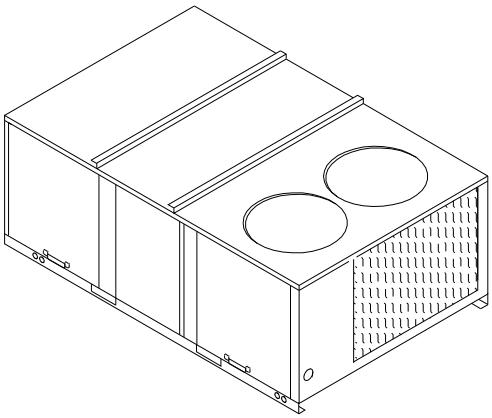
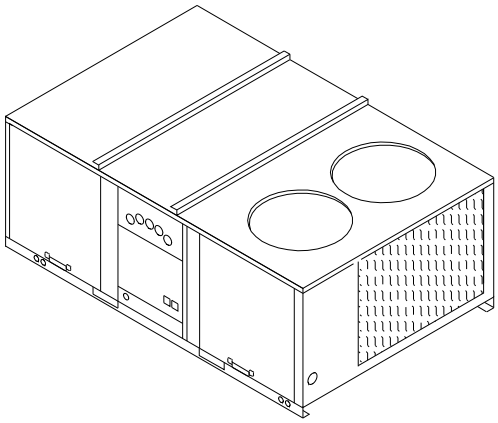
Service Facts

Packaged Cooling

20 Ton Rooftop Units with ReliaTel™ Controls, 50 Hz





Models: TC*200FD
YC*200FD

⚠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.

June 2011

RT-SVF45B-EN

Warnings, Cautions and Notices

Warnings, Cautions and Notices. Note that warnings, cautions and notices appear at appropriate intervals throughout this manual. Warnings are provided to alert installing contractors to potential hazards that could result in personal injury or death. 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.

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
Contains Refrigerant!

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 follow proper procedures or the use of non-approved refrigerants, refrigerant substitutes, or refrigerant additives could result in death or 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.

⚠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 codes 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 and OSHA guidelines for proper PPE.**
- **When working with or around hazardous chemicals, ALWAYS refer to appropriate MSDS 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 NFPA70E 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.

Table of Contents

General Data

Table 1. TC* general data—20 tons downflow and horizontal units

Model	TC*200FD
Cooling Performance[a]	
ARI Gross Capacity kW (MBh)	62.7 (214.1)
COP/EER[b]	3.14 / 10.7
Nominal Airflow—m^3/h (cfm)	10400 (6125)
ARI Airflow—m^3/h (cfm)	61.0 (208.2)
ARI Net Capacity—kW (MBh)	20.0
System Power—kW	19.6
Compressor	
No./Type	2/Scroll
Sound Rating dB[c]	9.2
Outdoor Coil—Type	Microchannel
Coil Width mm (in.)	25.4 (1)
Face Area—m^2 (sq. ft.)	3.27 (35.2)
Rows/Fins per inch	1 / 20
Indoor Coil—Type	Hi-Performance
Tube Size OD—in.	0.3125
Face Area—m^2 (sq. ft.)	(2.42) 26
Rows/Fins per inch	4 / 15
Refrigerant Control	Short Orifice
Drain Connection No./Size—in.	1/1.00 NPT
Outdoor Fan—Type	
No. Used/Diameter—mm (in.)	Propeller
Drive Type/No. Speeds	2 / 660 (26)
Airflow—m^3/h (cfm)	Direct / 1
No. Motors/Power—W (HP)	18000 (10600)
Motor RPM	2 / 560(0.75)
Indoor Fan—Type	
No. Used	FC Centrifugal
Diameter x Width—mm (in.)	1
Drive Type/No. Speeds	457x457 (18x18)
No. Motors	Belt / 1
Standard Motor Power—W (HP)	1
Oversized Motor Power—W (HP)	2200(3.0) / 3700(5.0)
Motor RPM—Standard/Oversized	2850 / 2920
Filters—Type/Furnished	
Type Furnished	Throwaway
Number Size Recommended	
Downflow—mm	(4)508x508x50 (4)508x635x50
Downflow—in	(4)20x20x2 (4)20x25x2
Horizontal—mm	(8)508x635x50
Horizontal—in	(8)20x25x2

Table 1. TC* general data—20 tons downflow and horizontal units (continued)

Model	TC*200FD
Refrigerant Charge	
R-410A kg (lb)[d]	6.1/3.2 (13.5/7)

(a) Cooling Performance is rated at 35°C (95°F) ambient, 26.7°C (80°F) entering dry bulb, 19.4°C (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 ±20% of nominal airflow. Ratings shown are tested and certified in accordance with ARI Standard 210/240 or 340/360 certification program.
(b) EER is rated at ARI conditions and in accordance with DOE test procedures.
(c) Sound Ratings shown are tested in accordance with ARI Standard 270 or 370.
(d) Refrigerant charge is an approximate value. For a more precise value, see unit nameplate and service instructions.

