GeneSys™

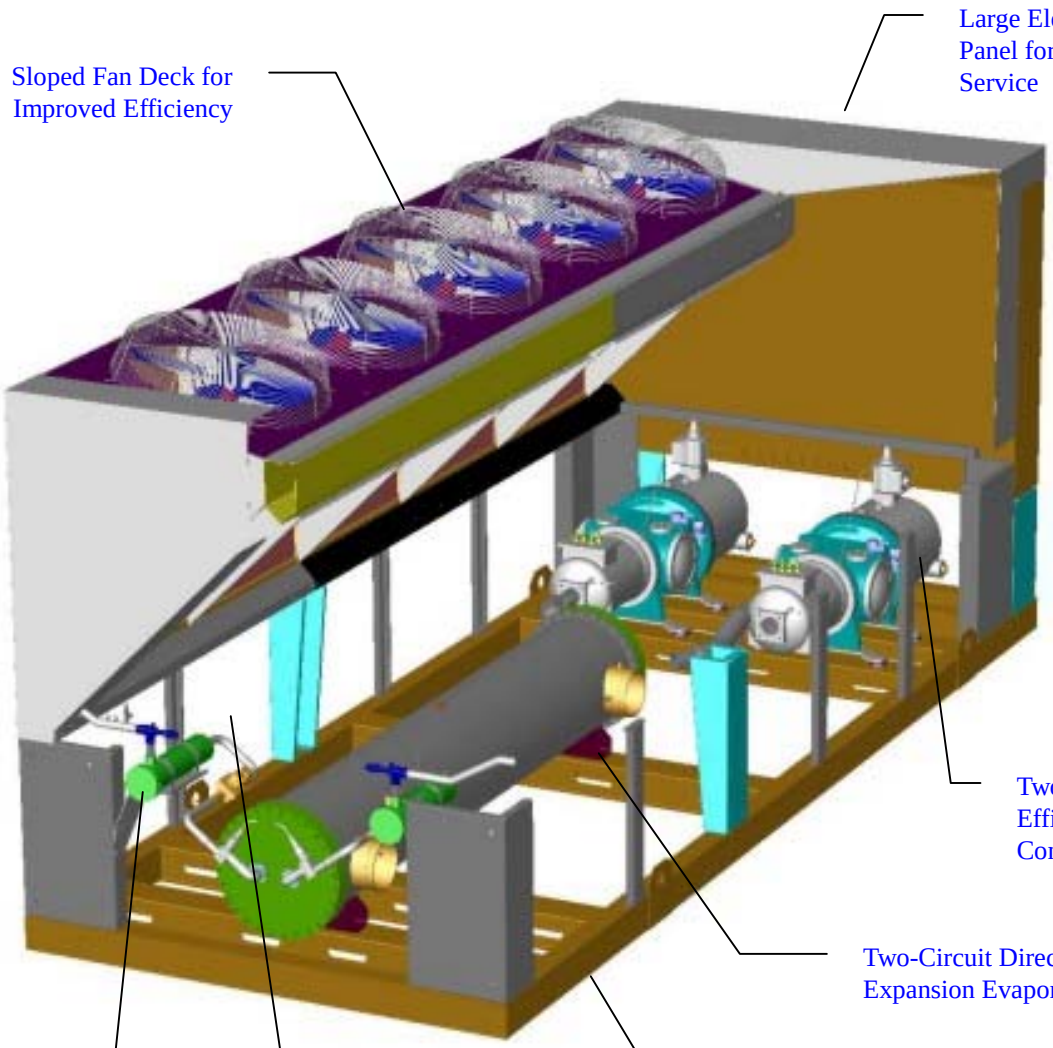
Air-Cooled Screw Compressor Chillers

Models AGS 120C to AGS 210C
110 to 210 Tons, 420 to 740 kW
Packaged and with Remote Evaporator
R-134a, 60 Hz

McQuay® Air Conditioning

Engineered for flexibility and performance™

Cutaway View of an AGS 170C Chiller
Typical of Models AGS 120C through AGS 210C



Model Code

A G S XXX C S

- **A** — Air-Cooled
- **G** — Global Product Line
- **S** — Screw Compressor
- **XXX** — Nominal Tons:
  XX0 = Standard Efficiency
  XX5 = High Efficiency
- **C** — Vintage
- **S** — S = Standard Ambient Packaged Unit
  M = Standard Ambient Remote Evaporator
  H = Packaged with High Ambient Option
  B = Remote with High Ambient Option.

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BMA MEMBER BACnet MANUFACTURERS ASSOCIATION

LONMARK 3.3

Unit controllers are LONMARK certified with an optional LONWORKS communications module

Manufactured in an ISO Certified Facility

Document:	PM AGS-2
Issue Date:	June 2005
Replaces:	New

Introduction

The GeneSys™ air-cooled screw chillers continue McQuay's legacy of high quality, high efficiency, latest technology and quiet operation. Our model AGS units utilize an advanced compressor design utilizing R-134a refrigerant. Superior control is provided by the innovative MicroTech II® family of controllers. Interface with your building's automation system with the McQuay Protocol Selectability® feature using factory-installed LonTalk®, BACnet® or Modbus® communication modules. The GeneSys chiller continues to be the only air-cooled screw compressor chiller with superior solid state starters as standard equipment. Perhaps most important, GeneSys continues McQuay's reputation for quiet operation making Genesys "neighborhood friendly". McQuay's GeneSys chiller provides the best overall value in air-cooled screw chillers available today!

The AGS solid state starters provide stepless acceleration, controlled deceleration, and advanced motor/compressor protection features. McQuay is the only manufacturer to provide this advanced technology as standard equipment on air-cooled chillers.

SUPERIOR EFFICIENCY

- Special high efficiency and/or high ambient models available
- Single-rotor compressor design
- Electronic expansion valve control
- High efficiency lanced condenser fins
- All models exceed ASHRAE 90.1 October 2001 efficiency standard

QUIET OPERATION

- Continuing the legacy of McQuay chillers
- Virtually vibration-free operation

OUTSTANDING RELIABILITY

- Independent refrigerant circuits
- Rugged compressor design
- Solid state starters for smooth acceleration and deceleration
- Advanced composite compressor gaterotor material
- Multiple compressors with independent controllers
- Proactive control logic
- Full factory-run-testing to optimize trouble-free operation
- Factory authorized startup

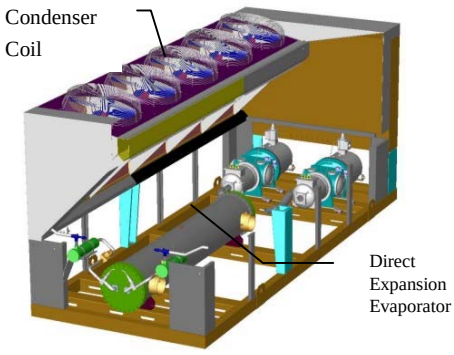
SUPERIOR CONTROLS LOGIC

- Easy to read 4-line by 20-character LCD display
- Supports standard protocols: LONTALK®, BACnet® or Modbus®
- Superior reliability under extreme operating conditions

Customer Benefits

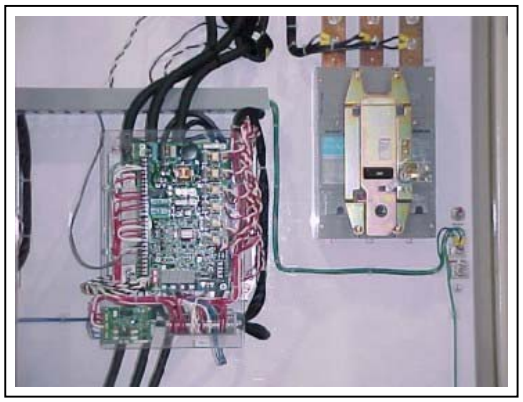
Low Operating Costs -- High Efficiency Operation

The GeneSys chiller uses the McQuay screw compressor design and large condenser coil surface areas for maximum heat transfer. Large condenser fans are used to move large volumes of air across the heat exchangers. A single-pass, pure counter-flow, low refrigerant pressure drop, direct expansion evaporator provides superior performance.



Superior Motor Control--Solid State Starters--Our Standard Offering

GeneSys chillers are the ONLY units available that provide the superior motor control of solid-state starters as standard. The benefits are impressive.



A primary benefit is that the compressors are started slowly, requiring from three to seven seconds to go from a stop to full-speed condition. This reduces vibration and compressor stresses for longer life. If liquid refrigerant is present at the compressor intake, the slow acceleration easily moves the liquid out without damage to the compressor.

Perhaps more important is the slow deceleration when operation is no longer required. The traditional jerking and backward rotation allowed by conventional starters is eliminated with solid-state starters. Again, extended compressor life is expected.

Another great benefit is the superior electrical system monitoring. In the event of main electrical power problems, the solid-state starters tightly monitor the power quality and make protective decisions to prevent compressor motor damage. See page 8 for a full description.

Quiet Operation – "Neighborhood Friendly"

The feature that sets the GeneSys chiller apart from other screw chillers is the low operating sound levels. The primary reason for quiet operation is the compressor design itself. McQuay's latest compressor design continues the philosophy of a single main rotor with two adjacent rotating gaterotors making gas flow velocities and subsequent noise levels the lowest available. This compressor design is unique and proven by years of excellent service. In addition, the condenser fans are selected for both good performance and low sound levels.

GeneSys chiller sound data is published in this catalog for an easy comparison with other offerings. See page 26. Although others claim low sound levels, it is difficult to find their published sound data to support their claims.

R-134a Refrigerant

All McQuay AGS chillers use R-134a. R-134a has no ozone depletion potential. It is environmentally safe and does not have a phase-out date.

MicroTech II® Controls

The MicroTech II unit controller provides an easy to use control environment. The control logic is designed to provide maximum efficiency, to continue operation in unusual operating conditions and provide a history of operating conditions.

Perhaps the greatest benefit is McQuay's Protocol Selectability™ feature that allows easy interfacing with your BAS of choice using LONMARK®, BACnet®, or Modbus® communications without costly gateways. See the complete control description on page 10 in this catalog.

MicroTech II uses distributed control with each refrigerant circuit having a dedicated microprocessor. Distributed control architecture means that if any compressor controller malfunctions, the remaining controllers are unaffected and their compressors will continue to operate. This feature greatly enhances chiller reliability.

Summary

Five major benefits separate the GeneSys chiller from most air-cooled screw chillers.

1. Superior control with the MicroTech II family of controls
2. Superior motor control with solid state starters
3. Low operating costs with our high efficiency design
4. Very quiet operation
5. R-134a refrigerant

IMPORTANT NOTE

Two series of units are available with the AGS-C chillers.

Standard Efficiency, designated by a "0" as the last digit in the model number (such as AGS 170C) are designed for operation up to 125°F. Significant unloading above 115°F can occur depending on a variety of factors. Contact your sales representative for performance above 115°F. Additional unloading can result with leaving water temperatures above 45°F. These units provide the lowest dollar per ton price. Ratings begin on page 18.

High Efficiency, designated by a "5" as the last digit in the model number (such as AGS 175C) are designed for operation up to 125°F without unloading for leaving water temperatures between 40°F and 45°F. Contact your sales representative for evaporator duty outside of this range. The High Efficiency models have larger components, and/or more fans than the comparable Standard Efficiency models. This results in improved efficiency and the ability to operate at higher ambient air temperatures. Ratings begin on page 21.

The High Efficiency units have a higher dollar-per-ton price than Standard Efficiency and should only be selected when full capacity operation above 115°F (46°C), or efficiencies above the standard efficiency offering are required.

High Ambient Option, A factory-installed option that allows operation in high ambient temperature locations. Units with this option are designated as "H" or "B" in the model code on page 2. It can be applied to any unit and is mandatory on:

1. All units with the optional VFD low ambient control.
2. All units that can have operating ambient temperatures above 115°F (46°C).

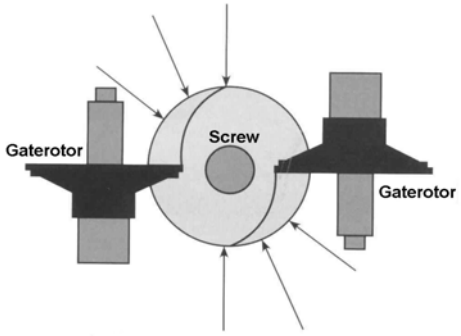
Compressor

Superior Efficiency

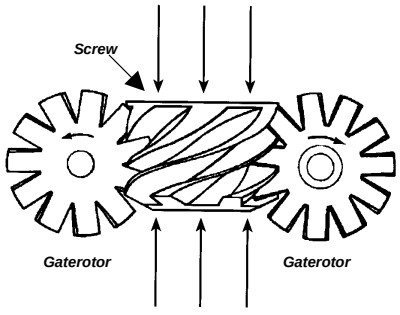
- Zero clearance fit between the two gaterotors and main screw rotor virtually eliminates leakage between the high and low-pressure sides during compression. Special gaterotor material made from an advanced composite, temperature stable material makes a zero clearance design possible.
- The GeneSys air-cooled chiller is equipped with the most advanced means of refrigerant flow control available. An electronic expansion valve coupled with the MicroTech II controller's control logic provides excellent operating efficiencies at both full and part load operation.
- Modulated stepless unloading matches compressor capacity to load.

Outstanding Reliability Features

- Full factory testing of the unit with water hookup helps provides a trouble-free start-up. Extensive quality control checks during testing means that each equipment protection and operating control is properly adjusted and operates correctly before it leaves the factory. Factory-installed options minimize field expenses and startup labor.
- The rugged design of the single-screw compressor allows it to be tolerant of liquid slugging. The GeneSys screw chiller will start and operate under conditions that would often damage other compressors.
- Very low loading enhances the bearing and compressor reliability. Due to symmetrical compression taking place on both sides of the main screw rotor, balanced forces result in the elimination of the radial force loads inherent in twin-screw compressors.
- Integral to the basic design of the single-screw compressor, the main screw rotor shaft and the gaterotor shafts cross at right angles in the compressor. The result is ample space to locate heavy duty bearings and increase compressor reliability since no limitations are placed on bearing design, as found in twin-screw compressors.



Balanced radial forces



Balanced axial forces

- An advanced composite material designed for strength, temperature stability and durability helps prevent premature wear on the gaterotor.

Evaporator

- Models AGS 120 through 210 are equipped with a two-circuit direct expansion evaporator having copper tubes rolled into steel tubesheets. The evaporators are single-pass for pure counter-flow heat exchange and low refrigerant pressure drop. Both characteristics contribute to the vessel's outstanding efficiency.

"W" Shaped Condenser Coils

- The McQuay designed "W" shaped condenser coil provides the maximum condenser heat transfer per foot of unit length. This translates to a smaller footprint, less structural elements and smaller pad size.

Excellent Serviceability

- Field serviceability has not been sacrificed to meet design performance objectives. Compressors are equipped with combination discharge check and shutoff valves. Suction service valves are available as an option.
- Compressors are located on the outside edges of the base allowing ready access.
- The "W" shaped coil provides good headroom under the unit for inspection and service.
- The MicroTech II controller gives detailed information on the causes of an alarm or fault.

Standard Solid State Starters

The addition of solid-state starters as standard (a McQuay exclusive) on the AGS units takes a giant step forward in compressor protection from failures from mechanical or electrical faults. It includes self-diagnostics, metering and display including ground fault and phase/voltage protection.

The starters provide smooth, stepless acceleration and controlled slow deceleration, reducing mechanical and electrical stress for even greater compressor/motor life. Some of the information available to the operator or service technician on each starter LED display includes:

Figure 1, Solid State Starter
(Shown with Optional Disconnect Switch)

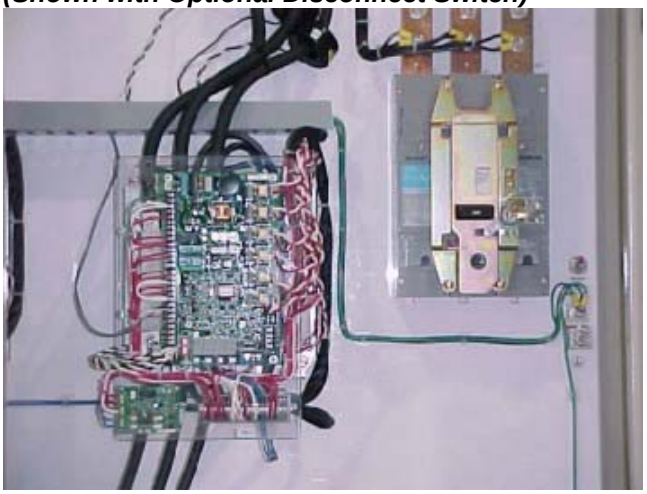


Figure 2, Solid State Starter Messages

Operating Messages	Fault Messages
Line voltage not present	System power not three phase
Voltage present, starter ready	Phase sequence incorrect
Motor accelerating	Line frequency less than 25 Hz
Motor at full speed	Line frequency more than 72 Hz
Motor at full speed, ramp time expired	Excessive current unbalance
Stop command received, motor decelerating	Operating parameters lost
Overload has reached 90% to 99%	No current after "Run" command
Overload at 100%, motor stopped	Undercurrent trip occurred
Passcode enabled	Control power too low
Passcode disabled	Motor stalled during acceleration
% Thermal overload content	External fault

Platform

The heavy duty, welded steel base, steel structural members and sheet-metal panels are painted with corrosion-resistant, 500-hour test salt spray paint (passes ASTM B117). This finish enhances the appearance of the unit and deters corrosion.

Electronic Expansion Valve

The GeneSys air-cooled chiller is equipped with the most advanced means of refrigerant flow control available. An electronic expansion valve coupled with a MicroTech II unit controller provides excellent operating efficiencies both at full and part load operation.

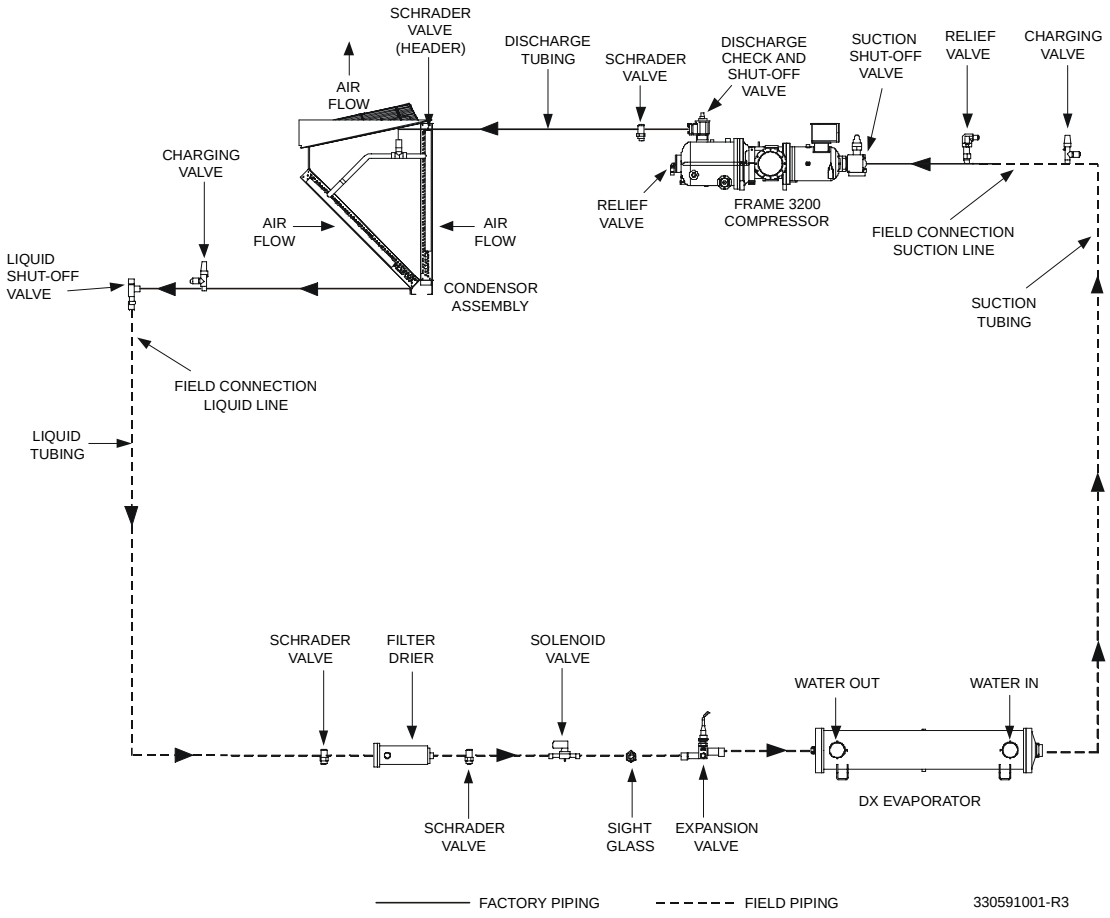
Unlike conventional thermal expansion valves which require a large pressure drop across the valve and result in higher condenser head pressure, the electronic valve does not need a large pressure drop across it to operate effectively. During part load operation, the electronic valve allows the system to operate at a lower condensing pressure, minimizes suction line superheat, and provides more stable system operation. Unit efficiencies can be dramatically improved. The electronic expansion valve for the GeneSys chiller line provides precise control with a quick response time.

ARI Certification

The ARI certification program does not include units with capacities in excess of 200 tons. Models AGS 120 through AGS 195 are ARI certified. Model AGS 210 is outside the ARI capacity range and is not certified. However, its rating and testing procedures follow the ARI standard applicable to the smaller units.

The certification program does not include remote evaporator models or applications using non-water fluids.

Figure 3, Piping Schematic (one circuit shown)



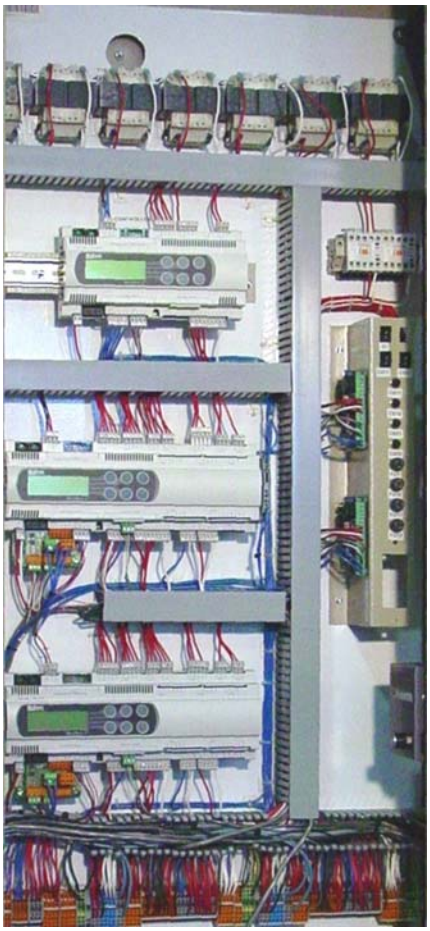
Controls

MicroTech II® Controller, The Ultimate Control System

The controller provides a user-friendly environment for the operator. The control logic is designed to provide maximum efficiency, to continue proper operation in unusual operating conditions and provide a history of operating conditions.

- Distributed control architecture enhances unit reliability. Each compressor circuit has its own microprocessor controller so that if one controller is unavailable, the other circuit is unaffected and will continue to run.
- A logic control system employed in the GeneSys MicroTech II controller optimizes the suction line superheat and the positioning of the electronic expansion valve at all compressor capacities. Intelligent fan staging and use of the optional fan variable frequency drives also contribute to optimizing unit efficiency at all operating conditions.

Control Panel with Unit and Compressor MicroTech II Controllers

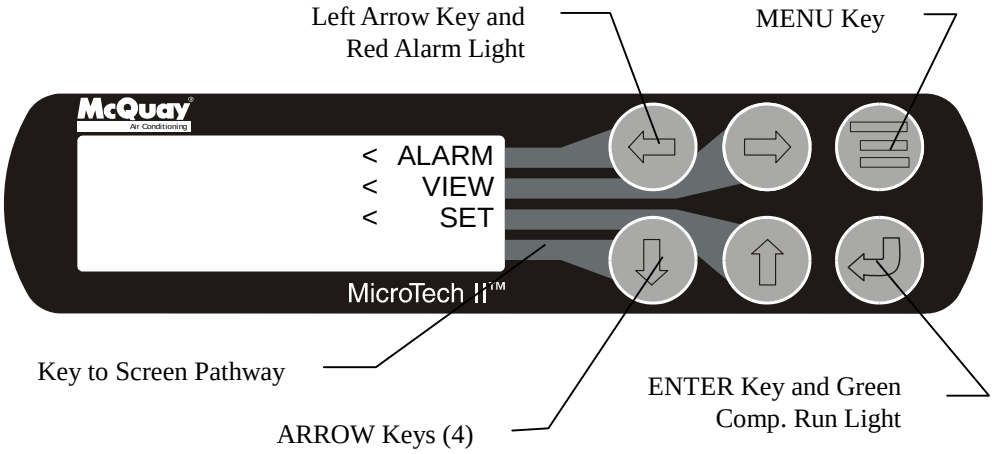


- The MicroTech II chiller controller is an advanced microprocessor-based control that maintains a precise and stable leaving chilled fluid temperature. This advanced logic means compressor cycling is minimized, reducing wear on both compressor and starting components.
- Stand-alone unit controls designed with the system operator in mind provide access to the unit temperatures, pressures, setpoints, operating states, and alarm messages. MicroTech II controllers include password protection to guard against unauthorized or accidental setpoint or parameter changes. Each compressor circuit has a dedicated controller. In the event one compressor-controller is unavailable, the remaining compressor will remain operational.
- Complete instrumentation with state-of-the-art pressure transducers and temperature sensors provide unparalleled operator information and diagnostics.
- Superior discharge pressure control maximizes unit efficiency by determining optimum condenser fan operation. Each fan is under control of the microprocessor, providing up to six staging steps per circuit.
- MicroTech II controllers have a proactive limit control feature that keeps the unit online if selected operating parameters start to exceed design settings. For example, if the discharge pressure starts to rise, rather than shutting down the unit, the control will inhibit any capacity increase to prevent further heat rejection to the condenser. If the pressure still continues to rise, the control will unload the compressor in an attempt to keep the discharge pressure within bounds.

Either of these actions will illuminate a warning signal on the controller and also be recorded in the fault register. If the situation is not corrected and the pressure still continues to rise, the control will shut off the compressor at the shut-off-setpoint.

The operator interface is a 4-line by-20 character/line liquid crystal display and 6-key keypad mounted on the unit controller as shown below.

Keypad/Display



Building Automation System (BAS) Interface

All MicroTech II controllers are capable of BAS communications, providing easy integration and comprehensive monitoring, control, and two-way data exchange using industry standard protocols such as LONMARK®, Modbus® or BACnet®.

Protocol Selectability™ Benefits

- Easy to integrate into your building automation system of choice
- Factory-installed and tested communication module
- Comprehensive point list for system integration, equipment monitoring and alarm notification
- Provides efficient equipment operation
- Owner/designer can select the BAS that best meets building requirements
- Comprehensive data exchange

Building Automation System of Your Choice

Integration Made Easy

McQuay MicroTech II controllers strictly conform to the interoperability guidelines of the LONMARK Interoperability Association and the BACnet Manufacturers Association. The controllers have received:

- LONMARK certification with optional LONWORKS communication module

Protocol Options

- BACnet MS/TP
- BACnet IP
- BACnet Ethernet
- LONWORKS® (FTT-10A)
- Modbus RTU

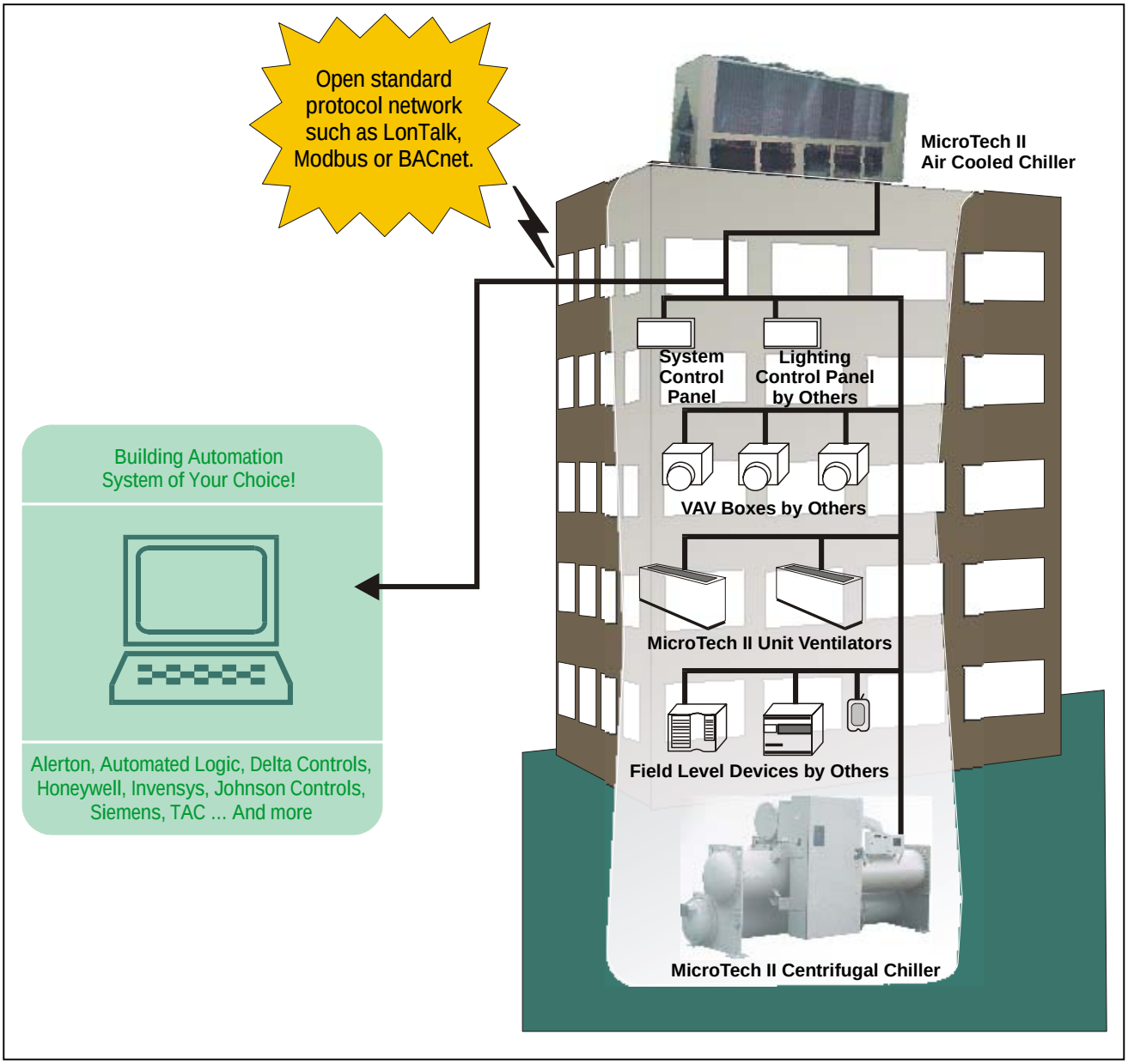
The BAS communication module can be ordered factory-mounted on a chiller or it can be field-mounted after the chiller is installed.

Table 1, Typical Data Point Availability

Typical Data Points (W = Write, R = Read)					
Active Setpoint	R	Compressor Run Hours	R (2)	Evap Water Pump Status	R
Actual Capacity	R	Compressor Select	W	Evap LWT	R
Capacity Limit Output	R	Compressor Starts	R (2)	Evap Pump Run Hours	R
Capacity Limit Setpoint	W	Compressor Suction Line Temp	R (2)	Evap Refrigerant Pressure	R (2)
Chiller Enable	W	Cond Refrigerant Pressure	R (2)	Ice Setpoint	W
Chiller Limited	R	Cond Sat. Refrigerant Temp	R (2)	Liquid Line Refrigerant Pressure	R (2)
Chiller Local/Remote	R	Cool Setpoint	W	Liquid Line Refrigerant Temp	R (2)
Chiller Mode Output	R	Current Alarm	R	Evap Sat. Refrigerant Temp	R (2)
Chiller Mode Setpoint	W	Default Values	W	Outdoor Air Temp	
Chiller On/Off	R	Evap EWT	R	Network Clear Alarm	W
Chiller Status	R	Evap Flow Switch Status	R	Pump Select	W
Compressor Discharge Temp	R (2)	Evap LWT for Unit	R	Run Enabled	R

Notes:
1. Data points available are dependent upon options selected
2. Per compressor

Figure 4, Sample System Architecture



Optional Remote Communication Panel

In addition to the unit-mounted user interface provided with MicroTech II controls, the AGZ chillers can be individually equipped with a remote user interface. It provides convenient access to unit diagnostics and control adjustments, without having to access a rooftop or outdoor location. A separate remote panel is required for each chiller on a job site.

Each remote user interface is similar to its unit-mounted counterpart and offers the same functionality, including:

- Touch sensitive keypad with a 4 line by 20-character display format.
- Digital display of messages in English language.
- All operating conditions, system alarms, control parameters and schedules are monitored.

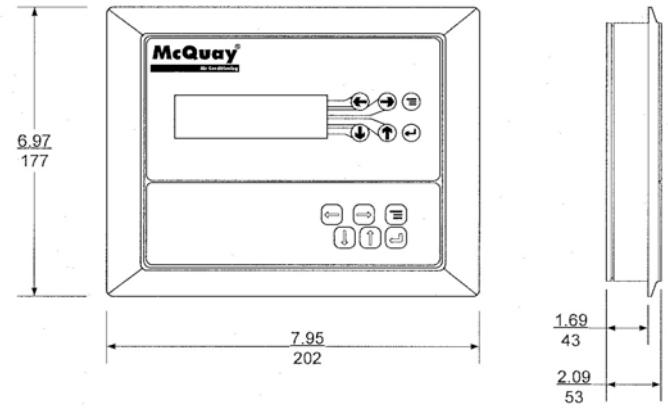
Features

- Can be wired up to 1,640 feet (500 meters) from the unit for flexibility in placing each remote user interface within your building.
- The main control is isolated from the remote user interface wiring so that wiring problems are less likely to damage the unit user interface.

Benefits

- Allows you to access the user interface for each unit from one location, inside the building.
- Users need to learn one format because the remote user interface is identical to the unit-mounted version.
- No additional field commissioning is required for the remote user interface.
- Can be retrofit after unit installation.
- Is fully compatible with the optional BAS communication modules.

Figure 5, Remote Interface Panel Dimensions



Cable and Wiring Recommendations

- No more than 1,640 feet (500 meters) of wiring can be used to connect the remote user interface to the unit.
- Power: AWG 22 twisted pair cable.
- Communications: Belden 9841 or equal AWG 22 twisted pair.

See manual *IOM MT II Remote* for wiring and installation information.

IMPORTANT NOTE

Two series of units are available with the AGS-C chillers.

Standard Efficiency, designated by a "0" as the last digit in the model number (such as AGS 170C) are designed for operation up to 125 degrees. Significant unloading above 115 degrees can occur depending on a variety of factors. Contact your sales representative for performance above 115 degrees. Additional unloading can result with leaving water temperatures above 45 degrees. These units provide the lowest dollar per ton price. Ratings begin on page 18.

High Efficiency, designated by a "5" as the last digit in the model number (such as AGS 175C) are designed for operation up to 125 degrees without unloading for leaving water temperatures between 40 and 45 degrees Fahrenheit. Contact your sales representative for evaporator duty outside of this range. The High Efficiency models have larger components, and/or more fans than the comparable Standard Efficiency models. This design results in improved efficiency and the ability to operate at higher ambient air temperatures. Ratings begin on page 21.

The High Efficiency units have a higher dollar-per-ton price than Standard Efficiency and should only be selected when full capacity operation above 115°F (46°C), or efficiencies above the standard efficiency offering, are required.

High Ambient Option, A factory installed option that provides components allowing operation in high ambient temperature locations. Units with this option are designated as "H" or "B" in the model code on page 2. It can be applied to any unit and is mandatory on:

1. All units with the optional VFD low ambient control.
2. All units that can have operating ambient temperatures above 115°F (46°C).

Table 2, Model Description (*such as AGS 170C* ***S/M/H/B)***

Platform	Standard Ambient	High Ambient Option
Complete Package	S	H
Remote Evaporator	M	B

General

There are separate performance tables for the standard and high efficiency models. The performance data is based on a 10-degree F (5.6-degree C) Delta-T through the evaporator. Adjustment factors for other Delta-Ts can be found in Table 6. The minimum leaving chilled water temperature without glycol is 40.0°F (4.4°C). Refer to Table 3 and Table 4 for ethylene or propylene glycol adjustment factors. Ratings are based on a 0.0001 ft^2 x hr x °F/BTU (0.0176 m^2 x °C/kW) fouling factor in the evaporator and sea level operation. See Table 6 for other fouling factors or elevations.

For applications outside the catalog ratings, contact your local McQuay sales office.

Selection Example

Specification: 130 tons cooling, 260 gpm, 56°F to 44°F, 95°F ambient air temperature, 2000 feet elevation, 0.0001 evaporator fouling factor, minimum EER of 9.7

1. Use the following formula (for water only) to calculate any missing elements:

   (gpm x delta-T) /24 = tons

The unit performance must be corrected for both altitude and Delta-T from Table 6. From performance data page 18 an AGS 140C at the given temperatures will produce 133.7 tons of cooling with a unit power input of 165.7 kW and a unit EER of 9.7. Correcting for 2000 feet altitude and 12 degree Delta-T from Table 6 factors:

Capacity: 133.7 x 0.994 = 132.9 tons

Power: 165.7 x 1.011 = 167.5

EER = Output / Input = 9.7EER x 0.994 x 1.011 = 9.75EER

2. Determine the evaporator pressure drop. Using Figure 6 on page 24, enter at 260 gpm and follow up to the AGS 140 line intersect. Read horizontally to obtain an evaporator pressure drop of 9.3 feet.

Selection example utilizing ethylene glycol

130 tons, 95°F ambient temperature, sea level

260 gpm, 54°F to 44°F chilled fluid temperature

0.0001 evaporator fouling factor.

Protect against freezing to 20°F

Provide a minimum EER of 9.2.

1. From Table 3 select an ethylene glycol concentration of 20% to protect to 18°F.
2. Obtain adjustment factors at 20% glycol from Table 3:

   Capacity = 0.979, Power = 0.990, Flow = 1.060, Pressure Drop = 1.256.
3. Select an AGS 140 with a capacity of 133.7 tons, 165.7 kW power input and correct performance with the 20% ethylene glycol factors.

   Correct capacity: 0.979 x 133.7 tons= 130.9 tons

   Correct unit power: 0.990 x 165.7 kW = 164.0 kW
4. Correct the EER using the capacity and power correction factors, 9.7 EER x 0.979 x 0.990 = 9.4 EER
5. Correct chilled fluid flow:

   Fluid flow required with 20% EG solution:

   260 gpm (water) x 1.06 flow correction factor = 276 gpm of ethylene glycol required
6. Determine the evaporator pressure drop. Using Figure 6, enter at 260 gpm (water flow rate, <u>not</u> the glycol flow rate) and follow to the AGS 140 line intersect. Read horizontally to obtain an evaporator pressure drop of 9.3 ft.
7. Correct the pressure drop for 20% EG solution:

   9.3 ft. x 1.256 pressure drop correction factor = 11.7 ft. for ethylene glycol.

