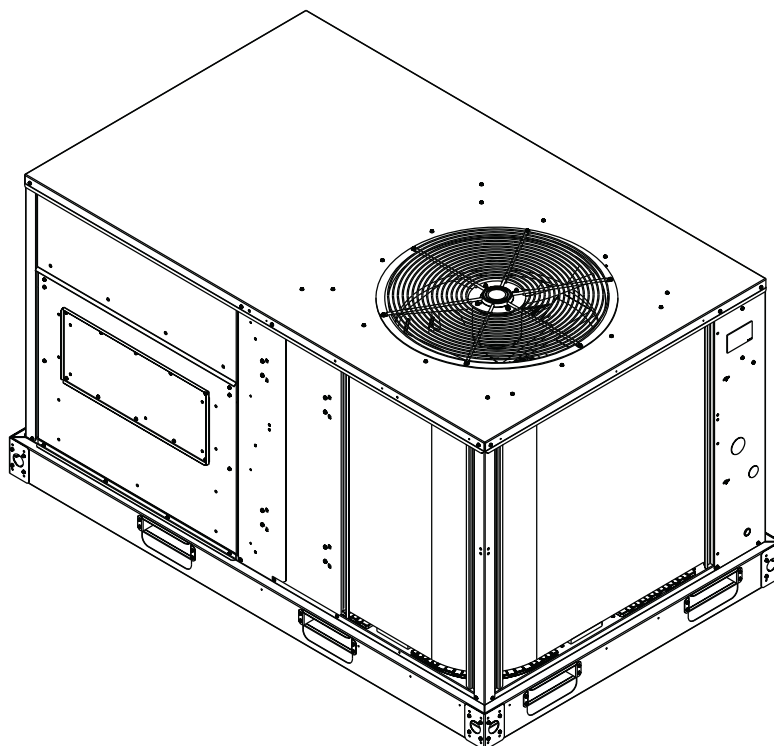


Service Facts

Packaged Rooftop Air Conditioners Foundation™ – Cooling, Gas/Electric

3 Tons, 60Hz Standard Efficiency Rooftop Units



Model Number: E/GDK036

SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

August 2024

RT-SVF103B-EN

Introduction

Read this manual thoroughly before operating or servicing this unit.

Warnings, Cautions, and Notices

Safety advisories appear throughout this manual as required. Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

The three types of advisories are defined as follows:

⚠ WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.
NOTICE	Indicates a situation that could result in equipment or property-damage only accidents.

Important Environmental Concerns

Scientific research has shown that certain man-made chemicals can affect the earth's naturally occurring stratospheric ozone layer when released to the atmosphere. In particular, several of the identified chemicals that may affect the ozone layer are refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those containing Hydrogen, Chlorine, Fluorine and Carbon (HCFCs). Not all refrigerants containing these compounds have the same potential impact to the environment. Trane advocates the responsible handling of all refrigerants.

Important Responsible Refrigerant Practices

Trane believes that responsible refrigerant practices are important to the environment, our customers, and the air conditioning industry. All technicians who handle refrigerants must be certified according to local rules. For the USA, the Federal Clean Air Act (Section 608) sets forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants and the equipment that is used in these service procedures. In addition, some states or municipalities may have additional requirements that must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.

⚠ WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury. All field wiring **MUST** be performed by qualified personnel. Improperly installed and grounded field wiring poses **FIRE** and **ELECTROCUTION** hazards. To avoid these hazards, you **MUST** follow requirements for field wiring installation and grounding as described in NEC and your local/state/national electrical codes.

⚠ WARNING

Personal Protective Equipment (PPE) Required!

Failure to wear proper PPE for the job being undertaken could result in death or serious injury. Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, **MUST** follow precautions in this manual and on the tags, stickers, and labels, as well as the instructions below:

- Before installing/servicing this unit, technicians **MUST** put on all PPE required for the work being undertaken (Examples; cut resistant gloves/sleeves, butyl gloves, safety glasses, hard hat/bump cap, fall protection, electrical PPE and arc flash clothing). **ALWAYS** refer to appropriate Safety Data Sheets (SDS) and OSHA guidelines for proper PPE.
- When working with or around hazardous chemicals, **ALWAYS** refer to the appropriate SDS and OSHA/GHS (Global Harmonized System of Classification and Labeling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection and handling instructions.
- If there is a risk of energized electrical contact, arc, or flash, technicians **MUST** put on all PPE in accordance with OSHA, NFPA 70E, or other country-specific requirements for arc flash protection, **PRIOR** to servicing the unit. **NEVER PERFORM ANY SWITCHING, DISCONNECTING, OR VOLTAGE TESTING WITHOUT PROPER ELECTRICAL PPE AND ARC FLASH CLOTHING. ENSURE ELECTRICAL METERS AND EQUIPMENT ARE PROPERLY RATED FOR INTENDED VOLTAGE.**

WARNING

Follow EHS Policies!

Failure to follow instructions below could result in death or serious injury.

- All Trane personnel must follow the company's Environmental, Health and Safety (EHS) policies when performing work such as hot work, electrical, fall protection, lockout/tagout, refrigerant handling, etc. Where local regulations are more stringent than these policies, those regulations supersede these policies.
- Non-Trane personnel should always follow local regulations.

WARNING

R-454B Flammable A2L Refrigerant!

Failure to use proper equipment or components as described below could result in equipment failure, and possibly fire, which could result in death, serious injury, or equipment damage.

The equipment described in this manual uses R-454B refrigerant which is flammable (A2L). Use ONLY R-454B rated service equipment and components. For specific handling concerns with R-454B, contact your local representative.

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Table of Contents

General Data	5	Drain Pan Condensate Overflow Switch (Optional)	17
Performance Data	6	Low Ambient Operation (Optional)	17
Sequence of Operation	12	Phase Monitor	17
Electromechanical Controls – Standard Economizers	12	Low Pressure Cutout	17
Electromechanical Control Cooling without an Economizer	12	High Pressure Cutout and Temperature Discharge Limit	17
Electromechanical Control Evaporator Fan Operation (for Gas Units)	12	Coil Frost Protection	17
Electromechanical Evaporator Fan Operation (for Cooling Only Units)	12	Initiation of Operating Modes	17
Economizer Setup	12	Fault Detection and Diagnostics (FDD) Certification	17
Electromechanical Control Cooling with an Economizer	12	Pressure Curves	18
Electromechanical Control Heating Operation (Units with Electric Heat)	12	Subcooling Charging Curve	19
Electromechanical Control Heating Operation (for Gas Units)	12	Refrigerant Circuit	20
Heating Cycle – Low Heat (Thermostat Calls for Heat)	13		
Heating Cycle – Medium Heat (Comfort Control Calls for Heat, Second Stage Thermostat)	13		
Heating Failures (Gas Heat)	13		
Drain Pan Condensate Overflow Switch (Optional)	14		
Low Ambient Operation (Optional)	14		
Indoor Fan Control	14		
Cooling Operation	14		
Phase Monitor	14		
Low Pressure Cutout	14		
High Pressure Cutout and Temperature Discharge Limit	14		
Coil Frost Protection	14		
Heating Operation	14		
Emergency Stop	14		
Fan Failure Switch	14		
Jade Controls – Low Leak Economizer	15		
Sequence of Operation	15		
Electromechanical Controls – LLE Economizers	17		
Economizer Setup	17		

