Air-Cooled Scroll Compressor Water Chillers

AGZ 010A – AGZ 034A

10 to 34 Tons, 35 to 120 kW
R-22, 60 Hertz

McQuay® Air Conditioning

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Introduction

McQuay International offers a complete line of air-cooled chillers from 10 to 425 tons (35 to 1500 kW) utilizing scroll, reciprocating and rotary-screw compressors.

This manual contains information on Models AGZ 010A through AGZ 034A, 10 to 34 tons (35 through 120 kW). These units are also available with the evaporators shipped separately for remote mounting. Contact the local McQuay sales office for details.

The McQuay AGZ air-cooled chillers are a product of the McQuay commitment to offer reliable, energy efficient equipment design incorporating high quality compressors and platform components with uncompromised operating efficiency.

ARI Standard 550/590-98 Certified

Efficiency

- Meets or exceeds ASHRAE 90.1-1999 efficiency standard
- Oversized condenser coils
- Copeland Compliant Scroll® compressors
- Maximum capacity reduction

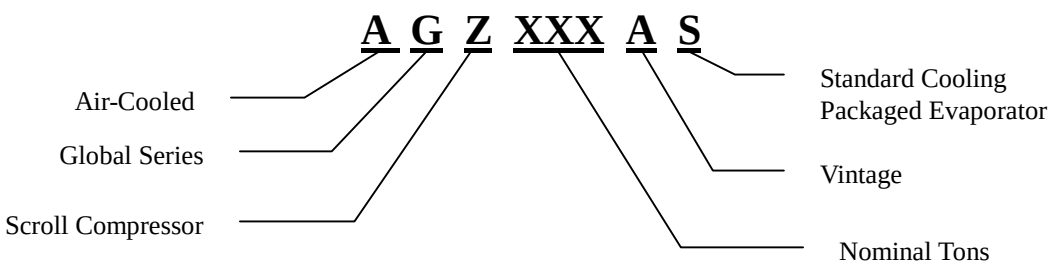
Reliability

- Rugged, proven compressor design
- Microprocessor operating and equipment protection controls
- Code and agency approval

Flexibility

- Complete factory assembly
- Seven sizes available from 10 to 34 tons
- Wide range of factory- and field installed-options
- Stock available in all sizes

MODEL CODE



Standard Construction

Construction

The AGZ 010A through 034A air-cooled water chillers are factory assembled and mounted on heavy-gauge steel channel base. This base distributes the unit weight for more even roof loading.

Compressors

All models use Copeland's Compliant Scroll® tandem compressors. These rugged hermetic compressors are constructed with an integral cast iron frame, cast iron scrolls, three Teflon® impregnated bearings, and three oil filtration devices for each compressor.

Using Copeland Compliant Scroll tandems provides two steps of modulation. One or both compressors can run, depending on the load of the system, resulting in part-load efficiency that is greater than full-load efficiency. Oil migration is controlled with two specially designed oil and gas equalization lines.

The design also offers radial and axial compliance (no tip seals), a large internal volume for liquid handling, a removable suction screen, and a rotary dirt trap and oil screen. In addition, the compressor is self-compensating for wear, handles liquid and debris, and inherently yields the highest efficiency for its class.

The compressor includes a solid-state motor protection module (Models AGZ 013 through 034 and internal power breakage on the AGZ 010) four individual motor-winding sensors, a patented internal discharge temperature probe, and a patented shutdown feature that prevents reverse rotation. An internal discharge check valve helps prevent shutdown noise and comes standard with high- and low-pressure taps with Shrader valves, a sight glass, an oil level adjustment valve, and an off-cycle crankcase heater.

Condenser Coils

Condenser coils have internally enhanced, seamless copper tubes arranged in a staggered row pattern. The coils are mechanically expanded into McQuay's lanced and rippled aluminum fins with full fin collars. Copper fins and coated fins are available options. Coil guards providing fin protection are standard equipment.

Condenser Fans and Motors

Multiple direct-drive propeller fans operate in formed bell-shaped orifices at low tip speeds for maximum efficiency and minimum noise and vibration. A heavy-gauge close mesh fan guard protects each fan.

Each condenser fan has a heavy-duty, three-phase TEAO motor with permanently lubricated ball bearings and inherent overload protection. Optional SpeedTrol motors are weather-protected.

Evaporator

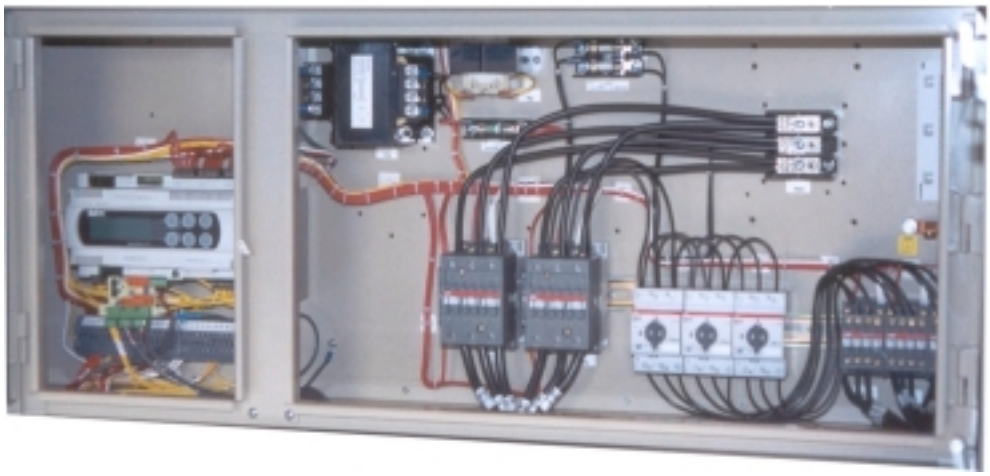
The evaporator is a compact, high efficiency, single circuit, brazed plate-to-plate type heat exchanger consisting of parallel stainless steel plates.

The evaporator is protected with an electric resistance heater and insulated with 3/4"(19mm) thick closed-cell polyurethane insulation. This combination provides freeze protection down to -20°F (-29°C) ambient air temperature.

The water side working pressure is 350 psig (2413 kPa). Evaporators are designed and constructed according to, and listed by, Underwriters Laboratories (UL).

Electrical Control Center

Operating controls, equipment protection controls, and motor starting equipment are factory wired, operationally tested, and ready for service. A state-of-the-art microprocessor with a 4-line by 20-character liquid crystal display provides the operating and protection functions. Across-the-Line compressor starters, fan contactors, evaporator heater fusing, control power transformer, and FanTrol discharge pressure control to 35°F are included as standard. Power and control components are housed in separate compartments, each with its own door.



Control System

The MicroTech II™ advanced DDC chiller controller surpasses all other microprocessor-based chiller control systems available today on this class of equipment. This powerful, user-friendly control system provides the flexibility and performance needed for a stand-alone unit as well as multiple units tied into a network system.

MicroTech II's state-of-the-art design will not only permit the chiller to run more efficiently, but will also simplify troubleshooting if a system failure occurs. Every MicroTech II controller is programmed and tested prior to shipment to provide a trouble-free start-up.

Operator-friendly

The MicroTech II menu structure is separated into four distinct categories which provide the operator or service technician with a full description of current unit status, control parameters, and alarms. Security protection helps prevent unauthorized changing of the setpoints and control parameters.

MicroTech II continuously performs self-diagnostic checks, monitoring system temperatures, pressures and protection devices, and it will automatically shutdown a compressor, a refrigerant circuit or the entire unit if a fault occurs. The cause of the shutdown will be retained in memory and can be easily displayed in plain English or metric units for operator review. The MicroTech II chiller controller can also retain and display the time the fault occurred and the operating conditions that were present at the time of the fault, which is an extremely useful feature for troubleshooting. In addition to displaying alarm diagnostics, the MicroTech II chiller controller also provides the operator with a warning of pre-alarm conditions.

Staging

The two scroll compressors are staged on and off as a function of leaving chilled water temperature. Lead/lag is automatic and switched every ten starts.

Equipment Protection

The unit is protected in two ways: (1) by alarms that shut the unit down and require manual reset to restore unit operation and (2) by limit alarms that reduce unit operation in response to some out-of-limit condition. Shut down alarms activate an alarm signal.

Shutdown Alarms

- No evaporator water flow
- Low evaporator pressure
- High condenser pressure
- Motor protection system
- Phase voltage protection (Optional)
- Outside ambient temperature
- Evaporator freeze protection
- Sensor failures

Limit Alarms

- Condenser pressure stage down, unloads unit at high discharge pressures
- Low ambient lockout, shuts off unit at low ambient temperatures
- Low evaporator pressure hold, holds stage #1 until pressure rises
- Low evaporator pressure unload, shuts off stage #2

Unit Enable Selection

Enables unit operation from either local keypad, digital input, or BAS

Unit Mode Selection

Selects standard cooling, ice, glycol, or test operation mode

Analog Inputs

- Reset of leaving water temperature, 4-20 mA

Digital Inputs

- Unit off switch
- Remote start/stop
- Flow switch
- Ice mode switch, converts control operation and setpoints for ice production
- Motor protection

Digital Outputs

- Shutdown alarm; field wired, activates on an alarm condition, off when alarm is cleared
- Evaporator pump; field wired, starts pump when unit is set to start

Condenser fan control

Control of condenser fans is provided by the MicroTech II controller. The control steps condenser fans based on discharge pressure.

Building Automation System (BAS) Interface

The following BAS protocols are supported:

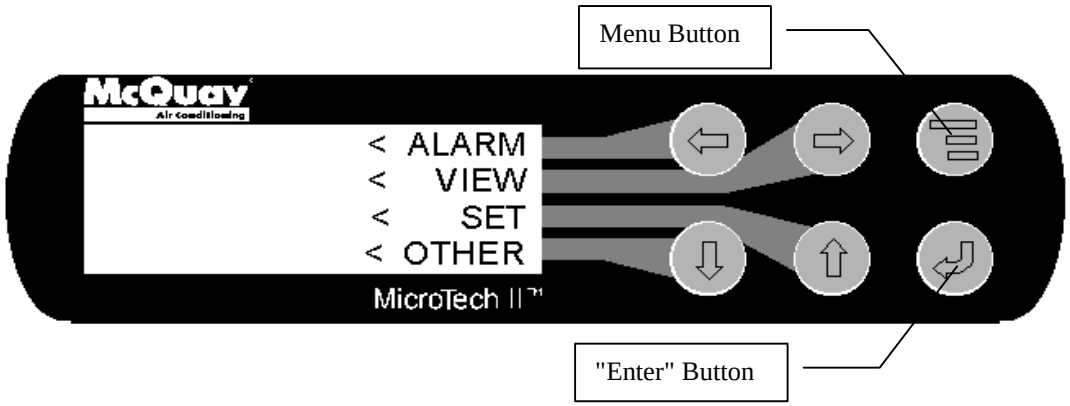
- BACnet®
- LonMark®

The following functions are generally available depending on the application and protocol in use:

- Enable/disable operation
- Select operating mode
- Set chilled water setpoint
- Set the network limit variable
- Read all digital and analog inputs and outputs
- Read operating mode and status
- Send a description of each alarm when it occurs

Keypad/Display

A 4-line by-20 character/line liquid crystal display and 6-key keypad is mounted on the unit controller. Its layout is shown below.