Performance Adjustment Factors

Ethylene and Propylene Glycol Factors

GeneSys chiller units are designed to operate with leaving chilled fluid temperatures of 20.0°F to 60.0°F (-6.7°C to 15.6°C). Consult the local McQuay sales office for performance outside these temperatures. Leaving chilled fluid temperatures below 40°F (4.4°C) result in evaporating temperatures at or below the freezing point of water and a glycol solution is required. Compressor unloading is not allowed at leaving fluid temperatures below 30°F (-1°C).

McQuay also recommends double insulation, and the system designer should determine its necessity. The use of glycol will reduce the performance of the unit depending on its concentration. Take this into consideration during initial system design. On glycol applications, the supplier typically recommends that a minimum of 25% solution by weight be used for protection against corrosion or additional inhibitors will be required.

Table 3, Ethylene Glycol

% E.G	Freeze Point		Capacity	Power	Flow	PD
	°F	°C				
10	26	-3.3	0.996	0.998	1.036	1.097
20	18	-7.8	0.988	0.994	1.061	1.219
30	7	-13.9	0.979	0.991	1.092	1.352
40	-7	-21.7	0.969	0.986	1.132	1.532
50	-28	-33.3	0.958	0.981	1.182	1.748

Table 4, Propylene Glycol

% P.G	Freeze Point		Capacity	Power	Flow	PD
	°F	°C				
10	26	-3.3	0.991	0.996	1.016	1.092
20	19	-7.2	0.981	0.991	1.032	1.195
30	9	-12.8	0.966	0.985	1.056	1.345
40	-5	-20.6	0.947	0.977	1.092	1.544
50	-27	-32.8	0.932	0.969	1.140	1.906

Table 5, Freeze Protection

Temperature °F (°C)	Percent Volume Glycol Concentration Required			
	For Freeze Protection		For Burst Protection	
	Ethylene Glycol	Propylene Glycol	Ethylene Glycol	Propylene Glycol
20 (6.7)	16	18	11	12
10 (-12.2)	25	29	17	20
0 (-17.8)	33	36	22	24
-10 (-23.3)	39	42	26	28
-20 (-28.9)	44	46	30	30
-30 (-34.4)	48	50	30	33
-40 (-40.0)	52	54	30	35
-50 (-45.6)	56	57	30	35
-60 (-51.1)	60	60	30	35

Notes:

1. These figures are examples only and may not be appropriate to every situation. Generally, for an extended margin of protection, select a temperature at least 10°F lower than the expected lowest ambient temperature. Adjust inhibitor levels for solutions less than 25% glycol.
2. Glycol of less than 25% concentration is not recommended because of the potential for bacterial growth and subsequent loss of heat transfer efficiency.

Altitude Correction Factors

Performance tables are based on sea-level altitude. At elevations higher than sea level, the performance of the unit will be decreased due to the lower air density. For performance at elevations other than sea level, refer to Table 6.

Evaporator Temperature Drop Factors

Performance tables are based on a 10-degree F (5.6 degree C) temperature drop through the evaporator. Other Delta-Ts will require adjustment factors found in Table 6. Temperature drops outside a 6 to 16-degree F (3.3 to 8.9-degree C) range can adversely affect the system's capability to maintain acceptable control and are not recommended.

The maximum water temperature that can be circulated through the evaporator in a non-operating mode is 100°F (37.8°C). High temperatures can result in poor performance and damage to the equipment.

Fouling Factor

Performance tables are based on water with a fouling factor of 0.0001 ft^2 x hr x °F/BTU (0.0176 m^2 x °C/kW) per ARI 550/590-98. As fouling is increased, performance decreases. For performance at other fouling factors see Table 6.

Foreign matter in the chilled water system will adversely affect the heat transfer capability of the evaporator and could increase the pressure drop and reduce the water flow. For optimum unit operation, proper water treatment and filtration must be maintained.

Table 6, Correction Factors

AGS Capacity and Power Multiplier										
Altitude	Chilled Water Delta T		Fouling Factor							
			0.0001 (0.0176)		0.00025 (0.044)		0.00075 (0.132)		0.00175 (0.308)	
	°F	°C	Cap.	Power	Cap.	Power	Cap.	Power	Cap.	Power
Sea Level	6	3.9	0.983	0.993	0.976	0.990	0.953	0.980	0.908	0.961
	8	4.4	0.992	0.997	0.985	0.994	0.962	0.983	0.917	0.965
	10	5.6	1.000	1.000	0.993	0.997	0.969	0.987	0.924	0.968
	12	6.7	1.007	1.003	1.000	1.000	0.976	0.989	0.930	0.971
	14	6.8	1.012	1.005	1.005	1.002	0.981	0.992	0.935	0.973
	16	8.9	1.018	1.008	1.011	1.005	0.986	0.994	0.940	0.975
2000 feet 610 meters	6	3.9	0.980	1.001	0.973	0.998	0.950	0.988	0.905	0.969
	8	4.4	0.989	1.005	0.982	1.002	0.959	0.991	0.914	0.973
	10	5.6	0.997	1.008	0.990	1.005	0.967	0.995	0.921	0.976
	12	6.7	1.004	1.011	0.997	1.008	0.973	0.997	0.927	0.979
	14	6.8	1.009	1.013	1.002	1.010	0.978	1.000	0.932	0.981
	16	8.9	1.015	1.016	1.007	1.013	0.983	1.002	0.937	0.983
4000 feet 1220 meters	6	3.9	0.977	1.010	0.970	1.007	0.947	0.997	0.902	0.978
	8	4.4	0.986	1.014	0.979	1.011	0.955	1.001	0.911	0.982
	10	5.6	0.994	1.018	0.987	1.015	0.963	1.004	0.918	0.985
	12	6.7	1.000	1.021	0.993	1.018	0.969	1.007	0.924	0.988
	14	6.8	1.005	1.023	0.998	1.020	0.974	1.009	0.929	0.990
	16	8.9	1.011	1.025	1.004	1.022	0.980	1.012	0.934	0.993
6000 feet 1830 meters	6	3.9	0.972	1.021	0.966	1.018	0.942	1.007	0.898	0.988
	8	4.4	0.982	1.025	0.975	1.022	0.951	1.011	0.907	0.992
	10	5.6	0.989	1.028	0.982	1.025	0.959	1.014	0.914	0.995
	12	6.7	0.996	1.031	0.989	1.028	0.965	1.017	0.920	0.998
	14	6.8	1.002	1.034	0.995	1.031	0.971	1.020	0.925	1.001
	16	8.9	1.006	1.036	0.999	1.033	0.975	1.022	0.930	1.003
8000 feet 2440 meters	6	3.9	0.968	1.032	0.961	1.029	0.938	1.018	0.894	0.999
	8	4.4	0.977	1.037	0.970	1.034	0.947	1.023	0.903	1.004
	10	5.6	0.985	1.040	0.978	1.037	0.954	1.026	0.910	1.007
	12	6.7	0.991	1.043	0.984	1.040	0.961	1.030	0.916	1.010
	14	6.8	0.997	1.046	0.990	1.043	0.966	1.032	0.921	1.013
	16	8.9	1.002	1.049	0.995	1.046	0.971	1.035	0.926	1.015

Performance Data, Standard Efficiency

Inch-Pound Units

Table 7, AGS 120CS – AGS 210CS

AGS Unit Size	Fan Power (kW)	LWT (deg F)	Ambient Air Temperature (deg F)														
			75			85			95			105			115		
			Unit Tons	PWR kWi	Unit EER	Unit Tons	PWR kWi	Unit EER	Unit Tons	PWR kWi	Unit EER	Unit Tons	PWR kWi	Unit EER	Unit Tons	PWR kWi	Unit EER
120	14.4	40	122.0	117.6	12.4	114.8	125.8	10.9	107.4	135.0	9.5	99.9	145.2	8.3	92.4	156.3	7.1
	14.4	42	127.0	120.0	12.7	119.6	128.1	11.2	112.0	137.3	9.8	104.3	147.5	8.5	96.5	158.7	7.3
	14.4	44	130.4	122.4	12.8	124.5	130.5	11.4	**116.7**	**139.7**	**10.0**	108.7	149.9	8.7	100.7	161.1	7.5
	14.4	46	137.5	124.9	13.2	129.5	133.0	11.7	121.5	142.2	10.3	113.3	152.4	8.9	105.0	163.6	7.7
	14.4	48	142.9	127.5	13.5	134.7	135.6	11.9	126.4	144.8	10.5	118.0	155.0	9.1	109.4	166.2	7.9
	14.4	50	148.4	130.1	13.7	140.0	138.2	12.2	131.4	147.4	10.7	122.7	157.6	9.3	113.9	168.8	8.1
130	14.4	40	131.1	128.1	12.3	123.3	137.2	10.8	115.4	147.4	9.4	107.3	158.7	8.1	99.2	171.0	7.0
	14.4	42	136.5	130.7	12.5	128.4	139.8	11.0	120.2	150.0	9.6	111.9	161.3	8.3	103.5	173.7	7.2
	14.4	44	141.9	133.4	12.8	133.6	142.4	11.3	**125.2**	**152.7**	**9.8**	116.6	164.0	8.5	108.0	176.4	7.3
	14.4	46	147.6	136.1	13.0	139.0	145.2	11.5	130.3	155.5	10.1	121.4	166.8	8.7	112.5	179.2	7.5
	14.4	48	153.3	139.0	13.2	144.4	148.1	11.7	135.5	158.3	10.3	126.4	169.7	8.9	117.2	182.1	7.7
	14.4	50	159.1	142.0	13.4	150.0	151.1	11.9	140.8	161.3	10.5	131.4	172.6	9.1	121.9	185.1	7.9
140	14.4	40	140.3	138.5	12.2	131.9	148.5	10.7	123.3	159.8	9.3	114.7	172.2	8.0	106.0	185.8	6.8
	14.4	42	146.0	141.4	12.4	137.3	151.4	10.9	128.5	162.7	9.5	119.6	175.1	8.2	110.5	188.7	7.0
	14.4	44	151.7	144.4	12.6	142.8	154.4	11.1	**133.7**	**165.7**	**9.7**	124.5	178.1	8.4	115.2	191.8	7.2
	14.4	46	157.7	147.4	12.8	148.5	157.5	11.3	139.1	168.7	9.9	129.6	181.2	8.6	120.0	194.9	7.4
	14.4	48	163.7	150.6	13.0	154.2	160.6	11.5	144.6	171.9	10.1	134.8	184.4	8.8	124.9	198.1	7.6
	14.4	50	169.9	153.9	13.2	160.1	163.9	11.7	150.2	175.2	10.3	140.1	187.7	9.0	129.9	201.4	7.7
160	14.4	40	159.5	157.7	12.1	149.7	169.1	10.6	139.9	181.9	9.2	129.9	196.0	8.0	119.9	211.4	6.8
	14.4	42	165.8	161.1	12.3	155.8	172.6	10.8	145.6	185.4	9.4	135.3	199.5	8.1	125.0	215.0	7.0
	14.4	44	172.3	164.7	12.6	161.9	176.1	11.0	**151.4**	**188.9**	**9.6**	140.9	203.1	8.3	130.2	218.6	7.1
	14.4	46	178.9	168.3	12.8	168.2	179.8	11.2	157.4	192.6	9.8	146.5	206.8	8.5	135.5	222.3	7.3
	14.4	48	185.6	172.1	12.9	174.6	183.6	11.4	163.5	196.5	10.0	152.3	210.7	8.7	140.9	226.2	7.5
	14.4	50	192.5	176.0	13.1	181.2	187.5	11.6	169.7	200.4	10.2	158.1	214.6	8.8	146.4	230.2	7.6
170	18.0	40	176.4	170.5	12.4	165.8	182.3	10.9	155.0	195.6	9.5	144.1	210.5	8.2	133.1	226.9	7.0
	18.0	42	183.5	174.2	12.6	172.6	186.0	11.1	161.5	199.3	9.7	150.2	214.2	8.4	138.9	230.6	7.2
	18.0	44	190.8	178.1	12.9	179.6	189.8	11.4	**168.1**	**203.1**	**9.9**	156.5	218.0	8.6	144.8	234.4	7.4
	18.0	46	198.3	182.0	13.1	186.7	193.7	11.6	174.9	207.0	10.1	162.9	221.9	8.8	150.8	238.4	7.6
	18.0	48	205.9	186.2	13.3	194.0	197.8	11.8	181.8	211.1	10.3	169.4	226.0	9.0	157.0	242.4	7.8
	18.0	50	213.7	190.4	13.5	201.4	202.1	12.0	188.8	215.4	10.5	176.1	230.2	9.2	163.3	246.6	7.9
180	18.0	40	178.2	173.8	12.3	172.9	190.7	10.9	167.2	210.6	9.5	161.0	233.9	8.3	154.5	260.8	7.1
	18.0	42	184.5	176.9	12.5	179.1	193.9	11.1	173.3	213.9	9.7	167.1	237.4	8.4	160.4	264.5	7.3
	18.0	44	190.9	180.2	12.7	185.5	197.2	11.3	**179.6**	**217.3**	**9.9**	173.2	241.0	8.6	166.5	268.3	7.4
	18.0	46	197.5	183.5	12.9	191.9	200.6	11.5	185.9	220.9	10.1	179.5	244.7	8.8	172.6	272.2	7.6
	18.0	48	204.1	187.0	13.1	198.5	204.1	11.7	192.4	224.5	10.3	185.9	248.5	9.0	178.9	276.2	7.8
	18.0	50	210.8	190.6	13.3	205.2	207.8	11.9	199.0	228.3	10.5	192.3	252.4	9.1	185.3	280.4	7.9

Continuation of table and important notes are on the following page.

Table 7 Continued

190	18.0	40	184.2	181.8	12.2	178.7	199.4	10.8	172.8	220.1	9.4	166.4	244.4	8.2	159.7	272.4	7.0
	18.0	42	190.7	185.1	12.4	185.2	202.7	11.0	179.1	223.6	9.6	172.7	248.0	8.4	165.8	276.2	7.2
	18.0	44	197.3	188.6	12.6	191.7	206.2	11.2	**185.6**	**227.2**	**9.8**	179.0	251.8	8.5	172.0	280.2	7.4
	18.0	46	204.1	192.1	12.7	198.4	209.9	11.3	192.2	231.0	10.0	185.5	255.7	8.7	178.4	284.4	7.5
	18.0	48	210.9	195.8	12.9	205.1	213.6	11.5	198.8	234.8	10.2	192.1	259.8	8.9	184.8	288.6	7.7
	18.0	50	218.0	199.7	13.1	212.0	217.5	11.7	205.6	238.8	10.3	198.8	263.9	9.0	191.4	293.0	7.8
210	26.4	40	198.8	197.2	12.1	193.3	214.3	10.8	187.3	234.8	9.6	180.8	258.9	8.4	173.9	287.0	7.3
	26.4	42	205.8	200.5	12.3	200.3	217.6	11.0	194.2	238.1	9.8	187.6	262.3	8.6	180.6	290.5	7.5
	26.4	44	213.0	203.9	12.5	207.4	221.0	11.3	**201.2**	**241.5**	**10.0**	194.6	265.8	8.8	187.4	294.1	7.6
	26.4	46	220.3	207.5	12.7	214.6	224.5	11.5	208.4	245.1	10.2	201.6	269.4	9.0	194.4	297.8	7.8
	26.4	48	229.0	212.0	13.0	222.0	228.2	11.7	215.7	248.7	10.4	208.8	273.1	9.2	201.5	301.6	8.0
	26.4	50	238.0	216.6	13.2	229.5	232.0	11.9	223.1	252.5	10.6	216.1	276.9	9.4	208.7	305.5	8.2

NOTES:

1. Rated in accordance with ARI Standard 550/590-1998**.**
2. Ratings based on R-134a, evaporator fouling factor of 0.0001, 10-degree Delta-T, evaporator flow of 2.4 gpm/ton and sea level altitude.
3. Interpolation is allowed, extrapolation is not permitted. Consult McQuay for performance outside the cataloged ratings.
4. KW and EER are for the entire unit, including compressors, fan motors and control power.

Table 8, Part Load Data, Standard Efficiency

AGS UNIT SIZE	% LOAD	60 HZ			
		CAPACITY TONS	POWER kWi	EER	IPLV
120	100.0	116.7	139.7	10.02	12.8
	75.0	87.5	87.8	11.96	
	50.0	58.4	51.0	13.74	
	25.0	29.2	28.3	12.39	
130	100.0	125.2	152.7	9.84	12.7
	75.0	93.9	97.0	11.62	
	50.0	62.6	53.9	13.94	
	25.0	31.3	30.1	12.48	
140	100.0	133.7	165.7	9.68	12.6
	75.0	100.3	102.5	11.74	
	50.0	66.9	59.2	13.56	
	25.0	33.4	32.1	12.50	
160	100.0	151.4	188.9	9.62	12.8
	75.0	113.6	117.5	11.60	
	50.0	75.7	65.0	13.98	
	25.0	37.9	35.4	12.81	
170	100.0	168.1	203.1	9.93	12.9
	75.0	126.1	125.6	12.05	
	50.0	84.0	72.8	13.85	
	25.0	42.0	39.1	12.89	
180	100.0	179.6	217.3	9.92	12.7
	75.0	134.7	140.4	11.51	
	50.0	89.8	78.2	13.79	
	25.0	44.9	42.1	12.80	
190	100.0	185.6	227.2	9.80	12.5
	75.0	139.2	147.1	11.35	
	50.0	92.8	81.8	13.61	
	25.0	46.4	44.1	12.63	
210	100.0	201.2	241.5	10.00	12.4
	75.0	151.0	159.5	11.35	
	50.0	100.6	89.8	13.44	
	25.0	50.3	49.1	12.30	

NOTE: Part load data and IPLV are based on temperatures and procedures in ARI Standard 550/590.

SI Units

Table 9, AGS 120CS – AGS 210CS

AGS Unit Size	Fan Power (kW)	LWT (deg C)	Ambient Air Temperature (deg C)														
			25			30			35			40			45		
			Unit KW	PWR kWi	Unit COP	Unit KW	PWR kWi	Unit COP	Unit KW	PWR kWi	Unit COP	Unit KW	PWR kWi	Unit COP	Unit KW	PWR kWi	Unit COP
120	14.4	5.0	432.7	120.4	3.59	409.4	127.9	3.20	385.7	136.2	2.83	361.8	145.3	2.49	337.5	155.3	2.17
	14.4	6.0	446.7	122.6	3.64	424.7	130.0	3.27	400.4	138.3	2.90	375.7	147.5	2.55	350.8	157.4	2.23
	14.4	7.0	461.6	124.8	3.70	440.4	132.2	3.33	415.4	140.5	2.96	390.0	149.6	2.61	364.4	159.6	2.28
	14.4	8.0	481.7	127.0	3.79	456.4	134.4	3.39	430.7	142.7	3.02	404.6	151.9	2.66	378.3	161.9	2.34
	14.4	9.0	498.7	129.4	3.86	472.7	136.8	3.46	446.3	145.0	3.08	419.5	154.2	2.72	392.5	164.2	2.39
	14.4	10.0	516.1	131.8	3.92	489.3	139.2	3.52	462.2	147.4	3.14	434.7	156.6	2.78	406.9	166.6	2.44
130	14.4	5.0	464.9	131.2	3.54	439.7	139.5	3.15	414.2	148.7	2.79	388.3	158.8	2.44	362.2	169.9	2.13
	14.4	6.0	481.9	133.6	3.61	456.0	141.9	3.21	429.7	151.0	2.85	403.1	161.2	2.50	376.2	172.3	2.18
	14.4	7.0	499.2	136.0	3.67	472.6	144.3	3.27	445.6	153.5	2.90	418.2	163.7	2.55	390.6	174.8	2.23
	14.4	8.0	516.9	138.5	3.73	489.5	146.8	3.33	461.8	156.0	2.96	433.7	166.2	2.61	405.3	177.3	2.29
	14.4	9.0	534.9	141.1	3.79	506.8	149.4	3.39	478.3	158.6	3.02	449.4	168.8	2.66	420.2	179.9	2.34
	14.4	10.0	553.3	143.8	3.85	524.4	152.1	3.45	495.1	161.3	3.07	465.4	171.5	2.71	435.4	182.6	2.38
140	14.4	5.0	497.3	142.0	3.50	470.3	151.1	3.11	442.8	161.2	2.75	415.0	172.4	2.41	386.9	184.5	2.10
	14.4	6.0	515.3	144.6	3.56	487.5	153.7	3.17	459.2	163.9	2.80	430.6	175.1	2.46	401.8	187.2	2.15
	14.4	7.0	533.6	147.3	3.62	505.0	156.4	3.23	476.0	166.6	2.86	446.6	177.8	2.51	416.9	190.0	2.19
	14.4	8.0	552.3	150.1	3.68	522.9	159.2	3.28	493.1	169.4	2.91	462.8	180.6	2.56	432.4	192.8	2.24
	14.4	9.0	571.3	153.0	3.73	541.1	162.1	3.34	510.4	172.2	2.96	479.4	183.5	2.61	448.1	195.7	2.29
	14.4	10.0	590.6	155.9	3.79	559.6	165.1	3.39	528.1	175.2	3.01	496.2	186.5	2.66	464.1	198.7	2.34
160	14.4	5.0	565.0	161.7	3.49	533.7	172.1	3.10	502.0	183.6	2.73	470.0	196.4	2.39	437.8	210.1	2.08
	14.4	6.0	585.0	164.8	3.55	552.9	175.3	3.15	520.3	186.8	2.79	487.4	199.5	2.44	454.3	213.3	2.13
	14.4	7.0	605.4	168.0	3.60	572.4	178.5	3.21	538.9	190.1	2.84	505.1	202.8	2.49	471.1	216.6	2.17
	14.4	8.0	626.3	171.4	3.65	592.3	181.8	3.26	557.9	193.4	2.88	523.2	206.2	2.54	488.2	220.0	2.22
	14.4	9.0	647.4	174.8	3.70	612.5	185.3	3.31	577.1	196.9	2.93	541.5	209.7	2.58	505.6	223.5	2.26
	14.4	10.0	668.9	178.3	3.75	633.1	188.8	3.35	596.7	200.4	2.98	560.1	213.2	2.63	523.2	227.1	2.30
170	18.0	5.0	625.3	174.7	3.58	591.2	185.4	3.19	556.6	197.4	2.82	521.4	210.8	2.47	486.0	225.4	2.16
	18.0	6.0	647.9	178.1	3.64	612.8	188.8	3.25	577.2	200.8	2.87	541.1	214.2	2.53	504.7	228.8	2.21
	18.0	7.0	671.0	181.6	3.69	634.9	192.3	3.30	598.3	204.3	2.93	561.2	217.7	2.58	523.8	232.3	2.25
	18.0	8.0	694.5	185.2	3.75	657.5	195.9	3.36	619.9	207.9	2.98	581.7	221.3	2.63	543.3	235.9	2.30
	18.0	9.0	718.5	188.9	3.80	680.4	199.6	3.41	641.8	211.6	3.03	602.6	225.0	2.68	563.1	239.6	2.35
	18.0	10.0	742.9	192.7	3.85	703.8	203.4	3.46	664.1	215.4	3.08	623.8	228.7	2.73	583.2	243.4	2.40
180	18.0	5.0	634.1	178.7	3.55	617.0	194.3	3.18	598.8	212.3	2.82	579.1	233.3	2.48	558.4	257.3	2.17
	18.0	6.0	654.1	181.6	3.60	636.9	197.2	3.23	618.3	215.3	2.87	598.4	236.5	2.53	577.4	260.6	2.22
	18.0	7.0	674.5	184.6	3.65	657.0	200.2	3.28	638.2	218.4	2.92	618.1	239.7	2.58	596.7	264.0	2.26
	18.0	8.0	695.2	187.6	3.70	677.5	203.3	3.33	658.5	221.6	2.97	638.0	243.0	2.63	616.4	267.5	2.30
	18.0	9.0	716.2	190.8	3.75	698.3	206.5	3.38	679.0	224.9	3.02	658.2	246.5	2.67	636.3	271.1	2.35
	18.0	10.0	737.5	194.0	3.80	719.4	209.8	3.43	699.8	228.3	3.07	678.8	250.0	2.72	656.5	274.8	2.39
190	18.0	5.0	655.4	187.0	3.50	637.8	203.1	3.14	618.8	221.9	2.79	598.5	243.8	2.46	577.1	268.7	2.15
	18.0	6.0	676.0	190.0	3.56	658.2	206.2	3.19	639.0	225.1	2.84	618.4	247.1	2.50	596.7	272.2	2.19
	18.0	7.0	697.1	193.2	3.61	679.0	209.4	3.24	659.6	228.3	2.89	638.7	250.5	2.55	616.6	275.8	2.24
	18.0	8.0	718.5	196.4	3.66	700.2	212.7	3.29	680.5	231.7	2.94	659.3	254.1	2.60	636.9	279.5	2.28
	18.0	9.0	740.2	199.8	3.71	721.6	216.1	3.34	701.7	235.2	2.98	680.2	257.7	2.64	657.5	283.3	2.32
	18.0	10.0	762.5	203.3	3.75	743.4	219.6	3.39	723.2	238.8	3.03	701.4	261.4	2.68	678.3	287.2	2.36
210	26.4	5.0	707.7	202.2	3.50	690.0	218.0	3.17	670.9	236.5	2.84	650.2	258.2	2.52	628.1	283.1	2.22
	26.4	6.0	730.1	205.3	3.56	712.2	221.0	3.22	692.9	239.5	2.89	671.9	261.3	2.57	649.6	286.3	2.27
	26.4	7.0	752.9	208.4	3.61	734.8	224.1	3.28	715.3	242.6	2.95	694.0	264.4	2.62	671.5	289.5	2.32
	26.4	8.0	776.7	211.8	3.67	757.8	227.3	3.33	738.0	245.8	3.00	716.6	267.7	2.68	693.7	292.8	2.37
	26.4	9.0	803.5	215.7	3.73	781.1	230.6	3.39	761.1	249.1	3.06	739.4	271.0	2.73	716.2	296.3	2.42
	26.4	10.0	831.0	219.7	3.78	804.8	234.0	3.44	784.6	252.5	3.11	762.6	274.5	2.78	739.1	299.8	2.47

NOTES:

1. Rated in accordance with ARI Standard 550/590-1998**.**
2. Ratings based on R-134a, evaporator fouling factor of 0.0176 m2 x C/kW, evaporator water flow of 0.054 L/s per kW and sea level altitude.
3. Interpolation is allowed, extrapolation is not permitted. Consult McQuay for performance outside the cataloged ratings.
4. KW and COP are for the entire unit, including compressors, fan motors and control power.

Performance Data, High Efficiency

Inch-Pound Units

Table 10, AGS 125CH – AGS 195CH, High Efficiency

AGS Unit Size	Fan Power (kW)	LWT (deg F)	Ambient Air Temperature (deg F)															
			75			85			95			105			115			
			Unit Tons	PWR kWi	Unit EER	Unit Tons	PWR kWi	Unit EER	Unit Tons	PWR kWi	Unit EER	Unit Tons	PWR kWi	Unit EER	Unit Tons	PWR kWi	Unit EER	
125	18.0	40	126.7	118.9	12.8	119.3	126.6	11.3	111.7	135.3	9.9	104.0	145.1	8.6	96.2	155.9	7.4	
	18.0	42	132.0	121.2	13.1	124.4	128.8	11.6	116.6	137.5	10.2	108.6	147.3	8.9	100.6	158.1	7.6	
	18.0	44	137.4	123.6	13.3	129.6	131.2	11.9	**121.6**	**139.8**	**10.4**	113.4	149.6	9.1	105.1	160.4	7.9	
	18.0	46	143.1	126.1	13.6	135.0	133.6	12.1	126.7	142.3	10.7	118.2	152.0	9.3	109.7	162.8	8.1	
	18.0	48	148.9	128.6	13.9	140.5	136.1	12.4	131.9	144.7	10.9	123.2	154.5	9.6	114.4	165.3	8.3	
	18.0	50	154.8	131.3	14.1	146.1	138.7	12.6	137.3	147.3	11.2	128.3	157.0	9.8	119.2	167.8	8.5	
135	18.0	40	136.7	128.9	12.7	128.6	137.3	11.2	120.4	147.0	9.8	112.1	157.8	8.5	103.7	169.8	7.3	
	18.0	42	142.3	131.4	13.0	134.1	139.9	11.5	125.6	149.5	10.1	117.0	160.3	8.8	108.3	172.3	7.5	
	18.0	44	148.2	134.1	13.3	139.7	142.5	11.8	**130.9**	**152.1**	**10.3**	122.1	162.9	9.0	113.1	174.9	7.8	
	18.0	46	154.2	136.8	13.5	145.4	145.2	12.0	136.4	154.8	10.6	127.3	165.6	9.2	118.0	177.6	8.0	
	18.0	48	160.3	139.7	13.8	151.3	148.0	12.3	142.0	157.6	10.8	132.6	168.4	9.4	123.0	180.3	8.2	
	18.0	50	166.6	142.6	14.0	157.3	150.9	12.5	147.7	160.5	11.0	138.0	171.2	9.7	128.2	183.2	8.4	
145	18.0	40	149.5	138.8	12.9	140.6	148.1	11.4	131.6	158.7	10.0	122.5	170.6	8.6	113.3	183.7	7.4	
	18.0	42	155.6	141.6	13.2	146.5	150.9	11.7	137.3	161.5	10.2	127.9	173.4	8.9	118.3	186.5	7.6	
	18.0	44	162.0	144.5	13.4	152.6	153.8	11.9	**143.0**	**164.4**	**10.4**	133.3	176.2	9.1	123.5	189.3	7.8	
	18.0	46	168.5	147.6	13.7	158.8	156.8	12.2	148.9	167.3	10.7	138.9	179.2	9.3	128.8	192.3	8.0	
	18.0	48	175.1	150.7	13.9	165.1	159.9	12.4	155.0	170.4	10.9	144.7	182.2	9.5	134.2	195.4	8.2	
	18.0	50	181.9	153.9	14.2	171.6	163.1	12.6	161.2	173.6	11.1	150.6	185.4	9.7	139.8	198.5	8.4	
165	21.6	40	167.5	153.6	13.1	157.7	163.4	11.6	147.7	174.6	10.1	137.5	187.4	8.8	127.2	201.6	7.6	
	21.6	42	174.5	156.7	13.4	164.4	166.5	11.8	154.0	177.7	10.4	143.5	190.5	9.0	132.9	204.6	7.8	
	21.6	44	181.6	160.0	13.6	171.2	169.7	12.1	**160.5**	**180.9**	**10.6**	149.7	193.6	9.3	138.7	207.8	8.0	
	21.6	46	189.0	163.4	13.9	178.2	173.1	12.4	167.2	184.3	10.9	156.1	196.9	9.5	144.7	211.1	8.2	
	21.6	48	196.5	166.9	14.1	185.4	176.6	12.6	174.1	187.7	11.1	162.6	200.3	9.7	150.9	214.5	8.4	
	21.6	50	204.2	170.6	14.4	192.8	180.2	12.8	181.1	191.3	11.4	169.3	203.9	10.0	157.2	218.0	8.7	
175	21.6	40	180.2	166.3	13.0	169.6	177.2	11.5	158.8	189.6	10.0	147.8	203.7	8.7	136.7	219.3	7.5	
	21.6	42	187.6	169.8	13.3	176.7	180.6	11.7	165.5	193.1	10.3	154.2	207.1	8.9	142.7	222.7	7.7	
	21.6	44	195.2	173.4	13.5	184.0	184.2	12.0	**172.5**	**196.6**	**10.5**	160.8	210.6	9.2	149.0	226.3	7.9	
	21.6	46	203.1	177.2	13.7	191.4	188.0	12.2	179.6	200.3	10.8	167.6	214.3	9.4	155.4	229.9	8.1	
	21.6	48	211.1	181.1	14.0	199.1	191.8	12.5	186.9	204.2	11.0	174.5	218.1	9.6	161.9	233.7	8.3	
	21.6	50	219.3	185.2	14.2	206.9	195.8	12.7	194.3	208.1	11.2	181.5	222.1	9.8	168.6	237.6	8.5	
195	21.6	40	188.2	176.5	12.8	182.9	192.5	11.4	177.2	211.5	10.1	170.9	233.9	8.8	164.3	259.8	7.6	
	21.6	42	194.8	179.6	13.0	189.5	195.5	11.6	183.7	214.6	10.3	177.4	237.0	9.0	170.6	263.1	7.8	
	21.6	44	201.6	182.8	13.2	196.2	198.7	11.8	**190.3**	**217.8**	**10.5**	183.9	240.3	9.2	177.1	266.5	8.0	
	21.6	46	208.5	186.1	13.4	203.1	202.0	12.1	197.1	221.1	10.7	190.6	243.7	9.4	183.6	270.0	8.2	
	21.6	48	216.5	190.1	13.7	210.0	205.4	12.3	203.9	224.5	10.9	197.4	247.2	9.6	190.3	273.6	8.3	
	21.6	50	224.9	194.3	13.9	217.1	208.9	12.5	210.9	228.0	11.1	204.3	250.8	9.8	197.1	277.4	8.5	

NOTES:

1. Rated in accordance with ARI Standard 550/590-1998**.**
2. Ratings based on R-134a, evaporator fouling factor of 0.0001, 10-degree Delta-T, evaporator flow of 2.4 gpm/ton and sea level altitude.
3. Interpolation is allowed, extrapolation is not permitted. Consult McQuay for performance outside the cataloged ratings.
4. KW and EER are for the entire unit, including compressors, fan motors and control power.
5. The High Efficiency units have a higher dollar-per-ton price than Standard Efficiency units and should only be selected when high ambient operation is required, or efficiencies above the Standard Efficiency offering is required.

Table 11, Part Load Data, High Efficiency

AGS UNIT SIZE	% LOAD	60 HZ			
		CAPACITY TONS	POWER kWi	EER	IPLV
125	100.0	121.6	139.8	10.44	13.1
	75.0	91.2	89.2	12.27	
	50.0	60.8	52.1	14.00	
	25.0	30.4	29.3	12.44	
135	100.0	130.9	152.1	10.33	13.0
	75.0	98.2	98.4	11.97	
	50.0	65.5	55.1	14.24	
	25.0	32.7	31.3	12.54	
145	100.0	143.0	164.4	10.44	13.3
	75.0	107.3	103.2	12.47	
	50.0	71.5	60.1	14.28	
	25.0	35.8	33.0	12.99	
165	100.0	160.5	180.9	10.65	13.5
	75.0	120.4	116.3	12.43	
	50.0	80.3	65.5	14.71	
	25.0	40.1	36.6	13.14	
175	100.0	172.5	196.6	10.53	13.5
	75.0	129.4	123.0	12.62	
	50.0	86.2	71.7	14.43	
	25.0	43.1	38.8	13.35	
195	100.0	190.3	217.8	10.49	13.1
	75.0	142.8	142.7	12.00	
	50.0	95.2	80.2	14.25	
	25.0	47.6	43.5	13.12	

NOTE: Part load data and IPLV are based on temperatures and procedures in ARI Standard 550/590.

