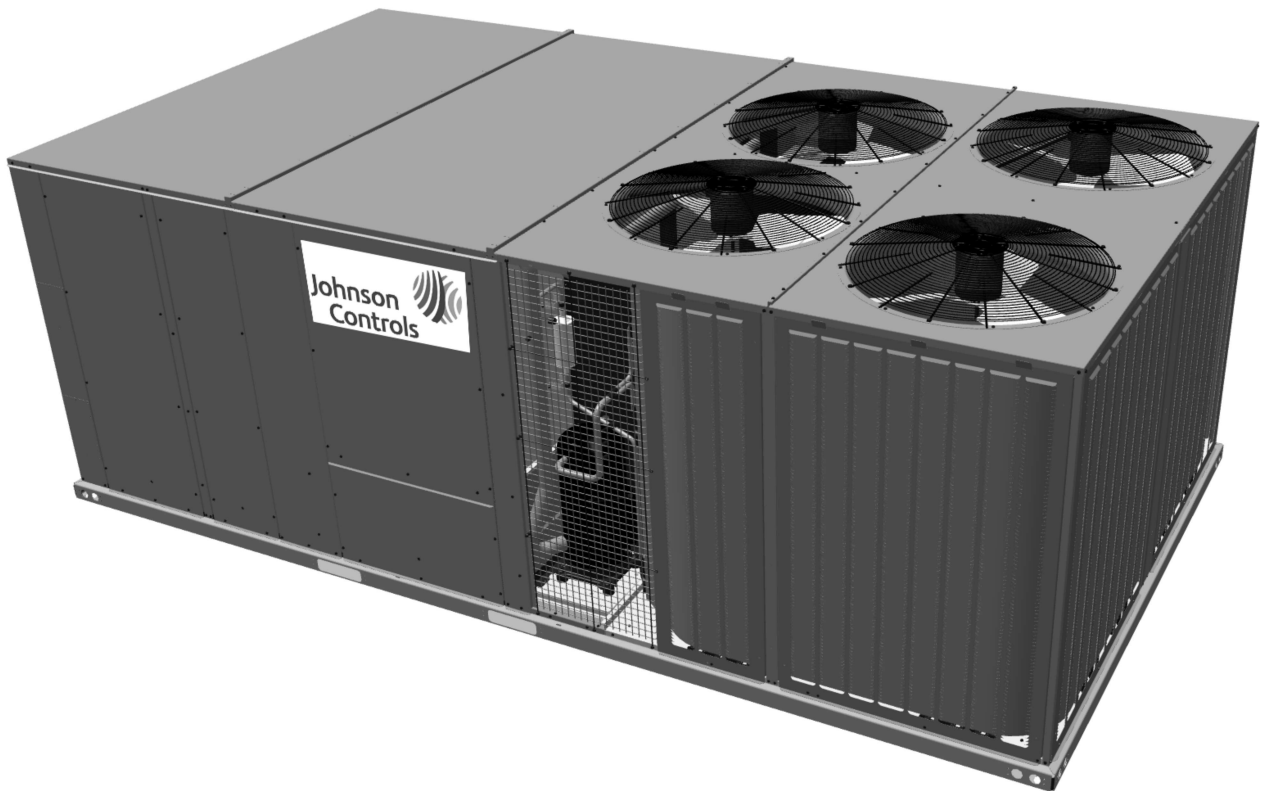




Technical Guide: Johnson Controls Choice AD15 to AD28



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Johnson Controls Ducted Systems

Contents

Description.....	3
Product highlights.....	3
Unit components.....	4
Nomenclature.....	5
Features and benefits.....	6
Standard features.....	6
Options and accessories.....	11
Factory and field-installed options.....	13
Physical data.....	20
Unit limitations.....	24
Capacity performance.....	25
AD15 cooling capacity performance.....	25
AD18 cooling capacity performance.....	27
AD20 cooling capacity performance.....	29
AD25 cooling capacity performance.....	31
AD28 cooling capacity performance.....	33
AD15 hot gas reheat capacity performance.....	35
AD18 hot gas reheat capacity performance.....	37
AD20 hot gas reheat capacity performance.....	39
AD25 hot gas reheat capacity performance.....	41
AD28 hot gas reheat capacity performance.....	43
Airflow performance.....	45
RPM selection and static resistance.....	47
Drive selection.....	48
Airflow specifications.....	49

