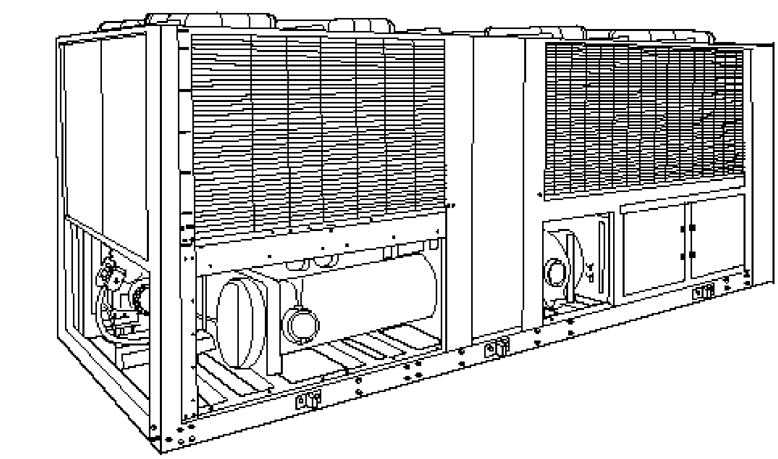
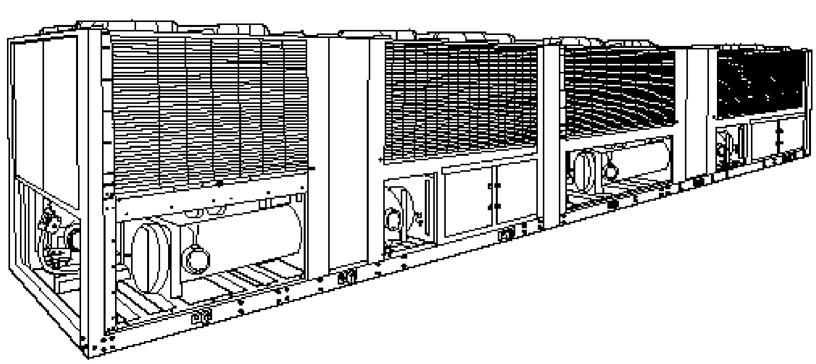
Product Data

30GTN,GTR,GBN,GBR Air-Cooled Reciprocating Liquid Chillers with *Comfort*Link™ Controls 50 Hz

Nominal Capacities: 50 to 400 Tons
127 to 1445 kW





Features/Benefits

*Comfort*Link control

Your link to a world of simple and easy to use air-cooled chillers that offer outstanding performance and value. The 30GTN,GTR, GBN,GBR liquid chillers employ more than the latest advanced microprocessor controls, they utilize an expandable platform that grows as your needs change. From stand-alone operation to remotely monitored and operated multi-chiller plants, *Comfort*Link controls can keep you plugged in.

*Comfort*Link controls are fully communicating, and are cable ready for connection to a Carrier Comfort Network (CCN). Occupancy scheduling, temperature and pressure read-outs, and the *Comfort*Link scrolling marquee clear language display compliment the standard features, linking you to a world of carefree comfort. The 30GTN,GTR,GBN,GBR chillers are built on the legendary performance of the Carrier model 30G Flotronic™ chiller and share many of the same time-proven features and technologies providing easy operation, quick installation and start-ups that save you money!

Superior temperature control equals potential for greater productivity

Whether in the classroom, on the production floor, or in the office, *Comfort*Link controls can help you to adapt to changing weather and business conditions. Accurate temperature control provided by the Carrier *Comfort*Link system helps to maintain higher levels of indoor air quality, thermal comfort, and productivity space.

While many air-cooled chillers use only leaving fluid temperature control, the 30GTN,GTR,GBN,GBR chillers utilize leaving fluid temperature control with a standard entering fluid temperature compensation.

This Carrier exclusive provides smart control and intelligent machine capacity staging. Unlike many chillers, Carrier model 30GTN,GTR,GBN,GBR chillers do not require constant fluid flow. The ability to operate with variable flow also allows building owners to realize even greater overall system energy savings in the chilled water pumping system of up to 85%, and not just at the chiller.

Full and part load efficiency advantage

The 30GTN,GTR,GBN,GBR chillers with *Comfort*Link control offer outstanding efficiencies (EER [Energy Efficiency Ratio], COP [coefficient of performance], and IPLV [integrated part load value]) in both full (up to 10.0 EER) and part load operation (IPLVs up to 14.7). Increased part load efficiency is provided by dual independent refrigeration circuits, suction cutoff unloading, and return fluid temperature compensation.

The fully integrated *Comfort*Link control system maintains efficient control over the compressors, unloaders, expansion valves, and condenser fans to optimize performance as conditions change. The Carrier exclusive longstroke electronic expansion valve (EXV) operates at reduced condensing pressures, thereby allowing the control to operate the fans down to lower outdoor temperatures. By utilizing valve position information, the control maintains the highest possible evaporator pressure and minimizes the excessive superheat that conventional thermal expansion valve (TXV) systems require. Wider operating ranges equal increased efficiencies and lower installed costs.

Building design flexibility

Design and consulting engineers will appreciate the broad selection of sizes and wide operating range offered by the 30GTN,GTR,GBN,GBR chillers. With built-in dual chiller control, imaginative large tonnage systems can be easily engineered and controlled with smaller, easier to handle modules. Modular design allows engineers to consider side by side, offset, or angled placement to fit the awkward spaces that the architect sometimes leaves for mechanical systems. Or, in the case of planned expansion, additional cooling can be brought on-line and controlled from the same system.

In some places facility managers may find that the cash flow provided by building up large air cooled multi-chiller plants can easily offset any efficiency losses when compared to large water cooled centrifugal type chilled water plants.

Quality and reliability

To assure long life and quality performance, every chiller is factory run tested. Individual components are also tested at many levels to assure that only the best parts make it into 30GTN,GTR,GBN,GBR chillers. Long life and reliability are also a function of design. While some manufacturers like to talk about moving parts, Carrier's engineers recognized the potential dangers to chiller systems caused by problems in the power distribution system. Low voltage and phase imbalances are but a few of the conditions that can hurt the compressor's motor. Model 30G chillers were one of the first to offer ground current sensing to prevent compressor motor burn-out that would contaminate the system and potentially threaten the life of future replacement compressors. The 06E semi-hermetic compressors are built for performance and have proven themselves in commercial refrigeration equipment worldwide.

With tens of thousands of chillers operating in all corners of the world, end-users count on the reliability of Carrier 30G chillers. The Carrier International Sdn. Bhd. Malaysia plant is an ISO 9001 registered facility as are many of Carrier's other component and assembly plants throughout the world.

Features

- Simple and easy to use *Comfort*Link communicating controls.
- Wide operating envelope from –28 to 52 C (–20 to 125 F).
- Accurate temperature control with return fluid compensation.
- Value added features built-in; dual chiller control, reset from return.
- Superior full and part-load efficiency.
- Precise multiple-step capacity.
- Low noise operation (quieter than many screw chillers).
- Dual independent refrigerant circuits.
- Factory run tested.
- Wide range of sizes available from stock.
- History of proven performance and reliability.

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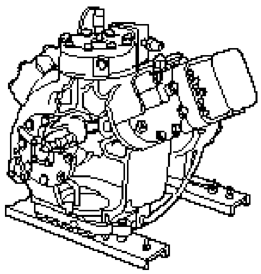
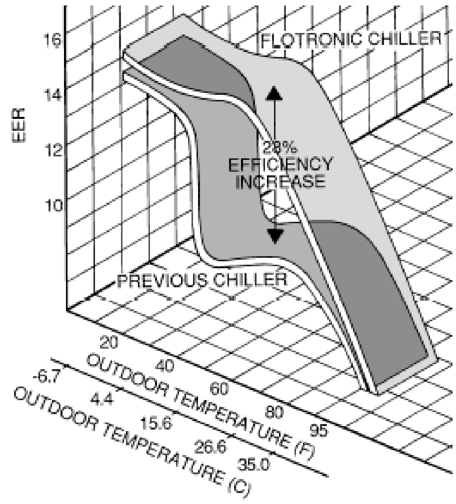
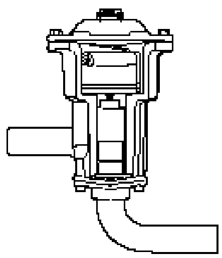
Features/Benefits (cont)



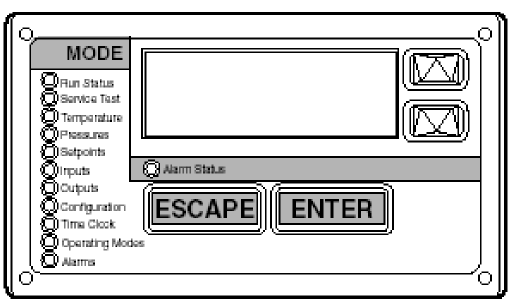
06E COMPRESSOR



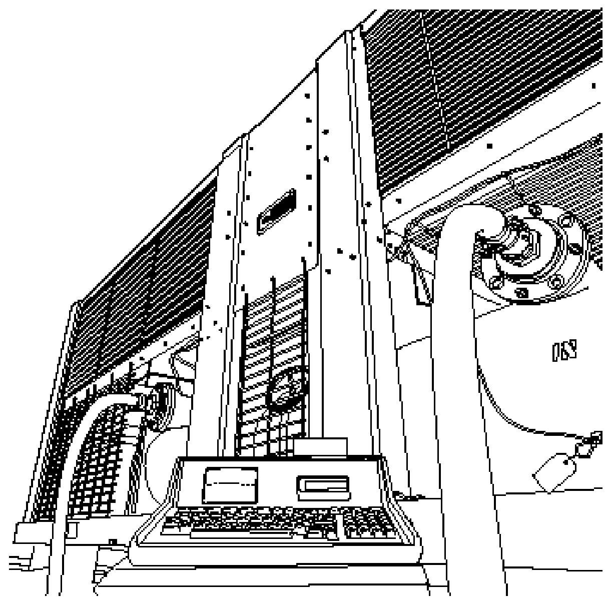
PART-LOAD EFFICIENCY
28% GAIN



ELECTRONIC EXPANSION VALVE (EXV)



SCROLLING MARQUEE DISPLAY



FACTORY SERVICE TEST

Quality Assurance

QUALITY SYSTEM SIRIM — UKAS QUALITY MANAGEMENT 074

ENVIRONMENTAL SYSTEM SIRIM — UKAS QUALITY MANAGEMENT 074

MS ISO 9001 REG. NO. AR 0239

MS ISO 14001 CERT. NO. C003001129

Model number nomenclature

30GT N 100 - - C 9

30GT/GB – Air-Cooled Liquid Chiller

Compressor Start
N – Across-The-Line Start with ComfortLink™ Controls
R – Part-Wind Start with ComfortLink™ Controls

Unit Sizes*
050 080 110 200 400
060 090 150 300
070 100 175 350

Module Designation (300-400 Unit Sizes Only)*
A
B

Not Used

Condenser Coil Options
- – Copper Tube, Aluminum Fins
C – Copper Tube, Copper Fins

V-Ph-Hz
9 – 400-3-50

*Refer to Unit Sizes and Modular Combinations below.

UNIT SIZES AND MODULAR COMBINATIONS

UNIT 30GTN,GBN	NOMINAL TONS	SECTION A UNIT 30GBN	SECTION B UNIT 30GBN
050	50	—	—
060	60	—	—
070	70	—	—
080	80	—	—
090	90	—	—
100	100	—	—
110	110	—	—
150	150	—	—
175	175	—	—
200	200	—	—
300	300	150	150
350	350	175	175
400	400	200	200

Physical Data – English

30GTN, GTR UNIT SIZE	050	060	070	080	090	100	110
APPROX OPERATING WEIGHT (lb)							
Cu-Al	3916	4780	5453	6720	7135	8710	8840
Cu-Cu	4329	5197	6081	7445	7860	9660	9790
REFRIGERANT TYPE	R-22						
Charge (lb)							
Ckt A	48	52	71	78	78	98	98
Ckt B	60	54	69	78	78	105	105
COMPRESSORS	Reciprocating, Semi-Hermetic						
Speed (rpm)	1450						
06E (Qty) Ckt A	(1) 275	(1) 299	(1) 265, (1) 265	(1) 265, (1) 299	(1) 265, (1) 299	(1) 265, (1) 299	(2) 299
(Qty) Ckt B	(1) 299	(1) 299	(1) 299	(1) 299	(1) 265, (1) 275	(1) 265, (1) 299	(2) 299
Oil Charge (Compressor/pt)	265/19.0, 275/19.0, 299/19.0						
No. Capacity Control Steps	4	4	4	4	8	8	8
Capacity (%)							
Ckt A	43.3	50.0	58.0	62.0	54.0	50.0	50.0
Ckt B	56.7	50.0	42.0	38.0	46.0	50.0	50.0
Minimum Capacity Step (%)	28.8	33.3	19.3	16.0	14.0	13.0	17.0
CONDENSER FANS	Propeller, Direct Drive						
Fan Speed (rpm)	950						
No. Blades…Dia.(in.)	6…30						
No. Fans…Hp/kW (each)	4…2.5/1.85	6…2.5/1.85	6…2.5/1.85	6..2.5/1.85	6…2.5/1.85	8…2.5/1.85	8..2.5/1.85
Total Airflow (cfm)	34,000	52,000	51,000	57,000	57,000	76,000	76,000
CONDENSER COILS	3/8-in. OD Vertical and Horizontal, Plate Fin, Enhanced Copper Tubing						
Fins/in.	17	17	17	17	17	17	17
No. Rows (Ckt A or B)	3	2	3	3	3	3	3
Face Area, Ckt A and B Total (sq ft)	80.5	116.7	116.7	128.3	128.3	168.0	168.0
Max Working Pressure Refrigerant (psig)	450						
COOLER	One…Direct Expansion, Shell and Tube						
No. Refrigerant Circuits	2	2	2	2	2	2	2
Net Water Volume, includes nozzles (gal.)	13.5	18.0	18.0	24.5	24.5	30.3	30.3
Max Working Pressure Refrigerant Side (psig)	278	278	278	278	278	278	278
Max Working Pressure Fluid Side (psig)	300	300	300	300	300	300	300
FLUID CONNECTIONS (in.)	Flat Face Flange						
Inlet and Outlet	3	4	4	4	4	5	5
Drain (NPT)	3/4						

LEGEND

Cu-Al – Copper Tubing, Aluminium Fins Condenser Coil
Cu-Cu – Copper Tubing, Copper Fins Condenser Coil
OD – Outside Diameter

Physical Data – English (cont)

30GBN,GBR UNIT SIZE	150	175	200
APPROX OPERATING WEIGHT (lb)			
Cu-Al	14,100	14,600	15,100
Cu-Cu	15,030	15,530	16,030
REFRIGERANT TYPE	R-22		
Charge (lb)			
Ckt A	230	230	230
Ckt B	230	230	230
COMPRESSORS	Reciprocating, Semi-Hermetic		
Speed (rpm)	1450		
06E (Qty) Ckt A	(1) 275, (2) 299	(1) 275, (2) 299	(1) 275, (3) 299
(Qty) Ckt B	(1) 275, (2) 299	(1) 275, (3) 299	(1) 275, (3) 299
Oil Charge (Compressor/pt)	265/19.0, 275/19.0, 299/19.0		
No. Capacity Control Steps	6	7	8
Capacity (%)			
Ckt A	50	57	50
Ckt B	50	43	50
Minimum Capacity Step (%)	17	14	13
CONDENSER FANS	Propeller, Direct Drive		
Fan Speed (rpm)	950		
No. Blades…Dia.(in.)	6…30		
No. Fans…Hp/kW (each)	12…2.5/1.85		
Total Airflow (cfm)	120,000		
CONDENSER COILS	1/2-in. OD Vertical and Horizontal, Plate Fin, Enhanced Copper Tubing		
Fins/in.	13.5	13.5	13.5
No. Rows (Ckt A or B)	4	4	4
Face Area, Ckt A and B Total (sq ft)	121.0	121.0	121.0
Max Working Pressure Refrigerant (psig)	450		
COOLER	One…Direct Expansion, Shell and Tube		
No. Refrigerant Circuits	2	2	2
Net Water Volume, includes nozzles (gal.)	60.2	60.2	60.2
Max Working Pressure Refrigerant Side (psig)	235	235	235
Max Working Pressure Fluid Side (psig)	250	250	250
FLUID CONNECTIONS (in.)	Flat Face Flange		
Inlet and Outlet	6	6	6
Drain (NPT)	3/4		

LEGEND

Cu-Al – Copper Tubing, Aluminium Fins Condenser Coil
Cu-Cu – Copper Tubing, Copper Fins Condenser Coil
OD – Outside Diameter

Physical Data – English (cont)