SI Units

Table 12, AGS 125CS – AGS 195CS, High Efficiency

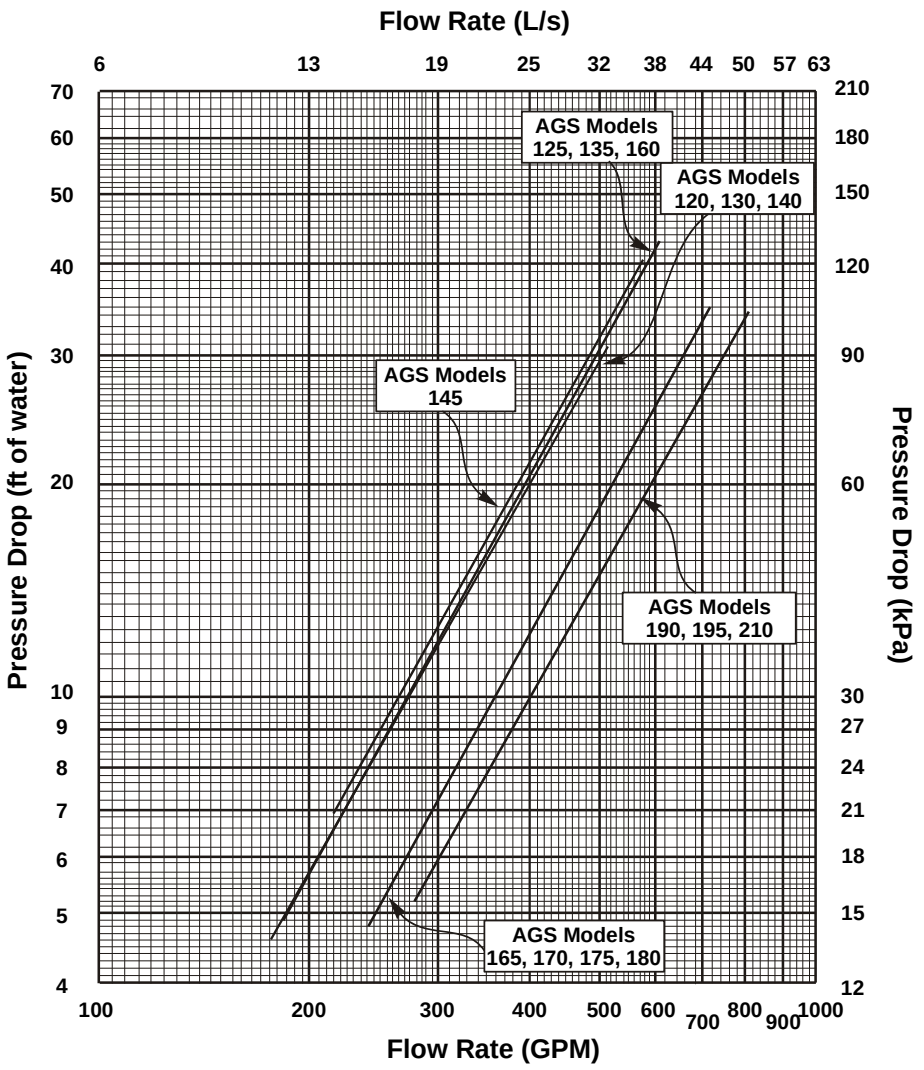
AGS Unit Size	Fan Power (kW)	LWT (deg C)	Ambient Air Temperature (deg C)														
			25			30			35			40			45		
			Unit KW	PWR kWi	Unit COP	Unit KW	PWR kWi	Unit COP	Unit KW	PWR kWi	Unit COP	Unit KW	PWR kWi	Unit COP	Unit KW	PWR kWi	Unit COP
125	18.0	5.0	449.6	121.6	3.70	425.7	128.6	3.31	401.4	136.4	2.94	376.7	145.2	2.59	351.6	154.8	2.27
	18.0	6.0	466.5	123.7	3.77	441.9	130.6	3.38	417.0	138.4	3.01	391.5	147.2	2.66	365.8	156.9	2.33
	18.0	7.0	483.8	125.9	3.84	458.6	132.8	3.45	432.9	140.6	3.08	406.7	149.3	2.72	380.3	159.0	2.39
	18.0	8.0	501.6	128.1	3.92	475.6	135.0	3.52	449.2	142.8	3.15	422.3	151.5	2.79	395.1	161.1	2.45
	18.0	9.0	519.7	130.4	3.99	493.0	137.3	3.59	465.9	145.0	3.21	438.2	153.7	2.85	410.3	163.3	2.51
	18.0	10.0	538.3	132.8	4.05	510.8	139.6	3.66	482.9	147.3	3.28	454.5	156.0	2.91	425.8	165.6	2.57
135	18.0	5.0	484.9	131.8	3.68	459.0	139.6	3.29	432.6	148.3	2.92	405.9	158.0	2.57	378.8	168.7	2.25
	18.0	6.0	502.9	134.2	3.75	476.3	141.9	3.36	449.2	150.6	2.98	421.7	160.3	2.63	393.9	170.9	2.30
	18.0	7.0	521.4	136.6	3.82	494.1	144.3	3.42	466.2	152.9	3.05	437.9	162.6	2.69	409.3	173.3	2.36
	18.0	8.0	540.3	139.1	3.89	512.3	146.7	3.49	483.6	155.4	3.11	454.5	165.1	2.75	425.2	175.7	2.42
	18.0	9.0	559.7	141.6	3.95	530.8	149.3	3.56	501.4	157.9	3.18	471.5	167.6	2.81	441.3	178.2	2.48
	18.0	10.0	579.4	144.3	4.02	549.7	151.9	3.62	519.5	160.5	3.24	488.8	170.2	2.87	457.7	180.8	2.53
145	18.0	5.0	530.2	142.1	3.73	501.7	150.6	3.33	472.9	160.1	2.95	443.5	170.8	2.60	413.9	182.5	2.27
	18.0	6.0	549.8	144.6	3.80	520.5	153.1	3.40	490.8	162.6	3.02	460.7	173.3	2.66	430.2	185.0	2.33
	18.0	7.0	569.8	147.3	3.87	539.8	155.7	3.47	509.2	165.3	3.08	478.3	175.9	2.72	447.0	187.6	2.38
	18.0	8.0	590.3	150.0	3.93	559.4	158.5	3.53	528.1	168.0	3.14	496.2	178.6	2.78	464.0	190.3	2.44
	18.0	9.0	611.2	152.8	4.00	579.5	161.3	3.59	547.2	170.7	3.21	514.5	181.4	2.84	481.4	193.1	2.49
	18.0	10.0	632.5	155.7	4.06	599.9	164.1	3.66	566.8	173.6	3.27	533.2	184.2	2.89	499.2	195.9	2.55
165	21.6	5.0	594.4	157.1	3.78	562.7	166.1	3.39	530.5	176.2	3.01	497.7	187.7	2.65	464.6	200.3	2.32
	21.6	6.0	616.5	160.0	3.85	584.0	168.9	3.46	550.8	179.0	3.08	517.2	190.5	2.72	483.1	203.1	2.38
	21.6	7.0	639.2	163.0	3.92	605.7	171.9	3.52	571.7	181.9	3.14	537.1	193.4	2.78	502.0	206.0	2.44
	21.6	8.0	662.4	166.1	3.99	628.0	174.9	3.59	593.0	185.0	3.21	557.4	196.4	2.84	521.4	208.9	2.50
	21.6	9.0	686.0	169.2	4.05	650.7	178.0	3.65	614.7	188.1	3.27	578.2	199.4	2.90	541.2	212.0	2.55
	21.6	10.0	710.2	172.5	4.12	673.9	181.3	3.72	637.0	191.3	3.33	599.4	202.6	2.96	561.4	215.1	2.61
175	21.6	5.0	639.1	170.2	3.75	604.9	180.1	3.36	570.2	191.3	2.98	534.9	204.0	2.62	499.2	217.9	2.29
	21.6	6.0	662.7	173.4	3.82	627.6	183.3	3.42	591.9	194.5	3.04	555.6	207.1	2.68	518.9	221.0	2.35
	21.6	7.0	686.8	176.7	3.89	650.7	186.6	3.49	614.0	197.7	3.11	576.7	210.4	2.74	539.0	224.2	2.40
	21.6	8.0	711.5	180.2	3.95	674.4	190.0	3.55	636.7	201.1	3.17	598.4	213.7	2.80	559.6	227.6	2.46
	21.6	9.0	736.7	183.7	4.01	698.6	193.5	3.61	659.8	204.6	3.23	620.4	217.1	2.86	580.6	231.0	2.51
	21.6	10.0	762.4	187.3	4.07	723.2	197.0	3.67	683.4	208.1	3.28	642.9	220.7	2.91	602.0	234.5	2.57
195	21.6	5.0	669.8	181.3	3.70	652.8	195.9	3.33	634.5	213.0	2.98	614.6	233.2	2.64	593.6	256.3	2.32
	21.6	6.0	690.9	184.1	3.75	673.8	198.7	3.39	655.2	215.9	3.04	635.2	236.1	2.69	613.8	259.2	2.37
	21.6	7.0	712.5	187.0	3.81	695.2	201.6	3.45	676.4	218.8	3.09	656.1	239.0	2.74	634.4	262.3	2.42
	21.6	8.0	734.9	190.0	3.87	716.9	204.6	3.50	697.9	221.8	3.15	677.3	242.1	2.80	655.4	265.5	2.47
	21.6	9.0	759.6	193.5	3.92	738.9	207.6	3.56	719.7	224.9	3.20	698.9	245.3	2.85	676.7	268.7	2.52
	21.6	10.0	785.3	197.3	3.98	761.3	210.8	3.61	741.8	228.0	3.25	720.7	248.5	2.90	698.3	272.0	2.57

NOTES:

1. Rated in accordance with ARI Standard 550/590-1998**.**
2. Ratings based on R-134a, evaporator fouling factor of 0.0176 m2 x C/kW, evaporator water flow of 0.054 L/s per kW and sea level altitude.
3. Interpolation is allowed, extrapolation is not permitted. Consult McQuay for performance outside the cataloged ratings.
4. KW and COP are for the entire unit, including compressors, fan motors and control power.
5. The High Efficiency units have a higher dollar-per-ton price and should only be selected when high ambient operation or efficiencies above the standard efficiency offering is required.

Pressure Drop

Figure 6, Evaporator Pressure Drops



Minimum/Nominal/Maximum Flow Rates

AGS MODEL	MINIMUM FLOW				NOMINAL FLOW				MAXIMUM FLOW			
	gpm	l/s	ft	kpa	gpm	l/s	ft	kpa	gpm	l/s	ft	kpa
120	175	11.1	4.6	13.7	280	17.7	10.6	31.6	467	29.5	26.5	79.1
125	182	11.5	4.9	14.6	292	18.5	11.8	35.2	486	30.8	29.2	87.2
130	188	11.9	5.3	15.8	300	19.0	12.9	38.5	501	31.7	30.4	90.7
135	196	12.4	5.6	16.7	314	19.9	13.5	40.3	524	33.1	33.5	100.0
140	201	12.7	5.9	17.6	321	20.3	13.6	40.6	535	33.8	30.4	90.7
145	215	13.6	6.9	20.6	343	21.7	16.1	48.0	572	36.2	40.2	119.9
160	227	14.4	7.2	21.5	363	23.0	17.1	51.0	606	38.3	43.0	128.4
165	241	15.2	4.8	14.4	385	24.4	11.3	33.8	642	40.6	28.6	85.3
170	252	16.0	5.2	15.7	403	25.5	12.3	36.7	672	42.6	31.1	92.7
175	259	16.4	5.7	17.0	414	26.2	12.9	38.5	690	43.7	32.6	97.2
180	269	17.1	5.9	17.7	431	27.3	13.9	41.4	718	45.5	35.0	104.5
190	278	17.6	5.2	15.5	445	28.2	12.3	36.7	742	47.0	30.7	91.6
195	285	18.1	5.4	16.1	457	28.9	12.8	38.2	761	48.2	32.6	97.3
210	302	19.1	5.9	17.6	483	30.6	14.3	42.7	805	50.9	34.5	103.0

Sound Data

Sound levels can be as important as unit cost and efficiency, and must be addressed before the start of any project design. The McQuay GeneSys chiller is engineered for quiet operation with aerodynamically designed fan blades, low speed motors and inherently quiet single screw compressors.

Standards

ARI has established standards to provide uniform methods for the determination of the sound levels of equipment. For large air-cooled chillers, it is ARI Standard 370, *Sound Ratings of Large Outdoor Refrigeration and Air-Conditioning Equipment.* Data contained in this section are in accordance with this standard.

Background Information

Sound is a vibration in an elastic medium and is essentially a pressure and particle displacement phenomena. A vibrating body produces compression waves and as the waves are emitted from the vibrating body, molecules are ultimately compressed. These values are transmitted through gases, liquids or solids-anything that is elastic or viscous.

The sound data provided in this section is presented with both sound pressure and sound power levels. Sound power is the total sound energy radiated by a source per unit of time integrated over the surface through which the sound is radiated. Sound power is a calculated quantity and cannot be measured directly like sound pressure. Sound power is not dependent on the surrounding environment or distance from the source.

Sound pressure varies with the distance from the source and is dependent on its surroundings. For example, a brick wall located 10 feet from a unit (two reflecting surfaces, the roof and the wall) will affect the sound pressure measurements differently than a unit mounted on a roof with only one reflecting surface (the roof). Sound pressure is measured in decibels (dB), which is a dimensionless ratio (on a logarithmic scale) between measured sound pressure and a reference sound pressure level.

Sound Pressure Levels - Full Load

All sound pressure tables give the overall "A" weighted sound pressure levels which are considered typical of what can be measured in a hemispherical field with a hand-held sound meter in the absence of any nearby reflective surfaces, other than the ground itself. The sound pressure in Table 13 measured at 30 feet from the side of the unit, at 100% unit load, no reflecting walls (Q=2), and ARI conditions; 95°F (35°C) ambient air temperature and 54/44°F (12.22/6.67°C) chilled water temperatures.

Sound Power Levels

Acoustical consultants can require sound power octave band data to perform a detailed acoustical analysis. Sound measurements are taken over a prescribed area around the unit and the data is mathematically calculated to give the sound power in dB.

Acoustic Analyzer™

The McQuay Acoustic Analyzer program is a tool that has been developed to assist the designer in determining sound levels in specific installations using actual equipment sound ratings. It is available through the local McQuay sales office.

Table 13, Sound Pressure Octave Band Data Without *Sound Enclosure*

AGS-C Model	Octave Band & Center Frequency, Hz.								Overall A-Weighted
	63	125	250	500	1000	2000	4000	8000	
120	38	41	51	55	61	62	59	52	67
125	40	43	53	57	63	64	61	54	69
130	38	41	51	55	61	62	59	52	67
135	40	43	53	57	63	64	61	54	69
140	38	41	51	55	61	62	59	52	67
145	40	43	53	57	63	64	61	54	69
160	38	41	51	55	61	62	59	52	67
165	41	46	54	59	65	66	62	56	70
170	40	43	53	57	63	64	61	54	69
175	41	46	54	59	65	66	62	56	70
180	40	43	53	57	63	64	61	54	69
190	40	43	53	57	63	64	61	54	69
195	41	46	54	59	65	66	62	56	70
210	41	46	54	59	65	66	62	56	70

Note: Data at:

R = 9.1 meters (30 feet), .sound pressure at 9.1 meters (30 feet) from unit

Q = 2, unit on a flat roof or ground with no adjacent wall(s).

Table 14, Sound Power Octave Band Data Without *Sound Enclosure*

AGS-C Model	Octave Band & Center Frequency, Hz.								Overall A-Weighted
	63	125	250	500	1000	2000	4000	8000	
120	65	68	77	81	87	89	86	78	93
125	67	70	79	83	89	91	88	80	95
130	65	68	77	81	87	89	86	78	93
135	67	70	79	83	89	91	88	80	95
140	65	68	77	81	87	89	86	78	93
145	67	70	79	83	89	91	88	80	95
160	65	68	77	81	87	89	86	78	93
165	68	72	80	85	91	93	89	82	97
170	67	70	79	83	89	91	88	80	95
175	68	72	80	85	91	93	89	82	97
180	67	70	79	83	89	91	88	80	95
190	67	70	79	83	89	91	88	80	95
195	68	72	80	85	91	93	89	82	97
210	68	72	80	85	91	93	89	82	97

Table 15, Sound Pressure Octave Band Data With *Sound Enclosure*

AGS-C Model	Octave Band & Center Frequency, Hz.								Overall A-Weighted
	63	125	250	500	1000	2000	4000	8000	
120	38	40	51	53	57	59	55	49	63
125	40	42	53	55	59	61	57	51	65
130	38	40	51	53	57	59	55	49	63
135	40	42	53	55	59	61	57	51	65
140	38	40	51	53	57	59	55	49	63
145	40	42	53	55	59	61	57	51	65
160	38	40	51	53	57	59	55	49	63
165	41	45	54	57	61	63	59	53	67
170	40	42	53	55	59	61	57	51	65
175	41	45	54	57	61	63	59	53	67
180	40	42	53	55	59	61	57	51	65
190	40	42	53	55	59	61	57	51	65
195	41	45	54	57	61	63	59	53	67
210	41	45	54	57	61	63	59	53	67

Note: Data at:

R = 9.1 meters (30 feet), .sound pressure at 9.1 meters (30 feet) from unit

Q = 2, unit on a flat roof or ground with no adjacent wall(s).

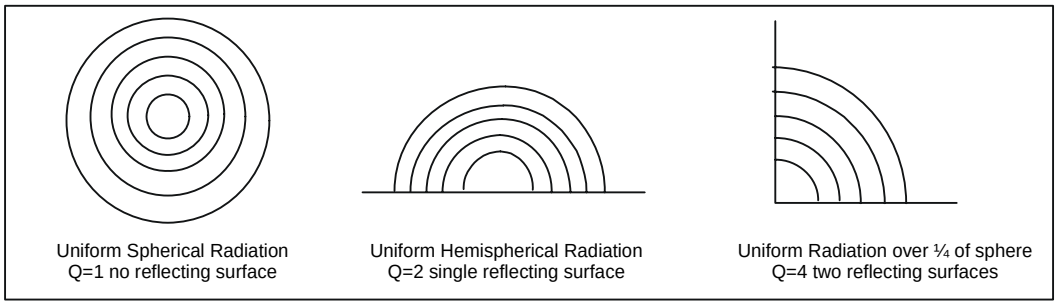
Table 16, Sound Power Octave Band Data* With *Sound Enclosure

AGS-C Model	Octave Band & Center Frequency, Hz.								Overall A-Weighted
	63	125	250	500	1000	2000	4000	8000	
120	65	67	77	80	83	85	82	76	90
125	67	69	79	82	85	87	84	78	92
130	65	67	77	80	83	85	82	76	90
135	67	69	79	82	85	87	84	78	92
140	65	67	77	80	83	85	82	76	90
145	67	69	79	82	85	87	84	78	92
160	65	67	77	80	83	85	82	76	90
165	68	71	80	84	87	89	85	80	93
170	67	69	79	82	85	87	84	78	92
175	68	71	80	84	87	89	85	80	93
180	67	69	79	82	85	87	84	78	92
190	67	69	79	82	85	87	84	78	92
195	68	71	80	84	87	89	85	80	93
210	68	71	80	84	87	89	85	80	93

Sound Reduction Due to Distance from a Unit

The distance between a source of sound and the location of the sound measurement plays an important role in minimizing sound problems. The equation below can be used to calculate the *sound pressure level* at any distance if the *sound power* is known. Results for typical distances are tabulated in Table 17. Another way of determining the effect of distance is to work from sound pressure only. "Q", the directionality factor, is a dimensionless number that compensates for the type of sound reflection from the source. For example, a unit sitting on a flat roof or ground with no other reflective surfaces or attenuation due to grass, snow, etc., between source and receiver: Q=2.

Figure 7, "Q" Definition, Plan View, Unit Located in Center



Sound pressure can be calculated at any distance from the unit if the sound power is known.

$$Lp=Lw-(20 \log r) + (10 \log Q) - .5$$

Lp = sound pressure r = distance from unit in feet

Lw = sound power Q = directionality factor

With Q=1, Unit suspended in space (theoretical condition), the equation simplifies to:

$$Lp = Lw – (20)(\log r) –0.5$$

With Q=2, for a unit sitting on a flat roof or ground with no adjacent vertical wall as a reflective surface, the equation simplifies to:

$$Lp = Lw - (20)(\log r) + 2.5$$

With Q=4 for a unit sitting on a flat roof or ground with one adjacent vertical wall as a reflective surface, the equation simplifies to:

$$Lp = Lw - (20)(\log r) + 5.5$$

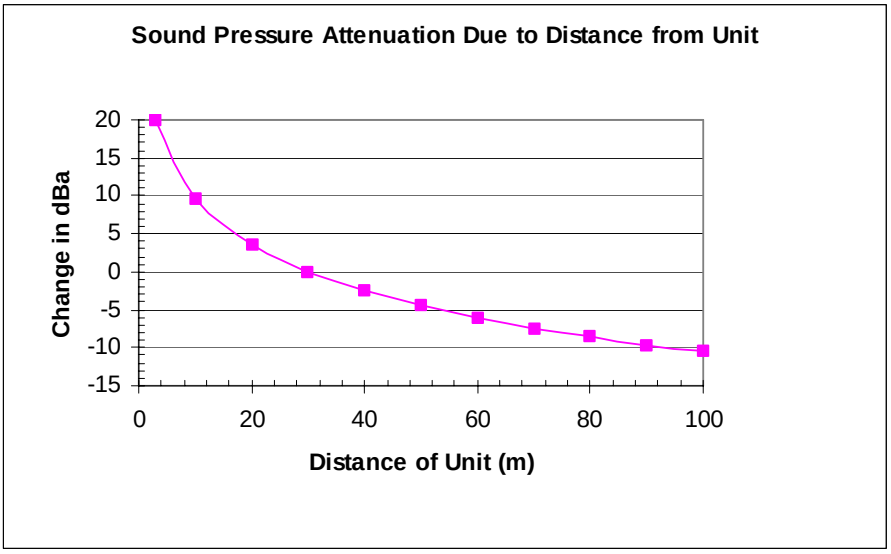
The equations are reduced to table form in Table 17 for various distances and the two most usual cases of "Q" type of location.

Table 17, dB Conversion of Sound Power to Pressure for Distance

Distance from Sound Source m. (ft)	DB Reduction from Sound Power at the Source to Sound Pressure at Referenced Distance	
	Q=2	Q=4
9 (30)	26.3	23.8
15 (50)	30.7	27.7
23 (75)	34.3	31.2
30 (100)	36.7	33.7
46 (150)	40.3	37.3
61 (200)	42.8	39.8
91 (300)	46.3	43.3

Figure 8 on the following page gives the reduction in *sound pressure* due to distance.

Figure 8, Sound Pressure Attenuation Due to Distance from Unit



Sound Isolation

The low sound level for the GeneSys chiller satisfies most customer requirements. However, there can be applications where even lower sound levels can be required. The most effective isolation method is to locate the unit away from sound sensitive areas. Avoid locations beneath windows or between structures where normal-operating sounds can be objectionable. Isolating water lines, electrical conduit and the unit itself can reduce structurally transmitted sound. Wall sleeves and rubber isolated piping hangers can be used to reduce transmission of water or pump noise into occupied spaces, and flexible electrical connections can be used to isolate sound through electrical conduit. Spring isolators are effective in reducing the low amplitude sound generated by screw compressors and can be used for unit isolation in sound sensitive areas.

Sound Pressure Levels, Low Ambient Operation

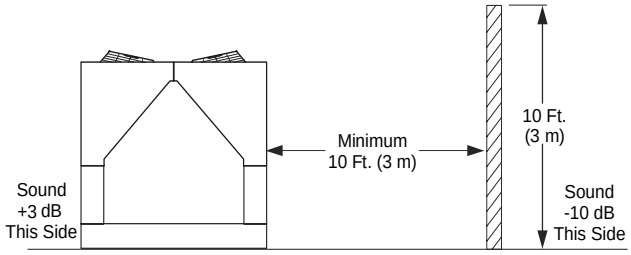
Unit operation at a lower ambient temperature than 95°F (35°C) will also result in lower sound pressure levels. The sound pressure level will decrease approximately 1 dBA for ambient air temperatures between 85°F and 94°F (29.4°C and 34.4°C), approximately 2 dBA for ambient air temperatures between 75°F and 84°F (23.9°C and 28.9°C), and approximately 3 dBA for ambient air temperatures between 65°F and 74°F (18.3°C and 23.3).

Sound Pressure Levels, Multiple Units

Multiple air-cooled unit installations will have a higher sound level than a single unit. Two units will have approximately 3 dB higher sound level of one unit, four units will be approximately 6 dB louder, and eight units approximately 9 dB louder than one unit.

Sound Control

Walls adjacent to a unit 20 feet (6 meters) or less will reflect sound outwards, increasing the sound pressure on the side away from the wall. This sound increase could be as high as 3 dB for one wall and as high as 6 dB for a corner location. Unit orientation and/or distance as noted above will decrease sound levels.



Sound levels can also be controlled by the installation of barrier walls. To be effective as sound blockers, walls must be solid with no open penetrations. Sound tends to leak out of openings. Block walls with filler material and slots on the side facing the unit are especially effective. The wall should be about 10 feet (3 meters) high or 2 feet (0.6 meters) higher than the unit and located at least 10 feet (3 meters) away so as not to affect unit performance. A three-sided enclosure will be the most effective solution and will reduce sound levels by about 10 dB. Remember that the wall will *increase* the sound level on the side opposite it by 3 to 6 dB (one or three-sided wall).

Note: The effect of adjacent walls on air recirculation and restriction must always be considered when using sound barrier walls.

Electrical Data

Field Wiring

General

Wiring must comply with all applicable codes and ordinances. Warranty does not cover damage to the equipment caused by wiring not complying with specifications.

An open fuse indicates a short, ground, or overload. Before replacing a fuse or restarting a compressor or fan motor, the trouble must be found and corrected.

Copper wire is required for all power lead terminations at the unit, and copper must be used for all other wiring to the unit.

AGS units can be ordered with main power wiring for either multiple-point power (standard) or single-point connection (optional).

If the standard multiple-point power wiring is ordered, two separate power connections are made to power blocks (or optional circuit breaker disconnects) in power panel. See the dimension drawings beginning on page 45 for entry locations. Separate disconnects are required for each electrical circuit if the McQuay optional factory-mounted disconnects are not ordered.

If the optional single-point power connection is ordered, a single power connection is made to a power block (or optional circuit breaker disconnect) in the unit power panel. A separate disconnect is required if the McQuay optional factory-mounted disconnect is not ordered. Isolation circuit breakers for each circuit are included.

It can be desirable to have the unit evaporator heaters on a separate disconnect switch from the main unit power supply so that the unit power can be shut down without defeating the freeze protection provided by the evaporator heaters. See the field wiring diagram on page 41 for connection details.

The 115-volt control transformer is factory mounted and wired.

⚠ CAUTION

If a separate disconnect is used for the 115V supply to the unit, it must power the entire control circuit, not just the evaporator heaters. It must be clearly marked so that it is not accidentally shut off during cold seasons. Freeze damage to the evaporator could result. If the evaporator is drained for winter freeze protection, the heaters must be *de-energized* to prevent heater burnout.

⚠ CAUTION

AGS unit compressors are single-direction rotation compressors and can be damaged if rotated in the wrong direction. For this reason, proper phasing of electrical power is important. Electrical phasing must be A, B, C for electrical phases 1, 2 and 3 (A=L1, B=L2, C=L3) for single or multiple point wiring arrangements. The solid-state starters contain phase reversal protection. DO NOT ALTER THE WIRING TO THE STARTERS.

Table 18, AGS 120C – AGS 210C, Electrical Data, Single-Point

AGS UNIT SIZE	VOLTS	HZ	MINIMUM CIRCUIT AMPACITY (MCA)	POWER SUPPLY (NOTE 1) FIELD WIRE	FIELD FUSE SIZE or HACR BREAKER SIZE	
					RECOM-MENDED	MAXIMUM
120C	208	60	581	(2) 350 MCM	700	800
	230		526	(2) 300 MCM	600	700
	380		320	400 MCM	400	400
	460		279	300 MCM	350	350
	575		211	4/0 AWG	250	250
125C	208	60	595	(2) 350 MCM	700	800
	230		539	(2) 300 MCM	600	700
	380		328	400 MCM	400	450
	460		285	300 MCM	350	350
	575		216	4/0 AWG	250	300
130C	208	60	625	(2) 300 MCM	700	800
	230		563	(2) 300 MCM	700	800
	380		342	400 MCM	400	450
	460		291	350 MCM	350	400
	575		222	4/0 AWG	250	300
135C	208	60	639	(2) 400 MCM	800	800
	230		576	(2) 350 MCM	700	800
	380		350	400 MCM	400	450
	460		298	350 MCM	350	400
	575		227	4/0 AWG	250	300
140C	208	60	660	(2) 400 MCM	800	800
	230		593	(2) 350 MCM	700	800
	380		359	2-250 MCM	400	500
	460		301	350 MCM	350	400
	575		231	250 MCM	300	300
145C	208	60	674	(2) 400 MCM	800	800
	230		606	(2) 350 MCM	700	800
	380		367	2-250 MCM	450	500
	460		308	350 MCM	350	400
	575		236	250 MCM	300	300
160C	208	60	716	(2) 2-250 MCM	800	1000
	230		646	(2) 400 MCM	800	800
	380		400	2-250 MCM	450	500
	460		325	400 MCM	400	450
	575		255	250 MCM	300	350
165C	208	60	745	(2) 2-250 MCM	1000	1000
	230		672	(2) 400 MCM	800	800
	380		416	2-300 MCM	500	500
	460		338	400 MCM	400	450
	575		265	300 MCM	300	350
170C	208	60	775	(2) 2-250 MCM	1000	1000
	230		701	(2) 400 MCM	800	800
	380		441	2-300 MCM	500	600
	460		351	400 MCM	400	450
	575		279	300 MCM	350	350
175C	208	60	790	(2) 2-250 MCM	1000	1000
	230		714	(2) 2-250 MCM	800	800
	380		449	2-300 MCM	500	600
	460		357	2-250 MCM	400	450
	575		284	300 MCM	350	350

Continued on next page.

AGS UNIT SIZE	VOLTS	HZ	MINIMUM CIRCUIT AMPACITY (MCA)	POWER SUPPLY (NOTE 1) FIELD WIRE	FIELD FUSE SIZE or HACR BREAKER SIZE	
					RECOM-MENDED	MAXIMUM
180C	208	60	853	(2) 2-300 MCM	1000	1000
	230		772	(2) 2-250 MCM	1000	1000
	380		469	(2)-250 MCM	600	600
	460		380	2-250 MCM	450	500
	575		301	350 MCM	350	400
190C	208	60	853	(2) 2-300 MCM	1000	1000
	230		772	(2) 2-250 MCM	1000	1000
	380		469	(2)-250 MCM	600	600
	460		380	2-250 MCM	450	500
	575		301	350 MCM	350	400
195C	208	60	871	(2) 2-300 MCM	1000	1000
	230		788	(2) 2-250 MCM	1000	1000
	380		479	(2)-250 MCM	600	600
	460		387	2-250 MCM	450	500
	575		306	350 MCM	350	400
210C	208	60	897	(2) 2-300 MCM	1000	1200
	230		812	(2) 2-250 MCM	1000	1000
	380		493	(2)-250 MCM	600	600
	460		396	2-250 MCM	450	500
	575		313	400 MCM	350	400

Notes

1. See Note 1 on page 40 for explanation of wiring nomenclature.
2. Table based on 75°C field wire.
3. A “HACR” breaker is a circuit breaker designed for use on equipment with multiple motors. It stands for Heating, Air Conditioning, Refrigeration.
4. Complete notes are on page 40.

Table 19, AGS 120C – AGS 210C, Electrical Data, Multiple-Point

AGS UNIT SIZE	VOLTS	HZ	ELECTRICAL CIRCUIT 1 (COMP 1)				ELECTRICAL CIRCUIT 2 (COMP 2)			
			MINIMUM CIRCUIT AMPS (MCA)	POWER SUPPLY	FIELD FUSING		MINIMUM CIRCUIT AMPS (MCA)	POWER SUPPLY	FIELD FUSING	
				FIELD WIRE	REC FUSE SIZE	MAX FUSE SIZE		FIELD WIRE	REC FUSE SIZE	MAX FUSE SIZE
120	208	60	320	400 MCM	400	500	320	400 MCM	400	500
	230		289	350 MCM	350	450	289	350 MCM	350	450
	380		176	3/0 AWG	225	300	176	3/0 AWG	225	300
	460		154	2/0 AWG	200	250	154	2/0 AWG	200	250
	575		116	1 AWG	150	200	116	1 AWG	150	200
125	208	60	327	400 MCM	400	500	327	400 MCM	400	500
	230		296	350 MCM	350	450	296	350 MCM	350	450
	380		180	3/0 AWG	225	300	180	3/0 AWG	225	300
	460		157	2/0 AWG	200	250	157	2/0 AWG	200	250
	575		119	1 AWG	150	200	119	1 AWG	150	200
130	208	60	320	400 MCM	400	500	363	2-250 MCM	450	600
	230		289	350 MCM	350	450	327	400 MCM	400	500
	380		176	3/0 AWG	225	300	198	3/0 AWG	250	300
	460		154	2/0 AWG	200	250	166	2/0 AWG	200	250
	575		116	1 AWG	150	200	128	1 AWG	175	200
135	208	60	327	400 MCM	400	500	371	2-250 MCM	450	600
	230		296	350 MCM	350	450	333	400 MCM	400	500
	380		180	3/0 AWG	225	300	202	4/0 AWG	250	300
	460		157	2/0 AWG	200	250	169	2/0 AWG	200	250
	575		119	1 AWG	150	200	130	1 AWG	175	200
140	208	60	363	2-250 MCM	450	600	363	2-250 MCM	450	600
	230		327	400 MCM	400	500	327	400 MCM	400	500
	380		198	3/0 AWG	250	300	198	3/0 AWG	250	300
	460		166	2/0 AWG	200	250	166	2/0 AWG	200	250
	575		128	1 AWG	175	200	128	1 AWG	175	200

Continued on next page.

AGS UNIT SIZE	VOLTS	HZ	ELECTRICAL CIRCUIT 1 (COMP 1)				ELECTRICAL CIRCUIT 2 (COMP 2)			
			MINIMUM CIRCUIT AMPS (MCA)	POWER SUPPLY	FIELD FUSING		MINIMUM CIRCUIT AMPS (MCA)	POWER SUPPLY	FIELD FUSING	
				FIELD WIRE	REC FUSE SIZE	MAX FUSE SIZE		FIELD WIRE	REC FUSE SIZE	MAX FUSE SIZE
145	208	60	371	2-250 MCM	450	600	371	2-250 MCM	450	600
	230		333	400 MCM	400	500	333	400 MCM	400	500
	380		202	4/0 AWG	250	300	202	4/0 AWG	250	300
	460		169	2/0 AWG	200	250	169	2/0 AWG	200	250
	575		130	1 AWG	175	200	130	1 AWG	175	200
160	208	60	363	2-250 MCM	450	600	420	2-300 MCM	500	700
	230		327	400 MCM	400	500	379	2-250 MCM	450	600
	380		198	3/0 AWG	250	300	239	250 MCM	300	400
	460		166	2/0 AWG	200	250	190	3/0 AWG	250	300
	575		128	1 AWG	175	200	151	2/0 AWG	200	250
165	208	60	378	2-250 MCM	450	600	434	2-300 MCM	450	600
	230		340	400 MCM	400	500	393	2-250 MCM	400	500
	380		206	4/0 AWG	250	350	247	250 MCM	250	350
	460		173	2/0 AWG	225	250	197	3/0 AWG	225	250
	575		132	1/0 AWG	175	225	156	2/0 AWG	175	225
170	208	60	427	2-300 MCM	600	700	427	2-300 MCM	600	700
	230		386	2-250 MCM	500	600	386	2-250 MCM	500	600
	380		243	250 MCM	300	400	243	250 MCM	300	400
	460		193	3/0 AWG	250	300	193	3/0 AWG	250	300
	575		154	2/0 AWG	200	250	154	2/0 AWG	200	250
175	208	60	434	2-300 MCM	600	700	434	2-300 MCM	600	700
	230		393	2-250 MCM	500	600	393	2-250 MCM	500	600
	380		247	250 MCM	300	400	247	250 MCM	300	400
	460		197	3/0 AWG	250	300	197	3/0 AWG	250	300
	575		156	2/0 AWG	200	250	156	2/0 AWG	200	250
180	208	60	469	(2) 250 MCM	600	800	469	(2) 250 MCM	600	800
	230		425	2-300 MCM	500	700	425	2-300 MCM	500	700
	380		258	300 MCM	350	400	258	300 MCM	350	400
	460		209	4/0 AWG	250	350	209	4/0 AWG	250	350
	575		166	2/0 AWG	200	250	166	2/0 AWG	200	250
190	208	60	469	(2) 250 MCM	600	800	469	(2) 250 MCM	600	800
	230		425	2-300 MCM	500	700	425	2-300 MCM	500	700
	380		258	300 MCM	350	400	258	300 MCM	350	400
	460		209	4/0 AWG	250	350	209	4/0 AWG	250	350
	575		166	2/0 AWG	200	250	166	2/0 AWG	200	250
195	208	60	478	(2) 250 MCM	600	800	478	(2) 250 MCM	600	800
	230		433	2-300 MCM	600	700	433	2-300 MCM	600	700
	380		263	300 MCM	350	400	263	300 MCM	350	400
	460		213	4/0 AWG	300	350	213	4/0 AWG	300	350
	575		169	2/0 AWG	200	250	169	2/0 AWG	200	250
210	208	60	491	(2) 250 MCM	600	800	491	(2) 250 MCM	600	800
	230		445	2-300 MCM	600	700	445	2-300 MCM	600	700
	380		270	300 MCM	350	450	270	300 MCM	350	450
	460		218	4/0 AWG	300	350	218	4/0 AWG	300	350
	575		172	2/0 AWG	225	250	172	2/0 AWG	225	250

Notes

1. See Note 1 on page 40 for explanation of wiring nomenclature.
2. Table based on 75°C field wire.
3. A “HACR” breaker is a circuit breaker designed for use on equipment with multiple motors. It stands for Heating, Air Conditioning, Refrigeration.
4. Complete notes are on page 40.

Table 20, AGS 120C – AGS 210C, Compressor and Condenser Fan Motor Amp Draw

AGS UNIT SIZE	VOLTS	HZ	RATED LOAD AMPS		FAN MOTORS FLA (EACH)	NO OF FAN MOTORS	L R A FAN MOTORS (EACH)
			CIRCUIT #1	CIRCUIT #2			
120	208	60	232	232	7.3	8	40.0
	230		210	210	6.6	8	40.0
	380		128	128	4.0	8	20.0
	460		112	112	3.3	8	20.0
	575		85	85	2.4	8	12.8
125	208	60	232	232	7.3	10	40.0
	230		210	210	6.6	10	40.0
	380		128	128	4.0	10	20.0
	460		112	112	3.3	10	20.0
	575		85	85	2.4	10	12.8
130	208	60	232	267	7.3	8	40.0
	230		210	240	6.6	8	40.0
	380		128	145	4.0	8	20.0
	460		112	122	3.3	8	20.0
	575		85	94	2.4	8	12.8
135	208	60	232	267	7.3	10	40.0
	230		210	240	6.6	10	40.0
	380		128	145	4.0	10	20.0
	460		112	122	3.3	10	20.0
	575		85	94	2.4	10	12.8
140	208	60	267	267	7.3	8	40.0
	230		240	240	6.6	8	40.0
	380		145	145	4.0	8	20.0
	460		122	122	3.3	8	20.0
	575		94	94	2.4	8	12.8
145	208	60	267	267	7.3	10	40.0
	230		240	240	6.6	10	40.0
	380		145	145	4.0	10	20.0
	460		122	122	3.3	10	20.0
	575		94	94	2.4	10	12.8
160	208	60	267	312	7.3	8	40.0
	230		240	282	6.6	8	40.0
	380		145	178	4.0	8	20.0
	460		122	141	3.3	8	20.0
	575		94	113	2.4	8	12.8
165	208	60	267	312	7.3	12	40.0
	230		240	282	6.6	12	40.0
	380		145	178	4.0	12	20.0
	460		122	141	3.3	12	20.0
	575		94	113	2.4	12	12.8
170	208	60	312	312	7.3	10	40.0
	230		282	282	6.6	10	40.0
	380		178	178	4.0	10	20.0
	460		141	141	3.3	10	20.0
	575		113	113	2.4	10	12.8
175	208	60	312	312	7.3	12	40.0
	230		282	282	6.6	12	40.0
	380		178	178	4.0	12	20.0
	460		141	141	3.3	12	20.0
	575		113	113	2.4	12	12.8
180	208	60	340	340	7.3	10	40.0
	230		308	308	6.6	10	40.0
	380		187	187	4.0	10	20.0
	460		154	154	3.3	10	20.0
	575		123	123	2.4	10	12.8

Continued on next page.

AGS UNIT SIZE	VOLTS	HZ	RATED LOAD AMPS		FAN MOTORS FLA (EACH)	NO OF FAN MOTORS	L R A FAN MOTORS (EACH)
			CIRCUIT #1	CIRCUIT #2			
190	208	60	340	340	7.3	10	40.0
	230		308	308	6.6	10	40.0
	380		187	187	4.0	10	20.0
	460		154	154	3.3	10	20.0
	575		123	123	2.4	10	12.8
195	208	60	340	340	7.3	12	40.0
	230		308	308	6.6	12	40.0
	380		187	187	4.0	12	20.0
	460		154	154	3.3	12	20.0
	575		123	123	2.4	12	12.8
210	208	60	340	340	11.0	12	46.0
	230		308	308	9.9	12	46.0
	380		187	187	6.0	12	25.0
	460		154	154	4.1	12	23.0
	575		123	123	3.0	12	20.0

NOTES:
1. Table based on 75°C field wire.
2. Complete notes are on page 40.

Table 21, AGS 120C – AGS 210C, Customer Wiring Information With Single-Point Power

AGS UNIT SIZE	VOLTS	HZ	WIRING TO STANDARD UNIT POWER BLOCK		WIRING TO OPTIONAL NONFUSED MOLDED CASE SWITCH IN UNIT	
			TERMINAL SIZE AMPS	CONNECTOR WIRE RANGE PER PHASE (COPPER WIRE ONLY)	SIZE	CONNECTOR WIRE RANGE PER PHASE (COPPER WIRE ONLY)
120	208	60	800	1/0 – 750 MCM (4/C)	800	1/0 – 500 MCM (3/C)
	230		800	1/0 – 750 MCM (4/C)	800	1/0 – 500 MCM (3/C)
	380		400	#6 – 350 MCM (2/c)	400	3/0 – 500 MCM (2/C)
	460		400	#6 – 350 MCM (2/c)	400	3/0 – 500 MCM (2/C)
	575		400	#6 – 350 MCM (2/c)	250	#6 – 350 MCM (1/C)
125	208	60	800	1/0 – 750 MCM (4/C)	800	1/0 – 500 MCM (3/C)
	230		800	1/0 – 750 MCM (4/C)	800	1/0 – 500 MCM (3/C)
	380		400	#6 – 350 MCM (2/C)	400	3/0 – 500 MCM (2/C)
	460		400	#6 – 350 MCM (2/C)	400	3/0 – 500 MCM (2/C)
	575		400	#6 – 350 MCM (2/C)	250	#6 – 350 MCM (1/C)
130	208	60	800	1/0 – 750 MCM (4/C)	800	1/0 – 500 MCM (3/C)
	230		800	1/0 – 750 MCM (4/C)	800	1/0 – 500 MCM (3/C)
	380		400	#6 – 350 MCM (2/C)	400	3/0 – 500 MCM (2/C)
	460		400	#6 – 350 MCM (2/C)	400	3/0 – 500 MCM (2/C)
	575		400	#6 – 350 MCM (2/C)	250	#6 – 350 MCM (1/C)
135	208	60	800	1/0 – 750 MCM (4/C)	800	1/0 – 500 MCM (3/C)
	230		800	1/0 – 750 MCM (4/C)	800	1/0 – 500 MCM (3/C)
	380		400	#6 – 350 MCM (2/C)	400	3/0 – 500 MCM (2/C)
	460		400	#6 – 350 MCM (2/C)	400	3/0 – 500 MCM (2/C)
	575		400	#6 – 350 MCM (2/C)	250	#6 – 350 MCM (1/C)
140	208	60	800	1/0 – 750 MCM (4/C)	800	1/0 – 500 MCM (3/C)
	230		800	1/0 – 750 MCM (4/C)	800	1/0 – 500 MCM (3/C)
	380		400	#6 – 350 MCM (2/C)	400	3/0 – 500 MCM (2/C)
	460		400	#6 – 350 MCM (2/C)	400	3/0 – 500 MCM (2/C)
	575		400	#6 – 350 MCM (2/C)	250	#6 – 350 MCM (1/C)
145	208	60	800	1/0 – 750 MCM (4/C)	800	1/0 – 500 MCM (3/C)
	230		800	1/0 – 750 MCM (4/C)	800	1/0 – 500 MCM (3/C)
	380		400	#6 – 350 MCM (2/C)	400	3/0 – 500 MCM (2/C)
	460		400	#6 – 350 MCM (2/C)	400	3/0 – 500 MCM (2/C)
	575		400	#6 – 350 MCM (2/C)	250	#6 – 350 MCM (1/C)

Continued on next page.

