LN Series
Chillers and
Outdoor Mechanical Rooms
Engineering Catalog

AHRI CERTIFIED®
www.ahridirectory.org
Air-Cooled Water Chilling Packages
AHRI Standards 550/590 and 551/591

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V28990 · Rev. A · 190620

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Features and Benefits

Flexibility of Design
With model sizes ranging from 45 to 140 tons the AAON LN Series chiller can suit any application.

Convenience and Serviceability
The AAON LN Series chiller was designed with convenient installation and servicing in mind. The LN Series chiller is delivered to the jobsite ready for installation and startup. AAON offers a wide variety of standard and optional features such as pumping packages. All components are piped, wired, and run tested before they are shipped from the factory.

All models feature lockable, hinged access doors to the cabinet interior. A controls compartment provides access to vital controls components, the electrical system, and compressors. All controls components are labeled and connected with color-coded wiring to match the unit wiring diagram. Water connections may be specified in the left, right, or bottom of the cabinet, which may be rooftop, platform or ground-level slab mounted. With all components internal to the cabinet, the LN Series chiller does not require mounting in a remote location or a screened, protected area to prevent contact with building or visiting personnel.

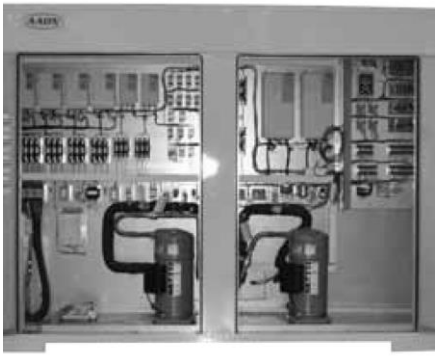

Figure 1 - Compressor and Control Compartment

Reliability
The cabinet's composite construction, galvanized G-90 sheet steel paneling surrounding insulating foam, provides strength, rigidity, and excellent thermal characteristics. Corrosion resistant external polyurethane paint surpasses a 2,500 hour salt spray test. The air-cooled condenser section includes coil guards to reduce any potential fin damage, and additional coil corrosion protection is offered with an optional polymer E-coating which surpasses a 10,000 hour salt spray test. AAON integrates the latest in reliable scroll compressor technology into the LN Series. Each chiller is factory inspected and checked for leaks before leaving the factory.

Quiet Operation
In addition to being dependable, the hermetic scroll compressors included in each LN Series chiller offer quiet operation. Each compressor is placed on raised structural decks and rubber isolation mounted minimizing vibration. The chiller cabinet construction, composite paneling with 2" thick foam insulation, not only provides good thermal insulation, but also minimizes excessive exterior sound levels. A standard feature on all AAON chillers is axial flow condenser fans providing maximum airflow with minimal noise levels. For quieter condenser section operation, Variable Frequency Drives (VFDs) are available to reduce condenser fan energy consumption and noise at part load operation. The low sound ECM condenser fans offer the best sound as they are specifically designed for reduced and redirected sound emission.

Efficiency
All condenser fans utilize direct drive motors for maximum efficiency. VFDs are available on all pump motors and condenser fans for efficient operation at part load conditions. The use of scroll compressors, while being both reliable and quiet, also boasts minimal frictional losses and outstanding efficiency. Variable capacity VFD controlled scroll compressors also provide load matching cooling capacity, with quiet energy efficient operation. The LN Series chiller maintains control on the leaving water temperature by modulating compressor capacity on and off at part load conditions, maintaining efficient operation across the entire range of operation.

Smart Controls
Every model is furnished with a Micro Control Systems (MCS) Magnum controller that modulates the compressors to maintain the leaving water temperature over a wide range of operating conditions. A convenient interface is provided with a large LCD display. Inputs are made using 9 large keys with menu driven prompts. Schedules are available with a seven day built-in time clock. Terminals are provided for remote stop-start and for remote reset of the leaving water temperature setpoint. The controller features 12 analog and 4 digital inputs, 10 relay outputs and 4 analog outputs. Non-volatile memory is used for all control functions. Optional features include diagnostic sensors for pressure and temperature on each refrigerant circuit, current sensors for each compressor, a full color touchscreen interface and a RS-485 port and Ethernet port allowing communication with a building management system.

Figure 2 - LCD Control and Display Panel

Factory Installed Pumping Packages
AAON has taken the lead with factory engineered and installed pumping packages that save time and expenses associated with the details of the jobsite construction of the equipment room. The LN Series effectively becomes a packaged outdoor mechanical room and eliminates the need to use valuable indoor floor space.

The factory installed piping package includes primary pumps and piping access to the building through the left, right, or bottom. Grooved end piping and fittings are furnished as a standard feature, and the insulated compartment can even be provided with heating for technician comfort while periodic maintenance is performed. Primary pumping packages include an Armstrong® pump, butterfly valves, strainers, and ball valves.

DualArm pumps are also available. The inlet and outlet ports on the casing are at least one size larger than a single pump size, so that both units may operate in parallel with no loss of single pump efficiency. Each port is fitted with an isolation valve that allows the units to operate in parallel or standby, and may also be used to isolate one pumping

unit for servicing or removal, with the other pump still operating.

For added convenience, selection of pumping packages is handled through the AAON selection software, AAON ECat. Pumps are selectable for primary pumping. Manual selection of the pumping package components is not possible due to the many combinations and applications conditions that may be selected. All the primary pumping systems are supported throughout the LN Series chiller sizes and associated flow rates. After pump selection is made, the AAON ECat software will generate a rating sheet, pump performance curves, and a piping diagram.

Application Information

Heat Exchanger Design Data
The system can start and pull down with up to 80°F entering water temperature. For continuous operation, it is recommended that the entering water temperature not exceed 65°F. The chiller must not be operated with a leaving water temperature of less than 42°F for a plain water application. When lower leaving fluid temperatures are required, an appropriate glycol solution must be used. The solution must have a freezing point at least 15°F lower than the design leaving fluid temperature. The temperature difference between fluid entering and leaving the chiller must be in the range of 6 to 16°F. The absolute maximum fluid temperature that can be circulated continuously through the heat exchanger is 110°F.

Fluid Volume
Consideration must be given to the total volume of fluid in the system. In close coupled, low volume systems, the leaving fluid temperature will change quickly with steps of capacity control. This is not acceptable if close control is desired for a conditioned space or an industrial process. In order to accurately determine the fluid volume needed for the application, you must resolve and agree on the amount of swing in fluid temperature that can be tolerated. This will depend on the control system, the terminal equipment operation, and use. The scroll compressor LN Series chiller models contain 4 compressors. Use the following example as a guide to determine swing in fluid temperature tolerable.

Use the information in Table 1, which lists the maximum step of capacity in each model size, and a factor for that model.

Loop Volume Example
An LN-075 is rated at 67 tons at the operating conditions. It is desired to have no greater than a +/- 3°F leaving water temperature variation due to compressor unloading. What is the minimum water volume required in the chilled water loop?

Solution: Use the following equation to determine the minimum allowable water loop volume.

$$Minimum\ Water\ Loop\ Volume = \frac{Actual\ Tons\ x\ Min\ Volume\ (\frac{Gal - °F\ swing}{Ton})}{Allowable\ °F\ Swing}$$

Allowable °F Swing is specified in the problem statement. With a tolerance of +/- 3°F, the total allowable swing is 6°F.

Select the value of Minimum Volume from Table 1.

Table 1 - Staged Scroll Compressor Chiller Minimum Water Loop Volume

Model	Maximum % Capacity Step	Minimum Volume (Gal-°F Swing)/ton
LN-045	30.8	36.96
LN-055	31.5	37.80
LN-060	28.9	34.68
LN-075	26.0	31.20
LN-095	32.4	38.88
LN-105	29.5	35.40
LN-120	32.3	38.76
LN-140	31.3	37.56

For LN-075:

$$Minimum\ Volume = 31.20\ \frac{Gal - °F}{Ton}$$

Compute the Minimum Water Loop Volume with the known performance of 67 tons of cooling at the application conditions:

$$Min\ Water\ Loop\ Volume = \frac{67\ tons * 31.20 \frac{Gal - °F}{Ton}}{6°F} = 348\ gallons$$

Notice if this system was selected for a 45°F leaving water temperature, the temperature will vary between 42°F to 48°F (recall the variation tolerance +/- 3°F) with the cycling of the compressors at the water loop volume of 348 gallons. The final selection should ensure the leaving water temperature does not drop below 42°F. If a leaving water temperature below 42°F is indicated then the loop volume should be increased or glycol should be included with the design.

If the fluid loop contains glycol, the above **water loop volume** should be multiplied by the correction factor in Table 2.

Table 2 - Glycol Volume Correction Factors

% by Weight	Glycol Volume Correction Factor	
	Ethylene	Propylene
10	1.038	1.017
20	1.066	1.033
30	1.100	1.058
40	1.140	1.092
50	1.192	1.142

It may be necessary to install a storage tank in the system to provide the necessary volume for close temperature control. When this is done, the tank should be installed in the loop between the fluid leaving from the chiller and the supply to the building. Figure 3 illustrates a proper storage tank usage.

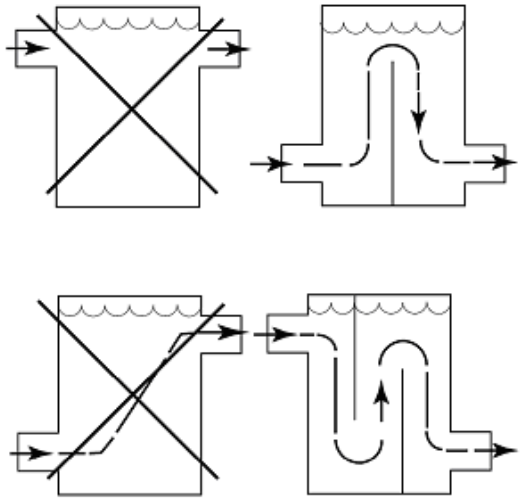

Figure 3 - Storage Tank Usage

Oversizing Chillers

Generally speaking, fully loaded equipment operates more efficiently than large equipment running at or near minimum capacity. When selecting a chiller, the anticipated part load operation of the system should be evaluated with respect to the NPLV rating of the equipment under consideration. Larger future loading requirements may cause temporary oversizing of equipment that is initially selected and installed. This should be done with care, although the AAON LN Series

chiller, with VFD controlled variable capacity scroll compressors, is more tolerant than older designs that use a single compressor.