30GBN,GBR UNIT SIZE	300			350			400		
SYSTEM MODULES	**A**	**B**	**Total**	**A**	**B**	**Total**	**A**	**B**	**Total**
APPROX OPERATING WEIGHT (lb)									
Cu-Al	14,100	14,100	28,200	14,600	14,600	29,200	15,100	15,100	30,200
Cu-Cu	15,030	15,030	30,060	15,530	15,530	31,060	16,030	16,030	32,060
REFRIGERANT TYPE	R-22								
Charge (lb)									
Ckt A	230	230	-	230	230	-	230	230	-
Ckt B	230	230	-	230	230	-	230	230	-
COMPRESSORS	Reciprocating, Semi-Hermetic								
Speed (rpm)	1450								
06E (Qty) Ckt A	(1) 275, (2) 299	(1) 275, (2) 299	-	(1) 275, (2) 299	(1) 275, (2) 299	-	(1) 275, (3) 299	(1) 275, (3) 299	-
(Qty) Ckt B	(1) 275, (2) 299	(1) 275, (2) 299	-	(1) 275, (3) 299	(1) 275, (3) 299	-	(1) 275, (3) 299	(1) 275, (3) 299	-
Oil Charge (Compressor/pt)	265/19.0, 275/19.0, 299/19.0								
No. Capacity Control Steps	6	6	-	7	7	-	8	8	-
Capacity (%)									
Ckt A	50	50	-	57	57	-	50	50	-
Ckt B	50	50	-	43	43	-	50	50	-
Minimum Capacity Step (%)	17	17	-	14	14	-	13	13	-
CONDENSER FANS	Propeller, Direct Drive								
Fan Speed (rpm)	950	950	-	950	950	-	950	950	-
No. Blades…Dia.(in.)	6…30	6…30	-	6…30	6…30	-	6…30	6…30	-
No. Fans…Hp/kW (each)	12…2.5/1.85	12…2.5/1.85	24…2.5/1.85	12…2.5/1.85	12…2.5/1.85	24…2.5/1.85	12…2.5/1.85	12…2.5/1.85	24…2.5/1.85
Total Airflow (cfm)	120,000	120,000	240,000	120,000	120,000	240,000	120,000	120,000	240,000
CONDENSER COILS	1/2-in. OD Vertical and Horizontal, Plate Fin, Enhanced Copper Tubing								
Fins/in.	13.5	13.5	-	13.5	13.5	-	13.5	13.5	-
No. Rows (Ckt A or B)	4	4	-	4	4	-	4	4	-
Face Area, Ckt A and B Total (sq ft)	121.0	121.0	242.0	121.0	121.0	242.0	121.0	121.0	242.0
Max Working Pressure Refrigerant (psig)	450	450		450	450		450	450	
COOLER	One…Direct Expansion, Shell and Tube								
No. Refrigerant Circuits	2	2	4	2	2	4	2	2	4
Net Water Volume, includes nozzles (gal.)	60.2	60.2	120.4	60.2	60.2	120.4	60.2	60.2	120.4
Max Working Pressure Refrigerant Side (psig)	235	235	-	235	235	-	235	235	-
Max Working Pressure Fluid Side (psig)	150	150	-	150	150	-	150	150	-
FLUID CONNECTIONS (in.)	Flat Face Flange								
Inlet and Outlet	6	6	-	6	6	-	6	6	-
Drain (NPT)	3/4	3/4	-	3/4	3/4	-	3/4	3/4	-

LEGEND

Cu-Al – Copper Tubing, Aluminium Fins Condenser Coil
Cu-Cu – Copper Tubing, Copper Fins Condenser Coil
OD – Outside Diameter

Physical Data – SI

30GTN,GTR UNIT SIZE	050	060	070	080	090	100	110
APPROX OPERATING WEIGHT (kg)							
Cu-Al	1776	2168	2473	3055	3243	3960	4018
Cu-Cu	1972	2357	2758	3384	3573	4390	4450
REFRIGERANT TYPE	R-22						
Charge (kg)							
Ckt A	21.8	23.6	32.2	35.4	35.4	44.5	44.5
Ckt B	27.2	24.5	31.3	35.4	35.4	44.5	47.7
COMPRESSORS	Reciprocating, Semi-Hermetic						
Speed (r/s)	24.2						
06E (Qty) Ckt A	(1) 275	(1) 299	(1) 265, (1) 265	(1) 265, (1) 299	(1) 265, (1) 299	(1) 265, (1) 299	(2) 299
(Qty) Ckt B	(1) 299	(1) 299	(1) 299	(1) 299	(1) 265, (1) 275	(1) 265, (1) 299	(2) 299
Oil Charge (Compressor/L)	265/9.0, 275/9.0, 299/9.0						
No. Capacity Control Steps	4	4	4	4	8	8	8
Capacity (%)							
Ckt A	43.3	50.0	58.0	62.0	54.0	50.0	50.0
Ckt B	56.7	50.0	42.0	38.0	46.0	50.0	50.0
Minimum Capacity Step (%)	28.8	33.3	19.3	16.0	14.0	13.0	17.0
CONDENSER FANS	Propeller, Direct Drive						
Fan Speed (r/s)	15.8						
No. Blades…Dia.(mm)	6…762						
No. Fans…kW (each)	4…1.85	6…1.85	6…1.85	6…1.85	6…1.85	8…1.85	8..1.85
Total Airflow (L/s)	16,045	25,540	24,068	26,898	26,898	35,864	35,864
CONDENSER COILS	9.53 mm OD Vertical and Horizontal, Plate Fin, Enhanced Copper Tubing						
Fins/m.	669	669	669	669	669	669	669
No. Rows (Ckt A or B)	3	2	3	3	3	3	3
Face Area, Ckt A and B Total (sq m)	7.48	10.84	10.84	11.92	11.92	15.61	15.61
Max Working Pressure Refrigerant (kPa)	3103						
COOLER	One…Direct Expansion, Shell and Tube						
No. Refrigerant Circuits	2	2	2	2	2	2	2
Net Water Volume, includes nozzles (L)	51.1	68.1	68.1	92.7	92.7	114.7	114.7
Max Working Pressure Refrigerant Side (kPa)	1916	1916	1916	1916	1916	1916	1916
Max Working Pressure Fluid Side (kPa)	2068	2068	2068	2068	2068	2068	2068
FLUID CONNECTIONS (in.)	Flat Face Flange						
Inlet and Outlet	3	4	4	4	4	5	5
Drain (NPT)	3/4						

LEGEND

Cu-Al – Copper Tubing, Aluminium Fins Condenser Coil
Cu-Cu – Copper Tubing, Copper Fins Condenser Coil
OD – Outside Diameter

Physical Data – SI (cont)

30GBN,GBR UNIT SIZE	150	175	200
APPROX OPERATING WEIGHT (kg)			
Cu-Al	6396	6625	6850
Cu-Cu	6816	7045	7270
REFRIGERANT TYPE		R-22	
Charge (kg)			
Ckt A	104.3	104.3	104.3
Ckt B	104.3	104.3	104.3
COMPRESSORS		Reciprocating, Semi-Hermetic	
Speed (r/s)		24.2	
06E (Qty) Ckt A	(1) 275, (2) 299	(1) 275, (2) 299	(1) 275, (3) 299
(Qty) Ckt B	(1) 275, (2) 299	(1) 275, (3) 299	(1) 275, (3) 299
Oil Charge (Compressor/L)		265/9.0, 275/9.0, 299/9.0	
No. Capacity Control Steps	6	7	8
Capacity (%)			
Ckt A	50	57	50
Ckt B	50	43	50
Minimum Capacity Step (%)	17	14	13
CONDENSER FANS		Propeller, Direct Drive	
Fan Speed (r/s)		15.8	
No. Blades…Dia.(mm)		6…762	
No. Fans…kW (each)		12…1.85	
Total Airflow (L/s)		56,628	
CONDENSER COILS		12.7 mm OD Vertical and Horizontal, Plate Fin, Enhanced Copper Tubing	
Fins/m	531	531	531
No. Rows (Ckt A or B)	4	4	4
Face Area, Ckt A and B Total (sq m)	11.24	11.24	11.24
Max Working Pressure Refrigerant (kPa)		3103	
COOLER		One…Direct Expansion, Shell and Tube	
No. Refrigerant Circuits	2	2	2
Net Water Volume, includes nozzles (L)	227.9	227.9	227.9
Max Working Pressure Refrigerant Side (kPa)	1620	1620	1620
Max Working Pressure Fluid Side (kPa)	1034	1034	1034
FLUID CONNECTIONS (in.)		Flat Face Flange	
Inlet and Outlet	6	6	6
Drain (NPT)		3/4	

LEGEND

Cu-Al – Copper Tubing, Aluminium Fins Condenser Coil
Cu-Cu – Copper Tubing, Copper Fins Condenser Coil
OD – Outside Diameter

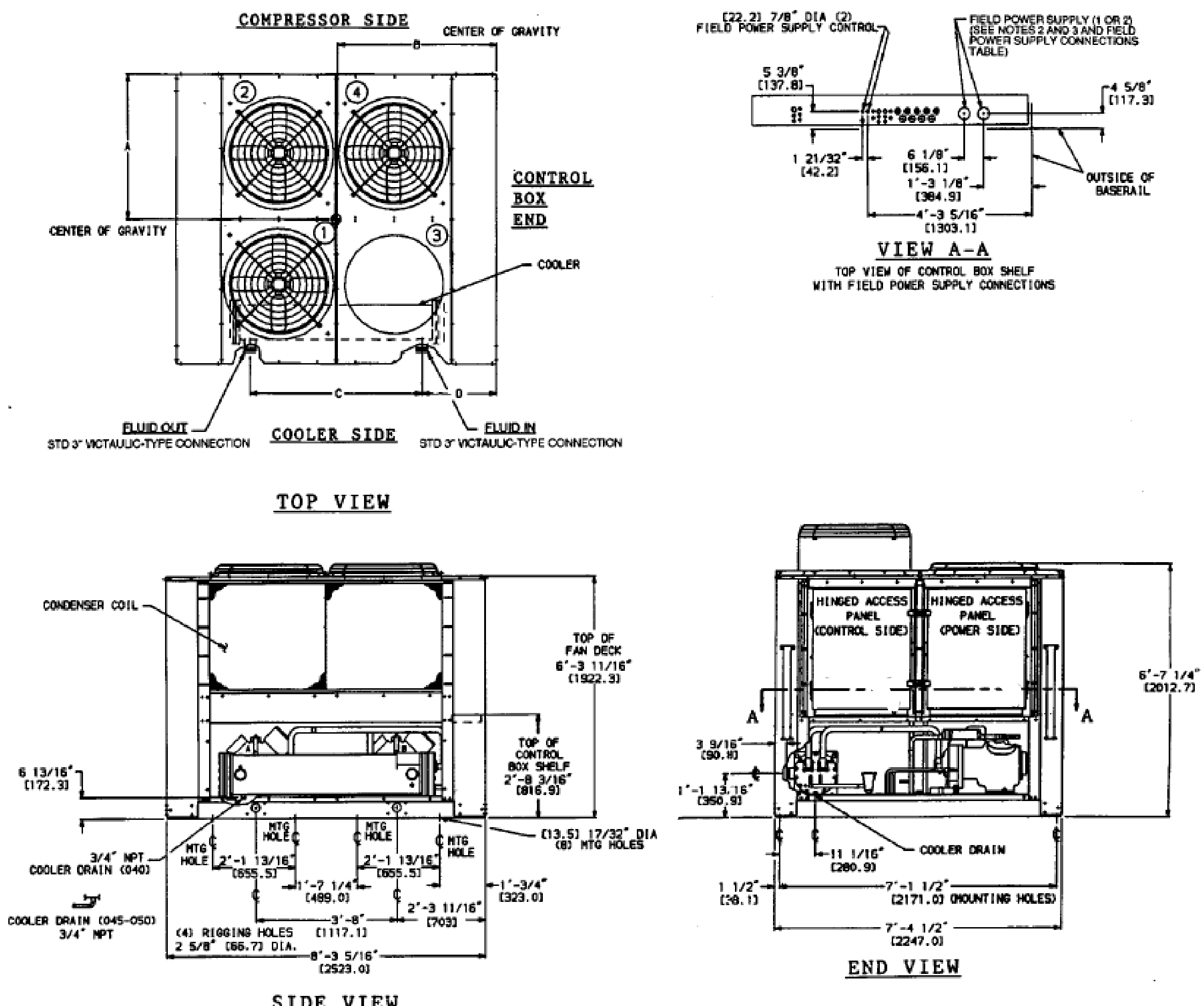
Physical Data – SI (cont)

30GBN,GBR UNIT SIZE	300			350			400		
SYSTEM MODULES	**A**	**B**	**Total**	**A**	**B**	**Total**	**A**	**B**	**Total**
APPROX OPERATING WEIGHT (kg)									
Cu-Al	6396	6396	12792	6625	6625	13250	6850	6850	13700
Cu-Cu	6816	6816	13632	7045	7045	14090	7270	7270	14540
REFRIGERANT TYPE	R-22								
Charge (kg)									
Ckt A	104.3	104.3	-	104.3	104.3	-	104.3	104.3	-
Ckt B	104.3	104.3	-	104.3	104.3	-	104.3	104.3	-
COMPRESSORS	Reciprocating, Semi-Hermetic								
Speed (r/s)	24.2								
06E (Qty) Ckt A	(1) 275, (2) 299	(1) 275, (2) 299	-	(1) 275, (3) 299	(1) 275, (2) 299	-	(1) 275, (3) 299	(1) 275, (3) 299	-
(Qty) Ckt B	(1) 275, (2) 299	(1) 275, (2) 299	-	(1) 275, (2) 299	(1) 275, (3) 299	-	(1) 275, (3) 299	(1) 275, (3) 299	-
Oil Charge (Compressor/L)	265/9.0, 275/9.0, 299/9.0								
No. Capacity Control Steps	6	6	-	7	7	-	8	8	-
Capacity (%)									
Ckt A	50	50	-	57	57	-	50	50	-
Ckt B	50	50	-	43	43	-	50	50	-
Minimum Capacity Step (%)	17	17	-	14	14	-	13	13	-
CONDENSER FANS	Propeller, Direct Drive								
Fan Speed (r/s)	15.8	15.8	-	15.8	15.8	-	15.8	15.8	-
No. Blades…Dia.(mm)	6…762	6…762	-	6…762	6…762	-	6…762	6…762	-
No. Fans…kW (each)	12…1.85	12…1.85	24…1.85	12…1.85	12…1.85	24…1.85	12…1.85	12…1.85	24…1.85
Total Airflow (L/s)	56,628	56,628	113,256	56,628	56,628	113,256	56,628	56,628	113,256
CONDENSER COILS	12.7 mm OD Vertical and Horizontal, Plate Fin, Enhanced Copper Tubing								
Fins/m	531	531	-	531	531	-	531	531	-
No. Rows (Ckt A or B)	4	4	-	4	4	-	4	4	-
Face Area, Ckt A and B Total (sq m)	11.24	11.24	22.48	11.24	11.24	22.48	11.24	11.24	22.48
Max Working Pressure Refrigerant (kPa)	3103	3103		3103	3103		3103	3103	
COOLER	One…Direct Expansion, Shell and Tube								
No. Refrigerant Circuits	2	2	4	2	2	4	2	2	4
Net Water Volume, includes nozzles (L.)	227.9	227.9	455.8	227.9	227.9	455.8	227.9	227.9	455.8
Max Working Pressure Refrigerant Side (kPa)	1620	1620	-	1620	1620	-	1620	1620	-
Max Working Pressure Fluid Side (kPa)	1034	1034	-	1034	1034	-	1034	1034	-
FLUID CONNECTIONS (in.)	Flat Face Flange								
Inlet and Outlet	6	6	-	6	6	-	6	6	-
Drain (NPT)	3/4	3/4	-	3/4	3/4	-	3/4	3/4	-

LEGEND

Cu-Al – Copper Tubing, Aluminium Fins Condenser Coil
Cu-Cu – Copper Tubing, Copper Fins Condenser Coil
OD – Outside Diameter

Base unit dimensions — 30GTN,GTR050



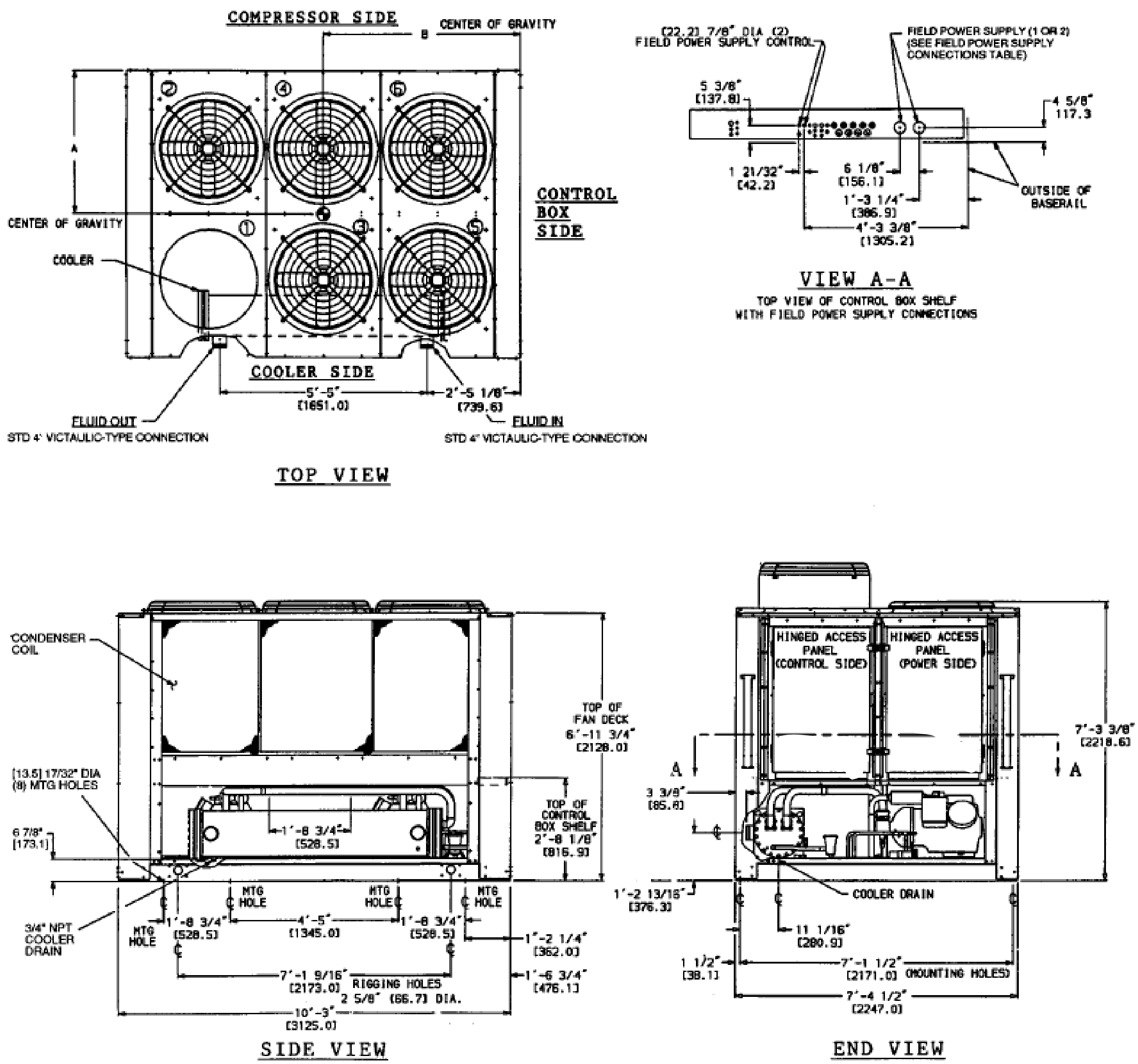
LEGEND

C — Copper Fins, Copper Tubing
Mtg — Mounting

NOTES:
1. Unit must have clearances for airflow as follows:
   TOP – Do not restrict in any way.
   ENDS – [1524] 5 ft
   SIDES – [1829] 6 ft
2. Mounting holes may be used to mount unit to concrete pad. They are not recommended for spring isolator location.
3. If spring isolators are used, a perimeter support channel between the unit and isolators is recommended.
4. Dimensions in [ ] are millimeters.