AGS UNIT SIZE	VOLTS	HZ	WIRING TO STANDARD UNIT POWER BLOCK		WIRING TO OPTIONAL NONFUSED MOLDED CASE SWITCH IN UNIT	
			TERMINAL SIZE AMPS	CONNECTOR WIRE RANGE PER PHASE (COPPER WIRE ONLY)	SIZE AMPS	CONNECTOR WIRE RANGE PER PHASE (COPPER WIRE ONLY)
160	208	60	800	1/0 – 750 MCM (4/C)	800	1/0 – 500 MCM (3/C)
	230		800	1/0 – 750 MCM (4/C)	800	1/0 – 500 MCM (3/C)
	380		800	1/0 – 750 MCM (4/C)	600	3/0 – 500 MCM (2/C)
	460		400	#6 – 350 MCM (2/C)	600	3/0 – 500 MCM (2/C)
	575		400	#6 – 350 MCM (2/C)	600	3/0 – 500 MCM (2/C)
165	208	60	800	1/0 – 750 MCM (4/C)	800	1/0 – 500 MCM (3/C)
	230		800	1/0 – 750 MCM (4/C)	800	1/0 – 500 MCM (3/C)
	380		800	1/0 – 750 MCM (4/C)	600	3/0 – 500 MCM (2/C)
	460		400	#6 – 350 MCM (2/C)	600	3/0 – 500 MCM (2/C)
	575		400	#6 – 350 MCM (2/C)	600	3/0 – 500 MCM (2/C)
170	208	60	1000	1/0 – 750 MCM (4/C)	1200	250 – 500 MCM (4/C)
	230		800	1/0 – 750 MCM (4/C)	800	1/0 – 800 MCM (2/C)
	380		800	1/0 – 750 MCM (4/C)	600	3/0 – 500 MCM (2/C)
	460		400	#6 – 350 MCM (2/C)	600	3/0 – 500 MCM (2/C)
	575		400	#6 – 350 MCM (2/C)	400	3/0 – 500 MCM (2/C)
175	208	60	1000	1/0 – 750 MCM (4/C)	1200	250 – 500 MCM (4/C)
	230		800	1/0 – 750 MCM (4/C)	800	1/0 – 800 MCM (2/C)
	380		800	1/0 – 750 MCM (4/C)	600	3/0 – 500 MCM (2/C)
	460		400	#6 – 350 MCM (2/C)	600	3/0 – 500 MCM (2/C)
	575		400	#6 – 350 MCM (2/C)	400	3/0 – 500 MCM (2/C)
180	208	60	1000	1/0 – 750 MCM (4/C)	1200	250 – 500 MCM (4/C)
	230		1000	1/0 – 750 MCM (4/C)	1200	250 – 500 MCM (4/C)
	380		800	1/0 – 750 MCM (4/C)	600	3/0 – 500 MCM (2/C)
	460		400	#6 – 350 MCM (2/C)	600	3/0 – 500 MCM (2/C)
	575		400	#6 – 350 MCM (2/C)	400	3/0 – 500 MCM (2/C)
190	208	60	1000	1/0 – 750 MCM (4/C)	1200	250 – 500 MCM (4/C)
	230		1000	1/0 – 750 MCM (4/C)	1200	250 – 500 MCM (4/C)
	380		800	1/0 – 750 MCM (4/C)	600	3/0 – 500 MCM (2/C)
	460		400	#6 – 350 MCM (2/C)	600	3/0 – 500 MCM (2/C)
	575		400	#6 – 350 MCM (2/C)	400	3/0 – 500 MCM (2/C)
195	208	60	1000	1/0 – 750 MCM (4/C)	1200	250 – 500 MCM (4/C)
	230		1000	1/0 – 750 MCM (4/C)	1200	250 – 500 MCM (4/C)
	380		800	1/0 – 750 MCM (4/C)	600	3/0 – 500 MCM (2/C)
	460		400	#6 – 350 MCM (2/C)	600	3/0 – 500 MCM (2/C)
	575		400	#6 – 350 MCM (2/C)	400	3/0 – 500 MCM (2/C)
210	208	60	1000	1/0 – 750 MCM (4/C)	1200	250 – 500 MCM (4/C)
	230		1000	1/0 – 750 MCM (4/C)	1200	250 – 500 MCM (4/C)
	380		800	1/0 – 750 MCM (4/C)	600	3/0 – 500 MCM (2/C)
	460		400	#6 – 350 MCM (2/C)	600	3/0 – 500 MCM (2/C)
	575		400	#6 – 350 MCM (2/C)	400	3/0 – 500 MCM (2/C)

NOTES:
1. Terminal size amps are the maximum amps that the power block is rated for.
2. Complete notes are on page 40.
3. Data based on 75°C wire.
4. (2/C) notation means two cables per conduit.

Table 22, AGS 120C – 210C, Wiring with Multiple-Point Power Without Disconnect

AGS UNIT SIZE	VOLTS	HZ	WIRING TO UNIT POWER BLOCK			
			TERMINAL SIZE (AMPS)		CONNECTOR WIRE RANGE PER PHASE (COPPER WIRE ONLY)	
			CKT 1	CKT 2	CKT 1	CKT 2
120	208	60	400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	230		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	380		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	460		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	575		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
125	208	60	400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	230		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	380		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	460		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	575		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
130	208	60	400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	230		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	380		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	460		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	575		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
135	208	60	400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	230		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	380		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	460		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	575		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
140	208	60	400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	230		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	380		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	460		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	575		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
145	208	60	400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	230		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	380		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	460		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	575		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
160	208	60	400	800	#6 – 350 MCM (2/C)	1/0 – 750 MCM (4/C)
	230		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	380		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	460		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	575		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
165	208	60	400	800	#6 – 350 MCM (2/C)	1/0 – 750 MCM (4/C)
	230		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	380		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	460		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	575		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
170	208	60	800	800	1/0 – 750 MCM (4/C)	1/0 – 750 MCM (4/C)
	230		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	380		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	460		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	575		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
175	208	60	800	800	1/0 – 750 MCM (4/C)	1/0 – 750 MCM (4/C)
	230		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	380		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	460		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	575		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
180	208	60	800	800	1/0 – 750 MCM (4/C)	1/0 – 750 MCM (4/C)
	230		800	800	1/0 – 750 MCM (4/C)	1/0 – 750 MCM (4/C)
	380		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	460		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	575		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)

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AGS UNIT SIZE	VOLTS	HZ	WIRING TO UNIT POWER BLOCK			
			TERMINAL SIZE (AMPS)		CONNECTOR WIRE RANGE PER PHASE (COPPER WIRE ONLY)	
			CKT 1	CKT 2	CKT 1	CKT 2
190	208	60	800	800	1/0 – 750 MCM (4/C)	1/0 – 750 MCM (4/C)
	230		800	800	1/0 – 750 MCM (4/C)	1/0 – 750 MCM (4/C)
	380		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	460		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	575		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
195	208	60	800	800	1/0 – 750 MCM (4/C)	1/0 – 750 MCM (4/C)
	230		800	800	1/0 – 750 MCM (4/C)	1/0 – 750 MCM (4/C)
	380		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	460		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	575		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
210	208	60	800	800	1/0 – 750 MCM (4/C)	1/0 – 750 MCM (4/C)
	230		800	800	1/0 – 750 MCM (4/C)	1/0 – 750 MCM (4/C)
	380		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	460		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)
	575		400	400	#6 – 350 MCM (2/C)	#6 – 350 MCM (2/C)

NOTES:
1. Terminal size amps are the maximum amps that the power block is rated for.
2. See Table 23 for multiple point with Disconnect Switch connections.
3. Data based on 75°C wire.
4. (2/C) notation means two cables per conduit.
5. Complete notes are on page 40.

Table 23, AGS 120C – 210C, Wiring with Multiple-Point Power with Disconnect Switch

AGS UNIT SIZE	VOLTS	HZ	WIRING TO UNIT DISCONNECT SWITCH (MOLDED CASE SWITCH)			
			TERMINAL SIZE (AMPS)		CONNECTOR WIRE RANGE PER PHASE (COPPER WIRE ONLY)	
			CKT 1	CKT 2	CKT 1	CKT 2
120	208	60	400	400	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	230		400	400	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	380		250	250	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
	460		250	250	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
	575		150	150	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
125	208	60	400	400	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	230		400	400	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	380		250	250	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
	460		250	250	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
	575		150	150	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
130	208	60	400	400	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	230		400	400	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	380		250	250	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
	460		250	250	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
	575		150	150	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
135	208	60	400	400	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	230		400	400	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	380		250	250	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
	460		250	250	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
	575		150	150	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
140	208	60	400	400	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	230		400	400	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	380		250	250	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
	460		250	250	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
	575		150	150	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
145	208	60	400	400	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	230		400	400	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	380		250	250	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
	460		250	250	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
	575		150	150	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)

Continued on next page.

AGS UNIT SIZE	VOLTS	HZ	WIRING TO UNIT DISCONNECT SWITCH			
			TERMINAL SIZE (AMPS)		CONNECTOR WIRE RANGE PER PHASE (COPPER WIRE ONLY)	
			CKT 1	CKT 2	CKT 1	CKT 2
160	208	60	400	400	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	230		400	600	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	380		250	400	#6 – 350 MCM (1/C)	3/0 – 500 MCM (2/C)
	460		250	250	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
	575		150	150	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
165	208	60	400	400	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	230		400	600	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	380		250	400	#6 – 350 MCM (1/C)	3/0 – 500 MCM (2/C)
	460		250	250	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
	575		150	150	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
170	208	60	600	600	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	230		600	600	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	380		400	400	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	460		250	250	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
	575		250	250	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
175	208	60	600	600	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	230		600	600	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	380		400	400	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	460		250	250	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
	575		250	250	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
180	208	60	600	600	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	230		600	600	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	380		400	400	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	460		250	250	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
	575		250	250	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
190	208	60	600	600	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	230		600	600	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	380		400	400	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	460		250	250	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
	575		250	250	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
195	208	60	600	600	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	230		600	600	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	380		400	400	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	460		250	250	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
	575		250	250	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
210	208	60	600	600	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	230		600	600	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	380		400	400	3/0 – 500 MCM (2/C)	3/0 – 500 MCM (2/C)
	460		250	250	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)
	575		250	250	#6 – 350 MCM (1/C)	#6 – 350 MCM (1/C)

NOTES:
1. Terminal size amps are the maximum amps that the disconnect switch is rated for.
2. Data based on 75°C wire.
3. (2/C) notation means two cables per conduit.
4. Complete notes are on page 40.

Electrical Data Notes

1. Explanation of field wiring designation:

Designation	Total Wires	Total Conduits
350 MCM	3	1
2-250 MCM	6	1
(2) 250 MCM	6	2
(2) 2-300 MCM	12	2

NOTE: Wire size shown is for illustrative purposes only.

2. Allowable voltage limits:
   Unit nameplate 208V/60Hz/3PH: 187V to 229V
   Unit nameplate 230V/60Hz/3Ph: 207V to 253V
   Unit nameplate 380V/60Hz/3Ph: 342V to 418V
   Unit nameplate 460V/60Hz/3Ph: 414V to 506V
   Unit nameplate 575V/60Hz/3Ph: 517V to 633V

   NOTE: Voltage unbalance not to exceed 2% with a resultant current unbalance of 6 to 10 times the voltage unbalance per NEMA MG-1, 1998 Standard.
3. Unit wire size ampacity (MCA) is equal to 125% of the largest compressor-motor RLA plus 100% of RLA of all other loads in the circuit including control transformer. Wire size ampacity for separate 115V control circuit power is 15 amps.
4. Compressor RLA values are for wire sizing purposes only, but do reflect normal operating current draw at unit rated capacity.
5. Single point power supply requires a single disconnect to supply electrical power to the unit. This power must be fused.
6. Multiple point power supply requires two independent power circuits.
7. All field wiring to unit power block or optional nonfused disconnect switch must be copper.
8. Field wire size values given in tables apply to 75°C rated wire per NEC.
9. External disconnect switch(s) or HACR breakers must be field supplied. **Note**: On single point power units, a non-fused disconnect switch in the panel is available as an option.
10. All wiring must be done in accordance with applicable local and national codes.
11. Recommended time delay fuse size or HACR breakers is equal to 150% of the largest compressor motor RLA plus 100% of remaining compressor RLAs and the sum of condenser fan FLAs.
12. Maximum time delay fuse size or HACR breakers is equal to 225% of the largest compressor-motor RLA plus 100% of remaining compressor RLAs and the sum of condenser fan FLAs.

Power Limitations:

1. Voltage within ± 10 percent of nameplate rating.
2. Voltage unbalance not to exceed 2% with a resultant current unbalance of 6 to 10 times the voltage unbalance per NEMA MG-1, 1998 Standard.

Optional Protocol Selectability Connection for BAS

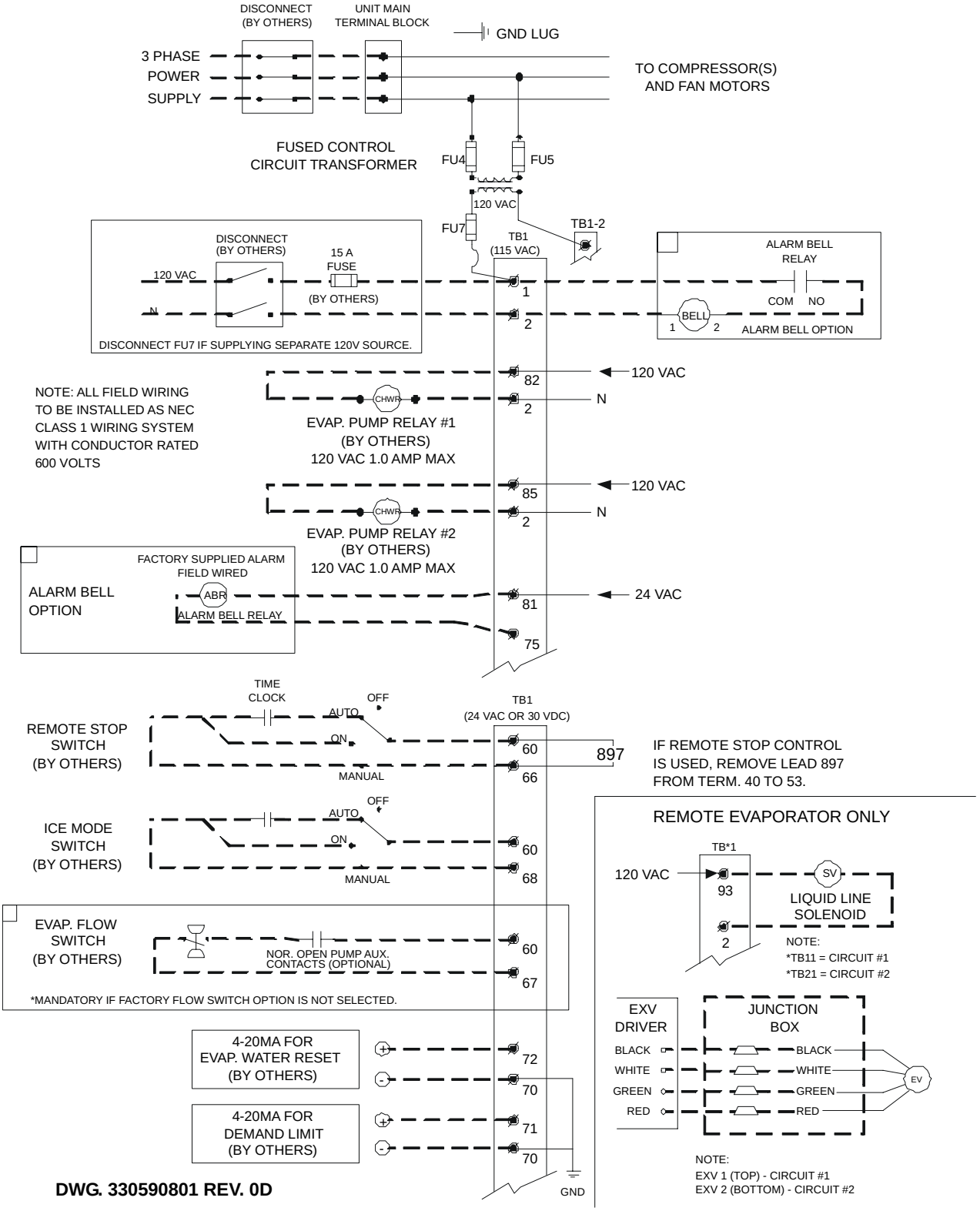
The locations and interconnection requirements for the various standard protocols are found in their respective installation manuals, obtainable from the local McQuay sales office and also shipped with each unit.

Modbus IM 743 LONWORKS IM 735 BACnet IM 736

Field Wiring Diagram

Figure 9, Typical Field Wiring Diagram

(Optional Single-point Power Connection to a Power Block Shown)



DWG. 330590801 REV. 0D

Physical Data, Standard Efficiency

Table 24, Physical Data, AGS 120CS – AGS 140CS

DATA	AGS MODEL NUMBER					
	120CS		130CS		140CS	
	Ckt 1	Ckt 2	Ckt 1	Ckt 2	Ckt 1	Ckt 2
BASIC DATA						
Unit Cap. @ 44°F LWT, 95°F Ambient Temperature kW, (tons)	116.7 (410)		125.2 (440)		133.7 (470)	
Unit Operating Charge lbs (kg)	131 (59)	131 (59)	131 (59)	131 (59)	131 (59)	131 (59)
Cabinet Dimensions L x W x H, in. (mm)	187 x 89 x 101 (4750 x 2261 x 2565)		187 x 89 x 101 (4750 x 2261 x 2565)		187 x 89 x 101 (4750 x 2261 x 2565)	
Unit Operating Weight, lbs. (kg)	9452 (4291)		9452 (4291)		9452 (4291)	
Unit Shipping Weight, lbs (kg)	9020 (4095)		9020 (4095)		9020 (4095)	
Economizer	No		No		No	
COMPRESSORS, SCREW, SEMI-HERMETIC						
Nominal Capacity, tons (kW)	60 (211)	60 (211)	60 (211)	70 (246)	70 (246)	70 (246)
CONDENSERS, HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLER						
Pumpdown Capacity, lbs (kg)	197 (89)	197 (89)	197 (89)	197 (89)	164 (74)	164 (74)
CONDENSER FANS, DIRECT DRIVE PROPELLER TYPE						
No. of Fans – 30 in. Fan Dia.	8		8		8	
No. of Motors -- hp (kW)	8 2 (1.5)		8 2 (1.5)		8 2 (1.5)	
Fan & Motor RPM, 60Hz	1140		1140		1140	
60 Hz Fan Tip Speed, fpm (m/s)	8950 (4224)		8950 (4224)		8950 (4224)	
60 Hz Total Unit Airflow, cfm (l/s)	86900 (41020)		86900 (41020)		86900 (41020)	
EVAPORATOR, DIRECT EXPANSION SHELL AND TUBE						
Shell Dia.-Tube Length in.(mm) - in. (mm)	15.5 x 82.4 (394 x 2093)		15.5 x 82.4 (394 x 2093)		15.5 x 82.4 (394 x 2093)	
Evaporator R-134a Charge lbs (kg)	1.95 (0.9)	1.95 (0.9)	1.95 (0.9)	1.95 (0.9)	1.95 (0.9)	1.95 (0.9)
Water Volume, gallons (liters)	49 (185)		49 (185)		49 (185)	
Max. Water Pressure, psi (kPa)	152 (1048)		152 (1048)		152 (1048)	
Max. Refrigerant Press., psi (kPa)	352 (2427)		352 (2427)		352 (2427)	

Table 25, Physical Data, AGS 160CS – AGS 180CS

DATA	AGS MODEL NUMBER					
	160CS		170CS		180CS	
	Ckt. 1	Ckt. 2	Ckt. 1	Ckt. 2	Ckt. 1	Ckt. 2
BASIC DATA						
Unit Cap. @ 44°F LWT, 95°F Ambient Temperature kW, (tons)	151.4 (532)		168.1 (591)		179.6 (631)	
Unit Operating Charge, lbs (kg)	131 (59)	131 (59)	159 (72)	159 (72)	171 (78)	171 (78)
Cabinet Dim., L x W x H, in. (mm)	187 x 89 x 101 4750 x 2261 x 2565		225 x 89 x 101 5715 x 2261 x 2565		225 x 89 x 101 5715 x 2261 x 2565	
Unit Operating Weight, lbs. (kg)	10209 (4635)		11277 (5120)		11277 (5120)	
Unit Shipping Weight, lbs (kg)	9484 (4306)		10552 (4791)		10552 (4791)	
Economizer	No		No		Yes	
COMPRESSORS, SCREW, SEMI-HERMETIC						
Nominal Capacity, tons (kW)	70 (246)	85 (299)	85 (299)	85 (299)	95 (334)	95 (334)
CONDENSERS, HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLER						
Pumpdown Capacity, lbs (kg)	197 (89)	197 (89)	247 (112)	247 (112)	247 (112)	247 (112)
CONDENSER FANS, DIRECT DRIVE PROPELLER TYPE						
No. of Fans; 30 in. Fan Dia.	8		10		10	
No. of Motors – hp (kW)	8 2 (1.5)		10 2 (1.5)		10 2 (1.5)	
Fan & Motor RPM, 60Hz	1140		1140		1140	
60 Hz Fan Tip Speed, fpm	8950 (4224)		8950 (4224)		8950 (4224)	
60 Hz Total Unit Airflow, cfm (l/s)	86900 (41020)		108630 (51280)		108630 (51280)	
EVAPORATOR, DIRECT EXPANSION SHELL AND TUBE						
Shell Dia.,Tube Length in.(mm)	19.4 x 82.4 (493 x 2093)		19.4 x 105.1 (493 x 2670)		19.4 x 105.1 (493 x 2670)	
Evaporator R-134a Charge lbs (kg)	2.53 (1.1)	2.53 (1.1)	3.16 (1.4)	3.16 (1.4)	3.16 (1.4)	3.16 (1.4)
Water Volume, gallons (liters)	83 (314)		106 (401)		106 (401)	
Max. Water Pressure, psi (kPa)	152 (1048)		152 (1048)		152 (1048)	
Max. Refrigerant Press., psi (kPa)	352 (2427)		352 (2427)		352 (2427)	

Table 26, Physical Data, AGS 190CS – AGS 210CS

DATA	AGS 190CS		AGS 210CS	
	Ckt 1	Ckt 2	Ckt 1	Ckt 2
BASIC DATA				
Unit Cap. @ 44°F LWT, 95°F Ambient Temperature kW, (tons)	185.6 (653)		201.2 (707)	
Unit Operating Charge lbs (kg)	172 (78)	172 (78)	201 (91)	201 (91)
Cabinet Dimensions L x W x H, in. (mm)	225 x 89 x 101 (5715 x 2261 x 2565)		263 x 89 x 101 (6680 x 2261 x 2565)	
Unit Operating Weight, lbs. (kg)	11277 (5120)		11928 (5415)	
Unit Shipping Weight, lbs (kg)	10552 (4791)		11011 (4999)	
Economizer	Yes		Yes	
COMPRESSORS, SCREW, SEMI-HERMETIC				
Nominal Capacity, tons (kW)	95 (334)	95 (334)	95 (334)	95 (334)
CONDENSERS, HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLER				
Pumpdown Capacity, lbs (kg)	247 (112)	247 (112)	296 (134)	296 (134)
CONDENSER FANS, DIRECT DRIVE PROPELLER TYPE				
No. of Fans -- 30 in. Fan Dia.	10		12	
No. of Motors -- hp (kW)	10 2 (1.5)		12 2.5 (1.9)	
Fan & Motor RPM, 60Hz	1140		1140	
60 Hz Fan Tip Speed, fpm (m/s)	8950 (4224)		8950 (4224)	
60 Hz Total Unit Airflow, cfm (l/s)	108630 (51280)		130360 (61530)	
EVAPORATOR, DIRECT EXPANSION SHELL AND TUBE				
Shell Dia.-Tube Length in.(mm) - in. (mm)	19.4 x 105.1 (493 x 2670)		19.4 x 105.1 (493 x 2670)	
Evaporator R-134a Charge lbs (kg)	3.63 (1.6)	3.63 (1.6)	3.63 (1.6)	3.63 (1.6)
Water Volume, gallons (liters)	106 (401)		104 (392)	
Max. Water Pressure, psi (kPa)	152 (1048)		152 (1048)	
Max. Refrigerant Press., psi (kPa)	352 (2427)		352 (2427)	

Physical Data, High Efficiency

Table 27, Physical Data, AGS 125CH– AGS 145CH

DATA	AGS MODEL NUMBER					
	125CH		135CH		145CH	
	Ckt 1	Ckt 2	Ckt 1	Ckt 2	Ckt 1	Ckt 2
BASIC DATA						
Unit Cap. @ 44°F LWT, 95°F Ambient Temperature kW, (tons)	121.6 (428)		130.9 (460)		143.0 (503)	
Unit Operating Charge lbs (kg)	159 (72)	159 (72)	159 (72)	159 (72)	159 (72)	159 (72)
Cabinet Dimensions L x W x H, in. (mm)	225 x 89 x 101 (5715 x 2261 x 2565)		225 x 89 x 101 (5715 x 2261 x 2565)		225 x 89 x 101 (5715 x 2261 x 2565)	
Unit Operating Weight, lbs. (kg)	10930 (4962)		10930 (4962)		10930 (4962)	
Unit Shipping Weight, lbs (kg)	10205 (4633)		10205 (4633)		10205 (4633)	
Economizer	No		No		No	
COMPRESSORS, SCREW, SEMI-HERMETIC						
Nominal Capacity, tons (kW)	60 (211)	60 (211)	60 (211)	70 (246)	70 (246)	70 (246)
CONDENSERS, HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLER						
Pumpdown Capacity, lbs (kg)	247 (112)	247 (112)	247 (112)	247 (112)	247 (112)	247 (112)
CONDENSER FANS, DIRECT DRIVE PROPELLER TYPE						
No. of Fans – 30 in. Fan Dia.	10, 30 (762)		10, 30 (762)		10, 30 (762)	
No. of Motors -- hp (kW)	10 2 (1.5)		10 2 (1.5)		10 2 (1.5)	
Fan & Motor RPM, 60Hz	1140		1140		1140	
60 Hz Fan Tip Speed, fpm (m/s)	8950 (4224)		8950 (4224)		8950 (4224)	
60 Hz Total Unit Airflow, cfm (l/s)	108630 (51280)		108630 (51280)		108630 (51280)	
EVAPORATOR, DIRECT EXPANSION SHELL AND TUBE						
Shell Dia.-Tube Length in.(mm) - in. (mm)	19.4 x 82.4 (493 x 2093)		19.4 x 82.4 (493 x 2093)		19.4 x 105.1 (493 x 2670)	
Evaporator R-134a Charge lbs (kg)	2.53 (1.1)	2.53 (1.1)	2.53 (1.1)	2.53 (1.1)	2.44 (1.1)	2.44 (1.1)
Water Volume, gallons (liters)	83 (314)		83 (314)		62 (236)	
Max. Water Pressure, psi (kPa)	152 (1048)		152 (1048)		152 (1048)	
Max. Refrigerant Press., psi (kPa)	352 (2427)		352 (2427)		352 (2427)	

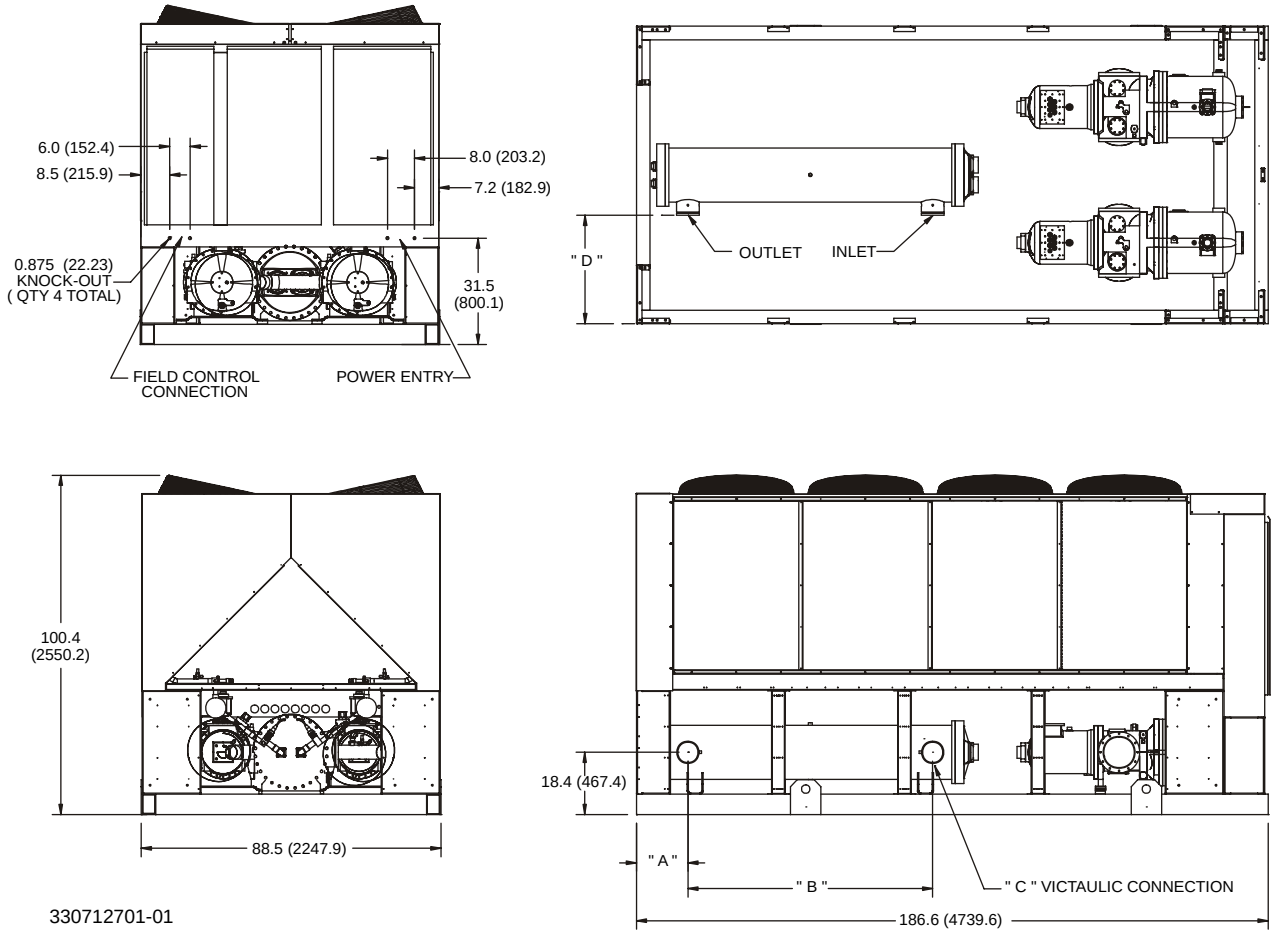
Table 28, Physical Data, AGS 165CH – AGS 195CH

DATA	AGS MODEL NUMBER					
	165CH		175CH		195CH	
	Ckt 1	Ckt 2	Ckt 1	Ckt 2	Ckt 1	Ckt 2
BASIC DATA						
Unit Cap. @ 44°F LWT, 95°F Ambient Temperature kW, (tons)	160.5 (564)		172.5 (607)		190.3 (669)	
Unit Operating Charge lbs (kg)	186 (84)	186 (84)	186 (84)	186 (84)	201 (91)	201 (91)
Cabinet Dimensions L x W x H, in. (mm)	263 x 89 x 101 (6680 x 2261 x 2565)		263 x 89 x 101 (6680 x 2261 x 2565)		263 x 89 x 101 (6680 x 2261 x 2565)	
Unit Operating Weight, lbs. (kg)	11928 (5415)		11928 (5415)		11928 (5415)	
Unit Shipping Weight, lbs (kg)	11011 (4999)		11011 (4999)		11011 (4999)	
Economizer	N0		N0		Yes	
COMPRESSORS, SCREW, SEMI-HERMETIC						
Nominal Capacity, tons (kW)	70 (246)	85 (299)	85 (299)	85 (299)	95 (334)	95 (334)
CONDENSERS, HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLER						
Pumpdown Capacity, lbs (kg)	296 (134)	296 (134)	296 (134)	296 (134)	296 (134)	296 (134)
CONDENSER FANS, DIRECT DRIVE PROPELLER TYPE						
No. of Fans – 30 in. Fan Dia.	12		12		12	
No. of Motors -- hp (kW)	12 2 (1.5)		12 2 (1.5)		12 2 (1.5)	
Fan & Motor RPM, 60Hz	1140		1140		1140	
60 Hz Fan Tip Speed, fpm (m/s)	8950 (4224)		8950 (4224)		8950 (4224)	
60 Hz Total Unit Airflow, cfm (l/s)	130360 (61530)		130360 (61530)		130360 (61530)	
EVAPORATOR, DIRECT EXPANSION SHELL AND TUBE						
Shell Dia.-Tube Length in.(mm) - in. (mm)	19.4 x 105.1 (493 x 2670)		19.4 x 105.1 (493 x 2670)		19.4 x 105.1 (493 x 2670)	
Evaporator R-134a Charge lbs (kg)	3.16 (1.4)	3.16 (1.4)	3.16 (1.4)	3.16 (1.4)	3.16 (1.4)	3.16 (1.4)
Water Volume, gallons (liters)	106 (401)		106 (401)		106 (401)	
Max. Water Pressure, psi (kPa)	152 (1048)		152 (1048)		152 (1048)	
Max. Refrigerant Press., psi (kPa)	352 (2427)		352 (2427)		352 (2427)	

Dimensions

Figure 10, Dimensions, AGS 120C – AGS 160C

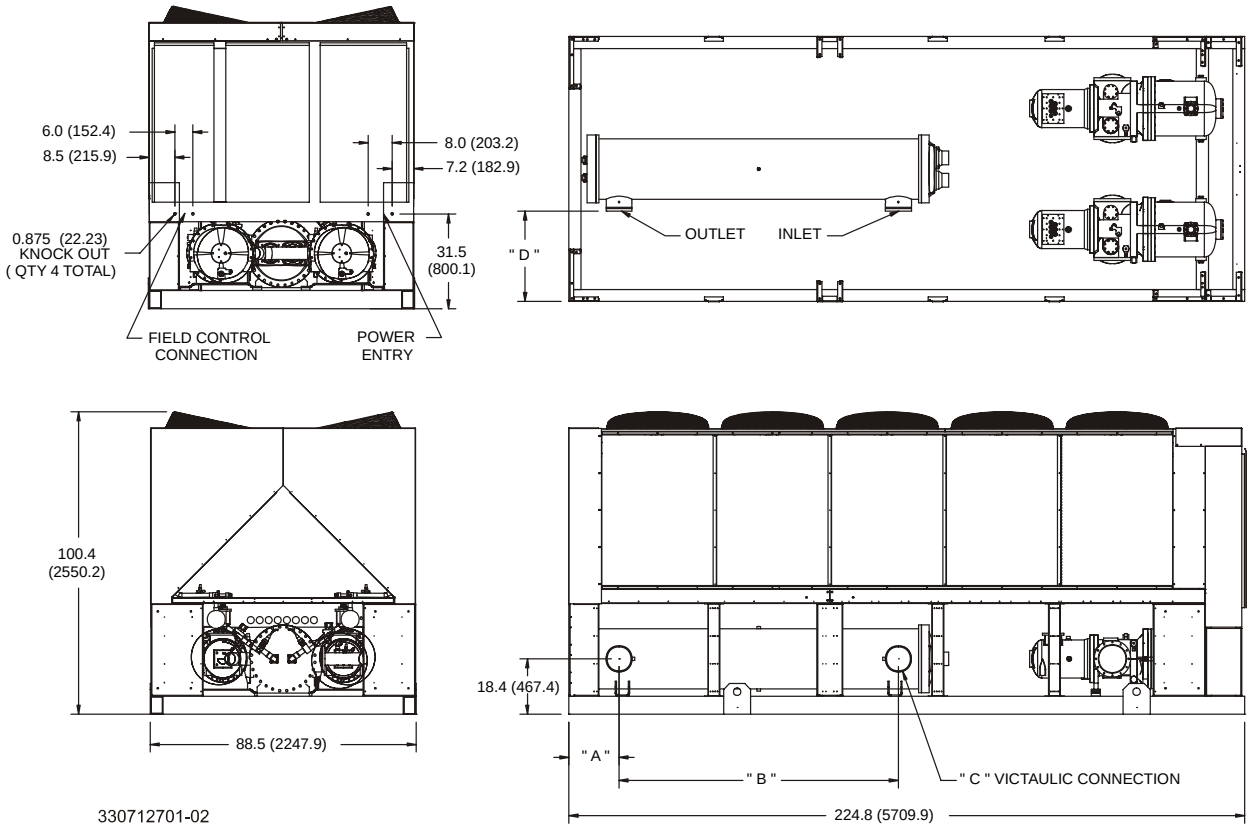
Note: See page 48 for lifting locations, mounting locations, weights and mounting loads.



