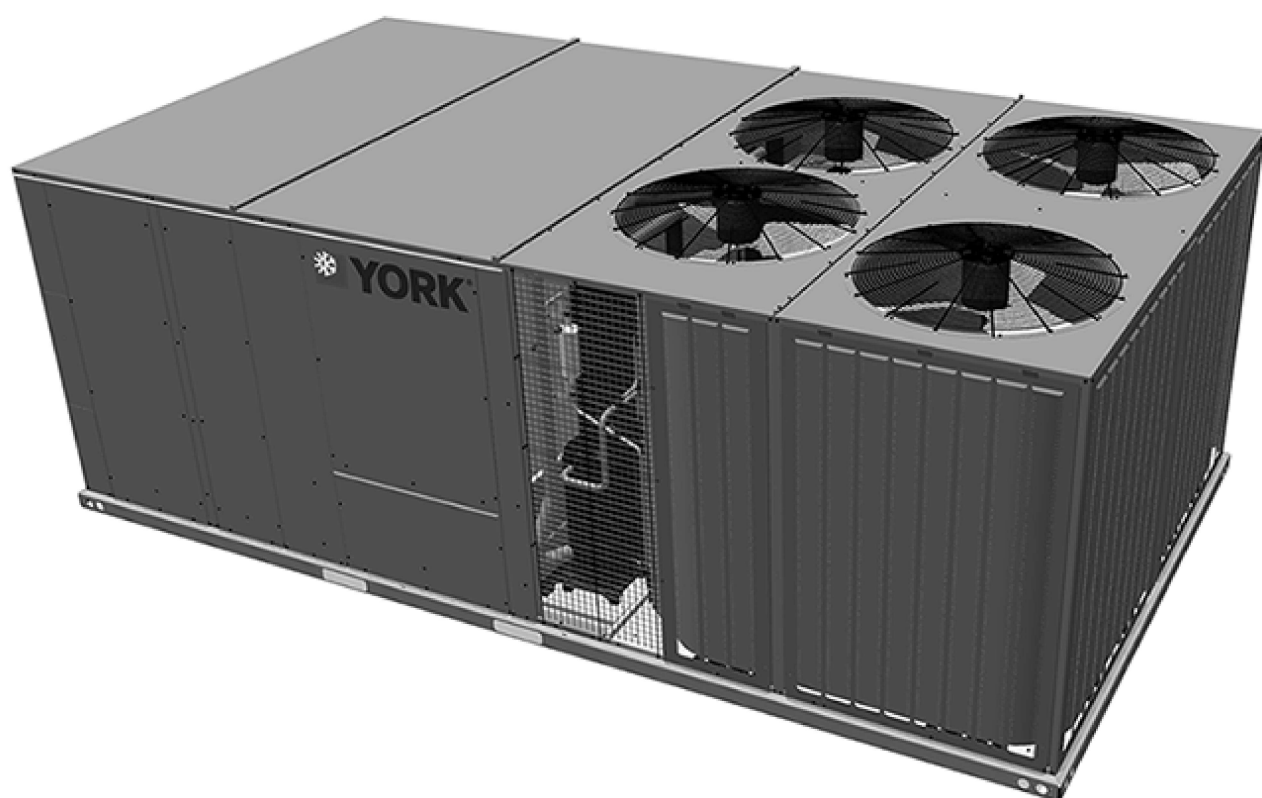




Technical Guide: YORK® Sun™ Choice AV15 to AV28



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Johnson Controls Ducted Systems