The four arrow buttons (UP, DOWN, LEFT, RIGHT) have three modes of use.

- Scroll between data screens as indicated by the arrows (default mode).
- Select a specific data screen in a hierarchical fashion using dynamic labels on the right side of the display (this mode is entered by pressing the MENU button).
- Change field values in edit mode.

Refrigerant Piping

Includes insulated suction line, sealed filter-drier, sightglass, solenoid valve, expansion valve, charging valves and relief valves.

Selection Procedure, I-P Units

Table 4 covers the range of leaving evaporator water temperatures and outside ambient temperatures encompassed under ARI 550/590-98. The tables are based on a 10 degree F temperature drop through the evaporator. Adjustment factors for applications having other than a 10 degree F drop can be found in Table 3. The minimum leaving chilled water temperature setpoint without glycol is 40°F. For anti-freeze selections, see Table 1 for ethylene glycol or Table 2 for propylene glycol adjustment factors. Ratings are based on a 0.0001 fouling factor in the evaporator at sea level operation. For other fouling factors, derates for different Delta-Ts, or altitude correction factors see Table 3. For applications outside the catalog ratings, contact your local McQuay sales representative.

Selection example

Given:

20 tons minimum.
95°F ambient temperature
48 gpm, 54°F - 44°F chilled water
0.0001 evaporator fouling factor

1. From Performance Table 4, an AGZ 020A at the given conditions will produce 20.4 tons with a compressor kW input of 22.2 and a unit EER of 9.6
2. Use the following formula to calculate any missing elements:

$$\text{GPM} = \frac{tons \times 24}{°F} \qquad \text{(Water only)}$$

3. Determine the evaporator pressure drop. Using Figure 1, enter at 48.0 gpm and follow up to the AGZ 020A line intersect. Read horizontally to obtain an evaporator pressure drop of 5.6 feet of water.

Selection example using ethylene glycol

Given:

15 tons minimum
95°F ambient air temperature
54°F - 44°F chilled water temperature
0.0001 evaporator fouling factor
Protect from freezing down to 0°F

1. From Table 1, select an ethylene glycol concentration of 40% to protect against freezing at 0°F.
2. At 40% glycol the correction factors are: Capacity = 0.961, kW = 0.976,
   Flow = 1.121, pressure drop = 1.263
3. Consider the AGZ 017A and correct with 40% ethylene glycol factors.
4. Correct capacity = 0.961 x 15.9 tons = 15.3 tons
5. Correct compressor kW = 0.976 x 17.5 = 17.1 kW
6. Correct chilled water flow:

$$\text{Water flow (at corrected capacity)} = \frac{15\,tons \times 24}{10°F} = 36.0 \text{ gpm}$$

   Glycol flow (at 40% solution) = 1.121 x 36.0 gpm = 40.4 gpm

Determine the evaporator pressure drop. Using Figure 1, enter at 36.0 gpm water flow and follow up to the AGZ 017A line intersect. Read horizontally to obtain an evaporator pressure drop of 3.7 feet. Correct for glycol, 1.263 x 3.7 = 4.7 ft.

Performance Adjustment Factors

Ethylene and Propylene Glycol Factors

AGZ units can operate with a leaving chilled fluid temperature range of 20°F (-6°C) to 60°F (15.6°C). A glycol solution is required when leaving chilled fluid temperature is below 40°F (4.4°C). The use of glycol will reduce the performance of the unit depending on concentration.

Table 1, Ethylene Glycol

% E.G.	Freeze Point					
	°F	°C	Cap.	Power	Flow	PD
10	26	-3	0.991	0.996	1.013	1.070
20	18	-8	0.982	0.992	1.040	1.129
30	7	-14	0.972	0.986	1.074	1.181
40	-7	-22	0.961	0.976	1.121	1.263
50	-28	-33	0.946	0.966	1.178	1.308

Table 2, Propylene Glycol

% P.G.	Freeze Point					
	°F	°C	Cap.	Power	Flow	PD
10	26	-3	0.987	0.992	1.010	1.068
20	19	-7	0.975	0.985	1.028	1.147
30	9	-13	0.962	0.978	1.050	1.248
40	-5	-21	0.946	0.971	1.078	1.366
50	-27	-33	0.929	0.965	1.116	1.481

NOTE: Units with glycol are not included in the ARI Certification Program

Altitude Correction Factors

Performance tables are based at sea level. Elevations other than sea level affect the performance of the unit. The decreased air density will reduce condenser capacity and reduce the unit's performance. For performance at elevations other than sea level refer to Table 3.

Evaporator Temperature Drop Factors

Performance tables are based on a 10°F (5°C) temperature drop through the evaporator. Adjustment factors for applications having temperature drops from 6°F to 16°F (3.3°C to 8.9°C) are in Table 3. Temperature drops outside this 6°F to 16°F (3.3°C to 8.9°C) range can affect the control 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).

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 than 0.0001 (0.0176) fouling factor, refer to Table 3.

Foreign matter in the chilled water system will change the heat transfer capability of the evaporator, and could increase the pressure drop and reduce the water flow. A water strainer must be installed in the return line at the entrance to the evaporator. For optimum unit operation, maintain proper water treatment.

Table 3, Capacity and Power Derates

Altitude	Chilled Water Temperature Range		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	3.3	0.995	0.999	0.990	0.997	0.973	0.992	0.939	0.982
	8	4.4	0.997	0.999	0.992	0.998	0.974	0.992	0.941	0.982
	10	5.6	1.000	1.000	0.995	0.998	0.977	0.993	0.944	0.983
	12	6.7	1.004	1.001	0.998	1.000	0.981	0.994	0.947	0.984
	14	6.8	1.008	1.002	1.003	1.001	0.985	0.996	0.951	0.986
	16	8.9	1.012	1.003	1.006	1.002	0.988	0.997	0.955	0.987
2000 feet	6	3.3	0.993	1.005	0.988	1.004	0.971	0.998	0.938	0.988
	8	4.4	0.995	1.006	0.990	1.004	0.972	0.999	0.939	0.989
	10	5.6	0.998	1.007	0.993	1.005	0.975	1.000	0.942	0.990
	12	6.7	1.002	1.008	0.997	1.006	0.979	1.001	0.946	0.991
	14	6.8	1.006	1.009	1.000	1.007	0.983	1.002	0.949	0.992
	16	8.9	1.010	1.010	1.004	1.009	0.987	1.003	0.953	0.993
4000 feet	6	3.3	0.991	1.012	0.986	1.011	0.968	1.006	0.935	0.996
	8	4.4	0.993	1.013	0.988	1.011	0.970	1.006	0.937	0.996
	10	5.6	0.996	1.014	0.991	1.012	0.973	1.007	0.940	0.997
	12	6.7	1.000	1.015	0.994	1.013	0.977	1.008	0.943	0.998
	14	6.8	1.004	1.016	0.998	1.015	0.981	1.009	0.947	0.999
	16	8.9	1.007	1.018	1.002	1.016	0.984	1.011	0.951	1.001
6000 feet	6	3.3	0.989	1.020	0.983	1.019	0.966	1.014	0.933	1.003
	8	4.4	0.990	1.021	0.985	1.019	0.968	1.014	0.935	1.004
	10	5.6	0.993	1.022	0.988	1.020	0.971	1.015	0.937	1.005
	12	6.7	0.997	1.023	0.992	1.022	0.974	1.016	0.941	1.006
	14	6.8	1.001	1.024	0.996	1.023	0.978	1.018	0.945	1.007
	16	8.9	1.005	1.026	0.999	1.024	0.982	1.019	0.948	1.009
8000 feet	6	3.3	0.986	1.029	0.980	1.028	0.963	1.022	0.930	1.012
	8	4.4	0.988	1.030	0.982	1.028	0.965	1.023	0.932	1.013
	10	5.6	0.990	1.031	0.985	1.029	0.968	1.024	0.935	1.014
	12	6.7	0.994	1.032	0.989	1.031	0.971	1.025	0.938	1.015
	14	6.8	0.998	1.034	0.993	1.032	0.975	1.027	0.942	1.016
	16	8.9	1.002	1.035	0.996	1.033	0.979	1.028	0.945	1.018