UNIT SIZE	Dimensions In (mm)			
	" A "	" B "	" C "	" D "
AGS120C	15.2 (386.1)	72.3 (1836.4)	6 (152.4)	32.1 (815.3)
AGS130C	15.2 (386.1)	72.3 (1836.4)	6 (152.4)	32.1 (815.3)
AGS140C	15.2 (386.1)	72.3 (1836.4)	6 (152.4)	32.1 (815.3)
AGS160C	16.2 (411.5)	70.3 (1785.6)	8 (203.2)	30.1 (764.5)

Figure 11, Dimensions, AGS 125C –190C

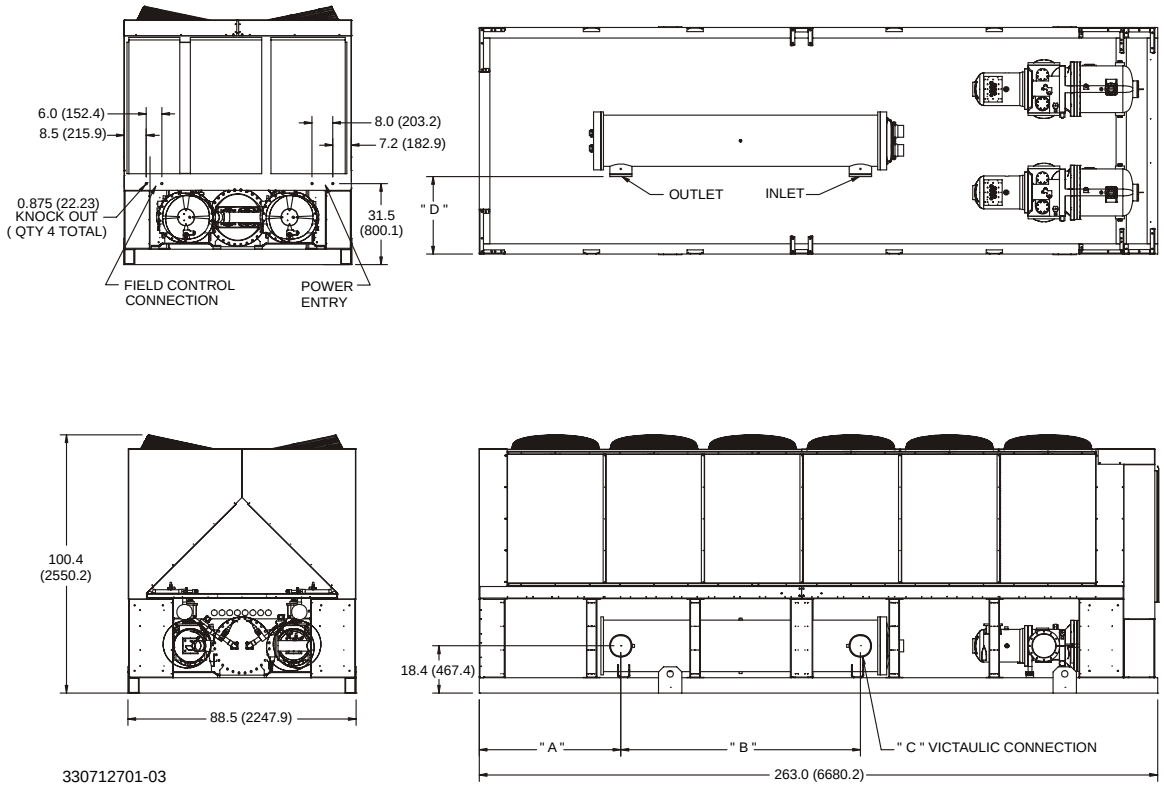
Note: See page 48 for lifting locations, mounting locations, weights and mounting loads.



UNIT SIZE	Dimensions In (mm)			
	" A "	" B "	" C "	" D "
AGS125C	39.3 (998.2)	70.3 (1785.6)	8 (203.2)	30.1 (764.5)
AGS135C	39.3 (998.2)	70.3 (1785.6)	8 (203.2)	30.1 (764.5)
AGS145C	15.6 (396.2)	94.9 (2410.5)	6 (152.4)	32.1 (815.3)
AGS170C	16.7 (424.2)	92.9 (2359.7)	8 (203.2)	30.1 (764.5)
AGS180C	16.7 (424.2)	92.9 (2359.7)	8 (203.2)	30.1 (764.5)
AGS190C	16.7 (424.2)	92.9 (2359.7)	8 (203.2)	30.1 (764.5)

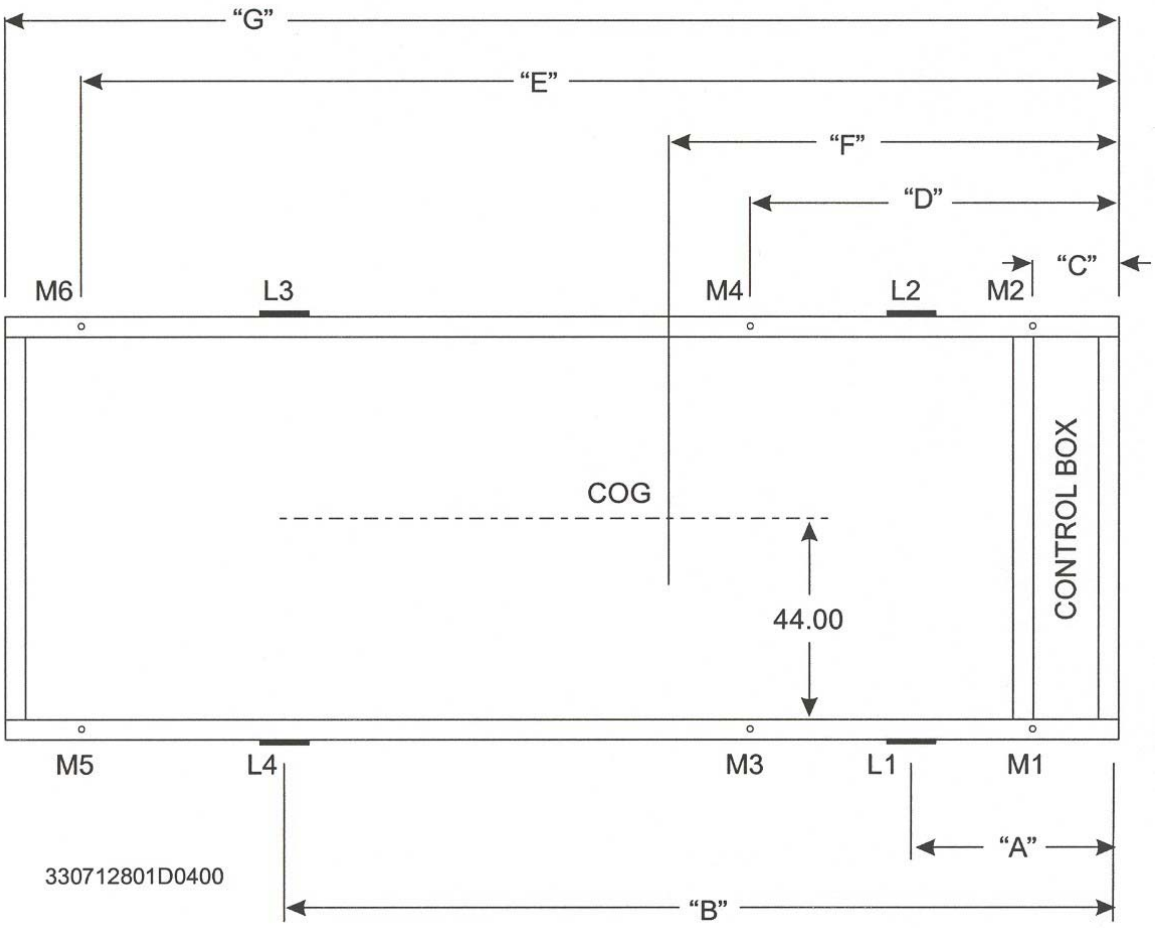
Figure 12 , Dimensions, AGS 165C –210C

Note: See page 48 for lifting locations, mounting locations, weights and mounting loads.



UNIT SIZE	Dimensions In (mm)			
	" A "	" B "	" C "	" D "
AGS165C	54.9 (1394.5)	92.9 (2359.7)	8 (203.2)	30.1 (764.5)
AGS175C	54.9 (1394.5)	92.9 (2359.7)	8 (203.2)	30.1 (764.5)
AGS195C	54.9 (1394.5)	92.9 (2359.7)	8 (203.2)	30.1 (764.5)
AGS210C	54.9 (1394.5)	92.9 (2359.7)	8 (203.2)	30.1 (764.5)

Figure 13, Mounting and Lifting Dimensions



AGS MODEL	A	B	C	D	E	F	G
120	36.00	136.60	12.00	57.30	174.60	71.49	186.60
125	36.00	168.85	12.00	69.25	212.80	86.54	224.80
130	36.00	136.60	12.00	57.30	174.60	71.49	186.60
135	36.00	168.85	12.00	69.25	212.80	86.54	224.80
140	36.00	136.60	12.00	57.30	174.60	71.49	186.60
145	36.00	168.85	12.00	69.25	212.80	86.66	224.80
160	36.00	136.60	12.00	57.30	174.60	74.37	186.60
165	36.00	189.00	12.00	84.00	251.00	105.17	263.00
170	36.00	168.85	12.00	69.25	212.80	89.65	224.80
175	36.00	189.00	12.00	84.00	251.00	105.17	263.00
180	36.00	168.85	12.00	69.25	212.80	89.65	224.80
190	36.00	168.85	12.00	69.25	212.80	89.65	224.80
195	36.00	189.00	12.00	84.00	251.00	105.17	263.00
210	36.00	189.00	12.00	84.00	251.00	105.17	263.00

NOTES:
1. Center of gravity (f) is calculated from shipping weight
2. Mounting holes are 0.75 inch diameter and have center located 2.0 inches from the outside edge.

Table 29, Lifting and Mounting Weights, Aluminum Fins

AGS	Lifting Weights				Mounting Weights						Operating Weight		Shipping Weight	
	L1, L2		L3, L4		M1, M2		M3, M4		M5, M6					
	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg
120	2919	1325	1591	722	1735	788	1631	740	1359	617	9452	4291	9020	4095
125	3161	1435	1941	881	1980	899	1875	851	1610	731	10930	4962	10205	4633
130	2919	1325	1591	722	1735	788	1631	740	1359	617	9452	4291	9020	4095
135	3161	1435	1941	881	1980	899	1875	851	1610	731	10930	4962	10205	4633
140	2919	1325	1591	722	1735	788	1631	740	1359	617	9452	4291	9020	4095
145	3075	1396	1896	861	1905	865	1800	817	1538	698	10485	4760	9942	4514
160	2933	1332	1809	821	1766	802	1724	783	1614	733	10209	4635	9484	4306
165	3017	1370	2489	1130	2129	967	2031	922	1804	819	11928	5415	11011	4999
170	3269	1484	2007	911	1940	881	1900	863	1798	816	11277	5120	10552	4791
175	3017	1370	2489	1130	2129	967	2031	922	1804	819	11928	5415	11011	4999
180	3269	1484	2007	911	1940	881	1900	863	1798	816	11277	5120	10552	4791
190	3269	1484	2007	911	1940	881	1900	863	1798	816	11277	5120	10552	4791
195	3017	1370	2489	1130	2129	967	2031	922	1804	819	11928	5415	11011	4999
210	3017	1370	2489	1130	2129	967	2031	922	1804	819	11928	5415	11011	4999

Table 30, Lifting and Mounting Weights, Copper Fins

AGS	Lifting Weights				Mounting Weights						Operating Weight		Shipping Weight	
	L1, L2		L3, L4		M1, M2		M3, M4		M5, M6					
	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg
120	3238	1470	1910	867	1948	884	1844	837	1572	714	10728	4871	10296	4674
125	3560	1616	2340	1062	2246	1020	2141	972	1876	852	12526	5687	11801	5358
130	3238	1470	1910	867	1948	884	1844	837	1572	714	10728	4871	10296	4674
135	3560	1616	2340	1062	2246	1020	2141	972	1876	852	12526	5687	11801	5358
140	3238	1470	1910	867	1948	884	1844	837	1572	714	10728	4871	10296	4674
145	3474	1577	2295	1042	2171	986	2066	938	1804	819	12081	5485	11538	5238
160	3252	1476	2128	966	1979	898	1937	879	1827	829	11485	5214	10760	4885
165	3496	1587	2968	1347	2448	1112	2350	1067	2123	964	13844	6285	12927	5869
170	3668	1665	2406	1092	2206	1002	2166	983	2064	937	12873	5844	12148	5515
175	3496	1587	2968	1347	2448	1112	2350	1067	2123	964	13844	6285	12927	5869
180	3668	1665	2406	1092	2206	1002	2166	983	2064	937	12873	5844	12148	5515
190	3668	1665	2406	1092	2206	1002	2166	983	2064	937	12873	5844	12148	5515
195	3496	1587	2968	1347	2448	1112	2350	1067	2123	964	13844	6285	12927	5869
210	3496	1587	2968	1347	2448	1112	2350	1067	2123	964	13844	6285	12927	5869

Remote Evaporator

This section contains data that is unique to AGS-CM/B remote evaporator models including:

- Refrigerant piping on page 50 and 51.
- Performance data on page 53.
- Dimensions on page 54.
- Physical data beginning on page 61.

Data common to both packaged and remote evaporator models are:

- Electrical data on page 30.
- Sound data on page 25.
- Evaporator pressure drop on page 24.

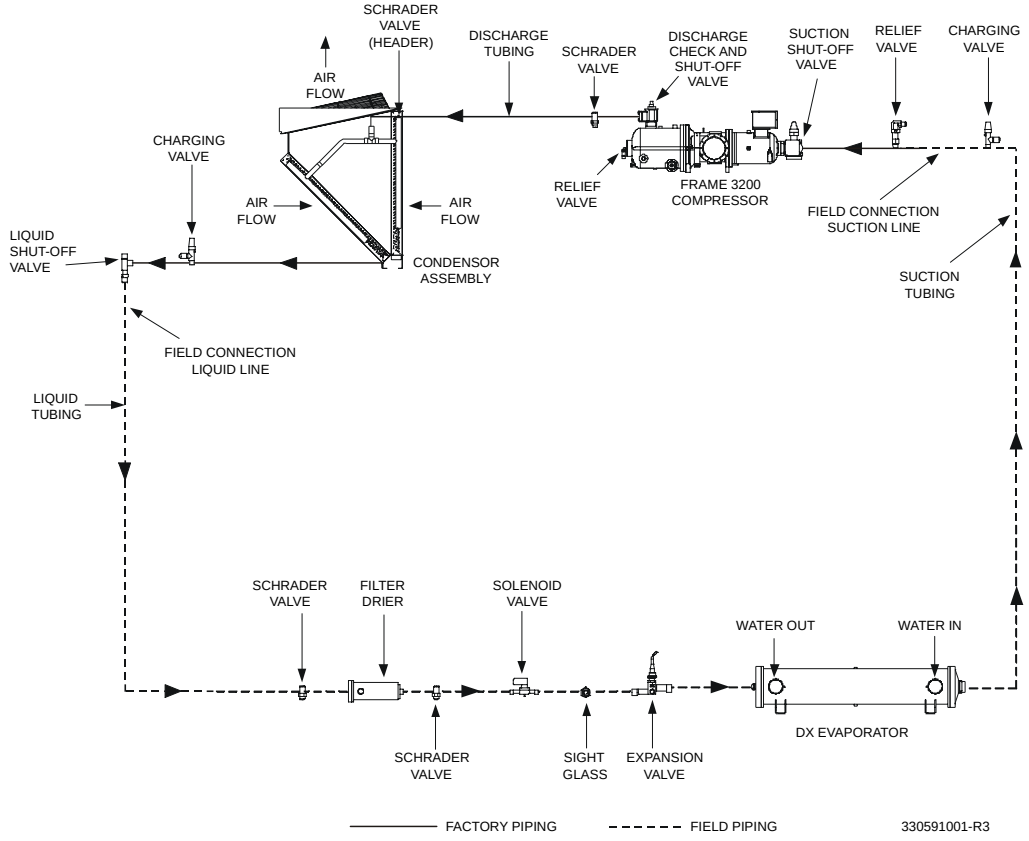
Piping Layout

Figure 14 shows the piping layout for one of the two refrigerant circuits for AGS units with a remote evaporator. Note that the refrigerant specialties are field installed adjacent to the evaporator and that the suction shutoff valve is standard on remote evaporator units. The outdoor unit, the evaporator, and a kit of refrigerant components are shipped as separate pieces.

The outdoor unit will have a full charge of refrigerant pumped down into the condensers. Additional charge will be required in the field, supplied by the customer, for the evaporator and field piping.

The location and size of the refrigerant connections are shown on the dimension drawings beginning on page 54. Do not run refrigerant piping underground.

Figure 14, Piping Schematic



Field Wiring

Field wiring connections from the remote evaporator to the outdoor unit are shown on Figure 9 on page 41. The following field connections are required:

1. The electronic expansion valve has a 30-feet long cable attached and can be used, as is, when the outdoor unit is less than 30 feet away. Beyond that, a junction box must be located within 30-feet of the evaporator, and up to 70 additional feet of 14GA wire connected from the cable to the unit, allowing up to a total distance of 100 feet (30 feet of cable and up to 70 feet of 14GA).
2. Two evaporator water temperature sensors with 100 feet of cable coiled in the unit control panel for extension to the evaporator and insertion in fittings located on the side of the inlet and outlet nozzles.
3. One suction line refrigerant temperature sensor per circuit with 100 feet of cable coiled in the unit control panel for extension to the evaporator.
4. One suction line pressure transducer per circuit with 100 feet of cable coiled in the unit control panel for extension to the evaporator.

Kit Components

The kit shipped with the unit has the following components for field installation:

Filter-drier and cores	Sight glass
Electronic expansion valve	Solenoid valve
Evaporator vent and drain plugs	Filter-drier cores for economizer piping (Sizes AGS 180 through 210
Charging Valve	

Refrigerant Pipe Sizing

Layout and size the refrigerant piping in accordance with the latest edition of the ASHRAE Handbook. A line sizing guide can be found below. Keep the refrigerant suction line pressure drop to a maximum of 2 degree F. in saturated temperature equivalent. Each of the two suction line's velocity must be sufficient to carry oil when considering a capacity reduction of 25% in each circuit.

NOTE: The following applies to all size units

- Maximum linear line length cannot exceed 75 feet.
- Maximum total equivalent length (TEL) cannot exceed 180 feet.
- The evaporator cannot be located more than 15 feet above the outdoor unit
- The evaporator cannot be located more than 20 feet below the outdoor unit.
- Suction line connection at unit = 3 5/8 inches.
- Suction line connection at evaporator = 4 1/8 inches.
- Liquid line connection at the unit = 1 3/8.
- Liquid line connection at the evaporator = 1 5/8.
- A piping drawing showing altitudes, line lengths, slopes and all fittings, using Form SF 99006 (Revised 5/02), must be sent to the local McQuay sales office for transmittal to the McQuay Technical Response Center for review prior to entering a unit order.
- When facing the unit control box, the left-hand compressor is circuit # 1, and the right-hand is compressor # 2. With mix-matched compressor sizes, #1 is the smallest.
- No underground refrigerant piping permitted.

Table 31, Fitting Equivalent Feet of Pipe

Line Size In. OD	Angle Valve	Globe Valve	Ball Valve	90 Degree Std. Radius Elbow	90 Degree Long Radius Elbow
2 5/8	29.00	69.0	1.0	6.0	4.1
3 1/8	35.0	84.0	1.0	7.5	5.0
3 5/8	41.0	100.0	1.0	9.0	5.9
4 1/8	47.0	120.0	1.0	10.0	6.7

Table 32, Recommended Horizontal or Downflow Suction Line Size

AGS Model	Circuit	Up to 50 Equiv. Ft.		Up to 75 Equiv. Ft.		Up to 100 Equiv. Ft.		Up to 125 Equiv. Ft.		Up to 150 Equiv. Ft.	
		Size	PD	Size	PD	Size	PD	Size	PD	Size	PD
120/125	Both	3 5/8	0.54	3 5/8	0.80	3 5/8	1.07	3 5/8	1.34	3 5/8	1.61
130/135	#1	3 5/8	0.54	3 5/8	0.80	3 5/8	1.07	3 5/8	1.34	3 5/8	1.61
	#2	3 5/8	0.71	3 5/8	1.06	3 5/8	1.42	3 5/8	1.77	3 5/8	2.12
140/145	Both	3 5/8	0.71	3 5/8	1.06	3 5/8	1.42	3 5/8	1.77	3 5/8	2.12
160/165	# 1	3 5/8	0.71	3 5/8	1.06	3 5/8	1.42	3 5/8	1.77	3 5/8	2.12
	# 2	3 5/8	1.00	3 5/8	1.51	3 5/8	2.01	4 1/8	1.36	4 1/8	1.63
170 to 210	Both	3 5/8	1.00	3 5/8	1.51	3 5/8	2.01	4 1/8	1.36	4 1/8	1.63

NOTE:

1. "Size" is tubing size in inches, "PD" is the pressure drop in equivalent degrees F. The line pressure drop can be interpolated by feet.

Table 33, Recommended Upflow Suction line Size

AGS Model	Circuit	Up to 50 Equiv. Ft.		Up to 75 Equiv. Ft.		Up to 100 Equiv. Ft.	
		Size	PD	Size	PD	Size	PD
120/125	Both	3 1/8	1.09	3 1/8	1.64	3 1/8	2.19
130/135	#1	3 1/8	1.09	3 1/8	1.64	3 1/8	2.19
	#2	3 1/8	0.71	3 1/8	1.06	3 1/8	1.42
140/145	Both	3 1/8	0.71	3 1/8	1.06	3 1/8	1.42
160/165	# 1	3 1/8	0.71	3 1/8	1.06	3 1/8	1.42
	# 2	3 5/8	1.00	3 5/8	1.51	3 5/8	2.01
170 to 210	Both	3 5/8	1.00	3 5/8	1.51	3 5/8	2.01

NOTE:

1. "Size" is tubing size in inches, "PD" is the pressure drop in equivalent degrees F. The line pressure drop can be interpolated by feet.

Table 34, Recommended Liquid line Size.

AGS Model	Circuit	Up to 50 Equiv. Ft.		Up to 75 Equiv. Ft.		Up to 100 Equiv. Ft.		Up to 125 Equiv. Ft.		Up to 150 Equiv. Ft.	
		Size	PD	Size	PD	Size	PD	Size	PD	Size	PD
120/125	Both	1 3/8	0.69	1 3/8	1.04	1 3/8	1.39	1 3/8	1.74	1 3/8	2.08
130/135	#1	1 3/8	0.69	1 3/8	1.04	1 3/8	1.39	1 3/8	1.74	1 3/8	2.08
	#2	1 3/8	0.92	1 3/8	1.37	1 3/8	1.83	1 3/8	2.29	1 3/8	2.75
140/145	Both	1 3/8	0.92	1 3/8	1.37	1 3/8	1.83	1 3/8	2.29	1 3/8	2.75
160/165	# 1	1 3/8	0.92	1 3/8	1.37	1 3/8	1.83	1 3/8	2.29	1 3/8	2.75
	# 2	1 3/8	1.30	1 3/8	1.95	1 3/8	2.6	1 3/8	3.25	1 3/8	3.90
170 to 210	Both	1 3/8	1.30	1 3/8	1.95	1 3/8	2.6	1 3/8	3.25	1 3/8	3.90

NOTE:

1. "Size" is tubing size in inches, "PD" is the pressure drop in equivalent degrees F. The line pressure drop can be interpolated by feet.

Performance Data

There is a derate to the packaged AGS performance beginning on page 18 due to refrigerant line losses exceeding those found on the packaged arrangement. Once the pipe design is finalized, the actual adjustment is easily determined using the procedure shown below. For preliminary purposes, the following can be used as a conservative estimate:

Table 35, Approximate Derate Factors

Actual Line Length Up To	Capacity Derate	Power Derate	EER Derate
75	0.94	0.97	0.97
50	0.96	0.98	0.98
25	0.98	0.99	0.99

Derate Procedure

1. Sketch the liquid and suction piping, including the actual pipe lengths and all fittings.
2. Using the recommended pipe sizes from Table 32 and Table 33, add up the equivalent pressure drop for the fittings in the suction line. Add this value to the actual linear feet of tubing to determine the total equivalent feet for the piping run.
3. Again using Table 32 and Table 33, determine the pressure drop (in degrees F) based on the TEL. Interpolation is encouraged.
4. Determine the derate factors from Table 36 based on the suction line pressure drop.

Table 36, Performance Derate Factors

Suction Line Press Drop °F	Unit Capacity %	Unit Power %	Unit EER %
0	100.0	100.0	100.0
1.0	98.3	99.0	99.3
2.0	96.2	98.1	98.1
3.0	94.4	97.2	97.1
4.0	92.5	96.3	96.1

Dimensions

Figure 15, Models AGS 120CM/B, 130CM/B, 140CM/B, 160CM/B (Remote Evaporator)

See Figure 24 on page 59 for lifting and mounting hole locations.

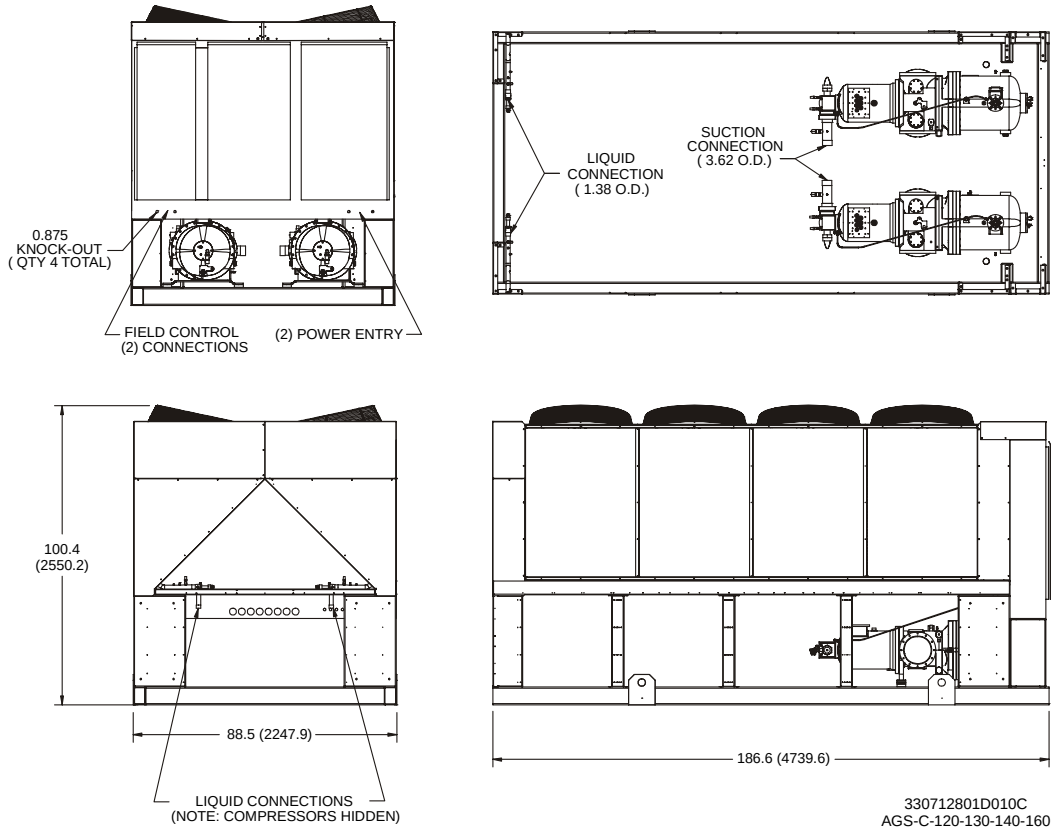


Figure 16, Models AGS 125 CM/B, 135CM/B, 145CM/B, 170CM/B (Remote Evaporator)

See Figure 24 on page 59 for lifting and mounting hole locations.

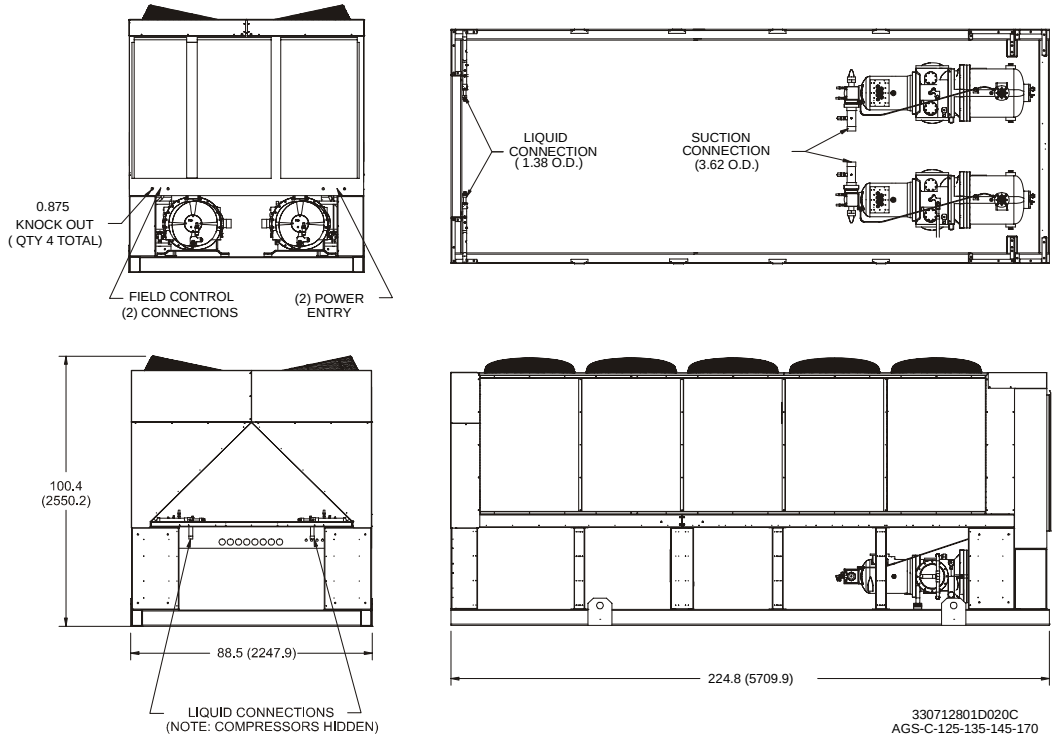


Figure 17, AGS 165CM/B, 175CM/B (Remote Evaporator)

See Figure 24 on page 59 for lifting and mounting hole locations.

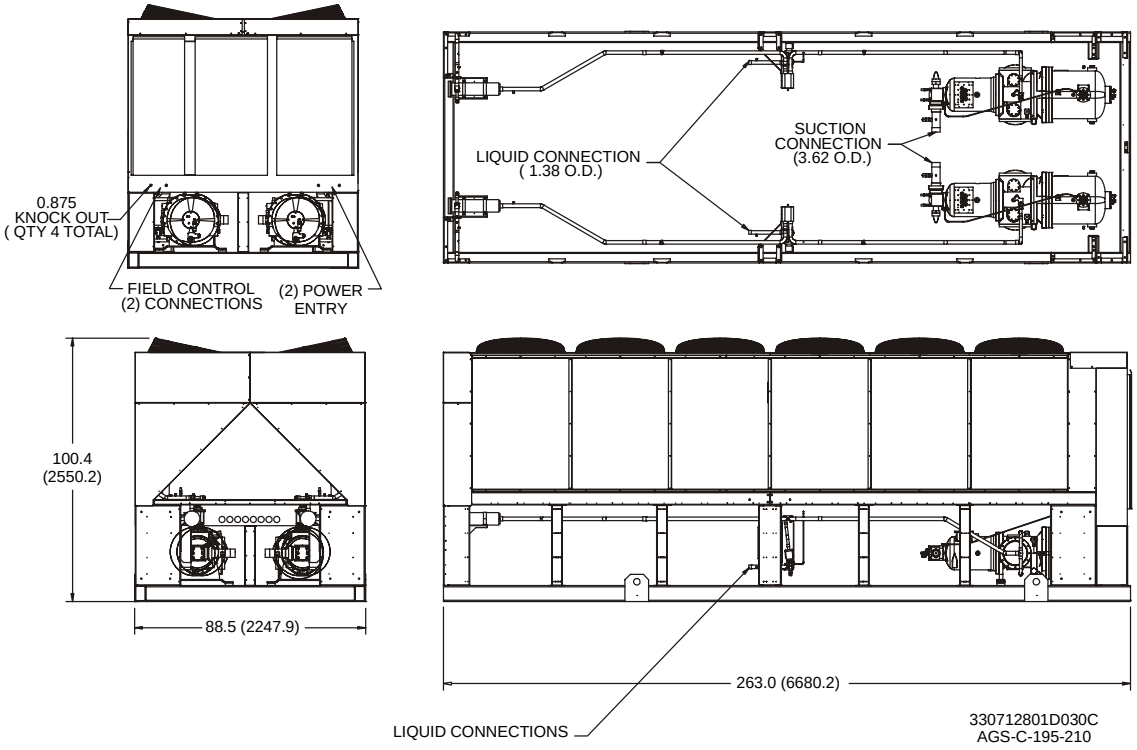


Figure 18, AGS 180CM/B-AGS 190CM/B (Remote Evaporator)

See Figure 24 on page 59 for lifting and mounting hole locations.

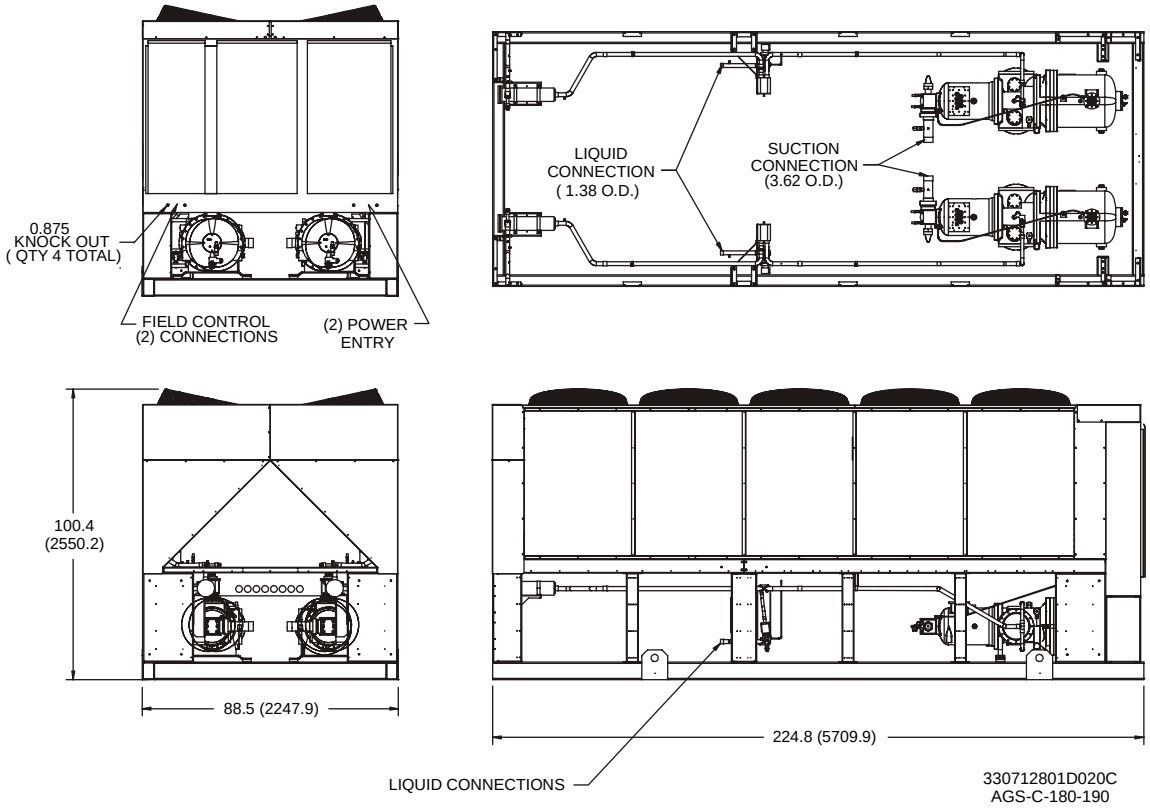
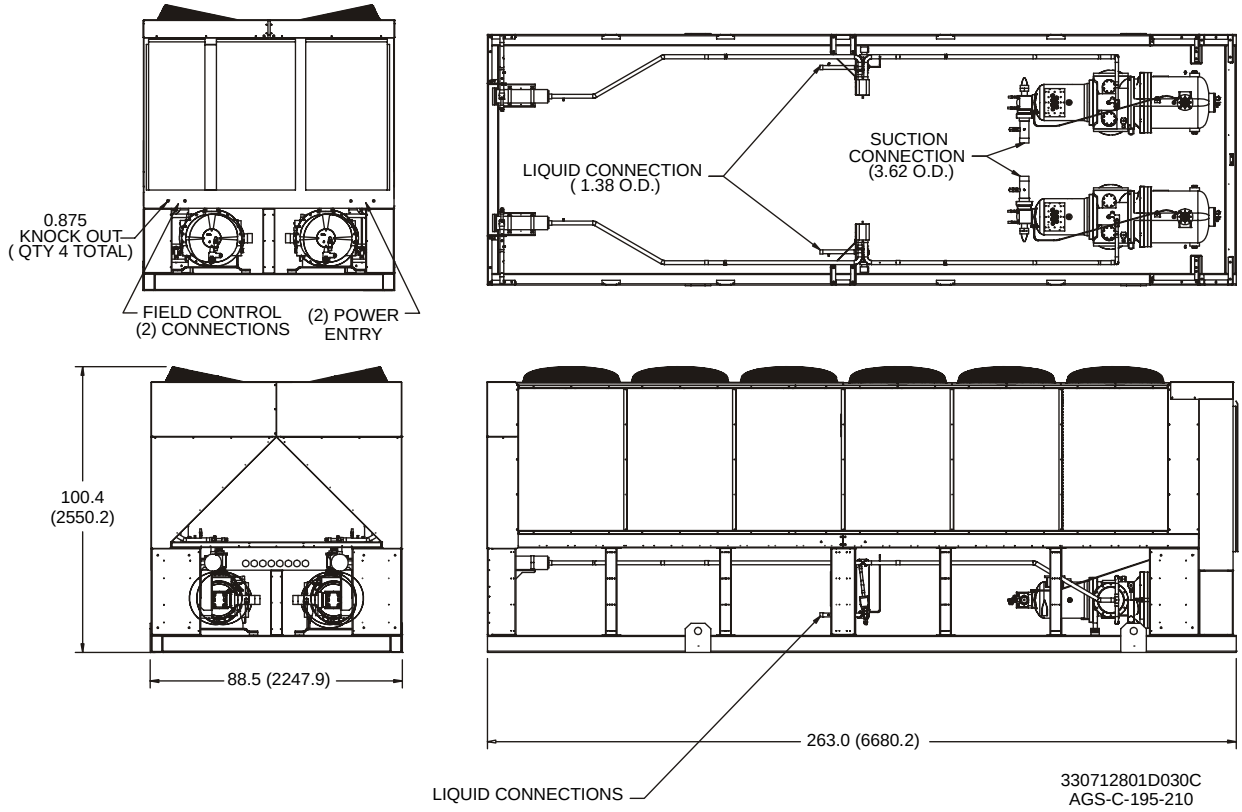


Figure 19, AGS 195CM/B, AGS 210CM/B (Remote Evaporator)

See Figure 24 on page 59 for lifting and mounting hole locations.



