is closed between terminal 3 (24VAC) and terminal 8 (SMK3) the unit will initiate whatever smoke purge sequence has been programmed into the Unit Controller for Smoke Purge Sequence 3. Refer to *Smoke Purge on page 97* for additional programming information. The Smoke Purge operating state will be maintained until the contact is opened.

No external power source may be used when field wiring any of the above inputs. The 24 volt AC source on terminal 3 (24VAC) of the terminal block CTB1 must be used as the power source when field wiring these inputs, as shown in Figure 7 and 8. Failure to do so will result in improper unit operation and damage to the unit controller.

VAV Heat Relay Output

This is a field wired *OUTPUT* that is used to command the VAV boxes to full open during morning warm up operation. This 24VAC signal should have a maximum current draw not to exceed 20VA. If the VA requirement of the VAV boxes approaches 20VA, isolation relays should be field supplied and installed to avoid overloading the unit power supply.

Note that this signal is used to drive the VAV boxes open in morning warm up operations. Failure to drive the VAV boxes open during this mode of operation can cause unit shutdown and/or damage to the ductwork due to overpressurization.

The VAV Heat Relay Output cannot exceed a current draw of 20VA. If the power requirements of the VAV boxes exceed this amount, isolation relays must be field supplied and installed to prevent overloading the unit controller power supply.

RETURN AIR BYPASS DAMPER

Units built with the FlexSys option will have an opening in the base of the unit between the evaporator coil and the supply air blower. A FlexSys unit requires a means to bypass return air and mix it with the air off the evaporator coil. JCI does have a special curb with the return duct bypass and bypass damper built into the curb. The purpose of the damper is to temper the supply air to the under floor system by mixing return air with the air off the evaporator coil. After the system is initialized, the mixed air damper modulates based ratio of the difference between the mixed air temperature minus the supply air temperature compared to the return air temperature minus the supply air temperature. As the mixed air temperature decreases, the damper opens allowing more air to bypass the evaporator coil resulting in a higher mixed air temperature supply to the under floor system.

The mixed air damper must be wired and installed into the system in the field. The wires to connect the actuator are located in the supply fan section, in the proximity of the actuator in the supply fan section floor, opposite the supply fan motor side. The plug assembly/ wires are attached with an elastic band and must be wired to the actuator, and the “plugs” mated together. Connect the wires to the motor as follows:

- Wire labeled “412” to terminal 1 in the actuator
- Wire labeled “303” to terminal 2 in the actuator
- Wire labeled “411” to terminal 5 in the actuator

BUILDING AUTOMATION SYSTEMS

The S100 unit ships ready for communication with any BAS utilizing the BACnet MS/TP protocol. The S100 unit can also communicate with BAS utilizing LON and N2 protocols with the addition of an E-Link gateway.

DIRTY FILTER SWITCH

On units with a dirty filter switch option, an adjustable differential pressure switch is installed to monitor the pressure drop across the filters. When the pressure drop across the filters exceeds the setting of the switch the switch closes sending a 24 volt signal to the Unit Controller. The Unit Controller posts a trouble fault in the service memory buffer; but will not shut down the unit.

ALARM CONTACTS

The Unit Controller has three sets dry Alarm Contacts that are closed during a fault. If the unit experiences a Supply Fan Fault, the Unit Controller will close a set of dry contacts between terminals 28 and 29 of the low voltage terminal block (CTB1). If the unit experiences a Cooling/Heating Fault, the Unit Controller will close a set of dry contacts between terminals 30 and 31 of the low voltage terminal block (CTB1). If the unit experiences a Sensor/Misc. Fault, the Unit Controller will close a set of dry contacts between terminals 32 and 33 of the low voltage terminal block (CTB1).

CTB1 FIELD CONTROL WIRING (INPUTS)

Wiring Notes

1. Wiring shown indicates typical wiring.
2. All wiring is Class 2, low voltage.
3. Maximum power available from the 24 VAC terminal is 40VA.
4. Use shielded wire where shown.
5. Potentiometer application shown. As an alternative, signal inputs can be driven from an analog output of a third party controller. Note: Input resistance is 15 K ohms.
6. The FlexSys Underfloor Relative Humidity Sensor is field supplied. In addition to two wires which transmit the 0 to 5VDC signal from the sensor to the Unit Controller, the Underfloor Relative Humidity Sensor will also need to be powered. The type of voltage required to power the sensor will depend on the sensor selected. If the sensor uses 24 VAC additional wires will need to be run to terminal 1 (24 VAC) and terminal 2 (24 VAC COM) of the CTB1 terminal block. If the sensor required a different power source than 24 VAC it will need to be field supplied.

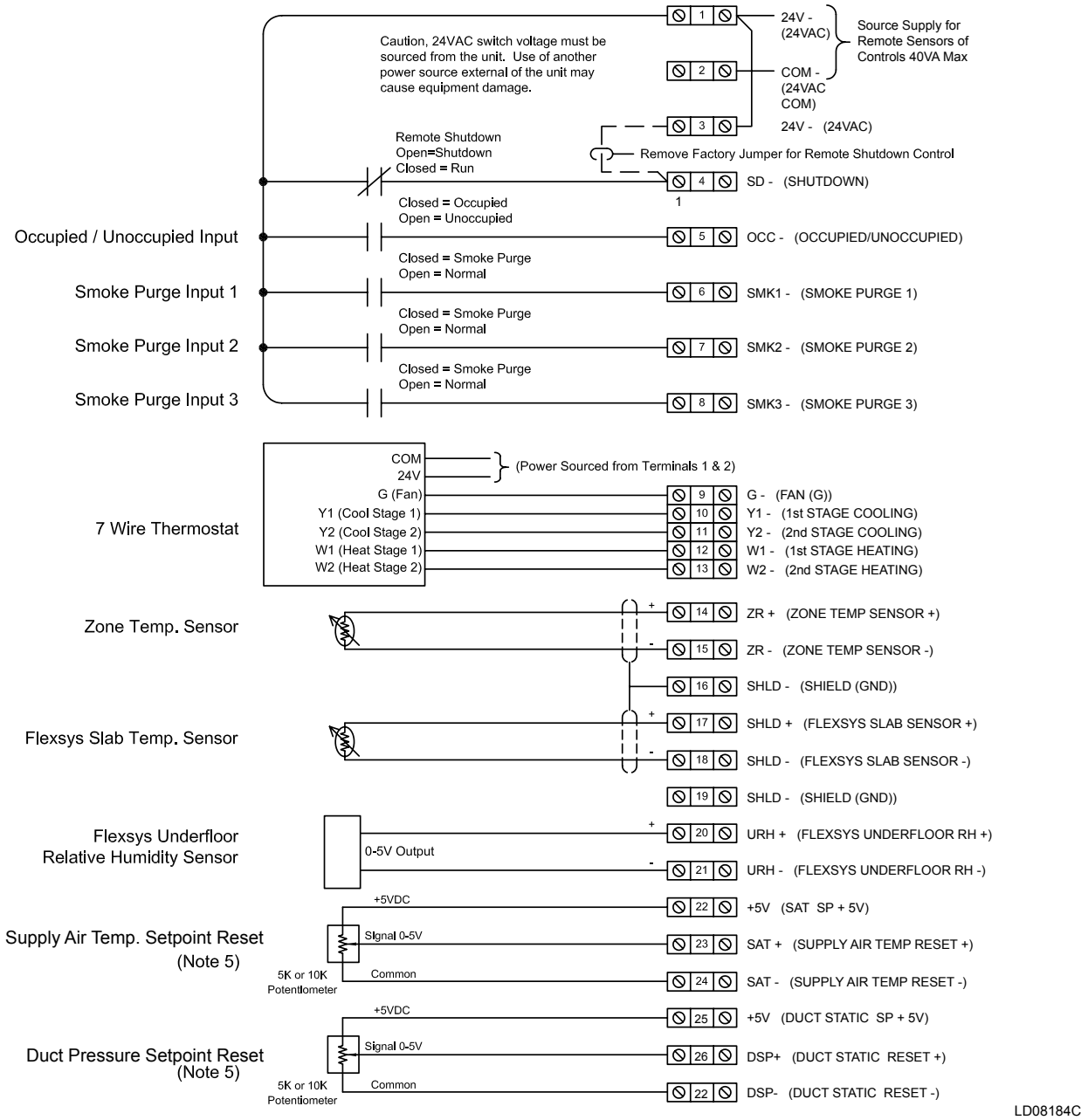
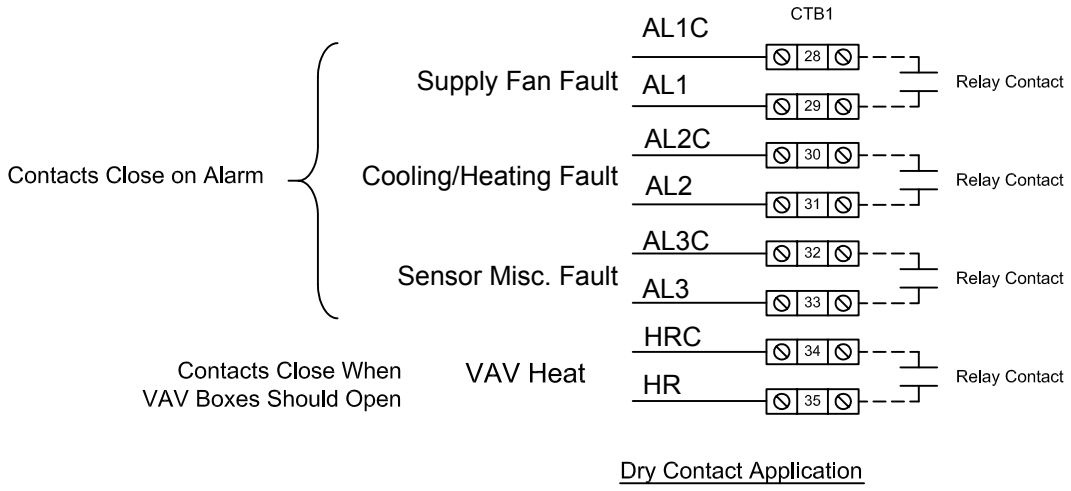


FIGURE 13 - FIELD CONTROL WIRING - INPUTS

CTB1 FIELD CONTROL WIRING (OUTPUTS)

Wirng Notes:

1. Wiring shown indicates typical wiring.
2. All wiring is Class 2, low voltage.
3. Maximum power available from the 24VAC terminal is 40VA.
4. Use shielded wire where shown.
5. Relay contacts suitable for pilot duty to 1A from 24VAC to 120VAC



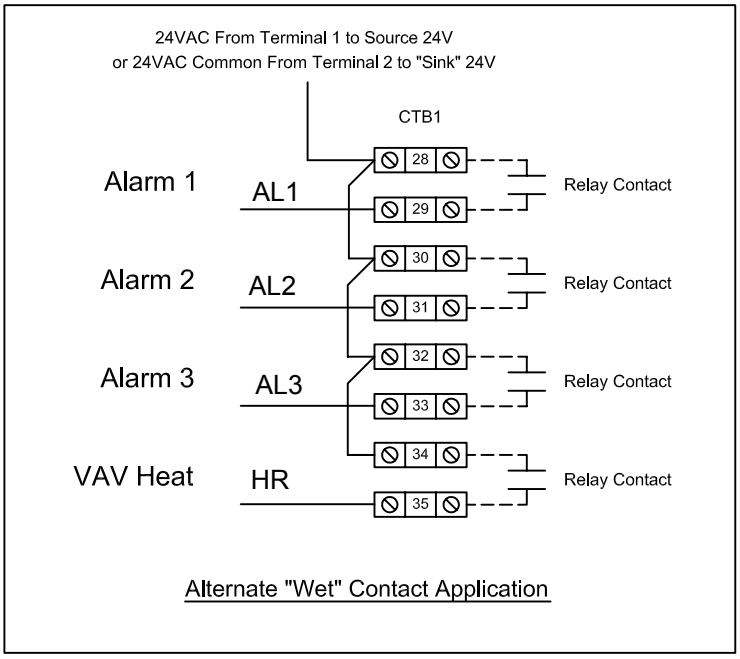


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FIGURE 14 - FIELD CONTROL WIRING - OUTPUTS

POWER WIRING

Field wiring to the unit must conform to provisions of National Electrical Code (NEC) ANSI / NFPA 70 latest edition and / or local ordinances. The unit must be electrically grounded in accordance with the NEC and / or local codes. Voltage tolerances, which must be maintained during starting and running conditions, are indicated on the unit data plate.

The internal wiring harnesses furnished with this unit are an integral part of the design certified unit. Field alteration to comply with electrical codes should not be required. If any of the wire supplied with the unit must be replaced, replacement wire must be of the type shown on the wiring diagram and the same minimum gauge as the replaced wire.

Power supply to the unit must be NEC Class 1 and must comply with all applicable codes. A disconnect switch must be provided (factory option available). The switch must be separate from all other circuits. Wire entry at knockout openings requires conduit fittings to comply with NEC and/or Local Codes.

Refer to *Figure 15 on page 38* and *Figure 16 on page 39* for typical field provided and field installed line side power wiring connections.

Field power wiring connected to the incoming power termination point must be copper conductor only. Aluminum wire cannot be connected to the incoming power termination point.

ELECTRICAL SERVICE SIZING

Electrical service required for the cooling only YPAL rooftop, use the appropriate calculations listed below from U.L. 1995. Based on the operating mode and configuration of the rooftop, the calculations will yield different MCA (minimum circuit ampacity), and MOP (maximum overcurrent protection). **MCA and Overcurrent Protection Device Data is supplied on the unit data plate. Also, refer to Electrical Data *Tables 4 through 9 starting on page 30.***

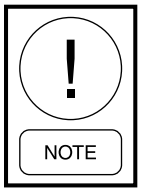
The following calculations apply to electrical data for the rooftop unit. All concurrent load conditions must be considered in the calculations, and you must use the highest value for any combination of loads.

Minimum Circuit Ampacity (MCA) is based on 125% of the rated load amps for the largest motor plus 100% of the rated load amps for all other loads included in the circuit, per N.E.C. Article 440-34.

The minimum recommended disconnect switch is based on 115% of the rated load amps for all loads included in the circuit, per N.E.C.

Maximum overcurrent protection is based upon 225% of the rated load amps for the largest motor plus 100% of the rated load amps for all other loads included in the circuit, per N.E.C. Article 440-22. If the maximum overcurrent protection does not equal a standard current rating of an overcurrent protective device, then the marked maximum rating is to be the next lower standard rating. However, if the device selected for maximum overcurrent protection is less than the MCA, then select the lowest standard maximum fuse size greater than or equal to the MCA.

For dual point power connections, PTB1 in the power panel supplies the all unit compressors and condenser fans. PTB2 in the power panel supplies power to the unit supply, return and exhaust fans, and control circuitry.



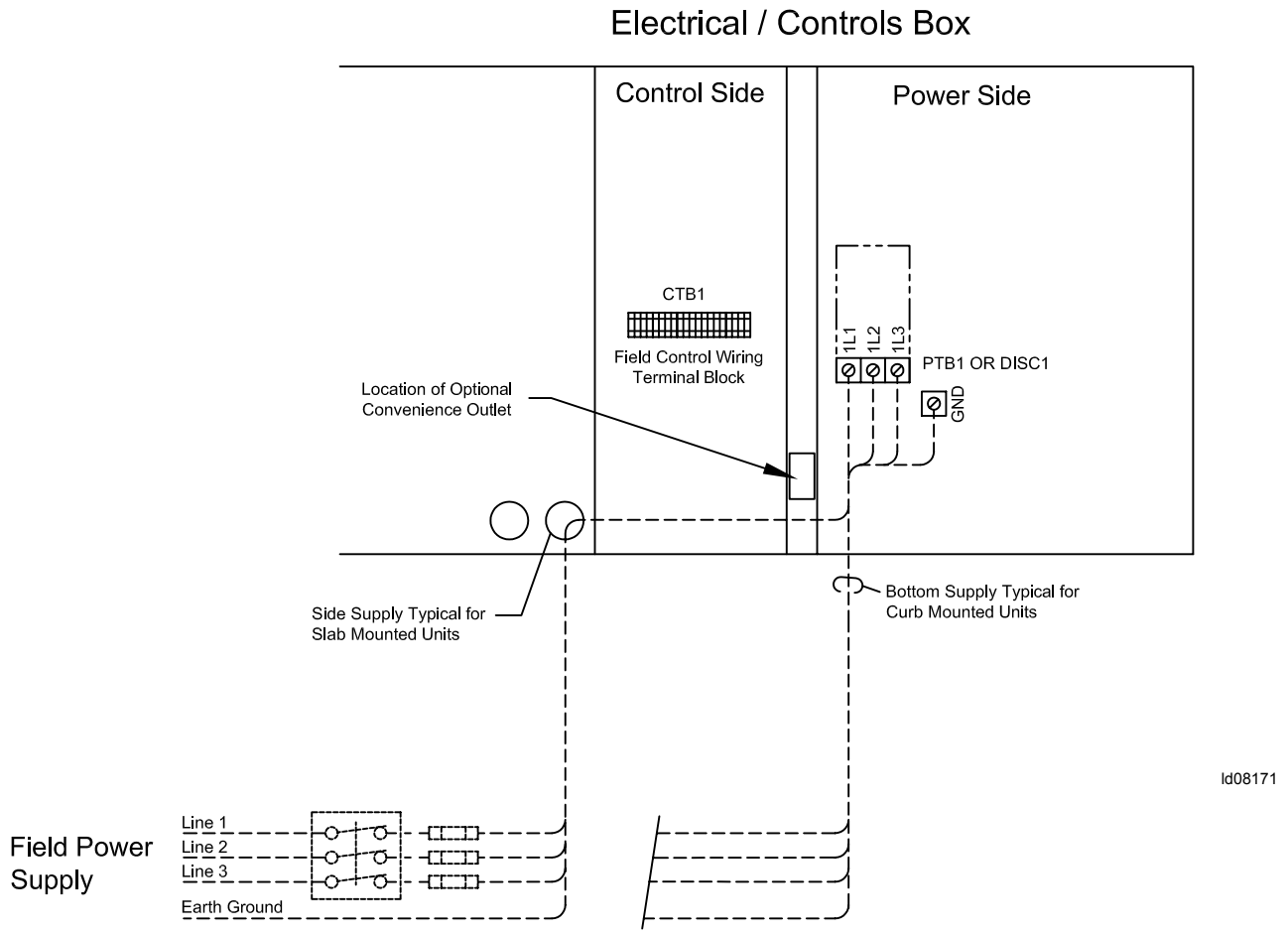
All wiring must conform to the National Electrical Code (NEC) and local codes that may be in addition to NEC.

TABLE 10 - THREE PHASE POWER SUPPLY CONDUCTOR SIZE RANGE *

130 Ton Unit				
Supply Voltage	**Single Point TB**	**Single Point Disconnect**	**Dual Point TB TB 1**	**TB 2**
460V	6 AWG-400 kcmil	6 AWG-350 kcmil	14 AWG-2/0	14 AWG-2/0
575V	6 AWG-400 kcmil	6 AWG-350 kcmil	14 AWG-2/0	14 AWG-2/0

The actual size of the conductor will depend on the total ampacity of the unit and length of the conductor run. The above table gives the conductor size range for the terminal block lugs in the unit.

UNIT POWER SUPPLY WIRING, STANDARD SINGLE POINT, W/ OR W/O DISCONNECT

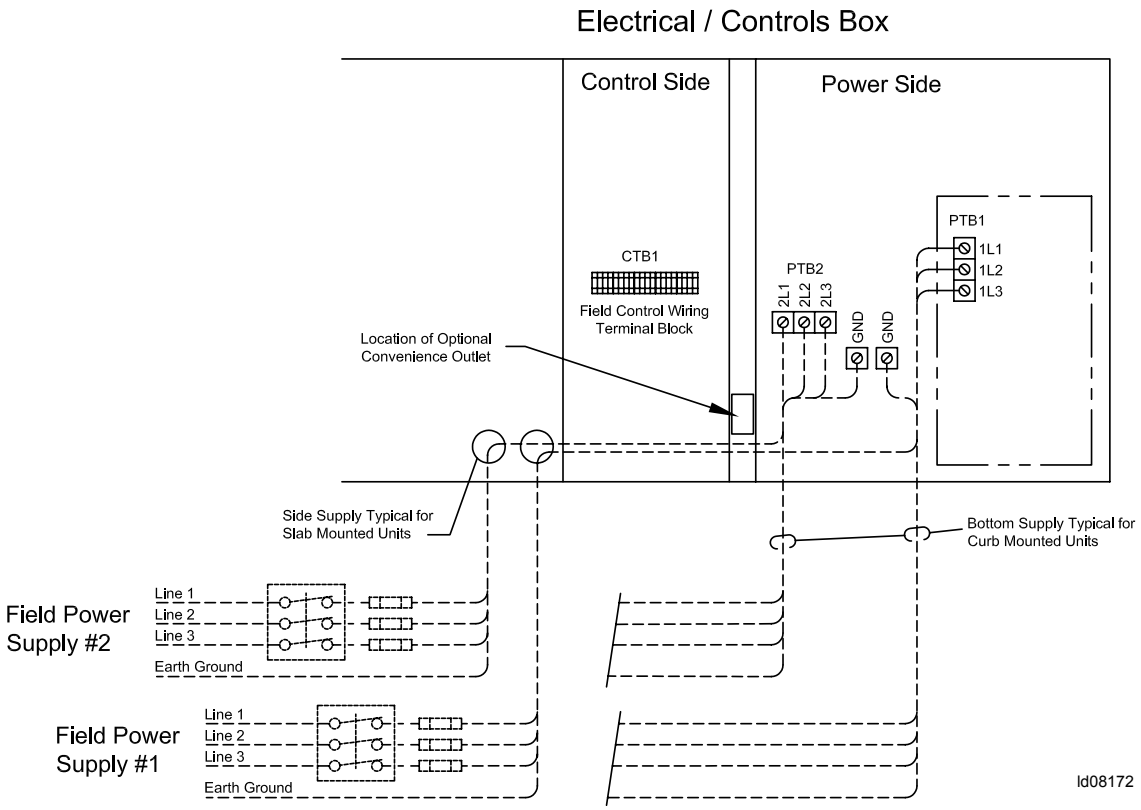


NOTES:

1. All field wiring must be provided through a field-supplied fused disconnect switch to the unit terminals (or optional molded disconnect switch).
2. All electrical wiring must be made in accordance with all N.E.C. and/or local code requirements.
3. Consult the I.O.M manual or unit nameplate data to determine Minimum Circuit Ampacities (MCA) and recommended Dual Element fuse sizes.
4. Minimum Circuit Ampacity (MCA) is based on U.L. Standard 1995, Section 36.14 (N.E.C. Section 440.34).
5. Maximum Dual Element Fuse size is based on U.L. Standard 1995, Section 36.15 (N.E.C. Section 440.22)
6. A (2) preceding the wire range indicates the number of termination points available per phase of the wire range specified. Actual wire size and number of wires per phase must be determined based on N.E.C.
7. Use copper conductors only.
8. On units with an optional disconnect switch, the supplied disconnect switch is a “Disconnecting Means” as defined in the N.E.C. Section 100, and is intended for isolating the unit from the available power supply to perform maintenance and troubleshooting. This disconnect switch is not intended to be a Load Break Device.

FIGURE 15 - SINGLE-POINT POWER SUPPLY WIRING

UNIT POWER SUPPLY WIRING, OPTIONAL DUAL POINT



NOTES:

1. All field wiring must be provided through a field-supplied fused disconnect switch to the unit terminals (or optional molded disconnect switch).
2. All electrical wiring must be made in accordance with all N.E.C. and/or local code requirements.
3. Consult the I.O.M manual or unit nameplate data to determine Minimum Circuit Ampacities (MCA) and recommended Dual Element fuse sizes.
4. Minimum Circuit Ampacity (MCA) is based on U.L. Standard 1995, Section 36.14 (N.E.C. Section 440.34).
5. Maximum Dual Element Fuse size is based on U.L. Standard 1995, Section 36.15 (N.E.C. Section 440.22)
6. A (2) preceding the wire range indicates the number of termination points available per phase of the wire range specified. Actual wire size and number of wires per phase must be determined based on N.E.C.
7. Use copper conductors only.
8. On units with an optional disconnect switch, the supplied disconnect switch is a “Disconnecting Means” as defined in the N.E.C. Section 100, and is intended for isolating the unit from the available power supply to perform maintenance and troubleshooting. This disconnect switch is not intended to be a Load Break Device.

FIGURE 16 - DUAL-POINT POWER SUPPLY WIRING WITH NON-FUSED DISCONNECT

TRANSDUCER PNEUMATIC TUBING

Static Pressure Control Plastic Tubing

(Pneumatic Tubing)

Duct static transducers (all VAV and Flexsys units) and any unit with an optional building pressure control transducer, require pneumatic tubing to be field supplied and installed. The *"High"* side of the respective transducer must be routed to the location in the building or ductwork where a constant pressure is desired. Both the duct static transducer (VAV and Flexsys only) and optional building pressure transducer are mounted in the unit control box. All wiring from the transducers is factory installed.

Duct Static Transducer

Plastic tubing (3/16" ID) must be run from the high pressure tap of the transducer to a static pressure tap (field supplied) in the supply duct, located at a point where constant pressure is desired. This is normally 2/3rds of the way down the duct, before the first take-off..

Building Pressure Transducer

Plastic tubing (3/16" ID) must be run from the high pressure tap of the building static pressure transducer to a static pressure tap (field supplied), located in the conditioned space. The tap should be placed in a location where over pressurization will cause a problem, for example, in the lobby area where excessive pressure will cause the doors to remain open. The tap should never be placed above the ceiling.

This will allow for standard building pressure control through the unit controller. There is an option to control the VFD Driven Exhaust Fan speed through the BAS, if desired. If the unit has a return fan, the same point can be used to control the Modulating Exhaust Damper. The point for BAS control can be enabled in the Service key.

Static Pressure Probe Installation

On units with duct static transducers (VAV and Flexsys units) and any unit with an optional building pressure, a factory supplied Static Pressure Probe must be field installed at the vertical post by the control compartment.

The factory supplied atmospheric pressure probe and associated mounting hardware are shipped inside the unit control panel. The hardware consists of a mounting bracket and a short section of pneumatic tubing. *The pneumatic tubing must be field installed from a factory pressure tap (next to the mounting location for the static pressure probe) to the atmospheric pressure probe (see Static Pressue Probe Installation Instructions, Form 100.50-N15).*

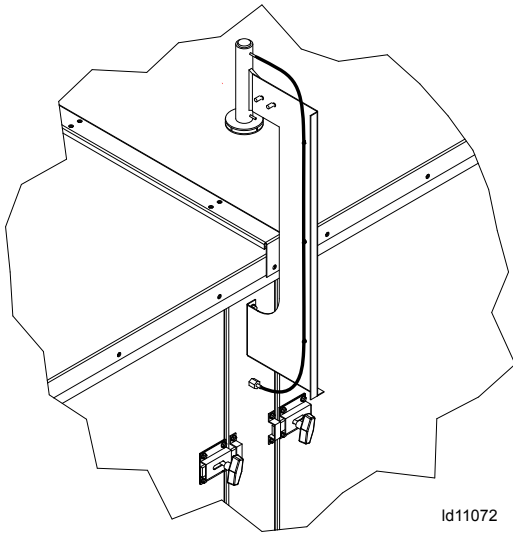


FIGURE 17 - STATIC PRESSURE PROBE INSTALLATION

If the unit is equipped with both a building pressure transducer and a duct static transducer, a "tee" will be factory installed, and both the duct static pressure transducer and building pressure will be connected to the "tee" - both building static pressure transducer and duct static transducer will use the same factory supplied atmospheric pressure probe.

NOTE

The "low" side connection of the duct static or building pressure transducers are shipped with the pneumatic tubing factory installed and routed, to the external factory pressure tap.

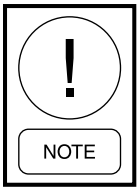
ROOF CURB INSTALLATION

General Information

When ordered, the roof curb is shipped knocked-down in a separate container and needs to be field assembled and installed. Refer to Installation Manual that is shipped with the roof curb for specific instructions.

On full perimeter roof curb the opening in the roof should not extend under the condenser section of the curb. The condenser section of the roof curb is not insulated and could result in condensation build up under the condenser section as well as higher than normal sound levels in the conditioned space.

The roof curb drawings contained in the Johnson Controls literature are not intended as construction documents for the field fabrication of a roof curb. Johnson Controls will not be responsible for the unit fit up, leak integrity, or sound level with field fabricated roof curbs.



Wood or fiber cant strips, roofing felts, roofing material, caulking and curb-to-roof fasteners are to be field supplied.

DUCT SYSTEM

Duct Connection Guidelines

All intake and discharge air duct connection to the unit may be made directly to the unit. These air duct connections should be on flexible material and should be installed so they are sufficiently loose. Duct runs and transitions must be made carefully to hold friction loss to a minimum. Avoid short turns, and duct elbows should contain splitters or turning vanes.

Ductwork connected to the supply discharge should run in a straight line for at least two equivalent outlet diameters. Never deadhead the discharge into the flat surface of a plenum.

Installation of elbows, discharge damper and other abrupt flow area changes installed directly at the fan outlet will cause system losses. These losses must be taken into account during the design phase and must be added to any field measurements.

SOUND AND VIBRATION TRANSMISSION

All roof mounted air handling units generate some sound and vibration that may or may not require some special treatment of the air conditioned space. The noise generated by the air handling unit is dependent on the speed of the fan, the amount of air the fan is moving, the fan type and the static efficiency of the fan. In applications where sound and vibration transmissions may be objectionable, good acoustical engineering practices must be incorporated in the system design.

GAS HEATING

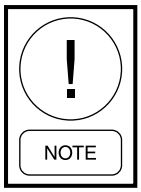
Gas Piping

Proper sizing of the gas piping depends on the cubic feet per hour of gas flow required, specific gravity of the gas and the total length of the gas pipe run. The latest edition of the National Fuel Gas Code, NFPA 54 ANSI Z223.1, should be followed in all cases unless superseded by local codes and/or gas company requirements. Refer to *Table 11 on page 41*.

TABLE 11 - PIPE SIZES

LENGTH IN FEET	NOMINAL IRON PIPE SIZE	
	1-1/2 IN.[1]	2 IN.[1]
10	1,600	3,050
20	1,100	2,100
30	890	1,650
40	760	1,450
50		1,270
60		1,150
70		1,050
80		990

[1] Maximum capacity of pipe in cubic feet of gas per hour (based upon a pressure drop of 0.3 inch water column and 0.6 specific gravity gas).



There may be a local gas utility requirement specifying a minimum diameter for gas piping. All units require a 1-1/2-inch pipe connection at the entrance fitting. Line size should not be sized smaller then the entrance fitting size.

Gas Connection

The gas supply piping should be routed to an appropriate location for entrance into the unit. The installing contractor will be responsible for providing the unit penetration, connection to the factory installed gas manifold, and water tight sealing of the gas piping penetration. Please refer to the latest edition of the National Fuel Gas Code, NFPA 54 ANSI Z223.1, local gas codes or gas company requirements for the proper installation of pressure regulators, shut-off valves and drip legs. Please refer to *Figure 8 on page 27*, for typical gas piping locations.

Gas Piping Recommendations

A drip leg and a ground joint union must be installed in the gas piping.

When required by local codes, a manual shut-off valve will have to be installed outside of the unit.

Use wrought iron or steel pipe for all gas lines. Pipe dope should be applied sparingly to male threads only.

Natural gas may contain some propane. Propane being an excellent solvent will quickly dissolve white lead or most standard commercial compounds. Therefore, a special pipe dope must be applied when wrought iron or steel pipe is used. Shellac base components such as Gaskolac or Stalastic, and compounds such as Rectorseal #5, Clyde's or John Crane may be used.

All piping should be cleaned of dirt and scale by hammering on the outside of the pipe and blowing out the loose particles. Before initial start-up, be sure that all of the gas lines external to the unit have been purged of air.

The gas supply should be a separate line and installed in accordance with all safety codes as prescribed under "Limitations" listed in the beginning of this section. After the gas connections have been completed, open the main shutoff valve admitting gas pressure to the mains. Check all joints for leaks with soap solution or other material suitable for the purpose. **NEVER USE A FLAME!**

The furnace and its individual manual shut-off valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 0.5 psig.

Disconnect gas piping from unit when leak testing at pressures greater than 0.5 psig. Pressures greater than 0.5 psig will cause gas valve damage resulting in a hazardous condition. If gas valve is subjected to pressure greater than 0.5 psig, it must be replaced.

A 1/8 inch N.P.T plugged tapping, accessible for test gage connection, must be installed immediately upstream of the gas supply connection to the furnace.

Combustion Vent

The combustion vent assembly is shipped in the return air section of the unit. The combustion vent assembly must be mounted over the flue gas outlet fixed panel located to the right of the gas heat access door. Install as follows:

1. Remove the combustion vent assembly from the return compartment.
2. Remove the vertical row of six screws on either side of the flue gas outlet fixed panel.
3. Mount the combustion vent assembly over the flue gas outlets and attach to the gas outlet fixed panel using the screws removed in step 2.
4. See *Figure 18 on page 42* for the proper orientation of the combustion vent. The internal baffle(s) must direct the flue gases upward.

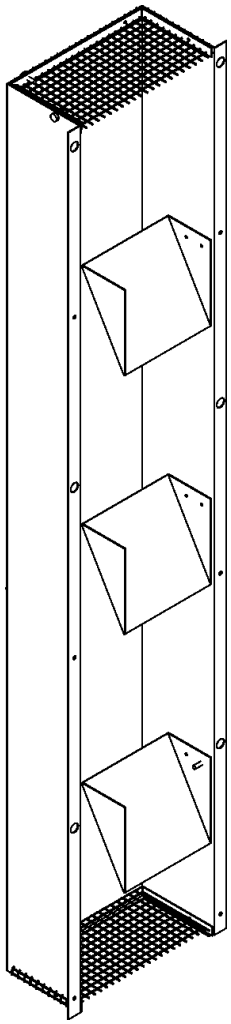


FIGURE 18 - COMBUSTION VENT

SECTION 3 – START-UP

To protect warranty, this equipment must be installed and serviced by an authorized Johnson Controls service mechanic or a qualified service person experienced in air handling and condenser unit installation. Installation must comply with all applicable codes, particularly in regard to electrical wiring and other safety elements such as HP cut-out settings, design working pressures and ventilation requirements consistent with the amount and type of refrigerant charge.

Lethal voltages exist within the control panel. Before servicing, open and tag all disconnect switches.

Reference Start-up Guide, Form 100.50-SU5 for additional information.

CRANKCASE HEATERS

With power applied to the rooftop unit, the crankcase heater for each compressor will be ON whenever the compressor is not running. The heater is interlocked into the compressor motor contactor and is not controlled by the microprocessor.

The purpose of the crankcase heater is to prevent the migration of refrigerant to the crankcase during shutdown, assuring proper lubrication of the compressor on start-up.

Anytime power is removed from the unit for more than an hour, the crankcase heater should be left ON for 24 hours prior to start.

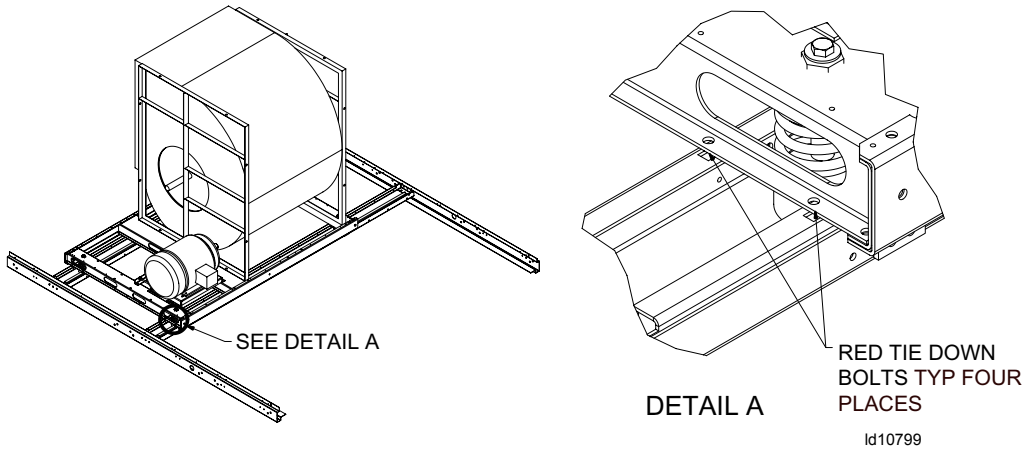
Power must be applied to the rooftop unit 24 hours prior to starting the unit compressors. Failure to observe this requirement can lead to compressor damage and voiding of the compressor warranty.

CHECKING THE SYSTEM PRIOR TO INITIAL START (NO POWER)

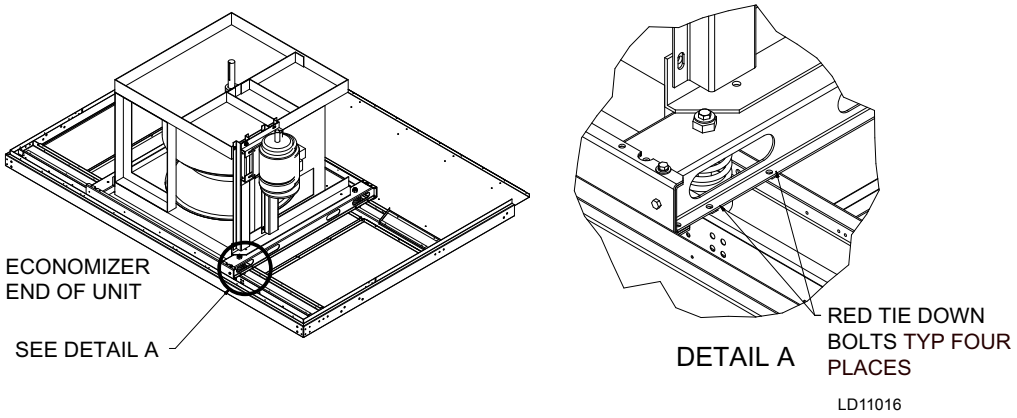
Unit Checks

1. Inspect the unit for shipping or installation damage.
2. Visually check for refrigerant piping leaks.
3. The compressor oil level should be maintained so that an oil level is visible in the sight glass. The oil level can only be tested when the compressor is running in stabilized conditions, guaranteeing that there is no liquid refrigerant in the lower shell of the compressor. In this case, the oil must be between 1/4 and 3/4 in the sight glass. At shutdown, the oil level can fall to the bottom limit of the oil sight glass.
4. Check the control panel to assure it is free of foreign material (wires, metal chips, etc.).
5. Visually inspect field wiring (power and control). Wiring MUST meet N.E.C. and local codes.
6. Check tightness of terminal lugs inside the power panel on both sides of the contactors, overloads, fuses, and power connections.
7. Verify fuse sizing in main circuits.
8. Verify field wiring for thermostat (if applicable), optional zone sensor, etc.
9. Verify all applicable pneumatic tubing has been field installed for duct static pressure transducers (VAV units), optional building pressure transducer for power exhaust option, and outdoor static pressure prove.
10. Supply, exhaust, and return fan isolator spring bolts removed *(refer to Figure 19 on page 44)*.

The supply, exhaust and return fans have tie down bolts installed at the factory to prevent movement in the fan assemblies during shipment. THESE HOLD DOWN BOLTS MUST BE REMOVED PRIOR TO OPERATION OF THE ABOVE FANS. There are eight bolts per assembly two at each comer of the fan skids, front and rear. The bolt locations are shown in Figure 19. The bolt heads are red in color and a label identifies their location in the unit.



SUPPLY & EXHAUST FAN ASSEMBLIES



RETURN FAN ASSEMBLY

FIGURE 19 - FAN ISOLATOR SPRING BOLTS (TOTAL OF 8)

11. Verify proper bearing and locking collar torque values on supply and exhaust fans (refer to *SECTION 4 – MAINTENANCE*).
12. Verify proper drive alignment of supply and exhaust fans (refer to *SECTION 4 – MAINTENANCE*).
13. Verify proper belt tension of supply fan, exhaust fan or return fan (refer to *SECTION 4 – MAINTENANCE*). Belts must be checked after 24 hours of initial operation.
14. Manually rotate condenser fan blades, supply exhaust and return blower wheels and motors, to assure freedom of movement.
15. Verify proper condensate drain trap installation (refer to *Figure 19 on page 44*). Fill traps with water prior to unit start-up.
16. If applicable, verify installation of air filters (refer to *SECTION 2 – INSTALLATION* for size and quantity).
17. Verify the Variable Frequency Drive setpoints for VAV units and optional Variable Frequency Drive Exhaust or Return Fans. The Variable Frequency Drive for the Supply Fan is in the supply fan blower compartment. The Variable Frequency Drive for the Exhaust or Return Fan is located in the return air compartment. Refer to separate literature supplement for VFD operation and programming; supplied with the rooftop unit (Form 100.40-NO4 (LS02)).
18. If equipped, open suction line ball valve, discharge line ball valve, and liquid line ball valve for each refrigerant system.

19. An installation checklist MUST be provided to the JCI start-up technician. Please ensure that all applicable boxes are checked, and that all applicable options, programs, and setpoints are provided. The JCI technician has the ability to deny start-up of the unit for any item that is checked off, but not complete. Any option, program, or setpoint that is applicable but not provided will be left at the factory default.

UNIT CHECKS – POWER APPLIED

1. Apply 3-phase power and verify its value. Voltage imbalance should be no more than 2% of the average voltage.
2. Verify programmed units setpoints (refer to Start-Up Guide, Form 100.50-SU5).
3. Verify correct fan rotation (fan should rotate in direction of arrow on fan housing).
4. Insure proper compressor rotation (see following instruction on *Verifying Compressor Rotation on page 45*).

Verifying Compressor Rotation

This unit uses scroll compressors, which will only operate in one direction. Failure to observe these steps could lead to compressor failure.

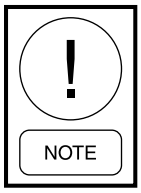
The YPAL rooftop unit uses hermetic scroll compressors, which only pump in one direction. Therefore, it is necessary to verify proper rotation at unit start-up. Operation of the compressor in the reverse direction will not produce any capacity, and cause the compressor to cycle on internal overload. Operating the compressor in reverse for longer than 60 seconds can result in failure of the compressor.

To verify proper rotation, monitor the suction and discharge pressures of the respective refrigerant circuit while the compressor cycles ON. If the discharge pressure increases and suction pressure decreases as the compressor cycles ON, the compressor is properly phased and operating in the correct rotation.

Suction and discharge pressure may be monitored with the User Interface display if the optional suction and discharge pressure transducers are installed. If the optional transducers are not installed, pressures must be monitored with a manifold gauge connected to the service valves located on the suction and discharge lines.

Compressor Oil Level Check

The oil level can only be tested when the compressor is running in stabilized conditions, to ensure that there is no liquid refrigerant in the lower shell of the compressor. When the compressor is running in stabilized conditions, the oil level must be between 1/2 and 3/4 in the oil sight glass.



At shutdown, the oil level can fall to the bottom limit of the oil sight glass

INITIAL START-UP

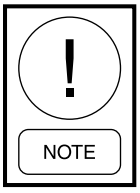
After all of the preceding checks have been completed and the control panel has been programmed as required, the unit may be placed into operation by performing the following:

1. Place the Unit Switch in the control panel to the ON position.
2. With a demand, the supply fan will cycle ON, and permit compressor operation if the air proving pressure switch for the supply fan has closed.
3. The first compressor will start. After several minutes of operation, a flow of refrigerant will be noted in the sight glass, the vapor in the sight glass will clear, and there should be a solid column of liquid visible in the sightglass when the TXV stabilizes.
4. Allow the compressor to run at least 10 minutes, being ready to stop it immediately if any unusual noise or adverse conditions develop.
5. Check the system operating parameters by checking evaporator superheat and condensing subcooling. Connect a gauge manifold set to the Schrader service valve connections on the liquid and common suction line in the condensing section of the unit. After the system is running and the pressures have stabilized, measure the temperature at the liquid and common suction lines near the Schrader service valves. Calculate evaporator superheat and condensing subcooling. Both should be approximately 15 degrees. Refer to *Checking Superheat and Subcooling on page 46* for information on how to calculate evaporator superheat and condenser subcooling. Repeat the above process for each of the refrigerant systems.

6. With an ammeter, verify that each phase of the condenser fans, compressors, supply fan, and exhaust fan are within the RLA/FLA as listed on the unit data plate.

Refrigerant Charge

This rooftop unit comes fully charged from the factory with refrigerant R-410A as standard. Because the components of R-410A evaporate (or condense) at different rates, the blend's composition constantly changes between bubble point and dew point. Because of this, only liquid refrigerant should be used when adding charge to the unit. The only exception would be if the entire contents of a refrigerant cylinder were added at one time.



Always charge with liquid when adding R-410A refrigerant. Failure to do so will compromise the properties of the refrigerant being added to the rooftop unit, and result in substandard performance of the unit.

Checking Superheat and Subcooling

R-410A temperature charts list the associated saturation temperature in one column, with the associated pressure in another column.

Subcooling (R-410A)

When the refrigerant charge is correct, there will be no vapor in the liquid sight glass with the system operating under full load conditions.

The subcooling temperature of each system can be calculated by recording the temperature of the liquid line at the outlet of the condenser and subtracting it from the saturation temperature listed in *Table 12 on page 47*, for the corresponding discharge pressure. If the rooftop unit does not have an access port for liquid access, subtract the condenser coil pressure drop value from the table on this page, from the discharge pressure to determine the equivalent saturation temperature.

Example:

When the discharge pressure is 388 PSIG and the liquid temperature is 95 °F.

Liquid Pressure = Discharge Pressure (388 PSIG) - 33.0 PSIG.

Saturation Temperature for 355 PSIG	= 108°F
Minus the liquid line temp	= 95°F
Liquid Line Subcooling of	= 13°F

The subcooling should be 15°F at design conditions.

Superheat (R-410A)

The superheat should be checked only after steady state operation of the unit has been established, the discharge air temperature has been pulled down to within the control range, and the unit is running in a fully loaded condition.

The superheat is calculated as the difference between the actual temperature of the refrigerant gas in the suction line and the temperature corresponding to the Suction Pressure as shown in *Table 12 on page 47*.

Example:

The suction pressure is 130 PSIG and the suction line temperature is 57 °F.

Suction Line Temperature	= 57°F
Saturation Temperature for 130 PSIG	= 45°F
Evaporator Superheat	= 12°F

When adjusting the expansion valve, the adjusting screw should be turned not more than one turn at a time, allowing sufficient time (approximately 15 minutes) between adjustments for the system and the thermal expansion valve to respond and stabilize.

The superheat setting should be adjusted to 12°F at design conditions.

Leak Checking

Leak check compressors, fittings and piping to assure no leaks. Verify the evaporator distributor tubes do not have bare copper touching each other or are against a sheet metal edge. If you are leak checking a unit charged with R-410A make sure the leak test device is capable of sensing refrigerant R-410A.

TABLE 12 - R410-A PRESSURE / TEMPERATURE CHART

PSIG	TEMP ˚F	PSIG	TEMP ˚F
0	-60	78	20
2	-58	80	21
4	-54	85	24
6	-50	90	26
8	-46	95	29
10	-42	100	32
12	-39	105	34
14	-36	110	36
16	-33	115	39
18	-30	120	41
20	-28	125	43
22	-26	130	45
24	-24	135	47
26	-20	140	49
28	-18	145	51
30	-16	150	53
32	-14	160	57
34	-12	170	60
36	-10	180	64
38	-8	190	67
40	-6	200	70
42	-4	210	73
44	-3	220	76
46	-2	225	78
48	0	235	80
50	1	245	83
52	3	255	85
54	4	265	88
56	6	275	90
58	7	285	92
60	8	295	95
62	10	305	97
64	11	325	101
66	13	355	108
68	14	375	112
70	15	405	118
72	16	500	134
74	17	600	149
76	19	700	159

GAS HEAT MODELS

Pre-Start Checks

Startup of gas heat includes verification of incoming gas line pressure and leak checks in the field installed gas lines, these items are the responsibility of the installing contractor; however, they should also be verified prior to unit start-up. Correct values and the proper procedures are described later in this section.

Verify wiring inside the burner compartment to insure the wiring/terminals are tight and securely connected to the components, such as the ignition control, flame sensor, gas valve, rollout switches and igniter.

The gas heat start up sequence begins with a 30 second prepurge. The next step in the sequence is the closure of the air proving switch. The heat section has a combustion air-proving switch. This switch must close before the ignition sequence can initiate. If the air-proving switch is closed after the 30 second prepurge the ignition control will energize the spark igniter and open the gas valve.

The furnace ignition control uses flame rectification as verification of burner operation. The minimum allowable flame current for operation is 0.7 DC microamps.

If the furnace ignition control does not prove flame in 7 seconds, it will turn off the spark signal and close the gas valve. It will wait 30 seconds and then initiate a second ignition sequence. If flame is not proven during the second 7 second trial for ignition the control will turn off the spark signal, close the gas valve, wait 30 seconds and initiate a third ignition sequence. If flame rectification is not proven on the third try, the ignition control will lock out.

The heat section has two roll out switches mounted above the burners. The purpose of the roll out switch is to protect the gas heat section from flame roll out, flame burning outside the heat exchanger. A restriction in the heat exchanger or breach in the flue passages could result in a roll out situation. The roll out switch is a manual reset device.

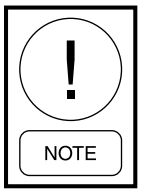
The unit has two high temperature limit switches. One located at the heat exchanger vestibule panel and the other located in the area of the heat exchanger return bend. These limits are automatic reset devices. If the limit opens the ignition control will deenergize the gas valve. As soon as the limit closes the ignition control will reinitiate the ignition sequence.

The control circuit is tested in the factory to insure that all of these steps are followed, however, natural gas is not actually introduced to the system in the plant; nitrogen is used in its place.

Post Start Checks

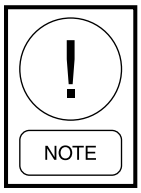
When a signal is received at the gas heat control module from the Unit Controller, verify:

- Combustion blower starts and runs for 30 seconds before the spark is initiated.
- Spark igniter sparks.
- Gas valve opens.
- Burners light from right to left, in a 2.5 second time frame.
- Each burner lights in sequential order from right to left; and establishes stable flame immediately upon ignition.
- No gas leaks in the unit piping as well as the supply piping.
- Correct manifold gas pressures. See *Manifold Gas Pressure Adjustment on page 49*
- The supply pressure is adequate. It must be within the limitations shown in *Table 13 on page 49*.

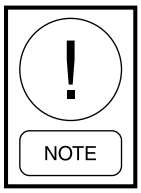


Supply pressure should be checked with all gas appliances in the building at full fire. At no time should the standby gas pressure exceed 13.5" WC, nor the operating pressure drop below 4.5" WC for natural gas or 11.0" WC for propane. If the gas pressure is outside these limits, contact the installing mechanical contractor for corrective action.

- The flame is stable, with the flame present only at the end of the burner and that there isn't any burning occurring inside the burner.



There should be a little yellow tipping of the flame.



There may be some smoke thru the flue, due to tooling oil burning off of the heat exchanger tubing.

TABLE 13 - LOW FIRE / HIGH FIRE PRESSURE - STAGED

TYPE OF GAS	LINE PRESSURE		MANIFOLD PRESSURE	
	MINIMUM	MAXIMUM	LOW FIRE +/- 0.3" WC	HIGH FIRE +/- 0.3" WC
NATURAL	4.5" WC	13.5" WC	1.4" WC	3.5" WC
PROPANE	11.0" WC	13.5" WC	4.2" WC	10.0" WC

TABLE 14 - LOW FIRE / HIGH FIRE MODULATING

TYPE OF GAS	LINE PRESSURE		PRESSURE TO MAXITROL VALVE	
	MINIMUM	MAXIMUM	LOW FIRE +/- 0.3" WC	HIGH FIRE +/- 0.3" WC
NATURAL	4.5" WC	13.5" WC	1.4" WC	3.5" WC

MANIFOLD PRESSURE – MODULATING GAS

TABLE 15 - LOW FIRE (INDUCER FAN ON LOW, 1.4" WC INPUT TO MAXITROL VALVE

INPUT VOLTAGE TO SIGNAL CONDITIONER (VDC)	MANIFOLD PRESSURE ("WC)
0.0	0.22
0.5	0.22
1.0	0.22
1.5	0.22
2.0	0.22
2.5	0.32
3.0	0.45
3.5	0.66
4.0	0.84
4.5	1.05
5.0	1.25
5.5	1.30
6.0	1.30
6.5	1.30

TABLE 16 - HIGH FIRE (INDUCER FAN ON HIGH, 3.5" WC INPUT TO MAXITROL VALVE

INPUT VOLTAGE TO SIGNAL CONDITIONER (VDC)	MANIFOLD PRESSURE ("WC)
4.0	1.10
4.5	1.40
5.0	1.70
5.5	2.10
6.0	2.50
6.5	2.90
7.0	3.15
7.5	3.25
8.0	3.30
8.5	3.30
9.0	3.30

Manifold Gas Pressure Adjustment

Small adjustments to the manifold gas pressure can be made by following the procedure outlined below. Refer to *Figure 20 on page 49* for the high and low fire pressure regulator adjustment locations.

1. Turn the gas off to the unit.
2. Use a 3/16 inch Allen wrench to remove the 1/8 inch NPT plug from the outlet pressure tap of the valve.
3. Install a brass adapter to allow the connection of a hose to the outlet pressure tap of the valve.
4. Connect the hose to a manometer capable of reading the required manifold pressure value.
5. Turn the gas back ON.
6. Place the heat section into high fire operation.
7. Compare the high fire manifold pressure to *Table 13 on page 49*.
8. To adjust the high fire manifold pressure remove the cap from the high fire pressure regulator. Use a 3/32 inch Allen wrench to make the manifold pressure adjustment. To increase the manifold pressure, turn the screw clockwise; to decrease the manifold pressure, turn the screw counterclockwise. Place your finger over the adjustment opening while verifying the manifold pressure.

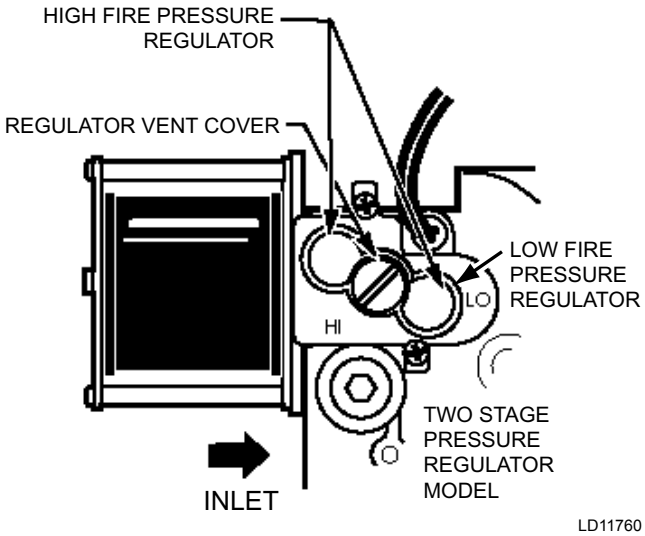


FIGURE 20 - MANIFOLD GAS PRESSURE ADJUSTMENT

TABLE 17 - GAS HEAT PERFORMANCE DATA

UNIT	GAS INPUT CAPACITY (BTU/HR X 1000)	MAXIMUM OUTPUT CAPACITY (BTU/HR X 1000)	AIRFLOW		TEMP. RISE
			MIN.	MAX.	
ALL UNITS	Burner 1	300	6,950	27,750	10-40
	Burner 2	600	11,150	27,750	20-50
	Burner 3	900	15,150	33,325	25-55

9. Place the heat section into low fire operation.
10. Compare the low fire manifold pressure to *Table 13 on page 49*.
11. To adjust the low fire manifold pressure remove the cap from the low fire pressure regulator. Use a 3/32 inch Allen wrench to make the manifold pressure adjustment. To increase the manifold pressure, turn the screw clockwise; to decrease the manifold pressure, turn the screw counter-clockwise. Place your finger over the adjustment opening while verifying the manifold pressure.
12. Turn the heat OFF.
13. Turn the gas OFF.
14. Remove the brass tubing adapter and replace the plug in the outlet pressure tap.

SECTION 4 – MAINTENANCE

Make sure power is removed from the unit before performing the maintenance items contained in this section.

GENERAL

A regularly scheduled preventive maintenance program will help to ensure the proper operation of the unit as well as possibly prevent extended periods of downtime due to component failure. It is the responsibility of the owner to ensure that proper maintenance is being performed on the S100 unit. Failure to provide the proper preventive maintenance could result in the warranty being voided.

PERIODIC MAINTENANCE – MONTHLY

Filters

Check the cleanliness of the filters and replace or clean as required.

Linkages

Examine the damper and operator linkages to insure that each is free and operating smoothly.

Compressors

Oil Level Check – The oil level can only be tested when the compressor is running in stabilized conditions, to ensure that there is no liquid refrigerant in the lower shell of the compressor. When the compressor is running in stabilized conditions, the oil level must be between 1/4 and 3/4 in the oil sight glass. *Note: at shutdown, the oil level can fall to the bottom limit of the oil sight glass.*

Oil Analysis – Use JCI Type "V" POE oil (clear) for units charged with R-410A refrigerant. The type of refrigerant and amount per system is listed on the unit rating plate. A change in the oil color or odor may be an indication of contaminates in the refrigeration system. If this occurs, an oil sample should be taken and analyzed. If contaminations are present, the system must be cleaned to prevent compressor failure. This can be accomplished through the installation of oversized suction and liquid line driers. The driers may have to be changed several times to clean up the system depending on the degree of contamination.

Never use the scroll compressor to pump the refrigerant system down into a vacuum. Doing so will cause internal arcing of the compressor motor, which will result in failure of compressor.

Fan Bearing Lubrication

Add grease slowly with shaft rotating until a slight bead forms at the seals. If necessary, re-lubricate while bearing is stationary. The fan data plate (attached to the fan scroll) lists the type of grease that must be used for lubricating the bearings. Refer to *Table 18 on page 51* for lubricating schedule.

Re-lubrication is generally accompanied by a temporary rise in operating temperature. Excess grease will be purged at seals.

Recommended Lubricant for Fan Bearings

A Lithium / Petroleum base grease conforming to an NLGI Grade II consistency is normally used. Lubricant must be free of any chemical impurities such as free acid or free alkali, dust, rust, metal particles or abrasive. This light viscosity, low torque grease is rust inhibited and water resistant, has a temperature range of -30°F to +200°F with intermittent highs of +250°F. Lubricate bearings as required by the severity of required duty.

TABLE 18 - FAN BEARING – LUBRICATION INTERVALS

RELUBRICATION SCHEDULE (MONTHS) BALL BEARING PILLOW BLOCKS									
SPEED (RPM)	**500**	**1000**	**1500**	**2000**	**2500**	**3000**	**3500**	**4000**	**4500**
SHAFT DIA									
1/2" thru 1-11/16"	6	6	5	3	3	2	2	2	1
1-15/16" thru 2-7/16"	6	5	4	2	2	1	1/2	1/4	1/4
2-11/16" thru 2-15/16"	5	4	3	2	1	1/2	1/2		
3-7/16" thru 3-15/16"	4	3	2	1	1/2	1/2			

Condenser Coils

Condenser coils should be kept clean and free of dirt, dust, and debris. Accumulation of dirt, dust, and debris could result in reduced performance, refrigerant system lockout, and/or compressor failure.

The microchannel coil cleaning procedure is significantly different than fin and tube type coils. Please follow the below procedure for cleaning microchannel coils

a. Remove surface debris with a vacuum cleaner using a soft brush instead of a hard plastic or metal tube. Compressed air can also be used blowing the dirt from inside out. If using a brush to remove the debris, ensure that the brush has soft bristles, NO wire brushes.

b. Rinse the coil with tap water. Do NOT use coil cleaners. Rinse the coil from the inside out, running water through every passage in the microchannel coil surface until it is clean. Use a gentle spray from a spray nozzle. Do NOT use a pressure washer. Pressure washers will cause damage to the microchannel coil surface

c. Because of the microchannel coil construction, water is retained longer than on standard fin and tube coils. It is generally recommended to blow or vacuum out the rinse water to speed the drying process and prevent water pooling.

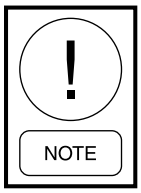
PERIODIC MAINTENANCE – THREE TO SIX MONTHS

Disconnect and lockout power from the unit anytime service is being performed on the fan section. Failure to do so could result in serious injury or death due to the fan turning ON while work is in progress.

Squealing belts during starting is caused by slipping belts that are not tensioned properly.

Motor Bearing Lubrication

Bearings must be re-lubricated periodically to assure long life. Motor bearing should be lubricated yearly, but may need lubrication more frequently, depending on severe operating conditions.



Removal of the relief plug on the motor bearing is required during greasing. Overgreasing the motor can cause bearing damage and will not be covered under unit warranty.

Belt Tension

Adjust the belt tension if necessary. Required belt tension data is supplied on the fan "skid" data plate, attached to the fan housing. Never use a belt dressing on the belts. If belts slip with the proper tension, use a good grade of belt cleanser to clean the belts. Refer to *Figure 22 on page 54 and Figure 23 on page 54.*

Never use excessive belt tension, as this could result in damaging the bearing, motor pulleys or motor base. See drive label on fan housing adjacent to drive for specific details on tension.

When it is necessary to replace one belt in a given set, the entire set of belts must be replaced.

PERIODIC MAINTENANCE – YEARLY

Check the fan wheels and inspect the drain pan for sludge and foreign material. Clean if required.

Observe the operation of all dampers and make any necessary adjustments in linkage and blade orientation for proper operation.

Entire Unit Inspection

In addition to the checks listed in this section, periodic overall inspections of the unit should be accomplished to ensure proper equipment operation. Items such as loose hardware, component operation, refrigerant leaks, unusual noises, etc. should be investigated and corrected immediately.

Sheave Alignment

To check sheave alignment, a straight edge or a piece of string can be used. If the sheaves are properly aligned, the string or straight edge will touch at all points, as indicated in *Figure 21 on page 53*. Rotating the sheaves will determine if the sheave is wobbly or the drive shaft is bent. Alignment error must be corrected to avoid bearing and belt failure.

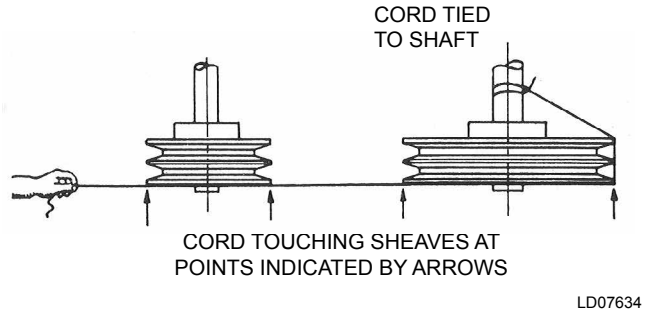


FIGURE 21 - SHEAVE ALIGNMENT

Belts

New belts should be re-checked after 24 hours of operation. On multiple belt adjustable pulleys, the pitch depth should be checked to insure identical belt travel, power transfer and wear. Adjustable motor bases are provided for belt adjustment.

Motor pulleys and blower shaft pulleys are locked in position with either setscrews or split taper lock bushings. All setscrews and/or taper lock bolts must be checked for tightness and alignment before putting equipment into operation.

An incorrectly aligned and tensioned belt can substantially shorten belt life or overload blower and motor bearings, shortening their life expectancy. A belt tensioned too tightly can overload the motor electrical, causing nuisance tripping of the motor overloads and/or motor failure and/or shaft failure.

Belt Replacement

Always replace belts as a set. Follow the steps below to replace belts:

1. Release the tension on the belts by loosening the adjusting nuts on the motor base.
2. Remove old belts and recheck the sheave alignment with a straight edge.
3. Install the new belts on the sheaves.

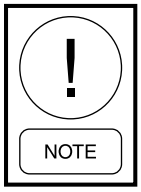
Never place the belts on the sheaves by using a screwdriver to pry the belt over the rim of the sheave. This will damage the belts permanently.

Belt Tensioning

Proper belt tensioning is required for optimum fan performance. Belts that are too loose could slip, and reduce the fan output. Belts that are too tight could cause premature bearing failure. Please follow the below procedure for obtaining proper belt tension. A belt tensioning tool will be needed for performing the below procedure.

This method should be used only for tensioning drives on which the grade of belt, rated belt capacity, service factor, design horsepower, etc. are known.

1. Measure span length (t) in inches as shown in *Figure 22 on page 54*, or calculate using formula.
2. From *Figure 22 on page 54,* the deflection height (h) is always 1/64" per inch of span length (t). For example, a 32" span length would require a deflection of 32/64" or 1/2".
3. Determine the minimum, maximum, and inital recommended pounds force using *Table 19 on page 54* or calculate based on the required Static Strand Tension (Ts).

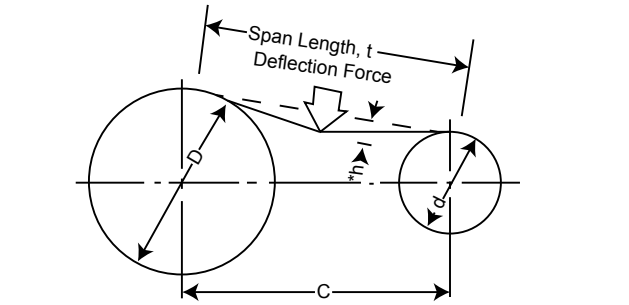


The initial recommended force is used only for installing new belts which have not seated themselves into the sheave grooves and where initial belt stretch has not taken place.

4. Using a spring scale, apply a perpendicular force to any ONE of the belts at the mid point of the span as shown in *Figure 22 on page 54*. Compare this deflection force wit the values found in Step 3.
    a. If the deflection force is below the minimum, the belts are too loose and the tension should be increased by increasing the center distance.
    b. If the deflection force is higher than the maximum, the belts are too tight and the tension should be decreased.

When new V-belts are installed on a drive the INITIAL tension will drop rapidly during the first few hours. Check tension frequently during the first 24 hours of operation. Subsequently retensioning should fall between the minimum and maximum force.

To determine the deflection distance from normal position, use a straightedge or stretch a cord from sheave to sheave to use as a reference line. On multiple belt drives an adjacent undeflected belt can be used as a reference.



