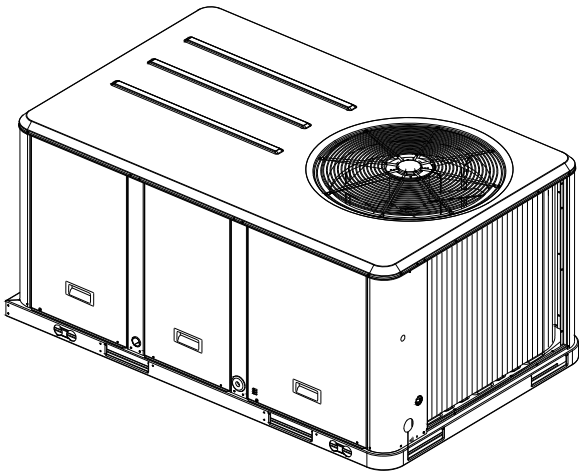
Service Facts

Packaged Rooftop Air Conditioners
Precedent™ 17 Plus – Cooling and Gas/Electric
3 - 5 Tons - 60 Hz



Model Numbers

THC037E3,4	YHC037E3,4
THC047E3,4	YHC047E3,4
THC067E3,4	YHC067E3,4

⚠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.

October 2011

RT-SVF66A-EN

Warnings, Cautions and Notices

Warnings, Cautions and Notices. Note that warnings, cautions and notices appear at appropriate intervals throughout this manual. Warnings are provide to alert installing contractors to potential hazards that could result in death or personal injury. Cautions are designed to alert personnel to hazardous situations that could result in personal injury, while notices indicate a situation that could result in equipment or property-damage-only accidents.

Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

Read this manual thoroughly before operating or servicing this unit.

ATTENTION: Warnings, Cautions and Notices appear at appropriate sections throughout this literature. Read these carefully:

⚠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-including industry replacements for CFCs such as HCFCs and HFCs.

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. 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

Refrigerant under High Pressure!

System contains oil and refrigerant under high pressure. Recover refrigerant to relieve pressure before opening the system. See unit nameplate for refrigerant type. Do not use non-approved refrigerants, refrigerant substitutes, or refrigerant additives. Failure to recover refrigerant to relieve pressure or the use of non-approved refrigerants, refrigerant substitutes, or refrigerant additives could result in an explosion which could result in death or serious injury or equipment damage.

⚠WARNING

Proper Field Wiring and Grounding Required!

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 electrical codes. Failure to follow code could result in death or serious injury.

⚠WARNING

Personal Protective Equipment (PPE) Required!

Installing/servicing this unit could result in exposure to electrical, mechanical and chemical hazards.

- **Before installing/servicing this unit, technicians MUST put on all Personal Protective Equipment (PPE) recommended for the work being undertaken. ALWAYS refer to appropriate MSDS sheets and OSHA guidelines for proper PPE.**
- **When working with or around hazardous chemicals, ALWAYS refer to the appropriate MSDS sheets and OSHA guidelines for information on allowable personal exposure levels, proper respiratory protection and handling recommendations.**
- **If there is a risk of arc or flash, technicians MUST put on all Personal Protective Equipment (PPE) in accordance with NFPA 70E or other country-specific requirements for arc flash protection, PRIOR to servicing the unit.**

Failure to follow recommendations could result in death or serious injury.

⚠WARNING

R-410A Refrigerant under Higher Pressure than R-22!

The units described in this manual use R-410A refrigerant which operates at higher pressures than R-22 refrigerant. Use ONLY R-410A rated service equipment or components with these units. For specific handling concerns with R-410A, please contact your local Trane representative.
Failure to use R-410A rated service equipment or components could result in equipment exploding under R-410A high pressures which could result in death, serious injury, or equipment damage.

⚠WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

⚠WARNING

Hazard of Explosion and Deadly Gases!

Never solder, braze or weld on refrigerant lines or any unit components that are above atmospheric pressure or where refrigerant may be present. Always remove refrigerant by following the guidelines established by the EPA Federal Clean Air Act or other state or local codes as appropriate. After refrigerant removal, use dry nitrogen to bring system back to atmospheric pressure before opening system for repairs. Mixtures of refrigerants and air under pressure may become combustible in the presence of an ignition source leading to an explosion. Excessive heat from soldering, brazing or welding with refrigerant vapors present can form highly toxic gases and extremely corrosive acids. Failure to follow all proper safe refrigerant handling practices could result in death or serious injury.

Table of Contents

General Data

Table 1. General data - 3-5 ton - 2 stage high efficiency 17 Plus

	T/YHC037E3,4	T/YHC047E3,4	T/YHC067E3,4
Cooling Performance[1]			
Gross Cooling Capacity - High Stage	36,500	50,500	60,000
EER/SEER[2]	13.0/17.5	13.0/17.5	13.0/17.2
Nominal CFM-High Stage/ARI Rated CFM	1,200 / 1,200	1,600 / 1,600	2,000 / 2,000
Nominal CFM-Low Stage	840	1,120	1,400
ARI Net Cooling Capacity-High Stage	36,000	49,000	58,500
System Power-High Stage (KW)	2.78	3.67	4.57
Compressor			
No./Type	1 / Scroll (2 Stage)	1 / Scroll (2 Stage)	1 / Scroll (2 Stage)
Outdoor Sound Rating (dB)[3]	81	87	87
Outdoor Coil - Type	Lanced	Lanced	Lanced
Tube Size (in.) OD	0.3125	0.3125	0.3125
Face Area (sq. ft)	17.00	17.00	17.00
Rows/FPI	3 / 17	3 / 16	3 / 16
Indoor Coil - Type	Lanced	Lanced	Lanced
Tube Size (in.) OD	0.3125	0.3125	0.3125
Face Area (sq. ft)	7.71	9.27	9.89
Rows/FPI	3 / 16	3 / 16	4 / 16
Refrigerant Control	Thermal Expansion Valve	Thermal Expansion Valve	Thermal Expansion Valve
Drain Connection No./Size (in.)	1 3/4 NPT	1 3/4 NPT	1 3/4 NPT
Outdoor Fan - Type	Propeller	Propeller	Propeller
No. Used / Diameter (in.)	1 / 22	1 / 26	1 / 26
Drive Type / No. Speeds	Direct / 1	Direct / 1	Direct / 1
CFM	3064	3982	3953
Motor HP	0.2	0.4	0.4
Motor RPM	1075	1075	1075
Indoor Fan - Type (Optional)	FC Centrifugal	FC Centrifugal	FC Centrifugal
No. Used / Diameter (in.)	1 / 11 x 11	1 / 11 x 11	1 / 11 x 11
Drive Type / Number. Speeds	Direct/Variable	Direct/Variable	Direct/Variable
Number Motors	1	1	1
Motor HP (Standard/Oversized)	0.75	1.0	1.0
Motor Frame Size (Standard/Oversized)	48	48	48
Filters - Type Furnished[4]	Throwaway	Throwaway	Throwaway
(No.) Size Recommended	(4) 20 x 30 x 2	(4) 16 x 25 x 2	(4) 16 x 25 x 2
Optional Hot Gas Reheat Coil -Type			
Tube Size (in.)OD	0.375	0.375	0.375
Face Area (sq. ft.)	6.83	6.83	6.83
Rows/FPI	2 / 18	2 / 18	2 / 18
Refrigerant Charge (Lbs of R-410A)[5]			
Standard	7.6	10.8	11.8
Optional Hot Gas Reheat Coil	7.6	12.5	12.8

Continued on next page

Table 1. General data - 3-5 ton - 2 stage high efficiency 17 Plus

	T/YHC037E3,4			T/YHC047E3,4			T/YHC067E3,4		
Gas/Electric Only									
Heating Performance[6]									
Heating Models	**Low**	**Med**	**High**	**Low**	**Med**	**High**	**Low**	**Med**	**High**
Heating Input (Btu)	60,000	80,000	100,000	60,000	80,000	120,000	60,000	80,000	130,000
Heating Output (Btu)	48,000	64,000	80,000	49,000	64,000	96,000	49,000	64,000	104,000
AFUE%[7]	78%	78%	78%	80%	79%	79%	80%	79%	80%
Steady State Efficiency (%)	80%	80%	81%	81%	80%	81%	81%	80%	80%
No. Burners	2	2	3	2	2	3	2	2	3
No. Stages	1	1	1	1	1	1	1	1	1
Gas Supply Line Pressure									
Natural (minimum / maximum)		4.5 / 14.0			4.5 / 14.0			4.5 / 14.0	
LP (minimum / maximum)		11 / 14.0			11 / 14.0			11 / 14.0	
Gas Connection Pipe Size (in.)	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2

Notes:
1. High Stage 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. ARI capacity is net and includes the effect of fan motor heat. Units are suitable for operation to ±20% of nominal cfm. Units are certified in accordance with the Unitary Air-Conditioner Equipment certification program, which is based on ARI standard 210/240.
2. EER and/or SEER are rated at ARI conditions and in accordance with DOE test procedures.
3. Outdoor Sound Rating shown is tested in accordance with ARI Standard 270. For additional information refer to Table 13, p. 14.
4. Optional 2" MERV 7 and MERV 13 pleated filters also available.
5. Refrigerant charge is an approximate value. For a more precise value, see unit nameplate and service instructions.
6. Heating performance limit settings and rating data were established and approved under laboratory test conditions using American National Standards Institute standards. 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. Applicable to Gas/Electric units only.
7. AFUE is rated in accordance with DOE test procedures.

Evaporator Fan Performance

Table 2. Direct drive evaporator fan performance - 3 ton high efficiency - T/YHC037E3,E4 downflow airflow

	External Static Pressure (Inches of Water)																			
	.10		.20		.30		.40		.50		.60		.70		.80		.90		1.00	
cfm	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
960	—	—	615	0.15	655	0.18	695	0.22	735	0.26	775	0.29	815	0.33	855	0.37	896	0.41	936	0.44
1080	599	0.16	639	0.20	680	0.24	720	0.27	760	0.31	800	0.35	840	0.38	880	0.42	920	0.46	960	0.49
1200	624	0.21	664	0.25	704	0.29	744	0.32	784	0.36	824	0.40	865	0.43	905	0.47	945	0.51	985	0.54
1320	649	0.26	689	0.30	729	0.34	769	0.37	809	0.41	849	0.45	889	0.49	929	0.52	969	0.56	1009	0.60
1440	673	0.31	713	0.35	753	0.39	793	0.43	834	0.46	874	0.50	914	0.54	954	0.57	994	0.61	1034	0.65

Continued

	External Static Pressure (Inches of Water)									
	1.10		1.20		1.30		1.40		1.50	
cfm	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
960	976	0.48	1016	0.52	1056	0.55	1096	0.59	1136	0.63
1080	1000	0.53	1040	0.57	1081	0.60	1121	0.64	—	—
1200	1025	0.58	1065	0.62	1105	0.66	—	—	—	—
1320	1050	0.63	1090	0.67	—	—	—	—	—	—
1440	1074	0.68	—	—	—	—	—	—	—	—

Notes:

1. For Constant CFM Direct Drive Fan, reference Table 10, p. 13 for Voltage vs. CFM setting.
2. Data includes pressure drop due to standard filters and wet coils.
3. Refer to Table 8, p. 13 to determine additional static pressure drop due to other options/accessories.
4. Direct Drive Fan Motor Heat (MBH) = 2.9245xFan BHP + 0.055
5. Factory supplied motors, in equipment, are definite purpose motors, specifically designed and tested to operate at all cataloged conditions. Using the full horsepower range of our fan motors as shown in our tabular data will not result in nuisance tripping or premature motor failure. Our product's warranty will not be affected.