Performance Data

Table 4, AGZ 010A – 034A, I-P Units

AGZ Unit Size	LWT (° F)	Ambient Air Temperature (°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
010	40	9.8	7.8	11.7	9.4	8.7	10.3	9.0	9.6	9.1	8.6	10.8	7.9	8.1	12.0	6.8
	42	10.2	7.9	12.0	9.8	8.8	10.7	9.4	9.7	9.4	8.9	10.8	8.2	8.4	12.1	7.0
	44	10.6	8.0	12.4	10.2	8.8	11.0	**9.8**	**9.8**	**9.7**	9.3	10.9	8.4	8.8	12.2	7.3
	46	11.1	8.1	12.8	10.6	8.9	11.3	10.2	9.9	10.0	9.7	11.0	8.7	9.2	12.3	7.5
	48	11.5	8.2	13.2	11.0	9.0	11.7	10.6	10.0	10.3	10.1	11.1	9.0	9.5	12.4	7.8
	50	11.9	8.3	13.5	11.4	9.1	12.0	11.0	10.1	10.6	10.5	11.2	9.3	9.9	12.5	8.0
013	40	13.5	11.6	11.6	12.9	12.8	10.3	12.3	14.1	9.0	11.7	15.6	7.9	11.1	17.2	6.8
	42	14.0	11.7	12.0	13.4	12.9	10.6	12.8	14.2	9.3	12.2	15.7	8.1	11.5	17.4	7.0
	44	14.5	11.8	12.3	13.9	13.0	10.9	**13.3**	**14.4**	**9.6**	12.6	15.9	8.3	11.9	17.5	7.2
	46	15.1	12.0	12.7	14.4	13.2	11.2	13.8	14.5	9.8	13.1	16.0	8.6	12.4	17.7	7.4
	48	15.6	12.1	13.0	15.0	13.3	11.5	14.3	14.7	10.1	13.6	16.2	8.8	12.8	17.8	7.7
	50	16.2	12.2	13.4	15.5	13.4	11.8	14.8	14.8	10.4	14.1	16.3	9.1	13.3	18.0	7.9
017	40	16.2	14.0	11.9	15.5	15.5	10.5	14.8	17.2	9.1	14.0	18.9	7.9	13.2	20.9	6.8
	42	16.8	14.2	12.3	16.1	15.7	10.7	15.3	17.3	9.4	14.5	19.1	8.1	13.7	21.1	7.0
	44	17.4	14.3	12.6	16.7	15.8	11.0	**15.9**	**17.5**	**9.6**	15.0	19.3	8.4	14.2	21.3	7.2
	46	18.1	14.5	12.9	17.3	16.0	11.3	16.4	17.6	9.9	15.6	19.5	8.6	14.7	21.4	7.4
	48	18.7	14.7	13.2	17.9	16.2	11.6	17.0	17.8	10.1	16.1	19.6	8.8	15.2	21.6	7.6
	50	19.3	14.8	13.5	18.5	16.3	11.9	17.6	18.0	10.4	16.7	19.8	9.0	15.7	21.8	7.8
020	40	20.8	18.0	11.8	19.9	19.8	10.4	19.0	21.8	9.1	18.0	24.0	7.9	16.9	26.4	6.8
	42	21.5	18.2	12.1	20.6	20.0	10.7	19.7	22.0	9.4	18.6	24.2	8.2	17.5	26.7	7.0
	44	22.3	18.4	12.4	21.4	20.2	11.0	**20.4**	**22.2**	**9.6**	19.3	24.4	8.4	18.2	26.9	7.3
	46	23.1	18.6	12.7	22.1	20.4	11.3	21.1	22.4	9.9	20.0	24.7	8.6	18.9	27.1	7.5
	48	23.9	18.8	13.1	22.9	20.6	11.6	21.9	22.6	10.2	20.7	24.9	8.9	19.5	27.4	7.7
	50	24.8	19.0	13.4	23.7	20.8	11.9	22.6	22.9	10.4	21.5	25.1	9.1	20.2	27.6	7.9
025	40	23.1	20.6	11.7	22.2	22.6	10.4	21.1	24.8	9.1	19.9	27.2	7.9	18.7	29.9	6.8
	42	24.0	20.9	12.1	23.0	22.8	10.7	21.9	25.0	9.4	20.7	27.5	8.1	19.4	30.2	7.0
	44	24.9	21.1	12.4	23.8	23.1	10.9	**22.7**	**25.3**	**9.6**	21.4	27.8	8.4	20.1	30.5	7.2
	46	26.0	21.1	12.9	24.7	23.3	11.2	23.5	25.6	9.9	22.2	28.0	8.6	20.9	30.8	7.4
	48	26.7	21.7	13.0	25.6	23.6	11.5	24.3	25.8	10.1	23.0	28.3	8.8	21.6	31.1	7.6
	50	27.7	21.9	13.3	26.5	23.9	11.8	25.2	26.1	10.4	23.8	28.6	9.0	22.4	31.4	7.8
029	40	28.8	24.8	12.3	27.6	27.5	10.8	26.3	30.4	9.4	25.0	33.5	8.2	23.6	37.0	7.0
	42	29.9	25.1	12.7	28.6	27.8	11.1	27.3	30.7	9.7	25.9	33.9	8.4	24.4	37.3	7.2
	44	31.0	25.4	13.0	29.7	28.1	11.4	**28.3**	**31.0**	**9.9**	26.8	34.2	8.6	25.3	37.7	7.4
	46	32.1	25.7	13.3	30.7	28.4	11.7	29.3	31.3	10.2	27.8	34.6	8.8	26.2	38.1	7.6
	48	33.3	26.1	13.6	31.8	28.7	12.0	30.3	31.7	10.4	28.8	34.9	9.1	27.2	38.4	7.8
	50	34.4	26.4	13.9	32.9	29.1	12.2	31.4	32.0	10.7	29.8	35.3	9.3	28.1	38.8	8.0
034	40	34.9	32.4	11.9	33.4	35.6	10.5	31.7	39.0	9.1	29.9	42.6	7.9	27.9	46.5	6.8
	42	36.1	32.8	12.2	34.6	36.0	10.7	32.9	39.5	9.4	31.0	43.1	8.1	28.9	47.0	7.0
	44	37.4	33.3	12.5	35.8	36.4	11.0	**34.0**	**39.9**	**9.6**	32.1	43.6	8.3	30.0	47.6	7.2
	46	38.8	33.7	12.8	37.1	36.9	11.3	35.2	40.4	9.8	33.2	44.1	8.5	31.1	48.1	7.4
	48	40.1	34.1	13.1	38.3	37.3	11.5	36.4	40.9	10.1	34.4	44.7	8.7	32.2	48.7	7.5
	50	41.5	34.6	13.4	39.6	37.8	11.8	37.7	41.4	10.3	35.6	45.2	8.9	33.3	49.2	7.7

Notes;

1. Ratings in accordance with ARI Standard 550/590-98. Shaded and bold ratings are at ARI standard conditions.
2. Ratings based on HCFC-22, evaporator fouling factor of 0.0001, evaporator water flow of 2.4 gpm/ton and sea level altitude.
3. KW input is for compressor only. EER is for the entire unit, including compressors, fan motors and control power.
4. Interpolation is allowed; extrapolation is not permitted. Consult McQuay for performance outside the cataloged ratings.
5. For LWT below 40°F please refer to Application Considerations.

Table 5, AGZ 010A through 034A, SI Units

AGZ Unit Size	LWT (°C)	Ambient Air Temperature (°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
010	5.0	35.0	8.0	3.40	33.7	8.8	3.03	32.3	9.7	2.70	30.9	10.7	2.38	29.4	11.8	2.09
	6.0	36.2	8.1	3.49	34.9	8.9	3.12	33.5	9.8	2.78	32.1	10.8	2.46	30.5	11.9	2.15
	7.0	37.5	8.2	3.59	36.2	9.0	3.21	34.8	9.9	2.86	33.3	10.9	2.53	31.7	12.0	2.22
	8.0	38.9	8.3	3.68	37.5	9.1	3.30	36.0	9.9	2.94	34.5	10.9	2.61	32.8	12.1	2.29
	9.0	40.2	8.4	3.78	38.8	9.1	3.39	37.3	10.0	3.02	35.7	11.0	2.68	34.0	12.2	2.35
	10.0	41.6	8.4	3.87	40.1	9.2	3.48	38.6	10.1	3.11	36.9	11.1	2.75	35.2	12.3	2.42
013	5.0	47.9	11.9	3.38	46.0	13.0	3.02	44.2	14.2	2.68	42.3	15.5	2.37	40.2	17.0	2.09
	6.0	49.5	12.0	3.47	47.6	13.1	3.10	45.7	14.3	2.75	43.7	15.6	2.44	41.5	17.1	2.14
	7.0	51.2	12.1	3.56	49.2	13.2	3.18	47.3	14.4	2.83	45.2	15.8	2.50	42.9	17.2	2.20
	8.0	52.9	12.2	3.64	50.9	13.3	3.26	48.9	14.5	2.90	46.7	15.9	2.57	44.4	17.4	2.26
	9.0	54.6	12.4	3.73	52.6	13.4	3.34	50.5	14.7	2.97	48.3	16.0	2.64	45.8	17.5	2.32
	10.0	56.4	12.5	3.82	54.3	13.6	3.42	52.2	14.8	3.05	49.9	16.2	2.70	47.3	17.6	2.38
017	5.0	57.7	14.4	3.46	55.3	15.8	3.07	52.9	17.2	2.71	50.4	18.9	2.39	47.9	20.6	2.10
	6.0	59.5	14.5	3.54	57.1	15.9	3.14	54.6	17.4	2.78	52.1	19.0	2.45	49.4	20.7	2.15
	7.0	61.4	14.7	3.62	59.0	16.0	3.22	56.4	17.5	2.84	53.8	19.2	2.51	51.0	20.9	2.20
	8.0	63.4	14.8	3.71	60.8	16.2	3.29	58.2	17.7	2.91	55.5	19.3	2.57	52.7	21.1	2.26
	9.0	65.3	15.0	3.79	62.7	16.3	3.37	60.0	17.8	2.98	57.2	19.5	2.63	54.3	21.3	2.31
	10.0	67.3	15.1	3.87	64.6	16.5	3.44	61.8	18.0	3.05	59.0	19.6	2.69	56.0	21.4	2.37
020	5.0	73.8	18.4	3.41	70.9	20.1	3.05	67.9	21.9	2.71	64.7	23.9	2.39	61.3	26.1	2.10
	6.0	76.2	18.6	3.50	73.2	20.3	3.12	70.2	22.1	2.78	66.9	24.1	2.45	63.4	26.3	2.16
	7.0	78.6	18.8	3.58	75.6	20.4	3.20	72.4	22.3	2.84	69.1	24.3	2.51	65.5	26.5	2.21
	8.0	81.2	19.0	3.66	78.0	20.6	3.28	74.8	22.5	2.91	71.3	24.5	2.58	67.6	26.7	2.27
	9.0	83.7	19.2	3.75	80.5	20.8	3.35	77.1	22.7	2.98	73.6	24.7	2.64	69.8	26.9	2.32
	10.0	86.4	19.4	3.83	83.0	21.0	3.43	79.5	22.9	3.05	75.9	24.9	2.70	72.0	27.1	2.38
025	5.0	82.2	21.1	3.41	79.0	22.9	3.05	75.5	24.9	2.70	71.8	27.1	2.39	67.8	29.5	2.09
	6.0	84.9	21.4	3.49	81.6	23.1	3.12	78.0	25.1	2.77	74.2	27.3	2.45	70.1	29.7	2.14
	7.0	87.9	21.5	3.59	84.2	23.4	3.19	80.6	25.4	2.84	76.6	27.6	2.51	72.5	30.0	2.20
	8.0	91.0	21.7	3.69	87.0	23.6	3.27	83.2	25.6	2.90	79.1	27.9	2.57	74.9	30.3	2.25
	9.0	93.5	22.1	3.73	89.8	23.9	3.34	85.9	25.9	2.97	81.7	28.1	2.63	77.3	30.6	2.31
	10.0	96.5	22.3	3.81	92.6	24.1	3.42	88.6	26.1	3.04	84.3	28.4	2.69	79.8	30.8	2.36
029	5.0	102.4	25.5	3.57	98.4	27.9	3.17	94.2	30.5	2.79	89.9	33.4	2.46	85.4	36.4	2.16
	6.0	105.8	25.8	3.66	101.6	28.2	3.24	97.3	30.8	2.86	92.9	33.7	2.52	88.2	36.8	2.21
	7.0	109.2	26.1	3.74	104.9	28.5	3.32	**100.5**	**31.1**	**2.93**	95.9	34.0	2.58	91.1	37.1	2.27
	8.0	112.8	26.3	3.82	108.3	28.8	3.39	103.7	31.4	3.00	99.0	34.3	2.64	94.0	37.4	2.32
	9.0	116.3	26.6	3.91	111.8	29.1	3.47	107.1	31.7	3.07	102.1	34.6	2.70	97.0	37.8	2.37
	10.0	120.0	26.9	3.99	115.3	29.4	3.54	110.4	32.0	3.13	105.3	35.0	2.76	100.1	38.1	2.43
034	5.0	123.8	33.3	3.46	118.8	36.1	3.07	113.5	39.2	2.71	107.7	42.5	2.39	101.4	46.0	2.09
	6.0	127.8	33.6	3.53	122.7	36.5	3.14	117.2	39.6	2.77	111.2	43.0	2.44	104.7	46.5	2.14
	7.0	131.9	34.0	3.61	126.6	36.9	3.21	120.9	40.1	2.83	114.8	43.4	2.50	108.1	46.9	2.19
	8.0	136.0	34.4	3.68	130.6	37.3	3.27	124.7	40.5	2.89	118.4	43.9	2.55	111.6	47.4	2.24
	9.0	140.3	34.8	3.76	134.6	37.7	3.34	128.6	40.9	2.95	122.1	44.3	2.60	115.1	47.9	2.28
	10.0	144.6	35.2	3.83	138.7	38.2	3.41	132.5	41.4	3.01	125.8	44.8	2.66	118.7	48.4	2.33

Notes:

1. Ratings in accordance with ARI Standard 550/590-98.
2. Ratings based on HCFC-22, evaporator fouling factor of 0.0001, evaporator water flow of 2.4 gpm/ton and sea level altitude.
3. KW input is for compressor only. EER is for the entire unit, including compressors, fan motors and control power.
4. Interpolation is allowed; extrapolation is not permitted. Consult McQuay for performance outside the cataloged ratings.
5. For LWT below 4.4°C please refer to Application Considerations.