* Deflection height
h= 1/64" per inch of span

where t = Span length, inches
C = Center Distance, inches
D = Larger sheave diameter, inches
d = Smaller sheave diameter, inches

$$t = \sqrt{C^2 - \left(\frac{D-d}{2}\right)^2}$$

$$h = \frac{t}{64}$$

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FIGURE 22 - DRIVE TENSIONING

TABLE 19 - RECOMMENDED MINIMUM FORCE PER BELT

Belt Selection	Small Sheave		Drive Ratio			
	Speed Range	Dia.	1.0	1.5	2.0	4.0 & Over
3V	1200-3600	2.65	2.0	2.4	2.6	3.0
	1200-3600	3.65	2.8	3.6	3.8	4.2
	1200-3600	4.75	3.8	4.2	4.4	4.8
	1200-3600	5.60	4.2	4.6	4.8	5.4
	1200-3600	6.90	4.6	5.0	5.2	5.6
5V	900-1800	7.1	8.5	9.5	10.0	11.0
	900-1800	9.0	10.0	11.0	12.0	13.0
	900-1800	14.0	12.0	13.0	14.0	15.0
	700-1200	21.2	14.0	15.0	16.0	17.0
8V	900-1800	12.5	18.0	21.0	23.0	25.0
	900-1800	14.0	21.0	23.0	24.0	28.0
	700-1500	17.0	24.0	26.0	28.0	30.0
	700-1200	21.2	28.0	30.0	32.0	34.0
	400-1000	24.8	31.0	32.0	34.0	36.0
3VX	1200-3600	2.20	2.2	2.5	2.7	3.0
	1200-3600	2.50	2.6	2.9	3.1	3.6
	1200-3600	3.00	3.1	3.5	3.7	4.2
	1200-3600	4.12	3.9	4.3	4.5	5.1
	1200-3600	5.30	4.6	4.9	5.1	5.7
	1200-3600	6.9	5.0	5.4	5.6	6.2
5VX	1200-3600	4.4	6.5	7.6	8.0	9.0
	1200-3600	5.2	8.0	9.0	9.5	10.0
	1200-3600	6.3	9.5	10.0	11.0	12.0
	1200-3600	7.1	10.0	11.0	12.0	13.0
	900-1800	9.0	12.0	13.0	14.0	15.0
	900-1800	14.0	14.0	15.0	16.0	17.0
AP	1800-3600	3.0	2.0	2.3	2.4	2.6
	1800-3600	4.0	2.6	2.8	3.0	3.3
	1800-3600	5.0	3.0	3.3	3.4	3.7
	1800-3600	7.0	3.5	3.7	3.8	4.3

TABLE 19 - RECOMMENDED MINIMUM FORCE PER BELT (CONT'D)

Belt Selection	Small Sheave		Drive Ratio			
	Speed Range	Dia.	1.0	1.5	2.0	4.0 & Over
BP	1200-1800	4.6	3.7	4.3	4.5	5.0
	1200-1800	5.0	4.1	4.6	4.8	5.6
	1200-1800	6.0	4.8	5.3	5.5	6.3
	1200-1800	8.0	5.7	6.2	6.4	7.2
CP	900-1800	7.0	6.5	7.0	8.0	9.0
	900-1800	9.0	8.0	9.0	10.0	11.0
	900-1800	12.0	10.0	11.0	12.0	13.0
	700-1500	16.0	12.0	13.0	13.0	14.0
DP	900-1500	12.0	13.0	15.0	16.0	17.0
	900-1500	15.0	16.0	18.0	19.0	21.0
	700-1200	18.0	19.0	21.0	22.0	24.0
	700-1200	22.0	22.0	23.0	24.0	26.0
AX	1800-3600	3.0	2.5	2.8	3.0	3.3
	1800-3600	4.0	3.3	3.6	3.8	4.2
	1800-3600	5.0	3.7	4.1	4.3	4.6
	1800-3600	7.0	4.3	4.6	4.8	5.3
BX	1200-1800	4.6	5.2	5.8	6.0	6.9
	1200-1800	5.0	5.4	6.0	6.3	7.1
	1200-1800	6.0	6.0	6.4	6.7	7.7
	1200-1800	8.0	6.6	7.1	7.5	8.2
CX	900-1800	7.0	10.0	11.0	12.0	13.0
	900-1800	9.0	11.0	12.0	13.0	14.0
	900-1800	12.0	12.0	13.0	13.0	14.0
	700-1500	16.0	13.0	14.0	14.0	15.0
DX	900-1500	12.0	16.0	18.0	19.0	20.0
	900-1500	15.0	19.0	21.0	22.0	24.0
	700-1200	18.0	22.0	24.0	25.0	27.0
	700-1200	22.0	25.0	27.0	28.0	30.0

Maximum Deflection Force = Minimum times 1.5
Initial Deflection Forece = Minimum times 2.0

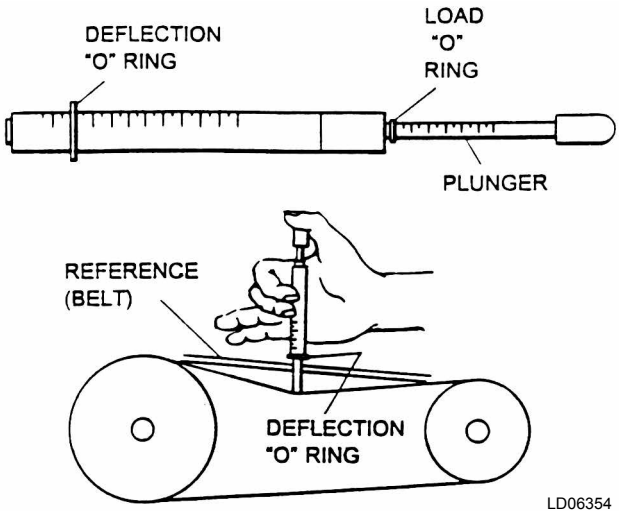

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FIGURE 23 - BELT TENSIONING GAUGE

Filter Drier Replacement

The filter/drier must be replaced any time work is performed on the refrigerant circuit. The rooftop unit comes with sealed type (non-replaceable) cores as standard. If the unit is not equipped with the optional valve package (suction, discharge, & liquid line valves), the refrigerant will need to be recovered with a recovery machine to replace the filter/drier.

If the unit is equipped with a valve package, the unit can be pumped down by closing the liquid line ball valve (prior to the filter/drier) while the unit is running, initiating a unit pump-down. The unit will shut off when the mechanical low-pressure switch opens. When the unit shuts down, close the ball valve located after the filter/drier and remove power from the unit to prevent the unit from running. Once the filter/drier core has been replaced, the filter/drier section should be evacuated via the Schrader access valve located next to the filter/drier prior to opening the ball valves and restoring the unit to normal operation.

Never shut the discharge valve while the unit is running. Doing so could cause a rupture in the discharge line or components, resulting in death or serious injury.

Never close the suction line ball valve with the compressor running. Doing so will cause the compressor to pump-down into a vacuum and damage the compressor due to internal arcing.

Forward Curved Fans

The forward curved fan wheel must be removed through the fan discharge opening. The location of other clamps, fan wheel, and shaft must be marked so each of these components can be reassembled in the same location (see *Figure 24 on page 55*). This will preserve the balance of the rotating assembly. Proceed with the following steps:

1. Disconnect all ductwork or guards attached to the blower housing to permit unobstructed access.
2. Remove the cut off plate attached at the discharge or blast area of the blower housing.
3. Thoroughly, clean the shaft of all grease and rust inhibitor. Be careful not to contaminate the bearing grease. Use emery cloth to remove all rust or the wheel may become “locked” to the shaft.
4. Loosen and remove setscrews on both bearing locking collars. Inspect and, if necessary, replace.
5. Loosen and remove setscrews from both sides of the wheel hub. Inspect and, if necessary, replace.
6. Using a rubber mallet or brass bar, slowly drive the shaft in one direction until the setscrew marks on the shaft are fully exposed. File the marks completely smooth. Drive the shaft in the opposite direction and file smooth the setscrew marks. Continue to clean the shaft of all dirt and residuals.

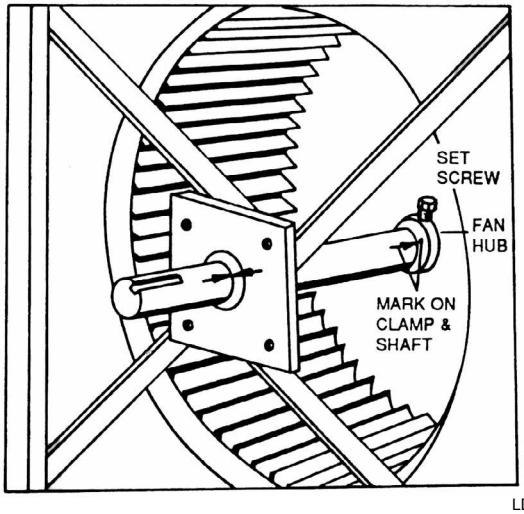


FIGURE 24 - EXAMPLE OF FC FAN SHAFT/ WHEELMARKING

7. To remove the key, use a rubber mallet or brass bar to drive the shaft and wheel in one direction. Drive the key in the opposite direction using a nail set or smaller size key stock until the key is completely free of the wheel. Be sure that key does not get bent by allowing it to ride up the key way edge. The slightest bend will prevent quick assembly. Should this occur, replace the key stock.
8. Remove the shaft, supporting the weight of the wheel, particularly for larger diameter wheels. Do not allow the weight of the shaft to be supported by one bearing as you disassemble.
9. Remove the wheel through the discharge or outlet area of the blower housing.

10. Reassemble in reverse order, centering the wheel between the edges of the inlet venturi. If bearings were removed or replaced, be sure to reuse any shim stock found between the mounting support/ plate and bearing housings.
11. Torque all hardware.

Disconnect and lockout power from the unit anytime service is being performed on the fan section. Failure to do so could result in serious injury or death due to the fan turning ON while work is in progress.

Fan Motor

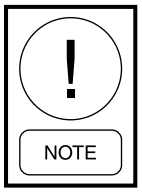
1. Shut off unit power and lock out.
2. Disconnect and tag power wires at motor terminals.
3. Loosen motor brace-to-mounting-rail attaching bolts.
4. Mark belt as to position. Remove and set aside belts.
5. Remove motor bracket hold down bolts.
6. Remove motor pulley and set aside.
7. Remove motor.
8. Install new motor. Reassemble by reversing steps 1 - 6. Be sure to reinstall multiple belts in their original position. Use a complete new set if required. Do not stretch belts over sheaves. Review the sections on motor and sheave installation, sheave alignment, and belt tensioning discussed previously.
9. Reconnect motor leads and restore power. Check fan for proper rotation as described in Start-Up Check List.

Fan Shaft Bearings

When removing and replacing the bearings, care should be taken to ensure that the area where the bearings fit on the shaft does not become scored or damaged. The shaft in this area should be thoroughly cleaned before the bearing is removed and again before the new bearing is installed.

Mounting Details

1. Check the shaft. It should be straight, free of burrs and full size. Be sure the bearing is not seated on a worn section of shafting.
2. Make certain any setscrews are not obstructing the bearing bore.
3. Align the bearing in its housing and slide the bearing into position on shaft (never hammer the ends of the inner race). If necessary, use a brass bar or pipe against the inner race to drift bearing into place (never hit the housing, as bearing damage may result). Make sure there is lubricant between the bearing outer ring and the housing.
4. Fasten the bearing housing to the unit mounting support with hex head cap screws, washers, new lock washers and hex nuts before securing the bearing to the shaft. This permits the bearing to align itself in position along the shaft and eliminates any possibility of cramping loads.
5. Rotate the shaft to make certain it turns freely.
6. Bearings may employ one of several different methods to lock the bearing to the shaft.



Shaft should be free from burrs. If old shaft is used, be sure a ball bearing is not seated on worn section and shaft is not bent.

There are various degrees of self-alignment in bearings of the same manufacturer. The force required for the self-alignment of the bearings used in JCI manufactured units has been specified and is closely monitored at the factory. If it is necessary to purchase a bearing locally, be sure it can be worked around in the housing with a short shaft made of wood or other soft material placed in the bearing.

Prior to installing the bearing on the shaft, it should be worked around in the housing to make sure that self-alignment will be obtained where the bearing is installed. After the shaft journal has been inspected for cleanliness, metal chips or burrs, the bearing is slipped, not forced, onto the shaft. Forcing the bearing onto the shaft by the use of flange, pillow block, or outer ring will damage the bearing internally. Force applied in this way transmits the load to the inner race through the balls in the bearing. Since the bearings are not designed for axial loading, the sides of the races in which the balls turn can be damaged. If the bearing cannot be made to slip onto the shaft by pressing on the inner ring of the bearing, check the shaft for burrs. Install the bearing so the part of the inner race, which receives the locking collar or contains setscrews, is toward the outside of the unit.

If the grease fitting must be changed on bearings that utilize a locking pin under the fitting, it is important to properly replace it. If an adapter or grease fitting of improper size and length is used, the locking pin may be either too tight or loose and can affect the alignment and re-lubrication of the bearing.

Bearing Lock Devices

Various types of locking devices are used to secure bearing(s) to the fan shaft. Refer to the instructions packed with bearings for special information. *Figure 25 on page 57* is a typical bearing with a setscrew-type locking device. The various locking devices can be classified under basic types: eccentric locking type, concentric locking type, and Skwezloc type.

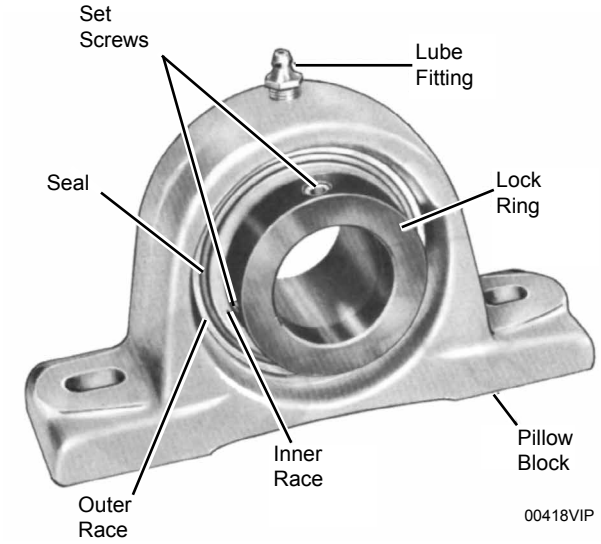


FIGURE 25 - BEARING WITH SETSCREW TYPE LOCKING DEVICE

Eccentric Type

An eccentric self-locking collar is turned and driven with a punch in the direction of shaft rotation to lock the bearing inner ring to the shaft. See *Figure 25 on page 57 and Figure 26 on page 57.*

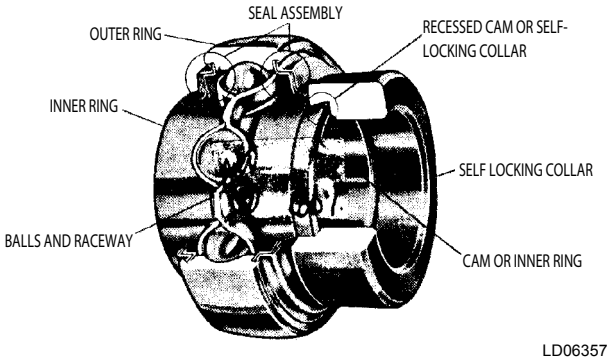
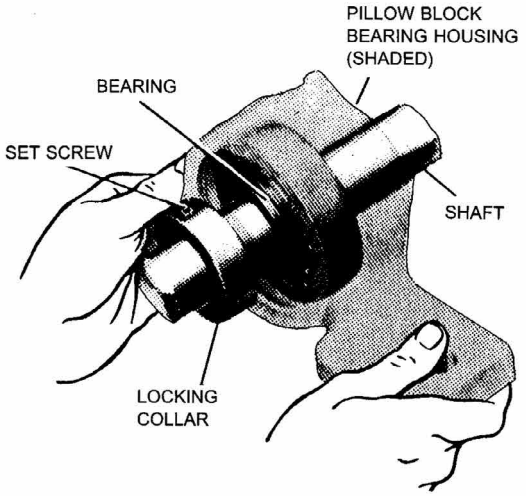


FIGURE 26 - BEARING WITH ECCENTRIC CAM

When the eccentric collar is engaged to the cam on the bearing inner ring and turned in direction of rotation, it grips the shaft with a positive binding action. The collar is then locked in place with the setscrew provided in the collar.

The self-locking collar is placed on the shaft with its cam adjacent to the cam on the end of the bearing's wide inner ring. In this position, with collar and bearing cams disengaged, the collar's bore is concentric with that of the bearing's inner ring. The wide inner ring is loose on the shaft. By turning the collar in the direction of normal shaft rotation, the eccentric recessed cam will drop over and engage with the corresponding cam on the bearing inner, causing it to grip the shaft tightly with a positive binding action. See *Figure 27 on page 58.* Make sure the two cams engage smoothly and the locking collar is down flat against the shoulder of the inner ring. The wide inner ring is now locked to the shaft. Using a punch or similar tool in the drilled hole of the collar, tap the tool lightly to lock the collar in the direction of normal shaft rotation.



NOTE: Do Not apply excessive force to the bearing housing (pillow block or flange when installing the bearing on the shaft.

CAUTION

Do not apply excessive force to the bearing housing (pillow block or flange) when installing the bearing on the shaft.

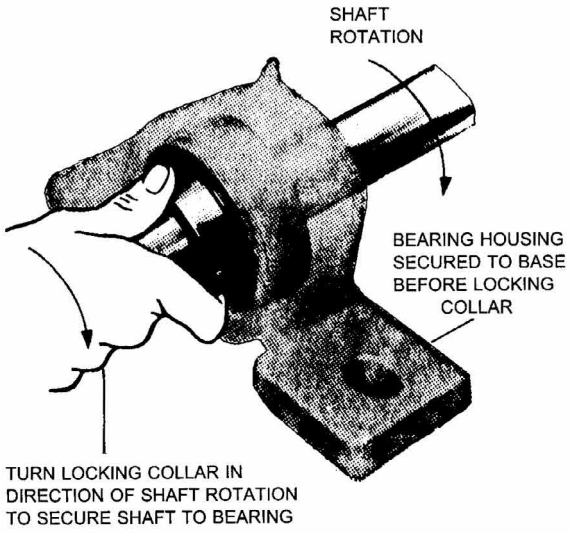


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FIGURE 27 - ECCENTRIC CAM LOCKING COLLAR BEARING INSTALLATION

As a final step, the setscrew is tightened. Torque per *Table 20 on page 58*. It exerts a wedging action to hold the collar always in the engaged position, even under shock and reversing loads.

To disassemble, loosen the setscrew and tap the collar in the direction opposite shaft rotation.

TABLE 20 - SETSCREW TORQUE

SET SCREW DIA.	HEX. SIZE ACROSS FLATS LBS.	MIN. RECOMMENDED TORQUE	
		INCH LBS.	FOOT LBS.
1/4 1/8	66 - 85	5.5 - 7.2	
5/16	5/32	126 - 164	10.5 - 13.7
3/8 3/16	228 - 296	19.0 - 24.7	
7/16	7/32	348 - 452	29.0 - 37.7
1/2 1/4	504 - 655	42.0 - 54.6	
5/8 5/16	1104 - 1435	92.0 - 119.6	

CAUTION

After proper installation of the bearing(s), run the unit for 10 to 15 minutes. Shut the unit down and lock it out. Check for proper engagement of locking collar and tightness of setscrew(s).

When replacing split bearings, refer to manufacturer's instruction provided with the bearing. It is extremely important to ensure that proper radial clearances are observed between the roller bearings and outer face. Failure to make proper adjustments will cause premature failure of the bearing.

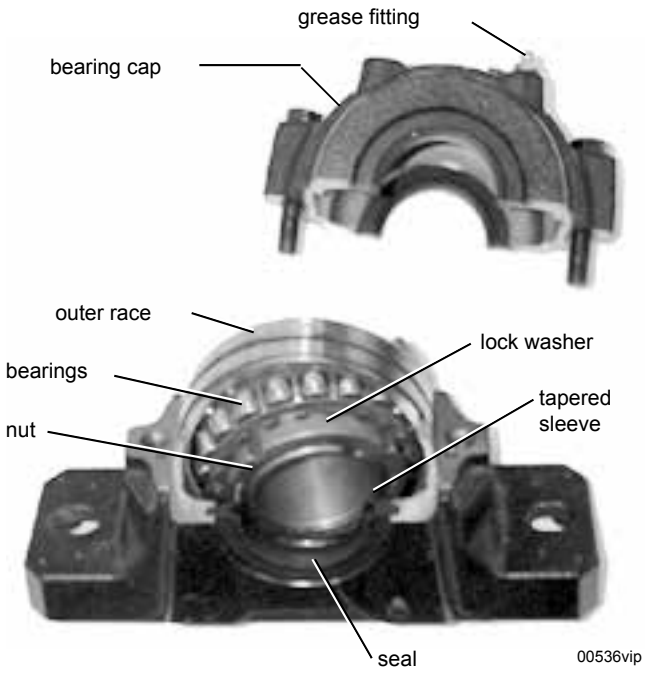


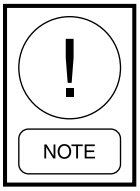
FIGURE 28 - SPLIT BEARING

SECTION 5 – SEQUENCE OF OPERATION

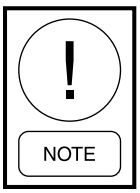
UNIT TYPE

The series 100 unit is capable of operating as 3 different unit types. The "Unit Type" can be viewed/selected in "Options – Unit Data"

1. Constant Volume (CV)
2. Variable Air Volume (VAV)
3. Flexsys
4. SZVAV



To see a complete list of the Options, Programs, and Setpoints menu's, as well as min/max values and factory defaults, please refer to SECTION 6 – USER INTERFACE CONTROL CENTER.



Please refer to SECTION 8 – SERVICE for a list of acronyms and abbreviations

OCCUPANCY/UNOCCUPANCY DETERMINATION

The "Current Oper Mode", OCC or UNOCC, is determined in one of three ways. The three ways are listed below in order of priority.

1. Hardwired: a 24 VAC input is provided to CTB1 at terminal OCC. Please note that the 24 VAC MUST, be provided by the S100 unit.
2. Internal Time Clock: The unit is programmed for Occ/Unocc times using the Internal Time Clock
3. BAS Command: A BAS system provides an Occ/Unocc signal to the S100 unit

CURRENT OPERATING MODE

Within the "*CURRENT OPER MODE*", the unit can operate in many different sub-modes. These sub-modes are listed below.

- Occ Standby
- Occ Cooling (VAV)
- Occ Cooling Low (CV)
- Occ Cooling High (CV)
- Occ Cooling w/ Bypass (Flexsys)
- Occ Cooling w/o Bypass (Flexsys)
- Occ Heating (VAV/Flexsys)
- Occ Heating Low (CV)
- Occ Heating High (CV)
- Unocc Cooling (VAV)
- Unocc Cooling Low (CV)
- Unocc Cooling High (CV)
- Unocc Heating (VAV/Flexsys)
- Unocc Heating Low (CV)
- Unocc Heating High (CV)
- Unocc Standby
- Comfort Vent Cooling (CV)
- Comfort Vent Heating (CV)
- Morning Warm-Up
- Under Floor Temp Override (Flexsys)

The Current Operating Mode can be viewed in the Status menu. The unit controller (IPU) monitors switching from a standby mode to an active cooling/heating mode. The unit must be in standby mode for 3 mins before switching to an active cooling/heating mode.

Constant Volume (CV)

1. Staged (Thermostat wired into CTB1 or BAS Commands)
2. Wired Zone Temp (Hardwired sensor to CTB1)
3. Comm Zone Temp (Zone temp signal from a BAS)

The control method is selected in the "Options" menu under "Unit Data"

Staged:

- The S100 unit can be controlled by a standard 2 stage cooling/heating thermostat
- The 24 VAC to the thermostat **MUST** be provided by the S100 unit
- Thermostat connections will be the standard connections; G, Y1, Y2, W1, W2
- Thermostat commands can also be provided by a BAS.

Zone Temperature Control:

- The S100 unit can be controlled by a Zone Temp Sensor
- Zone Temp Sensor can either be Hardwired to CTB1 or communicated from a BAS
    a. Hardwired: Control Method set to Wired Zone Temp
    b. Communicated from BAS: Control method set to Comm Zone Temp
- If Zone Temp Control is selected but no zone temp is provided or the wrong type is selected, the unit will display a Sens/Misc fault and will LOCKOUT

The following values must be set for zone temp control

1. Occ zone cooling SP
2. Unocc zone cooling SP
3. Occ zone heating SP
4. Unocc zone heating SP

Variable Air Volume (VAV)

Occupied:

- Supply fan is ON, controlled to duct static press SP
- S100 unit monitors RAT and compares it to RAT Cooling SP and RAT Heating SP
- In VAV mode, the S100 unit can operate with no external control signals

Unoccupied:

- Supply Fan is OFF
- S100 unit monitors the Zone Temp and compares it the Unocc Zone Cooling and Heating SP's
- Night Set-Back **MUST** be Enabled for Unocc Cooling/Heating to operate
- Unit **MUST** have a valid zone temperature. If there is not a valid zone temperature, the unit will display a Sens/Misc Fault and will LOCKOUT

ACTIVE MODE DETERMINATION:

The S100 unit uses different methods to determine the active mode. These different methods are listed below.

Constant Volume:

Staged

- 24 VAC input from a thermostat to CTB1
    a. Occ Cooling Low: 24 VAC to Y1
    b. Occ Cooling High: 24 VAC to Y2
    c. Occ Heating Low: 24 VAC to W1
    d. Occ Heating High: 24 VAC to W2

See *Table 21 on page 61*

- Thermostat commands can also be given from a BAS
- Occupancy is determined by 24 VAC to CTB1 terminal "OCC", Internal Time Clock, or Occupancy Command from BAS
- Unoccupancy modes are determined the same way as Occupancy modes

Space Sensor

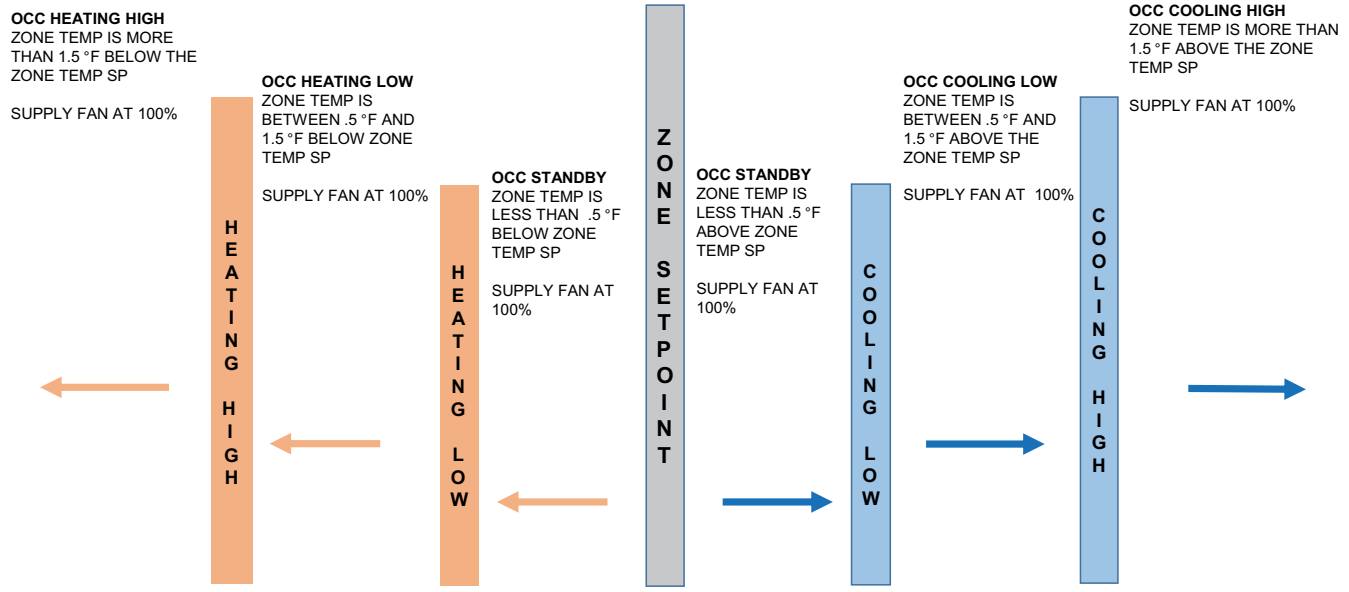
- Either Hardwired to CTB1 or communicated from a BAS
    a. Occ Cooling Low: .5 °F above Occ Zone Cooling SP
    b. Occ Cooling High: 1.5 °F above SP
    c. Occ Heating Low: .5 °F below Occ Zone Heating SP
    d. Occ Heating High: 1.5 °F below SP

See *Figure 29 on page 61*

- Occupancy determined same as staged above
- Unoccupancy modes are determined the same as Occupancy

TABLE 21 - CV STAGED INPUT

Y1 LOW COOL	Y2 HIGH COOL	W1 LOW HEAT	W2 HIGH HEAT	CURRENT OPER MODE	UNIT MODE
On	Off	Off	Off	Occupied	Occupied Cooling Low
On/Off	On	Off	Off	Occupied	Occupied Cooling High
Off	Off	On	Off	Occupied	Occupied Heating Low
Off	Off	On/Off	On	Occupied	Occupied Heating High
Off	Off	Off	Off	Occupied	Occupied Standby *(See Comfort Ventilation on page 92)*
On	Off	Off	Off	Unoccupied	Unoccupied Cooling Low
On/Off	On	Off	Off	Unoccupied	Unoccupied Cooling High
Off	Off	On	Off	Unoccupied	Unoccupied Heating Low
Off	Off	On/Off	On	Unoccupied	Unoccupied Heating High
Off	Off	Off	Off	Unoccupied	Unoccupied Standby



NOTES:
1- WHENEVER THE UNIT ENTERS AN ACTIVE COOLING OR HEATING MODE, THE UNIT CONTROLLER WILL UTILIZE AS MANY OR AS FEW STAGES OF COOLING or HEATING THAT IT NEEDS TO ACHIEVE AND MAINTAIN THE ACTIVE SUPPLY AIR TEMP SP.

2- UNOCCUPIED SEQUENCE WILL BE THE SAME AS ABOVE EXCEPT THE ZONE TEMP SPs USED WILL BE THE UNOCC SP's VALUES.

3- UNIT MODES WILL STAGE DOWN WHEN THE ZONE TEMP IS .5 °F UNDER SPs FOR COOLING AND .5 °F OVER SPs FOR HEATING.

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FIGURE 29 - OPERATIONAL MODE: CV WITH ZONE SENSOR

Variable Air Volume:

In the Occ mode, the active mode will be determined by the units RAT.

- Occ Standby: RAT is between the RAT Cooling SP and RAT Heating SP
- Occ Cooling: RAT is greater than the RAT Cooling SP by .5 °F
- Occ Heating: RAT is less than the RAT Heating SP by .5 °F

In the Unocc mode, the active mode will be determined by the Zone Temp

- Unocc Standby: Zone Temp is between the Unocc Zone Cooling and Unocc Zone Heating SP
- Unocc Cooling: Zone Temp is greater than the Unocc Zone Cooling SP by .5 °F
- Unocc Heating: Zone Temp is less than the Unocc Zone Heating SP by .5 °F
- Night Set-Back MUST be enabled for Unocc Cooling/Heating to operate
- Unit MUST have a valid zone temperature or it show a Sens/Misc fault and will not operate

NOTE

The RAT Cooling SP and RAT Heating SP cannot be closer than 2 °F, and the SP's are not self adjusting. If the RAT Cooling SP needs lowered, the RAT Heating SP may need lowered first. If the RAT Heating SP needs raised, the RAT Cooling SP may need raised first.

SINGLE ZONE VAV MODE

Units configured for Single Zone VAV operation shall contain a supply fan variable frequency drive. The unit shall switch between cooling mode, heating mode, and standby mode based on zone temperature. In cooling mode, the supply fan speed shall be varied based on zone temperature. If the zone termperature gets warmer, the supply fan speed shall increase. Conversely, if the zone termperature gets cooler, the supply fan speed shall decrease. In heating mode, the supply fan shall run at full speed. When the zone termperature is satisfied, the unit is neither in cooling mode nor heating mode, and the supply fan shall run at minimum speeed. Control of cooling and heating stages shall operate in the same manner as a Constant Volume unit with *Unit Mode Determination*, as described in the following section.

Unit Mode Determination

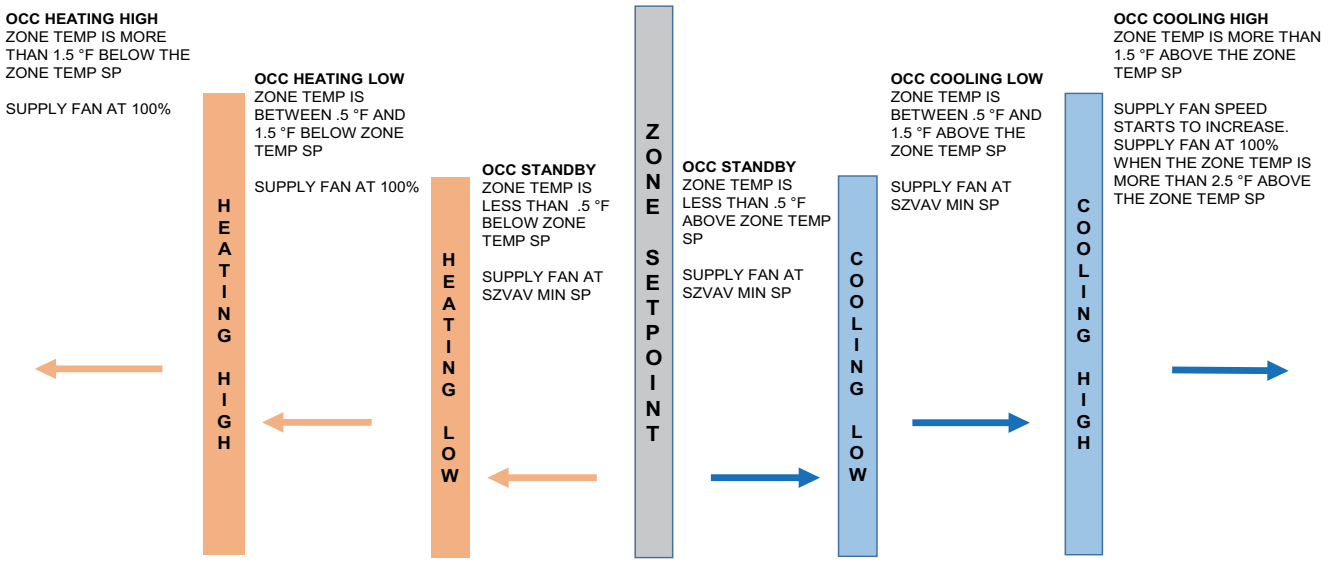
(Hardwired or Communicated)

The unit compares the analog “WIRED ZONE TEMP” or “COMM ZONE TEMP” input to the “OCC ZONE COOLING,” “OCC ZONE HEATING,” ”UNOCC ZONE COOLING,” or “UNOCC ZONE HEATING” setpoints to determine the sub-mode of operation. The following parameters must be programmed through the User Interface:

- “OCC ZONE COOLING SETPOINT” – SETPOINTS key / COOLING subsection
- “UNOCC ZONE COOLING SETPOINT” – SETPOINTS key / COOLING subsection
- “OCC ZONE HEATING SETPOINT” – SETPOINTS key / HEATING subsection
- “UNOCC ZONE HEATING SETPOINT” – SETPOINTS key / HEATING subsection

Figure 30 on page 62 shows what the UNIT MODE would be based on the difference between the zone temperature and the zone temperature setpoints.

The only difference between Hardwired and Communicated is the method the Unit Controller uses to determine the “ZONE TEMP”. In the Hardwired mode the input is an analog input to the control. In the Communicated mode the input is a serial input from a BAS control system.



NOTES:
1- WHENEVER THE UNIT ENTERS AN ACTIVE COOLING OR HEATING MODE, THE UNIT CONTROLLER WILL UTILIZE AS MANY OR AS FEW STAGES OF COOLING or HEATING THAT IT NEEDS TO ACHIEVE AND MAINTAIN THE ACTIVE SUPPLY AIR TEMP SP.

2- UNOCCUPIED SEQUENCE WILL BE THE SAME AS ABOVE EXCEPT THE ZONE TEMP SPs USED WILL BE THE UNOCC SP’s VALUES.

3- UNIT MODES WILL STAGE DOWN WHEN THE ZONE TEMP IS .5 °F UNDER SPs FOR COOLING AND .5 °F OVER SPs FOR HEATING.

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FIGURE 30 - OPERATIONAL MODE : SINGLE ZONE VAV

Supply Air Temp Active Setpoint Determination

When the "CONTROL METHOD" is set to Zone Temperature Control (either hardwired or communicated), the "SUPPLY AIR TEMP ACTIVE SP" is determined by the difference between the "ZONE TEMP" and the appropriate zone setpoint. *Table 22 on page 63* shows the parameters that are used to determine the "SUPPLY AIR TEMP ACTIVE SP":

Where:

- ΔT_{OC} = "ZONE TEMP" – "OCC ZONE COOLING SETPOINT"
- ΔT_{OH} = "ZONE TEMP" – "OCC ZONE HEATING SETPOINT"
- ΔT_{UC} = "ZONE TEMP" – "UNOCC ZONE COOLING SETPOINT"
- ΔT_{UH} = "ZONE TEMP" – "UNOCC ZONE HEATING SETPOINT"

TABLE 22 - ACTIVE SAT SETPOINT DETERMINATION, ZONE TEMPERATURE

ΔT_{OC} OCC COOL	ΔT_{OH} OCC HEAT	ΔT_{UC} UNOCC COOL	ΔT_{UH} UNOCC HEAT	OCCUPANCY MODE	UNIT MODE	ACTIVE SP
> 0.5 °F	---	---	---	Occupied	Occupied Cooling Low	1st Stage Cooling Setpoint
> 1.5 °F	---	---	---	Occupied	Occupied Cooling High	2nd Stage Cooling Setpoint
---	< -0.5 °F	---	---	Occupied	Occupied Heating Low	1st Stage Heating Setpoint
---	< -1.5 °F	---	---	Occupied	Occupied Heating High	2nd Stage Heating Setpoint
---	---	---	---	Occupied	Occupied Standby (See *Comfort Ventilation on page 92*)	None
---	---	> 0.5 °F	---	Unoccupied	Unoccupied Cooling Low	1st Stage Cooling Setpoint
---	---	> 1.5 °F	---	Unoccupied	Unoccupied Cooling High	2nd Stage Cooling Setpoint
---	---	---	< -0.5 °F	Unoccupied	Unoccupied Heating Low	1st Stage Heating Setpoint
---	---	---	< -1.5 °F	Unoccupied	Unoccupied Heating High	2nd Stage Heating Setpoint
---	---	---	---	Unoccupied	Unoccupied Standby	None

Supply Fan Speed Determination

When the *"Unit Type"* is set to Single Zone VAV, the *"SUPPLY FAN VFD SPEED"* is determined by the difference between the *"ZONE TEMP"* and the appropriate zone setpoint. *Table 23 on page 63* shows the parameters that are used to determine the *"SUPPLY FAN VFD SPEED."*

When the *"Unit Mode"* is Cooling High, a control loop shall modulate the *"SUPPLY FAN VFD SPEED."* The Feedback Signal shall be the *"ZONE TEMP."* The Proportional Band shall be between the COOLING SETPOINT + 1.5 °F to COOLING SETPOINT + 2.5 °F. The action of the control loop shall be direct acting (i.e., an increase in Zone Temperature will increase the Fan Speed.)

An adjustable *"SINGLEZONE VAV MIN VFD SPEED"* setpoint protects the unit from issues that may result from reduced supply fan airflow.

Range: 33.0% to 66.0%
Default: 50.0%

TABLE 23 - SUPPLY FAN VFD SPEED DETERMINATION

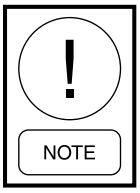
ΔT_{OC} OCC COOL	ΔT_{OH} OCC HEAT	ΔT_{UC} UNOCC COOL	ΔT_{UH} UNOCC HEAT	OCCUPANCY MODE	UNIT MODE	SUPPLY FAN VFD SPEED
> 0.5 °F	---	---	---	Occupied	Occupied Cooling Low	SZVAV Min Speed
> 1.5 °F	---	---	---	Occupied	Occupied Cooling High	SZVAV Min Speed
> 2.5 °F	---	---	---	Occupied	Occupied Cooling High	100%
---	< -0.5 °F	---	---	Occupied	Occupied Heating Low	100%
---	< -1.5 °F	---	---	Occupied	Occupied Heating High	100%
---	---	---	---	Occupied	Occupied Standby (See *Comfort Ventilation on page 92*)	SZVAV Min Speed
---	---	> 0.5 °F	---	Unoccupied	Unoccupied Cooling Low	SZVAV Min Speed
---	---	> 1.5 °F	---	Unoccupied	Unoccupied Cooling High	SZVAV Min Speed

TABLE 23 - SUPPLY FAN VFD SPEED DETERMINATION (CONT'D)

ΔT_{OC} OCC COOL	ΔT_{OH} OCC HEAT	ΔT_{UC} UNOCC COOL	ΔT_{UH} UNOCC HEAT	OCCUPANCY MODE	UNIT MODE	SUPPLY FAN VFD SPEED
---	---	> 2.5 °F		Unoccupied	Unoccupied Cooling High	100%
---	---	---	< -0.5 °F	Unoccupied	Unoccupied Heating Low	100%
---	---	---	< -1.5 °F	Unoccupied	Unoccupied Heating High	100%
---	---	---	---	Unoccupied	Unoccupied Standby	Off

SUPPLY FAN OPERATION

The supply fan is an integral part of the Series 100 rooftop unit. The supply fan **MUST** be on and the supply fan proving circuit **MUST** be closed before any other unit operation is allowed.



If the unit has an exhaust fan, the exhaust fan can operate to lower building pressure without the supply fan on

Supply Fan Proving Circuit:

- Same circuit for all unit types
- An air pressure switch closes when the supply fan starts and builds up enough pressure
- Once the supply fan output switches to ON, the air proving switch must be closed within 45 seconds
- If supply fan proving circuit is not made, unit will LOCKOUT
- If the Supply Fan Proving Circuit opens at any time during normal operation, the unit will LOCKOUT

Constant Volume:

- No VFD
- Supply Fan will start with 24 VAC input to “G” terminal on CTB1

  OR
- Supply Fan will start with BAS command to FAN (G) point

  OR
- Supply Fan will cycle ON with a 24 VAC input or BAS command to Y1, Y2, W1, or W2. When the 24 VAC input or BAS command is removed, supply fan will cycle OFF

  OR
- Supply Fan will cycle ON when a zone temp input (hardwired or BAS) energizes heating or cooling. Supply Fan will cycle OFF when zone temp input de-energizes heating or cooling

  OR
- Supply Fan will run continuously in the OCC mode when CONTINUOUS VENT is enabled

  OR
- Supply Fan will start when the unit is in Morning Warm-Up

Variable Air Volume:

- Unit will have a factory mounted VFD
- Supply fan will start when in OCC mode
- Supply Fan will start when the unit is in either Unocc Cooling or Unocc Heating
- Supply Fan VFD will control the supply fan to maintain the Active Duct Static Pressure SP
- Duct Static Transducer will have 1 of 3 ranges
  a. 0-1.25” WC (Typically used for Flexsys operation)
  b. 0-2.50” WC
  c. 0-5.0” WC (Most Common)
- Must set Duct Static Reset Low SP and Duct Static Reset High SP: Supply System-Setpoints Menu
- Duct Static Overpressure SP-Factory Default is 3.00” WC for 0-5.0” WC transducer

Supply Fan Control

- Once the supply fan is running, the speed will be controlled to the Active Duct Static Press SP. The duct static transducer will monitor the duct static pressure and send a 0-5 VDC signal to the unit controller. The unit controller then compares the current duct static press to the active duct static SP. The unit controller will send a 0-10 VDC to the supply fan VFD to control the speed accordingly.

Duct Static Pressure Reset

- The S100 unit can reset the Active Duct Static Press SP by utilizing the Duct Static Reset schedule
- If one constant static pressure is required, set both Duct Static Reset Low and High SP's at same value
- A 0-5 VDC signal to CTB1 or a 0-100 (%) command from BAS will reset the Active Duct Static SP
- 0 VDC or a 0 (%) BAS command will utilize the Duct Static Reset High SP
- 5 VDC or a 100 (%) BAS command will utilize the Duct Static Reset Low SP
- A VDC in between 0-5 VDC or a BAS command between 0-100 (%) will reset Active Duct Static SP somewhere between the Duct Static Reset Low and High SP's
- When using the BAS commands, the percent of reset will be from the High SP (0%) down to the Low SP (100%). Example: High SP of 2.00" WC and Low SP of 1.00" WC. A 25% command will reset the active duct static SP to 1.75" WC. A command of 75% would reset the active duct static SP to 1.25" WC
- "DUCT PRES RST BAS" must be enabled in Service Menu to utilize reset from BAS

Supply Fan Speed Determination

When the *"Unit Type"* is set to Single Zone VAV, the *"SUPPLY FAN VFD SPEED"* is determined by the difference between the *"ZONE TEMP"* and the appropriate zone setpoint. *Table 24 on page 65* shows the parameters that are used to determine the *"SUPPLY FAN VFD SPEED."*

When the *"Unit Mode"* is Cooling High, a control loop shall modulate the *"SUPPLY FAN VFD SPEED."* The Feedback Signal shall be the *"ZONE TEMP."* The Proportional Band shall be between the COOLING SETPOINT + 1.5 °F to COOLING SETPOINT + 2.5 °F. The action of the control loop shall be direct acting (i.e., an increase in Zone Temperature will increase the Fan Speed.)

An adjustable *"SINGLEZONE VAV MIN VFD SPEED"* setpoint protects the unit from issues that may result from reduced supply fan airflow.

Range: 33.0% to 66.0%
Default: 50.0%

TABLE 24 - SUPPLY FAN VFD SPEED DETERMINATION

ΔT_{OC} OCC COOL	ΔT_{OH} OCC HEAT	ΔT_{UC} UNOCC COOL	ΔT_{UH} UNOCC HEAT	OCCUPANCY MODE	UNIT MODE	SUPPLY FAN VFD SPEED
> 0.5 °F	---	---	---	Occupied	Occupied Cooling Low	SZVAV Min Speed
> 1.5 °F	---	---	---	Occupied	Occupied Cooling High	SZVAV Min Speed
> 2.5 °F	---	---	---	Occupied	Occupied Cooling High	100%
---	< -0.5 °F	---	---	Occupied	Occupied Heating Low	100%
---	< -1.5 °F	---	---	Occupied	Occupied Heating High	100%
---	---	---	---	Occupied	Occupied Standby (See *Comfort Ventilation on page 92*)	SZVAV Min Speed
---	---	> 0.5 °F	---	Unoccupied	Unoccupied Cooling Low	SZVAV Min Speed
---	---	> 1.5 °F	---	Unoccupied	Unoccupied Cooling High	SZVAV Min Speed
---	---	> 2.5 °F		Unoccupied	Unoccupied Cooling High	100%
---	---	---	< -0.5 °F	Unoccupied	Unoccupied Heating Low	100%
---	---	---	< -1.5 °F	Unoccupied	Unoccupied Heating High	100%
---	---	---	---	Unoccupied	Unoccupied Standby	Off

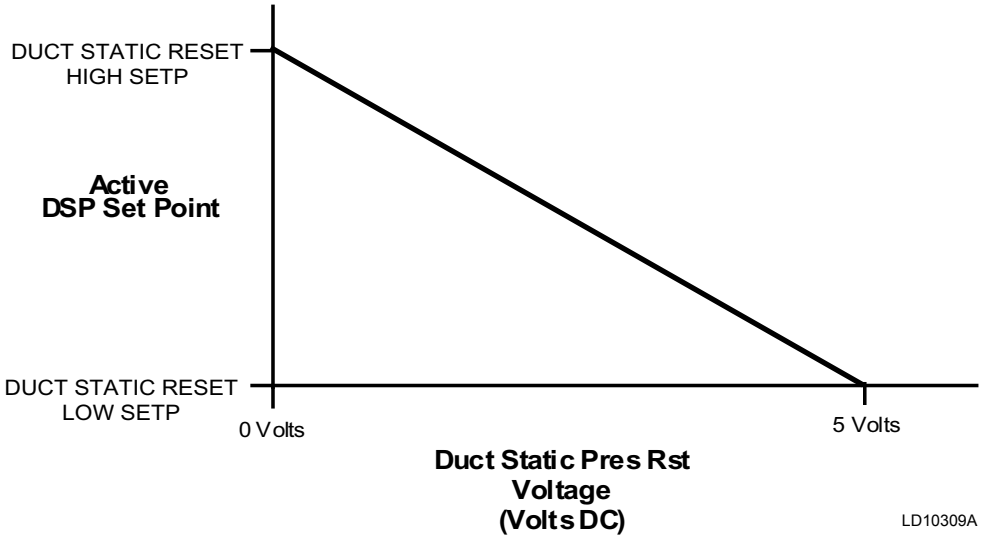


FIGURE 31 - ACTIVE DSP SETPOINT VS. DUCT STATIC PRES RST VOLTAGE

CAUTION

The bypass VFD is a standard Variable Frequency Drive packaged with an additional set of contactors. When bypass mode is activated, contactors route power around the VFD, connecting the indoor fan motor directly to the supply voltage. At this point, the motor will go to full RPM regardless of the duct pressure signal, because the VFD is out of the loop, and there is a potential for over pressuring the ducts.

CAUTION

The air balancer must set maximum duct static / CFM to stay within a static pressure that the ductwork of that installation can tolerate when the motor is at full RPM, considering that the VAV boxes, if they are part of the system, may not be full open.

CAUTION

If the duct system includes VAV boxes, they must be driven open in Bypass mode. Failure to do so could result in damage to the ductwork and the building structure.

ACTIVE SUPPLY AIR TEMPERATURE SETPOINTS

Depending on the unit type that is selected, the Series 100 units will use different setpoints for the supply air temperature.

Once a Series 100 unit enters an active cooling or heating mode, it will utilize as many or as little stages of cooling or heating as needed to achieve and maintain the Active SAT SP. Since the S100 unit utilizes DX (direct expansion) cooling, there is logic and algorithms built into the program to prevent short-cycling of compressors and/or stages of heat. There will be some under and over shooting of the Active SAT SP. This under/over shooting should normally stay within +/- 3°F. There could be some infrequent times where this under/over shoot approaches +/- 5 °F.

Constant Volume: Staged (Thermostat or a BAS command)

Occupied:

1st Stage Cooling SP:

- 24 VAC input to Y1
- BAS command to Y1

2nd Stage Cooling SP

- 24 VAC input to Y2
- BAS command to Y2

1st Stage Heating SP:

- 24 VAC input to W1
- BAS command to W1

2nd Stage Heating SP

- 24 VAC input to W2
- BAS command to W2

Unoccupied: Staged (Thermostat or a BAS command)

1st Stage Cooling SP:

- 24 VAC input to Y1
- BAS command to Y1

2nd Stage Cooling SP

- 24 VAC input to Y2
- BAS command to Y2

1st Stage Heating SP:

- 24 VAC input to W1
- BAS command to W1

2nd Stage Heating SP

- 24 VAC input to W2
- BAS command to W2

TABLE 25 - ACTIVE SAT SETPOINT DETERMINATION, STAGED INPUT

Y1 LOW COOL	Y2 HIGH COOL	W1 LOW HEAT	W2 HIGH HEAT	OCC. MODE	UNIT MODE	ACTIVE SP
On	Off	Off	Off	Occupied	Occupied Cooling Low	1st stage cooling Setpoint
On/Off	On	Off	Off	Occupied	Occupied Cooling High	2nd stage cooling Setpoint
Off	Off	On	Off	Occupied	Occupied Heating Low	1st stage heating Setpoint
Off	Off	On/Off	On	Occupied	Occupied Heating High	2nd stage heating Setpoint
Off	Off	Off	Off	Occupied	Occupied Standby (See *Comfort Ventilation on page 92*)	None
On	Off	Off	Off	Unoccupied	Unoccupied Cooling Low	1st stage cooling Setpoint
On/Off	On	Off	Off	Unoccupied	Unoccupied Cooling High	2nd stage cooling Setpoint
Off	Off	On	Off	Unoccupied	Unoccupied Heating Low	1st stage heating Setpoint
Off	Off	On/Off	On	Unoccupied	Unoccupied Heating High	2nd stage heating Setpoint
Off	Off	Off	Off	Unoccupied	Unoccupied Standby	None

Constant Volume: Zone Temperature Sensor (Hardwired or Communicated from a BAS)

Occupied:

1st Stage Cooling SP:

- Zone Temp is .5 °F higher than the Occ Zone Cooling SP

2nd Stage Cooling SP

- Zone Temp is 1.5 °F higher than the Occ Zone Cooling SP

1st Stage Heating SP:

- Zone Temp is .5 °F lower than the Occ Zone Heating SP

2nd Stage Heating SP

- Zone Temp is 1.5 °F lower than the Occ Zone Heating SP

Unoccupied:

1st Stage Cooling SP:

- Zone Temp is .5 °F higher than the Unocc Zone Cooling SP

2nd Stage Cooling SP

- Zone Temp is 1.5 °F higher than the Unocc Zone Cooling SP

1st Stage Heating SP:

- Zone Temp is .5 °F lower than the Unocc Zone Heating SP

2nd Stage Heating SP

- Zone Temp is 1.5 °F lower than the Unocc Zone Heating SP

CV operation has no reset schedule for the 1st and 2nd stage cooling and heating SP's built into the S100 unit's program, but all 4 SP's are available thru a BAS and are R/W.

TABLE 26 - ACTIVE SAT SETPOINT DETERMINATION, ZONE TEMPERATURE

ΔT_{OC} OCC COOL	ΔT_{OH} OCC HEAT	ΔT_{UC} UNOCC COOL	ΔT_{UH} UNOCC HEAT	OCCUPANCY MODE	UNIT MODE	ACTIVE SP
More Than 0.5 °F	---	---	---	Occupied	Occupied Cooling Low	1st Stage Cooling Setpoint
More Than 1.5 °F	---	---	---	Occupied	Occupied Cooling High	2nd Stage Cooling Setpoint
---	Less Than -0.5 °F	---	---	Occupied	Occupied Heating Low	1st Stage Heating Setpoint
---	Less Than -1.5 °F	---	---	Occupied	Occupied Heating High	2nd Stage Heating Setpoint
---	---	---	---	Occupied	Occupied Standby (See *Comfort Ventilation on page 92*)	None
---	---	More Than 0.5 °F	---	Unoccupied	Unoccupied Cooling Low	1st Stage Cooling Setpoint
---	---	More Than 1.5 °F	---	Unoccupied	Unoccupied Cooling High	2nd Stage Cooling Setpoint
---	---	---	Less Than -0.5 °F	Unoccupied	Unoccupied Heating Low	1st Stage Heating Setpoint
---	---	---	Less Than -1.5 °F	Unoccupied	Unoccupied Heating High	2nd Stage Heating Setpoint
---	---	---	---	Unoccupied	Unoccupied Standby	None

Variable Air Volume

With a Series 100 unit set-up for VAV operation, there is the ability to reset the Supply Air Temp SP by 1 of 4 different methods. This is for the Cooling SAT SP's only.

1. Hardwired
2. Outside Air
3. Return Air
4. Supply Fan VFD Speed

The Active Supply Air Temp SP will be maintained at or between the SAT High and SAT Low SP's

Hardwired SAT Reset:

- A 0-5 VDC signal wired into CTB1
- A 0-5 command from a BAS system
- 0 VDC or a 0 command from the BAS, the unit will utilize the SAT High SP
- 5 VDC or a 5 command from the BAS, the unit will utilize the SAT Low SP
- A VDC or command from the BAS in between 0-5, the unit will maintain a SP somewhere between the SAT High and the SAT Low SP's
- SAT Reset Method set to HARDWIRED
- SAT RST BAS must be enabled in the service key menus in order to communicate the 0-5 command

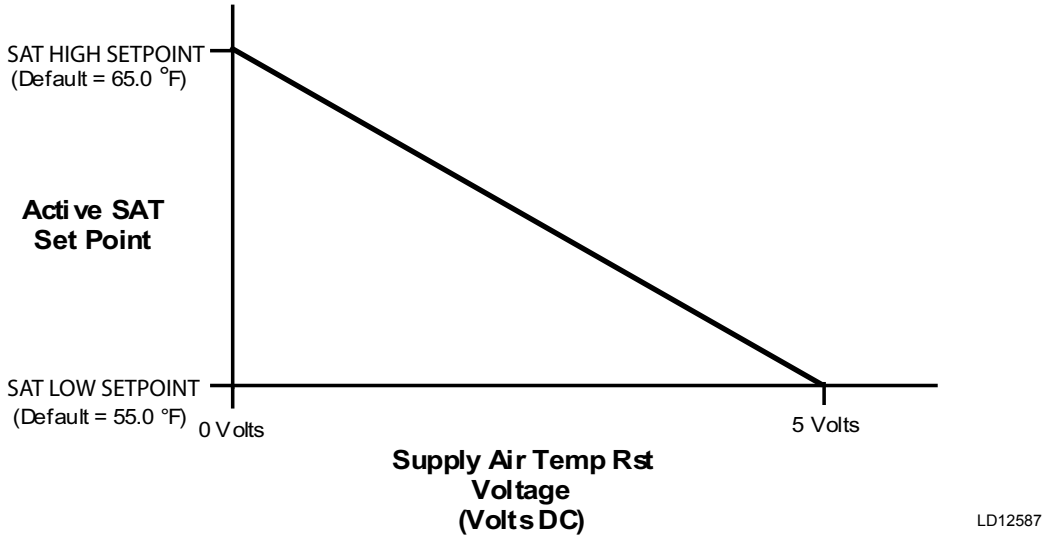


FIGURE 32 - ACTIVE SAT SETPOINT VS. SUPPLY AIR TEMP RST VOLTAGE

Outside Air Reset:

- The S100 unit will reset the active SAT Cooling SP based on the Outside Air temp
- Must set the OAT SP for High SAT and OAT SP for Low SAT. Cooling-Setpoints Menu
- SAT Reset Method set to Outside Air
- OAT equal to or less than the OAT for High SAT, the unit will utilize the High SAT
- OAT equal to or greater than the OAT for Low SAT, the unit will utilize the Low SAT

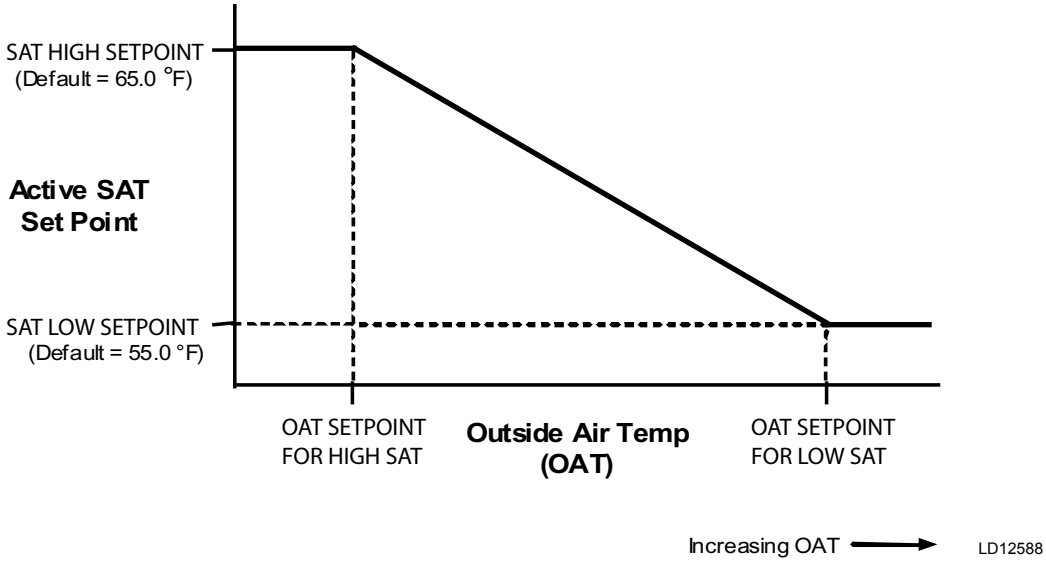


FIGURE 33 - ACTIVE SAT SETPOINT VS. OUTSIDE AIR TEMP

Return Air SAT Reset:

- The S100 unit will reset the active SAT Cooling SP based on the Return Air Temp
- Must set the RAT SP for High SAT and the RAT SP for Low SAT. Cooling-Setpoints Menu
- SAT Reset Method set to Return Air
- RAT equal to or less than the RAT SP for High SAT, the unit will utilize the High SAT
- RAT equal to or greater than the RAT SP for Low SAT, the unit will utilize the Low SAT

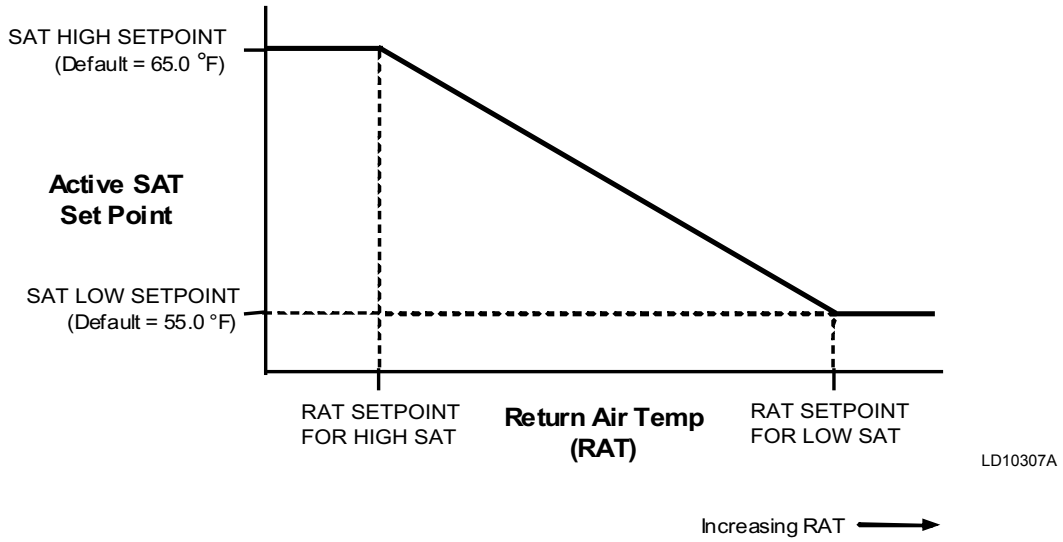


FIGURE 34 - ACTIVE SAT SETPOINT VS. RETURN AIR TEMP

Supply Fan VFD Speed Reset:

- The S100 unit will rest the active SAT Cooling SP based on the Supply Fan VFD Speed
- Must set the Fan Speed SP for High SAT and Fan Speed SP for Low SAT. Cooling-Setpoints Menu
- SAT Reset Method set to Supply Fan Speed
- VFD speed equal to or less than the Fan Speed for High SAT, the unit will utilize the High SAT
- VFD Speed equal to or greater than the Fan Speed for Low SAT, the unit will utilize the Low SAT

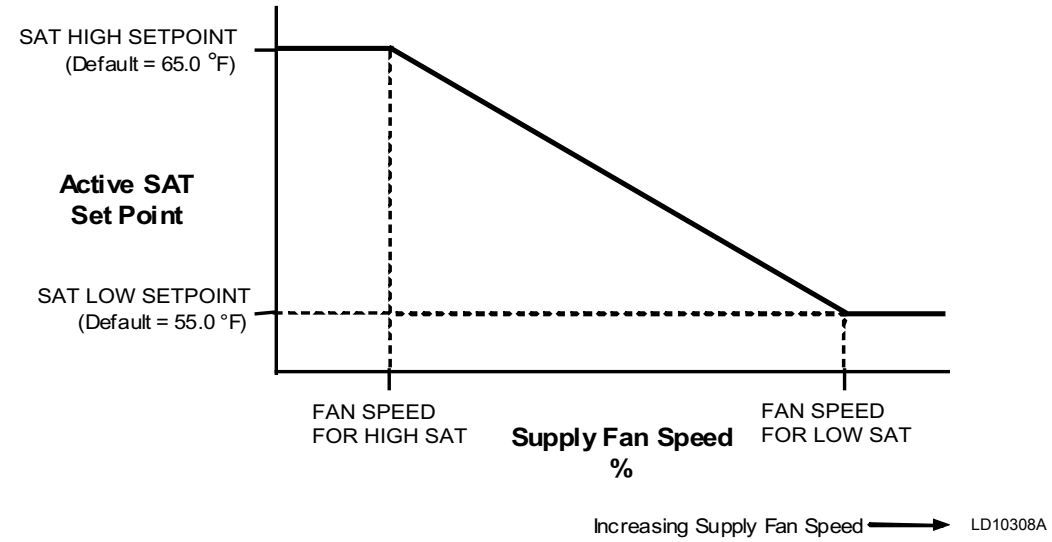


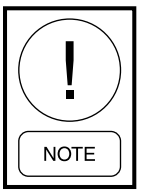
FIGURE 35 - ACTIVE SAT SETPOINT VS. SUPPLY FAN SPEED

These different SP's can be set using the S100 unit's control panel, or thru a BAS. The SAT Reset Method MUST be set using the unit's control panel. The SAT High SP and SAT Low SP are R/W points and a separate reset method could be utilized using programming in the BAS.

Heating SAT SP:

- The Heating SAT SP has no reset schedules available
- Must set the Heating SAT SP. Heating-Setpoints Menu
- Heating SAT SP is a R/W point thru a BAS

COMPRESSOR CONTROL



Compressor operation per system will have a fixed Mechanical Cooling Lockout SP of 50 °F with NO low ambient kit installed, and an adjustable Mechanical Cooling Lockout SP of 0-50 °F with a low ambient kit installed.

Whenever a change in the unit cooling status is made:

- Compressor turned OFF
- Compressor turned ON

A 3.5 minute Interstage Delay Timer is initiated. During these 3.5 minutes no compressor can be started or stopped normally. A compressor will still be stopped immediately if a safety fault occurs.

Constant Volume, SZVAV, and Variable Air Volume:

- S100 unit enters an Active cooling mode
- Unit Controller sets the “Cooling Control Offset” to 2 °F
- Unit Controller compares the SAT to the Active SAT SP plus or minus the “Cooling Control Offset”
- If SAT is greater than the Active SAT SP plus the “Cooling Control Offset”, Unit Controller will:
  a. Start a compressor

     OR

  b. Bring on an additional stage of cooling based on the “Next Stage To Enable”
- If SAT is less than the Active SAT SP minus the “Cooling Control Offset”, Unit Controller will:
  a. Stop a compressor based on the “Next Stage To Disable”

See *Table 65 - 67 starting on page 195.*

Cooling Control Offset:

- An internal calculation performed by the Unit Controller
- Looks at the difference between the SAT when a compressor is started, and the SAT again 3.5 min later.
- Helps to prevent over/undershooting of the SAT or MX SAT SP’s
- Helps to prevent short-cycling of compressors

COMPRESSOR OPERATION WITH ECONOMIZER:

- When the OA conditions are suitable for economizer operation, the unit controller will set the “Cooling Control Offset” to 4.5 °F.
- The “Cooling Control Offset” will remain at 4.5°F as long as the OA conditions are suitable and the economizer remains active

Economizer becomes Active, No compressors are operating:

- Compressors will be started based on the “Next Stage to Enable” when ALL of the following are true
  a. Econ Control Output greater than 95% for 30 sec
  b. SAT greater than or equal to Active SAT SP plus the “Cooling Control Offset” (4.5 °F)
  c. 3.5 min Inter-Staged Delay Timer has expired
- Compressors will be stopped based on the “Next Stage to Disable” when ALL the following are true
  a. Econ Control Output less than 5% for 30 sec
  b. SAT less than or equal to the Active SAT SP minus the “Cooling Control Offset” (4.5 °F)
  c. 3.5 min Inter-Staged Delay Timer has expired

Economizer becomes Active, 1 or more compressors operating:

- A compressor will be staged OFF, and then the sequence above will be utilized

COMPRESSOR STAGING:

The unit has three completely separate refrigeration circuits. There are two scroll compressors per circuit, for a total of six scroll compressors. This revision of the Series 100 unit will utilize a new program for the staging up and down of the compressors. Each unit can have up to 14 stages of cooling operation. This is accomplished by using compressors of varying sizes and cycling them on/off dependent on the cooling load.

See *Tables 65 through 67 starting on page 195* for the compressor staging sequences.

Fast Compressor Start:

The Series 100 unit can utilize a Fast Comp Start to shorten the length of time it takes the unit to stage on compressors. The Fast Comp Start allows the unit controller to go directly to a certain stage of cooling instead of staging on one at a time and then waiting for the 3.5 min inter-staged time delay to expire between starting compressors, which could take up to 50 mins to have all compressors operating.

Compressor Staging Logic:

The compressor staging logic utilizes many different factors to determine the available compressors.