Chiller Placement

The AAON LN Series chiller is designed for outdoor applications and mounting at ground level or on a roof. It must be placed on a level and solid foundation that has been prepared to support its weight. When installed at ground level, a one-piece concrete slab should be used with footings that extend below the frost line. With ground level installation, care must be taken to protect the coil fins from damage due to vandalism or other causes. The placement relative to the building air intakes and other structures is critical and must be carefully selected. .

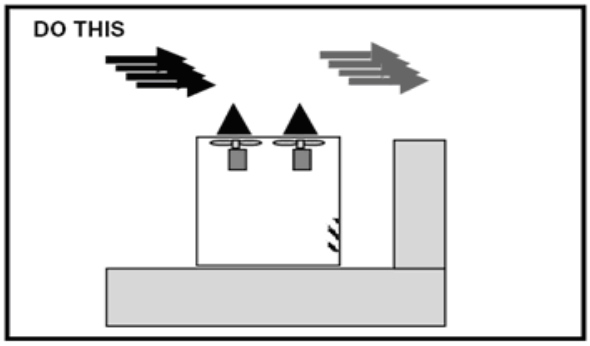

Figure 4 - Proper Chiller Placement

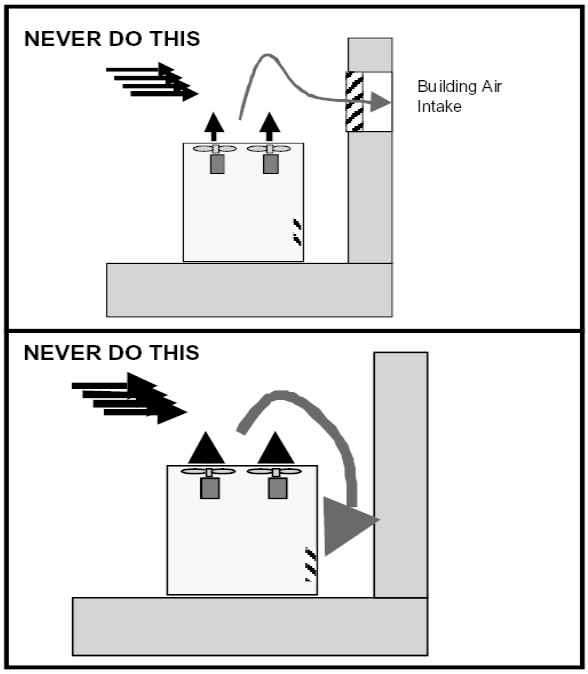

Figure 5 - Improper Chiller Placement

Be sure to observe the dimensions that are on the rating plate of the chiller for operational and service clearances. For proper unit operation, the immediate area must remain free of debris that may be drawn in and obstruct airflow in the condensing section. Table 3 shows the typical clearances found on the rating plate of each unit.

Table 3 - Service Clearances

Location	45-140 tons
Front	72”
Back	72”
Left or Right	96”
Top	Unobstructed

Always remember, there should be no obstruction above the unit that could deflect the discharge air downward where it could recirculate to the inlet of the condensing section. The position of the chiller must provide sufficient side and end clearance to allow air to enter, as well as, to permit the

access for any future service. If the low ambient option has been ordered with the equipment then special consideration must be given to snow accumulation when placing the unit. Condenser coils and fans must be free of snow or any other obstructions in order to start and operate properly with a correct amount of airflow.

Access Doors
When planning the placement of the chiller, take into consideration the access doors to the equipment. A lockable access door is provided to the compressor and controls compartment. A separate access door is also provided to the evaporator/heat exchanger compartment.

Mounting Isolation
For roof mounted applications or anytime vibration transmission may be a factor, vibration isolators may be considered.

Electrical Power Supply
A disconnect switch that is accessible from the outside of the cabinet is available factory installed. The single point electrical power connections are made in the compressor/electrical controls compartment. The power and control wiring is brought up through the utility entry to either the power supply terminal blocks or the disconnect switch. The controller furnished with the unit is supplied with its own power supply factory wired to the main power of the chiller. The voltage to the chiller must be within plus or minus 10% of the nameplate rating value on the unit.

All units are furnished with a single point power supply standard. The largest capacity single point power supply terminal supplied from AAON is rated at 1200 amps.

Electrical Data
When a pumping package is selected, the amp draw of the pumps is added to the standard electrical data. This will increase the minimum circuit ampacity and the maximum fuse size. Consult AAON ECat or the Electrical Service Sizing Data section of this catalog for electrical sizing information.

Dimensional Drawings
Equipment dimensions vary based on unit capacity, type of condenser, and pumping system. AAON ECat should be used with all the job application information in order to receive an accurate drawing for a specific model and feature set.

Optional High Efficiency Heat Exchangers
High Efficiency oversized heat exchangers are available on all model sizes for brazed plate and shell and tube and may be selected to improved performance with water or to use with systems that contain glycol to aid in offsetting the decreased capacity due to the thermal properties of glycol.

Factory Insulated Water System
Shell and tube and brazed plate heat exchangers are insulated at the factory before shipment. The suction lines and the line between the TXV and the chiller barrel / brazed plate are also insulated at the factory, but the ports are still accessible so the piping connections and components can be leak checked in the field.

Unit Selection

Selection Procedure
Chiller selection will require knowledge of:

Chiller
- Condenser Type
- Compressor Type
- Pumping System Type

Chiller Conditions
- System Load
- Ambient Conditions
- Entering Water/Glycol Temperature
- Leaving Water/Glycol Temperature (or Design Temperature Drop through the Chiller)
- Chiller Flow Rate
- Glycol Percentage
- Water Fouling Factor

Pumping System Conditions
- Building Pressure Drop
- Building Flow Rate
- Minimum/Maximum Loop Temperature
- External Loop Volume

Water Fouling Factor
The standard fouling factor is assumed at 0.0001 ft^2 x hr °F/Btu with AAON ECat. If calculating a solution with an alternative fouling factor, apply the appropriate correction factor shown in Table 6.

Glycol Chillers
A minimum leaving fluid temperature of 42°F is allowed when water is used as a heat transfer fluid to ensure freeze protection and continued operation of the heat exchanger. When lower leaving temperatures are desired, glycol must be added to the circulating fluid. AAON ECat will calculate correction factors of propylene glycol systems based on the percentage of glycol input into the Unit Conditions window. If calculating a solution requiring ethylene glycol, apply the appropriate correction factor from Table 4. Propylene glycol correction factors are shown in Table 5.

Chilled Water Flow Rate
An approximation of the chilled water flow rate in gallons per minute (gpm) is given by the following equation:

$$GPM = \frac{Tons\ x\ 24}{\Delta T\ water}$$

Selection Example 1
An air-cooled condenser scroll compressor chiller is needed that can provide 120 tons of cooling capacity at 105°F DB and 77°F WB ambient air temperature. The leaving water temperature needed is 44°F, with a 10°F ΔT or entering water temperature of 54°F. Assume a standard fouling factor, a standard sized chiller heat exchanger and no glycol.

System Load = 120 tons
Ambient Dry Bulb Conditions = 105°F
Entering Water temperature = 54°F
Leaving Chilled Water Temperature = 44°F
ΔT = 10°F

Solution: The approximate water flow rate is computed from the equation:

$$GPM = \frac{120\ tons\ x\ 24}{10°\text{F}} = 288\ GPM$$

Using AAON ECat, the performance of a LN-140 at these specific unit conditions is 120.4 tons of cooling capacity, the associated power input is 185.8 kW, the EER at operating conditions is 7.8, and the total pressure drop is 7.3 ftH_2O.

Unit Rating

2425 South Yukon Ave - Tulsa, Oklahoma 74107-2728 - Ph. (918) 583-2266 Fax (918) 583-6094
AAONEcat32 Ver. 4.277 (SN: 5918880-)
Chiller Selection Software Version: 1.0.1.0

	A1	A2	A3	A4	A5	B1	B2	B3	B4	1	2	3A	3B	3C	3D	4A	4B	4C	4D	5A	5B	5C	6D	6	7	8A	8B	8C	9	10A	10B	10C	10D
	L	N	A	-	1	4	0	-	C	-	A	-	3	-	F	A	A	0	0	-	0	0	0	0	:	A	0	-	0	0	0	0	-	0	0	0	0	-	0	0	0	0	-	0	B	-	0	0	0	-	0	-	0	E	0	0
	-	0	0	0	0	0	-	0	J	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	0	0	0	-	0	0	0	0	0	-	0	0	0	B												
	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26A	26B	26C	26D	26M	26P	27	28	29	30	31	32	33	34	35																						

Tag: CH #16

Job Information

Job Name:	New Job	Job Number:	Job #9990171
Altitude:	0.00 ft		

Physical Specifications

Compressors:	2 x CGSD80421VA+CGSD80485VA	Shipping Weight:	8309 lbs. (±5%)
Length (in):	182	Operational Weight:	8455 lbs. (±5%)
Width (in):	142	Refrigerant:	R-410A
Height (in)	104		

Conditions of Service

Percent Of Full Load:	100%	Unit kW Per Ton:	1.543
Capacity (Tons):	120.4	Compressor kW Per Ton:	1.425
Unit Power (kW):	185.8	Energy Efficiency (Btu/W*h):	7.776
Compressor Power (kW):	171.6	Unit NPLV.IP (Btu/W*h):	14.65
Fan Power (kW):	14.25	Unit NPLV.IP (kW/kW):	4.292
Building PD (ft):	40.00	Min/Max Loop Temperatures (°F):	44.00 / 80.00
Loop Volume (GAL):	2000	Building Flow Rate (GPM):	288.0
Water Connection Sizes (IN):	5.00	Max Op. Pressure:	125 PSI

Cooler

Model:	DP700x302_DM	Fouling Factor (hr.ft² °F/Btu):	0.000100
Fluid:	Water	HXC Pressure Drop (psi/ft w.g.):	2.36 / 5.45
Entering Fluid Temp (°F):	54.00	Total Pressure Drop (psi/ft w.g.):	3.18 / 7.33
Leaving Fluid Temp (°F):	43.97	Design Fluid Flow Rate (GPM):	288.0
Fluid Freezing Point (°F):	32.00	Min Fluid Flow Rate (GPM):	132.5

Condenser

Design Ambient:	105.0 °F DB 77.0 °F WB	Low Ambient Control:	Circuit 1 to 0 °F

Rating Information

EER at AHRI Conditions (Btu/W*h)):	*9.241*		
IPLV.IP at AHRI Conditions (Btu/W*h):	*15.73*	*Chiller Selection Software Version :*	1.0.1.0

Electrical Characteristics

Unit Power Supply:	460./3/60.0	Unit Rated (FLA):	261
Max. Over Current Protection:	300	Unit Min. Circuit Ampacity:	277