Part Load Data

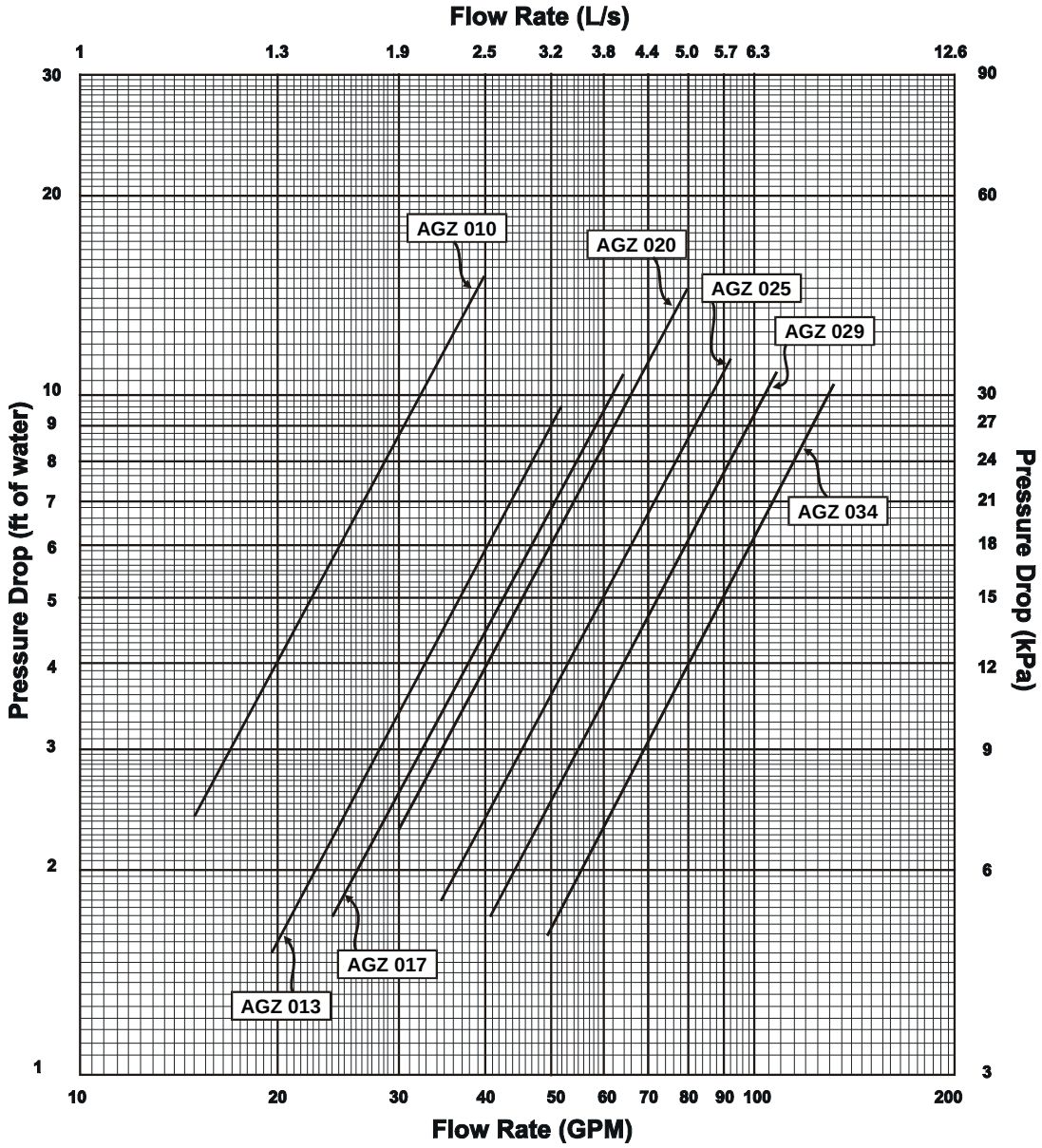
Table 6, Part Load Data, AGZ 010A – AGZ 034A

AGZ UNIT SIZE	% LOAD	60 HZ			
		CAPACITY TONS	POWER kWi	EER	IPLV
010	100.0	9.8	12.1	9.7	12.2
	75.0	7.3	7.4	11.9	
	50.0	4.9	4.6	12.6	
	25.0	2.4	2.4	12.0	
013	100.0	13.3	16.7	9.6	12.5
	75.0	10.0	10.0	11.9	
	50.0	6.6	6.1	13.1	
	25.0	3.3	3.2	12.4	
017	100.0	15.9	19.8	9.6	12.8
	75.0	11.9	11.9	12.1	
	50.0	7.9	7.1	13.5	
	25.0	4.0	3.7	12.8	
020	100.0	20.4	25.4	9.6	12.5
	75.0	15.3	15.8	11.6	
	50.0	10.2	9.2	13.3	
	25.0	5.1	4.9	12.5	
025	100.0	22.7	28.3	9.6	12.9
	75.0	17.0	16.6	12.3	
	50.0	11.3	10.0	13.6	
	25.0	5.7	5.3	12.9	
029	100.0	28.3	34.2	9.9	13.3
	75.0	21.2	20.3	12.5	
	50.0	14.1	12.0	14.2	
	25.0	7.1	6.3	13.4	
034	100.0	34.0	42.5	9.6	13.9
	75.0	25.5	23.3	13.1	
	50.0	17.0	13.9	14.7	
	25.0	8.5	7.3	14.0	

Certified according to ARI Standard 550/590-98

Evaporator Pressure Drops

Figure 1, AGZ 010A through 034A



AGZ Unit Model	Minimum				Nominal				Maximum			
	Flow Rate		Pressure Drop		Flow Rate		Pressure Drop		Flow Rate		Pressure Drop	
	gpm	L/s	ft.	kPa	gpm	L/s	ft.	kPa	gpm	L/s	ft.	kPa
AGZ010	15.0	0.9	2.4	7.1	24.0	1.5	5.8	17.3	40.0	2.5	15.2	45.5
AGA013	19.5	1.2	1.5	4.5	31.2	2.0	3.7	11.0	52.0	3.3	9.6	28.9
AGZ017	24.0	1.5	1.7	5.0	38.4	2.4	4.1	12.2	64.0	4.0	10.7	32.1
AGZ020	30.0	1.9	2.3	6.8	48.0	3.0	5.6	16.7	80.0	5.0	14.5	43.4
AGZ025	34.5	2.2	1.8	5.3	55.2	3.5	4.3	13.0	92.0	5.8	11.4	34.3
AGZ029	40.7	2.6	1.7	5.0	65.0	4.1	4.0	12.1	108.4	6.8	10.9	32.6
AGZ034	49.8	3.1	1.6	4.7	79.7	5.0	3.9	11.7	132.8	8.4	10.4	31.2

Electrical Data

Table 7, AGZ 010A – 034A, Electrical Data Single Point

AGZ Unit Size	Volts	Hz.	Minimum Circuit Ampacity (MCA)	Power Supply				Field Fuse Size or HACR Breaker Size	
				Field Wire		Hub			
				Quantity	Wire Gauge	Quantity	Nominal Size In. (mm)	Recommended	Maximum
010A	208	60	54	3	6	1	1.00 (25)	60	70
	230		54	3	6	1	1.00 (25)	60	70
	460		26	3	10	1	1.00 (25)	30	35
	575		23	3	10	1	1.00 (25)	30	30
013A	208	60	65	3	6	1	1.00 (25)	80	80
	230		65	3	6	1	1.00 (25)	80	80
	460		34	3	10	1	1.00 (25)	40	45
	575		27	3	10	1	1.00 (25)	30	35
017A	208	60	79	3	4	1	1.00 (25)	90	100
	230		79	3	4	1	1.00 (25)	90	100
	460		41	3	8	1	1.00 (25)	45	50
	575		33	3	10	1	1.00 (25)	40	40
020A	208	60	103	3	2	1	1.25 (32)	125	125
	230		103	3	2	1	1.25 (32)	125	125
	460		53	3	6	1	1.00 (25)	60	70
	575		45	3	8	1	1.00 (25)	50	60
025A	208	60	110	3	2	1	1.25 (32)	125	150
	230		110	3	2	1	1.25 (32)	125	150
	460		58	3	6	1	1.00 (25)	70	80
	575		48	3	8	1	1.00 (25)	60	60
029A	208	60	136	3	1/0	1	1.50 (38)	150	175
	230		136	3	1/0	1	1.50 (38)	150	175
	460		62	3	6	1	1.00 (25)	70	80
	575		58	3	6	1	1.00 (25)	70	70
034A	208	60	175	3	2/0	1	1.50 (38)	200	225
	230		175	3	2/0	1	1.50 (38)	200	225
	460		88	3	3	1	1.25 (32)	100	110
	575		72	3	4	1	1.00 (25)	90	100

See page 18 for all Electrical Data notes.

Table 8, AGZ 010A – 034A Compressor and Condenser Fan Motor Amp Draw

AGZ Unit Size	Volts	Hz.	Rated Load Amps			No. of Fan Mtrs	Locked Rotor Amps		
			Compressors		Fan Motor (Each)		Fan Motor (Each)	Compressors	
								Across-The-Line	
			No. 1	No. 2				No. 1	No. 2
010A	208	60	18.6	18.6	5.8	2	23.7	156	156
	230		18.6	18.6	5.8	2	21.4	156	156
	460		9.0	9.0	2.8	2	10.7	75	75
	575		7.4	7.4	3.0	2	11.5	54	54
013A	208	60	23.7	23.7	5.8	2	23.7	189	189
	230		23.7	23.7	5.8	2	21.4	189	189
	460		12.5	12.5	2.8	2	10.7	99	99
	575		9.1	9.1	3.0	2	11.5	74	74
017A	208	60	29.9	29.9	5.8	2	23.7	232	232
	230		29.9	29.9	5.8	2	21.4	232	232
	460		15.3	15.3	2.8	2	10.7	125	125
	575		11.6	11.6	3.0	2	11.5	100	100
020A	208	60	33.6	41.0	5.8	3	23.7	278	350
	230		33.6	41.0	5.8	3	21.4	278	350
	460		16.5	21.8	2.8	3	10.7	127	158
	575		13.7	17.3	3.0	3	11.5	100	125
025A	208	60	41.0	41.0	5.8	3	23.7	350	350
	230		41.0	41.0	5.8	3	21.4	350	350
	460		21.8	21.8	2.8	3	10.7	158	158
	575		17.3	17.3	3.0	3	11.5	125	125
029A	208	60	52.6	52.6	5.8	3	23.7	425	425
	230		52.6	52.6	5.8	3	21.4	425	425
	460		23.7	23.7	2.8	3	10.7	187	187
	575		21.7	21.7	3.0	3	11.5	148	148
034A	208	60	70	70	5.8	3	23.7	448	448
	230		70	70	5.8	3	21.4	448	448
	460		35	35	2.8	3	10.7	225	225
	575		28	28	3.0	3	11.5	180	180

See page 18 for all Electrical Data notes.

