

# HVAC Equipment for High-Performance Buildings

## Building Automation Systems



### Application and Data Server

Support of IT standards and Internet technologies  
Long-term trend data storage



### Network Automation Engine

Scalable family of engines from the smallest system to an enterprise network



### Field Equipment Controllers

Complete family of field controllers and accessories available with N2 open, LON, and BACnet capabilities



### Terminal Equipment Controllers

Equipment control from a single product: thermostat, controller and temperature sensor



### Wireless Components

Wireless field buses and room temperature sensing systems designed with the latest technology



### Integration Components

Adapts legacy systems to current component technology

## Chillers

### Air-Cooled, Electric



#### YORK YCAL, 10–65 TR

Scroll compressors  
HFC-410A refrigerant



#### Tempo YLAA, 65–150 TR

Scroll compressors  
HFC-410A refrigerant



#### Latitude™ YCIV/YCAV, 150–515 TR

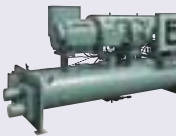
Variable-speed screw compressors  
HFC-134a refrigerant

## Water-Cooled, Electric



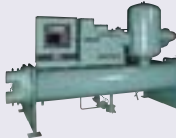
#### YORK YCWL, 50–150 TR

Scroll compressors  
HFC-410A refrigerant



#### YORK YS, 115–430 TR

Screw compressor, open-drive  
HFC-134a refrigerant



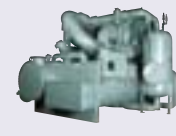
#### YORK YR, 200–435 TR

Screw compressor, semi-hermetic motor  
HFC-134a refrigerant



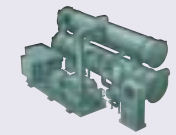
#### YORK YK/YD, 250–6000 TR

Centrifugal compressors  
HFC-134a refrigerant



#### YORK CYK, 500–3000 TR

High-head, compound centrifugal compressors  
HFC-134a refrigerant



#### YORK OM, 3000–8500 TR

Custom-designed, centrifugal compressor  
Also steam-drive and gas-drive

## Water-Cooled, Gas/Steam/Oil



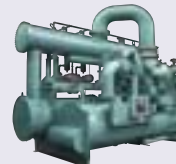
#### YORK YPC, 200–700 TR

Absorption chiller, two-stage  
Gas, oil, or high-pressure-steam drive  
Water refrigerant



#### YORK YIA, 120–1380 TR

Absorption chiller, single-stage  
Low-pressure-steam or hot-water drive  
Water refrigerant



#### YORK YST, 700–2800 TR

Centrifugal compressor, steam-turbine drive  
HFC-134a refrigerant

## Air-Handling Units and Coils



### Solution®, 1000–200,000 CFM

Indoor and outdoor applicable



### Coils

Hot water, cold water, glycol, steam, and refrigerant

## Condensing Units and Split Systems



### YORK YCUL, 15–130 TR

Scroll condensing unit, air-cooled  
HFC-407C or HCFC-22 refrigerant



### Split System, 7.5–50 TR

Scroll, air-cooled  
HCFC-22 refrigerant

## Packaged Equipment



### Outdoor

#### Single-Package Units

3–130 TR



### Indoor

#### Commercial Air-conditioners

Air-cooled, 2–25 TR  
Water-cooled, 5–105 TR



### Heat Pumps

Air-source, 3/4–3 TR  
Water-source, 1/2–6 TR



### Multi-story Residential Air-conditioners

Cooling, heating, and heat pump  
3/4–3 TR

## Terminal Units



### Low-Pressure Air Distribution

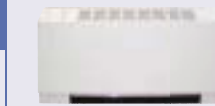
#### FlexSys™ System

Underfloor, variable-air-volume control  
Personal-comfort passive-diffuser option



#### AirFixture® Dual Airway® System

Overhead, variable-air-volume control



### Fan Coil Units

#### Variety of Models, 250–10,000 CFM

Exposed and concealed  
Horizontal and vertical  
Direct-drive and belt-drive



### VAV Terminal Boxes

#### Variety of Models, 75–8000 CFM

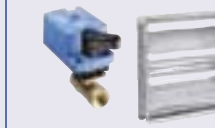
Single-duct  
Series fan-powered  
Parallel fan-powered

## Control Components



### Variable-Speed Drives

Open, enclosed and bypass  
Compatible with 1–500 HP motors  
Custom engineering available



### Valves, Actuators and Dampers

Global product family, broad selection,  
easy to order and use



### Sensors and Thermostats

Temperature, humidity and CO<sub>2</sub> sensors



### Refrigeration Controls

Temperature controls, pressure controls,  
flow switches, fan-speed controls  
and lube-oil controls



### Control Panels

Pre-wired and pre-assembled,  
standard and custom control panels

# 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

$$N = (60 \times \text{CFM}) / \text{space ft}^3$$

CFM = airflow rate (ft<sup>3</sup>/min)

Water quantity (GPM) required for heating and cooling

$$\text{GPM} = q / (500 \times \Delta t)$$

q = load in Btu/hr  
t = water temperature

Chiller capacity (Tons)

$$\text{Tons} = (\text{GPM} \times \Delta t) / 24$$

GPM = gallons per minute of chilled water  
t = water temperature

$$\text{Pump hp} = \frac{\text{GPM} \times \text{ft head}}{3960 \times \text{efficiency}} \times \text{specific gravity}$$

$$\text{Fan hp} = \frac{\text{CFM} \times \text{static pressure (in. W.G.)}}{6356 \times \text{efficiency}} \times \frac{\text{density of air}}{\text{density of standard air}}$$