UNIT 30GTN,GTR	DIMENSIONS "A"	"B"	"C"	"D"
050	3'-5 7/8" [1064]	3'-11" [1194]	5'-5 ½" [1663]	1'-5 3/16" [436.6]
050C	3'-6" [1067]	3'-11 3/16" [1199]	5'-5 ½" [1663]	1'-5 3/16" [436.6]

Base unit dimensions — 30GTN,GTR060,070



LEGEND

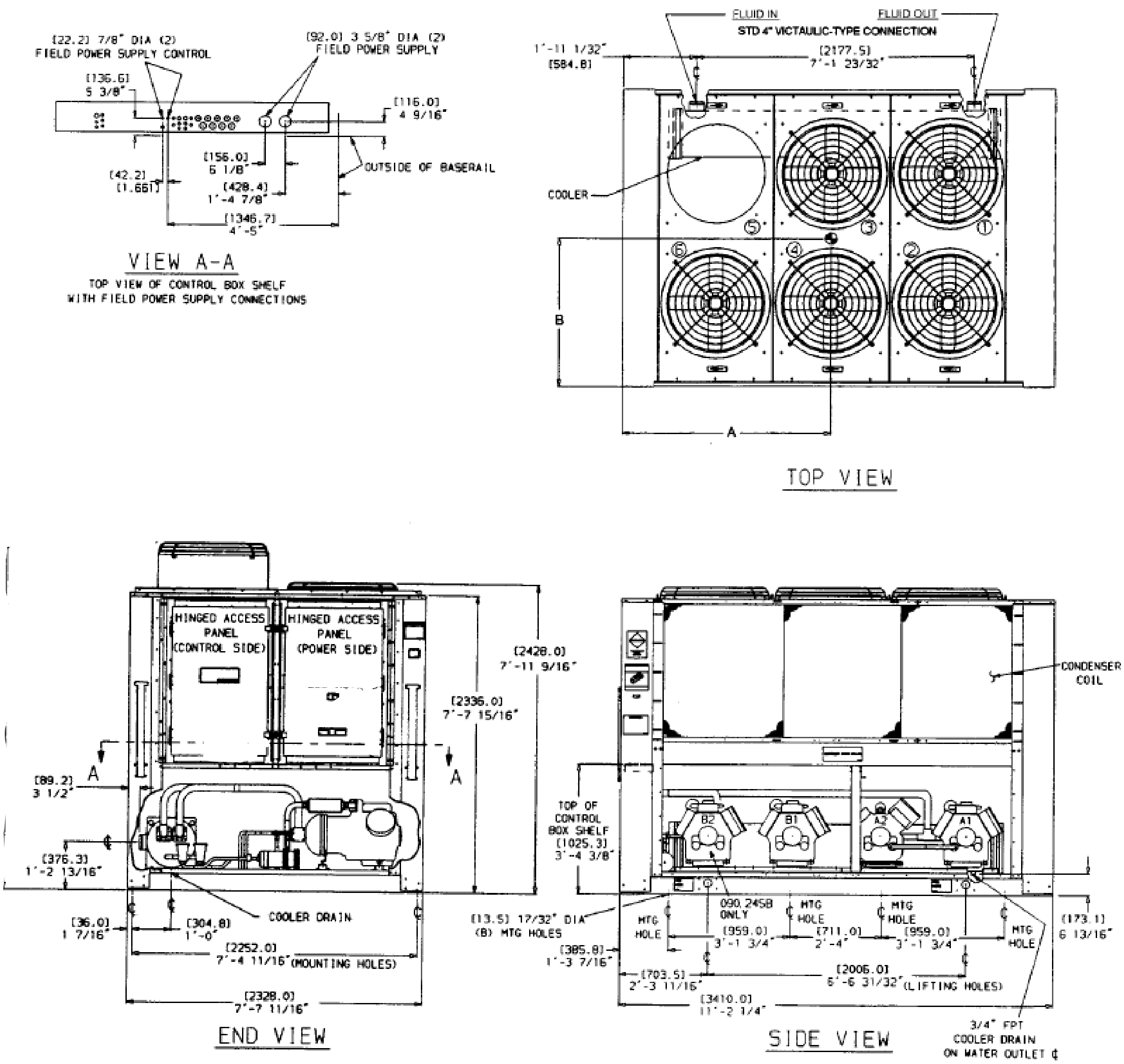
C — Copper Fins, Copper Tubing
Mtg — Mounting

NOTES

1. Unit must have clearances for airflow as follows:
   TOP – Do not restrict in any way.
   ENDS – [1524] 5 ft
   SIDES – [1829] 6 ft
2. Mounting holes may be used to mount unit to concrete pad. They are not recommended for spring isolator location.
3. If spring isolators are used, a perimeter support channel between the unit and isolators is recommended.
4. Dimensions in [ ] are millimeters.

UNIT	DIMENSIONS	
30GTN,GTR	"A"	"B"
060	3'-6 7/8" [1090]	4'-10 5/16" [1481]
060C	3'-7" [1092]	4'-10 9/16" [1488]
070	3'-6" [1067]	4'-10 ½" [1486]
070C	3'-6 3/16" [1072]	4'-10 7/8" [1496]

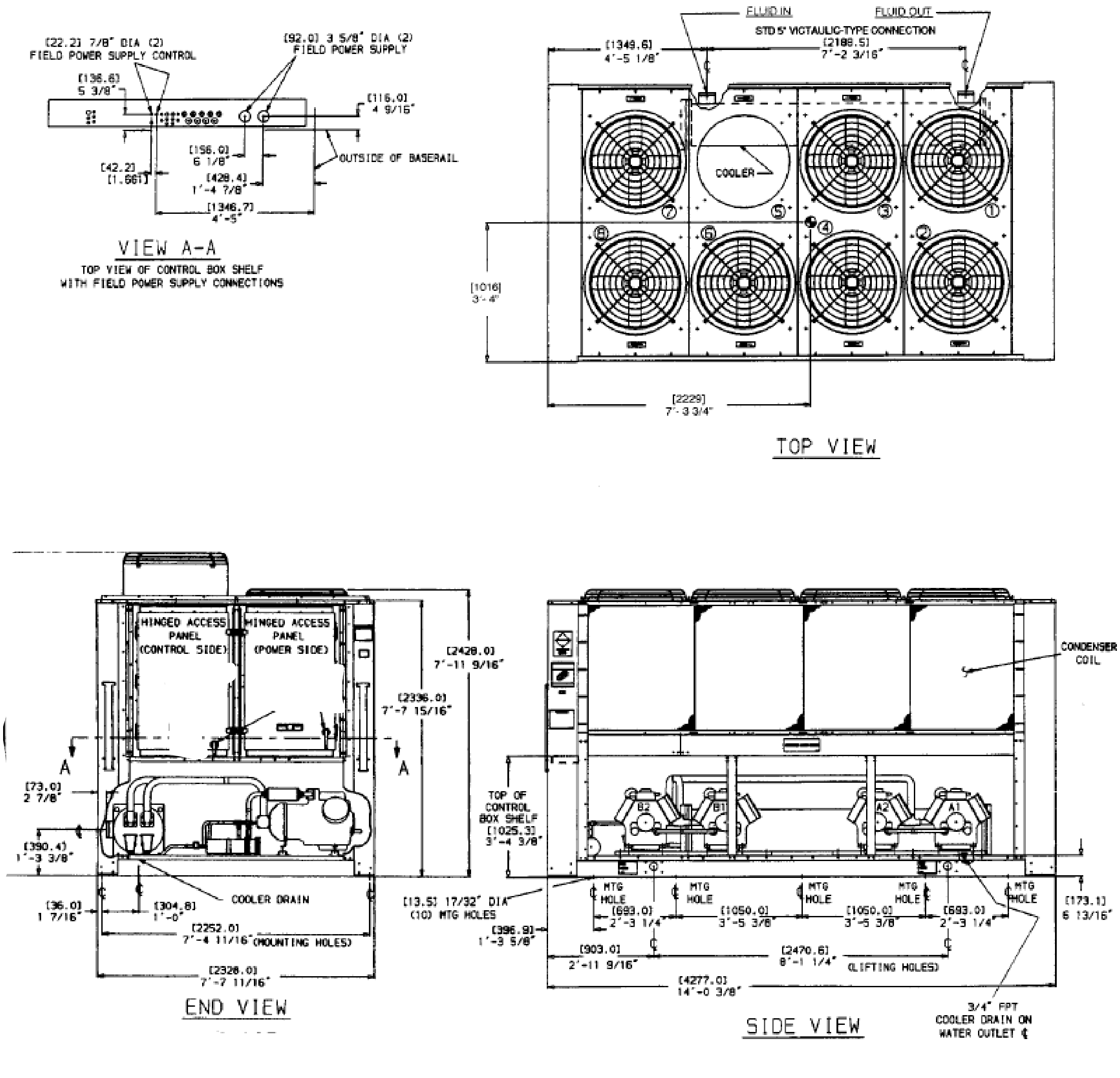
Base unit dimensions — 30GTN,GTR080,090



NOTES:
1. Unit must have clearances for airflow as follows:
   TOP – Do not restrict in any way.
   ENDS – [1524] 5 ft
   SIDES – [1829] 6 ft
2. Mounting holes may be used to mount unit to concrete pad. They are not recommended for spring isolator location.
3. If spring isolators are used, a perimeter support channel between the unit and isolators is recommended.
4. Dimensions in [ ] are millimeters.

UNIT 30GTN,GTR	DIMENSIONS "A"	DIMENSIONS "B"
080	5'-9 5/8" [1769]	3'-6" [1067]
090	5'-7 5/16" [1710]	3'-2 3/4" [984]

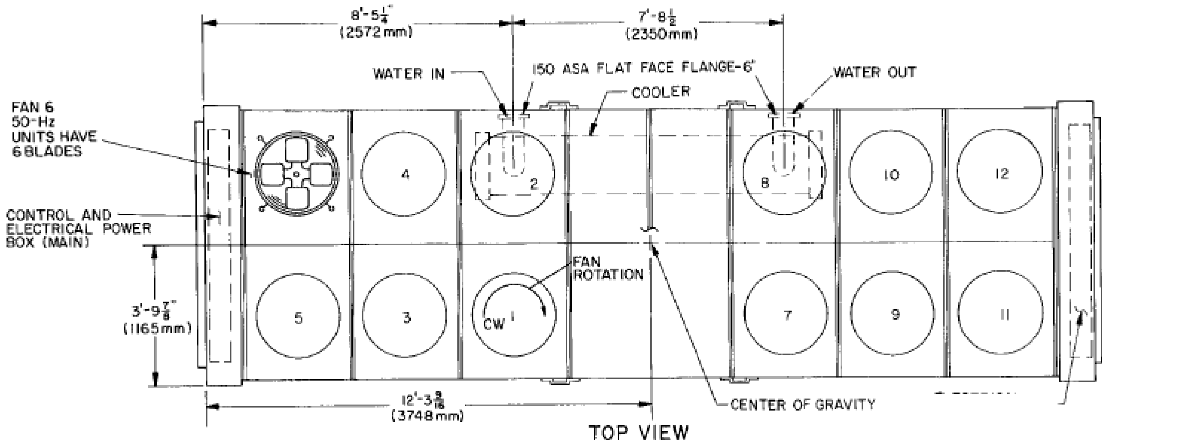
Base unit dimensions — 30GTN,GTR100,110

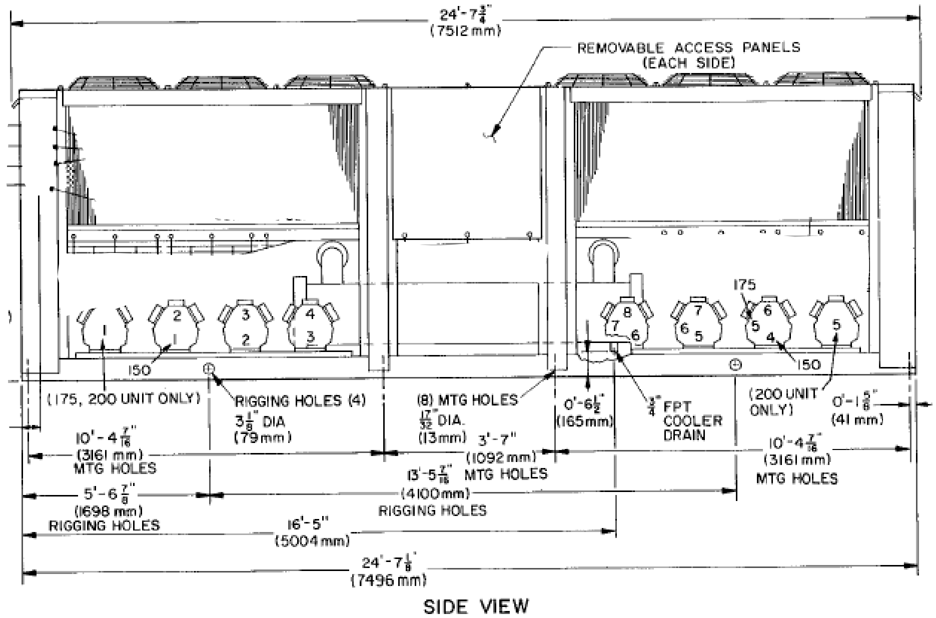


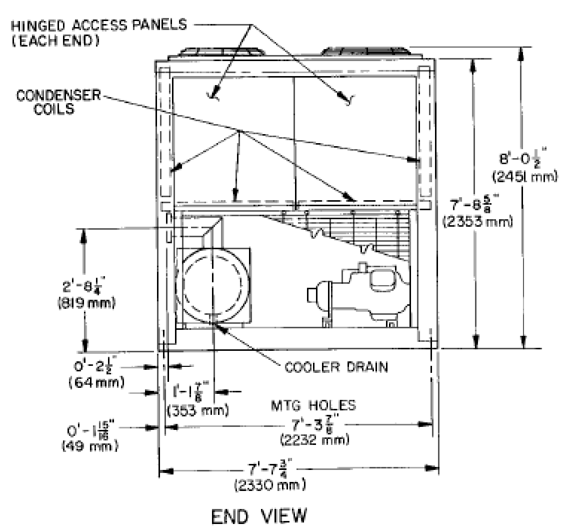
NOTES:

1. Unit must have clearances for airflow as follows:
   TOP – Do not restrict in any way.
   ENDS – [1524] 5 ft
   SIDES – [1829] 6 ft
2. Mounting holes may be used to mount unit to concrete pad. They are not recommended for spring isolator location.
3. If spring isolators are used, a perimeter support channel between the unit and isolators is recommended.
4. Dimensions in [ ] are millimeters.