Table 9, AGZ 010A – 034A Field Wiring Data, Single Point Power

AGZ UNIT SIZE	Volts	HZ.	Wiring to Standard Power Block Terminal		Wiring to Optional Disconnect Switch	
			Maximum Terminal Amps	Connector Wire Range (Copper Wire Only)	Disconnect Size	Connector Wire Range (Copper Wire Only)
010A	208	60	175	14 GA – 2/0	100	8 GA – 2/0
	230		175	14 GA – 2/0	100	8 GA – 2/0
	460		175	14 GA – 2/0	45	14 GA – 4 GA
	575		175	14 GA – 2/0	63	14 GA – 1 GA
013A	208	60	175	14 GA – 2/0	100	8 GA – 2/0
	230		175	14 GA – 2/0	100	8 GA – 2/0
	460		175	14 GA – 2/0	45	14 GA – 4 GA
	575		175	14 GA – 2/0	63	14 GA – 1 GA
017A	208	60	175	14 GA – 2/0	175	6GA – 300 kcmil
	230		175	14 GA – 2/0	175	6GA – 300 kcmil
	460		175	14 GA – 2/0	45	14 GA – 4 GA
	575		175	14 GA – 2/0	63	14 GA – 1 GA
020E	208	60	175	14 GA – 2/0	200	6GA – 300 kcmil
	230		175	14 GA – 2/0	200	6GA – 300 kcmil
	460		175	14 GA – 2/0	100	8 GA – 2/0
	575		175	14 GA – 2/0	160	8 GA – 1/0
025A	208	60	175	14 GA – 2/0	200	6GA – 300 kcmil
	230		175	14 GA – 2/0	200	6GA – 300 kcmil
	460		175	14 GA – 2/0	100	8 GA – 2/0
	575		175	14 GA – 2/0	160	8 GA – 1/0
029E	208	60	175	14 GA – 2/0	200	6GA – 300 kcmil
	230		175	14 GA – 2/0	200	6GA – 300 kcmil
	460		175	14 GA – 2/0	100	8 GA – 2/0
	575		175	14 GA – 2/0	160	8 GA – 1/0
034A	208	60	335	6 GA – 400 kcmil	200	6GA – 300 kcmil
	230		335	6 GA – 400 kcmil	200	6GA – 300 kcmil
	460		175	14 GA – 2/0	175	6GA – 300 kcmil
	575		175	14 GA – 2/0	175	6GA – 300 kcmil

See Page 18 for all Electrical Data notes.

Notes for “Electrical Data Single Point”

1. Field Fuse Size for recommended and maximum is based on use of a time-delay fuse.
2. 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 the control transformer.
3. Since the control transformer is furnished, no separate 115V power is required.
4. If a separate 115V power supply is used for the control circuit, then the wire sizing amps is 2 Amps.
5. Recommended power lead wire sizes for three conductors per conduit are based on 100% conductor ampacity in accordance with NEC. Voltage drop has not been included. Therefore, it is recommended that power leads be kept short. All terminal block connections must be made with copper (type THW) wire.
6. Single conductors should be used for power connections as listed under “Recommended Power Lead Wire Size.”
7. “Recommended Fuse Sizes” are selected at approximately 150% to 225% of the largest compressor RLA, plus 100% of all other loads in the circuit.
8. “Maximum Fuse Sizes” are selected at approximately 225% of the largest compressor RLA, plus 100% of all other loads in the circuit.
9. The recommended power lead wire sizes are based on an ambient temperature of 86°F. Ampacity correction factors must be applied for other ambient temperatures. Refer to the National Electrical Code Handbook.

Voltage Limitations:

Within 10% of nameplate rating.

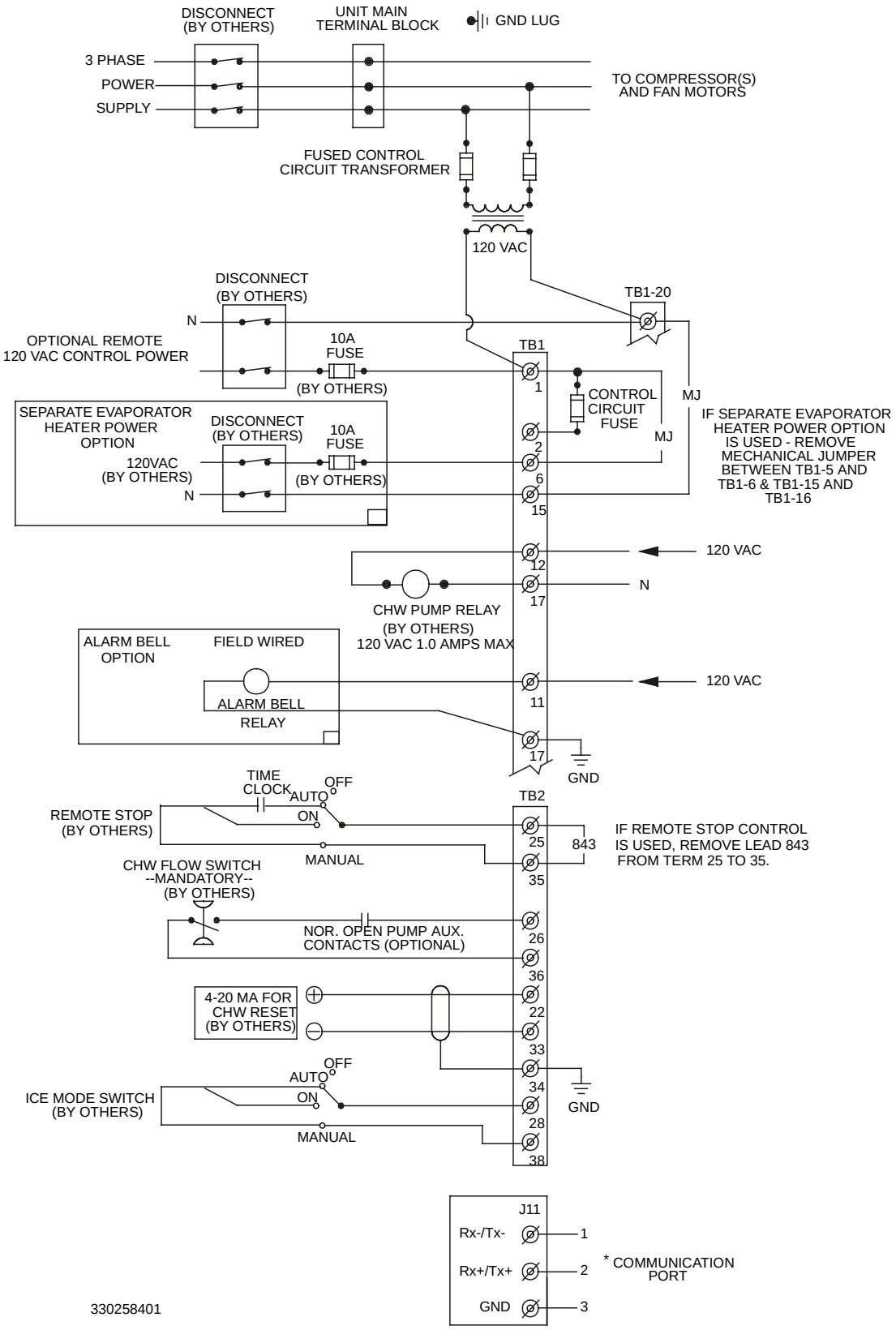
Notes for “Compressor and Condenser Fan Amp Draw”:

1. Compressor RLA values are for wiring sizing purposes only but do not reflect normal operating current draw at rated capacity.
2. Compressor LRA for reduced inrush start are for the first winding only. If the unit is equipped with SpeedTrol motors, the first motor is a single phase, 1 hp motor, with a LRA of 7.3 amps at 460 volts, 14.5 amps at 208, 230, and 575 volts.

Notes for “Field Wiring Data” - Single Point Power:

1. Single point power supply requires a single disconnect to supply electrical power to the unit. This power must be fused.
2. All field wiring to unit power block or non-fused disconnect switch must be copper.
3. All field wire size values given in table apply to 75°C rated wire per NEC.

Figure 2, AGZ 010A through 034A, Typical Field Wiring Diagram



Physical Data

Table 10, Physical Data, AGZ 010A through 017A

PHYSICAL DATA	AGZ MODEL NUMBER		
	010A	013A	017A
BASIC DATA			
Unit Capacity @ ARI Conditions (1), Tons (kW)	9.8 (34.3)	13.3 (46.6)	15.9 (55.7)
Number Of Refrigerant Circuits	1	1	1
Unit Operating Charge, R-22, Lb. (kg)	22.0 (10.0)	24.0 (10.9)	31.0 (14.1)
Cabinet Dimensions, LxWxH, In.	73.6 x 46.3 x 50.8	73.6 x 46.3 x 50.8	73.6 x 46.3 x 50.8
Cabinet Dimensions, LxWxH, (mm)	(1869) x (1176) x (1289)	(1869) x (1176) x (1289)	(1869) x (1176) x (1289)
Unit Operating Weight, Lb. (kg)	1090 (495)	1340 (608)	1450 (658)
Unit Shipping Weight, Lb. (kg)	1160 (527)	1400 (636)	1515 (688)
Add'l Weight If Copper Finned Coils, Lb. (kg)	220 (99.7)	220 (99.7)	220 (99.7)
COMPRESSORS			
Type	Scroll	Scroll	Scroll
Nominal Tons Per Compressor	6.0 / 6.0	7.5 / 7.5	9.0 / 9.0
Oil Charge Per Compressor, Oz. (g)	60 (1701)	140 (3969)	140 (3969)
CAPACITY REDUCTION STEPS - PERCENT OF COMPRESSOR DSPLACEMENT			
Standard Staging	0 – 50 – 100	0 – 50 – 100	0 – 50 – 100
CONDENSERS - HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLING			
Coil Face Area,Sq. Ft. (M^2)	30.3 (2.8)	30.3 (2.8)	30.3 (2.8)
Finned Height x Finned Length, In.	84 x 52	84 x 52	84 x 52
Finned Height x Finned Length, (mm)	(2134) x (1321)	(2134) x (1321)	(2134) x (1321)
Fins Per Inch x Rows Deep	16 x 2	16 x 2	16 x 3
Pumpdown Capacity Lb. (kg)	35.3 (16.0)	35.3 (16.0)	50.3 (22.8)
CONDENSER FANS - DIRECT DRIVE PROPELLER TYPE			
Number Of Fans - Fan Diameter, In. (mm)	2 – 26 (660)	2 – 26 (660)	2 – 26 (660)
Number Of Motors - HP (kW)	2 – 1.0 (0.75)	2 – 1.0 (0.75)	2 – 1.0 (0.75)
Fan And Motor RPM, 60	1140	1140	1140
60 Hz Total Unit Airflow, CFM (l/s)	13950 (6584)	13950 (6584)	12000 (5664)
DIRECT EXPANSION EVAPORATOR - BRAZED PLATE-TO-PLATE			
Connection Size Victaulic, In. (mm)	2 (51)	2 (51)	2 (51)
Water Volume, Gallons (L)	.94 (3.6)	1.66 (6.3)	2.00 (7.6)
Maximum Refrigerant Working Pressure, psig (kPa)	450 (3103)	450 (3103)	450 (3103)
Maximum Water Pressure, psig (kPa)	350 (2413)	350 (2413)	350 (2413)

NOTE:
Nominal capacity based on 95°F ambient air and 54°F/44°F water range.