Evaporator Fan Performance

Table 3. Direct drive evaporator fan performance - 3 ton high efficiency - T/YHC037E3,E4 horizontal airflow

	External Static Pressure (Inches of Water)																			
	.10		.20		.30		.40		.50		.60		.70		.80		.90		1.00	
cfm	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
960	596	0.11	634	0.15	673	0.18	711	0.22	750	0.26	788	0.29	827	0.33	865	0.36	904	0.40	942	0.44
1080	618	0.16	656	0.20	695	0.23	733	0.27	772	0.31	810	0.34	849	0.38	887	0.42	926	0.45	964	0.49
1200	640	0.21	678	0.25	717	0.29	755	0.32	794	0.36	832	0.40	871	0.43	909	0.47	948	0.51	986	0.54
1320	662	0.27	700	0.30	739	0.34	777	0.38	816	0.41	854	0.45	893	0.49	931	0.52	970	0.56	1008	0.59
1440	684	0.32	722	0.36	761	0.39	799	0.43	838	0.46	876	0.50	915	0.54	953	0.57	992	0.61	1030	0.65

Continued

	External Static Pressure (Inches of Water)									
	1.10		1.20		1.30		1.40		1.50	
cfm	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
960	981	0.47	—	—	—	—	—	—	—	—
1080	—	—	—	—	—	—	—	—	—	—
1200	—	—	—	—	—	—	—	—	—	—
1320	—	—	—	—	—	—	—	—	—	—
1440	—	—	—	—	—	—	—	—	—	—

Notes:

1. For Constant CFM Direct Drive Fan, reference Table 10, p. 13 for Voltage vs. CFM setting.
2. Data includes pressure drop due to standard filters and wet coils.
3. Refer to Table 8, p. 13 to determine additional static pressure drop due to other options/accessories.
4. Direct Drive Fan Motor Heat (MBH) = 2.9245xFan BHP + 0.055
5. Factory supplied motors, in equipment, are definite purpose motors, specifically designed and tested to operate at all cataloged conditions. Using the full horsepower range of our fan motors as shown in our tabular data will not result in nuisance tripping or premature motor failure. Our product's warranty will not be affected.

Table 4. Direct drive evaporator fan performance - 4 ton high efficiency - T/YHC047E3,E4 downflow airflow

	External Static Pressure (Inches of Water)																			
	.10		.20		.30		.40		.50		.60		.70		.80		.90		1.00	
cfm	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
1280	541	0.07	585	0.12	628	0.18	672	0.23	715	0.28	759	0.33	802	0.39	846	0.44	889	0.49	933	0.55
1440	564	0.15	608	0.20	651	0.25	695	0.30	738	0.36	782	0.41	825	0.46	869	0.51	912	0.57	956	0.62
1600	587	0.22	631	0.27	674	0.33	718	0.38	761	0.43	805	0.48	848	0.54	892	0.59	935	0.64	979	0.70
1760	610	0.30	654	0.35	697	0.40	741	0.45	784	0.51	828	0.56	871	0.61	915	0.66	958	0.72	1002	0.77
1920	634	0.37	677	0.42	721	0.48	764	0.53	808	0.58	851	0.63	895	0.69	938	0.74	982	0.79	1025	0.85

Continued

	External Static Pressure (Inches of Water)									
	1.10		1.20		1.30		1.40		1.50	
cfm	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
1280	976	0.60	1020	0.65	1063	0.70	1107	0.76	1150	0.81
1440	999	0.67	1043	0.73	1086	0.78	1130	0.83	1173	0.88
1600	1022	0.75	1066	0.80	1109	0.85	1153	0.91	1196	0.96
1760	1045	0.82	1089	0.88	1132	0.93	1176	0.98	1219	1.03
1920	1069	0.90	1112	0.95	1156	1.00	1199	1.06	1243	1.11

Notes:

1. For Constant CFM Direct Drive Fan, reference Table 10, p. 13 for Voltage vs. CFM setting.
2. Data includes pressure drop due to standard filters and wet coils.
3. Refer to Table 8, p. 13 to determine additional static pressure drop due to other options/accessories.
4. Direct Drive Fan Motor Heat (MBH) = 2.9245xFan BHP + 0.055
5. Factory supplied motors, in equipment, are definite purpose motors, specifically designed and tested to operate at all cataloged conditions. Using the full horsepower range of our fan motors as shown in our tabular data will not result in nuisance tripping or premature motor failure. Our product's warranty will not be affected.

Evaporator Fan Performance

Table 5. Direct drive evaporator fan performance - 4 ton high efficiency - T/YHC047E3,E4 horizontal airflow

	External Static Pressure (Inches of Water)																			
	.10		.20		.30		.40		.50		.60		.70		.80		.90		1.00	
cfm	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
1280	591	0.10	632	0.15	674	0.20	715	0.26	756	0.31	798	0.36	839	0.41	880	0.47	922	0.52	963	0.57
1440	621	0.19	663	0.24	704	0.30	745	0.35	787	0.40	828	0.45	869	0.51	911	0.56	952	0.61	993	0.66
1600	652	0.28	693	0.33	734	0.39	776	0.44	817	0.49	858	0.55	900	0.60	941	0.65	982	0.70	1023	0.76
1760	682	0.37	723	0.43	765	0.48	806	0.53	847	0.58	889	0.64	930	0.69	971	0.74	1012	0.80	1054	0.85
1920	712	0.47	754	0.52	795	0.57	836	0.62	878	0.68	919	0.73	960	0.78	1001	0.83	1043	0.89	1084	0.94

Continued

	External Static Pressure (Inches of Water)									
	1.10		1.20		1.30		1.40		1.50	
cfm	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
1280	1004	0.62	1045	0.68	1087	0.73	1128	0.78	1169	0.83
1440	1034	0.72	1076	0.77	1117	0.82	1158	0.87	1200	0.93
1600	1065	0.81	1106	0.86	1147	0.91	1189	0.97	1230	1.02
1760	1095	0.90	1136	0.95	1178	1.01	1219	1.06	1260	1.11
1920	1125	0.99	1167	1.05	1208	1.10	1249	1.15	1291	1.20

Notes:

1. For Constant CFM Direct Drive Fan, reference Table 10, p. 13 for Voltage vs. CFM setting.
2. Data includes pressure drop due to standard filters and wet coils.
3. Refer to Table 8, p. 13 to determine additional static pressure drop due to other options/accessories.
4. Direct Drive Fan Motor Heat (MBH) = 2.9245xFan BHP + 0.055
5. Factory supplied motors, in equipment, are definite purpose motors, specifically designed and tested to operate at all cataloged conditions. Using the full horsepower range of our fan motors as shown in our tabular data will not result in nuisance tripping or premature motor failure. Our product's warranty will not be affected.

Table 6. Direct drive evaporator fan performance - 5 ton high efficiency - T/YHC067E3,E4 downflow airflow

	External Static Pressure (Inches of Water)																			
	.10		.20		.30		.40		.50		.60		.70		.80		.90		1.00	
cfm	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
1600	618	0.13	656	0.18	693	0.23	731	0.28	769	0.33	806	0.38	844	0.43	881	0.48	919	0.53	957	0.58
1800	651	0.24	689	0.29	727	0.34	764	0.39	802	0.44	839	0.49	877	0.54	915	0.59	952	0.64	990	0.69
2000	685	0.35	722	0.40	760	0.45	798	0.50	835	0.55	873	0.60	910	0.65	948	0.70	986	0.75	1023	0.80
2200	718	0.46	756	0.51	793	0.56	831	0.61	869	0.66	906	0.71	944	0.76	981	0.81	1019	0.86	1057	0.91
2400	752	0.57	789	0.62	827	0.67	864	0.72	902	0.77	940	0.82	977	0.87	1015	0.92	1052	0.97	1090	1.02

Continued

	External Static Pressure (Inches of Water)									
	1.10		1.20		1.30		1.40		1.50	
cfm	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
1600	994	0.63	1032	0.68	1069	0.73	1107	0.79	1145	0.84
1800	1027	0.74	1065	0.79	1103	0.84	1140	0.89	—	—
2000	1061	0.85	1098	0.90	1136	0.95	—	—	—	—
2200	1094	0.96	1132	1.01	—	—	—	—	—	—
2400	—	—	—	—	—	—	—	—	—	—

Notes:

1. For Constant CFM Direct Drive Fan, reference Table 10, p. 13 for Voltage vs. CFM setting.
2. Data includes pressure drop due to standard filters and wet coils.
3. Refer to Table 8, p. 13 to determine additional static pressure drop due to other options/accessories.
4. Direct Drive Fan Motor Heat (MBH) = 2.9245xFan BHP + 0.055
5. Factory supplied motors, in equipment, are definite purpose motors, specifically designed and tested to operate at all cataloged conditions. Using the full horsepower range of our fan motors as shown in our tabular data will not result in nuisance tripping or premature motor failure. Our product's warranty will not be affected.

Evaporator Fan Performance

Table 7. Direct drive evaporator fan performance - 5 ton high efficiency - T/YHC067E3,E4 horizontal airflow

	External Static Pressure (Inches of Water)																			
	.10		.20		.30		.40		.50		.60		.70		.80		.90		1.00	
cfm	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
1600	680	0.14	717	0.19	753	0.25	790	0.31	827	0.36	864	0.42	901	0.47	937	0.53	974	0.59	1011	0.64
1800	716	0.27	753	0.32	789	0.38	826	0.44	863	0.49	900	0.55	937	0.61	973	0.66	1010	0.72	1047	0.78
2000	752	0.40	789	0.46	825	0.51	862	0.57	899	0.63	936	0.68	973	0.74	1009	0.80	1046	0.85	1083	0.91
2200	788	0.53	825	0.59	861	0.65	898	0.70	935	0.76	972	0.82	1009	0.87	1045	0.93	1082	0.99	1119	1.04
2400	824	0.67	861	0.72	897	0.78	934	0.84	971	0.89	1008	0.95	1045	1.01	1081	1.06	1118	1.12	1155	1.18

Continued

	External Static Pressure (Inches of Water)									
	1.10		1.20		1.30		1.40		1.50	
cfm	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp	rpm	bhp
1600	—	—	—	—	—	—	—	—	—	—
1800	—	—	—	—	—	—	—	—	—	—
2000	—	—	—	—	—	—	—	—	—	—
2200	—	—	—	—	—	—	—	—	—	—
2400	—	—	—	—	—	—	—	—	—	—

Notes:

1. For Constant CFM Direct Drive Fan, reference Table 10, p. 13 for Voltage vs. CFM setting.
2. Data includes pressure drop due to standard filters and wet coils.
3. Refer to Table 8, p. 13 to determine additional static pressure drop due to other options/accessories.
4. Direct Drive Fan Motor Heat (MBH) = 2.9245xFan BHP + 0.055
5. Factory supplied motors, in equipment, are definite purpose motors, specifically designed and tested to operate at all cataloged conditions. Using the full horsepower range of our fan motors as shown in our tabular data will not result in nuisance tripping or premature motor failure. Our product's warranty will not be affected.