Base unit dimensions — 30GBN,GBR150-200, 300A/B-400A/B



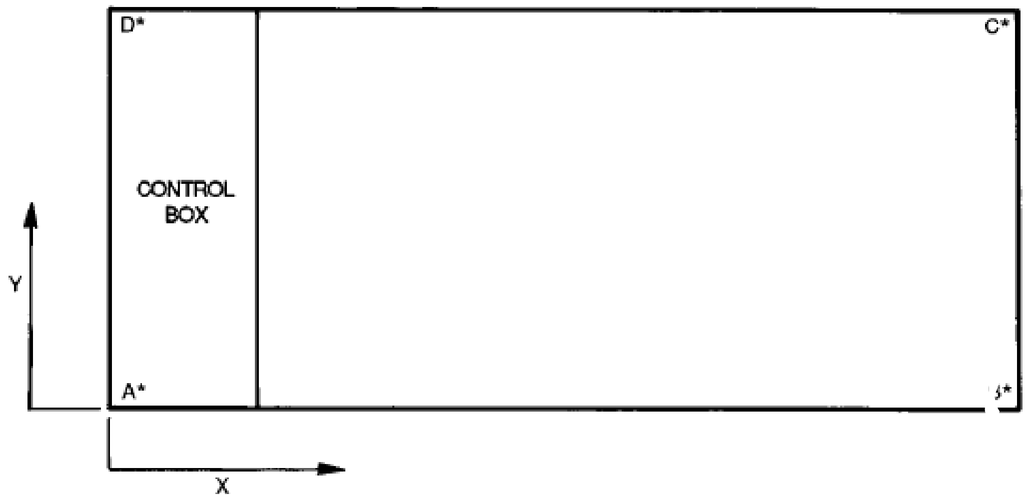




NOTES:

1. The approximate operating weight of the unit is:
   30GB150 — 14,100 lbs (6396 kg);
   30GB175 — 14,600 lbs (6621 kg),
   30GB200 — 15,100 lbs (6847 kg).
2. Unit must have clearances as follows
   Top — Do not restrict in any way,
   Ends — 5'-0" (1524 mm);
   Sides — 6'-0" (1829 mm)

Base unit dimensions — mounting weights (approximate)



UNIT SIZE 30GTN,GTR	CONDENSER COIL	lb				kg			
		A	B	C	D	A	B	C	D
050	C-AL	1074	968	889	986	487	439	403	447
	C-C	1182	1076	997	1095	536	488	452	496
060	C-AL	1269	1151	123	1238	575	522	509	561
	C-C	1373	1255	1227	1342	623	569	556	609
070	C-AL	1508	1369	1226	1350	684	621	556	612
	C-C	1664	1526	1383	1508	755	692	627	684
080	C-AL	1650	1730	1680	1660	750	786	764	755
	C-C	1830	1910	1863	1842	832	868	847	837
090	C-AL	1833	1864	1724	1714	833	847	784	779
	C-C	2014	2040	1907	1899	915	927	867	863
100	C-AL	2222	2222	2133	2133	1010	1010	970	970
	C-C	2460	2460	2370	2370	1118	1118	1077	1077
110	C-AL	2271	2271	2149	2149	1032	1032	976	976
	C-C	2508	2508	2387	2387	1140	1140	1085	1085

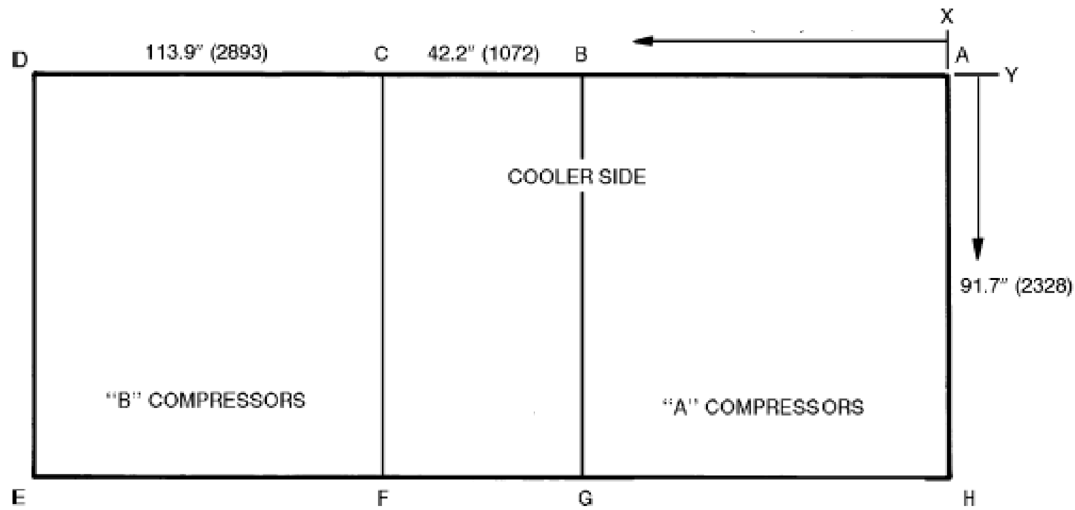
LEGEND
C-AL – Copper Tubing, Aluminium Fins
C-C – Copper Tubing, Copper Fins

NOTE: If spring isolators are used, a perimeter support channel between the unit and the isolators is recommended.

RIGGING CENTER OF GRAVITY

UNIT SIZE 30GTN,GTR	050		060		070		080		090		100,110	
	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
X Dimension	47.0	1194	58.3	1481	58.5	1486	69.6	1769	67.3	1710	87.8	2229
Y Dimension	41.9	1064	42.9	1090	42.0	1067	42.0	1067	38.8	984	40.0	1016

Base unit dimensions —
mounting weights (approximate) (cont)



UNIT SIZE 30GBN,GBR	CONDENSER COIL	lb							
		A	B	C	D	E	F	G	H
150, 300A/B	C-AL	1261	2230	2230	1261	1353	2200	2200	1353
	C-C	1377	2338	2338	1377	1467	2314	2314	1467
175, 350A/B	C-AL	1261	2230	2250	1350	1675	2275	2200	1353
	C-C	1377	2338	2360	1467	1788	2380	2314	1467
200, 400A/B	C-AL	1350	2250	2250	1350	1675	2275	2275	1675
	C-C	1467	2360	2360	1467	1788	2380	2380	1788

UNIT SIZE 30GBN,GBR	CONDENSER COIL	kg							
		A	B	C	D	E	F	G	H
150, 300A/B	C-AL	573	1014	1014	573	615	1000	1000	615
	C-C	626	1063	1063	626	667	1052	1053	667
175, 350A/B	C-AL	573	1014	1023	614	761	1034	1000	615
	C-C	626	1063	1073	667	813	1082	1053	667
200, 400A/B	C-AL	614	1023	1023	614	761	1034	1034	761
	C-C	667	1073	1073	667	813	1082	1083	813

LEGEND
C-AL – Copper Tubing, Aluminium Fins
C-C – Copper Tubing, Copper Fins

NOTE: If spring isolators are used, a perimeter support channel between the unit and the isolators is recommended.

Application data

Leveling unit

Unit must be level within 1/8-in. per ft when installed to ensure proper oil return to the compressors.

While most outdoor locations are suitable for 30GTN,GTR, GBN,GBR units, the roof is a common site that presents a problem if roof has been pitched to aid in water removal. To assure proper oil return, be sure that unit is level, particularly in its major lengthwise dimension, as compressor oil return piping runs in that direction.

It should be determined prior to installation if any special treatment is required to assure a level installation.

Cooler fluid temperature

1. *Maximum* leaving chilled fluid temperature (LCWT) for unit is 70 F (21 C). Unit can start and pull down with up to 95 F (35 C) entering-fluid temperature due to MOP (maximum operating pressure) feature of the TXV. For sustained operation, it is recommended that entering-fluid temperature not exceed 85 F (29.4 C).
2. *Minimum* LCWT for standard unit is 40 F (3.3 C). It is permissible to use a standard microprocessor-controlled *Comfort*Link™ chiller with leaving-fluid temperatures in the range of 34 to 39.9 F (1° to 3.28 C) only if a protective brine solution (20% antifreeze solution, or greater) is used. (See Controls and Troubleshooting literature for further information.)

Medium temperature brine application

Application of chiller for brine duty within the 39.9 to 15 F (3.3 to –9.4 C) range is possible by ordering the proper factory-installed brine option. For ratings below 38° F (3.3 C) LCWT, contact your local Carrier representative.

Leaving-fluid temperature reset

Reset reduces compressor power usage at part load when design LCWT is not necessary. Humidity control should be considered since higher coil temperatures resulting from reset will reduce latent heat capacity. Three reset options are offered, based on the following:

Return-fluid temperature — Increases LCWT temperature set point as return (or entering) fluid temperature decreases (indicating load decrease). Option may be used in any application where return fluid provides accurate load indication. Limitation of return fluid reset is that LCWT may only be reset to value of design return fluid temperature.

Outdoor-air temperature — Increases LCWT as outdoor ambient temperature decreases (indicating load decrease). This reset should be applied only where outdoor ambient temperature is an accurate indication of load. An accessory thermistor is required.

Space temperature — Increases LCWT as space temperature decreases (indicating load decrease). This reset should be applied only where space temperature is an accurate indication of load. An accessory thermistor is required.

For details on applying a reset option, refer to unit Controls and Troubleshooting literature. Obtain ordering part numbers for reset option from current price pages or contact your local Carrier representative.

Cooler flow range

Ratings and performance data in this publication are for a cooling temperature rise of 10° F (6° C), and are suitable for a range from 5 to 20 F (2.8 to 11.1 C) temperature rise without adjustment. The *Comfort*Link chillers may be operated using a different temperature range, provided flow limits are not exceeded. For minimum flow rates, see Minimum Cooler Fluid Flow Rates and Minimum Loop Volume table. High flow rate is limited by pressure drop that can be tolerated. If another temperature range is used, apply LCWT correction as given in Selection Procedure example on page 53.

MINIMUM COOLER FLUID FLOW RATES AND MINIMUM LOOP VOLUME

UNIT SIZE 30GTN,GTR,GBN,GBR	MINIMUM COOLER FLOW RATE		MINIMUM LOOP VOLUME	
	Gpm	L/s	Gal	L
050	37.7	2.38	153	580
060	47.5	3.00	181	684
070	47.5	3.00	210	796
080	66.7	4.20	243	920
090	59.5	3.75	272	1029
100	84.1	5.30	301	1138
110	81.1	5.30	333	1260
150, 300A/B	192.0	6.90	502	1900
175, 350A/B	192.0	6.90	568	2150
200, 400A/B	192.0	6.90	635	2403

NOTES:
1. Minimum flow based on 1.0 fps (0.30 m/s) velocity in cooler without special cooler baffling.
2. Minimum Loop Volumes:
   Gallons = V x ARI Cap. in tons
   Liters = N x ARI Cap. in kW

APPLICATION	V	N
Normal Air Conditioning	3	3.25
Process Type Cooling	6 to 10	6.5 to 10.8
Low Ambient Unit Operation	6 to 10	6.5 to 10.8

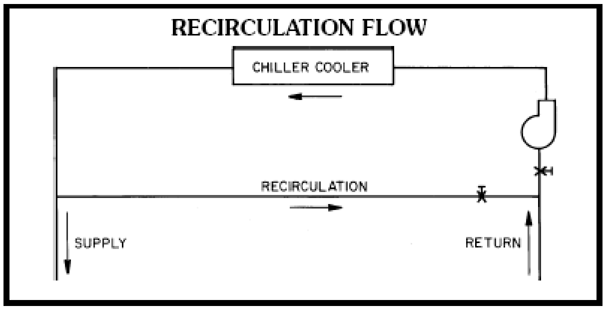
Minimum cooler flow (maximum cooler temperature rise) — The minimum cooler flow for standard units is shown in Minimum Cooler Fluid Flow Rates and Minimum Loop Volume tables. When gpm (L/s) required is lower (or rise higher), follow recommendations below:

a. Multiple smaller chillers may be applied in series, each providing a portion of the design temperature rise.

b. Cooler fluid may be recirculated to raise flow rate. However, mixed temperature entering cooler must be maintained a minimum of at least 5° F (2.8° C) above the LCWT.

c. Special cooler baffling is required to allow minimum flow rate to be reduced.

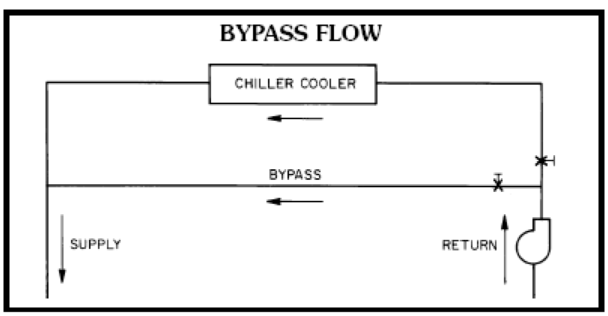
NOTE: Recirculation flow is shown below.



Maximum cooler flow — The maximum cooler flow (> 5 gpm/ton or < 5° F rise [> 0.09 L/s .kW or < 2.7° C rise]) results in practical maximum pressure drop through cooler.

1. Return fluid may bypass the cooler to keep pressure drop through cooler within acceptable limits. This permits a higher .T with lower fluid flow through cooler and mixing after the cooler.
2. Special cooler baffling to permit a cooler flow rate increase of 10% is available by special order.

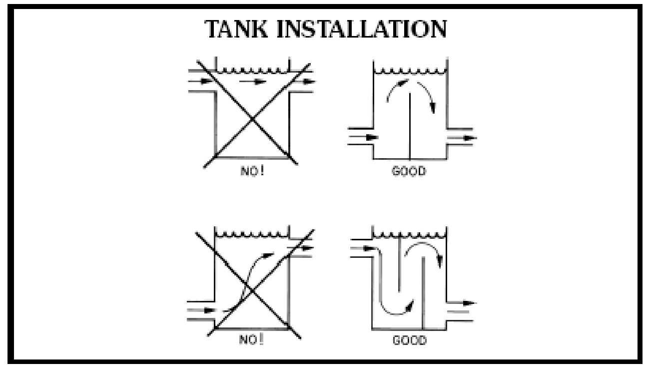
NOTE: Bypass flow is shown below.



Variable cooler flow rates — Variable rates may be applied to standard chiller. Unit will, however, attempt to maintain a constant leaving chilled fluid temperature. In such cases, minimum flow must be in excess of minimum flow given in Minimum Cooler Fluid Flow Rates and Minimum Loop Volume table, and flow rate must change in steps of less than 10% per minute. Apply 6 gal. per ton (6.5 L per kW) water loop volume minimum if flow rate changes more rapidly.

Fluid loop volume — The volume in circulation must equal or exceed 3 gal. per nominal ton (3.25 L per kW) of cooling for temperature stability and accuracy in normal air-conditioning applications. (For example, a 30GBN200 would require 635 gal. [2403 L].) In process cooling applications, or for operation at ambient temperature below 32 F (0° C) with low loading conditions, there should be from 6 to 10 gal. per ton (6.5 to 10.8 L per kW). To achieve this volume, it is often necessary to install a tank in the loop. Tank should be baffled to ensure there is no stratification and that water (or brine) entering tank is adequately mixed with liquid in the tank.

NOTE: Tank installation is shown below.



Cooler fouling factor — The fouling factor used to calculate tabulated ratings was .00010 ft^2 • hr • °F/Btu (.000018 m^2 • °C/W). As fouling factor is increased, unit capacity decreases and compressor power increases. Standard ratings should be corrected using following multipliers:

FOULING FACTOR		CAPACITY MULTIPLIER	COMPRESSOR POWER MULTIPLIER
English (ft^2.hr.°F/Btu)	SI (m^2.°C/W)		
.00025	.000044	0.991	0.995
.00050	.000088	0.977	0.987
.00075	.000132	0.955	0.979
.00175	.000308	0.910	0.952

Cooler protection — Protection against low ambient freeze-up is required for unit operation in areas that experience temperatures below 32 F (0° C). Protection should be in the form of inhibited ethylene glycol or other suitable brine.

Even though unit cooler is equipped with insulation and an electric heater that helps prevent freeze-up, it does not protect fluid piping external to unit or if there is a power failure. Use only antifreeze solutions approved for heat exchanger duty. Use of automotive-type antifreezes is not recommended because of the fouling that can occur once their relatively short-lived inhibitor breaks down.

Draining cooler and outdoor piping is recommended if system is not to be used during freezing weather conditions. See Low Ambient Temperature Operation section page 46.

Application data (cont)

Condenser

Altitude correction factors — Correction factors must be applied to standard ratings at altitudes above 2000 ft (610 m) using the following multipliers:

ALTITUDE CAPACITY		CAPACITY MULTIPLIER	COMPRESSOR POWER MULTIPLIER
ft	m		
0	0	1.00	1.00
2000	610	0.99	1.01
4000	1220	0.98	1.02
6000	1830	0.97	1.03
8000	2440	0.96	1.04
10000	3050	0.95	1.05

Condenser airflow — Airflow restrictions on units with standard fans will affect the unit capacity, condenser head pressure, and compressor power input. Correction factors to be applied for external static restrictions up to 0.2 in. wg (50 Pa) are as follows:

EXTERNAL STATIC		CAPACITY MULTIPLIER	COMPRESSOR POWER MULTIPLIER
in. wg	Pa		
0.0	0.0	1.000	1.00
0.1	25	0.986	1.01
0.2	50	0.968	1.03

High ambient temperature

High outdoor ambient chiller start-up and operation (fully loaded) is possible for standard 30GTN,GBN chillers at ambient temperatures up to 125 F (52 C) at nominal voltage. In some cases, where return water temperature is expected to exceed 60 F (15.5 C), an accessory kit may be required.

Low ambient temperature operation

With certain field provisions as described below, units will start and operate down to 0° F (–18 C).

NOTE: Minimum load on chiller must be above minimum step of unloading.

Antifreeze solution — Inhibited ethylene glycol or other suitable corrosion-resistant anti-freeze solution must be field supplied and installed in all units for unit operation below 32 F (0° C). Solution must be added to fluid loop to protect loop down to 15° F (8° C) below minimum operating ambient temperature. Concentration should be based on expected minimum temperature and either "Burst" or "Freeze" protection levels.

Provide sufficient volume in the chilled fluid loop — At least 6 gal per ton (6.5 L per kW) of refrigeration is the recommended minimum for a moderate system load.

Freeze versus burst protection — If chiller operation is not required during winter/off season, lower glycol concentrations based on "burst" protection criteria may be considered. Often use of burst protection results in lower fluid costs and has less impact on chiller cooler capacity and flow rate. Consult glycol fluid manufacturers for burst protection recommendations and fluid specifications.