Table 2. YC* general data—20 tons downflow and horizontal units

Model	YC*200FD	
Cooling Performance[a]		
ARI Gross Capacity—kw (MBh))	62.7 (214.1)	
COP/EER[b]	3.14 / 10.7	
Nominal Airflow—m^3/h (cfm)	6125	
ARI Airflow—m^3/h (cfm)	61.0 (208.2)	
System Power—kW	20.0	
Heating Performance[c]		
Heating Models	Low	High
Heating Input—(MBh)	61.1 (208.3)	97.7 (333.3)
1st Stage (2 Stage Only)—(MBh)	42.7 (145.8)	73.3 (250.0)
Heating Output—(MBh)	49.6 (169.2)	79.1 (270.0)
1st Stage (2 Stage Only)—(MBh)	34.7 (118.3)	59.3 (202.5)
Steady State Efficiency %	23.7 (81.0)	23.7 (81.0)
Numbers of Gas Heat Stages		
Number of Gas Burners	1	1
Gas Connection Pipe Size—in.	1/2	3/4
Compressor		
Number/Type	2/Scroll	
Sound Rating dB[d]	9.2	
Outdoor Coil		
Type	Microchannel	
Coil Width—mm (in.)	25.4 (1)	
Face Area—m^3 (sq. ft.)	3.27 (35.2)	
Rows / Fins per inch	1 / 20	
Indoor Coil		
Type	Hi-Performance	
Tube Size (in.) ID	0.3125	
Face Area—m^3 (sq. ft.)	(2.42) 26	
Rows/Fins per inch	4/15	
Refrigerant Control	Short Orifice	
Drain Connection Number/Size—in.	1/1.00 NPT	

Table 2. YC* general data—20 tons downflow and horizontal units (continued)

Model	YC*200FD
Outdoor Fan	
Type	Propeller
Number Used/Diameter—mm (in.)	2/660 (26)
Drive Type/No. Speeds	Direct/1
Airflow—m^3/h (CFM)	18000 (10600)
Number Motors/W (HP)	2/560(0.75)
Motor RPM	950
Indoor Fan	
Type	FC Centrifugal
Number Used	1
Diameter x Width—mm (in.)	457x457 (18x18)
Drive Type/No. Speeds	Belt / 1
Number Motors	1
Motor W (HP) (Standard/Oversized)	2200 (3.0) / 3700 (5.0)
Motor RPM (Standard/Oversized)	2850 / 2920
Filters	
Type Furnished	Throwaway
Number Size Recommended	
Downflow—mm	(4)508x508x50 (4)508x635x50
Downflow—in.	(4)20x20x2 (4)20x25x2
Horizontal—mm	(8)508x635x50
Horizontal—in.	(8)20x25x2
Refrigerant Charge	
R-410A kg (lb)[e]	6.1/3.2 (13.5/7)

(a) Cooling Performance is rated at 35°C (95°F) ambient, 26.7°C (80°F) entering dry bulb, 19.4°C (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 ±20% of nominal airflow. Ratings shown are tested and certified in accordance with ARI Standard 210/240 or 340/360 certification program.
(b) EER is rated at ARI conditions and in accordance with DOE test procedures.
(c) Heating performance unit settings and data were established under laboratory test conditions using American National Standards Institute standards. Ratings shown are for elevations up to 610 meters (2000 ft.). For elevations above 610 meters (2000 ft.), ratings should be reduced at the rate of 4% for each 305 meters (1000 ft.) above sea level.
(d) Sound Rating shown is tested in accordance with ARI Standard 270 or 370.
(e) Refrigerant charge is an approximate value. For a more precise value, see unit nameplate and service instructions.

Performance Data

Table 3. Evaporator fan performance TC*200F downflow or horizontal (SI)

	External Static Pressure (Pascals)																			
	25.00		50.00		75.00		100.00		125.00		150.00		175.00		200.00		225.00		250.00	
m3/h	RPM	kW	RPM	kW	RPM	kW	RPM	kW	RPM	kW	RPM	kW	RPM	kW	RPM	kW	RPM	kW	RPM	kW
	2.24 Nom kw Standard Motor & Low Static Drive Accy										2.24 Nom kw Standard Motor & High Static Drive Accy									
9005	429	0.72	466	0.84	498	0.94	528	1.04	557	1.15	586	1.27	616	1.40	644	1.53	670	1.65	697	1.78
9940	465	0.94	501	1.07	531	1.19	559	1.30	586	1.42	612	1.53	638	1.66	666	1.81	692	1.95	717	2.09
10875	502	1.21	536	1.35	565	1.49	592	1.61	617	1.73	642	1.86	665	1.98	689	2.12	714	2.28	739	2.43
11810	539	1.53	572	1.67	600	1.83	626	1.97	650	2.10	673	2.23	695	2.36	717	2.50	739	2.65	761	2.81
12745	575	1.87	607	2.05	635	2.21	660	2.37	683	2.52	704	2.66	726	2.80	747	2.95	767	3.10	787	3.25
	2.24 Nom kw Standard Motor Drive										3.73 Nom kw Oversized Motor & Drive									

Continued

	External Static Pressure (Pascals)																			
	275.00		300.00		325.00		350.00		375.00		400.00		425.00		450.00		475.00		500.00	
m^3/h	RPM	kW	RPM	kW	RPM	kW	RPM	kW	RPM	kW	RPM	kW	RPM	kW	RPM	kW	RPM	kW	RPM	kW
	2.24 Nom kw Standard Motor & High Static Drive Accessory																			
9005	724	1.93	749	2.07	772	2.22	796	2.37	818	2.53	841	2.69	862	2.86	884	3.02	904	3.18	925	3.34
9940	741	2.22	765	2.37	790	2.53	813	2.69	835	2.85	856	3.01	877	3.18	898	3.36	918	3.53	938	3.71
10875	763	2.59	786	2.74	807	2.89	829	3.05	851	3.22	873	3.39	894	3.57	914	3.74	934	3.92	953	4.10
11810	784	2.98	807	3.15	829	3.32	850	3.48	870	3.64	889	3.81	910	3.99	931	4.18	—	—	—	—
12745	808	3.42	829	3.60	850	3.78	871	3.96	892	4.14	—	—	—	—	—	—	—	—	—	—
	3.73 Nom kw Oversized Motor & Drive										3.73 Nom kw Oversized Motor & High Static Drive Accessory									

Note: Data includes pressure drop for filters and wet coil.

