

**EnergyXv2
Factory Installed Energy Recovery
WeatherMaster Commercial Rooftop Unit
15 to 25 Nominal Tons
with Puron® (R-410A) Refrigerant
and COMFORTLink™ Controls**

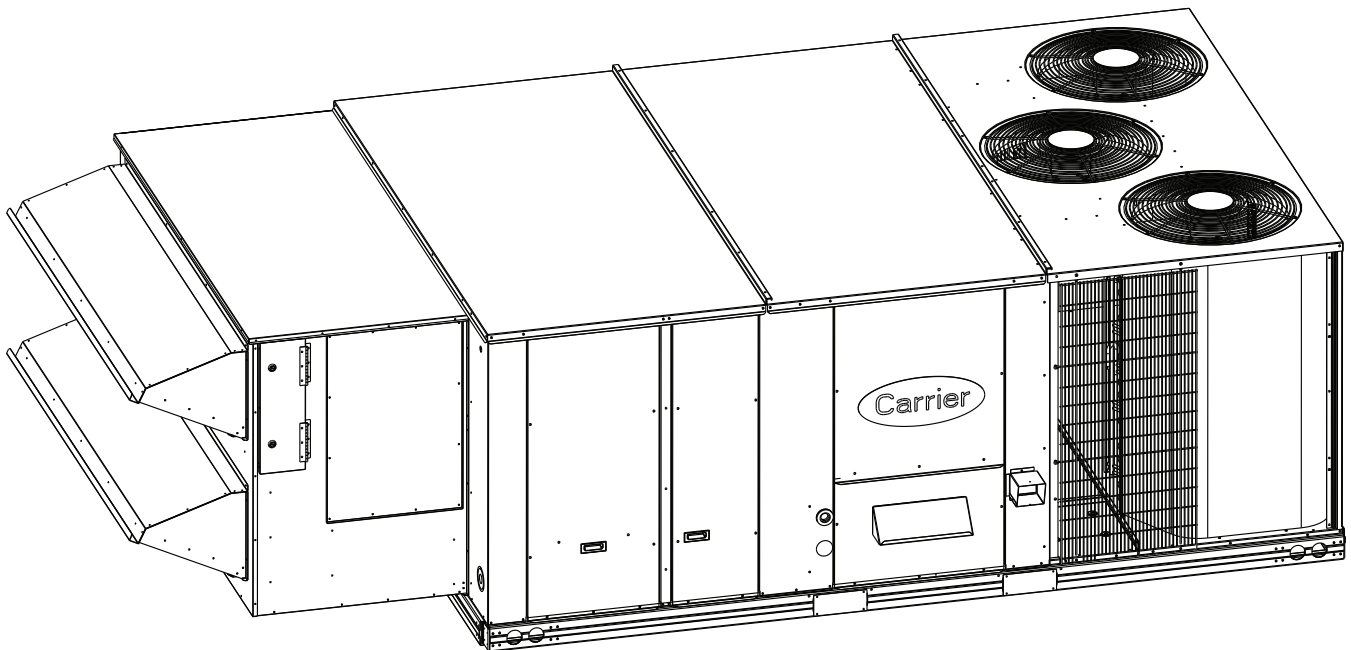


Advanced Product Data

This information is being provided to help specify and design future jobs utilizing the new WeatherMaster® 48/50HC 15 – 25 ton EnergyX™ energy recovery systems. Once the final information is published in a formal product data manual and application data manual, please use that data going forward.

Reference the Centurion™ Phase Out and Last Call bulletin for associated last order dates on Centurion EnergyX energy recovery systems.

Pricing will be provided to the Commercial Sales Managers in separate mailing.



C11309

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FEATURES AND BENEFITS

Just like the Centurion EnergyX energy recovery systems that it is replacing, the WeatherMaster EnergyX energy recovery system is a factory integrated, single piece, fully tested and agency listed energy recovery system specifically designed for the WeatherMaster series rooftop product family. It is factory installed on the rooftop unit and shipped as a single, integrated system. As with the Centurion units, the units are: single point power, single lift to the roof, integrated controls, and fit on a standard curb without extensions or sleeper rails; continuing to provide significant competitive advantages in energy recovery applications. The EnergyX system uses exhaust air to provide latent and sensible energy exchange from the intake air prior to entering either the unit DX coil or heating section. This preconditioning of air allows even higher system operating efficiencies and increased comfort control.

DETAILS AND DIFFERENCES

The WeatherMaster EnergyX energy recovery system is the next evolution in the WeatherMaster product. Building on the success and popularity of the high efficiency WeatherMaster rooftop by adding factory integrated energy recovery ventilators (ERV) further improves the energy efficiency, special application coverage, and comfort control of the existing WeatherMaster products. It contains all the energy recovery functions of the Centurion EnergyX, with the exceptions as described below.

Model number:

See Model Number Nomenclature Chart

Options:

See Model Number Nomenclature Chart: economizer and frost-protection

Accessories:

ERV motor status sensor, ERV filter maintenance sensor, horizontal curb adaptor, 2-position exhaust damper

Roofcurb:

Uses the standard base unit rooftop curb with no extension or support rail

Airflow:

See Physical Data Table. In contrast to the Centurion EnergyX, there is now only one airflow range per ERV thereby improving the ease of selection. As with the Centurion the unit is vertical supply & return only. Use curb accessory for horizontal airflow.

Energy recovery device:

AirXchange® AHRI certified, rotating energy wheel

Energy recovery fans:

Direct drive, variable speed, backwards curved

Controls:

ComfortLink version-5 (same as in current Centurion units)

Weight & dimensions:

See Certified Drawings

Electrical:

See Electrical Tables



MODEL NUMBER NOMENCLATURE

Position:

Example:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
4	8	H	C	D	D	2	4	A	2	A	6	A	0	A	0	A	0

1–2. Product Type

48 – Gas Heat – Elec.
Cool
50 – Elec. Cool – Elec.
Heat

3–4. Product Series

HC – High Efficiency

5. Heat Options

– No Factory–Installed Electric Heat
D – Low Heat Standard Gas Heat
E – Med Heat Standard Gas Heat
F – High Heat Standard Gas Heat
S – Low Heat Stainless Gas Heat
R – Med Heat Stainless Steel Gas Heat
T – High Heat Stainless Steel Gas Heat

6. Refrigerant & System Options

D – 2 Stage Cooling Models
E – 2 Stage Cooling Models w/ Humidi–MiZer

7–8. Nominal Cooling Capacity (Tons)

17 – 15 Tons
20 – 17.5 Tons
24 – 20 Tons
28 – 25 Tons

9. Sensor Options

A – None
B – RA Smoke Detector
C – SA Smoke Detector
D – RA + SA Smoke Det
E – CO2 sensor
F – RA Smoke + CO2
G – SA Smoke + CO2
H – RA + SA Smoke Det + CO2

10. Indoor Fan Options

1 – Standard Static – Belt Drive, Vertical SA/RA
2 – Medium Static – Belt Drive, Vertical SA/RA
3 – High Static – Belt Drive, Vertical SA/RA
B – Hi–Eff motor Medium Static – Belt Drive, Vertical SA/RA
C – Hi–Eff motor High Static – Belt Drive, Vertical SA/RA
5 – Standard Static – Belt Drive, Horizontal SA/RA
6 – Medium Static – Belt Drive, Horizontal SA/RA
7 – High Static – Belt Drive, Horizontal SA/RA
F – Hi–Eff motor Medium Static – Belt Drive, Horizontal SA/RA
G – Hi–Eff motor High Static – Belt Drive, Horizontal SA/RA

18. Packaging

0 – Standard

17. Electrical Options

A – None
C – Non–Fused Disconnect
D – Through–the–base Connectors
F – Non–Fused Disconnect &
Through–the–base Connectors

16. Service Options

0 – None
1 – Non–Powered Convenience Outlet
2 – Powered Convenience Outlet
3 – Hinged Panels

15. Intake / Exhaust Options

A – None
B – Temp Econo w/ Baro relief
D – Temp Econo w/ PE (cent) Vertical Only
F – Enthalpy Econo w/ Baro Relief
H – Enthalpy Econo w/ PE (cent) Vertical Only
K – 2–pos damper
P – Manual Outdoor Air Damper
Q – EnergyX Vertical Airflow Only
R – EnergyX + Economizer Vertical Airflow Only
S – EnergyX + Frost protection Vertical Airflow Only
T – EnergyX + Econo + Frost Protection Vertical
Airflow Only

14. Base Unit Controls

0 – Standard Electro–Mechanical Controls (EM)
1 – PremierLink
2 – RTU–Open
D – ComfortLink (Standard with EnergyX)

13. Factory Design Revision –

12. Voltage–Phase–Hz

1 – 575–3–60
5 – 208/230–3–60
6 – 460–3–60

11. Coil Options (outdoor / Indoor)

A – AL cond /AL evap
B – Pre–coat cond , std evap
C – E–coat AL cond, std evap
D – E–coat AL cond , E–coat AL evap
E – Copper cond / AL evap
F – Copper cond / CU evap
M – AL cond / AL evap, Louvered Hail Guard
N – PreCoat AL cond / AL evap, Louvered Hail Guard
P – ECoat cond / AL evap, Louvered Hail Guard
Q – ECoat cond / ECoat AL evap, Louvered Hail Guard
R – CU cond / AL evap, Louvered Hail Guard
S – CU cond / CU evap, Louvered Hail Guard

NOTE: See Page 6 for other special notes.

AHRI PERFORMANCE RATING SECTION

					Atlanta		Miami		Phoenix		Montreal		Detroit	
UNIT 48HC	RTU AHRI EER	ERV WHEEL	RTU AIR- FLOW (CFM)	ERV AIR- FLOW (CFM)	ERV RER	CEF	ERV RER	CEF	ERV RER	CEF	ERV RER	CEF	ERV RER	CEF
17	12.0	ERC-3628	5250	3800	68.67	16.60	80.82	17.59	61.82	16.05	43.08	14.52	55.58	15.54
20	12.0	ERC-3628	5950	3800	68.67	16.01	80.82	16.87	61.82	15.52	43.08	14.2	55.58	15.08
24	12.0	ERC-4646C	7000	5500	76.27	17.19	89.95	18.29	68.73	16.58	47.97	14.9	61.80	16.02
28	11.2	ERC-4646C	8750	5500	76.27	15.38	89.95	16.25	68.73	14.89	47.97	13.56	61.80	14.45

					Atlanta		Miami		Phoenix		Montreal		Detroit	
UNIT 50HC	RTU AHRI EER	ERV WHEEL	RTU AIR- FLOW (CFM)	ERV AIR- FLOW (CFM)	ERV RER	CEF	ERV RER	CEF	ERV RER	CEF	ERV RER	CEF	ERV RER	CEF
17	12.2	ERC-3628	5250	3800	68.67	16.86	80.82	17.86	61.82	16.29	43.08	14.75	55.58	15.78
20	12.2	ERC-3628	5950	3800	68.67	16.26	80.82	17.13	61.82	15.76	43.08	14.42	55.58	15.32
24	12.2	ERC-4646C	7000	5500	76.27	17.45	89.95	18.57	68.73	16.83	47.97	15.13	61.80	16.27
28	11.4	ERC-4646C	8750	5500	76.27	15.63	89.95	16.53	68.73	15.14	47.97	13.79	61.80	14.69

† CEF = Combined Efficiency factor. As described in AHRI Guideline V, the CEF is the efficiency of a system incorporating an ERV component with a unitary packaged air conditioner, heat pump, etc. Units vary according to the application. CEF is a dimensionless value as it may be expressed in Btu/(W · h) or in W/W. CEF is calculated per ARI Guideline V calculations using nominal flow rates and temperatures. CEF is analogous to a "system EER" where the system consists of the RTU + ERV. Actual CEF value will vary based on actual location, airflows and temperatures. Contact your Carrier Sales Engineer for additional information.

TYPICAL SELECTION PROCEDURE

When selecting the WeatherMaster Series Unit and EnergyX system to use on a given application, it is strongly recommended that the Carrier Packaged RTU Builder (PRB) Selection Software be used. This is because there are a number of variables which become complex when manual calculations are performed, but can easily be accounted for in a computer operation. Most specifically, the AHRI certified ratings use Standard CFM values, but due to real world operation, variances in altitude and air density are very important. The Carrier PRB software uses altitude corrected airflows (ACFM).

See Carrier's Packaged Rooftop Builder selection software for automated calculation of unit selection and Combined Efficiency Factor (CEF) values.

Typical Energy Recovery unit selection involves the following steps:

1. Determine the zone cooling and heating requirements at the design conditions.
2. Select Energy Recovery unit based on desired outdoor airflow rate.
Note: It is recommended that the outdoor airflow and exhaust airflow rates be designed at the same or close to the same value. If the difference between the two airflows becomes large enough, the energy recovery unit's cooling capacity, heating capacity and overall efficiency will be negatively impacted.
3. Calculate the Energy Recovery unit's leaving air conditions and unit capacities based on the outside airflow rate, temperature (dB & WB) and exhaust airflow rate and temperatures (dB and WB) at the design temperatures and maximum ventilation rate.
4. Subtract the Energy Recovery unit's cooling and heating capacities from the design zone requirements. The value that remains is the necessary design size of the rooftop unit.
5. Use the Energy Recovery unit's leaving air temperatures (dB and WB) as the ventilation air temperatures entering the rooftop unit to be mixed with the return air before passing through the rooftop unit's evaporator.
6. After selecting the desired Energy Recovery unit and rooftop unit, use AHRI's Guideline V to calculate the Combine Efficiency Factor (system EER).

Additional information on Energy Recovery capacity calculations and leaving air temperature calculations can be found in the two AHRI documents below:

AHRI Guideline V – CALCULATING THE EFFICIENCY OF ENERGY RECOVERY VENTILATION AND ITS EFFECT ON EFFICIENCY AND SIZING OF BUILDING HVAC SYSTEMS

AHRI Standard 1060 - PERFORMANCE RATING OF AIR-TO-AIR HEAT EXCHANGERS FOR ENERGY RECOVERY VENTILATION EQUIPMENT

OPTIONS & ACCESSORIES

DESCRIPTION	FACTORY OPTION	FIELD ACCESSORY
EnergyX	X	
EnergyX with Economizer	X	
EnergyX with Frost Protection	X	
EnergyX with Frost Protection and Economizer	X	
Motor Status Sensor		X
Filter Maintenance Sensor		X
Horizontal Curb Adapter		X
Two Position Exhaust Damper		X

Special Notes:

EnergyX requires ComfortLink Controls

EnergyX is only available in Vertical Supply/Return Air configuration

EnergyX with optional Economizer includes Power Exhaust Fan

CO2 Sensor must be field installed (wall or duct) on EnergyX models

Use of CO2 Sensor for Demand Control Ventilation (DCV) requires and Economizer

CONTROLS

The EnergyX v2 Energy Recovery Ventilator (ERV) module is controlled by a digital controller located inside the EnergyX chassis. It communicates with the WeatherMaster ComfortLINK controller via a UPC translator module which connects to the WeatherMaster rooftop unit's ComfortLINK controller via a LEN cable. All controller settings and configuration are input via the ComfortLINK scrolling marquee display.