	Qty	HP	VAC	Phase	RPM	FLA	RLA
Compressor 1:	2		460	3			51.4
Compressor 2:	2		460	3			64.1
Condenser Fans 1:	8	1.50	460	3	1140	3.6	
Control Circuit:	1		120	1		3	

NPLV Points

% Full Load	Tons	Unit kW	EER	Amb DB	Amb WB	GPM	EWT	LWT
100%	120.4	185.8	7.776	105.0	77.0	288.0	54.00	43.97
75%	90.30	98.61	10.99	80.0	63.8	288.0	51.47	43.99
50%	60.49	41.69	17.35	67.5	50.7	288.0	48.99	43.96
25%	30.10	20.19	17.89	55.0	41.7	288.0	46.43	43.96

Figure 6 - Example 1 AAON ECat Rating Sheet

Selection Example 2
An air-cooled condenser scroll compressor chiller is needed that can provide 100 tons of cooling capacity at 95°F DB ambient air temperature. The leaving water temperature needed is 44°F, with a 10°F ΔT or entering water temperature of 54°F. Assume a standard fouling factor and a standard sized brazed plate heat exchanger. The chiller fluid circuit needs to be protected down to 10°F.
System Load = 100 tons
Ambient Dry Bulb Conditions = 95°F
Entering Water temperature = 54°F
Leaving Chilled Water Temperature = 44°F
ΔT = 10°F

Solution: The approximate water flow rate is computed from the equation:

$$GPM = \frac{100\ tons\ x\ 24}{10°\text{F}} = 240\ GPM$$

Using AAON ECat, with a 30% propylene glycol to satisfy the freeze protection requirement down to 10°F, the performance of a LN-105 at these specific unit conditions is 99.4 tons of cooling capacity, the associated power input is 122.2 kW, the EER at operating conditions is 9.8, and the total pressure drop is 14.2 ftH_2O.

If an oversized brazed plate heat exchanger is used, using AAON ECat, the performance of a LN-105 at these specific unit conditions is 99.8 tons of cooling capacity, the associated power input is 122.3 kW, the EER at operating conditions is 9.8, and the total pressure drop is 12.6 ftH_2O.

Using AAON ECat, with water and a standard sized brazed plate heat exchanger, the performance of a LN-105 at these specific unit conditions is 101.8 tons of cooling capacity, the associated power input is 122.9 kW, the EER at operating conditions is 9.9, and the total pressure drop is 11.0 ftH_2O.
Consulting Table 4, the correction factors applicable for a 30% ethylene mix are:

Capacity = 0.97
Power = 0.99
Pressure Drop = 1.15
Flow Factor = 26.4

Applying the correction factors to the water performance:

$$Corrected\ Capacity = 101.8\ tons\ x\ 0.97 = 98.7\ tons$$

$$Corrected\ System\ kW = 122.9kW\ x\ 0.99 = 121.7kW$$

$$Corrected\ Flow\ Rate = \frac{98.7\ tons\ x\ 26.4}{10°\text{F}} = 261\ GPM$$

$$Corrected\ Pressure\ Drop = 11.0ftH_2O\ x\ 1.15 = 12.7ftH_2O$$

Performance Correction Factors

Table 4 - Ethylene Glycol Correction Factors

% Ethylene Glycol by Weight	Freeze Point °F	Capacity Factor	Power Factor	Pressure Drop Factor	Flow Factor
10	26	0.998	0.998	1.03	24.9
20	17	0.995	0.997	1.09	25.6
30	5	0.970	0.990	1.15	26.4
40	-10	0.941	0.985	1.23	27.4
50	-32	0.950	0.970	1.31	28.6

Table 5 - Propylene Glycol Correction Factors

% Propylene Glycol by Weight	Freeze Point °F	Capacity Factor	Power Factor	Pressure Drop Factor	Flow Factor
10	26	0.998	0.996	1.08	24.4
20	19	0.975	0.975	1.21	24.8
30	9	0.960	0.985	1.40	25.4
40	-6	0.921	0.975	1.67	26.2
50	-28	0.910	0.965	1.98	27.4

Table 6 - Water Fouling Correction Factor

Chilled Water ΔT (°F)	0.0001		0.00025		0.00075		0.00175	
	Capacity Factor	Power Factor	Capacity Factor	Power Factor	Capacity Factor	Power Factor	Capacity Factor	Power Factor
6	0.990	0.998	0.989	0.996	0.962	0.986	0.920	0.973
8	0.994	0.999	0.991	0.998	0.965	0.988	0.923	0.975
10	1.000	1.000	0.993	0.999	0.970	0.991	0.928	0.978
12	1.005	1.001	0.999	1.000	0.975	0.993	0.933	0.980
14	1.008	1.002	1.005	1.001	0.980	0.996	0.937	0.983
16	1.010	1.003	1.008	1.003	0.984	0.998	0.941	0.985