Performance Data

Table 8. Static pressure drop through accessories (inches water column) - 3-5 ton

							Economizer with OA/RA Dampers[a]				Electric Heater Accessory (kW)[b],[c]		
							100% OA	100% RA	100% OA	100% RA			
Ton	Unit Model Number	cfm	Standard Filters[d]	2" MERV 7 Filter	2" MERV 13 Filter	Reheat Coil	Downflow		Horizontal		5-6	9-18	23-36
3	T/YHC037E3,4	600	0.01	0.02	0.03	0.04	0.03	0.01	0.03	0.01	—	—	—
3	T/YHC037E3,4	960	0.01	0.03	0.04	0.08	0.04	0.01	0.04	0.01	0.01	0.01	0.01
3	T/YHC037E3,4	1200	0.02	0.04	0.05	0.10	0.06	0.01	0.06	0.01	0.02	0.02	0.02
3	T/YHC037E3,4	1440	0.03	0.05	0.06	0.14	0.08	0.02	0.08	0.01	0.02	0.03	0.03
4	T/YHC047E3,4	800	0.01	0.03	0.04	0.03	0.06	0.00	0.03	0.01	—	—	—
4	T/YHC047E3,4	1280	0.02	0.04	0.03	0.07	0.08	0.00	0.04	0.01	0.01	0.00	0.01
4	T/YHC047E3,4	1600	0.03	0.06	0.05	0.09	0.09	0.01	0.05	0.02	0.02	0.01	0.02
4	T/YHC047E3,4	1920	0.05	0.08	0.07	0.12	0.10	0.01	0.07	0.02	0.02	0.01	0.03
5	T/YHC067E3,4	1000	0.01	0.04	0.03	0.05	0.06	0.01	0.06	0.01	—	—	—
5	T/YHC067E3,4	1600	0.03	0.06	0.08	0.09	0.09	0.01	0.05	0.01	0.02	0.01	0.02
5	T/YHC067E3,4	2000	0.05	0.08	0.11	0.13	0.11	0.01	0.07	0.02	0.02	0.02	0.03
5	T/YHC067E3,4	2400	0.07	0.10	0.13	0.17	0.12	0.03	0.09	0.04	0.03	0.02	0.04

(a) OA = Outside Air and RA = Return Air.
(b) Nominal kW ratings at 240, 480, 600 volts. Heaters only available on T units.
(c) Electric heaters restricted on applications below 320 cfm/Ton.
(d) Tested with standard filters. Difference in pressure drop should be considered when utilizing optional 2" MERV 7 and MERV 13 filters.

Table 9. Electric heater voltage correction factors (applicable to auxiliary heat capacity)

Nominal Voltage	Distribution Voltage	Capacity Multiplier
240	208	0.751
240	230	0.918
240	240	1.000
480	440	0.840
480	460	0.918
480	480	1.000
600	540	0.810
600	575	0.918
600	600	1.000

Table 10. Voltage vs. CFM

PWM% Values	Potentiometer Voltage (Vdc)	CFM/Ton
70	<0.1	320
75	0.7	347
80	1.25	373
85	1.65	400
90	1.95	427
95	2.17	453
100	>2.4	480

Table 11. Reheat temperature rise

			Leaving Evaporator Dry Bulb						
Ton	Unit Model No.	CFM	35	40	45	50	55	60	65
3	T/YHC	960	24.0	22.5	21.1	19.7	18.2	16.8	15.4
3	T/YHC	1080	21.3	20.9	19.9	18.6	17.0	15.5	14.2
3	T/YHC	1200	19.1	19.3	18.6	17.4	16.0	14.5	13.4
3	T/YHC	1320	17.6	17.7	17.2	16.2	14.9	13.6	12.4
3	T/YHC	1440	15.9	16.4	16.2	15.4	14.3	13.1	11.9
4	T/YHC	1280	25.0	23.5	22.1	20.7	19.3	17.8	16.4
4	T/YHC	1440	22.8	22.2	21.1	19.6	18.0	16.5	15.2
4	T/YHC	1600	21.4	20.6	19.5	18.3	16.9	15.6	14.3
4	T/YHC	1760	20.3	19.7	18.7	17.4	16.0	14.7	13.5
4	T/YHC	1920	19.2	18.3	17.3	16.3	15.2	14.1	12.8
5	T/YHC	1600	22.6	21.3	19.7	18.1	16.6	15.1	13.8
5	T/YHC	1800	21.3	20.6	19.6	18.4	17.1	15.7	14.4
5	T/YHC	2000	19.3	19.1	18.4	17.3	16.1	14.7	13.5
5	T/YHC	2200	18.2	17.7	17.0	16.1	15.1	13.9	12.8
5	T/YHC	2400	16.4	16.4	16.0	15.2	14.1	13.0	12.0

Table 12. Air temperature rise across electric heaters (°F)

		3 Ton[a] 1200 cfm	4 Ton 1600 cfm	5 Ton[b] 2000 cfm
kW	Stages	Three Phase T*C037E3,E4	Three Phase T*C047E3, E4	Three Phase T*C067E3, E4
5.00	1	—	—	—
6.00	1	18.5	10.5	11.4
10.00	2	—	—	—
12.00	2	36.2	22.3	21.5
13.80	2	—	—	—
17.40	2	48.2	33.0	30.0
17.60	2	—	—	—
23.0	2	—	—	38.8

Notes:
1. For minimum design airflow, see airflow performance table for each unit.
2. To calculate temp rise at different airflow, use the following formula: Temp. rise across Electric Heater = kWx3414/1.08xCFM.

(a) The minimum allowable airflow for a 3 ton with a 17.4 kW heater is 1080 cfm.
(b) The minimum allowable airflow for a 5 ton unit with a 23.0 kW heater is 1900 cfm.

Table 13. Outdoor sound power level - dB (ref. 10 - 12 W)

	Unit Model	Octave Center Frequency								Overall
Ton	Number	63	125	250	500	1000	2000	4000	8000	dBA
3	T/YHC037E	79	85	79	79	77	71	67	58	81
4	T/YHC047E	80	86	84	85	83	79	73	67	87
5	T/YHC067E	80	86	84	85	83	79	73	67	87

Note: Tests follow ARI270-95.

Electrical Data

Table 14. Unit wiring - high efficiency

			Standard Indoor Fan Motor	
Tons	Unit Model Number	Voltage Range	MCA	Max Fuse Size or Max Circuit Breaker
3	T/YHC037E3	208-230	23.3	30
3	T/YHC037E4	460	11.4	15
4	T/YHC047E3	208-230	29.4	40
4	T/YHC047E4	460	13.7	20
5	T/YHC067E3	208-230	32.2	45
5	T/YHC067E4	460	15.2	20

Table 15. Unit wiring with electric heat (single point connection) - high efficiency - 3-5 tons

						Standard Indoor Motor	
Tons	Unit Model Number	Heater Model Number	Heater kW Rating[(a)]	Control Stages	Heater Amps	MCA	Max Fuse Size or Max Circuit Breaker
			208/230 Volts Three Phase				
3	THC037E3	BAYHTRE306*	4.5/6.0	1	12.5/14.4	24.8/27.1	30.0/30.0
3	THC037E3	BAYHTRE312*	9.0/12.0	2	25.0/28.9	40.4/45.3	45.0/50.0
3	THC037E3	BAYHTRE318*	13.1/17.4	2	36.3/41.9	54.5/61.5	60.0/70.0
4	THC047E3	BAYHTRX306*	4.5/6.0	1	12.5/14.4	29.4/29.8	40.0/40.0
4	THC047E3	BAYHTRX312*	9.0/12.0	2	25.0/28.9	43.0/47.9	45.0/50.0
4	THC047E3	BAYHTRX318*	13.1/17.4	2	36.3/41.9	57.1/64.1	60.0/70.0
5	THC067E3	BAYHTRX306*	4.5/6.0	1	12.5/14.4	32.2/32.2	45.0/45.0
5	THC067E3	BAYHTRX312*	9.0/12.0	2	25.0/28.9	43.0/47.9	45.0/50.0
5	THC067E3	BAYHTRX318*	13.1/17.4	2	36.3/41.9	57.1/64.1	60.0/70.0
5	THC067E3	BAYHTRX323*	17.3/23.0	2	48.0/55.3	71.8/80.9	80.0/90.0
			460 Volts Three Phase				
3	THC037E4	BAYHTRE406*	6.0	1	7.2	13.6	15.0
3	THC037E4	BAYHTRE412*	12.0	2	14.4	22.6	25.0
3	THC037E4	BAYHTRE418*	17.4	2	20.9	30.8	35.0
4	THC047E4	BAYHTRX406*	6.0	1	7.2	14.9	20.0
4	THC047E4	BAYHTRX412*	12.0	2	14.4	23.9	25.0
4	THC047E4	BAYHTRX418*	17.4	2	20.9	32.0	35.0
5	THC067E4	BAYHTRX406*	6.0	1	7.2	15.2	20.0
5	THC067E4	BAYHTRX412*	12.0	2	14.4	23.9	25.0
5	THC067E4	BAYHTRX418*	17.4	2	20.9	32.0	35.0
5	THC067E4	BAYHTRX423*	23.0	2	27.7	40.5	45.0

(a) Heater kW ratings are at 208/240V for 208/230V units, 480V for 460V units.