All control points, including outdoor airflow, exhaust airflow and CO2 setpoints are configured via the ComfortLink scrolling marquee interface. (Note: CO2 sensor requires a factory installed economizer.)

The EnergyX v2 energy recovery unit pre-conditions the outdoor air before it mixes with the return air and enters the rooftop unit evaporator coil. As a result, the EnergyX v2 operation is mostly independent of the rooftop unit operation except to allow the space conditioning needs to be met without RTU compressor operation or RTU heat operation for a significantly wider range of ambient temperatures (than a unit without an energy recovery module). This is achieved either by the pre-conditioning of the EnergyX v2 wheel or the economizer (if equipped). The EnergyX will pre-condition the outside air in the cooling and heating modes of operation.

For more information regarding controller operation, see the EnergyX v2 Start-Up, Operations, and Troubleshooting supplement manual.

OPERATING SEQUENCE

General

The sequence below describes the sequence of operation for a WeatherMaster unit with ComfortLINK controls and an EnergyX v2. For more information regarding controller operation, see the EnergyX v2 Start-Up, Operations, and Troubleshooting supplement manual.

The EnergyX module will not activate unless the RTU fan is on. The EnergyX v2 default condition is to remain off in the unoccupied mode, however, this can be over-ridden via the control set points.

Cooling Operation

When the ComfortLINK controller recognizes that the conditioned zone requires cooling (via the space temperature sensor or space thermostat) the EnergyX module is activated. The EnergyX control module follows the sequence of operation logic as listed below.

Step 1 — Economizer Operation

First, the EnergyX module checks if the outside air is suitable for free cooling via the outside air enthalpy sensor. If the outside air is suitable for free cooling and the unit has an economizer, the EnergyX will operate in "ventilation mode" where the wheel will remain off but the ERV economizer will modulate in free-cooling. If the unit is in Unoccupied mode, then the unit will not operate in economizer mode and will proceed to step-2.

Step 2 — Wheel Operation

If the outside air is not suitable for free cooling, then the EnergyX will operate in either cooling or heating mode as called for by the rooftop unit ComfortLINK controller. Note: if the unit is in Unoccupied mode, the default configuration is that the EnergyX module will not operate. This can be over-ridden by an adjustable set point in the ERV controller.

Cooling Operation

If the outside air is not suitable for free cooling then the EnergyX wheel will activate and the supply fan will activate per the CFM set point.

Modulating EnergyX Units Only - If a CO2 sensor is used (connected to the RTU ComfortLINK controller) the supply fan will modulate between the DCV minimum and DCV maximum set points. The exhaust fan will modulate to follow the supply fan operation per the Exhaust CFM-offset value. If the economizer opens more than 5%, the wheel utilizes a "stop-jog" operation to periodically rotate the wheel and minimize potential dirt build-up and excess wear on one section of the wheel. (Note: CO2 sensor requires a factory installed economizer).

Constant Volume EnergyX Units Only - A typical CO2 system used for Demand Control Ventilation allows the rooftop unit economizer to close below the normal minimum ventilation position unless a high CO2 signal is received. This reduces operational cost by not allowing excess ventilation air unless required due to high occupancy load. The high CO2 signal indicates the presence of larger number of occupants and a need for higher volumes of ventilation air. In this situation, the economizer would then open to a position above the normal minimum ventilation position to bring in more outdoor air. However, in a constant volume EnergyX unit, the ERV constant volume outdoor air ventilation setting is already set at this higher volume of outdoor air. Use of a CO2 sensor would artificially reduce the ERV pre-conditioning affect and thus reduce the efficiency of the ERV operation.

Heating Operation

When the ComfortLINK controller sees that the space requires heating via the space temperature sensor or when the thermostat or calls for heating, the EnergyX module is activated. The ERV wheel will rotate and the supply fan will activate per the CFM set point. **Modulating EnergyX Units Only** - If a CO2 sensor is used (connected to the RTU ComfortLINK controller) the supply fan will modulate between the DCV minimum and DCV maximum set points. The exhaust fan will modulate to follow the supply fan operation per the Exhaust CFM-offset value, via the Economizer Control Board (ECB).

OPERATING SEQUENCE (cont.)

Supply and Exhaust Air Frost Control Operation

When the factory installed frost protection option is used, the EnergyX module will sense pressure differential across the energy recovery cassette. The supply blower will be shut-off if the pressure differential across the energy recovery cassette exceeds the adjustable set point value. The blower will remain off for 5 minutes. The exhaust blower and wheel will remain on, in order to remove any frost build-up on the wheel.

EnergyX Wheel Maintenance and Blower Indicator Operation

When the optional factory installed wheel maintenance indicator is used, a proxy sensor monitors the EnergyX wheel and sends a corresponding alarm signal when appropriate. Pressure switches are used to detect and activate the unit alarm when blowers are not running.

EnergyX Filter Maintenance Indicator Operation

When the optional factory installed filter maintenance indicator is used, a factory--installed differential pressure switch measures pressure drop across the outside air filter and activates a field--supplied dry contact indicator when the pressure differential exceeds the adjustable switch set point. EnergyX operation is not interrupted.

APPLICATION DATA

Energy Recovery

Energy recovery devices such as the EnergyX typically result in substantial energy savings over other outdoor air devices. Specifically, the EnergyX adds sensible and latent capacity as well as additional stages of cooling and heating operation to the Rooftop Unit. Due to the EnergyX's significantly lower input watts than the corresponding RTU compressor(s), proper control strategies for this device maximize its operation to reduce the run time of the RTU compressor(s). This results in a much higher system efficiency than can typically be achieved by using a rooftop unit of the same total capacity.

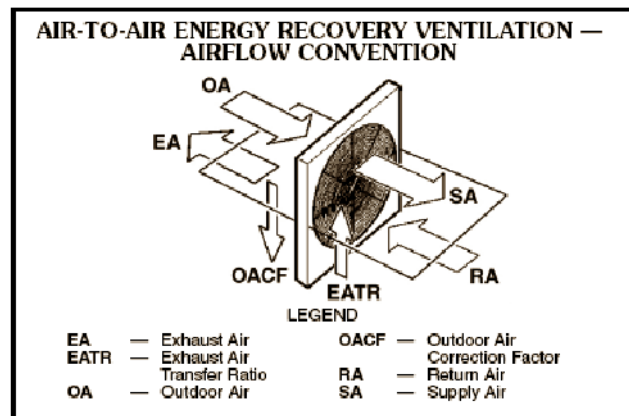
The EnergyX v2 with its modulating airflow capability allows a designer to increase the amount of outside air significantly more than normal with the following benefits:

- Reduced rooftop unit sizing - The more air that passes through the energy recovery device reduces the load (and potential unit size) on the rooftop unit's compressors and heating system
- Higher system cooling and heating efficiencies - Since the EnergyX v2 uses the power of 'rotary enthalpy transfer' as opposed to mechanical compression conditioning of the ventilation air resulting in a much higher operating efficiency (RER) of the energy recovery unit and system Combined Efficiency Factor (CEF). The higher the airflow through the EnergyX v2,

the higher the system efficiency (CEF) value. Since the EnergyX v2 also conditions ventilation air in the heating mode, the necessary amount and/or operation of the rooftop unit heat system is reduced.

- Better part-load conditioning – as the EnergyX is able to modulate its airflow, the ability to match the changing zone part-load capacity (in cooling and in heating) is greatly increased.
- Higher air change rates – Larger amounts of ventilation air allows the zone air to be flushed out more often. This can contribute significantly to reduced sickness and more productive operating environments.

All ventilated spaces are good candidates for energy recovery systems. The applications that benefit most are those that require a large amount of outside air for a space that has a low internal load. This is true because most outside air loads are latent which requires a larger rooftop unit to accommodate both internal and ventilation loads. Advantages of the ERV unit include the ability to reduce the size of the rooftop unit, provide better humidity levels and provide a stable, tempered space.



Examples of ERV applications are classrooms, churches, conference rooms, game rooms, auditoriums, movie theaters, day care centers, nursing homes, funeral homes, dormitories, and clinics. Retrofits of existing systems to handle outside air without modifying the rooftop unit are excellent applications. Other examples are bars, restaurants, casino/game rooms, barber/beauty shops, bingo halls, locker rooms, recreational facilities and health clubs. Animal shelters such as veterinary clinics and kennels have been very successful implementations. Retail spaces and manufacturing facilities are also good applications.

If the outside air requirement is greater than 10% of a rooftop unit's supply air rating the EnergyX v2 unit should be considered to enhance the comfort of the occupants and reduce the tonnage of the rooftop unit. Carrier's Packaged RTU Builder selection software program offers a quick, simple look at the advantages and payback of the EnergyX v2 system.

ASHRAE 62.1 Air Classification Requirements

The EnergyX v2 allows for easy compliance with the current ASHRAE Standard 62.1 Air Classification Requirements. Pollutant transfer via Desiccant is a 'non issue' since by virtue of the ASHRAE "classes of air" the main determinant is EATR or cross transfer of air by leakage from exhaust to supply. Since the EATR is an AHRI Certified measurement of an AHRI certified wheel device, the user can be assured of meeting the air dilution requirements of ASHRAE 62.1 and therefore the air classification requirements.

Industrial Applications are by definition those that are Class 4 air (or worse). Most wheel manufacturers do not encourage application of wheels to these types of applications. When required, many wheel manufacturers make specialty wheels with specific mechanical purge construction for industrial applications, that can be used to field-replace the factory provided wheels. Contact the applicable wheel manufacture for specific application details.

Choosing the proper airflow is essential. Unit selection guidance for the EnergyX v2 is in definite contrast to typical unit sizing and selections. Typical unit sizing methods are to select the energy recovery device per the desired amount of outdoor air and then calculate the total capacity of the resulting energy recovery unit. This capacity is then subtracted from the desired total capacity for the conditioned zone. The remaining value is the necessary capacity of the rooftop unit. By conventional cooling & heating capacity guidance, the effort is to reduce the amount of outside (ventilation air) as much as possible since this additional ventilation air results in increased load on the rooftop unit compressor and heating sections.

Note that all units can be used in applications that require more or less airflow than the published CFM operating range as long as the airflow range is within the capabilities of the EnergyX v2 fan system. This option can be used for high-static applications. Although performance is optimized at equal exhaust and supply airflow rates, the selection program and the EnergyX v2 unit can be used with unequal airflow amounts. The unit must be sized for the largest airflow amount. The smaller airflow used cannot be less than 50% of the larger airflow in the published range.

Energy recovery wheels

Carrier's EnergyX v2 energy recovery wheels consist of a welded stainless steel hub, spoke and rim assembly, which is independent of the heat transfer matrix. The heat transfer matrix is contained in patented energy transfer segments, removable from the wheel without requiring tools. The energy wheel uses a unique parallel plate geometry and polymer film substrate to provide an optimized heat exchanger design. The polymer film

construction is not subject to corrosion in coastal locations or swimming pool areas.

Silica gel technology

The EnergyX v2 energy recovery wheels use the desiccant material known as silica gel, which is a highly porous solid adsorbent material that structurally resembles a rigid sponge. It has a very large internal surface composed of myriad microscopic cavities and a vast system of capillary channels that provide pathways connecting the internal microscopic cavities to the outside surface of the sponge. Silica gel enthalpy wheels transfer water by rotating between two air streams of different vapor pressures. The vapor pressure differential drives molecules into/from these cavities to transfer moisture from the more humid airstream to the drier airstream.



Adsorption: silica gel vs. molecular sieve

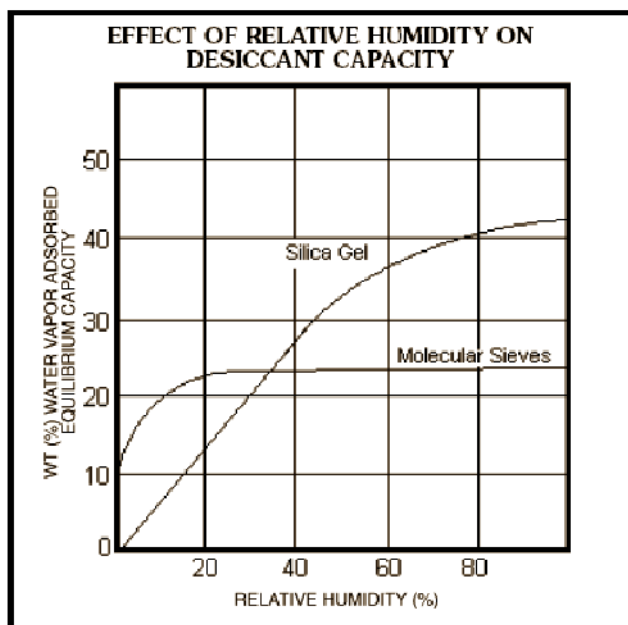
The graph below shows the effect of Relative Humidity on Desiccant Capacity characteristic curve for adsorption of water on silica gel. It shows the percent weight adsorbed versus relative humidity of the airstream in contact with the silica gel. The amount of water adsorbed rises linearly with increasing relative humidity (RH) until RH reaches near 60%. It then plateaus at above 40% adsorbed as relative humidity approaches 100%. For contrast, the curve for molecular sieves rises rapidly to plateau at about 20% adsorbed at 20% RH.

The Effect of Relative Humidity on Desiccant Capacity graph explains the following application considerations:

- Molecular sieves are preferred for regenerated applications such as desiccant cooling and dehumidification systems that must reduce the processed air streams to very low relative humidities.
- Silica gel has superior characteristics for recovering space conditioning energy from exhaust air and handling high relative humidity outside conditions.

The transfer of water by adsorption/desorption is not dependent on temperature. Therefore, the silica gel

enthalpy wheel works to reduce latent load at difficult part-load conditions.



Fungal growth and moisture transfer

Carrier EnergyX v2 units have silica gel-based desiccant wheels. The water molecules are individually transferred by desorption/adsorption to and from the silica gel surfaces. Water is present on the wheel in a molecular layer only, and condensation does not occur. Therefore, Carrier's energy recovery wheels experience dry moisture transfer; there is no bulk liquid water present that could support fungal growth. Water transfer to and from the wheel's desiccant surfaces occurs in the vapor phase; there are no wet surfaces and liquid water does not enter the airstream. Silica gel is also highly selective for water, based on the strong preference of the gel surface for the dipolar water molecule over other compounds.