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Description

The YORK® Sun™ 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

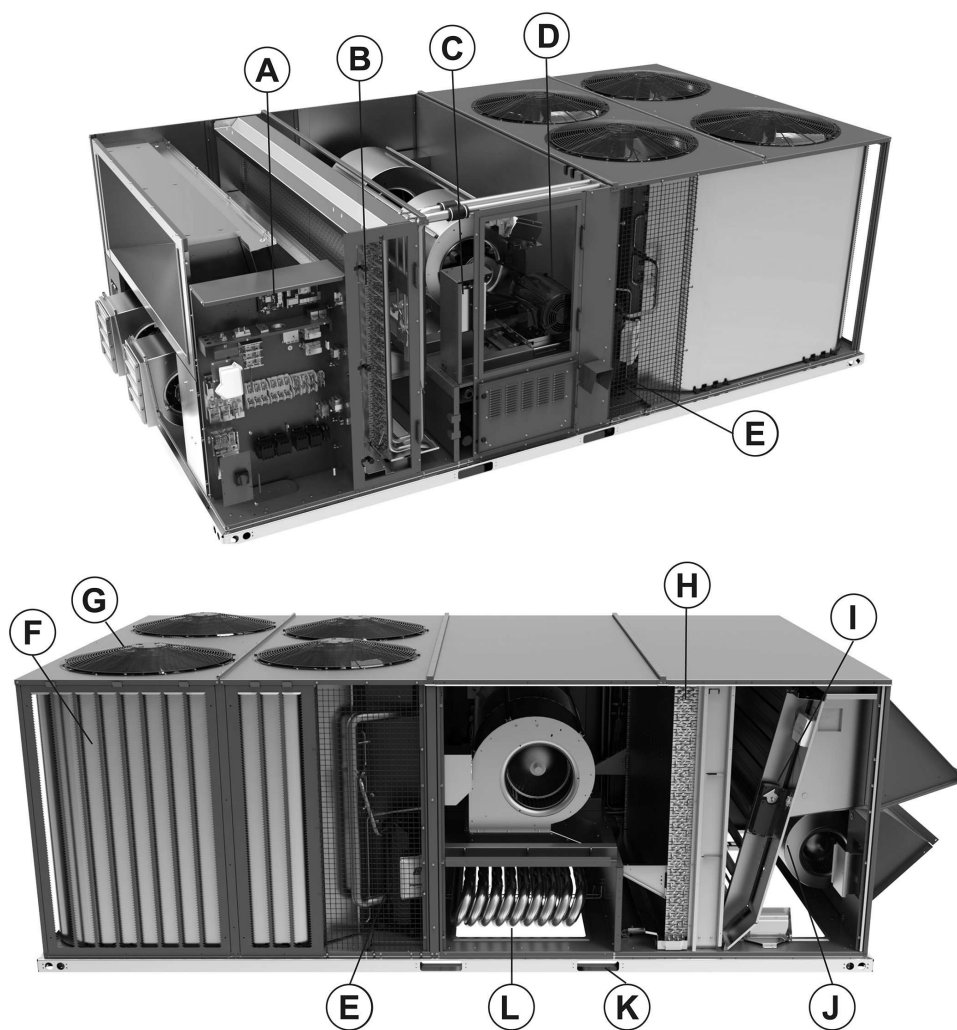
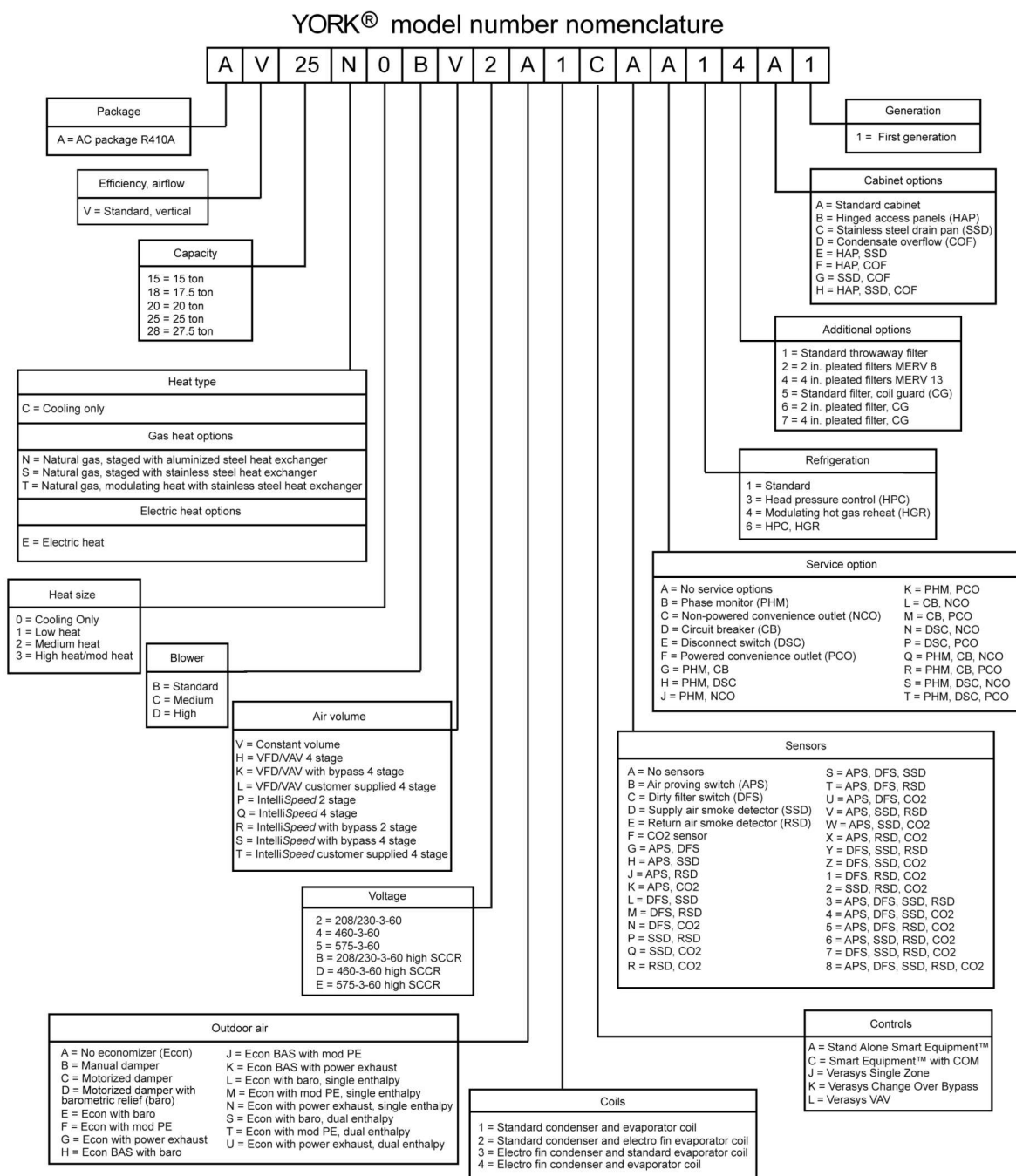