Evaporator Pressure Drops

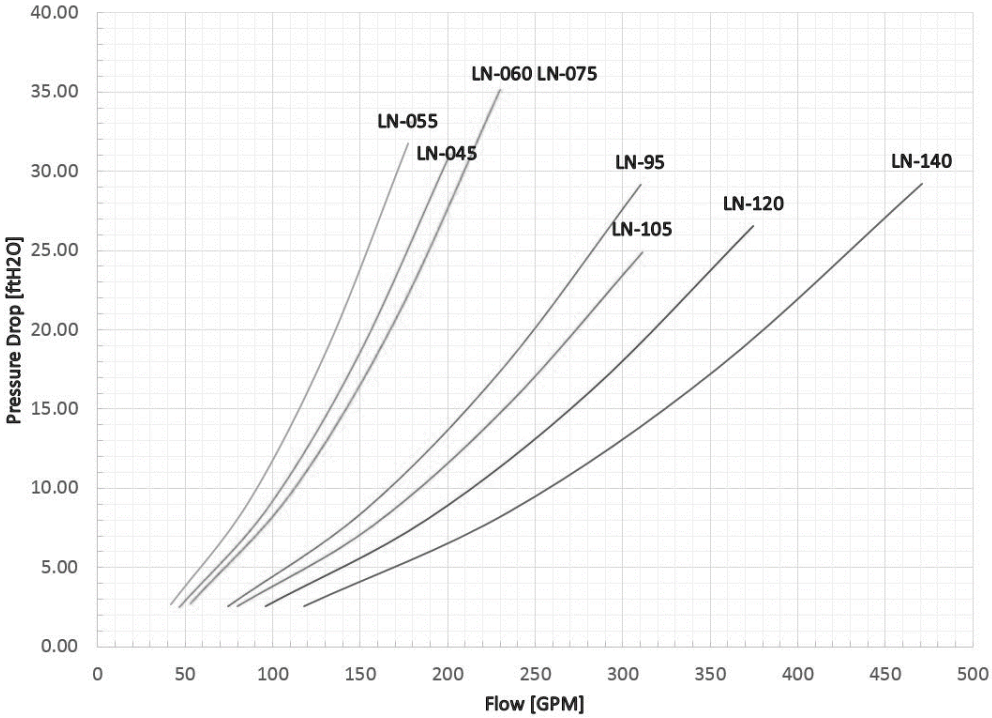

Figure 7 - Pressure Drop Across Standard Shell and Tube Heat Exchanger

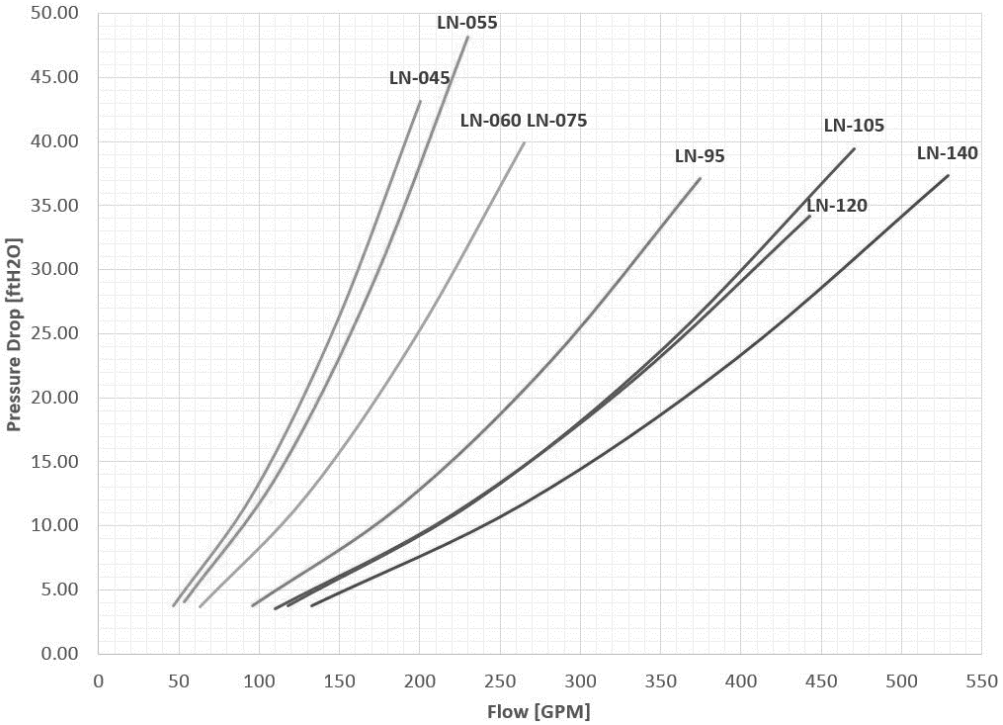

Figure 8 - Pressure Drop Across Oversized Shell and Tube Heat Exchanger

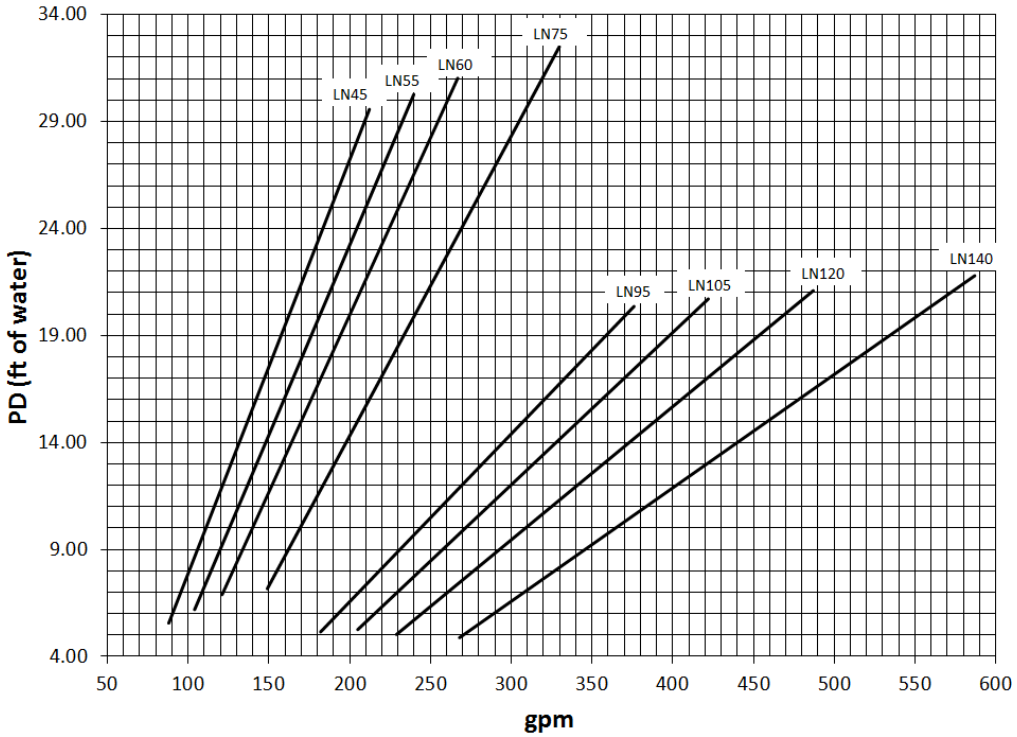

Figure 9 - Pressure Drop Across Standard Brazed Plate Heat Exchanger

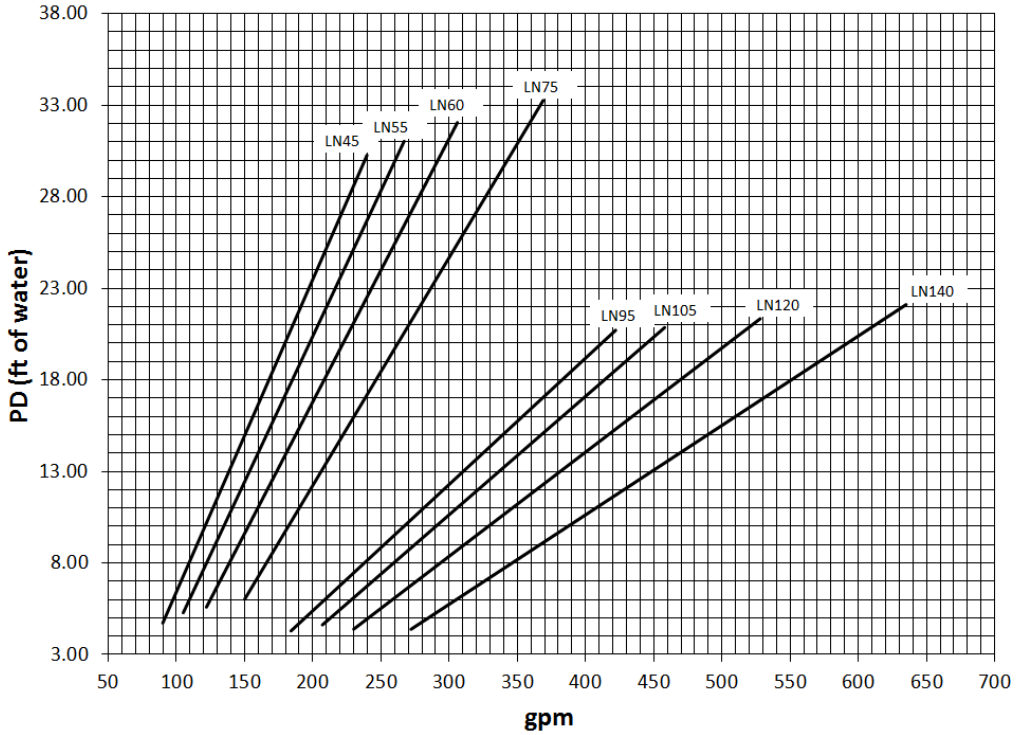

Figure 10 - Pressure Drop Across Oversized Brazed Plate Heat Exchanger

LN Series Feature String Nomenclature

Model Options : Unit Feature Options

GEN	MJREV	SIZE	SERIES	MNREV	VLT	A1	A2	A3	A4	A5	B1	B2	B3	B4	1	2	3A	3B	3C	3D	4A	4B	4C	4D	5A	5B	5C	5D	6	7	8A	8B	8C	9	10A	10B	10C	10D
LN	A	140	C	A	3	F	A	C	0	E	0	0	0	0	: A	0	– 0	0	0	0	– 0	0	0	0	– 0	0	0	0	– 0	B	– 0	0	0	– 0	– 0	E	0	0 –
																	0	0	0	0	0	– 0	J	0	0	0	– 0	0	0	0	0	– 0	0	0	0	0	0	– 0	0	0	0	0	B
																	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26A	26B	26C	26D	26E	26F	27	28	29	30	31	32	33	34	35

MODEL OPTIONS

SERIES AND GENERATION
LN

MAJOR REVISION
A

UNIT SIZE
045 = 45 ton Capacity
055 = 55 ton Capacity
060 = 60 ton Capacity
075 = 75 ton Capacity
095 = 95 ton Capacity
105 = 105 ton Capacity
120 = 120 ton Capacity
140 = 140 ton Capacity

SERIES
A = 45-60 ton units
B = 75 ton unit
C = 95-140 ton units

MINOR REVISION
A

VOLTAGE
2 = 230V/3Φ/60Hz
3 = 460V/3Φ/60Hz
4 = 575V/3Φ/60Hz
8 = 208V/3Φ/60Hz

A1: COMPRESSOR STYLE
F = R-410A Tandem VFD Compatible Scroll Compressor

A2: CONDENSER STYLE
A = Air-Cooled Microchannel Condenser

A3: EVAPORATOR CONFIGURATION
A = Standard Brazed Plate Constant Flow
B = Oversized Brazed Plate Constant Flow
C = Standard Shell & Tube Constant Flow
D = Oversized Shell & Tube Constant Flow

A4: COATING
0 = Standard
E = Polymer E-Coated Condenser Coil

A5: STAGING
0 = Staged Compressors
E = All Circuits with Variable Capacity Compressors - 2 Circuits
G = Half Circuits with Variable Capacity Compressors - 2 Circuits

B1: BLANK
0 = Standard

B2: BLANK
0 = Standard

B3: BLANK
0 = Standard

B4: BLANK
0 = Standard

UNIT FEATURE OPTIONS

1: UNIT ORIENTATION
A = Standard Access Left Water Connections
B = Standard Access Right Water Connections
C = Standard Access Bottom Water Connections

2: PUMPING STYLE
0 = No Pumps
B = Constant Flow Primary Pumping System - Large Pipe Size
D = Variable Flow Primary Pumping System - Large Pipe Size

LN Series Feature String Nomenclature

Model Options : Unit Feature Options

GEN	MJREV	SIZE	SERIES	MNREV	VLT	A1	A2	A3	A4	A5	B1	B2	B3	B4	1	2	**3A**	**3B**	**3C**	3D	4A	4B	4C	4D	5A	5B	5C	5D	6	7	8A	8B	8C	9	10A	10B	10C	10D
LN	A	– 140	– C	– A	– 3	– F	A	C	0	E	– 0	0	0	0	: A	0	–	**0**	**0**	**0**	0	– 0	0	0	0	– 0	0	0	0	– 0	B	– 0	0	0	– 0	– 0	E	0	0
–	0	0	0	0	0	– 0	J	0	0	0	– 0	0	0	0	0	– 0	0	0	0	0	0	0	– 0	0	0	0	0	0	– 0	0	0	B						
11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26A	26B	26C	26D	26E	26F	27	28	29	30	31	32	33	34	35								

3A: BUILDING PUMP CONFIGURATION

0 = No Building Pumps
A = 1 Pump + High Eff Motor
B = 1 Dual Pump + High Eff Motors
D = 1 Pump + VFD + High Eff Motor
E = 1 Dual Pump + 2 VFD's + High Eff Motors
K = 1 Pump + Field Installed VFD + High Eff Motor
L = 1 Dual Pump + 2 Field Installed VFD's + High Eff Motors

3B: BUILDING PUMP SERIES AND RPM

0 = No Building Pumps
A = 4360 (1,170 nominal rpm)
B = 4360 (1,760 nominal rpm)
C = 4360 (3,520 nominal rpm)
D = 4380 (1,170 nominal rpm)
E = 4380 (1,760 nominal rpm)
F = 4380 (3,520 nominal rpm)
K = 4382 (1,170 nominal rpm)
L = 4382 (1,760 nominal rpm)
M = 4382 (3,520 nominal rpm)

3C: PUMP SIZE

0 = No Building Pumps
A = 1.5B
B = 2B
C = 2D
D = 3D
E = 1.5x1.5x6
F = 2x2x6
G = 3x3x6
H = 4x4x6
J = 6x6x6
K = 1.5x1.5x8
L = 2x2x8
M = 3x3x8
N = 4x4x8
P= 5x5x8
Q = 6x6x8
R = 8x8x8
S = 2x2x10
T = 3x3x10
U = 4x4x10
V = 6x6x10
W = 8x8x10
Y = 4x4x11.5
Z = 5x5x11.5
1 = 6x6x11.5
2 = 8x8x11.5
3 = 4x4x13
4 = 6x6x13
5 = 8x8x13

LN Series Feature String Nomenclature

Model Options : Unit Feature Options

GEN	MJREV	SIZE	SERIES	MNREV	VLT	A1	A2	A3	A4	A5	B1	B2	B3	B4	1	2	3A	3B	3C	**3D**	**4A**	**4B**	**4C**	**4D**	**5A**	**5B**	**5C**	**5D**	**6**	**7**	**8A**	**8B**	**8C**	**9**	**10A**	**10B**	**10C**	10D
LN	A	– 140	– C	– A	– 3	– F	A	C	0	E	– 0	0	0	0	: A	0	– 0	0	0	**0**	– **0**	**0**	**0**	**0**	– **0**	**0**	**0**	**0**	– **0**	**B**	– **0**	**0**	**0**	– **0**	– **0**	**E**	**0**	0
															0	0	0	0	0	– 0	J	0	0	0	– 0	0	0	0	0	– 0	0	0	0	0	0	– 0	0	0	0	0	– 0	0	0	B
															11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26A	26B	26C	26D	26E	26F	27	28	29	30	31	32	33	34	35

