Air-Cooled Screw Compressor Chillers

Models AGS 225D to AGS 450D

210 to 450 Tons, 740 to 1580 kW

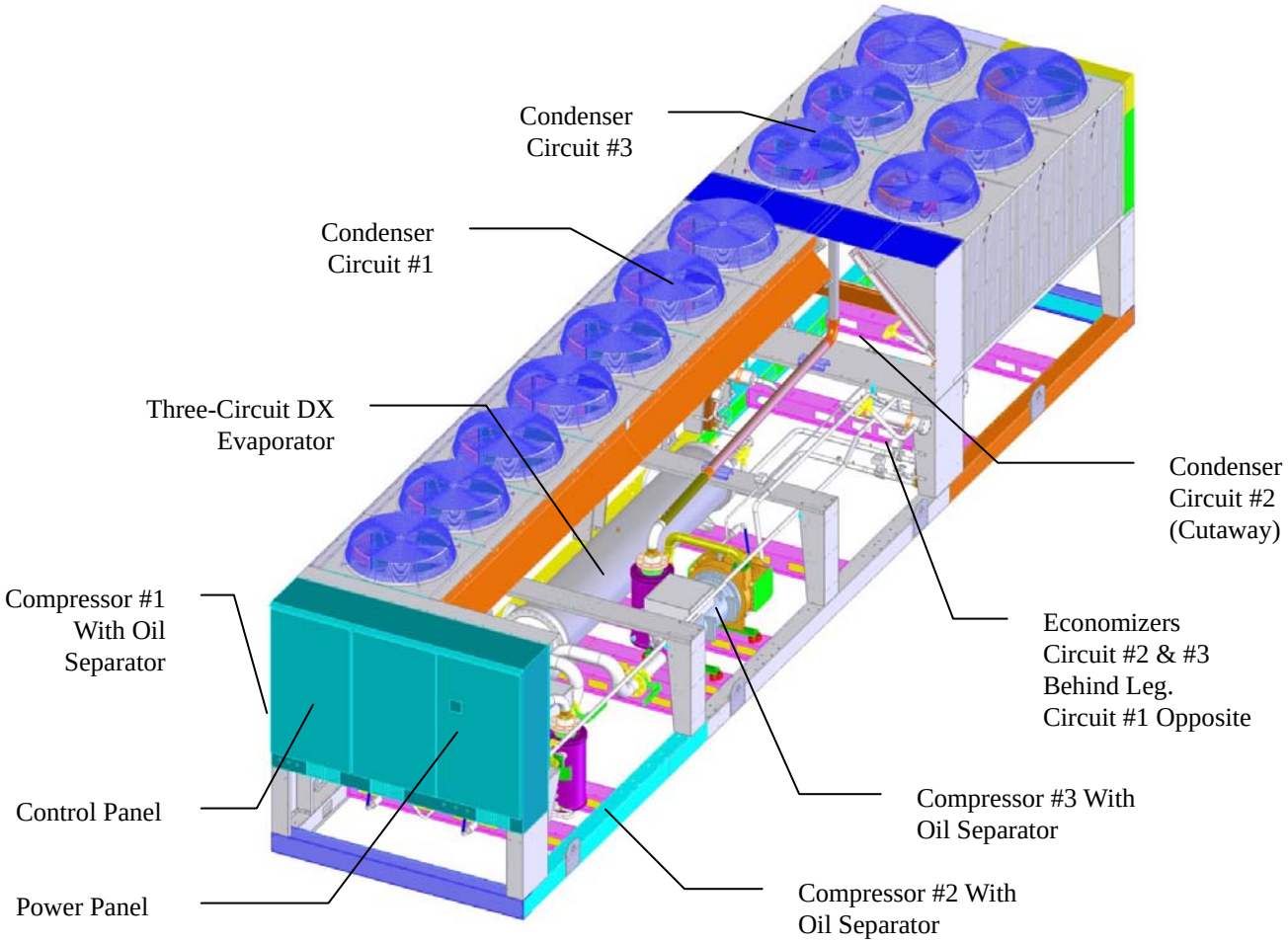
Packaged or with Remote Evaporator or Chilled Water Pump Package

R-134a, 60 Hz

McQuay Air Conditioning

Engineered for flexibility and performance ™

Cutaway View of a 300 ton AGS-D, Three-Circuit Chiller



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Manufactured in an ISO Certified Facility

Model Code

A G S XXX D S

- A — Air-Cooled
- G — Global Product Line
- S — Screw Compressor
- XXX — Nominal Tons:
- D — Vintage
- S — S = Standard , ASHRAE 90.1 Compliant; E = High Efficiency; M = Standard with Remote Evaporator; F = High Efficiency with Remote Evaporator

Table of Contents

Unit controllers are LONMARK certified with an optional LONWORKS communications module

Introduction

The AGS-D, air-cooled, screw compressor chillers continue McQuay's legacy of high quality, high efficiency, advanced technology and quiet operation. Our model AGS chillers utilize an advanced single screw compressor design using R-134a refrigerant. Superior control is provided by the innovative McQuay MicroTech II® family of controllers. They can interface with your building's automation system using the optional McQuay Protocol Selectability® feature, which uses factory-installed LONWORKS®, BACnet® or Modbus® communication modules. These chillers are furnished with solid state starters as standard and have wye-delta starters available as a lower cost option. Perhaps most important, these chillers continue McQuay's single screw compressor reputation for quiet operation, making them "neighborhood friendly". McQuay's AGS chillers provide the best overall value in air-cooled screw chillers available today!

The AGS-D offers standard solid-state starters that provide stepless acceleration, controlled deceleration, and advanced motor/compressor protection features.

SUPERIOR EFFICIENCY

- High efficiency models available
- Electronic expansion valve control
- True counter flow evaporator design
- High efficiency lanced condenser fins
- All models exceed ASHRAE 90.1 October 2004 efficiency standard

QUIET OPERATION

- Single-rotor compressor design
- Continuing the legacy of McQuay chillers
- Virtually vibration-free operation

OUTSTANDING RELIABILITY

- Multiple compressors with independent circuits
- Rugged compressor design
- Advanced composite compressor gaterotor material
- Proactive control logic
- Full factory-run-testing to optimize trouble-free operation
- Factory authorized supervision of startup

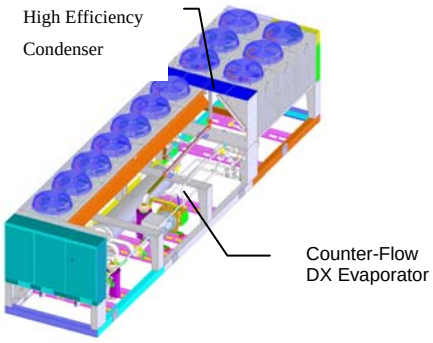
SUPERIOR CONTROLS LOGIC

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

Customer Benefits

Low Operating Costs -- High Efficiency Operation

The AGS chillers use 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.



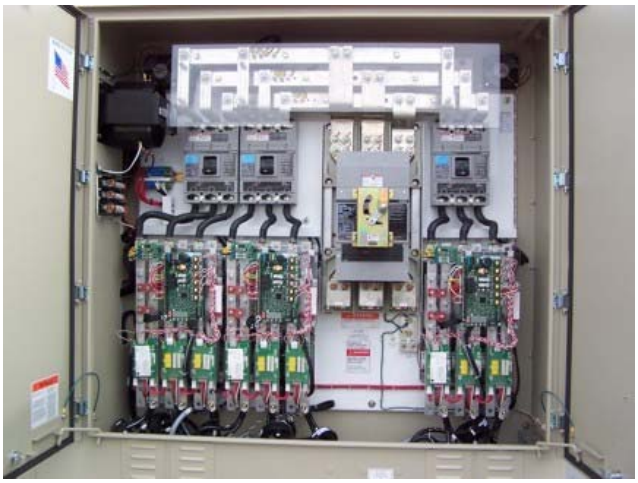
Quiet Operation – "Neighborhood Friendly"

The feature that sets the AGS-D chillers chiller apart from other screw chillers is the low operating sound levels at any load point. The primary reason for quiet operation is the compressor design itself. McQuay's latest compressor design continues to use a single main rotor with two adjacent rotating gaterotors making gas flow velocities and subsequent noise levels among 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.

The chiller sound data is published in this catalog for an easy comparison with other offerings. See page 28. Although others claim low sound levels, it is often difficult to find published sound data to support their claims.

Standard Solid State Starters

Solid-state starters are standard on AGS-D chillers with wye-delta starters available as a price-deduct option. The benefits of solid state 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 during shutdown. The traditional jerking and backward rotation allowed by conventional starters is eliminated with solid-state starters and 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.

R-134a Refrigerant

All McQuay AGS chillers use R-134a. R-134a has no ozone depletion potential and no 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 to 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 LONWORKS®, BACnet®, or Modbus® communications without costly gateways. See the complete control description on page 10 in this catalog.

Summary

Four major benefits separate the AGS-D chiller from most air-cooled screw chillers.

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

IMPORTANT NOTE

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

Standard Efficiency, designated by an "S" (or "M" with remote evaporator) as the last digit in the model number following the "D" vintage designation (i.e. AGS 220DS or AGS 220DM) are designed to meet ASHRAE 90.1 efficiency standard. These units provide the lowest dollar per ton price. Ratings begin on page 18.

High Efficiency, designated by an "E" (or "F" with remote evaporator) as the last digit in the model number (i.e. AGS 220DE or AGS 220DF) are designed for high efficiency operation. 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 19.

The high efficiency units have a higher dollar-per-ton price than standard efficiency and should only be selected when efficiencies above the standard efficiency offering are required.

High Ambient Option, A factory-installed option that allows operation in high ambient temperature locations having operating temperatures above 105°F up to 125°F (40.6°C to 51.7°C).

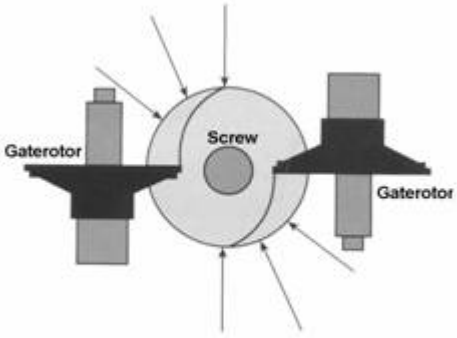
Compressor

Superior Efficiency

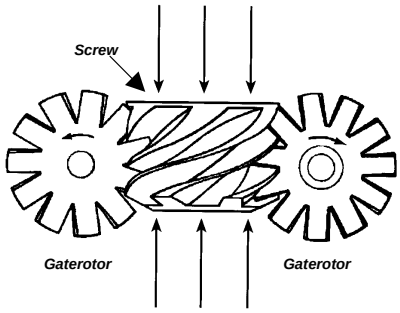
- Zero clearance fit between the two gaterotors and main screw rotor virtually eliminates leakage between the high and low-pressure sides during compression. Special gaterotor material made from an advanced composite, temperature stable material makes a zero clearance design possible with no metal-to-metal contact.
- The AGS 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 exactly to load.

Outstanding Reliability Features

- Full factory testing of every unit with water hookup helps provide 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 AGS 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.



Balanced radial forces



Balanced axial forces

Evaporator

- AGS units are equipped with a two or three-circuit (depending on the number of compressors) direct expansion evaporator with copper tubes rolled into steel tubesheets. The evaporators are single-pass on both the refrigerant and water sides for pure counter-flow heat exchange and low refrigerant pressure drop. Both attributes contribute to the vessel and total unit’s outstanding efficiency.

"W" Shaped Condenser Coils

- The McQuay designed "W" shaped, 16 fin-per-inch, condenser coil provides the maximum condenser heat transfer per foot of unit length. This translates to a smaller footprint, fewer structural elements and smaller pad size. The fins are slotted to provide even air distribution across and through the coil.

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 and serviceable components such as filter-driers are located on the outside edges of the base allowing ready access.
- The "W" shaped coil provides excellent 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

Having solid-state starters as standard on the AGS units takes a giant step forward in compressor protection and sets a standard for the rest of the industry. The starters include self-diagnostics, metering and display and include 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 are shown in Table 1.

Figure 1, Solid State Starters

(Shown with Optional Disconnect Switch and Circuit Breaker)

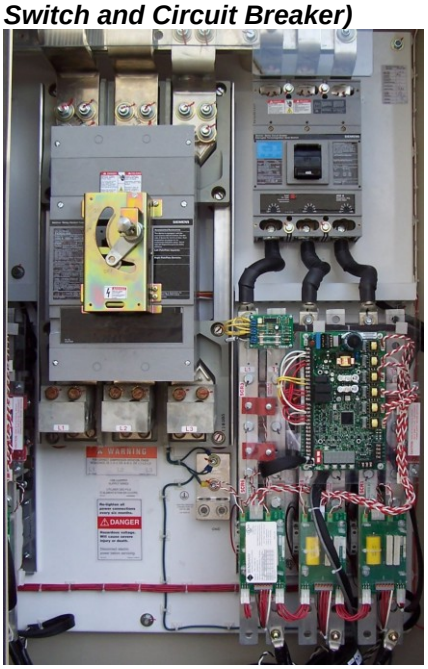


Table 1, Solid State Starter Messages

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

Platform

The heavy-duty 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

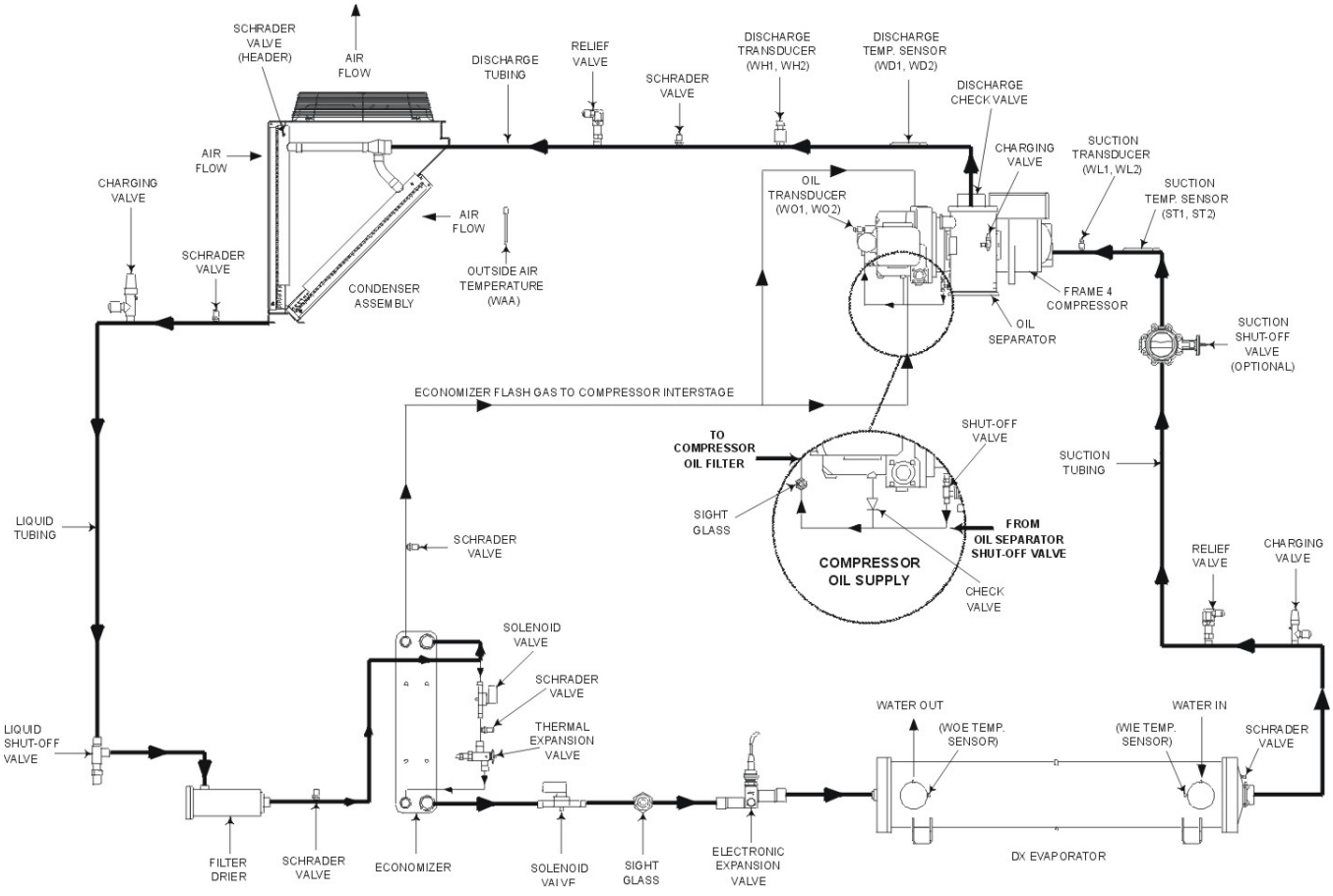
The AGS air-cooled chillers are equipped with the most advanced means of refrigerant flow control available. An electronic expansion valve coupled with a MicroTech II unit controller provides excellent operating efficiencies both at full and part load operation.

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 AGS 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 such as the McQuay AGS-D line. However, their rating procedures follow ARI Standard 590, which applies to units within the certification range.

Figure 2, Piping Schematic (one circuit shown)



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 and to continue proper operation in unusual operating conditions.

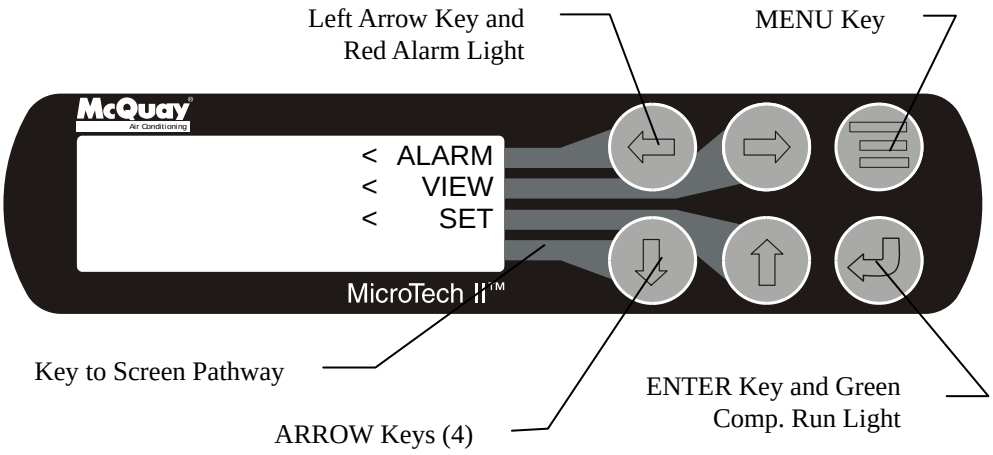
- A logic control system employed in the MicroTech II controller optimizes the suction line superheat and the positioning of the electronic expansion valve at all compressor capacities. Intelligent fan staging and use of the optional fan variable frequency drives also contribute to optimizing unit efficiency at all operating conditions.
- 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.
- Complete unit 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 controller 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 have the Protocol Selectability feature available as a low cost option. It provides easy BAS communications via a factory installed, or post-installation field-installed, module with easy integration and comprehensive monitoring, control, and two-way data exchange using industry standard protocols such as LONTALK®, 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 are LONMARK and BACnet certified when equipped with the optional LONWORKS or BACnet communication module.

Protocol Options

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

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

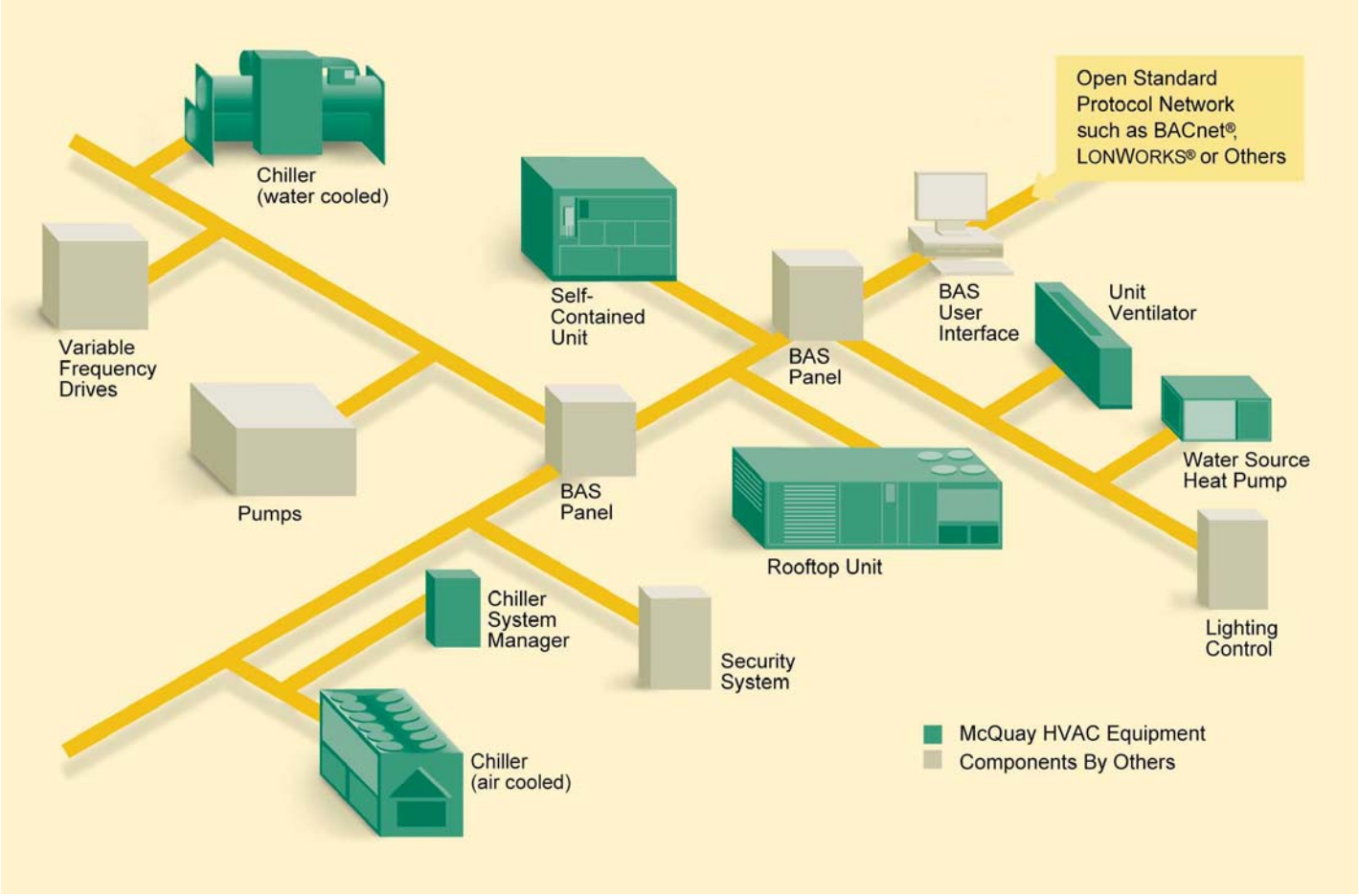
Table 2, Typical Data Point Availability

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 (per circuit)	W	Evap Pump Run Hours	R
Capacity Limit Output	R	Compressor Starts (per circuit)	R (2)	Evap Refrigerant Pressure	R (3)
Capacity Limit Setpoint	W	Compressor Suction Line Temp	R (3)	Ice Setpoint	W
Chiller Enable	W	Cond Refrigerant Pressure	R (3)	Liquid Line Refrigerant Pressure	R (3)
Chiller Limited	R	Cond Sat. Refrigerant Temp	R (3)	Liquid Line Refrigerant Temp	R (3)
Chiller Local/Remote	R	Cool Setpoint	W	Maximum Send Time	W
Chiller Mode Output	R	Current Alarm	R	Minimum Send Time	W
Chiller Mode Setpoint	W	Default Values	W	Evap Sat. Refrigerant Temp	R (3)
Chiller On/Off	R	Evap EWT	R	Outdoor Air Temp	R
Chiller Status	R	Evap Flow Switch Status	R	Network Clear Alarm	W
Chiller Type	R	Evap LWT for Unit	R	Run Enabled	R

Notes:

1. Data points available are dependent upon options selected
2. Per compressor
3. Per circuit

Figure 3, Sample System Architecture



Optional Remote Interface Panel

In addition to the standard unit-mounted user interface provided with MicroTech II onboard controls, the AGS-D 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.

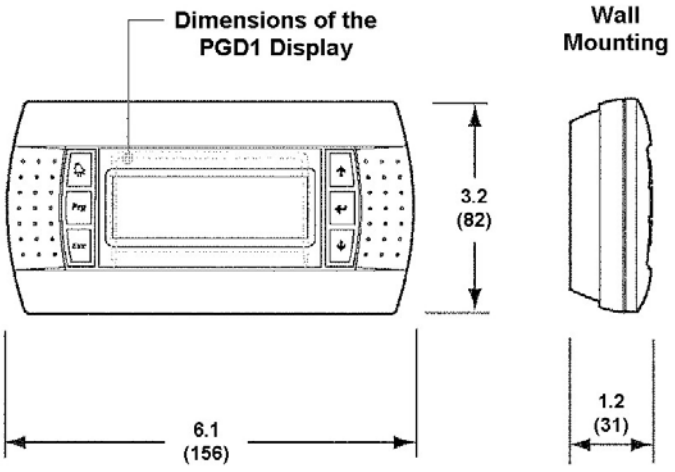
Features

- Can be wired up to 1,640 feet (500 meters) from the unit for flexibility in placing each remote 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 the operator to access information for each unit from one location, inside the building.
- Users need to learn only one format because the remote user interface is identical to the unit-mounted version.
- The application software resides in the unit controller and no additional software is required.
- Can be retrofit after unit installation.
- Is fully compatible with the optional BAS communication modules.

Figure 4, Remote Interface Panel Dimensions



NOTE: Dimensions in inches (millimeters)

Installation

- A maximum of 1,640 feet (500 meters) of wiring can be used to connect the remote user interface to the unit, using AWG 22 twisted pair cable.
- The panel mounts on a three-gang switch box.

Selection Procedure

IMPORTANT NOTE

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

Standard Efficiency, designated by a "S" (or “M” with remote evaporator) as the last digit in the model number following the “D” vintage designation (i.e. AGS 220DS or AGS 220DM) are designed to meet ASHRAE 90.1 efficiency standard. They provide the lowest dollar per ton price. Ratings begin on page 18.

High Efficiency, designated by an "E" (or “F” with remote evaporator) as the last digit in the model number (i.e. AGS 220DE or AGS 220DF) are designed for high efficiency operation. 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 19.

The high efficiency units have a higher dollar-per-ton price than standard efficiency and should only be selected when efficiencies above the standard efficiency offering are required.

High Ambient Option, A factory-installed option that allows operation in high ambient temperature locations having operating temperatures above 105°F up to 125°F (40.6°C to 51.7°C).

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 are required.

General

Ratings are based on R-134a, an evaporator fouling factor of 0.0001, 10-degree Delta-T, evaporator flow of 2.4 gpm/ton and sea level altitude.

Interpolation between ratings is allowed, extrapolation is not permitted. Consult the local McQuay sales office for performance outside the cataloged ratings.

KW input and EER or COP are for the entire unit, including compressors, fan motors and control power.

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 or 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: 330 tons cooling 660 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 on page 18, an AGS 350DS at the given temperatures will produce 337.2 tons of cooling with a unit power input of 419.5 kW and a unit EER of 9.6. Correcting for 2000 feet altitude and 12 degree Delta-T from Table 6 factors:

Capacity: 337.2 x 1.004 = 338.5 tons

Power: 419.5 kW x 1.011 = 424.1 kW

EER = Output / Input = 9.6 EER x 1.004 x 1.011 = 9.7 EER

2. Determine the evaporator pressure drop. Using Figure 5 on page 25, enter at 660 gpm and follow up to the AGS 350DS line intersection. Read horizontally to obtain an evaporator pressure drop of 9.6 feet.

Selection example utilizing ethylene glycol

330 tons, 95°F ambient temperature, sea level

660 gpm (based on water), 54°F to 44°F chilled fluid temperature

0.0001 evaporator fouling factor.

Protect against freezing to 20°F with ethylene glycol.

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=0.988, Power= .994, Flow=1.061, Pressure Drop=1.219.
3. Select an AGS 350DS with a capacity of 337.2 tons, 419.5 kW power input and correct performance for any non-standard conditions prevailing. (This example is based on all standard rating conditions) Then correct with the 20% ethylene glycol factors.

   Correct capacity: 0.988 x 337.2 tons= 333.2 tons

   Correct unit power: 0.994 x 419.5 kW = 417.0 kW
4. Correct the EER using the capacity and power correction factors, 9.6 EER x 0.988 x 0.994 = 9.4 EER
5. Correct chilled fluid flow:

   Fluid flow required with 20% EG solution:

   660 gpm (water) x 1.061 flow correction factor = 700 gpm of ethylene glycol required
6. Determine the evaporator pressure drop. Using Figure 5, enter at 660 gpm (water flow rate, <u>not</u> the glycol flow rate) and follow to the AGS 350DS line intersect. Read horizontally to obtain an evaporator pressure drop of 9.6ft.
7. Correct the pressure drop for 20% EG solution:

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

Performance Adjustment Factors

Ethylene and Propylene Glycol Factors

AGS 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. Microtech II control inhibits compressor unloading 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 degrees F lower than the expected lowest ambient temperature. Adjust inhibitor levels for solutions less than 25% glycol.

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

Table 7, Standard Efficiency AGS 225DS – AGS 450DS (Inch-Pound Units)

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
225DS	24.6	40	211.7	216.2	11.8	205.2	236.5	10.4	198.3	255.8	9.3	191.2	280.5	8.2	184.4	307.6	7.2
	24.6	42	218.4	219.7	11.9	211.8	240.2	10.6	204.7	259.8	9.5	197.2	285.1	8.3	190.0	312.9	7.3
	24.6	44	225.3	223.3	12.1	218.5	244.4	10.7	211.2	264.1	9.6	203.4	289.5	8.4	195.9	317.4	7.4
	24.6	46	232.4	227.1	12.3	225.3	248.3	10.9	217.8	268.4	9.7	209.8	294.1	8.6	202.1	322.3	7.5
	24.6	48	239.5	231.0	12.4	232.2	252.4	11.0	224.5	272.7	9.9	216.3	298.7	8.7	208.4	327.1	7.6
	24.6	50	246.7	234.8	12.6	239.3	256.6	11.2	231.4	277.4	10.0	223	303.7	8.8	214.9	332.6	7.8
250DS	28.7	40	231.8	233.6	11.9	224.9	255.5	10.6	217.5	278.5	9.4	209.6	303.0	8.3	202.0	329.7	7.4
	28.7	42	239.2	237.2	12.1	232.1	259.5	10.7	224.5	283.0	9.5	216.4	307.7	8.4	208.6	334.5	7.5
	28.7	44	246.7	241.1	12.3	239.4	263.5	10.9	231.6	287.4	9.7	223.4	312.4	8.6	215.5	339.7	7.6
	28.7	46	254.4	244.8	12.5	246.8	267.6	11.1	238.9	291.9	9.8	230.4	317.4	8.7	222.2	345.1	7.7
	28.7	48	262.2	248.7	12.7	254.4	271.8	11.2	246.2	296.3	10.0	237.5	322.4	8.8	229.1	350.8	7.8
	28.7	50	270.3	252.8	12.8	262.2	276.3	11.4	253.7	301.1	10.1	244.8	327.5	9.0	236.2	356.2	8.0
275DS	32.8	40	263.8	263.5	12.0	255.8	288.1	10.7	247.4	314.3	9.4	238.4	342.1	8.4	229.8	372.3	7.4
	32.8	42	272.2	267.8	12.2	263.9	292.8	10.8	255.2	319.3	9.6	246.0	347.4	8.5	237.1	377.9	7.5
	32.8	44	280.8	272.3	12.4	272.2	297.6	11.0	263.1	324.4	9.7	253.7	352.8	8.6	244.7	383.8	7.7
	32.8	46	289.5	276.7	12.6	280.7	302.4	11.1	271.4	329.7	9.9	261.5	358.4	8.8	252.0	389.7	7.8
	32.8	48	298.4	281.4	12.7	289.3	307.4	11.3	279.7	335.0	10.0	269.5	364.1	8.9	259.7	395.9	7.9
	32.8	50	307.5	286.1	12.9	298.1	312.5	11.4	288.2	340.5	10.2	277.8	370.1	9.0	267.7	402.2	8.0
300DS	32.8	40	298.2	301.0	11.9	289.0	329.2	10.5	279.5	359.4	9.3	269.4	391.2	8.3	259.6	425.9	7.3
	32.8	42	307.6	306.3	12.1	298.1	334.7	10.7	288.2	365.1	9.5	277.8	397.4	8.4	267.8	432.6	7.4
	32.8	44	317.3	311.5	12.2	307.5	340.5	10.8	297.0	371.1	9.6	286.3	403.8	8.5	276.0	439.5	7.5
	32.8	46	327.2	316.9	12.4	317.0	346.3	11.0	306.3	377.3	9.7	295.0	410.3	8.6	284.1	446.0	7.6
	32.8	48	337.2	322.4	12.5	326.8	352.2	11.1	315.7	383.7	9.9	303.9	417.0	8.7	292.6	453.1	7.7
	32.8	50	347.4	328.1	12.7	336.6	358.3	11.3	325.3	390.2	10.0	313.2	424.0	8.9	301.5	460.6	7.9
330DS	41.0	40	319.1	323.0	11.9	309.5	353.3	10.5	299.3	384.1	9.3	288.4	419.0	8.3	278.0	457.1	7.3
	41.0	42	329.3	328.1	12.0	319.4	358.9	10.7	308.9	390.2	9.5	297.7	425.6	8.4	286.9	464.2	7.4
	41.0	44	339.6	333.4	12.2	329.5	364.6	10.8	318.7	396.5	9.6	307.2	432.2	8.5	296.2	471.2	7.5
	41.0	46	350.2	338.8	12.4	339.7	370.4	11.0	328.7	402.8	9.8	316.9	439.1	8.7	305.5	478.7	7.7
	41.0	48	361.0	344.3	12.6	350.1	376.3	11.2	338.8	409.0	9.9	326.7	446.0	8.8	315.0	486.3	7.8
	41.0	50	372.0	350.0	12.8	360.9	382.5	11.3	349.1	415.7	10.1	336.7	453.2	8.9	324.8	494.0	7.9
350DS	41.0	40	337.7	341.7	11.9	327.5	373.7	10.5	316.7	406.4	9.3	305.2	443.3	8.3	294.2	483.5	7.3
	41.0	42	348.4	347.1	12.0	338.0	379.6	10.7	326.9	412.9	9.5	315.0	450.2	8.4	303.6	491.0	7.4
	41.0	44	359.4	352.7	12.2	348.7	385.7	10.8	337.2	419.5	9.6	325.1	457.2	8.5	313.4	498.4	7.5
	41.0	46	370.6	358.4	12.4	359.5	391.8	11.0	347.8	426.1	9.8	335.3	464.5	8.7	323.2	506.3	7.7
	41.0	48	382.0	364.2	12.6	370.5	398.0	11.2	358.5	432.7	9.9	345.7	471.7	8.8	333.3	514.3	7.8
	41.0	50	393.7	370.2	12.8	381.9	404.6	11.3	369.4	439.8	10.1	356.3	479.4	8.9	343.7	522.4	7.9
360DS	41.0	40	351.6	355.7	11.9	341.0	389.1	10.5	329.7	423.1	9.4	317.8	461.5	8.3	306.3	503.3	7.3
	41.0	42	362.8	361.3	12.0	351.9	395.2	10.7	340.3	429.9	9.5	328.0	468.7	8.4	316.1	511.0	7.4
	41.0	44	374.2	367.2	12.2	363.0	401.5	10.9	351.1	436.7	9.6	338.5	476.0	8.5	326.4	518.8	7.5
	41.0	46	385.9	373.1	12.4	374.3	407.8	11.0	362.1	443.7	9.8	349.1	483.5	8.7	336.6	527.0	7.7
	41.0	48	397.7	379.2	12.6	385.8	414.3	11.2	373.2	450.5	9.9	359.9	491.1	8.8	347.1	535.4	7.8
	41.0	50	409.9	385.4	12.8	397.6	421.1	11.3	384.6	457.9	10.1	371.0	499.0	8.9	357.8	543.8	7.9
390DS	45.1	40	373.9	377.0	11.9	362.7	412.4	10.6	350.8	449.8	9.4	338.0	489.4	8.3	325.7	532.6	7.3
	45.1	42	385.8	383.1	12.1	374.2	419.0	10.7	361.9	457.0	9.5	348.8	497.0	8.4	336.3	540.6	7.5
	45.1	44	397.9	389.5	12.3	386.0	425.7	10.9	373.2	464.2	9.6	359.9	504.8	8.6	347.1	549.0	7.6
	45.1	46	410.3	395.8	12.4	397.9	432.6	11.0	384.9	471.7	9.8	371.1	512.9	8.7	357.7	557.7	7.7
	45.1	48	422.9	402.3	12.6	410.2	439.6	11.2	396.7	479.1	9.9	382.4	521.0	8.8	368.7	566.6	7.8
	45.1	50	435.9	409.1	12.8	422.7	446.9	11.3	408.8	487.0	10.1	394.1	529.4	8.9	380.0	575.6	7.9

Continued on the next page.

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
400DS	45.1	40	391.2	394.5	11.9	379.4	431.5	10.6	367.0	470.6	9.4	353.6	512.1	8.3	340.8	557.3	7.3
	45.1	42	403.7	400.9	12.1	391.5	438.4	10.7	378.6	478.1	9.5	364.9	520.1	8.4	351.8	565.7	7.5
	45.1	44	416.3	407.5	12.3	403.8	445.4	10.9	390.4	485.8	9.6	376.5	528.3	8.6	363.1	574.5	7.6
	45.1	46	429.3	414.2	12.4	416.3	452.7	11.0	402.7	493.6	9.8	388.2	536.7	8.7	374.2	583.5	7.7
	45.1	48	442.5	421.0	12.6	429.1	460.0	11.2	415.0	501.4	9.9	400.1	545.2	8.8	385.6	592.9	7.8
	45.1	50	456.0	428.1	12.8	442.2	467.7	11.3	427.6	509.6	10.1	412.3	554.0	8.9	397.5	602.3	7.9
450DS	49.2	40	436.5	440.7	11.9	423.1	482.0	10.5	409.3	526.1	9.3	394.4	572.8	8.3	380.0	623.5	7.3
	49.2	42	450.4	448.4	12.1	436.4	490.1	10.7	421.9	534.5	9.5	406.7	581.9	8.4	392.0	633.4	7.4
	49.2	44	464.5	456.0	12.2	450.1	498.4	10.8	434.8	543.3	9.6	419.2	591.2	8.5	404.1	643.4	7.5
	49.2	46	478.9	464.0	12.4	464.1	507.0	11.0	448.4	552.4	9.7	431.8	600.6	8.6	415.9	653.0	7.6
	49.2	48	493.6	472.0	12.5	478.4	515.6	11.1	462.2	561.8	9.9	444.9	610.4	8.7	428.3	663.3	7.7
	49.2	50	508.6	480.4	12.7	492.8	524.6	11.3	476.2	571.3	10.0	458.5	620.7	8.9	441.4	674.3	7.9

NOTES:
1. Although AGS-D units are not within the ARI rating capacity range, they are rated in accordance with ARI Standard 550/590-1998**.**
2. I-P ratings are based on R-134a, evaporator fouling factor of 0.0001, evaporator water flow of 2.4 gpm per 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, High Efficiency AGS 225DE – AGS 450DE (Inch-Pound Units)

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
225DE	28.7	40	215.4	210.3	12.3	208.5	228.6	10.9	201.8	248.6	9.7	194.8	270.8	8.6	187.8	297.0	7.6
	28.7	42	222.2	213.6	12.5	215.1	232.3	11.1	208.3	252.5	9.9	201.0	275.2	8.8	193.6	302.0	7.7
	28.7	44	229.2	217.2	12.7	221.9	236.1	11.3	214.9	256.8	10.0	207.3	279.6	8.9	199.6	306.5	7.8
	28.7	46	236.4	220.9	12.8	228.9	240.1	11.4	221.6	260.9	10.2	213.8	284.1	9.0	205.9	311.3	7.9
	28.7	48	243.6	224.7	13.0	235.9	244.1	11.6	228.4	265.2	10.3	220.4	288.6	9.2	212.3	316.0	8.1
	28.7	50	250.9	228.3	13.2	243.0	248.2	11.8	235.4	269.7	10.5	227.2	293.5	9.3	219.0	321.3	8.2
250DE	32.8	40	240.5	221.7	13.0	230.6	244.5	11.3	221.2	269.7	9.8	213.6	293.7	8.7	205.8	319.5	7.7
	32.8	42	248.1	225.2	13.2	238.0	248.4	11.5	228.3	274.0	10.0	220.5	298.3	8.9	212.5	324.3	7.9
	32.8	44	255.9	228.8	13.4	245.5	252.3	11.7	235.5	278.2	10.2	227.5	302.9	9.0	219.4	329.3	8.0
	32.8	46	263.8	232.3	13.6	253.1	256.2	11.9	242.9	282.6	10.3	234.7	307.7	9.2	226.3	334.6	8.1
	32.8	48	271.9	236.1	13.8	260.9	260.3	12.0	250.3	286.9	10.5	241.9	312.5	9.3	233.3	339.9	8.2
	32.8	50	280.3	240.0	14.0	268.9	264.5	12.2	258.0	291.6	10.6	249.3	317.5	9.4	240.5	345.2	8.4
260DE	32.8	40	254.9	235	13.0	244.5	264.4	11.1	234.5	291.6	9.6	226.4	317.5	8.6	218.1	345.5	7.6
	32.8	42	263.0	238.7	13.2	252.3	268.5	11.3	242.0	296.2	9.8	233.7	322.5	8.7	225.2	350.6	7.7
	32.8	44	271.2	242.5	13.4	260.2	272.8	11.4	249.6	300.8	10.0	241.2	327.5	8.8	232.6	356.1	7.8
	32.8	46	279.6	246.3	13.6	268.3	277.0	11.6	257.4	305.5	10.1	248.7	332.7	9.0	239.9	361.8	8.0
	32.8	48	288.2	250.3	13.8	276.5	281.4	11.8	265.3	310.2	10.3	256.4	337.8	9.1	247.3	367.5	8.1
	32.8	50	297.2	254.4	14.0	285.0	286.0	12.0	273.4	315.3	10.4	264.2	343.2	9.2	254.9	373.3	8.2
275DE	36.9	40	268.3	255.0	12.6	259.8	278.5	11.2	251.6	304.2	9.9	242.9	331.5	8.8	234.1	360.8	7.8
	36.9	42	276.8	259.3	12.8	268.1	283.1	11.4	259.6	309.1	10.1	250.6	336.7	8.9	241.6	366.3	7.9
	36.9	44	285.6	263.6	13.0	276.5	287.8	11.5	267.7	314.1	10.2	258.4	342.0	9.1	249.2	372.0	8.0
	36.9	46	294.4	268.0	13.2	285.1	292.5	11.7	276.0	319.2	10.4	266.5	347.5	9.2	256.8	377.8	8.2
	36.9	48	303.5	272.5	13.4	293.8	297.3	11.9	284.5	324.4	10.5	274.6	353.0	9.3	264.6	383.8	8.3
	36.9	50	312.8	277.2	13.5	302.8	302.3	12.0	293.2	329.8	10.7	283.0	358.8	9.5	272.7	390.0	8.4

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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
300DE	36.9	40	300.5	295.6	12.2	290.9	323.0	10.8	281.7	352.9	9.6	272.0	384.7	8.5	262.1	418.8	7.5
	36.9	42	310.1	300.9	12.4	300.1	328.5	11.0	290.5	358.7	9.7	280.4	390.8	8.6	270.3	425.4	7.6
	36.9	44	320.0	306.1	12.5	309.6	334.1	11.1	299.5	364.7	9.9	289.0	397.2	8.7	278.6	432.2	7.7
	36.9	46	329.9	311.5	12.7	319.2	339.9	11.3	308.8	370.9	10.0	297.9	403.6	8.9	286.9	438.9	7.8
	36.9	48	340.0	316.9	12.9	329.0	345.7	11.4	318.3	377.2	10.1	307.0	410.4	9.0	295.5	445.9	8.0
	36.9	50	350.3	322.6	13.0	338.9	351.8	11.6	328.0	383.6	10.3	316.3	417.3	9.1	304.6	453.3	8.1
330DE	45.1	40	324.6	313.2	12.4	314.3	341.5	11.0	304.4	372.4	9.8	293.8	405.6	8.7	283.2	442.5	7.7
	45.1	42	334.9	318.1	12.6	324.3	346.9	11.2	314.2	378.3	10.0	303.3	412.0	8.8	292.3	449.4	7.8
	45.1	44	345.4	323.3	12.8	334.6	352.5	11.4	324.1	384.3	10.1	313.0	418.5	9.0	301.7	456.2	7.9
	45.1	46	356.1	328.5	13.0	345.0	358.1	11.6	334.2	390.4	10.3	322.8	425.1	9.1	311.2	463.5	8.1
	45.1	48	367.0	334.0	13.2	355.6	363.9	11.7	344.5	396.6	10.4	332.7	431.7	9.2	320.8	470.8	8.2
	45.1	50	378.3	339.4	13.4	366.5	369.9	11.9	355.0	403.1	10.6	342.9	438.8	9.4	330.7	478.3	8.3
350DE	49.2	40	343.4	328.0	12.6	332.6	357.7	11.2	322.1	390.1	9.9	310.9	424.9	8.8	299.7	463.4	7.8
	49.2	42	354.3	333.2	12.8	343.2	363.3	11.3	332.4	396.2	10.1	320.9	431.6	8.9	309.3	470.6	7.9
	49.2	44	365.4	338.6	13.0	354.0	369.2	11.5	342.9	402.6	10.2	331.2	438.3	9.1	319.3	477.8	8.0
	49.2	46	376.8	344.0	13.1	365.0	375.1	11.7	353.6	409.0	10.4	341.6	445.3	9.2	329.3	485.4	8.1
	49.2	48	388.4	349.7	13.3	376.2	381.1	11.8	364.5	415.3	10.5	352.1	452.2	9.3	339.5	493.0	8.3
	49.2	50	400.3	355.4	13.5	387.8	387.4	12.0	375.6	422.2	10.7	362.9	459.6	9.5	350.0	500.9	8.4
400DE	49.2	40	397.8	389.4	12.3	385.3	425.4	10.9	373.2	464.6	9.6	360.3	506.1	8.5	347.2	550.8	7.6
	49.2	42	410.5	395.8	12.4	397.6	432.3	11.0	385.0	472.0	9.8	371.8	514.1	8.7	358.4	559.2	7.7
	49.2	44	423.4	402.4	12.6	410.1	439.3	11.2	397.1	479.6	9.9	383.5	522.2	8.8	369.8	567.9	7.8
	49.2	46	436.6	408.9	12.8	422.8	446.4	11.4	409.5	487.3	10.1	395.4	530.6	8.9	381.2	576.9	7.9
	49.2	48	450.0	415.8	13.0	435.8	453.7	11.5	422.1	495.1	10.2	407.5	539.0	9.1	392.8	586.1	8.0
	49.2	50	463.8	422.9	13.2	449.1	461.3	11.7	434.9	503.3	10.4	420.0	547.8	9.2	404.9	595.5	8.2
450DE	53.3	40	439.4	430.7	12.2	425.5	470.6	10.9	412.0	514.2	9.6	397.8	560.4	8.5	383.3	610.1	7.5
	53.3	42	453.5	438.4	12.4	438.9	478.6	11.0	424.9	522.5	9.8	410.2	569.3	8.6	395.4	619.8	7.7
	53.3	44	467.9	446.0	12.6	452.7	486.8	11.2	438.0	531.3	9.9	422.7	578.6	8.8	407.5	629.6	7.8
	53.3	46	482.4	453.8	12.8	466.8	495.2	11.3	451.7	540.3	10.0	435.7	588.0	8.9	419.6	639.4	7.9
	53.3	48	497.2	461.7	12.9	481.1	503.7	11.5	465.6	549.5	10.2	449.0	597.8	9.0	432.2	649.6	8.0
	53.3	50	512.3	470.0	13.1	495.7	512.5	11.6	479.7	558.9	10.3	462.7	607.9	9.1	445.5	660.4	8.1

NOTES:

1. Although AGS-D units are not within the ARI rating capacity range, they are rated in accordance with ARI Standard 550/590-1998**.**
2. I-P ratings are based on R-134a, evaporator fouling factor of 0.0001, evaporator water flow of 2.4 gpm per 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 9, Standard Efficiency AGS 225DS – AGS 450DS (SI Units)