Table 1: Component location table

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

YORK® Sun™ 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.

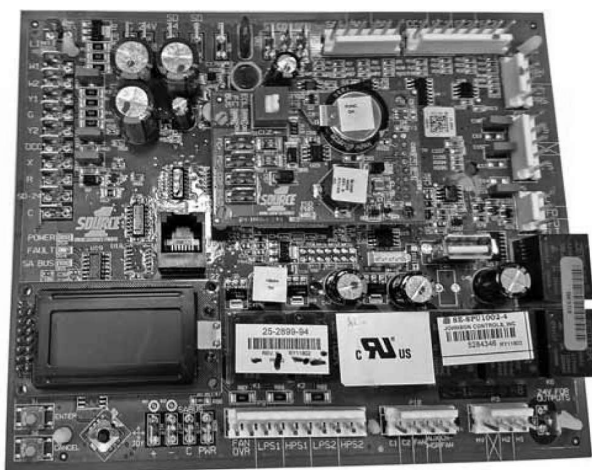
Balanced staged heating

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

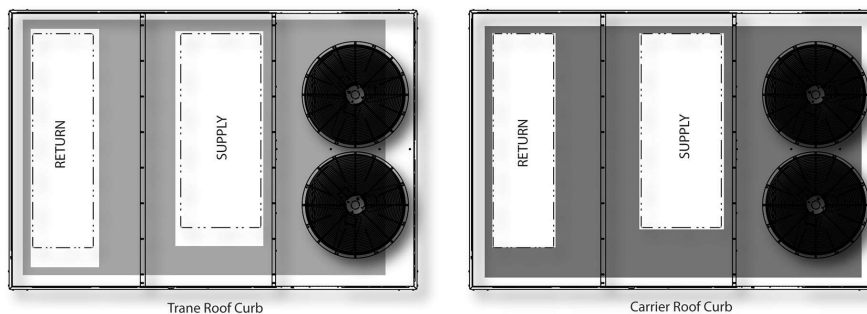
Each unit comes equipped with factory installed supply air, return air, and outdoor air temperature sensors to provide key temperature readings and reduce field installed complexity.

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.

Options and accessories

Non-electrical option or accessory	Factory option	Field-installed option
Roof curb, 14-inch or 24-inch height		✓
Burglar bars		✓
Coil/hail guard	✓	✓
Hinged and toolless access panels	✓	
Magna-Dry modulating hot gas reheat dehumidification	✓	
Aluminized steel gas heat exchanger	✓	
Stainless steel gas heat exchanger	✓	
Modulating gas heat	✓	
Flue exhaust extension		✓
Propane conversion		✓
High altitude kit for propane		✓
High altitude kit for natural gas		✓
Stainless steel drain pan	✓	
E-Coat coil coating	✓	
MERV 8, 2-in. filter	✓	
MERV 13, 4-in. filter	✓	