Table 16. Electrical characteristics - compressor motor and condenser fan motor - 60 cycle - high efficiency

Unit Model		Compressor Motors							Condenser Fan Motors					
Ton	Number	No.	Volts	Phase	hp	rpm	RLA	LRA	MCC	No.	Volts	Phase	hp	FLA	LRA
3	T/YHC037E3	1	208-230	3	2.8	3500	11.6	73.0	18.1	1	208-230	1	0.20	1.5	2.4
3	T/YHC037E4	1	460	3	2.7	3500	5.7	38.0	8.9	1	460	1	0.20	0.6	1.3
4	T/YHC047E3	1	208-230	3	3.6	3500	14.0	83.1	21.9	1	208-230	1	0.40	2.5	4.3
4	T/YHC047E4	1	460	3	3.6	3500	6.4	41.0	10.0	1	460	1	0.40	1.0	2.2
5	T/YHC067E3	1	208-230	3	4.3	3500	16.2	110.0	25.3	1	208-230	1	0.40	2.5	4.3
5	T/YHC067E4	1	460	3	4.3	3500	7.6	52.0	11.9	1	460	1	0.40	1.0	2.2

Table 17. Electrical characteristics - evaporator fan motor - 60 cycle - direct drive - high efficiency

Ton	Unit Model Number	Volts	Hz	Motor Phase	No.	FLA	LRA	bhp
3	T/YHC037E3	208-230	60	1	1	7.3	—	0.75
3	T/YHC037E4	208-230[a]	60	1	1	7.3	—	0.75
4	T/YHC047E3	208-230	60	1	1	9.4	—	1.00
4	T/YHC047E4	208-230[a]	60	1	1	9.4	—	1.00
5	T/YHC067E3	208-230	60	1	1	9.4	—	1.00
5	T/YHC067E4	208-230[a]	60	1	1	9.4	—	1.00

(a) Precedent models with 460 volt supply power will utilize a high efficiency (208-230)volt powered evaporator fan motor.

Table 18. Electrical characteristics - inducer motor

Unit Model Number	Stage	hp	rpm	Volts	Motor Phase	LRA
YHC037-067E	1	1/35	3000	208-230	1	0.6

Table 19. Electrical characteristics — power exhaust (cooling and gas/electric)

Tons	Volts	Motor Phase	hp	rpm	FLA	LRA
3-5	208-230	1	0.33	1075	2.2	3.9
3-5	460	1	0.33	1075	1.1	2.0
3-5	575	1	0.33	1075	1.0	1.8

Sequence of Operation

17 SEER units are offered with ReliaTel Controls only. The ReliaTel Controls is a microelectronic control feature, which provides operating functions that are significantly different than conventional electromechanical units.

ReliaTel Controls

- The master module is the ReliaTel Refrigeration Module (RTRM).
- The RTRM provides compressor anti-short cycle timing functions through minimum “Off” and “On” timing to increase reliability, performance and to maximize unit efficiency.
- Upon power initialization, the RTRM performs self-diagnostic checks to insure that all internal controls are functioning. It checks the configuration parameters against the components connected to the system.
- The LED located on the RTRM module is turned “On” within one second after power-up if all internal operations are okay.
- The RTRM will provide capability to control a low/high capacity 2-Stage Compressor.
- The ReliaTel Options Module (RTOM) is utilized in conjunction with the RTRM for control of a multi-speed indoor motor (IDM) and optional accessories.
- The RTOM provides the IDM with a Pulse Width Modulated (PWM) control signal for multiple airflow profiles. The maximum unit airflow is user adjustable with potentiometer DA COOL - FAN SPD on the RTOM. The potentiometer is adjustable between (70 - 100)% of factory preset maximum for the model/application. The RTOM uses the potentiometer setting as a reference for all airflow profiles.
- All 3-Phase Precedent units employ a Phase Monitor to ensure proper power supply connection of phases for compressor operation. If the monitor senses incorrect phase connection (phase reversal), a loss of phase, or large voltage imbalance between phases, all unit operation will be prevented until the condition is corrected. The Phase Monitor has green (Ok) and red (Phase Fault) status LEDs on the face of the monitor. All units are functional tested to ensure correct factory wiring. A red status LED is an indication of a serious problem that can only be resolved by isolating and repairing the Supply Power fault.

ReliaTel Fan Only Operation

When Fan Only operation is requested ReliaTel will control evaporator fan to provide 50% of maximum user set airflow

ReliaTel Control Evaporator Fan Operation (for Gas Units)

When the fan selection switch is set to the “Auto” position, the RTRM energizes the FAN output approximately 1 second after energizing the compressor contactor coil (CC1) in the cooling mode. In the heating mode, the RTRM energizes the FAN output approximately 45 second after gas ignition. Energizing the FAN output on the RTRM enables the IDM. The RTRM also communicates status to the RTOM. In cooling mode, the RTOM varies IDM speed to provide maximum cooling/ efficiency for all stages of operation. In heating mode the RTOM controls IDM speed to the maximum user set airflow.

The RTRM de-energizes the FAN output approximately 160 seconds after the cooling requirement has been satisfied to enhance unit efficiency. When the heating cycle is terminated, the FAN output is de-energized approximately 90 seconds after the heating requirement. During heating fan-off delay cycle, RTOM maintains fan speed at maximum user set airflow.

When the fan selection switch is set to the “On” position, the RTRM keeps the FAN output energized for continuous fan motor operation. The fan will operate at 50% of the user selected unit maximum airflow if the unit is not in an active cooling or heating mode.

When the unit is equipped with the optional clogged filter switch, wired between terminals J7-3and J7-4 on the ReliaTel Options Module (RTOM), the RTRM produces an analog output if the clogged filter switch (CFS) closes for two minutes after a request for fan operation. When the system is connected to a remote panel, the "SERVICE" LED will be turned on when this failure occurs.

ReliaTel Control Evaporator Fan Operation (for Cooling Only Units)

When the fan selection switch is set to the "Auto" position, the RTRM energizes the FAN output approximately 1 second after energizing the compressor contactor coil (CC1) in the cooling mode. In the heating mode, the RTRM energizes the FAN output approximately 1 second before energizing the electric heat contactors. Energizing the FAN output on the RTRM enables the IDM. The RTRM also communicates status to the RTOM. In cooling mode, the RTOM varies IDM speed to provide maximum cooling/efficiency for all stages of operation. In heating mode the RTOM controls IDM speed to the maximum user set airflow. The RTRM de-energizes the FAN output approximately 160 seconds after the cooling requirement has be satisfied to enhance unit efficiency. During the cooling fan-off delay cycle the indoor fan will operate at 50% of the user selected maximum airflow.

When the heating cycle is terminated, the FAN output is de-energized at the same time as the heater contactors.

When the fan selection switch is set to the "On" position, the RTRM keeps the FAN output energized for continuous fan motor operation. The fan will operate at 50% of the user selected unit maximum airflow if the unit is not in an active cooling or heating mode.

When the unit is equipped with the optional clogged filter switch, wired between terminals J7-3and J7-4 on the ReliaTel Options Module (RTOM), the RTRM produces an analog output if the clogged filter switch (CFS) closes for two minutes after a request for fan operation.

When the system is connected to a remote panel, the "SERVICE" LED will be turned on when this failure occurs.

Low Ambient Operation

During low ambient operation, outside air temperature below 40ºF (55°F for single sys), the RTRM will cycle the compressor and outdoor fan motor "Off" for approximately 3 minutes after every 10 minutes of accumulated compressor run time. The indoor fan motor (IDM) will continue to operate during this evaporator defrost cycle (EDC) and the compressor and outdoor fan will return to normal operation once the defrost cycle has terminated and the compressor "Off" time delay has been satisfied.

Note: (For units with the Dehumidification Option) When in dehumidification mode, the unit will not cycle as described above. The unit will run continuously in dehumidification mode at all ambient conditions above 40ºF. Dehumidification is disabled at ambient conditions below 40ºF.

17 SEER Single Zone Variable Air Volume (SZVAV) Control Sequence of Operation

General Standby Mode

During normal occupied periods, when there is no space cooling or heating demands, the user will be able to choose Constant or Cycling supply fan operation. During this period, if the supply fan is operating due to a Constant Fan Mode selection or due to a ventilation request, the supply fan will operate at 50% of the user selected, application specific, maximum airflow. The unit controls will be compatible with BACnet™ and LonTalk™ Building Automation System communication interfaces.

Cooling Operation

Default Operation: During Cooling operation, the control will monitor the Space Temperature and Space Cooling setpoint and with a PI control algorithm determine if active cooling capacity is

required. As the Space Temperature deviates from the Space Cooling Setpoint, the unit controller will calculate an active Discharge Air Cooling setpoint that the economizer (if installed) and compressor outputs will be controlled to meet. This active Discharge Air Cooling setpoint will be calculated between the Space Cooling setpoint and a user adjustable minimum (65°F default for SIngle Zone Variable Air Volume SZVAV). Once the control determines that a discharge air temperature equal to the user selected minimum (65°F default) is required to meet the space cooling demand, if the space demand continues to increase, the supply fan speed will be allowed to increase above its minimum speed proportionally to meet the additional demand.

Alternate Economizer Operation: Under the Default Operation, as described above, the supply fan speed will remain at minimum speed, as determined by the active cooling stages, until the space demand requires an increase in supply airflow. The customer will have the ability to choose to allow the supply fan speed to increase when the economizer is enthalpy enabled in order to realize the maximum cooling capacity of the economizer, prior to energizing compressor outputs, when the space requires active cooling capacity. All cooling capacity demand decisions will function as described in the "Default Operation" section above with the exception of the supply fan speed when the unit has an active cooling demand and the economizer is enthalpy enabled.

Heating Operation

During Heating operation, the control will monitor the Space Temperature and Space Heating setpoint and with a PI control algorithm determine if active heating capacity is required. As the Space Temperature deviates from the Space Heating Setpoint, the unit controller will increase the supply airflow up to the user selected, application specific, maximum airflow and begin to stage heating outputs (gas or electric) to meet the space demand.

The customer will also have the ability to enable Supply Air Tempering control which will allow the unit to bring on one stage of heating when the discharge air temperature falls below the Space Heating Setpoint - 10°F and the unit is operating in a minimum ventilation state with the supply fan running (not actively heating or cooling). The supply fan output will increase to the user selected, application specific, maximum airflow during Supply Air Tempering operation.

ReliaTel Control Dehumidification

The dehumidification cycle is only permitted above 40ºF as indicated above and is not permitted during a heating cycle or during a demand for 2nd stage cooling. Otherwise, when an installed zone humidity sensor indicates a relative humidity equal to or greater than the RH set point as adjusted on the ReliaTel Options Module (RTOM), a dehumidification cycle is initiated.

There are two steps of dehumidification - Enhanced Dehumidification and Hot Gas Reheat.

Enhanced Dehumidification . Enhanced Dehumidification will be available on all units equipped with a Space Humidity sensor, regardless of whether the unit is configured with traditional Hot Gas Reheat. Once the Space Humidity value exceeds the Dehumidification Setpoint and dehumidification is enabled the unit will energize the first stage of compressor operation at 80% of stage 1 airflow (approximately 56% user selected high-stage CFM). If during active enhanced dehumidification the Space Humidity falls below the Dehumidification Setpoint – 2%, Dehumidification will be terminated and the unit will transition back to normal Cooling or Heating control.

Hot Gas Reheat . Units with traditional Hot Gas Reheat will utilize Enhanced Dehumidifcation as described above as the first stage of dehumidification control. If the unit is operating in Enhanced Dehumidification and the Space Humidity is not recovering towards the Dehumidification Setpoint the unit will transition into full Hot Gas Reheat.