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
225DS	24.6	5	751.7	222.0	3.39	730.8	240.3	3.04	708.7	257.8	2.75	685.6	280.3	2.45	663.2	304.8	2.18
	24.6	6	773.1	225.3	3.43	751.8	243.8	3.08	729.1	261.5	2.79	705.0	284.3	2.48	681.6	309.1	2.20
	24.6	7	795.0	228.6	3.48	773.1	247.5	3.12	749.8	265.4	2.83	724.9	288.4	2.51	700.8	313.3	2.24
	24.6	8	817.3	232.1	3.52	794.6	251.1	3.16	770.7	269.3	2.86	745.3	292.5	2.55	720.6	317.6	2.27
	24.6	9	839.7	235.7	3.56	816.4	254.9	3.20	792.0	273.2	2.90	766.0	296.6	2.58	740.8	322.0	2.30
	24.6	10	862.4	239.1	3.61	838.8	258.7	3.24	813.8	277.4	2.93	787.2	301.1	2.61	761.5	326.8	2.33
250DS	28.7	5	823.3	239.8	3.43	801.0	259.8	3.08	777.3	280.8	2.77	751.9	302.9	2.48	727.4	326.8	2.23
	28.7	6	846.8	243.2	3.48	823.9	263.5	3.13	799.6	284.8	2.81	773.8	307.1	2.52	748.8	331.2	2.26
	28.7	7	870.6	246.7	3.53	847.0	267.1	3.17	822.2	288.8	2.85	796.0	311.4	2.56	770.6	335.8	2.29
	28.7	8	894.8	250.2	3.58	870.5	270.9	3.21	845.3	292.8	2.89	818.3	315.9	2.59	792.1	340.7	2.33
	28.7	9	919.5	253.8	3.62	894.6	274.7	3.26	868.5	296.8	2.93	840.9	320.3	2.63	814.2	345.6	2.36
	28.7	10	944.9	257.5	3.67	919.2	278.7	3.30	892.3	301.1	2.96	864.1	324.9	2.66	836.8	350.4	2.39

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
275DS	30.8	5	936.9	270.6	3.46	911.0	293.1	3.11	883.9	316.8	2.79	855.1	341.9	2.50	827.2	369.0	2.24
	30.8	6	963.5	274.6	3.51	936.8	297.4	3.15	908.8	321.4	2.83	879.4	346.8	2.54	850.9	374.1	2.27
	30.8	7	990.6	278.7	3.55	963.1	301.7	3.19	934.2	326.0	2.87	904.0	351.7	2.57	874.8	379.3	2.31
	30.8	8	1018.2	282.8	3.60	989.9	306.2	3.23	960.3	330.7	2.90	928.9	356.7	2.60	898.5	384.6	2.34
	30.8	9	1046.2	287.0	3.64	1017.2	310.7	3.27	986.7	335.5	2.94	954.4	361.8	2.64	923.1	390.1	2.37
	30.8	10	1074.8	291.4	3.69	1045.0	315.3	3.31	1013.6	340.5	2.98	980.6	367.1	2.67	948.5	395.8	2.40
300DS	32.8	5	1058.7	309.3	3.42	1029.0	335.0	3.07	998.4	362.3	2.76	965.8	391.1	2.47	934.3	422.3	2.21
	32.8	6	1088.7	314.1	3.47	1058.0	340.1	3.11	1026.0	367.5	2.79	992.7	396.8	2.50	960.5	428.3	2.24
	32.8	7	1119.3	318.9	3.51	1087.7	345.3	3.15	1054.3	373.0	2.83	1020.0	402.5	2.53	986.7	434.3	2.27
	32.8	8	1150.5	323.9	3.55	1118.0	350.6	3.19	1083.8	378.6	2.86	1047.7	408.3	2.57	1012.8	440.3	2.30
	32.8	9	1182.1	329.0	3.59	1148.8	356.0	3.23	1113.6	384.4	2.90	1076.2	414.3	2.60	1040.1	446.6	2.33
	32.8	10	1214.2	334.2	3.63	1180.0	361.5	3.26	1143.9	390.2	2.93	1105.7	420.6	2.63	1068.6	453.3	2.36
330DS	41.0	5	1133.3	331.6	3.42	1102.3	359.2	3.07	1069.4	387.2	2.76	1034.6	418.8	2.47	1000.8	453.0	2.21
	41.0	6	1165.6	336.4	3.46	1133.9	364.3	3.11	1100.1	392.7	2.80	1064.4	424.7	2.51	1029.7	459.3	2.24
	41.0	7	1198.4	341.3	3.51	1165.8	369.5	3.15	1131.3	398.4	2.84	1094.8	430.7	2.54	1059.3	465.6	2.28
	41.0	8	1231.9	346.2	3.56	1198.2	374.8	3.20	1163.1	404.0	2.88	1125.5	436.8	2.58	1089.1	472.2	2.31
	41.0	9	1265.8	351.3	3.60	1231.2	380.2	3.24	1195.0	409.7	2.92	1156.6	443.0	2.61	1119.5	479.0	2.34
	41.0	10	1300.6	356.5	3.65	1265.1	385.8	3.28	1227.8	415.7	2.95	1188.6	449.4	2.64	1150.6	485.8	2.37
350DS	41.0	5	1199.2	350.8	3.42	1166.4	380.0	3.07	1131.6	409.7	2.76	1094.7	443.0	2.47	1059.0	479.1	2.21
	41.0	6	1233.3	355.9	3.47	1199.8	385.4	3.11	1164.1	415.5	2.80	1126.3	449.3	2.51	1089.7	485.8	2.24
	41.0	7	1268.1	361.0	3.51	1233.5	390.9	3.16	1197.1	421.5	2.84	1158.4	455.6	2.54	1121.0	492.5	2.28
	41.0	8	1303.5	366.2	3.56	1267.8	396.5	3.20	1230.7	427.4	2.88	1190.9	462.1	2.58	1152.5	499.5	2.31
	41.0	9	1339.4	371.6	3.60	1302.8	402.1	3.24	1264.5	433.4	2.92	1223.9	468.6	2.61	1184.6	506.6	2.34
	41.0	10	1376.2	377.1	3.65	1338.6	408.1	3.28	1299.2	439.8	2.95	1257.7	475.4	2.65	1217.6	513.8	2.37
360DS	41.0	5	1248.6	365.2	3.42	1214.5	395.6	3.07	1178.2	426.5	2.76	1139.8	461.2	2.47	1102.7	498.7	2.21
	41.0	6	1284.1	370.5	3.47	1249.2	401.2	3.11	1212.1	432.6	2.80	1172.7	467.7	2.51	1134.6	505.6	2.24
	41.0	7	1320.3	375.8	3.51	1284.4	406.9	3.16	1246.5	438.8	2.84	1206.2	474.3	2.54	1167.2	512.6	2.28
	41.0	8	1357.2	381.2	3.56	1320.1	412.7	3.20	1281.4	445	2.88	1240.0	481.0	2.58	1200.0	519.9	2.31
	41.0	9	1394.5	386.8	3.61	1356.5	418.6	3.24	1316.6	451.2	2.92	1274.4	487.8	2.61	1233.4	527.4	2.34
	41.0	10	1432.9	392.5	3.65	1393.7	424.8	3.28	1352.7	457.9	2.95	1309.6	494.9	2.65	1267.8	534.9	2.37
390DS	45.1	5	1328.0	387.2	3.43	1291.5	419.5	3.08	1253.2	453.4	2.76	1212.4	489.3	2.48	1172.8	527.9	2.22
	45.1	6	1365.7	392.9	3.48	1328.2	425.5	3.12	1288.7	459.9	2.80	1247.1	496.1	2.51	1206.8	535.2	2.25
	45.1	7	1404.1	398.6	3.52	1365.6	431.6	3.16	1324.9	466.5	2.84	1282.3	503.2	2.55	1241.1	542.7	2.29
	45.1	8	1443.2	404.5	3.57	1403.5	437.9	3.20	1362.1	473.2	2.88	1317.9	510.4	2.58	1275.2	550.5	2.32
	45.1	9	1483.0	410.4	3.61	1442.2	444.3	3.25	1399.5	479.9	2.92	1354.2	517.7	2.62	1310.3	558.4	2.35
	45.1	10	1523.7	416.6	3.66	1481.7	450.9	3.29	1437.7	487.0	2.95	1391.4	525.2	2.65	1346.5	566.4	2.38
400DS	45.1	5	1389.4	405.1	3.43	1351.2	438.9	3.08	1311.1	474.4	2.76	1268.4	511.9	2.48	1227.0	552.4	2.22
	45.1	6	1428.9	411.1	3.48	1389.6	445.2	3.12	1348.2	481.2	2.80	1304.7	519.1	2.51	1262.5	560.1	2.25
	45.1	7	1469.0	417.1	3.52	1428.6	451.7	3.16	1386.1	488.1	2.84	1341.5	526.5	2.55	1298.3	567.9	2.29
	45.1	8	1510.0	423.2	3.57	1468.3	458.2	3.20	1425.0	495.1	2.88	1378.7	534.1	2.58	1333.9	576.0	2.32
	45.1	9	1551.5	429.5	3.61	1508.8	464.9	3.25	1464.1	502.2	2.92	1416.6	541.7	2.62	1370.6	584.3	2.35
	45.1	10	1594.2	436.0	3.66	1550.1	471.9	3.29	1504.0	509.6	2.95	1455.5	549.6	2.65	1408.5	592.6	2.38
450DS	49.2	5	1550.0	452.8	3.42	1506.5	490.5	3.07	1461.6	530.3	2.76	1414.0	572.6	2.47	1367.8	618.2	2.21
	49.2	6	1593.9	459.8	3.47	1548.9	497.9	3.11	1502.0	538	2.79	1453.3	580.8	2.50	1406.2	627.0	2.24
	49.2	7	1638.7	466.9	3.51	1592.4	505.5	3.15	1543.6	546	2.83	1493.2	589.2	2.53	1444.5	635.8	2.27
	49.2	8	1684.3	474.2	3.55	1636.7	513.2	3.19	1586.7	554.3	2.86	1533.8	597.7	2.57	1482.8	644.6	2.30
	49.2	9	1730.6	481.6	3.59	1681.8	521.1	3.23	1630.3	562.7	2.90	1575.6	606.6	2.60	1522.7	653.8	2.33
	49.2	10	1777.6	489.2	3.63	1727.5	529.2	3.26	1674.7	571.3	2.93	1618.7	615.7	2.63	1564.5	663.6	2.36

NOTES:

1. Although AGS-D units are not within the ARI rating capacity range, they are rated in accordance with ARI Standard 550/590-1998**.**
2. SI ratings based on R-134a, evaporator fouling factor of 0.0176 m2 x C/kW, evapr 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.

Table 10, High Efficiency AGS 225DE – AGS 450DE (SI Units)

AGS Unit Size	(Fan Power kW)	LWT (deg F)	Ambient Air Temperature (deg C)														
			25ºC			30ºC			35ºC			40ºC			45ºC		
			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
225DE	28.7	5	764.5	215.6	3.55	742.4	232.5	3.19	721.0	250.6	2.88	698.4	270.8	2.58	675.7	294.2	2.30
	28.7	6	786.2	218.8	3.59	763.6	235.9	3.24	741.7	254.2	2.92	718.3	274.7	2.62	694.6	298.4	2.33
	28.7	7	808.5	222.1	3.64	785.2	239.4	3.28	762.7	258	2.96	738.6	278.6	2.65	714.2	302.5	2.36
	28.7	8	831.1	225.5	3.69	807.2	243.0	3.32	784.0	261.8	2.99	759.3	282.7	2.69	734.4	306.8	2.39
	28.7	9	853.8	229.0	3.73	829.4	246.6	3.36	805.6	265.6	3.03	780.3	286.7	2.72	754.8	311.1	2.43
	28.7	10	876.9	232.3	3.77	851.9	250.3	3.40	827.7	269.7	3.07	801.9	291.1	2.75	775.9	315.8	2.46
250DE	30.8	5	852.2	228.0	3.74	820.7	249.0	3.30	790.4	271.8	2.91	765.9	293.6	2.61	741.1	316.7	2.34
	30.8	6	876.4	231.3	3.79	844.1	252.5	3.34	813.1	275.7	2.95	788.0	297.7	2.65	762.7	321.1	2.38
	30.8	7	900.9	234.6	3.84	867.9	256.1	3.39	836.0	279.5	2.99	810.5	301.9	2.68	784.8	325.6	2.41
	30.8	8	925.9	237.9	3.89	892.0	259.7	3.44	859.3	283.5	3.03	833.2	306.2	2.72	806.7	330.3	2.44
	30.8	9	951.5	241.3	3.94	916.6	263.4	3.48	883.0	287.4	3.07	856.2	310.4	2.76	829.1	335.0	2.48
	30.8	10	977.9	244.9	3.99	941.9	267.2	3.52	907.2	291.6	3.11	879.7	314.9	2.79	852.0	339.7	2.51
260DE	32.8	5	903.3	242.8	3.72	870.0	269.2	3.23	837.9	293.9	2.85	811.9	317.4	2.56	785.6	342.5	2.29
	32.8	6	929.0	246.2	3.77	894.8	273.0	3.28	861.8	298	2.89	835.3	321.9	2.60	808.5	347.2	2.33
	32.8	7	955.0	249.7	3.82	919.9	276.9	3.32	886.2	302.2	2.93	859.1	326.4	2.63	831.8	352.0	2.36
	32.8	8	981.5	253.2	3.88	945.5	280.8	3.37	910.9	306.5	2.97	883.2	331.0	2.67	855.1	357.1	2.39
	32.8	9	1008.6	256.9	3.93	971.6	284.8	3.41	936.0	310.7	3.01	907.5	335.6	2.70	878.8	362.2	2.43
	32.8	10	1036.6	260.7	3.98	998.4	288.9	3.46	961.6	315.3	3.05	932.5	340.4	2.74	903.1	367.3	2.46
275DE	34.9	5	952.6	261.9	3.64	925.4	283.4	3.27	899.0	306.7	2.93	871.0	331.4	2.63	842.8	357.6	2.36
	34.9	6	979.7	265.8	3.69	951.6	287.6	3.31	924.3	311.1	2.97	895.6	336.1	2.67	866.8	362.6	2.39
	34.9	7	1007.3	269.8	3.73	978.4	291.8	3.35	950.3	315.6	3.01	920.7	340.9	2.70	891.1	367.7	2.42
	34.9	8	1035.3	273.8	3.78	1005.6	296.1	3.40	976.8	320.3	3.05	946.3	345.8	2.74	915.5	372.9	2.45
	34.9	9	1063.8	277.9	3.83	1033.3	300.5	3.44	1003.7	324.9	3.09	972.2	350.8	2.77	940.5	378.3	2.49
	34.9	10	1093.0	282.2	3.87	1061.6	305.1	3.48	1031.0	329.8	3.13	998.8	355.9	2.81	966.4	383.8	2.52
300DE	36.9	5	1066.8	303.8	3.51	1036.1	328.8	3.15	1006.2	355.8	2.83	974.9	384.6	2.54	943.3	415.2	2.27
	36.9	6	1097.3	308.5	3.56	1065.4	333.8	3.19	1034.4	361.1	2.86	1002.0	390.1	2.57	969.6	421.2	2.30
	36.9	7	1128.4	313.4	3.60	1095.3	338.9	3.23	1063.2	366.5	2.90	1029.7	395.9	2.60	996.2	427.2	2.33
	36.9	8	1159.7	318.3	3.64	1125.8	344.2	3.27	1092.9	372.1	2.94	1058.0	401.7	2.63	1023.0	433.2	2.36
	36.9	9	1191.6	323.3	3.69	1156.8	349.5	3.31	1122.9	377.8	2.97	1087.0	407.7	2.67	1050.7	439.5	2.39
	36.9	10	1223.9	328.5	3.73	1188.2	355.0	3.35	1153.5	383.6	3.01	1116.7	413.9	2.70	1079.5	446.1	2.42
330DE	45.1	5	1152.3	321.4	3.59	1119.5	347.3	3.22	1087.7	375.4	2.90	1053.8	405.5	2.60	1019.6	438.5	2.33
	45.1	6	1185.0	326.0	3.64	1151.5	352.3	3.27	1118.9	380.7	2.94	1084.1	411.2	2.64	1049.0	444.6	2.36
	45.1	7	1218.3	330.7	3.68	1183.9	357.4	3.31	1150.5	386.2	2.98	1115.0	417.1	2.67	1079.1	450.8	2.39
	45.1	8	1252.2	335.5	3.73	1216.9	362.5	3.36	1182.6	391.7	3.02	1146.2	423.0	2.71	1109.4	457.2	2.43
	45.1	9	1286.7	340.5	3.78	1250.4	367.8	3.40	1215.1	397.2	3.06	1177.8	428.9	2.75	1140.2	463.7	2.46
	45.1	10	1322.1	345.5	3.83	1284.8	373.2	3.44	1248.5	403.1	3.10	1210.3	435.2	2.78	1171.8	470.4	2.49
350DE	49.2	5	1219.3	336.6	3.62	1184.6	363.8	3.26	1150.9	393.2	2.93	1115.1	424.7	2.63	1078.9	459.2	2.35
	49.2	6	1253.9	341.4	3.67	1218.4	369.0	3.30	1183.9	398.8	2.97	1147.2	430.7	2.66	1110.1	465.6	2.38
	49.2	7	1289.1	346.3	3.72	1252.7	374.3	3.35	1217.4	404.5	3.01	1179.8	436.8	2.70	1141.9	472.1	2.42
	49.2	8	1325.0	351.4	3.77	1287.6	379.7	3.39	1251.3	410.2	3.05	1212.9	443.0	2.74	1173.9	478.9	2.45
	49.2	9	1361.5	356.6	3.82	1323.1	385.2	3.43	1285.8	416	3.09	1246.3	449.3	2.77	1206.5	485.6	2.48
	49.2	10	1398.9	361.8	3.87	1359.5	390.9	3.48	1321.1	422.2	3.13	1280.6	455.9	2.81	1239.9	492.6	2.52
400DE	49.2	5	1412.5	399.9	3.53	1372.4	432.8	3.17	1333.4	468.3	2.85	1292.0	505.9	2.55	1250.1	546.0	2.29
	49.2	6	1452.8	405.8	3.58	1411.4	439.1	3.21	1371.2	475	2.89	1328.7	513.1	2.59	1286.0	553.6	2.32
	49.2	7	1493.6	411.8	3.63	1451.1	445.5	3.26	1409.7	481.9	2.93	1366.2	520.4	2.62	1322.4	561.4	2.36
	49.2	8	1535.1	417.8	3.67	1491.5	452.0	3.30	1449.1	488.9	2.96	1404.2	527.9	2.66	1358.9	569.5	2.39
	49.2	9	1577.4	424.1	3.72	1532.5	458.6	3.34	1489.0	495.9	3.00	1442.8	535.5	2.69	1396.2	577.6	2.42
	49.2	10	1620.8	430.6	3.76	1574.6	465.5	3.38	1529.7	503.3	3.04	1482.3	543.3	2.73	1434.7	586.0	2.45

Continued on next page.

AGS Unit Size	(Fan Power kW)	LWT (deg F)	Ambient Air Temperature (deg C)														
			25°C			30°C			35°C			40°C			45°C		
			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
450DE	53.3	5	1560.2	442.5	3.53	1515.3	479.0	3.16	1471.7	518.3	2.84	1425.9	560.2	2.55	1379.6	604.9	2.28
	53.3	6	1604.8	449.5	3.57	1558.1	486.3	3.20	1512.8	526	2.88	1465.5	568.4	2.58	1418.1	613.6	2.31
	53.3	7	1650.3	456.5	3.61	1601.9	493.8	3.24	1555.0	534	2.91	1505.9	576.7	2.61	1456.9	622.3	2.34
	53.3	8	1696.1	463.7	3.66	1646.5	501.4	3.28	1598.3	542.1	2.95	1547.4	585.2	2.64	1496.1	631.1	2.37
	53.3	9	1742.7	471.0	3.70	1691.8	509.2	3.32	1642.3	550.4	2.98	1589.8	594.0	2.68	1536.7	640.3	2.40
	53.3	10	1790.0	478.5	3.74	1737.7	517.2	3.36	1687.0	558.9	3.02	1633.1	603.0	2.71	1578.8	649.9	2.43

NOTES:

1. Although AGS-D units are not within the ARI rating capacity range, they are rated in accordance with ARI Standard 550/590-1998**.**
2. SI ratings are 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.

Table 11, Part Load Data, Standard Efficiency

Unit Model No.	% Load	Capacity Tons	Power kW	EER	IPLV
AGS225DS	100	211.2	264.1	9.6	12.7
	75	158.4	165.3	11.5	
	50	105.6	90.5	14.0	
	25	52.8	52.8	12.0	
AGS250DS	100	231.6	287.4	9.7	12.9
	75	173.7	178.2	11.7	
	50	115.8	97.9	14.2	
	25	57.9	56.0	12.4	
AGS275DS	100	263.1	324.4	9.7	12.9
	75	197.3	202.4	11.7	
	50	131.6	111.2	14.2	
	25	65.8	63.7	12.4	
AGS300DS	100	297.0	371.1	9.6	12.7
	75	222.8	232.4	11.5	
	50	148.5	127.3	14.0	
	25	74.3	74.3	12.0	
AGS330DS	100	318.7	396.5	9.6	13.0
	75	239.0	235.1	12.2	
	50	159.4	138.6	13.8	
	25	79.7	71.4	13.4	
AGS350DS	100	337.2	419.5	9.6	12.9
	75	252.9	252.9	12.0	
	50	168.6	147.7	13.7	
	25	84.3	76.6	13.2	
AGS360DS	100	351.1	436.7	9.6	12.8
	75	263.3	263.3	12.0	
	50	175.6	154.9	13.6	
	25	87.8	81.0	13.0	
AGS390DS	100	373.1	464.21	9.6	12.9
	75	279.8	275.2	12.2	
	50	186.6	164.6	13.6	
	25	93.3	86.1	13.0	
AGS400DS	100	390.4	485.8	9.6	12.9
	75	292.9	288.1	12.2	
	50	195.3	172.3	13.6	
	25	97.6	90.1	13.0	
AGS450DS	100	434.8	543.3	9.6	12.9
	75	326.2	318.2	12.3	
	50	217.5	191.9	13.6	
	25	108.7	100.4	13.0	

NOTE: Part load data and IPLV are based on temperatures and procedures in ARI Standard 550/590. High efficiency unit data is on the next page.

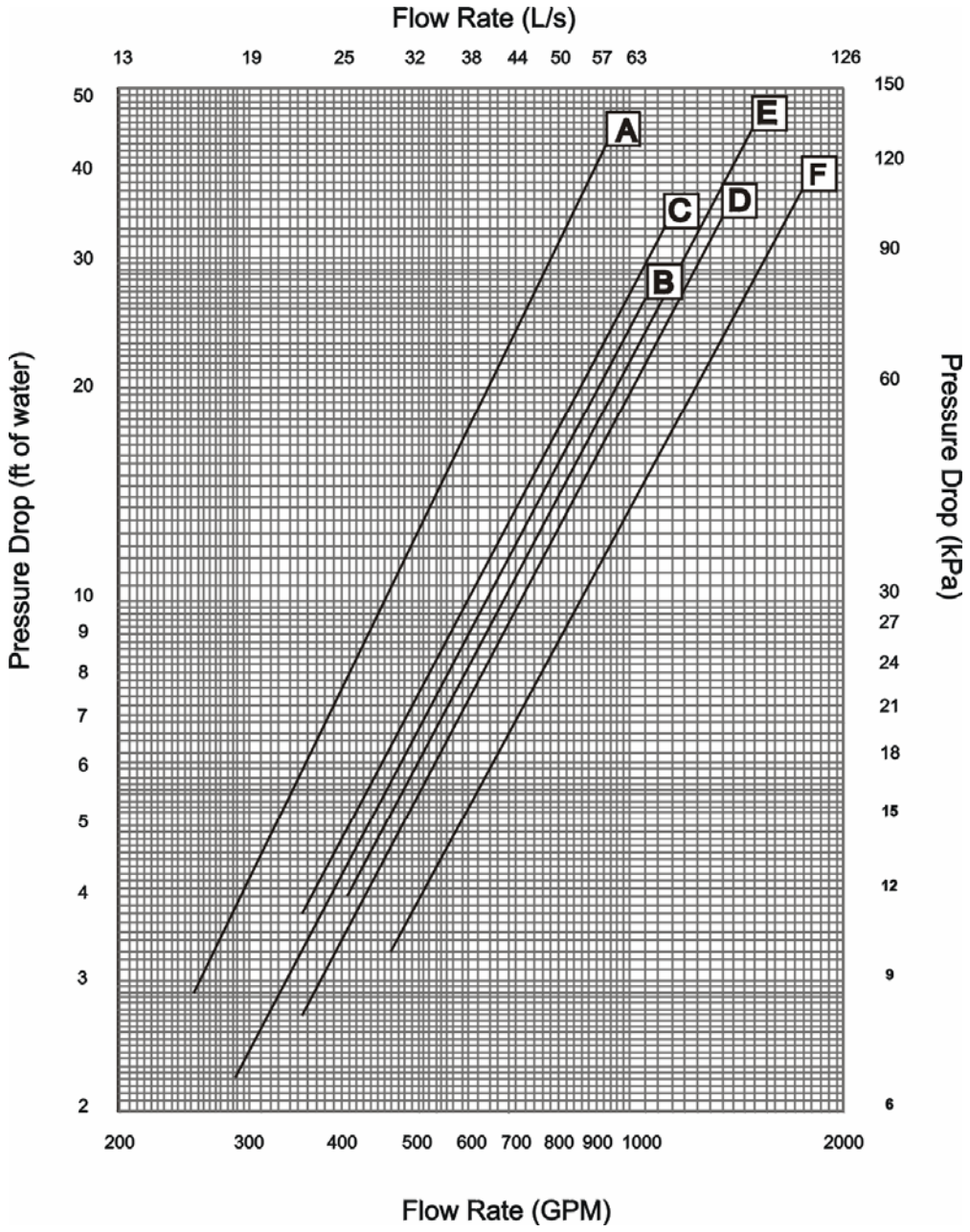
Table 12, Part Load Data, High Efficiency

Unit Model No.	% Load	Capacity Tons	Power kW	EER	IPLV
AGS225DE	100	214.9	256.8	10.0	13.0
	75	161.2	163.9	11.8	
	50	107.5	89.5	14.4	
	25	53.73	53.3	12.1	
AGS250DE	100	235.5	278.2	10.2	13.2
	75	176.6	176.6	12.0	
	50	117.8	96.8	14.6	
	25	58.9	57.0	12.4	
AGS260DE	100	249.6	300.8	10.0	12.9
	75	187.2	192.0	11.7	
	50	124.8	104.7	14.3	
	25	62.4	62.4	12.0	
AGS275DE	100	267.7	314.1	10.2	13.2
	75	200.7	200.7	12.0	
	50	133.8	110.7	14.5	
	25	66.9	64.7	12.4	
AGS300DE	100	299.5	364.7	9.9	12.8
	75	224.6	230.4	11.7	
	50	149.8	126.5	14.2	
	25	74.9	75.5	11.9	
AGS330DE	100	324.1	384.3	10.1	13.3
	75	243.1	233.4	12.5	
	50	162.1	137.9	14.1	
	25	81.0	73.1	13.3	
AGS350DE	100	342.9	402.6	10.2	13.5
	75	257.2	243.0	12.7	
	50	171.5	142.9	14.4	
	25	85.7	77.3	13.3	
AGS400DE	100	397.1	479.6	9.9	13.2
	75	297.8	288.2	12.4	
	50	198.6	170.2	14.0	
	25	99.3	90.9	13.1	
AGS450DE	100	438.0	531.3	9.9	13.1
	75	328.5	320.5	12.3	
	50	219.0	189.1	13.9	
	25	109.5	101.1	13.0	

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

Pressure Drop

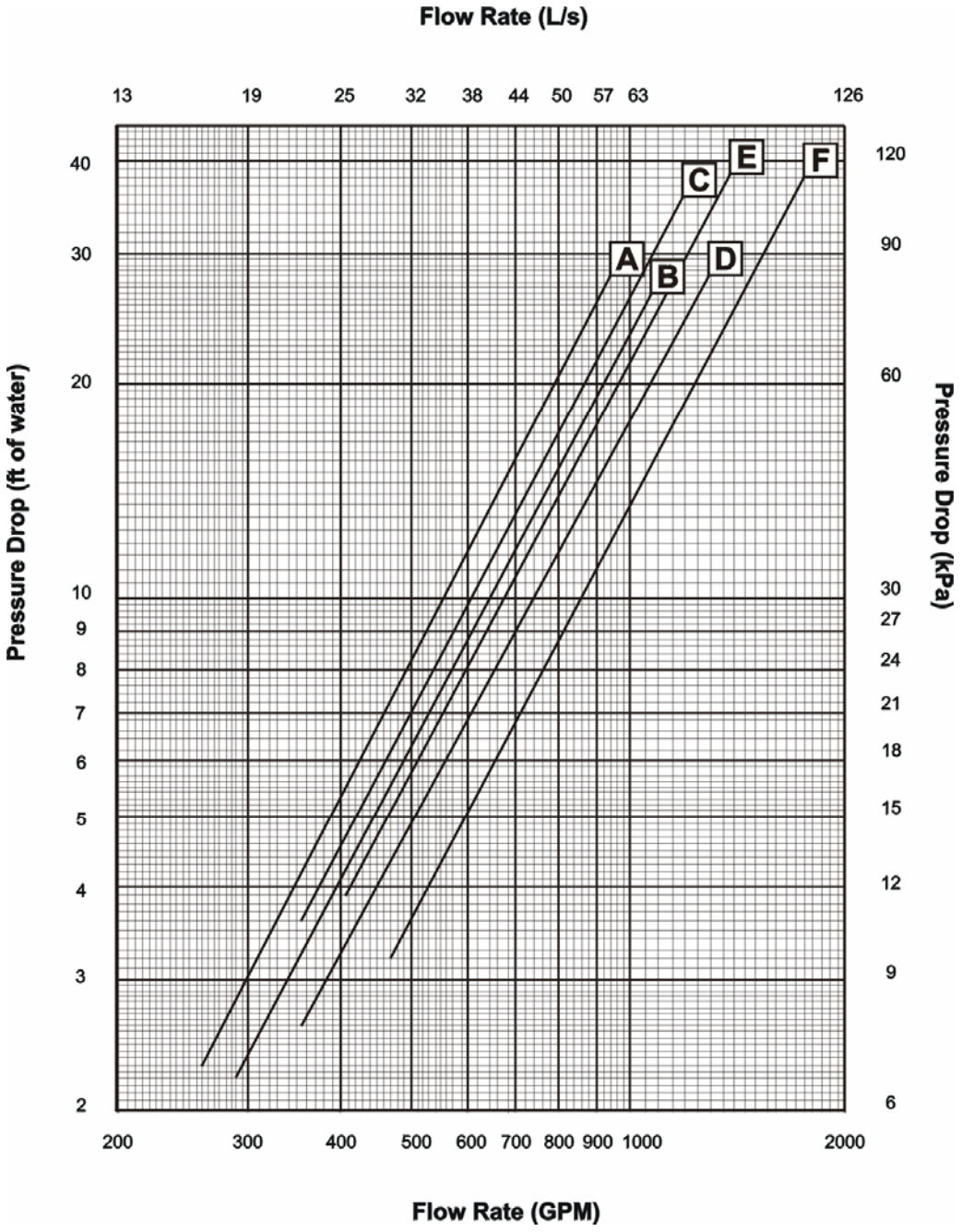
Figure 5, Standard Efficiency, Evaporator Pressure Drop



Standard Efficiency, Minimum/Nominal/Maximum Flow Rates

AGS MODEL	CURVE	MINIMUM FLOW				NOMINAL FLOW				MAXIMUM FLOW			
		gpm	ft	l/s	kpa	gpm	ft	l/s	kpa	gpm	ft	l/s	kpa
225DS	**A**	252	3.9	15.9	11.6	507	14.3	32.0	42.6	845	37.0	53.3	110.3
250DS	**A**	252	3.9	15.9	11.6	556	17.0	35.1	50.7	926	43.0	58.5	128.1
275DS	**B**	292	2.2	18.4	6.6	631	9.5	39.8	28.3	1052	26.5	66.4	79.0
300DS	**C**	355	3.7	22.4	11.0	713	12.2	45.0	36.4	1188	33.3	75.0	99.2
330DS	**D**	356	2.7	22.5	8.0	765	11.4	48.3	34.0	1275	30.0	80.4	89.4
350DS	**D**	356	2.7	22.5	8.0	809	12.6	51.1	37.5	1349	34.0	85.1	101.3
360DS	**E**	407	3.9	25.7	11.6	843	15.4	53.2	45.9	1404	40.0	88.6	119.2
390DS	**E**	407	3.9	25.7	11.6	896	17.3	56.5	51.6	1493	45.0	94.2	134.1
400DS	**F**	470	3.3	29.7	9.8	937	12.2	59.1	36.4	1562	32.0	98.6	95.4
450DS	**F**	470	3.3	29.7	9.8	1044	15.0	65.9	44.7	1740	37.0	109.8	110.3

Figure 6, High Efficiency, Evaporator Pressure Drops



High Efficiency, Minimum/Nominal/Maximum Flow Rates

AGS MODEL	CURVE	MINIMUM FLOW				NOMINAL FLOW				MAXIMUM FLOW			
		gpm	ft	l/s	kpa	gpm	ft	l/s	kpa	gpm	ft	l/s	kpa
225DE	**A**	260	2.3	16.4	6.9	516	8.7	32.5	25.9	860	23.4	54.2	69.7
250DE	**A**	260	2.3	16.4	6.9	565	10.4	35.7	31.0	942	28.0	59.4	83.4
260DE	**B**	292	2.2	18.4	6.6	599	8.7	37.8	25.9	998	23.5	63.0	70.0
275DE	**B**	292	2.2	18.4	6.6	642	9.8	40.5	29.2	1070	26.5	67.5	79.0
300DE	**C**	355	3.6	22.4	10.7	719	13.4	45.3	39.9	1198	36.0	75.6	107.3
330DE	**D**	356	2.6	22.5	7.7	778	11.4	49.1	34.0	1296	28.0	81.8	83.4
350DE	**E**	407	3.9	25.7	11.6	823	15.0	51.9	34.0	1372	38.4	86.5	114.4
400DE	**F**	470	3.2	29.7	9.5	953	12.1	60.2	44.7	1589	31.0	100.3	92.4
450DE	**F**	470	3.2	29.7	9.5	1051	14.5	66.3	36.1	1751	38.1	110.5	113.5

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 AGS 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 phenomenon. 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 "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 pressures is 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™ Program

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.

Standard Efficiency

Table 13, "A" Weighted Sound Pressure at 30 ft. without *Sound Blankets*

Model	Octave Band & Center Frequency.								Side Pressure Overall "A" Wt	Opposite Control Box Overall "A" Wt	Control Box End Overall "A" Wt
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz			
225 DS	38	52	63	66	65	61	56	48	70	66	67
250 DS	38	52	63	66	66	61	57	49	71	67	68
275 DS	40	54	63	68	67	62	58	51	72	68	69
300 DS	41	55	64	68	68	63	59	51	73	69	70
315 DS	42	55	64	68	68	63	60	51	73	69	70
330 DS	43	56	65	70	69	65	60	52	74	70	71
360 DS	43	56	66	70	69	66	61	52	74	70	71
390 DS	43	56	66	70	70	65	61	52	74	70	71
400 DS	43	56	67	70	70	66	61	52	75	71	72
450 DS	43	57	68	70	71	67	61	53	76	72	73

Table 14, "A" Weighted Sound Power without *Sound Blankets*

Model	Octave Band & Center Frequency								Power Overall "A" Wt
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	
225 DS	68	81	93	95	95	90	86	78	100
250 DS	68	82	93	96	95	91	86	78	100
275 DS	69	83	93	97	97	91	88	80	101
300 DS	70	84	94	98	98	92	89	81	102
315 DS	71	84	94	98	98	93	89	81	103
330 DS	72	85	94	99	99	94	90	82	104
360 DS	72	85	95	99	99	95	90	82	104
390 DS	73	85	96	99	99	95	90	82	104
400 DS	73	86	96	99	99	95	90	82	104
450 DS	73	87	98	100	101	97	91	82	105

Table 15, "A" Weighted Sound Pressure Data With *Sound Blankets at 30 ft.*

Model	Octave Band & Center Frequency								Side Pressure Overall "A" Wt	Opposite Control Box Overall "A" Wt	Control Box End Overall "A" Wt
	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz			
225 DS	38	51	61	63	63	59	54	47	68	64	65
250 DS	38	51	61	63	64	59	55	48	68	64	65
275 DS	40	53	61	65	65	60	56	50	70	66	67
300 DS	41	54	62	65	66	61	57	50	70	66	67
315 DS	42	54	62	65	66	61	58	50	71	67	68
330 DS	43	55	63	67	67	63	58	51	72	68	69
360 DS	43	55	64	67	67	64	59	51	72	68	69
390 DS	43	55	64	67	68	63	59	51	72	68	69
400 DS	43	55	65	67	68	64	59	51	72	68	69
450 DS	43	56	66	67	69	65	59	52	74	70	71

Table 16, "A" Weighted Sound Power Data with *Sound Blankets*

Model	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Power Overall "A" Wt
225 DS	68	80	91	92	93	88	84	77	98
250 DS	68	81	91	93	93	89	84	77	98
275 DS	69	82	91	94	95	89	86	79	99
300 DS	70	83	92	95	96	90	87	80	100
315 DS	71	83	92	95	96	91	87	80	100
330 DS	72	84	92	96	97	92	88	81	101
360 DS	72	84	93	96	97	93	88	81	102
390 DS	73	84	94	96	97	93	88	81	102
400 DS	73	85	94	96	97	93	88	81	102
450 DS	73	86	96	97	99	95	89	81	103

High Efficiency

Table 17, "A" Weighted Sound Pressure Data Without *Sound Blankets*

AGS Model	Octave Band & Center Frequency								Side Pressure Overall "A" Wt	Opposite Control Box Overall "A" Wt	Control Box End Overall "A" Wt
	63Hz	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	8000Hz			
225DE	38	52	63	66	65	61	56	48	70	66	67
250DE	38	52	63	66	66	61	57	49	71	67	68
260DE	38	52	63	66	66	62	57	49	71	67	68
275DE	40	54	63	68	67	62	58	51	72	68	69
300DE	41	55	64	68	68	63	59	51	73	69	70
330DE	43	56	65	70	69	65	60	52	74	70	71
350DE	43	56	66	70	69	66	61	52	74	70	71
400DE	43	56	67	70	70	66	61	52	75	71	72
450DE	43	57	68	70	71	67	61	53	76	72	73

Table 18, "A" Weighted Sound Power Data Without *Sound Blankets*

AGS-DE Model	Octave Band & Center Frequency, Hz.								Overall A-Weighted
	63Hz	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	8000Hz	
225DE	68	81	93	95	95	90	86	78	100
250DE	68	82	93	95	95	91	86	78	100
260DE	68	82	93	96	95	91	87	79	100
275DE	69	83	93	97	97	91	88	80	101
300DE	70	84	94	98	98	92	89	81	102
330DE	72	85	94	99	99	94	90	82	104
350DE	72	85	95	99	99	95	90	82	104
400DE	73	86	96	99	99	95	90	82	104
450DE	73	87	98	100	101	97	91	82	105

Table 19, "A" Weighted Sound Pressure Data With *Sound Blankets*

AGS-DE Model	Octave Band & Center Frequency								Side Pressure Overall "A" Wt	Opposite Control Box Overall "A" Wt	Control Box End Overall "A" Wt
	63Hz	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	8000Hz			
225DE	38	51	61	63	63	59	54	47	68	66	67
250DE	38	51	61	63	64	59	55	48	68	67	68
260DE	38	51	61	63	64	60	55	48	68	68	69
275DE	40	53	61	65	65	60	56	50	70	69	70
300DE	41	54	62	65	66	61	57	50	70	69	70
330DE	43	55	63	67	67	63	58	51	72	70	71
350DE	43	55	64	67	67	64	59	51	72	70	71
400DE	43	55	65	67	68	64	59	51	72	70	71
450DE	43	56	66	67	69	65	59	52	74	71	72

Table 20, High Efficiency Sound Power Data With *Sound Blankets*

AGS-DE Model	Octave Band & Center Frequency								Overall A-Weighted
	63Hz	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	8000Hz	
225DE	68	80	91	92	93	88	84	77	98
250DE	68	81	91	92	93	89	84	77	98
260DE	68	81	91	93	93	89	85	78	98
275DE	69	82	91	94	95	89	86	79	99
300DE	70	83	92	95	96	90	87	80	100
330DE	72	84	92	96	97	92	88	81	101
350DE	72	84	93	96	97	93	88	81	102
400DE	73	85	94	96	97	93	88	81	102
450DE	73	86	96	97	99	95	89	81	103

Table 21, One-Third Octave Band Sound Ratings, Standard Efficiency Units

AGS Model	Flat Power Readings											
	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz
225 DS	84.4	83.4	89.4	94.4	88.4	92.4	94.4	94.4	97.4	96.4	89.4	93.4
250 DS	84.8	83.8	89.8	94.8	88.8	92.8	95.8	95.8	96.8	96.8	89.8	93.8
275 DS	86.3	86.3	91.3	96.3	91.3	94.3	97.3	97.3	95.3	98.3	92.3	95.3
300 DS	86.3	87.3	92.3	97.3	92.3	95.3	97.3	98.3	96.3	98.3	93.3	96.3
315 DS	86.3	87.3	93.3	97.3	93.3	95.3	97.3	98.3	97.3	98.3	94.3	96.3
330 DS	87.2	89.2	94.2	97.2	95.2	96.2	98.2	98.2	97.2	99.2	95.2	98.2
360 DS	89.2	88.2	94.2	98.2	94.2	96.2	98.2	97.2	100.2	99.2	95.2	97.7
390 DS	89.5	87.5	94.5	98.5	93.5	96.5	98.5	97.5	100.5	99.5	95.5	97.5
400 DS	89.5	88.5	94.5	98.5	93.5	97.5	98.5	97.5	101.5	99.5	94.5	98.5
450 DS	90.8	88.8	94.8	97.8	94.8	98.8	99.8	98.8	102.8	99.8	95.8	98.8

Table 21 continued below

AGS Model	Flat Power Readings												
	800 Hz	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz	Overall "A" Power
225 DS	92.4	89.4	87.4	85.4	83.4	83.4	82.4	79.4	77.4	75.4	73.4	72.4	100
250 DS	92.8	89.8	87.8	85.8	83.8	83.8	82.8	79.8	77.8	75.8	73.8	72.8	100
275 DS	93.3	92.3	90.3	87.3	84.3	84.3	83.3	81.3	80.3	77.3	76.3	75.3	100
300 DS	94.3	93.3	91.3	88.3	85.3	85.3	84.3	82.3	81.3	78.3	76.3	75.3	101
315 DS	94.3	93.3	92.3	88.3	86.3	85.3	84.3	83.3	82.3	78.3	76.3	75.3	102
330 DS	95.2	94.2	93.2	90.2	87.2	86.2	85.2	84.2	83.2	78.2	78.2	77.2	104
360 DS	96.2	94.2	92.2	91.2	88.2	87.2	86.2	84.2	83.2	80.2	76.2	76.2	104
390 DS	96.5	93.5	93.5	90.5	88.5	87.5	86.5	83.5	82.5	79.5	76.5	76.5	104
400 DS	96.5	94.5	92.5	90.5	89.5	87.5	85.5	84.5	83.5	78.5	78.5	76.5	104
450 DS	98.8	94.8	93.8	92.8	89.8	88.8	86.8	84.8	83.8	79.8	77.8	76.8	105

Table 22, One-Third Octave Band Sound Ratings, High Efficiency Units

AGS Model	Flat Power Readings											
	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz
225 DE	84.4	83.4	89.4	94.4	88.4	92.4	94.4	94.4	97.4	96.4	89.4	93.4
250 DE	84.8	83.8	89.8	94.8	88.8	92.8	95.8	95.8	96.8	95.8	90.8	93.8
260 DE	84.8	83.8	89.8	94.8	88.8	92.8	95.8	95.8	96.8	96.8	89.8	93.8
275 DE	86.3	86.3	91.3	96.3	91.3	94.3	97.3	97.3	95.3	98.3	92.3	95.3
300 DE	86.3	87.3	92.3	97.3	92.3	95.3	97.3	98.3	96.3	98.3	93.3	96.3
330 DE	87.2	89.2	94.2	97.2	95.2	96.2	98.2	98.2	97.2	99.2	95.2	98.2
350 DE	89.2	88.2	94.2	98.2	94.2	96.2	98.2	97.2	100.2	99.2	95.2	97.7
400 DE	89.5	88.5	94.5	98.5	93.5	97.5	98.5	97.5	101.5	99.5	94.5	98.5
450 DE	90.8	88.8	94.8	97.8	94.8	98.8	99.8	98.8	102.8	99.8	95.8	98.8

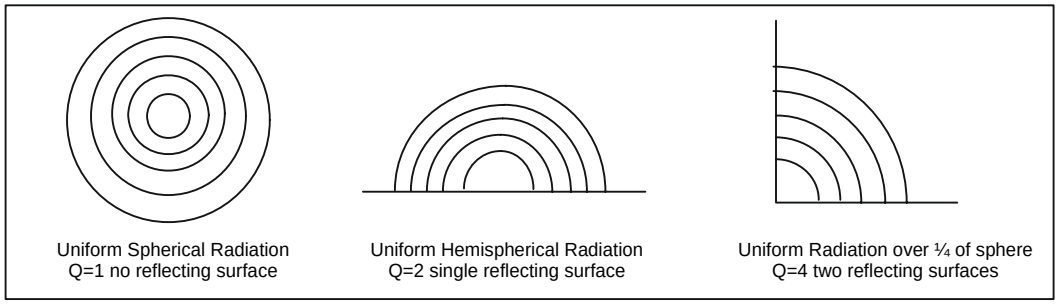
Table 22 continued below

AGS Model		Flat Power Readings										
	800 Hz	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz	Overall"A" Power
225 DE	92.4	89.4	87.4	85.4	83.4	83.4	82.4	79.4	77.4	75.4	73.4	72.4	100
250 DE	92.8	90.8	87.8	85.8	83.8	84.8	82.8	79.8	77.8	75.8	73.8	72.8	100
260 DE	92.8	89.8	87.8	85.8	84.8	84.8	82.8	80.8	77.8	75.8	74.8	72.8	100
275 DE	93.3	92.3	90.3	87.3	84.3	84.3	83.3	81.3	80.3	77.3	76.3	75.3	101
300 DE	94.3	93.3	91.3	88.3	85.3	85.3	84.3	82.3	81.3	78.3	76.3	75.3	102
330 DE	95.2	94.2	93.2	90.2	87.2	86.2	85.2	84.2	83.2	78.2	78.2	77.2	104
350 DE	96.2	94.2	92.2	91.2	88.2	87.2	86.2	84.2	83.2	80.2	76.2	76.2	104
400 DE	96.5	94.5	92.5	90.5	89.5	87.5	85.5	84.5	83.5	78.5	78.5	76.5	104
450 DE	98.8	94.8	93.8	92.8	89.8	88.8	86.8	84.8	83.8	79.8	77.8	76.8	105

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 23. 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:

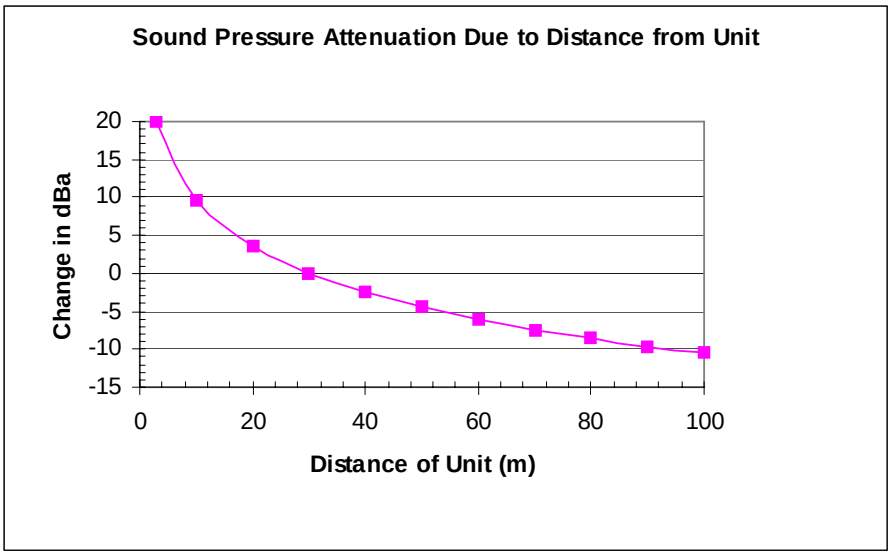
$$Lp = Lw – (20)(\log r) + 5.5$$

The equations are reduced to table form in Table 23 for various distances and the two most usual cases of "Q" type of location.

Table 23, 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, Sound Pressure Attenuation Due to Distance from Unit



Sound Isolation

The low sound level for the AGS 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.

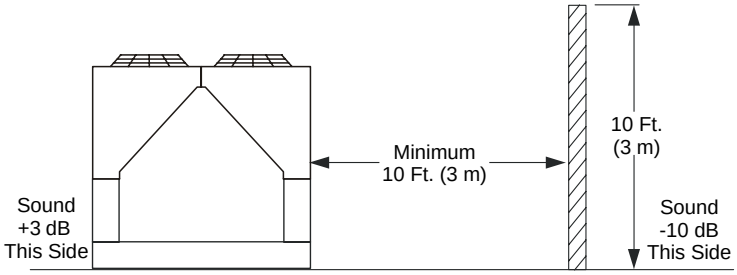
Sound Pressure Levels, Low Ambient Operation

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 the unit 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.

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

If the optional single-point power connection is ordered, a single power connection is made to a power block (or optional disconnect switch) in the unit power panel. A separate disconnect is required if the McQuay optional factory-mounted disconnect is not ordered. Factory-mounted isolation circuit breakers for each circuit are included as standard on all single-point connection options.