Table 4. Evaporator fan performance TC*200F downflow or horizontal (IP)

	External Static Pressure (Inches of Water)																			
	0.10		0.20		0.30		0.40		0.50		0.60		0.70		0.80		0.90		1.00	
cfm	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	3HP Standard Motor & Low Static Drive Accessory										3HP Standard Motor & High Static Drive Accessory									
5300	429	0.97	466	1.13	498	1.26	528	1.40	557	1.54	586	1.70	616	1.88	644	2.05	670	2.21	697	2.39
5850	465	1.27	501	1.44	531	1.60	559	1.75	586	1.90	612	2.06	638	2.23	666	2.42	692	2.61	717	2.80
6400	502	1.62	536	1.81	565	2.00	592	2.16	617	2.32	642	2.49	665	2.66	689	2.85	714	3.05	739	3.26
6950	539	2.05	572	2.24	600	2.45	626	2.64	650	2.82	673	2.99	695	3.17	717	3.36	739	3.55	761	3.77
7500	575	2.51	607	2.74	635	2.97	660	3.18	683	3.38	704	3.57	726	3.76	747	3.95	767	4.16	787	4.36
	3HP Standard Motor Drive										5HP Oversized Motor & Drive									

Continued

	External Static Pressure (Inches of Water)																			
	1.10		1.20		1.30		1.40		1.50		1.60		1.70		1.80		1.90		2.00	
cfm	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	3HP Standard Motor & High Static Drive Accessory																			
5300	724	2.59	749	2.78	772	2.98	796	3.18	818	3.40	841	3.61	862	3.83	884	4.05	904	4.27	925	4.48
5850	741	2.98	765	3.18	790	3.40	813	3.61	835	3.82	856	4.04	877	4.27	898	4.50	918	4.74	938	4.98
6400	763	3.47	786	3.67	807	3.87	829	4.08	851	4.31	873	4.55	894	4.78	914	5.01	934	5.26	953	5.50
6950	784	4.00	807	4.23	829	4.45	850	4.67	870	4.89	889	5.11	910	5.35	931	5.60	—	—	—	—
7500	808	4.59	829	4.82	850	5.07	871	5.31	892	5.56	—	—	—	—	—	—	—	—	—	—
	5HP Oversized Motor & Drive						5HP Oversized Motor & High Static Drive Accessory													

Note: Data includes pressure drop for filters and wet coil.

Table 5. Evaporator fan performance YC*200F downflow or horizontal (SI)

External Static Pressure (Pascals)																				
	25.00		50.00		75.00		100.00		125.00		150.00		175.00		200.00		225.00		250.00	
m3/h	RPM	kW	RPM	kW	RPM	kW	RPM	kW	RPM	kW	RPM	kW	RPM	kW	RPM	kW	RPM	kW	RPM	kW
	2.24 Nom kw Standard Motor & Low Static Drive Accy										2.24 Nom kw Standard Motor & High Static Drive Accy									
9005	448	0.78	482	0.89	513	0.99	542	1.09	571	1.21	601	1.33	630	1.46	657	1.59	683	1.71	710	1.86
9940	487	1.02	519	1.15	548	1.26	575	1.37	601	1.48	627	1.61	655	1.75	682	1.89	707	2.03	731	2.17
10875	527	1.31	557	1.45	584	1.58	610	1.69	634	1.82	658	1.95	682	2.08	707	2.23	732	2.39	756	2.54
11810	566	1.64	595	1.80	622	1.95	646	2.08	668	2.21	691	2.34	713	2.48	735	2.63	757	2.78	780	2.95
12745	607	2.05	634	2.21	659	2.37	682	2.52	704	2.66	725	2.80	746	2.94	767	3.09	787	3.25	807	3.41
	2.24 Nom kw Standard Motor Drive								3.73 Nom kw Oversized Motor & Drive											

Continued

External Static Pressure (Pascals)																				
	275.00		300.00		325.00		350.00		375.00		400.00		425.00		450.00		475.00		500.00	
m^3/h	RPM	kW	RPM	kW	RPM	kW	RPM	kW	RPM	kW	RPM	kW	RPM	kW	RPM	kW	RPM	kW	RPM	kW
	2.24 Nom kw Standard Motor & High Static Drive Accessory																			
9005	736	2.00	760	2.15	784	2.29	807	2.45	829	2.61	851	2.77	873	2.94	894	3.10	914	3.26	934	3.42
9940	755	2.31	780	2.47	803	2.62	826	2.78	847	2.95	868	3.11	889	3.28	910	3.46	930	3.64	950	3.82
10875	779	2.69	800	2.84	822	3.00	845	3.17	867	3.34	888	3.51	908	3.69	928	3.87	947	4.05	966	4.23
11810	803	3.12	825	3.29	847	3.46	866	3.62	886	3.78	907	3.96	928	4.15	—	—	—	—	—	—
12745	828	3.59	850	3.78	871	3.96	891	4.14	—	—	—	—	—	—	—	—	—	—	—	—
	3.73 Nom kw Oversized Motor & Drive								3.73 Nom kw Oversized Motor & High Static Drive Accessory											

Note: Data includes pressure drop for filters and wet coil.