General Data

Table 1. General data – 3 tons

	3 Tons
	E/GDK036
Cooling Performance^(a)	
Gross Cooling Capacity	38,000
EER ^(b) /SEER ^(c)	12.0/10.6
Nominal Airflow CFM / AHRI Rated CFM	1200/1050
AHRI Net Cooling Capacity	36,600
SEER ^(b) /SEER ^(c)	14.0/13.4
System Power (kW)	3.45
Compressor	
Number/Type	1/Scroll
Sound	
Outdoor Sound Rating (dBA) ^(d)	79
Outdoor Coil	
Type	Microchannel
Coil Width (in.)	0.63
Face Area (sq. ft.)	11.33
Rows/FPI	1/23
Indoor Coil	
Type	Microchannel
Coil Width (in.)	0.63
Face Area (sq. ft.)	6.44
Rows/FPI	2/16
Refrigerant Control	Thermal Expansion Valve
Drain Connection Number/Size (in.)	1/4"-14 NPT
Outdoor Fan	
Type	Propeller
Number Used/Diameter (in.)	1/23
Drive Type/No. Speeds	Direct/1
CFM	4,000
Number Motors/hp	1/0.33
Motor rpm	1100
Indoor Fan	
Type	FC Centrifugal
Number Used/Diameter (in.)	1/11x11
Drive Type/No. Speeds	Belt/1
Number Motors	1
Motor hp (Standard/Oversized)	1.0/2.0
Motor rpm (Standard/Oversized)	1750/1750
Motor Frame Size (Standard/Oversized)	56/56
Filters	
Type Furnished	Throwaway
Number Size Recommended	(4) 16x16x2
Refrigerant Charge (Pounds of R-454B)^(e)	
Circuit 1	3

(a) Cooling Performance is rated at 95°F ambient, 80°F entering dry bulb, 67°F entering wet bulb. Gross capacity does not include the effect of fan motor heat. AHRI capacity is net and includes the effect of fan motor heat. Units are suitable for operation to ±20% of nominal cfm. Certified in accordance with the Unitary Air-Conditioner Equipment Certification Program, which is based on AHRI Standard 210/240.

(b) EER and SEER are rated at AHRI conditions and calculated in accordance with AHRI Standard 210/240-2017. Airflow and net cooling capacity not shown.

(c) EER2 and SEER2 are rated at AHRI conditions and certified in accordance with AHRI Standard 210/240-2023.

(d) Outdoor Sound Rating shown is tested in accordance with AHRI Standard 270 or 370.

(e) Refrigerant charge is an approximate value. For a more precise value, see unit nameplate and service instructions.

Table 2. General data – heating performance – 3 tons

	Heating Performance^(a)	
	3 Tons	
Heating Models	Low	Medium
Heating Input (Btu/h)	72,000	100,000
First Stage (Btu)		80,000
Heating Output (Btu/h)	57,600	80,000
First Stage (Btu)		64,000
Steady State Efficiency%	80%	80%
No. Burners	2	3
No. Stages	1	2
Gas Supply Line Pressure (in. wc)	4.0/14.0	4.0/14.0
Natural Gas (Minimum/Maximum)	11.0/14.0	11.0/14.0
Gas Connection Pipe Size (in.)	1/2	1/2

(a) Heating Performance limit settings and rating data were established and approved under laboratory test conditions using American National Standards Institute standards (ANSI). Ratings shown are for elevations up to 2000 feet. For elevations above 2000 feet, ratings should be reduced at the rate of 4% for each 1000 feet above sea level.

Performance Data

Table 3. Belt drive evaporator fan performance - 3 tons cooling only units - EDK036A3, 4, W - downflow airflow

Available External Static Pressure (Inches of Water Gauge)																				
cfm	0.10		0.20		0.30		0.40		0.50		0.60		0.70		0.80		0.90		1.00	
	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
1-hp standard motor and pulley																				
960	---	---	---	---	601	0.18	657	0.22	709	0.26	757	0.30	802	0.35	844	0.39	884	0.44	921	0.49
1080	---	---	---	---	627	0.22	682	0.26	733	0.31	780	0.35	824	0.40	866	0.45	905	0.50	943	0.55
1200	---	---	597	0.22	655	0.26	708	0.31	758	0.36	804	0.41	847	0.46	888	0.51	927	0.57	964	0.62
1320	---	---	628	0.26	684	0.31	735	0.36	783	0.42	828	0.47	871	0.53	911	0.58	949	0.64	986	0.70
1440	601	0.26	660	0.32	714	0.37	763	0.43	810	0.48	854	0.54	895	0.60	935	0.66	972	0.72	1009	0.78
2-hp oversize motor and pulley																				
Available External Static Pressure (Inches of Water Gauge)																				
cfm	1.10		1.20		1.30		1.40		1.50											
	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp										
2-hp oversize motor and pulley																				
960	958	0.54	992	0.59	1025	0.64	1057	0.69	1088	0.74										
1080	979	0.60	1013	0.66	1046	0.71	1078	0.77	1109	0.82										
1200	1000	0.68	1034	0.73	1067	0.79	1099	0.85	1130	0.91										
1320	1021	0.76	1055	0.82	1088	0.88	1120	0.94	1150	1.00										
1440	1043	0.84	1077	0.91	1109	0.97	1141	1.04	1171	1.10										

Notes:

1. For Standard Evaporator Fan Speed (rpm), reference [Table 9, p. 11](#).
2. For Oversized Evaporator Fan Speed (rpm), reference [Table 10, p. 11](#).
3. 1-hp fan motor heat (MBh) = $2.8328 \times \text{Fan bhp} + 0.4714$, 2-hp fan motor heat (MBh) = $2.7146 \times \text{Fan bhp} + 0.816$.
4. Data includes pressure drop due to standard filters and wet coils. No accessories or options are included in pressure drop data.
5. Factory supplied motors, in commercial equipment, are definite purpose motors, specifically designed and tested to operate reliably and continuously at all cataloged conditions. Using the full horsepower range of the fan motors as shown in the tabular data will not result in nuisance tripping or premature motor failure. Our product's warranty will not be affected.
6. Available External Static Pressure is the static pressure difference between the return duct and the supply duct plus the static pressure drop caused by accessories and options.