If the standard multiple-point power wiring is ordered, two power connections are required on AGS 225 - 300 or three power connections on AGS 330 – 450. They are made to factory-mounted disconnect switches in the power panel. See the dimension drawings beginning on page 53 for entry locations.

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 46 for connection details.

The 120-volt control transformer is factory mounted and wired.

⚠ CAUTION

If a separate disconnect is used for the 120V supply to the unit, it must power the entire control circuit. It must be clearly marked so that it is not accidentally shut off during freezing temperatures, thereby de-energizing the evaporator heaters. 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.

Standard Efficiency

Table 24, Standard Efficiency, AGS 225DS – 450DS, Electrical Data, Optional Single-Point, without Pump Package

AGS UNIT SIZE	VOLTS	HZ	MIN. CIRCUIT AMPACITY (MCA)	POWER SUPPLY				FIELD FUSE OR BREAKER SIZE	
				FIELD WIRE		FIELD SUPPLIED HUB (IN.)			
				QTY	WIRE GA	QTY	NOM. SIZE	RECOM.	MAX.
225DS	460	60	488	6	250 MCM	2	2.0	600	600
	575		421	6	4/0 AWG	2	2.0	500	500
250DS	460	60	534	6	300 MCM	2	2.5	600	700
	575		451	6	4/0 AWG	2	2.0	500	600
275DS	460	60	604	6	350 MCM	2	2.5	700	800
	575		501	6	250 MCM	2	2.0	600	700
300DS	460	60	629	6	400 MCM	2	2.5	700	800
	575		521	6	300 MCM	2	2.5	600	700
330DS	460	60	716	6	500 MCM	2	3.0	800	800
	575		640	6	400 MCM	2	2.5	700	700
350DS	460	60	754	6	500 MCM	2	3.0	800	800
	575		664	6	400 MCM	2	2.5	700	800
360DS	460	60	784	12	300 MCM	2	3.5	800	800
	575		683	6	500 MCM	2	3.0	800	800
390DS	460	60	822	12	300 MCM	2	3.5	1000	1000
	575		684	6	500 MCM	2	3.0	800	800
400DS	460	60	853	12	300 MCM	2	3.5	1000	1000
	575		709	6	500 MCM	2	3.0	800	800
450DS	460	60	911	12	300 MCM	2	3.5	1000	1000
	575		755	6	500 MCM	2	3.0	800	800

NOTES

1. Table based on 75°C field wire.
2. Recommended fuse size is for application with standard ambient temperature, which is 105°F or less. Use the maximum fuse size above 105°F.
3. Complete notes are on page 45.

Table 25, Standard Efficiency, AGS 225DS – 450DS, Electrical Data, Standard Multi-Point Connection, without Pump Package, Circuits 1 and 2

AGS UNIT SIZE	VOLTS	HZ	ELECTRICAL CIRCUIT 1 (COMPRESSOR 1)							ELECTRICAL CIRCUIT 2 (COMPRESSOR 2)						
			MIN. CIRCUIT AM-PACITY (MCA)	POWER SUPPLY				FIELD FUSE OR. BREAKER SIZE		MIN. CIRCUIT AM-PACITY (MCA)	POWER SUPPLY				FIELD FUSE OR. BREAKER SIZE	
				FIELD WIRE		FIELD SUPPLIED HUB (IN.)					FIELD WIRE		FIELD SUPPLIED HUB (IN.)			
				QTY	WIRE GA	QTY	NOM. SIZE	RECOM.	MAX.		QTY	WIRE GA	QTY	NOM. SIZE	RECOM.	MAX.
225DS	460	60	269	3	300 MCM	1	2.5	350	450	269	3	300 MCM	1	2.5	350	450
	575		232	3	250 MCM	1	2.0	300	400	232	3	250 MCM	1	2.0	300	400
250DS	460	60	273	3	300 MCM	1	2.5	350	450	310	3	400 MCM	1	2.5	400	500
	575		235	3	250 MCM	1	2.0	300	400	259	3	300 MCM	1	2.5	350	400
275DS	460	60	310	3	400 MCM	1	2.5	400	500	346	3	500 MCM	1	3.0	450	500
	575		259	3	300 MCM	1	2.5	350	400	287	3	350 MCM	1	2.5	350	450
300DS	460	60	346	3	500 MCM	1	3.0	450	500	346	3	500 MCM	1	3.0	450	500
	575		287	3	350 MCM	1	2.5	350	450	287	3	350 MCM	1	2.5	350	450
330DS	460	60	273	3	300 MCM	1	2.5	350	450	273	3	300 MCM	1	2.5	350	450
	575		235	3	250 MCM	1	2.0	300	400	235	3	250 MCM	1	2.0	300	400
350DS	460	60	273	3	300 MCM	1	2.5	350	450	310	3	400 MCM	1	2.5	400	500
	575		235	3	250 MCM	1	2.0	300	400	259	3	300 MCM	1	2.5	350	400
360DS	460	60	310	3	400 MCM	1	2.5	400	500	310	3	400 MCM	1	2.5	400	500
	575		259	3	300 MCM	1	2.5	350	400	259	3	300 MCM	1	2.5	350	400
390DS	460	60	310	3	400 MCM	1	2.5	400	500	310	3	400 MCM	1	2.5	400	500
	575		259	3	300 MCM	1	2.5	350	400	259	3	300 MCM	1	2.5	350	400
400DS	460	60	310	3	400 MCM	1	2.5	400	500	310	3	400 MCM	1	2.5	400	500
	575		259	3	300 MCM	1	2.5	350	400	259	3	300 MCM	1	2.5	350	400
450DS	460	60	346	3	500 MCM	1	3.0	450	500	346	3	500 MCM	1	3.0	450	500
	575		287	3	350 MCM	1	2.5	350	450	287	3	350 MCM	1	2.5	350	450

Table 26, Electrical Data, AGS 330DS – 450DS, Standard Multi-Point, Circuit 3

AGS UNIT SIZE	VOLTS	HZ	MIN. CIRCUIT AMPACITY (MCA)	POWER SUPPLY				FIELD FUSE OR. BREAKER SIZE	
				FIELD WIRE		FIELD SUPPLIED HUB (IN.)			
				QTY	WIRE GA	QTY	NOM. SIZE	RECOM.	MAX.
330DS	460	60	269	3	300 MCM	1	2.5	350	450
	575		232	3	250 MCM	1	2.0	300	400
350DS	460	60	269	3	300 MCM	1	2.5	350	450
	575		232	3	250 MCM	1	2.0	300	400
360DS	460	60	269	3	300 MCM	1	2.5	350	450
	575		232	3	250 MCM	1	2.0	300	400
390DS	460	60	315	3	400 MCM	1	2.5	400	500
	575		262	3	300 MCM	1	2.5	350	450
400DS	460	60	346	3	500 MCM	1	3.0	450	500
	575		287	3	350 MCM	1	2.5	350	450
450DS	460	60	346	3	500 MCM	1	3.0	450	500
	575		287	3	350 MCM	1	2.5	350	450

NOTES

1. Table based on 75°C field wire.
2. Complete notes are on page 45.

Table 27, Standard Efficiency, AGS 225DS – 450DS, Compressor and Condenser Fan Motor Amp Draw, without Pump Package

AGS UNIT SIZE	VOLTS	HZ	RATED LOAD AMPS			NO. OF FAN MTRS	FAN MTRS FLA (EA)	FAN MTRS LRA (EA)	Solid State LRA (Note 3)			Wye-Delta LRA		
			CIRC. #1	CIRC. #2	CIRC. #3				CIRC. #1	CIRC. #2	CIRC. #3	CIRC. #1	CIRC. #2	CIRC. #3
225DS	460	60	195	195	--	12	4.1	23	1008	1008	--	310/1008	310/1008	--
	575		171	171	--	12	3.0	20	1310	1310	--	403/1310	403/1310	--
250DS	460	60	195	225	--	14	4.1	23	1008	1485	--	310/1008	457/1485	--
	575		171	190	--	14	3.0	20	1310	1310	--	403/1310	403/1310	--
275DS	460	60	225	250	--	16	4.1	23	1485	1485	--	457/1485	457/1485	--
	575		190	210	--	16	3.0	20	1310	1310	--	403/1310	403/1310	--
300DS	460	60	250	250	--	16	4.1	23	1485	1485	--	457/1485	457/1485	--
	575		210	210	--	16	3.0	20	1310	1310	--	403/1310	403/1310	--
330DS	460	60	195	195	195	20	4.1	23	1008	1008	1008	310/1008	310/1008	310/1008
	575		171	171	171	20	3.0	20	1310	1310	1310	403/1310	403/1310	403/1310
350DS	460	60	195	225	195	20	4.1	23	1008	1485	1008	310/1008	457/1485	310/1008
	575		171	190	171	20	3.0	20	1310	1310	1310	403/1310	403/1310	403/1310
360DS	460	60	225	225	195	20	4.1	23	1485	1485	1008	457/1485	457/1485	310/1008
	575		190	190	171	20	3.0	20	1310	1310	1310	403/1310	403/1310	403/1310
390DS	460	60	225	225	225	22	4.1	23	1485	1485	1485	457/1485	457/1485	457/1485
	575		190	190	190	22	3.0	20	1310	1310	1310	403/1310	403/1310	403/1310
400DS	460	60	225	225	250	22	4.1	23	1485	1485	1485	457/1485	457/1485	457/1485
	575		190	190	210	22	3.0	20	1310	1310	1310	403/1310	403/1310	403/1310
450DS	460	60	250	250	250	24	4.1	23	1485	1485	1485	457/1485	457/1485	457/1485
	575		210	210	210	24	3.0	20	1310	1310	1310	403/1310	403/1310	403/1310

NOTES:

1. Table based on 75°C field wire.
2. Complete notes are on page 45.
3. For solid state starters, inrush amps are 58% of the LRA.

Table 28, Standard Efficiency, AGS 225DS/M – AGS 450DS/M, Customer Wiring Information With Optional Single-Point Power with or Without Pump Package

AGS UNIT SIZE	VOLTS	HZ	POWER BLOCK (Std. Short Circuit Current Rating)		DISCONNECT SWITCH (Std. Short Circuit Current Rating)		DISCONNECT SWITCH (High Interrupt or High Short Circuit Current Rating)	
			TERMINAL SIZE AMPS	CONNECTION LUG RANGE PER PHASE	TERMINAL SIZE AMPS	CONNECTION LUG RANGE PER PHASE	TERMINAL SIZE AMPS	CONNECTION LUG RANGE PER PHASE
225DS/M	460	60	620A	#6-350 (2/PH)	600A	3/0-500 (2/PH)	1000A	#1-500 (2/PH)
	575		620A	#6-350 (2/PH)	600A	3/0-500 (2/PH)	800A	#1-500 (2/PH)
250DS/M	460	60	620A	#6-350 (2/PH)	800A	#1-500 (2/PH)	1000A	#1-500 (2/PH)
	575		620A	#6-350 (2/PH)	600A	3/0-500 (2/PH)	800A	#1-500 (2/PH)
275DS/M	460	60	760A	#4-500 (2/PH)	800A	#1-500 (2/PH)	1200A	#1-500 (2/PH)
	575		620A	#6-350 (2/PH)	600A	3/0-500 (2/PH)	1000A	#1-500 (2/PH)
300DS/M	460	60	760A	#4-500 (2/PH)	800A	#1-500 (2/PH)	1200A	#1-500 (2/PH)
	575		620A	#6-350 (2/PH)	600A	3/0-500 (2/PH)	1000A	#1-500 (2/PH)
330DS/M	460	60	760A	#4-500 (2/PH)	800A	#1-500 (2/PH)	1200A	#1-500 (2/PH)
	575		760A	#4-500 (2/PH)	800A	#1-500 (2/PH)	1200A	#1-500 (2/PH)
350DS/M	460	60	840A	#2-600 (2/PH)	1000A	#1-500 (2/PH)	1400A	300-600 (5/PH)
	575		760A	#4-500 (2/PH)	800A	#1-500 (2/PH)	1200A	#1-500 (2/PH)
360DS/M	460	60	840A	#2-600 (2/PH)	1000A	#1-500 (2/PH)	1400A	300-600 (5/PH)
	575		760A	#4-500 (2/PH)	800A	#1-500 (2/PH)	1200A	#1-500 (2/PH)
390DS/M	460	60	840A	#2-600 (2/PH)	1000A	#1-500 (2/PH)	1400A	300-600 (5/PH)
	575		760A	#4-500 (2/PH)	800A	#1-500 (2/PH)	1200A	#1-500 (2/PH)
400DS/M	460	60	1520A	#4-500 (4/PH)	1000A	#1-500 (2/PH)	1600A	300-600 (5/PH)
	575		760A	#4-500 (2/PH)	800A	#1-500 (2/PH)	1200A	#1-500 (2/PH)
450DS/M	460	60	1520A	#4-500 (4/PH)	1200A	#1-500 (2/PH)	1600A	300-600 (5/PH)
	575		840A	#2-600 (2/PH)	1000A	#1-500 (2/PH)	1400A	300-600 (5/PH)

NOTES:
1. Terminal size amps are the maximum amps that the power block is rated for.
2. Complete notes are on page 45.
3. Data based on 75°C wire.
4. (2/C) notation means two cables per conduit.

Table 29, Standard Efficiency, AGS 225DS – 450DS, Wiring with Standard Multiple-Point Power and Disconnect Switches with or without Pump package

AGS UNIT SIZE	VOLTS	HZ	DISCONNECT SW-CIRCUIT #1		DISCONNECT SW-CIRCUIT #2		DISCONNECT SW-CIRCUIT #3	
			TERMINAL SIZE AMPS	CONNECTION LUG RANGE PER PHASE	TERMINAL SIZE AMPS	CONNECTION LUG RANGE PER PHASE	TERMINAL SIZE AMPS	CONNECTION LUG RANGE PER PHASE
225DS	460	60	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	--	--
	575		350A	3/0-500 (2/PH)	350A	3/0-500 (2/PH)	--	--
250DS	460	60	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	--	--
	575		350A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	--	--
275DS	460	60	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	--	--
	575		400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	--	--
300DS	460	60	500A	3/0-500 (2/PH)	500A	3/0-500 (2/PH)	--	--
	575		400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	--	--
330DS	460	60	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)
	575		350A	3/0-500 (2/PH)	350A	3/0-500 (2/PH)	350A	3/0-500 (2/PH)
350DS	460	60	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)
	575		350A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	350A	3/0-500 (2/PH)
360DS	460	60	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)
	575		400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	350A	3/0-500 (2/PH)
390DS	460	60	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)
	575		400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)
400DS	460	60	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	500A	3/0-500 (2/PH)
	575		400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)
450DS	460	60	500A	3/0-500 (2/PH)	500A	3/0-500 (2/PH)	500A	3/0-500 (2/PH)
	575		400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)

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 45.

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Table 30, High Efficiency, AGS 225DE–450DE, Electrical Data, Optional Single-Point

AGS UNIT SIZE	VOLTS	HZ	MIN. CIRCUIT AMPACITY (MCA)	POWER SUPPLY				FIELD FUSE OR BREAKER SIZE	
				FIELD WIRE		FIELD SUPPLIED HUB (IN.)			
				QTY	WIRE GA	QTY	NOM. SIZE	RECOM.	MAX.
225DE	460	60	497	6	250 MCM	2	2.0	600	600
	575		427	6	4/0 AWG	2	2.0	500	500
250DE	460	60	542	6	300 MCM	2	2.5	600	700
	575		457	6	4/0 AWG	2	2.0	600	600
260DE	460	60	572	6	350 MCM	2	2.5	700	700
	575		476	6	250 MCM	2	2.0	600	600
275DE	460	60	612	6	350 MCM	2	2.5	700	800
	575		507	6	250 MCM	2	2.0	600	700
300DE	460	60	637	6	400 MCM	2	2.5	700	800
	575		527	6	300 MCM	2	2.5	600	700
330DE	460	60	724	6	500 MCM	2	3.0	800	800
	575		622	6	400 MCM	2	2.5	700	700
350DE	460	60	770	12	300 MCM	2	3.5	800	800
	575		652	6	400 MCM	2	2.5	700	800
400DE	460	60	861	12	300 MCM	2	3.5	1000	1000
	575		715	6	500 MCM	2	3.0	800	800
450DE	460	60	920	12	350 MCM	2	3.5	1000	1000
	575		761	12	300 MCM	2	3.5	800	800

NOTES
1. Table based on 75°C field wire.
2. Recommended fuse size is for application at 105°F ambient or less. Use the maximum fuse size above 105°F.
3. Complete notes are on page 45.

Table 31, High Efficiency, AGS 225DE – 450DE, Electrical Data, Standard Multiple-Point Connection, Circuits 1 and 2

AGS UNIT SIZE	VOLTS	HZ	ELECTRICAL CIRCUIT 1 (COMPRESSOR 1)							ELECTRICAL CIRCUIT 2 (COMPRESSOR 2)						
			MIN. CIRCUIT AMP-ACITY (MCA)	POWER SUPPLY				FIELD FUSE OR BREAKER SIZE		MIN. CIRCUIT AMP-ACITY (MCA)	POWER SUPPLY				FIELD FUSE OR BREAKER SIZE	
				FIELD WIRE		FIELD SUPPLIED HUB (IN.)					FIELD WIRE		FIELD SUPPLIED HUB (IN.)			
				QTY	WIRE GA	QTY	NOM. SIZE	RECOM.	MAX.		QTY	WIRE GA	QTY	NOM. SIZE	RECOM	MAX.
225DE	460	60	273	3	300 MCM	1	2.5	350	450	273	3	300 MCM	1	2.5	350	450
	575		235	3	250 MCM	1	2.0	300	400	235	3	250 MCM	1	2.0	300	400
250DE	460	60	273	3	300 MCM	1	2.5	350	450	315	3	400 MCM	1	2.5	400	500
	575		235	3	250 MCM	1	2.0	300	400	262	3	300 MCM	1	2.5	350	450
260DE	460	60	315	3	400 MCM	1	2.5	400	500	315	3	400 MCM	1	2.5	400	500
	575		262	3	300 MCM	1	2.5	350	450	262	3	300 MCM	1	2.5	350	450
275DE	460	60	315	3	400 MCM	1	2.5	400	500	350	3	500 MCM	1	3.0	450	600
	575		262	3	300 MCM	1	2.5	350	450	290	3	350 MCM	1	2.5	350	500
300DE	460	60	350	3	500 MCM	1	3.0	450	600	350	3	500 MCM	1	3.0	450	600
	575		290	3	350 MCM	1	2.5	350	500	290	3	350 MCM	1	2.5	350	500
330DE	460	60	273	3	300 MCM	1	2.5	350	450	273	3	300 MCM	1	2.5	350	450
	575		235	3	250 MCM	1	2.0	300	400	235	3	250 MCM	1	2.0	300	400
350DE	460	60	277	3	300 MCM	1	2.5	350	450	315	3	400 MCM	1	2.5	400	500
	575		238	3	250 MCM	1	2.0	300	400	262	3	300 MCM	1	2.5	350	450
400DE	460	60	315	3	400 MCM	1	2.5	400	500	315	3	400 MCM	1	2.5	400	500
	575		262	3	300 MCM	1	2.5	350	450	262	3	300 MCM	1	2.5	350	450
450DE	460	60	350	3	500 MCM	1	3.0	450	600	350	3	500 MCM	1	3.0	450	600
	575		290	3	350 MCM	1	2.5	350	500	290	3	350 MCM	1	2.5	350	500

Table 32 High Efficiency, AGS 330DE – 450DE, Electrical Data, Standard Multiple-Point, Circuit 3

AGS UNIT SIZE	VOLTS	HZ	MIN. CIRCUIT AMPACITY (MCA)	POWER SUPPLY				FIELD FUSE OR BREAKER SIZE	
				FIELD WIRE		FIELD SUPPLIED HUB (IN.)			
				QTY	WIRE GA	QTY	NOM. SIZE	RECOM.	MAX.
330DE	460	60	277	3	300 MCM	1	2.5	350	450
	575		238	3	250 MCM	1	2.0	300	400
350DE	460	60	277	3	300 MCM	1	2.5	350	450
	575		238	3	250 MCM	1	2.0	300	400
400DE	460	60	346	3	500 MCM	1	3.0	450	500
	575		287	3	350 MCM	1	2.5	350	450
450DE	460	60	346	3	500 MCM	1	3.0	450	500
	575		287	3	350 MCM	1	2.5	350	450

NOTES
1. Table based on 75°C field wire.
2. Complete notes are on page 45.

Table 33, High Efficiency, AGS 225DE-450DE, Compressor & Condenser Fan Motor Amp Draw

AGS UNIT SIZE	VOLTS	HZ	RATED LOAD AMPS			NO OF FAN MTRS	FAN MTRS FLA (EA)	FAN MTRS LRA (EA)	Solid State LRA (Note 1)			Wye-Delta LRA		
			CIRCUIT #1	CIRCUIT #2	CIRCUIT #3				CIRCUIT #1	CIRCUIT #2	CIRCUIT #3	CIRCUIT #1	CIRCUIT #2	CIRCUIT #3
225DE	460	60	195	195	--	14	4.1	23	1008	1008	--	310/1008	310/1008	--
	575		171	171	--	14	3.0	20	1310	1310	--	403/1310	403/1310	--
250DE	460	60	195	225	--	16	4.1	23	1008	1485	--	310/1008	457/1485	--
	575		171	190	--	16	3.0	20	1310	1310	--	403/1310	403/1310	--
260DE	460	60	225	225	--	16	4.1	23	1485	1485	--	457/1485	457/1485	--
	575		190	190	--	16	3.0	20	1310	1310	--	403/1310	403/1310	--
275DE	460	60	225	250	--	18	4.1	23	1485	1485	--	457/1485	457/1485	--
	575		190	210	--	18	3.0	20	1310	1310	--	403/1310	403/1310	--
300DE	460	60	250	250	--	18	4.1	23	1485	1485	--	457/1485	457/1485	--
	575		210	210	--	18	3.0	20	1310	1310	--	403/1310	403/1310	--
330DE	460	60	195	195	195	22	4.1	23	1008	1008	1008	310/1008	310/1008	310/1008
	575		171	171	171	22	3.0	20	1310	1310	1310	403/1310	403/1310	403/1310
350DE	460	60	195	225	195	24	4.1	23	1008	1485	1008	310/1008	457/1485	310/1008
	575		171	190	171	24	3.0	20	1310	1310	1310	403/1310	403/1310	403/1310
400DE	460	60	225	225	250	24	4.1	23	1485	1485	1485	457/1485	457/1485	457/1485
	575		190	190	210	24	3.0	20	1310	1310	1310	403/1310	403/1310	403/1310
450DE	460	60	250	250	250	26	4.1	23	1485	1485	1485	457/1485	457/1485	457/1485
	575		210	210	210	26	3.0	20	1310	1310	1310	403/1310	403/1310	403/1310

NOTES:

1. For solid state starters, the inrush Amps is 58% of the LRA
2. Table based on 75°C field wire.
3. Complete notes are on page 45.

Table 34, High Efficiency, AGS 225DE – AGS 450DE, Customer Wiring Information With Optional Single-Point Power

AGS UNIT SIZE	VOLTS	HZ	POWER BLOCK (Std. Short Circuit Current Rating)		DISCONNECT SWITCH (Std. Short Circuit Current Rating)		DISCONNECT SWITCH (High Interrupt or High Short Circuit Current Rating)	
			TERMINAL SIZE AMPS	CONNECTION LUG RANGE PER PHASE	TERMINAL SIZE AMPS	CONNECTION LUG RANGE PER PHASE	TERMINAL SIZE AMPS	CONNECTION LUG RANGE PER PHASE
225DE/F	460	60	620A	#6-350 (2/PH)	600A	3/0-500 (2/PH)	1000A	#1-500 (2/PH)
	575		620A	#6-350 (2/PH)	600A	3/0-500 (2/PH)	800A	#1-500 (2/PH)
250DE/F	460	60	620A	#6-350 (2/PH)	800A	#1-500 (2/PH)	1000A	#1-500 (2/PH)
	575		620A	#6-350 (2/PH)	600A	3/0-500 (2/PH)	800A	#1-500 (2/PH)
260DE/F	460	60	760A	#4-500 (2/PH)	800A	#1-500 (2/PH)	1000A	#1-500 (2/PH)
	575		620A	#6-350 (2/PH)	600A	3/0-500 (2/PH)	1000A	#1-500 (2/PH)
275DE/F	460	60	760A	#4-500 (2/PH)	800A	#1-500 (2/PH)	1200A	#1-500 (2/PH)
	575		620A	#6-350 (2/PH)	600A	3/0-500 (2/PH)	1000A	#1-500 (2/PH)
300DE/F	460	60	760A	#4-500 (2/PH)	800A	#1-500 (2/PH)	1200A	#1-500 (2/PH)
	575		620A	#6-350 (2/PH)	600A	3/0-500 (2/PH)	1000A	#1-500 (2/PH)
330DE/F	460	60	760A	#4-500 (2/PH)	1000A	#1-500 (2/PH)	1200A	#1-500 (2/PH)
	575		760A	#4-500 (2/PH)	800A	#1-500 (2/PH)	1200A	#1-500 (2/PH)
350DE/F	460	60	840A	#2-600 (2/PH)	1000A	#1-500 (2/PH)	1400A	300-600 (5/PH)
	575		760A	#4-500 (2/PH)	800A	#1-500 (2/PH)	1200A	#1-500 (2/PH)
400DE/F	460	60	1520A	#4-500 (4/PH)	1000A	#1-500 (2/PH)	1600A	300-600 (5/PH)
	575		760A	#4-500 (2/PH)	800A	#1-500 (2/PH)	1200A	#1-500 (2/PH)
450DE/F	460	60	1520A	#4-500 (4/PH)	1200A	#1-500 (2/PH)	1600A	300-600 (5/PH)
	575		840A	#2-600 (2/PH)	1000A	#1-500 (2/PH)	1400A	300-600 (5/PH)

NOTES:
1. Terminal size amps are the maximum amps that the power block is rated for.
2. Complete notes are on page 45.
3. Data based on 75°C wire.
4. (2/C) notation means two cables per conduit.

Table 35, High Efficiency, AGS 225DE – 450DE, Wiring with Standard Multiple-Point Power and Disconnect Switches

AGS UNIT SIZE	VOLTS	HZ	DISCONNECT SW-CIRCUIT #1		DISCONNECT SW-CIRCUIT #2		DISCONNECT SW-CIRCUIT #3	
			TERMINAL SIZE AMPS	CONNECTION LUG RANGE PER PHASE	TERMINAL SIZE AMPS	CONNECTION LUG RANGE PER PHASE	TERMINAL SIZE AMPS	CONNECTION LUG RANGE PER PHASE
225DE	460	60	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	--	--
	575		350A	3/0-500 (2/PH)	350A	3/0-500 (2/PH)	--	--
250DE	460	60	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	--	--
	575		350A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	--	--
260DE	460	60	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	--	--
	575		400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	--	--
275DE	460	60	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	--	--
	575		400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	--	--
300DE	460	60	500A	3/0-500 (2/PH)	500A	3/0-500 (2/PH)	--	--
	575		400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	--	--
330DE	460	60	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)
	575		350A	3/0-500 (2/PH)	350A	3/0-500 (2/PH)	350A	3/0-500 (2/PH)
350DE	460	60	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)
	575		350A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	350A	3/0-500 (2/PH)
400DE	460	60	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	500A	3/0-500 (2/PH)
	575		400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)
450DE	460	60	500A	3/0-500 (2/PH)	500A	3/0-500 (2/PH)	500A	3/0-500 (2/PH)
	575		400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)

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 45.

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 460V/60Hz/3Ph: 414V to 506V
   Unit nameplate 575V/60Hz/3Ph: 517V to 633V
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 a independent power supply for each circuit.
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 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.

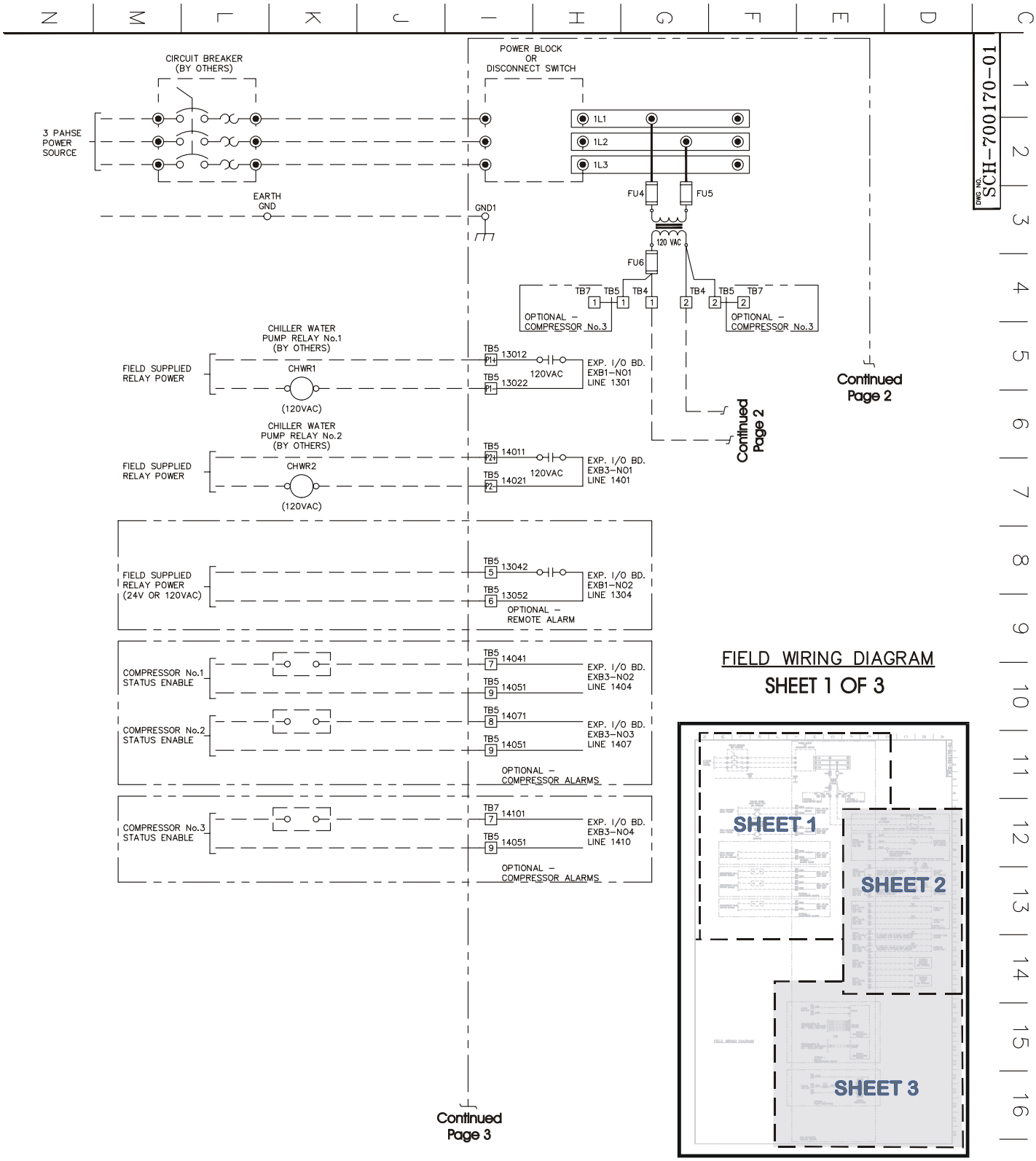
Optional Protocol Selectability Connection for BAS

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.

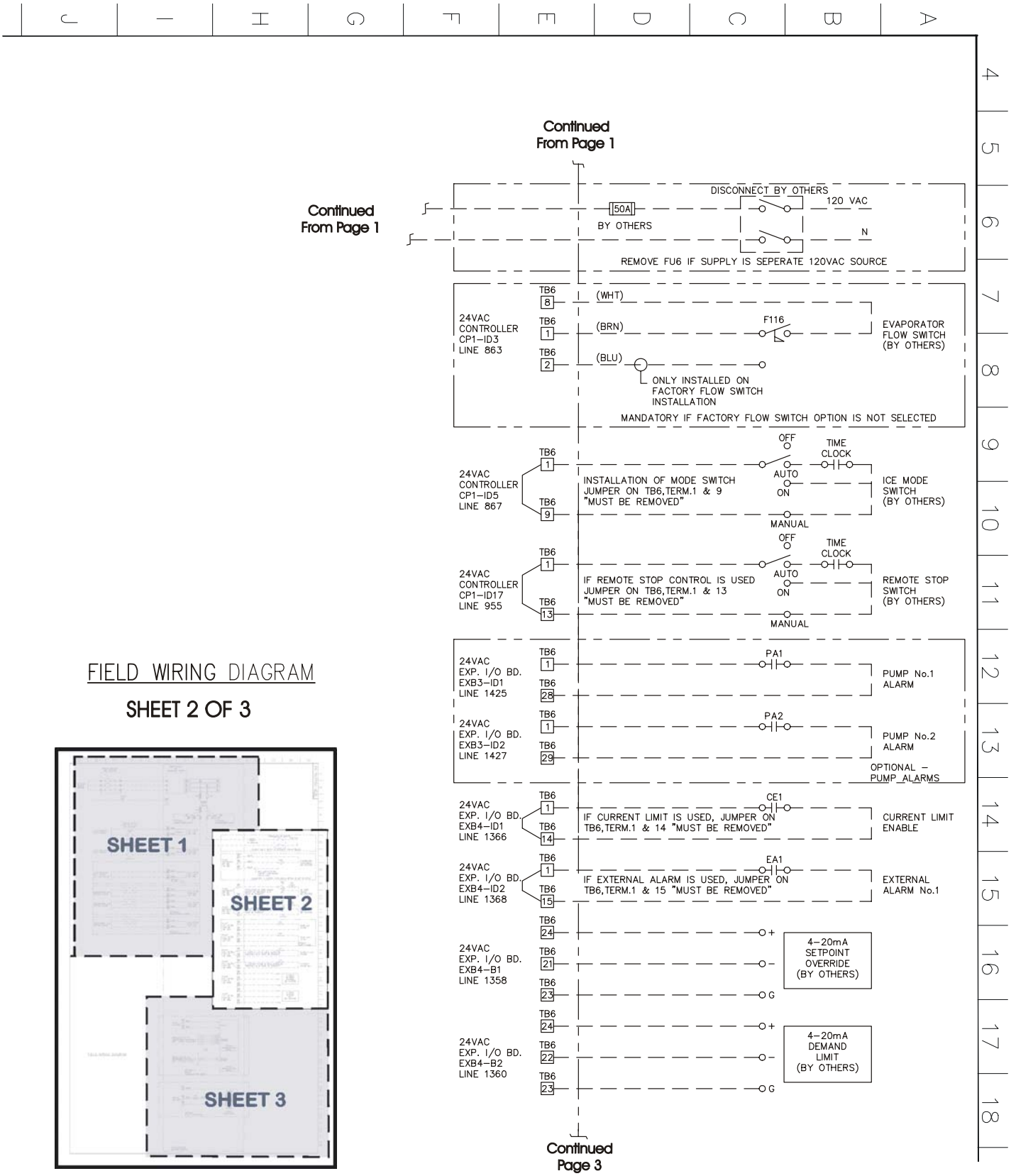
Modbus IM, 743-2	LONWORKS, IM 735-2
BACnet MS/TP, IM 736-2	BACnet IP/Ethernet, IM 837

Field Wiring Diagram

Figure 9, Typical Field Wiring Diagram

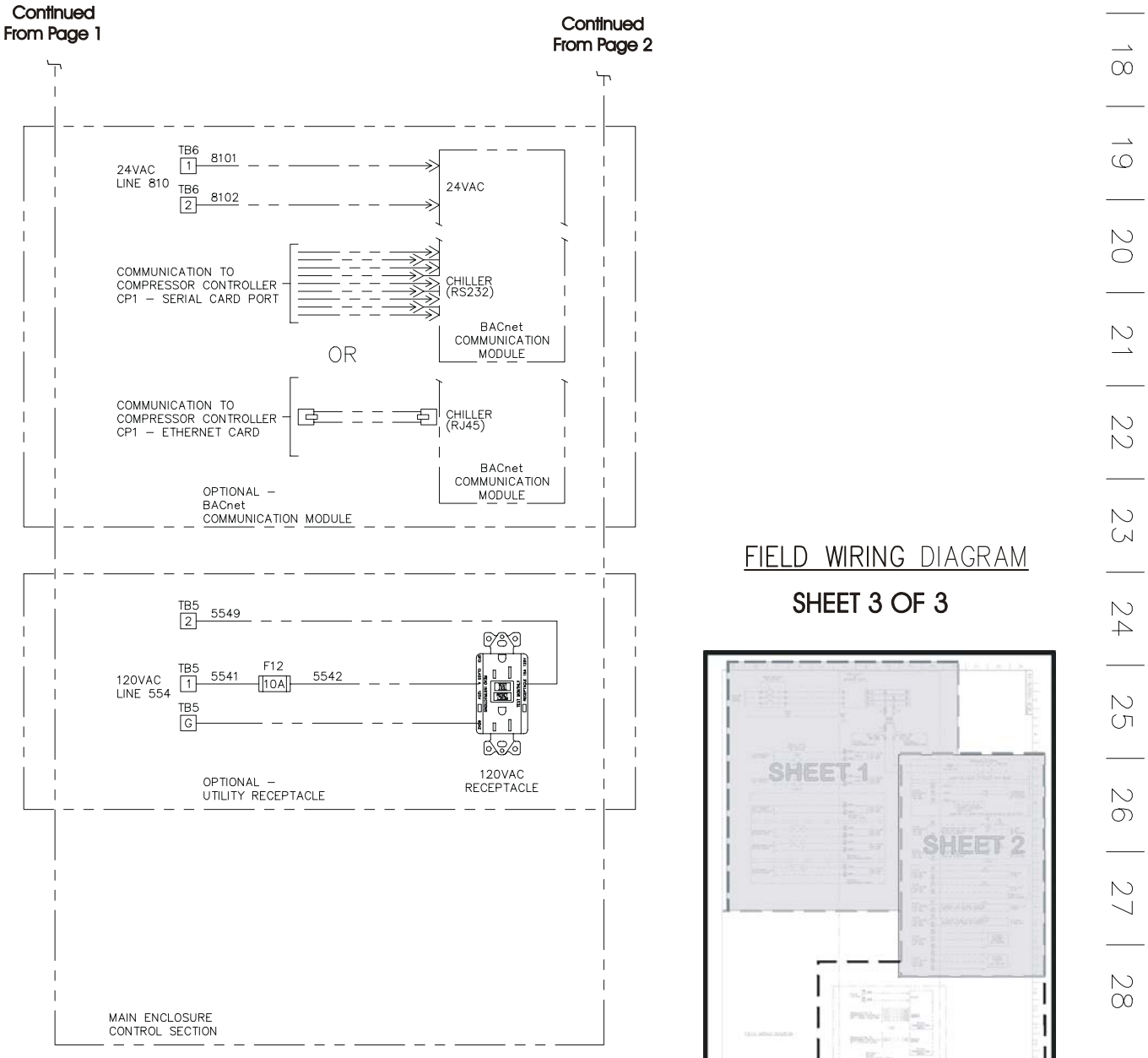


Updated JUL07- Supersedes all previous versions



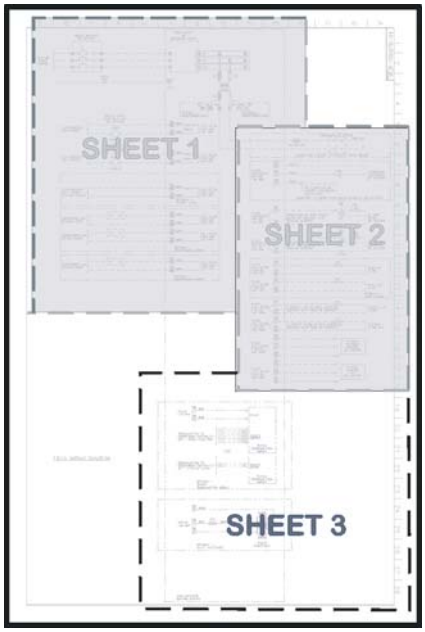
FIELD WIRING DIAGRAM

SHEET 2 OF 3



FIELD WIRING DIAGRAM

SHEET 3 OF 3



Physical Data, Standard Efficiency

Table 36, Standard Efficiency, AGS 225DS – AGS 275DS

DATA	AGS-DS MODEL NUMBER					
	225DS		250DS		275DS	
	Ckt 1	Ckt 2	Ckt 1	Ckt 2	Ckt 1	Ckt 2
BASIC DATA						
Unit Cap. @ ARI tons (kW)	211.2 (742.6)		231.6 (814.3)		263.1 (925.1)	
Unit Operating Charge lbs (kg)	185 (84)	185 (84)	210 (95)	210 (95)	210 (95)	240 (109)
Cabinet Dimensions L x W x H, in. (mm)	243x88x97 (6172x2225x2464)		279x88x97 (7087x2225x2464)		314x88x97 (7984x2225x2464)	
Unit Operating Weight, lbs. (kg)	12556 (5700)		13398 (6069)		14958 (6785)	
Unit Shipping Weight, lbs (kg)	12007 (5451)		12849 (5821)		14049 (6374)	
COMPRESSORS, SCREW, SEMI-HERMETIC						
Nominal Capacity, tons (kW)	100 (350)	100 (350)	100 (350)	125 (437)	125 (437)	150 (525)
Minimum Capacity (% of Full Load)	15		15		15	
CONDENSERS, HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLER						
Pumpdown Capacity, lbs (kg)	249 (113)	249 (113)	287 (130)	287 (130)	287 (130)	325 (148)
Coil Inlet Face Area, sq. ft. (sq m.)	129.2 (12.0)	129.2 (12.0)	150.8 (14.0)	150.8 (14.0)	150.8 (14.0)	172.5 (16.0)
CONDENSER FANS, DIRECT DRIVE PROPELLER TYPE						
No. of Fans/Circuit – 30 in. Fan Dia.	6	6	7	7	8	8
Fan Motor hp (kW)	2.5 (1.8)		2.5 (1.8)		2.5 (1.8)	
Fan & Motor RPM, 60Hz	1140		1140		1140	
60 Hz Fan Tip Speed, fpm (m/s)	8954 (45)		8954 (45)		8954 (45)	
60 Hz Total Unit Airflow, cfm (l/s)	137328 (64819)		160216 (75622)		183104 (86425)	
EVAPORATOR, DIRECT EXPANSION SHELL AND TUBE						
Shell Dia.-Tube Length, in.(mm)	16x108 (406x2750)		16x108 (406x2750)		20x108 (508x2750)	
Water Volume, gallons (liters)	65.8 (249.4)		65.8 (249.4)		108.5 (411.1)	
Max. Water Pressure, psi (kPa)	152 (1048)		152 (1048)		152 (1048)	
Max. Refrigerant Press., psi (kPa)	350 (2413)		350 (2413)		350 (2413)	

Table 37, Standard Efficiency, AGS 300DS

DATA	AGS MODEL NUMBER	
	300DS	
	Ckt 1	Ckt 2
BASIC DATA		
Unit Cap. @ ARI, tons (kW)	297.0 (1042.5)	
Unit Operating Charge lbs (kg)	240 (109)	240 (109)
Cabinet Dimensions L x W x H, in. (mm)	314x88x97 (7984x2225x2464)	
Unit Operating Weight (1), lbs. (kg)	14903 (6751)	
Unit Shipping Weight(1), lbs (kg)	14954 (6760)	
COMPRESSORS, SCREW, SEMI-HERMETIC		
Nominal Capacity, tons (kW)	150 (525)	150 (525)
Minimum Capacity (% of Full Load)	15	
CONDENSERS, HIGH EFFICIENCY FIN AND TUBE TYPE		
Pumpdown Capacity, lbs (kg)	325 (148)	325 (148)
Coil Inlet Face Area, sq. ft. (sq m.)	172.5 (16.0)	172.5 (16.0)
CONDENSER FANS, DIRECT DRIVE PROPELLER TYPE		
No. of Fans/Circuit – 30 in. Fan Dia	8	8
Fan Motor -- hp (kW)	2.5 (1.8)	
Fan & Motor RPM, 60Hz	1140	
60 Hz Fan Tip Speed, fpm (m/s)	8954 (45)	
60 Hz Total Unit Airflow, cfm (l/s)	183104 (86425)	
EVAPORATOR, DIRECT EXPANSION SHELL AND TUBE		
Shell Dia.-Tube Length, in.(mm)	20x108 (508x2750)	
Water Volume, gallons (liters)	103.2 (391.2)	
Max. Water Pressure, psi (kPa)	152 (1048)	
Max. Refrigerant Press., psi (kPa)	350 (2413)	

Table 38, Standard Efficiency, AGS 330DS – AGS 360DS

DATA	AGS MODEL NUMBER								
	330DS			350DS			360DS		
	Ckt. 1	Ckt. 2	Ckt. 3	Ckt. 1	Ckt. 2	Ckt. 3	Ckt. 1	Ckt. 2	Ckt. 3
BASIC DATA									
Unit Cap. @ ARI, tons (kW)	318.7 (1120.5)			337.2 (1185.6)			351.1 (1234.5)		
Unit Operating Charge, lbs (kg)	210 (95)	210 (95)	190 (86	210 (95)	210 (95)	190 (86)	210 (95)	210 (95)	190 (86)
Cabinet Dim., L x W x H, in. (mm)	403x88x97 (10239x2225x2459)			403x88x97 (10239x2225x2459)			403x88x97 (10239x2225x2459)		
Operating Weight(1), lbs. (kg)	20507 (9302)			20507 (9302)			20517 (9307)		
Shipping Weight(1), lbs (kg)	19596 (8889)			19596 (8889)			19639 (8908)		
COMPRESSORS, SCREW, SEMI-HERMETIC									
Nominal Capacity, tons (kW)	100 (350)	100 (350)	100 (350)	100 (350)	125 (437)	100 (350)	125 (437)	125 (437)	100 (350)
Minimum Capacity (% of Full Load)	10			10			10		
CONDENSERS, HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLER									
Pumpdown Capacity, lbs (kg)	287 (130)	287 (130)	243 (110)	287 (130)	287 (130)	243 (110)	287 (130)	287 (130)	243 (110)
Coil Inlet Face Area, sq. ft. (sq m.)	150.8 (14)	150.8 (14)	128.5 (12)	150.8 (14)	150.8 (14)	128.5 (12)	150.8 (14)	150.8 (14)	128.5 (12)
CONDENSER FANS, DIRECT DRIVE PROPELLER TYPE									
No. of Fans/Cir, Fan Dia. 30 in	7	7	6	7	7	6	7	7	6
Fan Motor -- hp (kW)	2.5 (1.8)			2.5 (1.8)			2.5 (1.8)		
Fan & Motor RPM, 60Hz	1140			1140			1140		
60 Hz Fan Tip Speed, fpm (m/s)	8954 (45)			8954 (45)			8954 (45)		
60 Hz Total Unit Airflow, cfm (l/s)	228880 (108031)			228880 (108031)			228880 (108031)		
EVAPORATOR, DIRECT EXPANSION SHELL AND TUBE									
Shell Dia.,Tube Length, in.(mm)	20x108 (508x2750)			20x108 (508x2750)			20x108 (508x2750)		
Water Volume, gallons (liters)	107.0 (405.4)			107.0 (405.4)			103.2 (391.2)		
Max. Water Pressure, psi (kPa)	152 (1048)			152 (1048)			152 (1048)		
Max. Refrigerant Press., psi (kPa)	350 (2413)			350 (2413)			350 (2413)		

Table 39, Standard Efficiency, AGS 390DS – AGS 450DS

DATA	AGS MODEL NUMBER								
	390DS			400DS			450DS		
	Ckt. 1	Ckt. 2	Ckt. 3	Ckt. 1	Ckt. 2	Ckt. 3	Ckt. 1	Ckt. 2	Ckt. 3
BASIC DATA									
Unit Cap. @ ARI, tons (kW)	373.2 (1311.8)			390.4 (1373.3))			434.8 (1529.1)		
Unit Operating Charge, lbs (kg)	210 (95)	210 (95)	230 (104)	215 (97)	215 (97)	235 (106)	140 (109)	140 (109)	140 (109)
Cabinet Dim., L x W x H, in. (mm)	439x88x97 11140x2225x2459)			439x88x97 11140x2225x2459)			474x88x97 12040x2225x2459)		
Operating Weight(1), lbs. (kg)	21156 (9596)			21708 (9847)			22485 (10199)		
Shipping Weight(1), lbs (kg)	20278 (9198)			20549 (9321)			21326 (9674)		
COMPRESSORS, SCREW, SEMI-HERMETIC									
Nominal Capacity, tons (kW)	125 (437)	125 (437)	125 (437)	125 (437)	125 (437)	150 (525)	150 (525)	150 (525)	150 (525)
Minimum Capacity (% of Full Load)	10			10			10		
CONDENSERS, HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLER									
Pumpdown Capacity, lbs (kg)	287 (130)	287 (130)	316 (144)	287 (130)	287 (130)	316 (144)	325 (147)	325 (147)	316 (144)
Coil Inlet Face Area, sq. ft. (sq m.)	150.8 (14)	150.8 (14)	171.7 (16)	150.8 (14)	150.8 (14)	171.7 (16)	172.5 (16)	172.5 (16)	171.7 (16
CONDENSER FANS, DIRECT DRIVE PROPELLER TYPE									
No. of Fans/Circuit – 30 in. Fan Dia	7	7	8	7	7	8	8	8	8
Fan Motor -- hp (kW)	2.5 (1.8)			2.5 (1.8)			2.5 (1.8)		
Fan & Motor RPM, 60Hz	1140			1140			1140		
60 Hz Fan Tip Speed, fpm (m/s)	8954 (45)			8954 (45)			8954 (45)		
60 Hz Total Unit Airflow, cfm (l/s)	251768 (118835)			251768 (118835)			274656 (129637)		
EVAPORATOR, DIRECT EXPANSION SHELL AND TUBE									
Shell Dia.,Tube Length, in.(mm)	20x108 (508x2750)			20x149 (508x3785)			20x149 (508x3785)		
Water Volume, gallons (liters)	103.2 (391.2)			97.2 (368.5)			97.2 (368.5)		
Max. Water Pressure, psi (kPa)	152 (1048)			152 (1048)			152 (1048)		
Max. Refrigerant Press., psi (kPa)	350 (2413)			350 (2413)			350 (2413)		