The Sequence of Operation for the full Hot Gas Reheat dehumidification cycle is identical to that of the second stage ReliaTel cooling cycle, except that the hot gas reheat valve (RHV) is energized, allowing air from the evaporator to be reheated. During full Hot Gas Reheat the compressor is operated at full stage and the evaporator motor operates at the user selected high-stage CFM. Also, any installed fresh air damper is driven to minimum position. The dehumidification cycle is

terminated by initiation of a heating cycle or a 2nd stage cooling cycle or when zone humidity is reduced to 5% below the R.H. set point. In the absence of a zone humidity sensor input, an on/off input from a zone humidistat is used to initiate/terminate the dehumidification cycle.

Dehumidification takes priority over a call for one stage cooling.

Heating or 2 stage cooling takes priority over dehumidification, and a relative humidity sensor takes priority over a humidistat.

ReliaTel 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 a modulating damper. When cooling is required and economizing is possible, the RTRM sends the cooling request to the unit economizer actuator (ECA) to open the economizer damper. The RTRM tries to cool the zone utilizing the economizer to slightly below the zone temperature setpoint. If the zone temperature continues to rise above the zone temperature setpoint controlband and the economizer damper is full open, the RTRM energizes the CPR1 output for 1st Stage compressor operation. If the zone temperature continues to rise above the zone temperature setpoint controlband and the economizer damper is fully open, the RTRM energizes the CPR 2 SPD OUT for 2nd Stage compressor operation. 1st Stage Compressor operation must be active for 3 minutes before 2nd Stage Compressor operation is allowed.

The operation described above applies to Zone Sensor controlled units as well as units under Thermostat control with the difference being that when under Thermostat control, the RTRM receives direct calls for unit operation. If the economizer is enabled and is being utilized as the first stage of cooling (Y1 active), then 1st Stage compressor operation will be utilized as second stage of cooling (Y2 active). 2nd Stage compressor operation is not utilized when economizer is enabled and unit is under Thermostat control. However, airflow profiles for second stage operation will match Zone Sensor controlled units after a specified period of (Y2 active) thermostat call.

Alternate Economizer Operation:

If desired the user will have the ability to override fan speed to maximum user set airflow after the economizer damper has modulated to fully open to meet cooling needs. This operation will enable additional free cooling to be introduced into the area over the standard air profile. When overridden, the fan speed will maintain maximum user set airflow for the duration of the cooling call regardless of Economizer status (enabled/disabled). Alternate operation is enabled by connecting wires ECON/ID FAN CONFIG and cycling unit power.

When the unit is equipped with the optional fan failure switch, wired between terminals J7-5 and J7-6 on the RTOM, the RTRM will stop all cooling functions and produce an analog output if the fan failure switch (FFS) does not open within 40 seconds after a request for fan operation. When the system is connected to a remote panel, the “SERVICE” LED will flash when this failure occurs.

Note: For units equipped with the Dehumidification Option, if the unit is economizing, the damper resets to minimum position while in dehumidification mode.

Economizer Set-Up

Adjusting the minimum position potentiometer located on the unit economizer Actuator (ECA) sets the required amount of ventilation air.

The following setpoint potentiometers will be used on the ReliaTel Economizer Module (RTEM) without the Demand Control Ventilation (DCV) option:

1. Design Min @ 50% of Max Airflow (RTEM DCV Min).
2. Design Min @ 82% of Max Airflow (RTEM DCV Setpoint LL).
3. Design Min @ 100% Airflow (RTEM Design Min).

Note: Max Airflow is user adjustable between (70-100)% of factory preset Max Airflow.

The controller will calculate the active OA Damper Minimum position linearly between the user-selected setpoints based on the RTOM airflow command.

The range for the Design Minimum setpoints at 50% and 82% Airflow will allow 0-100% minimum damper position.

The range for the Design Minimum setpoints at 100% Airflow will allow 0-50% minimum damper position.

By default, the Design Minimum Position schedule will be a linear line through all user selectable Design Minimum Position setpoints.

As airflow changes through the programmed profiles, the active economizer minimum position target will be calculated in a linear fashion in order to help maintain a constant OA Flow through the unit and not over/under-ventilate the space.

Economizer with the DCV option utilize the ReliaTel Ventilation Module (RTVM) to meet ventilation demands. The following setpoint potentiometers will be used on RTVM:

1. Design Min @ 50% of Max Airflow (RTVM R130)
2. Design Min @ 82% of Max Airflow (RTVM R136)
3. Design Min @100% Airflow (RTEM Design Min)
4. DCV Min @ 50% of Max Airflow (RTVM R41)
5. DCV Min @ 100% Airflow (RTEM DCV Min)

Note: Max Airflow is user adjustable between (70-100)% of factory preset Max Airflow.

For all DCV operation, the supply fan will remain at 50% of the maximum PWM output setting unless requested higher for heating or cooling operation. As airflow changes through the programmed profiles, the Active Building Design and DCV Min will be calculated linearly between the user selected setpoints and used to determine the Active OA Damper Position Target based on the Space CO2 Level in relation to the Design and DCV CO2 setpoints at any given airflow. All other Active/Passive DCV rules will be in effect as on traditional units.

Two of the three methods for determining the suitability of the outside air can be selected utilizing the enthalpy potentiometer on the ECA, as described below:

1. Ambient Temperature - controlling the economizing cycle by sensing the outside air dry bulb temperature. The Table below lists the selectable dry bulb values by potentiometer setting.
2. Reference Enthalpy - controlling the economizer cycle by sensing the outdoor air humidity. The Table below lists the selectable enthalpy values by potentiometer setting. If the outside air enthalpy value is less than the selected value, the economizer is allowed to operate.
3. Comparative Enthalpy - By utilizing a humidity sensor and a temperature sensor in both the return air stream and the outdoor air stream, the unit control processor (RTRM) will be able to establish which conditions are best suited for maintaining the zone temperature, i.e. indoor conditions or outdoor conditions. The potentiometer located on the ECA is non-functional when both the temperature and humidity sensors are installed.

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

* Factory settings

ReliaTel Control Cooling without an Economizer

When the system switch is set to the "Cool" position and the zone temperature rises above the cooling setpoint controlband, the RTRM energizes the CPR1 output for first stage cooling. When the CPR1 output energizes, the compressor contactor (CC1) coil is energized provided the low pressure control (LPC1), high pressure control (HPC1) and discharge line thermostat (TDL 1) are closed. When the CC1 contacts close, compressor (CPR1) and the outdoor fan motor (ODM) start to maintain the zone temperature to within ± 2ºF of the sensor setpoint at the sensed location. If the system demands additional cooling, RTRM will energize COMP 2-SPD OUT for second stage cooling.

ReliaTel Control Heating Operation (for Cooling Only Units)

When the system switch is set to the "Heat" position and the zone temperature falls below the heating setpoint controlband, the RTRM energizes HEAT 1. When HEAT 1 is energized, the first stage electric heat contactor (AH or AH & CH) is energized.

If the first stage of electric heat can not satisfy the heating requirement, the RTRM energizes HEAT 2. When HEAT 2 energizes, the second stage electric heat contactor (BH) is energized, if applicable. The RTRM cycles both the first and second stages of heat "On" and "Off" as required to maintain the zone temperature setpoint.

ReliaTel Control Heating Operation (for Gas Units)

When the system switch is set to the "Heat" position and the zone temperature falls below the heating setpoint controlband, a heat cycle is initiated when the RTRM communicates ignition information to the Ignition module (IGN).

Ignition Module

Ignition control (IGN) runs a self check (including verification that the gas valve is de-energized). IGN checks the high limit switch (TCO 1) for closed contacts, the pressure switch (PS) for open contacts, flame rollout (FR) for closed contacts. IGN energizes inducer blower. When PS closes, 20 second pre-purge begins. After 20 seconds, the IGN energizes the spark and gas valve at the same time. The spark will stay energized for at least 2 seconds attempting to establish flame. If a flame is not established, the spark will continue up to 7 seconds. Once a flame is established, spark is de-energized and indoor blower motor (IBM) timing begins. 45 seconds later, the RTRM energizes the IBM. When the zone sensor or thermostat is satisfied, the gas valve is de-energized, the inducer runs for 5 seconds then stops (post-purge), and the IBM runs for 60 seconds then stops unless being requested to run continuously.

If the burner fails to ignite, the ignition module will attempt two retries before locking out. The green LED will indicate a lock out by two fast flashes. An ignition lockout can be reset by;

1. Opening for 3 seconds and closing the main power disconnect switch,
2. By switching the "Mode" switch on the zone sensor to "OFF" and then to the desired position.
3. Allowing the ignition control module to reset automatically after one hour. Refer to the "Ignition Control Module Diagnostics" section for the LED diagnostic definitions.

When the fan selection switch is set to the "Auto" position, the RTRM energizes the FAN output approximately 30 second after initiating the heating cycle to start the indoor fan motor (IDM). The RTRM communicates status to the RTOM. The RTOM controls IDM speed to the maximum user set airflow.

Table 20. Ignition control module diagnostics

At any time the control is powered, a green LED indicator light shall be lit using the following signal:	
Steady OFF:	No Power/Failure/ Internal Failure:
Steady ON:	Normal

Table 20. Ignition control module diagnostics

Slow Flash Rate:	Normal, call for heat 3/4 second on, 1/4 second off)
Fast Flash Rate:	Used for error indication only
	(1/4 second off,3/4 second on)
Error Code Fast Flash Rate:	
1 Flash	Communication Issue between
	Refrigeration Module and 3SH control
2 Flashes	System Lockout:
	Failed to detect or sustain flame.
3 Flashes	Not implemented.
4 Flashes	High Limit switch protection device open.
5 Flashes	Flame sensed and gas valve not energized
	or flame sensed and no call for heat.
6 Flashes	Not implemented.

The pause between groups of fast flashes is approx. 2 seconds.
Additionally, the LED indicator light shall flash for one second at power-up.