3D: BUILDING PUMP MOTOR SIZE
0 = No Building Pumps
C = 1 hp
E = 2 hp
F = 3 hp
G = 5 hp
H = 7.5 hp
J = 10 hp
K = 15 hp
L = 20 hp
M = 25 hp
N = 30 hp
P = 40 hp
Q = 50 hp

4A: BLANK
0 = Standard

4B: BLANK
0 = Standard

4C: BLANK
0 = Standard

4D: BLANK
0 = Standard

5A: BLANK
0 = Standard

5B: BLANK
0 = Standard

5C: BLANK
0 = Standard

5D: BLANK
0 = Standard

6: REFRIGERATION OPTIONS
0 = Standard
A = Hot Gas Bypass on Non-Variable Capacity Circuits
B = Hot Gas Bypass - All Circuits

7: REFRIGERATION ACCESSORIES
0 = Standard
A = Sight Glass
B = Compressor Isolation Valves
C = Option A + B

8A: UNIT DISCONNECT TYPE
0 = Standard Single Point Power Block
A = Single Point Power Non-fused Disconnect

8B: DISCONNECT SIZE
0 = Power Block
N = 100 amps
R = 150 amps
U = 225 amps
Z = 400 amps
3 = 600 amps
5 = 800 amps
7 = 1200 amps

8C: BLANK
0 = Standard

9: ACCESSORIES
0 = Standard
B = Phase & Brown Out Protection

10A: UNIT CONTROL SEQUENCE
0 = Standard Controls

10B: UNIT CONTROL SUPPLIER
E = MCS Controls

10C: CONTROL SUPPLIER OPTIONS
0 = Standard
A = Touchscreen Interface
C = Modem
G = Option A + C

LN Series Feature String Nomenclature

Model Options : Unit Feature Options

GEN	MJREV	SIZE	SERIES	MNREV	VLT	A1	A2	A3	A4	A5	B1	B2	B3	B4	1	2	3A	3B	3C	3D	4A	4B	4C	4D	5A	5B	5C	5D	6	7	8A	8B	8C	9	10A	10B	10C	**10D**
LN	A	140	C	A	3	F	A	C	0	E	0	0	0	0	:	A	0	0	0	0	0	0	0	0	0	0	0	0	0	B	0	0	0	0	0	0	E	0	**0**
0	**0**	**0**	**0**	**0**	**0**	**J**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0	0	0	0	0	B
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26A**	**26B**	26C	26D	26E	26F	27	28	29	30	31	32	33	34	35

10D: BMS CONNECTION & DIAGNOSTICS
0 = None
A = BACnet IP
B = BACnet MSTP
C = Modbus IP
D = Modbus RTU
E = Lontalk
H = No BMS Connection with Diagnostics
J = BACnet IP with Diagnostics
K = BACnet MSTP with Diagnostics
L = Modbus IP with Diagnostics
M = Modbus RTU with Diagnostics
N = Lontalk with Diagnostics

11: BLANK
0 = Standard

12: VESTIBULE ACCESSORIES
0 = Standard
C = Vestibule Heating (Electric)

13: MAINTENANCE ACCESSORIES
0 = Standard
A = 115VAC Convenience Outlet Factory Wired
B = 115VAC Convenience Outlet Field Wired
C = Service Lights
F = Options A + C
J = Options B + C

14: BLANK
0 = Standard

15: CODE OPTIONS
0 = Standard ETL U.S.A. Listing
A = Chicago Code
B = ETL U.S.A. + Canada Listing

16: SHIPPING SPLITS
0 = One Piece Unit

17: AIR-COOLED CONDENSER ACCESSORIES
J = Cond. Coil Guards + 3Ø Cond. Fan Motor + VFD Controlled Cond. Fans - Head Pressure Control (0°F Low Ambient)
S = Cond. Coil Guards + Low Sound ECM Cond. Fans - Head Pressure Control (0°F Low Ambient)

18: BLANK
0 = Standard

19: BLANK
0 = Standard

20: BLANK
0 = Standard

21: BLANK
0 = Standard

22: BLANK
0 = Standard

23: BLANK
0 = Standard

24: CHILLER ACCESSORIES 1
0 = Standard
A = Glycol Chiller
C = Thermometers & Pressure Gauges
G = Option A + C

25: BLANK
0 = Standard

26A: BLANK
0 = Standard

26B: BLANK
0 = Standard

LN Series Feature String Nomenclature

Model Options : Unit Feature Options

GEN	MJREV	SIZE	SERIES	MNREV	VLT	A1	A2	A3	A4	A5	B1	B2	B3	B4	1	2	3A	3B	3C	3D	4A	4B	4C	4D	5A	5B	5C	5D	6	7	8A	8B	8C	9	10A	10B	10C	10D
LN	A	– 140	– C	– A	– 3	– F	A	C	0	E	– 0	0	0	0	: A	0	– 0	0	0	0	– 0	0	0	0	– 0	0	0	0	– 0	B	– 0	0	0	– 0	– 0	E	0	0 –
																													0	0	0	0	0	– 0	J	0	0	0 –
																													0	0	0	0	0	– 0	0	0	0	0 –
																													0	0	0	0	0	– 0	0	0	0	0 –
																													0	0	**0**	**0**	**0**	– **0**	**0**	**0**	**B**	
11	12	13	14	15	16	17	18	19	20		21	22	23	24	25	26A	26B	**26C**	**26D**	**26E**	**26F**		**27**	**28**	**29**	**30**	**31**		**32**	**33**	**34**	**35**

26C: BLANK
0 = Standard

26D: BLANK
0 = Standard

26E: BLANK
0 = Standard

26F: BLANK
0 = Standard

27: BLANK
0 = Standard

28: BLANK
0 = Standard

29: BLANK
0 = Standard

30: BLANK
0 = Standard

31: BLANK
0 = Standard

32: BLANK
0 = Standard

33: WARRANTY
0 = Standard Warranty
D = Compressor Warranty Years 2-5

34: CABINET MATERIAL
0 = Standard - Double Wall + R-13 Foam Insulation

35: PAINT & SPECIAL PRICING AUTHORIZATIONS
B = Premium AAON Gray Paint Exterior
E = Premium AAON Gray Paint Exterior + Shrink Wrap
X = Special Pricing Authorization + Premium AAON Gray Paint Exterior
1 = SPA + Premium AAON Gray Paint Exterior + Shrink Wrap
4 = Special Pricing Authorization + Special Exterior Paint Color
7 = SPA + Special Exterior Paint Color + Shrink Wrap

Model Options

Unit Series, Major Revision, Sizes, Series, and Minor Revision

Example: **LNA-140-C-A**-3-FAC0E-0000:A0-0000-0000-0000-0B-000-0-0E00-00000-0J000-00000-000000-00000-000B

The first number of the model string designates nominal tons of cooling capacity at AHRI conditions for an air-cooled condenser unit. Actual capacities will vary with conditions. Refer to the AAON ECat software for performance and cooling capacities at design conditions.

Table 7 - Unit Series, Major Revision, Sizes, Series, and Minor Revision

Series	Major Revision	Unit Size	Series	Minor Revision
LN	A	045	A Cabinet	A
		055		
		060		
		075	B Cabinet	
		095	C Cabinet	
		105		
		120		
		140		

Model Option

Voltage

Example: LNA-140-C-A-**3**-FAC0E-0000:A0-0000-0000-0000-0B-000-0-0E00-00000-0J000-00000-000000-00000-000B

All units have single point power blocks with grounding lugs and 120 VAC control circuits.

2 = *230V/3Φ/60Hz*
3 = *460V/3Φ/60Hz*
4 = *575V/3Φ/60Hz*
8 = *208V/3Φ/60Hz*

Model Option

Model Option A1 - Compressor Style

Example: LNA-140-C-A-3-**F**AC0E-0000:A0-0000-0000-0000-0B-000-0-0E00-00000-0J000-00000-000000-00000-000B

F = *R-410A Tandem VFD Compatible Scroll Compressors* - R-410A scroll compressors that can be factory provided with VFD speed control.

Model Option

Model Option A2 - Condenser Style

Example: LNA-140-C-A-3-F**A**C0E-0000:A0-0000-0000-0000-0B-000-0-0E00-00000-0J000-00000-000000-00000-000B

A = *Air-Cooled Microchannel Condenser* - Air-cooled condenser coils will be aluminum microchannel tubes.

Model Option

Model Option A3 - Evaporator Configuration

Example: LNA-140-C-A-3-FA**C**0E-0000:A0-0000-0000-0000-0B-000-0-0E00-00000-0J000-00000-000000-00000-000B

A = *Standard Brazed Plate Constant Flow* - Brazed Plate heat exchanger with grooved piping water connections and 3/4" closed-cell rubberized insulation. Option includes a 3/4" manual operation drain valve.

B = *Oversized Brazed Plate Constant Flow* - Brazed Plate heat exchanger with grooved piping water connections and 3/4" closed-cell rubberized insulation. Option includes a 3/4" manual operation drain valve.

C = *Standard Shell & Tube Constant Flow* - Shell and tube heat exchanger evaporator with grooved end piping, fittings and water connections and 3/4 inch closed cell polymer insulation with a minimum R-value of 3.5. Option includes a 3/4 inch manual operation drain valve.

D = *Oversized Shell & Tube Constant Flow* - Shell and tube heat exchanger evaporator with grooved end piping, fittings and water connections and 3/4 inch closed cell polymer insulation with a minimum R-value of 3.5. Option includes a 3/4 inch manual operation drain valve.

Model Option
Model Option A4 - Coating

Example: LNA-140-C-A-3-FAC**0**E-0000:A0-0000-0000-0000-0B-000-0-0E00-00000-0J000-00000-000000-00000-000B

0 = *Standard*
E = *Polymer E-Coated Condenser Coil* - Polymer e-coating is applied only to the condenser coils. Complete coil and casing are coated. Coating capable of withstanding at least 10,000 hours of salt spray per ASTM B117-90, yet is only 0.8-1.2 mils thick and has excellent flexibility. Option is intended for use in coastal saltwater conditions under the stress of heat, salt, sand and wind and is applicable to all corrosive environments where a polymer e-coating is acceptable. Coating includes a 5 year warranty, from the date of original equipment shipment from the factory. Instructions coil cleaning, maintenance, and recording keeping must be followed. Refer to the unit Installation, Operation and Maintenance Manual.