- Unit Size
- Compressor System Status (Normal or Faulted)

Current Stage:

- Unit enters an active Cooling Mode
- Unit Controller will determine the appropriate compressors to start based on the following:
  a. Internal programming logic

     AND

  b. Status of "Fast Comp Start"
     1. User Enabled
     2. User Disabled

Economizer Available:

- Unit enters an active cooling mode, and before any compressor is started, the "Current Stage" shall be set to 0 (zero)
- If "Econ Available" is YES, and the conditions determine that compressors are needed, Unit Controller will start the compressors that are needed for "Stage 1", and set the "Current Stage" to 1
- Staging Up/Down from this point will be in a sequential manner (Step 1,2,3,2,1 etc.)
- "Current Stage" will be recorded each time the controller stages Up/Down

Economizer Not Available AND "Fast Comp Start" is "User Disabled"

- Unit enters and active cooling mode
- Unit Controller will set the next stage to 1, and the compressors will be started/stopped sequentially
- 14 stages

Econ Not Available AND "Fast Comp Start" is "User Enabled"

- Unit enters an active cooling mode
- Unit Controller will determine the cooling stage needed for the initial cooling demand
- Unit Controller will bring on the appropriate compressors needed for the initial cooling demand
- There will be a 10 sec delay between compressors starting for the initial cooling demand
- Once all the appropriate compressors have been started for the initial cooling demand the Unit Controller will:
  a. Wait 3.5 min
  b. Determine if more or less cooling is needed
  c. More Cooling: Will start/stop the appropriate compressors for the next higher stage
  d. Less Cooling: Will start/stop the appropriate compressors for the next lower stage

TABLE 27 - 120-TON CAPACITY

Comp Sys 1 Status	Comp Sys 2 Status	Comp Sys 3 Status	% Capcity	Steps Available
OK	OK	OK	100	14
Faulted	OK	OK	72	6
OK	Faulted	OK	72	6
OK	OK	Faulted	54	4
Faulted	Faulted	OK	45	2
Faulted	OK	Faulted	27	2
OK	Faulted	Faulted	27	2

TABLE 28 - 130-TON CAPACITY

Comp Sys 1 Status	Comp Sys 2 Status	Comp Sys 3 Status	% Capcity	Steps Available
OK	OK	OK	100	14
Faulted	OK	OK	76	6
OK	Faulted	OK	64	6
OK	OK	Faulted	60	4
Faulted	Faulted	OK	40	2
Faulted	OK	Faulted	36	2
OK	Faulted	Faulted	24	2

TABLE 29 - 150-TON CAPACITY

Comp Sys 1 Status	Comp Sys 2 Status	Comp Sys 3 Status	% Capcity	Steps Available
OK	OK	OK	100	14
Faulted	OK	OK	77	6
OK	Faulted	OK	70	6
OK	OK	Faulted	52	4
Faulted	Faulted	OK	47	2
Faulted	OK	Faulted	29	2
OK	Faulted	Faulted	22	2

For Complete Compressor Staging Tables please refer to *Tables 65 through 67 starting on page 195.*

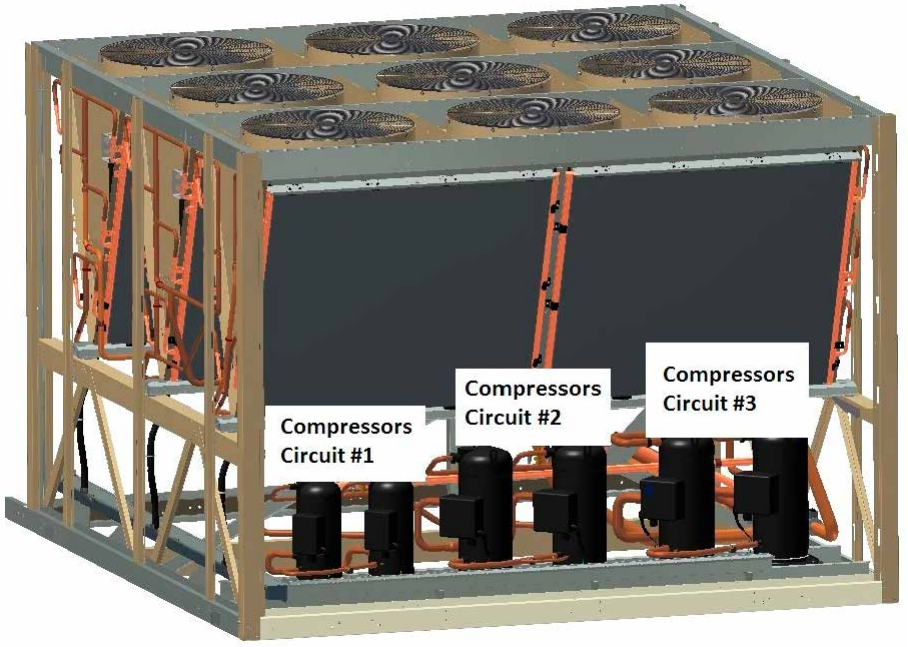


FIGURE 36 - REFRIGERANT CIRCUIT IDENTIFICATION LD17808

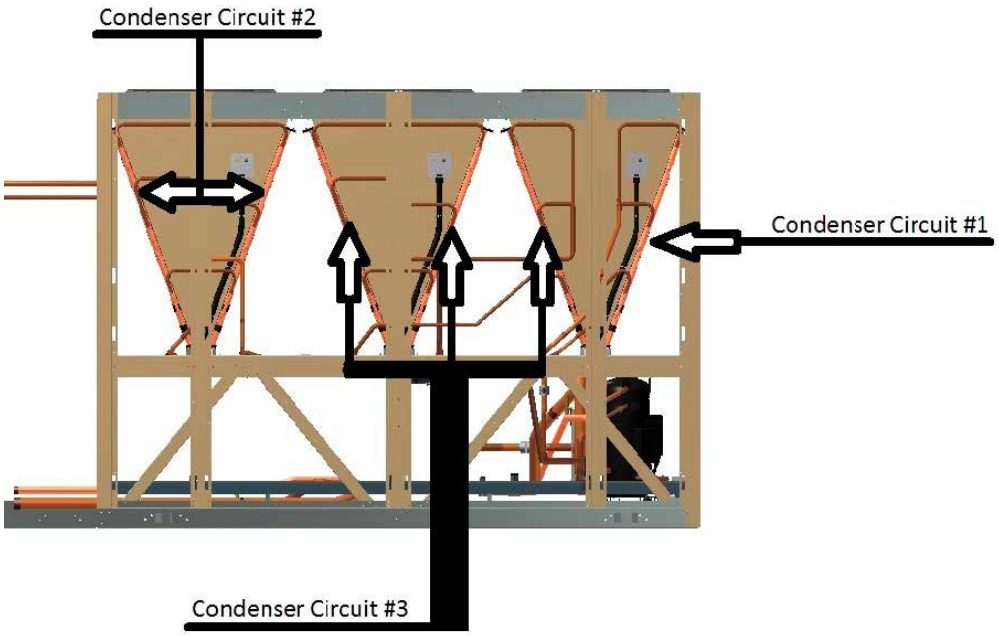


FIGURE 37 - CONDENSER COIL IDENTIFICATION LD17809

CHANGING STAGING SEQUENCES:

- During an active cooling mode, certain conditions could cause the unit controller to change the current staging method
    a. One or more Comp Systems develop a Fault condition
    b. Comp System Fault condition is cleared
    c. Economizer goes Active/Inactive
    d. When this occurs, the Unit Controller will determine the proper compressor stage for the conditions
- When changing staging sequences the Unit Controller will:
    a. Temporarily stop the "Cooling Control Offset" calculation
    b. Hold the current "Cooling Control Offset" value
    c. Wait until the staging sequence has completed
    d. Wait until 3.5 min has expired
    e. Resume normal operation based on the new staging sequence

COMPRESSOR STATUS AND RUN DATA:

Compressor Run Data:

- The Unit Controller will monitor the compressor starts and compressor run hours.
- This data will be stored in the Operating Hours/ Start Counter menu
- Operating hours/ start counts cannot be reset

Compressor Status:

- Each compressor circuit will have a high and low pressure switch
- Each compressor will have a manual reset O/L relay, as well as a compressor protection module
- The Unit Controller will monitor several different parameters to determine a compressor circuit status
    a. High DP Unload
    b. Low Amb Inhibit
    c. Low Suct Temp Unl
    d. Compr # Safety Trip
    e. Compr # Safety Fault
    f. Compr # Safety Lockout
- If ALL the above parameters are False, a compressor will be placed in a "Ready to Run State"
- Once a compressor is started, after the 3.5 min "Minimum On Timer" has expired, the Unit Controller will change a compressor status to "Ready to Stop State"

Compressor Safety Circuit:

- Each compressor circuit will monitor a "Compressor Safety Circuit"
- The "Compressor Safety Circuit" will include the following
    a. Compressor Solid State Motor Protector
    b. Compressor Overload (Circuit Breaker or Manual Motor Starter)
    c. High Pressure switch
- Each compressor circuit also has a Low Pressure Switch and Suction Line Temp Sensor. They are **NOT** a component of the "Compressor Safety Circuit", but are still monitored and are part of determining a compressor's status.

Compressor Safety Circuit Safety Trips And Safety Lockouts:

- The components in the "Comp Safety Circuit" are wired in series
- When all safeties are closed, there will be a 24 VAC input to the I/O board
- If any of the components open while a compressor is operating, both compressors in that circuit will be stopped (The 24 VAC input will be lost)
- The Unit Controller then monitors the time it takes for the open safety to reset and close, (24 VAC input will be re-established)
- The time to reset (re-establish 24 VAC input) will be recorded in the History Buffer and identified as the "Comp Status # Clear Time"
    a. Comp Motor Protector: Typically 30 min to clear
    b. High Press Switch: Typically less than 1 min

c. Compressor Overload: Requires a manual reset

- If the reset time is greater than 60 min, "Comp Status # Clear Time" will be changed to "Comp System # Time Out"

Compressor System Safety Trip:

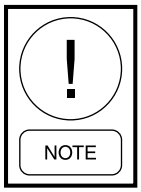
- Safety circuit input is ignored when both compressors of any system are OFF
- If either or both compressors are ON, and the safety circuit opens, the Unit Controller will turn OFF the active compressors for that circuit
- Compressor system will be made Active again when the safety circuit is closed.
- If Comp Safety Circuit opens the following will occur:
  a. A "Comp Sys # Status-Safety Trip" will be stored in the History Buffer
  b. The first safety trip will display "Comp # Safety Trip 1"
  c. A second trip within 120 minutes, will display "Comp # Safety Trip 2"
  d. A third trip within 120 min will cause the compressor system to LOCKOUT. History Buffer will display "Comp Sys # Safety Lockout"
  e. A manual reset will be required
  f. If 120 min expires before a second or third safety circuit trip, the safety circuit timer will be reset.

Low Pressure Cutout:

- Operation of the Low Pressure Cutout will be the same as the Comp Safety Circuit except for:
  a. The Low Press Switch will be ignored during the first 45 sec once a compressor system starts
- The Low Press Switch will be ignored when a comp system is Inactive
- Safety Trips and Safety Lockouts will follow the same logic as above
- History Buffer displays
  a. Comp # LPCO Trip 1 or 2
  b. Comp Sys # Status Safety Lockout

Resetting A Compressor Lockout

- Leave the unit control switch ON
- Press the "Compressor Systems" key
- Use the left/right arrow to find the compressor system with the LOCKOUT
- Use the up/down arrows to find the screen that displays "COMP SYS STATE LOCKOUT"
- Press the "Options" key, then enter the password, 9725, then press the checkmark again
- Screen will now display the following:
- OPTIONS – COMP SYS # ✓TO EDIT
- COMP SYS # STATE LOCKOUT
- Press the ✓ and then use the left/right arrows to change from LOCKOUT to RUN
- The Comp System Lockout has now been cleared



If the state immediately reverts back to LOCKOUT, there is still an open safety in the compressor safety circuit or the low pressure cutout

Suction Temperature Monitoring:

- Whenever a compressor is operating, the Unit Controller will monitor the Suction Line Temp for the system
- "Suction Line Temp" falls below "Suction Low Limit", 37 °F for R-410A, for 10 sec the Unit Controller will:
  a. Display the following
    1. Status screen: "Comp Sys # Status-Low Suct Temp Unload
    2. Compressor Sys # screen-"Status Low Suct Temp Unl"
    3. History screen-Low Suct Temp # Trip
  b. If both compressors were operating, Unit Controller will turn OFF the compressor with the longest run time
  c. Unit Controller will start a 60 sec timer
  d. After 60 sec, the Unit Controller will monitor the "Suct Line Temp" for the operating compressor

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e. If the “Suct Line Temp” falls below the “Suct Low Limit” , 37 °F for R-410A, the other compressor will be turned OFF

- This fault will be cleared for each compressor when the “Suct Line Temp” is greater than the “Suct Low Limit”, 37 °F for R-410A, plus 10 °F for 10 min.

High Discharge Pressure Unloading:

This feature allows the Unit Controller to shut down compressors before the discharge pressure reaches the High Pressure Cut-Out SP, thus providing reduced cooling for units that may have dirty condenser coils, overcharged systems, defective condenser fan motors, or the Outside Ambient Temp is higher than design conditions.

Sequence of Operation:

- Unit MUST have discharge pressure transducers installed for this feature to operate
- “System Unloading Pressure” MUST be set in the Comp Systems-Setpoints menu
- Both compressors for a compressor system MUST be operating
- System discharge pressure greater than/equal to the “System Unloading Pressure SP” for 10 sec
- Unit Controller will turn OFF the compressor with the fewest number of starts.
- Unit Controller will record the OAT at time of shutting down compressor
- The “High DP Unload” will be cleared when:

a. The current OAT is less than the OAT at time of trip by at least 5 °F

AND

b. The discharge pressure is less than the “System Unloading Pressure”

Low Ambient Lockout:

- The Series 100 unit, 120-150 ton Rev G, can operate mechanical cooling with an OAT as low as 50°F without a Low Ambient Package
- Mechanical cooling will be locked out below 0 °F with a Low Ambient package

CONDENSER FAN CONTROL

No Low Ambient Package Installed

The 120-150 Ton Model G unit will have nine condenser fans installed, three per refrigerant circuit. The condenser fans will have a staging that is different than previous versions of the Series 100 unit. The three fans will be controlled in a staged manner.

Each refrigerant circuit will have suction and discharge pressure transducers standard, and cycling on/off of condenser fans is possible.

Condenser Fan Sequence

1. One fan ON: Middle condenser fan STARTS
2. Two fans ON: Middle fan stops, two outside fans START
3. Three fans ON: All three fans START

TABLE 30 - CONDENSER FAN STAGING: ONE COMPRESSOR ON PER SYSTEM

One Compressor ON:	System 1	System 2	System 3
One Fan ON	OAT less than 75 °F	OAT less than 75 °F	OAT less than 75 °F
Two Fans ON	OAT is between 75 and 85 °F	OAT is between 75 and 85 °F	OAT is between 75 and 85 °F
Three Fans ON	OAT is greater than 85 °F	OAT is greater than 85 °F	OAT is greater than 85 °F

TABLE 31 - CONDENSER FAN STAGING: BOTH COMPRESSORS ON PER SYSTEM

Two Compressors ON:	System 1	System 2	System 3
One Fan ON	OAT is less than 58 °F	OAT is less than 58 °F	OAT is less than 58 °F
Two Fans ON	OAT is between 58 and 75 °F	OAT is between 58 and 75 °F	OAT is between 58 and 75 °F
Three Fans ON	OAT is greater than 75 °F	OAT is greater than 75 °F	OAT is greater than 75 °F

Condenser Fan Operation

- Whenever the first compressor is started in any refrigerant circuit, the appropriate number of fans will be started as per *Table 30 on page 76*
- After a 1 min delay, the unit controller will start to monitor the discharge pressure of the operating circuit
- Unit controller will cycle fans ON/OFF according to the Cond Fan Stage Up SP and Cond Fan Stage Down SP

  Cond Fan Stage Up SP: 350 psig

  Cond Fan Stage Down SP: 265 psig
- During times when OAT is between 50 and 75 °F, one cond fan could be cycled ON/OFF based on the Stage Up and Stage Down SP's
- If the discharge pressure transducer readings become invalid, condenser fans will be cycled as per *Tables 30 and 31 on page 76*

NOTE

Mechanical Cooling Lockout will be fixed at 50 °F with no low ambient package

Low Ambient Package Installed

- Condenser fan operation will be same as above except the middle condenser fan will be controlled by a VFD
- The Cond Fan VFD will be wired in parallel with the discharge pressure transducer.

NOTE

Mechanical Cooling Lockout will be adjustable between 0 and 50 °F with low ambient package installed.

NOTE

Compressor operation per system will have a fixed Mechanical Cooling Lockout SP of 50 °F with NO low ambient kit installed, and an adjustable Mechanical Cooling Lockout SP of 0-50 °F with a low ambient kit installed.

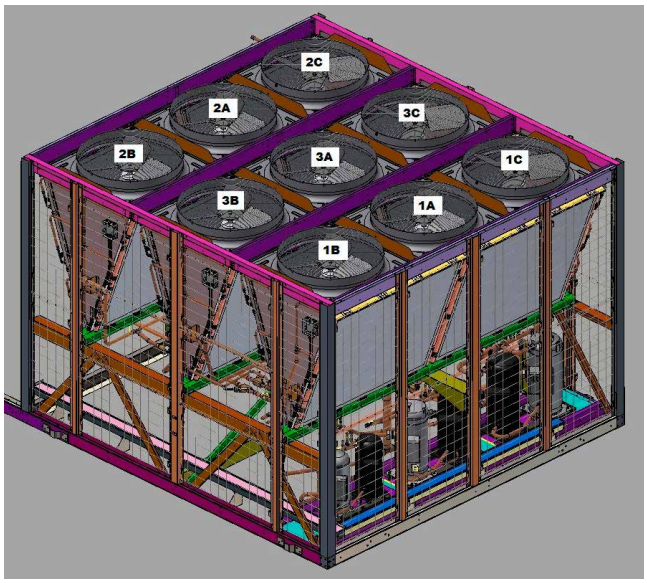

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FIGURE 38 - CONDENSER FANS

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ECONOMIZER

NOTE

For proper operation of the economizer, the "Damper Hardware" selection in the "Ventilation Menu" must be set to either "Standard" or "Tek-Air Full IAQ" . If ventilation is not required, please set Ventilation System to "User Disabled" in the "Ventilation-Program" menu. If "Damper Hardware" is set to "None" or "2 Position", the economizer will not operate.

The Series 100 unit can be ordered with an economizer. An economizer allows the unit to provide "free cooling" when the OA conditions are suitable. Economizer operation is a function of an active cooling mode, and it not the same as Ventilation mode.

Economizer Options

a. Dry Bulb

b. Single Enthalpy

c. Dual Enthalpy

d. Best Method

Dry Bulb

- Unit Controller will utilize the OAT to determine if conditions are suitable for economizing
- Econo Sys Status will be Normal Active if:

  a. Current Operating Mode is Occ or Unocc Cooling

AND

b. OAT is less than/equal to Active SAT SP plus 8 °F

- Econo Sys Status will be Normal Inactive if

a. Current Unit Mode is NOT Occ or Unocc Cooling

OR

b. OAT is greater than/equal to the Active SAT SP plus 10 °F

Single Enthalpy

- Unit MUST have an OA temp and humidity sensor installed
- Unit Controller will utilize the OAT and the OA Relative Humidity to determine if conditions are suitable
- Econo Sys Status will be Normal Active if:

a. Current Operating Mode is Occ or Unocc Cooling

AND

b. OAT is less than/equal to the Active SAT SP plus 8 °F

AND

c. OA Enthalpy is less than/equal to the OA Enthalpy SP

- Econo Sys Status will be Normal Inactive if:

a. Current Operating Mode is NOT Occ or Unocc Cooling

OR

b. OAT is greater than/equal to the active SAT SP plus 10 °F

c. OA Enthalpy is greater than/equal to the OA Enthalpy SP plus 1 btu/lb

Dual Enthalpy

- Unit MUST have OA and RA temp and humidity sensors
- Unit Controller will utilize the OAT/OA Humidity and the RAT/RA Humidity to determine if conditions are suitable
- Econo Sys Status will be Normal-Active if:

a. Current Operating Mode is Occ or Unocc Cooling

AND

b. OAT is less than/equal to the active SAT SP plus 8 °F

AND

c. OA Enthalpy is less than/equal to the RA Enthalpy minus 1 btu/lb

- Econo Sys Status will be Normal-Inactive if:

a. Current Operating Mode is NOT Occ or Unocc Cooling

OR

b. OAT is greater than/equal to the Active SAT SP plus 10 °F

OR

c. OA Enthalpy is greater than/equal to the RA Enthalpy

Best Method

- When the Econo Method is set to Best Available, the unit will determine the Econo Method to Use based on the sensors that are installed and reliable.
- Unit will use Dry Bulb if only the OAT sensor is reliable
- Unit will use Single Enthalpy if OAT and OA Humidity sensors are installed and reliable
- Unit will use Dual Enthalpy if OAT/OA Humidity and RAT/RA Humidity sensors are installed and reliable
- Example: If unit has OAT/OA Humidty sensors and RAT/RA Humidity sensors and the RA Humidity sensor is defective, Econo will operate as Single Enthalpy not Dual Enthalpy

Economizer Operation (CV And VAV)

- When conditions are determined suitable for Econo Operation, the Unit Controller will send a 0-10 VDC signal to the O/A damper actuator, modulating the dampers open/closed
- OA dampers will be modulated to maintain the Active SAT SP

HEATING OPERATION

The Series 100 unit can be ordered with different heating options. They are:

- None
- Electric Heat
- Staged Gas
- Modulating Gas
- Steam Heat
- Hot Water Heat

Electric Heat

- The following data must be entered
  a. Heating System MUST be User Enabled
  b. Heating Sys Type MUST be set to Electric
  c. Elect Heat capacity MUST be set to the Nameplate capacity

Constant Volume

- 1st and 2nd Stage Heating SP's must be entered

VAV and Flexsys

- Heating SAT SP must be entered

Heating Control Offset:

- Unit Controller will calculate a Heating Control Offset based on the KW of heat installed, the CFM's, and the Stages of heat
- The "Heating Control Offset" will be rounded up to the nearest ½ degree.
- If "Heating Control Offset" is calculated to be less than 2 °F, it will be set to 2 °F
- If Unit Mode "Comfort Vent Heating" or Supply Air Tempering, the Heating Control Offset will be fixed at 5 °F

TABLE 32 - HEAT STAGES

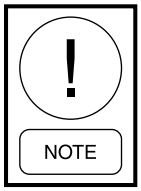
"ELEC HEAT CAPACITY" (KW)	MAXIMUM STAGES
80	3
108	3
150	4
200	6
250	7

Active SAT SP:

- VAV and Flexsys will utilize the "Heating SAT SP"
- CV will utilize the Active Supply Air Temp SP based on *Tables 25 and 26 starting on page 67*

Sequence of Operation: Electric Heat

- Unit Controller enters an Active Heating Mode
  a. Occ Heating
  b. Unocc Heating
  c. Comfort Vent Heating
  d. Supply Air Tempering
  e. Morning Warm-Up
- Unit Controller will determine the initial stages of heat needed
- Unit Controller will start the required stages of heat



Comfort Vent Heating and Supply Air Tempering will bring on one stage at a time

- After expiration of the 3.5 min Inter Staged Time Delay, the Unit Controller will cycle ON/OFF stages of heat based on the Heating Control Logic

Staged Gas Heat

- The following data must be entered
  a. Heating System MUST be User Enabled
  b. Heating Sys Type MUST be set to Staged Gas
  c. Staged Gas Heat capacity MUST be set to the Nameplate capacity
  d. Heat Limit Temperature MUST be programmed
- The unit can have either 1, 2 or 3 gas burner sections
- Each section will consist of (1) two stage gas valve, (1) ignition control, (1) induced draft motor, and high limit and rollout switches independent of the other burner sections

- The gas heat sections operation will be monitored by the Digital Multi-Plexor
- The Digital Multi-Plexor will receive a 24 VAC status input from each ignition control.
- The Digital Multi-Plexor will convert the 24 VAC status input to a 0-5 VDC output signal to the Unit Controller, based on the operational status of each burner section
- Unit Controller monitors the time it takes to go between stages of operation and the specified operation state. The following states will be shown under the Heating key, FURNACE # MODE:
  a. PURGE
  b. TRY FOR IGNITION
  c. ON-LOW
  d. ON-HIGH
  e. SAFETY TRIP
  f. SAFETY FAULT
  g. SAFETY LOCKOUT
  h. FAULT-LOCKOUT

Constant Volume

- 1st and 2nd Stage Heating SP's must be entered

VAV and Flexsys

- Heating SAT must be entered

Heating Control Offset (HCO):

- Unit Controller will calculate the Heating Control Offset based on the minimum firing rate, the CFM's, and the required temperature rise across the heat exchangers
- The "Heating Control Offset" will be rounded up to the nearest ½ degree.
- If "Heating Control Offset" is calculated to be less than 2 °F, it will be set to 2 °F
- If Unit Mode "Comfort Vent Heating" or Supply Air Tempering, the Heating Control Offset will be fixed at 5 °F

TABLE 33 - HEAT STAGES

"GAS HEAT CAPACITY" (MBH)	MAXIMUM STAGES
1125	6

Active SAT SP:

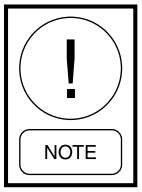
- VAV and Flexsys will utilize the "Heating SAT SP"
- CV will utilize the Active Supply Air Temp SP based on *Tables 25 and 26 starting on page 67*

Heating Control:

- The Unit Controller will use the current SAT to determine when to cycle additional stages of heat ON/OFF
- If SAT is less than the SAT SP minus the HCO an additional stage of heat will be started
- If SAT is greater than the SAT SP plus the HCO an additional stage of heat will be stopped
- If SAT plus 2 times the HCO is more than/equal to the "Heat Limit Temperature" additional stages of heat will be prevented from starting

Staged Gas Heat Sequence of Operation:

- Unit Controller enters an Active Heating Mode
  a. Occ Heating
  b. Unocc Heating
  c. Comfort Vent Heating
  d. Supply Air Tempering
  e. Morning Warm-Up
- Unit Controller will determine the initial stages of heat needed
- Unit Controller will start the required stages of gas heat



Comfort Vent Heating and Supply Air Tempering will bring on one stage at a time

- After expiration of the 3.5 min Inter Staged Time Delay, the Unit Controller will cycle ON/OFF stages of heat based on the Heating Control Logic

Sequence of Operation: Staged Gas Heat

- Each burner section will follow the same ignition sequence
- Ignition Control (Furnace 1 starts first) receives a 24 VAC input from Unit Controller
- Ignition Control closes internal contacts which start the Induced Draft Motor
- Induced Draft Motor comes up to speed which closes pressure switch
- 24 VAC runs through pressure switch and two limit switches
- After a 30 sec Purge delay, Ignition Control simultaneously produces a high voltage spark and outputs 24 VAC to the Lo Fire solenoid of gas valve for 7 seconds
- Ignition Control monitors flame rectification signal. Signal present for 15 sec, 24 VAC is sent to the appropriate terminal of the digital multiplexor. The multiplexor will then send a 0-5 VDC signal to the unit controller confirming operation
- Burner #1 will now be in low fire. If unit controller determines more heat is needed, 24 VAC will be sent to High Fire solenoid of the gas valve.
- If more heat is needed and there are the appropriate burner sections they will follow the above sequence.
- If flame rectification is not present, Ignition Control turns off high voltage and 24 VAC to gas valve, waits 30 seconds, then restarts the ignition sequence
- Ignition sequence will be tried 3 times. If successful ignition is not established after 3 attempts, the burner section will be locked out for one hour, or until the 24 VAC input to Ignition Control is removed.

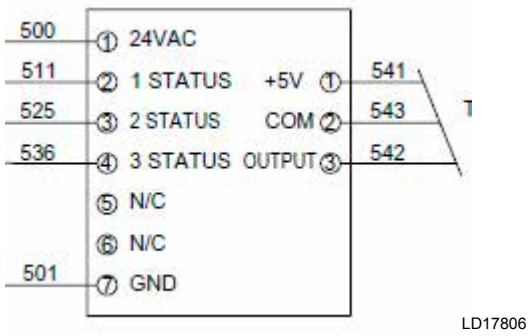


FIGURE 39 - DIGITAL MULTIPLEXOR CONNECTIONS - STAGED GAS HEAT

TABLE 34 - FURNACE STATUS INPUT STAGED GAS HEAT

MIN VOLTS DC	MAX VOLTS DC	FURNACE 1 STATUS	FURNACE 2 STATUS	FURNACE 3 STATUS
0.086	0.166	OFF	OFF	OFF
0.224	0.313	ON	OFF	OFF
0.361	0.461	OFF	ON	OFF
0.499	0.609	ON	ON	OFF
0.637	0.756	OFF	OFF	ON
0.774	0.904	ON	OFF	ON
0.912	1.051	OFF	ON	ON
1.050	1.199	ON	ON	ON

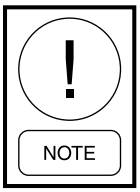
Modulating Gas Heat

- The following data MUST be entered
  a. Heating System MUST be User Enabled
  b. Heating Sys Type MUST be set to Modulating Gas Heat
  c. Modulating Gas Heat capacity MUST be set to the Nameplate capacity
- The unit can have either 1, 2, or 3 gas burner sections
- Unlike Staged Gas, furnace section 1 will be split into 2 halves
  a. Right hand side will be modulating (1A) and will have the following:
     1. Two staged gas valve
     2. Modulating Gas valve
     3. Ignition Control
     4. Limit and Roll Out switches

b. Left hand side will be staged (1B) and will have the following

1. Two staged gas valve
2. Ignition Control
3. Limit and Roll Out switches

- Furnace section 1 will have a shared 2 speed induced draft motor
- Modulating half (1A) of furnace section 1 will ALWAYS be first ON and last OFF (Unless a fault exists)
- Staged half (1B) of furnace section 1 will ALWAYS be last ON and first OFF (Unless a fault exists)



A fault on 1A will also cause 1B to be in a fault condition

- Burner sections 2 and 3 will have a 2 stage gas valve, single speed induced draft motor
- All furnace sections will have high limit and roll out switches independent of each other
- The gas heat sections operation will be monitored by the Digital Multi-Plexor
- The Digital Multi-Plexor will receive a 24 VAC status input from each ignition control.
- The Digital Multi-Plexor will convert the 24 VAC status input to a 0-5 VDC output signal to the Unit Controller, based on the operational status of each burner section
- FURNACE # MODE will be the same as Staged Gas

a. PURGE
b. TRY FOR IGNITION
c. ON-LOW
d. ON-HIGH
e. SAFETY TRIP
f. SAFETY FAULT
g. SAFETY LOCKOUT
h. FAULT-LOCKOUT

Constant Volume

- 1st and 2nd Stage Heating SP's must be entered

VAV and Flexsys

- Heating SAT must be entered

Heating Control Offset:

- Fixed at 1.5 °F for Mod Gas Heat

Active SAT SP:

- VAV and Flexsys will utilize the "Heating SAT"
- CV will utilize the Active Supply Air Temp SP based on *Tables 25 and 26 starting on page 67*

Heating Control:

- The Unit Controller will use the current SAT to determine when to cycle additional stages of heat ON/OFF
- If SAT is less than the SAT SP minus the HCO the heating system will be in the Increase Mode
- If SAT is greater than the SAT SP plus the HCO the heating system will be in the Decrease Mode

Sequence of Operation: Modulating Gas Heat

- Ignition Control (Furnace 1A starts first) receives a 24 VAC input from Unit Controller
- At the same time, Unit Controller sends 24 VAC signal to 6R (High Fire Relay) to place Induced Draft Motor on High Speed and Gas Valve in High Fire
- Induced Draft Motor comes up to speed and both Low and High pressure switches close
- After a 30 sec Purge Delay, Ignition Control will:

a. Produce a high voltage spark for 7 sec
b. Send 24 VAC to Low and High Solenoids of the gas valve
c. Modulate the Mod Gas Vlv to min high fire

- Ignition Controls checks for flame rectification. If present for 15 sec:

a. Ignition Control sends a 24 VAC signal to Digital Multi-Plexor
b. Multi-Plexor sends a 0-5 VDC to Unit Controller

c. Unit Controller removes 24 VAC from 6R which switches Inducer to Low Speed, and Gas valve to Low Fire.

d. Mod gas valve is modulated to minimum low fire

- **Furnace 1A is now in Modulation Mode**
- If flame rectification is not present, Ignition Control and Unit Control will remove signals for heating operation, wait 30 seconds, then restart the ignition sequence
- Ignition sequence will be tried 3 times. If successful ignition is not established after 3 attempts, the burner section will be locked out for one hour, or until the 24 VAC input to Ignition Control is removed.
- Furnace sections 2, 3, and 1B will follow same firing sequence as Staged gas

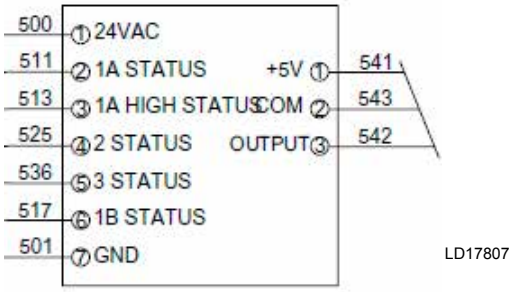


FIGURE 40 - DIGITAL MULTIPLEXOR CONNECTIONS - MODULATING GAS HEAT

Mod Gas Heat – Modulating Sequence:

- The modulating gas valve will be controlled by a Maxitrol Signal Conditioner. The signal conditioner can accept either a 4-20 mA or a 0-10 VDC signal. Which signal that the signal conditioner is looking for is determined by a set of 3 dip switches. The Series 100 unit utilizes the 0-10 VDC signal
  - 4-20 mA: All 3 dip switches ON
  - 0-10 VDC: All 3 dip switches OFF
- The Signal Conditioner is powered by 24 VAC. The Signal Conditioner will receive a 0-10 VDC signal from the I/O board (TB9 terminals 9 and 10) and convert that to a 0-20 VDC signal to the modulating gas valve.
- Once 1A is in Modulation Mode, it will modulate from low fire to high fire depending on the demand for heat.
- When 1A in Low Fire, the Low Fire Solenoid will be powered and the modulating gas valve will modulate from low to high
- When 1A in High Fire, the high fire solenoid will be powered and the modulating gas valve will modulate from low to high
- When staging UP, 1A must be in High Fire High, Mod valve at maximum, staged valve on high fire, before the next stage can be started.
- When staging DOWN, 1A must be in Low Fire Low, Mod valve at minimum, staged valve on low fire, before the next stage can be stopped
- 1A in High Fire High, and Unit Controller has demand for more heat:
  a. 1A drop to Low Fire Low
  b. Next available stage is brought on, 2, 3, or 1B
  c. Stages 2 or 3 will start on Low Fire
  d. 1A will modulate from Low Fire Low to High Fire High
  e. If still more heat needed
  f. 1A modulates to Low Fire Low
  g. Stage 2 or 3 goes to High Fire
  h. 1A will again modulate from Low fire low to high fire high
  i. This same sequence will be used until 1B is needed
- 1B will always start on High Fire

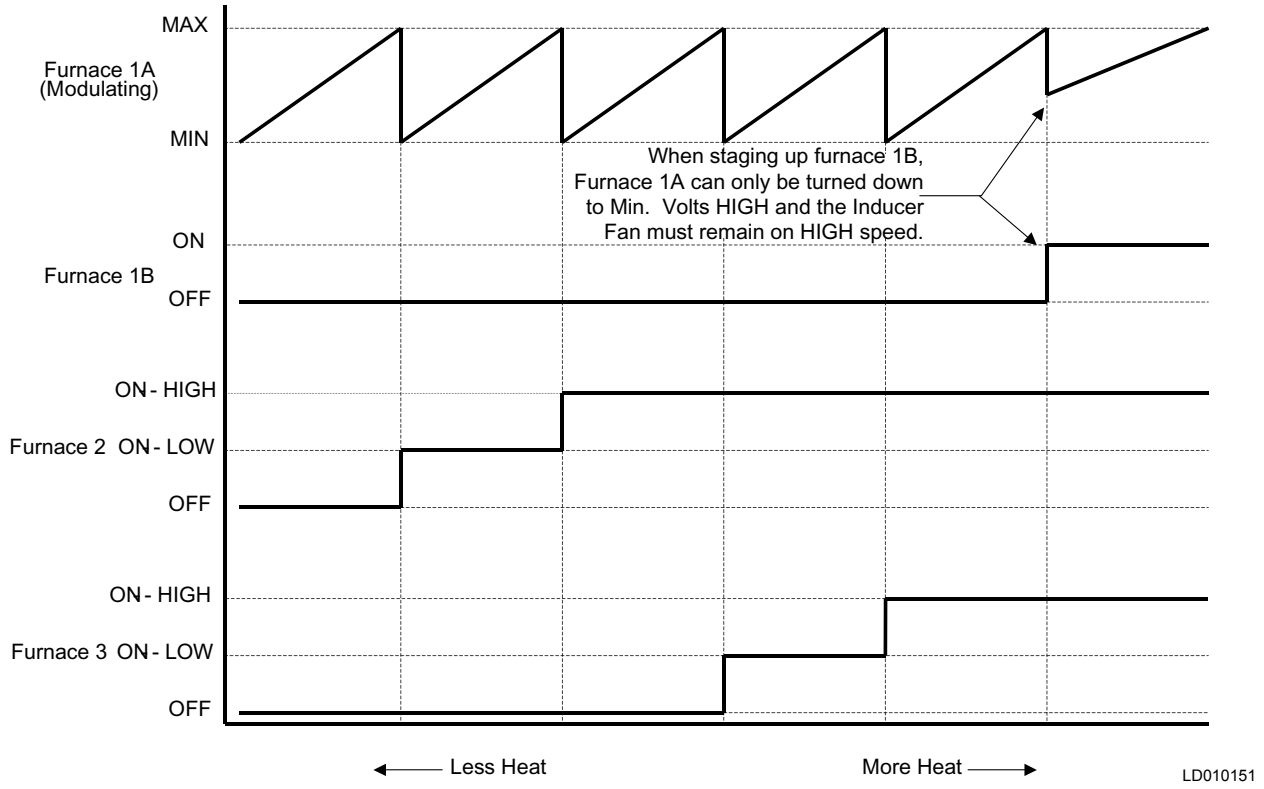


FIGURE 41 - MODULATING GAS HEAT STAGING SEQUENCE

TABLE 35 - FURNACE STATUS INPUT MODULATING GAS HEAT

MIN VOLTS DC	MAX VOLTS DC	MODULATING FURNACE 1A STATUS	FURNACE 1A HIGH STATUS	FURNACE 2 STATUS	FURNACE 3 STATUS	FURNACE 1B STATUS
0.086	0.166	OFF	OFF	OFF	OFF	OFF
0.224	0.313	ON	OFF	OFF	OFF	OFF
0.361	0.461	OFF	ON	OFF	OFF	OFF
0.499	0.609	ON	ON	OFF	OFF	OFF
0.637	0.756	OFF	OFF	ON	OFF	OFF
0.774	0.904	ON	OFF	ON	OFF	OFF
0.912	1.051	OFF	ON	ON	OFF	OFF
1.050	1.199	ON	ON	ON	OFF	OFF
1.187	1.346	OFF	OFF	OFF	ON	OFF
1.325	1.494	ON	OFF	OFF	ON	OFF
1.463	1.641	OFF	ON	OFF	ON	OFF
1.600	1.789	ON	ON	OFF	ON	OFF
1.738	1.936	OFF	OFF	ON	ON	OFF
1.876	2.084	ON	OFF	ON	ON	OFF
2.013	2.231	OFF	ON	ON	ON	OFF
2.151	2.379	ON	ON	ON	ON	OFF
2.289	2.526	OFF	OFF	OFF	OFF	ON
2.426	2.674	ON	OFF	OFF	OFF	ON
2.564	2.821	OFF	ON	OFF	OFF	ON

TABLE 35 - FURNACE STATUS INPUT MODULATING GAS HEAT (CONT'D)

MIN VOLTS DC	MAX VOLTS DC	MODULATING FURNACE 1A STATUS	FURNACE 1A HIGH STATUS	FURNACE 2 STATUS	FURNACE 3 STATUS	FURNACE 1B STATUS
2.702	2.969	ON	ON	OFF	OFF	ON
2.839	3.116	OFF	OFF	ON	OFF	ON
2.977	3.264	ON	OFF	ON	OFF	ON
3.115	3.411	OFF	ON	ON	OFF	ON
3.252	3.559	ON	ON	ON	OFF	ON
3.390	3.706	OFF	OFF	OFF	ON	ON
3.528	3.854	ON	OFF	OFF	ON	ON
3.665	4.001	OFF	ON	OFF	ON	ON
3.803	4.149	ON	ON	OFF	ON	ON
3.941	4.296	OFF	OFF	ON	ON	ON
4.078	4.444	ON	OFF	ON	ON	ON
4.216	4.592	OFF	ON	ON	ON	ON
4.354	4.739	ON	ON	ON	ON	ON

Hot Water/Steam Heat

- The following data MUST be entered
  a. Heating System MUST be User Enabled
  b. Heating Sys Type MUST be set to HW/ Steam heat
  c. HW Valve Action MUST be set to either direct or reverse

Constant Volume

- 1st and 2nd Stage Heating SP's must be entered

VAV and Flexsys

- Heating SAT must be entered

Active SAT SP:

- VAV and Flexsys will utilize the "Heating SAT"
- CV will utilize the Active Supply Air Temp SP based on *Tables 25 and 26 starting on page 67*

Sequence of Operation

- SAT is less than Heating SAT SP, valve will modulate open
- SAT is greater than Heating SAT SP, valve will modulate closed
- UNDER FLR TEMP OVRD is active, the valve will be controlled to the UNDERFLOOR TEMP CONTROL SP (Flexsys Only)

HW/Steam Valve Control

Unit Controller sends a 0-10 VDC signal to the HW/ Steam valve as described below

- Direct: An increase in heating demand will cause the unit controller to increase the voltage signal to the valve
- Reverse: An increase in heating demand will cause the unit controller to decrease the voltage signal to the valve

Freeze Protection

- Unit is not in an active heating mode
- Supply fan is ON
- Unit controller will modulate the HW/Steam valve open if the SAT falls below 38 °F

  OR

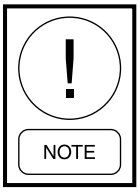
- Supply fan is OFF
- OAT drops below 40 °F
- The unit controller will send the appropriate signal to the valve
  a. 100% if Direct
  b. 0% if Reverse

Freeze Fault

- Unit controller monitors the status of the Freezestat
- Freezestat Open=Normal
- Freezestat Closed=Fault (Closes at 35 °F)
- Freezestat closed for 10 seconds unit controller will fully open HW/Steam valve
    a. 100% if Direct
    b. 0% if Reverse
- Unit Controller starts a 5 minute Freeze Trip timer
    a. Freezestat opens during this period, unit resumes normal operation
- Freezestat remains closed after 5 minute timer expires, the unit controller will shut down the unit and display a "LOCKOUT-HOT WATER FREEZE"

Morning Warm-Up

Morning Warm-Up is a function that can be used in any of the three set-ups; CV, VAV, and Flexsys. The basic operation is the same for all three set-ups.



CV units set-up for Staged control will not operate in Morning Warm-Up.

Morning Warm-Up allows for the unit's heating medium to be used to bring the controlled space to a comfortable temperature before personnel arrive.

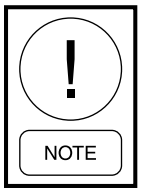
Morning Warm-Up can be initiated in one of three ways

1. A Morning Warm-Up command from the BAS
2. An command from the unit controller utilizing the internal programming schedule
3. 24 VAC input to W1 at CTB1 or a W1 command from the BAS

Morning Warm-Up Set-up

- The S100 unit must have a heating medium installed
- Morning Warm-Up must be "User Enabled"

Sequence of Operation: Morning Warm-Up



It is recommended that all VAV or underfloor boxes are open to their maximum position during Morning Warm-Up operation.

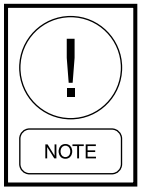
- The S100 unit MUST be in an Unoccupied mode before Morning Warm-Up can be initiated.
- The S100 unit receives a Morning Warm-Up command
- The unit's supply fan will start. If a VAV or Flexsys system, the supply fan VFD will control to the active duct static pressure SP
- After 5 minutes, the unit controller will compare the RAT to the RAT Heating SP.
- If the RAT is greater than or equal to the RAT Heating SP, the heating sequence will not be energized
- If the RAT is less than the RAT Heating SP by at least 1 °F, the unit controller will start the unit's heating medium
- Once the Heating medium is started the active SAT SP will be as below
    1. VAV or Flexsys will control to the Heating SAT
    2. CV will control to the 2nd Stage Heating SP
- The heating medium will remain ON until:
    1. The RAT is greater than or equal to the RAT Heating SP plus .5 °F

        OR

    2. The Morning Warm-Up command is removed

        OR

    3. The S100 unit enters and an Occupied mode



Failure to remove the Morning Warm-Up command or the W1 input from the unit controller will cause the unit to immediately re-enter Morning Warm-Up once an Unoccupied mode is entered.

Adaptive Morning Warm-Up

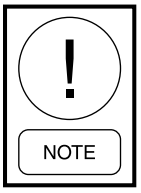
Adaptive Morning Warm-Up will only be utilized when the S100 unit is utilizing an internal programming schedule to determine Occupancy/Unoccupancy modes

With Adaptive Morning Warm-Up, the unit controller will calculate the start time to ensure that the RAT is within .5 °F of the RAT heating SP when the unit switches to an Occ mode. This is accomplished by calculating the Morning Warm-Up Optimal Start Time by averaging the amount of time it takes to bring the RAT within .5 °F of the RAT Heating SP for 3 consecutive days. The 3 warm-up times are averaged and added to a 10 minute offset. The new time is used as the Morn Warm-Up Opt Time for the next day.

Adaptive Morn Warm-Up Set-up

- Occupancy schedule **MUST** be programmed for the Occ and Unocc start and stop times. This is done thru the Schedule key
- Occupancy Schedule **MUST** be User Enabled
- Morning Warm-Up **MUST** be User Enabled
- Adapt Morning Warm-Up MUST be User Enabled
- RAT heating SP **MUST** be set
- Morn Warm-Up Max Time MUST be set
- If the Morn Warm-Up Opt Time exceeds the Morn Warm-Up Max Time. The Morn Warm-Up Opt Time will become the Morn Warm-Up Max Time
- If the Morn warm-Up Opt Time is determined to be less than 15 minutes, the Morn Warm-Up Opt Time becomes 15 minutes
- The default values for "Daily Warm Up Time Day 1 , Day 2, and Day 3 shall be initially set to 60 minutes. These values can be reset to the default values by turning the Morn Warm Up to User Disabled, then back to User Enabled

Sequence of Operation: Adaptive Morning Warm-Up



It is recommended that all VAV or underfloor boxes are open to their maximum position during Morning Warm-Up operation.

- The S100 unit MUST be in an Unoccupied mode before Morning Warm-Up can be initiated.
- The unit controller starts the Morning Warm-Up sequence
- The Supply fan starts. If VAV or Flexsys, the supply fan VFD will be controlled to the active duct static pressure SP
- If the RAT is greater than the RAT Heating SP minus 1.0 °F the unit control will not energize the heating sequence and it sets the daily warm up time to 5 mins.
- If the RAT is less than or equal to the RAT Heating SP minus 1.0 °F the unit control will energize the heating sequence based on the Morning Warm Up Optime
- Once the Heating medium is started the active SAT SP will be as below
  1. VAV or Flexsys will control to the Heating SAT
  2. CV will control to the 2nd Stage Heating SP
- The heating medium will remain ON until:
  1. The RAT is greater than or equal to the RAT Heating SP plus .5 °F

     OR
  2. The Morning Warm-Up command is removed

     OR
  3. The S100 unit enters and an Occupied mode

Supply Air Tempering

Supply Air Tempering is a function that is utilized in VAV and Flexsys configured units only. Supply Air Tempering will bring on the unit's heating source to temper the supply air. It is typically used on units that have large requirements of outside ventilation air during the winter months

When Supply Air Tempering is active, the unit's heating source will temper the SAT and try to maintain the Current Cooling SAT SP.

Sequence of Operation

- Heating System MUST be User Enabled
- Supply Air Tempering MUST be User Enabled

- Modulating Gas or HW/Steam
  - (VAV: Occ Standby or Occ Cooling) Current SAT is 2.5 °F less than the Active SAT SP for 5 mins
  - (Flexsys: Occ Standby or Occ Cooling w/o Bypass) MX SAT is 2.5 °F less than Active MX SAT SP for 5 mins
  - (Flexsys: Occ Cooling w/Bypass) MX SAT is 2.5 °F less than the Active MX SAT SP for 5 mins AND the Current Flex Evap Temp is 5 °F less than the Active SAT SP for 5 mins
  - Economizer Output is less than/equal to 5%
  - No compressor operation for 10 mins
- Staged Gas or Electric Heat
  - Same as above

    AND
  - Current Heat Entering Temp is 5 °F less than the Active SAT SP for 5 mins

Supply Air Tempering Termination

- Modulating Gas Heat
  - (VAV: Occ Standby or Occ Cooling) Current SAT is 4 °F greater than the Active Cooling SAT SP for 5 mins.
  - (Flexsys: Occ Standby or Occ Cooling with or without Bypass) MX SAT is 4 °F greater than the Active MX SAT SP for 5 mins
  - Mod Gas Heat is at Minimum Low Fire
- HW/Steam
  - (VAV: Occ Standby or Occ Cooling) Current SAT is greater than the Active Cooling SAT SP
  - (Flexsys: Occ Standby or Occ Cooling with or without Bypass) Current SAT is greater than the Active MX SAT SP for 5 mins
  - HW/Steam Valve position is less than/equal to 2%
- Staged Gas and Electric Heat
  - (VAV: Occ Standby or Occ Cooling) The Current Heat Entering Temp is greater than the Active Cooling SAT SP for 5 mins
  - (Flexsys: Occ Standby or Occ Cooling with or without Bypass) The Current Heat Entering Temp is greater than the Active MX SAT SP for 5 mins

VENTILATION

Ventilation is a function of bringing in a set amount of fresh outside air to a space. It is a separate function than an economizer, which is part of the cooling mode.

Ventilation on a Series 100 unit can be configured for 1 of 4 modes

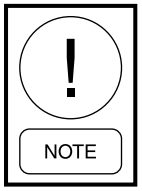
1. None
2. 2-Position Damper
3. Standard Damper
4. TEK-Air Full IAQ

There are 2 different control options for the Standard Damper and the TEK-Air:

1. Fixed Minimum
2. Demand Ventilation: Demand Ventilation requires the unit to have (2) CO2 sensors, one indoor and one outdoor (used for a reference). When the indoor CO2 level exceeds the outdoor CO2 level by the CO2 Offset SP, the O/A dampers will modulate open to lower the indoor CO2 level.

Ventilation System Active

- S100 unit MUST be in an Occupied Mode (ventilation will be inactive in any unoccupied mode)
- The supply fan proving circuit MUST be closed



If the economizer becomes active, the economizer control logic can open the O/A dampers past the Active Ventilation Minimum Position SP. The economizer cannot close the O/A dampers below the Active Ventilation Minimum Position SP

2 Position Damper

- Ventilation System **MUST** be User Enabled
- Damper Hardware **MUST** be set to 2 Position

Sequence of Operation

- When the Ventilation system is active, the unit controller will send a 10 VDC signal to the actuator
- When the Ventilation system is Inactive, the unit controller will remove the 10 VDC signal from the actuator
- The amount of outdoor air can be set by adjusting the damper linkages

Standard Damper (Fixed Minimum and Demand)

Standard dampers can be set for two control types

1. Fixed Minimum
2. Demand Ventilation

Standard Damper w/ Fixed Minimum Control

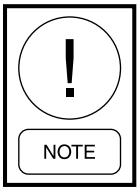
- This function is sometimes known as “The poor man’s air measuring station”. The S100 unit will modulate the O/A dampers between a minimum and maximum position based on the speed of the supply fan VFD.

Fixed Minimum

- Ventilation system **MUST** be User Enabled
- Damper Hardware **MUST** be set for Standard Dampers
- Ventilation control **MUST** be set for Fixed Minimum
- O/A Damper Min Pos and O/A Damper Max Pos MUST be set

Sequence of Operation (Standard Dampers w/ Fixed Minimum)

- Supply fan is ON
- Ventilation system is Active
- Economizer system is Inactive



If the economizer becomes active, the economizer control logic can open the O/A dampers past the Active Ventilation Minimum Position SP. The economizer cannot close the O/A dampers below the Active Ventilation Minimum Position SP

- Based on the Supply Fan VFD speed the O/A dampers will modulate as follows:
    1. VFD at 100%, O/A dampers will be at the OA Damper Min Pos
    2. VFD at 50%, O/A dampers will be at the OA Damper Max Pos
    3. VFD between 100% and 50%, O/A dampers will modulate between the OA Damp Min and OA Damp Max Positions

Standard Damper w/ Demand Ventilation

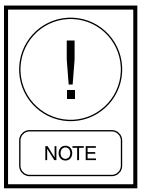
- When the S100 unit is configured for this option, the O/A dampers will modulate between a minimum and maximum position based on Ventilation Demand.

Demand Ventilation

- Ventilation system MUST be User Enabled
- Damper Hardware MUST be set for Standard Dampers
- Ventilation control MUST be set for Demand Ventilation
- O/A Damper Min Pos and O/A Damper Max Pos MUST be set
- CO2 Offset Set Point MUST be set

Sequence of Operation (Standard Dampers w/ Demand Ventilation)

- Supply fan is ON
- Ventilation system is Active
- Economizer system is Inactive



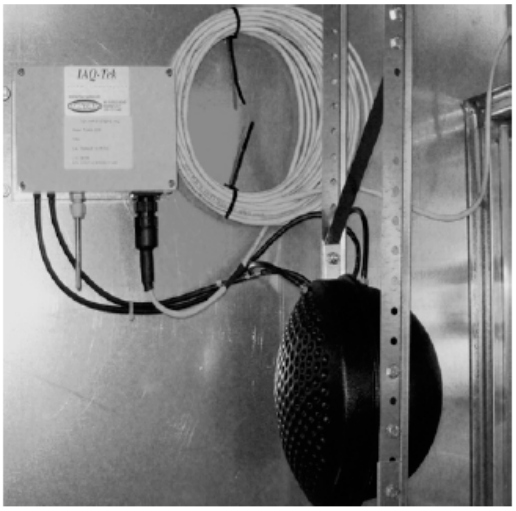
If the economizer becomes active, the economizer control logic can open the O/A dampers past the Active Ventilation Minimum Position SP. The economizer cannot close the O/A dampers below the Active Ventilation Minimum Position SP.

- Based on Ventilation Demand, the O/A dampers will modulate as follows
    1. Ventilation at 0%, O/A dampers will be at the OA Damp Min Pos
    2. Ventilation Demand at 100%, O/A dampers will be at the OA Damp Max Pos
    3. Ventilation Demand between 0-100%, O/A dampers will modulate between the OA Damp Min and OA Damp Max Positions

TEK-Air Full IAQ (Fixed Minimum and Demand)

TEK-Air Full IAQ can be set for two control types

1. Fixed Minimum
2. Demand Ventilation



LD17800

FIGURE 42 - TEK-AIR PROBE AND TRANSDUCER

LD17801

FIGURE 43 - TEK-AIR MONITOR

TEK-Air Factory Set-Up

The TEK-Air station should come from the factory programmed for proper operation. The programming should be checked during start-up to ensure proper operation

Password: 1234

Area Of Flow Device - This is the area of flow in square feet.

120-130: 30 sq ft

150: 35 sq ft

Sensor Flow Coeff - This is the sensor flow co-efficient for the type of differental pressure generating device being used. We use an IAQ-TEK probe, which uses a value of 0.762.

Altitude - This is the altitude in feet above or below sea level for the location of the probe. The unit controller makes an altitude correction calculation: therefore, this parameter should always be set to 0 feet.

Low Flow Alarm STPT - This is the low flow alarm setpoint in CFM. This parameter should be set to 0 CFM.

Analog Out Flow STPT - This is the full-scale range in CFM for the analog output scaling. This parameter should be set to 46,000 CFM.

Alarm Delay Period - Serveral of the IAQ-TEK alarm conditions have their initiation inhibited for a delay period. This period is utilised to create a delay between the actual occurrence of the alarm and the reporting of the alarm at the display. This parameter should be set to 20 seconds.

Press Average INT - This is the averaging time for the average pressure calculation. The parameter should be set to 10 seconds.

Use Fan Interlock - The fan interlock is used to interlock the action of the monitor to the running of the fan. When this function is turned ON, the low CFM airflow alarm is deactivated any time the digital input function reports that the fan is off. This parameter should be set to ON.

Balancers ADJ Fact - This feature allows the application of an airflow correction factor based on a difference between the calculated airflow and the air balancers report. Default is 100%.

Password Change - This allows the password to be changed. The password is set to 1234.

Auto-Zero Interval - This parameter should be set to 30 minutes.

Encl Temp Set PT - The transducer has an internal heater to maintain a constant temperature in the transducer enclosure. This value is used in the operation of the heater. The parameter should be set to 120°F.

Outside Air Temp Sensor Bias - Allows the air balancer to adjust the monitor outside air temperature readings to those observed by the air balancer. The unit controller uses the outside air input for the outdoor air sensor. This parameter should always be set to 0.

Transducer Zero - This sets the monitor zero range in "WC corresponding to the transducer 4mA output. This parameter should be set to 0.00" WC.

Transducer FS - This sets the monitor full scale range in "WC corresponding to the transducer 20mA output. This parameter should be set to 0.25" WC.

The TEK-Air station also has some built in diagnostic alarms.

The diagmostic alarms are used to provide diagnostic information on the performance of the product, and to alert the user to possible malfunction. Following is a description of the diagnositc alarms that are available at the IAQ-TEK monitor.

Low Flow Alarm - The Low Flow Alarm is used to alert the building operators that the intake volume has fallen below the minimum acceptable level. The control compares the derived CFM value to the programmed "LOW FLOW ALARM" setpoint. The unit is shipped from the factory with a "LOW FLOW ALARM" setpoint of 0 CFM. Should the airflow remain below this value for longer than the programmed ALARM DELAY PERIOD, 20 seconds, the IAQ-TEK monitor will show a Low Flow Alarm. To reset to normal the air volume must rise to a value ths is 10% high then the "LOW FLOW ALARM" setpoint. Once this threshold has been crossed, the alarm is reset automatically.

Reverse Flow Alarm - This is used to identify that the airflow is blowing out of the intake of the outdoor air. Should the airflow remain reversed for longer than the programmed ALARM DELAY PERIOD, 20 seconds, the IAQ-TEK monitor will show a Reverse Flow Alarm. In order to reset, the pressure input from the probe to the transducer must increase to zero or have a sign change to positive. Once the value has changed, the alarm is reset automatically.

Pressure Loss Alarm - The signal from the pressure transducer to the monitor indicates a negative pressure. The alarm will be initiated immediately without a delay period.

Outdoor Air Temperature Sensor Loss Alarm - Indicates the OUTSIDE AIR TEMP Input to the monitor went either high (input short) or low (input open). The alarm will be initiated immediately without a delay period.

Enclosure Temperature Loss - Indicates the enclosure temperature input to the monitor for the transducer went high (input short) or low (input open). The alarm will be initiated immediately without a delay period.

Loss of Enclosure Heater - Indicates the enclosure temperature fell 11°F below the "ENCL TEMP SET PT" - Should this remain low for longer than the programmed ALARM DELAY PERIOD, 20 seconds, the IAQ-TEK monitor will show a Loss of Enclosure Heater Alarm. If the temperature remains below for 1 hour, a heater malfunction will be initiated.

Auto-Zero Valve Malfunction - Indicates the pressure transducer's auto-zero valve malfunction. The alarm will be initiated immediately without a delay period. A Memory Loss Alarm indicates there has been a loss of nonvolatile memory parameters. The alarm will be initiated immediately without a delay period.

Checksum Error Alarm - Indicates there is a memory checksum error. The alarm will be initiated immediately without a delay period.

5

TEK-Air w/ Fixed Minimum

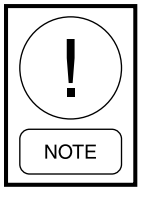
- The Series 100 unit will modulate the O/A dampers to maintain a set amount of outdoor air CFM's

Fixed Minimum

- Ventilation system MUST be User Enabled
- Damper Hardware MUST be set for TEK-Air Full IAQ
- Ventilation control MUST be set for Fixed Minimum
- Minimum Flow OA SP MUST be programmed

Sequence of Operation: TEK-Air w/ Fixed Minimum

- Supply Fan is ON
- Ventilation system is Active
- Economizer is Inactive



If the economizer becomes active, the economizer control logic can open the O/A dampers past the Active Ventilation Minimum Position SP. The economizer cannot close the O/A dampers below the Active Ventilation Minimum Position SP.

- Based on the programmed value for Minimum Flow OA SP the O/A dampers will modulate open/closed to maintain the required amount of OA CFMs

TEK-Air w/ Demand Ventilation

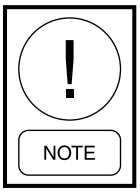
- The S100 unit will modulate the O/A dampers to maintain a set amount of outdoor air CFM's.
- If Ventilation Demand rises the O/A dampers will modulate between the OA Minimum Flow SP and the OA Maximum Flow SP

Demand Ventilation

- Ventilation system MUST be User Enabled
- Damper Hardware MUST be set for TEK-Air Full IAQ
- Ventilation control MUST be set for Demand Ventilation
- Minimum Flow OA SP MUST be programmed
- Maximum Flow OA SP MUST be programmed

Sequence of Operation: TEK-Air w/ Demand Ventilation

- Supply Fan is ON
- Ventilation system is Active
- Economizer is Inactive



If the economizer becomes active, the economizer control logic can open the O/A dampers past the Active Ventilation Minimum Position SP. The economizer cannot close the O/A dampers below the Active Ventilation Minimum Position SP.

- Based on the programmed value for Minimum Flow OA SP the O/A dampers will modulate open/closed to maintain the required amount of OA CFM's.
- If the Ventilation Demand starts to rise, the O/A dampers will modulate between the Min Flow OA SP and the Max Flow OA SP until the Ventilation Demand decreases to 0%

Comfort Ventilation

Comfort Ventilation is a sequence that is only applicable if the unit is configured for CV or SZVAV. It is typically needed if the unit has a high amount of outside air used for ventilation, or if CO2 sensors are installed. Comfort Ventilation prevents the space from getting to cool/warm before a thermostat or zone sensor requests cooling or heating. It uses the Occ Zone Cooling or Occ Zone Heating SPs.

Sequence of Operation

- Comfort Ventilation must be User Enabled (CV and SZVAV only)
- Comfort Ventilation must be User Enabled (CV and SZVAV). Enabled in the Ventilation Menu-Program
- Unit must be in an Occupied mode

Comfort Vent Cool

- Comfort Vent Cool will be enabled if the current SAT is more than 5 °F higher than the Occ Zone Cooling SP
- When in Comfort Vent Cool mode, the active SAT SP is equal to the Occ Zone Cooling SP
- Comfort Vent Cool will be disabled if the current SAT is more than 5 °F lower than the Occ Zone Cooling SP for 5 mins

Comfort Vent Heat

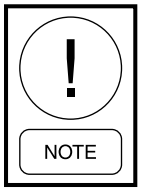
- Comfort Vent Heat will be enabled if the current SAT is more than 5 °F lower than the Occ Zone Heating SP
- When in Comfort Vent Heat mode, the active SAT SP is equal to the Occ Zone Heating SP
- Comfort Vent Heat will be disabled if the current SAT is more than 5 °F higher than the Occ Zone Heating SP for 5 mins

Continuous Ventilation

Continuous Ventilation is a sequence that is only applicable if the unit is configured for CV or SZVAV. It keeps the supply fan operating continuously while in the Occ mode. Continuous Ventilation must be User Enabled (CV and SZVAV), which can be enabled in the Ventilation Menu-Program.

EXHAUST

Exhaust is a function that allows the Series 100 unit to maintain the building pressure. The exhaust system will control an exhaust fan and/or exhaust dampers. The exhaust system has NO control over the O/A dampers.



A Series 100 unit can either have an exhaust fan or a return fan, but not both. An exhaust fan will have one 32"x32" forward curved blower wheel with one motor. A return fan will have one 44" plenum fan wheel with one motor.

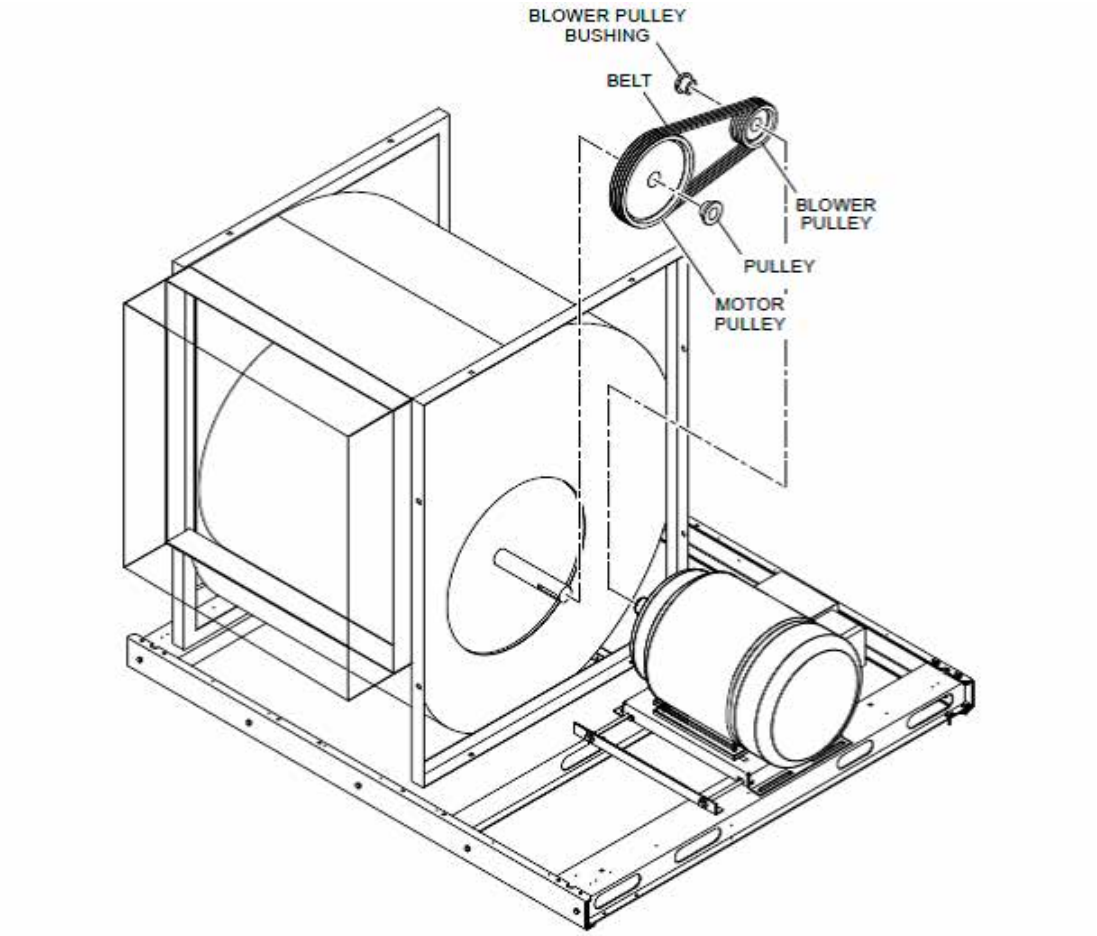


FIGURE 44 - EXHAUST FAN

Exhaust System Options

1. On/Off control based on Damper Position (CV only) (Single speed exhaust fan, modulating damper)
2. On/Off control based on building pressure (Single speed exhaust fan, barometric damper)
3. Modulating damper with fixed speed exhaust (Single speed exhaust fan)
4. Modulating Exhaust fan with VFD (Barometric exhaust damper)

On/Off Based on Damper Position

- Power Exhaust Type MUST be set to "On-Off Damper Control"
- "Econo Output for Fan Start" MUST be programmed into unit controller
- "Econo Output for Fan Stop" MUST be programmed into unit controller

Sequence of Operation: On/Off Based on Damper Position

- Only available on CV units
- When O/A damper position is greater than/equal to "Econo Output for Fan Start", exhaust fan will start
- When O/A damper position is less than/equal to "Econo Output for Fan Stop". Exhaust fan will stop

On/Off Based on Building Pressure

- Power Exhaust Type MUST be set to "On-Off Press Control"
- "Building Pressure Active SP" MUST be programmed into unit controller
- "Building Press Cntrl Offset" MUST be programmed into unit controller

Sequence of Operation: On/Off Based on Building Pressure

- Building Static pressure is greater than/equal to the “Building Press SP” plus the “Bldg Pressure Cntl Offset”, the exhaust fan will start
- Building Static pressure is less than/equal to the “Building Press SP” minus the “Bldg Pressure Cntl Offset”, the exhaust fan will stop

Modulating Damper w/ Fixed Speed Exhaust

- Power Exhaust Type MUST be set to Modulated Damper-VFD
- Bldg Press SP MUST be programmed into unit controller
- Exhaust Output for Fan Start MUST be programmed into unit controller
- Exhaust Output for Fan Stop MUST be programmed into unit controller

Sequence of Operation: Modulating Damper w/ Fixed Speed Exhaust

- Building Press rises above the Bldg Press SP
- Unit Controller sends a 0-10 VDC signal to exhaust damper actuator. Unit controller will display this signal as a %. 0 VDC = 0% and 10 VDC = 100% (% output is displayed as “Exhaust Damper Position)
- When the % output is equal to/greater than the “Exhaust Output for Fan Start”, the exhaust fan will start
- When the % output is equal to/less than the “Exhaust Output for Fan Stop”, the exhaust fan will stop.