Physical Data, High Efficiency

Table 40, High Efficiency, AGS 225DE – AGS 260DE

DATA	AGS-DE MODEL NUMBER					
	225DE		250DE		260DE	
	Ckt 1	Ckt 2	Ckt 1	Ckt 2	Ckt 1	Ckt 2
BASIC DATA						
Unit Cap. @ ARI, Tons (Kw)	214.9 (755.6)		235.5 (828.0)		249.6 (877.6)	
R-134a, Operating Charge lbs (kg)	210 (95)	210 (95)	210 (95)	210 (95)	240 (109)	240 (109)
Cabinet Dimensions L x W x H, in. (mm)	279x88x97 (7087x2225x2464)		314x88x97 (7984x2225x2464)		314x88x97 (7984x2225x2464)	
Unit Operating Weight, lbs. (kg)	13418 (6086)		14544 (6597)		14913 (6765)	
Unit Shipping Weight, lbs (kg)	12869 (5837)		13639 (6187)		14008 (6354)	
COMPRESSORS, SCREW, SEMI-HERMETIC						
Nominal Capacity, tons (kW)	100 (350)	100 (350)	100 (350)	125 (437)	125 (4370	125 (437)
Minimum Capacity (% of Full Load)	15		15		15	
CONDENSERS, HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLER						
Pumpdown Capacity, lbs (kg)	249 (113)	249 (113)	287 (130)	287 (130)	325 (147)	325 (147)
Coil Inlet Face Area, sq. ft. (sq m.)	150.8 (14.0)	150.8 (14.0)	150.8 (14.0)	172.5 (16)	172.5 (16.0)	172.5 (16.0)
CONDENSER FANS, DIRECT DRIVE PROPELLER TYPE						
No. of Fans/Circuit – 30 in. Fan Dia.	7	7	8	8	8	8
Fan Motor hp (kW)	2.5 (1.8)		2.5 (1.8)		2.5 (1.8)	
Fan & Motor RPM, 60Hz	1140		1140		1140	
60 Hz Fan Tip Speed, fpm (m/s)	8954 (45)		8954 (45)		8954 (45)	
60 Hz Total Unit Airflow, cfm (l/s)	160216 (75622)		18310 (86424)		183104 (86425)	
EVAPORATOR, DIRECT EXPANSION SHELL AND TUBE						
Shell Dia.-Tube Length, in.(mm)	16x108 (406x2750)		16x108 (406x2750)		20x108 (508x2750)	
Water Volume, gallons (liters)	63.6 (241.0)		63.6 (241.0)		108.5 (411.1)	
Max. Water Pressure, psi (kPa)	152 (1048)		152 (1048)		152 (1048)	
Max. Refrigerant Press., psi (kPa)	350 (2413)		350 (2413)		350 (2413)	

Table 41, High Efficiency, AGS 275DE – AGS 300DE

DATA	AGS MODEL NUMBER			
	275DE		300DE	
	Ckt 1	Ckt 2	Ckt 1	Ckt 2
BASIC DATA				
Unit Cap. @ ARI, tons (kW)	267.7 (940.9)		299.5 (1053.0)	
Unit Operating Charge lbs (kg)	240 (109)	260 (118)	265 (120)	265 (120)
Cabinet Dimensions L x W x H, in. (mm)	350x88x97 (8890x2225x2464)		350x88x97 (8890x2225x2464)	
Unit Operating Weight (1), lbs. (kg)	15671 (7109)		15669 (7107)	
Unit Shipping Weight(1), lbs (kg)	14766 (6698)		14808 (6717)	
COMPRESSORS, SCREW, SEMI-HERMETIC				
Nominal Capacity, tons (kW)	125 (437)	150 (525)	150 (525)	150 (525)
Minimum Capacity (% of Full Load)	15		15	
CONDENSERS, HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLER				
Pumpdown Capacity, lbs (kg)	325 (147)	361 (164)	361 (164)	361 (164)
Coil Inlet Face Area, sq. ft. (sq m.)	172.5 (16.0)	194.2 (18.0)	194.2 (18.0)	194.2 (18.0)
CONDENSER FANS, DIRECT DRIVE PROPELLER TYPE				
No. of Fans/Circuit – 30 in. Fan Dia.	9	9	9	9
Fan Motor hp (kW)	2.5 (1.8)		2.5 (1.8)	
Fan & Motor RPM, 60Hz	1140		1140	
60 Hz Fan Tip Speed, fpm (m/s)	8954 (45)		8954 (45)	
60 Hz Total Unit Airflow, cfm (l/s)	205992 (97228)		205992 (97228)	
EVAPORATOR, DIRECT EXPANSION SHELL AND TUBE				
Shell Dia.-Tube Length, in.(mm)	20x108 (508x2750)		20x108 (508x2750)	
Water Volume, gallons (liters)	108.5 (411.1)		103.2 (391.2)	
Max. Water Pressure, psi (kPa)	152 (1048)		152 (1048)	
Max. Refrigerant Press., psi (kPa)	350 (2413)		350 (2413)	

Table 42, High Efficiency, AGS 330DE – AGS 400DE

DATA	AGS MODEL NUMBER								
	330DE			350DE			400DE		
	Ckt. 1	Ckt. 2	Ckt. 3	Ckt. 1	Ckt. 2	Ckt. 3	Ckt. 1	Ckt. 2	Ckt. 3
BASIC DATA									
Unit Cap. @ ARI, tons (kW)	324.1 (1139.6)			342.9 (1205.6)			397.1 (1396.6)		
Unit Operating Charge, lbs (kg)	210 (95)	210 (95)	230 (104)	210 (95)	240 (109)	240 (109)	240 (109)	240 (109)	240 (109)
Cabinet Dim., L x W x H, in. (mm)	439x88x97 (11140x2225x2459)			474x88x97 (12040x2225x2459)			474x88x97 (12040x2225x2459)		
Operating Weight(1), lbs. (kg)	21146 (9592)			21918 (9942)			22485 (10199)		
Shipping Weight(1), lbs (kg)	20235 (9178)			21040 (9544)			21326 (9674)		
COMPRESSORS, SCREW, SEMI-HERMETIC									
Nominal Capacity, tons (kW)	100 (350)	100 (350)	100 (350)	100 (350)	125 (437)	100 (350)	125 (437)	125 (437)	150 (525)
Minimum Capacity (% of Full Load)	10			10			10		
CONDENSERS, HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLER									
Pumpdown Capacity, lbs (kg)	287 (130)	287 (130)	316 (1440	325 (147)	325 (147)	316 (144)	325 (147)	325 (147)	316 (144)
Coil Inlet Face Area, sq. ft. (sq m.)	150.8 (14)	150.8 (14)	171.7 (16)	150.8 (14)	172.5 (16)	171.7 (16)	172.5 (16)	172.5 (16)	171.7 (16)
CONDENSER FANS, DIRECT DRIVE PROPELLER TYPE									
No. of Fans/Circuit – 30 in. Fan Dia.	7	7	8	8	8	8	8	8	8
Fan Motor hp (kW)	2.5 (1.8)			2.5 (1.8)			2.5 (1.8)		
Fan & Motor RPM, 60Hz	1140			1140			1140		
60 Hz Fan Tip Speed, fpm (m/s)	8954 (45)			8954 (45)			8954 (45)		
60 Hz Total Unit Airflow, cfm (l/s)	251768 (118834)			274656 (129638)			274656 (129638)		
EVAPORATOR, DIRECT EXPANSION SHELL AND TUBE									
Shell Dia.,Tube Length in.(mm)	20x108 (508x2750)			20x108 (508x2750)			20x142 (508x3600)		
Water Volume, gallons (liters)	103.2 (391.2)			102.1 (387.0)			90.5 (343.0)		
Max. Water Pressure, psi (kPa)	152 (1048)			152 (1048)			152 (1048)		
Max. Refrigerant Press., psi (kPa)	350 (2413)			350 (2413)			350 (2413)		

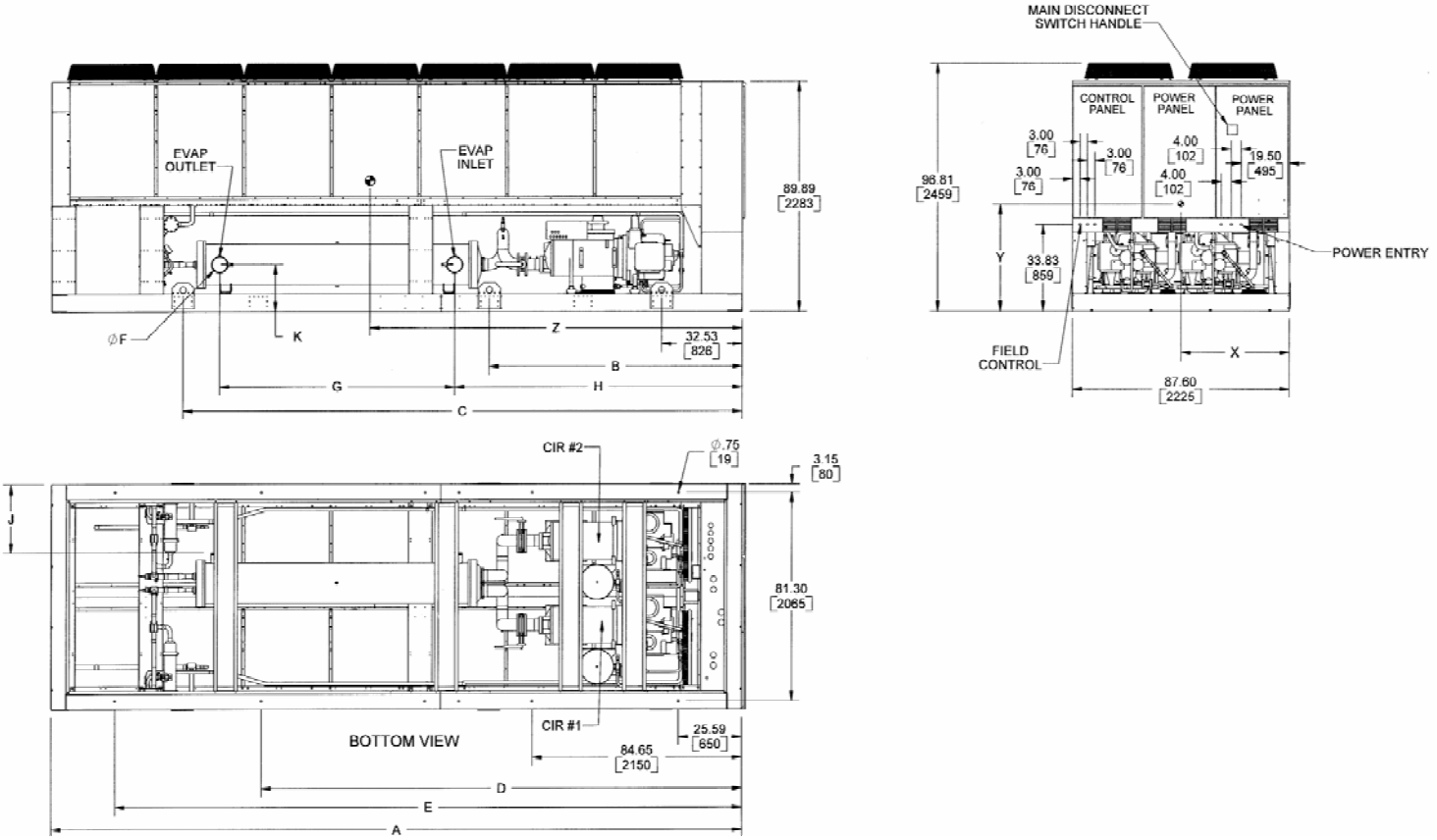
Table 43, High Efficiency, AGS 450DE

DATA	AGS MODEL NUMBER		
	450DE		
	Ckt. 1	Ckt. 2	Ckt. 3
BASIC DATA			
Unit Cap. @ ARI, tons (kW)	438.0 (1540.0)		
Unit Operating Charge, lbs (kg)	270 (122)	270 (122)	240 (109)
Cabinet Dim., L x W x H, in. (mm)	509x88x97 (12939x2225x2459)		
Unit Operating Weight, lbs. (kg)	23403 (10616)		
Unit Shipping Weight, lbs (kg)	22244 (10090)		
COMPRESSORS, SCREW, SEMI-HERMETIC			
Nominal Capacity, tons (kW)	150 (525)	150 (525)	150 (525)
Minimum Capacity (% of Full Load)	10		
CONDENSERS, HIGH EFFICIENCY FIN AND TUBE TYPE			
Pumpdown Capacity, lbs (kg)	361 (164)	361 (164)	316 (144)
Coil Inlet Face Area, sq. ft. (sq m.)	172.5 (16)	194.2 (18)	171.7 (16)
CONDENSER FANS, DIRECT DRIVE PROPELLER TYPE			
No. of Fans/Circuit – 30 in. Fan Dia.	9	9	8
Fan Motor hp (kW)	2.5 (1.8)		
Fan & Motor RPM, 60Hz	1140		
60 Hz Fan Tip Speed, fpm (m/s)	8954 (45)		
60 Hz Total Unit Airflow, cfm (l/s)	297544 (140440)		
EVAPORATOR, DIRECT EXPANSION SHELL AND TUBE			
Shell Dia.-Tube Length, in.(mm)	20x142 (508x142)		
Water Volume, gallons (liters)	90.5 (343.0)		
Max. Water Pressure, psi (kPa)	152 (1048)		
Max. Refrigerant Press., psi (kPa)	350 (2413)		

Dimensions

Standard Efficiency

Figure 10, Standard Efficiency, AGS 225DS – AGS 300DS



Notes:

1. See page 57 and following pages for weights and mounting loads.
2. A 14-fan unit is illustrated. See tables below of the number of fans on a specific model.
3. Mounting holes are ¾-inch diameter.
4. Power entry location shown is for single or multi-point. Multi-point will have two disconnect handles on panel front.
5. Allow 1-inch manufacturing tolerance on all dimensions.

Weights and Dimensions (lb, inch)

Unit Size	Shipping Weight	Operating Weight	No. of Fans	A	B	C	D	E	F	G	H	J	K	Center of Gravity		
														X	Y	Z
AGS225DS	12007	12556	12	243.3	N/A	210.8	N/A	217.7	6.0	95.0	116.4	26.6	18.4	45.6	39.9	95.0
AGS250DS	12849	13398	14	278.7	102.1	255.9	194.1	253.2	6.0	95.0	116.4	26.6	18.4	45.2	40.8	105.3
AGS275DS	14053	14958	16	314.2	102.1	250.1	199.7	288.6	8.0	92.9	117.7	25.3	20.4	44.9	40.6	114.7
AGS300DS	14049	14954	16	314.2	102.1	250.1	199.7	288.6	8.0	92.9	117.7	25.3	20.4	45.3	41.0	116.6

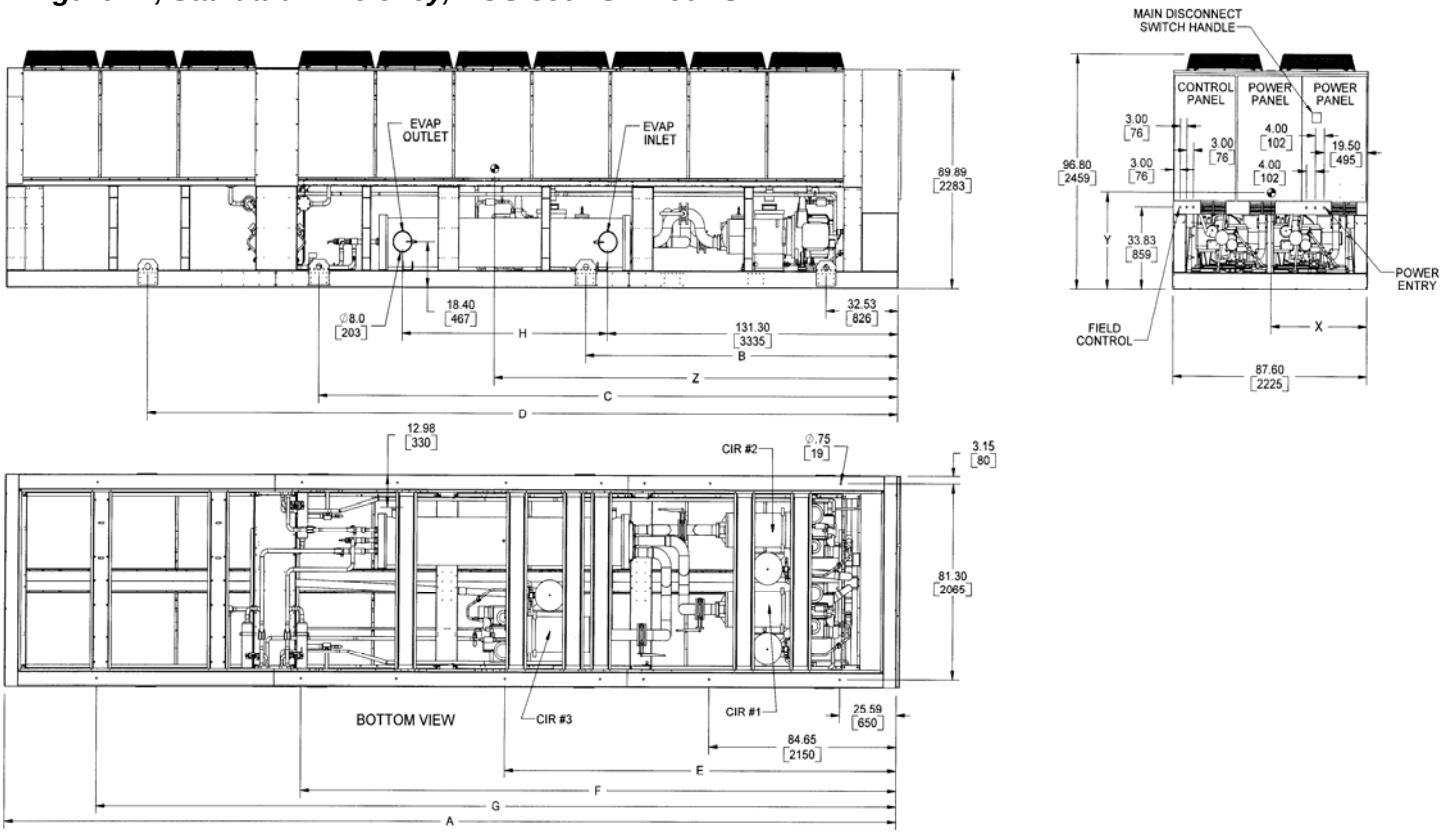
NOTE: Weights are with aluminum fins, add 131 pounds per fan section for copper fins.

Weights and Dimensions (kg, mm)

Unit Size	Shipping Weight	Operating Weight	No. of Fans	A	B	C	D	E	F	G	H	J	K	Center of Gravity		
														x	y	z
AGS225DS	5446	5695	12	6180	N/A	5354	N/A	5530	152	2413	2956	676	467	1157	1014	2412
AGS250DS	5828	6077	14	7079	2594	6500	4930	6431	152	2413	2956	676	467	1147	1037	2675
AGS275DS	6374	6784	16	7981	2594	6353	5072	7330	203	2360	2989	643	518	1141	1031	2914
AGS300DS	6349	6760	16	7981	2594	6353	5072	7330	203	2360	2989	643	518	1150	1041	2961

NOTE: Weights are with aluminum fins; add 59 kilograms per fan section for copper fins.

Figure 11, Standard Efficiency, AGS 330DS – 450DS



Notes:

1. See page 57 and following pages for weights and mounting loads.
2. A 20-fan unit is illustrated. See tables below of the number of fans on a specific model.
3. Power entry location shown is for single or multi-point. Multi-point will have two disconnect handles on panel front.
4. Mounting holes are ¾-inch diameter.
5. Allow 1-inch manufacturing tolerance on all dimensions.

Weights and Dimensions (lb., in.)

Unit Size	Shipping Weight	Operating Weight	No. of Fans	A	B	C	D	E	F	G	H	Center of Gravity		
												X	Y	Z
AGS330DS-350DS	19596	20507	20	403.1	141.2	262.0	339.3	177.0	269.3	361.6	92.9	43.5	39.7	149.6
AGS360DS	19639	20517	20	403.1	141.2	262.0	339.3	177.0	269.3	361.6	92.9	43.5	39.7	149.6
AGS390DS	20278	21156	22	438.6	141.2	262.0	348.3	177.0	269.3	361.6	92.9	43.8	40.1	158.2
AGS400DS	20549	21708	22	438.6	141.2	262.0	348.3	177.0	269.3	361.6	126.4	43.8	40.1	161.8
AGS450DS	21326	22485	24	474.0	137.6	297.4	383.8	169.3	304.7	397.0	126.4	43.8	40.1	173.0

NOTE: Weights are with aluminum fins, add 131 pounds per fan section for copper fins

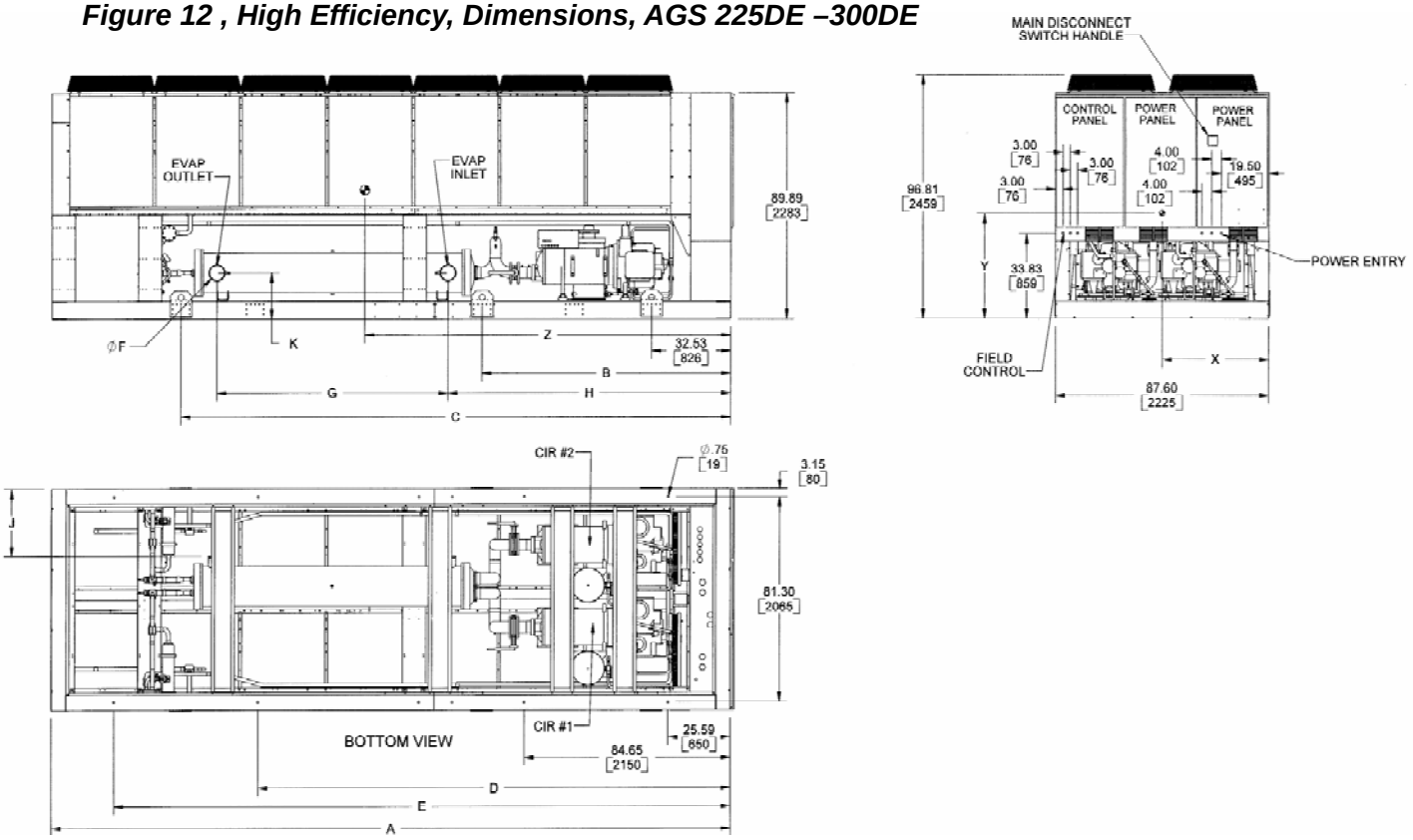
Weights and Dimensions (kg, mm)

Unit Size	Shipping Weight	Operating Weight	No. of Fans	A	B	C	D	E	F	G	H	Center of Gravity		
												X	Y	Z
AGS330DS-350DS	8889	9302	20	10239	3586	6655	8618	4496	6840	9185	2360	1105	1008	3800
AGS360DS	8908	9307	20	10239	3586	6655	8618	4496	6840	9185	2360	1105	1008	3800
AGS390DS	9198	9596	22	11140	3586	6655	8847	4496	6840	9185	2360	1113	1019	4018
AGS400DS	9321	9847	22	11140	3586	6655	8847	4496	6840	9185	3211	1113	1019	4110
AGS450DS	9674	10199	24	12040	3495	7554	9749	4299	7739	10085	3211	1113	1019	4395

NOTES: Weights are with aluminum fins, add 59 kilograms per fan section for copper fins

High Efficiency

Figure 12 , High Efficiency, Dimensions, AGS 225DE –300DE



Note:

1. See page 57 and following pages for weights and mounting loads.
2. A 14-fan unit is illustrated. See tables below of the number of fans on a specific model.
3. Mounting holes are ¾-inch diameter.
4. Power entry location shown is for single or multi-point. Multi-point will have two disconnect handles on panel front.
5. Allow 1-inch manufacturing tolerance on all dimensions.

Weights and Dimensions (lb, in)

Unit Model	Shipping Weight.	Operating Weight	Number of Fans	A	B	C	D	E	F	G	H	J	K	X	Y	Z
AGS225DE	12869	13418	14	278.7	102.1	255.9	194.1	253.2	6.0	95.0	116.4	26.6	18.4	45.2	40.8	105.3
AGS250DE	13639	14544	16	314.2	102.1	250.1	199.7	288.6	6.0	95.0	116.4	26.6	18.4	44.9	40.6	114.7
AGS260DE	14008	14913	16	314.2	102.1	250.1	199.7	288.6	8.0	92.9	117.7	25.3	20.4	45.3	41.0	116.6
AGS275DE	14766	15671	18	349.6	102.1	266.4	198.8	324.0	8.0	92.9	117.7	25.3	20.4	44.8	41.6	125.4
AGS300DE	14808	15669	18	349.6	102.1	266.4	198.8	324.0	8.0	92.9	117.7	25.3	20.4	45.1	42.4	127.6

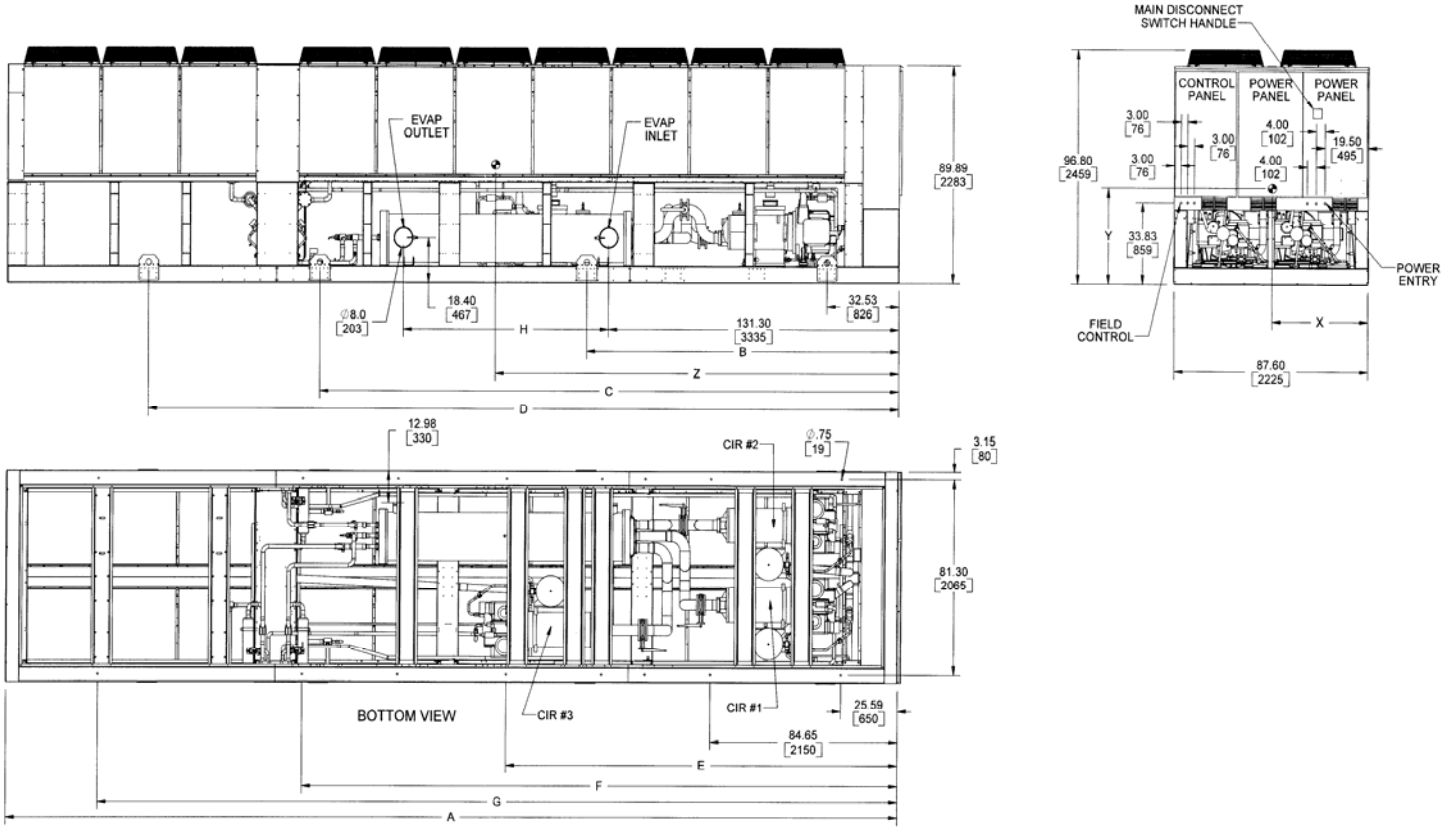
NOTES: Weights are with aluminum fins, add 131 pounds per fan section for copper fins

Weights and Dimensions (kg, mm)

Unit Model	Shipping Weight.	Operating Weight	Number of Fans	A	B	C	D	E	F	G	H	J	K	X	Y	Z
AGS225DE	5837	6086	14	7079	2594	6500	4930	6431	152	2413	2956	676	467	1147	1037	2675
AGS250DE	6187	6597	16	7981	2594	6353	5072	7330	152	2413	2956	676	467	1141	1031	2914
AGS260DE	6354	6765	16	7981	2594	6353	5072	7330	203	2360	2989	643	518	1150	1041	2961
AGS275DE	6698	7109	18	8880	2594	6767	5050	8230	203	2360	2989	643	518	1138	1057	3185
AGS300DE	6717	7107	18	8880	2594	6767	5050	8230	203	2360	2989	643	518	1145	1077	3240

NOTES: Weights are with aluminum fins, add 59 kilograms per fan section for copper fins

Figure 13, High Efficiency, Dimensions, AGS 330DE - AGS 450DE



NOTES::
1. See page 57 and following pages for weights and mounting loads.
2. A 20-fan unit is illustrated. See tables below of the number of fans on a specific model.
3. Power entry location shown is for single or multi-point. Multi-point will have two disconnect handles on panel front.
4. Mounting holes are ¾-inch diameter.
5. Allow 1-inch manufacturing tolerance on all dimensions.

Weights and Dimensions (lb, in)

Unit Model	Shipping Weight.	Operating Weight	No. of Fans	A	B	C	D	E	F	G	H	X	Y	Z
AGS330DE	20235	21146	22	438.6	140.8	262.0	348.3	177.0	269.3	361.6	92.9	43.8	40.1	158.2
AGS350DE	21040	21918	24	474.0	140.8	297.9	383.8	177.0	304.7	397.0	92.9	43.8	40.1	169.4
AGS400DE	21326	22485	24	474.0	140.8	297.9	383.8	177.0	304.7	397.0	126.4	43.8	40.1	173.0
AGS450DE	22244	23403	26	509.4	140.8	297.4	419.2	177.0	304.7	432.5	126.4	43.8	41.4	185.2

NOTES: Weights are with aluminum fins, add 131 pounds per fan section for copper fins.

Weights and Dimensions (kg, mm)

Unit Model	Shipping Weight.	Operating Weight	No. of Fans	A	B	C	D	E	F	G	H	X	Y	Z
AGS330DE	9178	9592	22	11140	3576	6655	8847	4496	6840	9185	2360	1113	1019	4018
AGS350DE	9544	9942	24	12040	3576	7564	9749	4496	7739	10085	2360	1113	1019	4303
AGS400DE	9674	10199	24	12040	3576	7564	9749	4496	7739	10085	3211	1113	1019	4395
AGS450DE	10090	10616	26	12939	3576	7554	10648	4496	7739	10986	3211	1113	1050	4705

NOTES: Weights are with aluminum fins, add 59 kilograms per fan section for copper fins.

Weights

Table 44, Standard Efficiency, Shipping and Lifting Weights, Aluminum Fins

Unit Size	Unit Fans	Shipping Weight		Location															
				L1		L2		L3		L4		L5		L6		L7		L8	
		lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg
225DS	12	12007	5451	3743	1699	4059	1843	2018	916	2188	993	-	-	-	-	-	-	-	-
250DS	14	12849	5833	2653	1204	2824	1282	2241	1017	2386	1083	1330	603	1416	642	-	-	-	-
275DS	16	14053	6380	2642	1199	2780	1262	2381	1081	2505	1137	1825	828.6	1920	871.7	-	-	-	-
300DS	16	14049	6378	2642	1199	2780	1262	2379	1080	2503	1136	1825	828.6	1920	871.7	-	-	-	-
330DS	20	19596	8897	3758	1706	3707	1683	2884	1309	2845	1292	1918	870	1892	859	1305	592	1287	584
350DS	20	19596	8897	3758	1706	3707	1683	2884	1309	2845	1292	1918	870	1892	859	1305	592	1287	584
360DS	20	19639	8916	3761	1707	3710	1684	2892	1313	2853	1295	1926	874	1900	862	1308	593	1290	585
390DS	22	20278	9206	3559	1616	3559	1616	2850	1294	2850	1294	2109	957	2109	957	1621	735	1621	735
400DS	22	20549	9329	3572	1622	3572	1622	2905	1319	2905	1319	2164	982	2164	982	1634	741	1634	741
450DS	24	21326	9682	3693	1677	3693	1677	3094	1405	3094	1405	2184	991	2184	991	1692	768	1692	768

Table 45, Standard Efficiency, Shipping and Lifting Weights, Copper Fins

Unit Size	Unit Fans	Shipping Weight		Location															
				L1		L2		L3		L4		L5		L6		L7		L8	
		lbs.	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg
225DS	12	13584	6167	4154	1886	4470	2029	2430	1103	2600	1180	-	-	-	-	-	-	-	
250DS	14	14689	6669	2660	1208	2810	1276	2546	1156	2690	1221	1980	899	2085	947	-	-	-	-
275DS	16	16155	7334	2992	1359	3130	1421	2731	1240	2855	1296	2175	987.6	2270	1031	-	-	-	-
300DS	16	16151	7333	2992	1359	3130	1421	2729	1239	2853	1295	2175	987.6	2270	1031	-	-	-	-
330DS	20	22224	10090	4086	1855	4035	1832	3213	1459	3174	1441	2247	1020	2221	1008	1633	741	1615	733
350DS	20	22224	10090	4086	1855	4035	1832	3213	1459	3174	1441	2247	1020	2221	1008	1633	741	1615	733
360DS	20	22267	10109	4089	1856	4038	1833	3221	1462	3182	1445	2255	1024	2229	1012	1636	743	1618	735
390DS	22	23169	10519	3920	1780	3920	1780	3212	1458	3212	1458	2470	1121	2470	1121	1982	900	1982	900
400DS	22	23440	10642	3933	1786	3933	1786	3266	1483	3266	1483	2526	1147	2526	1147	1995	906	1995	906
450DS	24	24480	11114	4087	1855	4087	1855	3488	1584	3488	1584	2579	1171	2579	1171	2086	947	2086	947

Table 46, Standard Efficiency, Operating and Mounting Weights, Aluminum Fins

Unit Size	Unit Fans	Operating Weight		Location																	
				M1		M2		M3		M4		M5		M6		M7		M8		M9		M10	
		lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg
225DS	12	12556	5700	2382	1081	2582	1172	2118	962	2297	1043	1525	692	1653	750	-	-	-	-	-	-	-	-
250DS	14	13398	6083	2411	1095	2566	1165	2002	909	2131	967	1243	564	1324	601	834	379	888	403	-	-	-	-
275DS	16	14958	6791	2523	1145	2697	1224	2183	991	2333	1059	1519	690	1624	737	1006	457	1073	487	-	-	-	-
300DS	16	14954	6789	2522	1145	2696	1224	2182	991	2332	1059	1518	689	1623	737	1006	457	1075	488	-	-	-	-
330DS	20	20507	9310	2818	1279	2780	1262	2535	1151	2500	1135	2095	951	2067	938	1657	752	1634	742	1219	553	1202	546
350DS	20	20507	9310	2818	1279	2780	1262	2535	1151	2500	1135	2095	951	2067	938	1657	752	1634	742	1219	553	1202	546
360DS	20	20517	9315	2818	1279	2780	1262	2537	1152	2502	1136	2097	952	2069	939	1658	753	1635	742	1219	553	1202	546
390DS	22	21156	9605	2678	1216	2678	1216	2488	1130	2488	1130	2112	959	2112	959	1750	795	1750	795	1550	704	1550	704
400DS	22	21708	9855	2678	1216	2678	1216	2488	1130	2488	1130	2192	995	2192	995	1896	861	1896	861	1600	726	1600	726
450DS	24	22485	10208	2721	1235	2721	1235	2558	1161	2558	1161	2323	1055	2323	1055	1948	884	1948	884	1693	769	1693	769

Table 47, Standard Efficiency, Operating and Mounting Weights, Copper Fins

Unit Size	Fans	Operating Weight		Location																	
				M1		M2		M3		M4		M5		M6		M7		M8		M9		M10	
		lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
225DS	12	14133	6416	2642	1199	2843	1291	2379	1080	2571	1167	1785	810	1913	869	-	-	-	-	-	-	-	-
250DS	14	15238	6918	2641	1199	2796	1269	2232	1013	2361	1072	1473	669	1554	706	1064	483	1118	507	-	-	-	-
275DS	16	17060	7745	2786	1265	2959	1343	2445	1110	2605	1183	1780	808	1883	855	1269	576	1333	605	-	-	-	-
300DS	16	17056	7743	2785	1264	2958	1343	2444	1110	2605	1183	1780	808	1883	855	1267	575	1334	606	-	-	-	-
330DS	20	23135	10503	3081	1399	3043	1382	2798	1270	2763	1254	2358	1071	2330	1058	1920	872	1897	861	1481	672	1464	665
350DS	20	23135	10503	3081	1399	3043	1382	2798	1270	2763	1254	2358	1071	2330	1058	1920	872	1897	861	1481	672	1464	665
360DS	20	23145	10508	3081	1399	3043	1382	2800	1271	2765	1255	2360	1071	2332	1059	1921	872	1898	862	1481	672	1464	665
390DS	22	24047	10917	2967	1347	2967	1347	2777	1261	2777	1261	2401	1090	2401	1090	2039	926	2039	926	1839	835	1839	835
400DS	22	24599	11168	2967	1347	2967	1347	2777	1261	2777	1261	2481	1126	2481	1126	2185	992	2185	992	1889	858	1889	858
450DS	24	25639	11640	3036	1378	3036	1378	2873	1304	2873	1304	2638	1198	2638	1198	2263	1027	2263	1027	2009	912	2009	912

Table 48, High Efficiency, Shipping and Lifting Weights, Aluminum Fins

Unit Size	Unit Fans	Shipping Weight.		Lifting Weight lbs (kg)															
				L1		L2		L3		L4		L5		L6		L7		L8	
		lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg
225DE	14	12869	5843	2653	1204	2824	1282	2246	1020	2391	1086	1335	606	1420	645	-	-	-	-
250DE	16	13639	6192	2565	1165	2698	1225	2311	1049	2431	1104	1771	804	1863	845.8	-	-	-	-
260DE	16	14808	6723	2562	1163	2738	1243	2341	1063	2503	1136	1867	848	1997	907	-	-	-	-
275DE	18	14766	6704	2615	1187	2737	1243	2470	1121	2586	1174	2129	966.6	2229	1012	-	-	-	-
300DE	18	14808	6723	2547	1156	2708	1229	2440	1108	2595	1178	2189	994	2329	1057	-	-	-	-
330DE	22	20235	9187	3548	1611	3548	1611	2845	1292	2845	1292	2104	955	2104	955	1620	735	1620	735
350DE	24	21040	9552	3661	1662	3661	1662	3055	1387	3055	1387	2144	973	2144	973	1660	754	1660	754
400DE	24	21326	9682	3693	1677	3693	1677	3095	1405	3095	1405	2184	992	2184	992	1691	768	1691	768
450DE	26	22244	10099	3658	1661	3658	1661	3171	1440	3171	1440	2429	1103	2429	1103	1864	846	1864	846

Table 49, High Efficiency, Shipping and Lifting Weights, Copper Fins

Unit Size	Unit Fans	Shipping Weight		Lifting Weight lbs (kg)															
				L1		L2		L3		L4		L5		L6		L7		L8	
		lbs.	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg
225DE	14	14709	6678	2660	1208	2810	1276	2550	1158	2695	1224	1986	902	2090	949	-	-	-	-
250DE	16	15741	7146	2915	1324	3048	1384	2661	1208	2781	1263	2121	963.1	2213	1005	-	-	-	-
260DE	16	16110	7314	2639	1198	2796	1269	2632	1195	2788	1266	2594	1178	2747	1247	-	-	-	-
275DE	18	17131	7777	3009	1366	3131	1421	2864	1300	2980	1353	2523	1146	2623	1191	-	-	-	-
300DE	18	17173	7797	2707	1229	2854	1296	2747	1247	2898	1316	2957	1342	3119	1416	-	-	-	-
330DE	22	23126	10499	3909	1775	3909	1775	3206	1456	3206	1456	2466	1120	2466	1120	1982	900	1982	900
350DE	24	24194	10984	4055	1841	4055	1841	3449	1566	3449	1566	2538	1152	2538	1152	2055	933	2055	933
400DE	24	24480	11114	4087	1855	4087	1855	3489	1584	3489	1584	2578	1170	2578	1170	2086	947	2086	947
450DE	26	25660	11650	4085	1855	4085	1855	3598	1633	3598	1633	2856	1297	2856	1297	2291	1040	2291	1040

Table 50, High Efficiency, Operating and Mounting Weights, Aluminum Fins

Unit Size	Unit Fans	Operating Weight		Isolator Location Weight lbs (kg)																	
				M1		M2		M3		M4		M5		M6		M7		M8		M9		M10	
		lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg	lbs	kg
225DE	14	13418	6092	2411	1095	2566	1165	2005	910	2134	969	1247	566	1328	603	836	380	891	405	-	-	-	-
250DE	16	14544	6603	2513	1141	2643	1200	2160	981	2273	1032	1473	669	1549	703	942	428	991	450	-	-	-	-
260DE	16	14913	6771	2514	1141	2687	1220	2177	988	2327	1056	1515	688	1620	735	1002	455	1071	486	-	-	-	-
275DE	18	15671	7115	2491	1131	2650	1203	2229	1012	2371	1076	1717	780	1826	829	1158	526	1231	559	-	-	-	-
300DE	18	15669	7114	2491	1131	2650	1203	2228	1012	2370	1076	1717	780	1826	829	1158	526	1231	559	-	-	-	-
330DE	22	21146	9600	2678	1216	2678	1216	2488	1130	2488	1130	2109	957	2109	957	1748	794	1748	794	1550	704	1550	704
350DE	24	21918	9951	2716	1233	2716	1233	2470	1121	2470	1121	2230	1012	2230	1012	1850	840	1850	840	1693	769	1693	769
400DE	24	22485	10208	2721	1235	2721	1235	2558	1161	2558	1161	2323	1055	2323	1055	1948	884	1948	884	1693	769	1693	769
450DE	26	23403	10625	2688	1220	2688	1220	2568	1166	2568	1166	2404	1091	2404	1091	2142	972	2142	972	1899	862	1899	862

Table 51, High Efficiency, Operating and Mounting Weights, Copper Fins

Unit Size	Unit Fans	Operating Weight		Isolator Location Weight lbs (kg)																	
				M1		M2		M3		M4		M5		M6		M7		M8		M9		M10	
		lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
225DE	14	15258	6927	2643	1200	2798	1270	2234	1014	2363	1073	1475	670	1556	706	1068	485	1120	508	-	-	-	-
250DE	16	16646	7557	2776	1260	2905	1319	2422	1100	2536	1151	1736	788	1812	823	1205	547	1254	569	-	-	-	-
260DE	16	17015	7725	2789	1266	2962	1345	2450	1112	2600	1180	1788	812	1893	859	1277	580	1346	611	-	-	-	-
275DE	18	18036	8188	2787	1265	2946	1337	2524	1146	2666	1210	2013	914	2122	963	1455	661	1523	691	-	-	-	-
300DE	18	18034	8187	2787	1265	2946	1337	2524	1146	2666	1210	2013	914	2122	963	1454	660	1522	691	-	-	-	-
330DE	22	24037	10913	2967	1347	2967	1347	2777	1261	2777	1261	2398	1089	2398	1089	2037	925	2037	925	1839	835	1839	835
350DE	24	25072	11383	3031	1376	3031	1376	2785	1264	2785	1264	2545	1155	2545	1155	2165	983	2165	983	2010	913	2010	913
400DE	24	25639	11640	3036	1378	3036	1378	2873	1304	2873	1304	2638	1198	2638	1198	2263	1027	2263	1027	2008	912	2008	912
450DE	26	26819	12176	3030	1376	3030	1376	2910	1321	2910	1321	2746	1247	2746	1247	2484	1128	2484	1128	2240	1017	2240	1017

Remote Evaporator

IMPORTANT NOTE: A drawing of the refrigerant piping showing all fittings, line sizes, lengths, and elevations must be submitted to McQuay, through the local sales office, for approval before entering order.

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

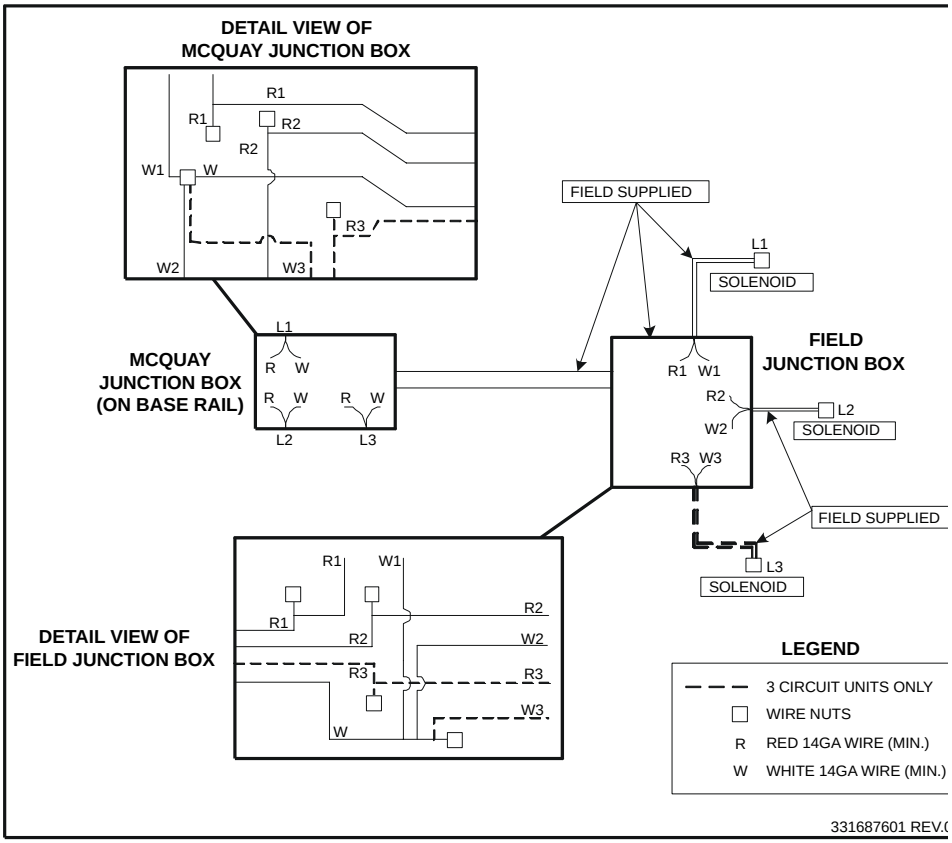
- Refrigerant piping beginning on page 61.
- Performance derate data on page 61.
- Dimensions and weights beginning on page 64.
- Physical data beginning on page 68.