Capacity correction (antifreeze)

Inhibited ethylene glycol (or other suitable brine) should be used in installations where subfreezing temperatures are expected. Unit performance data must be corrected for the addition of inhibited ethylene glycol as shown in following example. Correction factors can be derived from curves in the Inhibited Ethylene Glycol Performance chart at right. Additional performance information on this and other fluids is available in Carrier's Electronic Catalog (E-CAT) software program. "Slush" and "Burst" concentration may also be considered for winter shutdown protection and unit operation is not required.

Example: English — Where a 5 F outdoor temperature is anticipated, determine concentration of inhibited ethylene glycol to protect system to –10 F ambient temperature at zero flow.

Enter the solution crystallization point curve (at right) at –10 F; read that 40% concentration of inhibited ethylene glycol is required to prevent crystals from forming in solution.

Consider the 30GTN110 unit from the Selection Procedure example on page 53 (refer to correction curves at 40% solution).

Correct unit capacity — On the capacity correction curve in chart on page 47, read 0.95.

Corrected capacity = 0.95 x determined capacity
= 0.95 x 112.6
= 107.0 tons

Correct cooler water flow — On the cooler flow correction curve on page 47, read 1.15.

Chilled water flow (at corrected capacity)

$$= \frac{24 \text{ x corrected cap. in tons}}{\text{temperature rise F}} = \text{U.S. gpm}$$

$$= \frac{24 \text{ x } 107.0}{14°} = 183.4 \text{ U.S. gpm}$$

Chilled water flow (40% solution) = 1.15 x 183.4
= 210.9 U.S. gpm

Correct cooler pressure drop — On cooler pressure drop correction curve on page 47, read 1.33.

On cooler pressure drop curve on page 49, for 210.9 gpm, read pressure drop = 8.1 ft water gage. The pressure drop for 40% solution = 1.33 x 8.1 = 10.8 ft water.

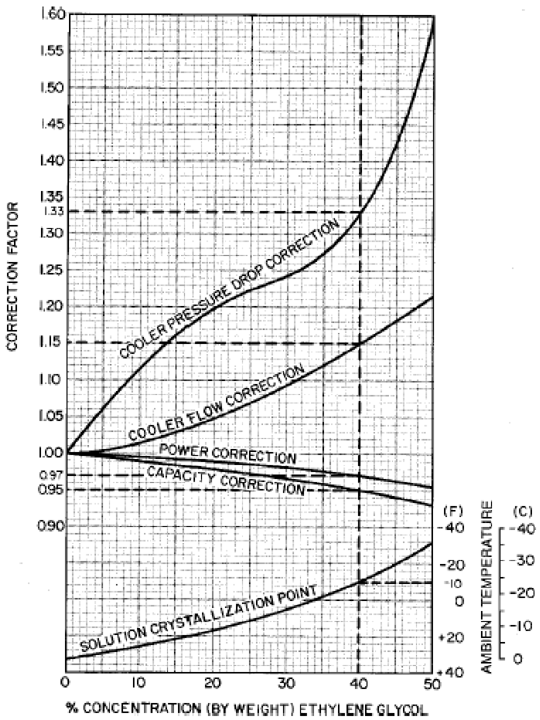
Correct compressor power input (kW) — On power correction curve below, read 0.97 correction factor at 40% ethylene glycol concentration.

Power input from Selection Procedure example = 126.1 kW.

Corrected power input = 0.97 x 126.1 = 122.3 kW

INHIBITED ETHYLENE GLYCOL PERFORMANCE CORRECTION FACTORS AND SOLUTION CRYSTALLIZATION POINTS

Correction factors apply to published chilled water performance ratings from 40 to 60 F (4.4 to 15.6 C) LCWT



Example: SI — Determine concentration of inhibited ethylene glycol to protect the system to –23 C ambient temperature at zero flow.

Enter the solution crystallization point curve above, at –23 C, read 40% concentration inhibited ethylene glycol is required to prevent crystals from forming in solution.

Consider 30GTN110 unit selected from the Selection Procedure example (refer to correction curves at 40% solution).

Correct unit capacity — On glycol performance capacity correction curve above, read 0.95.

Corrected capacity = 0.95 x determined capacity
= 0.95 x 379.7
= 360.7 kW

Correct chilled water flow — On cooler flow correction
curve above, read 1.15.

Chilled water flow (at corrected capacity)

$$= \frac{0.239 \times \text{corr. cap. in kW}}{\text{temperature rise C}} = \text{L/s}$$

$$= \frac{0.239 \times 360.7}{7.8°} = 11.1 \text{ L/s}$$

Chilled water flow (40% solution) = 1.15 x 11.1
= 12.8 L/s

Correct cooler pressure drop — On cooler pressure drop correction curve on this page, read 1.33.

On cooler pressure drop curve on page 49, for 12.8 L/s, read pressure drop of 24 kPa. The pressure drop for 40% solution = 1.33 x 24 = 31.92 kPa.

Correct compressor power input (kW) — On the power correction curve on this page, read 0.97 correction factor at 40% ethylene glycol concentration.

Power input from Selection Procedure example
= 123.2 kW.

Corrected power input = 0.97 x 123.2 = 119.5 kW.

Oversizing chillers

Oversizing chillers by more than 15% at design conditions must be avoided as the system operating efficiency is adversely affected (resulting in greater or excessive electrical demand). When future expansion of equipment is anticipated, install a single chiller to meet present load requirements and add a second chiller to meet the additional load demand.

It is also recommended that 2 smaller chillers be installed where operation at minimum load is critical. The operation of a smaller chiller loaded to a greater percentage over minimum is preferred to operating a single chiller at or near its minimum recommended value.

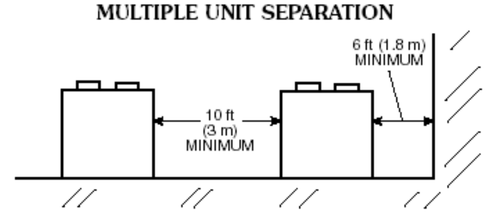
Hot gas bypass should not be used as a means to allow oversizing chillers. Hot gas bypass should be given consideration where substantial operating time is anticipated below the minimum unloading step.

Multiple chillers

Where chiller capacities greater than 200 tons (703 kW) are required, or where stand-by capability is desired, chillers may be installed in *parallel*. Units should be of equal size to ensure balanced fluid flows. Where a large temperature drop (> 25° F [13.9° C]) is desired, chillers may be installed in *series*. Fluid temperature sensors need not be moved for multiple chiller operation. A 10 ft (3 m) separation is required between units for airflow, and a 6 ft (1.8 m) distance is required from units to obstructions. See Multiple Unit Separation figure below. See Base Unit Dimensions section on pages 27-39 for service clearances.

Unit software is capable of controlling two units as a single plant. Refer to Controls, Start-Up, Operation, Service, and Troubleshooting guide for further details.

MULTIPLE UNIT SEPARATION



Application data (cont)

Electrical/utility interests

Energy management — Use of energy management practices can significantly reduce operating costs, especially during off-peak modes of operation. Demand limiting and temperature reset are 2 techniques for accomplishing efficient energy management. See Demand Limiting (also called load shedding) section below and Leaving-Fluid Temperature Reset section on page 44 for further details.

Demand limiting (also called load shedding) — When a utility's demand for electricity exceeds a certain level, loads are shed to keep electricity demand below a prescribed maximum level. Typically, this happens on hot days when air conditioning is most needed.

Demand may be limited on unit by resetting fluid temperature, or by unloading the chiller to a given predetermined percentage of the load. Demand limit may also be driven by an external 4 to 20 mA signal. These features require a signal from an intelligent central control. Do not cycle demand limiter for less than 10 minutes on and 5 minutes off.

Duty cycling cycles electrical loads at regular intervals regardless of need. This reduces the electrical operating costs of building by "fooling" demand indicating devices. Duty cycling of compressors or fans is *not* recommended since motor winding and bearing life suffer from constant cycling.

Remote on-off control

Remote on-off control may be applied by hard-wired connection (see Controls and Troubleshooting literature) or by connection to a Carrier Comfort Network (CCN).

Part-wind start

This is not generally required on 30GTN,GBN chillers due to use of multiple compressors allowing smaller electrical load increments, but is available if required. Maximum instantaneous current flow (see ICF in Electrical Data table on pages 78-81) should be used in determining need.

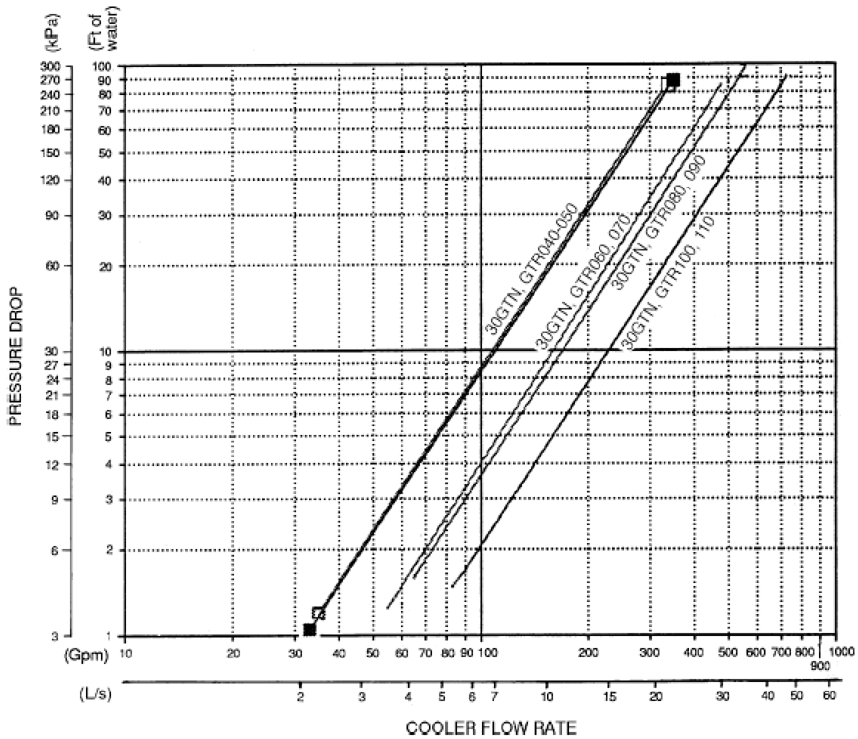
Strainers

It is recommended that a strainer with a minimum of 20 mesh be installed in the cooler fluid inlet line, just ahead of and as close as possible to the cooler.

Condenser coil protection

Copper-fin coils provide increased corrosion resistance in moderate coastal environments where industrial air pollution is not present. All copper coils eliminate bi-metallic construction to eliminate the potential for galvanic corrosion. Application in industrial environments is not recommended due to potential attack from sulfur, sulfur oxide, nitrogen oxides, carbon and several other industrial airborne contaminants. In moderate seacoast environments,
copper-fin coils have extended life compared to standard or pre-coated aluminum-fin coils.

COOLER FLUID PRESSURE DROP CURVES — 30GTN,GTR040-110
ENGLISH AND SI



LEGEND

■ — 040

□ — 045,050

NOTE: Ft of water = 2.31 x change in psig.

Selection procedure — English (with 30GTN example)

NOTE: The Carrier electronic catalog provides quick, easy computer selection of Carrier chillers. The catalog is available from your local Carrier representative.

I Determine unit size and operating conditions required to provide specified capacity at given conditions:

Capacity required . . . . .112 tons
Leaving chilled water temperature (LCWT) . . . 45 F
Chilled water temperature rise . . . . 14° F
Condenser entering-air temperature (CEAT) . . 95 F
Loop volume . . . . 350 gal.

Ratings are based on 10° F rise and are suitable for a temperature rise range from 5° to 15° F without adjustment. In this case, however, greater accuracy is desired.

II Correct LCWT for 14° F cooler water temperature rise.

Enter LCWT correction curve (below) at 14° F and read a correction of 0.3 F. Corrected LCWT is, therefore, 45 + 0.3 = 45.3 F.

III Determine capacity, unit size, and power input.

Enter Cooling Capacities table at given CEAT and LCWT — 95 F and 45 F, respectively.
Read down capacity column until the capacity nearest to but higher than specified required capacity is reached. In this case, 113 tons is delivered by a 30GTN110.

Interpolate between 45 F and 46 F to find determined capacity and power input at corrected LCWT (45.3 F). Values are:

Capacity . . . . 113.6 tons
Power input . . . . 136 kW

IV Calculate corrected cooler water flow.

$$\text{Water flow} = \frac{24 \times \text{corr cap. in tons}}{\text{temperature rise °F}} = \text{U.S. gpm}$$

$$= \frac{24 \times 113.6}{14} = 194.8 \text{ U.S. gpm}$$

V Calculate the cooler pressure drop.

Enter cooler pressure drop curve (page 32) at the corrected flow rate (194.8 U.S. gpm) and read, for the 30GTN110, a pressure drop of 10.4 ft of water.

VI Check loop volume and cooler water flow rate.

Minimum loop volume, from application data, is 333 gal. for 30GTN110. Therefore, given volume of 350 gal. is satisfactory. Minimum water flow rate, from application data, is 73 gpm for 30GTN110. Flow rate of 194.8 gpm is well above minimum required.

Selection procedure — SI (with 30GTN example)

I Determine unit size and operating conditions required to provide specified capacity at given conditions:

Capacity required . . . . 380 kW
Leaving chilled water temperature (LCWT) . . . . 6 C
Chilled water temperature rise . . . . 7.8° C
Condenser entering air temperature (CEAT) . . 35 C
Loop volume . . . . 1400 L

Ratings are based on 6 C rise and are suitable for a temperature rise range from 2.8° to 8.3° C without adjustment. In this case, however, greater accuracy is desired.

II Correct LCWT for 7.8° C cooler water temperature rise.

Enter LCWT correction curve (below) at 7.8° C and read a correction of 0.14 C. Corrected LCWT is, therefore, 6 + 0.14 = 6.1 C.

III Determine capacity, unit size, and power input.

Enter Cooling Capacities table at given CEAT and LCWT — 35 C and 6 C, respectively.
Read down the capacity column until the capacity nearest to but higher than the specified required capacity is reached. In this case, 381.7 kW is delivered by a 30GTN110.
Interpolate between 6 C and 7 C to find the determined capacity and power input at corrected LCWT (6.1 C).
Values are:

Capacity . . . . 383 kW
Power input . . . . 132.6 kW

IV Calculate corrected cooler water flow.

$$\text{Water flow} = \frac{0.239 \times \text{corr cap. in kW}}{\text{temperature rise °C}} = \text{L/s}$$

$$= \frac{0.239 \times 383}{7.8} = 11.7 \text{ L/s}$$

V Calculate cooler pressure drop.

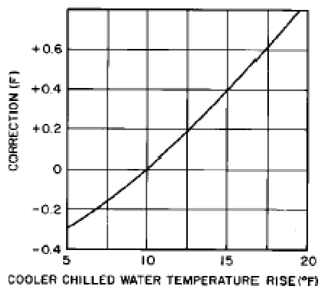
Enter cooler pressure drop curve (page 32) at corrected flow rate (11.7 L/s) and read, for 30GTN110, a pressure drop of 26.0 kPa.

VI Check loop volume and cooler water flow rate.

Minimum loop volume, from application data, is 1260 L for 30GTN110. Therefore, given volume of 1400 L is satisfactory. Minimum water flow rate, from application data, is 4.6 L/s for 30GTN110. Flow rate of 11.7 L/s is well above minimum required.

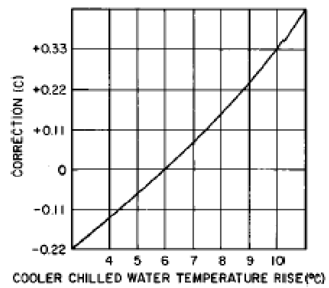
Selection procedure – English and SI

LCWT CORRECTION (ENGLISH)



Above 10 F, ADD correction to design LCWT.
Below 10 F, SUBTRACT.

LCWT CORRECTION (SI)



Above 6 C, ADD correction to design LCWT.
Below 6 C, SUBTRACT.