Electrical option or accessory	Factory option	Field-installed option
Constant volume airflow	✓	
IntelliSpeed discrete fan control	✓	
Multi-zone variable air volume (VAV)	✓	
CRSZ control single zone VAV	✓	
Standard, medium, or high static indoor blower motor	✓	
Non-fused disconnect switch	✓	
Circuit breaker	✓	
Powered convenience outlet	✓	
Non-powered convenience outlet	✓	✓
65 kA high SCCR	✓	
Phase monitor	✓	
Electric heat	✓	✓

Fresh air option or accessory	Factory option	Field-installed option
Manual outside air damper	✓	✓
Motorized outside air damper	✓	✓
Low leak economizer	✓	✓
Single or dual enthalpy economizer control	✓	✓
Barometric relief damper	✓	✓
Constant volume power exhaust	✓	✓
Modulating power exhaust	✓	✓
Bolt on energy recovery ventilator (ERV)		✓

Controls option or accessory	Factory option	Field-installed option
Air proving switch	✓	✓
Dirty filter switch	✓	✓
CO ² sensor	✓	✓
Condensate overflow switch	✓	✓
Low ambient head pressure control	✓	✓
Supply and return air smoke detectors	✓	✓
Smart Equipment™ control communication card	✓	✓
MAP (Mobile Access Portal) Gateway for use with Smart Equipment™ control		✓
Verasys	✓	✓

Factory and field-installed options

YORK® Sun™ Choice units have many factory options and field-installed accessories available for a wide range of application needs.

Constant volume airflow

Factory option

The standard airflow option on all Choice models, this provides the most traditional on and off method of blower control where the supply fan airflow and the air volume through the building duct remain constant. The unit's refrigerant staging adjusts based on the load to maintain the zone temperature.

IntelliSpeed discrete fan control with VFD

Factory option

The IntelliSpeed blower control method uses a variable frequency drive (VFD) to control staged modulation of the supply fan airflow in what is called multispeed fan control or discrete fan control. The VFD runs the supply fan at predetermined speeds set at the factory based on the number of cooling stages engaged by the cooling demand. This feature allows for higher part load efficiency and meets all requirements of ASHRAE 90.1 2013/2016 and 2015 IECC.

Multi-zone variable air volume (VAV)

Factory option

Intended for job applications where multiple zones are serviced by a single rooftop with zone dampers in the ductwork to control airflow to each zone. Similar to the IntelliSpeed blower control method, the VAV blower control option uses a VFD to control modulation of the supply fan airflow. Unlike IntelliSpeed, VAV operation provides full modulation of the supply fan speed to provide both a constant supply air temperature and a constant duct static pressure. This modulation is controlled by the VFD based on readings from a pressure transducer mounted in the unit supply duct.

CRSZ control single zone VAV

Factory option

A proprietary control logic for single-zone VAV applications, the continuous reset single zone control (CRSZ control) option provides the industry's best temperature control of a single-zone VAV system. The CRSZ control airflow option uses compressor staging and fan speed, along with programmatic resetting of the supply air temperature setpoint, to deliver stable zone temperature and humidity control.

High static indoor blower motor

Factory option

For applications with high static restrictions, units are offered with optional indoor motors that provide higher static output to varying degrees based on the application requirements.

MagnaDry modulating hot gas reheat dehumidification

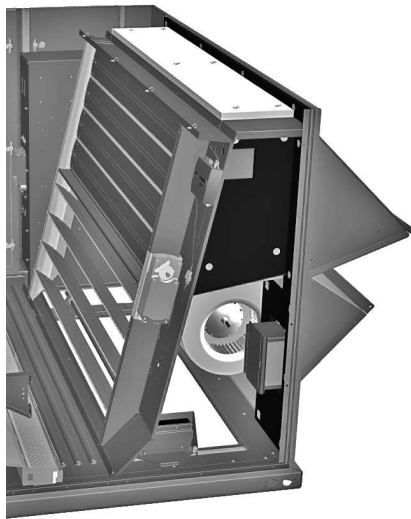
Factory option

Units optioned with reheat coils provide superior dehumidification at a wide range of outdoor temperatures to provide maximum comfort without overcooling the space. Unlike traditional on and off reheat systems, this system modulates dehumidification to more accurately meet the humidity and temperature setpoints.

Low leak economizer with fresh air hood

Factory or field-installed option

All units offer a variety of optional factory-installed or field-installed economizers that are shipped, installed, and wired with low leak dampers. The dampers are designed to meet ASHRAE 90.1, AMCA 511 Class 1A damper, and the International Energy Conservation Code (IECC) certification requirements by achieving leakage rates of 3 CFM/sq. ft. at 1-inch of static pressure. Each economizer goes through a rigorous 60,000 cycle test. You can select dry bulb, single enthalpy, or dual enthalpy economizer control as either a factory option or field-installed accessory. The economizer has spring return, fully modulating damper actuators and it is capable of introducing up to 100% outdoor air. As the outdoor air intake dampers open, the return air dampers close. The changeover from mechanical refrigeration to economizer operation is regulated by the outdoor air dry bulb temperature or the outdoor air enthalpy input.