Table 6. Evaporator fan performance YC*200F downflow or horizontal (IP)

External Static Pressure (Inches of Water)																				
	0.10		0.20		0.30		0.40		0.50		0.60		0.70		0.80		0.90		1.00	
CFM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	3HP Standard Motor & Low Static Drive Accessory										3HP Standard Motor & High Static Drive Accessory									
5300	448	1.05	482	1.19	513	1.33	542	1.46	571	1.62	601	1.79	630	1.96	657	2.13	683	2.30	710	2.49
5850	487	1.37	519	1.54	548	1.68	575	1.83	601	1.99	627	2.16	655	2.35	682	2.54	707	2.72	731	2.91
6400	527	1.76	557	1.95	584	2.11	610	2.27	634	2.44	658	2.61	682	2.79	707	2.99	732	3.20	756	3.41
6950	566	2.20	595	2.41	622	2.62	646	2.79	668	2.96	691	3.14	713	3.33	735	3.52	757	3.73	780	3.96
7500	607	2.75	634	2.97	659	3.18	682	3.38	704	3.57	725	3.76	746	3.94	767	4.15	787	4.36	807	4.57
	3HP Standard Motor Drive								5HP Oversized Motor & Drive											

Continued

External Static Pressure (Inches of Water)																				
	1.10		1.20		1.30		1.40		1.50		1.60		1.70		1.80		1.90		2.00	
CFM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
	3HP Standard Motor & High Static Drive Accessory																			
5300	736	2.68	760	2.88	784	3.08	807	3.29	829	3.50	851	3.72	873	3.94	894	4.16	914	4.37	934	4.59
5850	755	3.10	780	3.31	803	3.52	826	3.73	847	3.95	868	4.17	889	4.40	910	4.64	930	4.88	950	5.12
6400	779	3.61	800	3.81	822	4.02	845	4.25	867	4.48	888	4.71	908	4.95	928	5.19	947	5.43	966	5.68
6950	803	4.19	825	4.41	847	4.63	866	4.85	886	5.07	907	5.31	928	5.56	—	—	—	—	—	—
7500	828	4.82	850	5.06	871	5.31	891	5.55	—	—	—	—	—	—	—	—	—	—	—	—
	5HP Oversized Motor & Drive								5HP Oversized Motor & High Static Drive Accessory											

Note: Data includes pressure drop for filters and wet coil.

Table 7. T/YC*200 standard motor and drive/fan speed (rpm)

Unit Model No.	6 Turns Open	5 Turns Open	4 Turns Open	3 Turns Open	2 Turns Open	1Turns Open	Closed
T/YC*200F	500	537	574	611	648	685	N/A

Notes:
1. * indicates both horizontal and downflow units
2. Factory set at 3 turns open.

Table 8. T/YC*200 standard motor and low static fan drive

Unit Model No.	6 Turns Open	5 Turns Open	4 Turns Open	3 Turns Open	2 Turns Open	1Turns Open	Closed
T/YC*200F	418	442	466	489	513	537	N/A

Note: * indicates both horizontal and downflow units

Table 9. T/YC*200 standard motor and high static drive accessory/fan speed (rpm)

Unit Model No.	6 Turns Open	5 Turns Open	4 Turns Open	3 Turns Open	2 Turns Open	1Turns Open	Closed
T/YC*200F	685	722	759	796	833	870	N/A

Note: * indicates both horizontal and downflow units

Table 10. T/YC*200 oversized motor and drive/fan speed (rpm)

Unit Model No.	6 Turns Open	5 Turns Open	4 Turns Open	3 Turns Open	2 Turns Open	1Turns Open	Closed
T/YC*200F	682	714	746	777	809	841	N/A

Note: * indicates both horizontal and downflow units

Table 11. T/YC*200—static pressure drops through accessories—Pascals

Unit Model No.	Airflow m^3/h	Standard Filters	Economizer with OA/RA Dampers[a]		Electric Heater—Nom kW[b]			
			100% OA	100% RA	5–12	14–27	33–41	45–54
D200	9005	12	29	6	—	11	14	16
D200	10875	18	42	9	—	16	21	23
D200	12745	24	57	13	—	22	29	31
H200	9005	10	33	6	—	11	14	16
H200	10875	15	48	9	—	16	21	23
H200	12745	21	66	13	—	22	29	31

(a) OA = Outside Air, RA = Return Air
(b) Nominal kW ratings are at 415 V. Not all Heater sizes may be available.
* Indicates both horizontal and downflow units.

Electrical Data

Table 12. TC* unit wiring

Unit Model	Voltage	Standard Indoor Fan Motor—MCA	Oversize Indoor Fan Motor—MCA
TC*200FD	380–415	56.0	59.0

Table 13. TC* unit wiring with electric heat (single point connection)

Unit Model to Use With	Heater kW Rating	Unit Supply Power	Control Stages	Standard Indoor Motor MCA	Oversized Motor MCA
TC*200FD	22.6–26.9	380–415/50/3	2	56/57	59/61
TC*200FD	33.8–40.4	380–415/50/3	2	74/80	79/84
TC*200FD	45.1–53.8	380–415/50/3	2	96/104	100/108

Note: * All units to be installed under local codes.

Table 14. YC* unit wiring

Unit Model	Voltage	Standard Indoor Fan Motor—MCA	Oversize Indoor Fan Motor—MCA
YC*200FD	380–415	56.0	59.0

Sequence of Operation

⚠WARNING

Live Electrical Components!

During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

The ReliaTel Controls is a microelectronic control feature, which provides operating functions that are significantly different than conventional electro mechanical units. 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 ensure 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.