Model Option
Model Option A5 - Staging

Example: LNA-140-C-A-3-FAC0**E**-0000:A0-0000-0000-0000-0B-000-0-0E00-00000-0J000-00000-000000-00000-000B

0 = *Staged Compressors* - Two circuits, HGB is recommended on all circuits.
E = *All Circuits with Variable Capacity Compressor - 2 Circuits, 2 VCC + 2 On/Off Comp* - Two circuits, each with one lead compressor with variable capacity VFD speed control and one compressor with on/off capacity control.
G = *Half Circuits with Variable Capacity Compressor - 2 Circuits, 1 VCC + 3 On/Off Comp* - Two circuits, the lead circuit will include, one variable capacity compressor with VFD speed control and a compressor with on/off capacity control. The second circuit will have 2 compressors with on/off capacity control.

Model Option

Model Options B1, B2, B3, and B4 - Blank

Example: LNA-140-C-A-3-FAC0E-**0000**:A0-0000-0000-0000-0B-000-0-0E00-00000-0J000-00000-000000-00000-000B

0000 = *Standard*

Unit Feature 1

Unit Feature 1 - Orientation Options

Example: LNA-140-C-A-3-FAC0E-0000:**A**0-0000-0000-0000-0B-000-0-0E00-00000-0J000-00000-000000-00000-000B

A = *Standard Access Left Water Connections* - Water piping connected within the cabinet through piping cutouts on the unit's left.
B = *Standard Access Right Water Connections* - Water piping connected within the cabinet through piping cutouts on the unit's right.
C = *Standard Access Bottom Water Connections* - Water piping connected within the cabinet through piping cutouts on the unit's bottom.

Unit Feature 2

Unit Feature 2 - Pump Style

Example: LNA-140-C-A-3-FAC0E-0000:A**0**-0000-0000-0000-0B-000-0-0E00-00000-0J000-00000-000000-00000-000B

0 = *No Pumping Package*
B = *Constant Flow Primary Pumping System* - Select this option if water flow from the chiller to the building is constant.
D = *Variable Flow Primary Pumping System* - Select this option to modulate the flow of water through the chiller and to the building.

Unit Feature 3A

Unit Feature 3A - Building Pump Configuration

Example: LNA-140-C-A-3-FAC0E-0000:A0-**0**000-0000-0000-0B-000-0-0E00-00000-0J000-00000-000000-00000-000B

0 = *Standard - No Building Pump*
A *= 1 Pump and High Efficiency Motor*
B *= 1 Dual Pump and High Efficiency Motors*
D *= 1 Pump, 1 VFD, and High Efficiency Motor*
E *= 1 Dual Pump, 2 VFD's, and High Efficiency Motors*
K *= 1 Pump, 1 Field Installed VFD, and High Efficiency Motor*
L *= 1 Dual Pump, 2 Field Installed VFD's, and High Efficiency Motors*

AAON ECat will select the correct available options for Feature 3A based on unit conditions and the input from the pump selection program. To create a pump configuration select a pump option in Feature 2 and after all other features have been selected, input water conditions into the Unit Conditions window. Next, in the Pump Selection and Rating window, select the quantity and size of pumps, select the quantity and size of motors, select VFDs, and view pump curves.

Unit Feature 3B

Unit Feature 3B - Building Pump Series and RPM

Example: LNA-140-C-A-3-FAC0E-0000:A0-0**0**00-0000-0000-0B-000-0-0E00-00000-0J000-00000-000000-00000-000B

0 *= No Building Pumps*
A *= 4360 (1,170 nominal rpm)*
B *= 4360 (1,760 nominal rpm)*
C *= 4360 (3,520 nominal rpm)*
D *= 4380 (1,170 nominal rpm)*
E *= 4380 (1,760 nominal rpm)*
F *= 4380 (3,520 nominal rpm)*
K *= 4382 (1,170 nominal rpm)*
L *= 4382 (1,760 nominal rpm)*
M *= 4382 (3,520 nominal rpm)*

AAON ECat will select the correct available options for Feature 3B based on unit conditions and the input from the pump selection program. To create a pump configuration select a pump option in Feature 2 and after all other features have been selected, input water conditions into the Unit Conditions window. Next, in the Pump Selection and Rating window, select the quantity and size of pumps, select the quantity and size of motors, select VFDs, and view pump curves.

Unit Feature 3C

Unit Feature 3C - Building Pump Size

Example: LNA-140-C-A-3-FAC0E-0000:A0-00**0**0-0000-0000-0B-000-0-0E00-00000-0J000-00000-000000-00000-000B

0 = *No Building Pump*
A = *Pump 4360 1.5B*
B = *Pump 4360 2B*
C = *Pump 4360 2D*
D = *Pump 4360 3D*
E = *Pump 4380 1.5x1.5x6*
F = *Pump 4380 2x2x6*
G = *Pump 4380 3x3x6*
H = *Pump 4380/4382 4x4x6*
J = *Pump 4380 6x6x6*
K = *Pump 4380 1.5x1.5x8*
L = *Pump 4380 2x2x8*
M = *Pump 4380/4382 3x3x8*
N = *Pump 4380/4382 4x4x8*
P = *Pump 4380 5x5x8*
Q = *Pump 4380/4382 6x6x8*
R = *Pump 4380 8x8x8*
S = *Pump 4380 2x2x10*
T = *Pump 4380/4382 3x3x10*
U = *Pump 4380/4382 4x4x10*
V = *Pump 4380/4382 6x6x10*
W = *Pump 4380/4382 8x8x10*
Y = *Pump 4380 4x4x11.5*
Z = *Pump 4380 5x5x11.5*
1 = *Pump 4380 6x6x11.5*
2 = *Pump 4380 8x8x11.5*
3 = *Pump 4380 4x4x13*
4 = *Pump 4380 6x6x13*
5 = *Pump 4380 8x8x13*

AAON ECat will select the correct available options for Feature 3C based on unit conditions and the input from the pump selection program. To create a pump configuration select a pump option in Feature 2 and after all other features have been selected, input water conditions into the Unit Conditions window. Next, in the Pump Selection and Rating window, select the quantity and size of pumps, select the quantity and size of motors, select VFDs, and view pump curves.

Unit Feature 3D

Unit Feature 3D - Building Pump Motor Size

Example: LNA-140-C-A-3-FAC0E-0000:A0-000**0**-0000-0000-0B-000-0-0E00-00000-0J000-00000-000000-00000-000B

0 = *No Building Pump*
C = *1 hp*
E = *2 hp*
F = *3 hp*
G = *5 hp*
H = *7.5 hp*
J = *10 hp*
K = *15 hp*
L = *20 hp*
M = *25 hp*
N = *30 hp*
P = *40 hp*
Q = *50 hp*

AAON ECat will select the correct available options for Feature 3D based on unit conditions and the input from the pump selection program. To create a pump configuration select a pump option in Feature 2 and after all other features have been selected, input water conditions into the Unit Conditions window. Next, in the Pump Selection and Rating window, select the quantity and size of pumps, select the quantity and size of motors, select VFDs, and view pump curves.

Unit Features 4A, 4B, 4C, and 4D

Unit Features 4A, 4B, 4C, and 4D - Blank

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-**0000**-0000-0B-000-0-0E00-00000-0J000-00000-000000-00000-000B

0000 = *Standard*

Unit Features 5A, 5B, 5C, and 5D

Unit Features 5A, 5B, 5C, and 5D - Blank

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-0000-**0000**-0B-000-0-0E00-00000-0J000-00000-000000-00000-000B

0000 = *Standard*

Unit Feature 6

Unit Feature 6 - Refrigeration Options

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-0000-0000-**0**B-000-0-0E00-00000-0J000-00000-000000-00000-000B

0 = *Standard*
A = *Hot Gas Bypass on Non-Variable Capacity Refrigeration Circuits* - Field adjustable pressure activated bypass valve on all non-variable capacity compressor refrigerant circuits factory setup to divert hot compressor discharge gas to the evaporator if the pressure on the evaporator side of the valve drops below 105 psi for R-410A (34°F at sea level). The bypass valve is at full capacity after 6 degrees of differential (28°F at sea level). This option is used to prevent freeze-up during periods of low flow or cold entering heat exchanger conditions. This option is used for refrigerant system protection only and cannot be used for cooling capacity modulation.
B = *Hot Gas Bypass - All Circuits* - Field adjustable pressure activated bypass valve on all refrigerant circuits factory setup to divert hot compressor discharge gas to the evaporator if the pressure on the evaporator side of the valve drops below 105 psi for R-410A (34°F at sea level). The bypass valve is at full capacity after 6 degrees of differential (28°F at sea level). This option is used to prevent freeze-up during periods of low flow or cold entering heat exchanger conditions. This option is used for refrigerant system protection only and cannot be used for cooling capacity modulation.

Unit Feature 7

Unit Feature 7 - Refrigeration Accessories

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-0000-0000-0**B**-000-0-0E00-00000-0J000-00000-000000-00000-000B

0 = Standard
A = *Sight Glass* - Moisture indication sight glass attached to the refrigeration circuit liquid lines. The moisture indicator shows a green color when refrigerant is dry, a chartreuse color (green with a yellow tint or bright green) indicates caution and a yellow color indicates a wet condition. The sight glass is not a charge indicator.
B = *Compressor Isolation Valves* - Ball type service valves mounted on the refrigeration circuit discharge and suction lines permitting isolation of the compressor for service or replacement. The valves are located close to the compressors and work through a quarter turn from open to closed. Teflon seals and gaskets are used with a nylon cap gasket to prevent accidental loss. This option reduces the amount of refrigerant that must be recovered during compressor service or replacement.
C = *Sight Glass and Compressor Isolation Valves* - Options A + B

Table 8 - Moisture Content in the Refrigerant

Indicator Color	75° F Liquid Line Temperature
Green DRY	Below 75 ppm
Chartreuse CAUTION	75-150 ppm
Yellow WET	Above 150 ppm

Unit Feature 8A

Unit Feature 8A - Unit Disconnect Type

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-0000-0000-0B-**0**00-0-0E00-00000-0J000-00000-000000-00000-000B

0 = *Standard Single Point Power Block*
A = *Single Point Power Non-fused Disconnect Power Switch*

Individual components within the control cabinet are fused. Switch options include molded case, non-fused, disconnect switch externally mounted. The switch is accessible from the exterior of the unit. The switch disconnects high voltage service to the unit.

Unit Feature 8B

Unit Feature 8B - Disconnect 1 Size

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-0000-0000-0B-0**0**-0-0E00-00000-0J000-00000-000000-00000-000B

0 = *Standard Power Block*
N = *100 Amp*
R = *150 Amp*
V = *250 Amp*
Z = *400 Amp*
3 = *600 Amp*
5 = *800 Amp*
7 = *1200 Amp*

To add a switch, choose any switch and after all options have been selected and the pump program is completed AAON ECat will automatically calculate the minimum allowable ampacity and choose the correct size switch.