Modulating Exhaust with VFD

- Power Exhaust Type MUST be set to Modulate Damper-VFD
- Bldg Press SP MUST be programmed into unit controller
- Exhaust Output for Fan Start MUST be programmed into unit controller
- Exhaust Output for Fan Stop MUST be programmed into unit controller

Sequence of Operation: Modulating Exhaust with VFD

- This option operates basically the same as Modulating Damper w/ Fixed Speed Exhaust. The 0-10 VDC signal is sent to the exhaust fan VFD instead of to the exhaust damper actuator
- Building Press rises above the Bldg Press SP
- Unit Controller sends a 0-10 VDC signal to exhaust fan VFD. Unit controller will display this signal as a %. 0 VDC = 0% and 10 VDC = 100% (% output is displayed as “Exhaust Damper Position)
- When the % output is equal to/greater than the “Exhaust Output for Fan Start”, the exhaust fan will start
- When the % output is equal to/less than the “Exhaust Output for Fan Stop”, the exhaust fan will stop.
- Exhaust fan VFD speed will be controlled by the 0-10 VDC signal that is being sent by the unit controller.

VFD Exhaust Fan Control BAS

Overview

A communicated value has been provided to allow for control of the Exhaust Fan via a communicated signal from the Building Automation System. This will allow direct Exhaust Fan Control to be provided by the BAS. This additional control will allow for building pressure control to be maintained by an external source and not controlled directly by the unit. The option of standard building pressure control is still available, as seen in the previous section *Modulating Exhaust with A VFD.*

Required Programmed Values

"EXHAUST CONTROL BAS" must be set to *"USER ENABLED"* in the SERVICE key or enabled through BAS Point EXH_CTRL_BAS(BV24).

BAS Point to control Exhaust Fan Speed is EXH_ DAMPER/VFD(AV52).

"POWER EXHAUST TYPE" must be set to *"MODULATE DAMPER-VFD"* through the OPTIONS, key EXHAUST subsection of the User Interface.

"EXHAUST OUTPUT FOR FAN START" must be set using the SETPOINTS key, EXHAUST subsection of the User Interface.

"EXHAUST OUTPUT FOR FAN STOP" must be set using the SETPOINTS key, EXHAUST subsection of the User Interface.

Operation

When the *"EXHAUST CONTROL BAS"* is set to USER ENABLED and the *"POWER EXHAUST TYPE"* is set to MODULATE DAMPER-VFD, the controller shall read a BACnet BAS Analog Value. This Analog Value shall be set up for 0-100%.

The controller shall read the BACnet Analog Value and drive the *"EXHAUST/RETURN FAN VFD"* to this value. For example, if the Analog Value is 27%, the *"EXHAUST/RETURN FAN VFD"* shall be 27%. The outputs shall follow this Analog Value.

When the Analog Value is more than or equal to the *"EXHAUST OUTPUT FOR FAN START,"* the Unit Controller will send a binary signal to the exhaust fan VFD, and the motor will start. This binary output originates at terminal 4 of terminal block TB1 of the Unit Controller.

When the Analog Value is less than or equal to the *"EXHAUST OUTPUT FOR FAN STOP,"* the Unit Controller will remove the binary signal to the exhaust fan VFD and the motor will stop.

RETURN FAN

A Series 100 unit can be ordered with a return fan. A return fan is typically used on an HVAC system that has higher than normal return duct static. The return fan will assist the supply fan in making sure that proper return air flow is maintained. Return fans will be controlled by a VFD, and will operate whenever the supply fan in operating.

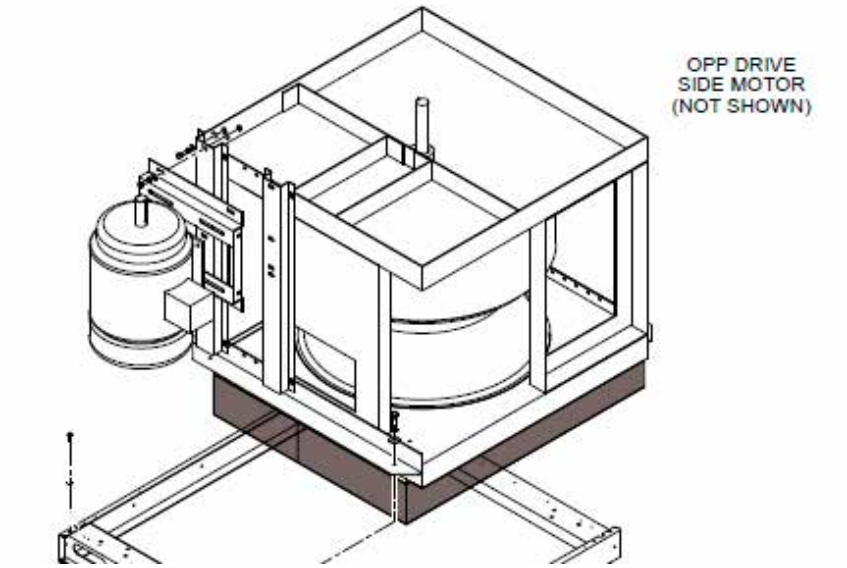


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FIGURE 45 - RETURN FAN

Return Fan Options

1. Return Fan without Exhaust
   - This selection will have no building pressure control
2. Return Fan with Exhaust
   - This selection will have modulating exhaust dampers and will have building pressure control

Return Fan without Exhaust

- Power Exhaust Type MUST be set to “Return Fan w/o Exhaust”

Sequence of Operation: Return Fan without Exhaust

- Supply Fan Starts, air proving switch closes
- Return Fan Starts, dry contacts in return fan VFD close to prove operation
- The return fan plenum pressure transducer measures the pressure of the return fan plenum
- Based on the return fan plenum pressure, the unit controller will send a 0-10 VDC signal to the return fan VFD
- The return fan VFD will control the speed of the return fan to maintain the “Active Return Plenum Press SP” (This SP is fixed at 0.05” WC for a return fan without exhaust)

Return Fan with Exhaust

- Power Exhaust Type MUST be set to “Return Fan w/ Exhaust”
- Bldg Press SP MUST be programmed into unit controller
- Return Pressure High SP MUST be programmed into unit controller

Sequence of Operation: Return Fan with Exhaust

- Supply Fan Starts, air proving switch closes
- Return Fan Starts, dry contacts in return fan VFD close to prove operation
- Building Pressure below Bldg Press SP (Return fan will control like a Return Fan without Exhaust)
    1. The return fan plenum pressure transducer measures the pressure of the return fan plenum
    2. Based on the return fan plenum pressure, the unit controller will send a 0-10 VDC signal to the return fan VFD
    3. The return fan VFD will control the speed of the return fan to maintain the “Active Return Plenum Press SP” (This SP is fixed at 0.05” WC)
- Building Pressure equal to/greater than Bldg Press SP
    1. Once the building pressure equals or rises above the building pressure SP, the unit controller sends a 0-10 VDC signal to the exhaust damper actuator. The unit controller displays this signal as a %, and can be seen as the Exhaust Damper Position. (0 VDC = 0% and 10 VDC = 100%)
    2. As the exhaust damper position increases, the speed of the return fan will be controlled by the Return Fan Plenum Pressure Control Loop. The Active Return Plenum Press SP will be reset between the Minimum Return Plenum Press SP (Non-Adjustable 0.05” WC) and the Return Pressure High SP (user adjustable between 0.15” WC and 0.45” WC)
    3. Once the building pressure drops below the Bldg Press SP, the return fan will again be controlled like a Return Fan without Exhaust
    4. See *Figure 46 on page 96*

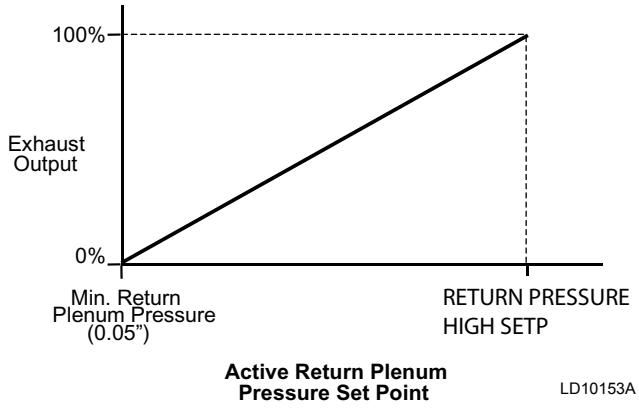


FIGURE 46 - ACTIVE RETURN PLENUM PRESSURE SETPOINT VS. EXHAUST OUTPUT.

VFD Return Fan with Exhaust BAS Control

Overview

A communicated value has been added to allow for the control of the Modulating Exhaust Damper when using a Return Fan with Exhaust on the Series 100 equipment. This will allow direct Modulated Exhaust Damper control to be provided by the BAS. This additional control will allow for building pressure controlto be maintained by an external source and not controlled directly by the unit.

Required Program Values

"EXHAUST CONTROL BAS" must be set to *"USER ENABLED"* in the SERVICE Key or enabled through BAS Point EXH_CTRL_BAS(BV24).

BAS Point to control Exhaust Damper Position is EXH_DAMPER/VFD(AV52)

"POWER EXHAUST TYPE" must be set to *"RETURN FAN W/EXHAUST"* through the OPTIONS key, EXHAUST subsection of the User Interface.

"BUILDING PRESSURE SETPOINT" must be set using the SETPOINTS key, EXHAUST subsection of the User Interface.

"RETURN PRESSURE HIGH SETP" must be set using the SETPOINTS key, SUPPLY SYSTEM subsection of the User Interface.

Operation

When the *"EXHAUST CONTROL BAS"* is set to *"USER ENABLED"* and the *"POWER EXHAUST TYPE"* is set to *"RETURN FAN W/EXHAUST,"* the controller shall read a BACnet BAS Analog Value. This Analog Value shall be set up for 0-100%.

The controller shall read the BACnet Analog Value and drive the *"EXHAUST DAMPER"* to this value. For example, if the Analog Value is 27%, the *"EXHAUST DAMPER"* shall be 27%. The outputs shall follow this Analog Value. The Return Fan operations remains unchanged. The spood ot the Return Fan is still controlled by the Return Fan Plenum Pressure versus the Return Fan Plunum Pressure Setpoint. For specific Return Fan operation, see *Return Fan on page 95* and its subsections.

SMOKE PURGE

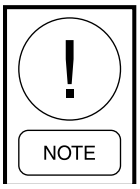
The Series 100 unit has the ability to enter into 1 of 3 smoke purge sequences. These sequences should only be used in very specific applications. While in Smoke Purge Mode, all other functions and commands will be ignored.

Smoke Purge Sequences

1. Smoke Purge Sequence 1
2. Smoke Purge Sequence 2
3. Smoke Purge Sequence 3

Each of the above sequences can be set for 1 of 3 different control sequences

1. Purge (Highest Priority)
2. Pressurization (Medium Priority)
3. Evacuation (Lowest Priority)



On VAV and Flexsys units, the supply fan VFD will still control to the Active Duct Static SP.

Sequence of Operation: Purge Mode - Used to purge the space with fresh air

- Start the Supply fan
- Start the Return Fan (if applicable)
- Start the Exhaust Fan (if applicable)
- Open O/A Dampers to 100% (if applicable)
- Close R/A Dampers to 0% (if applicable)
- Open Exhaust Dampers to 100% (if applicable)

Sequence of Operation: Pressurization Mode – Used to pressurize the space in order to force the air inside the space through the walls to adjacent spaces or outside the building envelope.

- Start the supply fan
- Start the return fan (if applicable)
- Stop the exhaust fan (if applicable)
- Open O/A dampers to 100% (if applicable)
- Close the R/A dampers to 0% (if applicable)

Sequence of Operation: Evacuation Mode – Used to evacuate the space in order to draw air through the walls from adjacent spaces or outside the building envelope

- Stop the supply fan
- Start the return fan (if applicable)
- Start the exhaust fan (if applicable)
- Close O/A dampers to 0% (if applicable)
- Open R/A dampers to 100% (if applicable)
- Open the exhaust dampers to 100% (if applicable)

SERIES 100: FLEXSYS OPERATION

The following sections deal with the operation of a Series 100 unit configured for Flexsys operation. Flexsys operation is the use of an underfloor plenum to provide conditioned air to a building. Since the conditioned air is delivered up from the floor, the operation differs from that of a typical VAV system. Please review these sections thoroughly before proceeding with unit setup, start-up, and operation.

The design of a Flexsys system is very critical to the proper operation of the Series 100 unit. Please review the following areas that create issues with the proper operation of a Flexsys system/unit.

1. Plenum Integrity: “If you make a hole, seal a hole”. The underfloor plenum must be completely sealed from air leaking out.
2. Open plenum returns: It is highly recommended that returns be ducted to every room. This allows the warmer return air to properly mix and be at the proper temperature returning to the unit.
3. Six foot cooling zone: When designing a Flexsys system, only the first six feet from the floor up is to be conditioned. Above 6 feet, the air needs to be mixed with heat loads. This will ensure that the R/A is at least 78 °F. It is has been determined that RAT’s cooler than 78 °F cannot properly raise the temperature of the air leaving the evap coil to the recommended MX SAT of 62-64 °F. It has been

determined than MX SAT's lower than 62 °F are uncomfortable to occupants of a space.

4. Multiple Plenums/One Unit: When designing a system that will serve multiple plenums, it is highly recommended that each plenum have its own volume damper controlled by an actuator. Each plenum should also have its own pressure transducer that controls the actuator driven volume damper. Each plenum should be maintained at .05" WC.

The above issues should have been taken into consideration during the design and engineering phase of the project.

Since a Flexsys unit delivers air through an underfloor plenum, some of the SP's differ from a typical VAV unit. Below are recommended SP's provided by the engineering team. There has been a lot of testing and research done on these systems to arrive at these SP's. Please be advised that these are recommendations only, and job specific SP's could be different. We recommend using these SP's at least as a starting point.

Factory Recommended Setpoints

RAT Cooling SP: 78 °F

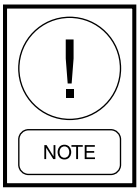
MX SAT SP: 62-64 °F (see note)

Evap Leaving Air Temp High SP: 58 °F

Evap Leaving Air Temp Low SP: 55 °F

Duct Static SP: .05" WC

Heating SAT SP: 80 °F



On a Flexsys unit, the MX SAT is the temperature of the Supply Air off the evaporator coil mixed with the warmer return air that is bypassed around the evaporator coil. The bypassed return air is introduced directly under the supply air fan.

Flexsys: Current Operating Mode (Occupied)

The current operating mode for a Flexsys configured unit will be decided the same as for a VAV configured unit, by the Return Air temperature.

- If the RAT is >= the Cooling RAT SP by .5 °F, the unit will enter the Cooling mode
- If the RAT <= the Heating RAT SP by .5 °F, the unit will enter the Heating mode
- If the RAT is between the Cooling RAT SP and the Heating RAT SP, the unit will remain in the Standby mode

Flexsys: Fan Operation

The same as a VAV configured unit, the supply fan will be controlled by a VFD. The VFD will control the speed of the supply fan up/down to achieve and maintain the Active Duct Static SP

The same as a VAV configured unit, the supply fan will be on whenever the unit is in the Occupied Mode, and will cycle on/off in the Unoccupied Mode with a demand for heating or cooling

Flexsys: Cooling

Occupied:

Whenever a Flexsys unit enters an Occ Cooling mode, it will always start in the Occ Cooling w/o Bypass mode for the first 30 seconds. After this time delay has expired, the unit controller will determine which mode it needs to be in; Occ Cooling w/o Bypass or Occ Cooling w/ Bypass

Occ Cooling w/o Bypass:

The unit controller will cycle the compressors or modulate the O/A damper to achieve and maintain the MX SAT SP.

- If the economizer is active, the unit will remain in the Occ Cooling w/o Bypass mode

  OR

- If the RAT >= RAT SP plus .5 °F, BUT, RAT < MX SAT SP + the RA Diff SP (user adjustable between 2-10 °F)

Occ Cooling w/ Bypass

If the RAT >= RAT SP plus .5 °F, AND, RAT > MX SAT SP + the RA Diff SP (user adjustable between 2-10 °F)

The unit controller will cycle the compressors to maintain either the Evap Leaving Air Temp High SP or the Evap Leaving Air Temp Low SP.

The unit controller will modulate the Flexsys Bypass Damper open/closed to achieve and maintain the MX SAT SP

Evap Leaving Air Temp High SP:

- R/A Humidity sensor is not reliable

  OR

- R/A Enthalpy < the Reset Enthalpy SP

Evap Leaving Air Temp Low SP:

- R/A Enthalpy is >= Reset Enthalpy SP

  OR

- Underfloor Slab Dewpoint is >= Underfloor Slab Temp – 2.0 °F for 120 seconds (Only if Dew Point Reset is User Enabled)

Return Air Bypass

Current %: This is the amount of air the unit thinks it is bypassing due to the fact that the MX SAT is not increasing. The unit controller utilizes the current RAT, the Current Evap Leaving Air Temp, and the MX SAT to perform a calculation to arrive at the Current %

Active SP %: This is how much of the return air the unit thinks it needs to bypass to warm the MX SAT from its current value to the MX SAT SP. The unit controller utilizes the current RAT, the current Evap Leaving Air Temp, and the current MX SAT to perform a calculation to arrive at the Active SP %

Both of the above numbers are based on internal algorithms and logic built into the unit controller. These algorithms and internal logic are not user adjustable.

Bypass Damper Position

This is the actual position of the bypass damper. The bypass damper should be able to drive between 0% and 100%

Bypass Damper Operation

The operation of the bypass damper is very slow and the logic that drives the damper is quite complicated. When the unit is in normal operation, it could take up to 40 mins for the bypass damper to go from 0% to 100%. If the unit is operating properly and the temperatures are in the proper range, the damper will probably never drive to 100%.

Unoccupied:

Unoccupied Cooling mode will be initiated by the current zone temp being higher than the Unoccupied Zone Cooling SP by .5 °F. The Night Set Back feature must be User Enabled. Night Set Back can be found under the Heating menu.

- Supply fan starts. Supply fan VFD is controlled to the Active Duct Static SP
- O/A damper is modulated open/closed to achieve and maintain the MX SAT SP

  AND/OR

- Compressors are cycled on/off to achieve and maintain the MX SAT SP
- Bypass damper remains closed
- Cooling operation will continue until the current zone temp is less than the Unocc Zone Cooling SP by .5 °F

Flexsys: Compressor Control

Occupied Cooling w/o Bypass

- S100 enters an active cooling mode
- Unit Controller sets the “Cooling Control Offset” to 2 °F
- Unit Controller compares the current MX SAT to the MX SAT SP plus or minus the “Cooling Control Offset”
- If MX SAT is greater than the MX SAT SP plus the “Cooling Control Offset”, the Unit Controller will:

  a. Start a Compressor

     OR

  b. Bring on a additional stage of cooling based on the “Next Stage to Enable”

- If MX SAT is less than the MX SAT SP minus the “Cooling Control Offset”, the Unit Controller will:

  a. Stop a compressor based on the “Next Stage to Disable”

Occupied Cooling w/ Bypass

- S100 unit enters an active cooling mode
- Unit Controller sets the “Cooling Control Offset” to 2 °F
- Unit Controller compares the Evap Leaving Air Temp to the Active Evap Leaving Air Temp SP plus or minus the “Cooling Control Offset”
- If Evap Leaving Air Temp is greater than the Active Leaving Air Temp SP plus the “Cooling Control Offset”, the Unit Controller will:

a. Start a compressor

OR

b. Bring On and additional stage of cooling based on the "Next Stage to Enable"

- If the Evap Leaving Air Temp is less than the Active Evap Leaving Air Temp SP, the Unit Controller will:

a. Stop a compressor based on the "Next Stage to Disable"

Flexsys: Economizer

- The suitability requirements will be the same as above except for

a. Normal-Active

1. OAT must be at least 2 °F below the MX SAT SP

b. Normal-Inactive

1. OAT is greater than/equal to the MX SAT SP

- When conditions are determined suitable for Econo Operation, the Unit Controller will send a 0-10 VDC signal to the O/A damper actuator, modulating the dampers open/closed
- OA dampers will be modulated to maintain the Active MX SAT SP

Flexsys: Heating

Occupied/Unoccupied heating operation will follow the same sequence as a VAV configured unit. It is recommended to limit the Heating SAT SP to 80 or 90°F. This will prevent the underfloor concrete slab from becoming too warm and then radiating heat for an extended period of time after heating operation has been terminated.

Flexsys: Underfloor Temperature Control

Dew Point Reset:

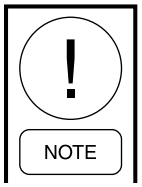
This sequence changes the Active Evaporator Leaving Air Temperature to a lower value when the temperature of the underfloor air approaches it's dew point.

- **MUST** have an underfloor slab temperature sensor AND an underfloor humidity sensor installed. (Field provided and field wired to CTB1. Can also be communicated from the BAS)
- Dew Point Reset MUST be User Enabled
- Unit controller uses the MX SAT and the underfloor humidity to calculate the underfloor dew point
- If Underfloor Air Dew Point >= the Underfloor Slab Temp – 2.0 °F for 120 seconds, the unit controller will switch from the Evap Leaving Air Temp High SP to the Evap Leaving Air Temp Low SP
- Unit controller will continue to use the Evap Leaving Air Temp Low SP until the Underfloor Air Dew Point < the Underfloor Slab Temp – 2.5°F

Active Slab Control:

This sequence allows heat to be turned ON during a transition from one occupancy state to another if the underfloor air temperature is higher than the undefloor slab temp.

- Unit MUST have heat installed
- Heating System MUST be User Enabled
- Active Slab Control MUST be User Enabled



The unit display shows the Heating System Status as Inactive while in Active Slab Control. The Supply System Status shows as Active.

Unoccupied to Occupied

- Unit controller checks the Underfloor Slab Temp immediately after switching from Unoccupied to Occupied Standby (if the unit controller calls from Occupied Cooling with or without Bypass during this time, Active Slab Control will be terminated)
- If Underfloor Slab Temp <= the MX SAT SP – 2 °F, the Underfloor Temp Override will become Active
- Underfloor Temp Control is set to MX SAT SP + 10 °F
- Unit Controller will generate a call for heat

a. If staged heat (staged gas or electric), unit controller will start the first stage of heat

b. If modulating (modulating gas or hot water/steam) unit controller will control the SAT to the Underfloor Temp Control SP

- Heating operation will continue until
  a. The Underfloor Slab Temp >= the MX SAT SP

     OR

  b. 20 minutes time has elapsed

Occupied to Unoccupied Mode

- Unit controller checks the Underfloor Slab Temp immediately after switching from an Occupied mode to Unoccupied Standby
- If the Underfloor Slab Temp > the RAT – 2 °F, Underfloor Temp Override will become Active
- The Underfloor Temp Control SP is set to the RAT SP + 10 °F
- Unit Controller will generate a call for heat
  a. If staged heat (staged gas or electric), unit controller will start the first stage of heat
  b. If modulating (modulating gas or hot water/ steam) unit controller will control the SAT to the Underfloor Temp Control SP
- Heating operation will continue until
  a. The Underfloor Slab Temp > RAT + 1 °F

     OR

  b. 20 minutes time has elapsed

Flexsys: All Other Sequences

The other sequences of operation for a Flexsys unit will follow the same procedures as a VAV configured unit.

Flexsys: Bacnet Points

The following list contains the special points associated with a Flexsys unit

TABLE 36 - BACNET POINTS ASSOCIATED WITH FLEXSYS UNIT

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
ACT_SAT_SP	ACTIVE SUPPLY AIR TEMP SP	R	AI04	517	CV or VAV: DISPLAYS THE ACTIVE SUPPLY AIR TEMP SP FLEXSYS: IF CURRENT MODE IS OCC COOLING W/O BYPASS, THIS WILL BE = TO THE MX SAT SP (MIXD_SAT_LIM; AV14): IF CURRENT MODE IS OCC COOLING W/ BYPASS, THIS WILL BE = TO EITHER THE EVAP LEAVING HIGH SP (EL_AIR_TMP_H; AV07) OR THE EVAP LEAVING LOW SP (EL_AIR_TMP_L; AV08) DEPENDING ON THE SYSTEM CONDITIONS.
BYPASS_ DAMPER	BYPASS DAMPER POSITION (FLEXSYS ONLY)	R	AI06	519	DISPLAYS THE ACTUAL BYPASS DAMPER POSITION
DEW_PNT_ RST	DEW POINT RESET (FLEXSYS)	R/W	AV80 BV04	1105	ALLOWS THE DEW POINT RESET FEATURE TO BE TURNED ON/OFF: 0=OFF 1=ON
EL_AIR_ TMP_H	EVAP LEAVING AIR TEMP HIGH SP (FLEXSYS)	R/W	AV07	1032	DISPLAYS THE ACTIVE SP FOR THE HIGH EVAP LEAVING AIR TEMP. THIS IS THE SP THE COMPRESSORS ARE CONTROLLED TO (OCC COOLING W/ BYPASS)
EL_AIR_ TMP_L	EVAP LEAVING AIR TEMP LOW SP (FLEXSYS)	R/W	AV08	1033	DISPLAYS THE ACTIVE SP FOR THE LOW EVAP LEAVING AIR TEMP. THIS IS THE SP THE COMPRESSORS ARE CONTROLLED TO (OCC COOLING W/ BYPASS)

TABLE 36 - BACNET POINTS ASSOCIATED WITH FLEXSYS UNIT (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
EVAP_AIR_ TMP	FLEXSYS EVAP TEMP CURRENT (FLEXSYS)	R	AI20	533	DISPLAYS THE ACTUAL TEMP OF THE AIR LEAVING THE EVAPORATOR (OCC COOLING W/ BYPASS)
MAX_BYPASS	MAXIMUM BYPASS SP (FLEXSYS)	R/W	AV10	1035	DISPLAYS THE MAX SETTING FOR THE BYPASS DAMPER
MIXD_SAT_ LIM	MX SUPPLY AIR TEMP SP (FLEXSYS)	R/W	AV14	1039	DISPLAYS THE ACTIVE MIXED AIR TEMP SP (OCC COOLING W/O BYPASS-COMPRESSOR CONTROL) (OCC COOLING W/ BYPASS-DAMPER CONTROL
RA_DIFF_BAS	RETURN AIR DIFF SP BAS (FLEXSYS)	R/W	AV42	1067	DISPLAYS THE ACTIVE DIFFERENTIAL SP BETWEEN THE RAT AND THE MX SAT SP WHICH IS UTILIZED IN THE INTERNAL LOGIC FOR SELECTING THE PROPER FLEXSYS COOLING MODE; OCC COOLING W/ BYPASS or OCC COOLING W/O BYPASS
RST_ENT_ BAS	RESET ENTHALPY SP BAS (FLEXSYS)	R/W	AV41	1066	DISPLAYS THE RA ENTHALPY SP WHICH CAUSES THE UNIT TO SWITCH FROM THE EVAP LEAVING HIGH SP TO THE EVAP LEAVING LOW SP
SUP_AIR_ TEMP	SUPPLY AIR TEMP CURRENT	R	AI46	559	CV or VAV: DISPLAYS THE ACTUAL TEMP OF THE SUPPLY AIR (°F) FLEXSYS: DISPLAYS THE ACTUAL TEMP OF THE MX SUPPLY AIR TEMP (°F)
UND_FLR_ DEWP	UNDERFLOOR SLAB DEW POINT (FLEXSYS)	R	AI55	568	DISPLAYS THE CALCULATED DEW POINT OF THE UNDERFLOOR AIR (°F)
UND_FLR_ HUMD	UNDERFLOOR AIR HUMIDITY (FLEXSYS)	R	AI56	569	DISPLAYS THE HUMIDITY VALUE OF THE UNDERFLOOR AIR (% RH)
UND_FLR_ TEMP	UNDEFLOOR SLAB TEMP (FLEXSYS)	R	AI57	570	DISPLAYS THE TEMP OF THE UNDERFLOOR SLAB (°F)
UND_HUMD_ BAS	UNDERFLOOR AIR HUMIDITY BAS (FLEXSYS)	R/W	AV36	1061	ALLOWS THE BAS SYSTEM TO INPUT AN UNDERFLOOR AIR HUMIDITY VALUE TO THE CONTROL. (% RH) "UNDER FLR HUMI BAS" MUST BE ENABLED IN THE SERVICE MENU FOR THIS POINT TO FUNCTION
UND_TEMP_ BAS	UNDERFLOOR SLAB TEMP BAS (FLEXSYS)	R/W	AV37	1062	ALLOWS THE BAS SYSTEM TO INPUT AN UNDERFLOOR SLAB TEMP VALUE TO THE CONTROL (°F) "UNDER FLR TEMP BAS" MUST BE ENABLED IN THE SERVICE MENU FOR THIS POINT TO FUNCTION

SECTION 6 – USER INTERFACE CONTROL CENTER

USER INTERFACE CONTROL CENTER

The User Interface is used to commission, monitor, and troubleshoot the rooftop unit. It provides access to operational data, parameter programming, and access to past "history" information that was recorded at the time of a unit or system fault.

The User Interface is installed in the low voltage control compartment of the rooftop unit.

The User Interface uses a flexible membrane style keypad and has an 80 character (2 lines of 40 characters) liquid crystal display. The display has a lighted background for night viewing and can be viewed in direct sunlight. The backlighting will energize when any button is pressed.

The keypad allows complete control of the system from a central location. The keypad offers a multitude of commands available to access displays, program parameters, and initiate system commands. The keypad consists of thirty-six keys, that are divided into three categories, Data Entry, Navigation, and Menu Selection keys. A description of each of the keys is contained below.

Data Entry Keys

The Data Entry Keys provide a means to enter values for items that support edits. The keys available to support numeric input are the 0 through 9 keys, the decimal key, the +/- key, the **X** key and the ✓ key. The keys available to support choice input are the ◄ key, the ► key, the **X** key, and the ✓ key. Editing is started by pressing the ✓ key. ***Once editing has started, the user must press either the ✓ key or the X key***. Any other key press will result in the "**Press ✓ or X to Exit**" message displayed for two seconds. If you try to edit an item that is view only it will be ignored by the menu system.

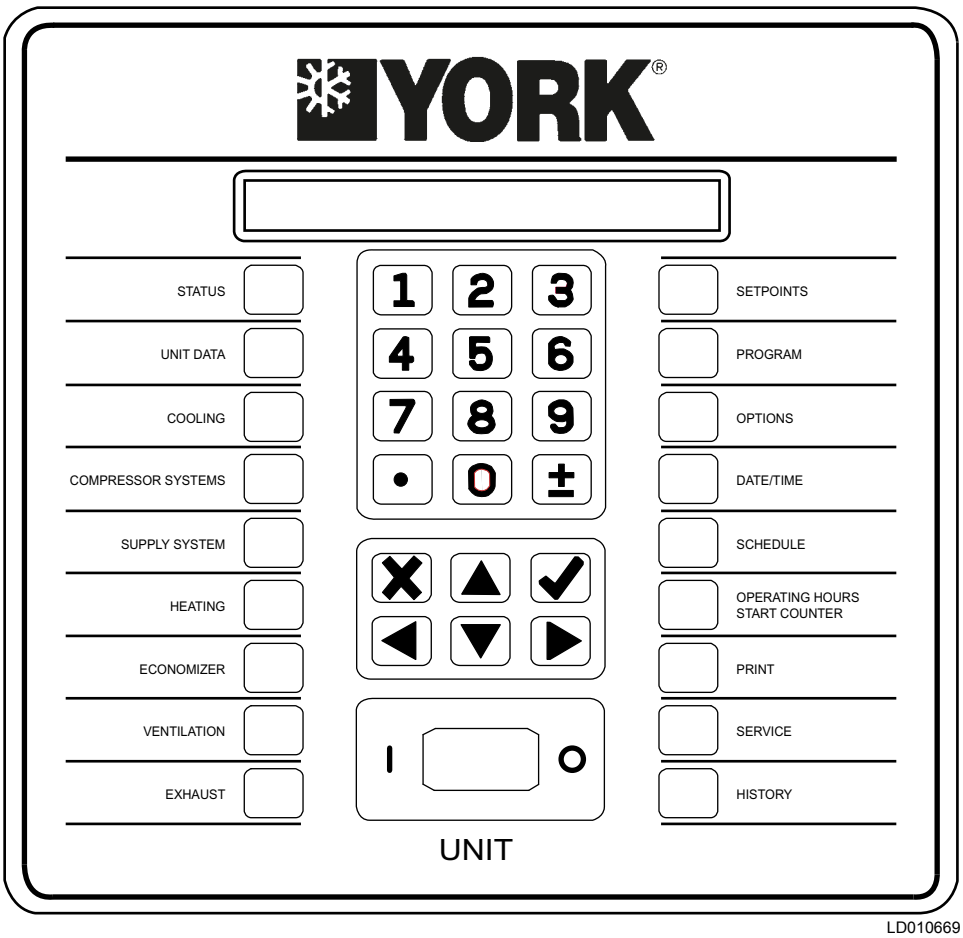


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FIGURE 47 - USER INTERFACE CONTROL PANEL

TABLE 37 - STATUS

DISPLAY TEXT	RANGE	DEFAULT	SETTING LOCATION	SHOWN WHEN
UNIT - OVERALL STATUS	LOCAL STOP / RUN / UNIT TRIP / UNIT FAULT / UNIT LOCKOUT / SMK PURGE #-PRESS / SMK PURGE #-PURGE / SMK PURGE #-EVAC	DERIVED		ALWAYS
CURRENT OPER MODE	OCC STANDBY / OCC COOLING LOW / OCC COOLING HIGH / OCC HEATING LOW / OCC HEATING HIGH / UNOCC STANDBY / UNOCC COOLING LOW / UNOCC COOLING HIGH / UNOCC HEATING LOW / UNOCC HEATING HIGH / MORNING WARM-UP / COMFORT VENT COOLING / COMFORT VENT HEATING	DERIVED		UNIT TYPE EQUALS CV
CURRENT OPER MODE	OCCUPIED STANDBY / OCCUPIED HEATING / OCCUPIED COOLING / UNOCCUPIED STANDBY / UNOCCUPIED HEATING / UNOCCUPIED COOLING / MORNING WARM-UP	DERIVED		UNIT TYPE EQUALS VAV
CURRENT OPER MODE	OCCUPIED STANDBY / OCCUPIED HEATING / OCC COOLING W/O BYP / OCC COOLING W/ BYP / UNOCCUPIED STANDBY / UNDER FLOOR TEMP OVERRIDE	DERIVED		UNIT TYPE EQUALS FLEXSYS
SUPPLY SYS STATUS	NORMAL - ACTIVE / NORMAL INACTIVE / SAFETY TRIP / SAFETY FAULT / SAFETY LOCKOUT	DERIVED		ALWAYS
COMP SYS 1 STATUS	NORMAL - COMP A ON / NORMAL - COMP B ON / NORMAL - BOTH ON / NORMAL - BOTH OFF / SAFETY TRIP / SAFETY FAULT / SAFETY LOCKOUT / LOW AMB INHIBIT / LOW SUCT TEMP UNL / HIGH DP UNLOAD / USER DISABLED	DERIVED		ALWAYS
COMP SYS 2 STATUS	NORMAL - COMP A ON / NORMAL - COMP B ON / NORMAL - BOTH ON / NORMAL - BOTH OFF / SAFETY TRIP / SAFETY FAULT / SAFETY LOCKOUT / LOW AMB INHIBIT / LOW SUCT TEMP UNL / HIGH DP UNLOAD / USER DISABLED	DERIVED		ALWAYS
COMP SYS 3 STATUS	NORMAL - COMP A ON / NORMAL - COMP B ON / NORMAL - BOTH ON / NORMAL - BOTH OFF / SAFETY TRIP / SAFETY FAULT / SAFETY LOCKOUT / LOW AMB INHIBIT / LOW SUCT TEMP UNL / HIGH DP UNLOAD / USER DISABLED	DERIVED		UNIT SIZE EQUALS 120 TON OR 130 TON
HEATING SYS STATUS	NORMAL - ACTIVE / NORMAL - INACTIVE / SAFETY TRIP / SAFETY FAULT / SAFETY LOCKOUT / USER DISABLED / NONE	DERIVED		ALWAYS
ECONO SYS STATUS	NORMAL - ACTIVE / NORMAL - INACTIVE / SAFETY TRIP / SAFETY FAULT / SAFETY LOCKOUT / USER DISABLED / NONE	DERIVED		ALWAYS
VENT SYS STATUS	NORMAL - ACTIVE / NORMAL - INACTIVE / SAFETY TRIP / SAFETY FAULT / SAFETY LOCKOUT / USER DISABLED / NONE	DERIVED		ALWAYS
EXHAUST SYS STATUS	NORMAL - ACTIVE / NORMAL - INACTIVE / SAFETY TRIP / SAFETY FAULT / SAFETY LOCKOUT / USER DISABLED / NONE	DERIVED		ALWAYS
SENSOR / MISC STATUS	NORMAL / WARNING / SAFETY TRIP / SAFETY FAULT / SAFETY LOCKOUT	DERIVED		ALWAYS
FILTER STATUS	OKAY / CHANGE	DERIVED		ALWAYS

TABLE 38 - UNIT DATA

DISPLAY TEXT	PASS WORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN UNIT TYPE IS:
UNIT TYPE	2	CONSTANT VOLUME / VARIABLE AIR VOLUME / FLEXSYS / SINGLE ZONE VAV	CONSTANT VOLUME	OPTIONS / UNIT DATA	ALWAYS
UNIT SIZE	2	120 TON, 130 TON, 150 TON	50 TON	OPTIONS / UNIT DATA	ALWAYS
MODEL GENERATION		MOD G OR MOD F	MOD G	OPTIONS / UNIT DATA	ALWAYS
REFRIGERANT TYPE	2	R-410A	R-410A	OPTIONS / UNIT DATA	ALWAYS
FAST COMP START	2	USER ENABLED / USER DISABLED	USER DISABLED	OPTIONS/ UNIT DATA	UNIT SIZE IS 70-150 TONS
UNIT DESIGN AIRFLOW	2	7500-52000 CFM	7500 CFM	OPTIONS/ UNIT DATA	FAST COMP START IS USER ENABLED
CONTROL METHOD	1	STAGED / WIRED ZONE TEMP / COMM ZONE TEMP	STAGED	OPTIONS / UNIT DATA	UNIT TYPE EQUALS CONSTANT VOLUME
SAT RESET METHOD	1	HARDWIRED, OUTSIDE AIR, RETURN AIR, SUPPLY FAN SPEED	HARDWIRED INPUT	OPTIONS / UNIT DATA	UNIT TYPE EQUALS VARIABLE AIR VOLUM
SUPPLY AIR TEMP					
CURRENT		-20.0º F TO 180.0º F	LOOK UP TABLE		UNIT TYPE E EQUALS CONSTANT VOLUME OR VARIABLE AIR VOLUM
ACTIVE SP		50º F TO 150º F	DERIVED		
MX SUPPLY AIR TEMP					
CURRENT		-20.0º F TO 180.0º F	LOOK UP TABLE		UNIT TYPE E EQUALS FLEXSYS
SETPOINT	1	50º F TO 65º F	65º F	SETOINTS/ UNIT DATA	
ZONE TEMP*					
CURRENT		-20.0º F TO 180.0º F	LOOK UP TABLE		UNIT TYPE EQUALS CONSTANT VOLUME OR VARIABLE AIR VOLUM
OCC ZONE COOLING SETPOINT	1	OCC ZONE HEATING SETPOINT + 2.0º F	72.0º F	SETOINTS/ UNIT DATA	
ZONE TEMP*					
CURRENT		-20.0º F TO 180.0º F	LOOK UP TABLE		UNIT TYPE EQUALS CONSTANT VOLUME OR VARIABLE AIR VOLUM
UNOCC ZONE COOLING SETPOINT	1	UNOCC ZONE HEATING SETPOINT + 2.0º F TO 95º F	85.0º F	SETOINTS/ UNIT DATA	

TABLE 38 - UNIT DATA (CONT'D)

DISPLAY TEXT	PASS WORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN UNIT TYPE IS:
ZONE TEMP*					
CURRENT		-20.0º F TO 180.0º F	LOOK UP TABLE		UNIT TYPE EQUALS CONSTANT VOLUME OR VARIABLE AIR VOLUM
OCC ZONE HEATING SETPOINT	1	60º F TO OCC ZONE COOLING SETPOINT - 2.0º F	68.0º F	SETOINTS/ UNIT DATA	
ZONE TEMP*					
CURRENT		-20.0º F TO 180.0º F	LOOK UP TABLE		UNIT TYPE EQUALS CONSTANT VOLUME OR VARIABLE AIR VOLUM
UNOCC ZONE HEATING SETPOINT	1	50º F TO UNOCC ZONE COOLING SETPOINT - 2.0º F	60.0º F	SETOINTS/ UNIT DATA	
SMOKE PURGE SEQ 1	1	PURGE / PRESSURIZATION / EVACUATION	PURGE	OPTIONS / UNIT DATA	ALWAYS
SMOKE PURGE SEQ 2	1	PURGE / PRESSURIZATION / EVACUATION	PRESSURIZATION	OPTIONS / UNIT DATA	ALWAYS
SMOKE PURGE SEQ 3	1	PURGE / PRESSURIZATION / EVACUATION	EVACUATION	OPTIONS / UNIT DATA	ALWAYS
DISPLAY LANGUAGE	1	ENGLISH / SPANISH	ENGLISH	OPTIONS / UNIT DATA	ALWAYS
DISPLAY UNITS	1	IMPERIAL / METRIC	IMPERIAL		ALWAYS

* ONLY THE ZONE TEMP SCREEN FOR THE CURRENT ACTIVE MODE WILL BE SHOWN.

TABLE 39 - COOLING

DISPLAY TEXT	PASS WORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN UNIT TYPE IS
SUPPLY AIR TEMP					
CURRENT		-20.0º F TO 180.0º F	LOOK UP TABLE		UNIT TYPE EQUALS CONSTANT VOLUME OR VARIABLE AIR VOLUM
ACTIVE SP		50.0º F TO 150.0º F	DERIVED		
FLEX EVAP TEMP					
CURRENT		-20.0º F TO 180.0º F	LOOK UP TABLE		UNIT TYPE EQUALS FLEXSYS AND CURRENT OPER MODE IS OCC COOLING W/ BYP
ACTIVE SP		50.0º F TO 60.0º F	DERIVED		
MX SUPPLY AIR TEMP					
CURRENT		-20.0º F TO 180.0º F	LOOK UP TABLE		UNIT TYPE EQUALS FLEXSYS
SETPOINT	1	50.0º F TO 75.0º F	65.0º F	SETPOINTS/ COOLING	
COOLING CONTROL OFFSET		1.0º F TO 100.0º F	DERIVED		
RETURN AIR DIFF SP	2	2.0º F TO 10.0º F	6.0º F	SETPOINTS/ COOLING	UNIT TYPE EQUALS FLEXSYS
ZONE TEMP*					
CURRENT		-20.0º F TO 180.0º F	LOOK UP TABLE		UNIT TYPE EQUALS CONSTANT VOLUME OR VARIABLE AIR VOLUM
OCC ZONE COOLING SETPOINT	1	OCC ZONE HEATING + 2.0º F TO 85.0º F	72.0º F	SETPOINTS/ COOLING	
ZONE TEMP*					
CURRENT		-20.0º F TO 180.0º F	LOOK UP TABLE		UNIT TYPE EQUALS CONSTANT VOLUME OR VARIABLE AIR VOLUM
UNOCC ZONE COOLING SETPOINT	1	UNOCC ZONE HEATING + 2.0º F TO 95.0º F	85.0º F	SETPOINTS/ COOLING	
RETURN AIR TEMP					
CURRENT		-20.0º F TO 180.0º F	LOOK UP TABLE		UNIT TYPE EQUALS VARIABLE AIR VOLUM OR FLEXSYS
RAT COOLING SETPOINT	1	RAT HEATING SETP +2º F TO RAT FOR HIGH SAT	70.0º F	SETPOINTS/ COOLING	
RETURN AIR BYPASS					
CURRENT		0 TO 100%	DERIVED		UNIT TYPE EQUALS FLEXSYS
ACTIVE SP		0 TO 100%	DERIVED		
BYPASS DAMPER POSITION		0 TO 100%	DERIVED		UNIT TYPE EQUALS FLEXSYS
UNDERFLOOR AIR					
TEMP		-20.0º F TO 180.0º F	LOOK UP TABLE		UNIT TYPE EQUALS FLEXSYS AND DEWPOINT RESET EQUALS ENABLED
HUMIDITY		0 TO 100%	DERIVED		

* ONLY THE ZONE TEMP SCREEN FOR THE CURRENT ACTIVE MODE WILL BE SHOWN.

TABLE 39 – COOLING (CONT'D)

DISPLAY TEXT	PASS WORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN UNIT TYPE IS
UNDERFLOOR SLAB					
TEMP		-20.0º F TO 180.0º F	LOOK UP TABLE		UNIT TYPE EQUALS FLEXSYS AND DEWPOINT RESET EQUALS ENABLED
DEW POINT		30.0º F TO 100.0º F	DERIVED		
MAXIMUM BYPASS	1	20.0 TO 40.0%	40%	SETPOINTS/ COOLING	UNIT TYPE EQUALS FLEXSYS
DEW POINT RESET	1	USER ENABLED USER DISABLED	USER DISABLED	PROGRAM/ COOLING	UNIT TYPE EQUALS FLEXSYS
EVAP AIR TEMP CURRENT					
CURRENT					
ACTIVE SP					
SUPPLY AIR HUMIDITY		DERIVED			
SAT LOW SETPOINT	1	50.0º F - 60.0º F	55.0º F	SETPOINTS/ COOLING	UNIT TYPE EQUALS VARIABLE AIR VOLUM
SAT HIGH SETPOINT	1	55.0º F - 65.0º F	65.0º F	SETPOINTS/ COOLING	UNIT TYPE EQUALS VARIABLE AIR VOLUM
OAT SETPOINT FOR					
LOW SAT	1	OAT SETPOINT FOR HIGH SAT TO 90º F	80.0º F	SETPOINTS/ COOLING	UNIT TYPE EQUALS VARIABLE AIR VOLUM AND SAT RESET METHOD EQUALS OUTSIDE TEMP
HIGH SAT	1	60.0º F TO OAT SETPOINT FOR LOW SAT	70.0º F	SETPOINTS/ COOLING	UNIT TYPE EQUALS VARIABLE AIR VOLUM AND SAT RESET METHOD EQUALS OUTSIDE TEMP
RAT SETPOINT FOR					
LOW SAT	1	RAT SETPOINT FOR HIGH RAT +5.0º F TO 90.0º F	90.0º F	SETPOINTS/ COOLING	UNIT TYPE EQUALS VARIABLE AIR VOLUM AND SAT RESET METHOD EQUALS RETURN TEMP
HIGH SAT	1	RAT COOLING SETPOINT TO RAT SETPOINT FOR LOW SAT -5º F	80.0º F	SETPOINTS/ COOLING	UNIT TYPE EQUALS VARIABLE AIR VOLUM AND SAT RESET METHOD EQUALS RETURN TEMP
FAN SPEED SETP FOR					
LOW SAT	1	FAN SPEED SETP FOR HIGH SAT TO 100%	90%	SETPOINTS/ COOLING	UNIT TYPE EQUALS VARIABLE AIR VOLUM AND SAT RESET METHOD EQUALS SUPPLY FAN SPEED
HIGH SAT	1	50% TO FAN SPEED SETP FOR LOW SAT	70%	SETPOINTS/ COOLING	UNIT TYPE EQUALS VARIABLE AIR VOLUM AND SAT RESET METHOD EQUALS SUPPLY FAN SPEED
EVAP LEAVING AIR TEMP HIGH	1	50.0º F - 60.0º F	60.0º F	SETPOINTS/ COOLING	UNIT TYPE EQUALS FLEXSYS
EVAP LEAVING AIR TEMP LOW	1	50.0º F - 60.0º F	50.0º F	SETPOINTS/ COOLING	UNIT TYPE EQUALS FLEXSYS
RESET ENTHALPY SP	2	25 TO 35 BTU	30 BTU/#	SETPOINTS/ COOLING	UNIT TYPE EQUALS FLEXSYS

TABLE 39 – COOLING (CONT'D)

DISPLAY TEXT	PASS WORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN UNIT TYPE IS
SUP AIR TEMPERING	2	USER ENABLED USER DISABLED	USER DISABLE	PROGRAM/ COOLING	UNIT TYPE EQUALS VARIABLE AIR VOLUM OR FLEXSYS
MECH CLG LOCKOUT TEMP	1	0.0º F - 65.0º F	50.0º F	SETPOINTS/ COOLING	PRESS TRANS PKG AND LOW AMBIENT PKG OTHER THAN NONE
MECH CLG LOCKOUT TMP MINIMUM	2	-10.0º F - 0.0º F	0.0º F	SETPOINTS/ COOLING	PRESS TRANS PKG AND LOW AMBIENT PKG OTHER THAN NONE

TABLE 40 - COMPRESSOR SYSTEMS (1, 2, OR 3)

DISPLAY TEXT	PASS WORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN UNIT TYPE IS
COMP SYS* STATUS		NORMAL - COMP A ON / NORMAL - COMP B ON / NORMAL - BOTH ON / NORMAL - BOTH OFF / SAFETY TRIP / SAFETY FAULT / SAFETY LOCKOUT / LOW AMB INHIBIT / LOW SUCT TEMP UNL / HIGH DP UNLOAD / USER DISABLED	DERIVED		ALWAYS
COMP SYS* STATE	1	STOP / RUN / LOCKOUT / AUTO RESET	DERIVED	OPTIONS / COMP SYS	ALWAYS
CONDENSER FAN 1A / 1		OFF / ON	DERIVED		UNIT SIZE EQUALS 120 - 150 TON
CONDENSER FAN 1B / 2		OFF / ON	DERIVED		UNIT SIZE EQUALS 120 - 150 TON
CONDENSER FAN 1C / 3					UNIT SIZE EQUALS 120 - 150 TON
CONDENSER FAN 2A / 4		OFF / ON	DERIVED		UNIT SIZE EQUALS 120 - 150 TON
CONDENSER FAN 2B / 5		OFF / ON	DERIVED		UNIT SIZE EQUALS 120 - 150 TON
CONDENSER FAN 2C / 6					UNIT SIZE EQUALS 120 - 150 TON
CONDENSER FAN 3A / 7		OFF / ON	DERIVED		UNIT SIZE EQUALS 120 - 150 TON
CONDENSER FAN 3B / 8		OFF / ON	DERIVED		UNIT SIZE EQUALS 120 - 150 TON
CONDENSER FAN 3C / 9					UNIT SIZE EQUALS 120 - 150 TON
SAFETY INPUT					
LPCO		OKAY - FAULTED	DERIVED		ALWAYS
CHAIN		OKAY - FAULTED	DERIVED		
SUCTION TEMP		-20.0º F TO 180.0º F	LOOK UP TABLE		PRESS TRANS PKG INDICATES THAT TRANSDUCERS ARE NOT INSTALLED FOR THE APPLICABLE SYSTEM
PRESSURE					
DISCHARGE *		0 TO 800 (R-410A)	LOOK UP TABLE		PRESS TRANS PKG INDICATES THAT TRANSDUCERS ARE INSTALLED FOR THE APPLICABLE SYSTEM
SUCTION *		0 TO 320 PSIG (R-410A)	LOOK UP TABLE		
TEMPERATURE					
SUCTION	1	-20.0º F TO 180.0º F	LOOK UP TABLE		PRESS TRANS PKG INDICATES THAT TRANSDUCERS ARE INSTALLED FOR THE APPLICABLE SYSTEM
SUPERHEAT		0.0º F TO 50.0º F	DERIVED		
CURRENT RUN TIME					
COMP A		HH:MM:SS	DERIVED		ALWAYS
COMP B		HH:MM:SS	DERIVED		
PUMPDOWN	2	USER ENABLED USER DISABLED	DISABLED	PROGRAM/ COMP SYS.	ALWAYS
READY TO RUN					
COMP A		YES - NO	DERIVED		ALWAYS
COMP B		YES - NO	DERIVED		
READY TO STOP					
COMP A		YES - NO	DERIVED		ALWAYS
COMP B		YES - NO	DERIVED		
SYSTEM UNLOADING PRESSURE	2	450 - 650 (R-410A)	600 PSIG	SETPOINTS/ COMP SYS	PRESS TRANS PKG DOES NOT EQUAL NONE
PRESS TRANS PKG	2	NONE / SYS 1 / SYS 1, 2 / SYS 1, 2, 3	NONE	OPTIONAL/ COMP SYS	ALWAYS
LOW AMBIENT PKG	2	NONE / SYS 1 / SYS 1, 2 / SYS 1, 2, 3	NONE	OPTIONAL/ COMP SYS	ALWAYS

TABLE 41 - SUPPLY SYSTEM

DISPLAY TEXT	PASS WORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN UNIT TYPE IS
SUPPLY SYS STATUS		NORMAL - ACTIVE NORMAL - INACTIVE SAFETY TRIP SAFETY FAULT SAFETY LOCKOUT			ALWAYS
SUPPLY FAN					
OUTPUT		ON - OFF	DERIVED		ALWAYS
STATUS		RUNNING STOPPED	DERIVED		
SUPPLY FAN VFD SPEED		0.0 TO 100%	DERIVED		UNIT TYPE EQUALS VARIABLE AIR VOLUM OR FLEXSYS
SINGLE ZONE VAV MIN VFD SPEED		33 To 66%	50%		UNIT TYPE EQUALS SINGLE ZONE VAV
DUCT STATIC PRESS					
CURRENT		0.00 TO 5.00 INWC	LOOK UP TABLE		UNIT TYPE EQUALS VARIABLE AIR VOLUM OR FLEXSYS
ACTIVE SP		0.00 TO 5.00 INWC	DERIVED		
RETURN FAN					
OUTPUT		ON - OFF	DERIVED		POWER EXHAUST TYPE EQUALS RETURN W/EXHAUST + RETURN W/O EXHAUST FANS
STATUS		RUNNING STOPPED	DERIVED		
EXHAUST / RETURN FAN VFD		0.0 TO 100%	DERIVED		POWER EXHAUST TYPE EQUALS RETURN W/EXHAUST + RETURN W/O EXHAUST FANS
RETURN FAN PRESS					
CURRENT		-1.00 TO +1.00 INWC	LOOK UP TABLE		POWER EXHAUST TYPE EQUALS RETURN W/EXHAUST + RETURN W/O EXHAUST FANS
ACTIVE SP		0.00 TO +1.00 INWC	DERIVED		
DUCT PRESS TRANSDUCER span	2	1.25, 2.5, 5.0	5.0	SETPOINTS / SUPPLY SYSTEM	UNIT TYPE EQUALS VARIABLE AIR VOLUM OR FLEXSYS
DUCT STATIC RESET LOW SETP	1	0 - I IN-WG - SPAN 0 IN-WG TO DUCT STATIC RESET HIGH	1.5 IN-WG	SETPOINTS / SUPPLY SYSTEM	UNIT TYPE EQUALS VARIABLE AIR VOLUM OR FLEXSYS
DUCT STATIC RESET HIGH SETP	1	DUCT STATIC RESET LOW LIMIT TO SPAN	2.5 in-wg	SETPOINTS / SUPPLY SYSTEM	UNIT TYPE EQUALS VARIABLE AIR VOLUM OR FLEXSYS
DUCT STATIC OVER PRESSURE	2	0 - I IN-WG - 5 IN-WG	3.0 in-wg	SETPOINTS / SUPPLY SYSTEM	UNIT TYPE EQUALS VARIABLE AIR VOLUM OR FLEXSYS
RETURN PRESSURE HIGH SETP	2	0.15 TO 0.45	0.15	SETPOINTS / SUPPLY SYSTEM	POWER EXHAUST EQUALS RETURN W/EXHAUST

TABLE 42 - HEATING

DISPLAY TEXT	PASS WORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN UNIT TYPE IS
HEATING SYS STATUS		NORMAL - ACTIVE / NORMAL - INACTIVE / FAULTED / USER DISABLED / UNDER FLOOR CONTROL / NONE	DERIVED		ALWAYS
HEATING SYSTEM TYPE	2	NONE / ELECTRIC/ STAGED GAS/ MODULATING GAS/ HOT WATER/ STEAM	NONE	OPTIONS / HEATING	ALWAYS
GAS HEAT CAPACITY	2	1125 MBH	375 MBH	OPTIONS / HEATING	HEAT TYPE EQUALS STAGED GAS OR MODULATING GAS
ELEC HEAT CAPACITY	2	80 KW / 80 KW - 200V/ 108 KW / 150 KW / 200 KW / 250 KW	80 KW	OPTIONS / HEATING	HEAT TYPE EQUALS ELECTRIC
SUPPLY AIR TEMP					
CURRENT		-20.0º F TO 180.0º F	LOOK UP TABLE		HEAT TYPE DOES NOT EQUAL NONE
ACTIVE SP		50.0º F TO 120.0º F	DERIVED		
ZONE TEMP*					
CURRENT		-20.0º F TO 180.0º F	LOOK UP TABLE		ALWAYS
OCC ZONE HEATING SETPOINT	1	60º F TO OCC ZONE COOLING SETPOINT -2.0 º F	68º F	SETPOINTS / HEATING	
ZONE TEMP*					
CURRENT		-20.0º F TO 180.0º F	LOOK UP TABLE		ALWAYS
UNOCC ZONE HEATING SETPOINT	1	50º F TO UNOCC ZONE COOLING SETPOINT -2.0 º F	60 F	SETPOINTS / HEATING	
RETURN AIR TEMP					
CURRENT		-20.0º F TO 180.0º F	LOOK UP TABLE		HEAT TYPE DOES NOT EQUAL NONE AND UNIT EQUALS Variable AIR VOLUM OR FLEXSYS
RAT HEATING SETPOINT	1	55.0º F - RAT COOLING SETPOINT -2.0º F	68.0º F	SETPOINTS / HEATING	
HEAT ENTERING TEMP		-20.0º F TO 180.0º F	LOOK UP TABLE		HEAT TYPE EQUALS STAGED GAS
STAGED HEAT STATUS					
STGS ON		0 TO 6	DERIVED		HEAT TYPE EQUALS ELECTRIC OR STAGED GAS
STGS AVAL		2 TO 6	DERIVED		
HW / STEAM					
VALVE POS		0.0 TO 100%	DERIVED		HEAT TYPE EQUALS HOT WATER HEAT STEAM
FRZ STAT		OK TRIPPED	DERIVED		
HEATING CONTROL OFFSET		1º F TO 100.0º F	DERIVED		

TABLE 42– HEATING (CONT'D)

DISPLAY TEXT	PASS WORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN UNIT TYPE IS
MOD FURNACE OUTPUT					
RELATIVE		0.0 TO 100%	DERIVED		HEAT TYPE EQUALS MODULATING GAS
APRX RATE		37.5 TO 900.0 MBH	DERIVED		
FURNACE 1A MODE		OFF / PURGE / IGNITION / ON - LOW / ON - HIGH / SAFETY TRIP / SAFETY FAULT / SAFETY LOCKOUT / FAULT - L/O	DERIVED		Heating TYPE EQUALS MODULATING GAS
FURNACE 1A MODE					
RELATIVE		0 TO 100%	DERIVED		HEAT TYPE EQUALS MODULATING GAS
APRX RATE		37.5 TO 150.0 MBH	DERIVED		
FURNACE 1B MODE		OFF / PURGE / IGNITION / ON / SAFETY TRIP / SAFETY FAULT / SAFETY LOCKOUT / FAULT -L/O	DERIVED		HEAT TYPE EQUALS MODULATING GAS
FURNACE 1 MODE		OFF / PURGE / IGNITION / ON-LOW / ON - HIGH / SAFETY TRIP / SAFETY FAULT / SAFETY LOCKOUT / FAULT -L/O	DERIVED		HEAT TYPE EQUALS STAGED GAS
FURNACE 2 MODE		OFF / PURGE / IGNITION / ON - LOW / ON - HIGH / SAFETY TRIP / SAFETY FAULT / SAFETY LOCKOUT / FAULT -L/O	DERIVED		GAS HEAT SIZE EQUALS 750 MBH OR 1125 MBH
FURNACE 3 MODE		OFF / PURGE / IGNITION / ON - LOW / ON -HIGH / SAFETY TRIP / SAFETY FAULT / SAFETY LOCKOUT / FAULT -L/O	DERIVED		GAS HEAT SIZE EQUALS 1125 MBH
HEATING SYSTEM	1	USER ENABLED USER DISABLED	USER ENABLED	PROGRAM / HEATING	HEAT TYPE DOES NOT EQUAL NONE
MORNING WARM UP	1	USER ENABLED USER DISABLED	USER DISABLED	PROGRAM / HEATING	HEAT TYPE DOES NOT EQUAL NONE AND CONSTANT VOLUME CONTROL METHOD DOES NOT EQUAL STAGED
ADAPT MORN WARM UP	1	USER ENABLED USER DISABLED	USER DISABLED	PROGRAM / HEATING	HEAT TYPE DOES NOT EQUAL NONE AND CONSTANT VOLUME CONTROL METHOD DOES NOT EQUAL STAGED

* ONLY THE ZONE TEMP SCREEN FOR THE CURRENT ACTIVE MODE WILL BE SHOWN.

TABLE 42 – HEATING (CONT'D)

DISPLAY TEXT	PASS WORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN UNIT TYPE IS
NIGHT SET BACK	1	USER ENABLED USER DISABLED	USER DISABLED	PROGRAM / HEATING	HEAT TYPE DOES NOT EQUAL NONE
HEAT LIMIT TEMPERATURE	2	100.0º F - 150.0º F	130.0º F	SETPOINTS / HEATING	HEAT TYPE DOES NOT EQUAL NONE
HEATING SAT	1	80.0º F - 115.0º F	100.0º F	SETPOINTS / HEATING	HEAT TYPE DOES NOT EQUAL NONE, UNIT TYPE EQUALS Variable AIR VOLUM, FLEXSYS
HW VALVE ACTION	2	DIRECT - REVERSE	DIRECT	PROGRAM / HEATING	Heating TYPE EQUALS HOT WATER STEAM
IST STAGE HEATING SETPOINT	1	80.0º F - 95.0º F	85.0º F	SETPOINTS / HEATING	HEAT TYPE DOES NOT EQUAL NONE AND UNIT TYPE EQUALS CONSTANT VOLUME
2ND STAGE HEATING SETPOINT	1	95.0º F - 115.0º F	100.0º F	SETPOINTS / HEATING	HEAT TYPE DOES NOT EQUAL NONE AND UNIT TYPE EQUALS CONSTANT VOLUME
DAILY WARM UP TIME DAY 1		0 MIN. TO MORNING WARM UP MAX TIME	DERIVED		HEAT TYPE DOES NOT EQUAL NONE AND MORN WARM UP EQUALS ENABLED
DAILY WARM UP TIME DAY 2		0 MIN. TO MORNING WARM UP MAX TIME	DERIVED		HEAT TYPE DOES NOT EQUAL NONE AND MORN WARM UP EQUALS ENABLED
DAILY WARM UP TIME DAY 3		0 MIN. TO MORNING WARM UP MAX TIME	DERIVED		HEAT TYPE DOES NOT EQUAL NONE AND MORN WARM UP EQUALS ENABLED
DAILY WARM UP TIMER		0 MIN. TO MORNING WARM UP MAX TIME	DERIVED		HEAT TYPE DOES NOT EQUAL NONE AND MORN WARM UP EQUALS ENABLED
MORNING WARM UP OPT TIME		0 MIN. TO MORNING WARM UP MAX TIME	DERIVED		HEAT TYPE DOES NOT EQUAL NONE AND MORN WARM UP EQUALS ENABLED
MORNING WARM UP MAX TIME	1	15 - 240 min.	120 MIN.	SETPOINTS/HEATING	HEAT TYPE DOES NOT EQUAL NONE AND MORN WARM UP EQUALS ENABLED

TABLE 43 - ECONOMIZER

DISPLAY TEXT	PASS WORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN UNIT TYPE IS
ECONO SYS STATUS		NORMAL - ACTIVE / NORMAL - INACTIVE / FAULTED / USER DISABLED / NONE	DERIVED		ALWAYS
ECONO INSTALLED	2	NONE / DRYBULB / SINGLE ENTHALPY / DUAL ENTHALPY	NONE	OPTIONS / ECONOMIZER	ALWAYS
ECONO METHOD TO USE	1	DRY BULB / SINGLE ENTHALPY / DUAL ENTHALPY / BEST AVAILABLE	BEST AVAILABLE	OPTIONS / ECONOMIZER	ECONOMIZER INSTALLED DOES NOT EQUAL NONE
ECONO METHOD ACTIVE		DRY BULB / SINGLE ENTHALPY / DUAL ENTHALPY	DERIVED		ECONOMIZER INSTALLED DOES NOT EQUAL NONE
ECONOMIZER CONTROL OUTPUT		0 TO 100%	DERIVED		ECONOMIZER INSTALLED DOES NOT EQUAL NONE
OUTSIDE AIR TEMP		-20.0º F TO 180.0º F	LOOK UP TABLE		ECONOMIZER INSTALLED DOES NOT EQUAL NONE
OUTSIDE AIR					
HUMIDITY		0 TO 100%	LOOK UP TABLE		ECONOMIZER INSTALLED EQUALS SINGLE ENTHALPY OR DUAL ENTHALPY
ENTHALPY		7.2 TO 204.9 BTU/LB	LOOK UP TABLE		ECONOMIZER INSTALLED EQUALS SINGLE ENTHALPY OR DUAL ENTHALPY
RETURN AIR TEMP		-20.0º F TO 180.0º F	LOOK UP TABLE		ECONOMIZER INSTALLED EQUALS DUAL ENTHALPY
RETURN AIR					
HUMIDITY		0 TO 100%	LOOK UP TABLE		ECONOMIZER INSTALLED EQUALS DUAL ENTHALPY
ENTHALPHY		7.2 TO 204.9 BTU/LB	LOOK UP TABLE		ECONOMIZER INSTALLED EQUALS DUAL ENTHALPY
OUTSIDE AIR ENTHALPY SETPOINT	1	22.0 TO 40.0 BTU/LB	28.0 BTU/LB	SETPOINTS / ECONOMIZER	ECONOMIZER INSTALLED DOES NOT EQUAL NONE
ECONOMIZER SYSTEM	1	USER ENABLED USER DISABLED	DISABLED	PROGRAM / ECONOMIZER	ECONOMIZER INSTALLED DOES NOT EQUAL NONE

TABLE 44 - VENTILATION

DISPLAY TEXT	PASS WORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN UNIT TYPE IS
VENT SYS STATUS		NORMAL - ACTIVE/ NORMAL - INACTIVE / FAULTED / USER DISABLED / NONE	DERIVED		ALWAYS
DAMPER HARDWARE	2	NONE / 2 POSITION/ STANDARD/ MINIMUM IAQ / FULL IAQ/ 1/3 - 2/3 IAQ/ TEK AIR FULL IAQ	STANDARD DAMPERS	OPTIONS / VENTILATION	ALWAYS
VENTILATION CONTROL	1	FIXED MINIMUM / DEMAND	FIXED MINIMUM	OPTIONS / VENTILATION	DAMPER HARDWARE DOES NOT EQUAL NONE OR 2 POSITION
OA DAMPER POSITION					
CURRENT		0.0 TO 100%	DERIVED		DAMPER HARDWARE DOES NOT EQUAL NONE
ACTIVE SP		0.0 TO 100%	DERIVED		
IAQ DMPR AIR FLOWS					
OA FLOW 1		0 TO DERIVED SPAN	DERIVED		DAMPER HARDWARE MIN. TEK-AIR FULL IAQ
OUTSIDE AIR FLOW					
TOTAL		0 TO DERIVED SPAN	DERIVED		DAMPER HARDWARE MIN. TEK-AIR FULL IAQ
ACTIVE SP		0 TO DERIVED SPAN	DERIVED		
VENTILATION DEMAND		0-100%	DERIVED		VENTILATION CONTROL EQUALS DEMAND
CO2 LEVEL					
OUTSIDE		0 TO 2000 PPM	LOOK UP TABLE		VENTILATION CONTROL EQUALS DEMAND
INSIDE		0 TO 2000 PPM	LOOK UP TABLE		
CO2 OFFSET					
CURRENT		± 0 TO 2000 PPM	DERIVED		VENTILATION CONTROL EQUALS DEMAND
SETPOINT	1	100-1000 PPM	500 PPM	SETPOINTS / VENTILATION	
OA DAMPER MINIMUM POSITION	1	0 - OA DAMPER MAXIMUM POSITION	15%	SETPOINTS / VENTILATION	DAMPER HARDWARE DOES NOT EQUAL NONE OR 2 POSITION DAMPER
OA DAMPER MAXIMUM POSITION	1	OA DAMPER MINIMUM POSITION TO 100%	30%	SETPOINTS / VENTILATION	DAMPER HARDWARE DOES NOT EQUAL NONE OR 2 POSITION DAMPER
CONTINUOUS VENT	1	USER ENABLED USER DISABLED	USER ENABLED	PROGRAM / VENTILATION	UNIT TYPE EQUALS CONSTANT VOLUME
COMFORT VENTILATION	1	USER ENABLED USER DISABLED	USER DISABLED	PROGRAM / VENTILATION	UNIT TYPE EQUALS CONSTANT VOLUME
OUTSIDE AIR MINIMUM FLOW	1	MINIMUM - DERIVED SPAN X 5% MAXIMUM - THE LOWER OF DERIVED SPAN X 50% AND OUTSIDE AIR MAXIMUM FLOW	DERIVED SPAN X 15%	SETPOINTS / VENTILATION	DAMPER HARDWARE AND VENTILATION CONTROL SET TO DEMAND TEK-AIR FULL IAQ

TABLE 44 – VENTILATION (CONT'D)

DISPLAY TEXT	PASS WORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN UNIT TYPE IS
OUTSIDE AIR MAXIMUM FLOW	1	MINIMUM - OUTSIDE AIR MINIMUM FLOW MAXIMUM - DERIVED FLOW	DERIVED SPAN X 30%	SETPOINTS / VENTILATION	DAMPER HARDWARE AND VENTILATION CONTROL SET TO DEMAND
MINIMUM OA FLOW SETPOINT	1	0-100%	DERIVED SPAN X 15%	SETPOINTS / VENTILATION	DAMPER HARDWARE AND VENTILATION CONTROL SET TO FIXED MINIMUM TEK-AIR FULL IAQ
VENTILATION SYSTEM	1	USER ENABLED USER DISABLED	USER ENABLED	PROGRAM / VENTILATION	DAMPER HARDWARE DOES NOT EQUAL NONE

TABLE 45 - EXHAUST

DISPLAY TEXT	PASS WORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN UNIT TYPE IS
EXHAUST SYS STATUS		NORMAL - ACTIVE / NORMAL - INACTIVE / FAULTED / USER DISABLED / NONE	DERIVED		ALWAYS
POWER EXHAUST TYPE	2	NONE / ON-OFF DAMPER CTRL / ON-OFF PRESS CNTRL / MODULATE DAMPER - VFD / RETURN FAN W/ EXH / RETURN FAN W/O EXH	SETTING	OPTIONS / EXHAUST	ALWAYS
BUILDING PRESSURE					
CURRENT		-0.50 TO 0.50 INWC	LOOK UP TABLE		POWER EXHAUST DOES NOT EQUAL NONE OR ON-OFF DAMPER CTRL
ACTIVE SETPOINT	1	-0.15 - +0.15 INWC	0.00 IWC	SETPOINTS / EXHAUST	
EXHAUST FAN					
OUTPUT		ON - OFF	DERIVED		POWER EXHAUST EQUALS ON OFF DAMPERS CTRL, ON-OFF PRESS CNTRL, MODULATE DAMPER - VFD FAN
STATUS		STOPPED / RUNNING	DERIVED		
EXHAUST DAMPER POSITION		0.0 TO 100%	DERIVED		POWER EXHAUST EQUALS MODULATE DAMPER - VFD, OR RETURN FAN W/ EXH
EXHAUST / RETURN FAN VFD		0.0 TO 100%	DERIVED		POWER EXHAUST EQUALS MODULATE DAMPER - VFD
BLDG PRESSURE CNTRL OFFSET	1	- 0.15 IWC TO +0.15	0.00 IWC	SETPOINTS / EXHAUST	POWER EXHAUST EQUALS ON - OFF PRESS CTRL
ECONO OUTPUT FOR FAN START	1	ECONO OUTPUT FOR FAN STOP TO 100%	10 %	SETPOINTS / EXHAUST	POWER EXHAUST EQUALS ON - OFF DMPR CTRL
ECONO OUTPUT FOR FAN STOP	1	0 TO ECONO OUTPUT FOR FAN START	5%	SETPOINTS / EXHAUST	POWER EXHAUST EQUALS ON - OFF DMPR CTRL
EXHAUST OUTPUT FOR FAN START	1	EXHAUST OUTPUT FOR FAN STOP TO 100%	10%	SETPOINTS / EXHAUST	POWER EXHAUST EQUALS MODULATE DAMPER - VFD
EXHAUST OUTPUT FOR FAN STOP	1	0 - TO EXHAUST OUTPUT FOR FAN START	5%	SETPOINTS / EXHAUST	POWER EXHAUST EQUALS MODULATE DAMPER - VFD

Setpoints

All setpoints values are numeric. Setpoints parameters can be viewed under their respective menu key on the left side of the keypad; however, they can only be changed under the SETPOINTS key using the following procedure. Press the SETPOINTS key to enter the setpoints menu. The Enter Password screen will appear. All setpoints parameters require the use of a password before they can be changed. See *Password on page 135* for information on how to enter a Password into the User Interface. If a Level 1 password is entered, only Level 1 setpoints will be available for change. Entering a Level 2 password will make all setpoints available. After the password has been accepted, use the ◄ key or the ► key to select the menu subsection: Unit, Cooling, Compressor Systems, Supply System, Heating, Economizer, Ventilation, or Exhaust that contains the parameter you would like to change. The setpoints contained under each of these menu subsections and their password level is contained in *Tables 38 through 45 starting on page 105*. Then use the ▼ key and the ▲ key to navigate to the parameter you want to change. Follow the instructions given in the Data Entry Keys section to change the value.