Sound performance.....	53
Electrical data.....	54
Constant volume standard static.....	54
Constant volume medium static.....	60
Constant volume high static.....	66
VFD 2 stage standard static.....	72
VFD 2 stage medium static.....	78
VFD 2 stage high static.....	84
VFD 4 stage standard static.....	90
VFD 4 stage medium static.....	96
VFD 4 stage high static.....	102
VFD CS standard static.....	108
VFD CS medium static.....	114
VFD CS high static.....	120
Typical wiring diagrams.....	126
Weights and dimensions.....	150
Rain hood dimensions.....	154
Utilities entry.....	154
Accessory weights.....	155
Roof curbs.....	156
Economizer options.....	160
Typical installation.....	160

Description

The Johnson Controls Choice 15 to 27.5 ton platform is designed with all the flexibility needed for today's applications, while simultaneously meeting tomorrow's efficiency requirements. Realizing that efficiency requirements are continuously pushing the envelope of technology, standard efficiency Choice units meet the latest U.S. Department of Energy (DOE) efficiency requirements in the base constant volume configuration while the optional IntelliSpeed and variable air volume (VAV) airflow options deliver energy efficiency exceeding the DOE mandates for 2023. Achieving efficiencies as high as 14.8 IEER (cooling only/electric heat) and 14.6 IEER (gas heat), the standard efficiency Choice product line provides users with significant energy savings alongside impressive flexibility and unparalleled reliability.

All models are available with extensive options and accessories provided both through factory installation and field kits. Airflow requirements are met through constant volume, IntelliSpeed discrete fan control, and VAV blower configurations. All tonnages can be configured for cooling only, electric heating, staged gas heating, or modulating gas heating. Near limitless flexibility is available with custom modifications provided by the Norman Modification Center located in the HVAC Rooftop Center of Excellence in Norman, Oklahoma.

The units are tested in accordance with the following:



Product highlights

- Smart Equipment™ Controls: streamlines commissioning, integration, and service
- Industry leading standard efficiency, up to 14.8 IEER, designed to meet DOE 2023 efficiency requirements
- Two independent refrigerant circuits
- Two stages of cooling (constant volume and IntelliSpeed) and four stages of cooling (IntelliSpeed and VAV) to meet advanced building code requirements
- Four unique airflow options in each tonnage. Constant volume, 2-stage IntelliSpeed, 4-stage IntelliSpeed, and VAV
- Footprint design allows for direct replacement of multiple competitive models (Carrier and Trane) without a transition curb
- Reliability designed into all products and tested at the component and system level at the Advanced Technology Lab in Norman, Oklahoma
- Factory installed staged gas heat and factory or field installed electric heat
- Optional modulating gas heat furnace with standard stainless steel heat exchanger
- Optional modulating hot gas reheat for maximum humidity control. The reheat option added to the base model allows for increased flexibility