LCWT — Leaving Chilled Water Temperature

Performance data

PART LOAD DATA, 50 Hz UNITS
PERCENT DISPLACEMENT — SEQUENCE A

CAPACITY STEPS	30GTN,GTR,GBN,GBR									
	050	060	070	080	090	100	110	150,300A/B	175,350A/B	200,400A/B
1	28	33	19	17	14	13	17	17	14	13
2	42	50	27	25	21	20	25	33	29	25
3	87	83	65	42	29	26	33	50	43	38
4	100	100	73	54	36	33	42	67	57	50
5	-	-	92	62	43	40	50	83	71	63
6	-	-	100	79	61	57	58	100	86	75
7	-	-	-	92	68	63	67	-	100	88
8	-	-	-	100	75	70	75	-	-	100
9	-	-	-	-	86	87	83	-	-	-
10	-	-	-	-	93	93	92	-	-	-
11	-	-	-	-	100	100	100	-	-	-

PART LOAD DATA, 50 Hz UNITS
PERCENT DISPLACEMENT — SEQUENCE B

CAPACITY STEPS	30GTN,GTR,GBN,GBR									
	050	060	070	080	090	100	110	150,300A/B	175,350A/B	200,400A/B
1	-	-	-	25	14	13	17	17	14	13
2	-	-	-	38	21	20	25	33	29	25
3	-	-	-	42	29	26	33	50	43	38
4	-	-	-	50	36	33	42	67	57	50
5	-	-	-	62	43	40	50	83	71	63
6	-	-	-	79	53	57	58	100	86	75
7	-	-	-	88	60	63	67	-	100	88
8	-	-	-	100	67	70	75	-	-	100
9	-	-	-	-	86	87	83	-	-	-
10	-	-	-	-	93	93	92	-	-	-
11	-	-	-	-	100	100	100	-	-	-

Performance data (cont)

COOLING CAPACITIES - ENGLISH

UNIT SIZE 30GTN,GTR GBN,GBR	LCWT (F)	CONDENSER ENTERING AIR TEMPERATURE (F) 85 Cap.	85 Input kW	85 Cooler Flow Rate	95 Cap.	95 Input kW	95 Cooler Flow Rate	105 Cap.	105 Input kW	105 Cooler Flow Rate	115 Cap.	115 Input kW	115 Cooler Flow Rate	125 Cap.	125 Input kW	125 Cooler Flow Rate
050	40	50.3	54.1	120.4	47.6	57.1	113.9	44.9	59.8	107.4	42.1	62.3	100.8	39.3	64.5	94.1
060		59.2	62.7	141.7	56.0	66.2	134.2	52.9	69.4	126.7	49.8	72.4	119.2	46.7	75.1	111.7
070		69.1	70.6	165.4	65.2	74.9	156.2	61.4	78.8	147.0	57.6	82.5	137.8	53.8	85.9	128.7
080		79.7	75.4	190.8	75.2	79.6	180.1	70.9	83.4	169.6	66.5	87.0	159.2	62.1	90.3	148.7
090		89.3	95.9	213.8	84.2	101.2	201.6	79.1	106.1	189.3	74.0	110.6	177.1	68.9	114.6	164.8
100		98.3	102.4	235.3	92.8	108.1	222.2	87.3	113.3	208.9	81.8	118.2	195.8	76.3	122.7	182.8
110		108.6	122.1	260.0	102.9	128.1	246.4	97.2	133.7	232.8	91.5	138.8	219.1	85.7	143.6	205.2
150,300A/B		164.4	175.8	392.9	155.0	184.6	370.5	145.7	192.3	348.3	136.2	199.3	325.7	126.9	205.6	303.3
175,350A/B		185.7	211.0	443.9	175.3	220.8	419.1	165.0	229.9	394.5	154.5	237.8	369.3	143.9	244.9	344.1
200,400A/B		203.7	244.6	486.9	192.4	255.6	460.0	181.3	265.6	433.4	170.1	274.7	406.6	158.8	282.8	379.7
050	42	52.1	55.1	124.8	49.3	58.2	118.2	46.5	61.0	111.5	43.7	63.6	104.7	40.9	66.0	97.9
060		61.3	63.9	146.9	58.1	67.5	139.2	54.9	70.9	131.5	51.7	74.0	123.8	48.5	76.8	116.1
070		71.6	71.9	171.4	67.7	76.4	162.1	63.7	80.5	152.7	5.8	84.3	143.3	55.9	87.8	133.9
080		82.6	76.9	197.9	78.1	81.3	187.1	73.6	85.3	176.2	69.1	89.0	165.5	64.6	92.4	154.7
090		92.6	97.9	221.9	87.3	103.4	209.2	82.1	108.5	196.7	76.9	113.1	184.1	71.6	117.4	171.5
100		102.1	104.5	244.6	96.5	110.4	231.1	90.8	115.9	217.4	85.2	121.0	204.0	79.5	125.7	190.6
110		112.8	124.8	270.2	106.9	131.0	256.0	101.0	136.9	242.1	95.1	142.2	227.9	89.2	147.2	213.8
150,300A/B		170.7	179.8	408.4	161.1	188.8	385.4	151.6	196.9	362.6	141.9	204.4	339.3	132.2	210.9	316.4
175,350A/B		192.8	215.8	461.3	182.3	226.1	436.0	171.6	235.4	410.4	160.8	243.9	384.8	150.1	251.4	359.1
200,400A/B		211.4	250.2	505.8	199.9	261.7	478.3	188.5	272.1	451.0	177.0	281.7	423.5	165.5	290.2	395.8
050	44	53.9	56.1	129.1	51.1	59.4	122.5	48.2	62.3	115.7	45.4	65.0	108.7	42.4	67.5	101.8
060		63.5	65.1	152.2	60.2	68.9	144.3	56.9	72.3	136.5	53.6	75.5	128.5	50.3	78.5	120.6
070		74.1	73.3	177.6	70.1	77.8	168.1	66.1	82.1	158.4	62.1	86.1	148.8	58.1	89.7	139.2
080		85.5	78.4	205.1	81.0	82.9	194.2	76.4	87.1	183.1	71.7	91.0	171.9	67.1	94.6	160.9
090		95.9	99.9	230.0	90.6	105.6	217.1	85.2	110.9	204.2	79.8	115.7	191.3	74.4	12.2	178.4
100		106.0	106.7	254.2	100.2	112.8	240.2	94.4	118.5	226.2	88.6	123.9	212.4	82.8	128.8	198.6
110		117.0	127.5	280.4	111.0	134.0	266.0	104.9	140.1	251.4	98.9	145.7	237.0	92.8	150.9	222.5
150,300A/B		177.3	183.8	424.5	167.4	193.1	400.7	157.6	201.6	377.2	147.6	209.4	353.3	137.6	216.3	329.5
175,350A/B		200.1	220.6	479.1	189.3	231.4	453.2	178.4	241.1	427.0	167.3	249.9	400.5	156.3	257.9	374.2
200,400A/B		219.4	255.9	525.2	207.7	267.9	497.2	195.9	278.7	468.9	184.2	288.8	441.0	172.2	297.7	412.3
050	45	54.8	56.7	131.5	52.0	59.9	124.7	49.1	63.0	117.8	46.2	65.7	110.8	43.2	68.2	103.7
060		64.6	65.7	154.9	61.3	69.5	146.9	57.9	73.1	138.9	54.6	76.3	130.9	51.2	79.4	122.9
070		75.4	73.9	180.8	71.3	78.6	171.1	67.3	82.9	161.4	63.2	87.0	151.6	59.2	90.7	141.9
080		87.1	79.2	208.9	82.4	83.8	197.6	77.8	88.1	186.5	73.1	92.0	175.3	68.4	95.7	164.0
090		97.6	100.9	234.1	92.2	106.7	221.1	86.8	112.1	208.1	81.3	117.1	194.9	75.8	121.6	181.8
100		108.0	107.8	259.0	102.1	114.0	244.8	96.2	119.9	230.7	90.3	125.3	216.6	84.5	130.3	202.6
110		119.0	128.9	285.5	113.0	135.5	271.0	106.9	141.7	256.4	100.8	147.4	241.7	94.6	152.8	226.9
150,300A/B		180.6	185.8	432.6	170.6	195.3	408.5	160.6	204.0	384.6	150.5	212.0	360.4	140.4	219.1	336.3
175,350A/B		204.0	223.2	488.5	192.9	234.0	461.9	181.8	244.0	435.4	170.7	253.1	408.9	159.5	261.2	381.9
200,400A/B		223.4	258.8	534.9	211.6	271.1	506.7	199.6	282.0	478.0	187.8	292.4	449.7	175.7	301.5	420.7
050	46	55.8	57.2	133.8	52.9	60.5	126.9	50.0	63.6	119.9	47.0	66.4	112.8	44.1	69.0	105.7
060		65.7	66.4	157.6	62.3	70.2	149.5	59.0	73.8	141.5	55.6	77.2	133.4	52.2	80.3	125.2
070		76.7	74.6	183.9	72.6	79.3	174.1	68.5	83.7	164.4	64.4	87.9	154.5	60.3	91.7	144.6
080		88.7	80.0	212.7	83.9	84.6	201.2	79.2	89.0	190.0	74.5	93.0	178.7	69.7	96.8	167.1
090		99.3	101.9	238.2	93.8	107.8	225.1	88.4	113.3	211.9	82.8	118.4	198.6	77.3	123.0	185.4
100		110.0	108.9	263.8	104.1	115.3	249.6	98.1	121.2	235.3	92.2	126.8	221.1	86.2	131.9	206.7
110		121.2	130.3	290.7	115.1	137.0	276.0	108.9	143.3	261.2	102.7	149.2	246.2	96.4	154.6	231.3
150,300A/B		184.0	187.8	440.7	173.8	197.6	416.3	163.7	206.4	392.1	153.5	214.6	367.6	143.3	221.8	343.1
175,350A/B		207.8	225.7	497.6	196.5	236.7	470.8	185.3	246.9	443.7	174.0	256.2	416.9	162.7	264.6	389.7
200,400A/B		227.5	261.7	544.9	215.5	274.2	516.2	203.5	285.4	487.5	191.4	296.0	458.6	179.3	305.4	429.4
050	48	57.7	58.2	138.4	54.7	61.7	131.4	51.8	64.9	124.2	48.8	67.8	117.0	45.7	70.5	109.7
060		68.0	67.6	163.2	64.5	71.6	154.9	61.1	75.3	146.6	57.6	78.8	138.3	54.1	82.0	129.9
070		79.3	75.9	190.4	75.1	80.8	180.3	71.0	85.4	170.3	66.8	89.7	160.3	62.6	93.7	150.1
080		91.8	81.5	220.2	86.9	86.4	208.6	82.0	90.8	196.9	77.2	95.1	185.4	72.4	99.0	173.7
090		102.7	103.9	246.6	97.2	110.1	233.2	91.6	115.8	219.7	85.9	121.1	206.2	80.2	125.9	192.5
100		114.1	111.1	273.8	107.9	117.7	259.0	101.9	123.9	244.5	95.7	129.7	229.8	89.6	135.0	215.1
110		125.5	133.1	301.3	119.2	140.1	286.2	113.0	146.6	271.1	106.6	152.7	255.8	100.2	158.4	240.5
150,300A/B		190.7	191.8	456.9	180.3	202.0	432.2	170.0	211.2	407.3	159.5	219.8	382.3	149.0	227.4	357.1
175,350A/B		215.4	230.7	516.2	203.9	242.2	488.7	192.4	252.8	461.2	180.9	262.5	433.5	-	-	-
200,400A/B		235.7	267.6	564.9	223.5	280.5	535.7	211.2	292.2	506.2	198.9	303.2	476.6	-	-	-

Performance data (cont)

COOLING CAPACITIES - ENGLISH

UNIT SIZE 30GTN,GTR GBN,GBR	LCWT (F)	CONDENSER ENTERING AIR TEMPERATURE (F) 85			95			105			115			125		
		Cap.	Input kW	Cooler Flow Rate	Cap.	Input kW	Cooler Flow Rate	Cap.	Input kW	Cooler Flow Rate	Cap.	Input kW	Cooler Flow Rate	Cap.	Input kW	Cooler Flow Rate
050	50	59.6	59.3	143.1	56.6	62.9	135.9	53.6	66.2	128.6	50.5	69.3	121.3	47.4	72.1	113.8
060		70.3	68.8	168.8	66.8	73.0	160.3	63.2	76.8	151.8	59.7	80.4	143.2	56.1	83.8	134.7
070		82.1	77.3	197.1	77.7	82.3	186.7	73.4	87.0	176.4	69.2	91.5	166.2	64.9	95.6	155.8
080		94.9	83.1	227.8	90.0	88.1	216.1	85.0	92.8	204.2	80.0	97.1	192.1	75.1	101.2	180.3
090		106.3	106.0	255.2	100.6	112.3	241.5	94.8	118.3	227.7	89.1	123.8	213.8	83.3	128.8	199.9
100		118.2	113.4	283.9	112.0	120.2	268.9	105.7	126.6	253.8	99.5	132.6	238.8	93.2	138.2	223.8
110		130.0	136.0	312.2	123.5	143.2	296.6	117.1	150.0	281.1	110.6	156.3	265.5	104.0	162.2	249.7
150,300A/B		197.6	195.9	473.8	187.0	206.5	448.4	176.5	216.1	423.1	165.6	225.0	397.2	154.9	233.0	371.3
175,350A/B		223.3	235.9	535.3	211.4	247.7	507.0	199.6	258.7	478.7	187.8	268.8	450.3	-	-	-
200,400A/B		244.1	273.6	585.4	231.7	287.0	555.5	219.1	299.2	525.3	206.4	310.6	494.9	-	-	-
050	60	69.5	64.6	167.2	65.4	68.2	157.2	61.2	71.4	147.3	57.1	74.4	137.3	53.0	77.0	127.4
060		79.9	73.7	192.2	75.2	77.9	180.9	70.6	81.7	169.8	66.0	85.1	158.7	61.4	88.2	147.7
070		95.1	83.6	228.9	90.2	89.1	216.9	84.2	93.8	202.5	78.4	98.0	188.5	72.6	101.9	174.6
080		106.6	89.0	256.4	100.1	93.9	240.8	93.7	98.4	225.3	87.3	102.4	210.1	81.0	106.1	195.0
090		122.0	114.8	293.5	114.2	121.1	274.8	106.6	126.7	256.3	98.9	131.8	238.0	-	-	-
100		138.3	123.8	332.7	129.7	130.7	312.1	121.3	137.0	291.8	113.0	142.8	271.7	104.7	148.0	251.9
110		153.6	150.9	369.5	145.6	158.7	350.3	136.4	165.1	328.0	127.4	171.0	306.5	118.6	176.4	285.2
150,300A/B		234.4	217.7	563.1	222.5	230.0	534.5	210.4	241.5	505.5	198.1	252.1	475.9	-	-	-
175,350A/B		264.6	262.8	635.5	251.5	276.8	604.1	238.3	289.9	572.4	-	-	-	-	-	-
200,400A/B		288.8	305.2	693.7	274.9	320.6	660.2	260.7	335.1	626.3	-	-	-	-	-	-

LEGEND

Cap. — Cooling Capacity Tons of Refrigeration
Input kW — Compressor Power Input
LCWT — Leaving Chilled Water Temperature (F)

NOTES:

1. Ratings apply to units with electronic or thermostatic expansion valves.
2. All ratings are in accordance with ARI (Air Conditioning and Refrigeration Institute, U.S.A.) Standard 590-92, based on:
   a. A cooler water temperature rise of 10° F. When greater accuracy is desired, correct design LCWT, before entering rating tables, by reference to the LCWT correction curve.
   b. A fouling factor of 0.00025 in the cooler.
   c. Refrigerant 22.
3. When a corrected LCWT is used, cooler pressure drop must also be corrected for new LCWT:
   a. Enter rating table for corrected LCWT. By interpolation, determine corrected capacity (tons) and power input (kW) to compressor at its rated voltage.
   b. Calculate corrected flow rate through the cooler:

$$= \frac{24 \times \text{capacity in tons}}{\text{temperature rise °F}} = \text{U.S. gpm}$$

   c. On Cooler Pressure Drop chart (pages 32 and 33),enter cooler pressure drop curve at corrected flow rate and read pressure drop.
4. When chilled water temperature rise is less than 5 F, high flow rate will normally be accompanied by an excessive pressure drop. In such cases, contact your Carrier representative for special selection of a cooler with wider baffle spacing.

Performance data (cont)