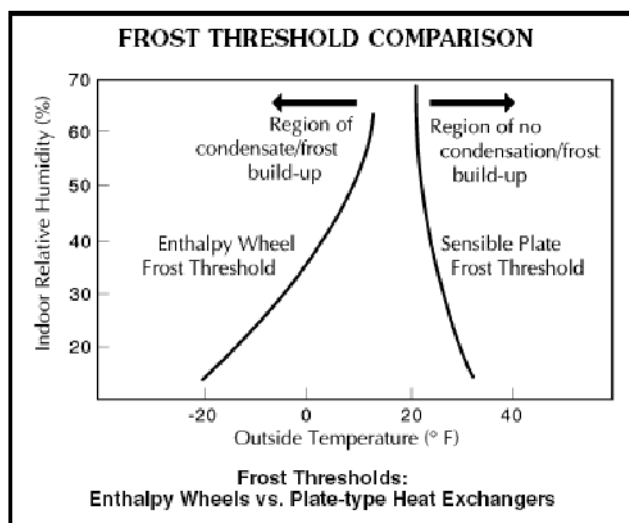
Frost control requirements

Energy recovery systems require frost protection or a means of defrosting in climates that experience severe winter conditions. Frost formation results in a reduction and eventual blockage of airflow through the energy wheel.

Frost formation causes reduced airflow through the heat exchanger. Without frost control, energy recovery and airflow may be significantly reduced. The frost threshold temperature is the point at which frost begins to accumulate on heat exchanger surfaces. It is a function of both outside temperature and indoor relative humidity.

The Frost Threshold Comparison figures compares the frost threshold of a plate-type sensible heat exchanger with that of an enthalpy wheel. Note that frost forms at temperatures between 22 F and 30 F in a plate-type heat exchanger, frost threshold temperatures for enthalpy wheels are generally 20 to 30 degrees lower, approximately 0° F to 20 F. This is because the enthalpy wheel removes water from the exhaust airstream, effectively lowering the exhaust's dew point. The water removed is subsequently picked up through desorption by

the entering outdoor air. Depending on the indoor relative humidity in areas where winter outside temperatures are between -5 F and 22 F, enthalpy wheel based recovery systems have a significant advantage over sensible plate type units because there is no additional cost for frost control. Even in cold areas, in most cases, enthalpy wheel based systems for schools and office buildings can be designed without frost control because most of the frosting hours are at night when the building is unoccupied. Consult bin data, such as that provided by ASHRAE, to qualify daytime applications in cold climates for frost-free operation.



The Frost Thresholds Temperatures table below lists typical frost threshold temperatures for Carrier's EnergyX v2 energy recovery wheels over a wide range of indoor-air temperatures and relative humidity. Frost control is not required until outdoor air temperatures are below the threshold.

INDOOR AIR RH (%)	INDOOR AIR DRY BULB TEMPERATURE			
	70 F	72 F	75 F	80 F
20	-14	-13	-11	-8
30	-3	-2	-1	3
40	5	7	9	11
50	12	13	15	18
60	18	19	21	26

In regions where winter temperatures are extreme, Carrier's energy recovery wheels can be used effectively with the Frost Protection Factory Installed Option (FIOP) NOTE: Refer to ASHRAE for bin data in cold climates where the threat of wheel frosting is frequent. Consult this information to ensure appropriate preheat techniques are used during occupied times.

Frost prevention for frost control is required in extremely cold climates to preserve performance and assure the continuous supply of outdoor air. Enthalpy wheel frost control strategies take advantage of inherently low frosting thresholds. This results in minimized energy use and maximized design load reductions. In regions that experience extreme winter conditions, the Frost Protection FIOP allows the exhaust fan to operate below the frost

threshold temperature; however, a temperature sensor would disable the supply fan when the outdoor-air temperatures reach the frost control set point. The outdoor-air temperature sensor is located in the outdoor air intake of the ERV section. To avoid depressurization of the space, fresh air dampers may be required as part of the building's ventilation system.

Economizers

As promulgated by ASHRAE, economizers reduce operating expenses and compressor run time by providing a source of free cooling and a means of ventilation to match changing application needs. When properly designed (per ASHRAE standards), the economizer will control the amount of outdoor air allowed into the building and is integrated with the operation of the compressors. Carrier economizers are properly designed and allow free cooling to occur when the outdoor air is suitable depending upon the control strategy chosen.

It has also been proven (by multiple independent sources) that using economizers with a Demand Control Ventilation (CO₂) strategy will result in considerable energy savings over a manual damper, 2-position damper or no damper applications. This is because manual and 2-position dampers allow air to be brought in at a fixed rate, with no variability as the outside air conditions change. Economizers with DCV control allows the outside ventilation air to be reduced to the minimum building ventilation requirements as required by the actual occupancy load, which in turn reduces the load on the unit compressors.

It is recommended that an economizer option always be used with the EnergyX v2. This allows for true free cooling operation when the outside air conditions allow for it.

Wheel Cleaning

The EnergyX v2 includes a 5 year wheel warranty as a standard product feature. Wheels are self cleaning from dry dust and dirt due to laminar airflow through the wheel. If volatile organic compounds (VOC's) are present, wheels need to be 'deep' cleaned just like evaporator coils must be in order to maintain latent recovery performance. Since it is easier and less risky to clean a wheel outside of the HVAC unit than within, EnergyX v2 unit construction allows for easy wheel segment removal.

It is recommended that a different wheel segment be cleaned each time the unit air filters are changed in order to ensure periodic entire wheel cleaning. Wheel cleaning can be done simply and easily by hand. Proper wheel cleaning does not remove wheel desiccant. See the EnergyX v2 Controls & Troubleshooting Supplement Instructions for additional wheel cleaning and service information.

EXHAUST FAN PERFORMANCE

Many applications that utilize energy recovery incorporate ducted return/exhaust air paths. In these applications, it is important to consider the duct pressure of the return/exhaust just as a designer would consider the effects of the supply duct static pressure on the airflow of the rooftop unit itself.

EnergyXv2 Modulating Volume 15-25 ton Units – The exhaust fan in the Modulating Volume EnergyXv2 unit will assist the rooftop unit fan in pulling air through the exhaust/return duct. These exhaust fans are backwards curved impeller designs which are capable of significant more static pressure operation than typical forward curved fan designs. The following exhaust fan performance curves are provided for additional guidance when considering return/exhaust duct design.

NOTE: If application designs require two separate ducts (one for exhaust air, one for return air) contact your Carrier Sales Engineer for additional guidance prior to specification or ordering.

PHYSICAL DATA

Model	48/50HC 15 -17.5 Ton (EMPXXXX -EMRXXXX)	
EnergyX size	HIGH NON ECONO CFM	HIGH ECONO CFM
EnergyX unit type	Modulating Air Flow Capability	
ERV WHEEL OA (CFM)	3900	3900
ERV WHEEL EA (CFM)	3900	3900
MAX ECONOMIZER OA (CFM)	3900	6000-7000
MAX ECONOMIZER EA (CFM)	3900	6000-7000
ENERGY RECOVERY WHEEL		
TYPE	Enthalpy Lightweight Polymer with Silica Gel Desiccant Coating	
MODEL (AirXchange)	ERC-3628 C	ERC-3628 C
SIZE (Dia. X Depth) (in.)	36 x 3	36 x 3
NOMINAL DRIVE MOTOR HP	1/20	1/20
SUPPLY FAN #1		
QTY - TYPE	1 - Backward Curved	1 - Backward Curved
DRIVE TYPE	Direct	Direct
BLOWER SIZE (DIAMETER)	400mm	400mm
NOMINAL MOTOR HP	1.179	1.179
SUPPLY FAN #2		
QTY - TYPE	1 - Backward Curved	1 - Backward Curved
DRIVE TYPE	Direct	Direct
BLOWER SIZE	400mm	400mm
NOMINAL MOTOR HP	0.179	1.179
EXHAUST FAN #1		
QTY - TYPE	1 - Backward Curved	1 - Backward Curved
DRIVE TYPE	Direct	Direct
BLOWER SIZE	500mm	500mm
NOMINAL MOTOR HP	3.619	4.619
EXHAUST FAN #2		
QTY - TYPE	N/A	1 - Backward Curved
DRIVE TYPE		Direct
BLOWER SIZE		500mm
NOMINAL MOTOR HP		3.619
FILTERS		
TYPE	2-in. Pleated, 30% Efficiency	
SUPPLY AIR (QTY) - SIZE	(3) 18 x 24 x 2	(3) 18 x 24 x 2
EXHAUST AIR (QTY) - SIZE	(3) 25 x 20 x 2	(3) 25 x 20 x 2
TYPE	Aluminum Water Filter	
Water Entrapment (QTY) - SIZE	N/A	(2) 15.94" X 32.94"X1"
* Wheel drive motor HP based upon standard motor data from AirXchange		

PHYSICAL DATA (cont.)

Model	48/50HC 20 - 25 Ton (EMSXXXX -EMTXXXX)
EnergyX size	HIGH ECONO CFM
EnergyX unit type	Modulating Air Flow Capability
ERV WHEEL OA (CFM)	6000
ERV WHEEL EA (CFM)	6000
MAX ECONOMIZER OA (CFM)	8000-10000
MAX ECONOMIZER EA (CFM)	8000-10000
ENERGY RECOVERY WHEEL	
TYPE	Enthalpy Lightweight Polymer with Silica Gel Desiccant Coating
MODEL (AirXchange)	ERC-5262
SIZE (Dia. X Depth) (in.)	52 x 3
NOMINAL DRIVE MOTOR HP	1/6
SUPPLY FAN #1	
QTY - TYPE	1 - Backward Curved
DRIVE TYPE	Direct
BLOWER SIZE (DIAMETER)	500mm
NOMINAL MOTOR HP	4.619
SUPPLY FAN #2	
QTY - TYPE	1 - Backward Curved
DRIVE TYPE	Direct
BLOWER SIZE	500mm
NOMINAL MOTOR HP	4.619
EXHAUST FAN #1	
QTY - TYPE	1 - Backward Curved
DRIVE TYPE	Direct
BLOWER SIZE	500mm
NOMINAL MOTOR HP	4.619
EXHAUST FAN #2	
QTY - TYPE	1 - Backward Curved
DRIVE TYPE	Direct
BLOWER SIZE	500mm
NOMINAL MOTOR HP	4.619
FILTERS	
TYPE	2-in. Pleated, 30% Efficiency
SUPPLY AIR (QTY) - SIZE	(4) 18 x 25 x 2
EXHAUST AIR (QTY) - SIZE	(3) 25 x 20 x 2
TYPE	Aluminum Water Filter
Water Entrapment (QTY) - SIZE	(3) 19.625 x 15.625 x1
* Wheel drive motor HP based upon standard motor data from AirXchange	

ELECTRICAL DATA

48/50HC With ERV - Without Economizer

48/50HC	V-Ph-Hz	UNIT VOLTAGE RANGE		COMP 1		COMP 2		OFM (ea)		IFM					COMBUSTION FAN MOTOR (48 series only) FLA	PWR EXH		ERV Motors *						ERV Total FLA	
		MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA	TYPE	Max WATTS	Max AMP Draw	EFF at Full Load	FLA		QTY	FLA (ea)	Exhaust		Supply		Wheel			
																		QTY	FLA (ea)	QTY	FLA (ea)	QTY	FLA (ea)		
17	208-3-60	187	253	25.0	164	25.0	164	350	1.5	STD	2278	7.9	81.3%	7.5	0.52	2	5.9	1	7.8	2	3.9	1	0.6	16.2	
											MED	2694	10.7	83.8%											10.2
											HIGH	4559	15.8	83.6%											15.0
	230-3-60	187	253	25.0	164	25.0	164	350	1.5	STD	2278	7.9	81.3%	7.5	0.52	2	5.9	1	7.8	2	3.9	1	0.6	16.2	
											MED	2694	10.7	83.8%											10.2
											HIGH	4559	15.8	83.6%											15.0
460-3-60	414	506	12.8	100	12.8	100	277	0.9	STD	2278	3.6	81.3%	3.4	0.3	2	3.1	1	3.4	2	1.8	1	0.3	7.3		
										MED	2694	5.0	83.8%											4.8	
										HIGH	4559	7.8	83.6%											7.4	
575-3-60	518	633	9.6	78	9.6	78	397	0.6	STD	1870	2.9	81.1%	2.8	0.24	2	2.4	1	3.4	2	1.8	1	0.3	7.3		
										MED	1870	2.9	81.1%											2.8	
										HIGH	4470	5.9	83.6%											5.6	
20	208-3-60	187	253	27.6	191	25.0	164	350	1.5	STD	2694	10.7	83.8%	10.2	0.52	2	5.9	1	7.8	2	3.9	1	0.6	16.2	
											MED	4559	15.8	83.6%											15.0
											HIGH-HI	5644	18.0	89.5%											17.1
	230-3-60	187	253	27.6	191	25.0	164	350	1.5	STD	2694	10.7	83.8%	10.2	0.52	2	5.9	1	7.8	2	3.9	1	0.6	16.2	
											MED	4559	15.8	83.6%											15.0
											HIGH-HI	5644	18.0	89.5%											17.1
460-3-60	414	506	12.8	100	12.2	100	277	0.9	STD	2694	5.0	83.8%	4.8	0.3	2	3.1	1	3.4	2	1.8	1	0.3	7.3		
										MED	4559	7.8	83.6%											7.4	
										HIGH-HI	5644	9.0	89.5%											8.6	
575-3-60	518	633	9.6	78	9.0	78	397	0.6	STD	1870	2.9	81.1%	2.8	0.24	2	2.4	1	3.4	2	1.8	1	0.3	7.3		
										MED	4470	5.9	83.6%											5.6	
										HIGH-HI	6978	8.0	89.5%											7.6	

* On 575V units, the ERV motors are 460V

48/50HC With ERV - Without Economizer

* On 575V units, the ERV motors are 460V

ELECTRICAL DATA (cont.)

48/50HC With ERV and Economizer

48 50HC	V-Ph-Hz	UNIT VOLTAGE RANGE		COMP 1		COMP 2		OFM (ea)		IFM TYPE	Max WATTS	Max AMP Draw	EFF at Full Load	FLA	COMBUSTION FAN MOTOR (48 series only) FLA	ERV Motors *						ERV Total FLA
		MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA							Exhaust		Supply		Wheel		
																QTY	FLA (ea)	QTY	FLA (ea)	QTY	FLA (ea)	
17	208-3-60	187	253	25.0	164	25.0	164	350	1.5	STD	2278	7.9	81.3%	7.5	0.52	2	7.8	2	3.9	1	0.6	24.0
										MED	2694	10.7	83.8%	10.2								
										HIGH	4559	15.8	83.6%	15.0								
	230-3-60	187	253	25.0	164	25.0	164	350	1.5	STD	2278	7.9	81.3%	7.5	0.52	2	7.8	2	3.9	1	0.6	24.0
										MED	2694	10.7	83.8%	10.2								
										HIGH	4559	15.8	83.6%	15.0								
460-3-60	414	506	12.8	100	12.8	100	277	0.9	STD	2278	3.6	81.3%	3.4	0.3	2	3.4	2	1.8	1	0.3	10.7	
									MED	2694	5.0	83.8%	4.8									
									HIGH	4559	7.8	83.6%	7.4									
20	208-3-60	187	253	27.6	191	25.0	164	350	1.5	STD	2694	10.7	83.8%	10.2	0.52	2	7.8	2	3.9	1	0.6	24.0
										MED	4559	15.8	83.6%	15.0								
										HIGH-HI	5644	18.0	89.5%	17.1								
	230-3-60	187	253	27.6	191	25.0	164	350	1.5	STD	2694	10.7	83.8%	10.2	0.52	2	7.8	2	3.9	1	0.6	24.0
										MED	4559	15.8	83.6%	15.0								
										HIGH-HI	5644	18.0	89.5%	17.1								
460-3-60	414	506	12.8	100	12.2	100	277	0.9	STD	2694	5.0	83.8%	4.8	0.3	2	3.4	2	1.8	1	0.3	10.7	
									MED	4559	7.8	83.6%	7.4									
									HIGH-HI	5644	9.0	89.5%	8.6									
575-3-60	518	633	9.6	78	9.0	78	397	0.6	STD	1870	2.9	81.1%	2.8	0.24	2	3.4	2	1.8	1	0.3	10.7	
									MED	4470	5.9	83.6%	5.6									
									HIGH-HI	6978	8.0	89.5%	7.6									

* On 575V units, the ERV motors are 460V

ELECTRICAL DATA (cont.)