Single or dual enthalpy control

Factory or field-installed option

Low leak economizers are available with standard dry bulb sensing. You can select the following configurations for true enthalpy control of the unit economizer.

- Single enthalpy control to monitor outdoor air humidity and temperature
 - Dual enthalpy control to monitor outdoor air and return air humidity and temperature
- Single or dual enthalpy sensors are available factory installed or as field-installed accessories.

Manual outside air damper

Factory or field-installed option

The manual outdoor air damper includes a slide-in assembly with a manually adjustable opening for fresh air entry. The factory installed damper has an opening range of 0% to 100%. The field-installed accessory is available with two options for opening range, 0% to 25% or 0% to 100%.

Motorized outside air damper

Factory or field-installed option

The motorized outdoor air damper includes a slide-in and plug-in damper assembly with a 2-position, spring return motor actuator. The damper opens to a preset position whenever the supply air blower is operating and drives fully closed when the blower motor shuts down. The factory installed damper has an opening range of 0% to 100%. The field-installed accessory is available with two options for opening range, 0% to 25% or 0% to 100%.

Barometric relief damper

Factory or field-installed option

You can use this damper option to relieve internal building air pressure on units with an economizer or motorized damper without a power exhaust. This accessory includes a rain hood, a bird screen, and a fully assembled damper.

Constant volume power exhaust

Factory or field-installed option

Units with an economizer are available with constant volume power exhaust. Whenever the outdoor air intake dampers are opened for free cooling, the exhaust fan is energized to prevent the conditioned space from being over-pressurized during economizer operation. The factory-installed version has an incorporated fold-out hood design for easy setup and operation. There are two options for the field-installed constant volume power exhaust. The standard CFM exhaust provides the same operational parameters as the factory-installed power exhaust while the high CFM exhaust provides expanded air movement capabilities.



Modulating power exhaust

Factory or field-installed option

For more precise control over a unit's exhaust performance, you can select a modulating power exhaust as a factory or field-installed option. The modulating power exhaust

monitors fluctuations to the static pressure in the duct and works in conjunction with the unit economizer to equalize pressure changes caused by bringing in fresh air. There are two options for the field-installed constant volume power exhaust. The standard CFM exhaust provides the same operational parameters as the factory-installed power exhaust while the high CFM exhaust provides expanded air movement capabilities.

Staged electric heat

Factory or field-installed option

Electric heat is available as a factory or field-installed option in 25 kW, 50 kW, and 75 kW and is available in all voltage options of the base units. All heaters are single point power and all field-installed electric heat accessories require a supplemental single point power kit based on the unit specifications.

Staged gas heat

Factory option in aluminized steel or stainless steel

Staged gas heating is available in two sizes, each with two stages of operation. The standard gas heat exchanger comes in aluminized steel for applications in non-corrosive environments with an optional stainless steel gas heat exchanger available for application in corrosive environments.

Modulating gas heat

Factory option

For improved temperature control and to provide more exact heating operation, select a modulating gas heat furnace. With the same maximum heating capacity as the high-heat staged gas heat and a 2.85 to 1 turndown ratio, the modulating gas heat option provides the same full load heating capabilities as the staged heating option and can also adjust the input rate to reflect the heating call. All modulating gas heat furnaces are equipped with stainless steel heat exchangers.

Flue exhaust extension

Field-installed option

In locations with wind or weather conditions that may interfere with the proper exhausting of furnace combustion products, this accessory can prevent the flue exhaust from entering nearby fresh air intakes.

Propane conversion kit

Field-installed option

Use this kit to convert a gas-fired heater from natural gas to propane. It contains the main burner orifices and gas valve replacement springs.

Gas heat high altitude kit

Field-installed option

Use this kit to convert a gas heat unit to operate at high altitudes from 2,000 to 10,000 feet. Conversion kits are available for natural gas and propane.

Hinged and toolless access panels

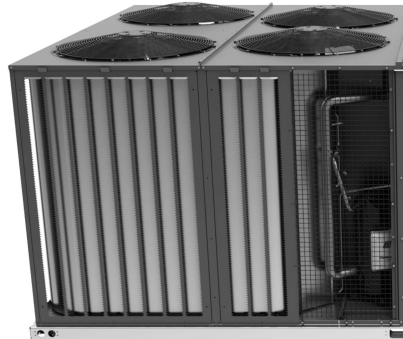
Factory option

To reduce service time, hinged and toolless access panels provide quick and easy access to frequently inspected or service components and areas of the unit. Hinged panels provide access to the control box, filters, gas and electric heat controls, and indoor blower section.