COOLING CAPACITIES – SI

UNIT SIZE 30GTN,GTR GBN,GBR	LCWT (C)	CONDENSER ENTERING AIR TEMPERATURE (C)														
		30			35			40			45			50		
		Cap.	Input kW	Cooler Flow Rate	Cap.	Input kW	Cooler Flow Rate	Cap.	Input kW	Cooler Flow Rate	Cap.	Input kW	Cooler Flow Rate	Cap.	Input kW	Cooler Flow Rate
050	4	173.5	54.0	7.4	165.0	56.6	7.1	156.4	59.0	6.7	147.8	61.2	6.3	139.1	63.2	6.0
060		204.1	62.6	8.8	194.3	65.7	8.3	184.5	68.5	7.9	174.7	71.2	7.5	164.9	73.7	7.1
070		238.2	70.6	10.2	226.1	74.3	9.7	214.1	77.8	9.2	202.1	81.1	8.7	190.1	84.1	8.2
080		274.7	75.2	11.8	260.7	78.9	11.2	247.0	82.3	10.6	233.3	85.5	10.0	219.6	88.5	9.4
090		307.8	95.7	13.2	291.8	100.4	12.5	275.7	104.7	11.8	259.8	108.7	11.2	243.7	112.3	10.5
100		338.4	102.1	14.5	321.3	107.1	13.8	304.0	111.8	13.0	286.9	116.2	12.3	269.8	120.2	11.6
110		374.5	121.6	16.1	356.6	126.9	15.3	338.7	131.9	14.5	320.8	136.5	13.8	302.7	140.8	13.0
150,300A/B		566.8	175.4	22.5	537.6	183.0	21.3	508.4	189.9	20.2	478.7	196.2	19.0	449.4	201.9	17.8
175,350A/B		640.5	210.3	25.4	608.1	219.0	24.1	575.6	227.0	22.9	542.7	234.2	21.6	509.8	240.6	20.2
200,400A/B		702.8	243.9	27.9	667.9	253.6	26.5	632.6	262.3	25.1	597.4	270.5	23.7	562.2	277.9	22.3
050	5	179.1	54.9	7.7	170.4	57.6	7.3	161.7	60.1	6.9	152.9	62.5	6.6	144.0	64.6	6.2
060		210.8	63.7	9.1	200.8	66.9	8.6	190.7	69.8	8.2	180.7	72.6	7.8	170.6	75.1	7.3
070		245.9	71.7	10.6	233.6	75.6	10.0	221.4	79.3	9.5	209.1	82.7	9.0	196.9	85.8	8.5
080		283.8	76.6	12.2	269.7	80.4	11.6	255.5	84.0	11.0	241.5	87.3	10.4	227.5	90.4	9.8
090		318.1	97.5	13.7	301.6	102.3	13.0	285.2	106.8	12.3	268.8	111.0	11.5	252.5	114.8	10.8
100		350.4	104.0	15.1	332.6	109.2	14.3	314.9	114.1	13.5	297.5	118.7	12.8	279.9	122.9	12.0
110		387.4	124.1	16.6	369.0	129.6	15.9	350.6	179.0	15.1	332.3	239.5	14.3	313.9	144.0	13.5
150,300A/B		586.8	178.9	23.3	556.7	186.9	22.1	526.9	194.0	20.9	496.5	200.7	19.7	466.2	206.6	18.5
175,350A/B		662.8	214.6	26.3	629.6	223.6	25.0	596.5	232.0	23.7	562.8	239.5	22.4	529.0	246.3	21.0
200,400A/B		727.1	248.9	28.9	691.4	259.0	27.5	655.3	268.1	26.0	619.3	276.7	24.6	583.2	284.4	23.2
050	6	184.8	55.8	7.9	176.0	58.7	7.6	167.1	61.3	7.2	158.1	63.7	6.8	149.0	65.9	6.4
060		217.6	64.8	9.4	207.3	68.1	8.9	197.0	71.1	8.5	186.7	74.0	8.0	176.4	76.6	7.6
070		253.9	72.9	10.9	241.4	76.9	10.4	228.8	80.7	9.8	216.3	84.2	9.3	203.8	87.5	8.8
080		292.9	78.0	12.6	278.7	81.9	12.0	264.3	85.6	11.4	249.8	89.0	10.7	235.5	92.3	10.1
090		328.5	99.3	14.1	311.8	104.3	13.4	294.9	108.9	12.7	278.1	113.3	12.0	261.3	117.2	11.2
100		362.5	106.0	15.6	344.5	111.4	14.8	326.4	116.4	14.0	308.3	121.2	13.3	290.3	125.6	12.5
110		400.4	126.6	17.2	381.7	132.3	16.4	362.9	137.6	15.6	344.1	142.6	14.8	325.1	147.2	14.0
150,300A/B		607.1	182.5	24.1	576.4	190.7	22.9	545.7	198.2	21.7	514.7	205.2	20.5	483.6	211.4	19.2
175,350A/B		685.8	219.0	27.3	651.7	228.4	25.9	617.9	237.1	24.6	583.2	244.9	23.2	549.0	252.1	21.8
200,400A/B		751.8	254.1	29.9	715.3	264.5	28.4	678.4	274.0	27.0	641.6	282.9	25.5	604.7	291.0	24.0
050	7	190.6	56.8	8.2	181.6	59.7	7.8	172.5	62.4	7.4	163.3	64.9	7.0	154.1	67.2	6.6
060		224.5	65.9	9.7	214.0	69.3	9.2	203.5	72.4	8.8	192.9	75.4	8.3	182.4	78.2	7.8
070		261.9	74.1	11.3	249.1	78.3	10.7	236.4	82.2	10.2	223.6	85.8	9.6	210.8	89.2	9.1
080		302.6	79.4	13.0	287.7	83.4	12.4	273.2	87.3	11.8	258.5	90.9	11.1	243.6	94.2	10.5
090		339.0	101.1	14.6	322.0	106.3	13.8	304.9	111.1	13.1	287.6	115.6	12.4	270.4	119.7	11.6
100		375.0	108.0	16.1	356.4	113.5	15.3	337.9	118.8	14.5	319.3	123.7	13.7	300.9	128.3	12.9
110		413.7	129.0	17.8	394.6	134.9	17.0	375.4	140.5	16.1	356.1	145.6	15.3	336.6	150.5	14.5
150,300A/B		628.1	186.2	25.0	596.3	194.6	23.7	564.9	202.4	22.5	533.2	209.7	21.2	501.3	216.2	19.9
175,350A/B		709.0	223.4	28.2	674.3	233.2	26.8	639.4	242.1	25.4	604.6	250.5	24.1	569.2	257.9	22.6
200,400A/B		777.1	259.3	30.9	739.8	270.1	29.4	702.0	279.9	27.9	664.8	289.3	26.4	626.6	297.6	24.9
050	8	196.5	57.7	8.5	187.3	60.8	8.1	178.1	63.6	7.7	168.7	66.2	7.3	159.3	68.6	6.9
060		231.4	67.0	10.0	220.8	70.5	9.5	210.1	73.8	9.0	199.3	76.8	8.6	188.5	79.7	8.1
070		270.1	75.3	11.6	257.1	79.6	11.1	244.2	83.6	10.5	231.0	87.4	9.9	218.0	91.0	9.4
080		312.3	80.8	13.4	297.1	85.0	12.8	282.1	88.9	12.1	267.2	92.7	11.5	251.9	96.1	10.8
090		349.7	102.9	15.1	332.3	108.3	14.3	314.9	113.3	13.6	297.4	118.0	12.8	279.7	122.2	12.0
100		387.4	110.0	16.7	368.7	115.7	15.9	349.7	121.2	15.0	330.8	126.2	14.2	311.8	131.0	13.4
110		427.1	131.6	18.4	407.6	137.7	17.5	388.0	143.4	16.7	368.3	148.8	15.9	348.3	153.8	15.0
150,300A/B		648.8	189.9	25.8	617.0	198.7	24.6	584.5	206.7	23.3	552.0	214.2	22.0	519.5	221.0	20.7
175,350A/B		732.9	228.0	29.2	697.4	238.0	27.8	661.5	247.3	26.3	625.7	255.9	24.9	589.4	263.6	23.5
200,400A/B		802.8	264.5	32.0	764.8	275.7	30.4	726.5	286.0	28.9	688.0	295.7	27.4	649.4	304.5	25.8
050	9	202.5	58.7	8.7	193.2	61.8	8.3	183.7	64.7	7.9	174.2	67.4	7.5	164.6	69.9	7.1
060		238.7	68.1	10.3	227.8	71.7	9.8	216.8	75.1	9.3	205.8	78.3	8.9	194.7	81.2	8.4
070		278.5	76.6	12.0	265.1	81.0	11.4	251.9	85.1	10.8	238.7	89.0	10.3	225.3	92.7	9.7
080		322.1	82.2	13.9	306.8	86.5	13.2	291.2	90.6	12.5	275.9	94.4	11.9	260.6	98.1	11.2
090		360.6	104.8	15.5	342.9	110.3	14.8	325.1	115.5	14.0	307.3	120.3	13.2	289.3	124.8	12.5
100		400.5	112.0	17.2	380.9	117.9	16.4	361.8	123.6	15.6	342.4	128.8	14.7	323.0	133.8	13.9
110		440.8	134.1	19.0	420.9	140.4	18.1	400.8	146.3	17.3	380.8	151.9	16.4	360.4	157.1	15.5
150,300A/B		670.3	193.6	26.7	637.5	202.6	25.4	604.9	211.0	24.1	571.4	218.8	22.8	538.0	226.0	21.4
175,350A/B		757.1	232.5	30.1	720.8	242.9	28.7	684.3	252.6	27.2	647.6	261.5	25.8	610.7	269.7	24.3
200,400A/B		829.0	269.9	33.0	790.1	281.4	31.5	751.0	292.0	29.9	711.8	302.2	28.3	672.3	311.3	26.8

Performance data (cont)

COOLING CAPACITIES – SI

UNIT SIZE 30GTN,GTR GBN,GBR	LCWT (C)	CONDENSER ENTERING AIR TEMPERATURE (C)														
		30			35			40			45			50		
		Cap.	Input kW	Cooler Flow Rate	Cap.	Input kW	Cooler Flow Rate	Cap.	Input kW	Cooler Flow Rate	Cap.	Input kW	Cooler Flow Rate	Cap.	Input kW	Cooler Flow Rate
050	10	208.6	59.7	9.0	199.1	62.9	8.6	189.5	65.9	8.2	179.8	68.7	7.7	169.9	71.3	7.3
060		246.0	69.3	10.6	234.9	73.0	10.1	223.7	76.4	9.6	212.3	79.7	9.1	201.0	82.8	8.7
070		287.2	77.8	12.4	273.4	82.3	11.8	259.8	86.6	11.2	246.4	90.6	10.6	232.8	94.4	10.0
080		332.0	83.6	14.3	316.5	88.1	13.6	300.8	92.3	13.0	284.9	96.3	12.3	269.3	100.0	11.6
090		371.8	106.6	16.0	353.7	112.3	15.2	335.5	117.7	14.4	317.2	122.7	13.7	298.9	127.4	12.9
100		413.6	114.1	17.8	393.8	120.2	17.0	373.9	126.0	16.1	354.2	131.4	15.3	334.4	136.6	14.4
110		455.1	136.7	19.6	434.4	143.2	18.7	414.0	149.3	17.8	393.4	155.1	16.9	372.7	160.5	16.1
150,300A/B		692.2	197.3	27.6	658.6	206.7	26.2	625.3	215.4	24.9	591.0	223.5	23.5	556.9	231.0	22.2
175,350A/B		782.2	237.3	31.2	744.7	247.9	29.7	707.3	257.9	28.2	670.0	267.2	26.7	632.3	275.7	25.2
200,400A/B		855.2	275.3	34.1	816.0	287.2	32.5	776.0	298.3	30.9	736.0	308.7	29.3	695.6	318.2	27.7
050	13	227.5	62.6	9.8	217.5	66.1	9.4	207.3	69.4	8.9	197.1	72.5	8.5	186.7	75.4	8.0
060		268.4	72.7	11.6	256.6	76.7	11.1	244.9	80.6	10.6	233.0	84.2	10.0	220.2	87.3	9.5
070		313.6	81.6	13.5	299.3	86.5	12.9	284.8	91.1	12.3	270.2	95.5	11.7	255.7	99.6	11.0
080		360.1	87.6	15.5	342.3	92.3	14.8	324.6	96.7	14.0	306.7	100.8	13.2	288.9	104.6	12.5
090		405.9	112.4	17.5	386.9	118.6	16.7	367.7	124.4	15.9	348.4	130.0	15.0	328.1	134.9	14.1
100		454.3	120.3	19.6	433.1	127.0	18.7	412.1	133.4	17.8	391.1	139.4	16.9	369.8	145.1	15.9
110		498.6	144.7	21.5	476.9	151.8	20.6	455.1	158.5	19.6	433.1	164.9	18.7	410.7	170.9	17.7
150,300A/B		760.4	208.9	30.3	724.5	219.2	28.9	688.5	228.8	27.5	652.3	237.9	26.0	-	-	-
175,350A/B		858.5	251.6	34.2	819.1	263.4	32.7	779.8	274.4	31.1	739.4	284.5	29.5	-	-	-
200,400A/B		938.1	292.1	37.4	896.0	305.1	35.7	853.5	317.1	34.0	811.0	328.7	32.3	-	-	-
050	16	243.1	65.0	10.5	230.0	68.2	9.9	216.9	71.1	9.4	203.8	73.8	8.8	190.7	76.2	8.2
060		279.5	74.2	12.1	264.6	77.9	11.4	249.9	81.3	10.8	235.3	84.5	10.2	220.9	87.3	9.5
070		336.4	84.6	14.5	317.2	89.1	13.7	298.3	93.3	12.9	279.8	97.2	12.1	261.4	100.8	11.3
080		372.8	89.5	16.1	352.2	93.9	15.2	331.8	97.9	14.3	311.7	101.6	13.5	291.8	105.0	12.6
090		426.6	115.5	18.4	402.0	121.1	17.3	377.6	126.2	16.3	353.5	130.8	15.3	329.6	135.0	14.2
100		483.7	124.5	20.9	456.6	130.7	19.7	429.8	136.4	18.5	403.3	141.7	17.4	377.1	146.5	16.3
110		540.3	152.1	23.3	511.4	158.5	22.1	482.9	164.4	20.8	454.6	169.9	19.6	426.4	174.9	18.4
150,300A/B		832.0	221.0	33.2	792.4	231.9	31.6	751.8	241.9	30.0	711.4	251.4	28.4	-	-	-
175,350A/B		939.3	266.8	37.5	897.4	279.5	35.8	855.4	291.5	34.1	812.8	302.7	32.4	-	-	-
200,400A/B		-	309.9	40.9	980.6	323.9	39.1	935.5	336.9	37.3	-	-	-	-	-	-

LEGEND

Cap. — Cooling Capacity kW of Refrigeration
Input kW — Compressor Power Input
LCWT — Leaving Chilled Water Temperature (C)

NOTES:

1. Ratings apply to units with electronic or thermostatic expansion valves.
2. All ratings are in accordance with ARI (Air Conditioning and Refrigeration Institute, U.S.A.) Standard 590-92, based on:
   a. A cooler water temperature rise of 6° C. When greater accuracy is desired, correct design LCWT, before entering rating tables, by reference to the LCWT correction curve.
   b. A fouling factor of 0.000018 in the cooler.
   c. Refrigerant 22.
3. When a corrected LCWT is used, cooler pressure drop must also be corrected for new LCWT:
   a. Enter rating table for corrected LCWT. By interpolation, determine corrected capacity (kW) and power input (kW) to compressor at its rated voltage.
   b. Calculate corrected flow rate through the cooler:
      $= \frac{0.239 \times \text{capacity in kW}}{\text{temperature rise °C}}$ = L/s
   c. On Cooler Pressure Drop chart (pages 32 and 33),enter cooler pressure drop curve at corrected flow rate and read pressure drop.
4. When chilled water temperature rise is less than 3 C, high flow rate will normally be accompanied by an excessive pressure drop. In such cases, contact your Carrier representative for special selection of a cooler with wider baffle spacing.

Electrical data

UNIT ELECTRICAL DATA

UNIT 30GTN,GTR, GBN,GBR	UNIT VOLTAGE			MCA		MOCP		ICF		Rec Fuse Size	
	V-Hz (3 Ph)	Supplied									
		Min	Max	XL	PW	XL	PW	XL	PW	XL	PW
050	400-50	342	440	166	166	200	200	415	277	200	200
060	400-50	342	440	194	194	225	225	442	304	225	225
070	400-50	342	440	213	213	250	250	461	323	250	250
080	400-50	342	440	242	242	250	250	490	352	250	250
090	400-50	342	440	269	269	250	250	517	379	250	250
100	400-50	342	440	297	297	300	300	545	407	300	300
110	400-50	342	440	355	355	350	350	603	465	350	350
150	400-50	342	440	480	480	500	500	729	591	500	500
175	400-50	342	440	557	557	600	600	806	668	600	600
200	400-50	342	440	634	634	700	700	883	745	700	700
300A	400-50	342	440	480	480	500	500	729	591	500	500
300B	400-50	342	440	480	480	500	500	729	591	500	500
350A	400-50	342	440	557	557	600	600	806	668	600	600
350B	400-50	342	440	557	557	600	600	806	668	600	600
400A	400-50	342	440	634	634	700	700	883	745	700	700
400B	400-50	342	440	634	634	700	700	883	745	700	700

CONTROL CIRCUIT

UNIT POWER V-Ph-Hz	CONTROL POWER			MCA and MOCP
	V-PH-Hz	Min	Max	
400-3-50	230-1-50	198	264	15

COMPRESSOR ELECTRICAL DATA

UNIT SIZE 30GTN,GTR, GBN,GBR	NOMINAL VOLTAGE V-Ph-Hz	COMPRESSOR NUMBERS															
		A1		A2		A3		A4		B1		B2		B3		B4	
		RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA	RLA	LRA
050-XL	400-3-50	56	253	-	-	-	-	-	-	77	345	-	-	-	-	-	-
050-PW	400-3-50	56	152	-	-	-	-	-	-	77	207	-	-	-	-	-	-
060-XL	400-3-50	77	345	-	-	-	-	-	-	77	345	-	-	-	-	-	-
060-PW	400-3-50	77	207	-	-	-	-	-	-	77	207	-	-	-	-	-	-
070-XL	400-3-50	48	223	48	223	-	-	-	-	77	345	-	-	-	-	-	-
070-PW	400-3-50	48	134	48	134	-	-	-	-	77	207	-	-	-	-	-	-
080-XL	400-3-50	48	223	77	345	-	-	-	-	77	345	-	-	-	-	-	-
080-PW	400-3-50	48	134	77	207	-	-	-	-	77	207	-	-	-	-	-	-
090-XL	400-3-50	48	223	77	345	-	-	-	-	48	223	56	253	-	-	-	-
090-PW	400-3-50	48	134	77	207	-	-	-	-	48	134	56	152	-	-	-	-
100-XL	400-3-50	48	223	77	345	-	-	-	-	48	223	77	345	-	-	-	-
100-PW	400-3-50	48	134	77	207	-	-	-	-	48	134	77	207	-	-	-	-
110-XL	400-3-50	77	345	77	345	-	-	-	-	77	345	77	345	-	-	-	-
110-PW	400-3-50	77	207	77	207	-	-	-	-	77	207	77	207	-	-	-	-
150-XL	400-3-50	56	253	77	345	77	345	-	-	56	253	77	345	77	345	-	-
150-PW	400-3-50	56	152	77	207	77	207	-	-	56	152	77	207	77	207	-	-
175-XL	400-3-50	56	253	77	345	77	345	-	-	56	253	77	345	77	345	77	345
175-PW	400-3-50	56	152	77	207	77	207	-	-	56	152	77	207	77	207	77	207
200-XL	400-3-50	56	253	77	345	77	345	77	345	56	253	77	345	77	345	77	345
200-PW	400-3-50	56	152	77	207	77	207	77	207	56	152	77	207	77	207	77	207
300A-XL	400-3-50	56	253	77	345	77	345	-	-	56	253	77	345	77	345	-	-
300A-PW	400-3-50	56	152	77	207	77	207	-	-	56	152	77	207	77	207	-	-
300B-XL	400-3-50	56	253	77	345	77	345	-	-	56	253	77	345	77	345	-	-
300B-PW	400-3-50	56	152	77	207	77	207	-	-	56	152	77	207	77	207	-	-
350A-XL	400-3-50	56	253	77	345	77	345	-	-	56	253	77	345	77	345	77	345
350A-PW	400-3-50	56	152	77	207	77	207	-	-	56	152	77	207	77	207	77	207
350B-XL	400-3-50	56	253	77	345	77	345	-	-	56	253	77	345	77	345	77	345
350B-PW	400-3-50	56	152	77	207	77	207	-	-	56	152	77	207	77	207	77	207
400A-XL	400-3-50	56	253	77	345	77	345	77	345	56	253	77	345	77	345	77	345
400A-PW	400-3-50	56	152	77	207	77	207	77	207	56	152	77	207	77	207	77	207
400B-XL	400-3-50	56	253	77	345	77	345	77	345	56	253	77	345	77	345	77	345
400B-PW	400-3-50	56	152	77	207	77	207	77	207	56	152	77	207	77	207	77	207