Unit Feature 8C

Unit Feature 8C - Blank

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-0000-0000-0B-00**0**-0-0E00-00000-0J000-00000-000000-00000-000B

0 = *Standard*

Unit Feature 9

Unit Feature 9 - Accessories

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-0000-0000-0B-000-**0**-0E00-00000-0J000-00000-000000-00000-000B

0 = *None*
B = *Phase and Brown Out Protection* - Voltage monitor that is used to protect motors and compressors from voltage imbalance, over/under voltage, and phase loss. Reset is automatic.

Unit Feature 10A

Unit Feature 10A - Unit Control Sequence

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-0000-0000-0B-000-0-**0**E00-00000-0J000-00000-000000-00000-000B

0 = *Standard AAON Controls*

Unit Feature 10B

Unit Feature 10B - Unit Control Supplier

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-0000-0000-0B-000-0-0**E**00-00000-0J000-00000-000000-00000-000B

E = *MCS Controls* - Micro Control Systems (MCS) maintains the chiller leaving water temperature. LCD interface is included within the controls compartment for unit configuration, setpoint adjustment, sensor status viewing, unit alarm viewing, and occupancy scheduling. PC with MCS-Connect software connected to the controller via RS-232 or Ethernet can also be used for unit configuration, setpoint adjustment, sensor status viewing, unit alarm view, and occupancy scheduling.

Unit Feature 10C

Unit Feature 10C - Unit Control Supplier Options

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-0000-0000-0B-000-0-0E**0**0-00000-0J000-00000-000000-00000-000B

0 = *None*
A = *Touchscreen Unit Control Interface* - Full color 15" 1024x768 pixel touchscreen interface included within the control compartment for unit configuration, setpoint adjustment, sensor status viewing, unit alarm view and occupancy scheduling. Graphical user interface allows for easy monitoring and troubleshooting of the chiller. Unit, controls, compressor and VFD literature can be viewed from the touchscreen.
C = *Modem* - A 56K modem which can allow MCS, AAON, or customer to remotely communicate with the unit in order to assist service in the field.
G = *Touchscreen Unit Control Interface and Modem*- Options A + C

Unit Feature 10D

Unit Feature 10D - BMS Connections & Diagnostic

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-0000-0000-0B-000-0-0E0**0**-00000-0J000-00000-000000-00000-000B

0 = *None*
A = *BACnet IP* - Ethernet communications port for end user interfacing via the BACnet IP protocol.

Unit Feature 10D - BMS Connections & Diagnostic Continued

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-0000-0000-0B-000-0-0E0**0**-00000-0J000-00000-000000-00000-000B

B = *BACnet MS/TP* - Adapter EIA-485 communications port for end user interfacing via the BACnet MS/TP protocol.
C = *Modbus IP* - Ethernet communications port for end user interfacing via the Modbus IP protocol.
D = *Modbus RTU* - EIA-485 communications port for end user interfacing via the Modbus RTU protocol.
E = *LonTalk* - Adapter communications port for end user interfacing via the LonTalk protocol.
H = *No BMS Connection with Diagnostics* - A diagnostics package of suction, discharge and liquid pressure transducers, temperature sensors that monitor compressor performance and current sensors that confirm mode of operation.
J = *BACnet IP with Diagnostics* - Option A + A diagnostics package of suction, discharge and liquid pressure transducers, temperature sensors that monitor compressor performance and current sensors that confirm mode of operation.
K = *BACnet MS/TP with Diagnostics* - Option B + A diagnostics package of suction, discharge and liquid pressure transducers, temperature sensors that monitor compressor performance and current sensors that confirm mode of operation.
L = *Modbus IP with Diagnostics* - Option C + A diagnostics package of suction, discharge and liquid pressure transducers, temperature sensors that monitor compressor performance and current sensors that confirm mode of operation.
M = *Modbus RTU with Diagnostics* - Option C + A diagnostics package of suction, discharge and liquid pressure transducers, temperature sensors that monitor compressor performance and current sensors that confirm mode of operation.
N = *LonTalk with Diagnostics* - Option E + A diagnostics package of suction, discharge and liquid pressure transducers, temperature sensors that monitor compressor performance and current sensors that confirm mode of operation.

Unit Feature 11

Unit Feature 11 - Blank

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-0000-0000-0B-000-0-0E00-**0**0000-0J000-00000-000000-00000-000B

0 = *Standard*

Unit Feature 12

Unit Feature 12 - Vestibule Accessories

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-0000-0000-0B-000-0-0E00-0**0**000-0J000-00000-000000-00000-000B

0 = *None*
C = *Vestibule Heating (Electric)* - 1kW base board heater mounted in the chiller evaporator compartment.

Unit Feature 13

Unit Feature 13 - Maintenance Accessories

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-0000-0000-0B-000-0-0E00-00**0**00-0J000-00000-000000-00000-000B

0 = *Standard*
A = *Factory Wired 115V Convenience Outlet* - Factory wired 2x4 inch electrical box with ground fault interrupter receptacle located within the controls vestibule. The circuit is rated at 12 amps maximum and is factory wired to a step-down transformer, fuse block and outlet disconnect. The circuit is wired to the line side of the unit power block or power switch permitting use of the outlet while power to the unit is shut off. **Caution: When the power to the unit is disconnected with the factory installed unit power switch, the convenience outlet will remain live.**
B = *Field Wired 115V Convenience Outlet* - Field wired 2x4 inch electrical box with ground fault interrupter receptacle, located within the controls vestibule. Receptacle is rated for 20 amps. The outlet must be field wired to a 115 VAC power supply.
C = *Service Lights* - Standard unit construction with service lights included in the controls and compressor compartments. The light circuit is wired to the line side of the unit power block, permitting use of the lights while the power to the unit is shut off.
F = *Factory Wired 115V Convenience Outlet + Service Lights* - Options A + C
J = *Field Wired 115V Convenience Outlet + Service Lights* - Options B + C

Unit Feature 14

Unit Feature 14 - Blank

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-0000-0000-0B-000-0-0E00-000**0**0-0J000-00000-000000-00000-000B

0 = *Standard*

Unit Feature 15

Unit Feature 15 - Code Options

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-0000-0000-0B-000-0-0E00-0000**0**-0J000-00000-000000-00000-000B

0 = *Standard ETL USA Listing* - All AAON equipment is ETL listed and tested in accordance with the latest revision of UL 1995. If a Special Pricing Authorization (SPA) is applied there may be additional costs incurred to secure the ETL label.
A = *Chicago Code* - Chicago code for a unit with cooling and gas heat. Chicago code states that unit wiring to the condenser fan motors must be in flexible conduit and refrigerant pressure relief valves must be supplied.
B = *ETL USA + Canada Listing* - Canadian and USA listings for export. The nameplate, safety labels, drain and pump warnings will be in English and French.

Unit Feature 16

Unit Feature 16 - Shipping Split

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-0000-0000-0B-000-0-0E00-00000-**0**J000-00000-000000-00000-000B

0 = *One Piece Unit*

Unit Feature 17

Unit Feature 17 - Air-Cooled Condenser Accessories

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-0000-0000-0B-000-0-0E00-00000-0**J**000-00000-000000-00000-000B

J = *Condenser Coil Guards, 3Φ Condenser Fan Motor, and VFD Controlled Air-Cooled Condenser Fans* - Condenser coil guards fabricated from galvanized sheet metal, painted and factory mounted across the condenser coil face. VFD controlled variable speed air-cooled condenser fans allow operation down to 0°F ambient.
S = *Cond. Coil Guards + Low Sound ECM Cond. Fans - Head Pressure Control (0°F Low Ambient)* - Condenser coil guards fabricated from galvanized sheet metal, painted and factory mounted across the condenser coil face. Condenser fans are specifically designed for reduced and redirected sound emission. The fans include optimized orifice, guide vanes, and serrated blades. These condenser fans are driven by EC motors which either speed up or slow down to adjust air flow in order to maintain the head pressure setpoint. The head pressure setpoint is field adjustable from 260-400 psi with a default setting of 340 psi with a Head Pressure Control Module. Option includes Low Sound ECM condenser fans, condenser head pressure controller and discharge pressure transducers. This option adds 9 inches of height to the standard unit. ECM air-cooled condenser fans allow operation down to 0°F ambient.

Unit Features 18-20

Unit Features 18-20 - Blank

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-0000-0000-0B-000-0-0E00-00000-0J**000**-00000-000000-00000-000B

000 = *Standard*

Unit Features 21-23

Unit Features 21-23 - Blank

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-0000-0000-0B-000-0-0E00-00000-0J000-**000**00-000000-00000-000B

000 = *Standard*

Unit Feature 24

Unit Feature 24 - Chiller Accessories 1

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-0000-0000-0B-000-0-0E00-00000-0J000-000**0**0-000000-00000-000B

0 = *Standard*
A = *Glycol Chiller* - Propylene glycol chiller system which does not include city make up water connections. Glycol is selected within the unit conditions window.
C = *Thermometers and Pressure Gauges* - Chilled water system with pumping package and thermometers and pressure gauges factory installed on the pumping package to indicate water temperature and pressure drop of various components.
G = *Glycol Chiller + Thermometers and Pressure Gauges* - Options A + C

Unit Feature 25

Unit Feature 25 - Blank

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-0000-0000-0B-000-0-0E00-00000-0J000-0000**0**-000000-00000-000B

0 = *Standard*

Unit Features 26A-26F

Unit Features 26A-26F - Blank

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-0000-0000-0B-000-0-0E00-00000-0J000-00000-**000000**-00000-000B

000000 = *Standard*

Unit Features 27-31

Unit Features 27-31 - Blank

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-0000-0000-0B-000-0-0E00-00000-0J000-00000-000000-**00000**-000B

00000 = *Standard*

Unit Feature 32

Unit Feature 32 - Blank

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-0000-0000-0B-000-0-0E00-00000-0J000-00000-000000-00000-**0**00B

0 = *Standard*

Unit Feature 33

Unit Feature 33 - Warranty

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-0000-0000-0B-000-0-0E00-00000-0J000-00000-000000-00000-0**0**0B

0 = *Standard Warranty* -
D = *Compressor Warranty Years 2-5* - Extends warranty coverage of compressors for the second to fifth years of unit operation from date of shipment.