Unit components

Figure 1: Component location

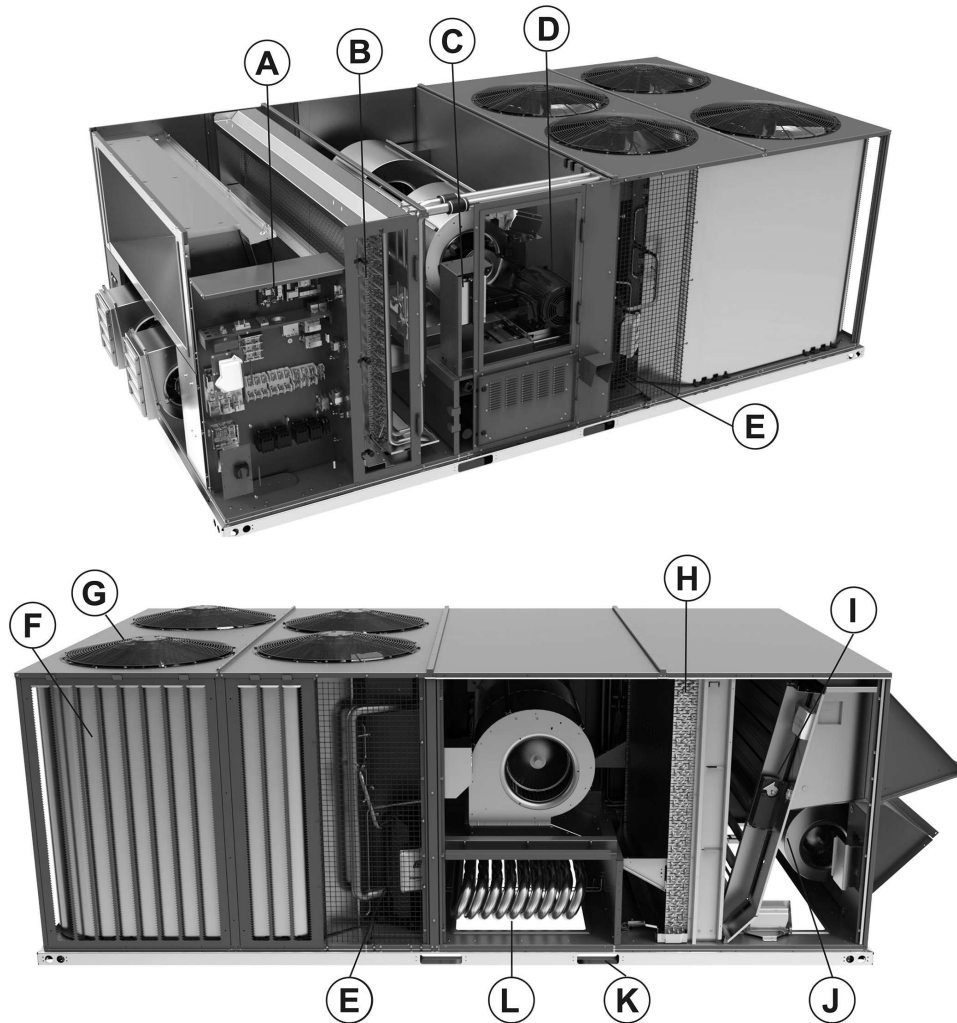
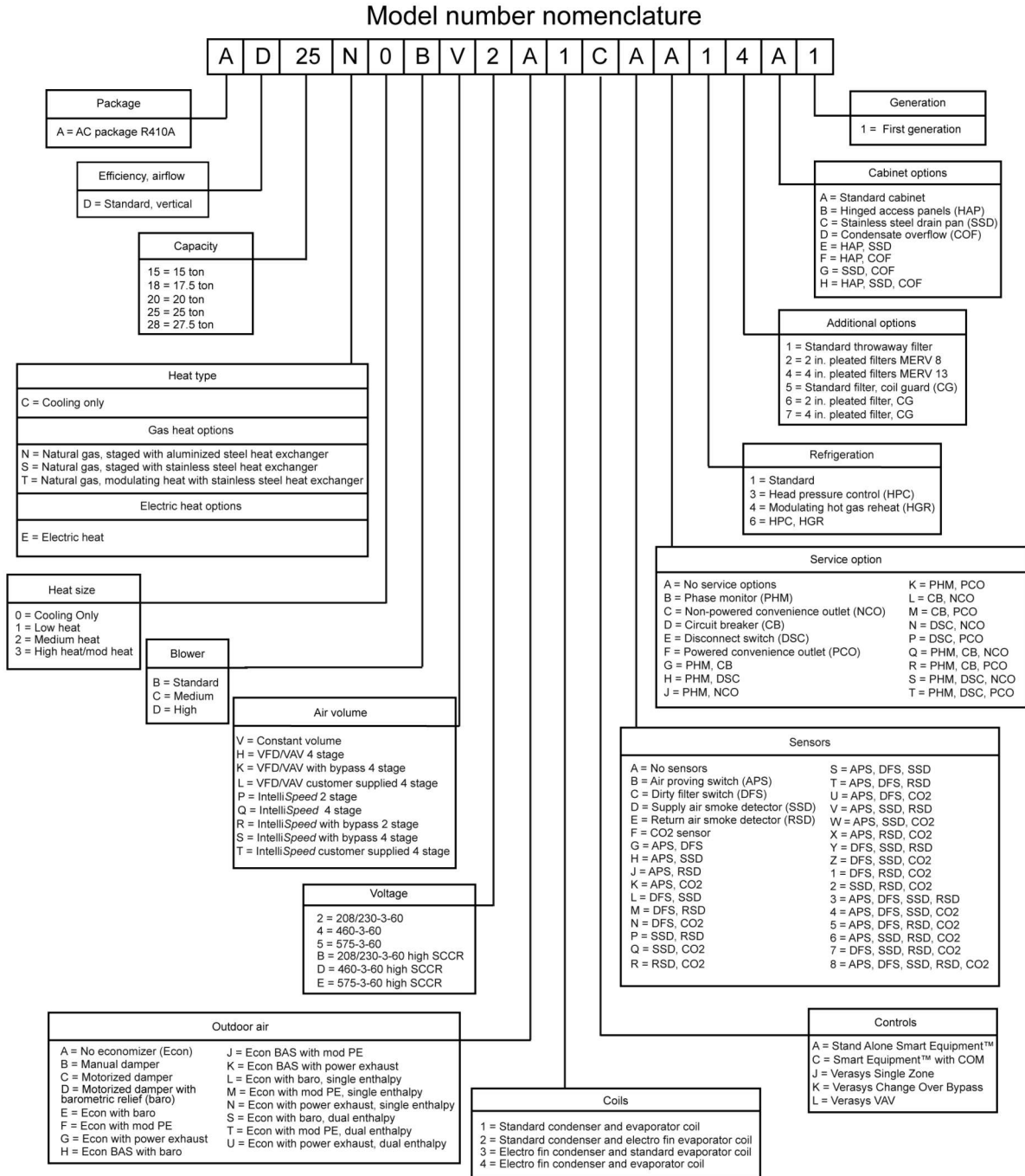