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 (K9) relay coil located on the RTRM. When the (K9) relay 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, compressor (CPR1) and the outdoor fan motor (ODM) start to maintain the zone temperature to within ±2°F of the sensor setpoint at the sensed location.

If the first stage of cooling can not satisfy the cooling requirement, the RTRM energizes the (K10) relay coil located on the RTRM. When the (K10) relay contacts close, the compressor contactor (CC2) coil is energized provided the low pressure control (LPC2), high pressure control (HPC2) and discharge line thermostat (DLT 2) are closed. When the CC2 contacts close, compressor (CPR2) starts to maintain the zone temperature to within ±2°F of the sensor setpoint at the sensed location.

ReliaTel Control Evaporator Fan Operation

When the fan selection switch is set to the "Auto" position, the RTRM energizes the (K6) relay coil approximately 1 second after energizing the compressor contactor coil (CC1) in the cooling mode. In the heating mode, the RTRM energizes the (K6) relay coil approximately 45 seconds after gas ignition (gas heat unit) or 1 second before energizing the electric heat contactors (electric heat unit). Closing the (K6) contacts on the RTRM energizes the indoor fan relay (F) coil to start the indoor fan motor (IDM).

The RTRM de-energizes the fan relay (F) approximately 60 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 is met (gas heat unit) or at the same time as the heater contactors (electric heat unit).

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

When the unit is equipped with the optional clogged filter switch, wired between terminals J7-3 and 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 55°F, 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.

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 modulating dampers. 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 mixed air sensor (MAS) senses that the mixed air temperature is below 53°F, the damper modulates toward the closed position. If the zone temperature continues to rise above the zone temperature setpoint controlband and the economizer damper is fully open, the RTRM energizes the compressor contactor (CC1).

If the zone temperature continues to rise above the zone temperature setpoint controlband and the economizer damper is fully open, the RTRM energizes the compressor contactor (CC2).

The ECA continues to modulate the economizer damper open/closed to keep the mixed air temperature that is calculated by the RTRM.

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

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.

Economizer Set-Up

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

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. Table 15, p. 14 lists the selectable dry bulb values by potentiometer setting.
2. Reference Enthalpy—Controlling the economizer cycle by sensing the outdoor air humidity. Table 15 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.

Table 15.

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

(a) Factory Setting

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 K1 relay coil. When the K1 relay contacts close, located on the RTRM, the first stage electric heat contactor (AH, or AH and CH) is energized.

If the first stage of electric heat can not satisfy the heating requirement, the RTRM energizes K2 relay coil. When the K2 relay contacts close, located on the RTRM, the second stage electric heat contactor (BH, or BH and DH) 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

Two-Stage (IGN) runs self-check (including verification that the gas valve is de-energized). IGN checks the high-limit switches (TC01 and TC02) for normally closed contacts.

With 115 Vac power supplied to the ignition module (IGN), the hot surface ignition probe (IP) is preheated for approximately 45 seconds.

The gas valve (GV) is energized for approximately 7 seconds for trial for ignition, to ignite the burner. Once the burner is ignited, the hot surface ignition probe (IP) is de-energized by the ignition module (IGN) and functions as the flame sensing device.

If the burner fails to ignite, the ignition module will attempt two retries before locking out. The green LED will indicate a lockout 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 "Ignition Control Module Diagnostics," p. 15 for the LED diagnostic definitions.

When the fan selection switch is set to the "Auto" position, the RTRM energizes the indoor fan relay (F) coil approximately 30 second after initiating the heating cycle to start the indoor fan motor (IDM).

The automatic reset high limit (TCO1), located in the bottom right corner of the burner compartment, protects against abnormally high leaving air temperatures.

The automatic reset fan fail limit (TCO2), located in the upper middle section of the indoor fan board, protects against abnormally high heat buildup which could occur because of extended cycling of the high limit (TCO1) or if the indoor fan motor (IDM) fails to operate.

Should TCO2 open, the RTRM will energize the indoor fan relay (F) in an attempt to start the fan motor. The RTRM signals that a heat failure has occurred by flashing the “Heat” LED on the zone sensor.

There is a green LED located in the Ignition Control Module. Table 16 lists the diagnostics and the status of the LED during the various operating states.

Ignition Control Module Diagnostics

At any time the control is powered, a green LED indicator light shall be lit using the following signal:

Table 16.

Steady OFF:	No Power/Failure/Internal Failure
Steady ON:	Normal
Slow Flash Rate:	Normal, call for heat (¾ second on, ¼ second off).
Fast Flash Rate:	Used for error indication only (¼ second off, ¾ 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.

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

Pressure Curves

Figure 1. TC/YC200FD Cooling cycle pressure curve: #1 circuit, one fan

(Based on Indoor airflow of 400 CFM/Ton)
(One Outdoor Fan)