Data common to both packaged and remote evaporator models are:

- Electrical data beginning on page 34.
- Sound data on page 27.
- Evaporator pressure drop on page 25.
- Performance data (subject to derating) on page 18

Field Wiring

Figure 14, Remote Evaporator Field Wiring



1. The 110V liquid line solenoid valves have to be wired back to the outdoor unit. Install a junction box adjacent to the evaporator and wire from each valve (two or three depending on model) to it. All the wiring, in conduit, can then be run from the box back to the unit junction box located on a unit base cross-frame between the compressors. The connections are made to marked terminals as shown in Figure 14. Wiring from the unit terminal box to the unit control panel is done in the factory.

2. Two evaporator water temperature sensors with 100 feet of cable coiled up and attached to the unit base 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 up and attached to the unit base for extension to the evaporator.
4. One suction line pressure transducer per circuit with 100 feet of cable coiled up and attached to the unit base for extension to the evaporator.
5. Liquid line solenoid cables, to be wired into the junction box located on the unit base between the compressors, are shipped in the control panel. If additional length is required, use 14 ga wire to a maximum of 100 feet.

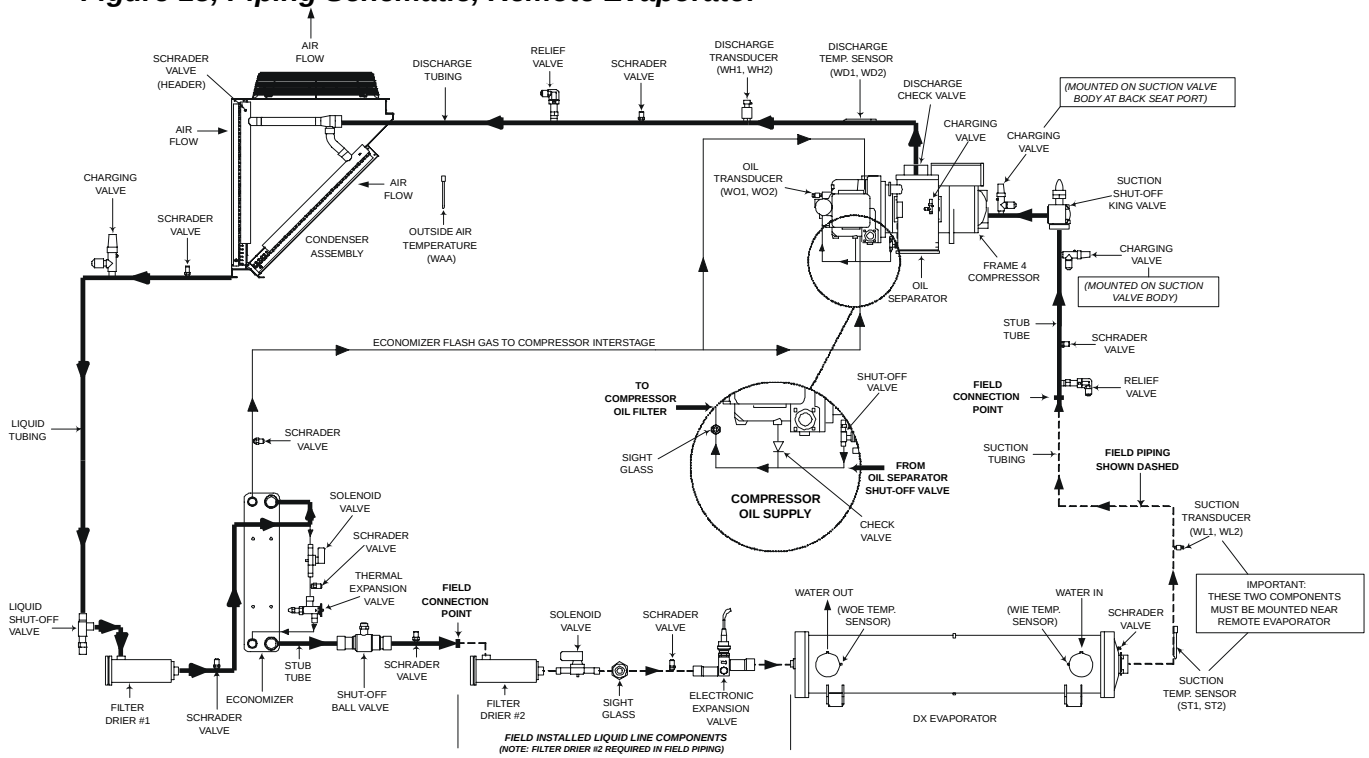
Piping Layout

Figure 15 shows the piping layout for one of the two or three 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 of refrigerant and oil will be required in the field, supplied by the customer, for the additional field piping.

The location and size of the refrigerant connections are shown on the dimension drawings beginning on page 64. Insulate the suction and liquid lines.

Figure 15, Piping Schematic, Remote Evaporator



Refrigerant Specialties Kit Components

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

Filter-drier and cores for field piping
Electronic expansion valve
Evaporator vent and drain shutoff valves
Suction coupling and flange for attachment to the evaporator
Sight glass
Solenoid valve
Charging Valve

Performance Derate Data

There is a derate to the packaged AGS performance due to field installed 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 52, 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 55 and Table 56, 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 length (TEL) for the piping run.
3. Again using Table 55 and Table 56, determine the pressure drop (in degrees F) based on the TEL. Interpolation is encouraged.
4. Determine the derate factors from Table 53 based on the suction line pressure drop.

Table 53, 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

Refrigerant Pipe Sizing

Layout and size the refrigerant piping in accordance with the latest edition of the ASHRAE Handbook. A line-sizing guide is below. Keep the refrigerant suction line pressure drop to a maximum of 2-degree F. in saturated temperature equivalent. Each 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 = 4 1/8-inch OD each.
- A piping drawing showing altitudes, line lengths, slopes and all fittings, using McQuay 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.
- Underground refrigerant piping is not permitted
- When facing the unit control box, the left-hand compressor is circuit # 1, and the right-hand is circuit # 2. If present, the compressor behind #2, on the right side, is circuit #3.

Table 54, 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 55, Recommended Horizontal or Downflow Suction Line Size

AGS-D 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
225DM 225DF	Both	3 5/8	1.47	4 1/8	1.19	4 1/8	1.59	4 1/8	1.98	4 1/8	2.38
250DM 250DF	1	3 5/8	1.47	4 1/8	1.19	4 1/8	1.59	4 1/8	1.98	4 1/8	2.38
	2	3 5/8	2.01	4 1/8	1.63	4 1/8	2.17	4 1/8	2.72	4 1/8	3.26
275DM 260DF	1	4 1/8	1.09	4 1/8	1.63	4 1/8	2.17	4 1/8	2.72	4 1/8	3.26
275DF	2	4 1/8	1.51	4 1/8	2.26	4 1/8	3.02	5 1/8	1.33	5 1/8	1.60
300DF 300DM	Both	4 1/8	1.51	4 1/8	2.26	4 1/8	3.02	5 1/8	1.33	5 1/8	1.60
330DF 330DM	All 3	3 5/8	1.47	4 1/8	1.19	4 1/8	1.59	4 1/8	1.98	4 1/8	2.38
350DF 350DM	1& 3	3 5/8	1.47	4 1/8	1.19	4 1/8	1.59	4 1/8	1.98	4 1/8	2.38
	2	3 5/8	2.01	4 1/8	1.63	4 1/8	2.17	4 1/8	2.72	4 1/8	3.26
360DM	1&2	3 5/8	2.01	4 1/8	1.63	4 1/8	2.17	4 1/8	2.72	4 1/8	3.26
	3	3 5/8	1.47	4 1/8	1.19	4 1/8	1.59	4 1/8	1.98	4 1/8	2.38
390DM	All 3	4 1/8	1.09	4 1/8	1.63	4 1/8	2.17	4 1/8	2.72	4 1/8	3.26
400DF 400DM	1&2	4 1/8	1.09	4 1/8	1.63	4 1/8	2.17	4 1/8	2.72	4 1/8	3.26
	3	4 1/8	1.51	4 1/8	2.26	4 1/8	3.02	5 1/8	1.33	5 1/8	1.60
450DF 450DM	All 3	4 1/8	1.51	4 1/8	2.26	4 1/8	3.02	5 1/8	1.33	5 1/8	1.60

Notes:

1. "Size" is tubing size in inches. Pressure drop is shown in degrees F, multiply by 0.97 for psi.
2. For equivalent lengths between table values, use the column higher than the length and calculate pressure drop based on a direct ratio of the length compared to column value. Example: for 90 ft equivalent length, use (90/100) times the pressure drop shown in the 100 Eqiv. Ft column**.**

Table 56, Recommended Upflow Suction line Size

AGS-D Model	Circuit	Up to 50 Equiv. Ft.		Up to 75 Equiv. Ft.		Up to 100 Equiv. Ft.	
		Size	PD	Size	PD	Size	PD
225DF 225DM	Both	3 5/8	1.47	3 5/8	2.20	3 5/8	2.94
250DF 250DM	1	3 5/8	1.47	3 5/8	2.20	3 5/8	2.94
	2	3 5/8	2.01	4 1/8	1.63	4 1/8	2.17
260DF 275DM	1	4 1/8	1.09	4 1/8	1.63	4 1/8	2.17
275DF	2	4 1/8	1.51	4 1/8	2.26	4 1/8	3.02
300DF 300DM	Both	4 1/8	1.51	4 1/8	2.26	4 1/8	3.02
330DF 330DM	All 3	3 5/8	1.47	3 5/8	2.20	3 5/8	2.94
350DF 350DM	1& 3	3 5/8	1.47	3 5/8	2.20	3 5/8	2.94
	2	3 5/8	2.01	4 1/8	1.63	4 1/8	2.17
360DM	1&2	3 5/8	2.01	4 1/8	1.63	4 1/8	2.17
	3	3 5/8	1.47	3 5/8	2.20	3 5/8	2.94
390DM	All 3	4 1/8	1.09	4 1/8	1.63	4 1/8	2.17
400DF 400DM	1&2	4 1/8	1.09	4 1/8	1.63	4 1/8	2.17
	3	4 1/8	1.51	4 1/8	2.26	4 1/8	3.02
450DF 450DM	All 3	4 1/8	1.51	4 1/8	2.26	4 1/8	3.02

Notes:

1. Pressure Drop is shown in degrees F., multiply by 0.97 for psi.
2. Do not use pipe size larger than shown in table for suction upflow line as flow velocity must be maintained with compressor unloaded for return oil to the compressor at light load conditions.

Table 57, Recommended Liquid line Size.

AGS-D 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
225 DF 225 DM	Both	1 5/8	0.84	1 5/8	1.26	1 5/8	1.68	1 5/8	2.11	1 5/8	2.53
250 DF 250 DM	1	1 5/8	0.84	1 5/8	1.26	1 5/8	1.68	1 5/8	2.11	1 5/8	2.53
	2	1 5/8	1.15	1 5/8	1.73	1 5/8	2.31	1 5/8	2.88	1 5/8	3.46
260 DF 275 DM	1	1 5/8	1.15	1 5/8	1.73	1 5/8	2.31	1 5/8	2.88	1 5/8	3.46
275 DF	2	1 5/8	1.60	1 5/8	2.40	1 5/8	3.20	1 5/8	4.00	1 5/8	4.80
300 DF 300 DM	Both	1 5/8	1.60	1 5/8	2.40	1 5/8	3.20	1 5/8	4.00	1 5/8	4.80
330 DF 330 DM	All 3	1 5/8	0.84	1 5/8	1.26	1 5/8	1.68	1 5/8	2.11	1 5/8	2.53
350 DF 350 DM	1& 3	1 5/8	0.84	1 5/8	1.26	1 5/8	1.68	1 5/8	2.11	1 5/8	2.53
	2	1 5/8	1.15	1 5/8	1.73	1 5/8	2.31	1 5/8	2.88	1 5/8	3.46
360 DM	1&2	1 5/8	1.15	1 5/8	1.73	1 5/8	2.31	1 5/8	2.88	1 5/8	3.46
	3	1 5/8	0.84	1 5/8	1.26	1 5/8	1.68	1 5/8	2.11	1 5/8	2.38
390 DM	All 3	1 5/8	1.15	1 5/8	1.73	1 5/8	2.31	1 5/8	2.88	1 5/8	3.46
400 DF 400 DM	1&2	1 5/8	1.15	1 5/8	1.73	1 5/8	2.31	1 5/8	2.88	1 5/8	3.46
	3	1 5/8	1.60	1 5/8	2.40	1 5/8	3.20	1 5/8	4.00	1 5/8	4.80
450 DM 450 DF	All 3	1 5/8	1.60	1 5/8	2.40	1 5/8	3.20	1 5/8	4.00	1 5/8	4.80

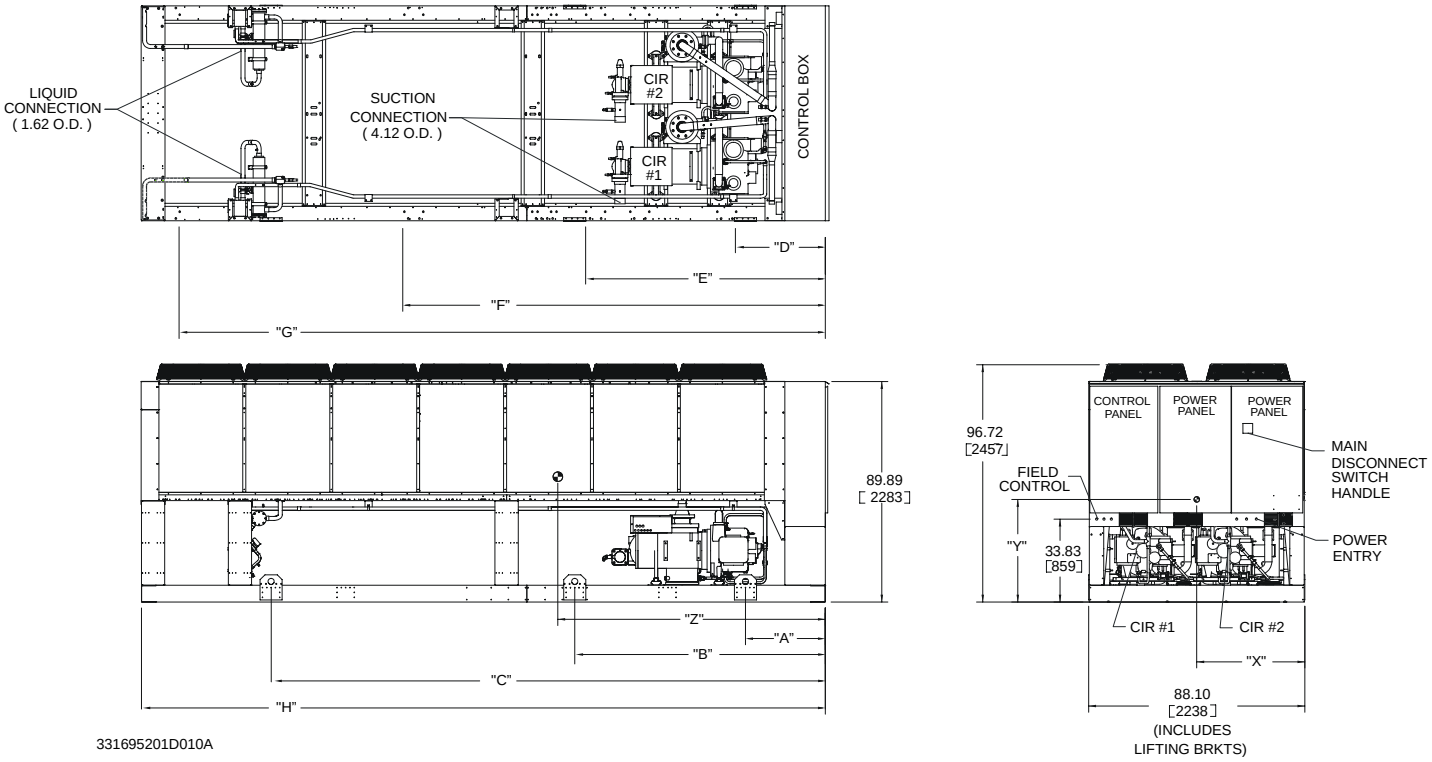
NOTE:

1. "Size" is tubing size in inches, "PD" is the pressure drop in degrees F. Multiply by 2.2 for psi.
2. Liquid line size shown is recommended selection based on cost and performance considerations.
3. Exceeding 1 5/8 liquid line size will cause problems with pumpdown capacity. Liquid subcooling is adequate for line sizing shown in he table.

IMPORTANT NOTE: A drawing of the refrigerant piping showing all fittings, line sizes and lengths, and elevations must be submitted to McQuay, through the local sales office, for approval before entering order.

Dimensions and Weights

Figure 16, AGS 225 – 300, Standard and High Efficiency, Remote Evaporator

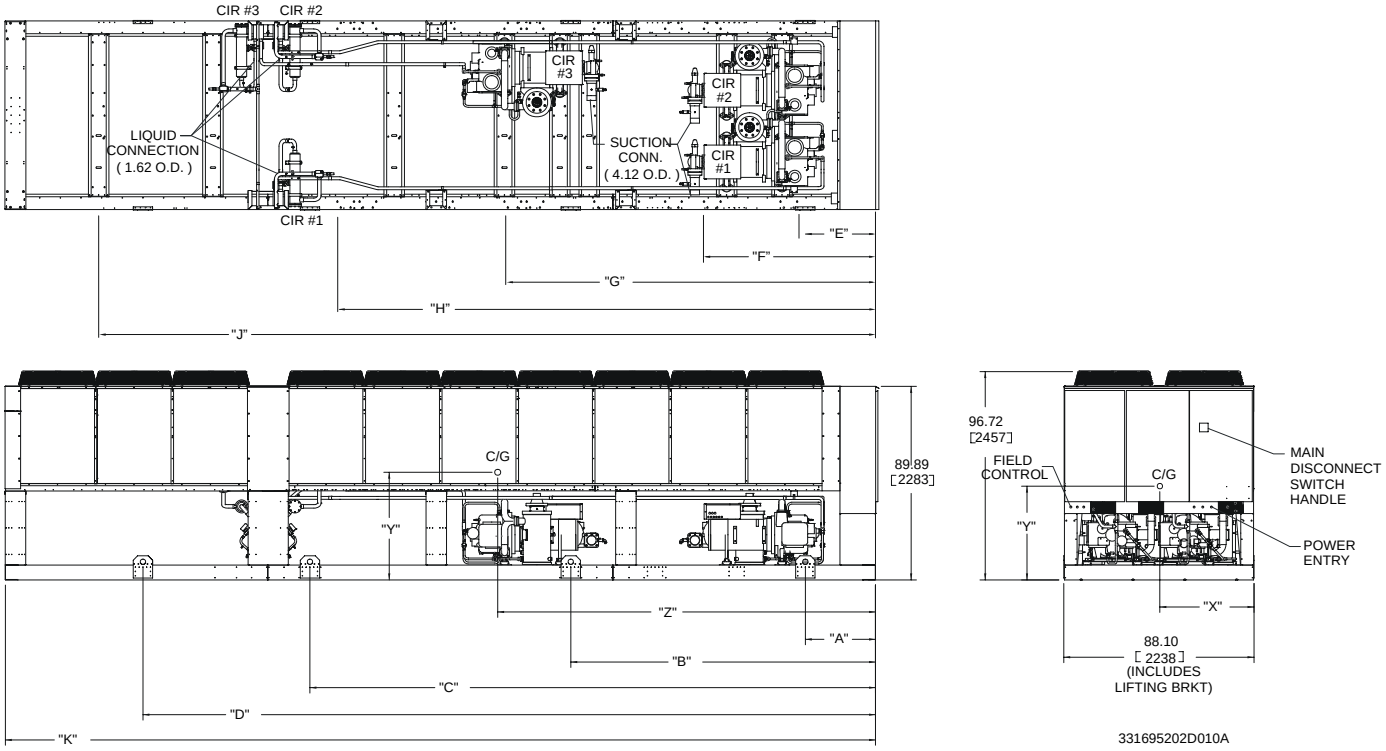


NOTES:

1. Allow a 1-inch manufacturing tolerance on all dimensions.
2. See Figure 10 on page 53 for location dimensions of the control and power knockouts.
3. Power entry location shown is for single or multi-point. Multi-point will have two disconnect handles on panel front.

INCH-POUND UNITS OF MEASURE														
UNIT SIZE	SHIPPING WEIGHT	OPERATING WEIGHT	NO. OF FANS	Lifting Locations			Mounting Locations				H	Center of Gravity		
				A	B	C	D	E	F	G		X	Y	Z
STD EFF.														
AGS225DM	10814	10814	12	32.5	N/A	210.8	25.6	84.7	N/A	217.7	243.3	45.4	42.3	86.6
AGS250DM	11518	11518	14	32.5	102.1	255.9	25.6	84.7	194.1	253.2	278.7	45.5	43.7	97.5
AGS275DM	12226	12226	16	32.5	102.1	250.1	25.6	84.7	199.7	288.6	314.2	45.2	44.4	109.0
AGS300DM	12226	12226	16	32.5	102.1	250.1	25.6	84.7	199.7	288.6	314.2	45.2	44.4	109.0
HIGH EFF.														
AGS225DF	11518	11518	14	32.5	102.1	255.9	25.6	84.7	194.1	253.2	278.7	45.5	43.7	97.5
AGS250DF	12226	12226	16	32.5	102.1	250.1	25.6	84.7	199.7	288.6	314.2	45.2	44.4	109.0
AGS260DF	12226	12226	16	32.5	102.1	250.1	25.6	84.7	199.7	288.6	314.2	45.2	44.4	109.0
AGS275DF	13027	13027	18	32.5	102.1	266.4	25.6	84.7	198.8	324.0	349.6	45.2	45.9	122.1
AGS300DF	13027	13027	18	32.5	102.1	266.4	25.6	84.7	198.8	324.0	349.6	45.2	45.9	122.1
SI UNITS OF MEASURE mm-kg														
STD EFF.														
AGS225DM	4905	4905	12	826	N/A	5354	650	2151	N/A	5530	6180	1153	1074	2200
AGS250DM	5225	5225	14	826	2594	6500	650	2151	4930	6431	7079	1156	1110	2477
AGS275DM	5546	5546	16	826	2594	6353	650	2151	5072	7330	7981	1148	1128	2769
AGS300DM	5546	5546	16	826	2594	6353	650	2151	5072	7330	7981	1148	1128	2769
HIGH EFF.														
AGS225DF	5225	5225	14	826	2594	6500	650	2151	4930	6431	7079	1156	1110	2477
AGS250DF	5546	5546	16	826	2594	6353	650	2151	5072	7330	7981	1148	1128	2769
AGS260DF	5546	5546	16	826	2594	6353	650	2151	5072	7330	7981	1148	1128	2769
AGS275DF	5909	5909	18	826	2594	6767	650	2151	5050	8230	8880	1148	1166	3101
AGS300DF	5909	5909	18	826	2594	6767	650	2151	5050	8230	8880	1148	1166	3101

Figure 17, AGS 330 – 450, Standard and High Efficiency, Remote Evaporator



NOTE:

1. Allow a 1-inch manufacturing tolerance on all dimensions.
2. See Figure 12 on page 52 for location dimensions of the control and power knockouts.
3. Power entry location shown is for single or multi-point. Multi-point will have two disconnect handles on panel front.

INCH-POUND UNITS OF MEASURE																
UNIT SIZE	SHIP WT	RUN WT	NO. OF FANS	Lifting Locations				Mounting Locations					K	Center of Gravity		
				A	B	C	D	E	F	G	H	J		X	Y	Z
STD EFF.																
AGS330DM	17798	17798	20	32.5	140.8	262.0	339.3	25.6	84.7	177.0	269.3	361.6	403.1	42.0	42.8	144.1
AGS350DM	17798	17798	20	32.5	140.8	262.0	339.3	25.6	84.7	177.0	269.3	361.6	403.1	42.0	42.8	144.1
AGS360DM	17798	17798	20	32.5	140.8	262.0	339.3	25.6	84.7	177.0	269.3	361.6	403.1	42.0	42.8	144.1
AGS390DM	18632	18632	22	32.5	140.8	262.0	348.3	25.6	84.7	177.0	269.3	361.6	438.6	42.0	43.5	155.3
AGS400DM	18632	18632	22	32.5	140.8	262.0	348.3	25.6	84.7	177.0	269.3	361.6	438.6	42.0	43.5	155.3
AGS450DM	18632	18632	24	32.5	140.8	297.8	383.8	25.6	84.7	177.0	304.7	397.0	474.0	42.2	44.3	167.2
HIGH EFF.																
AGS330DF	18632	18632	22	32.5	140.8	262.0	348.3	25.6	84.7	177.0	269.3	361.6	438.6	42.0	43.5	155.3
AGS350DF	19305	19305	24	32.5	140.8	297.4	383.8	25.6	84.7	177.0	304.7	397.0	474.0	42.2	44.3	167.2
AGS400DF	19305	19305	24	32.5	140.8	297.4	383.8	25.6	84.7	177.0	304.7	397.0	474.0	42.2	44.3	167.2
AGS450DF	20294	20294	26	32.5	140.8	297.4	419.2	25.6	84.7	177.0	304.7	432.5	509.4	42.1	45.1	181.2
SI UNITS OF MEASURE mm, kg																
UNIT SIZE	SHIP WT	RUN WT	NO. OF FANS	Lifting Locations				Mounting Locations					K	Center of Gravity		
				A	B	C	D	E	F	G	H	J		X	Y	Z
STD EFF.																
AGS330DM	8073	8073	20	826	3576	6655	8618	650	2150	4496	6840	9185	10239	1067	1087	3660
AGS350DM	8073	8073	20	826	3576	6655	8618	650	2150	4496	6840	9185	10239	1067	1087	3660
AGS360DM	8073	8073	20	826	3576	6655	8618	650	2150	4496	6840	9185	10239	1067	1087	3660
AGS390DM	8451	8451	22	826	3576	6655	8847	650	2150	4496	6840	9185	11140	1067	1105	3945
AGS400DM	8451	8451	22	826	3576	6655	8847	650	2150	4496	6840	9185	11140	1067	1105	3945
AGS450DM	8451	8451	22	826	3576	7564	9749	650	2150	4496	7739	10084	12040	1072	1125	4247
HIGH EFF.																
AGS330DF	8451	8451	22	826	3576	6655	8847	650	2150	4496	6840	9185	11140	1067	1105	3945
AGS350DF	8757	8757	24	826	3576	7554	9749	650	2150	4496	7739	10084	12040	1072	1125	4247
AGS400DF	8757	8757	24	826	3576	7554	9749	650	2150	4496	7739	10084	12040	1072	1125	4247
AGS450DF	9205	9205	26	826	3576	7554	10648	650	2150	4496	7739	10986	12939	1069	1146	4602

Lifting and Mounting Weights, Remote Evaporator

Table 58, Weights, AGS 225 – 300

NOTE: Refer to the dimension drawing on page 64 for location of the lifting tabs extending up from the base rails and the location of the mounting holes located in the bottom of the base rails.

AGS-D MODEL		LIFTING WEIGHTS						MOUNTING LOADS								RUN WEIGHT	SHIP WEIGHT	CU FIN ADD
		L1	L2	L3	L4	L5	L6	M1	M2	M3	M4	M5	M6	M7	M8			
STD. EFF.																		
225DM	lbs	3653	3883	N/A	N/A	1589	1689	1826	1941	1462	1555	N/A	N/A	643	684	10814	10814	1577
	kg	1658	1763	N/A	N/A	721	767	829	881	664	706	N/A	N/A	292	311	4910	4910	716
250DM	lbs	2537	2709	2052	2192	981	1048	2225	2376	1793	1915	992	1060	560	598	11518	11518	1840
	kg	1152	1230	932	995	445	476	1010	1079	814	869	450	481	254	271	5229	5229	835
275DM	lbs	2429	2559	2106	2219	1419	1495	2213	2331	1868	1968	1196	1260	677	713	12226	12226	2102
300DM	kg	1103	1162	956	1007	644	679	1005	1058	848	893	543	572	307	324	5551	5551	954
HIGH EFF.																		
225DE	lbs	2537	2709	2052	2192	981	1048	2225	2376	1793	1915	992	1060	560	598	11518	11518	1840
	kg	1152	1230	932	995	445	476	1010	1079	814	869	450	481	254	271	5229	5229	835
250DE	lbs	2429	2559	2106	2219	1419	1495	2213	2331	1868	1968	1196	1260	677	713	12226	12226	2102
260DE	kg	1103	1162	956	1007	644	679	1005	1058	848	893	543	572	307	324	5551	5551	954
275DE	lbs	2372	2499	2195	2312	1777	1872	2169	2286	1910	2012	1408	1483	857	903	13027	13027	2365
300DE	kg	1077	1135	997	1050	807	850	985	1038	867	913	639	673	389	410	5914	5914	1074

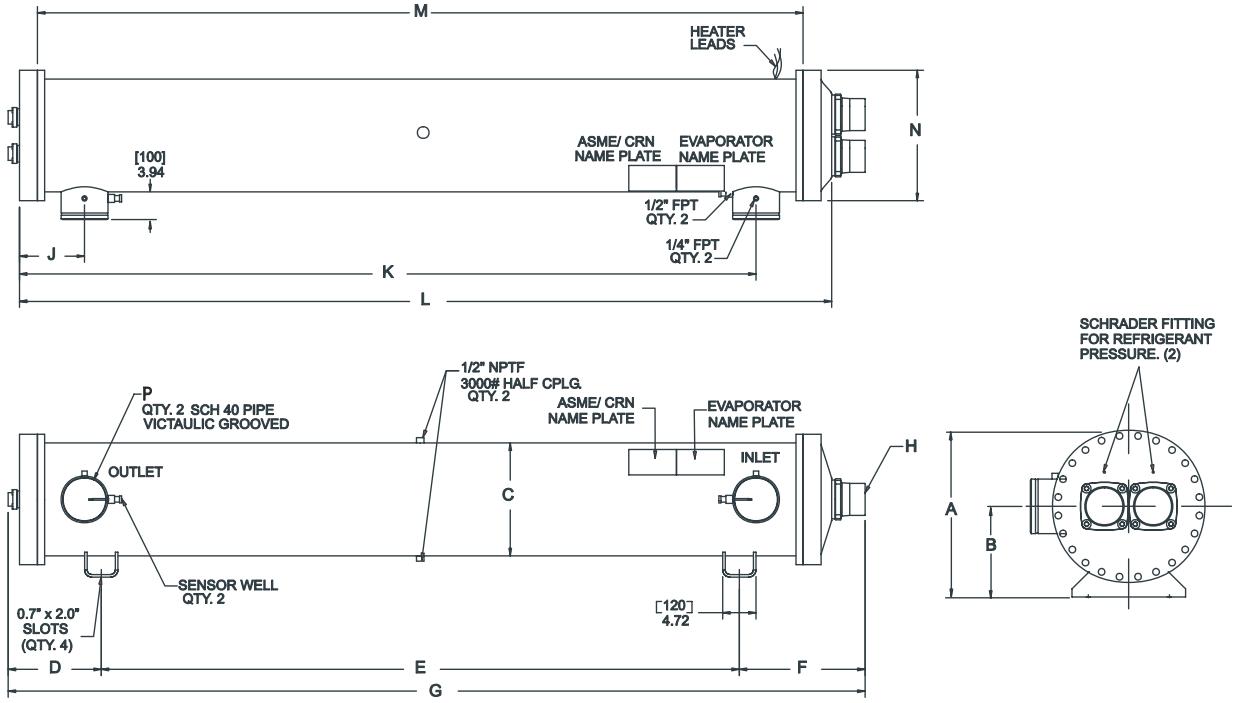
Table 59, Weights, AGS 330 – 450

NOTE: Refer to the dimension drawing on page 65 for location of the lifting tabs extending up from the base rails and the location of the mounting holes located in the bottom of the base rails.

AGS-D MODEL		LIFTING WEIGHTS								MOUNTING LOADS										RUN WTS	SHIP WTS	CU FIN ADD
		L1	L2	L3	L4	L5	L6	L7	L8	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10			
STD. EFF																						
330DM	lbs	3695	3366	2774	2527	1750	1594	1095	997	2652	2416	2358	2147	1896	1727	1435	1307	974	887	17798	17798	2628
350DM																						
360DM	kg	1678	1528	1259	1147	795	724	497	453	1204	1097	1071	975	861	784	651	593	442	403	8080	8080	1193
390DM	lbs	3570	3252	2817	2566	1980	1804	1383	1260	2542	2315	2320	2114	1975	1799	1629	1484	1284	1170	18632	18632	2891
400DM	kg	1621	1476	1279	1165	899	819	628	572	1154	1051	1053	960	897	817	740	674	583	531	8459	8459	1313
450DM	lbs	3625	3333	2978	2738	1994	1833	1462	1344	2541	2336	2357	2167	2095	1926	1675	1540	1389	1277	19305	19305	3154
	kg	1646	1513	1352	1243	905	832	664	610	1154	1061	1070	984	951	874	760	699	631	580	8764	8764	1432
HIGH EFF.																						
330DE	lbs	3570	3252	2817	2566	1980	1804	1383	1260	2542	2315	2320	2114	1975	1799	1629	1484	1284	1170	18632	18632	2891
	kg	1621	1476	1279	1165	899	819	628	572	1154	1051	1053	960	897	817	740	674	583	531	8459	8459	1313
350DE	lbs	3625	3333	2978	2738	1994	1833	1462	1344	2541	2336	2357	2167	2095	1926	1675	1540	1389	1277	19305	19305	3154
400DE	kg	1646	1513	1352	1243	905	832	664	610	1154	1061	1070	984	951	874	760	699	631	580	8764	8764	1432
450DE	lbs	3575	3272	3061	2801	2278	2085	1682	1539	2408	2204	2308	2212	2165	1981	1936	1772	1780	1629	20294	20294	3416
	kg	1623	1485	1390	1272	1034	947	764	699	1093	1001	1048	1004	983	899	879	804	808	740	9213	9213	1551

Evaporators

Figure 18, Remote Evaporator Dimensions



NOTES:

1. Liquid line connection is 1 5/8-inch IDS flange.
2. All dimensions are in inches (mm).
3. Insulated with ¾-inch Armaflex or equal UL approved insulation.
4. Tube side (refrigerant) maximum working pressure: 350 psig @ 175°F.
5. Shell side (water) maximum working pressure: 152 psig.

AGS MODEL	COND. MODEL NUMBER	DIMENSIONAL DATA, inches (mm)													
		'A'	'B'	'C'	'D'	'E'	'F'	'G'	'H' I.D.S.	'J'	'K'	'L'	'M'	'P' DIA	'N' DIA.
225DM, 250DM	330904451	20.3 (515)	11.0 (280)	16.0 (406)	13.2 (334)	90.2 (2292)	17.8 (452)	121.2 (3078)	4 1/8 (105)	9.2 (234)	103.9 (2640)	114.9 (2918)	108.3 (2750)	6 (154)	18.5 (470)
225DF, 250DF	330904452	20.3 (515)	11.0 (280)	16.0 (406)	13.2 (334)	90.2 (2292)	17.8 (452)	121.2 (3078)	4 1/8 (105)	9.2 (234)	103.9 (2640)	114.9 (2918)	108.3 (2750)	6 (154)	18.5 (470)
260DF, 275DM 275DF	330904453	24.9 (631)	13.6 (345)	20.0 (508)	13.2 (334)	90.2 (2292)	18.1 (459)	121.9 (3095)	4 1/8 (105)	10.6 (270)	103.3 (2624)	115.6 (2935)	108.3 (2750)	8 (203)	18.5 (470)
300DM, 300DF	330904454	24.9 (631)	13.6 (345)	20.0 (508)	13.5 (344)	90.2 (2292)	18.1 (459)	121.9 (3095)	4 1/8 (105)	10.6 (270)	103.3 (2624)	115.6 (2935)	108.3 (2750)	8 (203)	18.5 (470)
330DM, 330DF 350DM	330904455	22.8 (578)	11.5 (292)	20.0 (508)	14.6 (370)	88.2 (2240)	17.1 (435)	119.9 (3045)	3 1/8 (80)	10.6 (270)	103.3 (2624)	115.6 (2935)	108.3 (2750)	8 (203)	18.5 (470)
350DF, 360DM, 390DM	330904456	22.8 (578)	11.5 (292)	20.0 (508)	14.6 (370)	88.2 (2240)	17.1 (435)	119.9 (3045)	3 1/8 (80)	10.6 (270)	103.3 (2624)	115.6 (2935)	108.3 (2750)	8 (203)	18.5 (470)
400DM, 400DF 450DM, 450DF	330904457	22.8 (578)	11.5 (292)	20.0 (508)	14.6 (370)	121.7 (3090)	17.1 (435)	153.4 (3895)	3 1/8 (80)	10.6 (270)	136.8 (3474)	149.0 (3785)	141.7 (3600)	8 (203)	18.5 (470)

Physical Data, Remote Evaporator

Standard Efficiency

Table 60, Standard Efficiency, Remote Evaporator, AGS 225DM – AGS 275DM

DATA	AGS-DM MODEL NUMBER					
	225DM		250DM		275DM	
	Ckt 1	Ckt 2	Ckt 1	Ckt 2	Ckt 1	Ckt 2
BASIC DATA						
Unit Cap. @ ARI tons (kW) (Before Refrigerant Piping Derate)	211.2 (742.6)		231.6 (814.3)		263.1 (925.1)	
Unit Operating Charge lbs (kg)	185 (84)	185 (84)	210 (95)	210 (95)	210 (95)	240 (109)
Cabinet Dimensions L x W x H, in. (mm)	243x88x97 (6172x2225x2464)		279x88x97 (7087x2225x2464)		314x88x97 (7984x2225x2464)	
Unit Operating Weight, lbs. (kg)	10814 (4905)		11518 (5225)		12226 (5546)	
Unit Shipping Weight, lbs (kg)	10814 (4905)		11518 (5225)		12226 (5546)	
COMPRESSORS, SCREW, SEMI-HERMETIC						
Nominal Capacity, tons (kW)	100 (350)	100 (350)	100 (350)	125 (4370	125 (4370	150 (525)
Min. Unit Capacity (% of Full Load)	13		11		11	
CONDENSERS, HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLER						
Pumpdown Capacity, lbs (kg)	249 (113)	249 (113)	287 (130)	287 (130)	287 (130)	325 (148)
Coil Inlet Face Area, sq. ft. (sq m.)	129.2 (12.0)	129.2 (12.0)	150.8 (14.0)	150.8 (14.0)	150.8 (14.0)	172.5 (16.0)
Rows Deep/Fins Per Inch	3/16	3/16	3/16	3/16	3/16	3/16
CONDENSER FANS, DIRECT DRIVE PROPELLER TYPE						
No. of Fans/Circuit – 30 in. Fan Dia.	6	6	7	7	8	8
Fan Motor hp (kW)	2.5 (1.8)		2.5 (1.8)		2.5 (1.8)	
Fan & Motor RPM, 60Hz	1140		1140		1140	
60 Hz Fan Tip Speed, fpm (m/s)	8954 (45)		8954 (45)		8954 (45)	
60 Hz Total Unit Airflow, cfm (l/s)	137328 (64819)		160216 (75622)		183104 (86425)	
REMOTE EVAPORATOR, DIRECT EXPANSION SHELL AND TUBE						
Model Number	330904451		330904451		330904453	
Shell Dia.-Tube Length in.(mm) - in. (mm)	16x108 (406x2750)		16x108 (406x2750)		20x108 (508x2750)	
Operating Weight, lbs (kg)	1674 (759)		1674 (759)		2472 (1121)	
Shipping Weight, ibs (kg)	1317 (597)		1317 (597)		1760 (798)	
Water Volume, gallons (liters)	65.8 (249.4)		65.8 (249.4)		108.5 (411.1)	
Max. Water Pressure, psi (kPa)	152 (1048)		152 (1048)		152 (1048)	
Max. Refrigerant Press., psi (kPa)	350 (2413)		350 (2413)		350 (2413)	

Table 61, Standard Efficiency, AGS 300DM, Remote Evaporator

DATA	AGS MODEL NUMBER	
	300DM	
	Ckt 1	Ckt 2
BASIC DATA		
Unit Cap. @ ARI, tons (kW) (Before Piping Loss Derate)	297.0 (1042.5)	
Unit Operating Charge lbs (kg)	240 (109)	240 (109)
Cabinet Dimensions L x W x H, in. (mm)	314x88x97 (7984x2225x2464)	
Unit Operating Weight (1), lbs. (kg)	12226 (5909)	
Unit Shipping Weight(1), lbs (kg)	12226 (5909)	
COMPRESSORS, SCREW, SEMI-HERMETIC		
Nominal Capacity, tons (kW)	150 (525)	150 (525)
Min. Unit Capacity (% of Full Load)	13	
CONDENSERS, HIGH EFFICIENCY FIN AND TUBE TYPE		
Pumpdown Capacity, lbs (kg)	325 (148)	325 (148)
Coil Inlet Face Area, sq. ft. (sq m.)	172.5 (16.0)	172.5 (16.0)
Rows Deep/Fins Per Inch	3/16	3/16
CONDENSER FANS, DIRECT DRIVE PROPELLER TYPE		
No. of Fans/Circuit – 30 in. Fan Dia	8	8
Fan Motor -- hp (kW)	2.5 (1.8)	
Fan & Motor RPM, 60Hz	1140	
60 Hz Fan Tip Speed, fpm (m/s)	8954 (45)	
60 Hz Total Unit Airflow, cfm (l/s)	183104 (86425)	
REMOTE EVAPORATOR, DIRECT EXPANSION SHELL AND TUBE		
Model Number	330904454	
Shell Dia.-Tube Length in.(mm) - in. (mm)	20x108 (508x2750)	
Operating Weight, lbs (kg)	2471 (1121)	
Shipping Weight, ibs (kg)	1802 (817)	
Water Volume, gallons (liters)	103.2 (391.2)	
Max. Water Pressure, psi (kPa)	152 (1048)	
Max. Refrigerant Press., psi (kPa)	350 (2413)	

Table 62, Standard Efficiency, AGS 330DM – AGS 360DM, Remote Evaporator

DATA	AGS MODEL NUMBER								
	330DM			350DM			360DM		
	Ckt. 1	Ckt. 2	Ckt. 3	Ckt. 1	Ckt. 2	Ckt. 3	Ckt. 1	Ckt. 2	Ckt. 3
BASIC DATA									
Unit Cap. @ ARI, tons (kW) Before Piping Loss Derate0	318.7 (1120.5)			337.2 (1185.6)			351.1 (1234.5)		
Unit Operating Charge, lbs (kg)	210 (95)	210 (95)	190 (86	210 (95)	210 (95)	190 (86)	210 (95)	210 (95)	190 (86)
Cabinet Dim., L x W x H, in. (mm)	403x88x97 (10239x2225x2459)			403x88x97 (10239x2225x2459)			403x88x97 (10239x2225x2459)		
Operating Weight(1), lbs. (kg)	17798 (8073)			17798 (8073)			17798 (8073)		
Shipping Weight(1), lbs (kg)	17798 (8073)			17798 (8073)			17798 (8073)		
COMPRESSORS, SCREW, SEMI-HERMETIC									
Nominal Capacity, tons (kW)	100 (350)	100 (350)	100 (350)	100 (350)	125 (437)	100 (350)	125 (437)	125 (437)	100 (350)
Min. Unit Capacity (% of Full Load)	8			8			7		
CONDENSERS, HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLER									
Pumpdown Capacity, lbs (kg)	287 (130)	287 (130)	243 (110)	287 (130)	287 (130)	243 (110)	287 (130)	287 (130)	243 (110)
Coil Inlet Face Area, sq. ft. (sq m.)	150.8 (14)	150.8 (14)	128.5 (12)	150.8 (14)	150.8 (14)	128.5 (12)	150.8 (14)	150.8 (14)	128.5 (12)
Rows Deep/Fins Per Inch	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16
CONDENSER FANS, DIRECT DRIVE PROPELLER TYPE									
No. of Fans/Cir, Fan Dia. 30 in	7	7	6	7	7	6	7	7	6
Fan Motor -- hp (kW)	2.5 (1.8)			2.5 (1.8)			2.5 (1.8)		
Fan & Motor RPM, 60Hz	1140			1140			1140		
60 Hz Fan Tip Speed, fpm (m/s)	8954 (45)			8954 (45)			8954 (45)		
60 Hz Total Unit Airflow, cfm (l/s)	228880 (108031)			228880 (108031)			228880 (108031)		
REMOTE EVAPORATOR, DIRECT EXPANSION SHELL AND TUBE									
Model Number	330904455			330904455			330904456		
Shell Dia.,Tube Length in.(mm)	20x108 (508x2750)			20x108 (508x2750)			20x108 (508x2750)		
Operating Weight, lbs (kg)	2460 (1116)			2460 (1116)			2471 (1121)		
Shipping Weight, ibs (kg)	1760 (798)			1760 (798)			1802 (817)		
Water Volume, gallons (liters)	107.0 (405.4)			107.0 (405.4)			103.2 (391.2)		
Max. Water Pressure, psi (kPa)	152 (1048)			152 (1048)			152 (1048)		
Max. Refrigerant Press., psi (kPa)	350 (2413)			350 (2413)			350 (2413)		

Table 63, Standard Efficiency, AGS 390DM – AGS 450DM, Remote Evaporator

DATA	AGS MODEL NUMBER								
	390DM			400DM			450DM		
	Ckt. 1	Ckt. 2	Ckt. 3	Ckt. 1	Ckt. 2	Ckt. 3	Ckt. 1	Ckt. 2	Ckt. 3
BASIC DATA									
Unit Cap. @ ARI, tons (kW) Before Piping Loss Derate	373.2 (1311.8)			390.4 (1373.3))			434.8 (1529.1)		
Unit Operating Charge, lbs (kg)	210 (95)	210 (95)	230 (104)	215 (97)	215 (97)	235 (106)	140 (109)	140 (109)	140 (109)
Cabinet Dim., L x W x H, in. (mm)	439x88x97 11140x2225x2459)			439x88x97 11140x2225x2459)			474x88x97 12040x2225x2459)		
Operating Weight(1), lbs. (kg)	18632 (8451)			18632 (8451)			18632 (8451)		
Shipping Weight(1), lbs (kg)	18632 (8451)			18632 (8451)			18632 (8451)		
COMPRESSORS, SCREW, SEMI-HERMETIC									
Nominal Capacity, tons (kW)	125 (437)	125 (437)	125 (437)	125 (437)	125 (437)	150 (525)	150 (525)	150 (525)	150 (525)
Min. Unit Capacity (% of Full Load)	8			8			8		
CONDENSERS, HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLER									
Pumpdown Capacity, lbs (kg)	287 (130)	287 (130)	316 (144)	287 (130)	287 (130)	316 (144)	325 (147)	325 (147)	316 (144)
Coil Inlet Face Area, sq. ft. (sq m.)	150.8 (14)	150.8 (14)	171.7 (16)	150.8 (14)	150.8 (14)	171.7 (16)	172.5 (16)	172.5 (16)	171.7 (16
Rows Deep/Fins Per Inch	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16
CONDENSER FANS, DIRECT DRIVE PROPELLER TYPE									
No. of 30-in Fans/Circuit	7	7	8	7	7	8	8	8	8
Fan Motor -- hp (kW)	2.5 (1.8)			2.5 (1.8)			2.5 (1.8)		
Fan & Motor RPM, 60Hz	1140			1140			1140		
60 Hz Fan Tip Speed, fpm (m/s)	8954 (45)			8954 (45)			8954 (45)		
60 Hz Total Unit Airflow, cfm (l/s)	251768 (118835)			251768 (118835)			274656 (129637)		
EVAPORATOR, DIRECT EXPANSION SHELL AND TUBE									
Model Number	330904456			330904457			330904457		
Shell Dia.,Tube Length in.(mm)	20x108 (508x2750)			20x149 (508x3785)			20x149 (508x3785)		
Operating Weight, lbs (kg)	2471 (1121)			2996 (1360)			2996 (1360)		
Shipping Weight, ibs (kg)	1802 (817)			2072 (940)			2072 (940)		
Water Volume, gallons (liters)	103.2 (391.2)			97.2 (368.5)			97.2 (368.5)		
Max. Water Pressure, psi (kPa)	152 (1048)			152 (1048)			152 (1048)		
Max. Refrigerant Press., psi (kPa)	350 (2413)			350 (2413)			350 (2413)		