Table 1: Component location table

Item	Description	Item	Description
A	Smart Equipment™ controls	G	Condenser fans
B	Filter access, 2-inch or 4-inch filter options	H	Copper tube/aluminum fin evaporator coil
C	Optional variable frequency drive	I	Optional economizer. Optional manual or motorized outside air dampers not shown.
D	Belt drive blower motor with dual centrifugal fan design	J	Optional powered exhaust. Optional barometric relief not shown.
E	Scroll compressors in various arrangements to produce 2 or 4 stages of cooling depending on the selected model	K	Full perimeter base rails with holes for overhead rigging
F	MicroChannel condenser coils	L	Optional staged or modulating gas heat with aluminized or stainless steel heat exchanger. Optional electric heat not shown.

Nomenclature

Figure 2: Product nomenclature



Features and benefits

Standard features

Johnson Controls Choice units have the following standard features.

Efficiency

Available in standard efficiency cooling only, gas heat, or electric heat, Choice units achieve up to 11.1 EER. IEER ratings as high as 14.8 are specific to each model's heat type and indoor airflow selection to provide dialed in efficiencies for every model classification.

Indoor airflow options

Each tonnage has an industry leading four unique indoor airflow options available for maximum customization to meet the needs of each job site. Constant volume, 2-stage IntelliSpeed, 4-stage IntelliSpeed, and variable air volume (VAV) configurations each have a dedicated airflow and compressor staging algorithm designed to maximize efficiency and reliability. Variable airflow models, IntelliSpeed or VAV, include a factory installed variable frequency drive (VFD) to modulate the blower airflow.

Refrigerant circuits

All models contain a dual circuit refrigeration design with multiple compressor staging options dependent on the selected airflow option. Constant volume and 2-stage IntelliSpeed models have two stages of cooling operation, and 4-stage IntelliSpeed and VAV models have four stages of cooling operation.