Evaporators

Figure 20, Evaporator for AGS 120C - 140C

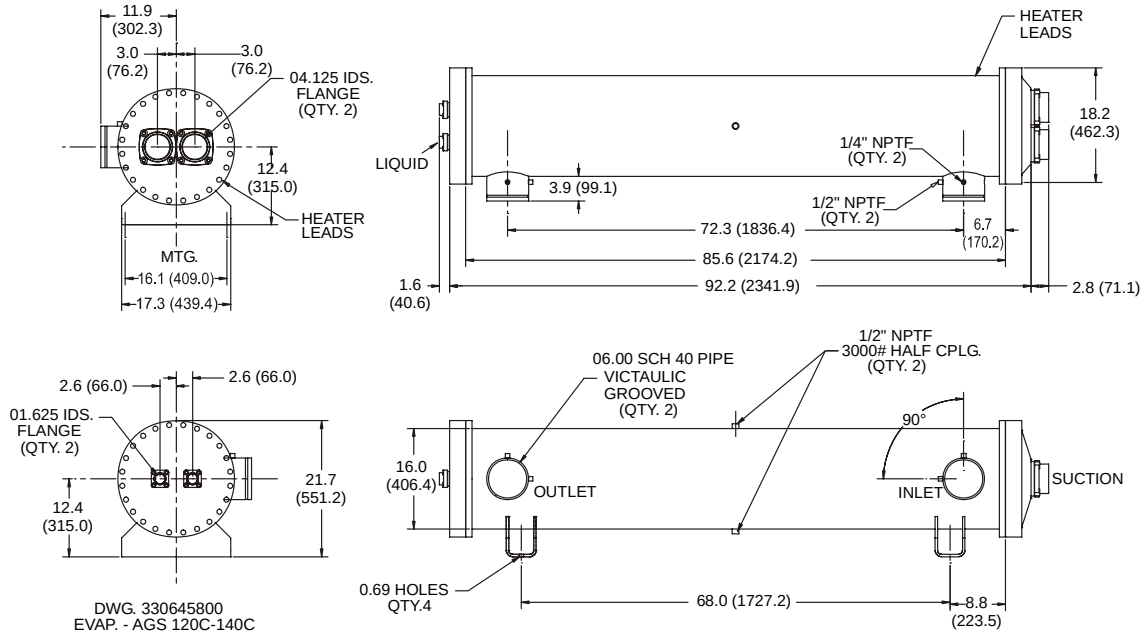


Figure 21, Evaporator for AGS 160C, AGS 125C - 135C

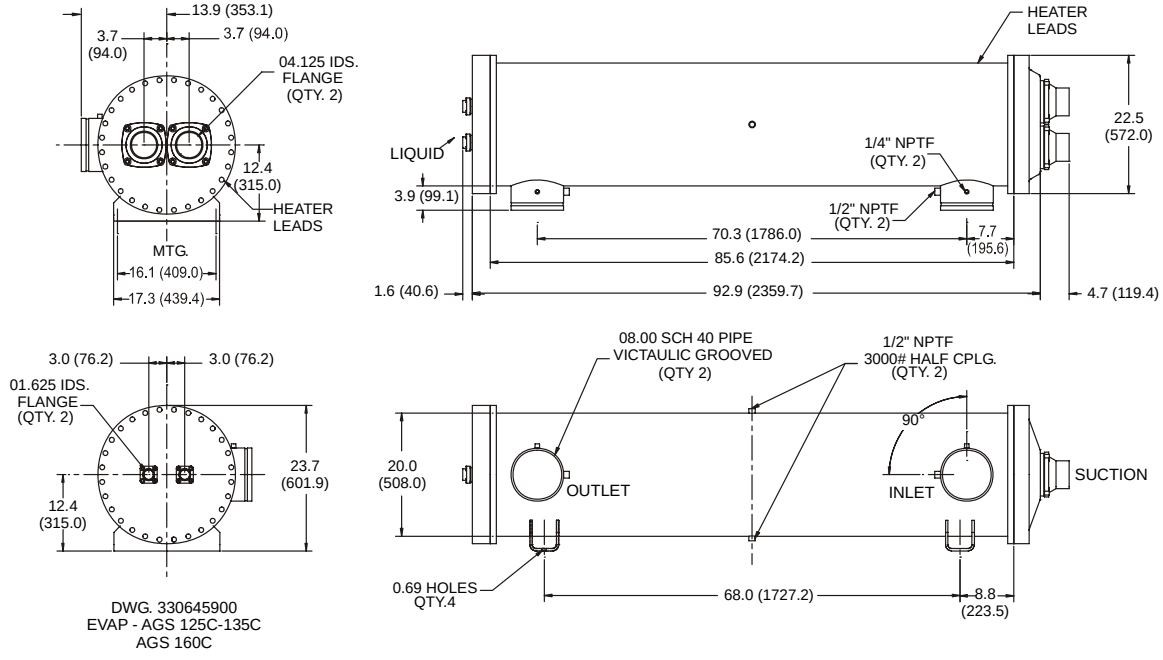


Figure 22, Evaporator for AGS 145C

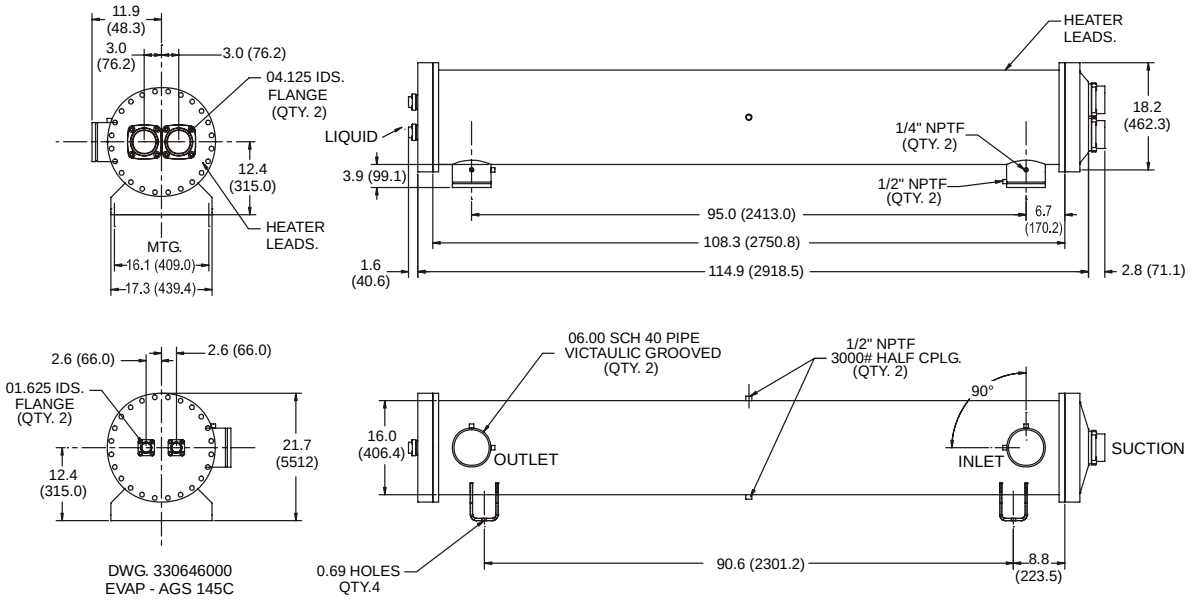
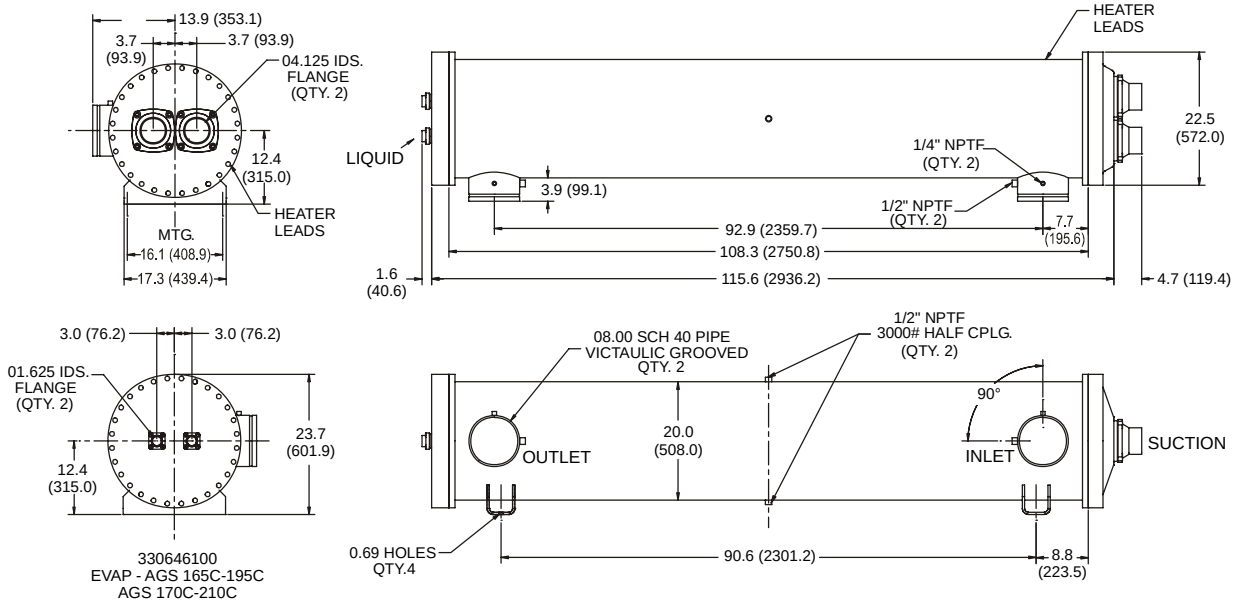
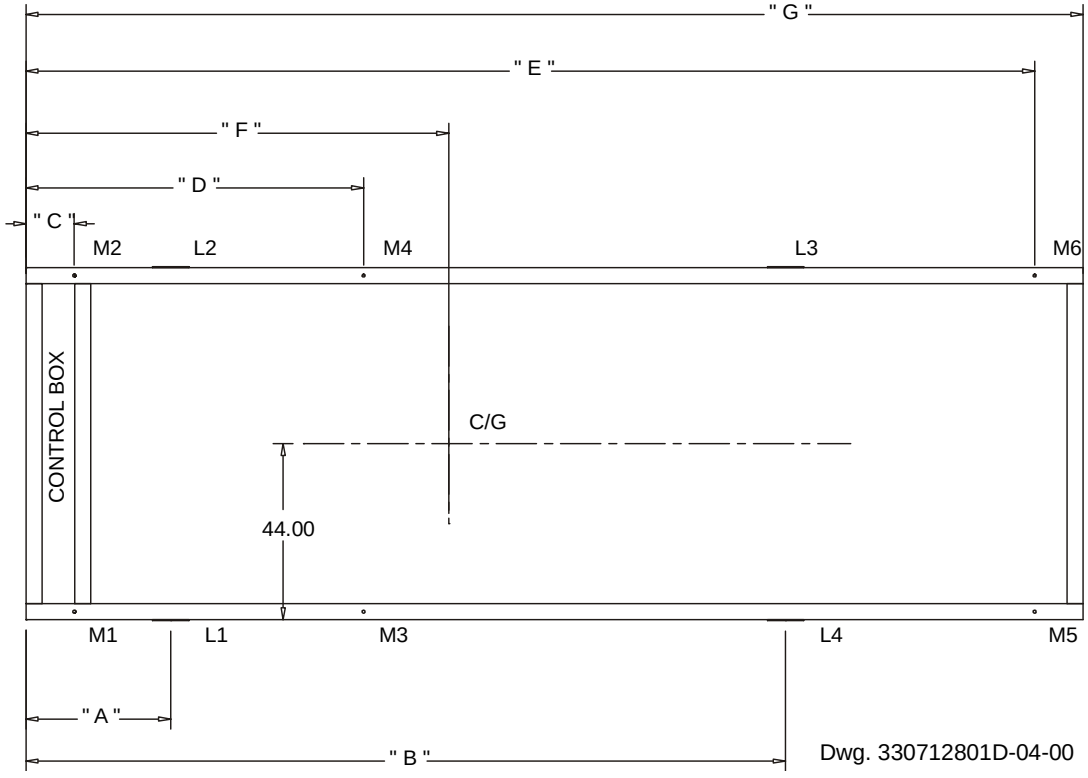


Figure 23, Evaporator for AGS 165C - 195C, AGS 170C - 210C



Lifting and Mounting Dimensions and Weights

Figure 24, Mounting and Lifting Dimensions, Remote Evaporator



AGS MODEL	DIMENSIONS IN INCHES						
	A	B	C	D	E	F	G
120	36.00	136.60	12.00	57.30	174.60	61.36	186.60
125	36.00	168.85	12.00	69.25	212.80	74.80	224.80
130	36.00	136.60	12.00	57.30	174.60	61.36	186.60
135	36.00	168.85	12.00	69.25	212.80	74.80	224.80
140	36.00	136.60	12.00	57.30	174.60	61.36	186.60
145	36.00	168.85	12.00	69.25	212.80	74.80	224.80
160	36.00	136.60	12.00	57.30	174.60	61.36	186.60
165	36.00	189.00	12.00	84.00	251.00	86.83	263.00
170	36.00	168.85	12.00	69.25	212.80	74.80	224.80
175	36.00	189.00	12.00	84.00	251.00	86.83	263.00
180	36.00	168.85	12.00	69.25	212.80	74.80	224.80
190	36.00	168.85	12.00	69.25	212.80	74.80	224.80
195	36.00	188.77	12.00	84.00	251.00	86.83	263.00
210	36.00	188.77	12.00	84.00	251.00	86.83	263.00

NOTE: Center of gravity (F) is calculated from shipping weight

Table 37, Lifting and Mounting Weights, Remote Evaporator, Aluminum Fins

AGS MODEL	Lifting Weights				Mounting Weights						Shipping & Operating Weights	
	L1 & L2		L3 & L4		M1 & M2		M3 & M4		M5 & M6			
	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg
120	3029	1375	1021	464	1747	793	1488	676	815	370	8100	3677
125	3169	1439	1307	593	1910	867	1632	741	935	424	8952	4064
130	3029	1375	1021	464	1747	793	1488	676	815	370	8100	3677
135	3169	1439	1307	593	1910	867	1632	741	935	424	8952	4064
140	3029	1375	1021	464	1747	793	1488	676	815	370	8100	3677
145	3169	1439	1307	593	1910	867	1632	741	935	424	8952	4064
160	3029	1375	1021	464	1747	793	1488	676	815	370	8100	3677
165	3196	1451	1590	722	2071	940	1741	790	974	442	9571	4345
170	3169	1439	1307	593	1910	867	1632	741	935	424	8952	4064
175	3196	1451	1590	722	2071	940	1741	790	974	442	9571	4345
180	3169	1439	1307	593	1910	867	1632	741	935	424	8952	4064
190	3169	1439	1307	593	1910	867	1632	741	935	424	8952	4064
195	3196	1451	1590	722	2071	940	1741	790	974	442	9571	4345
210	3196	1451	1590	722	2071	940	1741	790	974	442	9571	4345

NOTE: Refer to Figure 24.

Table 38, Lifting and Mounting Weights, Remote Evaporator, Copper Fins

AGS MODEL	Lifting Weights				Mounting Weights						Operating & Shipping Weights	
	L1 & L2		L3 & L4		M1 & M2		M3 & M4		M5 & M6			
	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg
120	3348	1520	1340	608	1960	890	1701	772	1028	467	9376	4257
125	3568	1620	1706	775	2176	988	1898	862	1201	545	10548	4789
130	3348	1520	1340	608	1960	890	1701	772	1028	467	9376	4257
135	3568	1620	1706	775	2176	988	1898	862	1201	545	10548	4789
140	3348	1520	1340	608	1960	890	1701	772	1028	467	9376	4257
145	3568	1620	1706	775	2176	988	1898	862	1201	545	10548	4789
160	3348	1520	1340	608	1960	890	1701	772	1028	467	9376	4257
165	3675	1668	2069	939	2390	1085	2060	935	1293	587	11487	5215
170	3568	1620	1706	775	2176	988	1898	862	1201	545	10548	4789
175	3675	1668	2069	939	2390	1085	2060	935	1293	587	11487	5215
180	3568	1620	1706	775	2176	988	1898	862	1201	545	10548	4789
190	3568	1620	1706	775	2176	988	1898	862	1201	545	10548	4789
195	3675	1668	2069	939	2390	1085	2060	935	1293	587	11487	5215
210	3675	1668	2069	939	2390	1085	2060	935	1293	587	11487	5215

NOTE: Refer to Figure 24.

Physical Data, Standard Efficiency

Table 39, Physical Data, AGS 120CM – AGS 140CM (Remote Evaporator)

DATA	120CM		130CM		140CM	
	Ckt 1	Ckt 2	Ckt 1	Ckt 2	Ckt 1	Ckt 2
BASIC DATA						
Unit Operating Charge lbs (kg), Note 1	131 (59)	131 (59)	131 (59)	131 (59)	131 (59)	131 (59)
Cabinet Dimensions L x W x H, in. (mm)	187 x 89 x 101 4750 x 2261 x 2565		187 x 89 x 101 4750 x 2261 x 2565		187 x 89 x 101 4750 x 2261 x 2565	
Outdoor Unit Operating Weight, lbs. (kg)	8100 (3677)		8952 (4064)		8100 (3677)	
Outdoor Unit Shipping Weight, lbs (kg)	8100 (3677)		8952 (4064)		8100 (3677)	
Add for Copper Fins, lbs (kg)	1276 (579)		1596 (725)		1276 (579)	
Economizer	No		No		No	
COMPRESSORS, SCREW, SEMI-HERMETIC						
Nominal Capacity, tons (kW)	60 (211)	60 (211)	60 (211)	70 (246)	70 (246)	70 (246)
CONDENSERS, HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLER						
Pumpdown Capacity, lbs (kg)	358 (163)	358 (163)	358 (163)	358 (163)	358 (163)	358 (163)
CONDENSER FANS, DIRECT DRIVE PROPELLER TYPE						
No. of Fans – 30 in. Fan Dia.	8		8		8	
No. of Motors -- hp (kW)	8 2 (1.5)		8 2 (1.5)		8 2 (1.5)	
Fan & Motor RPM, 60Hz	1140		1140		1140	
60 Hz Fan Tip Speed, fpm (m/s)	8950 (4224)		8950 (4224)		8950 (4224)	
60 Hz Total Unit Airflow, cfm (l/s)	86900 (41020)		86900 (41020)		86900 (41020)	
REMOTE EVAPORATOR, DIRECT EXPANSION SHELL AND TUBE						
Shell Dia.-Tube Length in.(mm) - in. (mm)	15.5 x 82.4 (394 x 2093)		15.5 x 82.4 (394 x 2093)		15.5 x 82.4 (394 x 2093)	
Operating Weight, lbs (kg)	1282 (562)		1282 (562)		1282 (562)	
Shipping Weight, lbs (kg)	875 (397)		875 (397)		875 (397)	
Evaporator R-134a Charge lbs (kg)	1.95 (0.9)	1.95 (0.9)	1.95 (0.9)	1.95 (0.9)	1.95 (0.9)	1.95 (0.9)
Water Volume, gallons (liters)	49 (185)		49 (185)		49 (185)	
Max. Water Pressure, psi (kPa)	152 (1048)		152 (1048)		152 (1048)	
Max. Refrigerant Press., psi (kPa)	352 (2427)		352 (2427)		352 (2427)	

NOTE: Charge quantity does not include field piping or evaporator.

Table 40, Physical Data, AGS 160CM – AGS 180CM (Remote Evaporator)

DATA	160CM		170CM		180CM	
	Ckt. 1	Ckt. 2	Ckt. 1	Ckt. 2	Ckt. 1	Ckt. 2
BASIC DATA						
Unit Operating Charge, lbs (kg)	131 (59)	131 (59)	159 (72)	159 (72)	171 (78)	171 (78)
Cabinet Dim., L x W x H, in. (mm)	187 x 89 x 101 4750 x 2261 x 2565		225 x 89 x 101 5715 x 2261 x 2565		225 x 89 x 101 5715 x 2261 x 2565	
Outdoor Unit Operating Wt, lbs. (kg)	8100 (3677)		8952 (4064)		8952 (4064)	
Outdoor Unit Shipping Wt, lbs (kg)	8100 (3677)		8952 (4064)		8952 (4064)	
Add for Copper Fins, lbs (kg)	1276 (579)		1596 (725)		1596 (725)	
Economizer	No		No		Yes	
COMPRESSORS, SCREW, SEMI-HERMETIC						
Nominal Capacity, tons (kW)	70 (246)	85 (299)	85 (299)	85 (299)	95 (334)	95 (334)
CONDENSERS, HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLER						
Pumpdown Capacity, lbs (kg)	358 (163)	358 (163)	399 (181)	399 (181)	399 (181)	399 (181)
CONDENSER FANS, DIRECT DRIVE PROPELLER TYPE						
No. of Fans; Fan Dia., in. (mm)	8		10		10	
No. of Motors – hp (kW)	8 2 (1.5)		10 2 (1.5)		10 2 (1.5)	
Fan & Motor RPM, 60HZ	1140		1140		1140	
60 Hz Fan Tip Speed, fpm	8950 (4224)		8950 (4224)		8950 (4224)	
m60 Hz Total Unit Airflow, cfm (l/s)	86900 (41020)		108630 (51280)		108630 (51280)	
REMOTE EVAPORATOR, DIRECT EXPANSION SHELL AND TUBE						
Shell Dia.,Tube Length in.(mm)	19.4 x 82.4 (493 x 2093)		19.4 x 105.1 (493 x 2670)		19.4 x 105.1 (493 x 2670)	
Operating Weight, lbs (kg)	1916 (870)		2283 (1037)		2283 (1037)	
Shipping Weight, lbs (kg)	1224 (556)		1400 (636)		1400 (636)	
Evaporator R-134a Charge lbs (kg)	2.53 (1.1)	2.53 (1.1)	3.16 (1.4)	3.16 (1.4)	3.16 (1.4)	3.16 (1.4)
Water Volume, gallons (liters)	83 (314)		106 (401)		106 (401)	
Max. Water Pressure, psi (kPa)	152 (1048)		152 (1048)		152 (1048)	
Max. Refrigerant Press., psi (kPa)	352 (2427)		352 (2427)		352 (2427)	

NOTE: Charge quantity does not include field piping or evaporator.

Table 41, Physical Data, AGS 190CM – AGS 210CM (Remote Evaporator)

DATA	AGS 190CM		AGS 210CM	
	Ckt 1	Ckt 2	Ckt 1	Ckt 2
BASIC DATA				
Unit Operating Charge lbs (kg)	172 (78)	172 (78)	201 (91)	201 (91)
Cabinet Dimensions L x W x H, in. (mm)	225 x 89 x 101 5715 x 2261 x 2565		263 x 89 x 101 6680 x 2261 x 2565	
Unit Shipping Weight, lbs (kg)	8952 (4064)		9571 (4345	
Unit Operating Weight, lbs. (kg)	8952 (4064)		9571 (4345	
Add for Copper Fins, lbs (kg	1596 (725)		1916 (870)	
Economizer	Yes		Yes	
COMPRESSORS, SCREW, SEMI-HERMETIC				
Nominal Capacity, tons (kW)	95 (334)	95 (334)	95 (334)	95 (334)
CONDENSERS, HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLER				
Pumpdown Capacity, lbs (kg)	399 (181)	399 (181)	438 (199)	438 (199)
CONDENSER FANS, DIRECT DRIVE PROPELLER TYPE				
No. of Fans -- Fan Dia., in. (mm)	10		12	
No. of Motors -- hp (kW)	10 2 (1.5)		12 2.5 (1.9)	
Fan & Motor RPM, 60HZ	1140		1140	
60 Hz Fan Tip Speed, fpm (m/s)	8950 (4224)		8950 (4224)	
60 Hz Total Unit Airflow, cfm (l/s)	108630 (51280)		130360 (61530)	
REMOTE EVAPORATOR, DIRECT EXPANSION SHELL AND TUBE				
Shell Dia.-Tube Length in.(mm) - in. (mm)	19.4 x 105.1 (493 x 2670)		19.4 x 105.1 (493 x 2670)	
Operating Weight, lbs (kg)	2281 (1036)		2281 (1036)	
Shipping Weight, lbs (kg)	1437 (652)		1437 (652)	
Evaporator R-134a Charge lbs (kg)	3.63 (1.6)	3.63 (1.6)	3.63 (1.6)	3.63 (1.6)
Water Volume, gallons (liters)	106 (401)		104 (392)	
Max. Water Pressure, psi (kPa)	152 (1048)		152 (1048)	
Max. Refrigerant Press., psi (kPa)	352 (2427)		352 (2427)	

Physical Data, High Efficiency

Table 42, Physical Data, AGS 125CB – AGS 145CB (Remote Evaporator)

DATA	125CB		135CB		145CB	
	Ckt 1	Ckt 2	Ckt 1	Ckt 2	Ckt 1	Ckt 2
BASIC DATA						
Unit Operating Charge lbs (kg)	159 (72)	159 (72)	159 (72)	159 (72)	159 (72)	159 (72)
Cabinet Dimensions L x W x H, in. (mm)	225 x 89 x 101 5715 x 2261 x 2565		225 x 89 x 101 5715 x 2261 x 2565		225 x 89 x 101 5715 x 2261 x 2565	
Unit Operating Weight, lbs. (kg)	8952 (4064		8952 (4064		8952 (4064	
Unit Shipping Weight, lbs (kg)	8952 (4064		8952 (4064		8952 (4064	
Add for Copper Fins, lbs (kg	1596 (725)		1596 (725)		1596 (725)	
Economizer	No		No		No	
COMPRESSORS, SCREW, SEMI-HERMETIC						
Nominal Capacity, tons (kW)	60 (211)	60 (211)	60 (211)	70 (246)	70 (246)	70 (246)
CONDENSERS, HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLER						
Pumpdown Capacity, lbs (kg)	399 (181)	399 (181)	399 (181)	399 (181)	399 (181)	399 (181)
CONDENSER FANS, DIRECT DRIVE PROPELLER TYPE						
No. of Fans -- Fan Dia., in. (mm)	10, 30 (762)		10, 30 (762)		10, 30 (762)	
No. of Motors -- hp (kW)	10 2 (1.5)		10 2 (1.5)		10 2 (1.5)	
Fan & Motor RPM, 60Hz	1140		1140		1140	
60 Hz Fan Tip Speed, fpm (m/s)	8950 (4224)		8950 (4224)		8950 (4224)	
60 Hz Total Unit Airflow, cfm (l/s)	108630 (51280)		108630 (51280)		108630 (51280)	
REMOTE EVAPORATOR, DIRECT EXPANSION SHELL AND TUBE						
Shell Dia.-Tube Length in.(mm) - in. (mm)	19.4 x 82.4 (493 x 2093)		19.4 x 82.4 (493 x 2093)		19.4 x 105.1 (493 x 2670)	
Operating Weight, lbs (kg)	1916 (870)		1916 (870)		1525 (692)	
Shipping Weight, lbs (kg)	1224 (556)		1224 (556)		1005 (456)	
Evaporator R-134a Charge lbs (kg)	2.53 (1.1)	2.53 (1.1)	2.53 (1.1)	2.53 (1.1)	2.44 (1.1)	2.44 (1.1)
Water Volume, gallons (liters)	83 (314)		83 (314)		62 (236)	
Max. Water Pressure, psi (kPa)	152 (1048)		152 (1048)		152 (1048)	

Max. Refrigerant Press., psi (kPa)	352 (2427)	352 (2427)	352 (2427)

Table 43, Physical Data, AGS 165CB – AGS 195CB (Remote Evaporator)

DATA	AGS MODEL NUMBER					
	165CB		175CB		195CB	
	Ckt 1	Ckt 2	Ckt 1	Ckt 2	Ckt 1	Ckt 2
BASIC DATA						
Unit Operating Charge lbs (kg)	186 (84)	186 (84)	186 (84)	186 (84)	201 (91)	201 (91)
Cabinet Dimensions L x W x H, in. (mm)	263 x 89 x 101 6680 x 2261 x 2565		263 x 89 x 101 6680 x 2261 x 2565		263 x 89 x 101 6680 x 2261 x 2565	
Unit Operating Weight, lbs. (kg)	9571 (4345)		9571 (4345)		9571 (4345)	
Unit Shipping Weight, lbs (kg)	9571 (4345)		9571 (4345)		9571 (4345)	
Add for Copper Fins, lbs (kg	1916 (879)		1916 (879)		1916 (879)	
Economizer	No		No		Yes	
COMPRESSORS, SCREW, SEMI-HERMETIC						
Nominal Capacity, tons (kW)	70 (246)	85 (299)	85 (299)	85 (299)	95 (334)	95 (334)
CONDENSERS, HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLER						
Pumpdown Capacity, lbs (kg)	438 (199)	438 (199)	438 (199)	438 (199)	438 (199)	438 (199)
CONDENSER FANS, DIRECT DRIVE PROPELLER TYPE						
No. of Fans -- Fan Dia., in. (mm)	12		12		12	
No. of Motors -- hp (kW)	12 2 (1.5)		12 2 (1.5)		12 2 (1.5)	
Fan & Motor RPM, 60Hz	1140		1140		1140	
60 Hz Fan Tip Speed, fpm (m/s)	8950 (4224)		8950 (4224)		8950 (4224)	
60 Hz Total Unit Airflow, cfm (l/s)	130360 (61530)		130360 (61530)		130360 (61530)	
REMOTE EVAPORATOR, DIRECT EXPANSION SHELL AND TUBE						
Shell Dia.-Tube Length in.(mm) - in. (mm)	19.4 x 105.1 (493 x 2670)		19.4 x 105.1 (493 x 2670)		19.4 x 105.1 (493 x 2670)	
Operating Weight, lbs (kg)	2283 (1037)		2283 (1037)		2281 (1036)	
Shipping Weight, lbs (kg)	1400 (636)		1400 (636)		1437 (652)	
Evaporator R-134a Charge lbs (kg)	3.16 (1.4)	3.16 (1.4)	3.16 (1.4)	3.16 (1.4)	3.63 (1.6)	3.63 (1.6)
Water Volume, gallons (liters)	106 (401)		106 (401)		106 (401)	
Max. Water Pressure, psi (kPa)	152 (1048)		152 (1048)		152 (1048)	
Max. Refrigerant Press., psi (kPa)	352 (2427)		352 (2427)		352 (2427)	

NOTE: Charge quantity does not include field piping or evaporator.

Installation and Application

Unit Placement

For roof-mounted applications, the unit must be installed on a steel channel or I-beam frame to support the unit above the roof. For ground level applications, the unit must be installed on a substantial base that will not settle. McQuay recommends a one-piece concrete slab with footings extended below the frost line, and the installation engineer should determine its necessity. The foundation must be level within 13 mm (1/2 inch) over its length and width and strong enough to support the unit's operating weight as listed in the Physical Data tables.

On ground level applications, protection against vandalism is recommended, either by the optional factory-installed lower wire mesh guards, by field installed louver kit or a field installed screen fence. Note that the fence must allow free flow of air to the condenser coil for proper unit operation. Wire mesh coil guards are standard.

Operating Limits:

Maximum standby ambient temperature, 130°F (55°C)

Maximum operating ambient temperature, 115°F (46°C), 125°F (52°C) with optional high ambient package (see detailed information on page 13)

Minimum operating ambient temperature (standard), 35°F (2°C)

Minimum operating ambient temperature (with optional low-ambient control), 0°F (-18°C)

Leaving chilled water temperature, 40°F to 60°F (4.4°C to 15.6°C)

Leaving chilled fluid temperatures (with anti-freeze), 20°F to 60°F (-7°C to 16°C),
Unloading is not permitted with fluid leaving temperatures below 30°F (-1°C).

Operating Delta-T range, 6 degrees F to 16 degrees F (3.3 degrees C to 8.9 degrees C)

Maximum operating inlet fluid temperature, 76°F (24°C)

Maximum non-operating inlet fluid temperature, 100°F (38°C)

Ice Mode

No special options are required for ice mode operation. The standard controller software will require “ice” setpoint changes and a digital signal into the controller is required to change to the ice mode and back to standard cooling. See Figure 9, Typical Field Wiring Diagram for connection location. The unit will operate at full load until the shutoff temperature is reached. Optional double evaporator insulation is recommended.

Clearances

Air-cooled units require free air flow to and from the condenser coils. Install units per the listed installation clearances. There must be **no obstructions** above the fan discharge that can cause air recirculation. Air restriction and recirculation can cause high-pressure trips and will reduce capacity, efficiency, and compressor life. Do not install ductwork on condenser fans. Structures, other equipment, fencing, plants, and trees must be considered for air flow interference. Ventilators and any sources of contaminated or heated discharges gases and air will affect system performance. Pit type installation must meet McQuay’s requirements.

The power wiring connection is made at the front of the control panel as noted on the dimension drawings.

Service Access

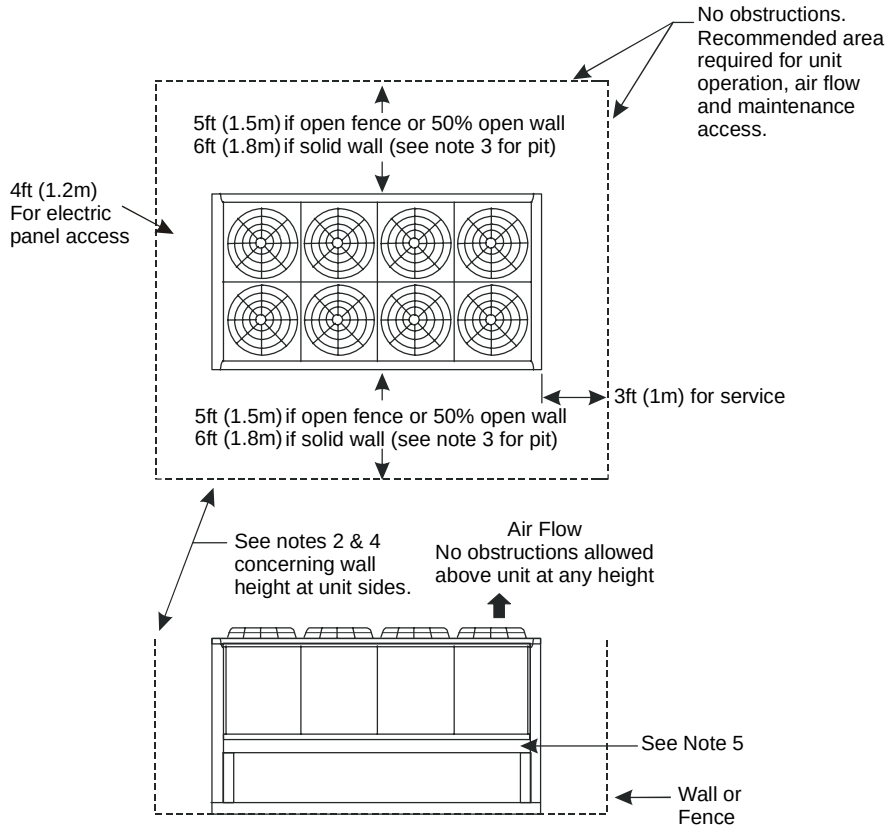
Compressors, filter-driers, and manual liquid line shutoff valves are accessible on the sides and end of the unit.

The side clearance required for air flow provides sufficient service clearance.

On all AGS units the condenser fans and motors can be removed from the top of the unit. The complete fan/motor assembly can be removed for service.

Do not block access to the sides or ends of the unit with piping or conduit. These areas must be open for service access. Do not block any access to the control panels with field-mounted disconnect switches.

Figure 25, Clearance Requirements, AGS 120C – 210C



Notes:

1. Minimum side clearance between two units is 12 feet (3.7 meters).
2. Unit must not be installed in a pit or enclosure that is deeper or taller than the height of the unit unless extra clearance is provided per note 4.
3. Minimum clearance on each side is 8 feet (2.4 meters) when installed in a pit no deeper than the unit height.
4. Minimum side clearance to a side wall or building taller than the unit height is 6 feet (1.8 meters) provided no solid wall above 16 feet.(8 meters) is closer than 12 feet (3.7 meters) to the opposite side of the unit.
5. Do not mount electrical conduits where they can block service access to compressor controls, refrigerant driers or valves.
6. There must be no obstruction of the fan discharge.
7. Field installed switches must not interfere with service access or air flow.
8. The evaporator can be removed from the side of the unit.

Restricted Air Flow

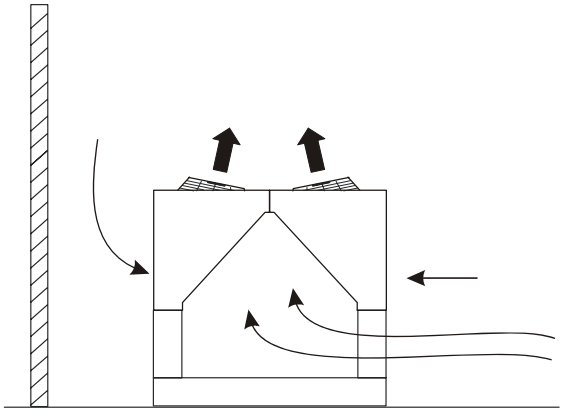
General

The clearances required for design operation of GeneSys air-cooled chillers are described in the previous section. Occasionally, these clearances cannot be maintained due to site restrictions such as units being too close together or a fence or wall restricting airflow, or both.

Fortunately, the McQuay GeneSys chillers have several features that can mitigate the penalties attributable to restricted airflow.

- The condenser section is “W” shaped, as shown below. This allows inlet air for these coils to come in from both sides and the bottom. All the coils in one "V" section serve one compressor. Every compressor always has its own independent refrigerant circuit.
- The MicroTech II control is proactive in response to “off-design conditions”. In the case of single or compounded influences restricting airflow to the unit, the microprocessor will act to keep the compressor(s) running (at reduced capacity) rather than allowing a shut-off on high discharge pressure.

Figure 26, Coil and Fan Arrangement



The following sections discuss the most common situations of condenser air restriction and give capacity and power adjustment factors for each. Note that in unusually severe conditions, the MicroTech II controller will adjust the unit operation to remain online until a normal condition is reached.

Case 1, Building or Wall on One Side of One Unit

The existence of a screening wall or the wall of a building in close proximity to an air-cooled chiller is common in both rooftop and ground level applications. Hot air recirculation on the coils adjoining the wall will increase compressor discharge pressure, decreasing capacity and increasing power consumption.

When close to a wall, it is desirable to place chillers on the north or east side of them. It is also desirable to have prevailing winds blowing parallel to the unit's long axis. The worst case is to have wind blowing hot discharge air into the wall.

Figure 27, Unit Adjacent to Wall

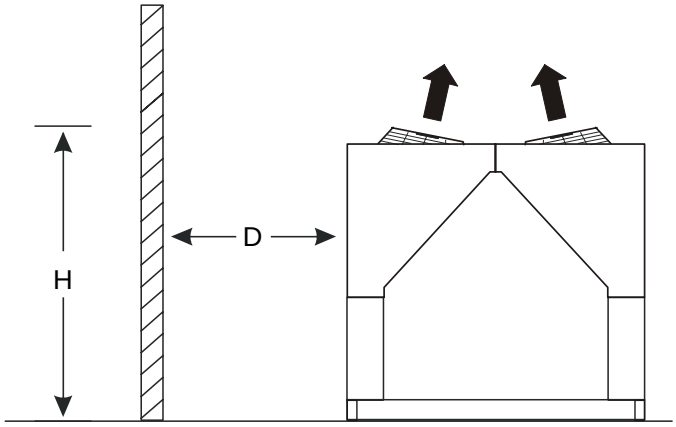
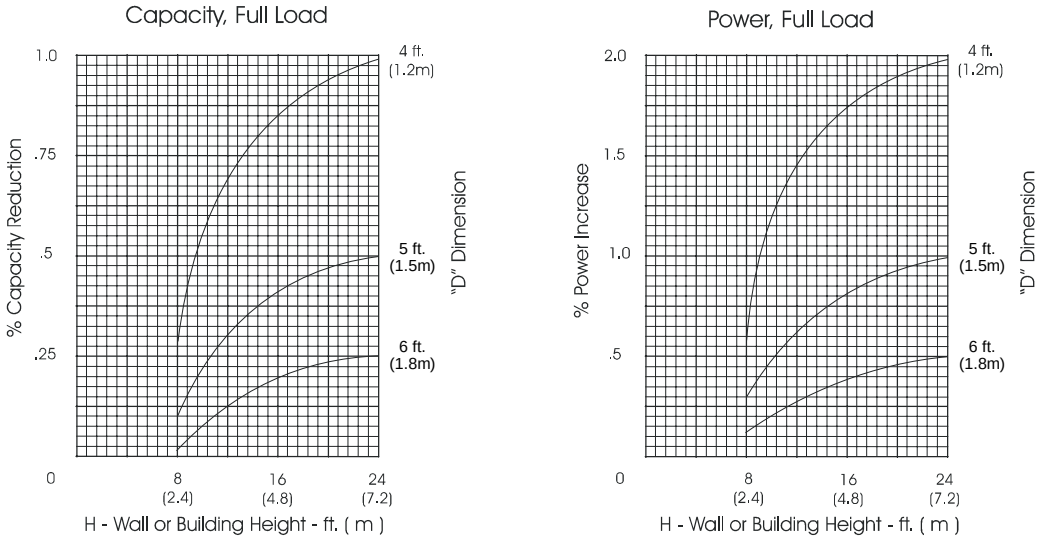


Figure 28, Adjustment Factors



Case 2, Two Units Side By Side

Two or more units sited side by side are common. If spaced closer than 12 feet (3.7 meters) it is necessary to adjust the performance of each unit; circuits adjoining each other are affected. If one of the two units also has a wall adjoining it, see Case 1. Add the two adjustment factors together and apply to the unit located between the wall and the other unit.