Table 4. Belt drive evaporator fan performance - 3 tons cooling only units - EDK036A3, 4, W - horizontal airflow

Available External Static Pressure (Inches of Water Gauge)																				
cfm	0.10		0.20		0.30		0.40		0.50		0.60		0.70		0.80		0.90		1.00	
	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
1-hp standard motor and pulley																				
960	---	---	---	---	610	0.19	666	0.23	717	0.27	765	0.31	809	0.36	850	0.40	890	0.45	927	0.50
1080	---	---	---	---	638	0.23	692	0.27	742	0.32	788	0.36	832	0.41	873	0.46	912	0.51	950	0.56
1200	---	---	610	0.23	667	0.27	719	0.32	768	0.37	813	0.42	856	0.47	897	0.52	935	0.58	972	0.63
1320	582	0.22	642	0.27	697	0.33	748	0.38	795	0.43	839	0.49	881	0.54	920	0.60	958	0.65	995	0.71
1440	618	0.28	675	0.33	728	0.39	777	0.44	822	0.50	865	0.56	906	0.62	945	0.68	983	0.74	1018	0.80
2-hp oversize motor and pulley																				
Available External Static Pressure (Inches of Water Gauge)																				
cfm	1.10		1.20		1.30		1.40		1.50											
	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp										
2-hp oversize motor and pulley																				
960	963	0.55	998	0.60	1031	0.65	1062	0.70	1093	0.75										
1080	985	0.61	1019	0.67	1052	0.72	1084	0.78	1115	0.83										
1200	1007	0.69	1041	0.75	1074	0.80	1106	0.86	1136	0.92										
1320	1030	0.77	1063	0.83	1096	0.89	1127	0.95	1158	1.02										
1440	1053	0.86	1086	0.93	1118	0.99	1149	1.06	1180	1.12										

Notes:

1. For Standard Evaporator Fan Speed (rpm), reference [Table 9, p. 11](#).
2. For Oversized Evaporator Fan Speed (rpm), reference [Table 10, p. 11](#).
3. 1-hp fan motor heat (MBh) = 2.8328 x Fan bhp. + 0.4714, 2-hp fan motor heat (MBh) = 2.7146 x Fan bhp. + 0.816.
4. Data includes pressure drop due to standard filters and wet coils. No accessories or options are included in pressure drop data.
5. Factory supplied motors, in commercial equipment, are definite purpose motors, specifically designed and tested to operate reliably and continuously at all cataloged conditions. Using the full horsepower range of the fan motors as shown in the tabular data will not result in nuisance tripping or premature motor failure. Our product's warranty will not be affected.
6. Available External Static Pressure is the static pressure difference between the return duct and the supply duct plus the static pressure drop caused by accessories and options.

Performance Data

Table 5. Belt drive evaporator fan performance - 3 tons with medium gas heat - GDK036A3, 4, W*M - downflow airflow

Available External Static Pressure (Inches of Water Gauge)																				
cfm	0.10		0.20		0.30		0.40		0.50		0.60		0.70		0.80		0.90		1.00	
	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
1-hp standard motor and pulley																				
1080	---	---	592	0.19	650	0.24	703	0.28	753	0.33	798	0.37	841	0.42	882	0.47	921	0.52	958	0.57
1200	---	---	627	0.24	683	0.29	734	0.33	781	0.38	826	0.44	868	0.49	908	0.54	946	0.59	982	0.65
1320	605	0.24	663	0.29	716	0.34	765	0.40	811	0.45	854	0.51	896	0.56	935	0.62	972	0.68	1008	0.73
1440	645	0.30	700	0.36	750	0.41	798	0.47	842	0.53	884	0.58	924	0.64	962	0.70	999	0.77	1034	0.83
2-hp oversize motor and pulley																				
Available External Static Pressure (Inches of Water Gauge)																				
cfm	1.10		1.20		1.30		1.40		1.50											
	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp										
2-hp oversize motor and pulley																				
1080	993	0.63	1027	0.68	1059	0.73	1091	0.79	1121	0.85										
1200	1017	0.71	1051	0.76	1083	0.82	1115	0.88	1145	0.94										
1320	1042	0.79	1076	0.85	1108	0.92	1139	0.98	1169	1.04										
1440	1068	0.89	1101	0.96	1133	1.02	1163	1.09	1193	1.15										

Notes:

1. For Standard Evaporator Fan Speed (rpm), reference [Table 9, p. 11](#).
2. For Oversized Evaporator Fan Speed (rpm), reference [Table 10, p. 11](#).
3. 1-hp fan motor heat (MBh) = 2.8328 x Fan bhp. + 0.4714, 2-hp fan motor heat (MBh) = 2.7146 x Fan bhp. + 0.816.
4. Data includes pressure drop due to standard filters and wet coils. No accessories or options are included in pressure drop data.
5. Factory supplied motors, in commercial equipment, are definite purpose motors, specifically designed and tested to operate reliably and continuously at all cataloged conditions. Using the full horsepower range of the fan motors as shown in the tabular data will not result in nuisance tripping or premature motor failure. Our product's warranty will not be affected.
6. Available External Static Pressure is the static pressure difference between the return duct and the supply duct plus the static pressure drop caused by accessories and options.

Table 6. Belt drive evaporator fan performance - 3 tons with low gas heat - GDK036A3, 4, W*L - downflow airflow

Available External Static Pressure (Inches of Water Gauge)																				
cfm	0.10		0.20		0.30		0.40		0.50		0.60		0.70		0.80		0.90		1.00	
	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
1-hp standard motor and pulley																				
960	---	---	---	---	618	0.19	673	0.23	724	0.27	771	0.32	814	0.36	856	0.41	895	0.46	932	0.50
1080	---	---	590	0.19	648	0.23	702	0.28	751	0.32	797	0.37	840	0.42	881	0.47	919	0.52	956	0.57
1200	---	---	625	0.24	680	0.28	732	0.33	779	0.38	824	0.43	866	0.48	906	0.54	944	0.59	981	0.65
1320	602	0.24	660	0.29	713	0.34	763	0.39	809	0.45	852	0.50	893	0.56	933	0.61	970	0.67	1006	0.73
1440	641	0.30	696	0.35	747	0.41	795	0.46	839	0.52	882	0.58	922	0.64	960	0.70	997	0.76	1032	0.82
2-hp oversize motor and pulley																				
Available External Static Pressure (Inches of Water Gauge)																				
cfm	1.10		1.20		1.30		1.40		1.50											
	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp										
2-hp oversize motor and pulley																				
960	968	0.55	1002	0.60	1035	0.65	1066	0.71	1097	0.76										
1080	992	0.62	1026	0.68	1058	0.73	1090	0.79	1120	0.84										
1200	1016	0.70	1049	0.76	1082	0.82	1113	0.88	1144	0.94										
1320	1041	0.79	1074	0.85	1106	0.91	1137	0.97	1167	1.04										
1440	1066	0.89	1099	0.95	1131	1.02	1161	1.08	1191	1.15										

Notes:

1. For Standard Evaporator Fan Speed (rpm), reference [Table 9, p. 11](#).
2. For Oversized Evaporator Fan Speed (rpm), reference [Table 10, p. 11](#).
3. 1-hp fan motor heat (MBh) = 2.8328 x Fan bhp. + 0.4714, 2-hp fan motor heat (MBh) = 2.7146 x Fan bhp. + 0.816.
4. Data includes pressure drop due to standard filters and wet coils. No accessories or options are included in pressure drop data.
5. Factory supplied motors, in commercial equipment, are definite purpose motors, specifically designed and tested to operate reliably and continuously at all cataloged conditions. Using the full horsepower range of the fan motors as shown in the tabular data will not result in nuisance tripping or premature motor failure. Our product's warranty will not be affected.
6. Available External Static Pressure is the static pressure difference between the return duct and the supply duct plus the static pressure drop caused by accessories and options.