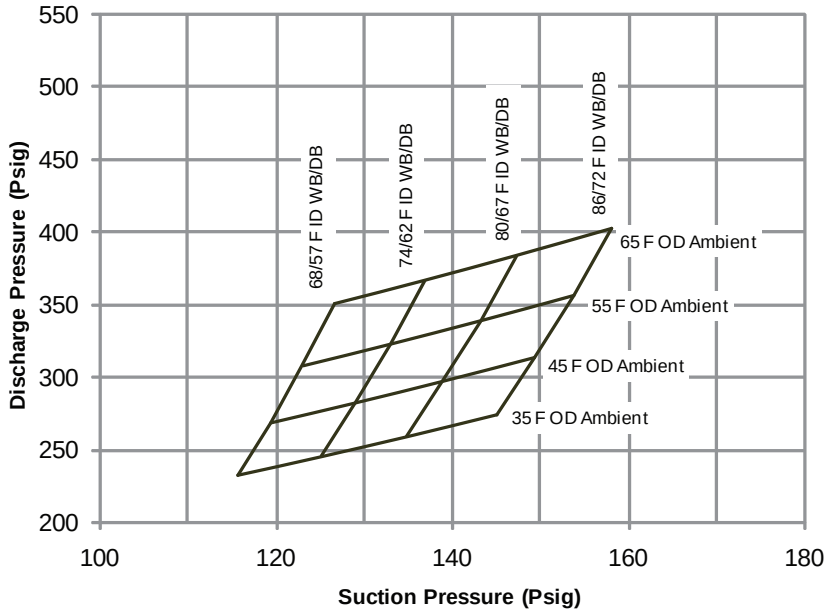


Figure 2. TC/YC200FD Cooling cycle pressure curve: #1 circuit, two fans

(Based on Indoor airflow of 400 CFM/Ton)
(Two Outdoor Fans)

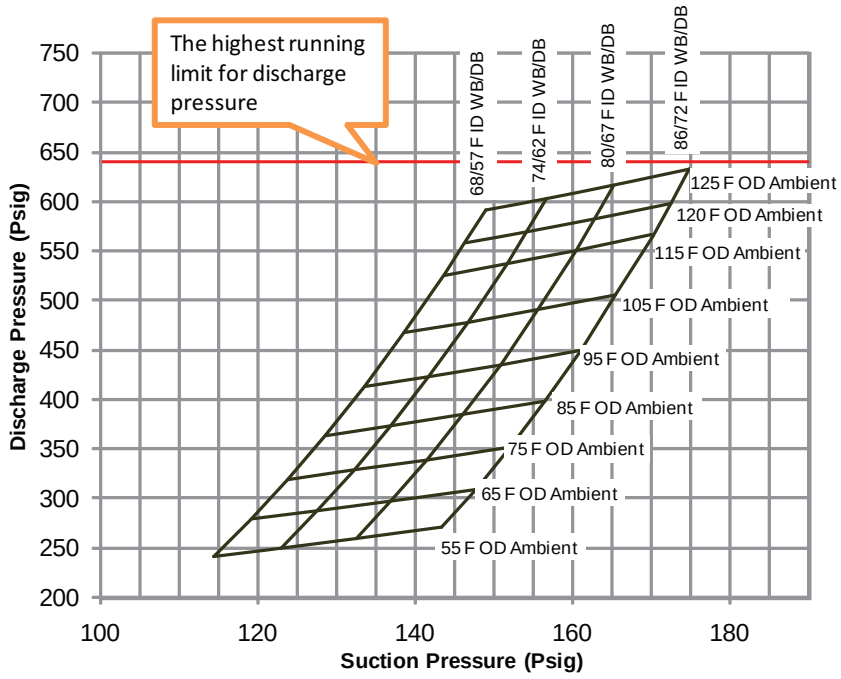


Figure 3. TC/YC200FD Cooling cycle pressure curve: #2 circuit, one fan

(Based on Indoor airflow of 400 CFM/Ton)
(One Outdoor Fan)

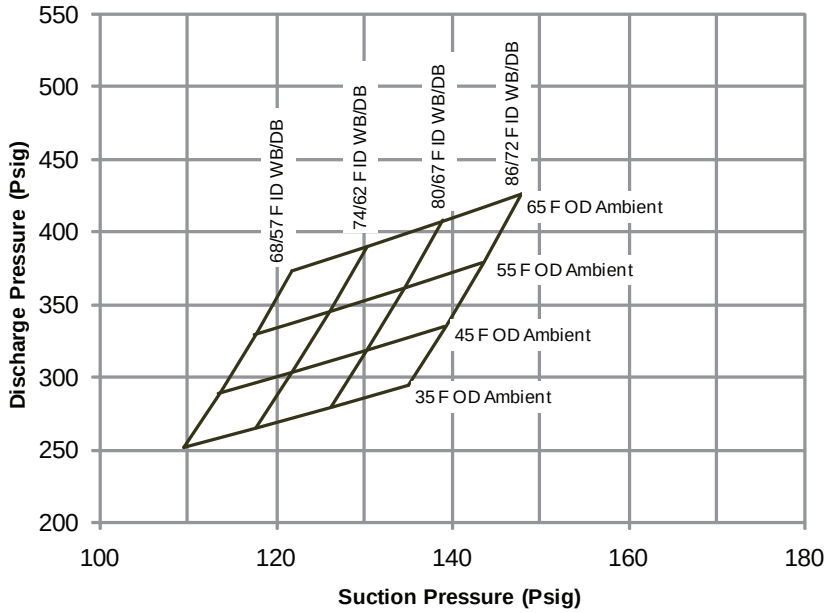
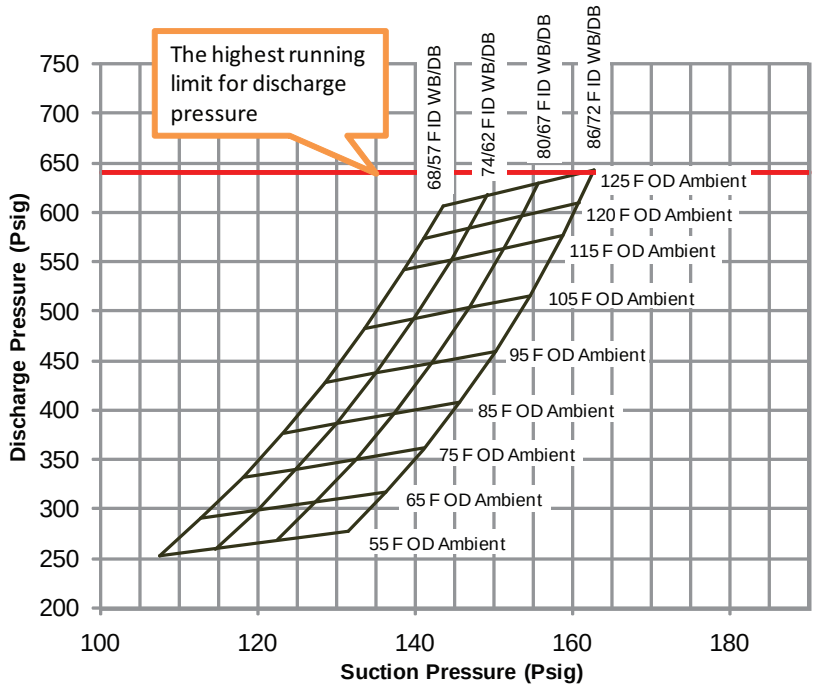