48/50HC With ERV and Economizer

48 50HC	V-Ph-Hz	UNIT VOLTAGE RANGE		COMP 1		COMP 2		OFM (ea)		IFM TYPE	Max WATTS	Max AMP Draw	EFF at Full Load	FLA	COMBUSTION FAN MOTOR (48 series only) FLA	ERV Motors *						ERV Total FLA
		MIN	MAX	RLA	LRA	RLA	LRA	WATTS	FLA							Exhaust		Supply		Wheel		
																QTY	FLA (ea)	QTY	FLA (ea)	QTY	FLA (ea)	
24	208-3-60	187	253	30.1	225	30.1	225	350	1.5	STD	4559	15.8	83.6%	15.0	0.52	2	7.8	2	7.8	1	1.2	32.4
										MED-HI	5644	18.0	89.5%	17.1								
										HIGH-HI	10601	29.9	91.7%	28.5								
	230-3-60	187	253	30.1	225	30.1	225	350	1.5	STD	4559	15.8	83.6%	15.0	0.52	2	7.8	2	7.8	1	1.2	32.4
										MED-HI	5644	18.0	89.5%	17.1								
										HIGH-HI	10601	29.9	91.7%	28.5								
460-3-60	414	506	16.7	114	16.7	114	277	0.9	STD	4559	7.8	83.6%	7.4	0.3	2	3.4	2	3.4	1	0.6	14.2	
									MED-HI	5644	9.0	89.5%	8.6									
									HIGH-HI	10601	15.0	91.7%	14.3									
28	575-3-60	518	633	12.2	80	12.2	80	397	0.6	STD	4470	5.9	83.6%	5.6	0.24	2	3.4	2	3.4	1	0.6	14.2
										MED-HI	6978	8.0	89.5%	7.6								
										HIGH-HI	7341	10.0	91.7%	9.5								
	208-3-60	187	253	48.1	245	33.3	239	350	1.5	STD	4559	15.8	83.6%	15.0	0.52	2	7.8	2	7.8	1	1.2	32.4
										MED-HI	5644	18.0	89.5%	17.1								
										HIGH-HI	10601	29.9	91.7%	28.5								
230-3-60	187	253	48.1	245	33.3	239	350	1.5	STD	4559	15.8	83.6%	15.0	0.52	2	7.8	2	7.8	1	1.2	32.4	
									MED-HI	5644	18.0	89.5%	17.1									
									HIGH-HI	10601	29.9	91.7%	28.5									
28	460-3-60	414	506	18.6	125	17.9	125	277	0.9	STD	4559	7.8	83.6%	7.4	0.3	2	3.4	2	3.4	1	0.6	14.2
										MED-HI	5644	9.0	89.5%	8.6								
										HIGH-HI	10601	15.0	91.7%	14.3								
	575-3-60	518	633	14.7	100	12.8	80	397	0.6	STD	4470	5.9	83.6%	5.6	0.24	2	3.4	2	3.4	1	0.6	14.2
										MED-HI	6978	8.0	89.5%	7.6								
										HIGH-HI	7341	10.0	91.7%	9.5								

* On 575V units, the ERV motors are 460V

ELECTRICAL DATA (cont.)

48HC - WITH ERV

48HC SIZE	IFM TYPE	NO C.O. or UNPWR C.O.										w/ PWRD C.O.									
		w/ERV w/o Economizer					w/ERV w/Economizer					w/ERV w/o Economizer					w/ERV w/Economizer				
		MCA	MOCp	DISC. SIZE		MCA	MOCp	DISC. SIZE		MCA	MOCp	DISC. SIZE		MCA	MOCp	DISC. SIZE					
				FLA	LRA			FLA	LRA			FLA	LRA			FLA	LRA				
17	STD	84.4	100	90	409		92.2	100	99	417		89.2	100	95	414		104	422			
	MED	87.1	100	93	426		94.9	110	102	434		91.9	100	99	431		107	439			
	HIGH	91.9	100	99	435		99.7	110	107	443		96.7	110	104	440		113	448			
	STD	42.1	50	45	241		45.5	50	49	245		44.3	50	47	243		51	247			
	MED	43.5	50	46	250		46.9	60	50	254		45.7	50	49	252		53	256			
	HIGH	46.1	50	49	254		49.5	60	53	258		48.3	60	52	256		56	260			
	STD	33.4	40	36	191		36.8	45	40	195		35.1	40	38	193		41	197			
	MED	33.4	40	36	191		36.8	45	40	195		35.1	40	38	193		41	197			
	HIGH	36.2	45	39	205		39.6	45	43	209		37.9	45	41	207		45	211			
	STD	91.9	100	98	456		99.6	125	107	464		96.7	110	103	461		112	469			
20	MED	96.7	110	103	465		104.4	125	112	473		101.5	125	109	470		118	478			
	HIGH-HI	98.8	125	106	467		106.5	125	115	475		103.6	125	111	472		120	480			
	STD	43.8	50	47	252		47.2	60	51	256		46.0	50	49	254		53	258			
	MED	46.4	50	50	256		49.8	60	54	260		48.6	60	52	258		56	262			
	HIGH-HI	47.6	60	51	257		51.0	60	55	261		49.8	60	54	259		57	263			
	STD	33.4	40	36	193		36.8	45	40	197		35.1	40	38	195		41	199			
	MED	36.2	45	39	207		39.6	45	43	211		37.9	45	41	209		45	213			
	HIGH-HI	38.2	45	41	205		41.6	50	45	209		39.9	45	43	207		47	211			
	STD	91.9	100	98	456		99.6	125	107	464		96.7	110	103	461		112	469			
	MED	96.7	110	103	465		104.4	125	112	473		101.5	125	109	470		118	478			

ELECTRICAL DATA (cont.)

48HC - WITH ERV

48HC SIZE	IFM TYPE	NO C.O. or UNPWR C.O.										w/ PWRD C.O.			
		w/ERV w/o Economizer					w/ERV w/Economizer					w/ERV w/o Economizer			
		MCA	MOCp	FLA	DISC. SIZE	LRA	MCA	MOCp	FLA	DISC. SIZE	LRA	MCA	MOCp	FLA	DISC. SIZE
24	STD	121.0	150	131	577	577	121.0	150	131	577	577	125.8	150	136	582
	MED-HI	123.1	150	133	579	579	123.1	150	133	579	579	127.9	150	138	584
	HIGH-HI	134.5	150	146	658	658	134.5	150	146	658	658	139.3	150	152	663
	STD	62.7	70	67	292	292	62.7	70	67	292	292	64.9	80	70	294
	MED-HI	63.9	80	69	293	293	63.9	80	69	293	293	66.1	80	71	295
	HIGH-HI	69.6	80	75	333	333	69.6	80	75	333	333	71.8	80	78	335
	STD	49.6	60	54	219	219	49.6	60	54	219	219	51.3	60	55	221
	MED-HI	51.6	60	56	217	217	51.6	60	56	217	217	53.3	60	58	219
	HIGH-HI	53.5	60	58	244	244	53.5	60	58	244	244	55.2	60	60	246
	STD	149.7	175	158	617	617	149.7	175	158	617	617	154.5	200	164	622
28	MED-HI	151.8	175	161	619	619	151.8	175	161	619	619	156.6	200	166	624
	HIGH-HI	163.2	200	174	698	698	163.2	200	174	698	698	168.0	200	179	703
	STD	68.1	80	73	318	318	68.1	80	73	318	318	70.3	80	76	320
	MED-HI	69.3	80	74	319	319	69.3	80	74	319	319	71.5	90	77	321
	HIGH-HI	75.0	90	81	359	359	75.0	90	81	359	359	77.2	90	83	361
	STD	54.5	60	58	243	243	54.5	60	58	243	243	56.2	60	60	245
	MED-HI	56.5	70	61	241	241	56.5	70	61	241	241	58.2	70	63	243
	HIGH-HI	58.4	70	63	268	268	58.4	70	63	268	268	60.1	70	65	270
	STD	149.7	175	158	617	617	149.7	175	158	617	617	154.5	200	164	622
	MED-HI	151.8	175	161	619	619	151.8	175	161	619	619	156.6	200	166	624



ELECTRICAL DATA (cont.)

50HC - With Electric Heat and ERV

50HC SIZE	IFM TYPE	ELEC. HTR		NO C.O. or UNPWR C.O.						w/ PWRD C.O.													
		CRHEATER	Nom (kW)	FLA	w/ERV w/o Economizer			w/ERV w/Economizer			w/ERV w/o Economizer			w/ERV w/Economizer									
					MCA	MOCOP	FLA	LRA	DISC. SIZE	MCA	MOCOP	FLA	LRA	DISC. SIZE	MCA	MOCOP	FLA	LRA	DISC. SIZE				
208/230-3-60	STD	NONE	—	—	84.4	100	90	409		92.2	100	99	417		89.2	100	95	414		97.0	110	104	422
		279A00	18.8/25.0	52.1/60.1	94.7/104.7	100/110	90/96	409/409	104.4/114.4	110/125	99/105	99/105	417/417	100.7/110.7	110/125	95/102	414/414	110.4/120.4	125/125	104/111	422/422		
		280A00	37.6/50.0	104.2/120.3	159.8/149.9	175/175	147/166	409/409	169.6/159.6	175/175	156/175	156/175	417/417	165.8/155.9	175/175	153/171	414/414	175.6/165.6	200/175	162/180	422/422		
		281A00	56.3/75.0	156.4/180.4	186.0/210.0	200/225	207/235	409/409	195.7/219.7	200/225	216/244	216/244	417/417	192.0/216.0	200/225	213/240	414/414	201.7/225.7	225/250	222/249	422/422		
	MED	NONE	—	—	87.1	100	93	426		94.9	110	102	434		91.9	100	99	431		99.7	110	107	439
		279A00	18.8/25.0	52.1/60.1	98.1/108.1	100/110	93/99	426/426	107.8/117.8	110/125	102/108	102/108	434/434	104.1/114.1	110/125	99/105	431/431	113.8/123.8	125/125	107/114	439/439		
		280A00	37.6/50.0	104.2/120.3	163.2/153.3	175/175	150/169	426/426	172.9/163.0	175/175	159/178	159/178	434/434	169.2/159.3	175/175	156/174	431/431	178.9/169.0	200/175	165/183	439/439		
		281A00	56.3/75.0	156.4/180.4	189.4/213.4	200/225	210/238	426/426	199.1/223.1	200/250	219/247	219/247	434/434	195.4/219.4	200/225	216/243	431/431	205.1/229.1	225/250	225/252	439/439		
	HIGH	NONE	—	—	91.9	100	99	435		99.7	110	107	443		96.7	110	104	440		104.5	125	113	448
		279A00	18.8/25.0	52.1/60.1	104.1/114.1	110/125	99/105	435/435	113.8/123.8	125/125	107/114	107/114	443/443	110.1/120.1	125/125	104/110	440/440	119.8/129.8	125/150	113/119	448/448		
460-3-60	STD	280A00	37.6/50.0	104.2/120.3	169.2/159.3	175/175	156/174	435/435	178.9/169.0	200/175	165/183	165/183	443/443	175.2/165.3	200/175	161/180	440/440	184.9/175.0	200/175	170/189	448/448		
		281A00	56.3/75.0	156.4/180.4	195.4/219.4	200/250	216/243	435/435	205.1/229.1	225/250	225/252	225/252	443/443	201.4/225.4	225/250	221/249	440/440	211.1/235.1	225/250	230/258	448/448		
		NONE	—	—	42.1	50	45	241		45.5	50	49	245		44.3	50	47	243		47.7	60	51	247
		282A00	25.0	30.1	50.8	60	47	241		55.1	60	51	245		53.6	60	49	243		57.8	60	53	247
	MED	283A00	50.0	60.1	73.3	80	81	241		77.5	80	85	245		76.1	80	84	243		80.3	90	88	247
		284A00	75.0	90.2	103.4	110	116	241		107.6	110	120	245		106.2	110	118	243		110.4	125	122	247
		NONE	—	—	43.5	50	46	250		46.9	60	50	254		45.7	50	49	252		49.1	60	53	256
		282A00	25.0	30.1	52.6	60	48	250		56.8	60	52	254		55.3	60	51	252		59.6	60	55	256
	HIGH	283A00	50.0	60.1	75.1	80	83	250		79.3	80	87	254		77.8	80	85	252		82.0	90	89	256
		284A00	75.0	90.2	105.2	110	117	250		109.4	125	121	254		107.9	125	120	252		112.1	125	124	256
575-3-60	STD	NONE	—	—	46.1	50	49	254		49.5	60	53	258		48.3	60	52	256		51.7	60	56	260
		282A00	25.0	30.1	55.8	60	51	254		60.1	70	55	258		58.6	60	54	256		62.8	70	58	260
		283A00	50.0	60.1	78.3	80	86	254		82.5	90	90	258		81.1	90	88	256		85.3	90	92	260
		284A00	75.0	90.2	108.4	125	120	254		112.6	125	124	258		111.2	125	123	256		115.4	125	127	260
	MED	NONE	—	—	33.4	40	36	191		36.8	45	40	195		35.1	40	38	193		38.5	45	41	197
		285A00	24.8	23.9	42.3	45	39	191		46.6	50	43	195		44.5	45	41	193		48.7	50	45	197
		286A00	49.6	47.7	72.1	80	66	191		76.3	80	70	195		74.2	80	68	193		78.4	80	72	197
		287A00	74.4	71.6	84.1	90	94	191		88.3	90	98	195		86.2	90	96	193		90.4	100	100	197
	HIGH	NONE	—	—	33.4	40	36	191		36.8	45	40	195		35.1	40	38	193		38.5	45	41	197
		285A00	24.8	23.9	42.3	45	39	191		46.6	50	43	195		44.5	45	41	193		48.7	50	45	197
		286A00	49.6	47.7	72.1	80	66	191		76.3	80	70	195		74.2	80	68	193		78.4	80	72	197
		287A00	74.4	71.6	84.1	90	94	191		88.3	90	98	195		86.2	90	96	193		90.4	100	100	197

ELECTRICAL DATA (cont.)