Program

All “Program” information is USER ENABLED/ USER DISABLED values. Program parameters can be viewed under their respective menu key on the left side of the keypad; however, they can only be changed under the PROGRAM key using the following procedure. Press the PROGRAM key to enter the “Program” menu. The Enter Password screen will appear. All Program parameters require the use of a password before they can be changed. See *Password on page 135* for information on how to enter a Password into the User Interface. If a Level 1 password is, entered only Level 1 “program” information will be available for change. Entering a Level 2 password will make all “program” information available. After the password has been accepted, use the ◄ key or the ► key to select the menu subsection: Unit, Cooling, Compressor Systems, Supply System, Heating, Economizer, Ventilation, Exhaust, that contains the parameter you would like to change. The parameters contained under each of these menu subsections and their password level are contained in *Tables 38 through 45 starting on page 105*. Then use the ▼ key and the ▲ key to navigate to the parameter you want to change. Follow the instructions given in the Data Entry Keys section to change the parameter to the desired value.

Options

All “Options” information is selected from the listed parameter data. Options parameters can be viewed under their respective menu key on the left side of the keypad; however, they can only be changed under the OPTIONS key using the following procedure. Press the OPTIONS key to enter the “Options” menu. The Enter Password screen will appear. All Option parameters require the use of a password before they can be changed. See *Password on page 135* for information on how to enter a Password into the User Interface. If a Level 1 password is entered, only Level 1 “options” information will be available for change. Entering a Level 2 password will make all “options” information available. After the password has been accepted, use the ◄ key or the ► key to select the menu subsection: Unit, Cooling, Compressor Systems, Supply System, Heating, Economizer, Ventilation, or Exhaust that contains the parameter you would like to change. The parameters contained under each of these menu subsections and their password level are contained in *Tables 38 through 45 starting on page 105*. Then use the ▼ key and the ▲ key to navigate to the parameter you want to change. Follow the instructions given in the Data Entry Keys section to change the parameter to the desired value.

Date / Time

To change the day, time, and date press the DATE/ TIME key. The ▼ key is used to scroll to the next item to be programmed and the ▲ key scrolls to the previous item. The following messages will be displayed. The first line will be an active display and the second line will be the entry line.

CLOCK FRI 18 JUN 2004 10:15:33 AM
DAY OF MONTH =XX

CLOCK FRI 18 JUN 2004 10:15:33 AM
DAY OF MONTH =XX

CLOCK FRI 18 JUN 2004 10:15:33 AM
YEAR =XXXX

CLOCK FRI 18 JUN 2004 10:15:33 AM
HOUR =XX

CLOCK FRI 18 JUN 2004 10:15:33 AM
MINUTE =XX

CLOCK FRI 18 JUN 2004 10:15:33 AM
DAY OF WEEK =XXX

CLOCK FRI 18 JUN 2004 10:15:33 AM
12 HOUR PERIOD =XX

CLOCK FRI 18 JUN 2004 10:15:33 AM
TIME FORMAT =XXXXXXX

CLOCK FRI 18 JUN 2001 10:15:33 AM
POWER OFF TIME =XXXXX

Follow the instructions given in the Data Entry Keys section to change the above values.

Schedule

The "clock schedule" function can be USER ENABLED / USER DISABLED by using the schedule screen below.

To set the schedule, press the SCHEDULE key. The display will show the following message:

SCHEDULE ✓ TO EDIT
OCCUPANCY SCHEDULE USER ENABLED

SCHEDULE MON ✓ TO EDIT
+START =06:00 AM STOP =10:00 PM

SCHEDULE TUE ✓ TO EDIT
START =06:00 AM STOP =10:00 PM

SCHEDULE WED ✓ TO EDIT
START =06:00 AM STOP =10:00 PM

SCHEDULE THU ✓ TO EDIT
START =06:00 AM STOP =10:00 PM

SCHEDULE FRI ✓ TO EDIT
START =06:00 AM STOP =10:00 PM

SCHEDULE SAT ✓ TO EDIT
START =06:00 AM STOP =10:00 PM

SCHEDULE SUN ✓ TO EDIT
START =06:00 AM STOP =10:00 PM

To change the start or stop time, press the ✓ key. The line under the 0 is the cursor. If the start time is wrong, it may be changed from the numeric keypad. Once the correct value (hour and minute) is entered, press the ✓ key. The cursor will then move to the AM/PM selection. This value may be chosen by the +/- key and entered by pressing the ✓ key. This process may be followed until the hour, minutes, and meridian of both the START and STOP points are set. Press the ▼ key to get the schedule for the next day to appear. The start and stop time of each day may be programmed differently. If you want to view the schedule without making a change, simply press the ▼ key until the day you wish to view appears. The ▲ key will scroll backwards to the previous screen.

After the SUN (Sunday) schedule appears on the display a subsequent press of the ▼ key will display the Holiday schedule. This is a two-part display. The first reads:

SCHEDULE HOL
START =06:00 AM STOP =10:00 PM

The times may be set using the same procedure as described above for the days of the week.

Continue pressing the ▼ key to set the 15 holiday dates. The display will read:

SCHEDULE MMDD
HOLIDAY 01 = 1225

The month and the day of each holiday are entered in this format. Enter 0000 to not specify a holiday. The MMDD is displayed when the value is being edited to remind the operator what the format of this number is. Eg. 1225 represents December 25.

The line below the empty space is the cursor and will move to the next or previous empty space when the ◄ key or the ► key is pressed. To set the Holiday, the cursor is moved to the space following the day of the week of the holiday and the +/- key is pressed. An * will appear in the space signifying that day as a holiday. The Holiday schedule must be programmed weekly. If there is no holiday, the +/- key is used to delete the *. The ✓ key is used to accept the holiday schedule for the next seven days.

OPERATING HOURS / START COUNTER

Compressor Operating hours and Compressor Starts; Supply Fan Operating hours and Supply Fan starts; Exhaust Fan operating hours and Exhaust Fan starts; and Return Fan operating hours and Return Fan starts are displayed via one key press. The maximum value for both hours and starts is 99,999, at which point they will roll over to 0. Following are the displays.

TABLE 46 - OPERATING HOURS / START COUNTER

DISPLAY TEXT	PASS WORD LEVEL	RANGE	DEFAULT	SETTING LOCATION	SHOW WHEN
COMPRESSOR 1A OPER HRS **COMPRESSOR 1A STARTS**	1		DERIVED		
COMPRESSOR 1B OPER HRS **COMPRESSOR 1B STARTS**	1		DERIVED		
COMPRESSOR 2A OPER HRS **COMPRESSOR 2A STARTS**	1		DERIVED		
COMPRESSOR 2B OPER HRS **COMPRESSOR 2B STARTS**	1		DERIVED		
COMPRESSOR 3A OPER HRS **COMPRESSOR 3A STARTS**	1		DERIVED		NUMBER OF COMPS 6. Unit capacity equals 120 ton, or130 ton.
COMPRESSOR 3B OPER HRS **COMPRESSOR 3B STARTS**	1		DERIVED		
CONDENSER FAN 1A					
CONDENSER FAN 1B					
CONDENSER FAN 2A					
CONDENSER FAN 2B					
CONDENSER FAN 3A					NUMBER OF COMPS 6. Unit capacity equals 120 ton or 130 ton.
CONDENSER FAN 3b					
EXHAUST FAN OPER HRS **EXHAUST FAN STARTS**	1		DERIVED		POWER EXHAUST ON/OFF DMPR / ON/OFF PRESS / MODULATE DAMPER - VFD.
SUPPLY FAN OPER HRS **SUPPLY FAN STARTS**	1		DERIVED		
RETURN FAN OPER HRS **RETURN FAN STARTS**	1		DERIVED		Supply system type equals return fan W/EXH RETURN W/O EXHAUST.

Shown below is a typical screen example.

HOURS / STARTS	oper HRS.	xxxxx
COMPRESSOR 1A	Starts	xxxxx

PRINTER

The Unit Control has the capability of being connected though the RS-232 serial port, Port 2, to a computer using Hyper Terminal. A NUL MODEM cable must be used to connect the computer to the Unit Control.

Set Up

The computer must be connected to Port 2 of the Unit Controller. Use the SERVICE key to verify that Port 2 is configured to “TERMINAL”.

Press the PRINT key on the key pad. Use the down arrow key to set the following:

PRTINER BAUD RATE

PRINTER PARITY

PRINTER STOP BITS

PRINTER ROWS PER PAGE

These parameters must be set identical to the settings in Hyper Terminal. In addition the data bits must be set to 8 and Flow Control to None.

To use Hyper Terminal to save a report to a file:

1. Select “Transfer – Transfer Text” and enter a file name to save the report in.
2. From the Unit Control panel, select the report you want to print. See *Report Section on page 122* to select the report.
3. As the report is uploading, from the Unit Control to the PC, it is displayed in the Hyper Terminal window.
4. When the reports finish transferring to the file, select “Transfer – Capture Text – Stop”.
5. The file can then be printed from an application like Notepad or Word.

To use Hyper Terminal to print a report without saving it to a file:

1. Select “Transfer – Capture to Printer”.
2. From the Unit Control panel, select the report you want to print. See *Report Section on page 122* to select the report.
3. As the report is uploading, from the Unit Control to the PC, it is displayed in the Hyper Terminal window.
4. After the reports finish transferring to the PC, select “Transfer – Capture to Printer” to send the last page to the printer.

Report Section

Press the PRINT key and enter the password. Press the ✓ key. Use the left or right arrow key to navigate through the menu. The following reports are available to be printed:

- STATUS
- UNIT DATA
- COOLING
- COMP SYSTEM
- SUPPLY SYSTEM
- HEATING
- ECONOMIZER
- VENTILATION
- EXHAUST
- SETPOINTS
- PROGRAM
- OPTIONS
- DATE / TIME
- SCHEDULE
- HOURS / STARTS
- SERVICE
- HISTORY BUFFER 1
- HISTORY BUFFER 2
- HISTORY BUFFER 3
- HISTORY BUFFER 4
- HISTORY BUFFER 5
- HISTORY BUFFER 6
- HISTORY BUFFER 7
- HISTORY BUFFER 8
- HISTORY BUFFER 9
- HISTORY BUFFER 10
- RUN TEST
- PRINT ALL REPORTS

After you have selected the report you want to print press the ✓ key to output the report to the computer.

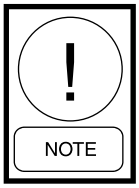
SERVICE

To enter Service Mode, press the SERVICE key. The following message is the initial screen and is displayed when the SERVICE key is pressed, unless a Level 2 password is active.

SERVICE ENTER PASSWORD

All the DIGITAL outputs (DO) except for the compressors can be forced ON. In order to force the outputs the LOCAL STOP switch must be in the off position. To force an output ON use the ◄ or ► key to navigate to the SERVICE DO section. Then use the ▲ or ▼ key to select the output you want to force ON. Press the ✓ key and then use the ► key to switch it from OFF to ON. Press the ✓ key again to energize the output. Repeat the above process in reverse to turn the forced output back to OFF.

All the ANALOG outputs (AO) can be forced ON. In order to force the outputs the LOCAL STOP switch must be in the OFF position. To force an output ON use the ◄ or ► key to navigate to the SERVICE AO section. Then use the ▲ or ▼ key to select the output you want to force ON. Press the ✓ key and then use the numeric key pad to enter the output value. Press the ✓ key again to energize the output. Repeat the above process in reverse to turn the forced output back to 0.0.



Failure to do so will leave the forced output value in place until a different value is initiated by the operation of the unit.

The ► key can be used to jump to the beginning of the next section of displays and the ◄ key can be used to jump to the beginning of the previous section of displays. The sections of displays are as follows:

- Parameters
- Analog Inputs
- Digital Inputs
- Digital Outputs
- Analog Outputs

Table 39 lists the Displayed Text, Input or Output type, Unit Control terminal location (ID), Value Range, and when item is displayed.

TABLE 47 - SERVICE

DISPLAY TEXT	TYPE	ID	VALUE RANGE	LOCATION	DESCRIPTION
DATA LOG FORMAT			OFF		USED TO ACTIVATE THE DATA LOG FEATURE OF THE CONTROL.
DATA LOG ERROR	ERROR DETAIL		SEE *TABLE 64 ON PAGE 193*		DATA LOG ERROR DETAIL (ONLY DISPLAYED WHEN ERROR IS PRESENT).
	ERROR STATE		SEE *TABLE 63 ON PAGE 192*		DATA LOG ERROR STATE (ONLY DISPLAYED WHEN ERROR IS PRESENT).
UPDATE FLASH			ON / OFF		USED TO UPDATE CONTROL SOFTWARE.
UPDATE FLASH ERROR					DESCRIPTION OF THE ERROR (ONLY DISPLAYED WHEN ERROR IS PRESENT).
FACTORY RUN TESTER			USER DISABLE / USER ENABLE		ONLY USED FOR FACTORY RUN TEST.
COMPRESSOR 1A	DIGITAL OUTPUT	TB4-2	ON / OFF	I/O BOARD	STATUS OF THE DIGITAL OUTPUT TO COMPRESSOR 1A.
COMPRESSOR 1B	DIGITAL OUTPUT	TB4-3	ON / OFF	I/O BOARD	STATUS OF THE DIGITAL OUTPUT TO COMPRESSOR 1B
COMPRESSOR 2A	DIGITAL OUTPUT	TB4-4	ON / OFF	I/O BOARD	STATUS OF THE DIGITAL OUTPUT TO COMPRESSOR 2A.
COMPRESSOR 2B	DIGITAL OUTPUT	TB4-5	ON / OFF	I/O BOARD	STATUS OF THE DIGITAL OUTPUT TO COMPRESSOR 2B.
COMPRESSOR 3A	DIGITAL OUTPUT	TB4-7	ON / OFF	I/O BOARD	STATUS OF THE DIGITAL OUTPUT TO COMPRESSOR 3A.
COMPRESSOR 3B	DIGITAL OUTPUT	TB4-8	ON / OFF	I/O BOARD	STATUS OF THE DIGITAL OUTPUT TO COMPRESSOR 3B.
CONDENSER FAN 1A/1	DIGITAL OUTPUT	TB4-9	ON / OFF	I/O BOARD	STATUS OF DIGITAL OUTPUT TO CONDENSER FAN 1A.
CONDENSER FAN 1B/2	DIGITAL OUTPUT	TB4-10	ON / OFF	I/O BOARD	STATUS OF DIGITAL OUTPUT TO CONDENSER FAN 1B.
CONDENSER FAN 1C/3	DIGITAL OUTPUT		ON / OFF	I/O BOARD	STATUS OF DIGITAL OUTPUT TO CONDENSER FAN 1C.
CONDENSER FAN 2A/4	DIGITAL OUTPUT	TB6-2	ON / OFF	I/O BOARD	STATUS OF DIGITAL OUTPUT TO CONDENSER FAN 2A.
CONDENSER FAN 2B/5	DIGITAL OUTPUT	TB6-3	ON / OFF	I/O BOARD	STATUS OF DIGITAL OUTPUT TO CONDENSER FAN 2B.
CONDENSER FAN 2C/6	DIGITAL OUTPUT		ON / OFF	I/O BOARD	STATUS OF DIGITAL OUTPUT TO CONDENSER FAN 2C.
CONDENSER FAN 3A/7	DIGITAL OUTPUT	TB6-4	ON / OFF	I/O BOARD	STATUS OF DIGITAL OUTPUT TO CONDENSER FAN 3A.
CONDENSER FAN 3B/8	DIGITAL OUTPUT	TB6-5	ON / OFF	I/O BOARD	STATUS OF DIGITAL OUTPUT TO CONDENSER FAN 3B.
CONDENSER FAN 3C/9	DIGITAL OUTPUT		ON / OFF	I/O BOARD	STATUS OF DIGITAL OUTPUT TO CONDENSER FAN 3C.
ELECTRIC HEAT STG 1	DIGITAL OUTPUT	TB3-2	ON / OFF	I/O BOARD	STATUS OF ELECTRIC HEAT DIGITAL OUTPUT TO STAGE 1.
ELECTRIC HEAT STG 2	DIGITAL OUTPUT	TB3-3	ON / OFF	I/O BOARD	STATUS OF ELECTRIC HEAT DIGITAL OUTPUT TO STAGE 2.

TABLE 47– SERVICE (CONT'D)

DISPLAY TEXT	TYPE	ID	VALUE RANGE	LOCATION	DESCRIPTION
ELECTRIC HEAT STG 3	DIGITAL OUTPUT	TB3-4	ON / OFF	I/O BOARD	STATUS OF ELECTRIC HEAT DIGITAL OUTPUT TO STAGE 3.
ELECTRIC HEAT STG 4	DIGITAL OUTPUT	TB3-5	ON / OFF	I/O BOARD	STATUS OF ELECTRIC HEAT DIGITAL OUTPUT TO STAGE 4.
ELECTRIC HEAT STG 5	DIGITAL OUTPUT	TB3-7	ON / OFF	I/O BOARD	STATUS OF ELECTRIC HEAT DIGITAL OUTPUT TO STAGE 5.
ELECTRIC HEAT STG 6	DIGITAL OUTPUT	TB3-8	ON / OFF	I/O BOARD	STATUS OF ELECTRIC HEAT DIGITAL OUTPUT TO STAGE 6.
ELECTRIC HEAT STG 7	DIGITAL OUTPUT	TB3-9	ON / OFF	I/O BOARD	STATUS OF ELECTRIC HEAT DIGITAL OUTPUT TO STAGE 7.
STG GAS FURN 1 LOW	DIGITAL OUTPUT	TB3-2	ON / OFF	I/O BOARD	STATUS OF STAGED GAS HEAT DIGITAL OUTPUT TO STAGE 1 LOW.
STG GAS FURN 1 HIGH	DIGITAL OUTPUT	TB3-3	ON / OFF	I/O BOARD	STATUS OF STAGED GAS HEAT DIGITAL OUTPUT TO STAGE 1 HIGH.
STG GAS FURN 2 LOW	DIGITAL OUTPUT	TB3-4	ON / OFF	I/O BOARD	STATUS OF STAGED GAS HEAT DIGITAL OUTPUT TO STAGE 2 LOW.
STG GAS FURN 2 HIGH	DIGITAL OUTPUT	TB3-5	ON / OFF	I/O BOARD	STATUS OF STAGED GAS HEAT DIGITAL OUTPUT TO STAGE 2 HIGH.
STG GAS FURN 3 LOW	DIGITAL OUTPUT	TB3-7	ON / OFF	I/O BOARD	STATUS OF STAGED GAS HEAT DIGITAL OUTPUT TO STAGE 3 LOW.
STG GAS FURN 3 HIGH	DIGITAL OUTPUT	TB3-8	ON / OFF	I/O BOARD	STATUS OF STAGED GAS HEAT DIGITAL OUTPUT TO STAGE 3 HIGH.
MOD GAS FURN 1A LOW	DIGITAL OUTPUT	TB3-2	ON / OFF	I/O BOARD	STATUS OF MOD GAS HEAT DIGITAL OUTPUT TO STAGE 1A LOW.
MOD GAS FURN 1A HI	DIGITAL OUTPUT	TB3-3	ON / OFF	I/O BOARD	STATUS OF MOD GAS HEAT DIGITAL OUTPUT TO STAGE 1A HIGH.
MOD GAS FURN 2 LOW	DIGITAL OUTPUT	TB3-4	ON / OFF	I/O BOARD	STATUS OF MOD GAS HEAT DIGITAL OUTPUT TO STAGE 2 LOW.
MOD GAS FURN 2 HIGH	DIGITAL OUTPUT	TB3-5	ON / OFF	I/O BOARD	STATUS OF MOD GAS HEAT DIGITAL OUTPUT TO STAGE 2 HIGH.
MOD GAS FURN 3 LOW	DIGITAL OUTPUT	TB3-7	ON / OFF	I/O BOARD	STATUS OF MOD GAS HEAT DIGITAL OUTPUT TO STAGE 3 LOW.
MOD GAS FURN 3 HIGH	DIGITAL OUTPUT	TB3-8	ON / OFF	I/O BOARD	STATUS OF MOD GAS HEAT DIGITAL OUTPUT TO STAGE 3 HIGH.
MOD GAS FURN 1B	DIGITAL OUTPUT	TB3-9	ON / OFF	I/O BOARD	STATUS OF MOD GAS HEAT DIGITAL OUTPUT TO STAGE 1B.
PUMP DOWN LLSV 1	DIGITAL OUTPUT	TB5-2	ON / OFF	I/O BOARD	STATUS OF PUMP DOWN SOLENOID LLSV 1 DIGITAL OUTPUT.
PUMP DOWN LLSV 2	DIGITAL OUTPUT	TB5-4	ON / OFF	I/O BOARD	STATUS OF PUMP DOWN SOLENOID LLSV 2 DIGITAL OUTPUT.
PUMP DOWN LLSV 3	DIGITAL OUTPUT	TB5-6	ON / OFF	I/O BOARD	STATUS OF PUMP DOWN SOLENOID LLSV 3 DIGITAL OUTPUT.
SUPPLY FAN OUTPUT	DIGITAL OUTPUT	TB1-2	ON / OFF	ALWAYS	STATUS OF SUPPLY FAN DIGITAL OUTPUT.
RETURN FAN OUTPUT	DIGITAL OUTPUT	TB1-4	ON / OFF	I/O BOARD	STATUS OF RETURN FAN DIGITAL OUTPUT.
EXHAUST FAN OUTPUT	DIGITAL OUTPUT	TB1-4	ON / OFF	I/O BOARD	STATUS OF EXHAUST FAN OR RETURN FAN DIGITAL OUTPUT.

TABLE 47– SERVICE (CONT'D)

DISPLAY TEXT	TYPE	ID	VALUE RANGE	LOCATION	DESCRIPTION
VAV HEAT RELAY	DIGITAL OUTPUT	TB1-12	ON / OFF	I/O BOARD	STATUS OF THE DIGITAL OUTPUT FOR THE VAV HEAT RELAY.
FAN FAULT	DIGITAL OUTPUT	TB1-6	OKAY / FAULTED	I/O BOARD	DIGITAL OUTPUT THAT IS GENERATED WHEN THERE IS A SUPPLY FAN FAULT.
COOL/HEATING FAULT	DIGITAL OUTPUT	TB1-8	ON / OFF	I/O BOARD	DIGITAL OUTPUT THAT IS GENERATED WHEN THERE IS A COOLING/HEATING FAULT.
SENSOR/MISC FAULT	DIGITAL OUTPUT	TB1-10	ON / OFF	I/O BOARD	DIGITAL OUTPUT THAT IS GENERATED WHEN THERE IS A SENSOR/MISC FAULT.
SUPPLY FAN VFD SPEED	ANALOG OUTPUT	TB9-1	0-10 VOLTS DC	I/O BOARD	ANALOG OUTPUT TO THE SUPPLY FAN VFD.
EXHAUST DAMPER POSITION	ANALOG OUTPUT	TB9-7	0-10 VOLTS DC	I/O BOARD	ANALOG OUTPUT TO THE EXHAUST DAMPER.
EXHAUST / RETURN FAN VFD	ANALOG OUTPUT	TB9-3	0-10 VOLTS DC	I/O BOARD	ANALOG OUTPUT TO THE EXHAUST OR RETURN FAN VFD.
OA DAMPER POSITION	ANALOG OUTPUT	TB9-5	0-10 VOLTS DC	I/O BOARD	ANALOG OUTPUT TO THE ECONOMIZER DAMPERS.
HEATING VALVE	ANALOG OUTPUT	TB9-9	0-10 VOLTS DC	I/O BOARD	ANALOG OUTPUT TO THE HEATING VALVE.
BYPASS DAMPER POSITION	ANALOG OUTPUT	TB9-11	0-10 VOLTS DC	I/O BOARD	ANALOG OUTPUT TO THE FLEXSYS BYPASS DAMPER.
SUPPLY AIR TEMP CURRENT	ANALOG INPUT	J1-1	0-5 VOLTS	I/O BOARD	ANALOG INPUT FROM THE SUPPLY OR MIXED AIR SENSOR.
MX SUPPLY AIR TEMP CURRENT	ANALOG INPUT	J1-1	0-5 VOLTS	I/O BOARD	ANALOG INPUT FROM THE SUPPLY OR MIXED AIR SENSOR.
HEAT ENTERING TEMP	ANALOG INPUT	J1-2	0-5 VOLTS	I/O BOARD	ANALOG INPUT FROM THE TEMPERATURE SENSOR POSITIONED BEFORE THE HEAT SECTION.
FLEX EVAP TEMP CURRENT	ANALOG INPUT	J1-3	0-5 VOLTS	I/O BOARD	ANALOG INPUT FROM THE TEMPERATURE SENSORS POSITIONED ON THE LEAVING SIDE OF THE EVAPORATOR COIL.
OUTSIDE AIR TEMP	ANALOG INPUT	J2-1	0-5 VOLTS	I/O BOARD	ANALOG INPUT FROM THE OUTDOOR AIR TEMPERATURE SENSOR.
RETURN AIR TEMP CURRENT	ANALOG INPUT	J2-2	0-5 VOLTS	I/O BOARD	ANALOG INPUT FROM THE RETURN AIR TEMPERATURE SENSOR.
OUTSIDE AIR HUMIDITY	ANALOG INPUT	J2-3	0-5 VOLTS	I/O BOARD	ANALOG INPUT FROM THE OUTDOOR AIR HUMIDITY SENSOR.
RETURN AIR HUMIDITY	ANALOG INPUT	J2-4	0-5 VOLTS	I/O BOARD	ANALOG INPUT FROM THE RETURN AIR HUMIDITY SENSOR.
TEMPERATURE SUCTION 1	ANALOG INPUT	J3-1	0-5 VOLTS	I/O BOARD	ANALOG INPUT FROM THE SYSTEM 1 SUCTION LINE TEMPERATURE SENSOR.
TEMPERATURE SUCTION 2	ANALOG INPUT	J3-2	0-5 VOLTS	I/O BOARD	ANALOG INPUT FROM THE SYSTEM 2 SUCTION LINE TEMPERATURE SENSOR.
TEMPERATURE SUCTION 3	ANALOG INPUT	J3-3	0-5 VOLTS	I/O BOARD	ANALOG INPUT FROM THE SYSTEM 3 SUCTION LINE TEMPERATURE SENSOR.

TABLE 47– SERVICE (CONT'D)

DISPLAY TEXT	TYPE	ID	VALUE RANGE	LOCATION	DESCRIPTION
PRESSURE SUCTION 1	ANALOG INPUT	J3-4	0-5 VOLTS	I/O BOARD	ANALOG INPUT FROM THE SYSTEM 1 SUCTION PRESSURE TRANSDUCER.
PRESSURE SUCTION 2	ANALOG INPUT	J4-1	0-5 VOLTS	I/O BOARD	ANALOG INPUT FROM THE SYSTEM 2 SUCTION PRESSURE TRANSDUCER.
PRESSURE SUCTION 3	ANALOG INPUT	J4-2	0-5 VOLTS	I/O BOARD	ANALOG INPUT FROM THE SYSTEM 3 SUCTION PRESSURE TRANSDUCER.
PRESSURE DISCHARGE 1	ANALOG INPUT	J4-3	0-5 VOLTS	I/O BOARD	ANALOG INPUT FROM THE SYSTEM 1 DISCHARGE PRESSURE TRANSDUCER.
PRESSURE DISCHARGE 2	ANALOG INPUT	J4-4	0-5 VOLTS	I/O BOARD	ANALOG INPUT FROM THE SYSTEM 2 DISCHARGE PRESSURE TRANSDUCER.
PRESSURE DISCHARGE 3	ANALOG INPUT	J4-5	0-5 VOLTS	I/O BOARD	ANALOG INPUT FROM THE SYSTEM 3 DISCHARGE PRESSURE TRANSDUCER.
CO2 LEVEL OUTSIDE	ANALOG INPUT	J5-2	0-5 VOLTS	I/O BOARD	ANALOG INPUT OF THE OUTDOOR CO2 SENSOR.
CO2 LEVEL INSIDE	ANALOG INPUT	J5-3	0-5 VOLTS	I/O BOARD	ANALOG INPUT FROM THE INDOOR CO2 SENSOR.
RETURN FAN PRESS CURRENT	ANALOG INPUT	J6-1	0-5 VOLTS	I/O BOARD	ANALOG INPUT FROM THE RETURN FAN PRESSURE TRANSDUCER.
DUCT STATIC PRESS CURRENT	ANALOG INPUT	J6-2	0-5 VOLTS	I/O BOARD	ANALOG INPUT FROM THE SUPPLY AIR PRESSURE TRANSDUCER.
BUILDING PRESSURE CURRENT	ANALOG INPUT	J6-3	0-5 VOLTS	I/O BOARD	ANALOG INPUT FROM THE BUILDING PRESSURE TRANSDUCER.
OA FLOW INPUT 1	ANALOG INPUT	J6-4	0 TO 4095 A/D COUNTS (1-5 VOLTS)	I/O BOARD	THIS IS THE AIR FLOW INPUT FROM THE TEK AIR MEASURING STATION.
OA FLOW INPUT 2	ANALOG INPUT	J6-5	0 TO 4095 A/D COUNTS (1-5 VOLTS)	I/O BOARD	THIS IS THE AIR FLOW INPUT FROM THE TEK AIR MEASURING STATION.
OA FLOW PRESSURE 1	ANALOG INPUT	J6-4	0 TO 0.25 INWC (0-5 VOLTS)	I/O BOARD	ANALOG INPUT FROM THE AIR MEASURING STATION PRESSURE TRANSDUCER.
OA FLOW PRESSURE 2	ANALOG INPUT	J6-5	0 TO 0.25 INWC (0-5 VOLTS)	I/O BOARD	ANALOG INPUT FROM THE AIR MEASURING STATION PRESSURE TRANSDUCER.
OA FLOW VELOCITY 1	ANALOG INPUT	J6-4	0 TO 2002 FPM (0-5 VOLTS)	I/O BOARD	ANALOG INPUT FROM THE AIR MEASURING STATION PRESSURE TRANSDUCER.
OA FLOW VELOCITY 2	ANALOG INPUT	J6-5	0 TO 2002 FPM (0-5 VOLTS)	I/O BOARD	ANALOG INPUT FROM THE AIR MEASURING STATION PRESSURE TRANSDUCER.
ZONE TEMP CURRENT	ANALOG INPUT	J7-1	0-5 VOLTS	I/O BOARD	ANALOG INPUT FROM THE ZONE TEMPERATURE SENSOR.
UNDERFLOOR SLAB TEMP	ANALOG INPUT	J7-2	0-5 VOLTS	I/O BOARD	ANALOG INPUT FROM THE UNDER FLOOR TEMPERATURE SENSOR.
UNDERFLOOR AIR HUMIDITY	ANALOG INPUT	J7-3	0-5 VOLTS	I/O BOARD	ANALOG INPUT FROM THE UNDERFLOOR HUMIDITY SENSOR.

TABLE 47– SERVICE (CONT'D)

DISPLAY TEXT	TYPE	ID	VALUE RANGE	LOCATION	DESCRIPTION
SUPPLY AIR HUMIDITY	ANALOG INPUT	J7-3	0-5 VDC	I/O BOARD	DISPLAYS THE % RH OF THE SUPPLY AIR
SUPPLY AIR TEMP RST	ANALOG INPUT	J7-4	0-5 VOLTS	I/O BOARD	HARDWIRED ANALOG INPUT TO RESET THE SUPPLY AIR TEMPERATURE SETPOINT .
DUCT STATIC PRES RESET	ANALOG INPUT	J7-5	0-5 VOLTS	I/O BOARD	HARDWIRED ANALOG INPUT TO RESET THE DUCT STATIC PRESSURE SETPOINT.
FURNACE STATUS	ANALOG INPUT	J5-1	0-5 VOLTS	I/O BOARD	ANALOG INPUT OF THE FURNACE MULTIPLEXER.
FURNACE 1A STAT HI	DIGITAL INPUT	TB01-3	ON / OFF	FURNACE MULTIPLEXER	FURNACE 1A HZ STATUS INPUT TO FURNACE MULTIPLEXER BOARD.
FURNACE STATUS COUNTS	ANALOG INPUT	J5-1	0 - 4095	I/O BOARD	STATUS OF THE INPUT FROM THE FURNACE MULTIPLEXER BOARD IN COUNT.
FURNACE 1 STATUS	DIGITAL INPUT	TB01-2	ON / OFF	FURNACE MULTIPLEXER	FURNACE 1 STATUS INPUT TO FURNACE MULTIPLEXER BOARD.
FURNACE 1A STATUS	DIGITAL INPUT	TB01-2	ON / OFF	FURNACE MULTIPLEXER	FURNACE 1A STATUS INPUT TO FURNACE MULTIPLEXER BOARD.
FURNACE 1B STATUS	DIGITAL INPUT	TB01-6	ON / OFF	FURNACE MULTIPLEXER	FURNACE 1B STATUS INPUT TO FURNACE MULTIPLEXER BOARD.
FURNACE 2 STATUS	DIGITAL INPUT	TB01-3	ON / OFF	FURNACE MULTIPLEXER	FURNACE 2 STATUS INPUT TO FURNACE MULTIPLEXER BOARD.
FURNACE 3 STATUS	DIGITAL INPUT	TB01-4	ON / OFF	FURNACE MULTIPLEXER	FURNACE 3 STATUS INPUT TO FURNACE MULTIPLEXER BOARD.
OCCUPANCY STATE	DIGITAL INPUT	TB8-2	OCCUPIED / UNOCCUPIED	I/O BOARD	HARDWIRED DIGITAL INPUT TO PUT THE UNIT INTO THE OCCUPIED MODE.
LOCAL STOP	DIGITAL INPUT	TB8-1	RUN / STOP	I/O BOARD	DIGITAL INPUT THAT TURNS THE UNIT ON AND OFF.
FAN (G)	DIGITAL INPUT	TB8-8	ON / OFF	I/O BOARD	HARDWIRED DIGITAL INPUT TO TURN THE SUPPLY FAN ON AND OFF.
Y1 LOW COOL	DIGITAL INPUT	TB8-10	ON / OFF	I/O BOARD	HARDWIRED DIGITAL INPUT TO PLACE THE UNIT IN FIRST STAGE COOLING MODE.
Y2 HIGH COOL	DIGITAL INPUT	TB8-11	ON / OFF	I/O BOARD	HARDWIRED DIGITAL INPUT TO PLACE THE UNIT IN SECOND STAGE COOLING MODE.
W1 LOW HEAT	DIGITAL INPUT	TB8-13	ON / OFF	I/O BOARD	HARDWIRED DIGITAL INPUT TO PLACE THE UNIT IN FIRST STAGE HEATING MODE.
W2 HIGH HEAT	DIGITAL INPUT	TB8-14	ON / OFF	I/O BOARD	HARDWIRED DIGITAL INPUT TO PLACE THE UNIT IN SECOND STAGE HEATING MODE.
SAFETY INPUT CHAIN 1	DIGITAL INPUT	TB7-1	OKAY / FAULTED	I/O BOARD	DIGITAL INPUT FROM THE COMPRESSOR SYSTEM 1 SAFETY CIRCUIT.
SAFETY INPUT CHAIN 2	DIGITAL INPUT	TB7-2	OKAY / FAULTED	I/O BOARD	DIGITAL INPUT FROM THE COMPRESSOR SYSTEM 2 SAFETY CIRCUIT.

TABLE 47– SERVICE (CONT'D)

DISPLAY TEXT	TYPE	ID	VALUE RANGE	LOCATION	DESCRIPTION
SAFETY INPUT CHAIN 3	DIGITAL INPUT	TB7-4	OKAY / FAULTED	I/O BOARD	DIGITAL INPUT FROM THE COMPRESSOR SYSTEM 3 SAFETY CIRCUIT.
SAFETY INPUTS LPCO 1	DIGITAL INPUT	TB7-5	OKAY / FAULTED	I/O BOARD	DIGITAL INPUT FROM THE COMPRESSOR SYSTEM 1 LOW PRESSURE SAFETY CIRCUIT.
SAFETY INPUTS LPCO 2	DIGITAL INPUT	TB7-7	OKAY / FAULTED	I/O BOARD	DIGITAL INPUT FROM THE COMPRESSOR SYSTEM 2 LOW PRESSURE SAFETY CIRCUIT.
SAFETY INPUTS LPCO 3	DIGITAL INPUT	TB7-8	OKAY / FAULTED	I/O BOARD	DIGITAL INPUT FROM THE COMPRESSOR SYSTEM 3 LOW PRESSURE SAFETY CIRCUIT.
SUPPLY FAN OUTPUT	DIGITAL INPUT	TB7-10	RUNNING / STOPPED	I/O BOARD	DIGITAL INPUT FOR THE SUPPLY FAN RUN VERIFICATION CIRCUIT.
EXHAUST FAN STATUS	DIGITAL INPUT	TB7-11	RUNNING / STOPPED	I/O BOARD	DIGITAL INPUT FROM THE EXHAUST FAN RUN VERIFICATION CIRCUIT.
RETURN FAN STATUS	DIGITAL INPUT	TB7-11	RUNNING / STOPPED	I/O BOARD	DIGITAL INPUT FROM THE RETURN FAN RUN VERIFICATION CIRCUIT.
FILTER STATUS	DIGITAL INPUT	TB7-13	OKAY / CHANGE	I/O BOARD	DIGITAL INPUT FROM THE DIRTY FILTER PRESSURE SWITCH.
HW/STEAM FRZ STAT	DIGITAL INPUT	TB7-14	OKAY / FAULTED	I/O BOARD	DIGITAL INPUT FROM THE HOT WATER FREEZESTAT.
SMOKE PURGE 1	DIGITAL INPUT	TB8-4	ON / OFF	I/O BOARD	HARDWIRED DIGITAL INPUT TO PLACE THE UNIT IS SMOKE PURGE 1 MODE.
SMOKE PURGE 2	DIGITAL INPUT	TB8-5	ON / OFF	I/O BOARD	HARDWIRED DIGITAL INPUT TO PLACE THE UNIT IS SMOKE PURGE 2 MODE.
SMOKE PURGE 3	DIGITAL INPUT	TB8-7	ON / OFF	I/O BOARD	HARDWIRED DIGITAL INPUT TO PLACE THE UNIT IS SMOKE PURGE 3 MODE.
CO2 LVL INSIDE BAS	COMMUN	PORT P1	USER DISABLE / USER ENABLE	IPU BOARD	THIS ITEM MUST BE ENABLED IN ORDER TO COMMUNICATE A CO2 VALUE TO THE UNIT.
CO2 LVL INSIDE VALUE BAS	COMMUN	PORT P1	101 TO 1899 PPM	IPU BOARD	THE INSIDE CO2 VALUE BEING COMMUNICATED TO THE UNIT THROUGH THE BAS SYSTEM.
DUCT PRES RESET BAS	COMMUN	PORT P1	USER DISABLE / USER ENABLE	IPU BOARD	THIS ITEM MUST BE ENABLED IN ORDER TO COMMUNICATE A DUCT STATIC PRESSURE RESET VALUE TO THE UNIT.
DUCT STATIC PRES RESET BAS	COMMUN	PORT P1	0 TO 100%	IPU BOARD	THE DUCT STATIC RESET VALUE BEING COMMUNICATED TO THE UNIT THROUGH THE BAS SYSTEM.
EXHAUST CONTROL BAS	COMMUN	PORT P1	ENABLE/ DISABLE	IPU BOARD	ENABLES OR DISABLES CONTROL OF THE EXHAUST FAN OR MODULATING EXHAUST DAMPER (RETURN FAN)
EXHAUST DAMPER/VFD	COMMUN	PORT P1	0 TO 100%	IPU BOARD	COMMUNICATED SIGNAL TO SET THE POSITION OF THE MODULATING DAMPER (RETURN FAN) OR SPEED OF THE EXHAUST FAN.
FAN (G) BAS	COMMUN	PORT P1	ON / OFF	IPU BOARD	GIVES THE STATUS OF THE COMMUNICATED FAN G INPUT.

TABLE 47– SERVICE (CONT'D)

DISPLAY TEXT	TYPE	ID	VALUE RANGE	LOCATION	DESCRIPTION
MORNING WARM UP CMD	COMMUN	PORT P1	ON / OFF	IPU BOARD	GIVES THE STATUS OF THE COMMUNICATED MORNING WARM UP COMMAND.
OCCUPANCY COMMAND	COMMUN	PORT P1	OCCUPIED / UNOCCUPIED	IPU BOARD	GIVES THE STATUS OF THE COMMUNICATED OCCUPANCY COMMAND.
SMOKE PURGE 1 BAS	COMMUN	PORT P1	ON OFF	IPU BOARD	GIVES THE STATUS OF THE COMMUNICATED SMOKE PURGE 1 COMMAND.
SMOKE PURGE 2 BAS	COMMUN	PORT P1	ON OFF	IPU BOARD	GIVES THE STATUS OF THE COMMUNICATED SMOKE PURGE 2 COMMAND.
SMOKE PURGE 3 BAS	COMMUN	PORT P1	ON OFF	IPU BOARD	GIVES THE STATUS OF THE COMMUNICATED SMOKE PURGE 3 COMMAND.
SAT RESET BAS	COMMUN	PORT P1	USER DISABLE / USER ENABLE	IPU BOARD	THIS ITEM MUST BE ENABLED IN ORDER TO COMMUNICATE A SUPPLY AIR TEMPERATURE RESET VALUE TO THE UNIT.
SUPPLY AIR TEMP RESET BAS	COMMUN	PORT P1	0 TO 5 VOLTS	IPU BOARD	THE SUPPLY AIR TEMPERATURE RESET VALUE BEING COMMUNICATED TO THE UNIT THROUGH THE BAS SYSTEM.
SYSTEM STOP	COMMUN	PORT P1	0 - ALLOWS ALL COMPRESSORS TO OPERATE; 1 - TURNS OFF COMPRESSOR SYSTEM 1; 2 - TURNS OFF COMPRESSOR SYSTEM 2; 3 - TURNS OFF COMPRESSOR SYSTEM 3	IPU BOARD	GIVES THE STATUS OF THE COMMUNICATED SYSTEM STOP COMMAND.
UNDER FLR HUMI BAS	COMMUN	PORT P1	USER DISABLE / USER ENABLE	IPU BOARD	THIS ITEM MUST BE ENABLED IN ORDER TO COMMUNICATE A UNDER FLOOR HUMIDITY VALUE TO THE UNIT.
UNDRFLOOR AIR HUMIDITY BAS	COMMUN	PORT P1	0 TO 100%	IPU BOARD	THE UNDER FLOOR HUMIDITY VALUE BEING COMMUNICATED TO THE UNIT.
UNDR FLR TEMP BAS	COMMUN	PORT P1	USER DISABLE / USER ENABLE	IPU BOARD	THIS ITEM MUST BE ENABLED IN ORDER TO COMMUNICATE AN UNDER FLOOR TEMPERATURE VALUE TO THE UNIT.
UNDERFLOOR SLAB TEMP BAS	COMMUN	PORT P1	-20 F TO 180 F	IPU BOARD	THIS IS THE ACTUAL UNDER FLOOR TEMPERATURE VALUE BEING COMMUNICATED BY THE BAS SYSTEM.
UNIT STOP	COMMUN	PORT P1	ON / OFF	IPU BOARD	GIVES THE STATUS OF THE COMMUNICATED UNIT STOP COMMAND.

TABLE 47– SERVICE (CONT'D)

DISPLAY TEXT	TYPE	ID	VALUE RANGE	LOCATION	DESCRIPTION
W1 LOW HEAT BAS	COMMUN	PORT P1	ON / OFF	IPU BOARD	GIVES THE STATUS OF THE COMMUNICATED W1 LOW HEAT COMMAND.
W2 HIGH HEAT BAS	COMMUN	PORT P1	ON / OFF	IPU BOARD	GIVES THE STATUS OF THE COMMUNICATED W2 HIGH HEAT COMMAND.
Y1 LOW COOL BAS	COMMUN	PORT P1	ON / OFF	IPU BOARD	GIVES THE STATUS OF THE COMMUNICATED Y1 LOW COOL COMMAND.
Y2 HIGH COOL BAS	COMMUN	PORT P1	ON / OFF	IPU BOARD	GIVES THE STATUS OF THE COMMUNICATED Y2 HIGH COOL COMMAND.
ZONE TEMP BAS	COMMUN	PORT P1	-20 F TO 180 F	IPU BOARD	GIVES THE ACTUAL VALUE OF THE COMMUNICATED ZONE TEMPERATURE.
FIRMWARE CRC	DERIVED		0 TO 99999	ALWAYS	THIS IS THE SIZE OF THE CODE IN THE SOFTWARE AND IS NOT FOR FIELD USE.
REAL TIME UI - PEAK 5 SEC AND AVERAGE	DERIVED				THE AVERAGE AND PEAK OVER THE LAST 5 SECONDS TIME USED BY THE USER INTERFACE. THIS IS NOT FOR FIELD USE.
REAL TIME UI - LOST AND PEAK	DERIVED				THE LOST AND PEAK TIME USED BY THE USER INTERFACE. THIS IS NOT FOR FIELD USE.
REAL TIME CONTROL - PEAK 5 SEC AND AVERAGE	DERIVED				THE AVERAGE AND PEAK OVER THE LAST 5 SECONDS TIME USED BY THE CONTROL. THIS IS NOT FOR FIELD USE.
REAL TIME CONTROL - LOST AND PEAK	DERIVED				THE LOST AND PEAK TIME USED BY THE CONTROL. THIS IS NOT FOR FIELD USE.
DE MODIFIER ADDRESS			-1 TO 41943		USED TO ENTER A SPECIFIC DE INSTANCE. SEE *SECTION 6 – USER INTERFACE CONTROL CENTER*
DE MODIFIER OFFSET			-1 TO 99		USED IN COMBINATION WITH THE DE MODIFIER ADDRESS TO ENTER A SPECIFIC DE INSTANCE. SEE *SECTION 6 – USER INTERFACE CONTROL CENTER*.
P1 BAUD RATE			1200, 4800, 9600, 19200, 38400, 76800		ESTABLISHES THE COMMUNICATION BAUD RATE FOR PORT 1.
P1 MANUAL MAC ADDRESS			-1 TO 127		ALLOWS THE MANUAL ENTRANCE OF THE MAC ADDRESS FOR PORT 1. SEE *SECTION 6 – USER INTERFACE CONTROL CENTER*.
P1 PARITY			NONE, EVEN, ODD, IGNORE		DO NOT CHANGE FROM DEFAULT VALUE FOR BACNET.
P1 PROTOCOL			BACNET, API		KEEP SETTING ON BACNET.

TABLE 47– SERVICE (CONT'D)

DISPLAY TEXT	TYPE	ID	VALUE RANGE	LOCATION	DESCRIPTION
P1 STOP BITS			1-2		DO NOT CHANGE FROM DEFAULT VALUE FOR BACNET.
P2 BAUD RATE			1200, 4800, 9600, 19200, 38400, 57600		ESTABLISHES THE COMMUNICATION BAUD RATE FOR PORT 2.
P2 MANUAL MAC ADDRESS			-1 TO 127		ALLOWS THE MANUAL ENTRANCE OF THE MAC ADDRESS FOR PORT 2. SEE *SECTION 6 – USER INTERFACE CONTROL CENTER*.
P2 PARITY			NONE, EVEN, ODD, IGNORE		ESTABLISHES THE PARITY FOR COMMUNICATION PORT 2.
P2 PROTOCOL			TERMINAL, MODBUS I/O, MODBUS SERVER, API, MODBUS CLIENT		ESTABLISHES THE PROTOCOL FOR COMMUNICATION PORT 2.
P2 STOP BITS			1 - 2		ESTABLISHES THE STOP BIT SETTING FOR COMMUNICATION PORT 2.
P3 BAUD RATE			1200, 4800, 9600, 19200, 38400, 57600		ESTABLISHES THE COMMUNICATION BAUD RATE FOR PORT 3.
P3 MANUAL MAC ADDRESS			-1 TO 127		ALLOWS THE MANUAL ENTRANCE OF THE MAC ADDRESS FOR PORT 3. SEE *SECTION 6 – USER INTERFACE CONTROL CENTER*.
P3 PARITY			NONE, EVEN, ODD, IGNORE		ESTABLISHES THE PARITY FOR COMMUNICATION PORT 3.
P3 PROTOCOL			TERMINAL, MODBUS I/O, MODBUS SERVER, API, MODBUS CLIENT		ESTABLISHES THE PROTOCOL FOR COMMUNICATION PORT 3.
P3 STOP BITS			1 - 2		ESTABLISHES THE STOP BIT SETTING FOR COMMUNICATION PORT 3.
P4 BAUD RATE			1200, 4800, 9600, 19200, 38400, 57600		ESTABLISHES THE COMMUNICATION BAUD RATE FOR PORT 4.
P4 MANUAL MAC ADDRESS			-1 TO 127		ALLOWS THE MANUAL ENTRANCE OF THE MAC ADDRESS FOR PORT 4. SEE *SECTION 6 – USER INTERFACE CONTROL CENTER*.
P4 PARITY			NONE, EVEN, ODD, IGNORE		ESTABLISHES THE PARITY FOR COMMUNICATION PORT 4.

TABLE 47– SERVICE (CONT'D)

DISPLAY TEXT	TYPE	ID	VALUE RANGE	LOCATION	DESCRIPTION
P4 PROTOCOL			TERMINAL, MODBUS I/O, MODBUS SERVER, API, MODBUS CLIENT		ESTABLISHES THE PROTOCOL FOR COMMUNICATION PORT 4.
P4 STOP BITS			1 - 2		ESTABLISHES THE STOP BIT SETTING FOR COMMUNICATION PORT 4.
CONNEXSYS ERROR FEATURE AND DETECTION	DERIVED				NOT FOR FIELD USE.
CONNEXSYS ERROR PAGE AND FIELD	DERIVED				NOT FOR FIELD USE.
CONNEXSYS ERROR REASON AND VALVE	DERIVED				NOT FOR FIELD USE.
REAL TIME PROBLEM STRING	DERIVED				NOT FOR FIELD USE.
REAL TIME PROBLEM NUMBER	DERIVED				NOT FOR FIELD USE.
REAL TIME PROBLEM	DERIVED				NOT FOR FIELD USE.

Following is an example of an Analog Input display that can be viewed from Service Mode. See *Table 47 on page 124* for a listing of the Analog Inputs.

```
SERVICE AI   PIO   J07-01   XX.X VDC
+ BUILDING STATIC PRES        =XX.XXINWC
```

Following is an example of a DIGITAL Input display that can be viewed from Service Mode. See *Table 47 on page 124* for a listing of the DIGITAL Inputs.

```
SERVICE   DI  PIO  TB08-01
  LOCAL STOP          RUN
```

Following is an example of a DIGITAL Output display that can be viewed from Service Mode. The XXX is replaced with OFF or ON in this section. See *Table 47 on page 124* for a listing of the Digital Outputs.

```
SERVICE     DO   PIO  TB03-05
  COMPRESSOR 2A       OFF
```

Following is an example of an Analog Output display that can be viewed from Service Mode. See *Table 47 on page 124* for a listing of the Analog Outputs.

```
SERVICE  AO   PIO    TB08-01    XX.X VDC
+ SYS 1 FEED VALVE OUTPUT      =XXX.X %
```

HISTORY

See "HISTORY key sequence" below.

The HISTORY key gives the user access to WARNING and FAULT information. Many operating parameters and states are saved at the time of a fault. The History information can be viewed after entering the Level 2 password.

When the HISTORY key is pressed, the first active warning will be displayed. If there are not any active warnings, HISTORY 1 is displayed. If there are not any faults, “NO FAULT” will be displayed. Data is not saved for warnings. Data is saved for faults.

When a warning is displayed, the ► key advances to the next warning or HISTORY 1 after the last warning. The ◄ key returns to the previous warning or the highest HISTORY number before the first warning.

When a HISTORY # is displayed, the ► key advances to the next HISTORY # or warning 1 after the last fault. The ◄ key returns to the previous HISTORY # or the highest warning number before the first fault. Buffer number 1 is the most recent and buffer number 10 is the oldest HISTORY # saved. A maximum of 10 HISTORY #'s are saved. The ▲ and ▼ key can be used to scroll forwards and backwards through the history buffer data.

HISTORY KEY SEQUENCE

History key pressed

Warning 1	Warning 2	Fault 1	Fault 2	Fault 3
		Fault 1 Data	Fault 2 Data	Fault 3 Data

The data following the initial History Fault display, is displayed in the same order and with the same message used under the respective menu function:

- Status
- Unit Data
- Cooling
- Supply System
- Comp Sys 1
- Comp Sys 2
- Comp Sys 3
- Heating
- Economizer
- Ventilation
- Exhaust
- Hours/Starts

Pressing the ▼ key from a History Fault display changes the display to the History Section display format. The ► and ◄ keys are used to select a section. Pressing the History or **X** key returns to the History Fault display. Pressing the ▼ key displays the next parameter in the selected list. From a parameter display, pressing the History or **X** key returns to the History Fault display. See *SECTION 6 – USER INTERFACE CONTROL CENTER* for instructions for navigating the parameter display.

For the following example, assume that there were three faults and one warning logged.

First, the HISTORY key is pressed to get the password prompt. If a level 2 password is active, this prompt is skipped.

```
HISTORY
ENTER PASSWORD
```

After entering the Level 2 password, the most recent WARNING is displayed.

```
HISTORY WARNING                ◄►
+ WRN-BUILDING PRS
```

The ► key is pressed to move to the first fault.

```
HISTORY 01  31 OCT 2004  12:45:59 AM  ◄►
+ LOCKOUT-DUCT PRS XDCR
```

The ► key is pressed to move to the next older fault (fault # 2).

```
HISTORY 02  31 OCT 2004  10:42:39 AM  ◄►
 AUTO RESET-MSAT SENSOR
```

The ► key is pressed to move to the next older fault (fault # 3).

```
HISTORY 03  30 OCT 2004  02:11:23 PM  ◄►
 WRN-BUILDING PRS
```

The ▼ key is pressed to view data saved when fault #3 was detected.

```
HISTORY 03 – STATUS            ◄►
UNIT-OVERALL STATUS       RUN
```

The ▼ key is pressed to view the second STATUS value.

```
HISTORY 03 – STATUS            ◄►
 CURRENT OPER MODE   RUN
```

The ► key is pressed to change to the next data section (UNIT DATA).

```
HISTORY 03 – UNIT DATA         ◄►
 UNIT TYPE        CONSTANT VOLUME
```

The **X** or HISTORY key is pressed to go back to the fault display.

```
HISTORY 03  30 OCT 2004  02:11:23 PM  ◄►
 WRN-BUILDING PRS
```

From fault display, the **X** key can be pressed to return to the Power Up Banner display.

PASSWORD

Passwords are used to allow restricted access to the modification and viewing of certain parameters using the Setpoints, Program, Options, Date/Time, Schedule, Operating Hours / Start Counter, Print, Service, and History menu keys. The menus activated by each of these buttons can only be viewed after an acceptable password is entered. Each parameter is associated with a level of access. Each level of access is associated with a specific password. The access levels available are: Level 1 or Level 2.

- If a parameter is tagged as Level 1, password of 9675 must be entered in order to change the value.
- If a parameter is tagged as Level 2, a password of 9725 must be entered in order to change the value. Entering the Level 2 password will also allow the changing of a Level 1 parameter.

Pressing Setpoints, Program, Options, Date/Time, Schedule, Operating Hours / Start Counter, Print, Service, or HISTORY key will take the user to the login prompt. When the user is first presented with the login prompt, the password field will be blank. If the user wishes to change Level 1 or Level 2 parameters, the user must know the appropriate password. At that point, only the parameters changeable under the specific password level will be displayed. For example, if the user presses the Options menu key, and then enters a Level 1 password, the user will be presented with a list of option parameters that have been tagged as Level 1. If the user enters a level 2 password, all parameters are displayed.

The password is entered by pressing the correct sequence of numerical keys (the 0 key through the 9 key), then pressing the ✓ key. As digits are entered, asterisks will be placed in the password field. Once entered, the menu system will compare the password to a list of stored passwords. If the entered password matches one of the stored passwords, the user is allowed access at the specified level, and the display will show the first applicable parameter of the menu list, with the appropriate edit prompts. If the password is not correct, the screen will display “Password Incorrect” for two seconds and then revert back to the Login Prompt. Pressing the X key during password entry will cancel the password entry process and take the user back to the Login Prompt.

Once a password has been accepted, reentry of that password will not be required until either the user presses a menu key other than Setpoints, Program, Options, Date/Time, Schedule, Operating Hours / Start Counter, Print, Service, History or key activity is idle for fifteen minutes. This ensures that the menu system reverts to password protection within an acceptable timeout.

POWER UP BANNER

When power is first applied to the control panel, the following message will be displayed for two seconds:

The top line displays the copyright message. The bottom line displays the software version, and the present date and time.

The software version number will be in the following format:

- C.ECO.ZZ.YY (control board released version).
- Where C is the Product Classification and stands for Commercial unit.
- ECO is the Family Code and stands for YPAL Packaged Rooftop Air Conditioner Control Panel.
- ZZ = the Product Code.
- YY = the Version Number.

COMMUNICATION

The Unit Controller is designed to communicate with a Building Automation System and a printer.

The Building Automation System communication uses BACnet protocol, MS/TP, Modbus I/O, Modbus Server, Modbus Client or Terminal. Other Building Automation system networks can be connected by using a router.

The printer communication uses ASCII protocol and RS-232 hardware.

Communication Ports

Port 1: Bacnet MS/TP, Bacnet IP *, LON **, or N2 ** (see notes)

Port 2: Hyper Terminal

Port 3: Others not defined here

Port 4: Modbus

NOTE

**** Ethernet Port (IP) not functional. For Bacnet IP use, please refer to Note 2 at the end of Bacnet Points List, Table 48 on page 140.***

NOTE

***** For LON or N2, an E-Link must be used. Communication wires are connected to Port 1 and then connected to the appropriate E-Link. Please refer to LON points list, Table 49 on page 156, or N2 points list,*** *Table 50 on page 162* ***for E-Link p/n's.***

BACnet Wiring

All BACnet devices are "daisy chained" together using a twisted pair, the (+) is connected to the (+) and the (-) to the (-). **DO NOT** connect wiring to terminals 1, 2 or 5. The connections on the PORT 1 connector are as follows:

1 - 5V
2 - Ground
3 - Receive (-)
4 - Transmit (+)
5 - Open

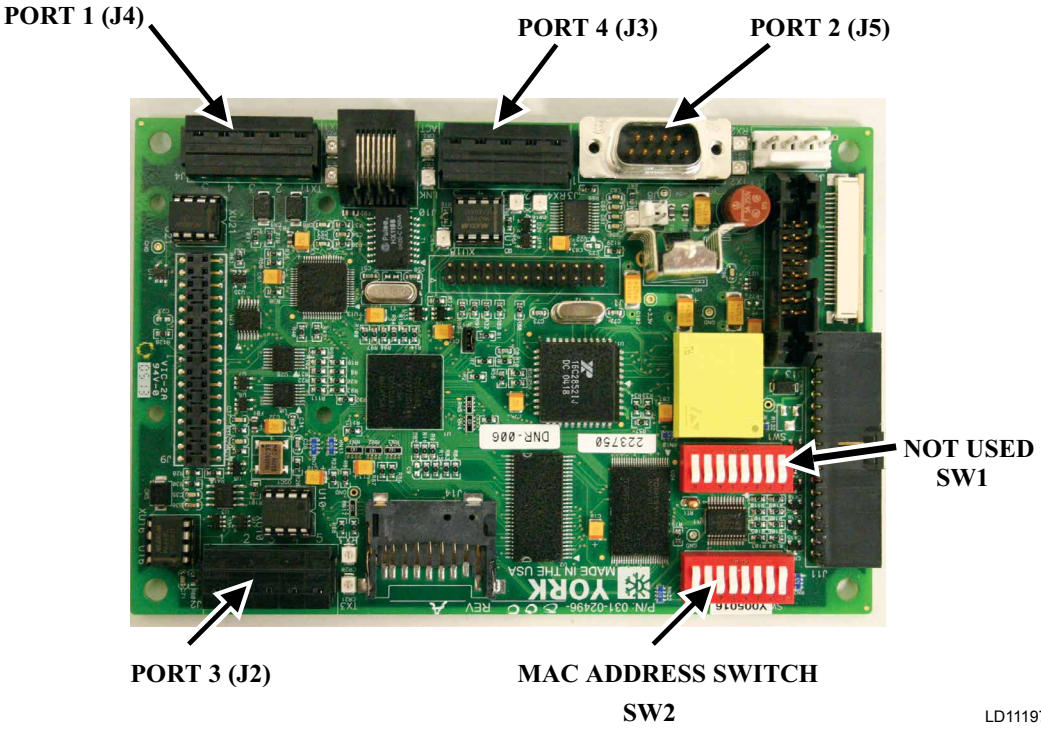


FIGURE 48 - IPU CONTROL BOARD

Device Object Instance (DE)

The unit is shipped to automatically establish the DE address after the MAC address is established using the MAC address switches on the IPU or through the User Interface. The default Device Object Instance (DE) would be 23000 plus the MAC address. For example, if you had a MAC address of 10 the default Device Object Instance (DE) would be 23010.

The MAC address can be set in two ways using the MAC Address Switches on the IPU or though the Service Key of the User Interface. The 8-way binary switch uses seven of the rockers to set the MAC address. The network address must be between 1 and 127. To determine the node address, add the value of each DIP switch in the ON position as shown in Fig. 39. Switch 8 must always be in the ON position to allow terminal operation.

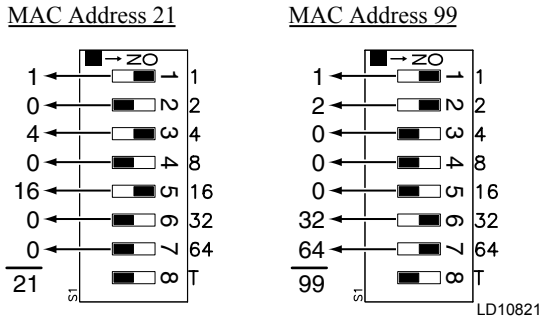


FIGURE 49 - MAC ADDRESS SWITCHES

As stated above the MAC address can also be set using the SERVICE Key. Go to parameter "PI MANUAL MAC ACCESS". Press the ✓ key and enter the MAC address number using the numeric keypad and then press the ✓ key again. The MAC address can be a number from 0 to 127. If the MAC address is entered using the User Interface the control will ignore any values entered through the MAC Address Switches. In order to make the MAC Address switches active again a value of –1 would need to be entered for the "PI MANUAL MAC ACCESS". In order to use the above procedure to establish the Device Object Instance (DE) the value for "DE MODIFIER OFFSET" MUST BE SET TO –1."

In most applications the above procedure allows the Device Object Instance (DE) to be established. Some applications may request that the Device Object Instance (DE) be set to a given value. This can be done through the User Interface. To do this you would use the "DE MODIFIER ADDRESS" in conjunction with the "DE MODIFIER OFFSET". Using this feature the Device Object Instance (DE) would be the ("DE MODIFIER ADDRESS" X 100) + "DE MODIFIER OFFSET". For example, if you wanted a DE address of 2010, set the "DE MODIFIER ADDRESS" to 20 and the "DE MODIFIER OFFSET" to 10. The Device Object instance (DE) is limited to a value between 0 and 4,194,303.

The "DE MODIFIER ADDRESS" and the "DE MODIFIER OFFSET" are both set using the SERVICE key of the User Interface. Go to parameter "DE MODIFIER ADDRESS". Press the ✓ key to enter the DE Modifier Address number using the numeric keypad and then press the ✓ key again. Then go to parameter "DE MODIFIER OFFSET". Press the ✓ key to enter the DE Modifier Offset number using the numeric keypad and then press the ✓ key again.