Pressure Curves

Figure 1. T/YHC037E3, E4, cooling cycle pressure curve, high stage (indoor airflow: 400 CFM/ton)

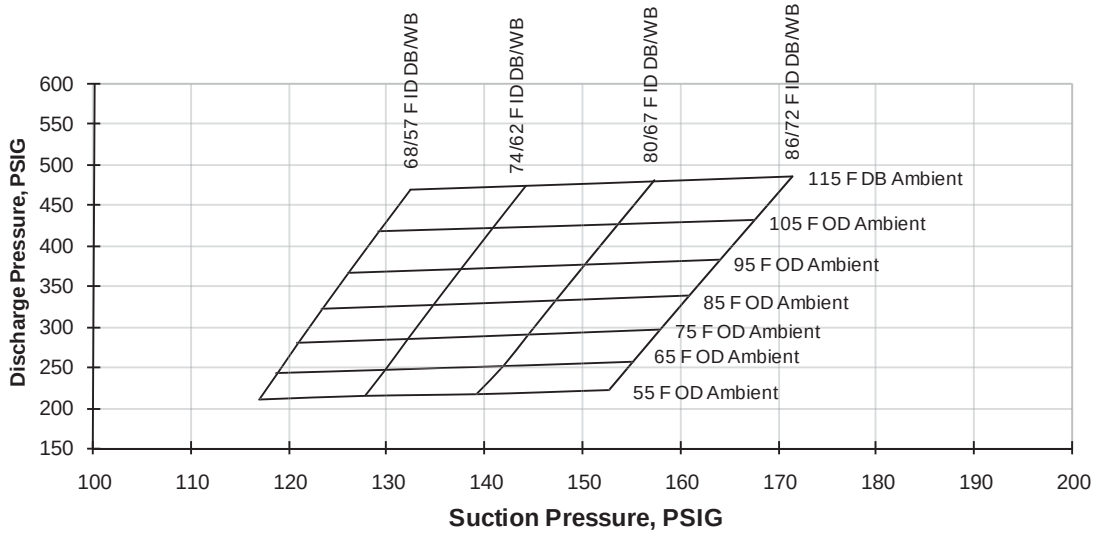


Figure 2. T/YHC037E3, E4, cooling cycle pressure curve, low stage (indoor airflow: 280 CFM/ton)

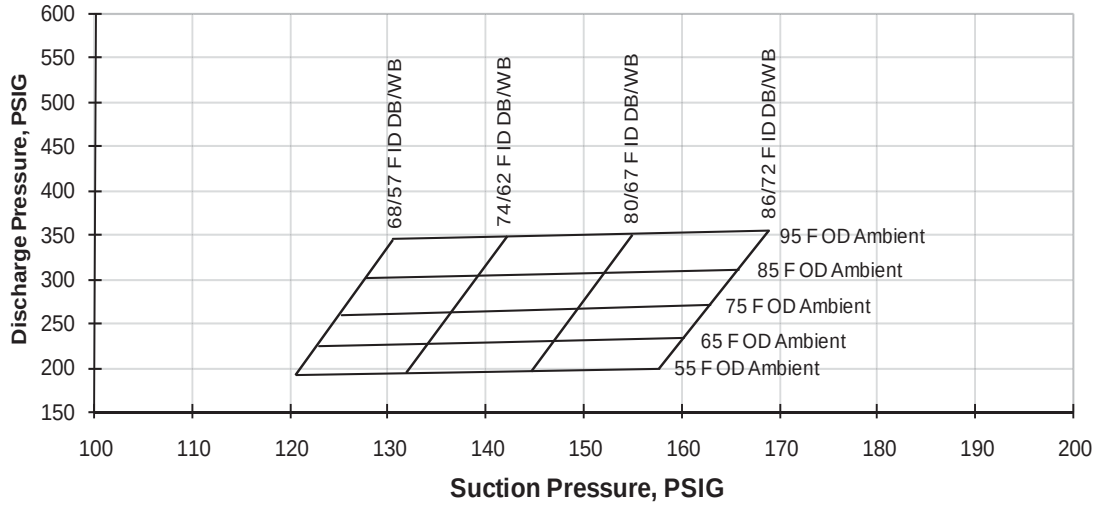


Figure 3. T/YHC047E3, E4, cooling cycle pressure curve, high stage (indoor airflow: 400 CFM/ton)

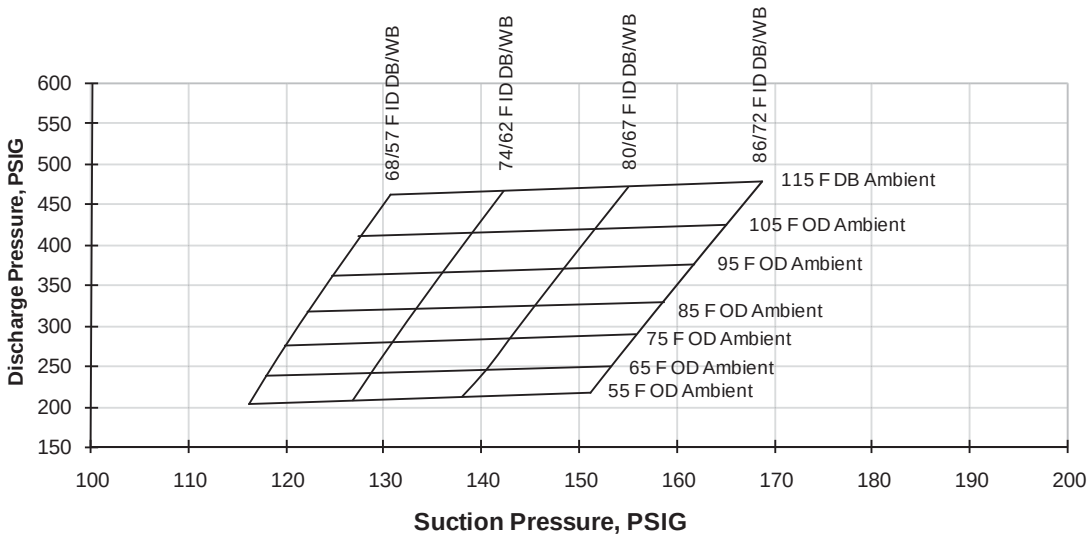
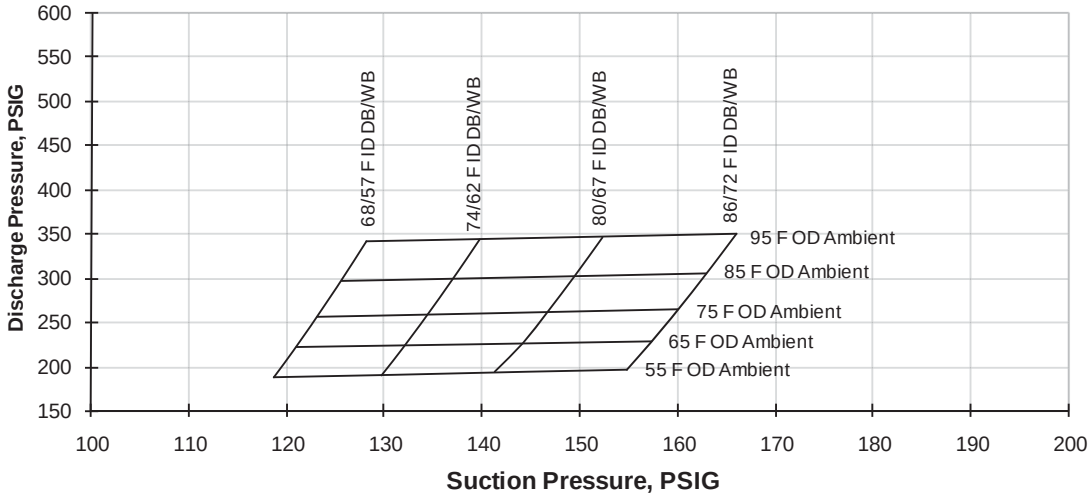


Figure 4. T/YHC047E3, E4, cooling cycle pressure curve, low stage (indoor airflow: 280 CFM/ton)



Pressure Curves

Figure 5. T/YHC067E3, E4, cooling cycle pressure curve, high stage (indoor airflow: 400 CFM/ton)

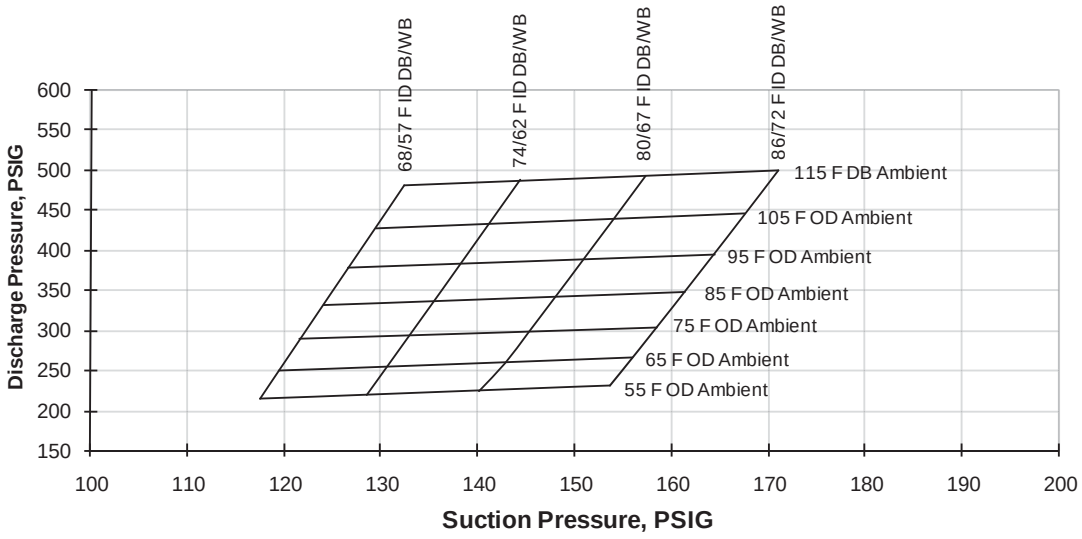
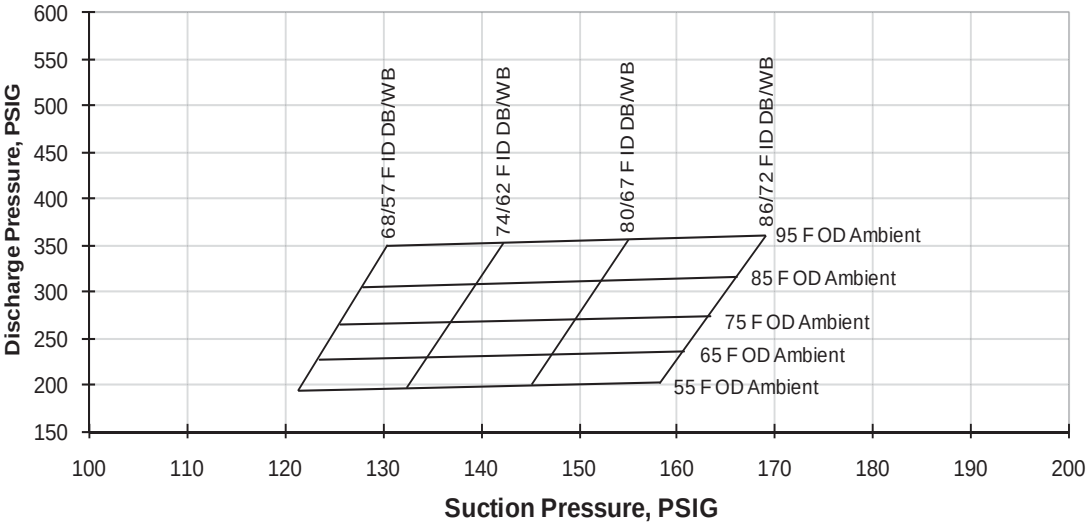