50HC - With Electric Heat and ERV

50HC SIZE	IFM TYPE	ELEC. HTR			NO C.O. or UNPWR C.O.						w/ PWRD C.O.					
		CRHEATER	Nom (kW)	FLA	w/ERV w/o Economizer			w/ERV w/Economizer			w/ERV w/o Economizer			w/ERV w/Economizer		
					MCA	MOCAP	DISC. SIZE FLA LRA	MCA	MOCAP	DISC. SIZE FLA LRA	MCA	MOCAP	DISC. SIZE FLA LRA	MCA	MOCAP	DISC. SIZE FLA LRA
20	STD	NONE	—	—	91.9	100	98 456	99.6	125	107 464	96.7	110	103 461	104.4	125	112 469
		279A00	18.8/25.0	52.1/60.1	98.1/108.1	100/110	98/99 456/456	107.8/117.8	125/125	107/108 464/464	104.1/114.1	110/125	103/105 461/461	113.8/123.8	125/125	112/114 469/469
		280A00	37.6/50.0	104.2/120.3	163.2/153.3	175/175	150/169 456/456	172.9/169.0	175/175	159/178 464/464	169.2/159.3	175/175	156/174 461/461	178.9/169.0	200/175	165/183 489/489
		281A00	56.3/75.0	156.4/180.4	189.4/213.4	200/225	210/238 456/456	199.1/229.1	200/250	219/247 464/464	195.4/219.4	200/225	216/243 461/461	205.1/229.1	225/250	225/252 489/489
	MED	NONE	—	—	96.7	110	103 465	104.4	125	112 473	101.5	125	109 470	109.2	125	118 478
		279A00	18.8/25.0	52.1/60.1	104.1/114.1	110/125	103/105 465/465	113.8/123.8	125/125	112/114 473/473	110.1/120.1	125/125	109/110 470/470	119.8/129.8	125/150	118/119 478/478
		280A00	37.6/50.0	104.2/120.3	169.2/159.3	175/175	156/174 465/465	178.9/169.0	200/175	165/183 473/473	175.2/165.3	200/175	161/180 470/470	184.9/175.0	200/175	170/189 478/478
		281A00	56.3/75.0	156.4/180.4	195.4/219.4	200/250	216/243 465/465	205.1/229.1	225/250	225/252 473/473	201.4/225.4	225/250	221/249 470/470	211.1/235.1	225/250	230/258 478/478
	HIGH-HI	NONE	—	—	98.8	125	106 467	106.5	125	115 475	103.6	125	111 472	111.3	125	120 480
		279A00	18.8/25.0	52.1/60.1	106.7/116.7	125/125	106/107 467/467	116.4/126.4	125/150	115/116 475/475	112.7/122.7	125/125	111/113 472/472	122.4/132.4	125/150	120/122 480/480
460-3-60	STD	280A00	37.6/50.0	104.2/120.3	171.8/161.9	175/175	158/177 467/467	181.6/171.6	200/175	167/186 475/475	177.8/167.9	200/175	164/182 472/472	187.6/177.6	200/200	173/191 480/480
		281A00	56.3/75.0	156.4/180.4	198.0/222.0	200/250	218/246 467/467	207.7/231.7	225/250	227/255 475/475	204.0/228.0	225/250	224/251 472/472	213.7/237.7	225/250	233/260 480/480
		NONE	—	—	43.8	50	47 252	47.2	60	51 256	46.0	50	49 254	49.4	60	53 258
		282A00	25.0	30.1	52.6	60	48 252	56.8	60	52 256	55.3	60	51 254	59.6	60	55 258
	MED	283A00	50.0	60.1	75.1	80	83 252	79.3	80	87 256	77.8	80	85 254	82.0	90	89 258
		284A00	75.0	90.2	105.2	110	117 252	109.4	125	121 256	107.9	125	120 254	112.1	125	124 258
		NONE	—	—	46.4	50	50 256	49.8	60	54 260	48.6	60	52 258	52.0	60	56 262
		282A00	25.0	30.1	55.8	60	51 256	60.1	70	55 260	58.6	60	54 258	62.8	70	58 262
	HIGH-HI	283A00	50.0	60.1	78.3	80	86 256	82.5	90	90 260	81.1	90	88 258	85.3	90	92 262
		284A00	75.0	90.2	108.4	125	120 256	112.6	125	124 260	111.2	125	123 258	115.4	125	127 262
575-3-60	STD	NONE	—	—	47.6	60	51 257	51.0	60	55 261	49.8	60	54 259	53.2	60	57 263
		282A00	25.0	30.1	57.3	60	53 257	61.6	70	57 261	60.1	70	55 259	64.3	70	59 263
		283A00	50.0	60.1	79.8	90	87 257	84.0	90	91 261	82.6	90	90 259	86.8	90	94 263
		284A00	75.0	90.2	109.9	125	122 257	114.1	125	126 261	112.7	125	124 259	116.9	125	128 263
	MED	NONE	—	—	33.4	40	36 193	36.8	45	40 197	35.1	40	38 195	38.5	45	41 199
		285A00	24.8	23.9	42.3	45	39 193	46.6	50	43 197	44.5	45	41 195	48.7	50	45 199
		286A00	49.6	47.7	72.1	80	66 193	76.3	80	70 197	74.2	80	68 195	78.4	80	72 199
		287A00	74.4	71.6	84.1	90	94 193	88.3	90	98 197	86.2	90	96 195	90.4	100	100 199
	HIGH-HI	NONE	—	—	36.2	45	39 207	39.6	45	43 211	37.9	45	41 209	41.3	50	45 213
		285A00	24.8	23.9	45.8	50	42 207	50.1	60	46 211	48.0	50	44 209	52.2	60	48 213
		286A00	49.6	47.7	75.6	80	70 207	79.8	80	73 211	77.7	80	71 209	81.9	90	75 213
		287A00	74.4	71.6	87.6	90	97 207	91.8	100	101 211	89.7	90	99 209	93.9	100	103 213



ELECTRICAL DATA (cont.)

50HC - With Electric Heat and ERV

50HC SIZE	NOM. V-P-Hz	ELEC. HTR			NO C.O. or UNPWR C.O.						w/ PWRD C.O.									
		CRHEATER	Nom (kW)	FLA	w/ERV w/o Economizer			w/ERV w/Economizer			w/ERV w/o Economizer			w/ERV w/Economizer						
					MCA	MOCPP	DISC. SIZE FLA LRA	MCA	MOCPP	DISC. SIZE FLA LRA	MCA	MOCPP	DISC. SIZE FLA LRA	MCA	MOCPP	DISC. SIZE FLA LRA				
24	STD	NONE	-	-	121.0	150	131	577	121.0	150	131	577	125.8	150	136	582	125.8	150	136	582
		279A00	18.8/25.0	52.1/60.1	124.3/134.3	150/150	131/131	577/577	124.3/134.3	150/150	131/131	577/577	130.3/140.3	150/150	136/136	582/582	130.3/140.3	150/150	136/136	582/582
		280A00	37.6/50.0	104.2/120.3	189.4/179.5	200/200	174/193	577/577	189.4/179.5	200/200	174/193	577/577	195.4/185.5	200/200	180/198	582/582	195.4/185.5	200/200	180/198	582/582
		281A00	56.3/75.0	156.4/180.4	215.6/239.6	225/250	234/262	577/577	215.6/239.6	225/250	234/262	577/577	221.6/245.6	225/250	240/267	582/582	221.6/245.6	225/250	240/267	582/582
		NONE	-	-	123.1	150	133	579	123.1	150	133	579	127.9	150	138	584	127.9	150	138	584
	MED HI	279A00	18.8/25.0	52.1/60.1	126.9/136.9	150/150	133/133	579/579	126.9/136.9	150/150	133/133	579/579	132.9/142.9	150/150	138/138	584/584	132.9/142.9	150/150	138/138	584/584
		280A00	37.6/50.0	104.2/120.3	192.0/182.1	200/200	177/195	579/579	192.0/182.1	200/200	177/195	579/579	198.0/188.1	200/200	182/201	584/584	198.0/188.1	200/200	182/201	584/584
	HIGH- HI	281A00	56.3/75.0	156.4/180.4	218.2/242.2	225/250	237/264	579/579	218.2/242.2	225/250	237/264	579/579	224.2/248.2	225/250	242/270	584/584	224.2/248.2	225/250	242/270	584/584
		NONE	-	-	134.5	150	146	658	134.5	150	146	658	139.3	150	152	663	139.3	150	152	663
		279A00	18.8/25.0	52.1/60.1	141.2/151.2	150/175	146/146	658/658	141.2/151.2	150/175	146/146	658/658	147.2/157.2	150/175	152/152	663/663	147.2/157.2	150/175	152/152	663/663
460-3-60	STD	280A00	37.6/50.0	104.2/120.3	206.3/196.3	225/200	190/208	658/658	206.3/196.3	225/200	190/208	658/658	212.3/202.3	225/225	195/214	663/663	212.3/202.3	225/225	195/214	663/663
		281A00	56.3/75.0	156.4/180.4	232.4/256.4	250/300	250/277	658/658	232.4/256.4	250/300	250/277	658/658	238.4/262.4	250/300	255/283	663/663	238.4/262.4	250/300	255/283	663/663
		NONE	-	-	62.7	70	67	292	62.7	70	67	292	64.9	80	70	294	64.9	80	70	294
		282A00	25.0	30.1	64.6	70	67	292	64.6	70	67	292	67.3	80	70	294	67.3	80	70	294
		283A00	50.0	60.1	87.1	90	94	292	87.1	90	94	292	89.8	90	96	294	89.8	90	96	294
	MED HI	284A00	75.0	90.2	117.2	125	129	292	117.2	125	129	292	119.9	125	131	294	119.9	125	131	294
		NONE	-	-	63.9	80	69	293	63.9	80	69	293	66.1	80	71	295	66.1	80	71	295
		282A00	25.0	30.1	66.1	80	69	293	66.1	80	69	293	68.8	80	71	295	68.8	80	71	295
	HIGH- HI	283A00	50.0	60.1	88.6	90	95	293	88.6	90	95	293	91.3	100	98	295	91.3	100	98	295
		284A00	75.0	90.2	118.7	125	130	293	118.7	125	130	293	121.4	125	132	295	121.4	125	132	295
575-3-60	STD	NONE	-	-	69.6	80	75	333	69.6	80	75	333	71.8	80	78	335	71.8	80	78	335
		282A00	25.0	30.1	73.2	80	75	333	73.2	80	75	333	76.0	80	78	335	76.0	80	78	335
		283A00	50.0	60.1	95.7	100	102	333	95.7	100	102	333	98.4	100	104	335	98.4	100	104	335
		284A00	75.0	90.2	125.8	150	136	333	125.8	150	136	333	128.5	150	139	335	128.5	150	139	335
		NONE	-	-	49.6	60	54	219	49.6	60	54	219	51.3	60	55	221	51.3	60	55	221
	MED HI	285A00	24.8	23.9	54.6	60	54	219	54.6	60	54	219	56.7	60	55	221	56.7	60	55	221
		286A00	49.6	47.7	84.3	90	78	219	84.3	90	78	219	86.5	90	80	221	86.5	90	80	221
		287A00	74.4	71.6	96.3	100	105	219	96.3	100	105	219	98.4	100	107	221	98.4	100	107	221
	HIGH- HI	NONE	-	-	51.6	60	56	217	51.6	60	56	217	53.3	60	58	219	53.3	60	58	219
		285A00	24.8	23.9	57.1	60	56	217	57.1	60	56	217	59.2	60	58	219	59.2	60	58	219

ELECTRICAL DATA (cont.)

50HC - With Electric Heat and ERV

50HC SIZE	IFM TYPE	ELEC. HTR		NO C.O. or UNPWR C.O.										w/ PWRD C.O.										
		CRHEATER	Nom (kW)	FLA	w/ERV w/o Economizer					w/ERV w/Economizer					w/ERV w/o Economizer					w/ERV w/Economizer				
					MCA	MOCAP	FLA	DISC. SIZE		LRA	MCA	MOCAP	FLA	DISC. SIZE		LRA	MCA	MOCAP	FLA	DISC. SIZE		LRA		
28	STD	NONE	—	—	149.7	175	158	617	149.7	175	158	617	154.5	200	164	622	154.5	200	164	622				
		279A00	18.8/25.0	52.1/60.1	149.7/149.7	175/175	158/158	617/617	149.7/149.7	175/175	158/158	617/617	154.5/154.5	200/200	164/164	622/622	154.5/154.5	200/200	164/164	622/622				
		280A00	37.6/50.0	104.2/120.3	189.4/179.5	200/200	174/193	617/617	189.4/179.5	200/200	174/193	617/617	195.4/185.5	200/200	180/198	622/622	195.4/185.5	200/200	180/198	622/622				
		281A00	56.3/75.0	156.4/180.4	215.6/239.6	225/250	234/262	617/617	215.6/239.6	225/250	234/262	617/617	221.6/245.6	225/250	240/267	622/622	221.6/245.6	225/250	240/267	622/622				
	MED HI	NONE	—	—	151.8	175	161	619	151.8	175	161	619	156.6	200	166	624	156.6	200	166	624				
		279A00	18.8/25.0	52.1/60.1	151.8/151.8	175/175	161/161	619/619	151.8/151.8	175/175	161/161	619/619	156.6/156.6	200/200	166/166	624/624	156.6/156.6	200/200	166/166	624/624				
		280A00	37.6/50.0	104.2/120.3	192.0/182.1	200/200	177/195	619/619	192.0/182.1	200/200	177/195	619/619	198.0/188.1	200/200	182/201	624/624	198.0/188.1	200/200	182/201	624/624				
		281A00	56.3/75.0	156.4/180.4	218.2/242.2	225/250	237/264	619/619	218.2/242.2	225/250	237/264	619/619	224.2/248.2	225/250	242/270	624/624	224.2/248.2	225/250	242/270	624/624				
	HIGH- HI	NONE	—	—	163.2	200	174	698	163.2	200	174	698	168.0	200	179	703	168.0	200	179	703				
		279A00	18.8/25.0	52.1/60.1	163.2/163.2	200/200	174/174	698/698	163.2/163.2	200/200	174/174	698/698	168.0/168.0	200/200	179/179	703/703	168.0/168.0	200/200	179/179	703/703				
280A00		37.6/50.0	104.2/120.3	206.3/196.3	225/200	190/208	698/698	206.3/196.3	225/200	190/208	698/698	212.3/202.3	225/225	195/214	703/703	212.3/202.3	225/225	195/214	703/703					
281A00		56.3/75.0	156.4/180.4	232.4/256.4	250/300	250/277	698/698	232.4/256.4	250/300	250/277	698/698	238.4/262.4	250/300	255/283	703/703	238.4/262.4	250/300	255/283	703/703					
460-3-60	STD	NONE	—	—	68.1	80	73	318	68.1	80	73	318	70.3	80	76	320	70.3	80	76	320				
		282A00	25.0	30.1	68.1	80	73	318	68.1	80	73	318	70.3	80	76	320	70.3	80	76	320				
		283A00	50.0	60.1	87.1	90	318	87.1	90	94	318	89.8	90	96	320	89.8	90	96	320					
		284A00	75.0	90.2	117.2	125	318	117.2	125	129	318	119.9	125	131	320	119.9	125	131	320					
	MED HI	NONE	—	—	69.3	80	74	319	69.3	80	74	319	71.5	90	77	321	71.5	90	77	321				
		282A00	25.0	30.1	69.3	80	74	319	69.3	80	74	319	71.5	90	77	321	71.5	90	77	321				
		283A00	50.0	60.1	88.6	90	319	88.6	90	95	319	91.3	100	98	321	91.3	100	98	321					
		284A00	75.0	90.2	118.7	125	319	118.7	125	130	319	121.4	125	132	321	121.4	125	132	321					
	HIGH- HI	NONE	—	—	75.0	90	81	359	75.0	90	81	359	77.2	90	83	361	77.2	90	83	361				
		282A00	25.0	30.1	75.0	90	81	359	75.0	90	81	359	77.2	90	83	361	77.2	90	83	361				
283A00		50.0	60.1	95.7	100	359	95.7	100	102	359	98.4	100	104	361	98.4	100	104	361						
284A00		75.0	90.2	125.8	150	359	125.8	150	136	359	128.5	150	139	361	128.5	150	139	361						
575-3-60	STD	NONE	—	—	54.5	60	58	243	54.5	60	58	243	56.2	60	60	245	56.2	60	60	245				
		285A00	24.8	23.9	54.6	60	58	243	54.6	60	58	243	56.7	60	60	245	56.7	60	60	245				
		286A00	49.6	47.7	84.3	90	78	243	84.3	90	78	243	86.5	90	80	245	86.5	90	80	245				
		287A00	74.4	71.6	96.3	100	105	243	96.3	100	105	243	98.4	100	107	245	98.4	100	107	245				
	MED HI	NONE	—	—	56.5	70	61	241	56.5	70	61	241	58.2	70	63	243	58.2	70	63	243				
		285A00	24.8	23.9	57.1	70	61	241	57.1	70	61	241	59.2	70	63	243	59.2	70	63	243				
		286A00	49.6	47.7	86.8	90	80	241	86.8	90	80	241	89.0	90	82	243	89.0	90	82	243				
		287A00	74.4	71.6	98.8	100	107	241	98.8	100	107	241	100.9	110	109	243	100.9	110	109	243				
	HIGH- HI	NONE	—	—	58.4	70	63	268	58.4	70	63	268	60.1	70	65	270	60.1	70	65	270				
		285A00	24.8	23.9	59.5	70	63	268	59.5	70	63	268	61.6	70	65	270	61.6	70	65	270				
286A00		49.6	47.7	89.2	90	82	268	89.2	90	82	268	91.3	100	84	270	91.3	100	84	270					
287A00		74.4	71.6	101.2	110	110	268	101.2	110	110	268	103.3	110	112	270	103.3	110	112	270					