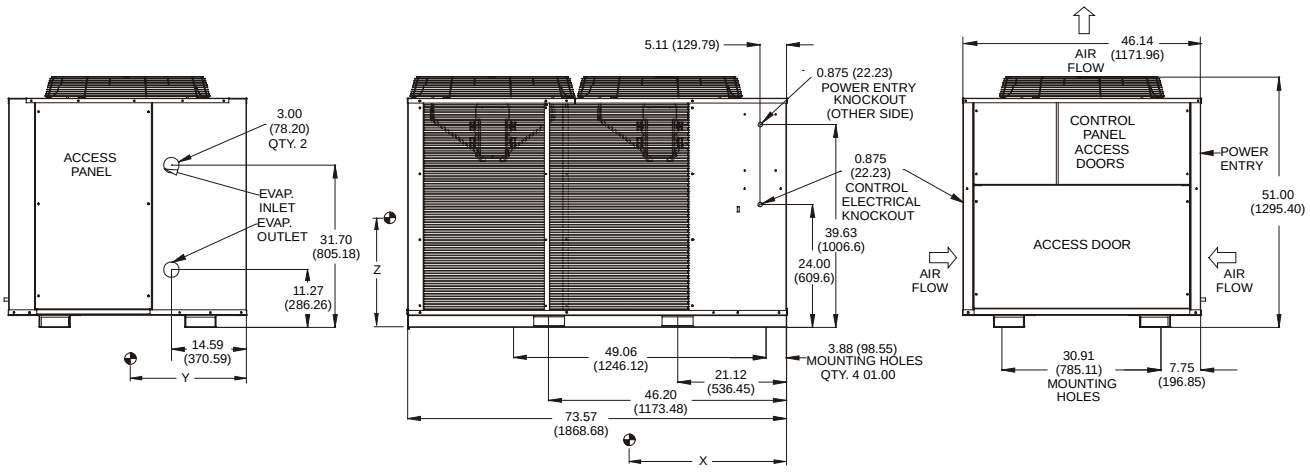
Table 11, Physical Data, AGZ 020A through 034A

PHYSICAL DATA	AGZ MODEL NUMBER			
	020A	025A	029A	034A
BASIC DATA				
Unit Capacity @ ARI Conditions (1), Tons (kW)	20.4 (71.4)	22.7 (79.5)	28.2 (98.7)	34.0 (119.0)
Number Of Refrigerant Circuits	1	1	1	1
Unit Operating Charge, R-22, Lb. (kg)	34.0 (15.4)	36.0 (16.3)	47.0 (21.3)	50.0 (22.7)
Cabinet Dimensions, LxWxH, In.	106.2x 46.3 x 50.8	106.2x 46.3 x 50.8	106.2x 46.3 x 58.8	106.2x 46.3 x 58.8
Cabinet Dimensions, LxWxH, (mm)	(2697) x (1176) x (1289)	(2697) x (1176) x (1289)	(2697) x (1176) x (1493)	(2697) x (1176) x (1493)
Unit Operating Weight, Lbs. (kg)	1620 (735)	1675 (760)	1930 (876)	2180 (990)
Unit Shipping Weight, Lbs. (kg)	1700 (772)	1750 (794)	2000 (908)	2230 (1012)
Add'l Weight If Copper Finned Coils, Lb. (kg)	350 (159)	350 (159)	435 (197)	435 (197)
COMPRESSORS				
Type	Scroll	Scroll	Scroll	Scroll
Nominal Horsepower	10.0 / 13.0	13.0 / 13.0	15.0 / 15.0	20.0 / 20.0
Oil Charge Per Compressor, Oz. (g)	140 (3969)	140 (3969)	140 (3969)	296 (8392)
CAPACITY REDUCTION STEPS - PERCENT OF COMPRESSOR DISPLACEMENT				
Standard Staging	0 – 45 - 100	0 – 50 – 100	0 – 50 – 100	0 – 50 – 100
CONDENSERS - HIGH EFFICIENCY FIN AND TUBE TYPE WITH INTEGRAL SUBCOOLING				
Coil Face Area,Sq. Ft. (M^2)	49.0 (4.6)	49.0 (4.6)	58.3 (5.4)	58.3 (5.4)
Finned Height x Finned Length, In.	84 x 84	84 x 84	100 x 84	100 x 84
Finned Height x Finned Length, (mm)	(2134) x (2134)	(2134) x (2134)	(2545) x (2134)	(2545) x (2134)
Fins Per Inch x Rows Deep	16 x 2	16 x 2	16 x 3	16 x 3
Pumpdown Capacity lb. (kg)	53.1 (24.0)	53.1 (24.0)	90.7 (41.1)	92.8 (42.0)
CONDENSER FANS - DIRECT DRIVE PROPELLER TYPE				
Number Of Fans - Fan Diameter, In. (mm)	3 – 26 (660)	3 – 26 (660)	3 – 26 (660)	3 – 26 (660)
Number Of Motors - HP (kW)	3 – 1.0 (0.75)	3 – 1.0 (0.75)	3 – 1.0 (0.75)	3 – 1.0 (0.75)
Fan And Motor RPM, 60	1140	1140	1140	1140
60 Hz Total Unit Airflow, CFM (l/s)	20925 (9877)	20925 (9877)	19800 (9346)	19800 (9346)
DIRECT EXPANSION EVAPORATOR - BRAZED PLATE-TO-PLATE				
Connection Size Victaulic, In. (mm)	2 (51)	2 (51)	2 (51)	2 (51)
Water Volume, Gallons (L)	2.16 (8.2)	3.05 (11.5)	4.00 (15.1)	5.55 (21.0)
Max. Refrigerant Working Pressure, psig (kPa)	450 (3103)	450 (3103)	450 (3103)	450 (3103)
Maximum Water Pressure, psig (kPa)	350 (2413)	350 (2413)	350 (2413)	350 (2413)

NOTE:
Nominal capacity based on 95°F ambient air and 54°F/44°F water range.

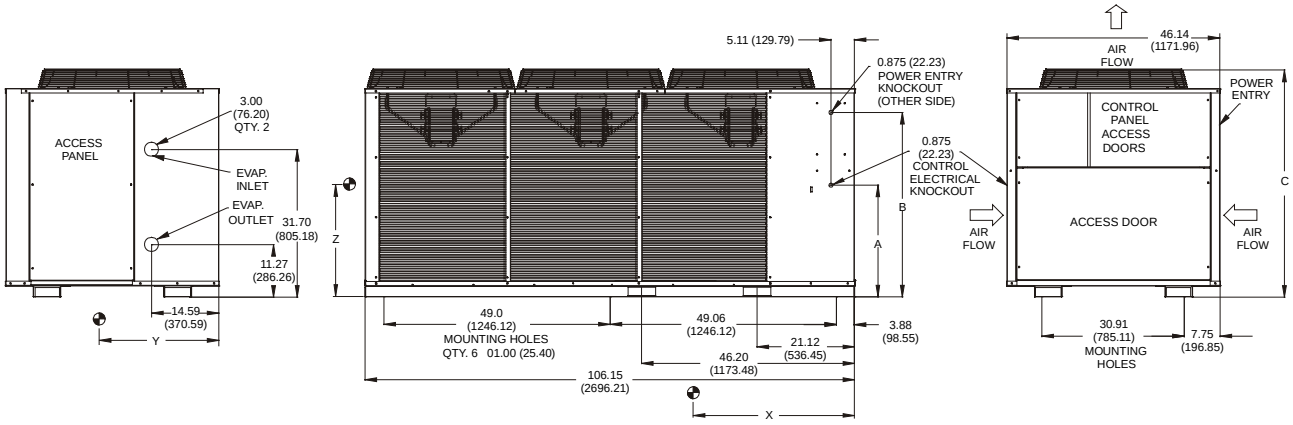
Dimensional Data

Figure 3, AGZ 010A through 017A



AGZ Unit Size	Center of Gravity Inches (mm)			Evaporator Connection Size Inch Victaulic
	X	Y	Z	
AGZ 010	27.8 (706.1)	22.7 (576.6)	19.2 (487.7)	2
AGZ 013	24.3 (617.2)	22.5 (571.5)	19.1 (485.1)	2
AGZ 017	24.4 (619.8)	22.4 (569.0)	19.1 (485.1)	2

Figure 4, AGZ 020A through 034A



AGZ Unit Size	Dimensions Inches (mm)			Center of Gravity Inches (mm)			Evaporator Connection Size Inch Victaulic
	A	B	C	X	Y	Z	
AGZ 020	24.0 (609.6)	39.6 (1006.6)	51.0 (1295.4)	33.8 (858.5)	22.4 (569.0)	20.2 (513.1)	2
AGZ 025	24.0 (609.6)	39.6 (1006.6)	51.0 (1295.4)	33.7 (856.0)	22.2 (563.9)	20.1 (510.5)	2
AGZ 029	33.0 (838.2)	47.6 (1209.8)	59.0 (1498.6)	36.5 (927.1)	23.1 (586.7)	22.6 (574.0)	2
AGZ 034	33.0 (838.2)	47.6 (1209.6)	59.0 (1498.6)	35.0 (889.0)	23.1 (586.7)	21.4 (543.6)	2

Sound Data

Table 12, AGZ 010A – 034A, Sound Pressure

AGZ Unit Size	Octave Band Sound Pressure Levels Per ARI Standard 370 (dB)								Overall "A" Weighted
	63 hz	125 hz	250 hz	500 hz	1000 hz	2000 hz	4000 hz	8000 hz	
010A	33	39	58	60	57	53	51	41	62
013A	33	39	58	60	57	53	51	41	62
017A	33	39	58	60	57	53	51	41	62
020A	34	41	59	61	58	55	52	42	63
025A	34	41	59	61	58	55	52	42	63
029A	36	42	60	64	61	56	53	43	65
034A	36	42	60	64	61	56	53	43	65

NOTE: Per ARI 370 - Sound Rating of Large Outdoor Refrigerating and Air-Conditioning Equipment. Sound pressure levels taken at 30 feet, Q=2.