Variable frequency drive

Factory-installed variable frequency drives (VFD) provide higher efficiency through both IntelliSpeed and variable air volume (VAV) operation. All factory-installed VFDs come with a 5-year manufacturer warranty and provide ease of commissioning with operation through the standard Smart Equipment™ control board and soft start capabilities for improved motor and belt life.

Indoor blower

The indoor blower is a single shaft, dual blower, forward curve centrifugal wheel design. All tonnages use a belt drive motor configuration with options for multiple levels of static resistance. The blower motor is mounted on a motor sled (patent pending) with multidirectional movement for simplified precise adjustments to belt tension and easier belt replacement.



Evaporator coils

All units come with copper tube/aluminum fin evaporator coils.

Condenser coils

All units come with microchannel condenser coils.

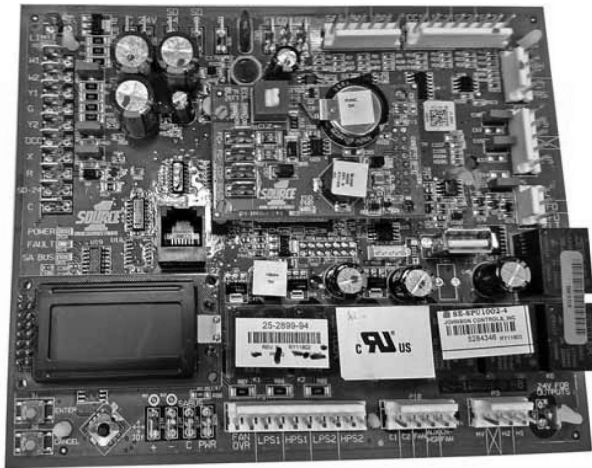
Balanced staged heating

All gas heat units are of a tubular design with in-shot burners and induced draft. Standard controls provide two stages of capacity control with an additional option for modulating gas heat. Each section includes a durable heat exchanger with aluminized steel or optional stainless steel tubes, a redundant gas valve, spark ignition, power venting, an ignition module for 100% shut-off, and all of the safety controls required to meet the latest ANSI standards. You can route the gas supply piping into the heating compartment through a hole in the base pan of the unit or through a hole in the piping panel on the front of the unit.

All electric heat models (factory or field installed) include a bank of nickel chromium elements mounted at the discharge of the supply air blower to provide a high velocity and uniform distribution of air across the heating elements. Each element bank is fully protected against excessive current and temperature by fuses and two thermal limit switches.

Advanced, versatile controls

Smart Equipment™ control boards have standardized a number of features previously available only as options or by using additional controls.



All units are factory commissioned, configured, and run tested.

You can configure the Smart Equipment™ control for use with a standard thermostat using the convenient screw terminals or for use with a zone sensor. You can also configure the control to communicate with multiple BAS communication protocols to integrate with building automation systems.

On-board USB port

The Smart Equipment™ control comes standard with an on-board USB port that accepts a common flash drive. You can use the port for features like data logging, listing current and

previous system faults, and backing up or updating the software version. Self-test and start up reports are also available through the USB port.

Built-in LCD

The Smart Equipment™ control board has an easy to read, built-in LCD and easy to use navigation joystick and buttons. Users can quickly navigate the menus to view unit status, options, current function, supply, return and outdoor temperatures, fault codes, and other information.

NOTICE

The Smart Equipment™ control board used in this product can effectively operate the cooling system down to 0°F when this product is applied in a comfort cooling application for people. An economizer is typically included in this type of application. When you apply this product for process cooling applications (such as computer rooms or switchgear), call the applications department for Ducted Systems at 1-877-874-SERV for guidance. Additional accessories may be needed for stable operation at temperatures below 30°F.