ELECTICAL DATA (cont.)

50HC Electric Heat and Single Point Kits

50HC	NOM. V-PH-HZ	IFM TYPE	ELECTRIC HEATER PART NUMBER	NOMINAL (kW)	APPLICATION (kW)	APPLICATION OUTPUT (MBH)	SINGLE POINT OR JUNCTION KIT PART NUMBER (CRSINGLE***A00)			
							NO C.O. OR UNPOWERED C.O.		W/PWRD C.O.	
							W/ERV W/O ECON	W/ERV W/ECON	W/ERV W/O ECON	W/ERV W/ECON
17	208/230-3-60	STD	CRHEATER279A00	25.0	18.8/23.0	64.1/78.3	-	-	-	-
			CRHEATER280A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			CRHEATER281A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
		MED	CRHEATER279A00	25.0	18.8/23.0	64.1/78.3	-	-	-	-
			CRHEATER280A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			CRHEATER281A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
			CRHEATER279A00	25.0	18.8/23.0	64.1/78.3	-	-	-	056
		HIGH	CRHEATER280A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			CRHEATER281A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
			CRHEATER282A00	25.0	23.0	78.3	-	-	-	-
	460-3-60	STD	CRHEATER283A00	50.0	45.9	156.7	057	057	057	057
			CRHEATER284A00	75.0	68.9	235.0	057	057	057	057
			CRHEATER282A00	25.0	23.0	78.3	-	-	-	-
		MED	CRHEATER283A00	50.0	45.9	156.7	057	057	057	057
			CRHEATER284A00	75.0	68.9	235.0	057	057	057	057
			CRHEATER285A00	24.8	22.8	77.7	-	-	-	-
			CRHEATER286A00	49.6	45.6	155.4	057	057	057	057
	575-3-60	STD	CRHEATER287A00	74.4	68.3	233.1	057	057	057	057
			CRHEATER285A00	24.8	22.8	77.7	-	-	-	-
		MED	CRHEATER286A00	49.6	45.6	155.4	057	057	057	057
			CRHEATER287A00	74.4	68.3	233.1	057	057	057	057
			CRHEATER285A00	24.8	22.8	77.7	-	-	-	-
			CRHEATER286A00	49.6	45.6	155.4	057	057	057	057
		HIGH	CRHEATER287A00	74.4	68.3	233.1	057	057	057	057
			CRHEATER285A00	24.8	22.8	77.7	-	-	-	-
			CRHEATER286A00	49.6	45.6	155.4	057	057	057	057
			CRHEATER287A00	74.4	68.3	233.1	057	057	057	057

ELECTICAL DATA (cont.)

50HC Electric Heat and Single Point Kits

50HC	NOM. V-PH-HZ	IFM TYPE	ELECTRIC HEATER PART NUMBER	NOMINAL (kW)	APPLICATION (kW)	APPLICATION OUTPUT (MBH)	SINGLE POINT OR JUNCTION KIT PART NUMBER (CRSINGLE***A00)			
							NO C.O. OR UNPOWERED C.O.		W/PWRD C.O.	
							W/ERV W/O ECON	W/ERV W/ECON	W/ERV W/O ECON	W/ERV W/ECON
20	208/230-3-60	STD	CRHEATER279A00	25.0	18.8/23.0	64.1/78.3	-	-	-	-
			CRHEATER280A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			CRHEATER281A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
		MED	CRHEATER279A00	25.0	18.8/23.0	64.1/78.3	-	-	-	056
			CRHEATER280A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			CRHEATER281A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
		HIGH-High Efficiency	CRHEATER279A00	25.0	18.8/23.0	64.1/78.3	-	056	-	056
			CRHEATER280A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			CRHEATER281A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
	460-3-60	STD	CRHEATER282A00	25.0	23.0	78.3	-	-	-	-
			CRHEATER283A00	50.0	45.9	156.7	057	057	057	057
			CRHEATER284A00	75.0	68.9	235.0	057	057	057	057
		MED	CRHEATER282A00	25.0	23.0	78.3	-	-	-	-
			CRHEATER283A00	50.0	45.9	156.7	057	057	057	057
			CRHEATER284A00	75.0	68.9	235.0	057	057	057	057
		HIGH-High Efficiency	CRHEATER285A00	24.8	22.8	77.7	-	-	-	-
			CRHEATER286A00	49.6	45.6	155.4	057	057	057	057
	575-3-60	STD	CRHEATER287A00	74.4	68.3	233.1	057	057	057	057
			CRHEATER285A00	24.8	22.8	77.7	-	-	-	-
			CRHEATER286A00	49.6	45.6	155.4	057	057	057	057
		MED	CRHEATER287A00	74.4	68.3	233.1	057	057	057	057
			CRHEATER285A00	24.8	22.8	77.7	-	-	-	-
			CRHEATER286A00	49.6	45.6	155.4	057	057	057	057
		HIGH-High Efficiency	CRHEATER287A00	74.4	68.3	233.1	057	057	057	057
			CRHEATER285A00	24.8	22.8	77.7	-	-	-	-

ELECTICAL DATA (cont.)

50HC Electric Heat and Single Point Kits

50HC	NOM. V–PH–HZ	IFM TYPE	ELECTRIC HEATER PART NUMBER	NOMINAL (kW)	APPLICATION (kW)	APPLICATION OUTPUT (MBH)	SINGLE POINT OR JUNCTION KIT PART NUMBER (CRSINGLE***A00)			
							NO C.O. OR UNPOWERED C.O.		W/PWRD C.O.	
							W/ERV W/O ECON	W/ERV W/ECON	W/ERV W/O ECON	W/ERV W/ECON
24	208/203–3–60	STD	CRHEATER279A00	25.0	18.8/23.0	64.1/78.3	056	056	056	056
			CRHEATER280A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			CRHEATER281A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
		MED–High Efficiency	CRHEATER279A00	25.0	18.8/23.0	64.1/78.3	056	056	056	056
			CRHEATER280A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			CRHEATER281A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
		HIGH–High Efficiency	CRHEATER279A00	25.0	18.8/23.0	64.1/78.3	056	056	056	056
			CRHEATER280A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			CRHEATER281A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
		STD	CRHEATER282A00	25.0	23.0	78.3	–	–	057	057
			CRHEATER283A00	50.0	45.9	156.7	057	057	057	057
			CRHEATER284A00	75.0	68.9	235.0	057	057	057	057
	460–3–60	MED–High Efficiency	CRHEATER282A00	25.0	23.0	78.3	057	057	057	057
			CRHEATER283A00	50.0	45.9	156.7	057	057	057	057
			CRHEATER284A00	75.0	68.9	235.0	057	057	057	057
		HIGH–High Efficiency	CRHEATER282A00	25.0	23.0	78.3	057	057	057	057
			CRHEATER283A00	50.0	45.9	156.7	057	057	057	057
			CRHEATER284A00	75.0	68.9	235.0	057	057	057	057
		STD	CRHEATER285A00	24.8	22.8	77.7	–	–	–	–
			CRHEATER286A00	49.6	45.6	155.4	057	057	057	057
			CRHEATER287A00	74.4	68.3	233.1	057	057	057	057
		MED–High Efficiency	CRHEATER285A00	24.8	22.8	77.7	–	–	–	–
			CRHEATER286A00	49.6	45.6	155.4	057	057	057	057
			CRHEATER287A00	74.4	68.3	233.1	057	057	057	057
	575–3–60	HIGH–High Efficiency	CRHEATER285A00	24.8	22.8	77.7	–	–	–	–
			CRHEATER286A00	49.6	45.6	155.4	057	057	057	057
			CRHEATER287A00	74.4	68.3	233.1	057	057	057	057

ELECTICAL DATA (cont.)

50HC Electric Heat and Single Point Kits

50HC	NOM. V-PH-HZ	IFM TYPE	ELECTRIC HEATER PART NUMBER	NOMINAL (kW)	APPLICATION (kW)	APPLICATION OUTPUT (MBH)	SINGLE POINT OR JUNCTION KIT PART NUMBER (CRSINGLE***A00)			
							NO C.O. OR UNPOWERED C.O.		W/PWRD C.O.	
							W/ERV W/O ECON	W/ERV W/ECON	W/ERV W/O ECON	W/ERV W/ECON
							W/ERV W/O ECON	W/ERV W/ECON	W/ERV W/O ECON	W/ERV W/ECON
28	208/230-3-60	STD	CRHEATER279A00	25.0	18.8/23.0	64.1/78.3	056	056	056	056
			CRHEATER280A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			CRHEATER281A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
		MED-High Efficiency	CRHEATER279A00	25.0	18.8/23.0	64.1/78.3	056	056	056	056
			CRHEATER280A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			CRHEATER281A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
		HIGH-High Efficiency	CRHEATER279A00	25.0	18.8/23.0	64.1/78.3	056	056	056	056
			CRHEATER280A00	50.0	37.6/45.9	128.1/156.7	056	056	056	056
			CRHEATER281A00	75.0	56.3/68.9	192.2/235.0	056	056	056	056
	STD	CRHEATER282A00	25.0	23.0	78.3	057	057	057	057	
		CRHEATER283A00	50.0	45.9	156.7	057	057	057	057	
		CRHEATER284A00	75.0	68.9	235.0	057	057	057	057	
		CRHEATER282A00	25.0	23.0	78.3	057	057	057	057	
		CRHEATER283A00	50.0	45.9	156.7	057	057	057	057	
		CRHEATER284A00	75.0	68.9	235.0	057	057	057	057	
	HIGH-High Efficiency	CRHEATER282A00	25.0	23.0	78.3	057	057	057	057	
		CRHEATER283A00	50.0	45.9	156.7	057	057	057	057	
		CRHEATER284A00	75.0	68.9	235.0	057	057	057	057	
		CRHEATER285A00	24.8	22.8	77.7	-	-	-	-	
		CRHEATER286A00	49.6	45.6	155.4	057	057	057	057	
		CRHEATER287A00	74.4	68.3	233.1	057	057	057	057	
	575-3-60	STD	CRHEATER286A00	49.6	45.6	155.4	057	057	057	057
			CRHEATER287A00	74.4	68.3	233.1	057	057	057	057
			CRHEATER285A00	24.8	22.8	77.7	-	-	-	-
MED-High Efficiency		CRHEATER286A00	49.6	45.6	155.4	057	057	057	057	
		CRHEATER287A00	74.4	68.3	233.1	057	057	057	057	
		CRHEATER285A00	24.8	22.8	77.7	-	-	-	-	
HIGH-High Efficiency		CRHEATER286A00	49.6	45.6	155.4	057	057	057	057	
		CRHEATER287A00	74.4	68.3	233.1	057	057	057	057	
		CRHEATER285A00	24.8	22.8	77.7	-	-	-	-	