Performance Data

Table 7. Belt drive evaporator fan performance - 3 tons with medium gas heat - GDK036A3, 4, W*M - horizontal airflow

Available External Static Pressure (Inches of Water Gauge)																				
cfm	0.10		0.20		0.30		0.40		0.50		0.60		0.70		0.80		0.90		1.00	
	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
1-hp standard motor and pulley																				
1080	---	---	611	0.21	667	0.25	719	0.29	767	0.34	812	0.39	854	0.44	894	0.49	932	0.54	968	0.59
1200	589	0.21	648	0.26	702	0.30	751	0.35	798	0.40	841	0.45	883	0.51	922	0.56	959	0.61	995	0.67
1320	630	0.26	686	0.31	737	0.37	785	0.42	830	0.47	872	0.53	912	0.58	951	0.64	987	0.70	1023	0.76
1440	672	0.33	725	0.38	774	0.44	820	0.50	863	0.55	904	0.61	943	0.67	980	0.73	1016	0.80	1051	0.86
														2-hp oversize motor and pulley						
Available External Static Pressure (Inches of Water Gauge)																				
cfm	1.10		1.20		1.30		1.40		1.50											
	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp										
2-hp oversize motor and pulley																				
1080	1003	0.64	1037	0.70	1069	0.75	1100	0.81	1131	0.86										
1200	1030	0.73	1063	0.78	1095	0.84	1126	0.90	1156	0.96										
1320	1056	0.82	1089	0.88	1121	0.94	1152	1.00	1181	1.07										
1440	1084	0.92	1116	0.99	1148	1.05	1178	1.12	1207	1.19										

Notes:

1. For Standard Evaporator Fan Speed (rpm), reference [Table 9, p. 11](#).
2. For Oversized Evaporator Fan Speed (rpm), reference [Table 10, p. 11](#).
3. 1-hp fan motor heat (MBh) = 2.8328 x Fan bhp. + 0.4714, 2-hp fan motor heat (MBh) = 2.7146 x Fan bhp. + 0.816.
4. Data includes pressure drop due to standard filters and wet coils. No accessories or options are included in pressure drop data.
5. Factory supplied motors, in commercial equipment, are definite purpose motors, specifically designed and tested to operate reliably and continuously at all cataloged conditions. Using the full horsepower range of the fan motors as shown in the tabular data will not result in nuisance tripping or premature motor failure. Our product's warranty will not be affected.
6. Available External Static Pressure is the static pressure difference between the return duct and the supply duct plus the static pressure drop caused by accessories and options.

Table 8. Belt drive evaporator fan performance - 3 tons with low gas heat - GDK036A3, 4, W*L - horizontal airflow

Available External Static Pressure (Inches of Water Gauge)																				
cfm	0.10		0.20		0.30		0.40		0.50		0.60		0.70		0.80		0.90		1.00	
	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
1-hp standard motor and pulley																				
960	---	---	---	---	631	0.20	685	0.24	735	0.28	781	0.33	824	0.37	865	0.42	904	0.47	941	0.51
1080	---	---	607	0.20	664	0.25	716	0.29	764	0.34	809	0.38	852	0.43	892	0.48	930	0.53	966	0.59
1200	584	0.21	644	0.25	698	0.30	748	0.35	794	0.40	838	0.45	880	0.50	919	0.56	957	0.61	993	0.67
1320	625	0.26	681	0.31	733	0.36	781	0.41	826	0.47	868	0.52	909	0.58	947	0.64	984	0.69	1020	0.75
1440	666	0.32	720	0.38	769	0.43	815	0.49	858	0.55	900	0.61	939	0.67	977	0.73	1013	0.79	1047	0.85
2-hp oversize motor and pulley																				
Available External Static Pressure (Inches of Water Gauge)																				
cfm	1.10		1.20		1.30		1.40		1.50											
	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp										
2-hp oversize motor and pulley																				
960	976	0.56	1010	0.61	1042	0.67	1074	0.72	1104	0.77										
1080	1001	0.64	1035	0.69	1067	0.75	1099	0.80	1129	0.86										
1200	1027	0.72	1060	0.78	1093	0.84	1124	0.90	1154	0.96										
1320	1054	0.81	1086	0.87	1118	0.94	1149	1.00	1179	1.06										
1440	1081	0.92	1113	0.98	1144	1.05	1175	1.11	1204	1.18										

Notes:

1. For Standard Evaporator Fan Speed (rpm), reference [Table 9, p. 11](#).
2. For Oversized Evaporator Fan Speed (rpm), reference [Table 10, p. 11](#).
3. 1-hp fan motor heat (MBh) = 2.8328 x Fan bhp. + 0.4714, 2-hp fan motor heat (MBh) = 2.7146 x Fan bhp. + 0.816.
4. Data includes pressure drop due to standard filters and wet coils. No accessories or options are included in pressure drop data.
5. Factory supplied motors, in commercial equipment, are definite purpose motors, specifically designed and tested to operate reliably and continuously at all cataloged conditions. Using the full horsepower range of the fan motors as shown in the tabular data will not result in nuisance tripping or premature motor failure. Our product's warranty will not be affected.
6. Available External Static Pressure is the static pressure difference between the return duct and the supply duct plus the static pressure drop caused by accessories and options.

Table 9. Standard motor and drive/fan speed (rpm)

Tons	Unit Model Number	Fan Sheave	6 Turns Open	5 Turns Open	4 Turns Open	3 Turns Open	2 Turns Open	1 Turn Open	Closed
3	E/GDK036A3, 4, W	AK59X3/4"	580	639	702	766	830	891	952

Note: Factory set at 3 turns open.

Table 10. Oversized motor and drive/fan speed (rpm)

Tons	Unit Model Number	Fan Sheave	6 Turns Open	5 Turns Open	4 Turns Open	3 Turns Open	2 Turns Open	1 Turn Open	Closed
3	E/GDK036A3, 4, W	AK56X3/4"	N/A	888	954	1018	1084	1147	1211

Note: Factory set at 3 turns open.

Sequence of Operation

These units are offered with electromechanical controls.

Note: *The Condensate Overflow Switch (COF) (optional) will shut the unit down if the float is raised and the switch is closed.*

Electromechanical Controls – Standard Economizers

Electromechanical Control Cooling without an Economizer

When the thermostat switch is set to **Cool** and the zone temperature rises above the cooling setpoint, the thermostat Y contacts close. The compressor contactor (CC1) coil is energized provided the low pressure control (LPC1), high pressure control (HPC1), and discharge line thermostat (DLT 1) are closed. When the (CC1) contacts close, the compressor (CPR1) and outdoor fan motor (ODM1) start.

Electromechanical Control Evaporator Fan Operation (for Gas Units)

When the thermostat fan selection switch is set to **Auto**, the Ignition Module (IGN) energizes the indoor fan relay (F) approximately 1 second after energizing the compressor contactor coil (CC1) in the cooling mode. In the heating mode, the Ignition Module (IGN) energizes the indoor fan relay (F) coil approximately 45 seconds after gas ignition. Closing indoor fan relay (F) coil starts the indoor fan motor (IDM). The (IGN) de-energizes the fan relay (F) approximately 80 seconds after the cooling requirement has been satisfied to enhance unit efficiency.

When the heating cycle is terminated, the indoor fan relay (F) coil is de-energized approximately 90 seconds after the heating requirement.

When the thermostat fan selection switch is set to **On**, the (IGN) keeps the indoor fan relay coil (F) energized for continuous fan motor operation.