Additional Settings

The following parameters can also be programmed using the SERVICE Key:

PORT 1

- “P1 BAUD RATE”.
- “P1 MANUAL MAC ADDRESS”.
- “P1 PARITY”.
- “P1 PROTOCOL”.
- “P1 STOP BITS”.

PORT 2

- “P2 BAUD RATE”.
- “P2 MANUAL MAC ADDRESS”.
- “P2 PARITY”.
- “P2 PROTOCOL”.
- “P2 STOP BITS”.

PORT 3

- “P3 BAUD RATE”.
- “P3 MANUAL MAC ADDRESS”.
- “P3 PARITY”.
- “P3PROTOCOL”.
- “P3 STOP BITS”.

PORT 4

- “P4 BAUD RATE”.
- “P4 MANUAL MAC ADDRESS”.
- “P4 PARITY”.
- “P4 PROTOCOL”.
- “P4 STOP BITS”.

Table 40 gives the BACnet name, BACnet Object Type and Instance, and the Modbus Register Address for the available communication points.

Any time a change is made to the MAC address using the DIP switches or a change to the above communication parameters using the SERVICE Key of the User Interface the main power to the unit must be cycled OFF and back ON to change the value in memory.

TABLE 48 - BACNET MS/TP, MODBUS, BACNET IP

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
ACT_DSP_SP	DUCT STATIC PRESS ACTIVE SP	R	AI01	514	DISPLAYS THE ACTIVE DUCT STATIC PRESS SP
ACT_MIN_ FLOW	ACTIVE MINIMUM AIRFLOW	R	AI02	515	DISPLAYS THE MIN VENTILATION AIR (CFM) SP WHEN THE UNIT HAS AN AIR FLOW MONITORING STATION
ACT_MIN_POS	ACTIVE MINIMUM POSITION	R	AI03	516	DISPLAYS THE MIN OA DAMPER POSITION (%) WHEN THE UNIT IS FIXED MIN VENT CONTROL
ACT_SAT_SP	ACTIVE SUPPLY AIR TEMP SP	R	AI04	517	**CV or VAV:** DISPLAYS THE ACTIVE SUPPLY AIR TEMP SP **FLEXSYS:** IF CURRENT MODE IS OCC COOLING W/O BYPASS, THIS WILL BE = TO THE MX SAT SP (MIXD_SAT_LIM; AV14): IF CURRENT MODE IS OCC COOLING W/ BYPASS, THIS WILL BE = TO EITHER THE EVAP LEAVING HIGH SP (EL_AIR_ TMP_H; AV07) OR THE EVAP LEAVING LOW SP (EL_AIR_TMP_L; AV08) DEPENDING ON THE SYSTEM CONDITIONS.
ACT_SLAB_ CTL	ACTIVE SLAB CONTROL **(FLEXSYS ONLY)**	R/W	AV77 BV01	1102	ALLOWS THE ACTIVE SLAB CONTROL TO BE TURNED ON/OFF 0=OFF 1=ON
AMORN_WA_ ACT	ADAPTIVE MORNING WARMUP STATUS **(ONLY USED WITH INTERNAL TIME CLOCK)**	R	BI01		DISPLAYS THE STATUS OF THE ADAPTIVE MORNING WARM-UP
BLD_STAT_ PRS	BUILDING PRESSURE CURRENT	R	AI05	518	DISPLAYS THE CURRENT BUILDING PRESS ("WC)
BULD_PRES_ SP	BLDG PRESS SP	R/W	AV01	1026	DISPLAYS THE ACTIVE BUILDING PRESSURE SP
BYPASS_ DAMPER	BYPASS DAMPER POSITION **(FLEXSYS ONLY)**	R	AI06	519	DISPLAYS THE ACTUAL BYPASS DAMPER POSITION
CO2_1_OUT	CO2 LEVEL OF THE OUTSIDE AIR	R	AI07	520	DISPLAYS THE ACTUAL OA AIR CO2 (PPM)
CO2_2_IN	CO2 LEVEL OF THE INSIDE AIR	R	AI08	521	DISPLAYS THE ACTUAL RA AIR CO2 (PPM)

TABLE 48 – BACNET MS/TP, MODBUS, BACNET IP (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
CO2_INSIDE	CO2 LVL INSIDE VALUE BAS	R/W	AV43	1168	A BAS ENTERED VALUE FOR THE INSIDE CO2 LEVEL. "CO2 LVL INSIDE BAS" MUST BE ENABLED USING THE SERVICE KEY IN ORDER TO USE THIS POINT
CO2_OFFSET	CO2 OFFSET SP	R/W	AV02	1027	DISPLAYS THE VALUE (PPM) THAT THE INDOOR CO2 MUST RISE ABOVE THE OUTSIDE CO2 TO ACTIVATE DEMAND VENTILATION
COL/HEAT_FLT	COOLING/ HEATING FAULT STATUS	R	BI02	1283	DISPLAYS THE STATUS OF THE COOLING OR HEATING SYSTEM. 0=NO FAULT 1=FAULT
COMFORT_ VENT	COMFORT VENTILATION **(CONSTANT VOLUME)**	R/W	AV78 BV02	1103	DISPLAYS THE STATUS OF THE COMFORT VENT OPTION AND ALLOW IT TO BE TURNED ON/OFF: 0=OFF 1=ON
COMP_1A	COMPRESSOR 1A STATUS	R	BI03	1284	DISPLAYS THE STATUS OF COMP 1A: 0=OFF 1=ON
COMP_1A_ OPER	COMP 1A OPERATING HRS	R	AI09	522	DISPLAYS THE OPERATING HRS OF COMP 1A
COMP_1B	COMPRESSOR 1B STATUS	R	BI04	1285	DISPLAYS THE STATUS OF COMP 1B: 0=OFF 1-ON
COMP_1B_ OPER	COMP 1B OPERATING HRS	R	AI10	523	DISPLAYS THE OPERATING HRS OF COMP 1B
COMP_2A	COMPRESSOR 2A STATUS	R	BI05	1286	DISPLAYS THE STATUS OF COMP 2A: 0=OFF 1=ON
COMP_2A_ OPER	COMP 2A OPERATING HRS	R	AI11	524	DISPLAYS THE OPERATING HRS OF COMP 2A
COMP_2B	COMPRESSOR 2B STATUS	R	BI06	1287	DISPLAYS THE STATUS OF COMP 2B: 0=OFF 1=ON
COMP_2B_ OPER	COMP 2B OPERATING HRS	R	AI12	525	DISPLAYS THE OPERATING HRS OF COMP 2B
COMP_3A	COMPRESSOR 3A STATUS **(70-150 TON ONLY)**	R	BI07	1288	DISPLAYS THE STATUS OF COMP 3A: 0=OFF 1=ON
COMP_3A_ OPER	COMP 3A OPERATING HRS **(70-150 TON ONLY)**	R	AI13	526	DISPLAYS THE OPERATING HRS OF COMP 3A
COMP_3B	COMPRESSOR 3B STATUS **(70-150 TON ONLY)**	R	BI08	1289	DISPLAYS THE STATUS OF COMP 3B: 0=OFF 1=ON
COMP_3B_ OPER	COMP 3B OPERATING HRS **(70-150 TON ONLY)**	R	AI14	527	DISPLAYS THE OPERATING HRS OF COMP 3B

TABLE 48 – BACNET MS/TP, MODBUS, BACNET IP (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
COMP_ LPCO_1	SAFETY INPUT LPCO CKT 1 STATUS	R	BI09	1290	DISPLAYS THE STATUS OF THE LOW PRESS SWITCH ON CKT 1: 0=FAULT 1=NO FAULT
COMP_ LPCO_2	SAFETY INPUT LPCO CKT 2 STATUS	R	BI10	1291	DISPLAYS THE STATUS OF THE LOW PRESS SWITCH ON CKT 2: 0=FAULT 1=NO FAULT
COMP_ LPCO_3	SAFETY INPUT LPCO CKT 3 STATUS **(70-150 TON ONLY)**	R	BI11	1292	DISPLAYS THE STATUS OF THE LOW PRESS SWITCH ON CKT 3: 0=FAULT 1=NO FAULT
COMP_STAT_1	SAFETY CHAIN CKT 1 STATUS	R	BI12	1293	DISPLAYS THE STATUS OF CKT 1 SAFETY CHAIN: 0=FAULT 1=NO FAULT
COMP_STAT_2	SAFETY CHAIN CKT 2 STATUS	R	BI13	1294	DISPLAYS THE STATUS OF CKT 2 SAFETY CHAIN: 0=FAULT 1=NO FAULT
COMP_STAT_3	SAFETY CHAIN CKT 3 STATUS **(70-130 TON ONLY)**	R	BI14	1295	DISPLAYS THE STATUS OF CKT 3 SAFETY CHAIN: 0=FAULT 1=NO FAULT
COND_FAN_1A	COND FAN 1A/1 STATUS	R	BI15	1296	DISPLAYS THE STATUS OF COND FAN 1A/1: 0=OFF 1=ON
COND_FAN_1B	COND FAN 1B/2 STATUS	R	BI16	1297	DISPLAYS THE STATUS OF COND FAN 1B/2: 0=OFF 1=ON
COND_FAN_2A	COND FAN 2A/3 STATUS	R	BI17	1298	DISPLAYS THE STATUS OF COND FAN 2A/3: 0=OFF 1=ON
COND_FAN_2B	COND FAN 2B/4 STATUS	R	BI18	1299	DISPLAYS THE STATUS OF COND FAN 2B/4: 0=OFF 1=ON
COND_FAN_3A	COND FAN 3A/5 STATUS **(70-150 TON ONLY)**	R	BI19	1300	DISPLAYS THE STATUS OF COND FAN 3A/5: 0=OFF 1=ON
COND_FAN_3B	COND FAN 3B/6 STATUS **(70-150 TON ONLY)**	R	BI20	1301	DISPLAYS THE STATUS OF COND FAN 3B/6: 0=OFF 1=ON
COND_FAN_ SPD	COND FAN SPEED	R	AI15	528	NOT USED AT THIS TIME. FOR FUTURE USE
CONTINU_ VENT	CONTINUOUS VENTILATION **(CONSTANT VOLUME)**	R/W	AV79 BV03	1104	DISPLAYS THE STATUS OF THE CONTINUOUS VENTILATION OPTION AND ALLOWS FOR IT TO BE TURNED ON/OFF: 0=OFF 1=ON
DCT_ST_PR_ RT	DUCT STATIC PRESS RESET	R	AI16	529	DISPLAYS THE STATUS OF THE HARDWIRED DUCT STATIC RESET VALUE TO CTB1 (%)
DCT_STAT_ PRS	DUCT STATIC PRESS CURRENT **(VAV or FLEXSYS)**	R	AI17	530	DISPLAYS THE ACTUAL DUCT STATIC PRESS. ("WC)

TABLE 48 – BACNET MS/TP, MODBUS, BACNET IP (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
DEW_PNT_ RST	DEW POINT RESET **(FLEXSYS)**	R/W	AV80 BV04	1105	ALLOWS THE DEW POINT RESET FEATURE TO BE TURNED ON/OFF: 0=OFF 1=ON
DSP_HI_LIMIT	DUCT STATIC RESET HIGH SP **(VAV or FLEXSYS)**	R/W	AV03	1028	DISPLAYS THE DUCT STATIC HIGH SP
DSP_LO_LIMIT	DUCT STATIC RESET LOW SP **(VAV or FLEXSYS)**	R/W	AV04	1029	DISPLAYS THE DUCT STATIC LOW SP
DSP_RST_BAS	DUCT STATIC PRESS RESET BAS **(VAV or FLEXSYS)**	R/W	AV05	1030	A BAS VALUE THAT CAUSES THE RESET OF THE DUCT STATIC PRESS SP BETWEEN TO HIGH AND LOW VALUES. "DUCT PRES RST BAS" MUST BE ENABLED THRU THE SERVICE KEY TO USE THIS POINT
ECON_ME_ USED	ECON METHOD ACTIVE	R	AI18	531	DISPLAYS THE STATUS OF THE ACTIVE ECONOMIZER MODE: 1=DRY BULB 2=SINGLE ENTHALPY 3=DUAL ENTHALPY 4=BEST METHOD AVAIL
ECON_STATUS	ECON SYSTEM STATUS	R	AI19	532	DISPLAYS THE STATUS OF THE ECONOMIZER: 1=INSTALLED AND ACTIVE 2=NOT INSTALLED 3=DISABLED
ECONO_ INSTAL	ECONOMIZER SYSTEM	R/W	AV81 BV05	1106	ALLOWS THE ECONOMIZER FEATURE TO BE TURNED ON/OFF: 0=OFF 1=ON
ECONO_ METHOD	ECON METHOD TO USE	R/W	AV06	1031	ALLOWS FOR THE SELECTION OF THE ECONOMIZER METHOD TO USE: 1=DRY BULB 2=SINGLE ENTHALPY 3=DUAL ENTHALPY 4=BEST METHOD AVAIL
EL_AIR_ TMP_H	EVAP LEAVING AIR TEMP HIGH SP **(FLEXSYS)**	R/W	AV07	1032	DISPLAYS THE ACTIVE SP FOR THE HIGH EVAP LEAVING AIR TEMP. THIS IS THE SP THE COMPRESSORS ARE CONTROLLED TO (**OCC COOLING W/ BYPASS)**
EL_AIR_ TMP_L	EVAP LEAVING AIR TEMP LOW SP **(FLEXSYS)**	R/W	AV08	1033	DISPLAYS THE ACTIVE SP FOR THE LOW EVAP LEAVING AIR TEMP. THIS IS THE SP THE COMPRESSORS ARE CONTROLLED TO **(OCC COOLING W/ BYPASS)**
EVAP_AIR_ TMP	FLEXSYS EVAP TEMP CURRENT **(FLEXSYS)**	R	AI20	533	DISPLAYS THE ACTUAL TEMP OF THE AIR LEAVING THE EVAPORATOR **(OCC COOLING W/ BYPASS)**

TABLE 48 – BACNET MS/TP, MODBUS, BACNET IP (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
EXH_DAMPER/ VFD	EXHAUST DAMPER BAS CONTROL	R/W	AV52	NA*	ALLOWS FOR THE CONTROL OF THE EXHAUST FAN SPEED OR MODULATING DAMPER (RETURN FAN). 0 TO 100% FOR BOTH APPLICATIONS.
EXH_FAN_ STAT	EXHAUST FAN STATUS	R	BI21	1302	DISPLAYS THE STATUS OF THE EXHAUST FAN PROVING CIRCUIT: 0=OPEN 1=CLOSED
EXHAUST_FAN	EXHAUST FAN OUTPUT STATUS	R	BI22	1303	DISPLAYS THE STATUS OF THE EXHAUST FAN OUTPUT: 0=OFF 1=ON
EXHAUST_ OUT	EXHAUST DAMPER POSITION	R	AI21	534	DISPLAYS THE CONTROL OUTPUT TO THE EXH DAMPER (%)
FAN_FAULT	FAN FAULT STATUS	R	BI23	1304	DISPLAYS THE STATUS OF THE SUPPLY, EXHAUST or RETURN FAN FAULT: 0=NO FAULT 1=FAULT
FAN_G	FAN (G) STATUS	R	BI24	1305	DISPLAYS THE STATUS OF THE FAN (G) INPUT; EITHER HARDWIRED (CTB1) or COMMUNICATED (BAS): 0=OFF 1=ON
FAN_G_BAS	FAN (G) BAS	R/W	AV82 BV06	1107	A BAS COMMAND THAT ALLOWS THE FAN (G) INPUT TO BE TURNED ON/OFF: 0=OFF 1=ON
FILTER_STATS	FILTER STATUS	R	BI25	1306	DISPLAYS THE STATUS OF THE DIRTY FILTER INPUT: 0=NO FAULT 1=FAULT
FURN_OUT_1	ELECT HEAT STAGE 1 STATUS STAGED GAS FURN 1 LO STATUS MOD GAS FURN 1A LOW STATUS	R	BI26	1307	DISPLAYS THE STATUS OF THE CONTROL OUTPUT TO THE INDICATED HEAT SECTION: 0=OFF 1=ON
FURN_OUT_2	ELECT HEAT STAGE 2 STATUS STAGED GAS FURN 1 HIGH STATUS MOD GAS FURN 1A HIGH STATUS	R	BI27	1308	DISPLAYS THE STATUS OF THE CONTROL OUTPUT TO THE INDICATED HEAT SECTION: 0=OFF 1=ON
FURN_OUT_3	ELECT HEAT STAGE 3 STATUS STAGED GAS FURN 2 LOW STATUS MOD GAS FURN 2 LOW STATUS	R	BI28	1309	DISPLAYS THE STATUS OF THE CONTROL OUTPUT TO THE INDICATED HEAT SECTION: 0=OFF 1=ON

TABLE 48 – BACNET MS/TP, MODBUS, BACNET IP (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
FURN_OUT_4	ELECT HEAT STAGE 4 STATUS STAGED GAS FURN 2 HIGH STATUS MOD GAS FURN 2 HIGH STATUS	R	BI29	1310	DISPLAYS THE STATUS OF THE CONTROL OUTPUT TO THE INDICATED HEAT SECTION: 0=OFF 1=ON
FURN_OUT_5	ELECT HEAT STAGE 5 STATUS STAGED GAS FURN 3 LOW STATUS MOD GAS FURN 3 LOW STATUS	R	BI30	1311	DISPLAYS THE STATUS OF THE CONTROL OUTPUT TO THE INDICATED HEAT SECTION: 0=OFF 1=ON
FURN_OUT_6	ELECT HEAT STAGE 6 STATUS STAGED GAS FURN 3 HIGH STATUS MOD GAS FURN 3 HIGH STATUS	R	BI31	1312	DISPLAYS THE STATUS OF THE CONTROL OUTPUT TO THE INDICATED HEAT SECTION: 0=OFF 1=ON
FURN_OUT_7	ELECT HEAT STAGE 7 STATUS MOD GAS FURN 1B STATUS	R	BI32	1313	DISPLAYS THE STATUS OF THE CONTROL OUTPUT TO THE INDICATED HEAT SECTION: 0=OFF 1=ON
HEAT_ENABLE	HEATING SYSTEM	R/W	AV83 BV07	1108	A BAS COMMAND THAT ALLOWS THE HEATING FUNCTION TO BE TURNED ON/OFF: 0=ENABLED 1=DISABLED
HEAT_ENT_ TEMP	HEAT ENTERING TEMP	R	AI22	535	DISPLAYS THE ACTUAL TEMP OF THE AIR ENTERING THE ELECT, STAGED GAS, OR MOD GAS HEAT SECTIONS
HEAT_STAGES	ELECTRIC HEAT STAGES or GAS HEAT STAGES	R	AI23	536	DISPLAYS THE NUMBER OF ELECT OR STAGED GAS HEAT STAGES AVAILABLE
HEAT_ VACTION	HW VALVE ACTION	R/W	AV84 BV08	1109	A BAS COMMAND THAT ALLOWS THE HOT WATER/STEAM VALVE ACTION TO BE CHANGED: 0=DIRECT 1=REVERSE
HEATING_SAT	HEATING SUPPLY SIR TEMP SP **(VAV or FLEXSYS)**	R/W	AV09	1034	DISPLAYS THE ACTIVE SUPPLY AIR TEMP SP FOR HEATING
HEATING_VLV	HEATING VALVE	R	AI24	537	DISPLAYS THE OUPUT FROM THE CONTROL TO A HW/STEAM VALVE or MOD GAS HEAT VALVE (%)

TABLE 48 – BACNET MS/TP, MODBUS, BACNET IP (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
HW_FRZ_STAT	HW/STEAM COIL FREEZESTAT STATUS	R	BI33	1314	DISPLAYS THE STATUS OF THE FREEZESTAT ON UNITS WITH HW/STEAM HEAT: 0=NO FAULT 1-FAULTED
LOCAL_STOP	LOCAL STOP STATUS	R	BI34	1315	DISPLAYS THE STATUS OF THE 24VAC INPUT TO THE CONTROL BOARD THRU THE SD TERMINAL AND/OR THE UNIT ON/OFF SWITCH
MAX_BYPASS	MAXIMUM BYPASS SP **(FLEXSYS)**	R/W	AV10	1035	DISPLAYS THE MAX SETTING FOR THE BYPASS DAMPER
MAX_FLOW_ DV	OUTSIDE AIR MAX FLOW SP	R/W	AV11	1036	DISPLAYS THE MAX AIRFLOW FOR DEMAND VENTILATIONWITH AN AIRFLOW STATION (CFM)
MECH_LCK_ TMP	MECH COOLING LOCKOUT SP	R/W	AV12	1037	DISPLAYS THE MIN OA TEMP AT WHICH MECH COOLING IS ALLOWED TO OPERATE
MIN_FLOW_DV	OUTSIDE AIR MIN FLOW SP	R/W	AV13	1038	DISPLAYS THE MIN AIRFLOW FOR DEMAND VENTILATION WITH AN AIRFLOW STATION (CFM)
MIN_OA_FLO	MINIMUM OA FLOW SET POINT	R/W	AV51	1076	DISPLAYS THE MIN OUTSIDE AIRFLOW ACTIVE SET POINT FOR TEKAIR MEASURING STATION (TEKAIR FULL IAQ). VENTILATION NEEDS TO BE USER ENABLED (CFM)
MIXD_SAT_LIM	MX SUPPLY AIR TEMP SP **(FLEXSYS)**	R/W	AV14	1039	DISPLAYS THE ACTIVE MIXED AIR TEMP SP **(OCC COOLING W/O BYPASS-COMPRESSOR CONTROL) (OCC COOLING W/ BYPASS-DAMPER CONTROL**
MORN_WARM_ UP	MORNING WARM UP	R/W	AV85 BV09	1110	A BAS COMMAND THAT ALLOWS MORNING WARM-UP TO BE ENABLED/DISABLED: 0=ENABLED 1-DISABLED
MORN_WUP_ CMD	MORN WARMUP COMMAND	R/W	AV86 BV10	1111	A BAS COMMAND THAT STARTS/ STOPS MORNING WARM-UP: 0=OFF 1=ON
MORN_WUP_ RAT	HEATING RET AIR TEMP SP **(VAV or FLEXSYS)**	R/W	AV15	1040	DISPLAYS THE ACTIVE R/A TEMP SP FOR HEATING
NIGHT_ SETBAC	NIGHT SETBACK FOR HEATING	R/W	AV87 BV11	1112	A BAS COMMAND THAT ALLOWS NIGHT SET BACK TO BE TURNED ON/OFF: 0=OFF 1=ON

TABLE 48 – BACNET MS/TP, MODBUS, BACNET IP (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
OA_DAMP_ POS1	OA DAMPER MINIMUM POSITION	R/W	AV16	1041	DISPLAYS THE ACTIVE SP FOR THE MIN OA DAMPER WHEN USING FIXED MINIMUM VENTILATION AND THE SUPPLY FAN VFD IS AT 100%
OA_DAMP_ POS2	OA DAMPER MAXIMUM POSITION	R/W	AV17	1042	DISPLAYS THE MAX POSITION FOR THE OA DAMPER WHEN USING FIXED MINIMUM VENTILATION AND THE SUPPLY FAN VFD IS AT 50%
OA_DAMPER	OA DAMPER POSITION CURRENT	R	AI25	538	DISPLAYS THE POSITION OF THE OA DAMPER (%)
OA_ENTH_ LIMIT	OA ENTHALPY SP	R/W	AV18	1043	DISPLAYS THE MAX ENTHALPY SP FOR USING OA FOR COOLING (BTU/LB) SINGLE or DUAL ENTHALPY
OA_ ENTHALPY	OA ENTHALPY	R	AI26	539	DISPLAYS THE CURRENT OA ENTHALPY (BTU/LB)
OA_FLO_ PRS_1	OA FLOW PRESS 1	R	AI27	540	NOT USED
OA_FLO_ PRS_2	OA FLOW PRESS 2	R	AI28	541	NOT USED
OA_FLOW_1	IAQ DAMPER AIR FLOWS OA FLOW 1	R	AI61	574	DISPLAYS THE AIR FLOW THRU A TEK-AIR FULL IAQ AIR MEASURING STATION (CFM)
OA_FLOW_2	IAQ DAMPER AIR FLOWS OA FLOW 2	R	AI62	575	NOT USED
OA_FLOW_ TOTL	OA FLOW TOTAL	R	AI63	576	DISPLAYS THE TOTAL AIR FLOW THRU A TEK-AIR FULL IAQ AIR MEASURING STATION (CFM)
OA_REL_ HUMID	OA HUMIDITY	R	AI29	542	DISPLAYS THE CURRENT OA RELATIVE HUMIDITY (%)
OA_TEMP	OA TEMPERATURE	R	AI30	543	DISPLAYS THE CURRENT OA TEMP
OAT_HIGH_ SAT	OA TEMP SP FOR HI SUPPLY AIR TEMP **(VAV, AND ONLY IF SAT RESET METHOD IS OUTSIDE AIR)**	R/W	AV19	1044	DISPLAYS THE OA TEMP SP USED FOR SWITCHING TO THE HIGH SUPPLY AIR TEMP SP
OAT_LOW_ SAT	OA TEMP SP FOR LO SUPPLY AIR TEMP **(VAV, AND ONLY IF SAT REST METHOD IS OUTSIDE AIR)**	R/W	AV20	1045	DISPLAYS THE OA TEMP SP USED FOR SWITCHING TO THE LOW SUPPLY AIR TEMP SP

TABLE 44 – BACNET MS/TP, MODBUS, BACNET IP (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
OCC_MODE	OCCUPANCY MODE STATUS	R	BI35	1316	DISPLAYS THE OCC/UNOCC STATUS WITH HARDWIRED, COMMUNICATED, or INTERNAL CLOCK SCHEDULE INPUT: (ENA=ENABLED/OCC DIS=DISABLED/UNOCC)
OCC_STATE	OCCUPANCY STATE STATUS	R	BI36	1317	DISPLAYS THE STATUS OF THE HARDWIRED INPUT: (ENA=ENABLED/OCC DIS=DISABLED/UNOCC)
OCC_ZN_ COOL	OCC ZONE COOLING SP	R/W	AV21	1046	DISPLAYS THE ACTIVE OCCUPIED ZONE COOLING SP
OCC_ZN_HEAT	OCC ZONE HEATING SP	R/W	AV22	1047	DISPLAYS THE ACTIVE OCCUPIED ZONE HEATING SP
OCCUPNCY_ CMD	OCCUPANCY COMMAND	R/W	AV88 BV12	1113	A BAS COMMAND THAT ALLOWS THE UNIT TO BE PLACED IN THE OCC/UNOCC MODE: (0=UNOCC 1=OCC)
PRS_1_DISCH	DISCH PRESS CKT 1	R	AI31	544	DISPLAYS THE CURRENT DISCH PRESS OF CKT 1 (PSIG)
PRS_1_SUCT	SUCT PRESS CKT 1	R	AI32	545	DISPLAYS THE CURRENT SUCT PRESS OF CKT 1 (PSIG)
PRS_2_DISCH	DISCH PRESS CKT 2	R	AI33	546	DISPLAYS THE CURRENT DISCH PRESS OF CKT 2 (PSIG)
PRS_2_ SUCTION	SUCT PRESS CKT 2	R	AI34	547	DISPLAYS THE CURRENT SUCT PRESS OF CKT 2 (PSIG)
PRS_3_DISCH	DISCH PRESS CKT 3 **(70-150 TON ONLY)**	R	AI35	548	DISPLAYS THE CURRENT DISCH PRESS OF CKT 3 (PSIG)
PRS_3_SUCT	SUCT PRESS CKT 3 **(70-150 TON ONLY)**	R	AI36	549	DISPLAYS THE CURRENT SUCT PRESS OF CKT 3 (PSIG)
PUMP_DOWN	PUMP DOWN	R/W	AV89 BV13	1114	A BAS COMMAND THAT ALLOWS THE PUMP DOWN FEATURE TO BE TURNED ON/OFF: (0=ON 1=OFF
PUMP_ DOWN_1	PUMP DOWN LLSV 1 STATUS	R	BI37	1318	DISPLAYS THE STATUS OF THE OUTPUT TO THE CKT 1 LIQ LINE SOLENOID VLV: (0=ON 1=OFF)
PUMP_ DOWN_2	PUMP DOWN LLSV 2 STATUS	R	BI38	1319	DISPLAYS THE STATUS OF THE OUTPUT TO THE CKT 2 LIQ LINE SOLENOID VLV: (0=ON 1=OFF)
PUMP_ DOWN_3	PUMP DOWN LLSV 3 STATUS **(70-150 TON ONLY)**	R	BI39	1320	DISPLAYS THE STATUS OF THE OUTPUT TO THE CKT 3 LIQ LINE SOLENOID VLV: (0=ON 1=OFF)

TABLE 44 – BACNET MS/TP, MODBUS, BACNET IP (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
RA_DIFF_BAS	RETURN AIR DIFF SP BAS **(FLEXSYS)**	R/W	AV42	1067	DISPLAYS THE ACTIVE TEMP SP THAT CAUSES THE UNIT TO SWITCH FROM COOLING w/o BYPASS TO COOLING w/BYPASS
RAT_COOL_SP	COOLING RETURN AIR TEMP SP **(VAV or FLEXSYS)**	R/W	AV23	1048	DISPLAYS THE ACTIVE RETURN AIR TEMP SP FOR COOLING
RAT_HIGH_ SAT	RA TEMP SP FOR HI SUPPLY AIR TEMP **(VAV, AND ONLY IF SAT RESET METHOD IS RETURN AIR)**	R/W	AV24	1049	DISPLAYS THE RA TEMP SP USED FOR SWITCHING TO THE HIGH SUPPLY AIR TEMP SP
RAT_LOW_SAT	RA TEMP SP FOR LO SUPPLY AIR TEMP **(VAV, AND ONLY IF SAT RESET METHOD IS RETURN AIR)**	R/W	AV25	1050	DISPLAYS THE RA TEMP SP USED FOR SWITCHING TO THE LOW SUPPLY AIR TEMP SP
RDY_RUN_C1A	READY TO RUN COMP 1A STATUS	R	BI40	1321	DISPLAYS THE STATUS OF COMP 1A READY TO RUN IF COMP IS OFF: (YES/NO)
RDY_RUN_ C1B	READY TO RUN COMP 1B STATUS	R	BI41	1322	DISPLAYS THE STATUS OF COMP 1B READY TO RUN IF THE COMP IS OFF: (YES/NO)
RDY_RUN_C2A	READY TO RUN COMP 2A STATUS	R	BI42	1323	DISPLAYS THE STATUS OF COMP 2A READY TO RUN IF THE COMP IS OFF: (YES/NO)
RDY_RUN_ C2B	READY TO RUN COMP 2B STATUS	R	BI43	1324	DISPLAYS THE STATUS OF COMP 2B READY TO RUN IF THE COMP IS OFF: (YES/NO)
RDY_RUN_C3A	READY TO RUN COMP 3A STATUS **(70-150 TON ONLY)**	R	BI44	1325	DISPLAYS THE STATUS OF COMP 3A READY TO RUN IF THE COMP IS OFF: (YES/NO)
RDY_RUN_ C3B	READY TO RUN COMP 3B STATUS **(70-150 TON ONLY)**	R	BI45	1326	DISPLAYS THE STATUS OF COMP 3B READY TO RUN IF THE COMP IS OFF: (YES/NO)
RDY_STOP_ C1A	READY TO STOP COMP 1A STATUS	R	BI46	1327	DISPLAYS THE STATUS OF COMP 1A READY TO STOP IF OPERATING: (YES/NO)
RDY_STOP_ C1B	READY TO STOP COMP 1B STATUS	R	BI47	1328	DISPLAYS THE STATUS OF COMP 1B READY TO STOP IF OPERATING: (YES/NO)
RDY_STOP_ C2A	READY TO STOP COMP 2A STATUS	R	BI48	1329	DISPLAYS THE STATUS OF COMP 2A READY TO STOP IF OPERATING: (YES/NO)

TABLE 48 – BACNET MS/TP, MODBUS, BACNET IP (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
RDY_STOP_ C2B	READY TO STOP COMP 2B STATUS	R	BI49	1330	DISPLAYS THE STATUS OF COMP 2B READY TO STOP IF OPERATING: (YES/NO)
RDY_STOP_ C3A	READY TO STOP COMP 3A STATUS **(70-150 TON ONLY)**	R	BI50	1331	DISPLAYS THE STATUS OF COMP 3A READY TO STOP IF OPERATING: (YES/NO)
RDY_STOP_ C3B	READY TO STOP COMP 3B STATUS **(70-150 TON ONLY)**	R	BI51	1332	DISPLAYS THE STATUS OF COMP 3B READY TO STOP IF OPERATING: (YES/NO)
RET_AIR_ BY_S	RETURN AIR BYPASS ACTIVE SP	R	AI37	550	DISPLAYS THE VALUE (%) FOR THE CURRENT SP OF THE RA BYPASS DAMPER ONN A FLEXSYS UNIT
RET_AIR_ ENTH	RETURN AIR ENTHALPY	R	AI38	551	DISPLAYS THE ACTUAL RA ENTHALPY (BTU/LB)
RET_AIR_ HUMD	RETURN AIR HUMIDITY	R	AI39	552	DISPLAYS THE ACTUAL RA RELATIVE HUMIDITY (%)
RET_AIR_ TEMP	RETURN AIR TEMP CURRENT	R	AI40	553	DISPLAYS THE ACTUAL RA TEMP (°F)
RET_FAN_OUT	EXHAUST/ RETURN FAN VFD	R	AI41	554	DISPLAYS THE OUTPUT FROM THE CONTROL TO THE EXH OR RET FAN VFD (%)
RET_FAN_ PRES	RETURN FAN PRESSURE CURRENT	R	AI42	555	DISPLAYS THE ACTUAL PRESSURE THAT IS USED TO CONTROL THE RETURN FAN SPEED ("WC)
RET_FAN_ STAT	RETURN FAN STATUS	R	BI52	1333	DISPLAYS THE STATUS OF THE RETURN FAN RUN VERIFICATION CIRCUIT (0=STOP/VERIFICATION CKT OPEN, 1=RUN/VERIFICATION CKT CLOSED)
RST_ENT_BAS	RESET ENTHALPY SP BAS **(FLEXSYS)**	R/W	AV41	1066	DISPLAYS THE RA ENTHALPY SP WHICH CAUSES THE UNIT TO SWITCH FROM THE EVAP LEAVING HIGH SP TO THE EVAP LEAVING LOW SP
SAT_HIGH_LIM	SUPPY AIR TEMP HI SP	R/W	AV26	1051	DISPLAYS THE UPPER LIMIT FOR THE SUPPLY AIR TEMP SP ON A VAV UNIT (°F)
SAT_LOW_LIM	SUPPLY AIR TEMP LO SP	R/W	AV27	1052	DISPLAYS THE LOWER LIMIT FOR THE SUPPLY AIR TEMP SP ON A VAV UNIT (°F)

TABLE 48 – BACNET MS/TP, MODBUS, BACNET IP (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
SAT_RST_BAS	SUPPLY AIR TEMP RESET BAS	R/W	AV28	1053	DISPLAYS THE ANALOG INPUT FROM THE BAS SYSTEM THAT ALLOWS THE RESET OF THER ACTIVE SUPPLY AIR TEMP SP. 0 USES SAT HIGH SP AMD 5 USES SAT LOW SP. "SAT RST BAS" MUST BE ENABLED IN THE SERVICE MENU FOR THIS POINT TO FUNCTION
SAT_SUC_ TMP1	SATURATED SUCT TEMP CKT 1	R	AI43	556	DISPLAYS THE SATURATION TEMP OF SYSTEM 1 SUCTION GAS BASED ON SYSTEM 1 SUCTION PRESS (°F)
SAT_SUC_ TMP2	SATURATED SUCT TEMP CKT 2	R	AI44	557	DISPLAYS THE SATURATION TEMP OF SYSTEM 2 SUCTION GAS BASED ON SYSTEM 2 SUCTION PRESS (°F)
SAT_SUC_ TMP3	SATURATED SUCT TEMP CKT 3 (70-150 TON ONLY)	R	AI45	558	DISPLAYS THE SATURATION TEMP OF SYSTEM 3 SUCTION GAS BASED ON SYSTEM 3 SUCTION PRESS (°F)
SAT_TEMPER	SUPPLY AIR TEMPERING STATUS	R	BI53	1334	DISPLAYS THE STATUS OF SUPPLY AIR TEMPERING (ON/OFF)
SEN/MSC_FLT	SENSOR/MISC FAULT STATUS	R	BI54	1335	DISPLAYS THE STATUS OF A SENSOR OR MISC FAULT (0=NO FAULT 1=FAULTED)
SF_PROV_SW	SUPPLY FAN STATUS	R	BI55	1336	DISPLAYS THE STATUS OF THE SUPPLY FAN AIR PROVING CIRCUIT (0=STOP VERIFICATION/ CKT OPEN 1=RUN VERIFICATION/ CKT CLOSED)
SF_SPD_H_ SAT	FAN SPEED SP FOR HI SUPPLY AIR TEMP	R/W	AV29	1054	DISPLAYS THE SUPPLY FAN SPEED SP USED FOR SWITCHING TO THE HIGH SUPPLY AIR TEMP SP
SF_SPD_L_ SAT	FAN SPEED SP FOR LO SUPPLY AIR TEMP	R/W	AV30	1055	DISPLAYS THE SUPPLY FAN SPEED SP USED FOR SWITCHING TO THE LOW SUPPLY AIR TEMP SP
SMOKE_ PUR_1	SMOKE PURGE 1 STATUS	R	BI56	1337	DISPLAYS THE STATUS OF THE SMOKE PURGE 1 INPUT EITHER HARDWIRED OR COMMUNICATED (ON/OFF)
SMOKE_ PUR_2	SMOKE PURGE 2 STATUS	R	BI57	1338	DISPLAYS THE STATUS OF THE SMOKE PURGE 2 INPUT EITHER HARDWIRED OR COMMUNICATED (ON/OFF)

TABLE 48 – BACNET MS/TP, MODBUS, BACNET IP (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
SMOKE_ PUR_3	SMOKE PURGE 3 STATUS	R	BI58	1339	DISPLAYS THE STATUS OF THE SMOKE PURGE 3 INPUT EITHER HARDWIRED OR COMMUNICATED (ON/OFF)
SMOKE_ PUR1_B	SMOKE PURGE 1 BAS	R/W	AV90 BV14	1115	A BAS COMMAND THAT ALLOWS SMOKE PURGE 1 TO BE ACTIVATED (0=OFF 1=ON)
SMOKE_ PUR2_B	SMOKE PURGE 2 BAS	R/W	AV91 BV15	1116	A BAS COMMAND THAT ALLOWS SMOKE PURGE 2 TO BE ACTIVATED (0=OFF 1=ON)
SMOKE_ PUR3_B	SMOKE PURGE 3 BAS	R/W	AV92 BV16	1117	A BAS COMMAND THAT ALLOWS SMOKE PURGE 3 TO BE ACTIVATED (0=OFF 1=ON)
STG_1_COOL	1ST STAGE COOLING SP **(CV ONLY)**	R/W	AV31	1056	DISPLAYS THE ACTIVE SUPPLY AIR TEMP SP FOR A 1ST STAGE COOLING INPUT (Y1)
STG_1_HEAT	1ST STAGE HEATING SP **(CV ONLY)**	R/W	AV32	1057	DISPLAYS THE ACTIVE SUPPLY AIR TEMP SP FOR A 1ST STAGE HEATING INPUT (W1)
STG_2_COOL	2ND STAGE COOLING SP **(CV ONLY)**	R/W	AV33	1058	DISPLAYS THE ACTIVE SUPPLY AIR TEMP SP FOR A 2ND STAGE COOLING INPUT (Y2)
STG_2_HEAT	2ND STAGE HEATING SP **(CV ONLY)**	R/W	AV34	1059	DISPLAYS THE ACTIVE SUPPLY AIR TEMP SP FOR A 2ND STAGE HEATING INPUT (W2)
SUP_AIR_ TEMP	SUPPLY AIR TEMP CURRENT	R	AI46	559	**CV or VAV:** DISPLAYS THE ACTUAL TEMP OF THE SUPPLY AIR (°F) **FLEXSYS:** DISPLAYS THE ACTUAL TEMP OF THE MX SUPPLY AIR TEMP (°F)
SUP_AIR_ TRST	SUPPLY AIR TEMP RESET	R	AI47	560	DISPLAYS THE VALUE, 0-5 VDC, OF A HARDWIRED OR COMMUNICATED INPUT THAT WILL BE USED TO RESET THE SUPPLY AIR TEMP SP (VDC)
SUP_FAN_VFD	SUPPLY FAN VFD SPEED	R	AI48	561	DISPLAYS THE OUTPUT FROM THE CONTROL TO THE SUPPLY FAN VFD (%)
SUPPLY_FAN	SUPPLY FAN OUTPUT STATUS	R	BI59	1340	DISPLAYS THE STATUS OF THE OUTPUT FROM THE CONTROLLER TO THE SUPPLY FAN CIRCUIT (0=OFF 1=ON)

TABLE 48 – BACNET MS/TP, MODBUS, BACNET IP (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
SYSTEM_STOP	SYSTEM STOP	R/W	AV35	1060	ALLOWS A BAS COMMAND THAT MANUALLY SHUTS DOWN COMPRESSOR CIRCUITS (0=ALL CKTS CAN OPERATE 1=SHUTS DOWN CKT 1 2=SHUTS DOWN CKT 2 3=SHUTS DOWN CKT 3
SZ_MIN_VFD	SINGLE ZONE MINIM UM VFD	R/W	AV53	NA*	ALLOWS THE MINIMUM SUPPLY FAN SPEED TO BE RESET BETWEEN 33% AND 66% WHEN USING SZVAV.
TEMP_1_SUCT	SUCT TEMP CKT 1	R	AI49	562	DISPLAYS THE ACTUAL SYSTEM 1 SUCT LINE TEMP (°F)
TEMP_1_ SUPER	SUCT SUPERHEAT CKT 1	R	AI50	563	DISPLAYS THE SYSTEM 1 SUPERHEAT (°F)
TEMP_2_SUCT	SUCT TEMP CKT 2	R	AI51	564	DISPLAYS THE ACTUAL SYSTEM 2 SUCT LINE TEMP (° F)
TEMP_2_ SUPER	SUCT SUPERHEAT CKT 2	R	AI52	565	DISPLAYS THE SYSTEM 2 SUPERHEAT (°F)
TEMP_3_SUCT	SUCT TEMP CKT 3 **(70-150 TON ONLY)**	R	AI53	566	DISPLAYS THE ACTUAL SYSTEM 3 SUCT LINE TEMP (°F)
TEMP_3_ SUPER	SUCT SUPERHEAT CKT 3 **(70-150 TON ONLY)**	R	AI54	567	DISPLAYS THE SYSTEM 3 SUPERHEAT (°F)
UND_FLR_ DEWP	UNDERFLOOR SLAB DEW POINT **(FLEXSYS)**	R	AI55	568	DISPLAYS THE CALCULATED DEW POINT OF THE UNDERFLOOR AIR (°F)
UND_FLR_ HUMD	UNDERFLOOR AIR HUMIDITY **(FLEXSYS)**	R	AI56	569	DISPLAYS THE HUMIDITY VALUE OF THE UNDERFLOOR AIR (% RH)
UND_FLR_ TEMP	UNDEFLOOR SLAB TEMP **(FLEXSYS)**	R	AI57	570	DISPLAYS THE TEMP OF THE UNDERFLOOR SLAB (°F)
UND_HUMD_ BAS	UNDERFLOOR AIR HUMIDITY BAS **(FLEXSYS)**	R/W	AV36	1061	ALLOWS THE BAS SYSTEM TO INPUT AN UNDERFLOOR AIR HUMIDITY VALUE TO THE CONTROL. (%) "UNDER FLR HUMI BAS" MUST BE ENABLED IN THE SERVICE MENU FOR THIS POINT TO FUNCTION
UND_TEMP_ BAS	UNDERFLOOR SLAB TEMP BAS **(FLEXSYS)**	R/W	AV37	1062	ALLOWS THE BAS SYSTEM TO INPUT AN UNDERFLOOR AIR TEMP VALUE TO THE CONTROL (°F) "UNDER FLR TEMP BAS" MUST BE ENABLED IN THE SERVICE MENU FOR THIS POINT TO FUNCTION

* Not Available

TABLE 48 – BACNET MS/TP, MODBUS, BACNET IP (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
UNIT_MODE	CURRENT OPER MODE	R	AI58	571	0= OCC COOLING 1= OCC COOLING LOW 2= OCC COOLING HIGH 3= OCC COOLING W/ BYPASS 4= OCC COOLING W/O BYPASS 5= OCC HEATING 6= OCC HEATING LOW 7= OCC HEATING HIGH 8= OCC STANDBY 9= UNOCC COOLING 10= UNOCC COOLING LOW 11= UNOCC COOLING HIGH 12= UNOCC HEATING 13= UNOCC HEATING LOW 14= UNOCC HEATING HIGH 15= UNOCC STANDBY 16= COMFORT VENT COOLING 17= COMFORT VENT HEATING 18= NIGHT SET-BACK 19= MORNING WARM-UP 20= POWER UP STANDBY
UNIT_STOP	UNIT STOP	R/W	AV93 BV17	1118	A BAS COMMAND THAT ALLOWS THE UNIT TO BE SHUT DOWN (0=NORMAL OPERATION 1=UNIT STOPPED)
UNSTABLE_ SYS	UNSTABLE SYSTEM STATUS (NOT USED)	R	BI60		
UNOCC_ZN_ COOL	UNOCC ZONE COOLING SP	R/W	AV38	1063	UNOCC ZONE COOLING SP
UNOCC_ZN_ HEAT	UNOCC ZONE HEATING SP	R/W	AV39	1064	UNOCC ZONE HEATING SP
VAV_HEAT	VAV HEAT RELAY STATUS	R	BI61	1342	DISPLAYS THE STATUS OF THE OUTPUT THAT ENERGIZES A VAV HEAT RELAY (OFF/ON)
VENT_ CONTROL	VENTILATION CONTROL	R/W	AV94 BV18	1119	A BAS COMMAND THAT ALLOWS THE SELECTION OF THE VENTILATION FUNCTION (0=FIXED MINIMUM 1=DEMAND)
VENT_DEM_ OUT	VENTILATION DEMAND	R	AI59	572	DISPLAYS THE STATUS OF THE VENTILATION OUTPUT FOR DEMAND VENTILATION (%)

TABLE 48 – BACNET MS/TP, MODBUS, BACNET IP (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	MODBUS REGISTER ADDRESS	POINTS LIST DESCRIPTION
VENT_ENABLE	VENTILATION SYSTEM	R/W	AV95 BV19	1120	A BAS COMMAND THAT ALLOWS THE VENTILATION FUNCTION TO BE TURNED ON OR OFF (0=OFF 1=ON)
W1_LO_ HEAT_B	W1 LO HEAT BAS	R/W	AV96 BV20	1121	A BAS COMMAND THAT ALLOWS AN INPUT FOR W1, FIRST STAGE HEAT (0=OFF 1=ON)
W1_LOW_ HEAT	W1 LOW HEAT STATUS	R	BI62	1343	DISPLAYS THE STATUS OF THE W1 HEAT INPUT EITHER HARDWIRED OR COMMUNICATED FROM A BAS (ON/OFF)
W2_HI_ HEAT_B	W2 HIGH HEAT BAS	R/W	AV97 BV21	1122	A BAS COMMAND THAT ALLOWS AN INPUT FOR W2, SECOND STAGE HEAT (0=OFF 1=ON)
W2_HIGH_ HEAT	W2 HIGH HEAT STATUS	R	BI63	1344	DISPLAYS THE STATUS OF THE W2 HEAT INPUT EITHER HARDWIRED OR COMMUNICATED FROM A BAS (ON/OFF)
Y1_LO_ COOL_B	Y1 LO COOL BAS	R/W	AV98 BV22	1123	A BAS COMMAND THAT ALLOWS AN INPUT FOR Y1, FIRST STAGE COOL (0=OFF 1=ON)
Y1_LOW_ COOL	Y1 LOW COOL STATUS	R	BI64	1345	DISPLAYS THE STATUS OF THE Y1 COOL INPUT EITHER HARDWIRED OR COMMUNICATED FROM A BAS (ON/OFF)
Y2_HI_ COOL_B	Y2 HIGH COOL BAS	R/W	AV99 BV23	1124	A BAS COMMAND THAT ALLOWS AN INPUT FOR Y2, SECOND STAGE COOL (0=OFF 1=ON)
Y2_HIGH_ COOL	Y2 HIGH COOL STATUS	R	BI65	1346	DISPLAYS THE STATUS OF THE Y2 COOL INPUT EITHER HARDWIRED OR COMMUNICATED FROM A BAS (ON/OFF)
ZONE_TEMP	ZONE TEMP CURRENT	R	AI60	573	DISPLAYS THE ACTUAL ZONE TEMPERATURE (°F)
ZONE_TEMP_ BAS	ZONE TEMP BAS	R/W	AV40	1065	ALLOWS THE BAS SYSTEM TO INPUT AN ZONE TEMPERATURE READING (°F) THE CONTROL METHOD MUST BE SET TO "COMM ZONE TEMP" FOR THIS POINT TO FUNCTION

NOTES

1. The most up to date listing of the Standard Points Mapping can be found in the York/JCI website.
2. For a Building Automation System using Bacnet IP, a gateway must be used, since the unit controller does not have a functional IP Port. We recommend using a JCI NCE (MS-NCE2560-0)

TABLE 49 - LON POINTS LIST

BACnet NAME	USER INTERFACE NAME	BACnet OBJECT TYPE AND INSTANCE	SNVT	POINTS LIST DESCRIPTION
nvoACT _DSP_SP	DUCT STATIC SETPOINT	AI-001	SNVT_count_f (51)	A DERIVED VALUE THE DUCT STATIC IS CONTROLED TO ("WG).
nvoACT_MIN_FLOW	ACTIVE MINIMUM AIR FLOW	AI-002	SNVT_count_f (51)	A DERIVED VALUE THE MINIMUM VENTILATION AIR IS CONTROLED TO (CFM).
nvoACT_MIN_POS	ACTIVE MINIMUM POSITION	AI-003	SNVT_switch (95)	A DERIVED VALUE THE DAMPER IS CONTROLED TO FOR MINIMUM VENTILATION AIR (%).
nvoACT_SAT_SP	SUPPLY AIR SETP	AI-004	SNVT_count_f (51)	A DERIVED VALUE THE SUPPLY AIR TEMEPRATURE IS CONTROLED TO (°F).
nviACT_SLAB_CTL	ACTIVE SLAB CONTROL	AV-077	SNVT_switch (95)	ALLOWS THE ACTIVE SLAB CONTROL FEATURE TO BE TURNED ON AND OFF ON FLEXSYS UNITS (0 = OFF / 1 = ON).
nviBUILD_PRES_SP	BUILDING PRESSURE SP	AV-001	SNVT_count_f (51)	THE BUILDING PRESSURE SETPOINT ("WG).
nvoBLD_STAT_PRS	BUILDING STATIC PRES	AI-005	SNVT_count_f (51)	ACTUAL BUILDING PRESSURE INPUT ("WG).
nvoBYPASS_DAMPER	BYPASS DAMPER	AI-006	SNVT_switch (95)	ACTUAL BYPASS DAMPER POSITION (%).
nvoCO2_1_OUT	CO2 1 (OUTSIDE)	AI-007	SNVT_count_f (51)	ACTUAL OUTDOOR CO2 VALUE (PPM).
nvoC02_2_INSIDE	CO2 1 (INSIDE)	AI-008	SNVT_count_f (51)	ACTUAL INDOOR CO2 VALUE (PPM).
nviCO2_OFFSET	CO2 OFFSET	AV-002	SNVT_count_f (51)	THE DIFFERENCE BETWEEN THE INDOOR AND OUTSIDE CO2 MUST EXCEED THIS VALUE TO INITIATE DEMAND VENTILATION (CO2).
nvoCOL_HEAT_FLT	COOLING/HEATING FAULT	BI-002	SNVT_switch (95)	GIVES THE FAULT STATUS OF THE COOLING AND HEATING SYSTEM (0 - NOT FAULT; 1 - FAULTED).
nvoCOMP_1A	COMPRESSOR 1A	BI-003	SNVT_switch (95)	STATUS OF COMPRESSOR 1A, (ON/OFF).
nvoCOMP_1B	COMPRESSOR 1B	BI-004	SNVT_switch (95)	STATUS OF COMPRESSOR 1B, (ON/OFF).
nvoCOMP_2A	COMPRESSOR 2A	BI-005	SNVT_switch (95)	STATUS OF COMPRESSOR 2A, (ON/OFF).
nvoCOMP_2B	COMPRESSOR 2B	BI-006	SNVT_switch (95)	STATUS OF COMPRESSOR 2B, (ON/OFF).
nvoCOMP_3A	COMPRESSOR 3A	BI-007	SNVT_switch (95)	STATUS OF COMPRESSOR 3A, (ON/OFF).
nvoCOMP_3B	COMPRESSOR 3B	BI-008	SNVT_switch (95)	STATUS OF COMPRESSOR 3B, (ON/OFF).
nvoCOMP_LPCO_1	COMPRESSOR LPCO 1	BI-009	SNVT_switch (95)	STATUS OF COMPRESSOR SYSTEM 1 LOW PRESSURE CUTOUT CIRCUIT (NFL - NO FAULT / FLT - FAULTED).
nvoCOMP_LPCO_2	COMPRESSOR LPCO 2	BI-010	SNVT_switch (95)	STATUS OF COMPRESSOR SYSTEM 2 LOW PRESSURE CUTOUT CIRCUIT (NFL - NO FAULT / FLT - FAULTED).
nvoCOMP_LPCO_3	COMPRESSOR LPCO 3	BI-011	SNVT_switch (95)	STATUS OF COMPRESSOR SYSTEM 3 LOW PRESSURE CUTOUT CIRCUIT (NFL - NO FAULT / FLT - FAULTED).
nvoCOMP_STAT_1	COMPRESSOR STATUS 1	BI-012	SNVT_switch (95)	STATUS OF COMPRESSOR SYSTEM 1 COMPRESSOR SAFETY CIRCUIT (NFL - NO FAULT / FLT - FAULTED).
nvoCOMP_STAT_2	COMPRESSOR STATUS 2	BI-013	SNVT_switch (95)	STATUS OF COMPRESSOR SYSTEM 2 COMPRESSOR SAFETY CIRCUIT (NFL - NO FAULT / FLT - FAULTED).
nvoCOMP_STAT_3	COMPRESSOR STATUS 3	BI-014	SNVT_switch (95)	STATUS OF COMPRESSOR SYSTEM 3 COMPRESSOR SAFETY CIRCUIT (NFL - NO FAULT / FLT - FAULTED).

TABLE 49 – LON POINTS LIST (CONT'D)

BACnet NAME	USER INTERFACE NAME	BACnet OBJECT TYPE AND INSTANCE	SNVT	POINTS LIST DESCRIPTION
nvoDCT_ST_PR_RT	DUCT STATIC PRES RST	AI-016	SNVT_switch (95)	A HARDWIRED ENTERED ANALOG VOLTAGE THAT RESULTS IN A %RESET DOWN FROM THE DUCT STATIC HIGH LIMIT BASED ON A PERCENT OF THE DIFRFERENCE BETWEEN DUCT STATIC HIGH LIMIT AND DUCT STATIC LOW LIMIT (%).
nvoDCT_STAT_PRS	DUCT STATIC PRES	AI-017	SNVT_count_f (51)	ACTUAL DUCT STATIC PRESSURE INPUT TO THE CONTROL ("WG).
nviDEW_PNT_RST	DEW POINT RESET	AV-080	SNVT_switch (95)	THIS ALLOWS THE DEW POINT RESET FEATURE TO BE TURNED ON AND OFF ON FLEXSYS UNITS (0 = OFF / 1 = ON).
nviDSP_HI_LIMIT	DUCT STATIC HIGH LIMIT	AV-003	SNVT_count_f (51)	THE DUCT STATIC UPPER SETPOINT ("WG).
nviDSP_LO_LIMIT	DUCT STATIC LOW LIMIT	AV-004	SNVT_count_f (51)	THE DUCT STATIC LOWER SETPOINT ("WG).
nviDSP_RST_BAS	DUCT STATIC PRES RST BAS	AV-005	SNVT_switch (95)	A BAS ENTERED VALUE THAT RESULTS IN A %RESET DOWN FROM THE DUCT STATIC HIGH LIMIT BASED ON A PERCENT OF THE DIFRFERENCE BETWEEN DUCT STATIC HIGH LIMIT AND DUCT STATIC LOW LIMIT (%). "DUCT PRES RST BAS" MUST BE ENABLED USING THE SERVICE KEY IN ORDER TO USE THIS FEATURE.
nviECONO_INSTAL	ECONOMIZER INSTALLED	AV-081	SNVT_switch (95)	ALLOWS THE ECONOMIZER FEATURE TO BE TURNED ON AND OFF (0 = OFF / 1 = ON).
nvoECON_ME_USED	ECONOMIZER METHOD	AI-018	SNVT_count (8)	THE ECONOMIZER METHOD BEING USED BY THE CONTROL (1 - DRY BULB; 2 - SINGLE ENTHALPY; 3 - DUAL ENTHALPY; 4 - BEST METHOD).
nvoECON_STATUS	ECONOMIZER SUITABLE ECON INSTALLED	AI-019	SNVT_count (8)	STATUS OF THE ECONOMIZER OPTION (0 - INSTALLED AND INACTIVE; 1 - INSTALLED AND ACTIVE; 2 - NOT INSTALLED; 3 - DISABLED).
nviEL_AIR_TMP_H	EVAP LEAVING AIR TEMP HIGH	AV-007	SNVT_count_f (51)	ON A FLEXSYS UNIT WITH BYPASS THIS IS THE SUPPLY AIR TEMPERATURE HIGH SETPOINT (°F).
nviEL_AIR_TMP_L	EVAP LEAVING AIR TEMP LOW	AV-008	SNVT_count_f (51)	ON A FLEXSYS UNIT WITH BYPASS THIS IS THE SUPPLY AIR TEMPERATURE LOW SETPOINT (°F).
nvoEVAP_AIR_TMP	EVAPORATOR AIR TEMP 1	AI-020	SNVT_count_f (51)	ACTUAL TEMPERATURE OF AIR LEAVING THE EVAPORATOR COIL ON A FLEXSYS UNIT (°F).
nvoEXHAUST_FAN	EXHAUST FAN	BI-022	SNVT_switch (95)	THE STATUS OF THE BINARY OUTPUT FOR THE EXHAUST (ON / OFF).
nvoEXH_FAN_STAT	EXHAUST FAN STATUS	BI-021	SNVT_switch (95)	THE STATUS OF THE EXHAUST FAN RUN VERIFICATION CIRCUIT (RUN - ON VERIFICATION CIRCUIT CLOSED / STO - STOP - VERIFICATION CIRCUIT OPEN).
nvoFAN_FAULT	FAN FAULT	BI-023	SNVT_switch (95)	IDENTIFIES IF THERE IS A SUPPLY, EXHAUST, OR RETURN FAN FAULT (0 - NO FAULT; 1= FAULTED).
nvoFILTER_STATS	FILTER STATUS	BI-025	SNVT_switch (95)	IDENTIFIES THE STATUS OF THE BINARY DIRTY FILTER INPUT (0- NO FAULT; 1- FAULTED).
nvoHEAT_ENT_TMP	HEAT ENTERING TEMP	AI-022	SNVT_count_f (51)	ACTUAL TEMPERATURE OF THE AIR ENTERING THE STAGGED HEAT SECTION (°F).
nviHEATING_SAT	HEATING SAT	AV-009	SNVT_count_f (51)	THE HEATING SAT SETPOINT FOR A VAV OR FLEXSYS UNIT (°F).
nvoHEAT_STAGES	ELECTRIC HEAT STAGES GAS HEAT STAGES	AI-023	SNVT_count (8)	DERIVED VALUE SHOWING THE NUMBER OF ELECTRIC OR STAGGED GAS HEAT STAGES AVAILABLE (1 - 7).
nvoHEATING_VALV	HEATING VALVE	AI-024	SNVT_switch (95)	THE OUPUIT FROM THE CONTROL TO A HOT WATER, STEAM, OR MODULATING GAS HEAT VALVE (%).

TABLE 49 – LON POINTS LIST (CONT'D)

BACnet NAME	USER INTERFACE NAME	BACnet OBJECT TYPE AND INSTANCE	SNVT	POINTS LIST DESCRIPTION
nvoHW_FRZ_STAT	HOT WATER FRZ STATUS	BI-033	SNVT_switch (95)	THE STATUS OF THE FREEZESTAT CIRCUIT ON UNITS WITH HOT WATER OR STEAM HEAT. (FLT - FAULTED / NFL - NO FAULT).
nviMAX_BYPASS	MAXIMUM BYPASS	AV-010	SNVT_switch (95)	THE MAXIMUM ALLOWABLE SETTING FOR THE BY PASS DAMPER IN A FLEXSYS UNIT (%).
nviMAX_FLOW_DV	MAX FLOW DEMAND VENTILATION	AV-011	SNVT_count_f (51)	THE MAXIMUM ALLOWABLE AIRFLOW FOR DEMAND VENTILATION WITH AN AIR MEASURING STATION (CFM).
nviMECH_LCK_TMP	MECH CLG LOCKOUT TEMP	AV-012	SNVT_count_f (51)	THE MINIMUM OUTDOOR TEMEPRATURE AT WHICH MECHANICAL COOLING IS ALLOWED TO OPERATE (°F).
nviMIN_FLOW_DV	MIN FLOW DEMAND VENTILATION	AV-013	SNVT_count_f (51)	THE MINIMUM ALLOWABLE AIRFLOW FOR DEMAND VENTILATION WITH AN AIR MEASURING STATION (CFM).
nviMIXD_SAT_LIM	MIXED SAT LIMIT	AV-014	SNVT_count_f (51)	ON A FLEXSYS UNIT THIS IS THE SUPPLY AIR SETPOINT WHEN OPERATING WITHOUT A BYPASS DAMPER (°F).
nviMORN_WUP_CMD	MORNING WARM UP CMND	AV-086	SNVT_switch (95)	A BAS GENERATED COMMAND TO ALLOW THE MORNING WARM UP FEATURE TO BE TURNED ON AND OFF (0 = OFF / 1 = ON).
nviMORN_WUP_RAT	RAT HEATING SETP	AV-015	SNVT_count_f (51)	ON A VAV OR FLEXSYS UNIT THIS IS THE RETURN AIR TEMPERATURE SETPOINT USED TO DETERMINE WHEN THE UNIT SHOULD SWITCH TO THE HEATING MODE (°F).
nviNIGHT_SETBAC	NIGHT SET BACK (FOR HEATING)	AV-077	SNVT_switch (95)	THIS COMMAND ALLOWS THE NIGHT SET BACK HEATING FUCTION TO BE TURNED ON AND OFF (0 = OFF / 1 = ON).
nvoOA_DAMPER	OA DAMPER	AI-025	SNVT_switch (95)	THIS IS THE POSITION OF THE OUTDOOR DAMPER (%).
nviOA_DAMP_POS1	OA DAMPER MIN POSITION 1	AV-016	SNVT_switch (95)	THE MINIMUM POSITION FOR THE OUTDOOR AIR DAMPER WHEN USING FIXED VENTILATION CONTROL WHEN THE SUPPLY FAN IS AT FULL SPEED (%).
nviOA_DAMP_POS2	OA DAMPER MIN POSITION 2	AV-017	SNVT_switch (95)	THE MINIMUM POSITION FOR THE OUTDOOR AIR DAMPER WHEN USING FIXED VENTILATION CONTROL WHEN THE SUPPLY FAN IS AT 50% OF FULL SPEED (%).
nvoOA_ENTHALPY	OUTSIDE AIR ENTHALPY	AI-026	SNVT_count_f (51)	ACTUAL OUTSIDE AIR ENTHALPY (BTU/LB).
nviOA_ENTH_LIMT	OA ENTHALPY LIMIT	AV-018	SNVT_count_f (51)	THE UPPER ENTHALPY LIMIT TO ALLOW THE USE OF OUTDOOR AIR FOR SINGLE OR DUAL ENTHALPY ECONOMIZER (BTU/LB).
nvoOA_FLO_PRS_1	OA FLOW PRESSURE 1	AI-027	SNVT_count_f (51)	THE VELOCITY OF THE AIR AS MEASURED AT A MINIMUM, FULL, OR 1/3 DAMPER SECTION OF AN AIR MEASURING STATION (FPM).
nvoOA_FLO_PRS_2	OA FLOW PRESSURE 2	AI-028	SNVT_count_f (51)	THIS IS THE VELOCITY OF THE AIR AS MEASURED AT THE 2/3 DAMPER SECTION OF AN AIR MEASURING STATION (FPM).
nvoOA_REL_HUMID	OUTSIDE AIR HUMIDITY	AI-029	SNVT_switch (95)	ACTUAL OUTDOOR AIR RELATIVE HUMIDITY (%).
nvoOA_TEMP	OUTSIDE AIR TEMP	AI-030	SNVT_count_f (51)	ACTUAL OUTDOOR AIR TEMPERATURE (°F).
nviOCCUPNCY_CMD	OCCUPANCY COMMAND	AV-088	SNVT_switch (95)	THIS BAS COMMAND ALLOWS THE UNIT TO BE PLACED IN THE OCCUPIED OR UNOCCUPIED MODE (0 = UNOCCUPIED / 1 = OCCUPIED).
nviOCC_ZN_COOL	OCCUPIED ZONE COOLING SETP	AV-021	SNVT_count_f (51)	THE OCCUPIED ..

TABLE 49 – LON POINTS LIST (CONT'D)

BACnet NAME	USER INTERFACE NAME	BACnet OBJECT TYPE AND INSTANCE	SNVT	POINTS LIST DESCRIPTION
nviOCC_ZN_HEAT	OCCUPIED ZONE HEATING SETP	AV-022	SNVT_count_f (51)	THE OCCUPIED ZONE HEATING SETPOINT (°F).
nvoPRS_1_DISCH	PRESSURES 1 DISCHARGE	AI-031	SNVT_count_f (51)	ACTUAL SYSTEM 1 DISCHARGE PRESSURE (PSI).
nvoPRS_1_SUCTION	PRESSURES 1 SUCTION	AI-032	SNVT_count_f (51)	ACTUAL SYSTEM 1 SUCTION PRESSURE (PSI).
nvoPRS_2_DISCH	PRESSURES 2 DISCHARGE	AI-033	SNVT_count_f (51)	ACTUAL SYSTEM 2 DISCHARGE PRESSURE (PSI).
nvoPRS_2_SUCTION	PRESSURES 2 SUCTION	AI-034	SNVT_count_f (51)	ACTUAL SYSTEM 2 SUCTION PRESSURE (PSI).
nvoPRS_3_DISCH	PRESSURES 3 DISCHARGE	AI-035	SNVT_count_f (51)	ACTUAL SYSTEM 3 DISCHARGE PRESSURE (PSI).
nvoPRS_3_SUCTION	PRESSURES 3 SUCTION	AI-036	SNVT_count_f (51)	ACTUAL SYSTEM 3 SUCTION PRESSURE (PSI).
nviRAT_COOL_SP	RAT COOLING SETP	AV-023	SNVT_count_f (51)	ON A VAV OR FLEXSYS UNIT THIS VALUE IS USED TO DETERMINE WHEN THE UNIT SHOULD SWITCH TO THE COOLING MODE (°F).
nvoRET_AIR_BY_S	ACTIVE BYPASS ACTIVE SP	AI-037	SNVT_switch (95)	A DERIVED VALUE FOR THE CURRENT SETPOINT OF THE RETURN AIR BYPASS DAMPER ON A FLEXSYS UNIT (%).
nvoRET_AIR_ENTH	RETURN AIR ENTHALPY	AI-038	SNVT_count_f (51)	ACTUAL RETURN AIR ENTHALPY (BTU/LB).
nvoRET_AIR_HUMD	RETURN AIR HUMIDITY	AI-039	SNVT_switch (95)	ACTUAL RETURN AIR RELATIVE HUMIDITY (%).
nvoRET_AIR_TEMP	RETURN AIR TEMP	AI-040	SNVT_count_f (51)	ACTUAL RETURN AIR TEMPERATURE (°F).
RET_FAN_OUT	EXHAUST/RETURN FAN VFD	AI41		THE OUTPUT FROM THE CONTROL TO THE EXHAUST OR RETURN FAN VFD (%).
nvoRET_FAN_PRES	RETURN FAN PRESSURE	AI-042	SNVT_count_f (51)	THE ACTUAL PRESSURE THAT IS USED TO CONTROL THE RETURN FAN (IWC).
nvoRET_FAN_STAT	RETURN FAN STATUS	BI-052	SNVT_switch (95)	THE STATUS OF THE RETURN FAN RUN VERIFICATION CIRCUIT (RUN - VERIFICATION CIRCUIT CLOSED / STO - STOP - VERIFICATION CIRCUIT OPEN).
nviSAT_HIGH_LIM	SAT HIGH LIMIT	AV-026	SNVT_count_f (51)	THE UPPER LIMIT FOR THE SUPPLY AIR TEMPEATURE SETPOINT ON A VAV UNIT (°F).
nviSAT_LOW_LIM	SAT LOW LIMIT	AV-027	SNVT_count_f (51)	THE LOWER LIMIT FOR THE SUPPLY AIR TEMPEATURE SETPOINT ON A VAV UNIT (°F).
nviSAT_RST_BAS	SUPPLY AIR TEMP RST BAS	AV-028	SNVT_count_f (51)	THIS IS AN ANALOG INPUT FROM THE BAS SYSTEM THAT ALLOWS THE RESET OF THE ACTIVE SUPPLY AIR TEMPERATURE SETPOINT ON VAV UNITS. 0 VOLTS USES SAT HIGH LIMIT AND 5 VOLTS USES SAT LOW LIMIT (V). "SAT RST BAS" MUST BE ENABLED USING THE SERVICE KEY IN ORDER TO USE THIS FEATURE.
nvoSAT_SUC_TMP1	SATURATED SUCTION TEMP (TEMPERATURES 1 SUCTION)	AI-043	SNVT_count_f (51)	THE SATURATION TEMPERATURE OF THE SYSTEM 1 SUCTION GAS BASED ON THE SYSTEM 1 SUCTION PRESSURE (°F).
nvoSAT_SUC_TMP2	SATURATED SUCTION TEMP (TEMPERATURES 2 SUCTION)	AI-044	SNVT_count_f (51)	THE SATURATION TEMPERATURE OF THE SYSTEM 2 SUCTION GAS BASED ON THE SYSTEM 2 SUCTION PRESSURE (°F).
nvoSAT_SUC_TMP3	SATURATED SUCTION TEMP (TEMPERATURES 3 SUCTION)	AI-045	SNVT_count_f (51)	THE SATURATION TEMPERATURE OF THE SYSTEM 3 SUCTION GAS BASED ON THE SYSTEM 3 SUCTION PRESSURE (°F).