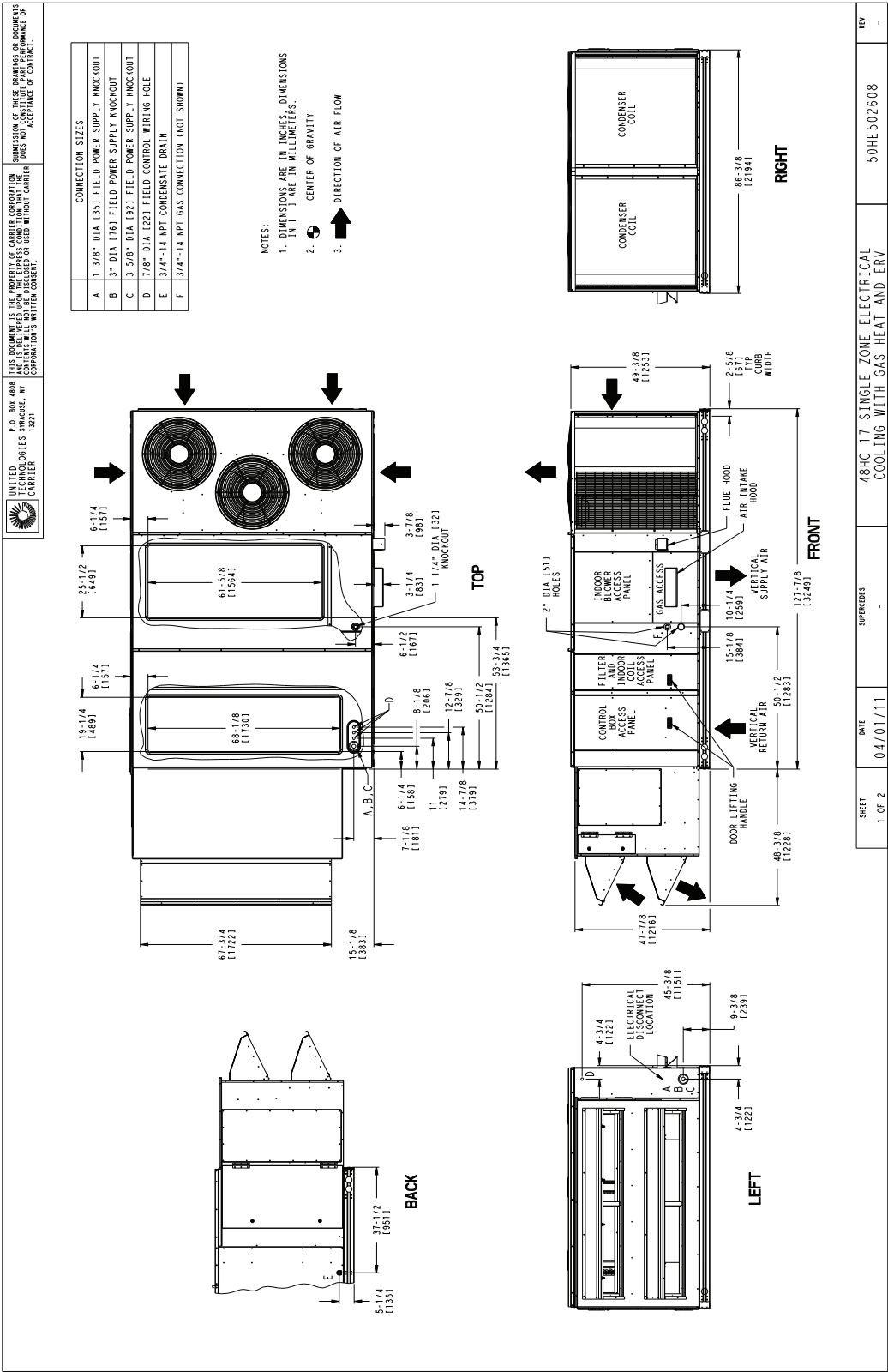


Fig. 1 - 48HC17

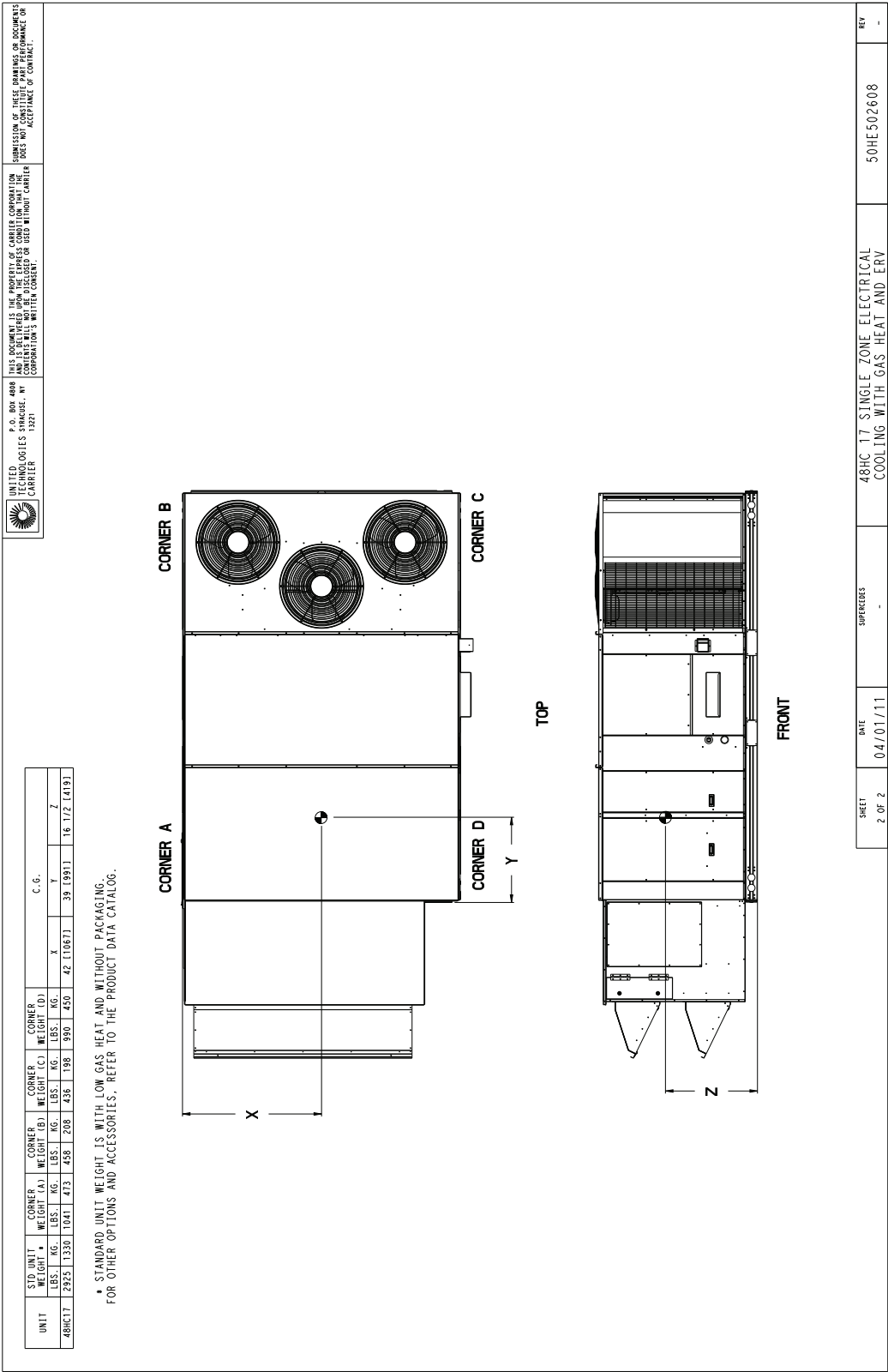
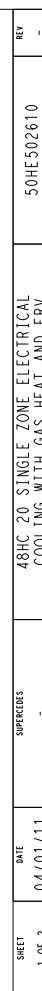


Fig. 2 - 48HC17



C11270

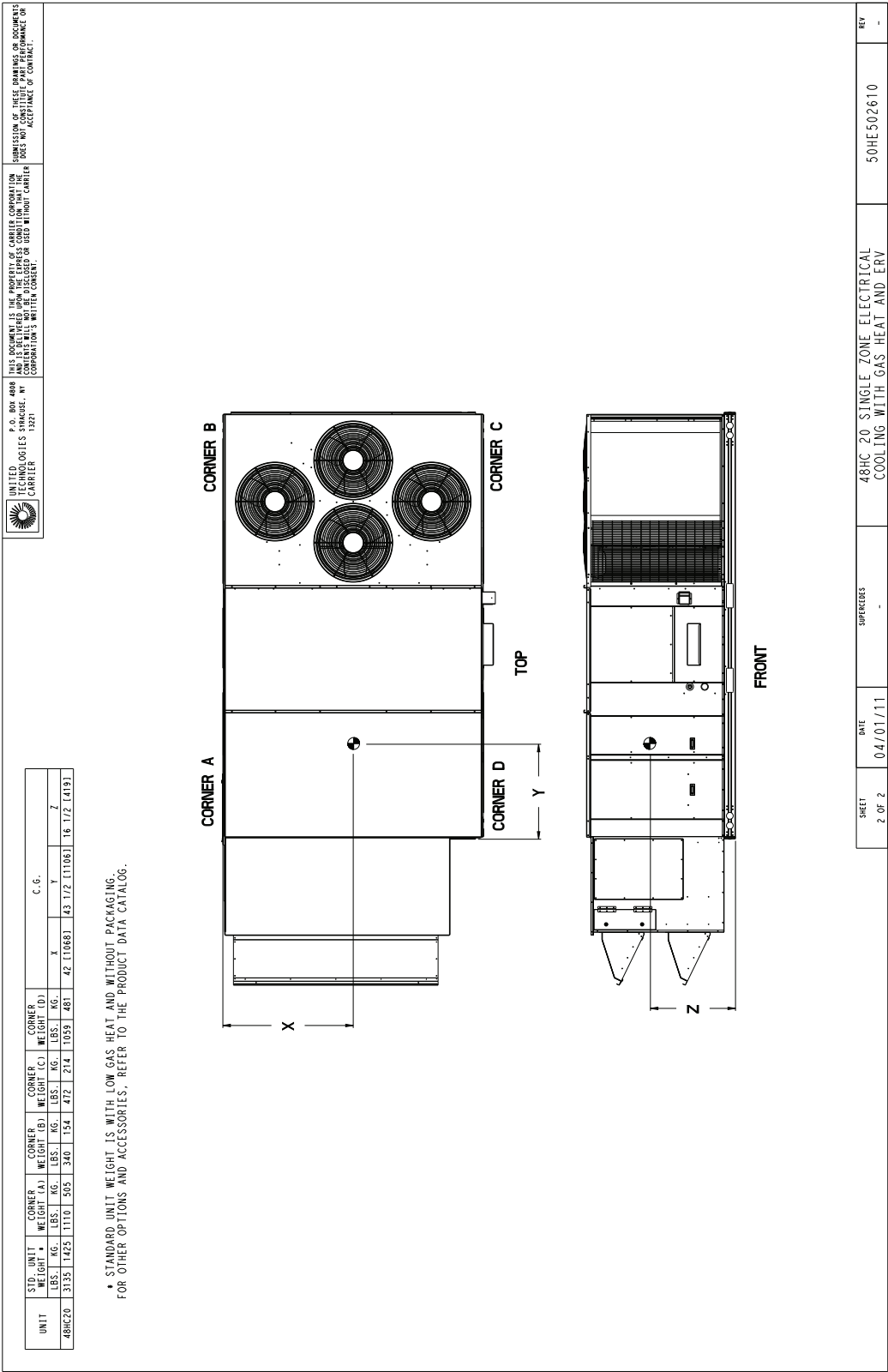


Fig. 4 - 48HC20

C11271

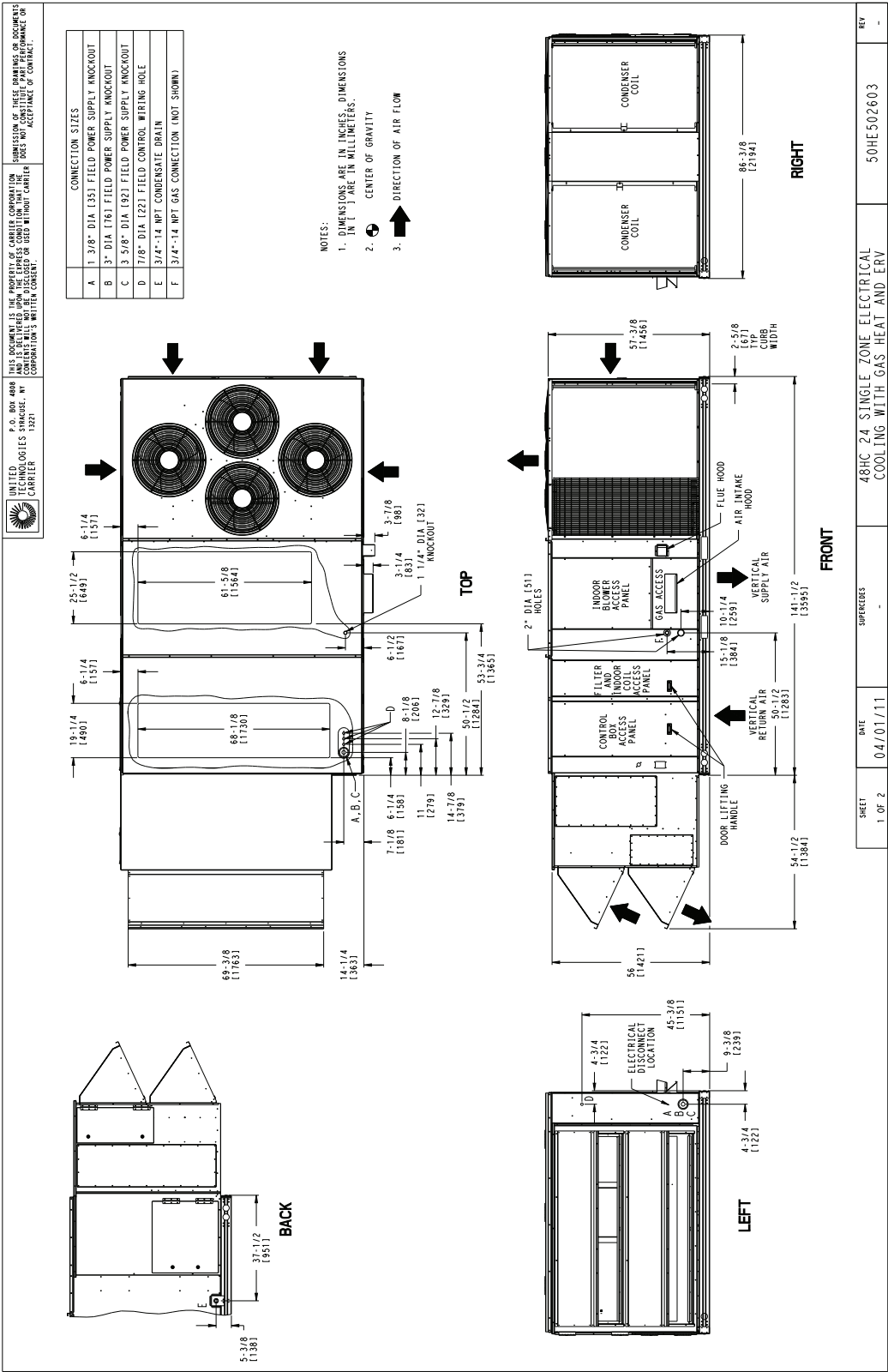
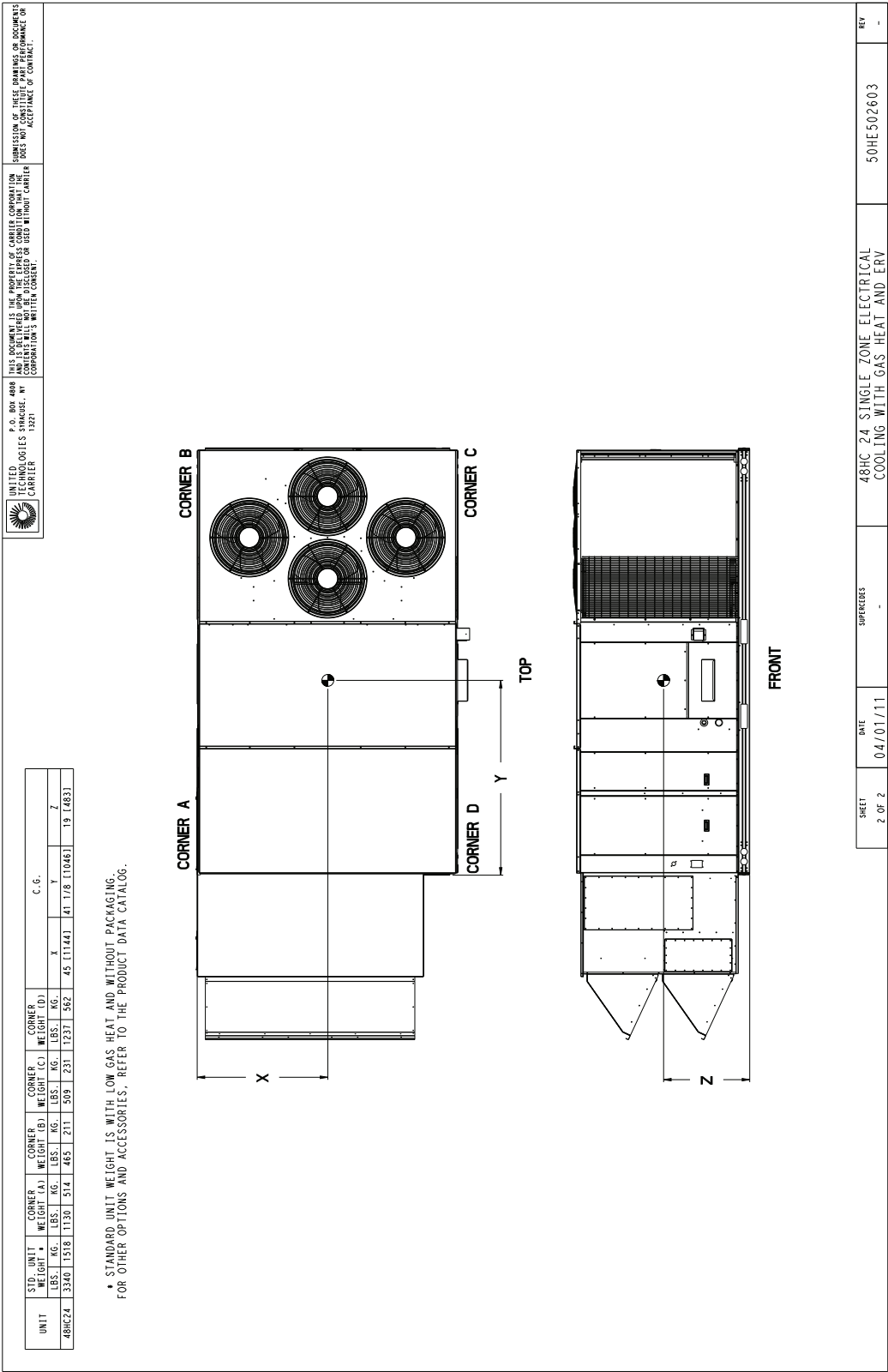