Figure 4. TC/YC200FD Cooling cycle pressure curve: #2 circuit, two fans

(Based on Indoor airflow of 400 CFM/Ton)
(Two Outdoor Fans)



Subcooling Charging Curves

Figure 5. TC/YC200FD Subcooling curve (psig): one fan

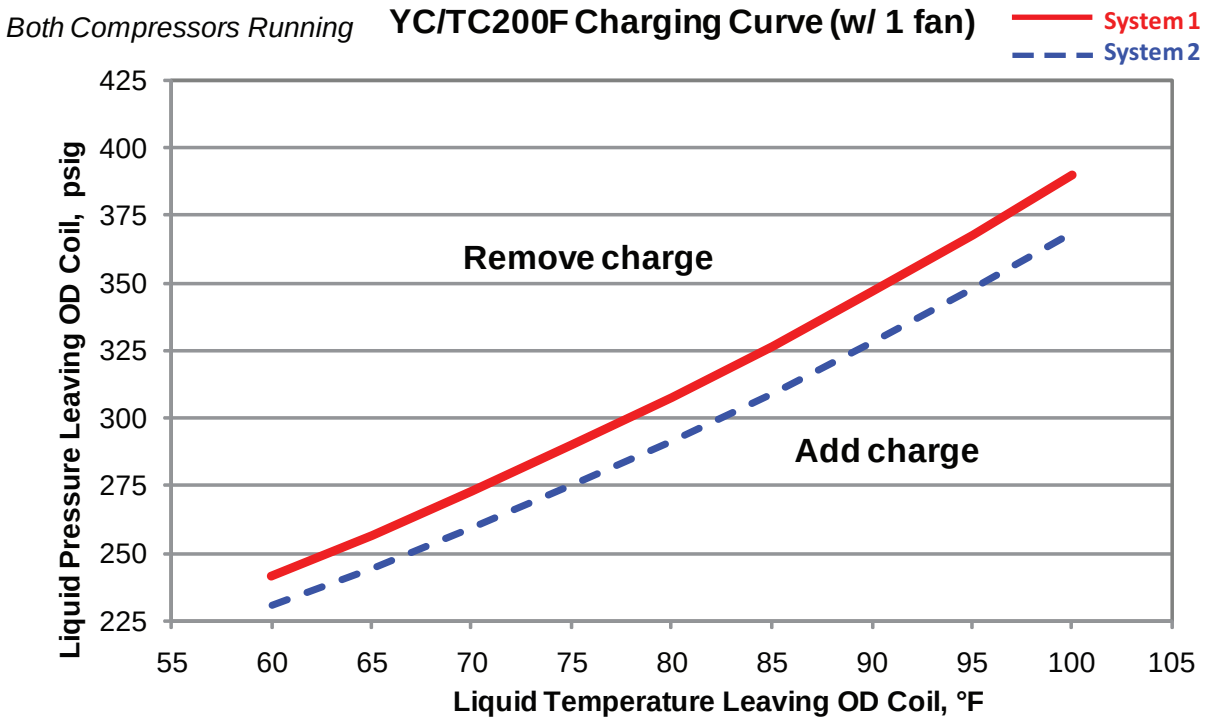