Mounting units end to end will not necessitate adjusting performance.

Do not use pit or solid wall surrounds where the ambient air temperature exceeds 105°F (40°C).

Figure 29, Two Units Side by Side

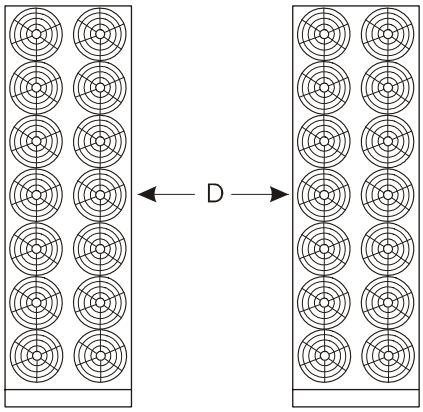
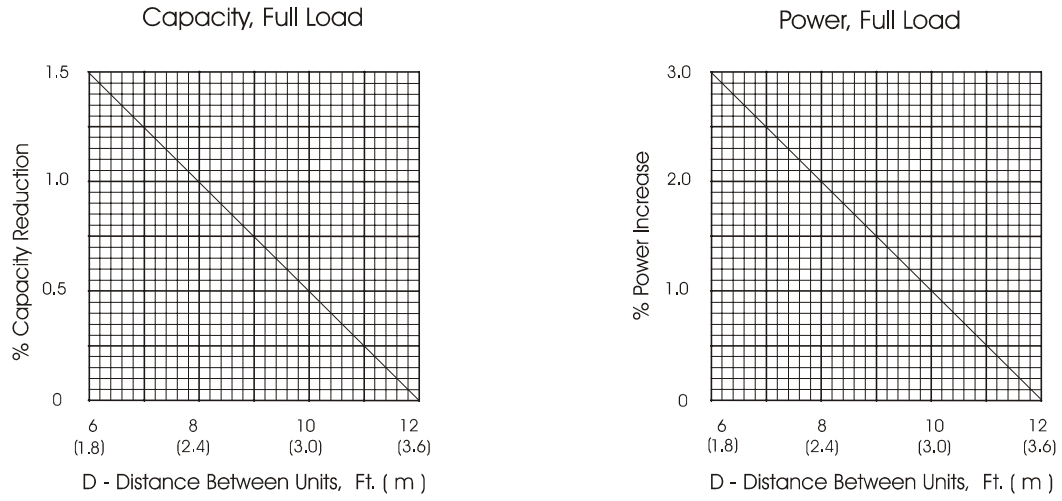


Figure 30, Adjustment Factor



Case 3, Three or More Units Side By Side

When three or more units are side by side, the outside chillers (1 and 3 in this case) are influenced by the middle unit only on their inside circuits. Their adjustment factors will be the same as Case 2. All inside units (only number 2 in this case) are influenced on both sides and must be adjusted by the factors shown below.

Figure 31, Three or More Units

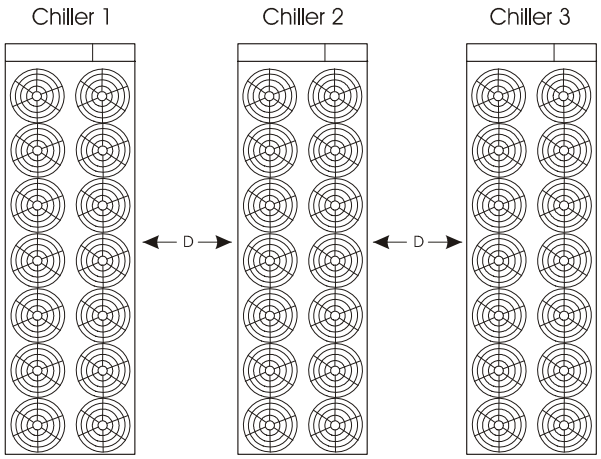
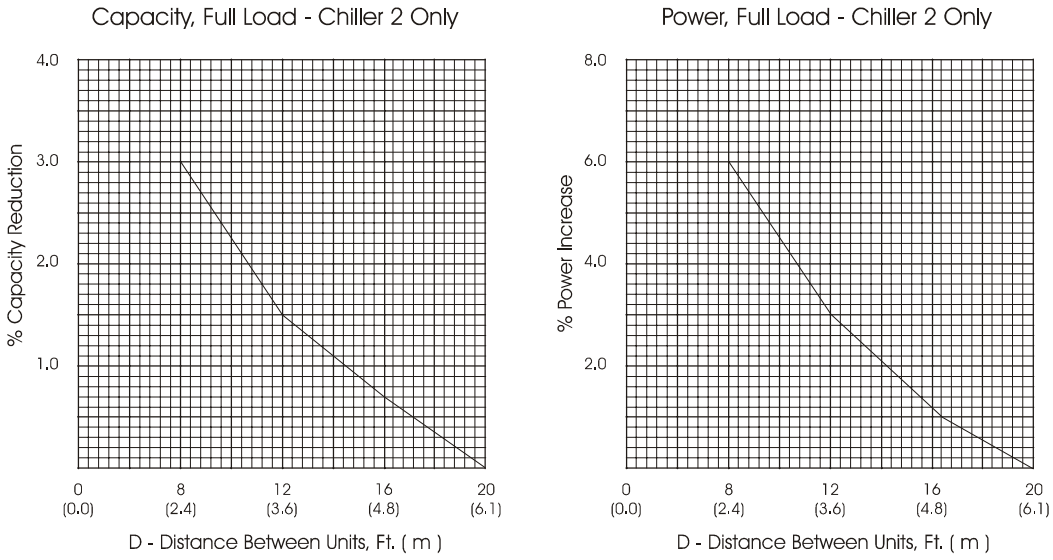


Figure 32, Adjustment Factor



Case 4, Open Screening Walls

Decorative screening walls are often used to help conceal a unit either on grade or on a rooftop. Design these walls such that the combination of their open area and distance from the unit do not require performance adjustment. It is assumed that the wall height is equal to or less than the unit height when mounted on its base support. This is usually satisfactory for concealment. If the wall height is greater than the unit height, see Case 5, Pit Installation.

The distance from the sides of the unit to the side walls must be sufficient for service, such as opening control panel doors.

If each side wall is a different distance from the unit, the distances can be averaged providing either wall is not less than 8 feet (2.4 meters) from the unit. For example, do not average 4 feet and 20 feet to equal 12 feet (1 meter and 5 meters to equal 3 meters).

Figure 33, Open Screening Walls

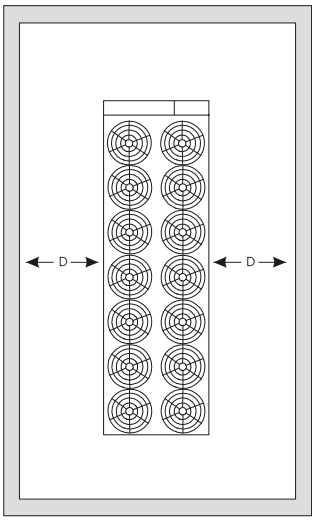
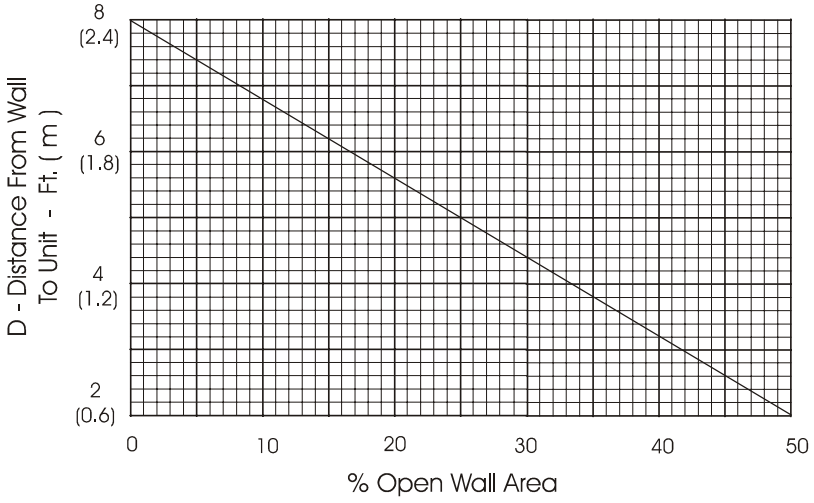


Figure 34, Wall Free Area vs Distance



Case 5, Pit/Solid Wall Installation

Pit installations can cause operating problems. Use care if they are to be used on an installation. Recirculation and restriction can both occur. A solid wall surrounding a unit is substantially the same as a pit and the data presented here should be used.

Steel grating is sometimes used to cover a pit to prevent accidental falls or trips into the pit. The grating material and installation design must be strong enough to prevent such accidents, yet provide abundant open area or serious recirculation problems will occur. Have any pit installation reviewed by the McQuay sales representative prior to installation to make sure it has sufficient air-flow characteristics. The installation design engineer must approve the work to avoid an unreasonable risk of accident.

Figure 35, Pit Installation

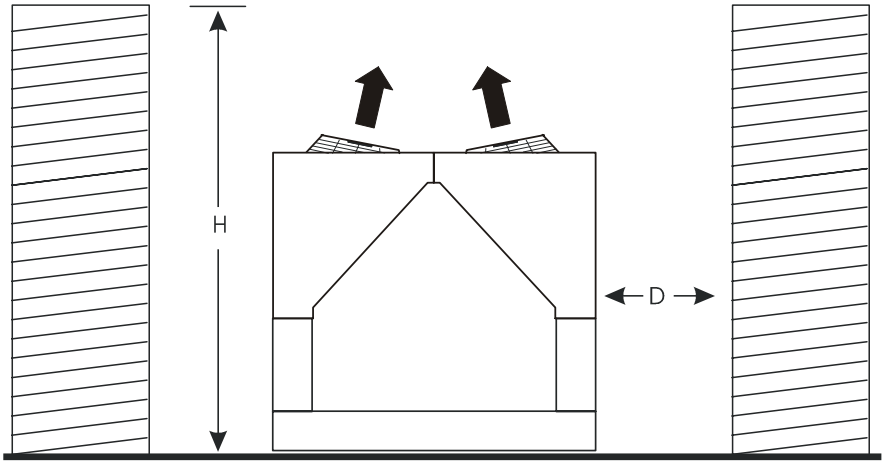
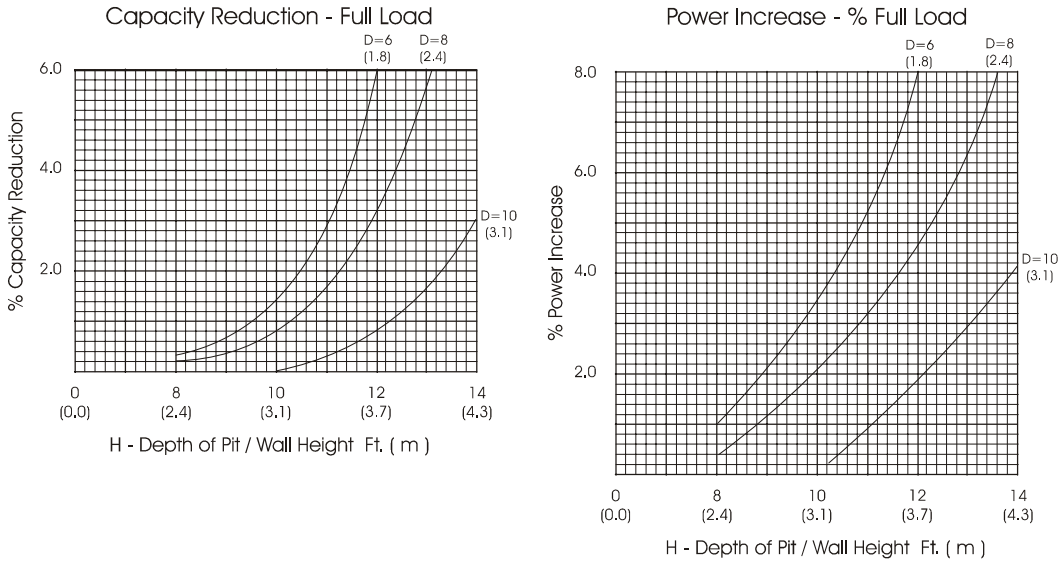


Figure 36, Adjustment Factor



Chilled Water Systems

Chilled water piping for McQuay chillers must be designed and installed in conformance with the system recommendations described in American Society of Heating Refrigeration and Air-Conditioning Engineers, Inc. (ASHRAE) Handbooks.

Multiple Units

Chillers are frequently installed in multiple. Doing so provides standby reliability and improved performance, and is recommended. Multiplicity of machines, however, can result in unexpected problems where chiller controls or capacity reduction are overlooked in the design. Single chiller installations are equally susceptible to application oversight. The following offers supplemental information to that discussed in ASHRAE handbooks for the purpose of minimizing installation problems.

Water Flow

Chilled water systems are normally designed with leaving chilled water temperatures of 42°F to 50°F (5°C to 10°C), a 10 degree F (5.5 degree C) water temperature difference and 0.0001 (0.0176) fouling factor. Catalog performance tables display data for the chillers at these conditions. Actual design can be different, and McQuay Product Manuals include adjustment factors or special rating tables to account for other conditions.

1. Addition of secondary coolants such as ethylene glycol
2. Variances from 10 degree F (5.5 degree C) water temperature differences
3. Greater than standard water fouling
4. Elevation and ambient air temperatures

Specifications and start-up procedures should:

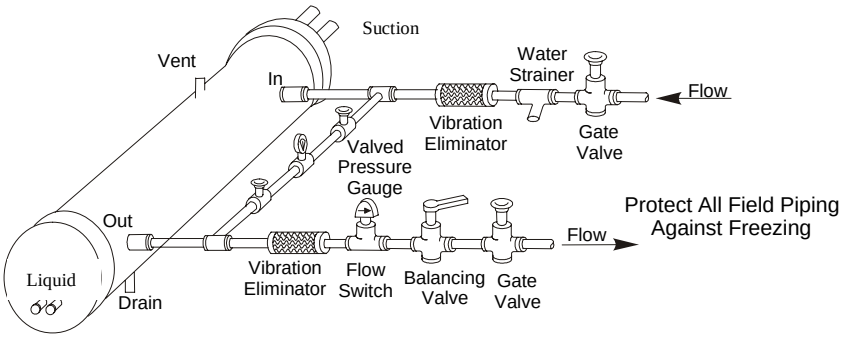
1. Confirm that the chilled water piping system had been properly flushed out before being connected to the chiller vessel.
2. Confirm that the piping contains:
   a) A cleanable 40-mesh strainer to remove impurities before they reach the chiller vessel
   b) An expansion tank in the piping
   c) An air vent located at the system high point to purge trapped air in the piping system. An air vent is also located at the top of each water head of the evaporator. Each evaporator water head is also provided with a drain connection.

All water systems include air in solution with the water. The percentage of air that can be retained in solution is a function of the water temperature and water pressure. Since these two values change in both chilled and hot water systems, the presence of both "b" and "c" components listed above are vital to the successful operation of the system.

The presence of a cleanable filter or strainer (2a above) in a chilled water piping system is frequently taken for granted. The fact is that the filter or strainer may be inadequate for the installation or may be installed in the wrong location.

Many chiller installations today are replacements for older less efficient machines or chillers with obsolete refrigerants. Existing piping is drained down, opened to atmosphere, and reconnected to the new chiller vessel. Rust formed over the years and during the replacement process can break loose, pass through a conventional strainer, and settle in the chiller vessel, that is frequently the lowest point in the piping system. Use a higher capacity filter for these installations and chemical treatment of the water.

Figure 37, Typical Chilled Water Piping



Note: The cross piping for the pressure gauge can be as small as ¼ inch. The purpose of this arrangement is to provide an easy method to use one gauge to accurately measure both pressures

Checking Water Flow

The simplest method of checking water flow in a clean system (the chiller vessel has not been fouled nor is air bound), is to read the entering and leaving pressures and compare the actual pressure drop to the value published in the product catalog.

Pressure drops at the job are read in psi or feet of water. Published values are displayed in feet of water. Use the following formula to convert from one to another.

Feet of water x 2.31 = psi

System Water Volume

It is important to have adequate water volume in the system to provide an opportunity for the chiller to sense a load change, adjust to the change and stabilize. As the expected load change becomes more rapid, a greater water volume is needed. The system water volume is the total amount of water in the evaporator, air handling products and associated piping. If the water volume is too low, operational problems can occur including rapid compressor cycling, rapid loading and unloading of compressors, erratic refrigerant flow in the chiller, improper motor cooling, shortened equipment life and other undesirable occurrences.

For normal comfort cooling applications where the cooling load changes relatively slowly, we recommend a minimum system volume in gallons of 4 times the flow rate (gpm). For example, if the design chiller flow rate is 350 gpm, we recommend a minimum system volume of 1400 gallons (350 gpm x 4).

Since there are many other factors that can influence performance, systems can successfully operate below these suggestions. However, as the water volume decreases below these suggestions, the possibility of problems increases.

Evaporator Freeze Protection

Evaporator freeze-up can be a concern in the application of air-cooled water chillers. To protect against freeze-up, insulation and an electric heater cable are furnished with

the unit. This protects the evaporator down to -20°F (-29°C) ambient air temperature. Although the evaporator is equipped with freeze protection, it does not protect water piping external to the unit or the evaporator itself if there is a power failure or heater cable burnout. Consider the following recommendations for additional protection.

1. If the unit will not be operated during the winter, drain evaporator and chilled water piping and flush with glycol. Drain and vent connections are provided on the evaporator to ease draining.
2. Add a glycol solution to the chilled water system to provide freeze protection. Freeze point should be approximately ten degrees below minimum design ambient temperature.
3. The addition of thermostatically controlled heat and insulation to exposed piping.
4. Continuous circulation of water through the chilled water piping and evaporator.

The evaporator heater cable is factory wired to the 115-volt circuit in the control box. This power can be supplied from a separate source, or it can be supplied from the control circuit. Operation of the heater cable is automatic through the ambient sensing thermostat that energizes the evaporator heater cable for protection against freeze-up. Unless the evaporator is drained in the winter, the disconnect switch to the evaporator heater must be closed. Conversely, do not apply heat to the evaporator if it is drained.

Table 44, Freeze Protection

Temperature °F (°C)	Percent Volume Glycol Concentration Required			
	For Freeze Protection		For Burst Protection	
	Ethylene Glycol	Propylene Glycol	Ethylene Glycol	Propylene Glycol
20 (6.7)	16	18	11	12
10 (-12.2)	25	29	17	20
0 (-17.8)	33	36	22	24
-10 (-23.3)	39	42	26	28
-20 (-28.9)	44	46	30	30
-30 (-34.4)	48	50	30	33
-40 (-40.0)	52	54	30	35
-50 (-45.6)	56	57	30	35
-60 (-51.1)	60	60	30	35

NOTES:
1. These figures are examples only and cannot be appropriate to every situation. Generally, for an extended margin of protection, select a temperature at least 10°F lower than the expected lowest ambient temperature. Inhibitor levels should be adjusted for solutions less than 25% glycol.
2. Glycol of less than 25% concentration is not recommended because of the potential for bacterial growth and subsequent loss of heat transfer efficiency. Additional inhibitors may be required.

Chilled Water Pump

The starters for chilled water pumps should be wired to, and controlled by, the chiller's microprocessor. The controller will energize the pump whenever at least one circuit on the chiller is *enabled* to run, whether there is a call for cooling or not. Connection points are shown in Figure 9 on page 41.

Variable Speed Pumping

Variable water flow involves changing the water flow through the evaporator as the load changes. McQuay chillers are designed for this duty provided that the rate of change in water flow is slow and the minimum and maximum flow rates for the vessel are not exceeded. The recommended maximum change in water flow is 10 percent of the change per minute and the water flow must remain between the minimum and maximum values listed on page 24.

Electrical Connections

All wiring must be done in accordance with applicable local and national codes.

GeneSys units can be ordered with either standard multiple point power or optional single point power connections and with various disconnect and circuit breaker options. Wiring within the unit is sized in accordance with the U.S.A. National Electrical Code. Field-supplied disconnect switches are required if not factory-supplied with the unit.

Table 45, Electric Power Connection Options

Multi-Point Power Connection	Single Point Power Connection
Standard: 2 power blocks, no disconnect switches, no compressor isolation circuit breakers	Optional: 1 power block, 2 compressor isolation circuit breakers
Optional: 2 disconnect switches replacing the power blocks, no compressor isolation circuit breakers	Optional: 1 disconnect switch replacing the power block, 2 compressor isolation circuit breakers
Optional: 2 high interrupt rated disconnect switches, no compressor circuit breakers	Optional: 1 high interrupt rated disconnect switch, 2 standard isolation circuit breakers
Optional: high short circuit current rated panel, 2 high interrupt disconnect switches, no compressor circuit breakers	Optional: high short circuit current rated panel, 1 high interrupt disconnect switch, 2 isolation circuit breakers

NOTES:

1. Disconnect switches are molded case construction with lockable through-the-door handles. They can be used to remove the unit/circuit from the power system.
2. The individual compressor isolation circuit breakers for each circuit isolate the compressor and do *not* have through-the-door handles. They are operable only after the panel doors are opened.
3. The high short circuit rated panel means that a short circuit current up to the ratings shown in Table 46 will be contained in the panel. There is a short period of time when the circuit breaker will pass a short circuit before opening a circuit that can damage downstream components. In other words, the enclosure is stronger than a standard enclosure. It has a high interrupt rated disconnect switch(es).
4. The factory-mounted control power transformer is protected by fuses.
5. Condenser fans are protected and isolated by circuit breakers.

Table 46, Interrupt Ratings (kAmps)

VOLTAGE	STANDARD SHORT CIRCUIT PANEL RATING	HIGH INTERRUPT DISCONNECT SWITCH	HIGH SHORT CIRCUIT RATED PANEL
208-230	5 kA	200 kA	65 kA
380-460	5 kA	100 kA	65 kA
575	5 kA	25 kA	25 kA

Disconnecting means are addressed by Article 440 of the U.S.A. National Electrical Code (NEC) which requires "disconnecting means capable of disconnecting air conditioning and refrigerating equipment including motor-compressors, and controllers from the circuit feeder." Select and locate the disconnect switch per the NEC guidelines. Maximum recommended fuse sizes are given in the electrical data tables of this catalog for help in sizing the disconnect.

Terminals are provided in a unit control panel for optional field hookup of the control circuit to a separate fused 115-volt power supply in lieu of the standard factory installed control transformer.

Terminals are provided in the unit control center for field hookup of the evaporator heater to either a separate 115-volt power supply or to control circuit power.

Vibration Isolators

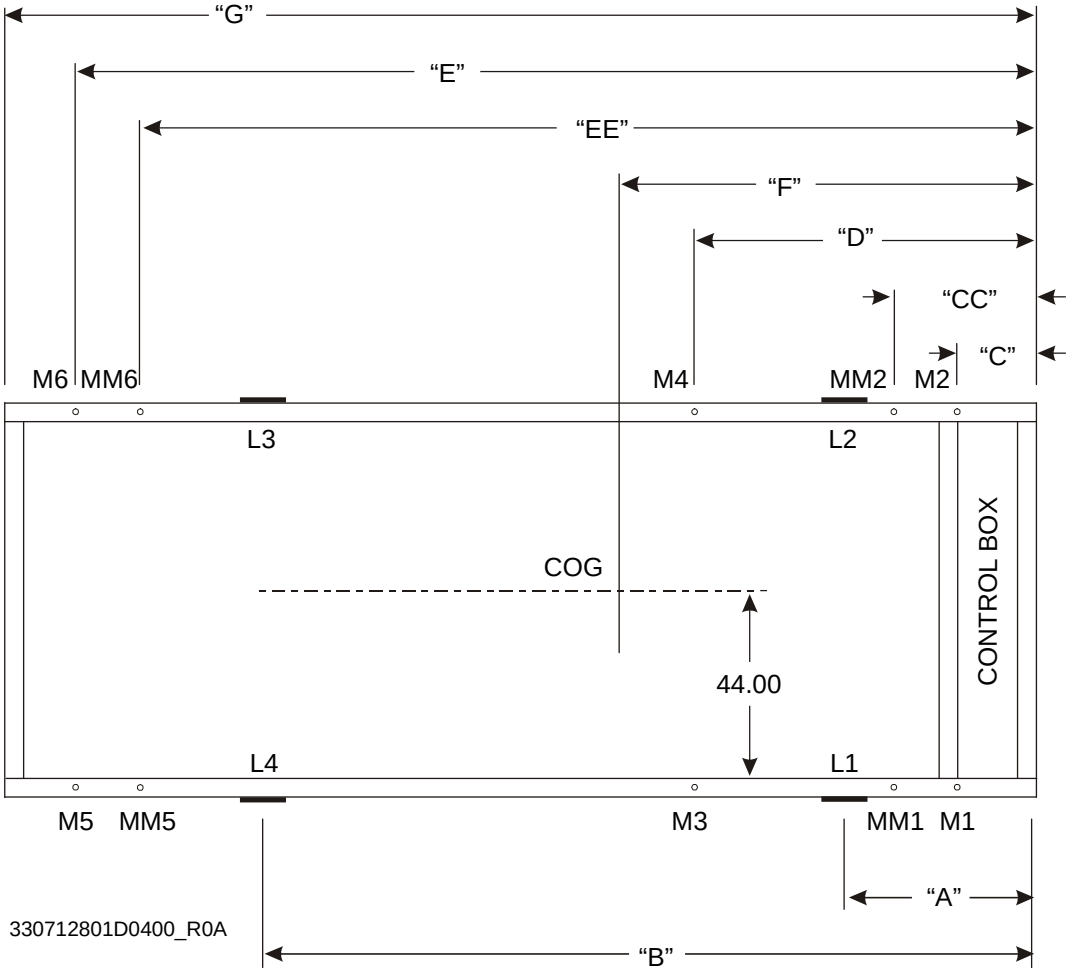
Vibration isolators are recommended for all roof-mounted installations or wherever vibration transmission is a consideration. Initially installed the unit on shims or blocks at the illustrated "free height" of the isolator that is six inches for the McQuay isolators shown. When all piping, wiring, flushing, charging, etc. is complete, adjust the springs upward to load them and to provide clearance to free the blocks, which are then removed.

Installation of spring isolators requires flexible pipe connections and at least three feet of conduit flex tie-ins. Support piping and conduit independently from the unit to not stress connections.

There are separate weight and isolator tables for copper fin coils. All other coil types, such as ElectroFin and Blackfin, use the aluminum fin data.

Isolator bolting: the unit base is an enclosed box design and has six mounting locations. Mounting locations M1 and M2 at dimension “C” and locations M5 and M6 at dimension “E” do not have access in the base to allow bolting isolators to the base and can be used for isolators that do not require bolting to the unit base. Locations MM1, MM2, M3, M4, MM5 and MM6 have access holes on top of the base, above the lower mounting holes. One simple method of bolting the base to the isolators is to remove the short threaded studs, usually provided with isolators, and replace them with eight-inch threaded rod. The rod will extend above the top of the base and a washer and nut can then be easily attached.

Figure 38, Mounting and Lifting Dimensions



NOTE: Dimensions are on the following page.

Table 47, Dimensions

MODEL	A	B	C	CC	D	E	EE	F	G
120	36.00	136.60	12.00	21.00	57.30	174.60	165.60	71.49	186.60
125	36.00	168.85	12.00	21.00	69.25	212.80	203.80	86.54	224.80
130	36.00	136.60	12.00	21.00	57.30	174.60	165.60	71.49	186.60
135	36.00	168.85	12.00	21.00	69.25	212.80	203.80	86.54	224.80
140	36.00	136.60	12.00	21.00	57.30	174.60	165.80	71.49	186.60
145	36.00	168.85	12.00	21.00	69.25	212.80	203.80	86.66	224.80
160	36.00	136.60	12.00	21.00	57.30	174.60	165.60	74.37	186.60
165	36.00	189.00	12.00	21.00	84.00	251.00	242.00	105.17	263.00
170	36.00	168.85	12.00	21.00	69.25	212.80	203.80	89.65	224.80
175	36.00	189.00	12.00	21.00	84.00	251.00	242.00	105.17	263.00
180	36.00	168.85	12.00	21.00	69.25	212.80	203.80	89.65	224.80
190	36.00	168.85	12.00	21.00	69.25	212.80	203.80	89.65	224.80
195	36.00	189.00	12.00	21.00	84.00	251.00	242.00	105.17	263.00
210	36.00	189.00	12.00	21.00	84.00	251.00	242.00	105.17	263.00

NOTES:

1. Center of gravity (F) is calculated from shipping weight
2. Dimensions are in inches.
3. Mounting holes are 0.75 inch diameter and have center located 2.0 inches from the outside edge.

Table 48, Lifting and Mounting Weights, Packaged, Aluminum Fins, Standard Isolators Only, AGS-CS/H

AGS	Lifting Weights				Mounting Weights						Operating Weight		Shipping Weight	
	L1, L2		L3, L4		M1, M2		M3, M4		M5, M6					
	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg
120	2919	1324	1591	722	1749	793	1645	746	1333	605	9452	4287	9020	4091
125	3161	1434	1941	880	1996	905	1887	856	1583	718	10930	4958	10205	4629
130	2919	1324	1591	722	1749	793	1645	746	1333	605	9452	4287	9020	4091
135	3161	1434	1941	880	1996	905	1887	856	1583	718	10930	4958	10205	4629
140	2919	1324	1591	722	1749	793	1645	746	1333	605	9452	4287	9020	4091
145	3075	1395	1896	860	1916	869	1810	821	1517	688	10485	4756	9942	4510
160	2933	1330	1809	821	1802	817	1742	790	1561	708	10209	4631	9484	4302
165	3017	1369	2489	1129	2137	969	2038	924	1789	811	11928	5411	11011	4995
170	3269	1483	2007	910	1945	882	1904	864	1790	812	11277	5115	10552	4786
175	3017	1369	2489	1129	2137	969	2038	924	1789	811	11928	5411	11011	4995
180	3269	1483	2007	910	1945	882	1904	864	1790	812	11277	5115	10552	4786
190	3269	1483	2007	910	1945	882	1904	864	1790	812	11277	5115	10552	4786
195	3017	1369	2489	1129	2137	969	2038	924	1789	811	11928	5411	11011	4995
210	3017	1369	2489	1129	2137	969	2038	924	1789	811	11928	5411	11011	4995

Table 49, Lifting and Mounting Weights, Packaged Copper Fins, Standard Isolators Only, AGS-CS/H

AGS	Lifting Weights				Mounting Weights						Operating Weight		Shipping Weight	
	L1, L2		L3, L4		M1, M2		M3, M4		M5, M6					
	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg
120	3557	1613	2229	1011	2174	986	2070	939	1758	798	10728	4866	10296	4670
125	3959	1796	2739	1242	2528	1147	2419	1097	2115	959	12526	5682	11801	5353
130	3557	1613	2229	1011	2174	986	2070	939	1758	798	10728	4866	10296	4670
135	3959	1796	2739	1242	2528	1147	2419	1097	2115	959	12526	5682	11801	5353
140	3557	1613	2229	1011	2174	986	2070	939	1758	798	10728	4866	10296	4670
145	3873	1757	2694	1222	2448	1110	2342	1062	2049	929	12081	5480	11538	5234
160	3571	1620	2447	1110	2227	1010	2167	983	1986	901	11485	5210	10760	4881
165	3975	1803	3447	1564	2776	1259	2677	1214	2428	1101	13844	6280	12927	5864
170	4067	1845	2805	1272	2477	1124	2436	1105	2322	1053	12873	5839	12148	5510
175	3975	1803	3447	1564	2776	1259	2677	1214	2428	1101	13844	6280	12927	5864
180	4067	1845	2805	1272	2477	1124	2436	1105	2322	1053	12873	5839	12148	5510
190	4067	1845	2805	1272	2477	1124	2436	1105	2322	1053	12873	5839	12148	5510
195	3975	1803	3447	1564	2776	1259	2677	1214	2428	1101	13844	6280	12927	5864
210	3975	1803	3447	1564	2776	1259	2677	1214	2428	1101	13844	6280	12927	5864

Table 50, Lifting & Mounting Weights, Remote Aluminum Fins, Standard or Bolted Isolators, AGS-CM/B

AGS	Lifting Weights				Mounting Weights						Operating Weight		Shipping Weight	
	L1, L2		L3, L4		MM1, MM2		MM3, MM4		MM5, MM6					
	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg
120	3029	1374	1021	463	1780	807	1521	690	749	340	8100	3674	8100	3674
125	3169	1437	1307	593	1938	879	1659	753	879	399	8952	4061	8952	4061
130	3029	1374	1021	463	1780	807	1521	690	749	340	8100	3674	8100	3674
135	3169	1437	1307	593	1938	879	1659	753	879	399	8952	4061	8952	4061
140	3029	1374	1021	463	1780	807	1521	690	749	340	8100	3674	8100	3674
145	3169	1437	1307	593	1938	879	1659	753	879	399	8952	4061	8952	4061
160	3029	1374	1021	463	1780	807	1521	690	749	340	8100	3674	8100	3674
165	3196	1450	1590	721	2099	952	1764	800	923	419	9571	4341	9571	4341
170	3169	1437	1307	593	1938	879	1659	753	879	399	8952	4061	8952	4061
175	3196	1450	1590	721	2099	952	1764	800	923	419	9571	4341	9571	4341
180	3169	1437	1307	593	1938	879	1659	753	879	399	8952	4061	8952	4061
190	3169	1437	1307	593	1938	879	1659	753	879	399	8952	4061	8952	4061
195	3196	1450	1590	721	2099	952	1764	800	923	419	9571	4341	9571	4341
210	3196	1450	1590	721	2099	952	1764	800	923	419	9571	4341	9571	4341

Table 51, Lifting & Mounting Weights, Remote Copper Fins, Standard or Bolted Isolators, AGS-CM/B

AGS	Lifting Weights				Mounting Weights						Operating Weight		Shipping Weight	
	L1, L2		L3, L4		MM1, MM2		MM3, MM4		MM5, MM6					
	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg
120	3667	1663	1659	753	2205	1000	1946	883	1174	533	9376	4253	9376	4253
125	3967	1799	2105	955	2470	1120	2191	994	1411	640	10548	4785	10548	4785
130	3667	1663	1659	753	2205	1000	1946	883	1174	533	9376	4253	9376	4253
135	3967	1799	2105	955	2470	1120	2191	994	1411	640	10548	4785	10548	4785
140	3667	1663	1659	753	2205	1000	1946	883	1174	533	9376	4253	9376	4253
145	3967	1799	2105	955	2470	1120	2191	994	1411	640	10548	4785	10548	4785
160	3667	1663	1659	753	2205	1000	1946	883	1174	533	9376	4253	9376	4253
165	4154	1884	2548	1156	2738	1242	2403	1090	1562	708	11487	5211	11487	5211
170	3967	1799	2105	955	2470	1120	2191	994	1411	640	10548	4785	10548	4785
175	4154	1884	2548	1156	2738	1242	2403	1090	1562	708	11487	5211	11487	5211
180	3967	1799	2105	955	2470	1120	2191	994	1411	640	10548	4785	10548	4785
190	3967	1799	2105	955	2470	1120	2191	994	1411	640	10548	4785	10548	4785
195	4154	1884	2548	1156	2738	1242	2403	1090	1562	708	11487	5211	11487	5211
210	4154	1884	2548	1156	2738	1242	2403	1090	1562	708	11487	5211	11487	5211

Table 52, Spring Flex Isolators

Housing	Spring Color	Max. Load Each Lbs. (kg)	Defl. In. (mm)	Dimensions In. (mm)					Housing Part Number	Spring Part Number
				A	B	C	D	E		
CP-2-27	**Orange**	1500 (681)	0.5 (12.7)	10.2 (259.1)	9.0 (228.6)	7.7 (195.6)	2.7 (68.6)	5.75 (146.0)	226103B-00	(2) 226117A-00
CP-2-28	**Green**	1800 (815)	0.5 (12.7)	10.2 (259.1)	9.0 (228.6)	7.7 (195.6)	2.7 (68.6)	5.75 (146.0)	226103B-00	(2) 226118A-00
CP-2-31	**Gray**	2200 (998)	0.5 (12.7)	10.2 (259.1)	9.0 (228.6)	7.7 (195.6)	2.7 (68.6)	5.75 (146.0)	226103B-00	(2) 226119A-00
CP-2-32	**White**	2600 (1180)	0.5 (12.7)	10.2 (259.1)	9.0 (228.6)	7.7 (195.6)	2.7 (68.6)	5.75 (146.0)	226103B-00	(2) 226120A-00

Table 53, Neoprene-in-Shear Isolators

Type		Max. Load Each Lbs. (kg)	Defl. In. (mm)	Pin	McQuay Part Number
RP-4	**Black**	1500 (681)	0.25 (6.4)	1/2 in. 13NC-28	216398A-04
RP-4	**Red**	2250 (1019)	0.25 (6.4)	1/2 in. 13NC-28	216398A-01
RP-4	**Green**	3300 (1497)	0.25 (6.4)	1/2 in. 13NC-28	216398A-03

Note (1) "D" is the mounting hole diameter.