TABLE 49 – LON POINTS LIST (CONT'D)

BACnet NAME	USER INTERFACE NAME	BACnet OBJECT TYPE AND INSTANCE	SNVT	POINTS LIST DESCRIPTION
nvoSEN_MSC_FLT	SENSOR / MISC FAULT	BI-054	SNVT_switch (95)	IDENTIFIES IF A SENSOR OR MISCELLANEOUS FAULT IS PRESENT (0 - NO FAULT;1 - FAULTED).
nvoSF_PROV_SW	SF PROVING SWITCH	BI-055	SNVT_switch (95)	THE STATUS OF THE SUPPLY FAN AIR PROVING CIRCUIT (RUN - VERIFICATION CIRCUIT CLOSED / STO - STOP - VERIFICATION CIRCUIT OPEN).
nviSTG_1_COOL	STG 1 COOLING	AV-031	SNVT_count_f (51)	FOR A CONSTANT VOLUME UNIT THIS IS THE ACTIVE SAT SETPOINT FOR A FIRST STAGE COOLING DEMAND (°F).
nviSTG_1_HEAT	STG 1 HEATING	AV-032	SNVT_count_f (51)	FOR A CONSTANT VOLUME UNIT THIS IS THE ACTIVE SAT SETPOINT FOR A FIRST STAGE HEATING DEMAND (°F).
nviSTG_2_COOL	STG 2 COOLING	AV-033	SNVT_count_f (51)	FOR A CONSTANT VOLUME UNIT THIS IS THE ACTIVE SAT SETPOINT FOR A SECOND STAGE COOLING DEMAND (°F).
nviSTG_2_HEAT	STG 2 HEATING	AV-034	SNVT_count_f (51)	FOR A CONSTANT VOLUME UNIT THIS IS THE ACTIVE SAT SETPOINT FOR A SECOND STAGE HEATING DEMAND (°F).
nvoSUP_AIR_TEMP	SUPPLY AIR TEMP	AI-046	SNVT_count_f (51)	ACTUAL SUPPLY AIR TEMPERATURE (°F).
nvoSUP_AIR_TRST	SUPPLY AIR TEMP RST	A-0I47	SNVT_count_f (51)	THIS IS EITHER A HARDWIRED OR COMMUNICATED 0 TO 5VDC INPUT THAT ADJUST THE SUPPLY AIR SETPOINT BETWEEN THE SAT LOW AND SAT HIGH LIMIT (V).
SUP_FAN_VFD	SUPPLY FAN VFD	AI48		THE ACTUAL OUPUT TO THE SUPPLY FAN VFD (%).
nvoSUPPLY_FAN	SUPPLY FAN	BI-059	SNVT_switch (95)	THE STATUS OF THE BINARY OUPUT FROM THE CONTROLLER TO THE SUPPLY FAN CIRCUIT (ON / OFF).
nviSYSTEM_STOP	SYSTEM STOP	AV-035	SNVT_count (8)	A 0- VALLUE ALLOWS ALL COMPRESSORS TO OPERATE; 1 - TURNS OFF COMPRESSOR SYSTEM 1; 2 - TURNS OFF COMPRESSOR SYSTEM 2; 3 - TURNS OFF COMPRESSOR SYSTEM 3.
nvoTEMP_1_SUCTION	TEMPERATURE 1 SUCTION	AI-049	SNVT_count_f (51)	THE ACTUAL TEMPERATURE OF THE SYSTEM 1 SUCTION LINE (°F).
nvoTEMP_2_SUCTION	TEMPERATURE 2 SUCTION	AI-051	SNVT_count_f (51)	THE ACTUAL TEMPERATURE OF THE SYSTEM 2 SUCTION LINE (°F).
nvoTEMP_3_SUCTION	TEMPERATURE 3 SUCTION	AI-053	SNVT_count_f (51)	THE ACTUAL TEMPERATURE OF THE SYSTEM 3 SUCTION LINE (°F).
nvoUND_FLR_DEWP	UNDER FLOOR DEW POINT	AI-055	SNVT_count_f (51)	THE CALACULATED DEW POINT OF THE AIR UNDER THE FLOOR IN A FLEXSYS SYSTEM (%).
nviUND_HUMD_BAS	UNDER FLOOR HUMIDITY BAS	AV-036	SNVT_switch (95)	THIS ALLOWS THE BAS SYSTEM TO INPUT A UNDER FLOOR HUMIDITY VALUE TO THE CONTROL ON A FLEXSYS SYSTEM (%) "UNDER FLR HUMI BAS" MUST BE ENABLED USING THE SERVICE KEY IN ORDER TO USE THIS FEATURE.
nvoUND_FLR_HUMD	UNDER FLOOR HUMIDITY	AI-056	SNVT_switch (95)	HUMIDITY VALUE OF THE AIR UNDER THE FLOOR THE CONTROL IS CONTROLLING TO IN A FLEXSYS SYSTEM (%).
nviUND_TEMP_BAS	UNDER FLOOR TEMP BAS	AV-037	SNVT_count_f (51)	THIS ALLOWS THE BAS SYSTEM TO INPUT A UNDER FLOOR TEMPERATURE VALUE TO THE CONTROL ON A FLEXSYS SYSTEM (°F). "UNDER FLR TEMP BAS" MUST BE ENABLED USING THE SERVICE KEY IN ORDER TO USE THIS FEATURE.
nvoUND_FLR_TEMP	UNDER FLOOR TEMP	AI-057	SNVT_count_f (51)	TEMPERATURE OF THE AIR UNDER THE FLOOR THE CONTROL IS CONTROLLING TO IN A FLEXSYS SYSTEM (°F).

TABLE 49 – LON POINTS LIST (CONT'D)

BACnet NAME	USER INTERFACE NAME	BACnet OBJECT TYPE AND INSTANCE	SNVT	POINTS LIST DESCRIPTION
nvoUNIT_MODE	UNIT MODE	AI-058	SNVT_count (8)	0 - OCCUPIED COOLING 1 - OCCUPIED COOLING LOW 2 - OCCUPIED COOLING HIGH 3 - OCCUPIED COOLING WITH BYPASS 4 - OCCUPIED COOLING WITHOUT BYPASS 5 - OCCUPIED HEATING 6 - OCCUPIED HEATING LOW 7 - OCCUPIED HEATING HIGH 8 - OCCUPIED STANDBY 9 - UNOCCUPIED COOLING 10 - UNOCCUPIED COOLING LOW 11 - UNOCCUPIED COOLING HIGH 12 - UNOCCUPIED HEATING 13 - UNOCCUPIED HEATING LOW 14 - UNOCCUPIED HEATING HIGH 15 - UNOCCUPIED STANDBY 16 - COMFORT VENT COOLING 17 - COMFORT VENT HEATING 18 - NIGHT SET BACK 19 - MORNING WARM UP 20 - POWER UP STANDBY
nviUNIT_STOP	UNIT STOP	AV-093	SNVT_switch (95)	THIS COMMAND ALLOWS THE UNIT TO BE SHUT DOWN THROUGH THE BAS SYSTEM (0 = NORMAL OPERATION/ 1 = STOPPED.
nviUNOCC_ZN_COOL	UNOCCUPIED ZONE COOLING	AV-038	SNVT_count_f (51)	THE UNOCCUPIED ZONE COOLING SETPOINT (°F).
nviUNOCC_ZN_HEAT	UNOCCUPIED ZONE HEATING	AV-039	SNVT_count_f (51)	THE UNOCCUPIED ZONE HEATING SETPOINT (°F).
nvoVENT_DEM_OUT	VENTILATION DEMAND P1 OUTP	AI-059	SNVT_switch (95)	THE VENTILATION OUTPUT BEING GENERATED BY THE DEMAND VENTILATION FEATURE (%).
nviVENT_ENABLE	VENTILATION ENABLE	AV-095	SNVT_switch (95)	THIS COMMAND ALLOWS THE VENTILATION FUNCTION TO BE TURNED ON OR OFF (0 = OFF / 1 = ON).
nviZONE_TMP_BAS	ZONE TEMP BAS	AV-040	SNVT_count_f (51)	THIS ALLOWS THE BAS SYSTEM TO INPUT A ZONE TEMPERATURE VALUE TO THE CONTROL ON A CONSTANT VOLUME UNIT WITH COMMUNICATED ZONE CONTROL (°F).
nvoZONE_TEMP	ZONE TEMP	AI-060	SNVT_count_f (51)	ZONE TEMPERATURE THE CONTROL IS CONTROLLING TO (°F).

NOTES

1. The most up to listing of the standard points mapping can be found in the Johson Controls website.
2. In order to do LON protocol an E-Link Gateway Part Number YK-ELNK101-0 or YK-ELNKE01-0 must be used.

TABLE 50 - N2 POINTS LIST

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	ENG UNITS	N2 ADDRESS	POINTS LIST DESCRIPTION
ACT _DSP_SP	DUCT STATIC SETPOINT	R	AI01	WC	AI 1	A DERIVED VALUE THE DUCT STATIC IS CONTROLLED TO ("WG).
ACT_MIN_ FLOW	ACTIVE MINIMUM AIR FLOW	R	AI02	CFM	AI 2	A DERIVED VALUE THE MINIMUM VENTILATION AIR IS CONTROLLED TO (CFM).
ACT_MIN_POS	ACTIVE MINIMUM POSITION	R	AI03	%	AI 3	A DERIVED VALUE THE DAMPER IS CONTROLLED TO FOR MINIMUM VENTILATION AIR (%).
ACT_SAT_SP	SUPPLY AIR SETP	R	AI04	°F	AI 4	A DERIVED VALUE THE SUPPLY AIR TEMPERATURE IS CONTROLLED TO (°F).
ACT_SLAB_ CTL	ACTIVE SLAB CONTROL	R/W	AV77	0, 1	AO 34	ALLOWS THE ACTIVE SLAB CONTROL FEATURE TO BE TURNED ON AND OFF ON FLEXSYS UNITS (0 = OFF / 1 = ON).
BUILD_PRES_ SP	BUILDING PRESSURE SP	R/W	AV01	WC	AO 1	THE BUILDING PRESSURE SETPOINT ("WG).
BLD_STAT_ PRS	BUILDING STATIC PRES	R	AI05	WC	AI 5	ACTUAL BUILDING PRESSURE INPUT ("WG).
BYPASS_ DAMPER	BYPASS DAMPER	R	AI06	%	AI 6	ACTUAL BYPASS DAMPER POSITION (%).
CO2_1_OUT	CO2 1					
(OUTSIDE)	R	AI07	PPM	AI 7	ACTUAL OUTDOOR CO2 VALUE (PPM)	
CO2_2_INSIDE	CO2 1 (INSIDE)	R	AI08	PPM	AI 8	ACTUAL INDOOR CO2 VALUE (PPM).
CO2_OFFSET	CO2 OFFSET	R/W	AV02	PPM	AO 2	THE DIFFERENCE BETWEEN THE INDOOR AND OUTSIDE CO2 MUST EXCEED THIS VALUE TO INITIATE DEMAND VENTILATION (PPM).
COL_HEAT_ FLT	COOLING/ HEATING FAULT	R	BI02	0, 1	DI 1	GIVES THE FAULT STATUS OF THE COOLING AND HEATING SYSTEM (NFL - NO FAULT; FLT - FAULTED).
COMP_1A	COMPRESSOR 1A	R	BI03	0, 1	DI 2	STATUS OF COMPRESSOR 1A, (0 = OFF, 1 = ON).
COMP_1B	COMPRESSOR 1B	R	BI04	0, 1	DI 3	STATUS OF COMPRESSOR 1B, (0 = OFF, 1 = ON).
COMP_2A	COMPRESSOR 2A	R	BI05	0, 1	DI 4	STATUS OF COMPRESSOR 2A, (0 = OFF, 1 = ON).
COMP_2B	COMPRESSOR 2B	R	BI06	0, 1	DI 5	STATUS OF COMPRESSOR 2B, (0 = OFF, 1 = ON).
COMP_3A	COMPRESSOR 3A	R	BI07	0, 1	DI 6	STATUS OF COMPRESSOR 3A, (0 = OFF, 1 = ON).
COMP_3B	COMPRESSOR 3B	R	BI08	0, 1	DI 7	STATUS OF COMPRESSOR 3B, (0 = OFF, 1 = ON).
COMP_ LPCO_1	COMPRESSOR LPCO 1	R	BI09	0, 1	DI 8	STATUS OF COMPRESSOR SYSTEM 1 LOW PRESSURE CUTOUT CIRCUIT (0 - FAULTED / 1 - NO FAULT).

TABLE 50 – N2 POINTS LIST (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	ENG UNITS	N2 ADDRESS	POINTS LIST DESCRIPTION
COMP_ LPCO_2	COMPRESSOR LPCO 2	R	BI10	0, 1	DI 9	STATUS OF COMPRESSOR SYSTEM 2 LOW PRESSURE CUTOUT CIRCUIT (0 - FAULTED / 1 - NO FAULT).
COMP_ LPCO_3	COMPRESSOR LPCO 3	R	BI11	0, 1	DI 10	STATUS OF COMPRESSOR SYSTEM 3 LOW PRESSURE CUTOUT CIRCUIT (0 - FAULTED / 1 - NO FAULT).
COMP_STAT_1	COMPRESSOR STATUS 1	R	BI12	0, 1	DI 11	STATUS OF COMPRESSOR SYSTEM 1 COMPRESSOR SAFETY CIRCUIT (0 - FAULTED / 1 - NO FAULT).
COMP_STAT_2	COMPRESSOR STATUS 2	R	BI13	0, 1	DI 12	STATUS OF COMPRESSOR SYSTEM 2 COMPRESSOR SAFETY CIRCUIT (0 - FAULTED / 1 - NO FAULT).
COMP_STAT_3	COMPRESSOR STATUS 3	R	BI14	0, 1	DI 13	STATUS OF COMPRESSOR SYSTEM 3 COMPRESSOR SAFETY CIRCUIT (0 - FAULTED / 1 - NO FAULT).
DCT_ST_PR_ RT	DUCT STATIC PRES RST	R	AI16	%	AI 9	A HARDWIRED ENTERED ANALOG VOLTAGE THAT RESULTS IN A %RESET DOWN FROM THE DUCT STATIC HIGH LIMIT BASED ON A PERCENT OF THE DIFFERENCE BETWEEN DUCT STATIC HIGH LIMIT AND DUCT STATIC LOW LIMIT (%).
DCT_STAT_ PRS	DUCT STATIC PRES	R	AI17	WC	AI 10	ACTUAL DUCT STATIC PRESSURE INPUT TO THE CONTROL ("WG).
DEW_PNT_ RST	DEW POINT RESET	R/W	AV80	0, 1	AO 35	THIS ALLOWS THE DEW POINT RESET FEATURE TO BE TURNED ON AND OFF ON FLEXSYS UNITS (0 = OFF / 1 = ON).
DSP_HI_LIMIT	DUCT STATIC HIGH LIMIT	R/W	AV03	WC	AO 3	THE DUCT STATIC UPPER SETPOINT ("WG).
DSP_LO_LIMIT	DUCT STATIC LOW LIMIT	R/W	AV04	WC	AO 4	THE DUCT STATIC LOWER SETPOINT ("WG).
DSP_RST_BAS	DUCT STATIC PRES RST BAS	R/W	AV05	%	AO 5	A BAS ENTERED VALUE THAT RESULTS IN A %RESET DOWN FROM THE DUCT STATIC HIGH LIMIT BASED ON A PERCENT OF THE DIFFERENCE BETWEEN DUCT STATIC HIGH LIMIT AND DUCT STATIC LOW LIMIT (%). "DUCT PRES RST BAS" MUST BE ENABLED USING THE SERVICE KEY IN ORDER TO USE THIS FEATURE.
ECONO_ INSTAL	ECONOMIZER INSTALLED	R/W	AV81	0, 1	AO 36	ALLOWS THE ECONOMIZER FEATURE TO BE TURNED ON AND OFF (0 = OFF / 1 = ON).
ECON_ME_ USED	ECONOMIZER METHOD	R	AI18	INDEX	AI 11	THE ECONOMIZER METHOD BEING USED BY THE CONTROL (O - DRY BULB; 1 - SINGLE ENTHALPY; 2 - DUAL ENTHALPY).
ECON_STATUS	ECONOMIZER SUITABLE ECON INSTALLED	R	AI19	INDEX	AI 12	STATUS OF THE ECONOMIZER OPTION (0 - INSTALLED AND INACTIVE; 1 - INSTALLED AND ACTIVE; 2 - NOT INSTALLED).
EL_AIR_ TMP_H	EVAP LEAVING AIR TEMP HIGH	R/W	AV07	°F	AO 6	ON A FLEXSYS UNIT WITH BYPASS THIS IS THE SUPPLY AIR TEMPERATURE HIGH SETPOINT (°F).

TABLE 50 – N2 POINTS LIST (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	ENG UNITS	N2 ADDRESS	POINTS LIST DESCRIPTION
EL_AIR_TMP_L	EVAP LEAVING AIR TEMP LOW	R/W	AV08	°F	AO 7	ON A FLEXSYS UNIT WITH BYPASS THIS IS THE SUPPLY AIR TEMPERATURE LOW SETPOINT (°F).
EVAP_AIR_ TMP	EVAPORATOR AIR TEMP 1	R	AI20	°F	AI 13	ACTUAL TEMPERATURE OF AIR LEAVING THE EVAPORATOR COIL ON A FLEXSYS UNIT (°F).
EXHAUST_FAN	EXHAUST FAN	R	BI22	0, 1	DI 15	THE STATUS OF THE BINARY OUTPUT FOR THE EXHAUST (0 = OFF / 1 = ON).
EXH_FAN_ STAT	EXHAUST FAN STATUS	R	BI21	0, 1	DI 14	THE STATUS OF THE EXHAUST FAN RUN VERIFICATION CIRCUIT (0 - VERIFICATION CIRCUIT OPEN / 1 - VERIFICATION CIRCUIT CLOSED).
EXHAUST_OUT	EXHAUST OUTPUT	R	AI21	%	AI 14	CONTROL OUTPUT TO THE EXHAUST DAMPER (%).
FAN_FAULT	FAN FAULT	R	BI23	0, 1	DO 16	IDENTIFIES IF THERE IS A SUPPLY, EXHAUST, OR RETURN FAN FAULT (0 - NO FAULT; 1 - FAULTED).
FILTER_STATS	FILTER STATUS	R	BI25	0, 1	DO 17	IDENTIFIES THE STATUS OF THE BINARY DIRTY FILTER INPUT (0 - NO FAULT;1 - FAULTED).
HEAT_ENT_ TMP	HEAT ENTERING TEMP	R	AI22	°F	AI 15	ACTUAL TEMPERATURE OF THE AIR ENTERING THE STAGED HEAT SECTION (°F).
HEATING_SAT	HEATING SAT	R/W	AV09	°F	AO 8	THE HEATING SAT SETPOINT FOR A VAV OR FLEXSYS UNIT (°F).
HEAT_STAGES	ELECTRIC HEAT STAGES GAS HEAT STAGES	R	AI23	INDEX	AI 16	DERIVED VALUE SHOWING THE NUMBER OF ELECTRIC OR STAGED GAS HEAT STAGES AVAILABLE (1 - 7).
HEATING_VALV	HEATING VALVE	R	AI24	%	AI 17	THE OUTPUT FROM THE CONTROL TO A HOT WATER, STEAM, OR MODULATING GAS HEAT VALVE (%).
HW_FRZ_STAT	HOT WATER FRZ STATUS	R	BI33	0, 1	DO 18	THE STATUS OF THE FREEZESTAT CIRCUIT ON UNITS WITH HOT WATER OR STEAM HEAT. (0 - NO FAULT / 1 - FAULTED).
MAX_BYPASS	MAXIMUM BYPASS	R/W	AV10	%	AO 9	THE MAXIMUM ALLOWABLE SETTING FOR THE BY PASS DAMPER IN A FLEXSYS UNIT (%).
MAX_FLOW_ DV	MAX FLOW DEMAND VENTILATION	R/W	AV11	CFM	AO 10	THE MAXIMUM ALLOWABLE AIRFLOW FOR DEMAND VENTILATION WITH AN AIR MEASURING STATION (CFM).
MECH_LCK_ TMP	MECH CLG LOCKOUT TEMP	R/W	AV12	°F	AO 11	THE MINIMUM OUTDOOR TEMPERATURE AT WHICH MECHANICAL COOLING IS ALLOWED TO OPERATE (°F).
MIN_FLOW_DV	MIN FLOW DEMAND VENTILATION	R/W	AV13	CFM	AO 12	THE MINIMUM ALLOWABLE AIRFLOW FOR DEMAND VENTILATION WITH AN AIR MEASURING STATION (CFM).
MIXD_SAT_LIM	MIXED SAT LIMIT	R/W	AV14	°F	AO 13	ON A FLEXSYS UNIT THIS IS THE SUPPLY AIR SETPOINT WHEN OPERATING WITHOUT A BYPASS DAMPER (°F).

TABLE 50 – N2 POINTS LIST (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	ENG UNITS	N2 ADDRESS	POINTS LIST DESCRIPTION
MORN_WUP_ CMD	MORNING WARM UP CMND	R/W	AV 86	0, 1	AO 37	A BAS GENERATED COMMAND TO ALLOW THE MORNING WARM UP FEATURE TO BE TURNED ON AND OFF (0 = OFF / 1 = ON).
MORN_WUP_ RAT	RAT HEATING SETP	R/W	AV15	°F	AO 14	ON A VAV OR FLEXSYS UNIT THIS IS THE RETURN AIR TEMPERATURE SETPOINT USED TO DETERMINE WHEN THE UNIT SHOULD SWITCH TO THE HEATING MODE (°F).
NIGHT_ SETBAC	NIGHT SET BACK (FOR HEATING)	R/W	AV87	0, 1	AO 38	THIS COMMAND ALLOWS THE NIGHT SET BACK HEATING FUNCTION TO BE TURNED ON AND OFF (0 = OFF / 1 = ON).
OA_DAMPER	OA DAMPER	R	AI25	%	AI 18	THIS IS THE POSITION OF THE OUTDOOR DAMPER (%).
OA_DAMP_ POS1	OA DAMPER MIN POSITION 1	R/W	AV16	%	AO 15	THE MINIMUM POSITION FOR THE OUTDOOR AIR DAMPER WHEN USING FIXED VENTILATION CONTROL WHEN THE SUPPLY FAN IS AT FULL SPEED (%).
OA_DAMP_ POS2	OA DAMPER MIN POSITION 2	R/W	AV17	%	AO 16	THE MINIMUM POSITION FOR THE OUTDOOR AIR DAMPER WHEN USING FIXED VENTILATION CONTROL WHEN THE SUPPLY FAN IS AT 50% OF FULL SPEED (%).
OA_ENTHALPY	OUTSIDE AIR ENTHALPY	R	AI26	BTU/LB	AI 19	ACTUAL OUTSIDE AIR ENTHALPY (BTU/LB).
OA_ENTH_ LIMT	OUTSIDE AIR ENTHALPY SETPOINT	R/W	AV18	BTU/LB	AO 17	THE UPPER ENTHALPY LIMIT TO ALLOW THE USE OF OUTDOOR AIR FOR SINGLE OR DUAL ENTHALPY ECONOMIZER (BTU/ LB).
OA_FLO_ PRS_1	OA FLOW PRESSURE 1	R	AI27	WC	AI 20	THE VELOCITY OF THE AIR AS MEASURED AT A MINIMUM, FULL, OR 1/3 DAMPER SECTION OF AN AIR MEASURING STATION ("WC).
OA_FLO_ PRS_2	OA FLOW PRESSURE 2	R	AI28	WC	AI 21	THIS IS THE VELOCITY OF THE AIR AS MEASURED AT THE 2/3 DAMPER SECTION OF AN AIR MEASURING STATION ("WC).
OA_REL_ HUMID	OUTSIDE AIR HUMIDITY	R	AI29	%	AI 22	ACTUAL OUTDOOR AIR RELATIVE HUMIDITY (%).
OA_TEMP	OUTSIDE AIR TEMP	R	AI30	°F	AI 23	ACTUAL OUTDOOR AIR TEMPERATURE (°F).
OCCUPNCY_ CMD	OCCUPANCY COMMAND	R/W	AV88	0, 1	AO 39	THIS BAS COMMAND ALLOWS THE UNIT TO BE PLACED IN THE OCCUPIED OR UNOCCUPIED MODE (0 = UNOCCUPIED / 1 = OCCUPIED).
OCC_ZN_ COOL	OCCUPIED ZONE COOLING SETP	R/W	AV21	°F	AO 18	THE OCCUPIED ZONE COOLING SETPOINT (°F).
OCC_ZN_HEAT	OCCUPIED ZONE HEATING SETP	R/W	AV22	°F	AO 19	THE OCCUPIED ZONE HEATING SETPOINT (°F).

TABLE 50 – N2 POINTS LIST (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	ENG UNITS	N2 ADDRESS	POINTS LIST DESCRIPTION
PRS_1_DISCH	PRESSURES 1 DISCHARGE	R	AI31	PSI	AI 24	ACTUAL SYSTEM 1 DISCHARGE PRESSURE (PSI).
PRS_1_ SUCTION	PRESSURES 1 SUCTION	R	AI32	PSI	AI 25	ACTUAL SYSTEM 1 SUCTION PRESSURE (PSI).
PRS_2_DISCH	PRESSURES 2 DISCHARGE	R	AI33	PSI	AI 26	ACTUAL SYSTEM 2 DISCHARGE PRESSURE (PSI).
PRS_2_ SUCTION	PRESSURES 2 SUCTION	R	AI34	PSI	AI 27	ACTUAL SYSTEM 2 SUCTION PRESSURE (PSI).
PRS_3_DISCH	PRESSURES 3 DISCHARGE	R	AI35	PSI	AI 28	ACTUAL SYSTEM 3 DISCHARGE PRESSURE (PSI).
PRS_3_ SUCTION	PRESSURES 3 SUCTION	R	AI36	PSI	AI 29	ACTUAL SYSTEM 3 SUCTION PRESSURE (PSI).
RAT_COOL_SP	RAT COOLING SETP	R/W	AV23	°F	AO 20	ON A VAV OR FLEXSYS UNIT THIS VALUE IS USED TO DETERMINE WHEN THE UNIT SHOULD SWITCH TO THE COOLING MODE (°F).
RET_AIR_BY_S	ACTIVE BYPASS ACTIVE SP	R	AI37	%	AI 30	A DERIVED VALUE FOR THE CURRENT SETPOINT OF THE RETURN AIR BYPASS DAMPER ON A FLEXSYS UNIT (%).
RET_AIR_ ENTH	RETURN AIR ENTHALPY	R	AI38	BTU/LB	AI 31	ACTUAL RETURN AIR ENTHALPY (BTU/LB).
RET_AIR_ HUMD	RETURN AIR HUMIDITY	R	AI39	%	AI 32	ACTUAL RETURN AIR RELATIVE HUMIDITY (%).
RET_AIR_ TEMP	RETURN AIR TEMP	R	AI40	°F	AI 33	ACTUAL RETURN AIR TEMPERATURE (°F).
RET_FAN_OUT	EXHAUST/ RETURN FAN VFD	R	AI41	%	AI 34	THE OUTPUT FROM THE CONTROL TO THE EXHAUST OR RETURN FAN VFD (%).
RET_FAN_ PRES	RETURN FAN PRESSURE	R	AI42	WC	AI 35	THE ACTUAL PRESSURE THAT IS USED TO CONTROL THE RETURN FAN (IWC).
RET_FAN_ STAT	RETURN FAN STATUS	R	BI52	0, 1	DI 19	THE STATUS OF THE RETURN FAN RUN VERIFICATION CIRCUIT (0 - STOP - VERIFICATION CIRCUIT OPEN / 1 - VERIFICATION CIRCUIT CLOSED).
SAT_HIGH_LIM	SAT HIGH LIMIT	R/W	AV26	°F	AO 21	THE UPPER LIMIT FOR THE SUPPLY AIR TEMPERATURE SETPOINT ON A VAV UNIT (°F).
SAT_LOW_LIM	SAT LOW LIMIT	R/W	AV27	°F	AO 22	THE LOWER LIMIT FOR THE SUPPLY AIR TEMPERATURE SETPOINT ON A VAV UNIT (°F).
SAT_RST_BAS	SUPPLY AIR TEMP RST BAS	R/W	AV28	VOLTS DC	AO 23	THIS IS AN ANALOG INPUT FROM THE BAS SYSTEM THAT ALLOWS THE RESET OF THE ACTIVE SUPPLY AIR TEMPERATURE SETPOINT ON VAV UNITS. 0 VOLTS USES SAT HIGH LIMIT AND 5 VOLTS USES SAT LOW LIMIT (V). “SAT RST BAS” MUST BE ENABLED USING THE SERVICE KEY IN ORDER TO USE THIS FEATURE.

TABLE 50 – N2 POINTS LIST (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	ENG UNITS	N2 ADDRESS	POINTS LIST DESCRIPTION
SAT_SUC_ TMP1	SATURATED SUCTION TEMP (TEMPERATURES 1 SUCTION)	R	AI43	°F	AI 36	THE SATURATION TEMPERATURE OF THE SYSTEM 1 SUCTION GAS BASED ON THE SYSTEM 1 SUCTION PRESSURE (°F).
SAT_SUC_ TMP2	SATURATED SUCTION TEMP (TEMPERATURES 2 SUCTION)	R	AI44	°F	AI 37	THE SATURATION TEMPERATURE OF THE SYSTEM 2 SUCTION GAS BASED ON THE SYSTEM 2 SUCTION PRESSURE (°F).
SAT_SUC_ TMP3	SATURATED SUCTION TEMP (TEMPERATURES 3 SUCTION)	R	AI45	°F	AI 38	THE SATURATION TEMPERATURE OF THE SYSTEM 3 SUCTION GAS BASED ON THE SYSTEM 3 SUCTION PRESSURE (°F).
SEN_MSC_FLT	SENSOR/MISC FAULT	R	BI54	0, 1	DI 20	IDENTIFIES IF A SENSOR OR MISCELLANEOUS FAULT IS PRESENT (0 - NO FAULT; 1 - FAULTED).
SF_PROV_SW	SF PROVING SWITCH	R	BI55	0, 1	DI 21	THE STATUS OF THE SUPPLY FAN AIR PROVING CIRCUIT (0 - VERIFICATION CIRCUIT OPEN / 1 - VERIFICATION CIRCUIT CLOSED).
STG_1_COOL	STG 1 COOLING	R/W	AV31	°F	AO 24	FOR A CONSTANT VOLUME UNIT THIS IS THE ACTIVE SAT SETPOINT FOR A FIRST STAGE COOLING DEMAND (°F).
STG_1_HEAT	STG 1 HEATING	R/W	AV32	°F	AO 25	FOR A CONSTANT VOLUME UNIT THIS IS THE ACTIVE SAT SETPOINT FOR A FIRST STAGE HEATING DEMAND (°F).
STG_2_COOL	STG 2 COOLING	R/W	AV33	°F	AO 26	FOR A CONSTANT VOLUME UNIT THIS IS THE ACTIVE SAT SETPOINT FOR A SECOND STAGE COOLING DEMAND (°F).
STG_2_HEAT	STG 2 HEATING	R/W	AV34	°F	AO 27	FOR A CONSTANT VOLUME UNIT THIS IS THE ACTIVE SAT SETPOINT FOR A SECOND STAGE HEATING DEMAND (°F).
SUP_AIR_ TEMP	SUPPLY AIR TEMP	R	AI46	°F	AI 39	ACTUAL SUPPLY AIR TEMPERATURE (°F).
SUP_AIR_ TRST	SUPPLY AIR TEMP RST	R	AI47	VOLTS DC	AI 40	THIS IS EITHER A HARDWIRED OR COMMUNICATED 0 TO 5VDC INPUT THAT ADJUST THE SUPPLY AIR SETPOINT BETWEEN THE SAT LOW AND SAT HIGH LIMIT (V).
SUP_FAN_VFD	SUPPLY FAN VFD	R	AI48	%	AI 41	THE ACTUAL OUTPUT TO THE SUPPLY FAN VFD (%).
SUPPLY_FAN	SUPPLY FAN	R	BI59	0, 1	DI 22	THE STATUS OF THE BINARY OUTPUT FROM THE CONTROLLER TO THE SUPPLY FAN CIRCUIT (0 = OFF, 1 = ON).
SYSTEM_STOP	SYSTEM STOP	R/W	AV35	INDEX	AO 28	A 0 - VALUE ALLOWS ALL COMPRESSORS TO OPERATE: 1 - TURNS OFF COMPRESSOR SYSTEM 1. 2 - TURNS OFF COMPRESSOR SYSTEM 2. 3 - TURNS OFF COMPRESSOR SYSTEM 3.

TABLE 50 – N2 POINTS LIST (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	ENG UNITS	N2 ADDRESS	POINTS LIST DESCRIPTION
TEMP_1_ SUCTION	TEMPERATURE 1 SUCTION	R	AI49	°F	AI 42	THE ACTUAL TEMPERATURE OF THE SYSTEM 1 SUCTION LINE (°F).
TEMP_2_ SUCTION	TEMPERATURE 2 SUCTION	R	AI51	°F	AI 43	THE ACTUAL TEMPERATURE OF THE SYSTEM 2 SUCTION LINE (°F).
TEMP_3_ SUCTION	TEMPERATURE 3 SUCTION	R	AI53	°F	AI 44	THE ACTUAL TEMPERATURE OF THE SYSTEM 3 SUCTION LINE (°F).
UND_FLR_ DEWP	UNDER FLOOR DEW POINT	R	AI55	°F	AI 45	THE CALCULATED DEW POINT OF THE AIR UNDER THE FLOOR IN A FLEXSYS SYSTEM (°F).
UND_HUMD_ BAS	UNDER FLOOR HUMIDITY BAS	R/W	AV36	%	AO 29	THIS ALLOWS THE BAS SYSTEM TO INPUT A UNDER FLOOR HUMIDITY VALUE TO THE CONTROL ON A FLEXSYS SYSTEM (%). “UNDER FLR HUMI BAS” MUST BE ENABLED USING THE SERVICE KEY IN ORDER TO USE THIS FEATURE.
UND_FLR_ HUMD	UNDER FLOOR HUMIDITY	R	AI56	%	AI 46	HUMIDITY VALUE OF THE AIR UNDER THE FLOOR THE CONTROL IS CONTROLLING TO IN A FLEXSYS SYSTEM (%).
UND_TEMP_ BAS	UNDER FLOOR TEMP BAS	R/W	AV37	°F	AO 30	THIS ALLOWS THE BAS SYSTEM TO INPUT A UNDER FLOOR TEMPERATURE VALUE TO THE CONTROL ON A FLEXSYS SYSTEM (°F). “UNDER FLR TEMP BAS” MUST BE ENABLED USING THE SERVICE KEY IN ORDER TO USE THIS FEATURE.
UND_FLR_ TEMP	UNDER FLOOR TEMP	R	AI57	°F	AI 47	TEMPERATURE OF THE AIR UNDER THE FLOOR THE CONTROL IS CONTROLLING TO IN A FLEXSYS SYSTEM (°F).
UNIT_MODE	UNIT MODE	R	AI58	INDEX	AI 48	0 - OCCUPIED COOLING 1 - OCCUPIED COOLING LOW 2 - OCCUPIED COOLING HIGH 3 - OCCUPIED COOLING WITH BYPASS 4 - OCCUPIED COOLING WITHOUT BYPASS 5 - OCCUPIED HEATING 6 - OCCUPIED HEATING LOW 7 - OCCUPIED HEATING HIGH 8 - OCCUPIED STANDBY 9 - UNOCCUPIED COOLING 10 - UNOCCUPIED COOLING LOW 11 - UNOCCUPIED COOLING HIGH 12 - UNOCCUPIED HEATING 13 - UNOCCUPIED HEATING LOW 14 - UNOCCUPIED HEATING HIGH 15 - UNOCCUPIED STANDBY 16 - COMFORT VENT COOLING 17 - COMFORT VENT HEATING 18 - NIGHT SET BACK 19 - MORNING WARM UP 20 - POWER UP STANDBY

TABLE 50 – N2 POINTS LIST (CONT'D)

BACNET NAME	USER INTERFACE NAME	READ/ WRITE	BACNET OBJECT TYPE AND INSTANCE	ENG UNITS	N2 ADDRESS	POINTS LIST DESCRIPTION
UNIT_STOP	UNIT STOP	R/W	AV93	0, 1	AO 40	THIS COMMAND ALLOWS THE UNIT TO BE SHUT DOWN THROUGH THE BAS SYSTEM (0 = NORMAL OPERATION/ 1 = STOPPED.
UNOCC_ZN_ COOL	UNOCCUPIED ZONE COOLING	R/W	AV38	°F	AO 31	THE UNOCCUPIED ZONE COOLING SETPOINT (°F).
UNOCC_ZN_ HEAT	UNOCCUPIED ZONE HEATING	R/W	AV39	°F	AO 32	THE UNOCCUPIED ZONE HEATING SETPOINT (°F).
VENT_DEM_ OUT	VENTILATION DEMAND P1 OUTP	R	AI59	%	AI 49	THE VENTILATION OUTPUT BEING GENERATED BY THE DEMAND VENTILATION FEATURE (%).
VENT_ENABLE	VENTILATION ENABLE	R/W	AV95	0, 1	AO 41	THIS COMMAND ALLOWS THE VENTILATION FUNCTION TO BE TURNED ON OR OFF (0 = OFF / 1 = ON).
ZONE_TMP_ BAS	ZONE TEMP BAS	R/W	AV40	°F	AO 33	THIS ALLOWS THE BAS SYSTEM TO INPUT A ZONE TEMPERATURE VALUE, °F, TO THE CONTROL. TO USE THIS FEATURE THE “CONTROL METHOD” MUST BE SET TO “COMM ZONE TEMP”.
ZONE_TEMP	ZONE TEMP	R	AI60	°F	AI 50	ZONE TEMPERATURE THE CONTROL IS CONTROLLING TO (°F).

Notes

1. The most up to date listing of the standard points mapping can be found on the Johnson Controls website.
2. In order to do N2 protocol, an E-Link Gateway Part Number YK-ELNK 100-0 or YK-ELINK 00-0 must be used.

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SECTION 7 – PARAMETER DESCRIPTIONS AND OPTIONS

TABLE 51 - DEFINITIONS

MENU ITEM	DEFINITION
ACTIVE SLAB CONTROL	This parameter is programmed through the PROGRAM key. This function allows heat to be turned on during the transition from Unoccupied to Occupied mode or Occupied to Unoccupied mode if the under floor conditions of a FlexSys system are right for the growth of mold and mildew. The choices are USER ENABLED or USER DISABLED.
ADAPT MORN WARM UP	This parameter is programmed through the PROGRAM key. Adaptive Morning Warm Up uses the past three days of warm up times and temperatures to calculate the start time for the current day. This parameter allows the user to USER ENABLED or USER DISABLED this feature.
BLDG PRESSURE CNTRL OFFSET	This parameter is programmed through the SETPOINTS key. The Unit Controller To determine when to turn on the exhaust fan. When the exhaust option is configured for ‘‘ON-OFF PRESS CNTRL’’.
BUILDING PRESSURE ACTIVE SETPOINT	This parameter is programmed through the SETPOINTS key. It identifies the control point for the building pressure.
BUILDING PRESSURE CURRENT	This is the actual pressure in the conditioned space.
BYPASS DAMPER POSITION	This is the actual position of the bypass damper, by percent open, in a FlexSys unit.
CO2 LEVEL INSIDE	This is the CO_2 level of the air in the conditioned space.
CO2 LEVEL OUTSIDE	This is the CO_2 level of the outdoor air.
CO2 OFFSET SETPOINT	This parameter is programmed through the SETPOINTS key. The Outside CO_2 level must be lower than the Indoor CO_2 level plus the CO_2 OFFSET SETPOINT before the outdoor door damper will start to open for additional ventilation.
CO2 OFFSET CURRENT	This represents the current difference between the “CO2 LEVEL INSIDE” versus the “CO2 LEVEL OUTSIDE”.
COMFORT VENTILATION	This parameter is programmed through the PROGRAM key. This function is only used on a Constant Volume unit. The Unit Controller monitors the Return Air Temperature and energizes stages of cooling or heating prior to a demand from the space. This function is only active when the unit is in the Occupied mode. The choices are USER ENABLED or USER DISABLED.
COMP SYS 1 STATUS	This is the current operating mode of the system 1 compressors. The display will show Normal - Comp A On, Normal - Comp B On, Normal - Both ON, Normal - Both Off, Safety Trip, Safety Fault, Safety Lockout, Low Amb Inhibit, Low Suct Temp Unl, High DP Unload, or User Disabled.
COMP SYS 2 STATUS	This is the current operating mode of the system 2 compressors. The display will show Normal - Comp A On, Normal - Comp B On, Normal - Both ON, Normal - Both Off, Safety Trip, Safety Fault, Safety Lockout, Low Amb Inhibit, Low Suct Temp Unl, High DP Unload, or User Disabled.
COMP SYS 3 STATUS	This is the current operating mode of the system 3 compressors. The display will show Normal - Comp A On, Normal - Comp B On, Normal - Both ON, Normal - Both Off, Safety Trip, Safety Fault, Safety Lockout, Low Amb Inhibit, Low Suct Temp Unl, High DP Unload, or User Disabled.
CONDENSER FAN 1A/1	This identifies if the Unit Controller has sent a Binary output to Condenser Fan 1A /1.
CONDENSER FAN 1B/2	This identifies if the Unit Controller has sent a Binary output to Condenser Fan 1B /2.
CONDENSER FAN 2A/3	This identifies if the Unit Controller has sent a Binary output to Condenser Fan 2A /3.
CONDENSER FAN 2B/4	This identifies if the Unit Controller has sent a Binary output to Condenser Fan 2B/4.
CONDENSER FAN 3A/5	This identifies if the Unit Controller has sent a Binary output to Condenser Fan 3A /5.
CONDENSER FAN 3B/6	This identifies if the Unit Controller has sent a Binary output to Condenser Fan 3B/6.
CONTINUOUS VENT	This parameter is programmed through the PROGRAM key. This is only used on a Constant Volume unit. When this parameter is enabled the supply blower will operate whenever the unit is in the Occupied mode. The choices are USER ENABLED or USER DISABLED.
CONTROL METHOD	This parameter is programmed through the OPTIONS key and identifies the control method being used on a Constant Volume unit. The choices are Staged, Wired Zone Temp or Comm Zone Temp.

TABLE 51 – DEFINITIONS (CONT'D)

MENU ITEM	DEFINITION
COOLING CONTROL OFFSET	This is the control band the unit is trying to maintain. The control band is the Active setpoint +/- the Cooling Control Offset. If the temperature is above this band additional cooling is required, if the temperature is below this band cooling is decreased.
CURRENT OPER MODE	This is the current operating mode of the unit. The display will show Occ Standby, Occ Cooling Low, Occ Cooling High, Occ Heating Low, Occ Heating High, Unocc Standby, Unnocc Cooling Low, Unocc Cooling High, Unocc Heating Low, Unocc Heating High, Morning Warm-up, Comfort Vent Cooling, Comfort Vent Heating, Occupied Cooling, Occupied Heating, Unoccupied Cooling, Unoccupied Heating, Occ Cooling W/O Bypass, Occ Cooling W Bypass, or Underfloor Temp Override.
CURRENT RUN TIME COMP A	This is the amount of time the compressor has been in operation during the current cycle. This is shown for each compressor of every compressor system.
CURRENT RUN TIME COMP B	This is the amount of time the compressor has been in operation during the current cycle. This is shown for each compressor of every compressor system.
DAILY WARM UP TIME	This is the time it takes to bring the Return Air Temperature up to setpoint during Adaptive Morning Warm Up. The Unit Controller uses this value in the calculation of Daily Warm Up Time Day 1.
DAILY WARM UP TIME DAY 1	This is the Morning Warm Up time the Unit Controller recorded during the previous day 1. This value is used to calculate the current Morning Warm initiate time for Adaptive Morning Warm Up.
DAILY WARM UP TIME DAY 2	This is the Morning Warm Up time the Unit Controller recorded during the previous day 2. This value is used to calculate the current Morning Warm initiate time for Adaptive Morning Warm Up.
DAILY WARM UP TIME DAY 3	This is the Morning Warm Up time the Unit Controller recorded during the previous day 3. This value is used to calculate the current Morning Warm initiate time for Adaptive Morning Warm Up.
DAMPER HARDWARE	This parameter is programmed through the OPTIONS key and identifies the type of ventilation system installed in the unit. The choices are None, 2 Position Damper, Standard Dampers, Minimum IAQ, Full IAQ, 1/3-2/3 IAQ.
DEW POINT RESET	This parameter is programmed through the PROGRAM key. This function changes the Active Supply Air Temperature to a lower value when the air beneath the floor of a FlexSys unit approaches the dew point temperature of the air. The choices are USER ENABLED or USER DISABLED.
DISPLAY LANGUAGE	This parameter is programmed through the OPTIONS key. This allows the user to select the language the Unit Controller will use to display the information at the User Interface. The choices are English or Spanish.
DISPLAY UNITS	This parameter is programmed through the OPTIONS key. This allows the user to select which unit of measure the Unit Controller will use to display the information at the User Interface. The choices are Imperial, metric.
DUCT PRESS TRANSDUCER SPAN	This parameter is programmed through the SETPOINTS key. This allows the use of three different duct pressure control ranges, 0 to1.00 in-wg, 0 to 2.50 in-wg, or 0 to 5.00 in-wg.
DUCT STATIC OVER PRESSURE	This parameter is programmed through the SETPOINTS key. This sets the maximum allowable Duct Static value before the Unit Controller lockouts the unit on an over pressure fault.
DUCT STATIC PRESS ACTIVE SP	This is the current Duct Static setpoint that the Unit Controller is trying to maintain.
DUCT STATIC PRESS CURRENT	This is the actual duct static pressure value.
DUCT STATIC RESET LOW SETP	This parameter is programmed through the SETPOINTS key. This is the minimum Duct Static Control point.
DUCT STATIC RESET HIGH SETP	This parameter is programmed through the SETPOINTS key. This is the maximum Duct Static Control point.
ECONOMIZER CONTROL OUTPUT	This is the analog output from the Unit Controller to the Economizer Damper Actuator.

TABLE 51 – DEFINITIONS (CONT'D)

MENU ITEM	DEFINITION
ECONO INSTALLED	This parameter is programmed through the PROGRAM key and tells the Unit Controller what type of economizer is installed, None, Dry Bulb, Single Enthalpy, Dual Enthalpy.
ECONO METHOD ACTIVE	This value indicates which of the available economizer methods the Unit Controller is using.
ECONO METHOD TO USE	This parameter is programmed through the PROGRAM key and tells the Unit Controller which of the available economizer options to use. The choices are Dry Bulb, Single Enthalpy, Dual Enthalpy, or Best Available.
ECONO OUTPUT FOR FAN START	This parameter is set through the SETPOINTS key and identifies the position of the economizer damper required to turn ON the exhaust fan in an ON/OFF DAMPER CTRL.
ECONO OUTPUT FOR FAN STOP	This parameter is set through the SETPOINTS key and identifies the position of the economizer damper required to turn OFF the exhaust fan in an ON/OFF DAMPER CTRL option.
ECONO SYS STATUS	This is the active status of the economizer system, display will show Normal- Active, Normal-Inactive, Faulted, User Disabled; or None.
ELEC HEAT CAPACITY	This parameter is programmed through the OPTIONS key. This parameter is used to identify the electric heat capacity installed in the unit. The options are 40 KW, 80 KW, 40 KW-200, 80 KW-200, 100 KW, 100 KW-200, 108 KW, 120 KW, 150 KW, 160 KW, 200 KW, 240 KW, or 250 KW.
EVAP LEAVING AIR TEMP HIGH	This parameter is programmed through the SETPOINTS key. This becomes the Active Supply Air Temperature setpoint for a FlexSys unit when it is in the Occupied Cooling With Bypass mode.
EVAP LEAVING AIR TEMP LOW	This parameter is programmed through the SETPOINTS key. This becomes the Active Supply Air Temperature setpoint for a FlexSys unit when it is in the Dew Point Reset mode.
EXHAUST DAMPER POSITION/VFD	This identifies the percentage output from the Unit Controller to the Exhaust Damper or Exhaust Fan when controlled by the unit or BAS (when exhaust Control BAS is enabled).
EXHAUST FAN OUTPUT	This identifies the Unit Controller is sending a Binary output to energize the exhaust fan circuit.
EXHAUST FAN STATUS	This verifies a Binary input to the Unit Controller is present when the exhaust fan is operating.
EXHAUST OUTPUT FOR FAN START	This parameter is set through the SETPOINTS key and identifies the position of the exhaust damper required to turn ON the exhaust fan in an ON/OFF PRESS CNTRL option.
EXHAUST OUTPUT FOR FAN STOP	This parameter is set through the SETPOINTS key and identifies the position of the exhaust damper required to turn OFF the exhaust fan in an ON/OFF PRESS CNTRL option.
EXHAUST/RETURN FAN VFD	This is a derived value that indicates the output, in percent, to the Return Fan VFD.
EXHAUST SYS STATUS	This is the active status of the exhaust system. The display will show Normal-Active, Normal-Inactive, Faulted, User Disabled, or None.
EXHAUST/RETURN FAN VFD	This identifies speed output in percentage that is being sent to the exhaust or return fan VFD.
FAN SPEED SETP FOR HIGH SAT	This parameter is programmed through the SETPOINTS key. When the supply fan speed is equal to or less than this value the Active Supply Air Temperature setpoint on a Variable Air Volume Unit will be set to the SAT setpoint High Limit.
FAN SPEED SETP FOR LOW SAT	This parameter is programmed through the SETPOINTS key. When the supply fan speed is equal to or greater than this value the Active Supply Air Temperature setpoint on a Variable Air Volume Unit will be set to the SAT setpoint Low Limit.
FILTER STATUS	This is status of the unit filters. A differential pressure switch must be installed to measure the pressure drop across the filters. When the filters are dirty the switch closes sending a Binary signal to the Unit Controller. The User Interface display will show Okay or Change.
FLEX EVAP TEMP ACTIVE SP	This is the active evaporator temperature setpoint that the Unit Controller is trying to control to. This value is used when a FlexSys unit is in the Occupied Cooling With Bypass mode.
FLEX EVAP TEMP CURRENT	This is the actual air temperature leaving the evaporator coil of a FlexSys unit.

TABLE 51 – DEFINITIONS (CONT'D)

MENU ITEM	DEFINITION
FURNACE 1 MODE	This is the current status of the first heat exchanger section of a staged gas heat unit. The User Interface will display Off, Purge, Ignition, On-Low, On-High, Safety Trip, Safety Fault, Safety Lockout, or Fault- I/O.
FURNACE 1A MODE	This is the current status of the modulating section of the modulating gas heat furnace. The User Interface will display Off, Purge, Ignition, On-Low, On-High, Safety Trip, Safety Fault, Safety Lockout, or Fault- I/O.
FURNACE 1B MODE	This is the current status of the non-modulating section of the modulating gas heat furnace. The User Interface will display Off, Purge, Ignition, On, Safety Trip, Safety Fault, Safety Lockout, or Fault- I/O.
FURNACE 2 MODE	This is the current status of the second heat exchanger section of a staged gas heat unit. The User Interface will display Off, Purge, Ignition, On-Low, On-High, Safety Trip, Safety Fault, Safety Lockout, or Fault- I/O.
FURNACE 3 MODE	This is the current status of the third heat exchanger section of a staged gas heat unit. The User Interface will display Off, Purge, Ignition, On-Low, On-High, Safety Trip, Safety Fault, Safety Lockout, or Fault- I/O.
GAS HEAT CAPACITY	This parameter is programmed through the OPTIONS key. This parameter is used to identify the gas heat capacity installed in the unit. The options are 375 MBH, 750 MBH, or 1125 MBH.
HEAT ENTERING TEMP	This is the temperature of the supply air entering the staged heat section. This value is used to initiate and terminate Supply Air Tempering when Staged Heat is installed.
HEAT LIMIT TEMPERATURE	This parameter is programmed through the SETPOINTS key. This value determines the maximum allowable Supply Air Temperature when heating is installed. If the temperature goes above this setting the heat section will be shut down.
HEATING CONTROL OFFSET	This is the control band the unit is trying to maintain. The control band is the Active setpoint +/- the Heating Control Offset. If the temperature is below this band, additional heating is required, if the temperature is above this band heating is decreased.
HEATING SAT	This parameter is programmed through the SETPOINTS key. On a VAV or FlexSys unit this becomes the Active Supply Air Temperature setpoint for heating operation. The Unit Controller controls the heating option to try and maintain this temperature.
HEATING SYS STATUS	This is the current operating mode of the Heating Section. The display will show Normal - Active, Normal - Inactive, Safety Trip, Safety Fault, Safety Lockout, User Disabled, or None.
HEATING SYSTEM TYPE	This parameter is programmed through the OPTIONS key. This parameter is used to identify the type of heat installed in the unit. The options are None, Electric, Stage Gas, Modulating Gas, Hot Water / Steam.
HW / STEAM FRZ STAT	This is the status of the hydronic heat freezestat. This is done through a Binary input to the Unit Controller. The switch is open for normal operation and closed on failure. The User Interface will indicate OK or FAULTED.
HW / STEAM HEAT - VALVE POS	This is the output from the Unit Controller to the hydronic valve as percent open.
HW VALVE ACTION	This parameter is programmed through the PROGRAM key. This parameter controls the output to the hydronic modulating valve. When the parameter is set to DIRECT the output is 0 volts for off and 10 volts for full capacity. When the parameter is set to REVERSE the output is 10 volts for off and 0 volts for full capacity.
IAQ DMPR AIR FLOWS OA FLOW 1	This is the airflow through a Minimum, Full, or the 1/3 section of a 1/3 - 2/3 IAQ.
MAXIMUM BYPASS	This parameter is programmed through the SETPOINTS key. It establishes the maximum allowable position of the bypass damper in a FlexSys unit.
MECH CLG LOCKOUT TEMP	This parameter is programmed through the SETPOINTS key. When the outdoor temperature is equal to or less than this temperature, the Unit Controller will prevent the compressors from operating.
MINIMUM OA FLOW SETPOINT	This parameter is programmed through the SETPOINTS key. When air measurement stations are installed and the unit is not in the Occupied mode, this is the minimum allowable airflow.

TABLE 51 – DEFINITIONS (CONT'D)

MENU ITEM	DEFINITION
MX SUPPLY AIR TEMP	This parameter is programmed through the SETPOINTS key. This becomes the Active Supply Air Temperature setpoint for a FlexSys unit when it is in the Occupied Cooling Without Bypass mode.
FURNACE 1A MODE APRX RATE	This is the approximate firing rate of the modulating gas heat section in MBH.
FURNACE 1A MODE RELATIVE	This is the output from the Unit Controller to the modulating gas heat section in percent of full capacity.
MORNING WARM UP	This parameter is programmed through the PROGRAM key. This tells the Unit Controller if the Morning Warmup option is available or not. When it is programmed to USER ENABLED, Morning Warm Up is available to be used. When it is programmed to USER DISABLED, Morning Warm Up is unavailable.
MORNING WARM UP MAX TIME	This parameter is programmed through the SETPOINTS key. This value is the maximum time the Unit Controller will allow for Morning Warm Up when the unit is in the Adaptive Morning Warm Up mode. If the derived Morning Warm Up Opt Time exceed this time the Morning Warm Up Max Time will be used.
MORNING WARM UP OPT TIME	This is the average of the previous three days Warm Up times plus 10 minutes. This value will be used to determine the Morning Warm Up start time for the next day when the unit is in the Adaptive Morning Warm Up mode.
NIGHT SET BACK	This parameter is programmed through the PROGRAM key. This parameter allows the user to enable or disable Night Set Back. If this parameter is disabled Unoccupied Heating will not be available. The two parameters to choose from are USER ENABLED or USER DISABLED.
OA DAMPER MAXIMUM POSITION	This parameter is programmed through the SETPOINTS key. This establishes the maximum amount of ventilation air to be used in a Demand Ventilation situation.
OA DAMPER MINIMUM POSITION	This parameter is programmed through the SETPOINTS key. This establishes the minimum amount of ventilation air to be used when the unit is in the Occupied mode.
OA DAMPER POSITION ACTIVE SP	This is the damper position setpoint, in percent open, the Unit Controller is trying to maintain.
OA DAMPER POSITION CURRENT	This is the actual output, in percent open to the outdoor air damper.
OUTSIDE AIR ENTHALPY	This indicates the total heat content of the outdoor air.
OUTSIDE AIR HUMIDITY	This is the outdoor air relative humidity.
OUTSIDE AIR TEMP	This is the outdoor air dry bulb temperature.
OAT SETPOINT FOR HIGH SAT	This parameter is programmed through the SETPOINTS key. When the outdoor temperature is equal to or less than this temperature the Active Supply Air Temperature setpoint on a Variable Air Volume Unit will be set to the SAT HIGH SETPOINT.
OAT SETPOINT FOR LOW SAT	This parameter is programmed through the SETPOINTS key. When the outdoor temperature is equal to or greater than this temperature the Active Supply Air Temperature setpoint on a Variable Air Volume Unit will be set to the SAT LOW SETPOINT.
OUTSIDE AIR ENTHALPY SETPOINT	This parameter is programmed through the SETPOINTS key and is the upper limit of outdoor enthalpy that can be used for economizer operation. If the outdoor air enthalpy is above this value, the economizer is made inactive.
OUTSIDE AIR FLOW ACTIVE SP	This is the airflow setpoint that the Unit Controller is trying to maintain.
OUTSIDE AIR FLOW TOTAL	This is the same as OA Flow 1 for a Minimum or Full IAQ and is the sum of the OA Flow 1 and OA Flow 2 for a 1/3 - 2/3 IAQ.
OUTSIDE AIR MAXIMUM FLOW	This parameter is programmed through the SETPOINTS key. When air measurement stations are installed and the unit is in the Demand Ventilation mode, this is the maximum allowable airflow value.
OUTSIDE AIR MINIMUM FLOW	This parameter is programmed through the SETPOINTS key. When air measurement stations are installed and the unit is in the Demand Ventilation mode, this is the minimum airflow value.

TABLE 51 – DEFINITIONS (CONT'D)

MENU ITEM	DEFINITION
POWER EXHAUST TYPE	This parameter is programmed through the OPTIONS key and tells the Unit Controller what type of Exhaust is installed. The choices are None, On-Off Damper Cntrl, On-Off Press Cntrl, Modulate Damper VFD, Return Fan W/Exh, or Return Fan W/O Exh.
PRESS TRANS PKG	This parameter is programmed through the OPTIONS key. This identifies to the Unit Controller which of the compressor systems are configured with suction and discharge pressure transducers. The options are None, Sys 1; Sys 1, 2; or Sys 1, 2 and 3.
PRESSURE DISCHARGE*	This is the discharge pressure and is shown for each compressor system if pressure transducers are installed and configured for the system.
PRESSURE SUCTION*	This is the suction pressure and is shown for each compressor system if pressure transducers are installed and configured for the system.
PUMPDOWN	This parameter is programmed through the PROGRAM key. If Pumpdown is USER ENABLED at the end of the compressor system cycle the solenoid value to the expansion vales will close and the compressor will continue to operate for 30 seconds or until the low pressure cutout opens. This removes the refrigerant from the low side of the system. The choices are USER ENABLED or USER DISABLED. If Pumpdown is ENABLED all compressor system will use Pumpdown.
RETURN AIR ENTHALPY	This is the total heat content of the return air.
RETURN AIR HUMIDITY	This is the return air relative humidity.
RETURN AIR TEMP	This is the return air dry bulb temperature.
RETURN AIR TEMP CURRENT	This is the temperature of the return air entering the unit.
RAT HEATING SETPOINT	On a VAV or FlexSys unit, the Unit Controller monitors the RAT HEATING SETPOINT. When the return air temperature is 0.5º F below this value the control switches into the Occupied Heating mode.
RAT COOLING SETPOINT	On a VAV or FlexSys unit, the Unit Controller monitors the RAT COOLING SETPOINT. When the return air temperature is 0.5º F above this value the control switches into the Occupied Cooling mode.
RAT SETPOINT FOR HIGH SAT	This parameter is programmed through the SETPOINTS key. When the Return Air Temperature is equal to or LESS than this temperature the Active Supply Air Temperature setpoint on a Variable Air Volume Unit will be set to the SAT HIGH SETPOINT.
RAT SETPOINT FOR LOW SAT	This parameter is programmed through the SETPOINTS key. When the Return Air Temperature is equal to or greater than this temperature the Active Supply Air Temperature setpoint on a Variable Air Volume Unit will be set to the SAT LOW SETPOINT.
READY TO RUN COMP A	This means the minimum OFF time has been achieved and all the safety circuits are closed and compressor A of the system is ready to be energized. The User Interface will display either YES or NO.
READY TO RUN COMP B	This means the minimum OFF time has been achieved and all the safety circuits are closed and compressor B of the system is ready to be energized. The User Interface will display either YES or NO.
READY TO STOP COMP A	This means the minimum ON time has been achieved and compressor A of the system is ready to be de-energized. The User Interface will display either YES or NO.
READY TO STOP COMP B	This means the minimum ON time has been achieved and compressor B of the system is ready to be de-energized. The User Interface will display either YES or NO.
REFRIGERANT TYPE	This parameter is programmed through the OPTIONS key and identifies the type of refrigerant in the unit. The choice is R-410A.
RETURN AIR BYPASS ACTIVE SP	This is the position of the bypass damper by percent open the Unit Controller uses as the bypass setpoint on a FlexSys unit.
RETURN AIR BYPASS CURRENT	This is the position of the by-pass damper by percent open the Unit Controller uses as the Active Bypass percent setpoint on a FlexSys unit.
RETURN FAN PRESSURE ACTIVE SP	This is the current mixed air chamber pressure that the Unit Controller is trying to maintain.

* May be 1, 2, or 3

TABLE 51 – DEFINITIONS (CONT'D)

MENU ITEM	DEFINITION
RETURN FAN PRESS CURRENT	This is the actual pressure in the mixed air chamber of the unit.
RETURN FAN OUTPUT	This is the Binary output from the Unit Controller to the Return Fan control system.
RETURN FAN STATUS	This is a Binary input into the Unit Controller that identifies the Return Fan is functioning.
SAFETY INPUT LPCO	This is the Binary input to the Unit Controller from the Low Pressure Cutout safety circuit. ON means the safety circuit is normal and FAULTED means it has faulted. This parameter will be shown for each compressor system.
SAFETY INPUT CHAIN	This is the Binary input to the Unit Controller from the Compressor Safety Circuit Chain. This includes the high pressure cutout, compressor motor protector, and the external overload or circuit breaker. ON means the safety circuit is normal and FAULTED means it has faulted. This parameter will be shown for each compressor system.
SAT RESET METHOD	This parameter is programmed through the OPTIONS key and identifies the Supply Air Temperature reset method being used on a Variable Air Volume Unit. The choices are Hardwired, Outside Air, Return Air, or Supply Fan Speed.
SAT HIGH SETPOINT	This parameter is programmed through the SETPOINTS key. This establishes the maximum Active Supply Air Temperature to be used in a Variable Air Volume Unit.
SAT LOW SETPOINT	This parameter is programmed through the SETPOINTS key. This establishes the minimum Active Supply Air Temperature to be used in a Variable Air Volume Unit.
SENSOR / MISC STATUS	This is the current status of the Sensors. The display will show Normal, Warning, Safety Trip, Safety Fault, or Safety Lockout.
SINGLE ZONE MINIMUM VAV SPEED	This parameter provides the minimum speed of the Supple Fan during SZVAV operation.
SMOKE PURGE SEQ 1	This parameter is programmed through the OPTIONS key. This allows the user to select which of the three smoke purge sequences to use a sequence 1, Purge, Pressurization, or Evacuation. Smoke Purge Sequence 1 is energized through a Binary input to the Unit Controller.
SMOKE PURGE SEQ 2	This parameter is programmed through the OPTIONS key. This allows the user to select which of the three smoke purge sequences to use a sequence 2, Purge, Pressurization, or Evacuation. Smoke Purge Sequence 2 is energized through a Binary input to the Unit Controller.
SMOKE PURGE SEQ 3	This parameter is programmed through the OPTIONS key. This allows the user to select which of the three smoke purge sequences to use a sequence 3, Purge, Pressurization, or Evacuation. Smoke Purge Sequence 3 is energized through a Binary input to the Unit Controller.
1ST STAGE COOLING SETPOINT	This parameter is programmed through the SETPOINTS key. This value is used in a Constant Volumn unit as the Active SAT Setpoint for 1st Stage cooling operation.
1ST STAGE HEATING SETPOINT	This parameter is programmed through the SETPOINTS key. This value is used in a Constant Volumn unit as the Active SAT Setpoint for 1st Stage heating operation.
2ND STAGE 2 COOLING SETPOINT	This parameter is programmed through the SETPOINTS key. This value is used in a Constant Volumn unit as the Active SAT Setpoint for 2nd Stage cooling operation.
2ND STAGE 2 HEATING SETPOINT	This parameter is programmed through the SETPOINTS key. This value is used in a Constant Volumn unit as the Active SAT Setpoint for 2nd Stage heating operation.
STAGED HEAT STATUS STGS ON	This identifies the number of stages of gas or electric heat that the Unit Controller has energized.
STAGED HEAT STATUS STGS AVAIL	This identifies the number of stages of gas or electric heat that are available.
SUCTION TEMP	This is the temperature of the suction line leaving the evaporator coil and will be shown for each system. This value is monitored and used to prevent liquid refrigerant from being returned to the compressor.
SUP AIR TEMPERING	This parameter is programmed through the PROGRAM key. This parameter is used to allow the heat to operate when the unit is in the Occupied Standby Mode to temper the ventilation air entering the space. The choices are USER ENABLED or USER DISABLED.