Table 13, AGZ 010A – 030A, Sound Power

AGZ Unit Size	Octave Band Sound Power Levels Per ARI Standard 370 (dB)								Overall "A" Weighted
	63 hz	125 hz	250 hz	500 hz	1000 hz	2000 hz	4000 hz	8000 hz	
010A	60	66	85	87	84	80	78	68	89
013A	60	66	85	87	84	80	78	68	89
017A	60	66	85	87	84	80	78	68	89
020A	61	68	86	88	85	82	79	69	90
025A	61	68	86	88	85	82	79	69	90
029A	61	68	86	88	85	82	79	69	90
034A	61	68	86	88	85	82	79	69	90

Per ARI 370 - Sound Rating of Large Outdoor Refrigerating and Air-Conditioning Equipment

Sound levels are as important as unit cost and efficiency, and they must be addressed before to the start of any development program. Efforts by McQuay Design Engineers to design chillers that are sensitive to the sound requirements of the market, combined with inherently quiet scroll compressors, have paid off.

Background Information

Sound is a vibration in an elastic medium and is essentially a pressure and particle displacement phenomena. A vibrating body produces compression waves, and as the waves are emitted from the vibrating body, molecules are ultimately compressed. These values are transmitted through gas, liquid, solid--anything which 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, as is sound pressure.

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 will affect the sound pressure measurements differently than a brick wall at 20 feet. Sound pressure is measured in decibels (dB), which is a dimensionless ratio (on a logarithmic scale) between measured sound pressure and a reference sound pressure level.

Sound Pressure Levels - Full Load

All sound pressure tables give the overall "A" weighted sound pressure levels, which are considered typical of what can be measured in a free field with a hand-held sound meter, in the absence of any nearby reflective surfaces. The sound pressure levels are measured at 30 feet (10 meters) from the side of the unit at 100% unit load and ARI conditions. 95°F (35°C) ambient air temperature and 54/44°F (12/7°C) evaporator water temperatures for air-cooled units.

Sound Power Levels

Acoustical consultants may require sound power octave band data to perform a detailed acoustical analysis. The preceding tables present sound power levels per ARI Standard 370, “Sound Rating of Large Outdoor Refrigerating and Air Conditioning Equipment” for AGZ chillers. These standards were developed to establish uniform methods of determining the sound power radiated by large outdoor and indoor equipment. The aforementioned methods are based on providing sound power levels by octave band and the overall ‘A’ weighted value. Measurements are taken over a prescribed area around the unit and the data is mathematically calculated to give the sound power, dB.

Sound Reduction due to Distance from the 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.

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

Lw = sound power

r = distance from unit in feet

Q = directionality factor

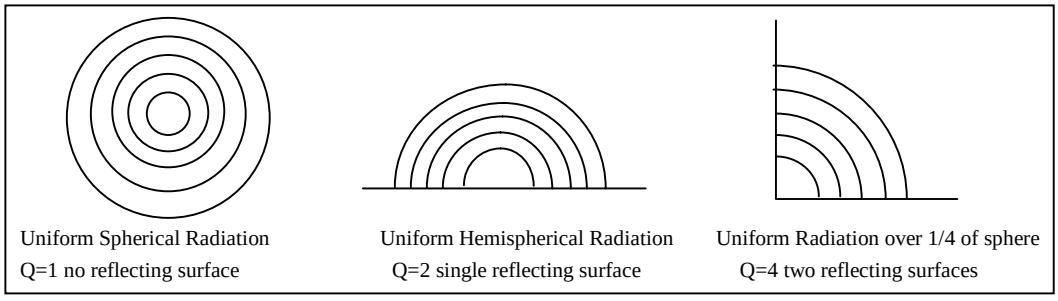
The directionality factor is a dimensionless number that compensates for the type of sound radiation from the source. Figure 1 shows the typical Q values of different reflecting surfaces.

For a unit sitting on a flat roof with no other reflective surfaces or attenuation due to grass, snow, etc., between source and receiver: Q=2.

With Q=2, the equation simplifies to:

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

Figure 5, "Q" Values



Unit placement

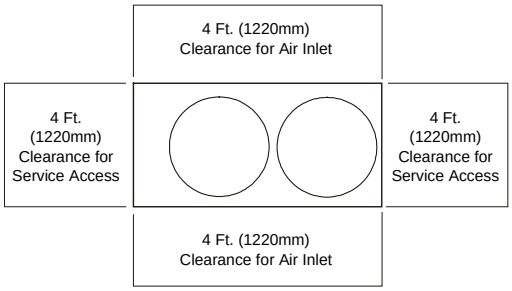
AGZ units are for outdoor applications and can be mounted either on a roof or at ground level. Set units on a solid and level foundation. On roof-mounted applications, install the unit on a steel channel or I-beam frame to support the unit above the roof. On ground-level applications, install the unit on a substantial base that will not settle. A one-piece concrete slab with footings extended below the frost line is recommended. Be sure the foundation is level within 1/2"(13mm) over its length and width. The foundation must be strong enough to support the operating weights listed in Table 10 and Table 11.

Standard wire-mesh coil guards protect the condenser coils. On ground-level applications, additional protection security can be achieved by erecting a screen fence. The fence must allow free flow of air to the condenser coil for proper unit operation.

Clearances

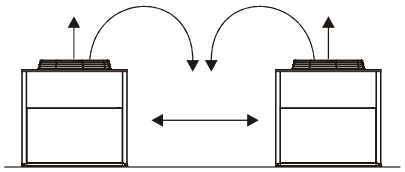
The flow of air to and from the condenser coil must not be impeded. Restricting airflow or allowing air recirculation will result in a decrease in unit performance and efficiency because discharge pressures are increased. There must be no obstruction above the unit that would deflect discharge air downward where it could be recirculated back to the inlet of the condenser coil. The condenser fans are propeller type and will not operate with ductwork on the fan outlet.

Figure 6, Clearances

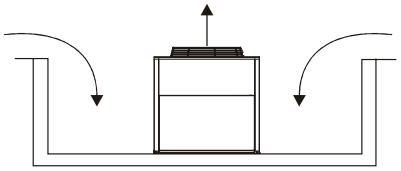


Install the unit with enough side clearance for air entrance to the coil and for servicing. Provide service access to the evaporator, compressors, electrical control panel and piping components as shown in Figure 6.

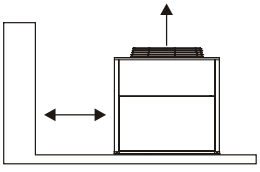
Do not allow debris to accumulate near the unit. Air movement can draw debris into the condenser coil causing coil starvation. Give special consideration to low ambient operation where snow can accumulate. Keep condenser coils and fan discharge free of snow or other obstructions to permit adequate airflow for proper unit operation.



The recommended minimum side clearance between two units is 8 feet (2440mm).



The unit must not be installed in a pit or enclosure that is deeper or taller than the height of the unit unless extra space is provided. The minimum clearance on each side of the unit is 6 feet (1828mm) when installed in a pit. The pit cannot be deeper than the unit.



The minimum clearance to a side wall or building taller than the unit height is 6 feet (1828mm) provided no solid wall above 6 feet (1828mm) tall is closer than 12 feet (3658mm) to the opposite side of the unit.

Sound Isolation

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 may be objectionable. Reduce structurally transmitted sound by isolating water lines, electrical conduit and the unit itself. Use wall sleeves and rubber isolated piping hangers to reduce transmission of water or pump noise into occupied spaces. Use flexible electrical conduit to isolate sound through electrical conduit. Spring isolators are effective in reducing the low amplitude sound generated by scroll compressors and for unit isolation in sound sensitive areas.

Chilled Water Piping

Flush the system water piping thoroughly before making connections to the unit evaporator. A strainer of 40 mesh must be installed in the return water line before the inlet to the chiller. Design the water piping so that the chilled water circulating pump discharges into the evaporator inlet.

Connect the return water line to the evaporator inlet connection (top connection). Connect the supply water line to the evaporator outlet connection (bottom connection).

Install a flow switch in the horizontal piping of the supply (evaporator outlet) water line.

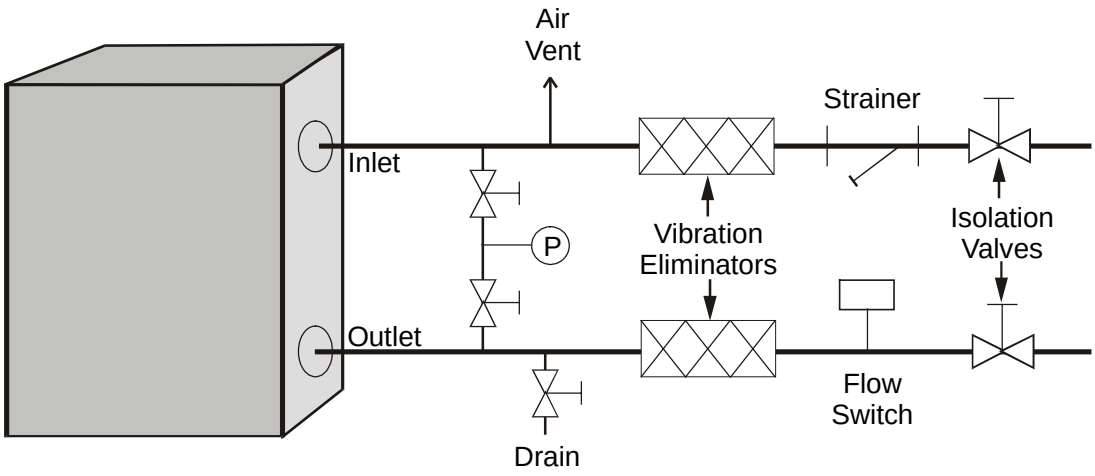
Provide drain connections at low points in the system to permit complete drainage of the system. Locate air vents at the high points in the system to purge air out of the system. Purge air from the water system before unit start-up to provide adequate flow through the evaporator.

Install pressure gauges in the inlet and outlet water lines to the evaporator. A single gauge can be installed in a bypass line as shown in Figure 7. Measure pressure drop through the evaporator to calculate proper flow as shown in Figure 7. Vibration eliminators are recommended in both the supply and return water lines.

Insulate chilled water piping to reduce heat loss and prevent condensation. Thoroughly drain water from chillers not running in the winter to protect against freezing. If the chiller operates year round, or if the system is not drained for the winter, the chilled water piping exposed to outdoor temperature should be protected against freezing. Wrap the lines with a heater cable and add proper amount of glycol to the system to further protect the system during low ambient periods.

The thermostat sensor is factory mounted in the return water well.