High Efficiency

Table 64, High Efficiency, AGS 225DF – AGS 260DF, Remote Evaporator

DATA	AGS-DE MODEL NUMBER					
	225DF		250DF		260DF	
	Ckt 1	Ckt 2	Ckt 1	Ckt 2	Ckt 1	Ckt 2
BASIC DATA						
Unit Cap. @ ARI, Tons (Kw) Before Piping Loss Derate	214.9 (755.6)		235.5 (828.0)		249.6 (877.6)	
R-134a, Operating Charge lbs (kg)	210 (95)	210 (95)	210 (95)	210 (95)	240 (109)	240 (109)
Cabinet Dimensions L x W x H, in. (mm)	279x88x97 (7087x2225x2464)		314x88x97 (7984x2225x2464)		314x88x97 (7984x2225x2464)	
Unit Operating Weight, lbs. (kg)	11518 (5225)		12226 (5646)		12226 (5646)	
Unit Shipping Weight, lbs (kg)	11518 (5225)		12226 (5646)		12226 (5646)	
COMPRESSORS, SCREW, SEMI-HERMETIC						
Nominal Capacity, tons (kW)	100 (350)	100 (350)	100 (350)	125 (437)	125 (4370	125 (437)
Min. Unit Capacity (% of Full Load)	13		11		13	
CONDENSERS, HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLER						
Pumpdown Capacity, lbs (kg)	249 (13)	249 (113)	287 (130)	187 (130)	325 (147)	325 (147)
Coil Inlet Face Area, sq. ft. (sq m.)	150.8 (14.0)	150.8 (14.0)	150.8 (14.0)	172.5 (16)	172.5 (16.0)	172.5 (16.0)
Rows Deep/Fins Per Inch	3/16	3/16	3/16	3/16	3/16	3/16
CONDENSER FANS, DIRECT DRIVE PROPELLER TYPE						
No. of Fans/Circuit – 30 in. Fan Dia.	7	7	8	8	8	8
Fan Motor hp (kW)	2.5 (1.8)		2.5 (1.8)		2.5 (1.8)	
Fan & Motor RPM, 60Hz	1140		1140		1140	
60 Hz Fan Tip Speed, fpm (m/s)	8954 (45)		8954 (45)		8954 (45)	
60 Hz Total Unit Airflow, cfm (l/s)	160216 (75622)		18310 (86424)		183104 (86425)	
REMOTE EVAPORATOR, DIRECT EXPANSION SHELL AND TUBE						
Model Number	330904452		330904452		330904453	
Shell Dia.-Tube Length in.(mm) - in. (mm)	16x108 (406x2750)		16x108 (406x2750)		20x108 (508x2750)	
Operating Weight, lbs (kg)	1675 (760)		1675 (760)		2472 (1121)	
Shipping Weight, ibs (kg)	1336 (606)		1336 (606)		1760 (798)	
Water Volume, gallons (liters)	63.6 (241.0)		63.6 (241.0)		108.5 (411.1)	
Max. Water Pressure, psi (kPa)	152 (1048)		152 (1048)		152 (1048)	
Max. Refrigerant Press., psi (kPa)	350 (2413)		350 (2413)		350 (2413)	

Table 65, High Efficiency, AGS 275DF – AGS 300DF, Remote Evaporator

DATA	AGS MODEL NUMBER			
	275DF		300DF	
	Ckt 1	Ckt 2	Ckt 1	Ckt 2
BASIC DATA				
Unit Cap. @ ARI, tons (kW) Before Piping Loss Derate	267.7 (940.9)		299.5 (1053.0)	
Unit Operating Charge lbs (kg)	240 (109)	260 (118)	265 (120)	265 (120)
Cabinet Dimensions L x W x H, in. (mm)	350x88x97 (8890x2225x2464)		350x88x97 (8890x2225x2464)	
Unit Operating Weight (1), lbs. (kg)	13027 (5909)		13027 (5909)	
Unit Shipping Weight(1), lbs (kg)	13027 (5909)		13027 (5909)	
COMPRESSORS, SCREW, SEMI-HERMETIC				
Nominal Capacity, tons (kW)	125 (437)	150 (525)	150 (525)	150 (525)
Min. Unit Capacity (% of Full Load)	11		13	
CONDENSERS, HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLER				
Pumpdown Capacity, lbs (kg)	325 (147)	361 (164)	361 (164)	361 (164)
Coil Inlet Face Area, sq. ft. (sq m.)	172.5 (16.0)	194.2 (18.0)	194.2 (18.0)	194.2 (18.0)
Rows Deep/Fins Per Inch	3/16	3/16	3/16	3/16
CONDENSER FANS, DIRECT DRIVE PROPELLER TYPE				
No. of Fans/Circuit – 30 in. Fan Dia.	9	9	9	9
Fan Motor hp (kW)	2.5 (1.8)		2.5 (1.8)	
Fan & Motor RPM, 60Hz	1140		1140	
60 Hz Fan Tip Speed, fpm (m/s)	8954 (45)		8954 (45)	
60 Hz Total Unit Airflow, cfm (l/s)	205992 (97228)		205992 (97228)	
EVAPORATOR, DIRECT EXPANSION SHELL AND TUBE				
Model Number	330904453		330904454	
Shell Dia.-Tube Length in.(mm) - in. (mm)	20x108 (508x2750)		20x108 (508x2750)	
Operating Weight, lbs (kg)	2472 (1121)		2471 (1121)	
Shipping Weight, ibs (kg)	1760 (798)		1802 (817)	
Water Volume, gallons (liters)	108.5 (411.1)		103.2 (391.2)	
Max. Water Pressure, psi (kPa)	152 (1048)		152 (1048)	
Max. Refrigerant Press., psi (kPa)	350 (2413)		350 (2413)	

Table 66, High Efficiency, AGS 330DF – AGS 400DF, Remote Evaporator

DATA	AGS MODEL NUMBER								
	330DF			350DF			400DF		
	Ckt. 1	Ckt. 2	Ckt. 3	Ckt. 1	Ckt. 2	Ckt. 3	Ckt. 1	Ckt. 2	Ckt. 3
BASIC DATA									
Unit Cap. @ ARI, tons (kW) Before Piping Loss Derate	324.1 (1139.6)			342.9 (1205.6)			397.1 (1396.6)		
Unit Operating Charge, lbs (kg)	210 (95)	210 (95)	230 (104)	210 (95)	240 (109)	240 (109)	240 (109)	240 (109)	240 (109)
Cabinet Dim., L x W x H, in. (mm)	439x88x97 (11140x2225x2459)			474x88x97 (12040x2225x2459)			474x88x97 (12040x2225x2459)		
Operating Weight(1), lbs. (kg)	18632 (8451)			19305 (8757)			19305 (8757)		
Shipping Weight(1), lbs (kg)	18632 (8451)			19305 (8757)			19305 (8757)		
COMPRESSORS, SCREW, SEMI-HERMETIC									
Nominal Capacity, tons (kW)	100 (350)	100 (350)	100 (350)	100 (350)	125 (437)	100 (350)	125 (437)	125 (437)	150 (525)
Min. Unit Capacity (% of Full Load)	8			8			8		
CONDENSERS, HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLER									
Pumpdown Capacity, lbs (kg)	287 (130)	287 (130)	316 (1440	325 (147)	325 (147)	316 (144)	325 (147)	325 (147)	316 (144)
Coil Inlet Face Area, sq. ft. (sq m.)	150.8 (14)	150.8 (14)	171.7 (16)	150.8 (14)	172.5 (16)	171.7 (16)	172.5 (16)	172.5 (16)	171.7 (16)
Rows Deep/Fins Per Inch	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16	3/16
CONDENSER FANS, DIRECT DRIVE PROPELLER TYPE									
No. of Fans/Circuit – 30 in. Fan Dia.	7	7	8	8	8	8	8	8	8
Fan Motor hp (kW)	2.5 (1.8)			2.5 (1.8)			2.5 (1.8)		
Fan & Motor RPM, 60Hz	1140			1140			1140		
60 Hz Fan Tip Speed, fpm (m/s)	8954 (45)			8954 (45)			8954 (45)		
60 Hz Total Unit Airflow, cfm (l/s)	251768 (118834)			274656 (129638)			274656 (129638)		
REMOTE EVAPORATOR, DIRECT EXPANSION SHELL AND TUBE									
Model Number	330904455			330904456			330904457		
Shell Dia.,Tube Length in.(mm)	20x108 (508x2750)			20x108 (508x2750)			20x142 (508x3600)		
Operating Weight, lbs (kg)	2460 (1116)			2471 (1121)			2996 (1360)		
Shipping Weight, ibs (kg)	1760 (798)			1802 (817)			2072 (940)		
Water Volume, gallons (liters)	103.2 (391.2)			102.1 (387.0)			90.5 (343.0)		
Max. Water Pressure, psi (kPa)	152 (1048)			152 (1048)			152 (1048)		
Max. Refrigerant Press., psi (kPa)	350 (2413)			350 (2413)			350 (2413)		

Table 67, High Efficiency, AGS 450DF, Remote Evaporator

DATA	AGS MODEL NUMBER		
	450DF		
	Ckt. 1	Ckt. 2	Ckt. 3
BASIC DATA			
Unit Cap. @ ARI, tons (kW) Before Piping Loss Derate	438.0 (1540.0)		
Unit Operating Charge, lbs (kg)	270 (122)	270 (122)	240 (109)
Cabinet Dim., L x W x H, in. (mm)	509x88x97 (12939x2225x2459)		
Unit Operating Weight, lbs. (kg)	20294 (9205)		
Unit Shipping Weight, lbs (kg)	20383 (9254)		
COMPRESSORS, SCREW, SEMI-HERMETIC			
Nominal Capacity, tons (kW)	150 (525)	150 (525)	150 (525)
Min Unit Capacity (% of Full Load)	7		
CONDENSERS, HIGH EFFICIENCY FIN AND TUBE TYPE			
Pumpdown Capacity, lbs (kg)	361 (164)	361 (164)	316 (144)
Coil Inlet Face Area, sq. ft. (sq m.)	172.5 (16)	194.2 (18)	171.7 (16)
Rows Deep/Fins Per Inch	3/16	3/16	3/16
CONDENSER FANS, DIRECT DRIVE PROPELLER TYPE			
No. of Fans/Circuit – 30 in. Fan Dia.	9	9	8
Fan Motor hp (kW)	2.5 (1.8)		
Fan & Motor RPM, 60Hz	1140		
60 Hz Fan Tip Speed, fpm (m/s)	8954 (45)		
60 Hz Total Unit Airflow, cfm (l/s)	297544 (140440)		
EVAPORATOR, DIRECT EXPANSION SHELL AND TUBE			
Model Number	303904457		
Shell Dia. -- Tube Length in.(mm) - in. (mm)	20x142 (508x142)		
Operating Weight, lbs (kg)	2996 (1360)		
Shipping Weight, ibs (kg)	2072 (940)		
Water Volume, gallons (liters)	90.5 (343.0)		
Max. Water Pressure, psi (kPa)	152 (1048)		
Max. Refrigerant Press., psi (kPa)	350 (2413)		

Pump Packages

General Description

McQuay can provide an optional on-board chilled water pump package on standard efficiency AGS-DS chillers. The pump packages provide important benefits:

- Greatly simplify the chilled water system design and installation
- Provide installation savings by reducing field piping, wiring and control costs
- Save valuable floor space inside the building.

Just bring the return chilled water line to the pump inlet on the chiller and connect the chilled water supply line to the evaporator outlet as usual.

Standard Components

- Single Pump: Armstrong Model 4380 close-coupled, vertical in-line radially split case pump, with inside type mechanical seal, serviceable without breaking pipe connections. The motor and pump rotating assembly can be serviced without removing the pump casing from the line.

OR

- Dual Pumps in a Single Casting: Armstrong Models 4302 or 4382, depending on size. Consisting of two Model 4300 or 4380 pumps, mounted on a common casing and including a flapper valve to prevent recirculation when only one pump is operating, and isolation valves that allow one pump to be removed without affecting the operation of the other pump.

PLUS

- Combination triple-duty outlet valve having a drip-tight discharge shutoff valve, non-slam check valve, and flow throttling valve
- Combination suction guide with flow stabilizing outlet vanes and stainless steel strainer with a disposable fine-mesh strainer for start-up
- Factory power and control wiring from the AGS chiller on sizes up to AGS 300D or on units with pumps up to 30 HP. Models 330D and larger or units with pumps larger than 30 HP require a separate power supply to the pump control panel, control wiring will be done in the factory.
- Flow switch mounted and wired
- Interconnecting piping from pump outlet valve to the evaporator inlet

Options

- Water pressure gauges on the pump suction and discharge
- Expansion tank with size increments from 4.4 to 90 gallons, field installed
- Air separator with air vent, field installed
- Isolation valve at package inlet, field installed
- Isolation valve at package outlet, field installed
- Flex piping connections, field installed

Selection Procedure

Groups of AGS model sizes have a family of pump sizes selected to meet the range of flows and total pressure drops particular to that group of units. The pump curves for group of units start with on page79.

The families, and the units and pumps associated with the family, are shown in the following table:

AGS-DS UNITS	PUMPS	
	SINGLE	DUAL
225, 250	5x5x8 30HP 3600rpm 4x4x6 15/20/25HP 3600rpm	6x6x6 15/20/25HP 3600rpm
275, 300	6x6x11.5 20/25/30/40HP 1800rpm	8x8x13 25/30/40HP 1800rpm 6x6x6 20HP 3600rpm
330. 350 360	6x6x11.5 20/25/30/40HP 1800rpm	8x8x11.5 25/30/40HP 1800rpm 6x6x10 20HP 1800rpm
390, 400	8x8x13 30/40/50HP 1800rpm	8x8x11.5 30/40/50HP 1800rpm
450	8x8x13 30/40/50HP 1800rpm	8x8x13 50 HP 1800rpm 8x8x11.5 30/40HP 1800rpm

Selection Requirements

The AGS model size, the chilled water flow, and the total dynamic system head are required to select a pump package.

AGS Model Size

- The AGS model size is determined by the selection program or selected from the AGS catalog.ratings.

Chilled Water Flow

- The flow will either be specified or determined from the AGS selection program.

Total Head

The total dynamic head is the sum of three components:

1. Internal pump package losses from piping, valves and fittings, refer to Table 68.
2. External system pressure drop as determined by the system designer.
3. Evaporator pressure drop from the selection program or from the pressure drop curves in Figure 5 on page 25.

For systems using a glycol solution:

- For *internal package* pressure drop, use Table 68 as is. Glycol has no significant impact.
- For *evaporator* pressure drop, the computer selection program includes an automatic correction. Catalog selections have a correction factor that is applied to the water pressure drop. Do not use straight water pressure drop values for the evaporator.
- The external pressure drop must be corrected and given for glycol.

Pump Selection: Enter the appropriate curve as shown in Table 68, using the system flow rate and the total head. In the event the system point falls between curves, select the larger pump. The impeller will be trimmed to job conditions and a submittal will be made with the job specific pump curve.

Table 68, Chiller Internal Pressure Drop and Water Volume

AGS Models	Internal Pressure Drop	Selection Curve Single Pump	Selection Curve Dual Pump	Water Volume Gallons
225D, 250D	8	Figure 19	Figure 20	26
275D, 300D	9	Figure 21	Figure 22	57
330D, 350D, 360D	10	Figure 23	Figure 24	101
390D, 400D	11	Figure 25	Figure 26	110
450D	13	Figure 27	Figure 28	114

NOTE: Internal pump package pressure drop is based on the AGS group maximum flow. Lower flow rates have a negligible affect on the pump selection.

Selection Example

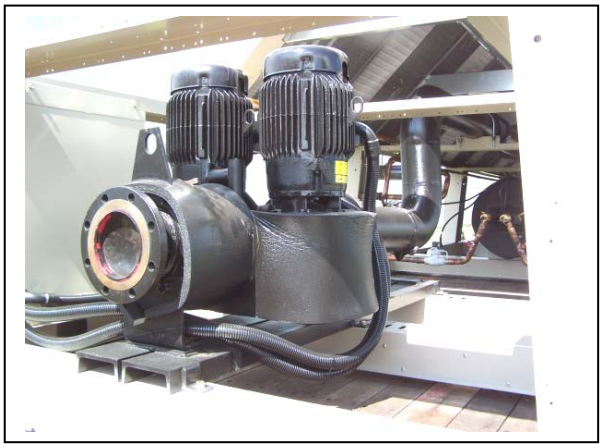
Using the selection example from page 14, we have an AGS 350DS with 660 gpm of water at a 9.6 ft evaporator pressure drop. The internal pump package pressure drop from is 10.0 ft. Using an external pressure drop given at 120 ft, gives a total system head of:

Internal pump package….. ..10.0 ft
Evaporator……..……9.6 ft
External…… …..100.0 ft
Total Head 119.6 ft

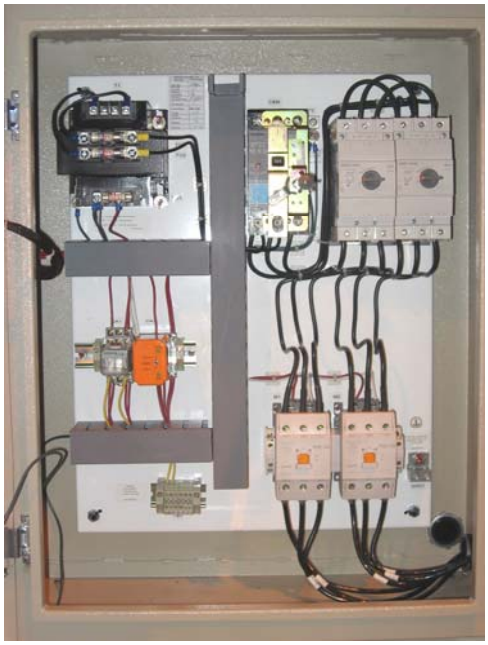
Select a dual pump package.

Go to the designated group of pump curves beginning on page 79 to select the specific pump for the application (Figure 24 in this case). Specific pump curves follow the group curves. They provide a closer view of the pump's operational characteristics.

For 660 gpm and 119.6 feet of head, in the AGS 330 to 360 group, select an 8 x 8 x 11.5, 40 hp dual pump. The specific pump curve is Figure 32 on page 85.



Dual pump package showing inlet flange for field mounting the ship-loose inlet piping assembly. Factory-piping from the pump discharge to the evaporator inlet is visible in the background.



Dual pump control panel showing (clockwise from upper left) transformer, disconnect, circuit breakers, motor control protection, terminal block, alternating relay

Pump Curves

Figure 19, AGS 225, 250DS, Single Pump

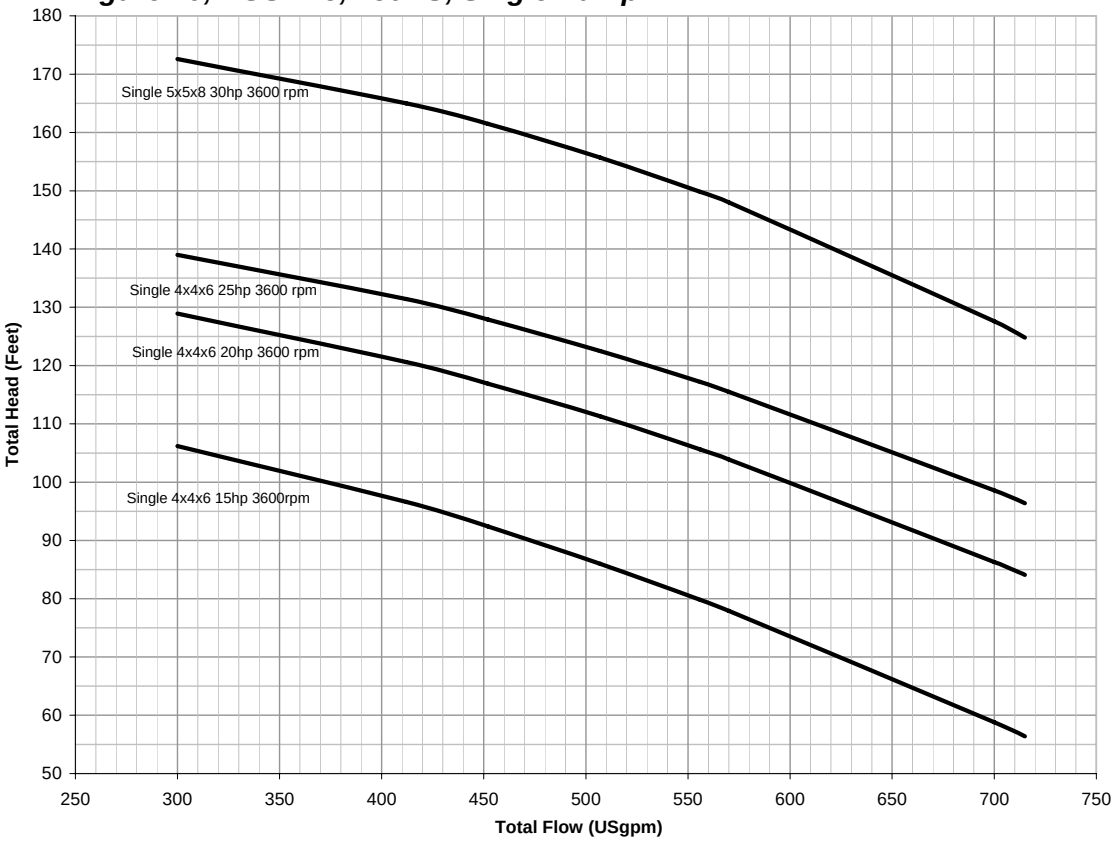


Figure 20, AGS 225, 250DS, Dual Pumps

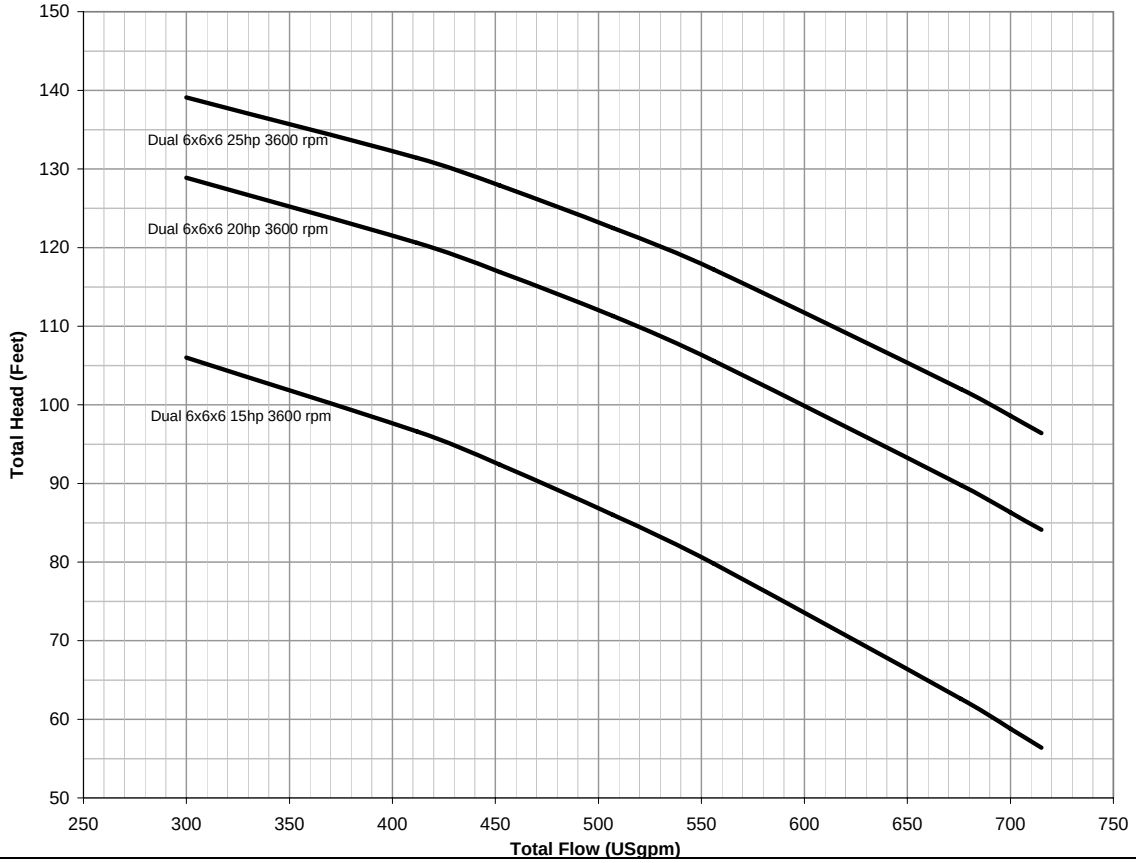


Figure 21, AGS 275, 300DS, Single Pump

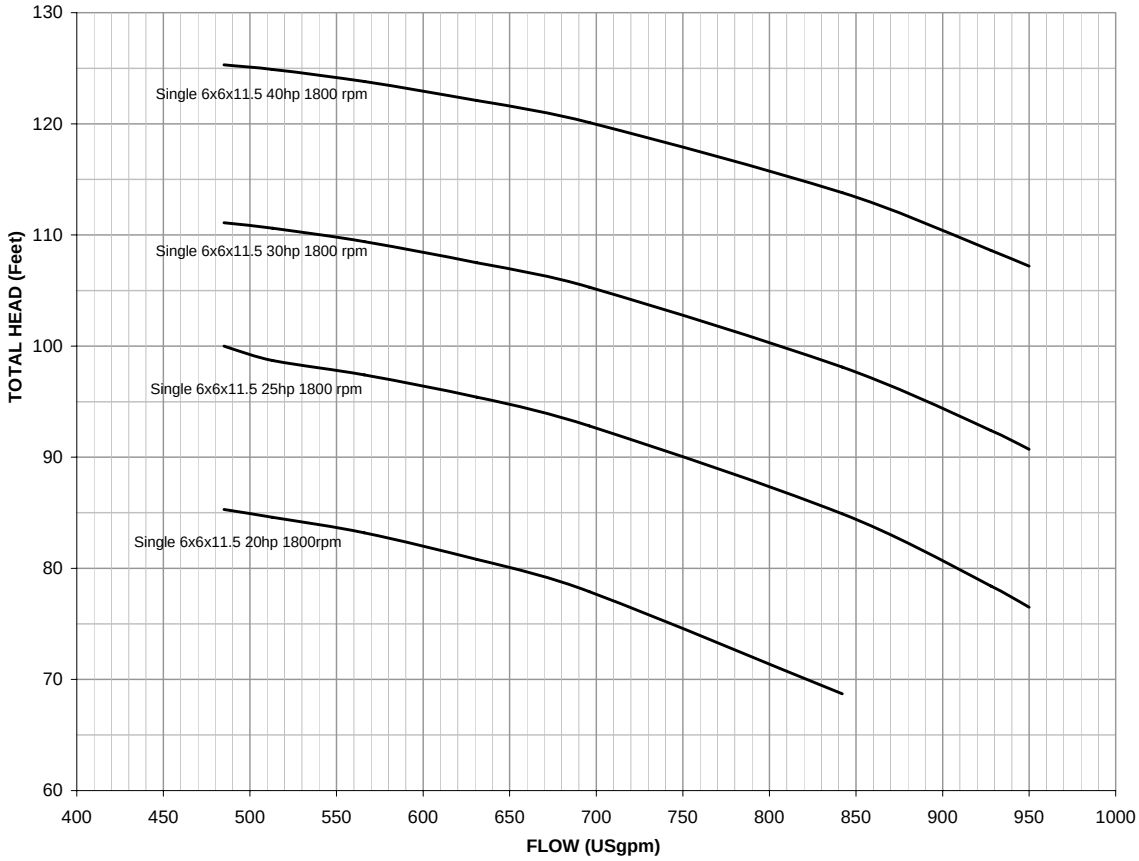


Figure 22, AGS 275, 300DS, Dual Pumps

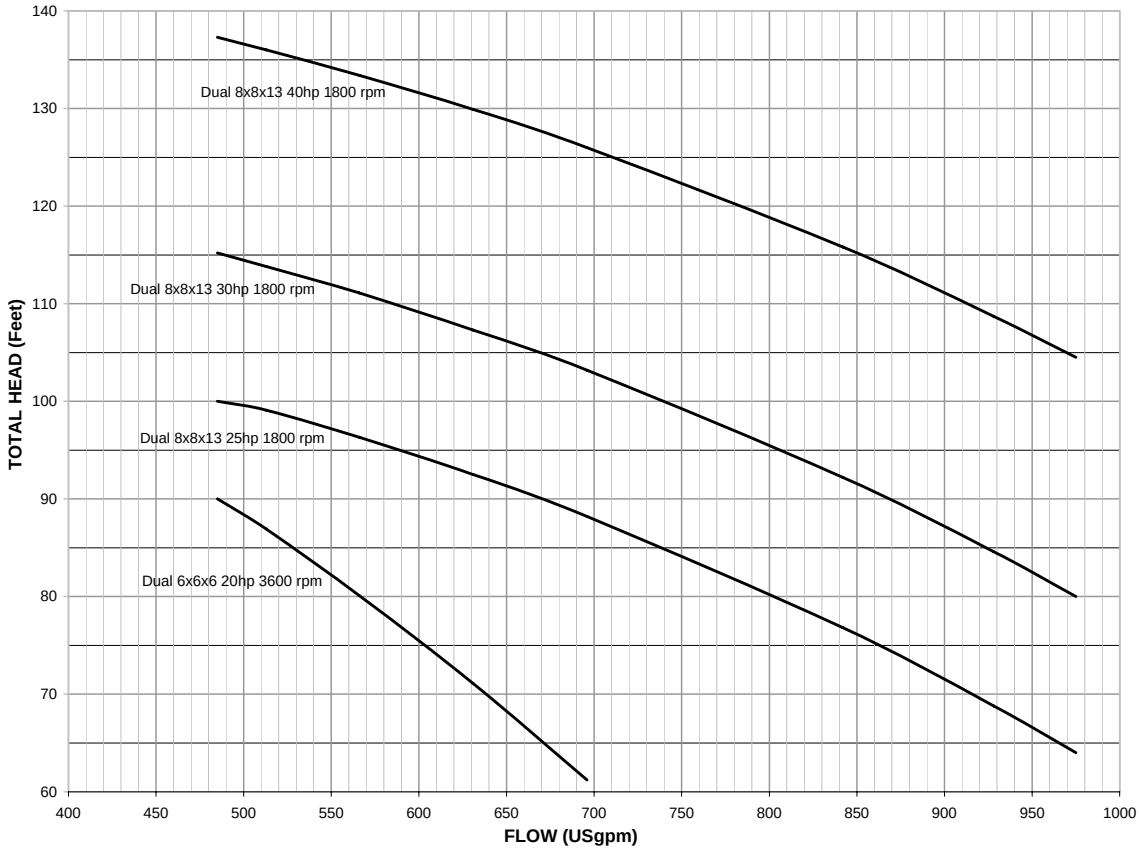


Figure 23, AGS 330, 350, 360DS, Single Pump

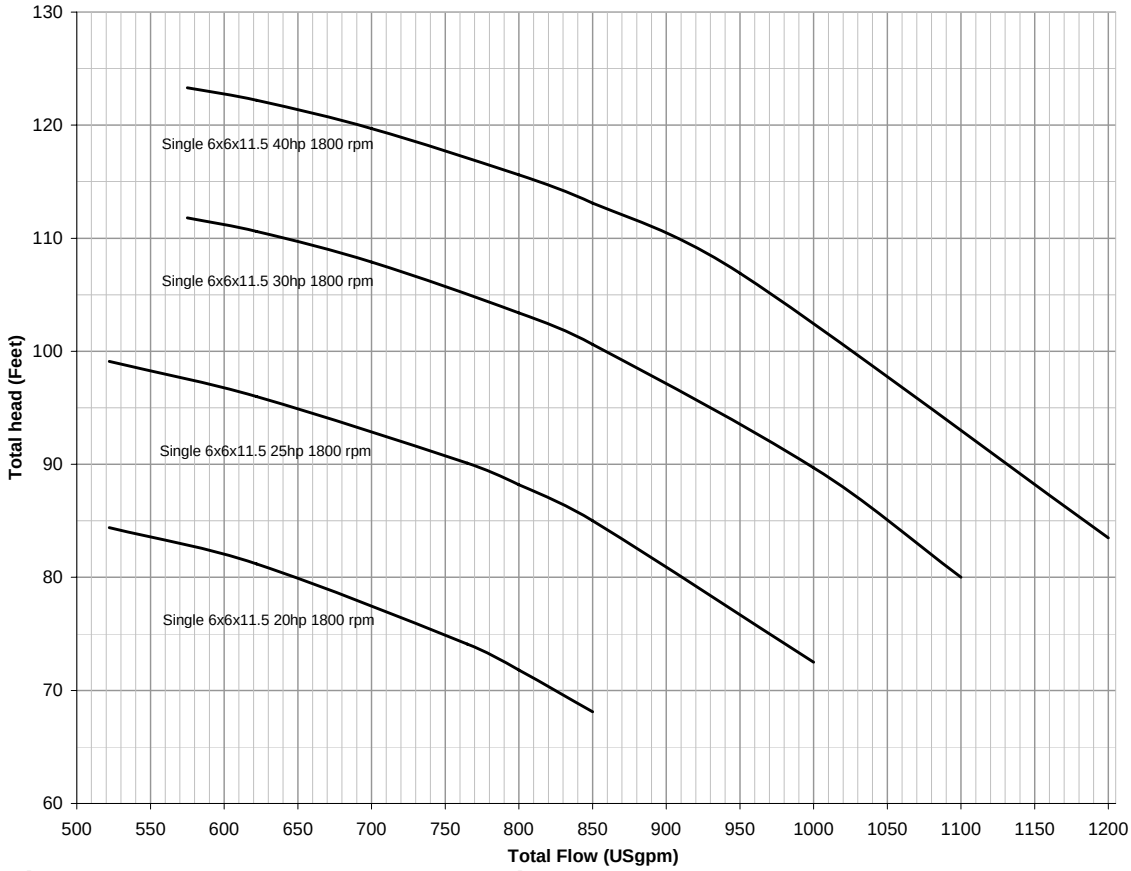


Figure 24, AGS 330, 350, 360DS, Dual Pumps

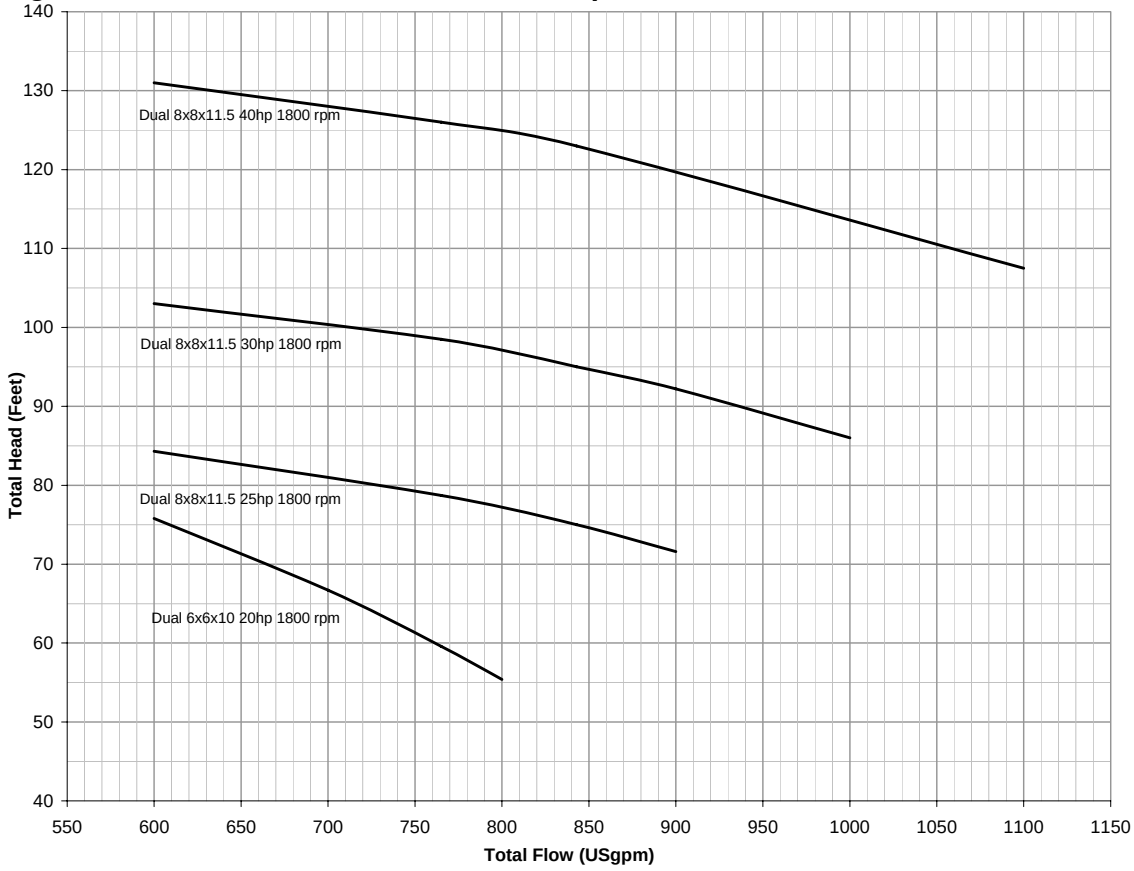


Figure 25, AGS 390, 400DS, Single Pump

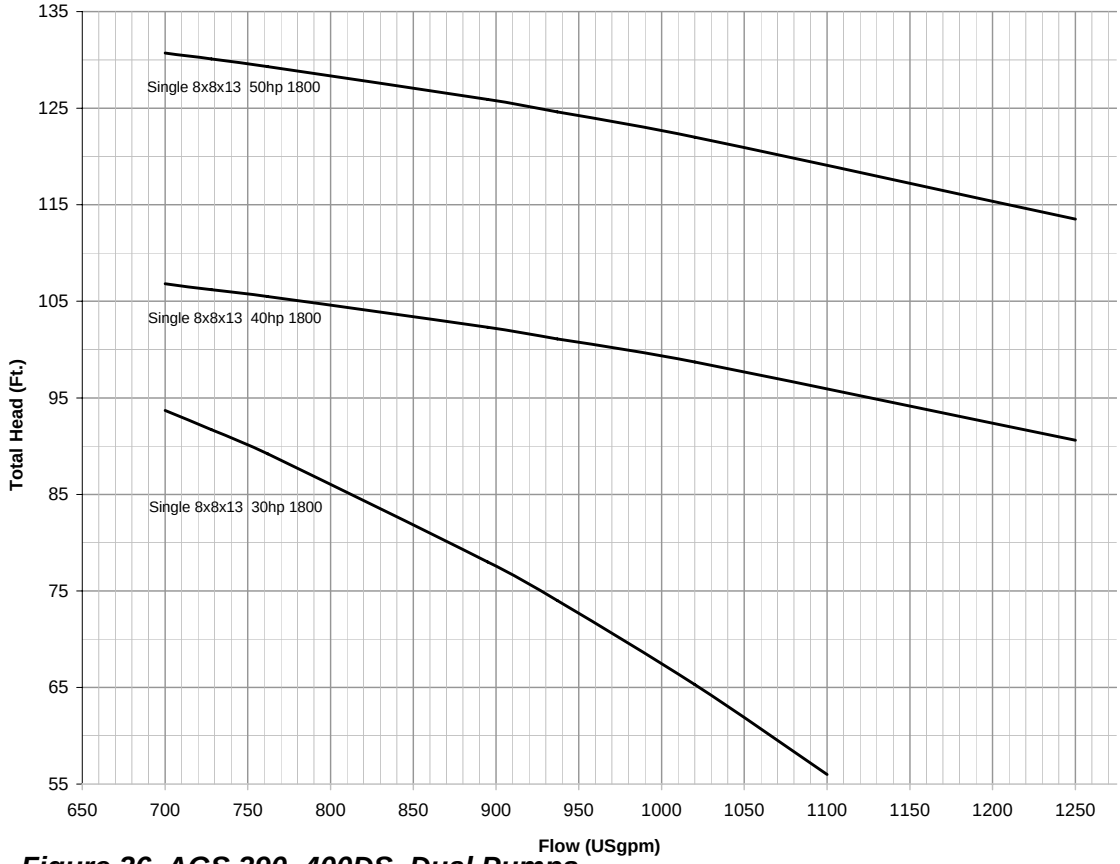


Figure 26, AGS 390, 400DS, Dual Pumps

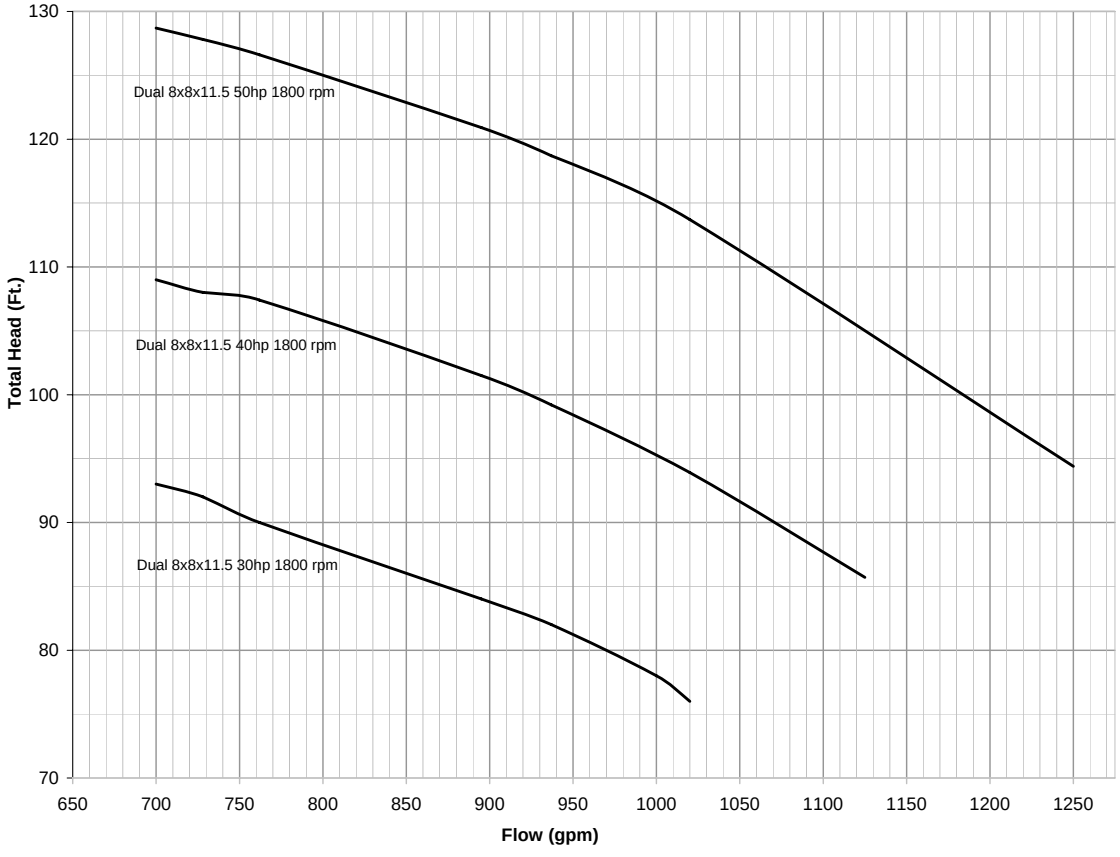


Figure 27, AGS 450DS, Single Pump

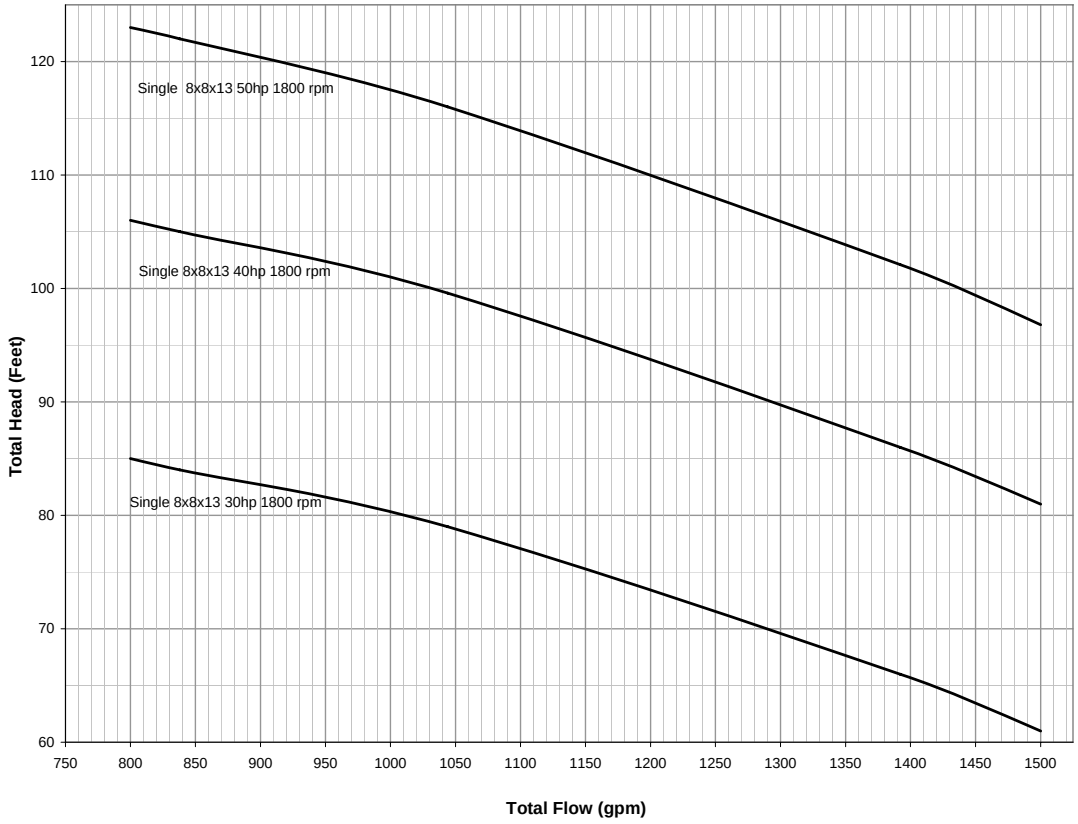
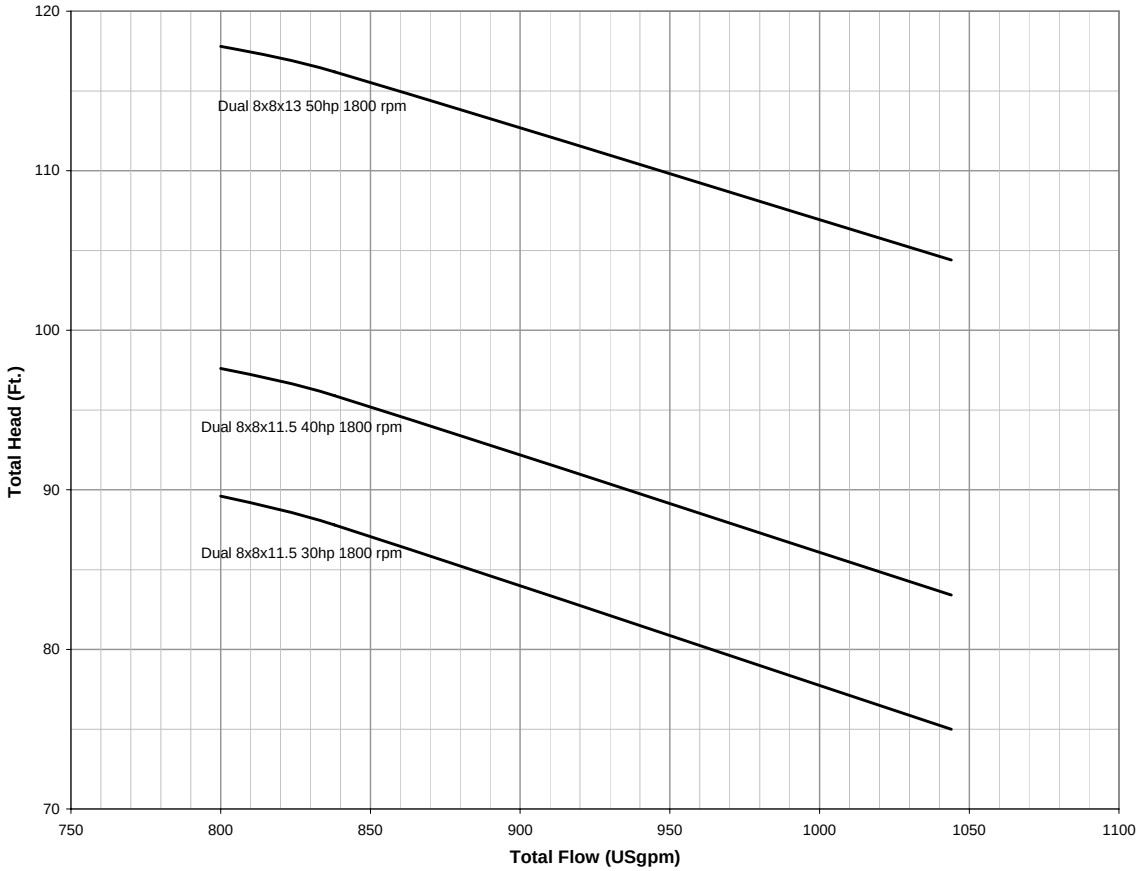