Figure 39, Spring Flex Mountings

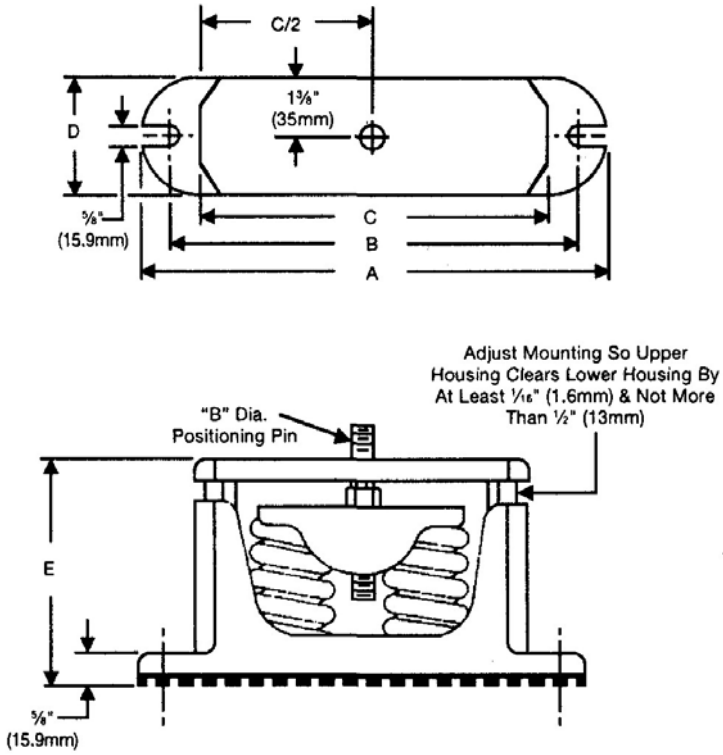
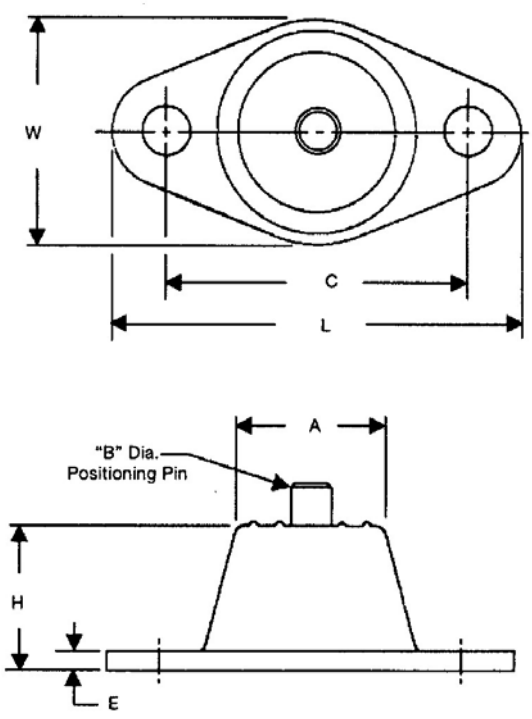


Figure 40, Single Neoprene-in-Shear Mounting



Standard Features

Full Factory Testing

Factory run tests with water hookups on all units prior to shipment help provide a trouble free start-up. McQuay performs extensive quality control checks and individual unit tests so that all controls are properly adjusted and operating correctly. Job site start-up and expenses are kept to a minimum as the unit is shipped ready to operate. Each packaged unit is pressure tested, evacuated, and charged with a full operating charge of R-134a refrigerant and oil. Remote evaporator units have an operating charge in the outdoor unit, and require field charging for the evaporator and for the field piping.

Construction

The heavy-duty welded steel base, steel structural members and sheet-metal panels are painted with corrosion-resistant, 500-hour salt spray paint (passes ASTM B117). This finish enhances the appearance of the unit and deters corrosion.

The GeneSys air-cooled screw chillers are designed for easy handling and low installation costs. The channel base distributes the unit weight for uniform low roof loading. Lifting tabs are provided on the base of the unit to simplify installation. See dimension drawing for location.

Compressors

All units feature multiple compressors with independent refrigerant circuits. The compressor is a direct drive, 3600 rpm, single-screw type with one main rotor that meshes with two diametrically opposed gaterotors. The two exactly opposed gaterotors create two exactly opposed compression cycles resulting in a well-balanced compression cycle.

Each compressor is equipped with a combination discharge check and shutoff valve.

Evaporator

The evaporator is a single pass, two circuit, direct expansion, shell-and-tube type with water flowing in the shell side and refrigerant residing in the tubes. A special refrigerant distribution plate in the refrigerant inlet head provides even flow through all the tubes.

The evaporator is constructed with a carbon steel shell and seamless high efficiency copper tubes.

The evaporator is insulated with ¾-inch vinyl nitrate polymer sheet insulation and provided with heaters to provide limited freeze protection. The insulation has a K factor of 0.28 at 75°F (24°C). The insulation is fitted and cemented in place. Double insulation is available as an option.

The shell (water) side maximum working pressure is 152 psi (1048 kPa). The tube (refrigerant) side working pressure is 352 psi (2427 kPa). Victaulic® water connections are standard. All evaporators are designed, constructed, inspected and stamped in accordance with the requirements of the ASME Boiler and Pressure Vessel Code.

Condenser Fans and Motors

Multiple direct-drive propeller fans operate in formed bell shaped orifices at low tip speeds for maximum static efficiency and minimum noise and vibration. Each fan is protected by a heavy-gauge, close meshed PVC coated fan guard and is positioned within the unit cabinet for maximum protection against the elements.

Fan motors are weather protected, three-phase, direct-drive, 1140 rpm, totally enclosed air-over motors with class F insulation or better.

As standard, the units will operate down to 35°F (1.7°C). Optional VFD head pressure control on the first fan in each circuit permits unit operation down to 0°F (-18°C) ambient (balance of fans are staged on and off). However, since the actual minimum ambient can be dependent on wind conditions, wind louvers are also available.

Condenser Coils

The condenser coils are constructed with internally enhanced seamless copper tubes arranged in a staggered row pattern and mechanically expanded into McQuay lanced and rippled aluminum fins with full fin collars. The fins have full drawn collars to completely cover the copper tube for protection against atmospheric corrosion and provide excellent heat transfer. An integral subcooler on the air inlet side provides sufficient subcooling to effectively reduce the possibility of liquid flashing and increase unit efficiency. Standard PVC coated wire mesh guards protect the coils.

Control Centers

The GeneSys screw chiller is shipped with all operating and equipment protection controls, phase voltage monitor, control transformer and solid-state motor starting and protection equipment, all factory-wired, operationally tested, and ready for service. The solid-state starter provides:

Controlled acceleration	Electronic thermal overload	Stalled motor protection
Controlled deceleration	Over/under current protection	Single phase protection
Phase rotation protection	Current unbalance protection	High load current

Each compressor has its own controller providing an important reliability feature-in case one compressor's controller malfunctions, the other compressor will continue to operate.

The controls for each circuit are located in a weather-resistant, hinged control center, with tool-locked doors to deter unauthorized entry. The microprocessor controllers are located in a separate panel to separate controls from power wiring and components.

Microprocessor Control

The GeneSys chillers have the McQuay MicroTech II controller with the Protocol Selectability feature to allow easy integration into the building automation system of choice using open, standard protocols such as BACnet, LonTalk or Modbus. The control is described in more detail beginning on page 10.

Optional Features

Controls

Water Flow Switch (Field-Installed, Paddle Type)

(Part Number 01750330) A 150 psig water flow switch is available for field installation in the chilled water piping to protect against evaporator freeze-up under low, or no flow conditions. Terminals are provided in the unit control center for field connection of the water flow detection switch. Installation of a flow detection device is required.

Water Flow Switch (Factory-Installed, Solid State)

A solid state flow switch located in the evaporator outlet nozzle is factory installed and wired. In addition to the electronic output signal, the switch has an LED display to visually indicate the presence of flow. It eliminates the need for a field-installed switch.

The 24 Vac powered flow sensor is a solid state alternative to mechanical switches for sensing the acceptable flow rate of water. These compact units are constructed of corrosion-resistant materials and 316 stainless steel parts and installed directly through a ¼ inch NPT into the flow.

The flow sensors operate on the calorimetric principle. The sensors use the cooling effect of a flowing fluid to provide reliable flow rate detection of liquids over a very wide flow range. The amount of thermal energy that is removed from the tip determines the local flow rate and when it exceeds a setpoint it changes the output-state.

Remote Communication Panel

A remote panel that interfaces with the unit MicroTech controller and allows remote viewing of operation, clearing of alarms and changing of setpoints. See page 13.

BAS Modules

A factory-installed communication module allows LONTALK, BACnet® or Modbus® communications with BAS standard protocols. See page 11 for details.

High Ambient Operation

Option required for operation at ambient temperatures above 115°F (46°C) or when the unit is equipped with the VFD low ambient fan control option. The kit includes a thermostat controlled, panel ventilation fan and inlet grille with filter. The option can be ordered with any unit. Ordering a “High Efficiency” unit does not automatically include this kit, it must be ordered separately. Compressor loading and unloading is adaptively determined by system load, ambient air temperature and other inputs to the MicroTech II control algorithms.

Low Ambient Operation

Factory mounting of a variable frequency drive (VFD) motor on the lead condenser fan motor for each circuit provides for chiller operation between 35°F (2°C) and 0°F (-18°C). Line reactors for the VFDs are included. This option requires the addition of the High Ambient Operation option to remove excess heat.

Electrical

The standard power connection is multi-point to a power block for each of two circuits with no internal isolating circuit breakers or unit disconnects.

NOTE: see Table 46 page 75 for panel ratings, Table 54 for option summary.

Single-Point Connection to Power Block

A single power block mounted in the unit power panel for power connection. Each circuit is factory-wired from the power block to an isolating circuit breaker for each compressor. Multiple-point power block (one circuit per compressor) is standard.

Single-Point Connection to Disconnect Switch
Single power supply to a factory-mounted, molded-case disconnect switch. Each circuit is factory-wired from the disconnect to an isolating circuit breaker for each compressor.

Multi-Point with Disconnect Switches
Separate power supply to a disconnect switch for each of two circuits. Isolating circuit breaker for each compressor are *not* included.

High Interrupting Single-Point Disconnect Switch
High interrupting current rated, factory-mounted disconnect switch. Includes factory-wiring to an additional disconnecting circuit breakers for each circuit. Interrupt ratings are shown in Table 46 on page 75.

High Short Circuit Current Rating Panel, Single Point
High short circuit current rated panel. Includes high interrupting capacity unit disconnect switch and factory-wiring to standard isolating circuit breakers for each circuit. Interrupt ratings are shown in Table 46 on page 75. The high short circuit rated panel means that a short circuit current up to the ratings shown in Table 46 will not destroy the enclosure, even though the internal components may be destroyed.

High Interrupting Multi-Point Disconnect Switch
Separate power supply to each circuit's high interrupt current rated disconnect switch.

High Short Circuit Current Rated Panel, Multi-Point
High short circuit current rated panel. Includes two high interrupting capacity disconnect switches. Interrupt ratings are shown in Table 46 on page 75. The high short circuit rated panel means that a short circuit current up to the ratings shown in Table 46 will not destroy the enclosure, even though the internal components may be destroyed.

Table 54, Power Connection Options

	Multi-Point (Code)	Single Point (Code)	
Power Block	STD (MN)	OPT. Incl CB (PC)	
Disconnect Switch(s)	OPT, No CB (WN)	OPT, Incl CB (DC)	Select Only One of These Options
High Interrupt Disconnect Switch.	OPT, No CB (WT)	OPT, Incl CB (DT)	
High Short Circuit Rated Panel	OPT, No CB (WH)	OPT, Incl CB (DH)	

NOTE:
1. CB = Compressor isolation circuit breaker
2. (Code) is the McQuay ordering code

115 Volt Convenience Outlet
A 10.0 amp, 115-volt convenience outlet mounted inside the control panel is available as a factory-mounted option or as a field-installed kit on all units.

Unit
Remote Evaporator
With this option, the evaporator is shipped loose, along with a kit of refrigeration specialties, for field mounting, piping, insulating and wiring. Typically used in cold climates to eliminate evaporator freeze-up due to low ambient temperatures.

Right-hand Evaporator Water Connections
Right-hand evaporator water connections (as viewed from the control panel) are an available option.

Black Fin Coil
Aluminum fin stock is precoated with a phenolic-epoxy coating with 1000-hour salt spray resistance (ASTM B117-90).

Copper Fin Condenser Coils
Copper fin condenser coils are available as an option on all models.

Baked Epoxy Condenser Fin Coating

Electro Fin™ flexible dip and baked epoxy protective coating with 3000+ hour salt spray resistance (ASTM B117-90) is available on the condenser coils and coil frames. Provides protection against adverse environments such as salt air as found on seacoast applications and many chemical environments. The coating can be applied to copper or aluminum coils. Consult the local McQuay sales office for complete specification and chemical resistance chart.

Protective Base Guards

Optional factory installed wire mesh lower base guards provide protection for ground level installations. Coil guards are standard.

Louvers (Wind and Hail Protection)

- **Coil-Only Louvers**

  The presence of wind will have an adverse affect on any air-cooled chiller. Wind across a condenser coil will not allow a chiller to operate as efficiently, or possibly not even start, at low ambient temperatures. Wind raises the minimum ambient temperature in which the chiller can operate. The McQuay AGS-C air-cooled chillers are available with factory-installed (or as a field-installed kit) coil louvers, which allow the chiller to operate effectively down to the ambient temperature for which it was designed.

  Hail can have a damaging effect on the performance of an air-cooled condenser. As the finned area is flattened against the coil, restricting airflow, the efficiency of the coil is reduced.

- **Coil and Base Louvers**

  The coil louvers can also be supplied with base louvers, which when combined, enclose the entire side and end of the unit. The base louvers are primarily for appearance and provide some protection against vandalism. This option is available as factory-mounted or as a field-installed kit.

Vibration Isolators

Spring or rubber-in-shear vibration isolators are available for field installation under the unit base frame on sound sensitive applications. Consult the local McQuay sales office for seismic isolation.

Double Evaporator Insulation

Double evaporator thermal insulation is available and recommended for low fluid temperature applications.

Sound Enclosure

The sound enclosure option reduces unit sound per the values shown on page 26. Consists of a sheet metal enclosure with isolation material inside.

Suction Shutoff Valves

Factory-mounted suction shutoff valves that, when used in conjunction with the compressor discharge valve, isolate the compressor for service. The shutoff valves are standard on remote evaporator models.

The specification is available in MSWord from the local McQuay sales office.

SECTION 15XXX

AIR-COOLED ROTARY SCREW CHILLERS

PART 1 - GENERAL

1.01 SUMMARY

Section includes design, performance criteria, refrigerants, controls, and installation requirements for air-cooled rotary screw packaged chillers.

1.02 REFERENCES

Comply with applicable Standards/Codes of ARI 550/590, ANSI/ASHRAE 15, ASHRAE 90.1 October 2001 requirements, and ASME Section VIII.

1.03 SUBMITTALS

A. Submit shop drawings and product data in accordance with specification requirements.

B. Submittals shall include the following:

1. Dimensioned plan and elevation view drawings, required clearances, and location of all field connections.
2. Summary of all auxiliary utility requirements such as electricity, water, etc. Summary shall indicate quality and quantity of each required utility.
3. Single line schematic drawing of the field power hookup requirements, indicating all items that are furnished.
4. Schematic diagram of control system indicating points for field connection. Diagram shall fully delineate field and factory wiring.
5. Certification of factory run test signed by company officer.
6. Installation manuals.

1.04 QUALITY ASSURANCE

A. Qualifications; Equipment manufacturer must specialize in the manufacture of the products specified and have five years experience with the equipment and refrigerant offered.

B. Regulatory Requirements: Comply with the codes and standards specified.

C. Chiller must be manufactured in an ISO certified facility.

1.05 DELIVERY AND HANDLING

A. Chillers shall be delivered to the job site completely assembled and charged with refrigerant and oil by the manufacturer.

B. Comply with the manufacturer's instructions for rigging and handling.

1.06 WARRANTY

The refrigeration equipment manufacturer's warranty shall be for a period of one year from date of equipment start up, but not more than 18 months from shipment. It shall cover replacement parts (and the labor to replace them) having proven defective within the above period.

PART 2--PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Basis of Design - McQuay model AGS, including the standard product features and all special features required per the plans and specifications.

B. Equal Products - Equipment manufactured by [ENTER MANUFACTURER NAME HERE] may be acceptable as an equal. Naming these products as equal does not imply that their standard construction or configuration is acceptable or meets the specifications. Equipment proposed "as equal", must meet the specifications including all architectural, mechanical, electrical, and structural details, all scheduled performance and the job design, plans and specifications.

2.02 UNIT DESCRIPTION

Provide and install as shown on the plans, factory assembled, factory charged with R-134a, and factory-run-tested, air-cooled, rotary screw compressor packaged chillers in the quantity and size specified. Each chiller shall consist of multiple semi-hermetic screw compressors, direct expansion evaporator, air-cooled condenser section, control system and all components necessary for protected and controlled unit operation. Chillers using zeotropic refrigerants such as HFC-407C shall have a five-year refrigerant warranty.

2.03 DESIGN REQUIREMENTS

A. General: Provide a complete rotary screw packaged chiller as specified herein and as shown on the drawings. The unit shall be in accordance with the standards referenced in section 1.02 and any local codes.

B. Performance: Refer to the schedule of performance on the drawings. The chiller shall be capable of stable operation to a minimum of 15

percent of full load without hot gas bypass. The unit shall be capable of operating to 35°F (4.4°C).

OPTION: The unit shall have factory mounted, low ambient head pressure control providing operation to 0°F (-18°C).

C. Acoustics: Sound pressure for the unit shall not exceed the following tabulated levels. When needed to achieve these levels, the manufacturer shall provide the necessary sound treatment. Acceptable sound attenuation devices include, but are not limited to compressor sound blankets, low-sound fans and discharge gas mufflers. Chiller performance, affected by the use of these devices, shall meet or exceed the scheduled performance requirements. Sound data shall be in one-third octave bands and be provided with the quotation. Sound measurements are to be taken in accordance with ARI Standard 370.

[ENTER BELOW - TABLE OF OCTAVE BAND CENTER FREQUENCIES]

2.04 CHILLER COMPONENTS

A. Compressors: The compressors shall be field serviceable, semi-hermetic, single-rotor screw type with one central helical rotor meshing with two opposing gaterotors. The gaterotor contact element shall be constructed of engineered composite material, dimensionally stable up to 1500°F and wear resistant for extended life. Compressors shall be vibration isolated from the frame by neoprene compression mounts. If a twin-screw design is used, the manufacturer shall provide an extended 5-year parts and labor warranty covering all moving parts.

OPTION: Each compressors shall be equipped with a suction service shutoff valve.

B. Electric motors: Motors shall be high torque, two pole, semi-hermetic, squirrel cage induction type with inherent thermal protection on all three phases and cooled by suction gas. Full-load power factor shall be, at minimum, 0.90. Motors not meeting this minimum power factor must be capacitor-corrected to 0.90 or better.

C. Solid-State Motor Starters (each compressor): Starter shall be designed using the current generation of reliable solid-state technology. Each starter shall provide controlled motor acceleration and deceleration, and shall provide protection for the following conditions: ground faults, phase rotation, electronic thermal overload, over/under current, stalled motor, single phase, high load current and current unbalance. Across-the-line or wye-delta starters are not acceptable. Acceptable solid-state starter manufacturers are GE, Cutler-Hammer, Benshaw or Reliance. The solid state starters shall be capable of self-diagnostics, metering, and have an LED display to include the following operating and fault messages:

1. Operating Messages:

   Line voltage not present
   Voltage present, starter ready
   Motor accelerating
   Motor at full speed
   Motor at full speed, ramp time expired
   Stop command received, motor decelerating
   Thermal overload has reached 90% to 99%
   Thermal overload at 100%, motor stopped
   Thermal overload reduced to 60%, motor can restart
   Passcode enabled
   Passcode disabled
   Thermal overload content in percentage

2. Fault Messages:

   System power not three phase
   Phase sequence incorrect
   Line frequency less than 25 Hz
   Line frequency more than 72 Hz
   Excessive current unbalance
   Operating parameters lost
   No current after "Run" command
   Undercurrent trip occurred
   Overcurrent trip occurred
   Control power too low
   Motor stalled during acceleration
   External fault

D. Evaporator: The evaporator shall be of the direct expansion type with single pass on the refrigerant and water side for high efficiency

counterflow heat transfer and low pressure drops, carbon steel shell, and high efficiency finned copper tubes rolled into steel tubesheets. The evaporator shall be insulated with ¾-inch (19 mm) closed cell polyurethane insulation and heated with a thermostatically controlled electric heater to help freeze protection to -20°F (-29°C). The evaporator shall be designed, inspected, and stamped in accordance with ASME Section VIII requirements.

E. Condenser: The condenser coils shall have seamless copper tubes mechanically bonded into aluminum plate type fins.
OPTION: Copper tubes mechanically bonded into copper, plate type fins.
OPTION: Copper tubes mechanically bonded into Black Fin® precoated plate type fins.
OPTION: Copper tubes mechanically bonded into aluminum plate type fins with Electofin® baked epoxy coating after coil assembly.

The fins shall have full drawn collars to completely cover the tubes. A subcooling coil shall be an integral part of the main condenser coil. Condenser fans shall be propeller type arranged for vertical air discharge and individually driven by direct drive fan motors. Each fan shall be housed in its own compartment to eliminate condenser-air cross flow during fan cycling and shall be equipped with a heavy-gauge close-meshed PVC coated fan guard. The coils shall be protected by PVC coated wire mesh screen.
OPTION: The coils shall be protected by stamped louvers to provide additional overall protection including hail protection, and a reduction in wind influence at low ambient air temperature operation.
OPTION: The unit shall be provided with stamped louvers covering the lower portion of the unit in addition to the coil louvers.
Fan motors shall be weather protected, three-phase, direct-drive, 1140 rpm, totally enclosed air-over motors with class F insulation or better. ODP motors are not acceptable.

F. Refrigerant Circuit: The unit must have refrigerant circuits completely independent of each other with one compressor per circuit. Each circuit shall include an electronic expansion valve, combination discharge check and shutoff valve, liquid line shutoff valves, replaceable core filter-driers, and sight glass with moisture indicator.

G. Unit casing and all structural members and rails shall be fabricated of steel and painted to meet ASTM B117 500-hour salt spray test. The control enclosure and unit panels shall be corrosion resistant painted before assembly.

H. Advanced microprocessor based control system: The control system architecture shall provide distributed-control where each compressor circuit has its own microprocessor controller so in the event that one controller becomes inoperative, the other circuits will continue to operate uninterrupted.

   a. Control Panel: A NEMA Type 3R weatherproof control panel shall contain the unit control system, control interlock terminals and field-power connection points. Hinged control panel access doors shall be lockable. Barrier panels shall be provided to protect against accidental contact with line voltage when accessing the control system.

   b. Factory-supplied power components shall include: individual contactors and circuit breakers for fan motors, circuit breakers and factory mounted transformers for each control-circuit, unit power terminal blocks for connection to remote disconnect switch, and terminals for power supply to the evaporator heater circuit. Fan motors shall have inherent overload protection and compressor motors shall have three-phase motor overload protection.

   c. Control system starting components shall include solid-state start timer.

   d. The control logic shall be designed to maximize operating efficiency and equipment life with protections for operation under unusual conditions and to provide a history of operating conditions. The system shall intelligently stage the unit to sustain leaving water temperature precision and stability while minimizing compressor cycling.

   e. Equipment protection functions controlled by the microprocessor shall include high discharge pressure, loss of refrigerant, loss of water flow, freeze protection, and low refrigerant pressure.

   f. User controls shall include auto/stop switch, chilled water set-point adjustment, anti-recycle timer, and digital display with water

temperature and set-point, operating temperatures and pressures, and diagnostic messages.

g. The following features and functions shall be included:
    i. Durable liquid crystal display (LCD) screen type, having minimum four 20-character lines with 6 key input pad conveniently mounted on the unit controller. Default language and units of measure shall be English and I-P respectively. Messages shall be in plain English. Coded messages, LED indicators and LED displays are not acceptable.
    ii. Separate control section and password protection for critical parameters.
    iii. Remote reset of chilled water temperature using a 4-20mA signal.
    iv. Soft-load operation, protecting the compressor by preventing full-load operation during the initial chilled fluid pull-down period.
    v. Non-volatile program memory allowing auto-restart after a power failure without requiring a UPS (un-interruptible power supply).
    vi. Recording of safety shutdowns, including date-and-time stamp with system temperatures and pressures. A minimum of six previous occurrences shall be maintained in a revolving memory.
    vii. Start-to-start and stop-to-start cycle timers, providing minimum compressor off-time while maximizing motor protection.
    viii. Lead-lag compressor staging for part-load operation by manual selection or automatically by circuit run hours.
    ix. Discharge pressure control through intelligent cycling of condenser fans to maximize efficiency.
    x. Pro-active compressor unloading when selected operating parameters exceed design settings, such as high discharge pressure or low evaporator pressure.

xi. Diagnostic monitoring of unit operation, providing a pre-alarm signal in advance of a potential shutdown, allowing time for corrective action.

xii. OPTIONAL: BAS communication flexibility through Protocol Selectability™, modular plug-in that enables the unit controller to communicate with standardized protocols.

Factory mounted DDC controller(s) shall support operation on a BACnet®, Modbus® or LONMARKS ® network via one of the data link / physical layers listed below as specified by the successful Building Automation System (BAS) supplier.

- BACnet MS/TP master (Clause 9)
- BACnet IP, (Annex J)
- BACnet ISO 8802-3, (Ethernet)
- LONMARKS FTT-10A. The unit controller shall be LONMARKS ® certified.

The information communicated between the BAS and the factory mounted unit controllers shall include the reading and writing of data to allow unit monitoring, control and alarm notification as specified in the unit sequence of operation and the unit points list.

For chillers communicating over a LONMARKS network, the corresponding LONMARKS eXternal Interface File (XIF) shall be provided with the chiller submittal data.

All communication from the chiller unit controller as specified in the points list shall be via standard BACnet objects. Proprietary BACnet objects shall not be allowed. BACnet communications shall conform to the BACnet protocol (ANSI/ASHRAE135-2001). Provided a BACnet Protocol Implementation Conformance Statement (PICS) along with the unit submittal.

2.05 OPTIONS AND ACCESSORIES

The following options are to be included:

- Multi-point service disconnect switches, factory mounted
- Single-point power connection to power block
- Single point power connection to disconnect switch
- Chilled water flow switch to be field mounted by contractor in the chilled water line and field wired to terminals in the control panel.
- Spring vibration isolators for field installation
- 115-volt convenience outlet mounted in control panel
- Remote field-installed communication panel

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install in strict accordance with manufacturer's requirements, shop drawings, and contract documents.

B. Adjust and level chiller in alignment on supports.

C. Coordinate electrical installation with electrical contractor.

D. Coordinate controls with control contractor.

E. Provide all appurtenances required to insure a fully operational and functional chiller.

3.02 START-UP

A. Provide proper charge of refrigerant and oil.

B. Provide Factory Authorized starting of chillers, and instruction to the owner on proper operation and maintenance.

Specifications – Remote Condenser

The specification is available in MSWord from the local McQuay sales office.

SECTION 15XXX
AIR-COOLED ROTARY SCREW CHILLERS
WITH REMOTE EVAPORATOR

PART 1 - GENERAL

1.01 SUMMARY

Section includes design, performance criteria, refrigerants, controls, and installation requirements for air-cooled rotary screw packaged chillers with remote evaporators.

1.02 REFERENCES

Comply with applicable Standards/Codes of ARI 550/590, ANSI/ASHRAE 15, ASHRAE 90.1 October 2001 requirements, and ASME Section VIII.

1.03 SUBMITTALS

A. Submit shop drawings and product data in accordance with specification requirements.

B. Submittals shall include the following:

1. Dimensioned plan and elevation view drawings, including field refrigerant piping, required clearances, and location of all field connections.
2. Summary of all auxiliary utility requirements such as electricity, water, etc. Summary shall indicate quality and quantity of each required utility.
3. Single line schematic drawing of the power field hookup requirements, indicating all items that are furnished.
4. Schematic diagram of control system indicating points for field connection. Diagram shall fully delineate field and factory wiring.
5. Certification of factory run test signed by company officer.
6. Installation manuals.

1.04 QUALITY ASSURANCE

A. Qualifications; Equipment manufacturer must specialize in the manufacture of the products specified and have five years experience with the equipment and refrigerant offered.

B. Regulatory Requirements: Comply with the codes and standards specified.

C. Chiller must be manufactured in an ISO certified facility.

1.05 DELIVERY AND HANDLING

A. Chillers shall be delivered to the job site with the outdoor unit completely assembled and charged with refrigerant and oil by the manufacturer. The evaporator and refrigeration specialties shall ship separately but at the same time as the outdoor unit.

B. Comply with the manufacturer's instructions for rigging and handling.

1.06 WARRANTY

The refrigeration equipment manufacturer's warranty shall be for a period of one year from date of equipment start up, but not more than 18 months from shipment. It shall cover replacement parts (and the labor to replace them) having proven defective within the above period.

PART 2--PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Basis of Design - McQuay model AGS, including the standard product features and all special features required per the plans and specifications.

B. Equal Products - Equipment manufactured by [ENTER MANUFACTURER NAME HERE] may be acceptable as an equal. Naming these products as equal does not imply that their standard construction or configuration is acceptable or meets the specifications. Equipment proposed "as equal", must meet the specifications including all architectural, mechanical, electrical, and structural details, all scheduled performance and the job design, plans and specifications.

2.02 UNIT DESCRIPTION

Provide and install as shown on the plans, factory assembled, factory charged with R-134a, and factory-run-tested air-cooled rotary screw compressor chillers with remote evaporators, in the quantity and size specified. Each outdoor section shall consist of multiple semi-hermetic screw compressors, air-cooled condenser section, control system and all components necessary for protected and controlled unit operation. Chillers using zeotropic refrigerants such as HFC-407C shall have a five-year refrigerant warranty.

2.03 DESIGN REQUIREMENTS

A. General: Provide a complete rotary screw packaged chiller as specified herein and as shown on the drawings. The unit shall be in accordance with the standards referenced in section 1.02 and any local codes.

B. Performance: Refer to the schedule of performance on the drawings. The chiller shall be capable of stable operation to a minimum of 15 percent of full load without hot gas bypass. The unit shall be capable of operating to 35°F (4.4°C).

OPTION: The unit shall have factory mounted, low ambient head pressure control providing operation to 0°F (-18°C).

C. Acoustics: Sound pressure for the unit shall not exceed the following tabulated levels. When needed to achieve these levels, the manufacturer shall provide the necessary sound treatment. Acceptable sound attenuation devices include, but are not limited to compressor sound blankets, low-sound fans and discharge gas mufflers. Chiller performance, affected by the use of these devices, shall meet or exceed the scheduled performance requirements. Sound data shall be in one-third octave bands and be provided with the quotation. Sound measurements are to be taken in accordance with ARI Standard 370.

[ENTER BELOW - TABLE OF OCTAVE BAND CENTER FREQUENCIES]

2.04 CHILLER COMPONENTS

A. Compressors: The compressors shall be field serviceable, semi-hermetic, single-rotor screw type with one central helical rotor meshing with two opposing gaterotors. The gaterotor contact element shall be constructed of engineered composite material, dimensionally stable up to 1500°F and wear resistant for extended life. Compressors shall be vibration isolated from the frame by neoprene compression mounts. If a twin-screw design is used, the manufacturer shall provide an extended 5-year parts and labor warranty covering all moving parts.

OPTION: Each compressor shall be equipped with a suction service shutoff valve.

B. Electric motors: Motors shall be high torque, two pole, semi-hermetic, squirrel cage induction type with inherent thermal protection on all three phases and cooled by suction gas. Full-load power factor shall be, at minimum, 0.90. Motors not meeting this minimum power factor must be capacitor-corrected to 0.90 or better.

C. Solid-State Motor Starters (each compressor): Starter shall be designed using the current generation of reliable solid-state technology. Each

starter shall provide controlled motor acceleration and deceleration, and shall provide protection for the following conditions: ground fault, phase rotation, electronic thermal overload, over/under current, stalled motor, single phase, high load current and current unbalance. Across-the-line or wye-delta starters are not acceptable. Acceptable solid-state starter manufacturers are GE, Cutler-Hammer, Benshaw or Reliance. The solid state starters shall be capable of self-diagnostics, metering, and have an LED display to include the following operating and fault messages:

1. Operating Messages:

   Line voltage not present
   Voltage present, starter ready
   Motor accelerating
   Motor at full speed
   Motor at full speed, ramp time expired
   Stop command received, motor decelerating
   Thermal overload has reached 90% to 99%
   Thermal overload at 100%, motor stopped
   Thermal overload reduced to 60%, motor can restart
   Passcode enabled
   Passcode disabled
   Thermal overload content in percentage

2. Fault Messages:

   System power not three phase
   Phase sequence incorrect
   Line frequency less than 25 Hz
   Line frequency more than 72 Hz
   Excessive current unbalance
   Operating parameters lost
   No current after "Run" command
   Undercurrent trip occurred
   Overcurrent trip occurred
   Control power too low
   Motor stalled during acceleration
   External fault

D. Remote Evaporator: The evaporator shall be of the direct expansion type with single pass on the refrigerant and water side for high efficiency counterflow heat transfer and low pressure drops, carbon steel shell, and high efficiency finned copper tubes rolled into steel

tubesheets. The evaporator shall be insulated with ¾-inch (19 mm) closed cell polyurethane insulation and heated with a thermostatically controlled electric heater to help freeze protection to -20°F (-29°C). The evaporator shall be designed, inspected, and stamped in accordance with ASME Section VIII requirements.

E. Condenser: The condenser coils shall have seamless copper tubes mechanically bonded into aluminum plate type fins.
OPTION: Copper tubes mechanically bonded into copper, plate type fins.
OPTION: Copper tubes mechanically bonded into Black Fin® precoated plate type fins.
OPTION: Copper tubes mechanically bonded into aluminum plate type fins with Electofin® baked epoxy coating after coil assembly.

The fins shall have full drawn collars to completely cover the tubes. A subcooling coil shall be an integral part of the main condenser coil. Condenser fans shall be propeller type arranged for vertical air discharge and individually driven by direct drive fan motors. . Each fan shall be housed in its own compartment to eliminate condenser-air cross flow during fan cycling and shall be equipped with a heavy-gauge close-meshed PVC coated fan guard. The coils shall be protected by PVC coated wire mesh screen.
OPTION: The coils shall be protected by stamped louvers to provide additional protection including hail and a reduction in wind influence at low ambient air temperature operation.
OPTION: The unit shall be provided with stamped louvers covering the lower portion of the unit in addition to the coil louvers.

Fan motors shall be weather protected, three-phase, direct-drive, 1140 rpm, totally enclosed air-over motors with class F insulation or better. ODP motors are not acceptable.

F. Refrigerant Piping: The unit shall have field-installed suction and liquid refrigerant piping for each of the two circuits, completely independent of each other. Field piping and wiring shall include an electronic expansion valve, filter-drier, and sight glass with moisture indicator, solenoid valve and charging valve, all supplied by the chiller

manufacturer and installed, leak tested, evacuated and charged by the contractor.

G. Unit casing and all structural members and rails shall be fabricated of steel and painted to meet ASTM B117 500-hour salt spray test. The control enclosure and unit panels shall be corrosion resistant painted before assembly.

H. Advanced microprocessor based control system: The control system architecture shall provide distributed-control where each compressor circuit has its own microprocessor controller so in the event that one controller becomes inoperative, the other circuits will continue to operate uninterrupted.

   a. Control Panel: A NEMA Type 3R weatherproof control panel shall contain the unit control system, control interlock terminals and field-power connection points. Hinged control panel access doors shall be lockable. Barrier panels shall be provided to protect against accidental contact with line voltage when accessing the control system.

   b. Factory-supplied power components shall include: individual contactors and circuit breakers for fan motors, circuit breakers and factory mounted transformers for each control-circuit, unit power terminal blocks for connection to remote disconnect switch, and terminals for power supply to the evaporator heater circuit. Fan motors shall have inherent overload protection and compressor motors shall have three-phase motor overload protection.

   c. Control system starting components shall include solid-state start timer.

   d. The control logic shall be designed to maximize operating efficiency and equipment life with protections for operation under unusual conditions and to provide a history of operating conditions. The system shall intelligently stage the unit to sustain leaving water temperature precision and stability while minimizing compressor cycling.

   e. Equipment protection functions controlled by the microprocessor shall include high discharge pressure, loss of refrigerant, loss of water flow, freeze protection, and low refrigerant pressure.

f. User controls shall include auto/stop switch, chilled water set-point adjustment, anti-recycle timer, and digital display with water temperature and set-point, operating temperatures and pressures, and diagnostic messages.

g. The following features and functions shall be included:

   i. Durable liquid crystal display (LCD) screen type, having minimum four 20-character lines with 6 key input pad conveniently mounted on the unit controller. Default language and units of measure shall be English and I-P respectively. Messages shall be in plain English. Coded messages, LED indicators and LED displays are not acceptable.

   ii. Separate control section and password protection for critical parameters.

   iii. Remote reset of chilled water temperature using a 4-20mA signal.

   iv. Soft-load operation, protecting the compressor by preventing full-load operation during the initial chilled fluid pull-down period.

   v. Non-volatile program memory allowing auto-restart after a power failure without requiring a UPS (un-interruptible power supply).

   vi. Recording of safety shutdowns, including date-and-time stamp with system temperatures and pressures. A minimum of six previous occurrences shall be maintained in a revolving memory.

   vii. Start-to-start and stop-to-start timers, providing minimum compressor off-time while maximizing motor protection.

   viii. Lead-lag compressor staging for part-load operation by manual selection or automatically by circuit run hours.

   ix. Discharge pressure control through intelligent cycling of condenser fans to maximize efficiency.

   x. Pro-active compressor unloading when selected operating parameters exceed design settings, such as high discharge pressure or low evaporator pressure.

xi. Diagnostic monitoring of unit operation, providing a pre-alarm signal in advance of a potential shutdown, allowing time for corrective action.

xii. OPTIONAL: BAS communication flexibility through Protocol Selectability™, modular plug-ins that enable the unit controller to communicate with standardized protocols. Factory mounted DDC controller(s) shall support operation on a BACnet®, Modbus® or LONMARKS ® network via one of the data link / physical layers listed below as specified by the successful Building Automation System (BAS) supplier.

- BACnet MS/TP master (Clause 9)
- BACnet IP, (Annex J)
- BACnet ISO 8802-3, (Ethernet)
- LONMARKS FTT-10A. The unit controller shall be LONMARKS ® certified.

The information communicated between the BAS and the factory mounted unit controllers shall include the reading and writing of data to allow unit monitoring, control and alarm notification as specified in the unit sequence of operation and the unit points list.

For chillers communicating over a LONMARKS network, the corresponding LONMARKS eXternal Interface File (XIF) shall be provided with the chiller submittal data.

All communication from the chiller unit controller as specified in the points list shall be via standard BACnet objects. Proprietary BACnet objects shall not be allowed. BACnet communications shall conform to the BACnet protocol (ANSI/ASHRAE135-2001). Provided a BACnet Protocol Implementation Conformance Statement (PICS) along with the unit submittal.

2.05 OPTIONS AND ACCESSORIES

The following options are to be included:

- Multi-point service disconnect switches, factory mounted
- Single-point power connection to power block

- Single point power connection to disconnect switch
- Chilled water flow switch to be field mounted by contractor in the chilled water line and field wired to terminals in the control panel.
- Spring vibration isolators for field installation
- 115-volt convenience outlet mounted in control panel
- Remote field-installed communication panel

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install in strict accordance with manufacturer's instructions and requirements, shop drawings, and contract documents. Field-installed refrigerant piping shall be leak tested, dehydrated and charged per best industry practice. A factory-authorized technician shall supervise charging and startup. Liquid and suction lines shall be field insulated. Liquid line solenoid valve and expansion valve shall be field wired to the outdoor unit. Temperature sensors and pressure transducers shall be interconnected between the outdoor unit and evaporator per the chiller manufacturer's installation instructions.

B. Adjust and level chiller in alignment on supports.

C. Coordinate electrical installation with electrical contractor.

D. Coordinate controls with control contractor.

E. Provide all appurtenances required to insure a fully operational and functional chiller.

3.02 START-UP

A. Provide proper charge of refrigerant and oil.

B. Provide Factory Authorized starting of chillers, and instruction to the owner on proper operation and maintenance.

This document contains the most current product information as of this printing. For the most up-to-date product information, please go to **www.mcquay.com.**