Figure 7, Typical Chilled Water Piping



Series Compared to Parallel Operation

Consider system pressure drop when designing the water piping. Parallel piped systems have half of the total system flow going through the evaporator of each chiller, reducing the individual unit and the total system pressure drop.

Series piped evaporators require that the total system water flows through both evaporators. Not only is the pressure drop through each evaporator increased, but the pressure drops must be added together to obtain the total evaporator pressure drop. Series piped evaporators normally require larger circulating pumps for the chilled water system.

Temperature and Water Flow Limitations

AGZ units are designed to operate in ambient conditions from 35°F (1.7°C) to 115°F (46.1°C). A low ambient option with SpeedTrol allows operation down to 0°F (-18°C). The minimum ambient air temperature is based on still conditions where the wind is not greater than 5 mph. Greater wind velocities will result in reduced discharge pressure, increasing the minimum operating ambient temperature. Field-fabricated wind baffles may be required to allow the chiller to operate effectively down to the ambient temperature for which the unit was designed.

Evaporator flow rates below the minimum values can result in laminar flow causing freeze-up problems, poor performance, scaling and poor control. Flow rates above the maximum values will result in high-pressure drops and may cause excessive plate erosion, potentially leading to failure.

Evaporator Freeze Protection

Evaporator freeze protection can be a concern in the application of air-cooled water chillers. To protect against freeze-up, insulation and an electric heater cable are furnished with the unit. This protects the evaporator from freezing down to -20°F (-29°C) ambient as long as power is available to the heater. Although the evaporator is equipped with this freeze protection, it does not protect water piping to the unit or the evaporator if there is a power failure or heater cable burnout. Consider the following recommendations for additional protection.

1. If the unit will not be operated during the winter, drain evaporator and chilled water piping.
2. Add a glycol solution to the chilled water system to provide antifreeze protection. Freeze point should be approximately ten degrees below minimum design ambient temperature.

The evaporator heater cable is wired to the 115 volt circuit in the control box. This power should be supplied from a separate source, but it may 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 to the evaporator heater must not be open.

System Water Volume

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

For normal comfort cooling applications, where the cooling load changes relatively slowly, we recommend a minimum system volume of five minutes times the flow rate (GPM). For example, if the design chiller flow rate is 120 GPM, we recommend a minimum system volume of 600 gallons (120 GPM x 5 minutes).

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

Optional Features

Controls

Hot Gas Bypass

Hot gas bypass permits unit operation down to 10% of full load capacity. This option includes a hot gas bypass valve and solenoid valve. Hot gas bypass is provided on the common refrigerant circuit.

SpeedTrol Head Pressure Control

Optional SpeedTrol head pressure control allows unit operation down to 0°F (-18°C) on all models.

Phase Loss/Voltage Protection Kit

Phase loss with under/over voltage protection and multiple LED indication of fault type.

Electrical

Disconnect Switch

Factory-mounted non-fused disconnect switch with through-the-door handle allows power to be disconnected from the unit before opening the control panel doors.

Unit

Copper Fin Condenser Coils

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

Coated Coils

Aluminum and copper coils are available with *ElectroFin*™ (*Electrofin* is a trademark of Applied Surface Technology Inc.) baked epoxy coating for additional protection. This coating system provides 3000+ hour salt spray resistance (ASTM B117-90) and is applied to both the coil and the coil frame. The coating is particularly well suited to salt air environments and many chemical applications.

Black Fin Coil

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

Water Flow Switch

A water flow switch is available for installation in the chilled water piping to prevent evaporator freeze-up under low- or no-flow conditions. Terminals are provided in the unit control center for field hook-up of the water flow safety switch.

Vibration Isolators

Spring or rubber-in-shear vibration isolators are available for field installation to reduce vibration transmission through the unit base.

Double Evaporator Insulation

Two layers of factory-installed 3/4 inch insulation. Recommended for low temperature applications.

Remote Evaporator

The evaporator is shipped separately for locating remotely from the unit. Requires field mounting, piping and wiring.

NOTE: Specifications are available on disk from the local McQuay representative

SECTION 15XXX
AIR-COOLED SCROLL COMPRESSOR CHILLERS
AGZ 010A-AGZ 034A

PART 1 - GENERAL

1.01 SUMMARY

Section includes design, performance criteria, refrigerants, controls, and installation requirements for air-cooled scroll compressor chillers.

1.02 REFERENCES

Comply with applicable Standards/Codes of ARI 550/590-98, ANSI/ASHRAE 15, ETL, cETL, NEC, and OSHA as adopted by the State.

Units shall meet the efficiency standards of ASHRAE Standard 90.1, October 2001.

1.03 SUBMITTALS

A. Submit shop drawings and product data in accordance with the specifications.

B. Submittals shall include the following:

1. Dimensioned plan and elevation view drawings, required clearances, and location of all field connections.
2. Summary of all auxiliary utility requirements, such as electricity, water, compressed air, etc. Summary shall indicate quality and quantity of each required utility.
3. Single-line schematic drawing of the power field hookup requirements, indicating all items that are furnished.
4. Schematic diagram of control system indicating points for field interface/connection.
5. Diagram shall fully delineate field and factory wiring.
6. Certification of factory-run test of chiller unit signed by company officer.
7. 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 manufacturer plant must be ISO9002 Registered.

1.05 DELIVERY AND HANDLING

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

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

1.06. WARRANTY

The refrigeration equipment manufacturer’s guarantee shall be for a period of one year from date of equipment start-up but not more than 18 months from shipment. The guarantee shall provide for repair or replacement due to failure by material and workmanship that prove defective within the above period, excluding refrigerant.

1.07 MAINTENANCE

Maintenance of the chillers shall be the responsibility of the owner and performed in accordance with the manufacturer’s instructions.

PART 2--PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. McQuay International

B. (Approved Equal)

2.02 UNIT DESCRIPTION

Provide and install as shown on the plans factory-assembled, factory-charged, and factory-tested air-cooled scroll compressor packaged chillers in the quantity specified. Each chiller shall consist of hermetic tandem scroll compressors, direct expansion evaporator, air-cooled condenser section, control system and all components necessary for controlled unit operation.

2.03 DESIGN REQUIREMENTS

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

B. Performance: Refer to the schedule of performance on the drawings. The chiller shall be capable of stable operation to a minimum of 50 percent of full load without hot gas bypass. Performance shall be in accordance with ARI Standard 550/590.

C. Acoustics: Sound pressure levels for the unit shall not exceed the following specified levels. The manufacturer shall provide the necessary sound treatment to meet these levels if required. Sound data shall be provided with the quotation. Test shall be in accordance with ARI Standard 370.

	Octave Band							
63	125	250	500	1000	2000	4000	8000	dBA
____	____	____	____	____	____	____	____	____

2.04 CHILLER COMPONENTS

A. Compressors: The compressors shall be sealed hermetic scroll type with crankcase oil heater and suction strainer. Compressor shall have a forced-feed lubrication system with a reversible oil pump and oil charge. The compressor motor shall be refrigerant gas cooled, high torque, hermetic induction type, two-pole, with inherent thermal protection on all three phases and shall be mounted on RIS vibration isolator pads.

B. Evaporator: The evaporator shall be direct expansion type with stainless steel plates brazed together with copper. It shall be insulated with 3/4 inch (19mm) closed cell polyurethane insulation and be heated with an electric heater to provide freeze protection to -20°F (-29°C) ambient temperature.

C. Condenser: The condenser coils shall consist of 3/8 inch (10mm) seamless copper tubes mechanically bonded into plate-type fins. 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. They shall be equipped with a heavy-gauge fan guard. Fan motors shall be TEAO, three-phase, direct-drive, 1140 rpm.

D. Refrigerant Circuit: The refrigerant circuit shall include a refrigerant filter-drier, sight glass with moisture indicator, liquid line solenoid valve (no exceptions), thermal expansion valve, and insulated suction line.

E. Control System: A centrally located weatherproof control panel shall contain the field power connection points, control interlock terminals, and control system. Power and starting components shall include factory circuit breaker of fan motors and control circuit, individual contactors for each fan motor, solid-state compressor three-phase motor overload protection, inherent fan motor overload protection and unit power terminal blocks for connection to remote disconnect switch. Terminals shall also be provided for power supply to the evaporator heater circuit. Hinged access doors shall be lockable. Barrier panels or separate enclosures are required to protect against accidental contact with line voltage when accessing the control system.

F. An advanced DDC microprocessor unit controller with a 4-line by 20-character liquid crystal display provides the operating and protection functions.. The controller shall take pre-emptive limiting action in case of high discharge pressure or low evaporator pressure.

The controller shall contain the following features as a minimum:

Equipment Protection

The unit shall be protected in two ways: (1) by alarms that shut the unit down and require manual reset to restore unit operation and (2) by limit alarms that reduce unit operation in response to some out-of-limit condition. Shut down alarms shall activate an alarm signal.

Shutdown Alarms

- No evaporator water flow
- Low evaporator pressure
- High condenser pressure
- Motor protection system
- Phase voltage protection (Optional)
- Outside ambient temperature
- Evaporator freeze protection
- Sensor failures

Limit Alarms

- Condenser pressure stage down, unloads unit at high discharge pressures
- Low ambient lockout, shuts off unit at low ambient temperatures
- Low evaporator pressure hold, holds stage #1 until pressure rises
- Low evaporator pressure unload, shuts off one compressor

Unit Enable Selection

Enables unit operation from either local keypad, digital input, or BAS

Unit Mode Selection

Selects standard cooling, ice, glycol, or test operation mode

Analog Inputs

Reset of leaving water temperature, 4-20 mA

Digital Inputs

- Unit off switch
- Remote start/stop
- Flow switch
- Ice mode switch, converts operation and setpoints for ice production
- Motor protection

Digital Outputs

- Shutdown alarm; field wired, activates on an alarm condition, off when alarm is cleared
- Evaporator pump; field wired, starts pump when unit is set to start

Condenser fan control

The unit controller shall provide control of condenser fans based on compressor discharge pressure.

Building Automation System (BAS) Interface

The following BAS protocols shall be supported:

- BACnet®
- LonMark®

2.05 OPTIONS AND ACCESSORIES

The following options are to be included:

- Hot gas bypass to allow unit operation to 10 percent of full load
- Low ambient head pressure control to 0°F (-17.8°C)
- Non-fused disconnect switch with through-the-door handle
- Aluminum fins shall be pre-coated with a phenolic epoxy coating with 1000 hour salt spray rating (ASTM B117-90
- Copper fin condenser coils
- *ElectroFin*™ baked epoxy coating providing 3000+ hour salt spray resistance (ASTM B117-90) and is applied to both the coil and the coil frames.
- Chilled water flow switch to be field mounted in the chilled water line and field wired to terminals in the control panel.
- Spring vibration isolators for field installation
- Rubber-in-shear vibration isolators for field installation
- Double evaporator insulation

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 for a fully operational and functional chiller.

3.02 START-UP

A. Install proper charge of refrigerant and oil.

B. Provide testing and starting of machine, and instruct the Owner in its proper operation and maintenance.

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