Coil guard and hail guard

Factory or field-installed option

A louvered panel design combination coil guard and hail guard protects the unit condenser coils and outdoor condenser area from a wide range of damage caused by events such as hail, tampering, and animal entry.



Stainless steel drain pan

Factory option

An optional rust-proof stainless steel drain pan is available to provide years of trouble-free operation in corrosive environments.

Circuit breaker

Factory option

A factory-installed circuit breaker provides both easy access to shut off power to the unit for safe servicing and also protects the unit from a short-circuit or overload condition.

Non-fused disconnect switch

Factory option

A factory-mounted service disconnect switch provides easy access to shut off power to the unit for safe servicing of the product.

Powered convenience outlet

Factory option

The powered convenience outlet option provides a 120V single-phase GFCI outlet with a cover on the unit exterior. The outlet is powered by a stepdown transformer in the unit.

Non-powered convenience outlet

Factory or field-installed option

The non-powered convenience outlet option provides a 120V single-phase GFCI outlet with a cover on the exterior of the unit. The outlet requires the installer to provide the 120V single-phase power source and wiring. The outlet is available factory installed or as a field-installed accessory.

65 kA high SCCR

Factory option

The HIGH SCCR electrical option replaces all necessary electrical components and wiring with higher rated components and larger gauge wiring to increase the short-circuit current rating to 65 kA from the standard unit 5 kA rating. This provides additional protection to the unit in the event of a short-circuit condition.

Supply and return air smoke detectors

Factory or field-installed option

The smoke detectors stop operation of the unit and provide a fault message to the control board. Smoke detectors are available for supply and/or return air configurations.



WARNING

Factory-installed smoke detectors may be subjected to extreme temperatures during off times due to outside air infiltration. These smoke detectors have an operational limit of -4°F to 158°F. Smoke detectors installed in areas that could be outside this range must be relocated to prevent false alarms.

Phase monitor

Factory option

Monitors the electrical phase to the unit to prevent damage from out of phase conditions.

Air proving switch

Factory or field-installed option

To ensure proper indoor blower operation, you can use an optional air proving switch to monitor whether supply air airflow is present when a cooling or heating cycle initiates. If proper airflow is not detected at the beginning of a cycle or throughout operation, the call for heating or cooling is cancelled and a unit alarm registered.

Dirty filter switch

Factory or field-installed option

This option includes a differential pressure switch that energizes the fault light on the unit thermostat, indicating that there is an abnormally high pressure drop across the filters.

CO₂ sensor

Factory or field-installed option

The provided CO₂ sensor detects CO₂ levels and automatically overrides the economizer when levels rise above the preset limits.

Condensate overflow switch

Factory or field-installed option

Mounted to the unit drain pan, the condensate overflow switch is a float switch that monitors the level of water in the drain pan to shut down unit operation and prevent drain pan overflow within the unit.

Low ambient head pressure control

Factory or field-installed option

An integrated low-ambient control allows units to operate in the cooling mode down to 0°F outdoor ambient without additional components or intervention. The option includes a divider panel for the condenser section to isolate airflow through the condenser coils. Optionally, you can program the control board to lock out the compressors when the outdoor air temperature is low or when free cooling is available.

E-coat evaporator and condenser

Factory option

The evaporator and/or condenser coils are coated with an epoxy polymer coating to protect against corrosion.

Filters

Factory option

Two-inch pleated MERV 8 or 4-inch pleated MERV 13 are available to meet LEED requirements. A 2-inch throwaway is shipped as standard.

Burglar bars

Field-installed option

Mount in the supply and return openings to prevent entry into the duct work.

Smart Equipment™ control with communication

Factory or field-installed option

The communication option for the Smart Equipment™ control is a factory installed add-on card to expand the capabilities with a gateway to BACnet MS/TP (programmable to Modbus or N2 protocols).

Mobile Access Portal gateway for use with Smart Equipment™ control

Field-installed option

You can use the Mobile Access Portal (MAP) gateway to provide a wireless connection to any Smart Equipment™ enabled product or system. The MAP gateway generates a Wi-Fi signal for connection with any electronic device with Wi-Fi capabilities and a web browser. Used in conjunction with the Smart Equipment™ communication card and daisy chained network wiring, a single MAP gateway can provide single point access to an entire network of rooftop units through the unit control board, a Smart Equipment™ enabled zone sensor, or Smart Equipment™ enabled thermostat.