Figure 6. T/YHC067E3, E4, cooling cycle pressure curve, low stage (indoor airflow: 280 CFM/ton)



Subcooling Charging Charts

Figure 7. T/YHC037E subcooling charging chart

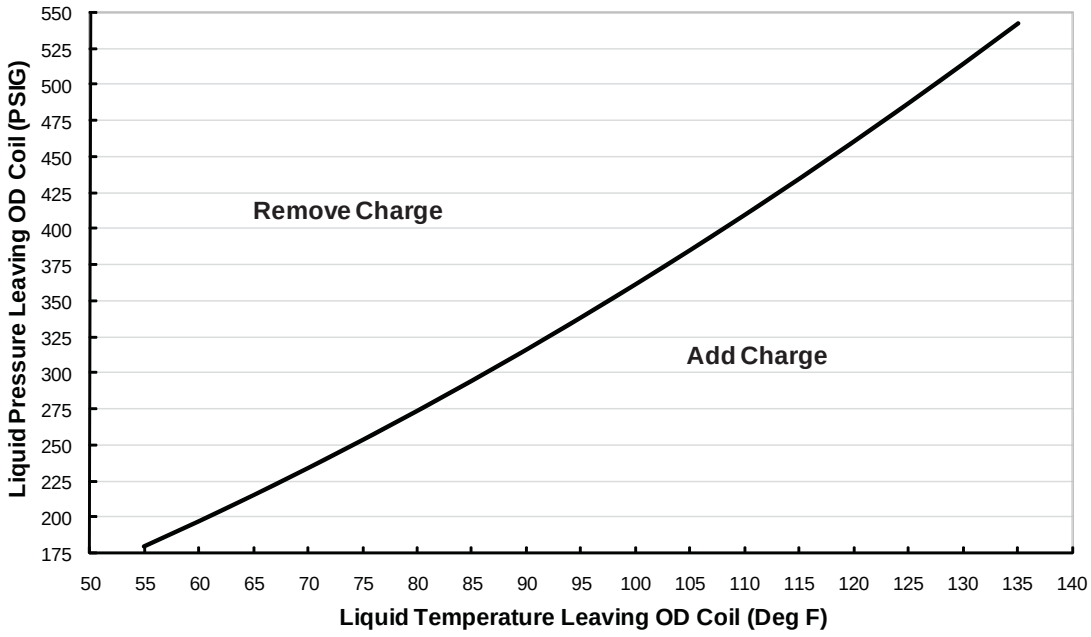
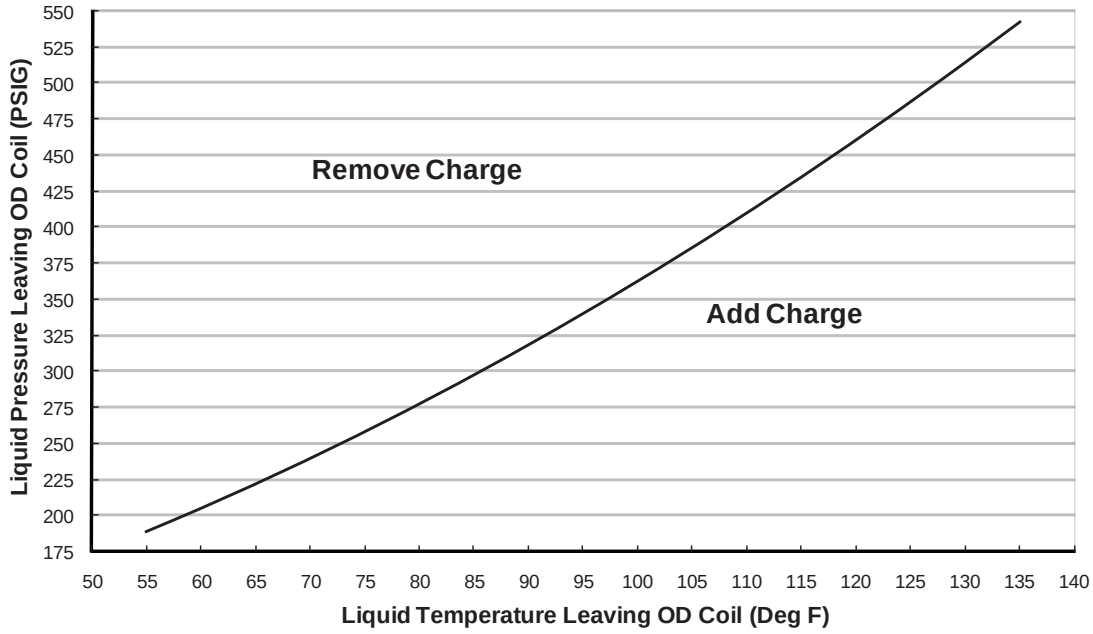
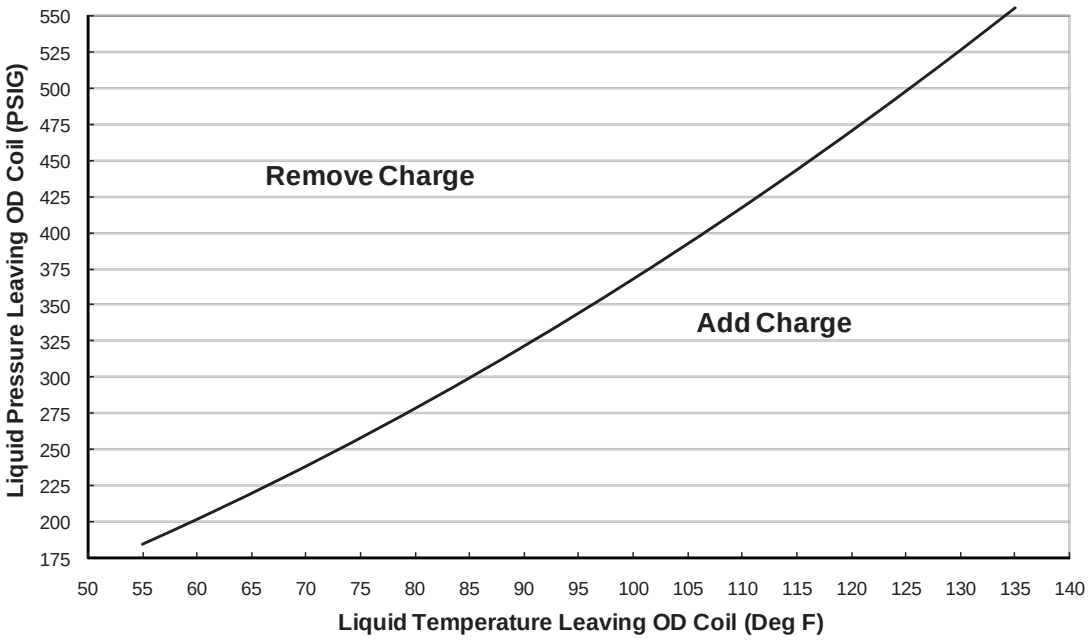


Figure 8. T/YHC047E3, E4, subcooling charging chart



Subcooling Charging Charts

Figure 9. T/YHC067E3, E4, subcooling charging chart



Notes:

- *Liquid temperature is leaving outdoor coil refrigerant temperature.*
- *Liquid pressure is leaving outdoor coil refrigerant pressure.*

Refrigerant Circuits

Figure 10. T/YHC037E, T/YHC047E, T/YHC067E

UNIT	NO. CIRCUITS INDOOR COIL	NO. CIRCUITS OUTDOOR COIL
T/YHC037E1, E3, E4	9	7
T/YHC047E1, E3, E4	9	8
T/YHC067E1, E3, E4	12	8