TABLE 51 – DEFINITIONS (CONT'D)

MENU ITEM	DEFINITION
SUPPLY AIR TEMP ACTIVE SP	This is the Supply Air Temperature the Unit Controller is trying to maintain.
SUPPLY AIR TEMP CURRENT	This is the current Supply Air Temperature supplied by the unit.
SUPPLY FAN OUTPUT	This is the Binary output from the Unit Controller to the Supply Fan control system.
SUPPLY FAN OUTPUT PROOF	This is a Binary input into the Unit Controller that identifies the Supply Fan is functioning.
SUPPLY FAN VFD SPEED	This indicates the output, in percent, to the SUPPLY FAN VFD.
SUPPLY SYS STATUS	This is the active status of the Supply System, display will show Normal- Active; Normal-Inactive; Safety Trip, Safety Fault, or Safety Lockout.
SYSTEM UNLOADING PRESSURE	This parameter is programmed through the SETPOINTS key. If two compressors of the system are operative and the discharge pressure is equal to or greater than this value the Unit Controller will turn off one of the compressors. This feature is only operative when a discharge pressure transducer is installed in the compressor system.
TEMPERATURE SUPERHEAT	This is calculated for each compressor system that has a suction line pressure transducer installed and configured. This is the refrigerant evaporator superheat leaving the evaporator coil.
UNDERFLOOR AIR HUMIDITY	This is the humidity level under the floor of a FlexSys installation.
UNDERFLOOR AIR TEMP	This is the temperature of the air in the underfloor space.
UNDERFLOOR SLAB DEW POINT	This is the dewpoint of the air beneath the floor of a FlexSys installation.
UNDERFLOOR SLAB TEMP	This is the temperature of the slab beneath the floor of a FlexSys installation.
UNIT INSTALLED ALTITUDE	This parameter is programmed through the SETPOINTS key. This is the altitude at which the unit is installed. This is used in the calculation of an airflow correction factory when air measuring stations are installed.
UNIT SIZE	This parameter is programmed through the OPTIONS key and identifies the size of the unit. The choices are 120 Ton or 130 Ton.
UNIT TYPE	This parameter is programmed through the OPTIONS key and identifies the type of unit. The choices are Constant Volume, Variable Volume, or FlexSys.
UNIT-OVERALL STATUS	This is the active status of the Unit. The display will show Local Stop, Run, Unit Trip, Unit Fault, Unit Lockout, SMK Purge # - Press, SMK Purge #-Purge, or Smk Purge #-Evac.
VENT SYS STATUS	This is the active status of the Ventilation System. The display will show Normal- Active, Normal-Inactive, Safety Trip, Safety Fault, Safety Lockout, User Disabled, or None.
VENTILATION CONTROL	This parameter is programmed through the OPTIONS key and identifies whether the unit will operate with a Fixed Minimum or Demand ventilation system.
VENTILATION DEMAND	This is the output in percent to the outside air damper when the unit is operating in the Demand Ventilation Mode.
ZONE TEMP OCC ZONE COOLING SETPOINT	This parameter is programmed using the SETPOINTS key. This is the temperature that the Unit Controller compares the actual space temperature to, to decide when to switch into the Occupied Cooling Mode.
ZONE TEMP OCC ZONE HEATING SETPOINT	This parameter is programmed using the SETPOINTS key. This is the temperature that the Unit Controller compares the actual space temperature to, to decide when to switch into the Occupied Heating Mode.
ZONE TEMP UNOCC ZONE COOLING SETPOINT	This parameter is programmed using the SETPOINTS key. This is the temperature that the Unit Controller compares the actual space temperature to, to decide when to switch into the Unoccupied Cooling Mode.
ZONE TEMP UNOCC ZONE HEATING SETPOINT	This parameter is programmed using the SETPOINTS key. This is the temperature that the Unit Controller compares the actual space temperature to, to decide when to switch into the Unoccupied Heating Mode.
ZONE TEMP CURRENT	This is the temperature in the conditioned space.

SECTION 8 – SERVICE

ANALOG INPUT OPERATION

This section describes the control operation of the 29 analog inputs. These inputs are used by the control to monitor and respond to unit temperatures, pressures, enthalpy, etc. The location of each of these connections on the Unit Controller is contained in *Table 47 on page 124*. Notice that the ID gives the jack connection designated as "J" and then the identifying number of the connector, followed by a – and then the pin number of the connector. For example the SUPPLY AIR TEMPERATURE analog input would be found at J1-1. This is connector J1 – Pin 1. As the Unit Control board is positioned in the control box the top row of the J series connectors is the input, the middle row is the common, and the bottom row is the 5VDC input to the sensor. Also the pin in the right hand top corner is pin 1.

Temperature Sensors

The temperature sensors are all 10K Type III Thermistors. The relationship between the temperature and the voltage output and resistance is contained in *Table 52 on page 179*. The following analog inputs are of this type: Supply Air Temperature, Heat Entering Temp, Flex Evap Temp, Outside Air Temp, Return Air Temp, Suction Temp #1, Suction Temp #2, Suction Temp #3, Zone Temp, and Under Floor Temp.

Duct Pressure Transducer

The Duct Pressure Transducer is located in the return air section of the unit. The purpose of the transducer is to sense and convert the static pressure in the supply-side of the duct to a 0 to 5VDC signal. The DC voltage is sent to the Unit Controller and compared against the "DUCT STATIC PRESS ACTIVE SP". The transducer is factory wired, but pneumatic tubing must be field supplied and installed (refer to *SECTION 2 – INSTALLATION*). The duct static pressure transducer measures differential pressure between the pressure in the duct and atmospheric pressure. When verifying transducer operation, the technician must insert a tee in the pneumatic tubing and connect a manometer to the tee to verify the pressure being applied to the transducer. Once this pressure is known, a comparison can be made of the duct pressure vs. output VDC from the transducer. *Table 53 on page 180* shows the relationship between the pressure applied to the duct pressure transducer and the output voltage. The output is linear between 0" WC and the SPAN. The "DUCT PRESS TRANSDUCER SPAN" can be set to 1.25, 2.5 or 5" WC.

TABLE 52 - TEMPERATURE SENSOR RESISTANCE

°F	VOLTAGE	RESISTANCE	°C
-25	0.49	139,639	-30.6
-20	0.53	127,453	-28.9
-15	0.60	109,624	-26.1
-10	0.69	94,519	-23.34
-5	0.78	81,665	-20.55
0.0	0.88	70,750	-17.78
5	0.98	61,418	-15.00
10	1.10	53,426	-12.22
15	1.22	46,582	-9.44
20	1.35	40,703	-6.67
25	1.48	35,639	-3.89
30	1.62	31,269	-1.11
35	1.77	27,490	1.67
40	1.91	24,219	4.44
45	2.06	21,377	7.22
50	2.21	18,900	10.00
55	2.36	16,744	12.78
60	2.51	14,681	15.56
65	2.66	13,216	18.33
70	2.80	11,771	21.11
75	2.94	10,502	23.89
80	3.08	9,388	26.67
85	3.21	8,404	29.45
90	3.33	7,537	32.22
95	3.45	6,770	35.0
100	3.56	6,090	37.78
105	3.66	5,487	40.56
110	3.76	4,951	43.34
115	3.85	4,475	46.11
120	3.94	4,050	48.89
125	4.02	3,671	51.66
130	4.09	3,332	54.44
135	4.16	3,029	57.22

TABLE 53 - BUILDING PRESSURE TRANSDUCER OUTPUT

DIFFERENTIAL INPUT PRESSURE - " WC	OUPTUT VOLTAGE - VDC
-0.50	0.00
-0.40	0.50
-0.30	1.00
-0.20	1.50
-0.10	2.00
0.00	2.50
0.10	3.00
0.20	3.50
0.30	4.00
0.40	4.50
0.50	5.00

Building Pressure Transducer

The Building Pressure Transducer is located in the return air section of the unit. The purpose of the transducer is to sense and convert the static pressure in the building to a 0 to 5VDC signal. The DC voltage is then sent to the Unit Controller and compared against the "BUILDING PRESSURE ACTIVE SETPOINT". The transducer is factory wired, but pneumatic tubing must be field supplied and installed (refer to *SECTION 2 – INSTALLATION*). The Building Pressure Transducer measures differential pressure in the building and atmospheric pressure. When verifying transducer operation, the technician can insert a tee into the pneumatic tubing and connect a manometer to the tee to verify the pressure being applied to the transducer. Once this pressure is known, a comparison can be made of the building pressure vs. output VDC from the transducer. A practical and quick check of this transducer can also be accomplished by removing the pneumatic tubing lines from both the low and high side connections on the transducer. Since both of the inputs will now be exposed to the same pressure, the differential pressure will be zero, and the output 2.5VDC according to *Table 53 on page 180*.

TABLE 54 - DUCT PRESSURE TRANSDUCER

1.25" WC SPAN DIFFERENTIAL INPUT PRESS	2.5" WC SPAN DIFFERENTIAL INPUT PRESS	5.0" WC SPAN DIFFERENTIAL INPUT PRESS	VOLTAGE VDC
0.125	0.25	0.5	0.50
0.25	0.50	1.0	1.00
0.375	0.75	1.50	1.50
0.50	1.00	2.00	2.00
0.625	1.25	2.50	2.50
0.75	1.50	3.00	3.00
0.875	1.75	3.50	3.50
1.00	2.00	4.00	4.00
1.125	2.25	4.50	4.50
1.25	2.50	5.00	5.00

Return Fan Pressure Transducer

If the unit is order with the Return Fan Option the unit will have a Return Fan Pressure Transducer. The transducer is mounted in the return compartment and compares the pressure in the return air compartment to atmospheric pressure. The Unit Controller varies the speed of the Return Fan in order to maintain the correct differential pressure in the return compartment. When verifying transducer operation, the technician can insert a tee into the pneumatic tubing and connect a manometer to the tee to verify the pressure being applied to the transducer. Once this pressure is known, a comparison can be made of the return compartment pressure vs. output VDC from the transducer. A practical and quick check of this transducer can also be accomplished by removing the pneumatic tubing lines from both the low and high side connections on the transducer. Since both of the inputs will now be exposed to the same pressure, the differential pressure will be zero, and the output 2.5VDC according to *Table 55 on page 181*.

TABLE 55 - RETURN FAN PRESSURE TRANSDUCER OUTPUT

DIFFERENTIAL INPUT PRESSURE - " WC	OUPTUT VOLTAGE - VDC
-1.00	0.00
-0.80	0.50
-0.60	1.00
-0.40	1.50
-0.20	2.00
0.00	2.50
0.20	3.00
0.40	3.50
0.60	4.00
0.80	4.50
1.00	5.00

Discharge Pressure Transducer

The discharge Pressure Transducer is located in the common discharge line of the tandem compressors for each refrigerant circuit. The purpose of this transducer is to sense and convert the discharge pressure into a DC voltage. The DC voltage is then sent to the Unit Controller where it is used to control the number of condenser fan when the unit is in cooling operation. The discharge pressure value, in PSIG, is displayed by the User Interface.

The Discharge Transducer has a range of 0 to 650 PSIG, with a linear output of 0 to 5 DC volts. *Table 56 on page 181* illustrates the DC volt output from the transducer for a given discharge pressure.

Suction Pressure Transducer

The optional suction pressure transducer is located in the common suction line of the tandem compressors for each refrigerant circuit. The purpose of the transducer is to sense and convert the suction pressure to a DC voltage. The DC voltage is then sent to the Unit Controller where it is displayed by the User Interface. When this option is installed the Unit Controller will also calculate and display the Evaporator Superheat value for the system.

The Suction Transducer has a range of 0 to 0 - 400 PSIG, with a linear output of 0 to 5VDC. *Table 56 on page 181* illustrates the DC volt output from the transducer for a given suction pressure.

TABLE 56 - PRESSURE TRANSDUCERS

SUCTION TRANSDUCER		DISCHARGE TRANSDUCER	
PRESSURE PSIG R-410A	VOLTAGE VDC	PRESSURE PSIG R-410A	VOLTAGE VDC
0	0.50	0	0.50
50	1.00	81	1.00
100	1.50	162	1.50
150	2.00	244	2.00
200	2.50	325	2.50
250	3.00	406	3.00
300	3.50	488	3.50
350	4.00	569	4.00
400	4.50	650	4.50

Humidity Sensors

The humidity sensor outputs a 0 to 5VDC in response to the relative humidity sensed. An outdoor air humidity sensor is used whenever the economizer is configured for single or dual enthalpy. A return air humidity sensor is used whenever the economizer is configured for dual enthalpy. A humidity sensor is also used to monitor the humidity in the space between the slab and raised floor system used for FlexSys applications. *Table 57 on page 182* gives the relationship between the voltage output of the humidity sensor and the % relative humidity.

TABLE 57 - HUMIDITY SENSOR OUTPUTS

% RELATIVE HUMIDITY	OUTPUT VOLTAGE VDC	% RELATIVE HUMIDITY	OUTPUT VOLTAGE VDC
5	0.25	55	2.75
10	0.50	60	3.00
15	0.75	65	3.25
20	1.00	70	3.50
25	1.25	75	3.75
30	1.50	80	4.00
35	1.75	85	4.25
40	2.00	90	4.50
45	2.25	95	4.75
50	2.50	100	5.00

CO_2 Sensor

Two CO_2 sensors are used in conjunction with the "DEMAND VENTILATION" option. In "DEMAND VENTILATION" the Unit Control monitors the CO_2 level of the outdoor air and the CO_2 level in the conditioned space and varies the amount of ventilation air based on the relationship between these two values. *Table 58 on page 182* gives the VDC output for a given CO_2 level.

TABLE 58 - CO^2 SENSOR OUTPUT

PPM CO2	OUTPUT VOLTAGE VDC	PPM CO2	OUTPUT VOLTAGE VDC
80	0.20	1120	2.80
160	0.40	1200	3.00
240	0.60	1280	3.20
320	0.80	1360	3.40
400	1.00	1440	3.60
480	1.20	1520	3.80
560	1.40	1600	4.00
640	1.60	1680	4.20
720	1.80	1760	4.40
800	2.00	1840	4.60
880	2.20	1920	4.80
960	2.40	2000	5.00
1040	2.60		

Furnace Status Input

The Unit Controller monitors the operation of the Staged and Modulating Gas Heat sections and displays the status through the STATUS screen of the User Interface. The operation of each of the gas heat sections is monitored by a multiplexer installed in the gas heat section. When a gas heat section is energized, it sends a 24 volt signal to the multiplexer. The multiplexer takes the five ON/OFF inputs and converts them into a 0 to 5VDC signal that is sent to the Unit Controller. The Unit Controller then decodes this analog input and displays the furnace section status. *Tables 59 and 60 on page 183* show the relationship between the DC voltage and the furnace operation status.

TABLE 59 - FURNACE STATUS INPUT MODULATING GAS HEAT

MIN VOLTS DC	MAX VOLTS DC	MODULATING FURNACE 1A STATUS	FURNACE 1A HIGH STATUS	FURNACE 2 STATUS	FURNACE 3 STATUS	FURNACE 1B STATUS
0.086	0.166	OFF	OFF	OFF	OFF	OFF
0.224	0.313	ON	OFF	OFF	OFF	OFF
0.361	0.461	OFF	ON	OFF	OFF	OFF
0.499	0.609	ON	ON	OFF	OFF	OFF
0.637	0.756	OFF	OFF	ON	OFF	OFF
0.774	0.904	ON	OFF	ON	OFF	OFF
0.912	1.051	OFF	ON	ON	OFF	OFF
1.050	1.199	ON	ON	ON	OFF	OFF
1.187	1.346	OFF	OFF	OFF	ON	OFF
1.325	1.494	ON	OFF	OFF	ON	OFF
1.463	1.641	OFF	ON	OFF	ON	OFF
1.600	1.789	ON	ON	OFF	ON	OFF
1.738	1.936	OFF	OFF	ON	ON	OFF
1.876	2.084	ON	OFF	ON	ON	OFF
2.013	2.231	OFF	ON	ON	ON	OFF
2.151	2.379	ON	ON	ON	ON	OFF
2.289	2.526	OFF	OFF	OFF	OFF	ON
2.426	2.674	ON	OFF	OFF	OFF	ON
2.564	2.821	OFF	ON	OFF	OFF	ON
2.702	2.969	ON	ON	OFF	OFF	ON
2.839	3.116	OFF	OFF	ON	OFF	ON
2.977	3.264	ON	OFF	ON	OFF	ON
3.115	3.411	OFF	ON	ON	OFF	ON
3.252	3.559	ON	ON	ON	OFF	ON
3.390	3.706	OFF	OFF	OFF	ON	ON
3.528	3.854	ON	OFF	OFF	ON	ON
3.665	4.001	OFF	ON	OFF	ON	ON
3.803	4.149	ON	ON	OFF	ON	ON
3.941	4.296	OFF	OFF	ON	ON	ON
4.078	4.444	ON	OFF	ON	ON	ON
4.216	4.592	OFF	ON	ON	ON	ON
4.354	4.739	ON	ON	ON	ON	ON

TABLE 60 - FURNACE STATUS INPUT STAGED GAS HEAT

MIN VOLTS DC	MAX VOLTS DC	FURNACE 1 STATUS	FURNACE 2 STATUS	FURNACE 3 STATUS
0.086	0.166	OFF	OFF	OFF
0.224	0.313	ON	OFF	OFF
0.361	0.461	OFF	ON	OFF
0.499	0.609	ON	ON	OFF
0.637	0.756	OFF	OFF	ON
0.774	0.904	ON	OFF	ON
0.912	1.051	OFF	ON	ON
1.050	1.199	ON	ON	ON

FAULTS

A fault is defined as an abnormal condition, which results in the shutdown of an operating system or the complete unit. The presence of a fault condition indicates a situation in which possible damage to the unit may occur if the unit or system were allowed to continue to operate. There are four types of faults.

Unit Lockout – The complete unit is shutdown and locked out. A manual reset is required to restart the unit after the fault has been corrected.

System Lockout – One of the compressor systems or other component is shutdown and locked out. A manual reset is required to restart the system after the fault has been corrected.

Unit Auto Reset – The complete unit is shutdown but the unit will restart automatically when the fault condition is cleared.

System Auto Reset – One of the compressor systems or other component is shut down but the system or component will restart automatically when the fault condition is cleared.

A UNIT LOCKOUT can be reset by turning the “LOCAL STOP” switch off for 5 seconds and then back on. If the cause of the lockout has been corrected the unit will reset and begin proper operation.

A SYSTEM LOCKOUT except for COMPR # LOCKOUT and COMPR # LPCO SAFETY LOCKOUT can be reset by turning the “LOCAL STOP” switch OFF for 5 seconds and then back ON. A COMPR # LOCKOUT and COMPR # LPCO SAFETY LOCKOUT must be reset by entering the OPTIONS key and the COMPRESSOR SYSTEMS # subsection, which has the lockout. Then use the up and down arrow key to go to COMP SYS # STATUS. The current status will be LOCKOUT. Press the ✓ key and use the right arrow key to change LOCKOUT to RUN.

In addition to faults the User Interface will also display warnings. A warning is defined as an abnormal condition under which the unit continues to operate. Warnings will not require the unit to shut down; however, they may require the Unit Controller to disable certain functions that may result in the unit operating less efficiently or eliminate certain features.

Table 62 on page 190 lists the faults / warnings that will be displayed under the STATUS and HISTORY keys of the User Interface. When a fault is present line two of the effected STATUS screen display (UNIT-OVERALL STATUS, COMPRESSOR SYSTEM 1, COMPRESSOR SYSTEM 2, COMPRESSOR SYSTEM 3, HEATING SYSTEM, ECONOMIZER SYSTEM, SUPPLY SYSTEM, EXHAUST SYSTEM, VENTILATION SYSTEM, or SENSOR / MISC STATUS) will change nomenclature to indicate a WARNING, SAFETY TRIP, SAFETY FAULT, or SAFETY LOCKOUT is present. A fault / warning description, method of reset and conditions under which the information is displayed is also contained in the table. Additional information for each of the faults is contained under their respective part of SECTION 5 - SEQUENCE OF OPERATION located in this IOM.

When a fault is declared, the Unit Controller will record the time of occurrence, the date of occurrence, and a complete unit snapshot at the time of each occurrence in the HISTORY buffer. This data can be retrieved using the HISTORY key of the User Interface.

The HISTORY buffer stores the data from the last ten faults from the most recent (HISTORY 01) to the oldest (HISTORY 10). No fault HISTORY is eliminated once recorded other than being “pushed off” of the end of the list by a new fault when the buffer becomes full.

Warnings are only displayed in the HISTORY buffer while they are active. When the problem that generated the WARNING is corrected the record is removed from the buffer. The Unit Controller does not record the time of occurrence, the date of occurrence, or a complete unit snapshot at the time of occurrence for a WARNING.

The HISTORY buffer is password protected and a level 2 password must be entered in order to view the data.

When the HISTORY key is pressed, the password prompt will appear. After the proper level 2 password has been entered the screen will show the first active warning. If there are no active warnings present, the first fault will be displayed. If there are no faults in the HISTORY buffer, the screen will display "NO FAULT". See *SECTION 6 – USER INTERFACE CONTROL CENTER* for additional information on how to navigate through the HISTORY menu.

In addition to the items listed in *Table 63 on page 192*, the following items listed below are contained under the HISTORY key.

"COMPRESSOR SYSTEM (1,2,OR 3) CLEAR" - Whenever there is a compressor safety trip the Unit Controller initiates the "COMPR STATUS CLEAR TIME (1,2, OR 3)" timer. The Unit Control records the time it takes for the trip to clear. When the fault clears "COMPRESSOR SYSTEM (1,2,OR 3) CLEAR" shows the time it took for the fault to clear in the HISTORY buffer.

"COMPRESSOR SYSTEM (1,2,OR 3)TIME OUT" – If the "COMPR STATUS CLEAR TIME (1,2, OR 3)" timer reaches 60 minutes a "COMPRESSOR SYSTEM (1,2,OR 3)TIME OUT" will be indicated in the HISTORY buffer. In most cases this indicates the compressor circuit over current protector opened. The compressor circuit over current protector is a manual reset device and the circuit would not reset in the required 60 minute time frame. The STATUS key will display the message "COMP SYS (1,2,OR 3) STATUS" "SAFETY LOCKOUT". The Unit Controller locks out the corresponding compressor system when a "COMPRESSOR SYSTEM (1,2,OR 3)TIME OUT" is declared.

"COMPR SYSTEM (1,2,OR 3) INHIBIT" – This WARNING indicates the compressor system safety circuit experienced a trip but reset prior to the exploration of the 60 minute reset time function. If the safety circuit does not reset in 60 minutes it will be replaced with a "COMPRESSOR SYSTEM (1,2,OR 3)TIME OUT" message.

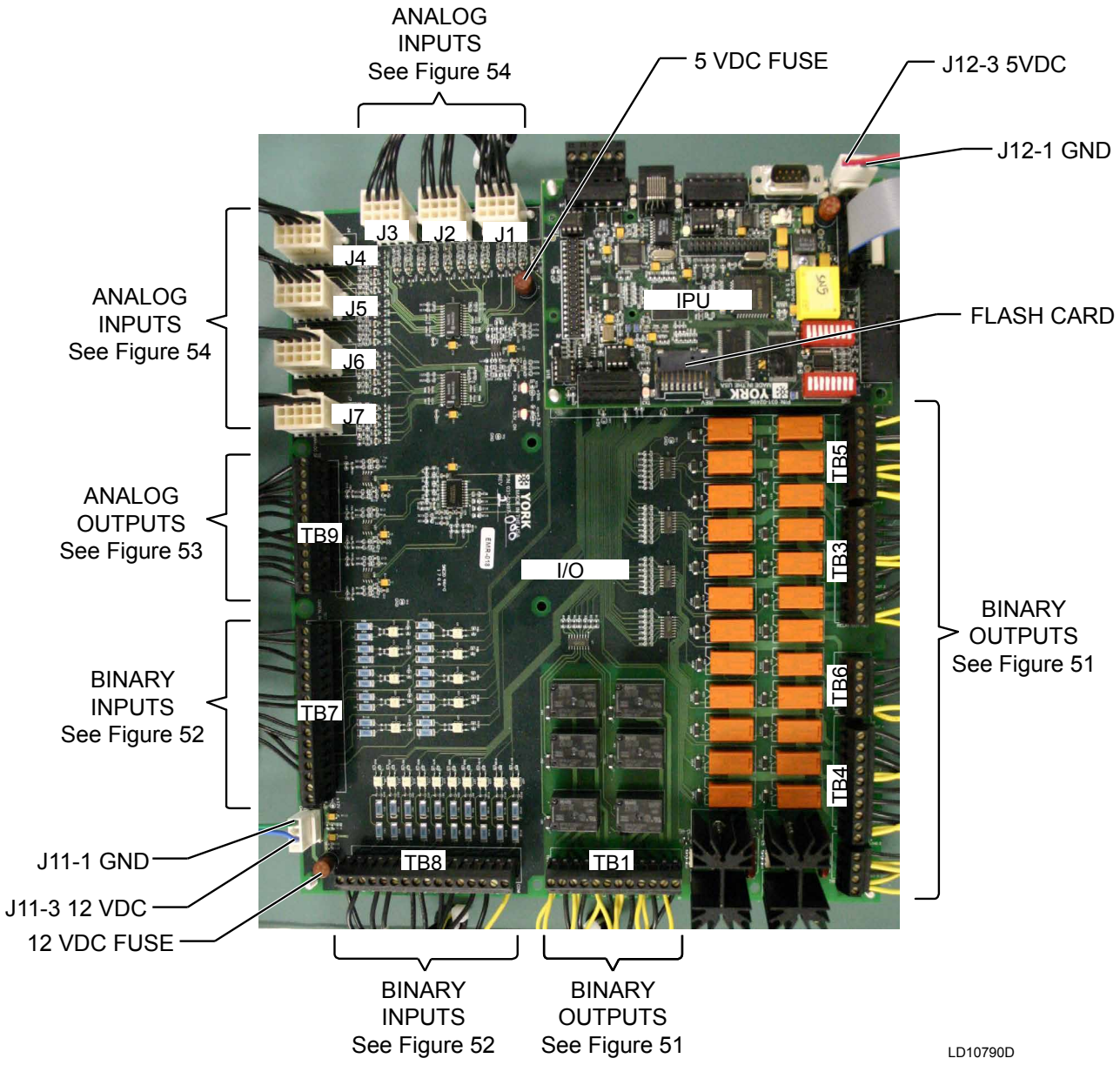


FIGURE 50 - I/O CONTROL BOARD

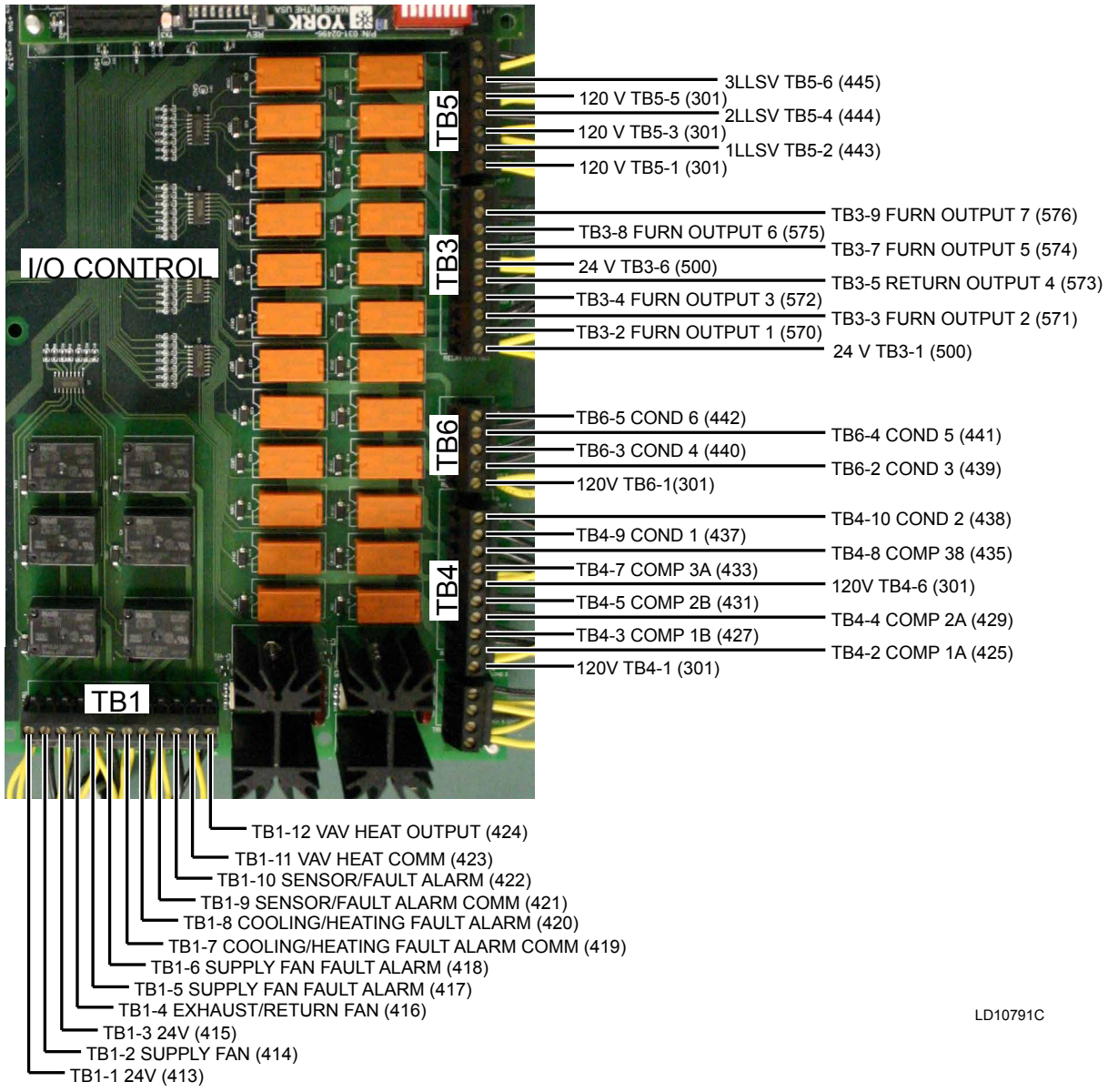


FIGURE 51 - I/O CONTROL BOARD - BINARY OUTPUTS

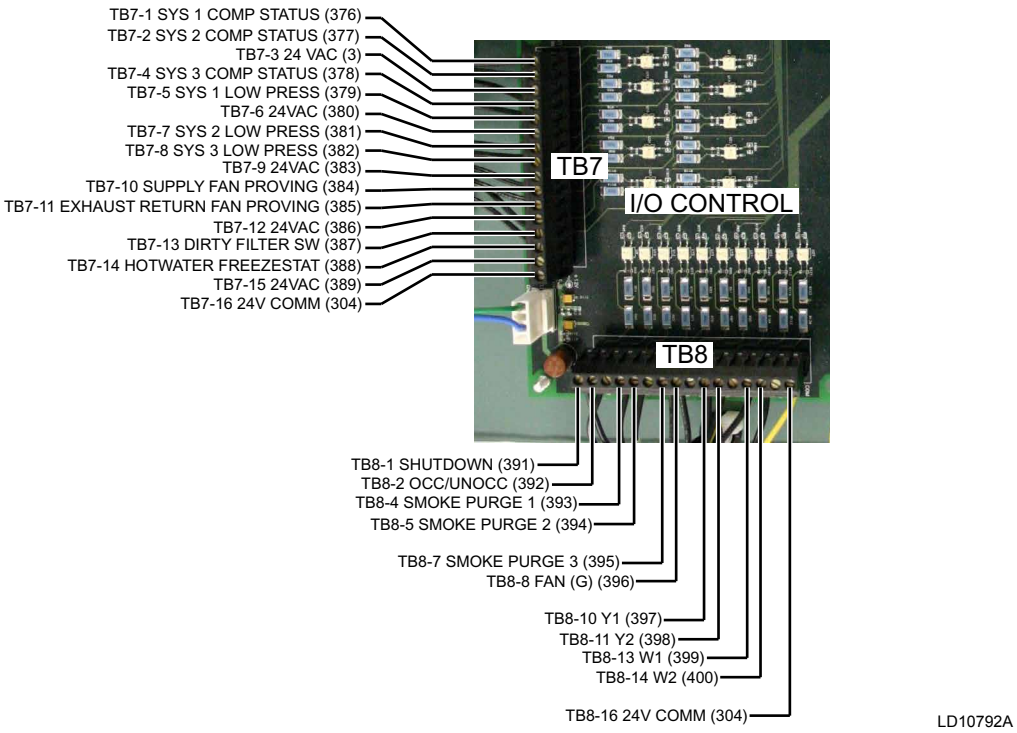


FIGURE 52 - I/O CONTROL BOARD - BINARY INPUTS

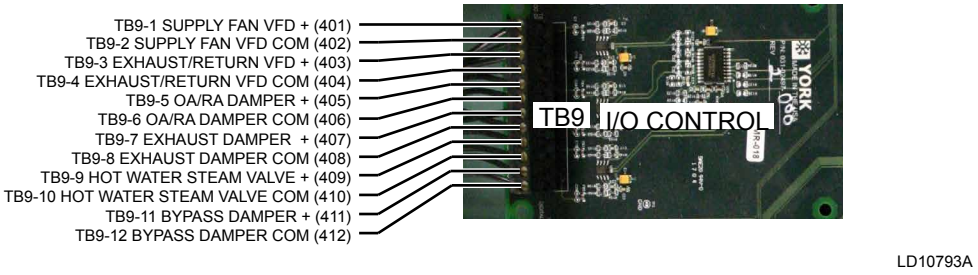
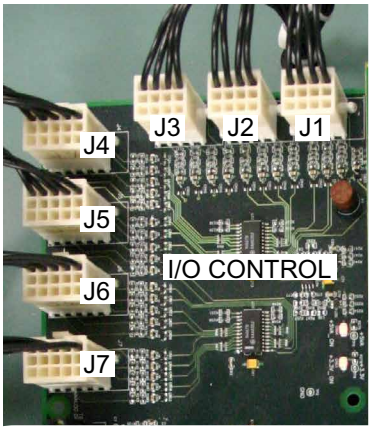


FIGURE 53 - I/O CONTROL BOARD - ANALOG OUTPUTS

5	4	3	2	1
10	9	8	7	6
15	14	13	12	11

J4, J5, J6, J7 PINOUTS



4	3	2	1
8	7	6	5
12	11	10	9

J1, J2, J3 PINOUTS

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FIGURE 54 - I/O CONTROL BOARD - ANALOG INPUTS (SEE *TABLE 61 ON PAGE 189* FOR PIN OUTS)

TABLE 61 - I/O CONTROL BOARD - ANALOG INPUT PIN OUTS

PIN NO.	SIGNAL
J1-1	INPUT SUPPLY AIR TEMP (308)
J1-5	SHIELD SUPPLY AIR TEMP
J1-9	REF SUPPLY AIR TEMP 5VDC (309)
J1-2	INPUT HEAT ENTER TEMP (310)
J1-6	SHIELD HEAT ENTER TEMP
J1-10	REF HEAT ENTER TEMP 5VDC (311)
J1-3	INPUT FLEX EVAP TEMP (312)
J1-7	SHIELD FLEX EVAP TEMP
J1-11	REF FLEX EVAP TEMP 5VDC (313)
	OR (SEE NOTES)
J1-3	INPUT EVAP AIR TEMP (312)
J1-7	SHIELD EVAP AIR TEMP
J1-11	REF EVAP AIR TEMP 5 VDC (313)
J2-1	INPUT OA TEMP (314)
J2-5	SHIELD OA TEMP
J2-9	REF OA TEMP 5VDC (315)
J2-2	INPUT RA TEMP (316)
J2-6	SHIELD RA TEMP
J2-10	REF RA TEMP 5VDC (317)
J2-3	INPUT OA HUM (318)
J2-7	COM OA HUM (319)
J2-4	INPUT RA HUM (320)
J2-8	COM RA HUM (321)
J3-1	INPUT SUCT TEMP SYS1 (322)
J3-5	SHIELD SUCT TEMP SYS1
J3-9	REF SUCT TEMP SYS1 5VDC (323)
J3-2	INPUT SUCT TEMP SYS2 (324)
J3-6	SHIELD SUCT TEMP SYS2
J3-10	REF SUCT TEMP SYS2 5VDC (325)
J3-3	INPUT SUCT TEMP SYS3 (326)
J3-7	SHIELD SUCT TEMP SYS3
J3-11	REF SUCT TEMP SYS3 5VDC (327)
J3-4	INPUT SUCT PRESS SYS1 (328)
J3-8	COM SUCT PRESS SYS1 (329)
J3-12	REF SUCT PRESS SYS1 5VDC (330)
J4-1	INPUT SUCT PRESS SYS2 (331)
J4-6	COM SUCT PRESS SYS2 (332)
J4-11	REF SUCT PRESS SYS2 5VDC (333)
J4-2	INPUT SUCT PRESS SYS3 (334)
J4-7	COM SUCT PRESS SYS3 (335)
J4-12	REF SUCT PRESS SYS3 5VDC (336)

PIN NO.	SIGNAL
J4-3	INPUT DISCH PRESS SYS1 (337)
J4-8	COM DISCH PRESS SYS1 (338)
J4-13	REF DISCH PRESS SYS1 5VDC (339)
J4-4	INPUT DISCH PRESS SYS2 (340)
J4-9	COM DISCH PRESS SYS2 (341)
J4-14	REF DISCH PRESS SYS2 5VDC (342)
J4-5	INPUT DISCH PRESS SYS3 (343)
J4-10	COM DISCH PRESS SYS3 (344)
J4-15	REF DISCH PRESS SYS3 5VDC (345)
J5-1	INPUT GAS HEAT STATUS (542)
J5-6	COM GAS HEAT STATUS (543)
J5-11	REF GAS HEAT STATUS 5VDC (541)
J5-2	INPUT OA CO2 (348)
J5-7	COM OA CO2 (349)
J5-3	INPUT RA CO2 (350)
J5-8	COM RA CO2 (351)
J6-1	INPUT RETURN FAN PRESS (352)
J6-6	COM RETURN FAN PRESS (353)
J6-2	INPUT DUCT PRESS (354)
J6-7	COM DUCT PRESS (355)
J6-3	INPUT BLDG PRESS (356)
J6-8	COM BLDG PRESS (357)
J6-4	INPUT OA AIR PRESS 1 (358)
J6-9	COM OA AIR PRESS 1 (359)
J6-5	INPUT OA AIR PRESS 2 (360)
J6-10	COM OA AIR PRESS 2 (361)
J7-1	INPUT ZONE TEMP SENSOR (363)
J7-6	SHIELD ZONE TEMP SENSOR (364)
J7-11	REF ZONE TEMP SENSOR 5VDC (362)
J7-2	INPUT FLEXSYS SLAB SENSOR (366)
J7-7	SHIELD FLEXSYS SLAB SENSOR (367)
J7-12	REF FLEXSYS SLAB SENSOR 5VDC (365)
J7-3	INPUT FLEXSYS UNDER FLOOR HUM (368)
J7-8	COM FLEXSYS UNDER FLOOR HUM (369)
	OR (SEE NOTES)
J7-3	INPUT SUPPLY AIR HUMIDITY (368)
J7-8	COM SUPPLY AIR HUMIDITY (369)
J7-4	INPUT SAT RESET (371)
J7-9	COM SAT RESET (372)
J7-14	REF SAT RESET 5VDC (370)
J7-5	INPUT DUCT STATIC RESET (374)
J7-10	COM DUCT STATIC RESET (375)
J7-15	REF DUCT STATIC RESET 5VDC (373)

Notes: Flex Evap Temp And Flexsys Underfloor Humidity Are For Flexsys Units Only. Evap Air Temp And Sa Humidity Are For Cv And Vav Units If Hot Gas Reheat Is Installed.

TABLE 62 - WARNING DESCRIPTION TABLE

HISTORY SCREEN WORDING	DESCRIPTION	RESET	SHOW WHEN UNIT TYPE IS	STATUS SCREEN WORDING	FAULT OUTPUT TYPE
WRN-BUILDING PRS	BUILDING STATIC PRESmore than 0.45 INWC OR less than -0.45 INWC FOR 10 SECONDS. POWER EXHAUST REVERTS TO NONE OR ON/OFF.	AUTO RESET	POWER EXHAUST OTHER THAN NONE OR ON - OFF DAMPER	EXHAUST SYS STATUS WARNING	SENSOR/ MISC FAULT
WRN-CO2 SENSOR 1 OUTSIDE	OUTSIDE CO_2 SENSOR OUT OF RANGE FOR more than or equal to 15 MINUTES.	AUTO RESET	VENTILATION CONTROL EQUALS DEMAND	VENTILATION SYS STATUS WARNING	SENSOR/ MISC FAULT
WRN-CO2 SENSOR 2 INSIDE	OUTSIDE CO_2 SENSOR OUT OF RANGE FOR more than or equal to 15 MINUTES.	AUTO RESET	VENTILATION CONTROL EQUALS DEMAND	VENTILATION SYS STATUS WARNING	SENSOR/ MISC FAULT
WRN-COMPR SYSTEM * INHIBIT	SEE DESCRIPTION AT THE END OF THE TABLE.	AUTO RESET			COOLING HEATING FAULT
WRN-DIRTY FILTER 1	THE FILTER STATUS INPUT IS CLOSED FOR more than or equal to 1 MINUTE.	AUTO RESET	DIRTY FILTER SWITCH IS INSTALLED	FILTER STATUS CHANGE	SENSOR/ MISC FAULT
WRN-DISCHARGE PRS SENSOR *	THE DISCHARGE PRESURE FOR THAT SYSTEM IS OUT OF RANGE FOR more than or equal to 10 SECONDS.	AUTO RESET	PRESS TRANS PKG IS ON FOR THE SYSTEM	SENSOR/ MISC STATUS WARNING	SENSOR/ MISC FAULT
WRN-DUCT PRS XDCR	SUPPLY FAN OUTPUT ON, SUPPLY FAN STATUS MUST BE RUNNING FOR 5 MINUTES, STATIC PRESS CURRENT less than or equal to (0.333 X DUCT STATIC PRESS ACTIVE SP) FOR 30 SECONDS.	AUTO RESET	UNIT TYPE IS VAV OR FLEXSYS	SUPPLY SYS STATUS WARNING	FAN FAULT
WRN-EXHAUST FAN	THE EXHAUST FAN OUTPUT IS ON FOR 45 SECONDS AND THE RUN VERIFICATION INPUT IS LOW (OPEN) FOR 10 SECONDS.	AUTO RESET	POWER EXHAUST OTHER THEN NONE	EXHAUST SYSTEM STATUS WARNING	SENSOR/ MISC FAULT
WRN-FREEZESTAT TRIP	THE HW/STEAM FREEZSTAT CIRCUIT GOES HIGH (CLOSED) BUT GOES LOW (OPEN) WITHIN 5 MINUTES.	AUTO RESET	HEATING SYSTEM TYPE EQUALS HOT WATER STEAM	SENSOR/ MISC STATUS WARNING	COOLING HEATING FAULT
WRN-FURNACE MULTIPLEXER FAULT	ON MODULATING GAS THE HEAT BINARY OUTPUTS DO NOT MATCH THE GAS FURANCE STATUS INPUT. SEE *TABLE 59 ON PAGE 183* OR NO FURNACE STATUS INPUT ON STAGED GAS.	AUTO RESET	HEATING SYSTEM TYPE EQUALS MODULATING GAS OR STAGED GAS	SENSOR/ MISC STATUS WARNING	COOLING HEATING FAULT
WRN-GAS FURNACE	THE HEAT BINARY OUTPUTS DO NOT MATCH THE GAS FURANCE STATUS INPUT. SEE TABLE *TABLE 60 ON PAGE 183*.	AUTO RESET	HEATING SYSTEM TYPE EQUALS STAGED GAS		COOLING HEATING FAULT
WRN-HET SENSOR	THE HEAT ENTERING SENSOR IS OUT OF RANGE FOR more than or equal to 10 SECONDS.	AUTO RESET	HEATING SYSTEM TYPE IS STAGED GAS OR ELECTRIC	SENSOR/ MISC STATUS WARNING	SENSOR/ MISC FAULT
WRN-HIGH DP UNLOAD *#	BOTH COMPRESSOR ARE ON FOR THE SYSTEM AND THE DISCHARGE PRESS IS more than or equal to THE SYSTEM UNLOADING PRESSURE FOR 10 SECONDS.	AUTO RESET	PRESS TRANS PKG IS ON FOR THE SYSTEM	SENSOR/ MISC STATUS WARNING	SENSOR/ MISC FAULT
WRN-LOW AMBIENT TEMP *	THE OUTDOOR TEMP IS less than or equal TO THE MECH COOL LOCKOUT TEMP.	AUTO RESET	LOW AMBIENT PKG IS NOT INSTALLED FOR THE SYSTEM	COMP SYS * STATUS LOW AMB INHIBIT	SENSOR/ MISC FAULT

TABLE 62 - WARNING DESCRIPTION TABLE (CONT'D)

HISTORY SCREEN WORDING	DESCRIPTION	RESET	SHOW WHEN UNIT TYPE IS	STATUS SCREEN WORDING	FAULT OUTPUT TYPE
WRN-LOW SUCTION TEMP *#	THE SUCTION TEMP IS LEES THAN THE SUCTION TEMP LOW LIMIT FOR 10 CONTINUOUS SECONDS.	AUTO RESET		COMP SYS * STATUS SUCTION TEMP UNL # ON	SENSOR/ MISC FAULT
WRN-OA FLOW PRS 1	REFER TO AIR MEASUREMENT STATION SENSOR FAULTS IN *SECTION 5 – SEQUENCE OF OPERATION*	LOCKS OUT THE AIR MEASURING STATION	DAMPER HARDWARE IS MINIMUM IAQ, FULL IAQ, 1/3-2/3 IAQ, TEK AIR FULL IAQ	SENSOR/ MISC STATUS WARNING	SENSOR/ MISC FAULT
WRN-OA FLOW PRS 2	REFER TO AIR MEASUREMENT STATION SENSOR FAULTS IN *SECTION 5 – SEQUENCE OF OPERATION*	LOCKS OUT THE AIR MEASURING STATION	DAMPER HARDWARE IS 1/3 - 2/3 IAQ	SENSOR/ MISC STATUS WARNING	SENSOR/ MISC FAULT
WRN-OUTSIDE AIR RH	OUTSIDE AIR TEMP more than or equal to 32 F FOR 10 SECONDS OUTDOOR AIR HUMIDITY less than 5% FOR 10 SECONDS.	AUTO RESET	ECONO INSTALLED SINGLE ENTHALPY OR DUAL ENTHALPY	SENSOR/ MISC STATUS WARNING	SENSOR/ MISC FAULT
WRN-RETURN AIR RH	RETURN AIR TEMP more than or equal to 32 F FOR 10 SECONDS. RETURN AIR HUMIDITY less than 5% FOR 10 SECONDS.	AUTO RESET	ECONO INSTALLED DUAL ENTHALPY	SENSOR/ MISC STATUS WARNING	SENSOR/ MISC FAULT
WRN-RETURN FAN XDCR	SUPPLY FAN OUTPUT IS ON AND RETURN FAN PRESS CURRENT less than -0.95 INWC OR more than 0.95 INWC FOR 30 SECONDS OR SUPPLY FAN OUTPUT IS OFF AND RETURN FAN PRESSURE CURRENT less than -0.1 INWC OR more than 0.1 INWC FOR 5 MINUTES.	AUTO RESET	POWER EXHAUST TYPE IS RETURN FAN W/EXH OR RETURN FAN W/O EXH	SUPPLY SYS STATUS WARNING	FAN FAULT
WRN-SLAB TEMP SENSOR	UDERFLOOR SLAB TEMP SENSOR IS OUT OF RANGE FOR more than or equal to10 SECONDS.	AUTO RESET	UNIT TYPE IS FLEXSYS AND DEW POINT RESET IS USER ENABLED	SENSOR/ MISC STATUS WARNING	SENSOR/ MISC FAULT
WRN-SUCTION PRS SENSOR *	SUCTION PRESSURE OUT OF RANGE FOR more than or equal to 10 SECONDS.	AUTO RESET	PRESS TRANS PKG IS ON FOR THE SYSTEM	SENSOR/ MISC STATUS WARNING	SENSOR/ MISC FAULT
WRN-SUCTION TEMP SENSOR * #	SUCTION TEMPERATURE SENSOR IS OUT OF RANGE FOR more than or equal to 10 SECONDS.	AUTO RESET		SENSOR/ MISC STATUS WARNING	SENSOR/ MISC FAULT
WRN-UNDER FLOOR RH SENSOR	UDERFLOOR AIR HUMIDITY IS less than5% FOR more than or equal to 5 MINUTES.	AUTO RESET	UNIT TYPE IS FLEXSYS AND DEW POINT RESET IS USER ENABLED	SENSOR/ MISC STATUS WARNING	SENSOR/ MISC FAULT

* CAN BE 1, 2, OR 3 # CAN BE A OR B

TABLE 63 - FAULT AUTO - RESET

HISTORY SCREEN WORDING	DESCRIPTION	RESET	HOW WHEN UNIT TYPE IS	STATUS SCREEN WORDING	FAULT OUTPUT TYPE
AUTO RESET-COMPRESSOR SYSTEM * CLEAR	SEE DESCRIPTION BELOW	AUTO RESET			
AUTO RESET-COMPRESS SYSTEM * TRIP 1	THE SAFETY INPUT CHAIN IS OPEN (FAULTED) FOR MORE THEN TWO SECONDS WITH EITHER OR BOTH COMPRESSOR OF THE SYSTEM ON AND THIS IS THE FIRST TRIP IN A 120 MINUTE SPAN.	AUTO RESET		COMP SYSTEM * STATUS SAFVETY TRIP	COOLING HEATING FAULT
AUTO RESET COMPRESSOR SYSTEM * TRIP 2	THE SAFETY INPUT CHAIN IS OPEN (FAULTED) FOR MORE THEN TWO SECONDS WITH EITHER OR BOTH COMPRESSOR OF THE SYSTEM ON AND THIS IS THE SECOND TRIP IN A 120 MINUTE SPAN.	AUTO RESET		COMP SYSTEM * STATUS SAFETY TRIP	COOLING HEATING FAULT
AUTO RESET-LOW SUCTION TEMP	EITHER IS COMPRESSOR ON AND THE TEMPERATURE - SUCTION IS Less than OR EQUAL TO THE SUCTION LOW LIMIT FOR 10 CONTINUOUS SECONDS AND AFTER THE COMPRESSOR WAS TURNED OFF THE TEMPERATURE DID NOT RISE ABOVE THE LIMIT.	AUTO RESET		COMP SYSTEM * STATUS SAFETY FAULT	SENSOR/ MISC FAULT
AUTO RESET-LPCO * TRIP 1	THE LOW PRESSURE CUTOUT INPUT CHAIN IS OPEN (FAULTED) FOR MORE THEN TWO SECONDS WITH EITHER OR BOTH COMPRESSOR OF THE SYSTEM ON AND THIS IS THE FIRST TRIP IN A 120 MINUTE SPAN.	AUTO RESET		COMP SYSTEM * STATUS SAFVETY TRIP	COOLING HEATING FAULT
AUTO RESET-LPCO * TRIP 2	THE LOW PRESSURE CUTOUT INPUT CHAIN IS OPEN (FAULTED) FOR MORE THEN TWO SECONDS WITH EITHER OR BOTH COMPRESSOR OF THE SYSTEM ON AND THIS IS THE SECOND TRIP IN A 120 MINUTE SPAN.	AUTO RESET		COMP SYSTEM * STATUS SAFVETY TRIP	COOLING HEATING FAULT
AUTO RESET - MSAT SENSOR	MS SUPPLY AIR TEMP CURRENT SENSOR IS OUT OF RANGE FOR more than or equal to 10 SECONDS.	AUTO RESET	UNIT TYPE IS FLEXSYS	SENSOR/ MISC STATUS SAFETY LOCKOUT	SENSOR/ MISC FAULT
AUTO RESET - POWER FAIL	POWER IS LOST WHEN THE UNIT OPERATING STATE IS RUN.	AUTO RESET			
AUTO RESET - RAT SENSOR	RETURN AIR TEMP CURRENT SENSOR IS OUT OF RANGE FOR more than or equal to 10 SECONDS.	AUTO RESET		SENSOR/ MISC STATUS SAFETY FAULT	SENSOR/ MISC FAULT
AUTO RESET - REMOTE I/O COMM	NO COMMUNICATION FROM THE I/O BOARD FOR more than or equal to 5 SECONDS.	AUTO RESET			SENSOR/ MISC FAULT
AUTO RESET - STAGED INPUT	THE CONTROL HAS A COOLING AND HEATING THERMOSTAT INPUT AT THE SAME TIME FOR A PERIOD Greater than 10 SECONDS.	AUTO RESET		SENSOR/ MISC STATUS SAFETY LOCKOUT	SENSOR/ MISC FAULT

TABLE 63 – FAULT AUTO - RESET (CONT'D)

HISTORY SCREEN WORDING	DESCRIPTION	RESET	HOW WHEN UNIT TYPE IS	STATUS SCREEN WORDING	FAULT OUTPUT TYPE
AUTO RESET - ZONE TEMP SENSOR	ZONE TEMP CURRENT SENSOR IS OUT OF RANGE FOR more than or equal to 10 SECONDS.	AUTO RESET	UNIT TYPE IS VAV AND NIGHT SET BACK IS USER ENABLED OR UNIT TYPE IS SET TO CV AND THE CONTROL METHOD IS SET TO ZONE SENSOR HARDWIRED.	SENSOR/ MISC STATUS SAFETY LOCKOUT	SENSOR/ MISC FAULT

* CAN BE 1, 2, OR 3 # CAN BE A OR B

TABLE 64 - FAULTS LOCKOUT

HISTORY SCREEN WORDING	DESCRIPTION	RESET	SHOW WHEN UNIT TYPE IS	STATUS SCREEN WORDING	FAULT OUTPUT TYPE
LOCKOUT-COMPRESSOR SYSTEM * TIME OUT	SEE “LOCKOUT-COMPRESSOR SYSTEM * TIME OUT” NOTE AT THE END OF THIS TABLE.	SYSTEM LOCKOUT		COMP SYSTEM * - SAFETY LOCKOUT	COOLING HEATING FAULT
LOCKOUT - COMPRESSOR SYSTEM *	HIGH PRESS SW, COMP MOTOR PROTECTOR, OR OVERCURRENT PROTECTOR OPEN - 3 TIMES IN 120 MINUTES ON COMP SYSTEM*.	SYSTEM LOCKOUT		COMP SYSTEM * - SAFETY LOCKOUT	COOLING HEATING FAULT
LOCKOUT-HIGH DUCT PRESSURE	DUCT STATIC PRESS CURRENT .+ DUCT STATIC OVER PRESSURE.	UNIT LOCKOUT	UNIT TYPE IS VAV OR FLEXSYS	SUPPLY SYS STATUS SAFETY LOCKOUT	FAN FAULT
LOCKOUT - HOT WATER FREEZE	THE HYDRONIC FREEZE STAT SWITCH REMAINED CLOSED more than or equal to 5 MINUTES.	UNIT LOCKOUT	HEAT TYPE HOT WATER / STEAM	HEATING SYS STATUS - SAFETY LOCKOUT	COOLING HEATING FAULT
LOCKOUT-LPCO	LOW PRESSURE CUTOUT OPEN - 3 TIMES IN 120 MINUTES ON COMPR SYSTEM*.	SYSTEM LOCKOUT		COMP SYSTEM * - SAFETY LOCKOUT	COOLING HEATING FAULT
LOCKOUT - MANUAL STOP *	THE COMPRESSOR SYSTEM HAS BEEN PLACED IN THE STOP MODE EITHER THROUGH THE USER INTERFACE OR BY A COMMUNICATED INPUT.	SYSTEM LOCKOUT		COMP SYS * STATUS DISABLED	
LOCKOUT - MANUAL UNIT STOP	THE UNIT IS SHUT DOWN THROUGH THE SHUT DOWN SWITCH ON THE UNIT OR BY AN EXTERNAL HARDWIRED OR COMMUNICATED INPUT.	UNIT LOCKOUT		UNIT - OVERALL STATUS LOCAL STOP	

TABLE 64 – FAULTS LOCKOUT (CONT'D)

HISTORY SCREEN WORDING	DESCRIPTION	RESET	SHOW WHEN UNIT TYPE IS	STATUS SCREEN WORDING	FAULT OUTPUT TYPE
LOCKOUT - OAT SENSOR	OUTSIDE AIR TEMP SENSOR IS OUT OF RANGE FOR more than or equal to 10 SECONDS.	UNIT LOCKOUT		COMP SYS * STATUS SAFETY LOCKOUT; ECONO SYS STATUS SAFETY LOCKOUT	SENSOR/ MISC FAULT
LOCKOUT - RETURN FAN	RETURN FAN STATUS IS LOW AND TIME FROM START more than or equal to 30 SEC UNIT LOCKOUT.	UNIT LOCKOUT	POWER EXHAUST TYPE IS RETURN FAN W/EXH OR RETURN FAN W/O EXH AND THE SUPPLY FAN IS ON	UNIT - OVERALL STATUS UNIT LOCKOUT	FAN FAULT
LOCKOUT - SAT SENSOR	SUPPLY AIR TEMP CURRENT SENSOR IS OUT OF RANGE FOR more than or equal to 10 SECONDS.	UNIT LOCKOUT	UNIT TYPE IS CONSTANT VOLUNE OR VARIABLE AIR VOLUME		SENSOR/ MISC FAULT
LOCKOUT-SUPPLY FAN	SUPPLY FAN STATUS IS LOW AND TIME FROM START more than or equal to 30 SEC UNIT LOCKOUT.	UNIT LOCKOUT		UNIT - OVERALL STATUS UNIT LOCKOUT	FAN FAULT

* CAN BE 1, 2, OR 3

*"WRN - COMP SYSTEM * INHIBIT"* - This WARNING indicates the compressor system safety circuit experienced a trip but reset prior to the exploration of the 60 minute reset time function. If the safety circuit does not reset in 60 minutes it will be replaced with a *"LOCKOUT - COMPRESSOR SYSTEM * TIME OUT"* message.

*"AUTO RESET - COMPRESSOR SYSTEM * CLEAR"* - When ever there is a compressor safety trip the Primary Unit Controller initiates the *"COMPR STATUS CLEAR TIME *"* timer. The Primary Unit Control records the time it takes for the trip to clear. When the fault clears *"COMPRESSOR SYSTEM * CLEAR"* shows the time it took for the fault to clear in the HISTORY buffer.

*"LOCKOUT-COMPRESSOR SYSTEM * TIME OUT"* – If the *"COMPR STATUS CLEAR TIME *"* timer reaches 60 minutes a *"LOCKOUT - COMPRESSOR SYSTEM * TIME OUT"* will be indicated in the HISTORY buffer.

TABLE 65 - 150-TON STAGING

STEP	SYSTEM 1 COMPRESSORS		SYSTEM 2 COMPRESSORS		SYSTEM 3 COMPRESSORS		% OF TOTAL CAPACITY
	ONE	BOTH	ONE	BOTH	ONE	BOTH	
1	On	Off	Off	Off	Off	Off	11%
2	Off	Off	On	Off	Off	Off	15%
3	Off	Off	Off	Off	On	Off	24%
4	Off	Off	On	On	Off	Off	30%
5	On	On	On	Off	Off	Off	37%
6	On	On	Off	Off	On	Off	46%
7	On	Off	On	Off	On	Off	50%
8	Off	Off	On	On	On	Off	54%
9	On	Off	Off	Off	On	On	59%
10	Off	Off	On	Off	On	On	63%
11	On	On	Off	Off	On	On	70%
12	Off	Off	On	On	On	On	78%
13	On	Off	On	On	On	On	89%
14	On	On	On	On	On	On	100%

TABLE 66 - 130-TON STAGING

STEP	SYSTEM 1 COMPRESSORS		SYSTEM 2 COMPRESSORS		SYSTEM 3 COMPRESSORS		% OF TOTAL CAPACITY
	ONE	BOTH	ONE	BOTH	ONE	BOTH	
1	On	Off	Off	Off	Off	Off	12%
2	Off	Off	On	Off	Off	Off	18%
3	Off	Off	Off	Off	On	Off	20%
4	On	Off	On	Off	Off	Off	30%
5	On	Off	Off	Off	On	Off	32%
6	On	On	On	Off	Off	Off	42%
7	On	Off	On	Off	On	Off	50%
8	On	On	On	On	Off	Off	59%
9	On	On	On	Off	On	Off	62%
10	On	Off	On	On	On	Off	68%
11	On	Off	On	Off	On	On	70%
12	On	On	On	On	On	Off	80%
13	On	Off	On	On	On	On	88%
14	On	On	On	On	On	On	100%

TABLE 67 - 120-TON STAGING

STEP	SYSTEM 1 COMPRESSORS		SYSTEM 2 COMPRESSORS		SYSTEM 3 COMPRESSORS		% OF TOTAL CAPACITY
	ONE	BOTH	ONE	BOTH	ONE	BOTH	
1	Off	Off	On	Off	Off	Off	14%
2	Off	Off	Off	Off	On	Off	23%
3	Off	Off	On	On	Off	Off	27%
4	Off	Off	On	Off	On	Off	36%
5	On	Off	On	On	Off	Off	41%
6	Off	Off	Off	Off	On	On	45%
7	Off	Off	On	On	On	Off	50%
8	On	On	On	On	Off	Off	55%
9	Off	Off	On	Off	On	On	59%
10	On	Off	On	On	On	Off	64%
11	Off	Off	On	On	On	On	73%
12	On	On	On	On	On	Off	77%
13	On	Off	On	On	On	On	86%
14	On	On	On	On	On	On	100%

MULTI MEDIA CARD

The Unit Controller is made up of two separate control boards, the PLUG IN I/O board and the IPU board. All the digital and analog inputs and outputs are connected to the PLUG IN I/O control. All the system logic is contained on the PLUG IN I/O board. The IPU board mounts on top of the PLUG IN I/O board and handles the communication between the PLUG IN I/O board and the User Interface. Another feature of this control system is the availability to connect a MULTI MEDIA CARD to the IPU board. The MULTI MEDIA CARD allows operational data to be continuously saved and used for the diagnosis of unit operating problems.

A MULTI MEDIA CARD is similar to a hard drive in a PC. It has a directory structure and files are saved on it. The difference between a hard drive and the MULTI MEDIA CARD is that the MULTI MEDIA CARD is made of non-volatile flash memory. This allows the MULTI MEDIA CARD to be removed from the IPU board and placed in a PC for data analysis without the lost of any data.

The MULTI MEDIA CARD is considered a Service tool and as such is controlled through the SERVICE key of the User Interface. Entry into the SERVICE screen requires a Level 2 password.

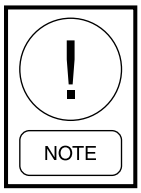
Data is continuously stored to the MULTI MEDIA CARD in root and subdirectories. The root directories are set up by month and year, under each of the root directories are subdirectories for each day. For example the data for January 11, 2005 would be stored in a root directory identified by Rm200501, the year followed by the month. The subdirectory for this day would be identified as 20050111.csv, the year followed by the month, followed by the day. Each of these files contains all the data monitored for the day specified by the file name.

All connected Analog Inputs, Analog Outputs, Digital Inputs, Digital Outputs, Serial Data and Derived Data will be collected. The data will be collected once every 5 seconds and stored in the same order as in the History buffer. Each line of data will be timed and date stamped. Each file will include a header line detailing what data is stored in each column.

The collected data can be analyzed using a PC. The MULTI MEDIA CARD can be inserted into a MULTI MEDIA CARD reader attached to the PC. The data can be analyzed using Excel or another data analysis tool.

To install or remove the MULTI MEDIA CARD from the IPU board “DATA LOG FORMAT” must be set to off. This is done through the SERVICE screen of the User Interface. When the MULTI MEDIA CARD is installed the operation can be programmed to “UNCOMPRESSED” in which case data will be recorded every 5 seconds or “SKIP UNCHANGED” which is the same as “UNCOMPRESSED” except values are only saved when they change.

If an error occurs when writing to the MULTI MEDIA CARD, “DATA LOG ERROR STATE” and “DATA LOG ERROR DETAIL” will appear under the SERVICE screen. “DATA LOG ERROR STATE” indicates what operation failed and “DATA LOG ERROR DETAIL” will give the error code from the operation. *Table 57* gives a description of the “DATA LOG ERROR STATE” and *Table 58* gives a description of the “DATA LOG ERROR DETAIL.”



The SD card cannot exceed 2 MB for data logging or software updates. Not all SD cards are compatible with the IPU system.

TABLE 68 - DATA LOG ERROR STATE

DATA LOG ERROR STATE	AN ERROR OCCURRED WHEN DOING THIS:
1	Mounting the flash card
2	Opening the root directory
3	Reading the root directory
4	Closing the root directory
5	Opening a sub-directory
6	Reading a sub-directory
7	Closing a sub-directory
8	Deleting an old directory
11	Creating a directory
14	Creating a file
15	Open a file
16	Write a file
17	Delete a file
18	Close a file

TABLE 69 - DATA LOG ERROR LOG DETAIL

DATA LOG ERROR DETAIL	THIS ERROR OCCURRED:
1	Not permitted
2	No such entity
3	No such process
4	Operation interrupted
5	I/O error
6	Bad file handle
11	Try again later
12	Out of memory
16	Resource busy
19	No such device
20	Not a directory
21	Is a directory
22	Invalid argument
23	Too many open files in system
27	File too large
28	No space left on device
29	Illegal seek
30	Read-only file system
60	File name too long

TABLE 70 - ACRONYMS

ACRONYM/ ABBREVIATION	DEFINITION
"	SYMBOL FOR INCHES
AMB	AMBIENT
BAS	BUILDING AUTOMATION SYSTEM
BLDG	BUILDING AUTOMATION SYSTEM
BTU	BRITSH THERMAL UNIT
CFM	CUBIC FEET per MINUTE
CFSTGDN	CONDENSER FAN STAGE DOWN
CFSTGUP	CONDENSER FAN STAGE UP
COMM	COMMUNICATION/COMMUNICATED
COMP	COMPRESSOR
CTB	CONTROL TERMINAL BOARD
CV	CONSTANT VOLUME
DAMP	DAMPER
°F	DEGREES FAHRENHEIT
DEHUM	DEHUMIDIFY/DEHUMIDIFICATION
DEWPT	DEW POINT
DP	REFRIGERANT DISCHARGE PRESURE
ECONO	ECONOMIZER
EVAP	EVAPORATOR
G	THERMOSTAT TERMINAL FOR SUPPLY FAN

TABLE 70 - ACRONYMS (CONT'D)

ACRONYM/ ABBREVIATION	DEFINITION
HCO	HEATING CONTROL OFFSET
HGRH	HOT GAS REHEAT
HPCO	HIGH PRESSURE CUT-OUT
HW	HOT WATER
IAQ	INDOOR AIR QUALITY
LPCO	LOW PRESSURE CUT-OUT
MAX	MAXIMUM
MIN	MINIMUM
MOD	MODULATING
MX	MIXED (FOR FLEXSYS-SUPPLY AIR & BYPASSED AIR
OA	OUTSIDE AIR
OAT	OUTSIDE AIR TEMPERATURE
OCC	OCCUPIED
POS	POSITION
PRESS	PRESSURE
PSI	POUNDS per SQUARE INCH
R/W	READ/WRITE
RA	RETURN AIR
RAT	RETURN AIR TEMPERATURE
RH	RELATIVE HUMIDITY
S100	SERIES 100
SA	SUPPLY AIR
SAT	SUPPLY AIR TEMPERATURE
SP	REFRIGERANT SUCTION PRESSURE
SUCT	SUCTION
UNL	UNLOADER/UNLOADING
UNOCC	UNOCCUPIED
VAC	VOLT A/C
VAV	VARIABLE AIR VOLUME
VDC	VOLTS D/C
VFD	VARIABLE FREQUENCY DRIVE
W/	WITH
W/O	WITHOUT
W1	THERMOSTAT TERMINAL FOR 1ST STAGE HEATING
W2	THERMOSTAT TERMINAL FOR 2ND STAGE HEATING
WC	WATER COLUMN
Y1	THERMOSTAT TERMINAL FOR 1ST STAGE COOLING
Y2	THERMOSTAT TERMINAL FOR 2ND STAGE COOLING

The following factors can be used to convert from English to the most common SI Metric values.

TABLE 71 - SI METRIC CONVERSION

MEASUREMENT	MULTIPLY ENGLISH UNIT	BY FACTOR	TO OBTAIN METRIC UNIT
Capacity	Tons Refrigerant Effect (ton)	3.516	Kilowatts (kW)
Power	Horsepower	0.7457	Kilowatts (kW)
Flow Rate	Gallons / Minute (gpm)	0.0631	Liters / Second (l/s)
Length	Feet (ft)	0.3048	Meters (m)
	Inches (in)	25.4	Millimeters (mm)
Weight	Pounds (lbs)	0.4538	Kilograms (kg)
Velocity	Feet / Second (fps)	0.3048	Meters / Second (m/s)
Pressure Drop	Feet of Water (ft)	2.989	Kilopascals (kPa)
	Pounds / Square Inch (psi)	6.895	Kilopascals (kPa)

TEMPERATURE

To convert degrees Fahrenheit (°F) to degrees Celsius (°C), subtract 32° and multiply by 5/9 or 0.5556.

Example: (45.0°F - 32°) x 0.5556 = 7.22°C

To convert a temperature range (i.e., a range of 10°F) from Fahrenheit to Celsius, multiply by 5/9 or 0.5556.

Example: 10.0°F range x 0.5556 = 5.6 °C range

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