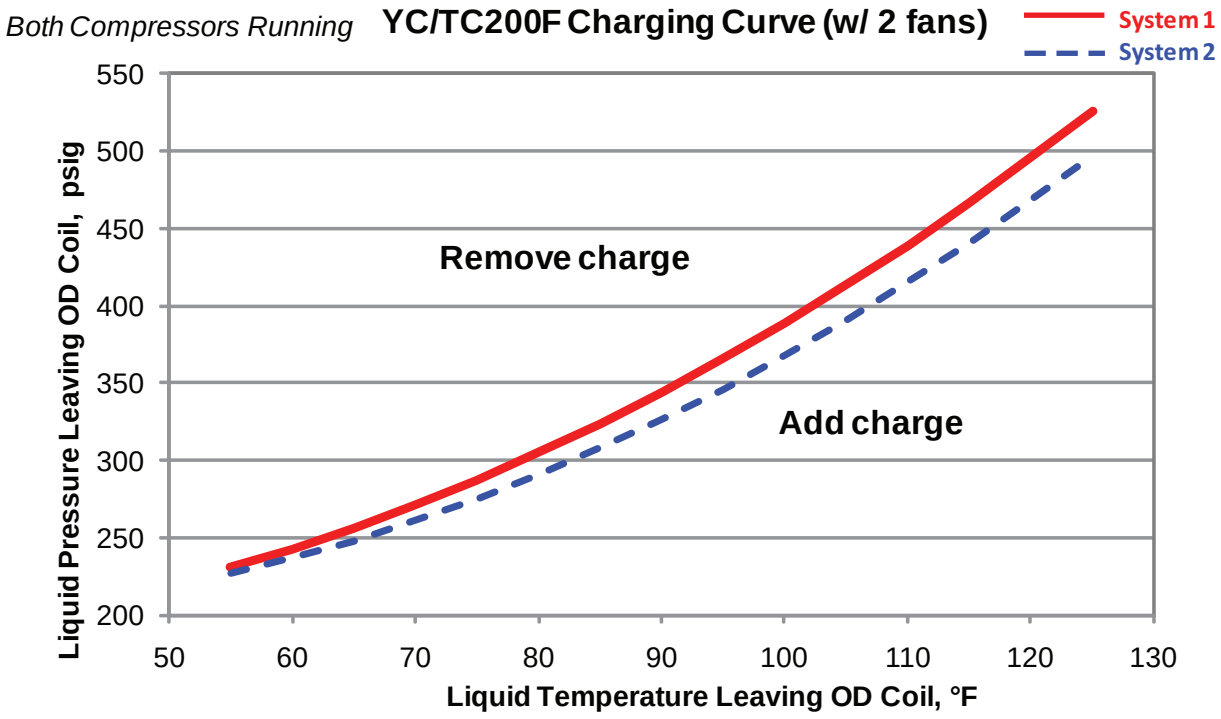
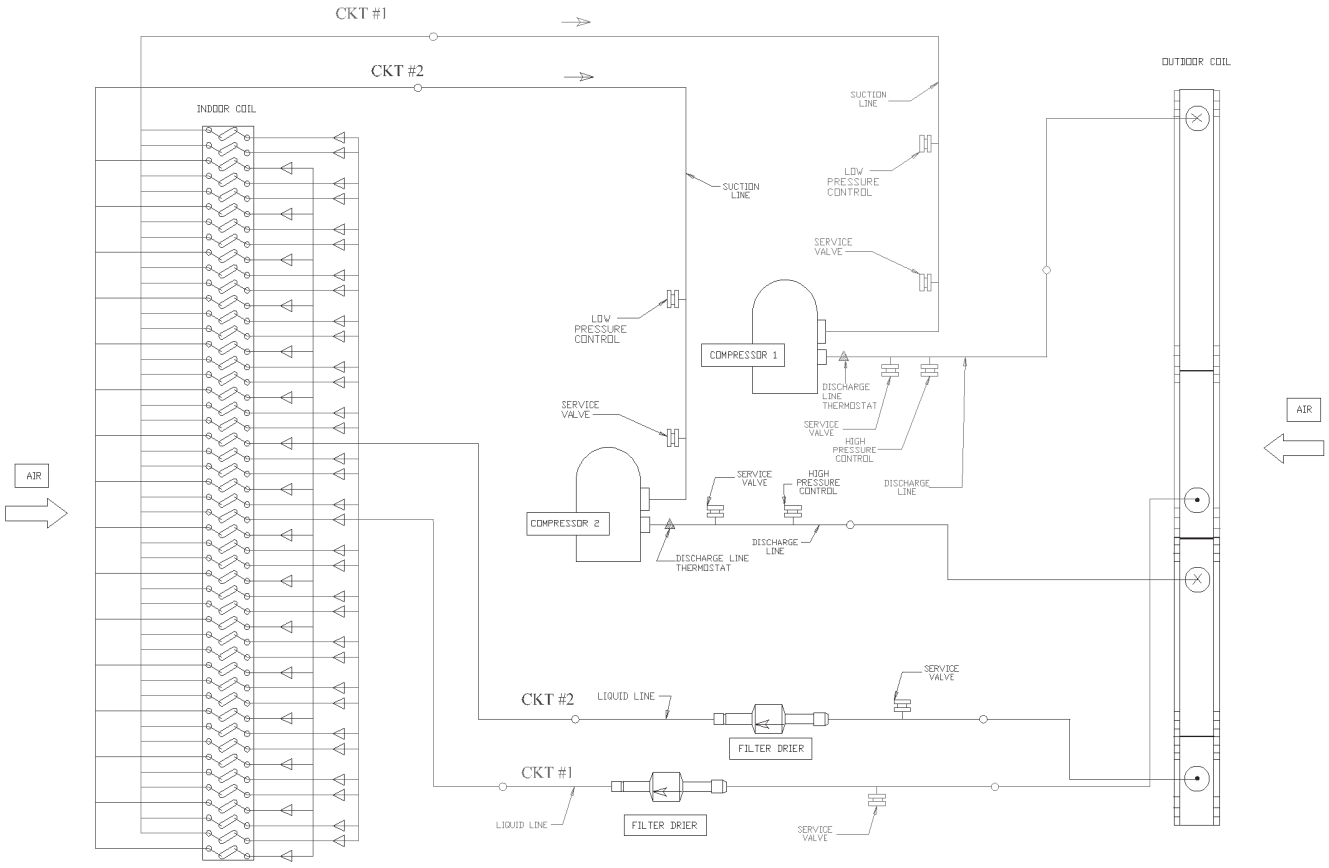


Figure 6. TC/YC200FD Subcooling curve (psig): two fans



Refrigerant Circuit

Figure 7. 20 ton packaged cooling refrigerant circuit



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