Verasys

Factory or field-installed option

Verasys provides a simple user experience with configurable self-recognizing controllers without the need for any additional tools. Verasys creates enhanced integration of HVACR equipment, zoning, and controls. Contractors are able to offer a complete bundled solution of equipment and controls to serve the light commercial market.

Physical data

Table 2: AV15 to AV18 physical data

Component	Models					
	AV15			AV18		
Nominal tonnage	15			17.5		
ARI cooling performance	2 Stage		4 Stage	2 Stage		4 Stage
Gross capacity @ ARI A point (Btu)	183,000		184,000	211,000		211,000
ARI net capacity (Btu)	172,000		174,000	198,000		198,000
EER	11.1 ¹ / 10.9 ²		11.0 ¹ / 10.8 ²	11.0 ¹ / 10.8 ²		11.0 ¹ / 10.8 ²
IEER CV	13.0 ¹ / 12.8 ²		NA	12.6 ¹ / 12.4 ²		NA
IEER with Intellispeed	14.2 ¹ / 14.0 ²		14.8 ¹ / 14.6 ²	14.2 ¹ / 14.0 ²		14.6 ¹ / 14.4 ²
IEER with VAV	NA		14.6 ¹ / 14.4 ²	NA		14.4 ¹ / 14.2 ²
CFM	4800		4570	5400		5780
System power (KW)	15.78		16.11	18.33		18.33
Refrigerant type	R-410a		R-410a	R-410a		R-410a
Refrigerant charge (lb-oz)						
System 1	7-10		7-12	10-0		9-12
System 2	8-2		8-0	10-4		10-0
ARI heating performance						
Heating model	(N,S)1	(N,S)3	T3	(N,S)1	(N,S)3	T3
Heating type	Stg. low	Stg. high	Mod. high	Stg. low	Stg. high	Mod. high
1st stage heat input (K Btu)	165	300	140	165	300	140
2nd stage heat input (K Btu)	220	400	400	220	400	400
1st stage heat output (K Btu)	134	243	113	134	243	113
2nd stage heat output (K Btu)	178	324	324	178	324	324
Steady state efficiency (%)	81	81	81	81	81	81
No. of burners	5	9	9	5	9	9
No. of stages / Turn down	2	2	2.85 to 1	2	2	2.85 to 1
Temperature rise range (°F)	15-45	35-65	35-65	15-45	30-65	30-65
Gas limit setting (°F)	130	130	130	130	130	130
Gas piping connection (in.)	3/4	3/4	3/4	3/4	3/4	3/4
Dimensions (in.)						
Length	129-3/4					
Width	88-3/4					
Height	48-9/16					
Operating weight	1750			1830		
Compressors	2 Stage		4 Stage	2 Stage		4 Stage
Type	Scroll		Scroll	Scroll		Scroll
Quantity	2		2	2		2
Unit capacity steps (%)	50 / 100		34/50/84/100	47 / 53		31/47/85/100
Condenser coil data						
Face area (sq. ft.)	22.1			22.1		
Type	MCHX			MCHX		
Thickness	20 mm			25 mm		
FPI	23			23		
Circuitry type	2-Pass			2-Pass		
Evaporator coil data						
Face area (sq. st.)	22.0			22.0		
Rows	3			4		
Fins per inch	17			15		
Tube diameter	3/8			3/8		
Circuitry type	Intertwined			Intertwined		

Table 2: AV15 to AV18 physical data

Component	Models					
	AV15			AV18		
Nominal tonnage	15			17.5		
Refrigerant control	TXV			TXV		
Condenser fan data						
Quantity	2			2		
Fan diameter (in.)	30			30		
Type	Prop			Prop		
Drive type	Direct			Direct		
Number of motors	2			2		
Motor HP each	1/2			1/2		
RPM	850			850		
Nominal total CFM	10,800			10,700		
Belt drive evap fan data						
Quantity	2			2		
Fan size (in.)	15x15			15x15		
Type	Centrifugal			Centrifugal		
Static range	Std	Med	High	Std	Med	High
Motor sheave	1VP40	1VP40	1VP60	1VP60	1VP65	1VP65
Blower sheave	AK89	BK77	BK100	AK114	BK115	BK100
Belt	AX41	BX43	BX48	AX49	BX50	BX46
Motor HP each	2.9	3.7	5.25	3.7	5.25	7.5
RPM	1745	1750	1750	1750	1750	1760
Frame size	56	56	145T	56	145T	213T
Filters						
Quantity - size	6 - (20 x 25 x 2) ³⁴			6 - (20 x 25 x 2) ³⁴		
	6 - (20 x 25 x 4) ⁵			6 - (20 x 25 x 4) ⁵		