Fig. 5 - 48HC24



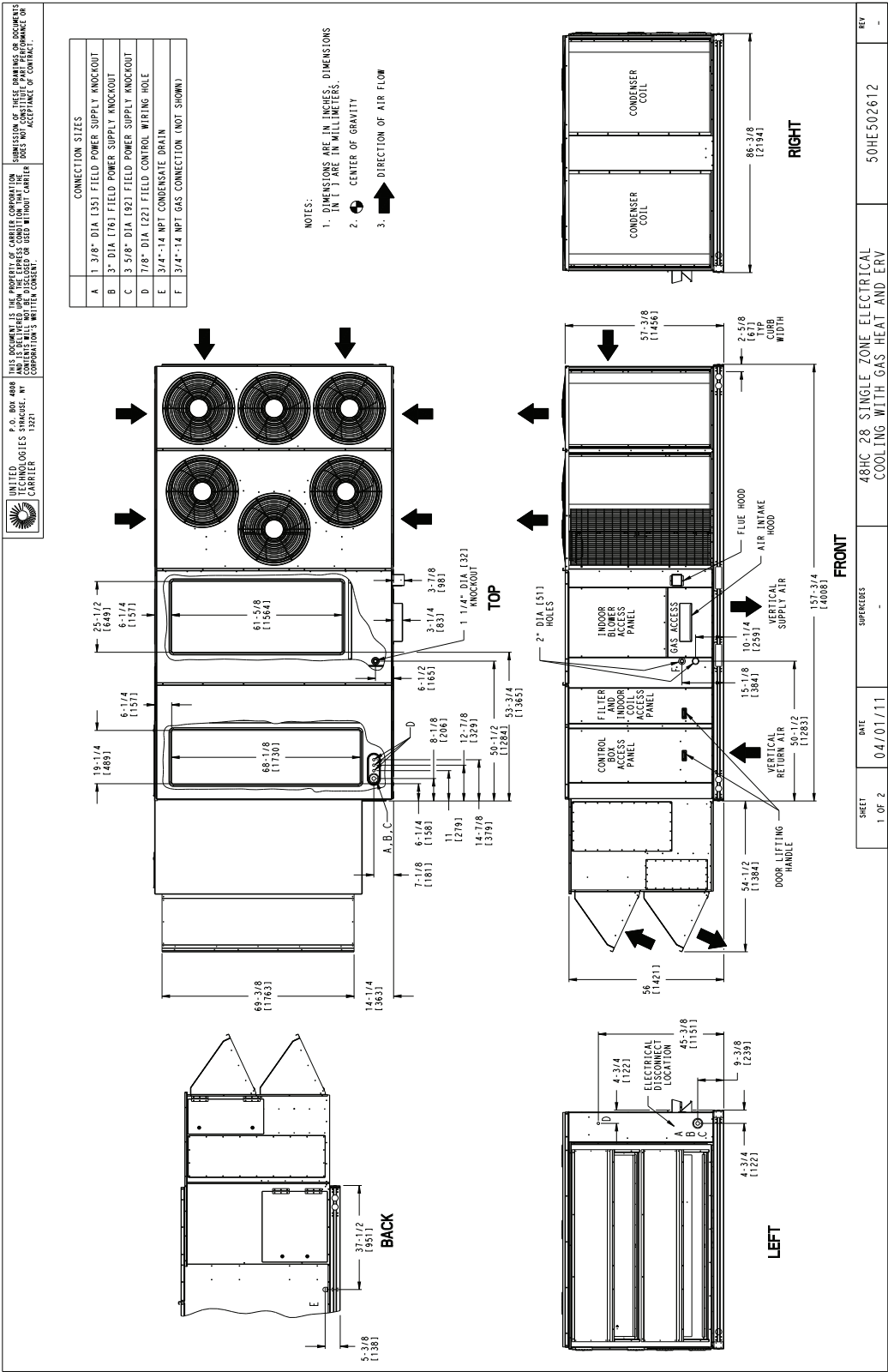
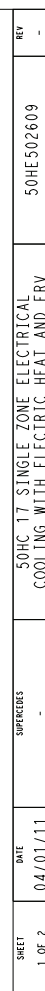


Fig. 7 - 48HC28



C11268



Fig. 11 - 50HC20

SHEET	DATE	SUPERFICES	REV
1 OF 2	04/01/11	-	50HC 20 SINGLE ZONE ELECTRICAL COOLING WITH ELECTRIC HEAT AND ERV



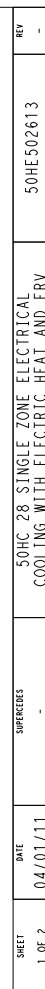


Fig. 15 - 50HC28

GUIDE SPECIFICATIONS - ENERGY X™

Packaged Energy Recovery Ventilator

Nominal Airflow Capacity Range: 3,900 CFM to 6000 CFM



Part 1 — General

1.01 System Description

EnergyX™ v2 (Energy Recovery Ventilation) unit is an electrically controlled ventilation air pre-conditioner utilizing an AHRI 1060 certified energy recovery cassette to reduce the cooling and heating loads placed on the primary HVAC unit by untreated outdoor air. Building exhaust air shall be introduced to the EnergyX™ v2 unit through ductwork. Unit shall be designed as a factory-installed option to be used with WeatherMaster 48HC and gas heat or 50HC cooling only rooftop units for use in vertical supply and return applications only.

1.02 Quality Assurance

- A. Unit shall be designed in accordance with UL Standard 1995.
- B. Energy Recovery unit shall be ETL tested and certified.
- C. Rooftop unit and Energy Recovery unit shall be ETL certified as one single system.
- D. Roof curb or curb extension shall be designed to conform to NRCA Standards.
- E. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.
- F. Unit casing shall be capable of withstanding ASTM No. 141 (Method 6061) 500-hour salt spray test.
- G. Unit shall contain ARI 1060 certified Energy Recovery Cassette.
- H. Unit EATR leakage rates shall be capable of meeting ASHRAE Standard 62.1 requirements for use of class-2 exhaust with class-1 ventilation air.

Part 2 — Products

2.01 Equipment (Standard)

A. General

The EnergyX unit shall be a factory assembled, single piece unit. Contained within the unit enclosure shall be all factory wiring with a single, pre-determined point of power input and a single point of 24-volt control wiring.

B. Unit Cabinet

- 1. Unit cabinet shall be constructed of galvanized steel coated with a prepainted baked enamel finish.
- 2. All models shall have hoods installed over outside air intake and exhaust openings. Outside air hood shall have aluminum water entrainment filters.
- 3. All models have 1-in., 2 pound density fiberglass insulation.
- 4. Hinged access doors with compression latches shall be provided on all units for access to fans and filters. Hinged doors shall be provided with at least one handle capable of being locked.
- 5. Exhaust air stream shall have back-draft dampers to prevent air penetration during off cycles.
- 6. Holes shall be provided in the base rails for rigging shackles to facilitate overhead rigging.

C. Blowers

- 1. 15-25 Ton units with Modulating Volume CFM EnergyX unit:
 - a. Blowers shall be direct drive with variable speed motors.
 - b. Blower wheel shall be made from steel with a corrosion resistant finish. It shall be a dynamically balanced, double-inlet type with backward-curved blades.
 - c. Blowers shall be mounted on neoprene vibration isolation pads.
 - d. Motors shall be high efficiency and have thermal overload protection.

D. Filter Section

- 1. Standard filter section shall accept commercially available, 2-in. pleated filter(s).
- 2. Factory-installed exhaust and outdoor air filters shall be 2-in. pleated type with a MERV 8 minimum efficiency rating.

E. Controls and Safeties

The EnergyX unit shall operate in conjunction with rooftop unit fan.

F. Electrical Requirements

All unit power wiring shall enter unit cabinet at a single location.

G. Energy Recovery Cassette

1. The energy recovery media shall have a minimum of 70% effectiveness at nominal unit airflow.
2. Energy wheel performance shall be ARI Standard 1060 Certified and bear the ARI Certified Product Seal.
3. The energy recovery cassette shall be an UL Recognized component for electrical and fire safety.
4. The wheel shall be coated with silica gel desiccant, permanently bonded without the use of binders or adhesives.
5. Coated wheels shall be washable with detergent or alkaline coil cleaner and water.
6. The silica gel shall not dissolve or deliquesce in the presence of water or high humidity.
7. The substrate shall be made of a lightweight polymer and shall not degrade or require additional coatings for application in coastal environments.
8. The wheel polymer layers shall be wound continuously with one flat and one structured layer in an ideal parallel plate geometry providing laminar flow and minimum pressure drop.
9. The polymer layers shall be captured in a stainless steel wheel frame or aluminum and stainless steel segment frames that provide a rigid and self-supporting matrix.
10. Energy recovery wheels greater than 19 inches in diameter shall be provided with removable wheel segments.
11. Wheel frame shall be a welded hub, spoke and rim assembly of stainless, plated, and or coated steel and shall be self supporting without the wheel segments in place.
12. All wheels shall use removable wheel segment design, except 2-6 ton constant volume unit.
13. Wheel segments shall be removable without the use of tools to facilitate maintenance and cleaning.
14. Wheel rim shall be continuous rolled stainless steel and the wheel shall be connected to the shaft by means of taper locks.
15. Wheel bearings shall provide an L-10 life of 400,000 hours.
16. Drive belts of stretch urethane shall be provided for wheel rim drive without the need for external tensioners or adjustment.

2.02 Options and Accessories

A. Supply and exhaust air frost control option

1. Factory-installed frost protection module shall sense pressure differential across the energy recovery cassette.
2. Supply blower shall be shut-off if the pressure differential across the energy recovery cassette exceeds an adjustable set point. Blower shall remain off for an adjustable time period.
3. Exhaust blower and wheel shall remain in operation in order to remove any frost build-up on the wheel.

B. Maintenance indicator package

1. A factory-installed switch shall monitor the energy recovery blower and wheel motor amp draw and send a signal to field-supplied 24-v indicator upon amperage surge that maintenance required.

C. Filter maintenance indicator

1. A factory-installed differential pressure switch shall measure pressure drop across the outside air filter and activate a field-supplied 24-v indicator when airflow is restricted. It shall not interrupt EnergyX operation. Switch set point shall be adjustable.

D. Free cooling with enthalpy and stop/jog control

1. An enthalpy sensor shall prevent the wheel from rotating if the outside air conditions are acceptable for free cooling. Both exhaust and supply blowers will remain on.
2. Stop-Jog-Control shall energize the wheel periodically during the free cooling operation of the EnergyX to prevent dirt build-up on the wheel.

E. Economizer option

1. The economizer shall be integrated in the energy recovery module and shall allow air to bypass the energy recovery wheel for free cooling and fail-safe operation. Tilting wheel mechanisms shall not be allowed.
2. The economizer damper shall be motorized with factory-installed, 24-volt Belimo actuator.
3. The EnergyX shall be capable of using the economizer in a free cooling mode of operation.
4. The economizer shall utilize enthalpy sensor controls when in the economizer mode.

F. Motorized 2-position damper accessory -

1. The motorized 2-position supply and exhaust dampers shall include a factory-installed, 2-position, 24-volt motor.
2. Damper actuators shall be spring-return actuators.
3. Dampers shall open when the energy recovery module is in operation and close when unit is off.

G. CO2 Sensor

1. The modulating airflow energy recovery unit shall be capable of incorporating a CO2 sensor for use with Demand Control Ventilation.
2. The CO2 sensor shall connect to the base rooftop unit's digital controller.
3. The modulating airflow energy recovery unit shall use at a minimum, a high & low CFM airflow setpoints when a CO2 sensor is used.

H. Roof Curb

1. The energy recovery module shall use the standard rooftop unit roofcurb.
2. Roofcurb extensions, support rails or other devices that come in contact with the roof surface to support the energy recovery module shall not be allowed.
3. A horizontal adaptor curb shall be used to convert vertical return air applications into horizontal return air applications. The unit supply airflow shall be convertible via the base rooftop unit operation & restrictions.