Altitude	Air Density Ratio at 70°F
2000 ft	0.930
4000 ft	0.864
6000 ft	0.801
8000 ft	0.743

$$\text{Total cooling (Btu/hr)} = \text{CFM} \times 4.5 \times \Delta h$$

$$\text{Sensible cooling (Btu/hr)} = \text{CFM} \times 1.085 \times \Delta t$$

$$\text{Latent cooling (Btu/hr)} = \text{CFM} \times 4840 \times \Delta w$$

CFM = airflow rate (ft<sup>3</sup>/min)

h = enthalpy (Btu/lb)

t = dry bulb air temperature (°F)

w = humidity ratio (lb water / lb dry air)

Fan Laws

$$\text{CFM}_2 = \text{CFM}_1 \times (\text{RPM}_2 / \text{RPM}_1)$$

$$\text{SP}_2 = \text{SP}_1 \times (\text{RPM}_2 / \text{RPM}_1)^2$$

$$\text{HP}_2 = \text{HP}_1 \times (\text{RPM}_2 / \text{RPM}_1)^3$$

1 = initial; 2 = desired

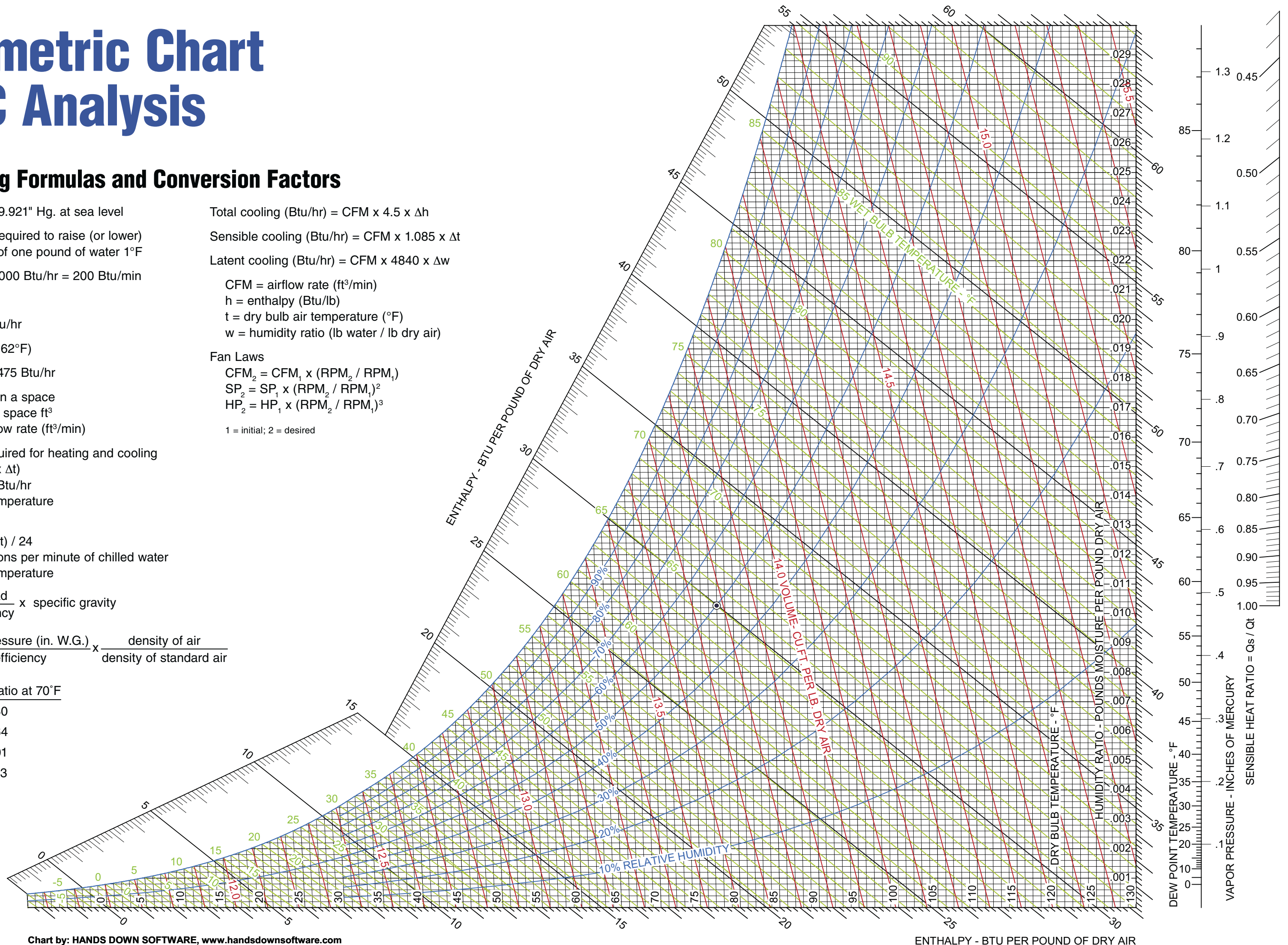


Chart by: HANDS DOWN SOFTWARE, www.handsdownsoftware.com

ENTHALPY - BTU PER POUND OF DRY AIR