Figure 28, AGS 450DS, Dual Pumps



Specific Pump Curves

Figure 29, 4 x 4 x 6, AGS 225-250DS, Single

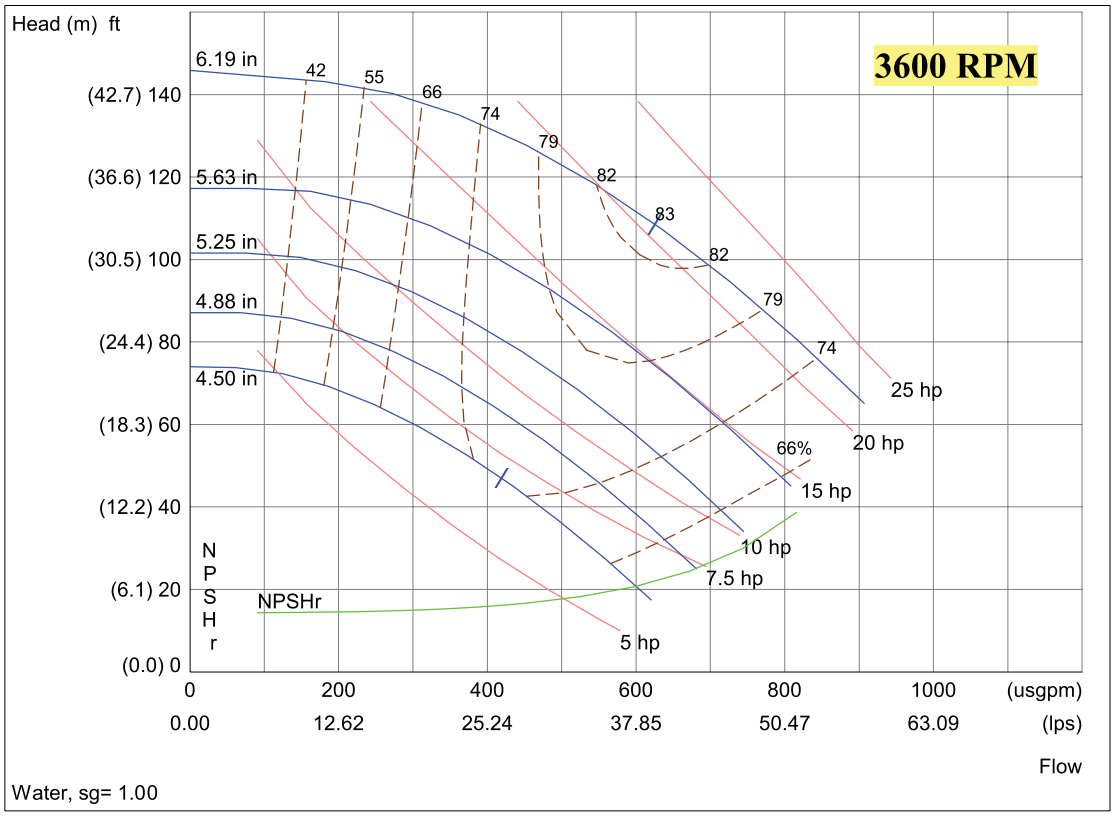


Figure 30, 5 x 5 x 8, AGS 225-250DS, Single

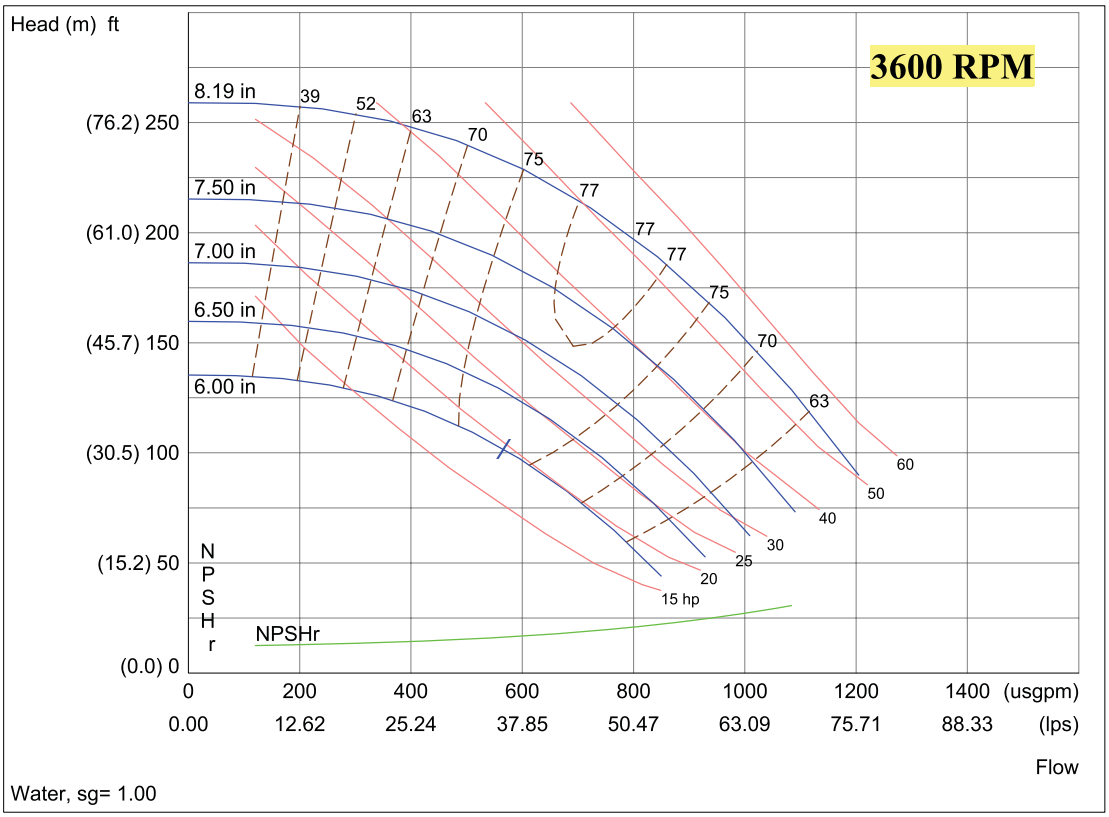


Figure 31, 6 x 6 x 6, AGS 225-300DS, Dual

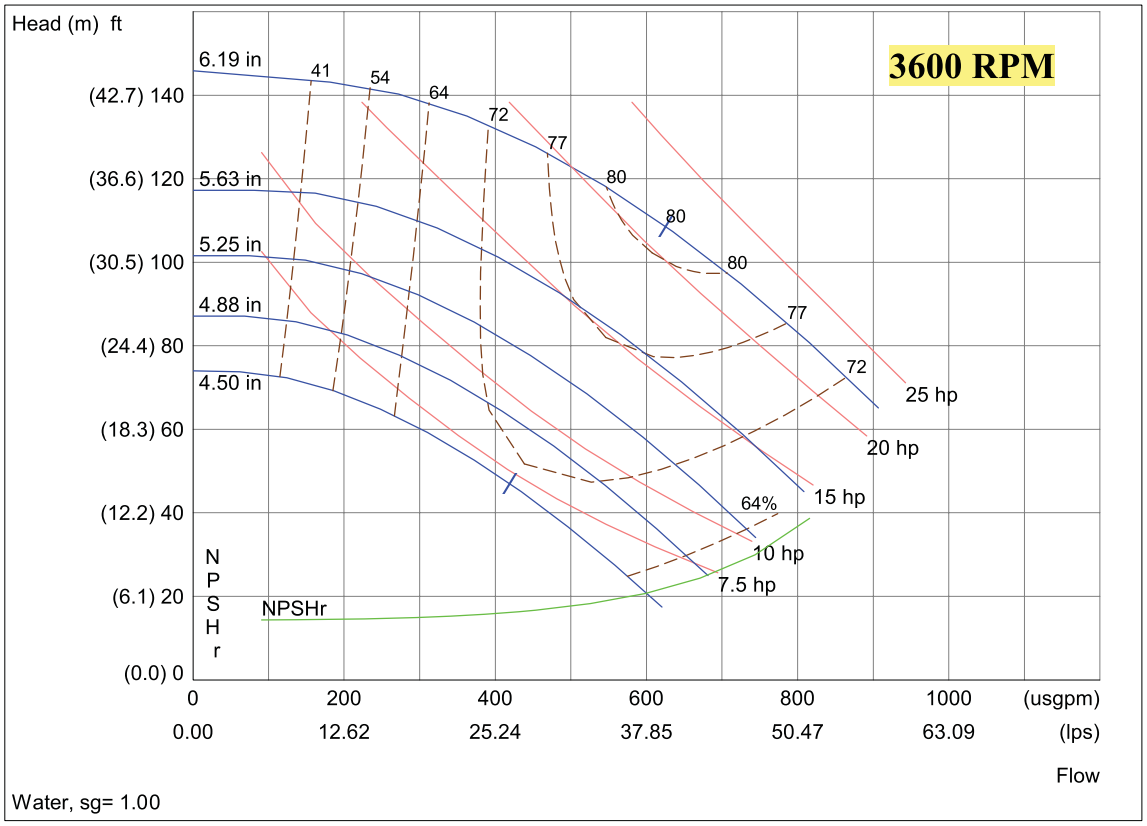


Figure 32, 8 x 8 x 11.5, AGS 330-450DS, Dual

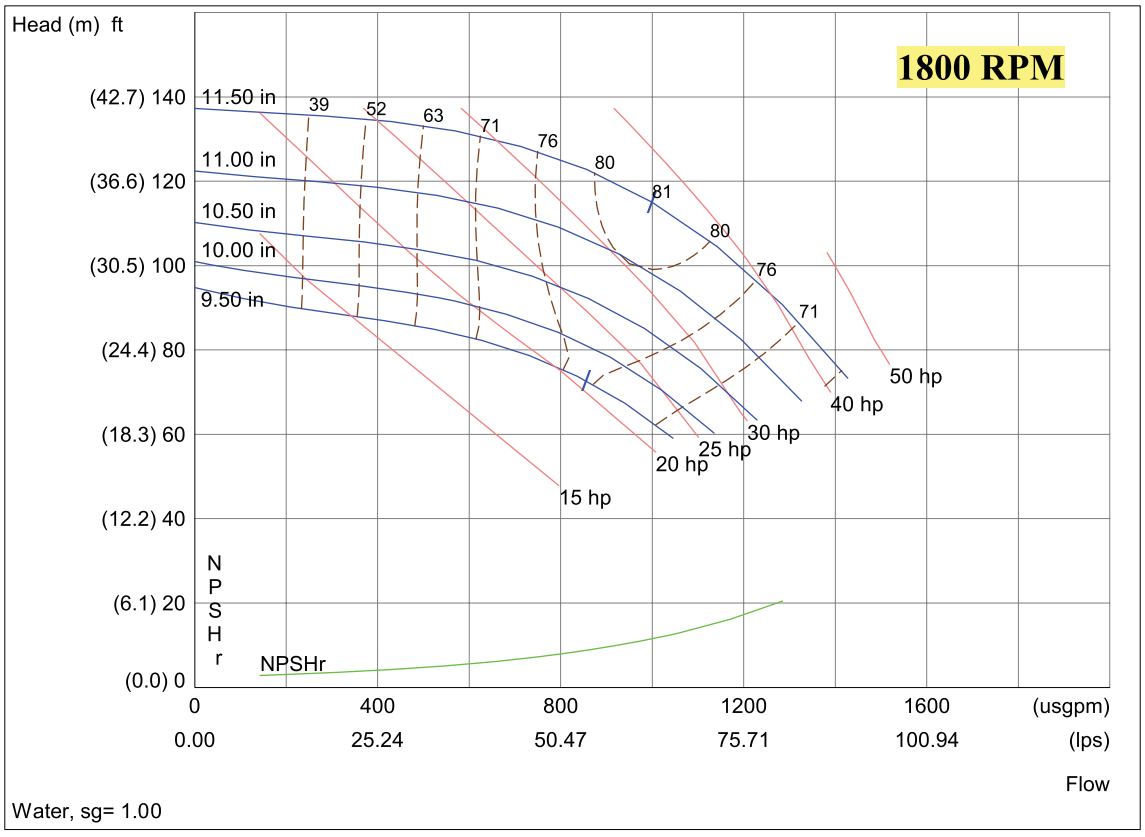


Figure 33, 8 x 8 x 13, AGS 390, 450DS, Single

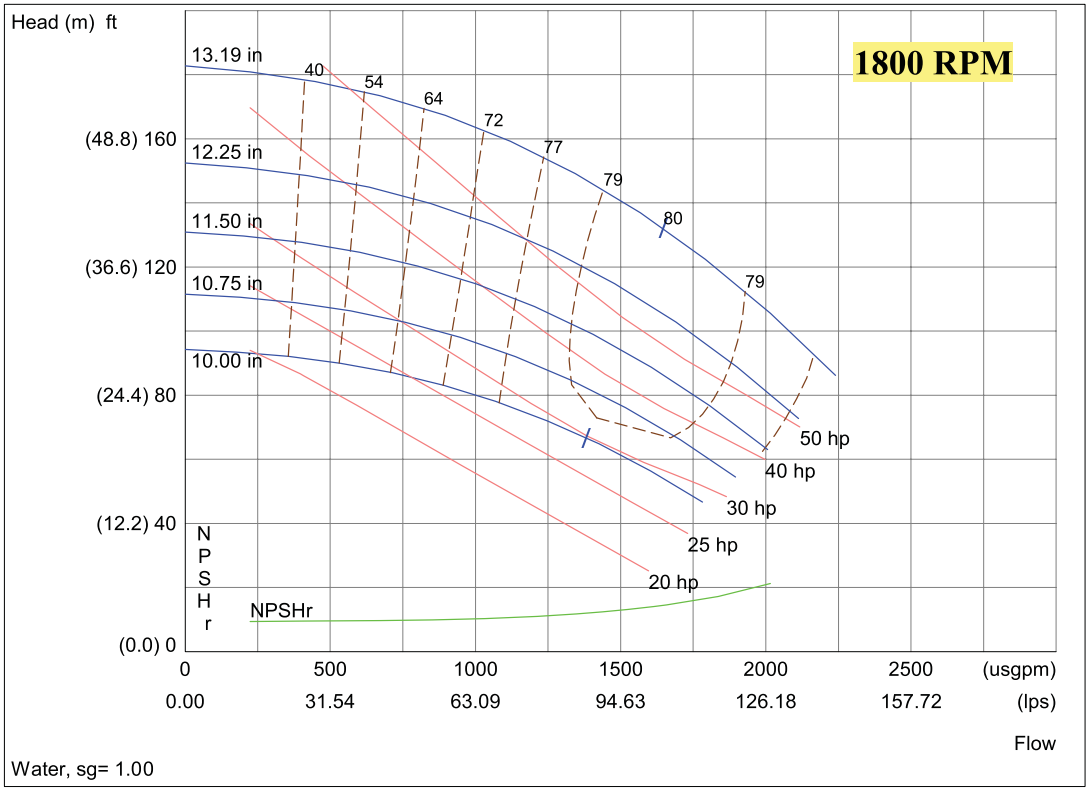


Figure 34, 6 x 6 x 10, AGS 330-360DS, Dual

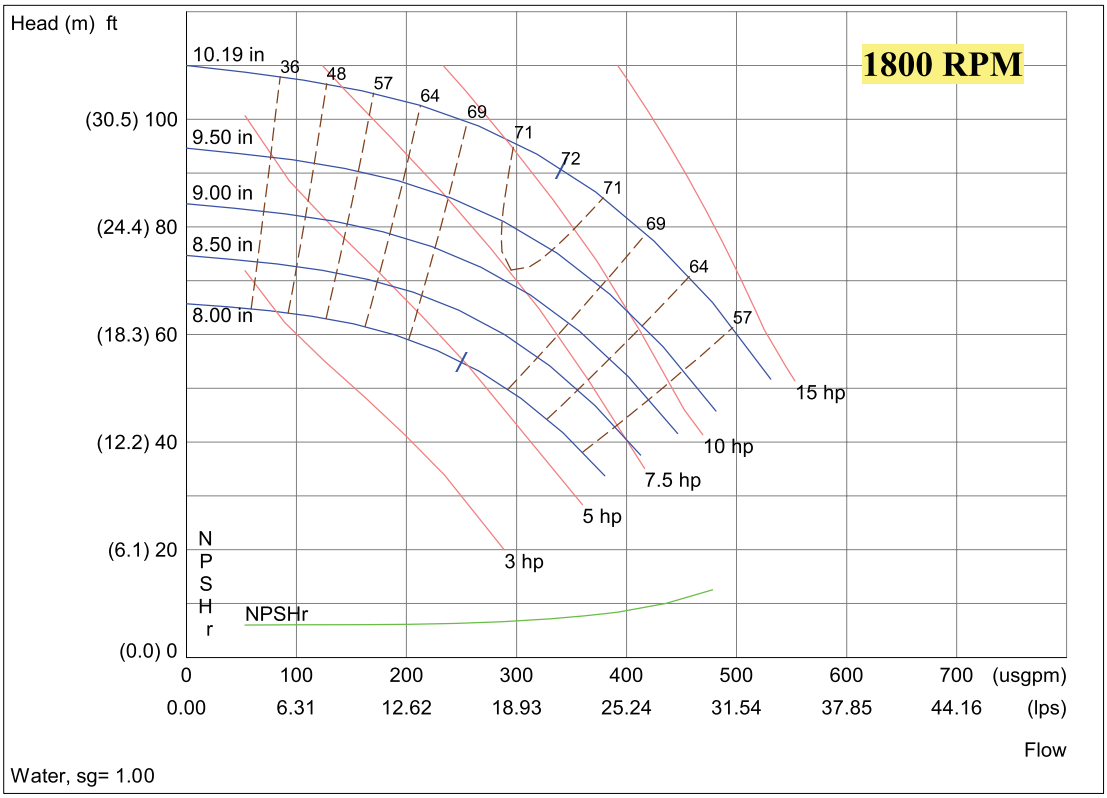


Figure 35, 6 x 6 x 11.5, AGS 275-360DS, Single

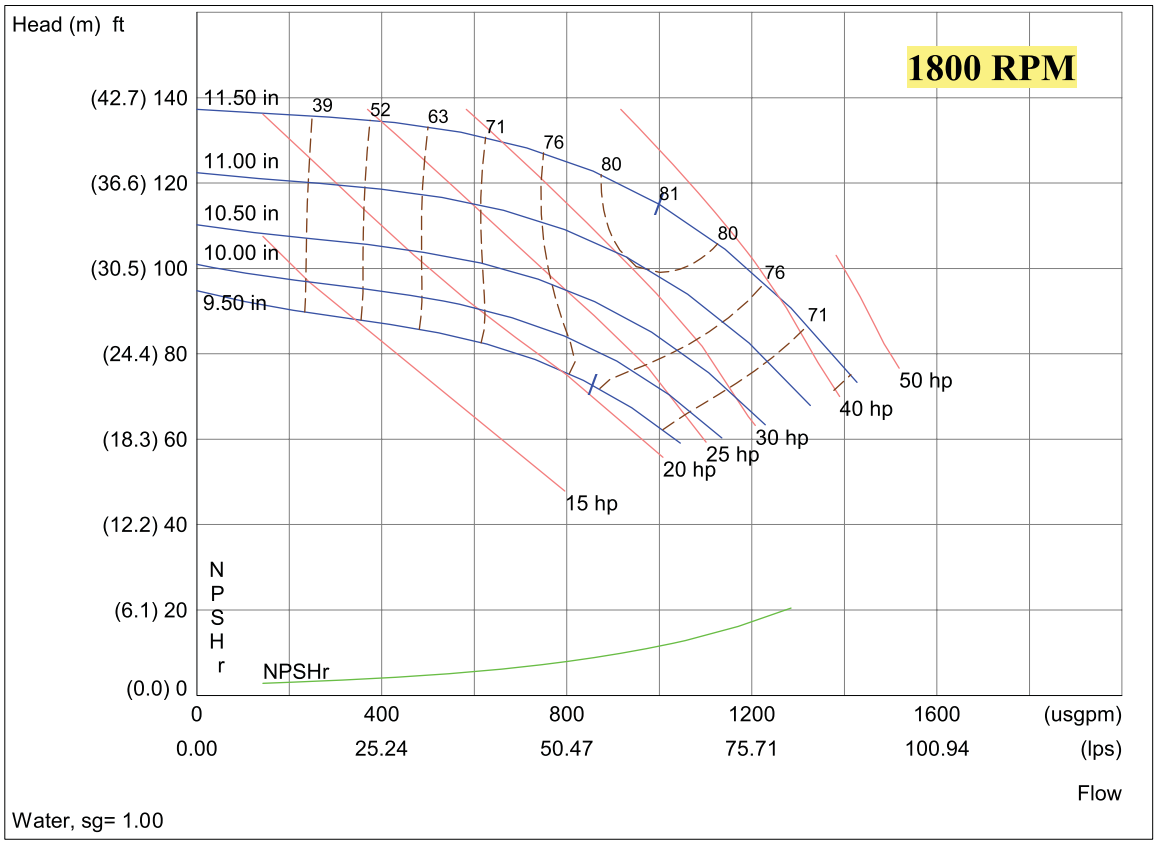
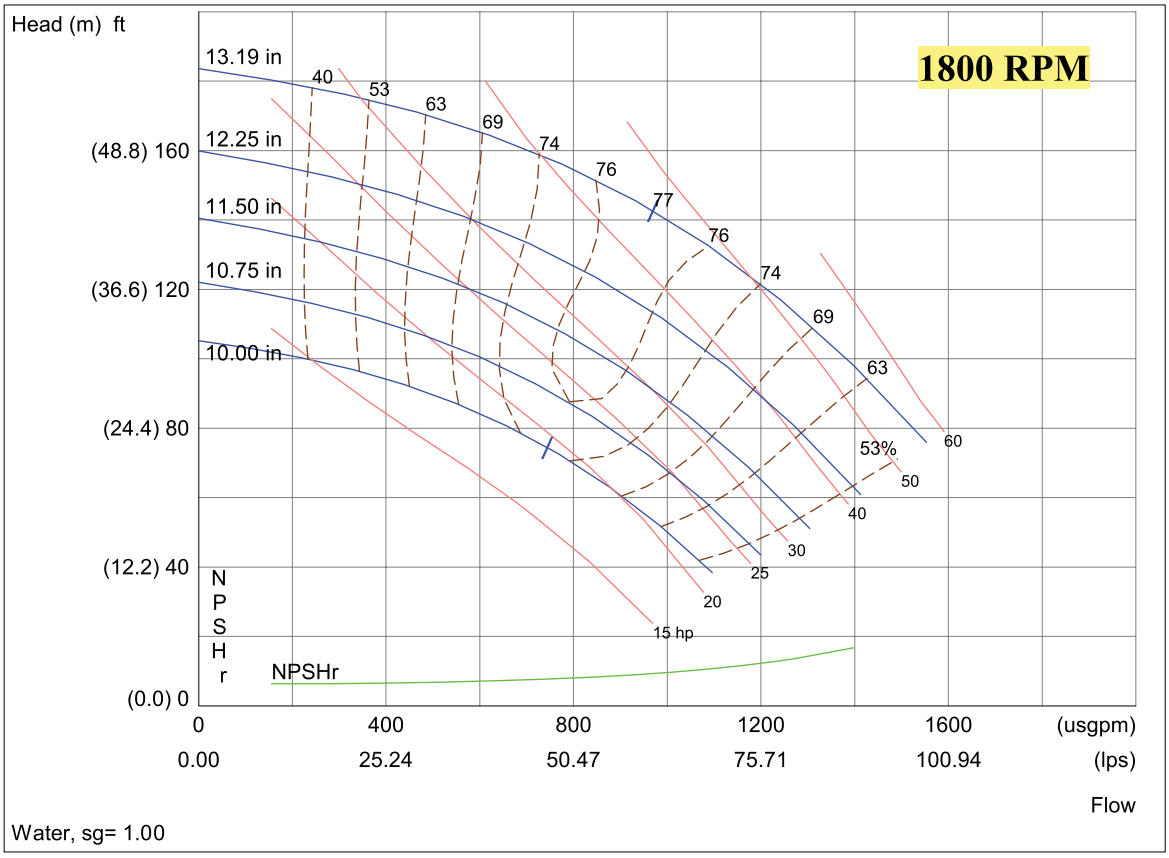
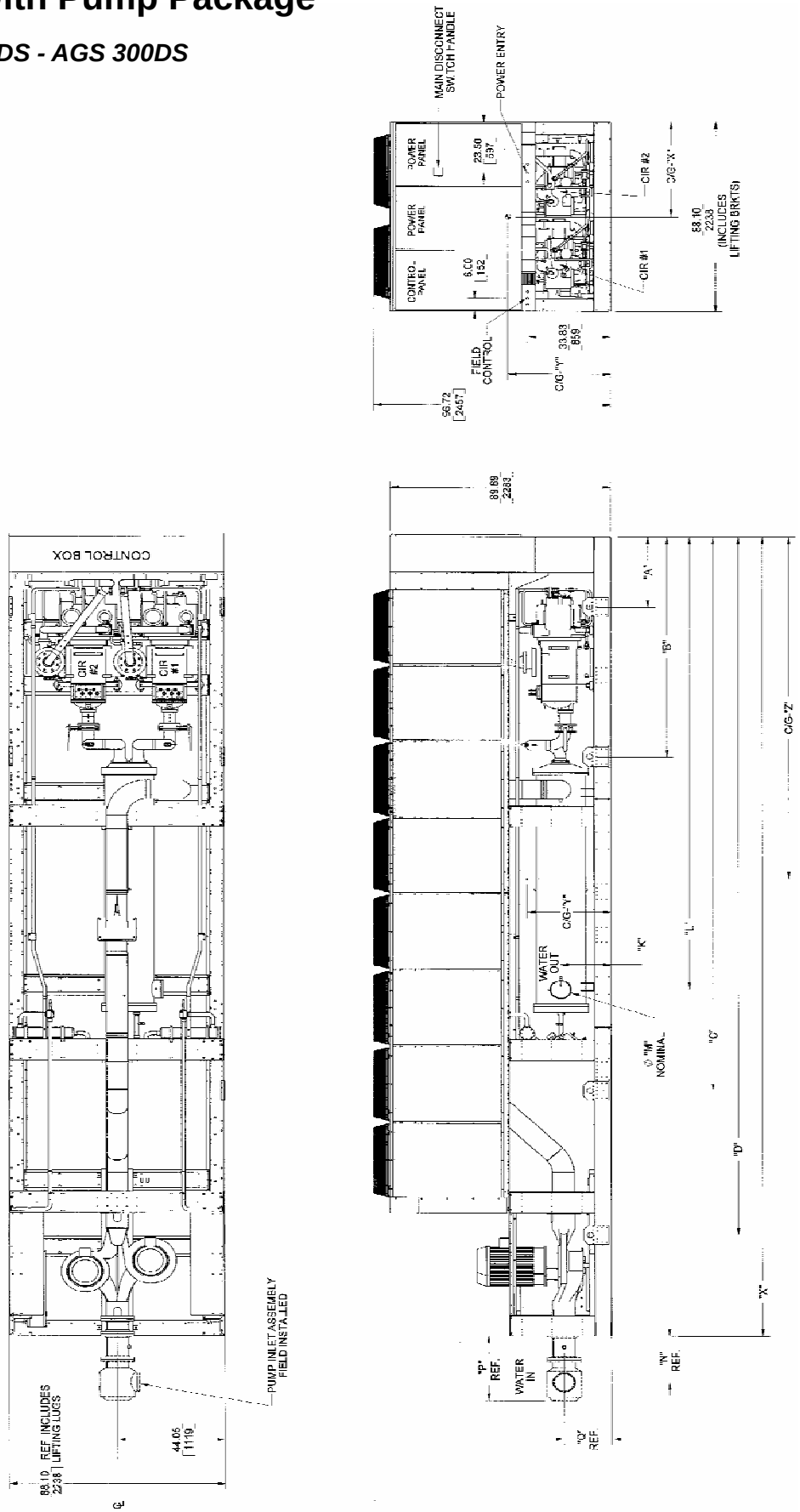


Figure 36, 8 x 8 x 13, AGS 275, 300, 450DS, Dual



Dimensions with Pump Package

Figure 37, AGS 225DS - AGS 300DS



Notes.

1. Dual pumps shown, dimensions are the same for single pump units.
2. Allow one-inch manufacturing tolerance.
3. Refer to page 101 for service and air flow clearances.

Table 69, Dimensions (in.)

UNIT SIZE	FANS	A	B	C	D	E	F	G	H	J	X	Y	C/G "X"	C/G "Y"	C/G "Z"
AGS225DS	12	32.5	102.1	212.0	289.0	25.6	84.7	N/A	221.7	310.4	336.0	88.1	45.5	36.4	127.8
AGS250DS	14	32.5	102.1	212.0	289.0	25.6	84.7	N/A	221.7	310.4	336.0	88.1	45.5	37.9	132.7
AGS275DS	16	32.5	102.1	257.5	324.5	25.6	84.7	174.8	257.1	345.8	371.4	88.1	46.1	36.9	158.9
AGS300DS	16	32.5	102.1	257.5	324.5	25.6	84.7	174.8	257.1	345.8	371.4	88.1	46.1	36.9	158.9

Table 70, Dimensions (mm)

UNIT SIZE	FANS	A	B	C	D	E	F	G	H	J	X	Y	C/G "X"	C/G "Y"	C/G "Z"
AGS225DS	12	826	2594	5385	7341	650	2151	N/A	5631	7884	8534	2238	1155	925	3246
AGS250DS	14	826	2594	5385	7341	650	2151	N/A	5631	7884	8534	2238	1155	963	3371
AGS275DS	16	826	2594	6541	8242	650	2151	4440	6530	8783	9434	2238	1170	937	4036
AGS300DS	16	826	2594	6541	8242	650	2151	4440	6530	8783	9434	2238	1170	937	4036

Table 71, Dimensions for Water Connections (in.)

UNIT SIZE	Dimensions Refer to Unit Dimension Drawings					
	K	L	M	N	P	Q
AGS225DS	18.4	211.4	6 Nom.	19.3	26.0	19.9
AGS250DS	18.4	211.4	6 Nom.	19.3	26.0	19.9
AGS275DS	20.4	210.4	8 Nom.	21.6	30.1	19.4
AGS300DS	20.4	210.4	8 Nom.	21.6	30.1	19.4

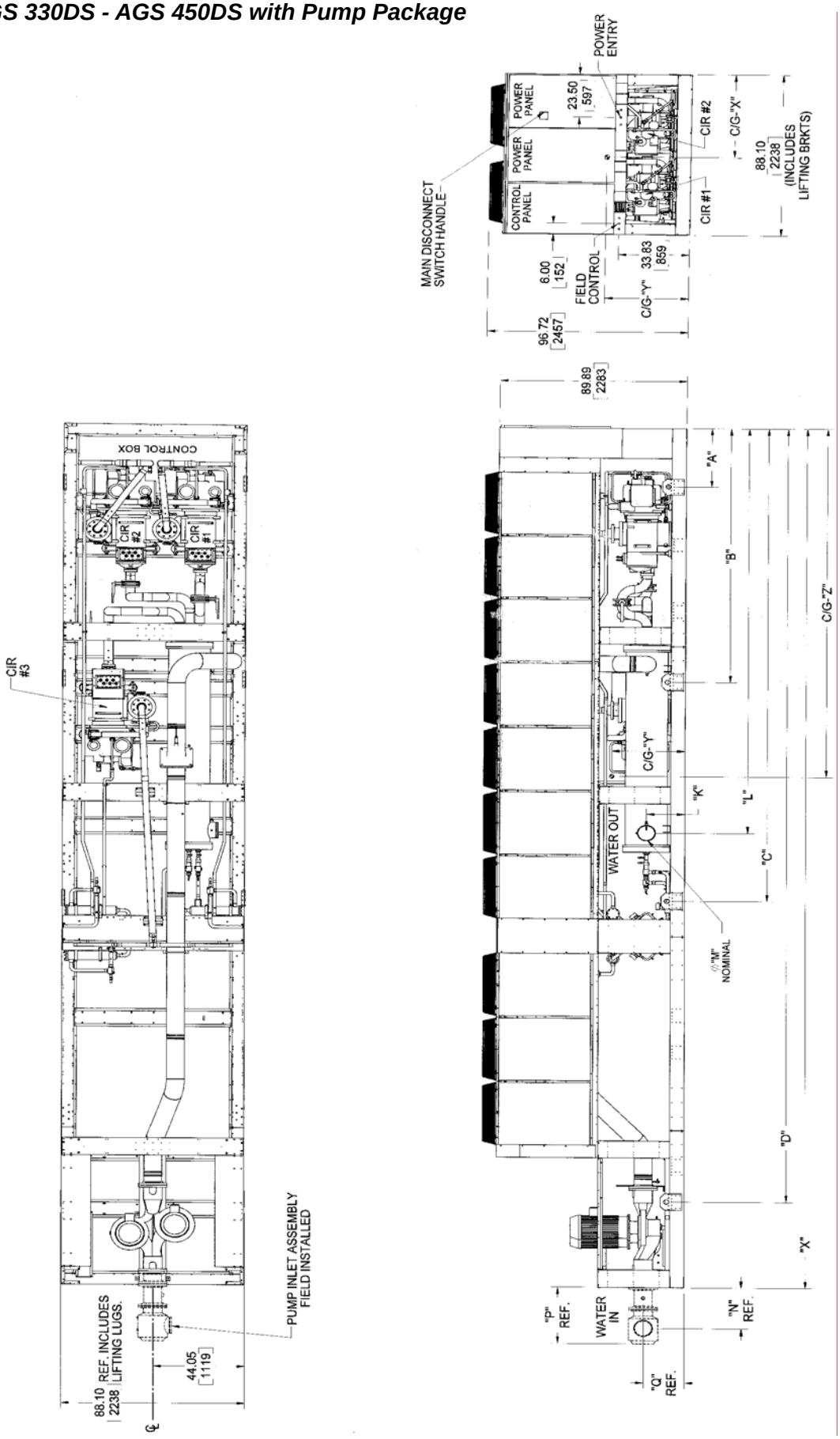
Table 72, Dimensions for Water Connections (mm)

UNIT SIZE	Dimensions Refer to Unit Dimension Drawings					
	K	L	M	N	P	Q
AGS225DS	467	5370	152 Nom.	490	660	505
AGS250DS	467	5370	152 Nom.	490	660	505
AGS275DS	518	5344	203 Nom.	549	765	493
AGS300DS	518	5344	203 Nom.	549	765	493

Table 73, Total Weights

UNIT SIZE	Shipping Weight (lbs)	Operating Weight (lbs)	Add for Copper Fins (lbs)	Shipping Weight (kgs)	Operating Weight (kgs)	Add for Copper Fins (kgs)
AGS225DS	14952	15732	1577	6782	7136	716
AGS250DS	15470	16259	1840	7017	7375	835
AGS275DS	17649	19041	2102	8006	8637	954
AGS300DS	17649	19041	2102	8006	8637	954

Figure 38, AGS 330DS - AGS 450DS with Pump Package



Notes.

1. Dual pumps shown, dimensions are the same for single pump units.
2. Allow one-inch manufacturing tolerance.
3. Refer to page 101 for service and air flow clearances.

Table 74, Unit Dimensions, (in.)

AGS SIZE	FANS	A	B	C	D	E	F	G	H	J	X	Y	C/G "X"	C/G "Y"	C/G "Z"
330DS	20	141.2	262.0	426.9	25.6	84.7	177.0	269.3	448.3	473.9	88.1	44.1	38.6	190.4	141.2
350DS	20	141.2	262.0	426.9	25.6	84.7	177.0	269.3	448.3	473.9	88.1	44.1	38.6	190.4	141.2
360DS	20	141.2	262.0	426.9	25.6	84.7	177.0	269.3	448.3	473.9	88.1	44.1	38.6	190.4	141.2
390DS	22	141.2	262.0	462.4	25.6	84.7	177.0	269.3	483.7	509.3	88.1	44.1	38.8	199.1	141.2
400DS	22	141.2	262.0	462.4	25.6	84.7	177.0	269.3	483.7	509.3	88.1	44.3	38.6	200.4	141.2
450DS	24	137.6	297.4	497.8	25.6	84.7	212.4	304.7	519.1	544.7	88.1	44.4	39.0	216.6	137.6

Table 75, Unit Dimensions, (mm)

AGS SIZE	FANS	A	B	C	D	E	F	G	H	J	X	Y	C/G "X"	C/G "Y"	C/G "Z"
330DS	20	826	3586	6655	10843	650	2151	4496	6840	11387	12037	2238	1120	981	4835
350DS	20	826	3586	6655	10843	650	2151	4496	6840	11387	12037	2238	1120	981	4835
360DS	20	826	3586	6655	10843	650	2151	4496	6840	11387	12037	2238	1120	981	4835
390DS	22	826	3586	6655	11744	650	2151	4496	6840	12286	12936	2238	1121	985	5057
400DS	22	826	3586	6655	11744	650	2151	4496	6840	12286	12936	2238	1126	979	5089
450DS	24	826	3495	7554	12644	650	2151	5395	7740	13186	13836	2238	1129	991	5502

Table 76, Dimensions for Water Connections (in.)

AGS SIZE	K	L	M	N	P	Q
330DS	18.4	224.2	8" NOM.	22.2	30.7	19.5
350DS	18.4	224.2	8" NOM.	22.2	30.7	19.5
360DS	18.4	224.2	8" NOM.	22.2	30.7	19.5
390DS	18.4	224.2	8" NOM.	22.5	30.7	19.5
400DS	18.4	257.7	8" NOM.	22.5	30.7	19.5
450DS	18.4	257.7	8" NOM.	22.5	30.7	19.5

Table 77, Dimensions for Water Connections (mm)

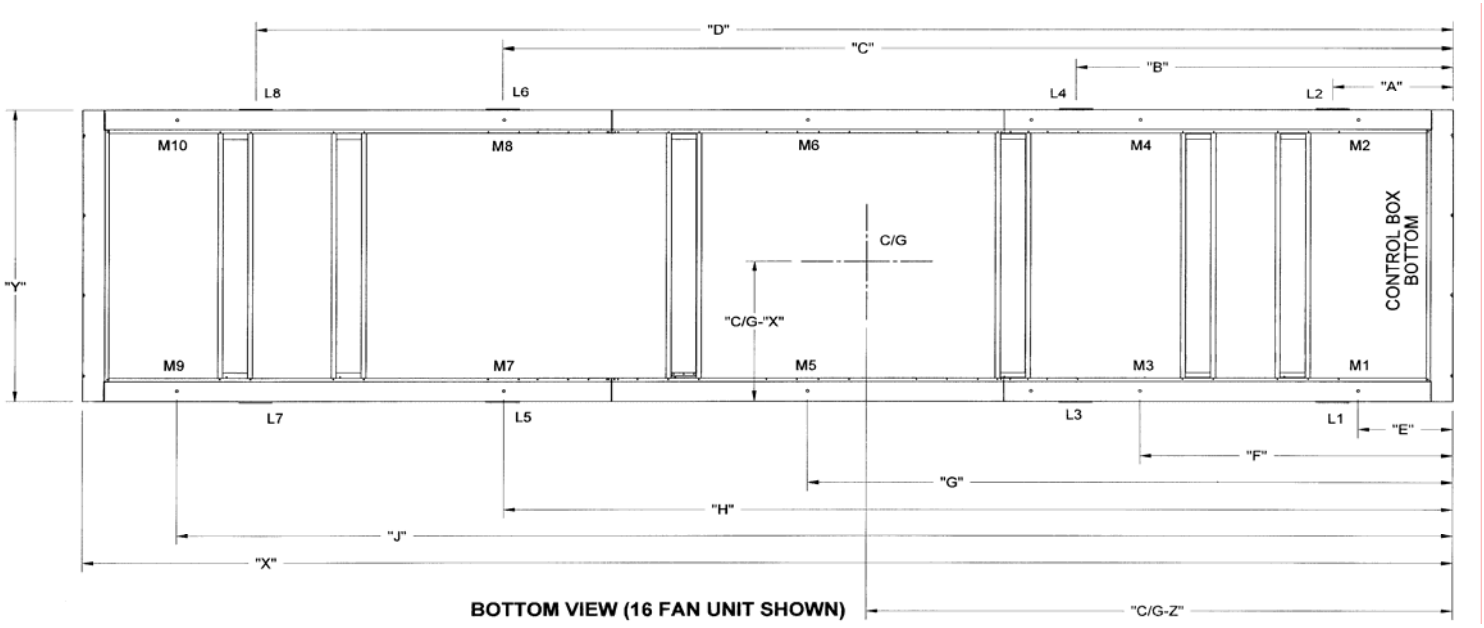
AGS SIZE	K	L	M	N	P	Q
330DS	467	5695	203 NOM.	564	780	495
350DS	467	5695	203 NOM.	564	780	495
360DS	467	5695	203 NOM.	564	780	495
390DS	467	5695	203 NOM.	572	780	495
400DS	467	6546	203 NOM.	572	780	495
450DS	467	6546	203 NOM.	572	780	495

Table 78, Total Weights

AGS SIZE	SHIPPING WEIGHT (lbs)	OPERATING WEIGHT (lbs)	ADD FOR COPPER FINS (lbs)	SHIPPING WEIGHT (kg)	OPERATING WEIGHT (kg)	ADD FOR COPPER FINS (kg)
330DS	23412	25010	2628	10620	11355	1193
350DS	23412	25010	2628	10620	11355	1193
360DS	23455	25020	2628	10639	11359	1193
390DS	24184	25813	2891	10970	11719	1313
400DS	24533	26443	2891	11128	12005	1313
450DS	25586	27555	3154	11606	12510	1432

Lifting and Mounting Weights

Figure 39, Lifting and Isolator locations, AGS 225DS - 300DS, with Pump Package



NOTE: L(number) are lifting points, M(number) are mounting points.

Table 79, Dimensions (in.)

UNIT SIZE	SHIP WT.	OPRT WT.	FANS	A	B	C	D	E	F
AGS225DS	14952	15492	12	32.5	102.1	212.0	289.0	25.6	84.7
AGS250DS	15470	16019	14	32.5	102.1	212.0	289.0	25.6	84.7
AGS275DS	17649	18554	16	32.5	102.1	257.5	324.5	25.6	84.7
AGS300DS	17649	18554	16	32.5	102.1	257.5	324.5	25.6	84.7

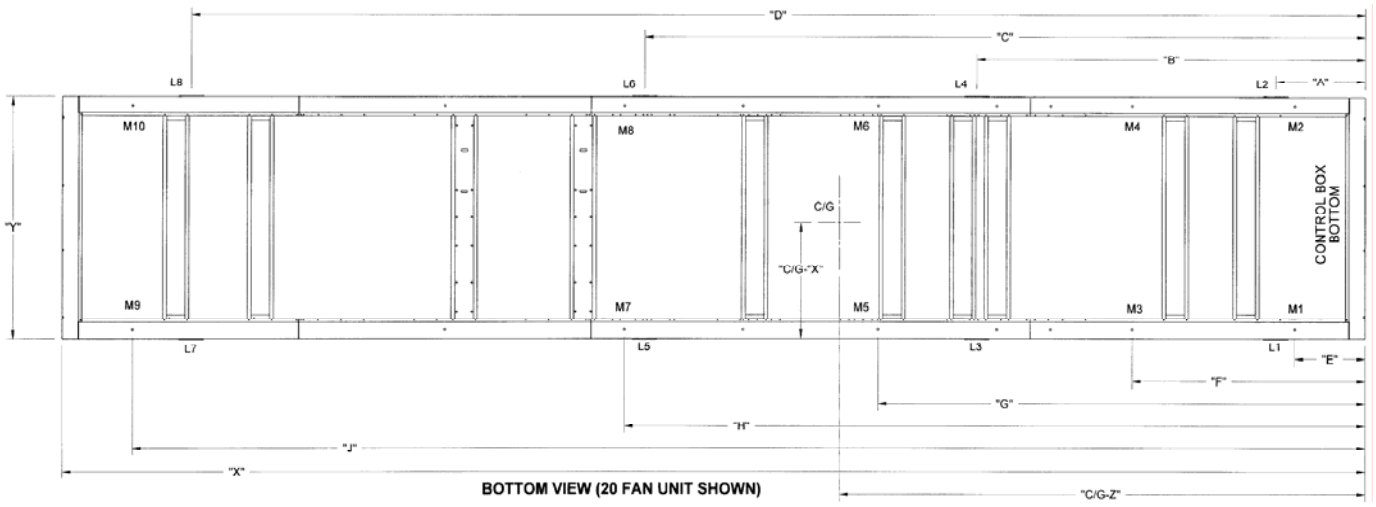
UNIT SIZE	G	H	J	X	Y	C/G - "X"	C/G - "Y"	C/G - "Z"
AGS225DS	N/A	221.7	310.4	336.0	88.1	45.5	36.4	127.8
AGS250DS	N/A	221.7	310.4	336.0	88.1	45.5	37.9	132.7
AGS275DS	174.8	257.1	345.8	371.4	88.1	46.1	36.9	158.9
AGS300DS	174.8	257.1	345.8	371.4	88.1	46.1	36.9	158.9

Table 80, Dimensions (mm)

UNIT SIZE	SHIP WT.	OPRT WT.	FANS	A	B	C	D	E	F
AGS225DS	6782	7027	12	826	2594	5385	7341	650	2151
AGS250DS	7017	7266	14	826	2594	5385	7341	650	2151
AGS275DS	8006	8416	16	826	2594	6541	8242	650	2151
AGS300DS	8006	8416	16	826	2594	6541	8242	650	2151

UNIT SIZE	G	H	J	X	Y	C/G - "X"	C/G - "Y"	C/G - "Z"
AGS225DS	N/A	5631	7884	8534	2238	1155	925	3246
AGS250DS	N/A	5631	7884	8534	2238	1155	963	3371
AGS275DS	4440	6530	8783	9434	2238	1170	937	4036
AGS300DS	4440	6530	8783	9434	2238	1170	937	4036

Figure 40, Lifting and Isolator Locations, AGS 330DS - 450DS, with Pump Package



NOTE: L(number) are lifting points, M(number) are mounting points.

Table 81, Dimensions (in.)

AGS SIZE	FANS	A	B	C	D	E	F	G	H	J	X	Y	C/G "X"	C/G "Y"	C/G "Z"
330DS	20	32.5	141.2	262.0	426.9	25.6	84.7	177.0	269.3	448.3	473.9	88.1	44.1	38.6	190.4
350DS	20	32.5	141.2	262.0	426.9	25.6	84.7	177.0	269.3	448.3	473.9	88.1	44.1	38.6	190.4
360DS	20	32.5	141.2	262.0	426.9	25.6	84.7	177.0	269.3	448.3	473.9	88.1	44.1	38.6	190.4
390DS	22	32.5	141.2	262.0	462.4	25.6	84.7	177.0	269.3	483.7	509.3	88.1	44.1	38.8	199.1
400DS	22	32.5	141.2	262.0	462.4	25.6	84.7	177.0	269.3	483.7	509.3	88.1	44.3	38.6	200.4
450DS	24	32.5	137.6	297.4	497.8	25.6	84.7	212.4	304.7	519.1	544.7	88.1	44.4	39.0	216.6

Table 82, Dimensions (mm)

AGS SIZE	FANS	A	B	C	D	E	F	G	H	J	X	Y	C/G "X"	C/G "Y"	C/G "Z"
330DS	20	826	3586	6655	10843	650	2151	4496	6840	11387	12037	2238	1120	981	4835
350DS	20	826	3586	6655	10843	650	2151	4496	6840	11387	12037	2238	1120	981	4835
360DS	20	826	3586	6655	10843	650	2151	4496	6840	11387	12037	2238	1120	981	4835
390DS	22	826	3586	6655	11744	650	2151	4496	6840	12286	12936	2238	1121	985	5057
400DS	22	826	3586	6655	11744	650	2151	4496	6840	12286	12936	2238	1126	979	5089
450DS	24	826	3495	7554	12644	650	2151	5395	7740	13186	13836	2238	1129	991	5502

Table 83, Shipping and Lifting Weights with Pump Package, Aluminum Fins

AGS-D MODEL	SHIPPING AND LIFTING WEIGHT FOR EACH POINT									
	L1		L2		L3		L4		L5	
	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg
225DS	2540	1153	2709	1230	2138	971	2279	1035	1502	682
250DS	2508	1139	2677	1215	2157	979	2303	1046	1603	728
275DS	2563	1164	2809	1275	2345	1065	2571	1167	1861	845
300DS	2563	1164	2809	1275	2345	1065	2571	1167	1861	845
330DS	3555	1614	3561	1617	3181	1444	3186	1446	2764	1255
350DS	3555	1614	3561	1617	3181	1444	3186	1446	2764	1255
360DS	3561	1617	3568	1620	3186	1446	3192	1449	2769	1257
390DS	3596	1633	3609	1638	3269	1484	3281	1490	2905	1319
400DS	3602	1635	3649	1657	3288	1493	3330	1512	2939	1334
450DS	3701	1680	3766	1710	3435	1559	3494	1586	3028	1375

AGS-D MODEL	SHIPPING AND LIFTING WEIGHT FOR EACH POINT					
	L6		L7		L8	
	lbs.	kg	lbs.	kg	lbs.	kg
225DS	1601	727	1056	479	1126	511
250DS	1711	777	1215	552	1297	589
275DS	2039	926	1652	750	1810	822
300DS	2039	926	1652	750	1810	822
330DS	2769	1257	2196	996	2200	998
350DS	2769	1257	2196	996	2200	998
360DS	2774	1259	2200	998	2204	1000
390DS	2915	1323	2301	1044	2309	1048
400DS	2976	1351	2359	1071	2389	1084
450DS	3081	1399	2519	1143	2562	1163

Table 84, Operating and Mounting Weights with Pump Package, Aluminum Fins

AGS-D MODEL	OPERATING AND MOUNTING LOADS FOR EACH POINT											
	M1		M2		M3		M4		M5		M6	
	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg
225DS	2566	1165	2734	1241	2277	1034	2425	1101	N/A	-	N/A	-
250DS	2549	1157	2719	1234	2294	1041	2447	1111	N/A	-	N/A	-
275DS	2198	998	2405	1092	2051	931	2244	1019	1826	829	1997	907
300DS	2198	998	2405	1092	2051	931	2244	1019	1826	829	1997	907
330DS	2703	1227	2708	1229	2634	1196	2639	1198	2527	1147	2531	1149
350DS	2703	1227	2708	1229	2634	1196	2639	1198	2527	1147	2531	1149
360DS	2704	1228	2709	1230	2635	1196	2640	1199	2528	1148	2532	1150
390DS	2735	1242	2744	1246	2684	1219	2693	1223	2604	1182	2613	1186
400DS	2767	1256	2801	1272	2722	1236	2756	1251	2652	1204	2685	1219
450DS	2957	1342	3007	1365	2892	1313	2941	1335	2751	1249	2798	1270

AGS-D MODEL	OPERATING AND MOUNTING LOADS FOR EACH POINT							
	M7		M8		M9		M10	
	lbs.	kg	lbs.	kg	lbs.	kg	lbs.	kg
225DS	1605	729	1709	776	1170	531	1246	566
250DS	1704	774	1817	825	1322	600	1409	640
275DS	1621	736	1772	804	1399	635	1529	694
300DS	1621	736	1772	804	1399	635	1529	694
330DS	2419	1098	2424	1100	2211	1004	2215	1006
350DS	2419	1098	2424	1100	2211	1004	2215	1006
360DS	2420	1099	2425	1101	2212	1004	2216	1006
390DS	2524	1146	2533	1150	2338	1061	2346	1065
400DS	2581	1172	2614	1187	2419	1098	2449	1112
450DS	2649	1203	2694	1223	2413	1096	2453	1114

Electrical Data with Factory-Wired Pump Package

NOTE: The electrical data in Table 85 through Table 87 is for the entire chiller unit, including the factory-wired pump package, as designated in column one.