Electromechanical Evaporator Fan Operation (for Cooling Only Units)

When the thermostat fan selection switch is set to **Auto**, the thermostat energizes the indoor fan relay coil (F) to start the indoor fan motor (IDM). The fan relay (F) de-energizes after the cooling requirement has been satisfied. When the heating cycle is terminated, the indoor fan relay (F) coil is de-energized with heater contactors.

When the thermostat fan selection switch is set to **On**, the thermostat keeps the indoor fan relay coil (F) energized for continuous fan motor operation.

Economizer Setup

Adjusting the minimum position potentiometer located on the unit economizer module (RTEM-EM) sets the required amount of ventilation air.

Ambient temperature is controlling the economizing cycle by sensing the outside air dry bulb temperature. [Table 11, p. 12](#) lists the selectable dry bulb values by potentiometer setting.

Table 11. Potentiometer settings

Potentiometer Setting	Dry Bulb	Enthalpy
A	27 Btu/lb (63 kJ/kg)	73°F (22.8°C)
B	25 Btu/lb (58 kJ/kg)	70°F (21.1°C)
C ^(a)	23 Btu/lb (53 kJ/kg)	67°F (19.4°C)
D	22 Btu/lb (51 kJ/kg)	63°F (17.2°C)
E	19 Btu/lb (44 kJ/kg)	55°F (12.8°C)

(a) Factory setting.

Electromechanical Control Cooling with an Economizer

The economizer is utilized to control the zone temperature providing the outside air conditions are suitable. Outside air is drawn into the unit through modulating dampers.

When cooling is required and economizing is possible, the unit economizer module (RTEM-EM) opens the economizer damper. The RTEM-EM continues to modulate the economizer damper open/closed to keep the mixed air temperature in the 50°F to 55°F range.

The thermostat will close the Y2 contacts to turn on contactor (CC1) if mechanical cooling is required.

If economizing is not possible, the RTEM-EM drives the damper to the minimum position setpoint when the indoor fan relay (F) is energized and allows mechanical cooling operation.

Electromechanical Control Heating Operation (Units with Electric Heat)

When the system switch is set to **Heat** and the zone temperature falls below the heating setpoint, the thermostat closes W1 contacts the first stage electric heat contactor (AH or AH and CH) is energized. If the first stage of electric heat cannot satisfy the heating requirement, the thermostat closes W2.

When the W2 contacts close, the second stage electric heat contactor (BH or BH and DH) is energized, if applicable. The thermostat cycles both the first and second stages of heat **On** and **Off** as required to maintain the zone temperature setpoint.

Electromechanical Control Heating Operation (for Gas Units)

When the system switch is set to **Heat** and the zone temperature falls below the heating setpoint, the ignition module (IGN) initiates a heat cycle.

Heating Cycle – Low Heat (Thermostat Calls for Heat)

(R) and (W) thermostat contacts close signaling the control module (IGN) to run its self-check routine. After the control has verified that the pressure switch (PS) contacts are open, the limit switch (TCO) contacts are closed, and the flame rollout (RO) switch is closed, the induced draft blower (CFM) will be energized.

After the induced draft blower (CFM) has come up to speed, the control will verify that the pressure switch (PS) contacts are closed and run the induced draft blower for a 20 seconds pre-purge. The gas valve (GV) is energized to permit gas flow, and the spark igniter (IP) is energized. The flame detector (FD) confirms that ignition has been achieved within the 7-seconds trial period.

Once the flame detector detects that ignition has been achieved, the indoor blower motor (IDM) will be energized after a delay of approximately 45 seconds and will continue to run during the heating cycle.

Once the thermostat is satisfied, (R) and (W) contacts open signaling the control module to close the gas valve and de-energize the induced draft blower after a 5 seconds post-purge. The indoor blower motor will continue to operate at the current speed for 60 or 90 seconds (field selectable) after the flames are out.

Heating Cycle – Medium Heat (Comfort Control Calls for Heat, Second Stage Thermostat)

Call for First Stage Only

(R) and (W1) thermostat contacts close signaling the control module (IGN) to run its self-check routine. After the control has verified that the pressure switch (PS) contacts are open, the limit switch (TCO) contacts are closed, and the flame rollout (FL) switch is closed, the induced draft blower (CBM) will be energized on high speed for approximately 5 seconds.

After the induced draft blower (CBM) has come up to speed, the control will verify that the pressure switch (PS) contacts are closed and switch the induced draft blower to low speed for a 20 seconds pre-purge. The gas valve (GV) is energized in the first stage to permit gas flow, and the spark igniter (IP) is energized. The flame detector (FD) confirms that ignition has been achieved within the 7-seconds trial period.

Once the flame detector confirms that ignition has been achieved, the indoor blower motor (IDM) will be energized at low speed after a delay of approximately 45 seconds and will continue to run during the heating cycle.

Call for Second Stage After First Stage

(R) and (W2) thermostat contacts close signaling a call for second stage heat. The induced draft motor (CBM) is energized on high speed and the gas valve on second stage. After approximately 30 seconds the control energizes the indoor blower on high speed.

Second Stage Satisfied, First Stage Still Called

(R) and (W2) open, the induced draft blower is switched to low speed and the gas valve is reduced to first stage. After about 30 seconds the indoor blower motor is switched to low speed.

First Stage Satisfied

(R) and (W1) opens, the gas valve (GV) will close. The induced draft blower (CBM) will be de-energized after approximately 5 seconds post-purge. The indoor blower motor (IDM) will continue to run for the fan off period (field selectable to 60 or 90 seconds by using jumpers), then will be de-energized by the control module.

Comfort Control Calls for Heat (First Stage Comfort Control)

(R) and (W1/W2) (jumped) thermostat contacts close signaling a call for heat. First stage sequence of operation remains the same as above. Second stage heat has a 10 minutes delay from the time of First stage ignition.

Comfort Control Satisfied

(R) and (W1/W2) (jumped) contacts open signaling the control module to close the gas valve and de-energize the induced draft blower after approximately 5 seconds post-purge. The I.D. blower motor will continue to operate at the current speed for 60 or 90 seconds after the flames are out.

Heating Failures (Gas Heat)

Low Heat Models

Check the ignition module (IGN) LED indicator:

- Steady OFF: Check Power or Bad Board
- Flashing Slow (the LED flashes on for 3/4 second, then off for 1/4 second): Normal, No Call for Heat
- Flashing Fast (the LED flashes on for 1/4 second, and off for 1/4 second): Call for Heat
- Continuous On: Internal Error-Replace Control Board
- 2 Flashes: 1 Hour Lockout, No Flame
- 3 Flashes: Pressure Switch/Inducer Issue
- 4 Flashes: Open Temperature Limit Switch or Rollout Limit
- 5 Flashes: Flame without Gas Valve
- 7 Flashes: Gas Valve Circuit Error
- 8 Flashes: Low Flame Sense

Medium Heat Models

Check the ignition module (IGN) LED indicator:

- Steady OFF: Check Power or Bad Board
- Flashing Slow (the LED flashes on for 3/4 second, then off for 1/4 second): Normal, No Call for Heat
- Flashing Fast: Not Used
- Steady ON: Normal, No Call for Heat
- 2 Flashes: System Lockout: Failed to detect or sustain flame

Sequence of Operation

- 3 Flashes: Pressure Switch Problem Detected
- 4 Flashes: High Limit Switch Protection Device Open
- 5 Flashes: Flame Sensed and Gas Valve not Energized or Flame Sensed and no W Signal
- 6 Flashes: Flame Rollout Switch Open
- 7 Flashes: Thermostat Miswired; W1 and W2

Drain Pan Condensate Overflow Switch (Optional)

The Condensate Overflow Switch (COF) is used to prevent water overflow from the drain pan. The float switch is installed on the corner lip of the drain pan. When the condensate level reaches the trip point, the COF relay energizes and opens the 24Vac control circuit which disables the unit. Once the 24Vac control circuit opens, a delay timer prevents unit start-up for 3 minutes.