Unit Feature 34

Unit Feature 34 - Cabinet Material

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-0000-0000-0B-000-0-0E00-00000-0J000-00000-000000-00000-00**0**B

0 = *Standard - Double Wall + R-13 Foam Insulation* - Double wall rigid polyurethane foam injected panel construction with service access doors to the controls compartment and evaporator compartment.

Unit Feature 35

Unit Feature 35 - Paint and Special Pricing Authorization

Example: LNA-140-C-A-3-FAC0E-0000:A0-0000-0000-0000-0B-000-0-0E00-00000-0J000-00000-000000-00000-000**B**

B = *Premium AAON Gray Paint Exterior* - Cabinet exterior is primer washed then spray coated with a two part polyurethane, heat-baked exterior paint. The paint is gray in color and is capable of withstanding at least 2,500 hours, with no visible corrosive effects, when tested in a salt spray and fog atmosphere in accordance with the ASTM B 117-95 test procedure.
C = *Premium AAON Gray Paint Exterior and Shrink Wrap* - Option B + Unit is shrink-wrapped prior to shipment to protect unit during shipment and while in storage awaiting installation.
X = *Special Pricing Authorization and Premium AAON Gray Paint Exterior* - Option B + the Applications Department must issue a Special Pricing Authorization (SPA) to include a non-standard option.
1 = *Special Pricing Authorization, Premium AAON Gray Paint Exterior, and Shrink Wrap* - Option C + the Applications Department must issue a Special Pricing Authorization (SPA) to include a non-standard option.
4 = *Special Pricing Authorization and Special Exterior Paint Color* - If a special paint color is specified, a set-up charge and price add per unit is required. The Applications Department must issue a Special Pricing Authorization (SPA) to include a non-standard option.
7 = *Special Pricing Authorization, Special Exterior Paint Color, and Shrink Wrap* - Option 4 + unit is shrink-wrapped prior to shipment to protect unit during shipment and while in storage awaiting installation.

General Data

Unit Information

Table 9 - 45-75 ton Units Compressor Information

	Model			
	LN-045	LN-055	LN-060	LN-075
R-410A VFD Compatible Scroll Compressors				
Quantity/Nominal tons Staged	2/10, 2/13	2/13, 2/15	2/13, 2/20	2/15, 2/20
Quantity/Nominal tons All Variable	2/13, 2/10 Var.	2/15, 2/13 Var.	2/20, 2/13 Var.	2/20, 2/15 Var.
Quantity/Nominal tons Half Variable	2/13, 1/10, 1/10 Var.	2/15, 1/13, 1/13 Var.	2/20, 1/13, 1/13 Var.	2/20, 1/15, 1/15 Var.
Quantity of Circuits	2			
Nominal Unit Staged Capacity Steps (%) Staged	27%, 56%, 79%, 100%	28%, 58%, 80%, 100%	25%, 52%, 78%, 100%	25%, 53%, 78%, 100%
Nominal Unit Staged Capacity Steps (%) All Variable	19%-28%, 39%-59%, 67%-80%, 90%-100%	20%-29%, 43%-60%, 69%-81%, 91%-100%	19%-26%, 38%-55%, 68%-79%, 93%-100%	18%-24%, 38%-50%, 66%-75%, 89%-100%
Nominal Unit Staged Capacity Steps (%) Half Variable	19%-28%, 47%-57%, 74%-79%, 95%-100%	21%-29%, 50%-59%, 75%-80%, 95%-100%	19%-27%, 46%-54%, 74%-78%, 96%-100%	19%-25%, 45%-51%, 73%-76%, 94%-100%
Compressor VFD Range				
208V, 230V, 460V, & 575V	35-60 Hz			

Table 10 - 45-75 ton Units Evaporator and Condenser Information

	Model			
	LN-045	LN-055	LN-060	LN-075
Evaporator				
Quantity	1 Shell & Tube or 1 Brazed Plate			
Max Water Pressure	125 psig			
Connection Sizes	3”			4”
Standard- Shell and Tube				
Max gpm	197		216	269
Min gpm	83		90	113
Oversized- Shell and Tube				
Max gpm	216		245	269
Min gpm	83		90	113
Standard- Brazed Plate				
Max gpm	178	197	216	278
Min gpm	68	83	90	113
Oversized- Brazed Plate				
Max gpm	197	216		278
Min gpm	83	90		113
Air-Cooled Cond. Fans				
Quantity	4			8
Type	36” Propeller Fan			
hp	1.5			

Table 11 - 95-140 tons Units Compressor Information

	Model			
	LN-095	LN-105	LN-120	LN-140
R-410A VFD Compatible Scroll Compressors				
Quantity/Nominal tons Staged	4/25	2/25, 2/32	4/32	2/35, 2/40
Quantity/Nominal tons All Variable	2/25, 2/25 Var.	2/32, 2/25 Var.	2/32, 2/32 Var.	2/40, 2/35 Var.
Quantity/Nominal tons Half Variable	3/25, 1/25 Var.	2/32, 1/25, 1/25 Var.	3/32, 1/32 Var.	2/40, 1/35, 1/35 Var.
Quantity of Circuits	2			
Nominal Unit Staged Capacity Steps (%) Staged	30 %, 62%, 82%, 100%	27%, 56%, 79%, 100%	31%, 63%, 82%, 100%	30%, 61%, 81%, 100%
Nominal Unit Staged Capacity Steps (%) All Variable	18%-30%, 38%-62%, 64%-82%, 86%-100%	16%-27%, 34%-56%, 63%-79%, 88%-100%	18%-31%, 38%-63%, 64%-82%, 86%-100%	18%-30%, 37%-61%, 65%-82%, 87%-100%
Nominal Unit Staged Capacity Steps (%) Half Variable	18%-30%, 50%-62%, 74%-82%, 92%-100%	16%-27%, 45%-56%, 73%-79%, 94%-100%	18%-31%, 51%-63%, 75%-82%, 93%-100%	18%-30%, 50%-61%, 75%-81%, 94%-100%
Compressor VFD Range				
208V, 230V, 460V, & 575V	35-60 Hz			

Table 12 - 95-140 tons Units Evaporator and Condenser Information

	Model			
	LN-095	LN-105	LN-120	LN-140
Evaporator				
Quantity	1 Shell & Tube or 1 Brazed Plate			
Max Water Pressure	125 psig			
Connection Sizes	4”		5”	
Standard- Shell and Tube				
Max gpm	350	388		555
Min gpm	143	158	180	143
Oversized- Shell and Tube				
Max gpm	378	388		611
Min gpm	143	158	180	143
Standard- Brazed Plate				
Max gpm	350	422	449	555
Min gpm	152	172	201	248
Oversized- Brazed Plate				
Max gpm	389		449	555
Min gpm	172	188	220	172
Air-Cooled Cond. Fans				
Quantity	8			
Type	36” Propeller Fan			
hp	1.5			

Control Vendors

Micro Control Systems (MCS) Magnum Control System

Figure 11 - LCD Interface, MCS Magnum Controller, and Touchscreen Interface

The MCS Magnum controller is factory provided on all AAON chiller systems. The controller efficiently varies the cooling capacity of the compressors to maintain a leaving water temperature over a wide variety of operating conditions.

Configuration
Standard LCD interface is included within the controls compartment for unit configuration, setpoint adjustment, sensor status viewing, unit alarm viewing, and scheduling. PC with free MCS-Connect software can be connected to the controller via RS-232 or Ethernet for unit configuration, setpoint adjustment, sensor status viewing, unit alarm viewing, and occupancy scheduling. Optional full color 15" 1024x768 pixel touchscreen interface is available, and includes graphical user interface that allows for easy monitoring and troubleshooting of the chiller. Unit, controls, compressor, and VFD literature can be viewed from the touchscreen.

Diagnostics
Optional diagnostic sensors are available to provide each refrigerant circuit's suction, discharge and liquid temperature and pressure and also monitor each compressor's current. These sensors can be monitored from the MCS-Connect software.

Network Capability
The MCS Magnum controller can be directly integrated with BACnet IP or Modbus IP protocols via Ethernet port and Modbus RTU protocol via EIA-485 port. With adapter, the controller can be integrated with BACnet MS/TP or LonTalk protocols. Optional 56K modem allows remote communication to the unit from MCS, AAON, or the customer to assist with service, diagnosis, and program updates.

Electrical Service Sizing Data

Use the following equations to correctly size the electrical service wiring and disconnect switch for the unit.

To calculate the correct Minimum Circuit Ampacity (MCA) and Maximum Overcurrent Protection (MOP) values for units, use the equations below.

MCA = 1.25(Load 1) + Load 2 + Load 3

MOP = 2.25(Load 1) + Load 2 + Load 3

Where:
Load 1 = Current of the largest motor/compressor
Load 2 = Sum of the currents of the remaining motors, including chiller pump motors, compressors, evaporative-cooled condenser pump motors, boiler building pump motors and boiler recirculating pump motors
Load 3 = Additional currents, including evaporative-cooled condenser sump heaters and boilers

Use Rated Load Amps (RLA) for compressors and Full Load Amps (FLA) for all other motors and electric heaters. Evaporative-cooled condenser currents should be added only if the unit is equipped with an evaporative-cooled condenser section. Boiler current should be added only if the unit is equipped with a boiler.

Select a fuse rating equal to the MOP value. If the MOP does not equal a standard fuse rating select the next lower standard fuse rating. If the MOP is less than the MCA then select the fuse rating equal to or greater than the MCA.

Standard Ampere Ratings for Fuses (From NEC Handbook, 240-6)
The standard ratings for fuses shall be considered 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100, 110, 125, 150, 175, 200, 225, 250, 300, 350, 400, 450, 500, 600, 700, 800 and 1000 amperes.

Disconnect (Power) Switch Size

To calculate the disconnect switch size use the equation shown below.

DSS $\geq$ MOP

Select the standard switch size equal to the calculated Disconnect Switch Size (DSS) value. If this value is not a standard size, select the next larger size.

Literature Change History

February 2014
Initial version.

January 2015
Updated cover picture and fan cycling operation temperature minimum.

November 2016
Revision of the amp rating of the factory installed convenience outlet in feature 13.

November 2018
Minor revision changed to "A" because LN is now AHRI certified. Updated E-coating description to include more detailed information about warranty coverage. Added Low Sound ECM condenser fan option in Feature 17. Revised the Unit Information. Revised example calculations.

December 2018
Updated Evaporator Pressure Drop charts for the shell and tube heat exchanger.

June 2019
Updated the e-coating definition for 10,000 hours of salt spray. Revised the AAON recommended entering water temperature of 65ºF or less for continuous operating conditions.

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