Pump packages with pumps over 30 HP and pump packages on chiller units larger than AGS 300 require separate electric service to the pump and must be field-wired.

Optionally, all pump packages can be supplied for separate electric service on any size unit.

Table 85, AGS225DS-AGS450DS, Electrical Data with Pump Package, Optional Single Point Power

AGS-DS UNIT SIZE w/SINGLE OR DUAL PUMP	VOLTS	HZ	MIN. CIRCUIT AMPACITY (MCA)	POWER SUPPLY				FIELD FUSE OR CKT. BREAKER SIZE	
				FIELD WIRE		FIELD SUPPLIED HUB (IN.)			
				QTY	WIRE GA	QTY	NOM. SIZE	RECOM.	MAX.
225 w/ 15HP	460	60	509	6	250 MCM	2	2.0	600	700
	575		438	6	4/0 AWG	2	2.0	500	600
225 w/ 20HP	460	60	515	6	300 MCM	2	2.5	600	700
	575		443	6	4/0 AWG	2	2.0	500	600
225 w/ 25HP	460	60	522	6	300 MCM	2	2.5	600	700
	575		448	6	4/0 AWG	2	2.0	500	600
225 w/ 30HP	460	60	528	6	300 MCM	2	2.5	600	700
	575		453	6	4/0 AWG	2	2.0	500	600
250 w/ 20HP	460	60	561	6	300 MCM	2	2.5	700	700
	575		473	6	250 MCM	2	2.0	600	600
250 w/ 25HP	460	60	568	6	300 MCM	2	2.5	700	700
	575		478	6	250 MCM	2	2.0	600	600
250 w/ 30HP	460	60	574	6	350 MCM	2	2.5	700	700
	575		483	6	250 MCM	2	2.0	600	600
275 w/ 20HP	460	60	631	6	400 MCM	2	2.5	700	800
	575		523	6	300 MCM	2	2.5	600	700
275 w/ 25HP	460	60	638	6	400 MCM	2	2.5	800	800
	575		528	6	300 MCM	2	2.5	600	700
275 w/ 30HP	460	60	644	6	400 MCM	2	2.5	800	800
	575		533	6	300 MCM	2	2.5	600	700
300 w/ 20HP	460	60	656	6	400 MCM	2	2.5	800	800
	575		543	6	300 MCM	2	2.5	600	700
300 w/ 25HP	460	60	663	6	400 MCM	2	2.5	800	800
	575		548	6	300 MCM	2	2.5	700	700
300 w/ 30HP	460	60	669	6	400 MCM	2	2.5	800	800
	575		553	6	300 MCM	2	2.5	700	700

NOTE: Complete notes are on page 45.

Table 86, AGS225DS-450Ds, Electrical Data with Pump Package, Standard Multi-Point Power

AGS-DS UNIT SIZE w/SINGLE OR DUAL PUMP	VOLTS	HZ	CIRCUIT #1							CIRCUIT #2						
			MIN. CIRCUIT AMP-ACITY (MCA)	POWER SUPPLY				FIELD FUSE OR CIRCUIT. BREAKER SIZE		MIN. CIRCUIT AMP-ACITY (MCA)	POWER SUPPLY				FIELD FUSE OR CIRCUIT. BREAKER SIZE	
				FIELD WIRE		FIELD SUPPLIED HUB (IN.)					FIELD WIRE		FIELD SUPPLIED HUB (IN.)			
				QTY	WIRE GAGE	QTY	NOM SIZE	RECOM	MAX.		QTY	WIRE GAGE	QTY	NOM. SIZE	RECOM	MAX.
225 w/ 15HP	460	60	290	3	350 MCM	1	2.5	350	450	269	3	300 MCM	1	2.5	350	450
	575		249	3	250 MCM	1	2.0	300	400	232	3	250 MCM	1	2.0	300	400
225 w/ 20HP	460	60	296	3	350 MCM	1	2.5	350	450	269	3	300 MCM	1	2.5	350	450
	575		254	3	250 MCM	1	2.0	300	400	232	3	250 MCM	1	2.0	300	400
225 w/ 25HP	460	60	303	3	350 MCM	1	2.5	400	450	269	3	300 MCM	1	2.5	350	450
	575		259	3	300 MCM	1	2.5	400	400	232	3	250 MCM	1	2.0	300	400
225 w/ 30HP	460	60	309	3	350 MCM	1	2.5	400	500	269	3	300 MCM	1	2.5	350	450
	575		264	3	300 MCM	1	2.5	400	400	232	3	250 MCM	1	2.0	300	400
250 w/ 20HP	460	60	300	3	350 MCM	1	2.5	350	450	273	3	300 MCM	1	2.5	350	450
	575		257	3	300 MCM	1	2.5	400	400	235	3	250 MCM	1	2.0	300	400
250 w/ 25HP	460	60	307	3	350 MCM	1	2.5	400	500	273	3	300 MCM	1	2.5	350	450
	575		262	3	300 MCM	1	2.5	400	400	235	3	250 MCM	1	2.0	300	400
250 w/ 30HP	460	60	313	3	400 MCM	1	2.5	400	500	273	3	300 MCM	1	2.5	350	450
	575		267	3	300 MCM	1	2.5	350	400	235	3	250 MCM	1	2.0	300	400
275 w/ 20HP	460	60	342	3	500 MCM	1	3.0	450	500	315	3	400 MCM	1	2.5	400	500
	575		284	3	300 MCM	1	2.5	350	450	262	3	300 MCM	1	2.5	350	450
275 w/ 25HP	460	60	349	3	500 MCM	1	3.0	450	500	315	3	400 MCM	1	2.5	400	500
	575		289	3	350 MCM	1	2.5	350	450	262	3	300 MCM	1	2.5	350	450
275 w/ 30HP	460	60	355	3	500 MCM	1	3.0	450	500	315	3	400 MCM	1	2.5	400	500
	575		294	3	350 MCM	1	2.5	350	450	262	3	300 MCM	1	2.5	350	450
300 w/ 20HP	460	60	373	3	500 MCM	1	3.0	450	600	346	3	500 MCM	1	3.0	450	500
	575		309	3	350 MCM	1	2.5	400	500	287	3	350 MCM	1	2.5	350	450
300 w/ 25HP	460	60	380	6	4/0 AWG	2	2.0	500	600	346	3	500 MCM	1	3.0	450	500
	575		314	3	400 MCM	1	2.5	400	500	287	3	350 MCM	1	2.5	350	450
300 w/ 30HP	460	60	386	6	4/0 AWG	2	2.0	500	600	346	3	500 MCM	1	3.0	450	500
	575		319	3	400 MCM	1	2.5	400	500	287	3	350 MCM	1	2.5	350	450

NOTES: Complete notes are on page 45.

Table 87, AGS 225DS-300DS, Compressor, Pump and Condenser Fan Motor Amp Draw with Pump Package

AGS-DS UNIT SIZE w/SINGLE OR DUAL PUMP	VOLTS	HZ	RATED LOAD AMPS		NO OF FAN MTRS	FAN MTRS FLA (EA)	PUMP MTRS FLA (EA)	FAN MTRS LRA (EA)	Solid State LRA (Note 1)		Wye Delta LRA	
			CIRCUIT #1	CIRCUIT #2					CIRCUIT #1	CIRCUIT #2	CIRCUIT #1	CIRCUIT #2
225 w/ 15HP	460	60	195	195	12	4.1	21.0	23	1008	1008	310/1008	310/1008
	575		171	171	12	3.0	17.0	20	1310	1310	403/1310	403/1310
225 w/ 20HP	460	60	195	195	12	4.1	27.0	23	1008	1008	310/1008	310/1008
	575		171	171	12	3.0	22.0	20	1310	1310	403/1310	403/1310
225 w/ 25HP	460	60	195	195	12	4.1	34.0	23	1008	1008	310/1008	310/1008
	575		171	171	12	3.0	27.0	20	1310	1310	403/1310	403/1310
225 w/ 30HP	460	60	195	195	12	4.1	40.0	23	1008	1008	310/1008	310/1008
	575		171	171	12	3.0	32.0	20	1310	1310	403/1310	403/1310
250 w/ 20HP	460	60	195	225	14	4.1	27.0	23	1008	1485	310/1008	457/1485
	575		171	190	14	3.0	22.0	20	1310	1310	403/1310	403/1310
250 w/ 25HP	460	60	195	225	14	4.1	34.0	23	1008	1485	310/1008	457/1485
	575		171	190	14	3.0	27.0	20	1310	1310	403/1310	403/1310
250 w/ 30HP	460	60	195	225	14	4.1	40.0	23	1008	1485	310/1008	457/1485
	575		171	190	14	3.0	32.0	20	1310	1310	403/1310	403/1310
275 w/ 20HP	460	60	225	250	16	4.1	27.0	23	1485	1485	457/1485	457/1485
	575		190	210	16	3.0	22.0	20	1310	1310	403/1310	403/1310
275 w/ 25HP	460	60	225	250	16	4.1	34.0	23	1485	1485	457/1485	457/1485
	575		190	210	16	3.0	27.0	20	1310	1310	403/1310	403/1310
275 w/ 30HP	460	60	225	250	16	4.1	40.0	23	1485	1485	457/1485	457/1485
	575		190	210	16	3.0	32.0	20	1310	1310	403/1310	403/1310
300 w/ 20HP	460	60	250	250	16	4.1	27.0	23	1485	1485	457/1485	457/1485
	575		210	210	16	3.0	22.0	20	1310	1310	403/1310	403/1310
300 w/ 25HP	460	60	250	250	16	4.1	34.0	23	1485	1485	457/1485	457/1485
	575		210	210	16	3.0	27.0	20	1310	1310	403/1310	403/1310
300 w/ 30HP	460	60	250	250	16	4.1	40.0	23	1485	1485	457/1485	457/1485
	575		210	210	16	3.0	32.0	20	1310	1310	403/1310	403/1310

NOTES:

1. For Solid State starters, the inrush amps are 58% of the LRA
2. Complete notes are on page 45.

Electrical Data with Field-Wired Pump Package

Table 88, Wiring for Pump Package when Field-Wired with Separate Service

PUMP SIZE	VOLTS	HZ	MIN. CIRCUIT AMPACITY (MCA)	POWER SUPPLY				FIELD FUSE SIZE OR MAX. CKT. BREAKER	
				FIELD WIRE		FIELD SUPPLIED HUB (IN.)			
				QTY	WIRE GA	QTY	NOM. SIZE	RECOM.	MAX.
15 HP	460	60	27	3	10 AWG	1	0.5	35	45
	575		22	3	12 AWG	1	0.5	30	35
20 HP	460	60	34	3	10 AWG	1	0.5	45	60
	575		28	3	10 AWG	1	0.5	35	45
25 HP	460	60	43	3	8 AWG	1	0.5	60	70
	575		34	3	10 AWG	1	0.5	45	60
30 HP	460	60	50	3	8 AWG	1	0.5	70	90
	575		40	3	8 AWG	1	0.5	50	70
40 HP	460	60	65	3	6 AWG	1	0.75	110	110
	575		52	3	6 AWG	1	0.75	90	90
50 HP	460	60	82	3	4 AWG	1	1.0	110	125
	575		65	3	6 AWG	1	0.8	90	110

Table 89, AGS 225DS–450DS, Customer Unit Wiring Information with Optional Single-Point Power and Pump Package Field-Wired

AGS UNIT SIZE	VOLTS	HZ	POWER BLOCK (Std. Short Circuit Current Rating)		DISCONNECT SWITCH (Std. Short Circuit Current Rating)		DISCONNECT SWITCH (High Interrupt or High Short Circuit Current Rating)	
			TERMINAL SIZE AMPS	CONNECTION LUG RANGE PER PHASE	TERMINAL SIZE AMPS	CONNECTION LUG RANGE PER PHASE	TERMINAL SIZE AMPS	CONNECTION LUG RANGE PER PHASE
225DS	460	60	620A	#6-350 (2/PH)	600A	3/0-500 (2/PH)	1000A	#1-500 (2/PH)
	575		620A	#6-350 (2/PH)	600A	3/0-500 (2/PH)	800A	#1-500 (2/PH)
250DS	460	60	620A	#6-350 (2/PH)	800A	#1-500 (2/PH)	1000A	#1-500 (2/PH)
	575		620A	#6-350 (2/PH)	600A	3/0-500 (2/PH)	800A	#1-500 (2/PH)
275DS	460	60	760A	#4-500 (2/PH)	800A	#1-500 (2/PH)	1200A	#1-500 (2/PH)
	575		620A	#6-350 (2/PH)	600A	3/0-500 (2/PH)	1000A	#1-500 (2/PH)
300DS	460	60	760A	#4-500 (2/PH)	800A	#1-500 (2/PH)	1200A	#1-500 (2/PH)
	575		620A	#6-350 (2/PH)	600A	3/0-500 (2/PH)	1000A	#1-500 (2/PH)
330DS	460	60	760A	#4-500 (2/PH)	800A	#1-500 (2/PH)	1200A	#1-500 (2/PH)
	575		760A	#4-500 (2/PH)	800A	#1-500 (2/PH)	1200A	#1-500 (2/PH)
350DS	460	60	840A	#2-600 (2/PH)	1000A	#1-500 (2/PH)	1400A	300-600 (5/PH)
	575		760A	#4-500 (2/PH)	800A	#1-500 (2/PH)	1200A	#1-500 (2/PH)
360DS	460	60	840A	#2-600 (2/PH)	1000A	#1-500 (2/PH)	1400A	300-600 (5/PH)
	575		760A	#4-500 (2/PH)	800A	#1-500 (2/PH)	1200A	#1-500 (2/PH)
390DS	460	60	840A	#2-600 (2/PH)	1000A	#1-500 (2/PH)	1400A	300-600 (5/PH)
	575		760A	#4-500 (2/PH)	800A	#1-500 (2/PH)	1200A	#1-500 (2/PH)
400DS	460	60	1520A	#4-500 (4/PH)	1000A	#1-500 (2/PH)	1600A	300-600 (5/PH)
	575		760A	#4-500 (2/PH)	800A	#1-500 (2/PH)	1200A	#1-500 (2/PH)
450DS	460	60	1520A	#4-500 (4/PH)	1200A	#1-500 (2/PH)	1600A	300-600 (5/PH)
	575		840A	#2-600 (2/PH)	1000A	#1-500 (2/PH)	1400A	300-600 (5/PH)

NOTES:
1. Terminal size amps are the maximum amps that the power block is rated for.
2. Complete notes are on page 45.
3. Data based on 75°C wire.
4. (2/C) notation means two cables per conduit.

Table 90, AGS 225DS–450DS, Unit Wiring with Standard Multiple-Point Power and Disconnect Switches and Pump Package Field-Wired

AGS UNIT SIZE	VOLTS	HZ	DISCONNECT SW-CIRCUIT #1		DISCONNECT SW-CIRCUIT #2		DISCONNECT SW-CIRCUIT #3	
			TERMINAL SIZE AMPS	CONNECTION LUG RANGE PER PHASE	TERMINAL SIZE AMPS	CONNECTION LUG RANGE PER PHASE	TERMINAL SIZE AMPS	CONNECTION LUG RANGE PER PHASE
225DS	460	60	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	--	--
	575		350A	3/0-500 (2/PH)	350A	3/0-500 (2/PH)	--	--
250DS	460	60	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	--	--
	575		350A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	--	--
275DS	460	60	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	--	--
	575		400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	--	--
300DS	460	60	500A	3/0-500 (2/PH)	500A	3/0-500 (2/PH)	--	--
	575		400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	--	--
330DS	460	60	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)
	575		350A	3/0-500 (2/PH)	350A	3/0-500 (2/PH)	350A	3/0-500 (2/PH)
350DS	460	60	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)
	575		350A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	350A	3/0-500 (2/PH)
360DS	460	60	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)
	575		400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	350A	3/0-500 (2/PH)
390DS	460	60	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)
	575		400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)
400DS	460	60	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	500A	3/0-500 (2/PH)
	575		400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)
450DS	460	60	500A	3/0-500 (2/PH)	500A	3/0-500 (2/PH)	500A	3/0-500 (2/PH)
	575		400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)	400A	3/0-500 (2/PH)

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 45.

Application

Piping Connections

The ship-loose suction piping assembly, consisting of the suction guide and a short length of pipe must be field installed after receipt of the unit at the job site. Do not use the inlet assembly to support the return chilled water line. All piping must be supported separately.

A strainer, normally mounted at the inlet of the evaporator, is not required as the suction guide is equipped with a stainless steel strainer and disposable start-up strainer.

The supply chilled water line is connected to the evaporator outlet in normal fashion.

Electrical Connections

Pump packages on units up to Model AGS 300DS or with pump size up to30 HP have factory-installed power and control wiring. Units larger than 300DS or with pumps larger than 30 HP require field power wiring from a field-supplied power source with disconnect to the pump package electrical panel. The control wiring is factory-installed.

Freeze Protection

Page 111 contains information on freeze protection for the chiller unit. The addition of a pump package adds components that need protection.

If the system will be drained, the pump(s) and the interconnecting piping also have to be drained. A drain plug is provided at the very bottom of the pump housing and at the bottom of the evaporator barrel.

If the system is to have heat tracing, the factory pipe insulation will have to be removed and replaced after the installation of the tracing.

If an anti-freeze solution is to be used, additional anti-freeze must be added to protect the water in the pump package. See Table 68 for water volumes.

Installation

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. The addition of neoprene waffle pads (supplied by customer) under the frame allows water to drain from inside the frame, which can act as a dam.

On ground level applications, protection against vandalism is recommended; either by the optional factory-installed lower wire mesh guards or louvers, or by a field installed screening 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, 105°F (40.6°C), 125°F (52°C) with optional high ambient package (see detailed information on page 14)

Minimum operating ambient temperature (standard control), 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 chilled water delta-T range, 6 to 16 degrees F (3.3 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

Optional double evaporator insulation is recommended 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 Diagramfor connection location. In ice mode, the unit will operate at full load until the shutoff temperature setpoint is reached.

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.

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 proper air flow provides sufficient service clearance.

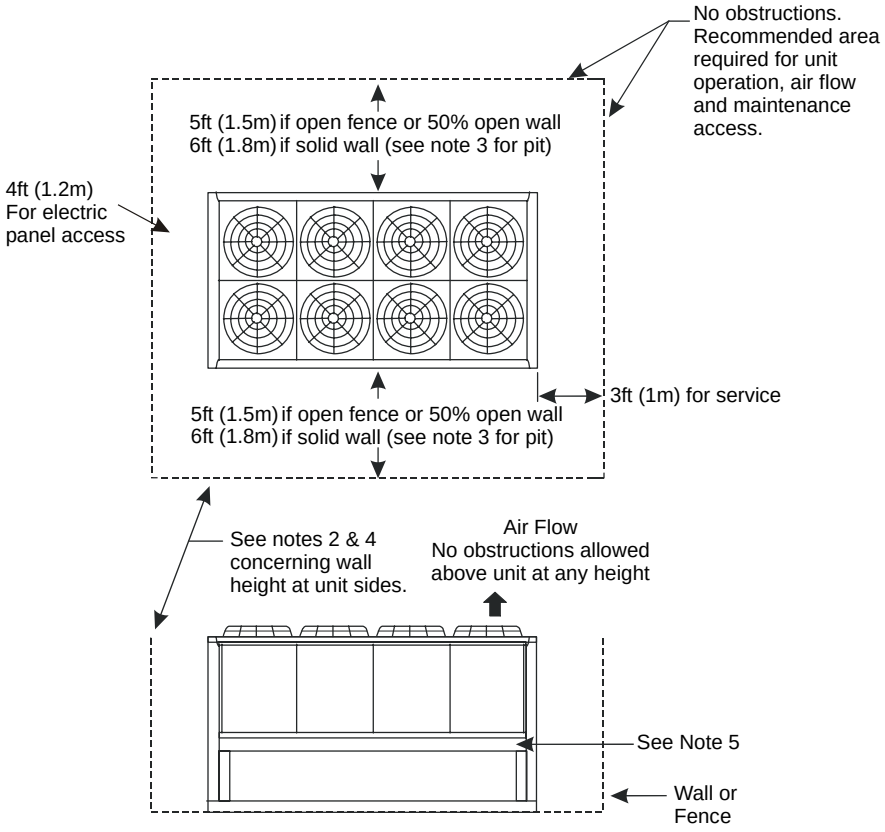
On all AGS units the condenser fans and motors can be removed from the top of the unit. The complete fan/motor assembly can be removed for service.

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

Sufficient room must be provided for replacing evaporator tubes. Refer to the unit dimension drawings.

Clearances

Figure 41, Clearance Requirements



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. The evaporator can be removed from the side of the unit.

Restricted Air Flow

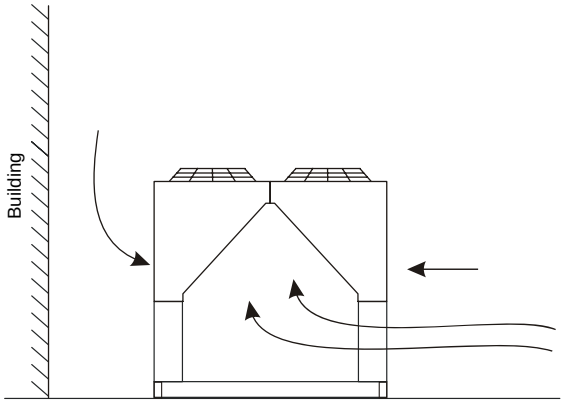
General

The clearances required for design operation of AGS 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 AGS 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 unit running (at reduced capacity), rather than allowing a shut-off on high discharge pressure.

Figure 42, 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 43, Unit Adjacent to Wall

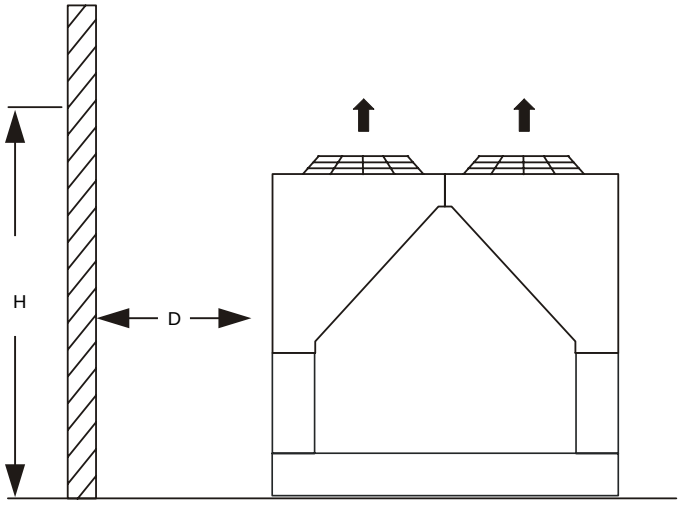
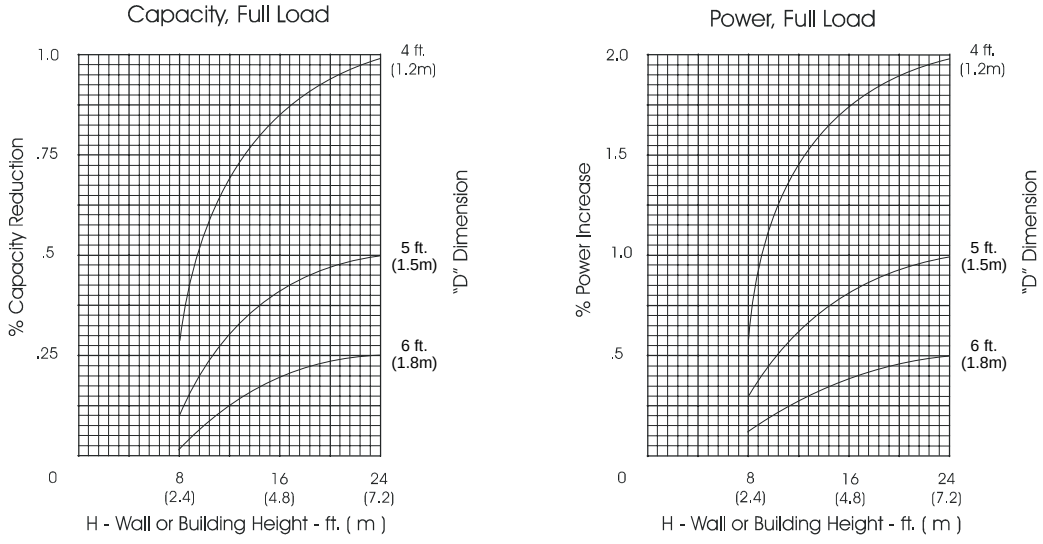


Figure 44, Adjustment Factors



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 45, Two Units Side by Side

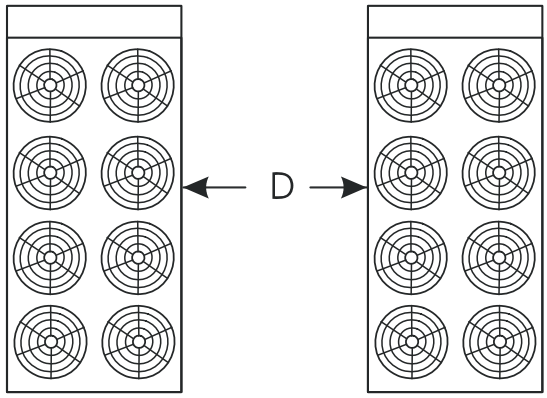
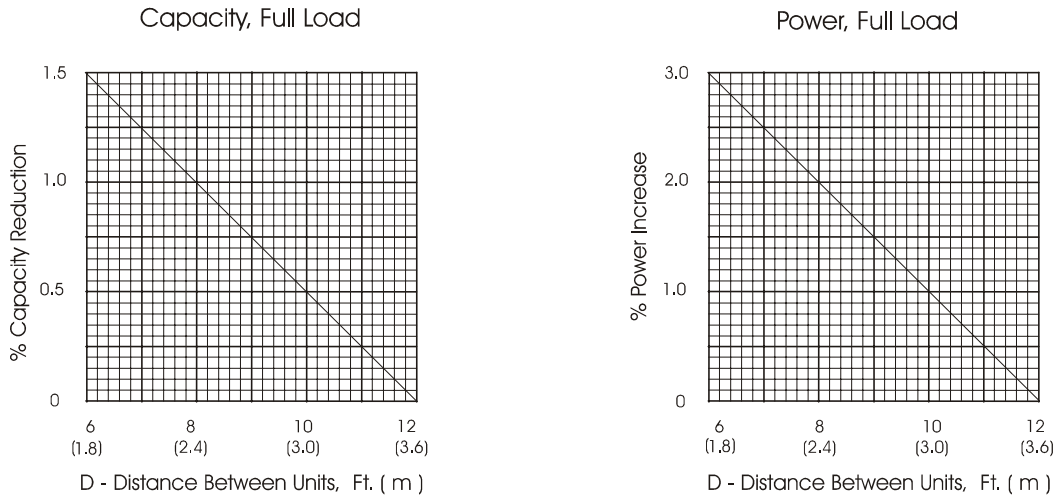


Figure 46, Adjustment Factor



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 47, Three or More Units

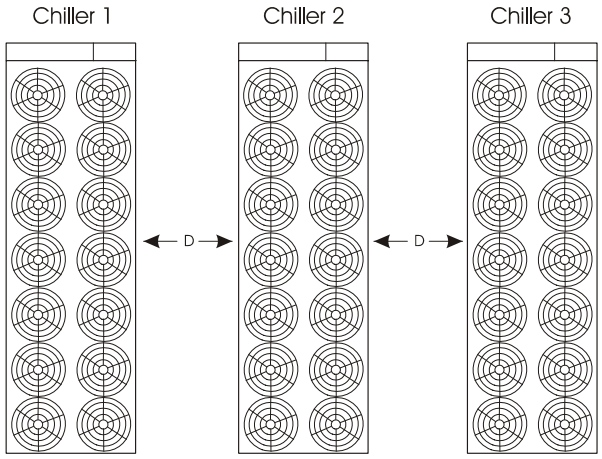
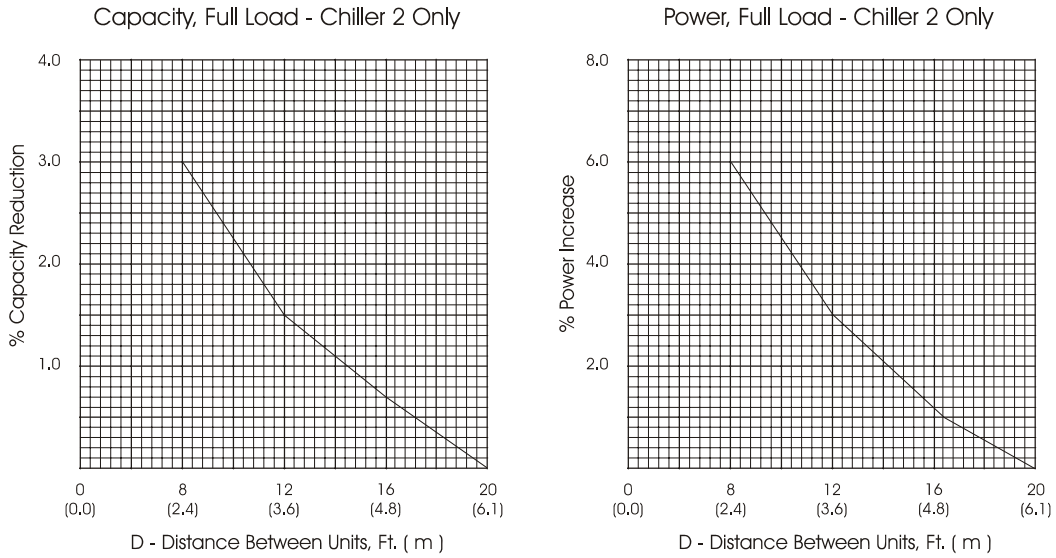


Figure 48, Adjustment Factor



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 49, Open Screening Walls

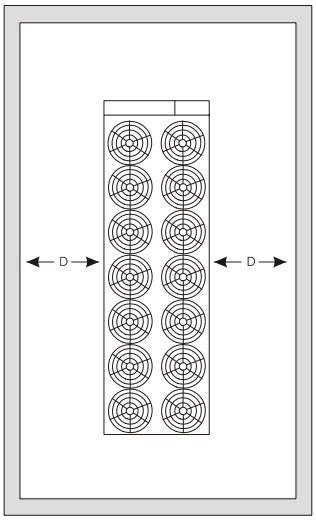
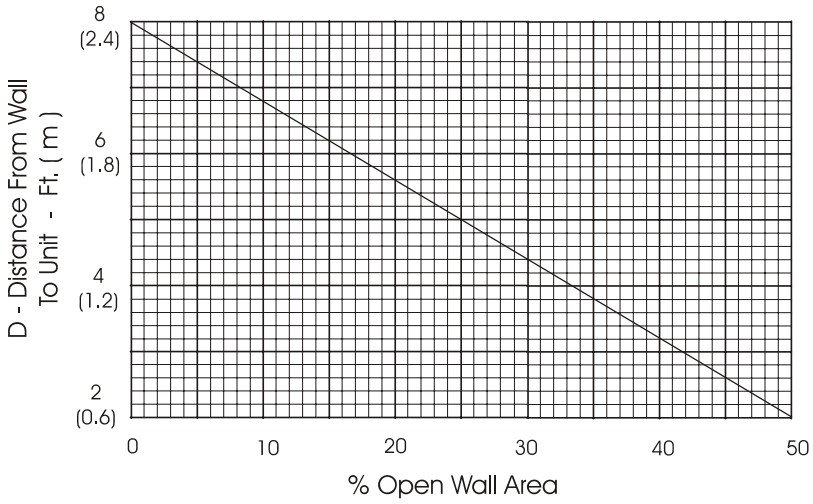


Figure 50, Wall Free Area vs Distance



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 51, Pit Installation

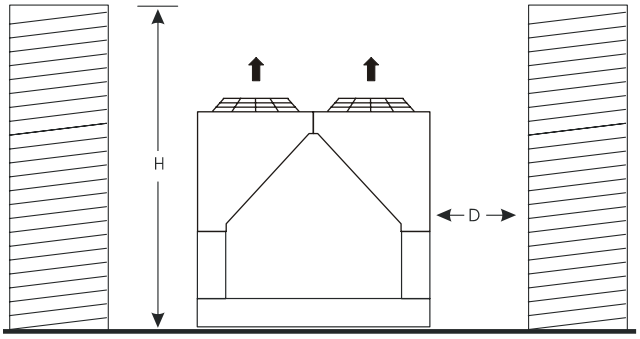
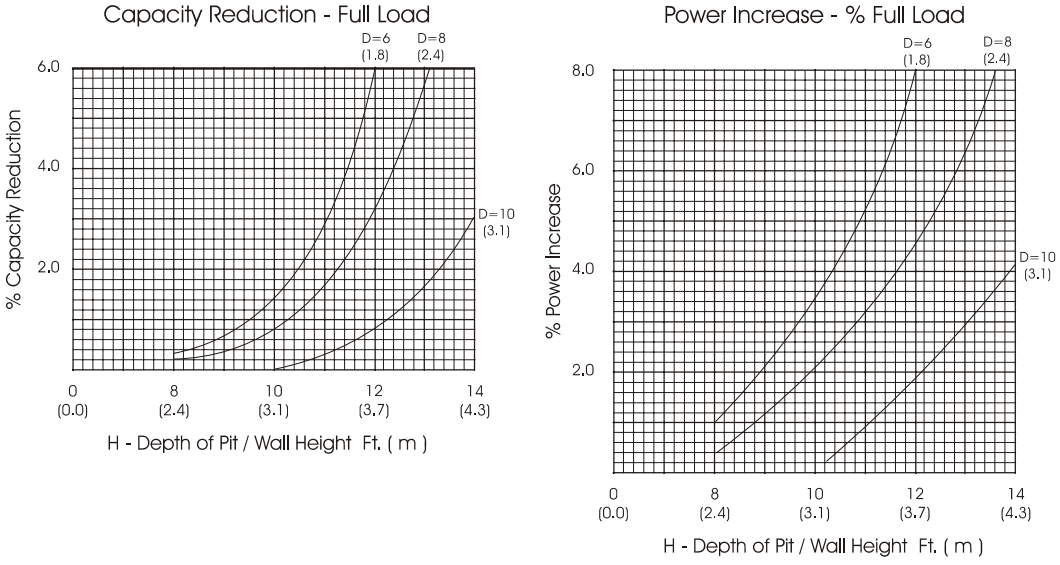


Figure 52, Adjustment Factor



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 multiples. 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 sections offer supplemental information to that discussed in ASHRAE handbooks, which are a recommended source.

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 catalogs 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:

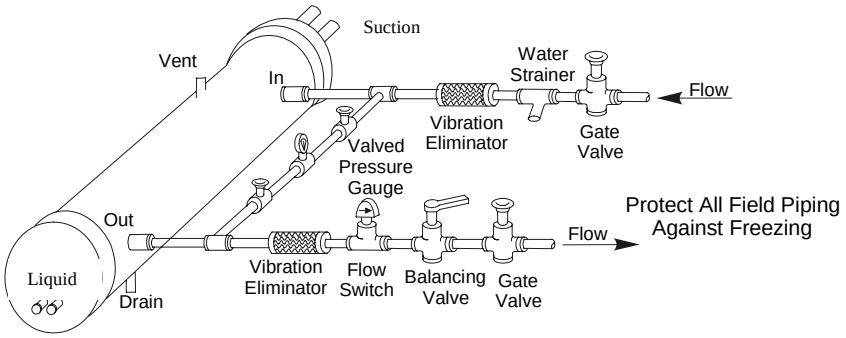
1. Confirm that the chilled water piping system had been properly flushed out before being connected to the chiller vessel.
2. Confirm that the piping contains:
    a) A cleanable 20-mesh strainer to remove impurities before they reach the chiller vessel
    b) An expansion tank in the piping
    c) 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 sometimes the lowest point in the piping system. Use a higher capacity filter for these installations and chemical treatment of the water.

Figure 53, 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 the evaporator pressure drop

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

All chilled water systems need adequate time to recognize a load change, respond to that load change and stabilize, without undesirable short cycling of the compressors or loss of control. In air conditioning systems, the potential for short cycling usually exists when the building load falls below the minimum chiller plant capacity or on close-coupled systems with very small water volumes.

Some of the things the designer should consider when looking at water volume are the minimum cooling load, the minimum chiller plant capacity during the low load period and the desired cycle time for the compressors.

Assuming that there are no sudden load changes and that the chiller plant has reasonable turndown, a rule of thumb of “gallons of water volume equal to two to three times the chilled water gpm flow rate” is often used.

A properly designed storage tank should be added if the system components do not provide sufficient water volume.

Flow Switch

A flow switch must be included in the chilled water system to prove that there is adequate water flow to the evaporator before the unit can start or to shut down the unit if water flow is interrupted.
A solid state, thermal dispersion flow switch that is factory-mounted in the chiller leaving water nozzle and factory-wired is available as an option.

Evaporator Freeze Protection

Evaporator freeze-up can be a concern in the application of air-cooled water chillers in areas experiencing below freezing temperatures. To protect against freeze-up, insulation and an electric heater cable are furnished with the unit. This helps protect 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 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 for this purpose.
2. Add a year around glycol solution to the chilled water system to provide freeze protection. Freeze point should be approximately ten-degrees below minimum design ambient temperature. The ten-degree value provides some safety for an unusual cold spell or from dilution of the system caused by adding water and no anti-freeze.
3. The addition of thermostatically controlled heat and insulation to exposed piping.
4. Continuous circulation of water through the chilled water piping and evaporator. (Dependent on power availability).

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.

NOTE: See page 100 for additional considerations on units with pump packages.

Table 91, 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

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. The pump will also be turned on when the ambient temperature reaches 40°F. Connection points are shown in Figure 9 on page 46.

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 is slow and the minimum and maximum flow rates for the vessel, listed on page 25 or 26, are not exceeded. The recommended maximum change in water flow is 10 percent of the change per minute.

Electrical Connections

All wiring must be done in accordance with applicable local and national codes. AGS units can be ordered with either standard multi-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 92, Electric Power Connection Options

Multi-Point Power Connection	Single-Point Power Connection
Standard: disconnect switch per circuit, no compressor isolation circuit breakers	Optional: one power block, compressor isolation circuit breakers
Optional: high interrupt rated disconnect switches, no compressor isolation circuit breakers	Optional: one disconnect switch replacing the power block, compressor isolation circuit breakers
Optional: high short circuit current rated panel, high interrupt disconnect switches, no compressor isolation circuit breakers	Optional: one high interrupt rated disconnect switch, compressor isolation circuit breakers
	Optional: high short circuit current rated panel, one high interrupt disconnect switch, compressor 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 93 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.
4. The factory-mounted control power transformer is protected by fuses.
5. Condenser fans are protected and isolated by circuit breakers.

Table 93, Interrupt Ratings (kAmps)

VOLTAGE	STANDARD SHORT CIRCUIT PANEL RATING	HIGH INTERRUPT DISCONNECT SWITCH	HIGH SHORT CIRCUIT RATED PANEL
460	35 kA	100 kA	65 kA
575	10 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.

Standard Features

Full Factory Testing

A factory run test, with water hookups, on all units prior to shipment helps 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 lubricant.

Construction

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

Compressors

All units feature multiple compressors with independent refrigerant circuits. The compressor is a direct drive, 3600 rpm, single-rotor 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 or three-circuit (depending on size), direct expansion, shell-and-tube type with water flowing in the shell side and refrigerant 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 350 psi (2413 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 three-phase, direct-drive, 1140 rpm, totally enclosed, air-over motors (TEAO) 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, optional louvers are available and recommended for low ambient temperature operation.

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. Several optional coil materials are available for corrosive atmospheres.

Control Center

The AGS screw chillers are shipped with all operating and equipment protection controls, control transformer, motor starters and electronic protection equipment, all factory-wired, operationally tested, and ready for service.

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

Microprocessor Control

The AGS chillers have the McQuay MicroTech II controller with the optional 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. A flow detection device of some type 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.

BAS Modules

A factory-installed communication module allows LONWORK®, BACnet® or Modbus® communications with BAS standard protocols. See page 11 for details. The module can also be retrofitted after shipment.

High Ambient Operation

This option is required for operation at ambient temperatures above 105°F (40.6°C), up to 125°F (51.7°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. 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 VFD heat.

Remote Display Module

A remote, wall-mounted display module, hard wired to the unit that provides the equivalent data display that is available on the unit's onboard controller.

Second Pump Output Signal

Provides a digital output to control a second chilled water pump. Standard unit has one pump output.

Electrical

The standard power connection is multi-point to disconnect switches (two or three) with through-the-door handles and no individual branch circuit breakers.

NOTE: see page 112 for ratings of standard and optional electrical panels.

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 switch to an isolating circuit breaker for each compressor circuit.

Single-Point Connection with High Interrupting Disconnect Switch

High interrupting current rated, factory-mounted disconnect switch. Includes factory-wiring to an additional isolating circuit breakers for each circuit. Interrupt ratings are shown in Table 93 on page 113

Single-Point Connection with High Short-Circuit Current Rated Panel,

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 93 on page113. The high short circuit rated panel means that a short circuit current up to the ratings shown in Table 93 will not destroy the enclosure, even though the internal components may be destroyed.

Multi-Point Connection with High Interrupting Disconnect Switches

Separate power supply to each circuit's high interrupting current rated disconnect switch. Isolating circuit breakers for each compressor are *not* included.

Multi-Point Connection with High Short Circuit Current Rated Panel,

High short-circuit current rated panel. Includes two or three high interrupting capacity disconnect switches. Interrupt ratings are shown in Table 93 on page113. Isolating circuit breakers for each compressor are *not* included. The high short circuit rated panel means that a short circuit current up to the ratings shown in Table 93 will not destroy the enclosure, even though the internal components may be destroyed.

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.

Wye-Delta Compressor Starters

Wye-delta starters in lieu of the standard solid-state starters.

Phase/Voltage Monitor

Phase/voltage monitor for wye-delta starters provides under/over voltage and phase sequence protection with LED indicating light. It comes as standard on solid-state starters.

Ground Fault Protection

Provides ground fault protection for the entire unit on wye-delta starters. It comes as standard on solid-state starters.

Unit

Right-hand Evaporator Water Connections

Right-hand evaporator water connections (as viewed from the control panel) are an available option only on two-compressor models, AGS 225DS-300DS and 225DE-300DE.

Remote Evaporator

The evaporator is shipped loose for remote mounting inside the building, eliminating potential freeze-up problems. Field refrigerant piping and wiring are required. Refrigerant specialties are shipped with the unit.

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

ElectroFin™ flexible dip and baked epoxy protective coating with 5000+ 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. Wire mesh 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-D 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 outer 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 Blankets

Removable sound blankets reduce unit overall sound level. See page 28 or page 29 for sound ratings.

Suction Shutoff Valves

Factory-mounted suction shutoff valves that, when used in conjunction with the compressor discharge valve, isolate the compressor for service.

MEA Approval Sticker

MEA approval sticker on unit. Required in New York City.

Pump Package

Factory-mounted on all sizes and factory wired on units up to AGS 300 or pumps up to 30 HP. The package includes either a single pump or dual pumps in a single casing, a combination discharge check, shutoff and throttling valve, a combination suction guide with flow stabilizing vanes and strainer, flow switch, control panel, and interconnecting piping from the pump to the evaporator inlet.

Specifications

NOTE: 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. 1/3 octave band sound ratings per ARI Standard 370..
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 and fully delineate field and factory wiring.

5. Certification of factory run test.

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 (except for field-installed piping on remote evaporator installations).

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.

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.

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) ambient temperature.

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, sound enclosures and/or low-sound fans. Chiller performance, affected by the use of these devices, shall meet or exceed the scheduled performance requirements. Sound measurements are to be taken in accordance with ARI Standard 370

Octave band								
63	125	350	500	1000	2000	4000	8000	dBA

Also, achieve both of the following sound level performance criteria:

a. Over the eight octave bands, sound levels shall be equal to or less than the sound level data contained in equipment schedules.

b. Based on 1/3 octave band data the dba level of any band shall not be more than:

1) 15 db above the arithmetic average of the two adjacent bands between 25 Hz and 125 Hz

2) 8 db above the arithmetic average of the two adjacent bands between 160 Hz and 400 Hz

3) 5 db above the arithmetic average of the two adjacent bands between 500 Hz and 10,000 Hz

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 additional 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.

C. Solid-State Compressor Motor Starters: Each 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. 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

OPTION Wye-Delta Compressor Motor Starter: Each compressor shall be equipped with an open transition, wye-delta starter.

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' exterior 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 upper coil louvers.

Fan motors shall be weather protected, three-phase, direct-drive, 1140 rpm, TEAO, 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, liquid line shutoff valves, replaceable core filter-driers, sight glass with moisture indicator and combination discharge check and shutoff valve

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:

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 tool-lockable. Barrier panels shall be provided to protect against accidental contact with line voltage when accessing the control system.

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.

Single-Point Connection to Disconnect Switch

Multi-point power supply to factory-mounted disconnect switches with through-the-door handles, for each compressor circuit.

OPTION: Single-point power connection with high interrupting disconnect switch consisting of a high interrupting current rated, factory-mounted disconnect switch and includes factory-wiring to an additional isolating circuit breakers for each compressor circuit.

OPTION: High short-circuit current rated panel including a single-point high interrupting capacity unit disconnect switch and factory-wiring to standard isolating circuit breakers for each circuit.

OPTION: Separate multi-point power supply to each circuit's high interrupting current rated disconnect switch. Isolating circuit breakers for each compressor are not included.

OPTION: Multi-point connection to high short-circuit current rated panel. Includes two or three high interrupting capacity disconnect switches. Isolating circuit breakers for each compressor are not included.

b. Control system starting components shall include solid-state start timer.
c. 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.
d. 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.
e. User controls shall include auto/stop switch, chilled water set-point adjustment, anti-recycle timer, and digital display with water temperature and setpoint, operating temperatures and pressures, and diagnostic messages.
f. 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. OPTIONAL: BAS communication flexibility through Protocol Selectability™, modular plug-ins that enable the unit controller to communicate using standardized protocols such as LONTALK®, Modbus® and BACnet®.

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

vii. 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.

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

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

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

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

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

2.05 OPTIONS AND ACCESSORIES

- Chilled water flow switch to be factory mounted in the chilled water outlet nozzle and factory wired to terminals in the control panel.
- Compressor sound blankets
- Double evaporator insulation for low chilled fluid applications
- Remote evaporator for field mounting, piping and wiring, to include refrigerant specialties shipped with the unit for field mounting.
- Pump package mounted on the unit as specified elsewhere and consisting of pump(s), combination discharge check/shut-off/throttling valve, inlet guide assembly with flow stabilizing vanes, stainless steel strainer, and disposable fine-mesh startup strainer, flow switch, control panel, and piping from the pump outlet to the evaporator inlet.
- Right hand evaporator connections (available up to 300 tons)
- Optional condenser coils. Aluminum fin is standard
    - Copper fin

- Aluminum fin with precoated black fin
- Aluminum fin with dipped and baked coating
- Copper fin with dipped and baked coating

- Low ambient temperature operation to 0°F (-18°C) with fan speed control
- Spring vibration isolators for field installation
- 115-volt convenience outlet mounted in control panel
- Unit enclosure options: Standard is vinyl-coated wire mesh screens over the condenser coils. Options are:
  - Vinyl-coated wire mesh screens enclosing the frame section
  - Stamped louvers covering the condenser coil
  - Stamped louvers covering the frame section
  - Louvers over the condenser coil and wire mesh screen on frame section
- High ambient temperature operation, control panel modifications for operation above 105°F to 125°F

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.

END OF SECTION

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.**