Low Ambient Operation (Optional)

During low ambient operation, outside air temperature below 40°F, the Low Ambient Controller will cycle the outdoor fan motor **Off** and **On** based on discharge pressure. The indoor fan motor (IDM) will continue to operate and the outdoor fan will return to normal operation once the ambient temperature is above 40°F.

Indoor Fan Control

Cooling Operation

For cooling operation, the unit will operate at Low Fan Speed during Fan Only, Economizer Only, and compressor operation by default. When the unit receives a call for cooling, if the economizer is enabled, the unit will energize the associated Low Speed output and begin to modulate the OA Damper open above minimum position up to 100% as necessary. By default, the Supply Fan will remain at low speed for the duration of Economizer-Only cooling. If the Supply Fan is on when the compressor is energized, it will remain energized or energize at low speed for the duration of Cool 1.

Once the Supply Fan is no longer requested ON after a Cooling call is cleared, the Supply Fan will remain energized at Low Speed for 60 seconds as on traditional units.

Phase Monitor

The Phase Monitor is a three-phase line monitor module that protects against phase loss, phase reversal, and phase unbalance. It is intended to protect compressors from reverse rotation. It has an operating input voltage range of 190 to 600 VAC and LED indicators for ON and FAULT. There are no field adjustments and the module automatically resets from a fault condition.

Low Pressure Cutout

The low pressure cutouts are wired in series with the high pressure cutouts and the temperature discharge limits. If this circuit is open before a compressor is started, the compressor in that circuit will not be allowed to operate.

Anytime this circuit is opened, the compressor in that circuit is turned off immediately.

High Pressure Cutout and Temperature Discharge Limit

The high pressure controls and temperature discharge limit are wired in series between the compressor output on the LTB and the compressor contactor. If the high pressure safety or temperature discharge limit opens, the compressor is turned off.

Coil Frost Protection

The Froststat™ control monitors the evaporator coil temperature to prevent the evaporator from freezing due to low operating temperatures whenever there is a demand for cooling. When an open circuit has occurred, the Froststat opens the 24Vac ground as well as all of the cooling contactors.

Heating Operation

Standard unit operation for heating will continue on units equipped with a two-speed indoor fan. During heat mode, all units configured with staged electric or gas heat will heat the supply air and space as normal utilizing full speed indoor fan.

Emergency Stop

This input de-energizes the 24Vac output from the phase monitor and can be activated by opening a field supplied device connected to the LTB.

Fan Failure Switch

In electric heat mode, heaters will not be energized until differential pressure switch proves airflow. The factory set point is 0.07-inch w.c.

Jade Controls – Low Leak Economizer

Sequence of Operation

Table 12. Dry bulb operation no DCV (CO₂ sensor) - 1 speed fan

DCV	OA Good to economize?	Y1-I	FAN SPD	Y1-O	Occupied	Unoccupied
None	No	Off	High	0-v/Off	MIN POS	Closed
		On	High	24-v/On	MIN POS	Closed
None	Yes	Off	High	0-v/Off	MIN POS	Closed
		On	High	0-v/Off	MIN POS to Full-Open	Closed to Full-Open
		On	High	24-v/On	MIN POS to Full-Open	Closed to Full-Open

Table 13. Dry bulb operation with DCV (CO₂ sensor) - 1 speed fan

DCV	OA Good to economize?	Y1-I	FAN SPD	Y1-O	Occupied	Unoccupied
Below CO ₂ set	No	Off	High	0-v/Off	VENTMIN	Closed
		On	High	24-v/On	VENTMIN	Closed
		On	High	24-v/On	VENTMIN	Closed
	Yes	Off	High	0-v/Off	VENTMIN	Closed
		On	High	0-v/Off	VENTMIN to Full-Open	Closed to Full-Open
		On	High	24-v/On	VENTMIN to Full-Open	Closed to Full-Open
Above CO ₂ set	No	Off	High	0-v/Off	VENTMIN to VENTMAX	Closed
		On	High	24-v/On	VENTMIN to VENTMAX	Closed
	Yes	Off	High	0-v/Off	VENTMIN to VENTMAX	Closed
		On	High	0-v/Off	VENTMIN to Full-Open	Closed to Full-Open
		On	High	24-v/On	VENTMIN to Full-Open	Closed to Full-Open

Sequence of Operation

Table 14. Enthalpy operation no DCV (CO₂ sensor) – 1 speed fan

DCV	OA Good to economize?	Y1-I	FAN SPD	Y1-O	Occupied	Unoccupied
None	No	Off	High	0-v/Off	MIN POS	Closed
		On	High	24-v/On	MIN POS	Closed
None	Yes	Off	High	0-v/Off	MIN POS	Closed
		On	High	0-v/Off	MIN POS to Full-Open	Closed to Full-Open
		On	High	24-v/On	MIN POS to Full-Open	Closed to Full-Open

Table 15. Enthalpy operation with DCV (CO₂ sensor) – 1 speed fan

DCV	OA Good to economize?	Y1-I	FAN SPD	Y1-O	Occupied	Unoccupied
Below set	No	Off	High	0-v/Off	VENTMIN	Closed
		On	High	24-v/On	VENTMIN	Closed
	Yes	Off	High	0-v/Off	VENTMIN	Closed
		On	High	0-v/Off	VENTMIN to Full-Open	Closed to Full-Open
		On	High	24-v/On	VENTMIN to Full-Open	Closed to Full-Open
Above set	No	Off	High	0-v/Off	VENTMIN to VENTMAX	Closed
		On	High	24-v/On	VENTMIN L to VENTMAX	Closed
		On	High	24-v/On	VENTMIN H to VENTMAX	Closed
	Yes	Off	High	0-v/Off	VENTMIN L to VENTMAX	Closed
		On	High	0-v/Off	VENTMIN to Full-Open	Closed to Full-Open
		On	High	DELAY (b) 24-v/On	VENTMIN to Full-Open	Closed to Full-Open

Electromechanical Controls – LLE Economizers

Economizer Setup

Adjusting the minimum position (MIN POS/VENTMAX on the SETPOINTS menu) sets the required amount of ventilation air.

Ambient temperature controls the economizing cycle by sensing the outside air dry bulb temperature. [Table 16, p. 17](#) lists the five selectable dry bulb values (ENTH CURVE) on the SETPOINTS menu.