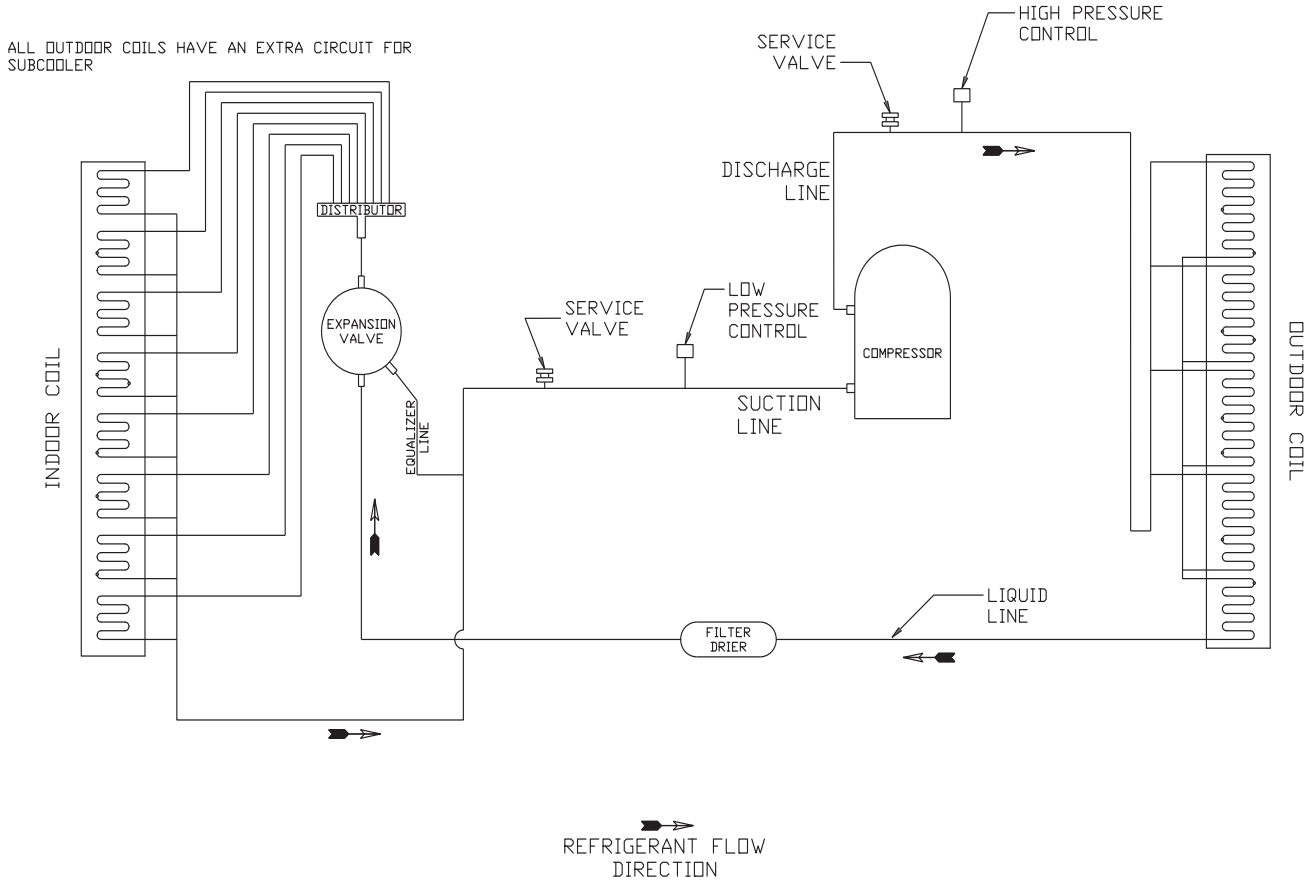


Figure 11. T/YHC037E - reheat

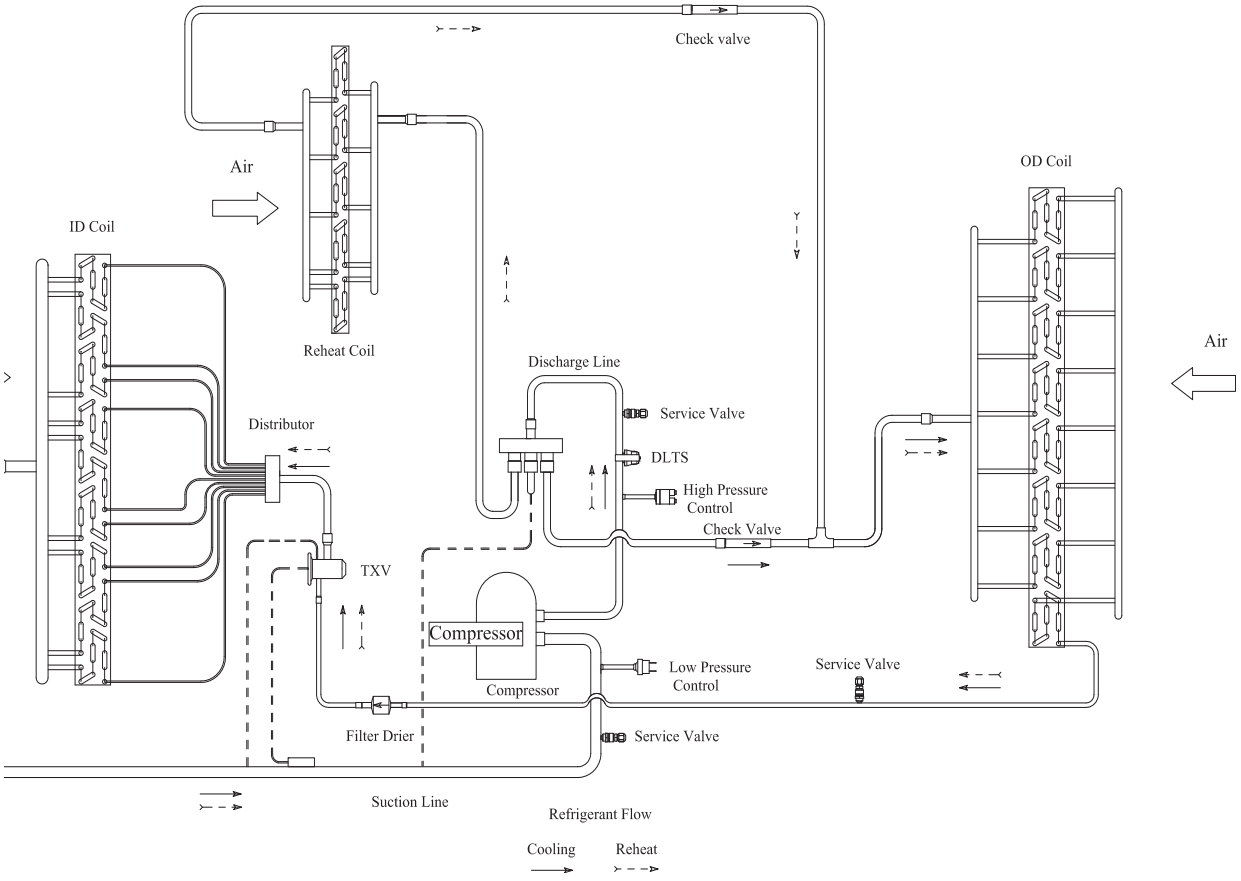


Figure 12. T/YHC047E - reheat

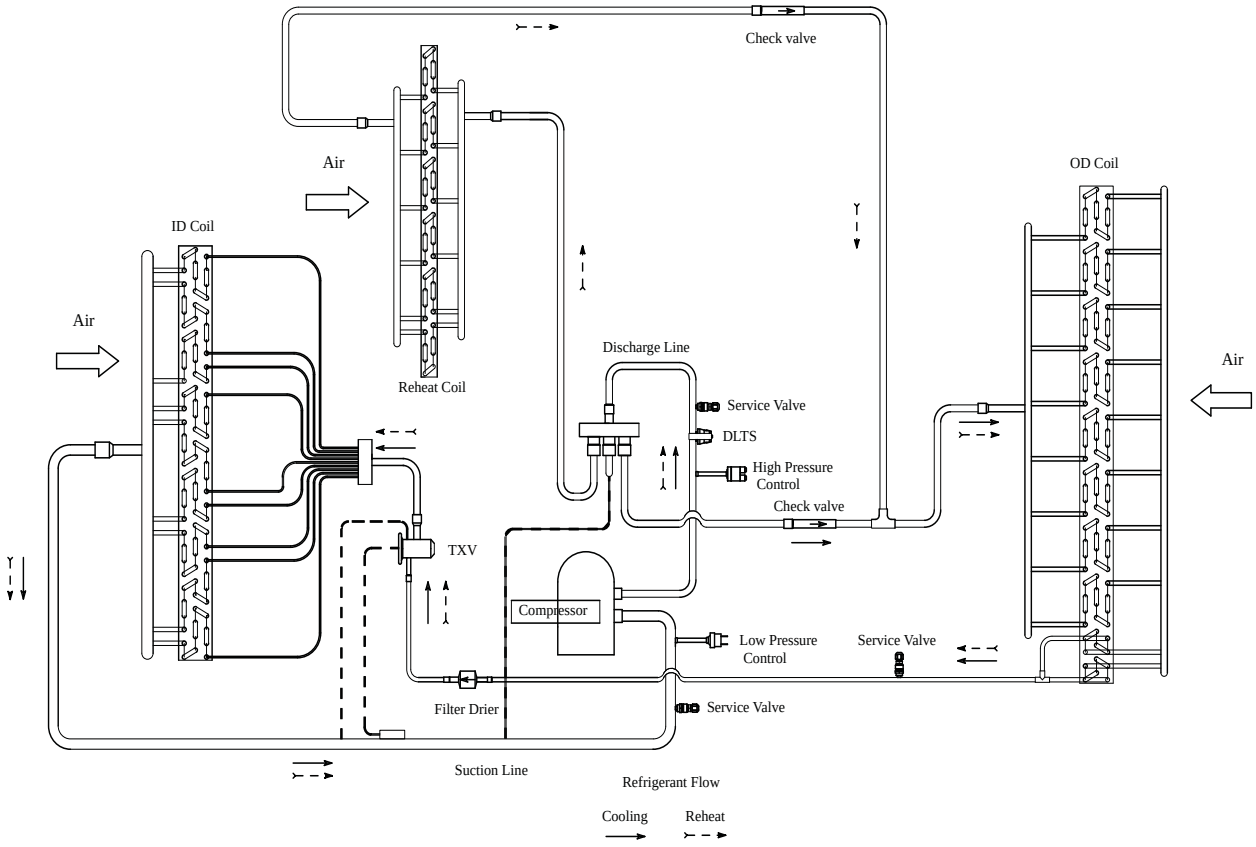
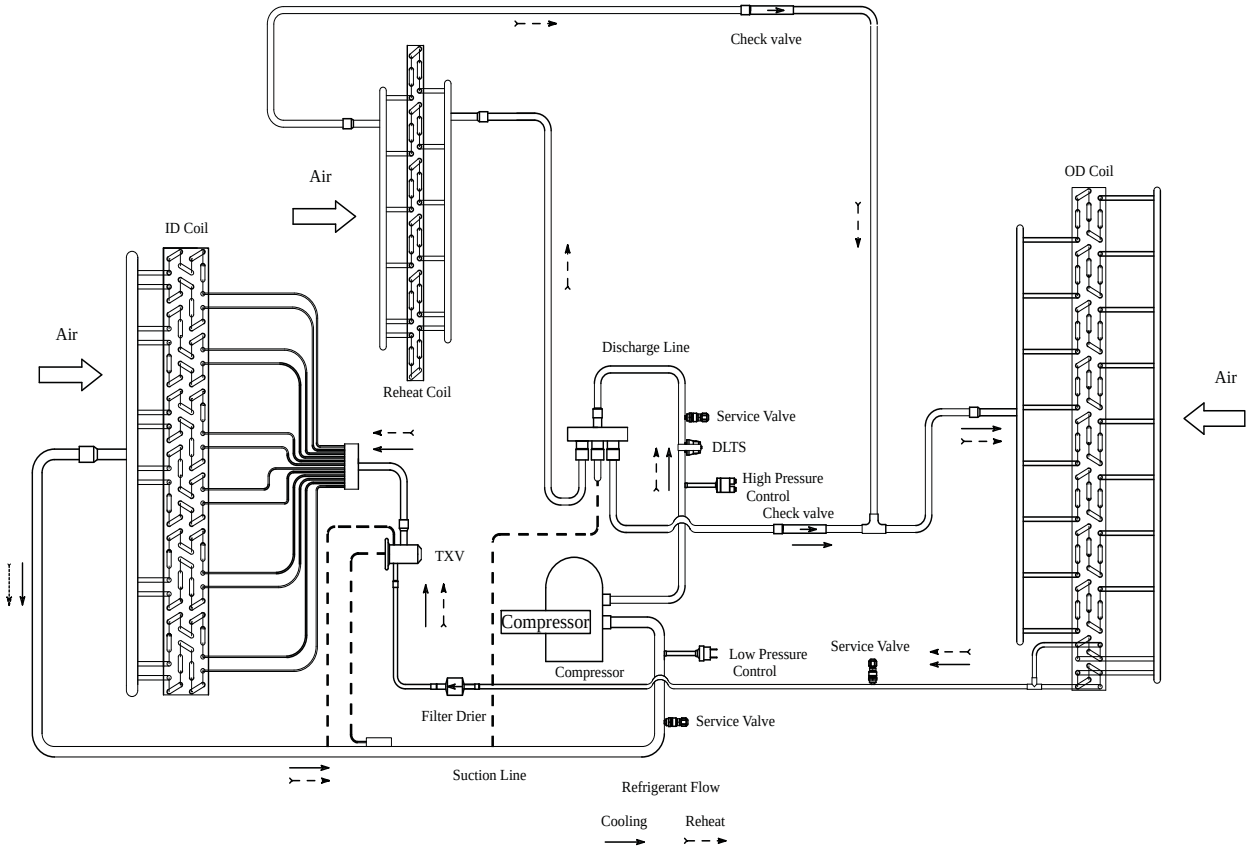


Figure 13. T/YHC067E - reheat



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