1 Cooling only unit or cooling unit with electric heat

2 Cooling unit with gas heat

3 2 in. throwaway, standard, MERV (Minimum Efficiency Reporting Value) 3

4 Optional 2 in. pleated, MERV 8

5 Optional 4 in. pleated, MERV 13

Table 3: AV20 to AV28 physical data

Component	Models								
	AV20		AV25		AV28				
Nominal tonnage	20		25		27.5				
ARI cooling performance	2 Stage	4 Stage	2 Stage	4 Stage	2 Stage	4 Stage			
Gross capacity @ ARI A point (Btu)	252,000	252,000	308,000	304,000	347,000	350,000			
ARI net capacity (Btu)	238,000	234,000	286,000	274,000	320,000	320,000			
EER	11.0 ¹ / 10.8 ²	11.0 ¹ / 10.8 ²	10.2 ¹ / 10.0 ²	10.2 ¹ / 10.0 ²	10.4 ¹ / 10.2 ²	10.2 ¹ / 10.0 ²			
IEER CV	12.4 ¹ / 12.2 ²	NA	11.6 ¹ / 11.4 ²	NA	11.6 ¹ / 11.4 ²	NA			
IEER with Intellispeed	14.2 ¹ / 14.0 ²	14.4 ¹ / 14.2 ²	14.0 ¹ / 13.8 ²	14.4 ¹ / 14.2 ²	13.4 ¹ / 13.2 ²	14.4 ¹ / 14.2 ²			
IEER with VAV	NA	14.2 ¹ / 14.0 ²	NA	14.2 ¹ / 14.0 ²	NA	14.2 ¹ / 14.0 ²			
CFM	6000	6090	8000	7800	9050	9350			
System power (KW)	22.04	21.67	28.60	27.40	31.37	32.00			
Refrigerant type	R-410a	R-410a	R-410a	R-410a	R-410a	R-410a			
Refrigerant charge (lb-oz)									
System 1	10-14	10-10	14-12	15-4	16-8	16-8			
System 2	11-4	11-10	15-4	16-0	17-4	17-4			
ARI heating performance									
Heating model	(N,S)1	(N,S)3	T3	(N,S)1	(N,S)3	T3	(N,S)1	(N,S)3	T3
Heating type	Stg. low	Stg. high	Mod. high	Stg. low	Stg. high	Mod. high	Stg. low	Stg. high	Mod. high
1st stage heat input (K Btu)	165	300	140	165	300	140	165	300	140
2nd stage heat input (K Btu)	220	400	400	220	400	400	220	400	400
1st stage heat output (K Btu)	134	243	113	134	243	113	134	243	113
2nd stage heat output (K Btu)	178	324	324	178	324	324	178	324	324
Steady state efficiency (%)	81	81	81	81	81	81	81	81	81
No. of burners	5	9	9	5	9	9	5	9	9
No. of stages / Turn down	2	2	2.85 to 1	2	2	2.85 to 1	2	2	2.85 to 1
Temperature rise range (°F)	15-45	30-65	30-65	10-40	20-55	20-55	10-40	20-55	20-55
Gas limit setting (°F)	130	130	130	130	130	130	130	130	130
Gas piping connection (in.)	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
Dimensions (in.)									
Length	143-13/16			143-13/16			160-1/16		
Width	88-3/4			88-3/4			88-3/4		
Height	48-9/16			56-9/16			56-9/16		
Operating weight	1930			2090			2170		
Compressors	2 Stage	4 Stage		2 Stage	4 Stage		2 Stage	4 Stage	
Type	Scroll	Scroll		Scroll	Scroll		Scroll	Scroll	
Quantity	2	2		2	3		2	3	
Unit capacity steps (%)	46 / 100	31/46/85/100		50 / 50	25/50/75/100		50 / 50	25/50/75/100	
Condenser coil data									
Face area (sq. ft.)	25.1			30.8			35.4		
Type	MCHX			MCHX			MCHX		
Thickness	25 mm			25 mm			25 mm		
FPI	23			23			23		
Circuitry type	2-Pass			2-Pass			2-Pass		
Evaporator coil data									
Face area (sq. st.)	22.0			26.0			26.0		
Rows	4			4			4		
Fins per inch	15			15			15		
Tube diameter	3/8			3/8			3/8		
Circuitry type	Intertwined			Intertwined			Intertwined		