Table 16. Single enthalpy and dual enthalpy boundaries (parameters ES1 through ES5)

Enth. Curve	Temp. dry-Bulb (°F)	Temp. dewpoint (°F)	Enthalpy (btu/lb/da)	Point P1		Point P2	
				Temp. °F	Humid. %RH	Temp. °F	Humid. %RH
ES1	80.0	60.0	28.0	80.0	36.8	66.3	80.1
ES2	75.0	57.0	26.0	75.0	39.6	63.3	80.0
ES3	70.0	54.0	24.0	70.0	42.3	59.7	81.4
ES4	65.0	51.0	22.0	65.0	44.8	55.7	84.2
ES5	60.0	48.0	20.0	60.0	46.9	51.3	88.5
HL	86.0	66.0	32.4	86.0	38.9	72.4	80.3

Note: For differential enthalpy there is a high limit boundary. The high limit boundary is ES1 when there are no stages of mechanical cooling energized and HL when a compressor stage is energized.

Note: To disable the economizer to do functional testing, use a 10 mm wrench to completely unsecure the shaft coupling. After testing, tighten shaft coupling securely onto damper shaft using minimum 120 lb-in. (13.6 Nm) to maximum 180 lb-in. (20.3 Nm) torque.

Drain Pan Condensate Overflow Switch (Optional)

The Condensate Overflow Switch (COF) is utilized to prevent water overflow from the drain pan. The float switch is installed on the corner lip of the drain pan. When the condensate level reaches the trip point, the COF relay energizes and opens the 24Vac control circuit which disables the unit. Once the 24Vac control circuit is opened, a delay timer will prevent unit start-up for three minutes.

Low Ambient Operation (Optional)

During low ambient operation, outside air temperature below 50°F, the Low Ambient Controller will cycle the outdoor fan motor **Off** and **On** based on discharge pressure. The indoor fan motor (IDM) will continue to operate and the outdoor fan will return to normal operation once the ambient temperature is above 50°F.

Phase Monitor

The Phase Monitor is a three-phase line monitor module that protects against phase loss, phase reversal, and phase unbalance. It is intended to protect compressors from reverse rotation. It has an operating input voltage range of 190 to 600 VAC and LED indicators for ON and FAULT. There are no field

adjustments and the module will automatically resets from a fault condition.

Low Pressure Cutout

The low pressure cutouts are wired in series with the high pressure cutouts and the temperature discharge limits. If this circuit is open before a compressor is started, the compressor in that circuit will not be allowed to operate.

Anytime this circuit is opened, the compressor in that circuit is turned off immediately.

High Pressure Cutout and Temperature Discharge Limit

The high pressure controls and temperature discharge limit are wired in series between the compressor outputs on the LTB and the compressor contactors. If the high pressure safety or temperature discharge limit opens, the compressor on the affected circuit is turned off.

Coil Frost Protection

The Froststat™ control monitors the evaporator coil temperature to prevent the evaporator from freezing due to low operating temperatures whenever there is a demand for cooling. When an open circuit has occurred, the Froststat opens the 24Vac ground and opens all of the cooling contactors.

Initiation of Operating Modes

The JADE controller initiates the following modes: Compressor, Economizer, Fans, Heating System, and Cooling System.

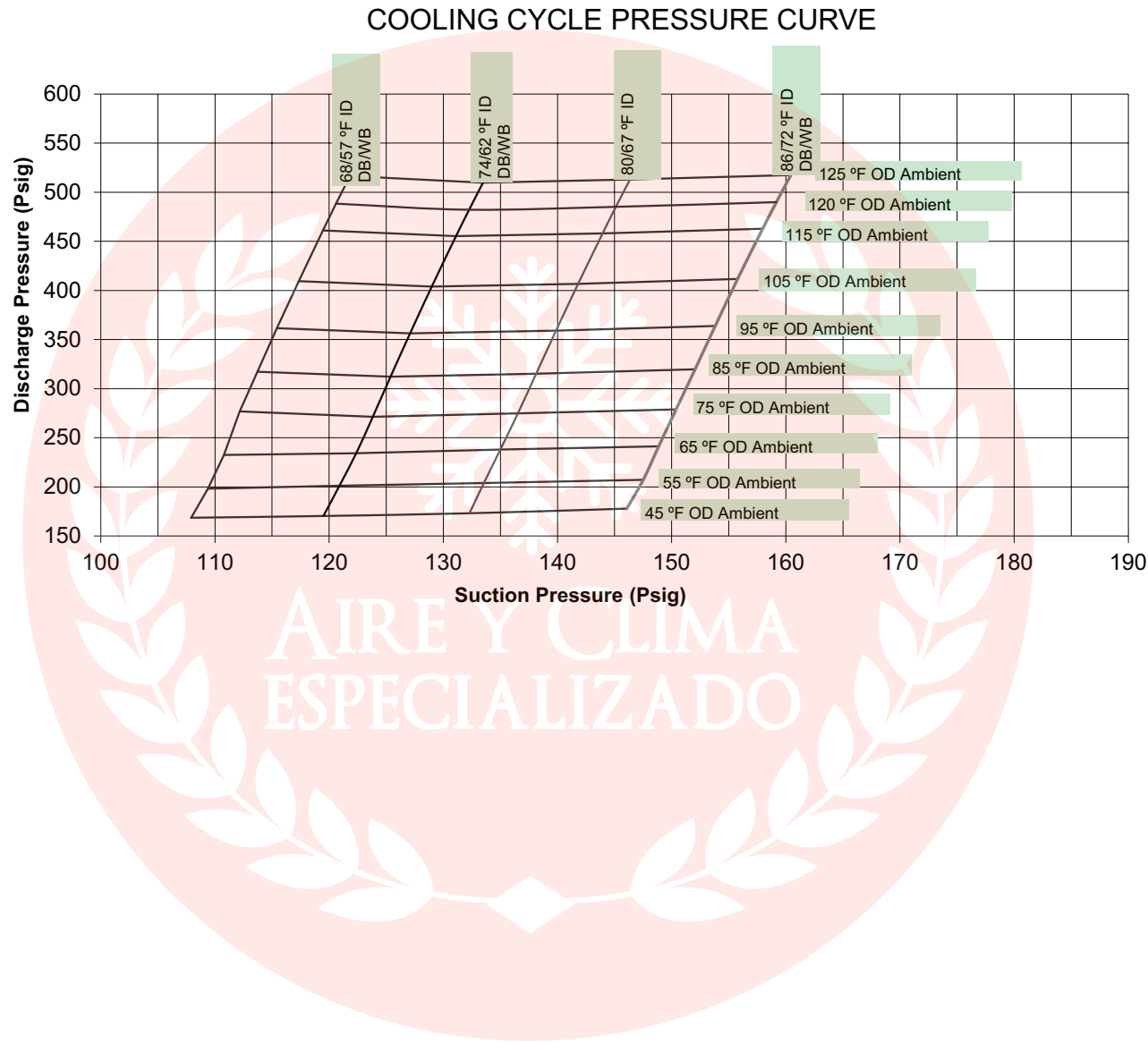
The Compressor mode is initiated by either the OAT going above the DRYBLB SET setting or by the thermostat initiating a call to cool when the damper is at 100% open. The Economizer mode is controlled by the MAT getting above the MAT SET setting while the OAT is below the DRYBLB SET setting. While the fans are not controlled by the controller, the Fan mode is dependent on what state the system is in (OCC or Y1 states will cause the damper to go to a LOW fan speed damper setting, while Y2 or W states will cause the controller to open the damper to the HIGH fan speed damper setting). The Heating System mode requires an input to the AUX2-1 terminal from the thermostat, and the Cooling System mode requires an input to the Y1 IN terminal from the thermostat.

