Integrated solutions to optimize your building’s performance

HVAC equipment systems

 YORK® water-cooled chillers
Scroll (YCWY)  50-200 tons, HFC-410A refrigerant.
Variable-Speed Screw (YVWA)  320-300 tons, HFC-134a refrigerant, future compatible with R-513A.

 YORK® absorption chillers
York Solution Endura™ outdoor air handling units  2,000-12,000 CFM, 2” foam double-wall panels with external frame, variable aspect, flexible factory-packaged controls. Membrane roof system with 10 year warranty, Endurashield™ exterior coating system, optional full-length service vestibule.
York Custom air handling units  2,000-200,000 CFM, indoor and outdoor, 2”, 3” or 4” foam double-wall panels with integral frame, full thermal break options, fully customizable.
York Large capacity centrifugal chillers (YK, YK-EP, CYK, OM) Up to 6,500 tons, HFC-134a refrigerant, future compatible with R-513A.
York Steam-turbine driven centrifugal (YST) 700-2,800 tons, HFC-134a refrigerant, future compatible with R-513A.

 YORK® air-cooled chillers
Scroll (YCAL & YLA**) 15-200 tons, HFC-410A refrigerant.
Variable-speed screw (YURA, YCWY**) 150-500 tons, HFC-134a refrigerant, future compatible with R-513A.
Free-cooling variable-speed screw (YVWA) 115-500 tons, free-cooling with optional waterside economizer, HFC-134a refrigerant, future compatible with R-513A.

 YORK® absorption chillers
Absorption chillers/heat pumps (YIAU/HAP) 30-2000 tons, water refrigerant, hot water, steam, natural gas, light oil.

 YORK® air handling units & coils
York Solution™ indoor air handling units 2,000-120,000 CFM, 2” foam double-wall panels with external frame, variable aspect, flexible factory-packaged controls.

 YORK® terminal boxes
VW terminal boxes  75-8,000 CFM, single or dual-duct, series or parallel fan-powered, flexible factory-packaged controls, water and electric heat options.
Blower coils  5,200 CFM, high capacity fan coil applications. Horizontal, vertical, centrifugal configurations and new configurations utilizing direct drive ECM technology.

 YORK® variable refrigerant flow (VRF) systems
Indoor units  3-36 tons, heat recovery and heat pump modules and low ambient type for extreme climates. Air-cooled condensing units with all inverter compressors and extended operating ranges.

 YORK® mini-split systems
Single zone  0.75-4 tons, single condensing unit with single indoor unit. Multiple styles, control options, capacities, operating ranges and efficiency ratings. Wi-Fi capable; Energy Star rated on select models. Inverter compressor standard on all models.
Multi zone  5-30 tons, single condensing unit with 2-5 indoor units. Multiple styles, control options, capacities, operating ranges and efficiency ratings. Wi-Fi capable; Energy Star rated on select models. Inverter compressor standard on all models.

 YORK® variable refrigerant flow (VRF) systems
Indoor units  3-36 tons, heat recovery and heat pump modules and low ambient type for extreme climates. Air-cooled condensing units with all inverter compressors and extended operating ranges.

 YORK® water-cooled chillers
Reversible chillers  2-50 tons, water-to-water heat pumps, (2-5 tons to 10-50 tons), modular application, geothermal capable.

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Psychrometric chart for HVAC analysis

Air-conditioning formulas and conversion factors

Atmospheric pressure = 29.921" Hg. at sea level
1 BTU = Amount of heat required to raise (or lower)
the temperature of one pound of water 1°F
1 ton of refrigeration = 12,000 Btu/hr = 200 Btu/min
1 watt = 3.414 Btu/hr
1 horsepower = 2545.6 Btu/hr
1 ft (head) = 0.433 psi (at 62°F)
1 boiler horsepower = 33,475 Btu/hr

Air changes per hour (N) in a space
N = (60 x CFM) / space ft³
CFM = airflow rate (ft³/min)

Water quantity (GPM) required for heating and cooling
GPM = q / (500 x Δt)
q = load in Btu/hr
t = water temperature

Chiller capacity (Tons)
Tons = (GPM x Δt) / 24
GPM = gallons per minute of chilled water
t = water temperature

Pump hp = (GPM x Δt x specific gravity) / 3960 x efficiency
Fan hp = (CFM x static pressure (in. W.G.) x density of air) / 6356 x efficiency

Altitude
Air density ratio at 70°F

2000 ft 0.930
4000 ft 0.864
6000 ft 0.801
8000 ft 0.743

Total cooling (Btu/hr) = CFM x 4.5 x Δh
Sensible cooling (Btu/hr) = CFM x 1.085 x Δt
Latent cooling (Btu/hr) = CFM x 4840 x Δw

Fan Laws
CFM₂ = CFM₁ x (RPM₂ / RPM₁)
SP₂ = SP₁ x (RPM₂ / RPM₁)²
HP₂ = HP₁ x (RPM₂ / RPM₁)³
₁ = initial; ₂ = desired

About Johnson Controls Building Technologies & Solutions

Johnson Controls Building Technologies & Solutions is making the world safer, smarter and more sustainable – one building at a time. Our technology portfolio integrates every aspect of a building – whether security systems, energy management, fire protection or HVACR – to ensure that we exceed customer expectations at all times. We operate in more than 150 countries through our unmatched network of branches and distribution channels, helping building owners, operators, engineers and contractors enhance the full lifecycle of any facility. Our arsenal of brands includes some of the most trusted names in the industry, such as Tyco®, YORK®, Metasys®, Ruskin®, Titus®, Frick®, PENN®, Sabroe®, Simplex® and Grinnell®. For more information, visit www.johnsoncontrols.com or follow @johnsoncontrols on Twitter.

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