Reduced field installed complexity

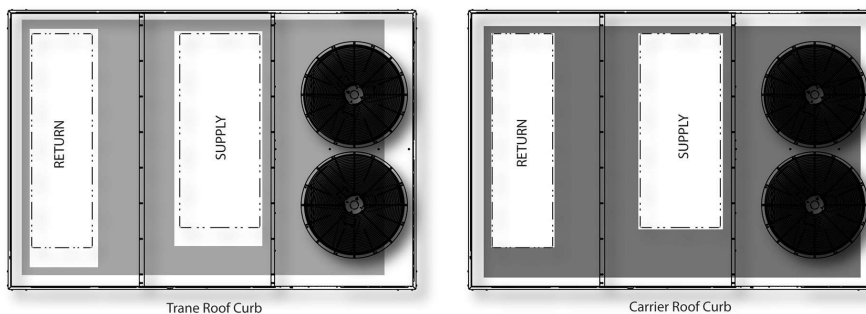
Each unit comes equipped with factory installed supply air, return air, and outdoor air temperature sensors to provide key temperature readings and reduce field installed complexity.

Standard factory warranty

All models include a 1-year limited warranty on the complete unit. Compressors and electric heater elements each have a 5-year warranty. Aluminized steel heat exchangers have a 10-year warranty and stainless steel heat exchangers have a 15-year warranty.

Replacement opportunity with footprint

All tonnages have a meticulously designed footprint providing the unique ability to directly replace, without the need for a transition curb, existing 15 to 27.5 ton units from select competitive manufacturers (Carrier and Trane). Airflow testing was conducted on each competitive footprint to ensure full unit performance and operation in these applications. Some utilities may require relocation with guidance from competitive replacement literature.



Dedicated duct configuration

All models are manufactured with a dedicated duct configuration for downflow operation allowing for quick and easy installation without removing or relocating panels.

Utility connections

Gas and electrical utility entries are supplied in the unit underside as well as the side of the unit. You can make utility connections quickly and with a minimum amount of field labor.

Sloped drain pan

All units are provided with a multidirectional sloped condensate drain pan with 1 in. I.D. female connection. Drain pans are sloped in accordance with ASHRAE 62 and are available in composite or stainless steel configurations.

Color-coded and numbered wiring

Wiring is color coded and numbered to match the provided unit wiring diagram to make for easy troubleshooting and field installation.

Convertible filter rack

Units are provided with the selected 2-inch or 4-inch filter. With a simple conversion in the field, units can accept either size filter in the standard filter rack.

Full perimeter base rails

The permanently attached base rails provide a solid foundation for the entire unit and protect the unit during shipment. The rails offer rigging holes so that you can use an overhead crane to place the units on a roof.

Operating conditions

The units are capable of starting and running at 125°F outdoor temperature, exceeding the maximum load criteria of AHRI Standard 340/360. The compressor, with standard controls, is capable of operation down to 45°F outdoor temperature in all installations and as low as 0°F outdoor temperature with cyclic cooling cycles in certain applications. The addition of a low ambient kit allows for cooling operation down to -20°F outdoor temperature. Gas heat is rated to operate in outdoor temperatures down to -40°F.

Safety monitoring

The control monitors the outdoor, supply, and return air temperatures and the high and low pressure switch status on the independent refrigerant circuits. On units with heating, the gas valve and high temperature limit switches are monitored on gas and electric heating units. The control also monitors the voltage supplied to the unit and protects the unit if low voltage occurs due to a brown out, or if other electrical issues occur.

Anti-short cycle protection

To aid compressor life, an anti-short cycle delay is incorporated into the standard control. Compressor reliability is further ensured by programmable minimum run times. For testing, you can temporarily override the anti-short cycle delay with the push of a button.

Fan delays

Fan on and fan off delays are fully programmable. Furthermore, the heating and cooling fan delay times are independent of one another. All units are programmed with default values based on their configuration of cooling and heating capacity.

Nuisance trip protection and three strikes

To prevent nuisance calls, the control board uses a three times, you're out philosophy. The high-pressure switch, low-pressure switch, antifreeze protection, or low voltage, detection must trip three times within two hours before the unit control board locks out the associated compressor. Similarly, the heating high limit switch must trip three times within one hour before the unit control board locks out heating operation. An alarm message appears on the LCD.

Low limit control

When there is a demand for cooling during cold outside conditions the low limit control (LLC) prevents the supply air from dropping below a specified setpoint. This is a programmable setpoint.