Fault Detection and Diagnostics (FDD) Certification

The JADE controller is a certified FDD product (HJW10) by California Title 24, Part 6.

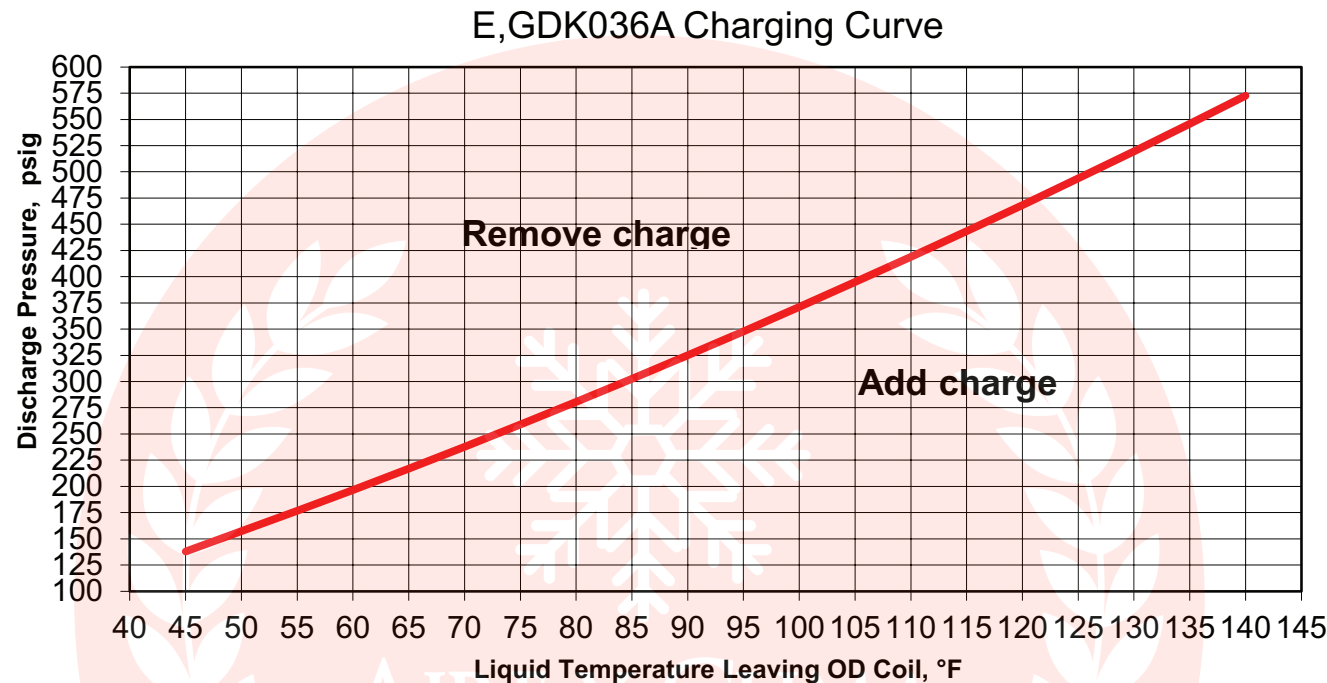
Pressure Curves

Figure 1. E/GDK036 cooling cycle pressure curve



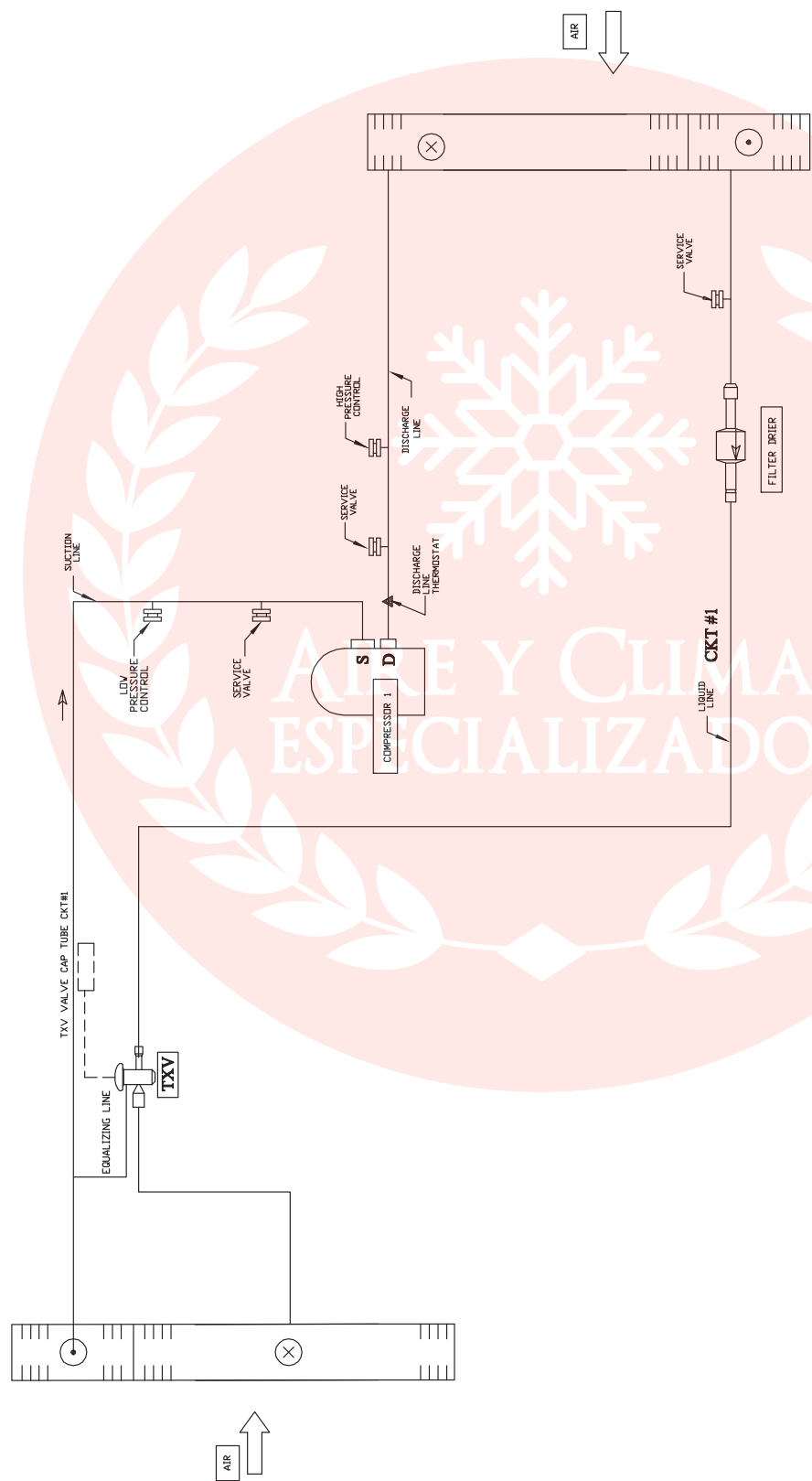
Subcooling Charging Curve

Figure 2. E/GDK036 subcooling charging curve



Refrigerant Circuit

Figure 3. E/GDK036 refrigerant circuit











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