Electrical data (cont)

CONDENSER FAN DATA

UNIT SIZE 30GTN,GTR GBN,GBR	NOMINAL VOLTAGE (V-Ph-Hz)	CONDENSER FAN	
		TOTAL (Quantity)	FLA (ea)
050	400-3-50	4	3.4
060	400-3-50	6	3.4
070	400-3-50	6	3.4
080	400-3-50	6	3.4
090	400-3-50	6	3.4
100	400-3-50	8	3.4
110	400-3-50	8	3.4
150	400-3-50	12	3.4
175	400-3-50	12	3.4
200	400-3-50	12	3.4
300A	400-3-50	12	3.4
300B	400-3-50	12	3.4
350A	400-3-50	12	3.4
350B	400-3-50	12	3.4
400A	400-3-50	12	3.4
400B	400-3-50	12	3.4

LEGEND AND NOTES FOR ELECTRICAL DATA

LEGEND

FLA - Full Load Amps (Fan Motors)
ICF - Maximum Instantaneous Current Flow during starting (the point in the starting sequence where the sum of the LRA for the starting compressor, plus the total RLA for all running compressors, plus the total FLA for all running fan motors is maximum)
LRA - Locked Rotor Amps
MCA - Minimum Circuit Amps (for wire sizing) – complies with NEC Section 430-24
MOCP - Maximum Overcurrent Protection Device Amps
Rec Fuse- Recommended dual-element fuse amps: 150% of largest size compressor RLA plus 100% of sum of remaining compressor RLAs. Size up to the next larger fuse size.
RLA - Rated Load Amps (compressors)

*Units are suitable for use on electrical systems where voltage supplied to the unit terminals is not below or above the listed minimum and maximum limits. Maximum allowable phase imbalance is: voltage, 2%; amps 10%.

NOTES:

1. All units/modules have single point primary power connection. (Each unit/module requires its own power supply). Main power must be supplied from a field-supplied disconnect.
2. The unit control circuit power (230 v, single-phase) must be supplied from a separate source through a field-supplied disconnect. The control circuit transformer accessory may be applied to power from primary unit power.
3. Crankcase heaters are wired into the control circuit so they are always operable as long as the control circuit power supply disconnect is on, even if any safety device is open, and the unit ON/OFF switch is in the OFF position.
4. Units have the following power wiring terminal blocks and parallel conductors:

UNIT SIZE 30GTN,GTR, GBN,GBR	VOLTAGE	TERMINAL BLOCKS	PARALLEL CONDUCTORS
050 to 070	400	1	3
080 to 110	400	1	3
150 to 200, 300A/B to 400A/B	400	2	6

5. Maximum incoming wire size for each terminal block is 500 kcmil.
6. Power draw control circuits include crankcase heaters. Each compressor has a crankcase heater which draws 180 watts of power.

Controls

Microprocessor

The *Comfort*Link™ microprocessor controls overall unit operation. Its central executive routine controls a number of processes simultaneously. These include internal timers, reading inputs, analog to digital conversions, fan control, display control, diagnostic control, output relay control, demand limit, capacity control, head pressure control, and temperature reset. Some processes are updated almost continuously, others every 2 to 3 seconds, and some every 30 seconds.

The microprocessor routine is started by switching the Emergency ON-OFF circuit breaker switch (switch 2) to ON position.

When the unit receives a call for cooling (either from the internal control or CCN network command), the unit stages up in capacity to maintain the cooler fluid set point. The first compressor starts 11/2 to 3 minutes after the call for cooling. The lead circuit can be specifically designated or randomly selected by the controls, depending on how the unit is field configured. A field configuration is also available to determine if the unit should stage up both circuits equally or load one circuit completely before bringing on the other.

The *Comfort*Link microprocessor controls the capacity of the chiller by cycling compressors on and off at a rate to satisfy actual dynamic load conditions. The control maintains leaving-fluid temperature set point shown on scrolling marquee display board through intelligent cycling of compressors. Accuracy depends on loop volume, loop flow rate, load, outdoor-air temperature, number of stages, and particular stage being cycled off. No adjustment for cooling range or cooler flow rate is required, because the control automatically compensates for cooling range by measuring both return-fluid temperature and leaving-fluid temperature. This is referred to as *leaving-fluid temperature control with return-fluid temperature compensation*.

The basic logic for determining when to add or remove a stage is a time band integration of deviation from set point plus rate of change of leaving-fluid temperature. When leaving-fluid temperature is close to set point and slowly moving closer, logic prevents addition of another stage. If leaving-fluid temperature is less than 34 F (1.1 C) for water, or 6° F (3.3° C) below the set point for brine units, the unit is shut off until the fluid temperature goes to 34 F (1.1 C) or to 6° F (3.3° C) above the set point to protect against freezing.

If 1° F per minute (0.6° C per minute) pulldown control has been selected (factory setting), no additional steps of capacity are added as long as difference between leaving-fluid temperature and set point is greater than 4° F (2.2° C) and rate of change in leaving-fluid temperature is less than 1° F per minute (0.6° C per minute).

If it has been less than 90 seconds since the last capacity change, compressors will continue to run unless a safety device trips. This prevents rapid cycling and also helps return oil during short *on* periods.

Lead/lag operation can be configured to balance compressor operating hours when set to automatic. When lead/lag operation is configured to automatic, a compressor wear factor is used to determine which circuit to start first by utilizing a combination of actual run hours and number starts. Lag compressors in a circuit would also be started to maintain even wear factors. Either circuit can be set to always lead, if desired.

The control also performs other special functions when turning on or off. When a circuit is to be turned off, EXV is closed first, and compressor is run until conditions are met to terminate pumpout to remove refrigerant that was in the cooler. At start-up, if a circuit has not run in the last 15 minutes, circuit is run to remove any refrigerant that has migrated to the cooler. The oil pressure switch is bypassed for 2 minutes during start-up and for 1 minute during normal operation.

Thermistors

Eight thermistors are used for temperature-sensing inputs to microprocessor. (A ninth [T9] and/or tenth [T10] may be used as a remote temperature sensor for optional LCWT reset.)

- T1 Cooler leaving chilled fluid temperature
- T2 Cooler entering fluid (return) temperature
- T3 Saturated condensing temperature — Circuit A
- T4 Saturated condensing temperature — Circuit B
- T5 Cooler saturation temperature — Circuit A
- T6 Cooler saturation temperature — Circuit B
- T7 Return gas temperature entering compressor cylinder — Circuit A
- T8 Return gas temperature entering compressor cylinder — Circuit B
- T9 Outdoor air temperature sensor (accessory)
- T10 Remote space temperature sensor (accessory)

The microprocessor uses these temperatures to control capacity, fan cycling, and EXV operation.

Electronic expansion valve (EXV)

To control flow of refrigerant for different operating conditions, EXV piston moves up and down over slot orifices through which refrigerant flows to modulate size of opening. Piston is moved by a stepper motor through 1500 discrete steps. The piston is repositioned by the microprocessor every 3 seconds as required.

The EXV is used to control superheat in compressor. The difference between 2 thermistors (compressor return gas temperature minus cooler saturation temperature) is used to determine superheat. The EXV is controlled to maintain superheat entering pistons at approximately 29 F (16.1 C), which results in slightly superheated refrigerant leaving cooler.

The electronic control provides for a prepurge and pumpout cycle each time the lead compressor in a circuit is started or stopped. These pumpout cycles minimize amount of excess refrigerant that can go to compressor on start-up and cause oil dilution (which would result in eventual bearing wear).

The microprocessor software is programmed so that EXV functions as an MOP (maximum operating pressure) valve, limiting the suction temperatures to 55 F (12.8 C).

Accessory controls

Demand can be further limited by keeping a selected number of compressors from turning on by utilizing demand limit control (the Energy Management Module is required for this function). This FIOP/accessory interfaces with microprocessor to control unit so that chiller's kW demand does not exceed its setting. It is activated from an external switch.

The standard *Comfort*Link™ control is programmed to accept various accessory temperature reset options (based on return-fluid temperature, outdoor-air temperature, or space temperature), that reset the LCWT. An accessory thermistor (T9 or T10) is required if outdoor-air temperature or space temperature reset is selected. The Energy Management Module (EMM) is only required for temperature reset that is initiated by a 4 to 20 mA signal.

Ground current protection

The 070-400 sizes have ground current protection that shuts off compressor(s) if a 2 to 3 amp ground current is sensed by a toroid around the compressor power leads.

30GTN,GTR,GBN,GBR *Comfort*Link controls with Scrolling Marquee display module

A standard four-digit alphanumeric display shows all of the *Comfort*Link control codes (with expandable clear language), plus set points, time of day, temperatures, pressures, and superheat. Additional information can be displayed all at once with the Navigator display.

Control sequence

Off cycle — During unit off cycle, crankcase heater is energized. If ambient temperature is below 36 F (2 C), cooler heaters (if equipped) are also energized. Electronic expansion valves are closed.

Start-up — After control circuit switches on, prestart process takes place, then microprocessor checks itself and waits for temperature to stabilize. First circuit to start may be A or B (automatic lead/lag feature). The controlled pulldown feature limits compressor loading on start-up to reduce demand on start-up and unnecessary compressor usage. The microprocessor limits supply-fluid temperature decrease (start-up only) to 1° F (0.6° C) per minute.

Capacity control

On first call for cooling, microprocessor starts initial compressor and fan stage on lead circuit. The EXV remains closed, permitting a pumpout on startup. After pumpout, the valves open and, if necessary, additional outdoor fans are energized. Crankcase heaters are deenergized when a compressor is started. As additional cooling is required, lag circuit starts. If further cooling is needed, compressors are added, alternating between lead and lag circuits. Speed at which capacity is added or decreased is controlled by temperature deviation from set point and rate of temperature change of chilled fluid. As *less* cooling is required, circuits shut down (or unload) in an order that balances each circuit's compressor run time (depending upon configuration). When no further cooling is called for (in each compressor circuit), EXV closes and compressor and fans continue to run while pumping down cooler.

Control features

Low-temperature override — This feature prevents LCWT from overshooting the set point and possibly causing a nuisance trip-out by the freeze protection.

High-temperature override — This feature allows chiller to add capacity quickly during rapid load variations.

Demand limit — If applied, limits the total power draw of unit to selected point by controlling number of operational compressors during periods of peak electrical demand. The Energy Management Module is required for either 2-stage or 4 to 20 mA demand limit.

Temperature reset — If applied, microprocessor compares either return fluid, space temperature, or outdoor-air temperature with the accessory board settings, and adjusts LCWT appropriately. The Energy Management Module can also be added for 4 to 20 mA reset.

Electronic expansion valve and condenser-fan control — The EXV opens and closes on signal from microprocessor to maintain an approximate 29° F (16° C) refrigerant superheat entering the compressor cylinders. (The compressor motor increases the refrigerant superheat from the approximate 5° F [3° C] leaving the cooler to that entering the cylinders.) Condenser fans (operated by microprocessor) run to as low an ambient as possible to maintain a minimum EXV pressure differential.

Abnormal conditions

All control safeties in chiller operate through compressor protection board or control relay and microprocessor. High-pressure switch directly shuts down compressor(s) through compressor protection board or control relay. For other safeties, microprocessor makes appropriate decision to shut down a compressor due to a safety trip or bad sensor reading and displays appropriate failure code on the display. Chiller holds in safety mode until reset. It then reverts to normal control when unit is reset.

Oil pressure safety — Safety cuts out if pressure differential is below minimum. Safety is bypassed on start-up for 2 minutes.

Loss-of-charge safety — Safety cuts out if system pressure drops below minimum.

High-pressure cutout — Switch shuts down compressors if compressor discharge pressure increases to 426 psig (2918 kPa).

Ground current safety — Safety opens on sensing a current-to-ground in compressor windings in excess of 2.5 amps.

Compressor anti-cycling — This feature limits compressor cycling.

Loss of flow protection — Additional protection is provided by temperature differences between entering and leaving fluid temperature sensors if cooler temperature drops to 34 F (1.1 C). Proof of flow switches are recommended.

Sensor failures — Failures are detected by the microprocessor.

Diagnostics

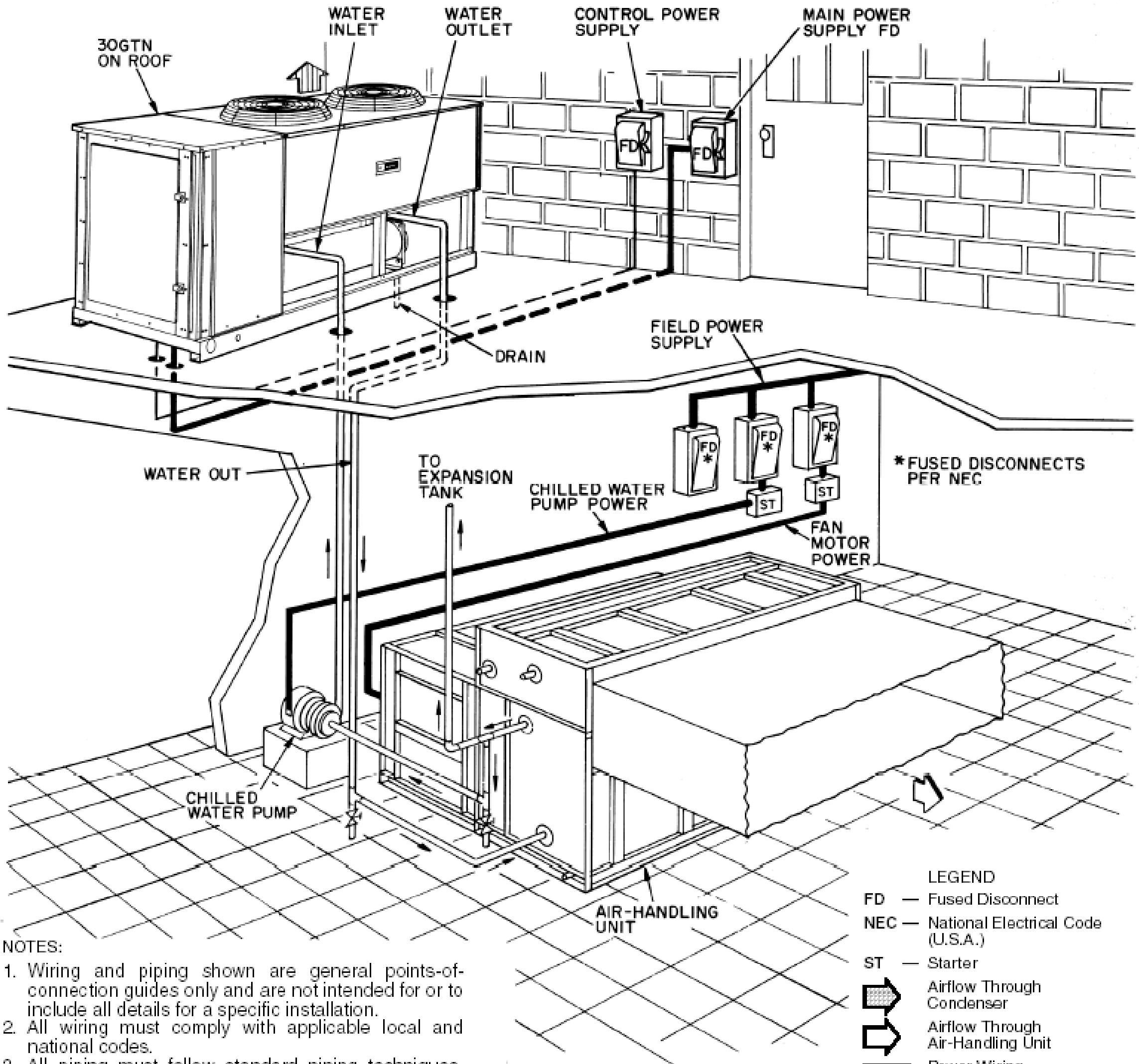
Microprocessor may be put through service test (see Controls, Start-Up, Operation, Service and Troubleshooting literature) without additional equipment or tools. Service test confirms microprocessor is functional, informs observer through display the condition of each sensor and switch in chiller, and allows observer to check for proper operation of fans and compressor(s).

Default settings

To facilitate quick start-ups, all 30GTN,GTR,GBN,GBR chillers with *Comfort*Link™ controls are pre-configured with a default setting that assumes stand-alone operation supplying 44 F (6.7 C) chilled water.

Configuration setting will be based on any options or accessories included with the unit at the time of manufacturing. Date and time will need reconfiguring based on location and local time zone. If operation based on occupancy scheduling is desired, this will also need to be set during installation.

Typical piping and wiring — 30GTN,GTR050-110, GBN,GBR150-200



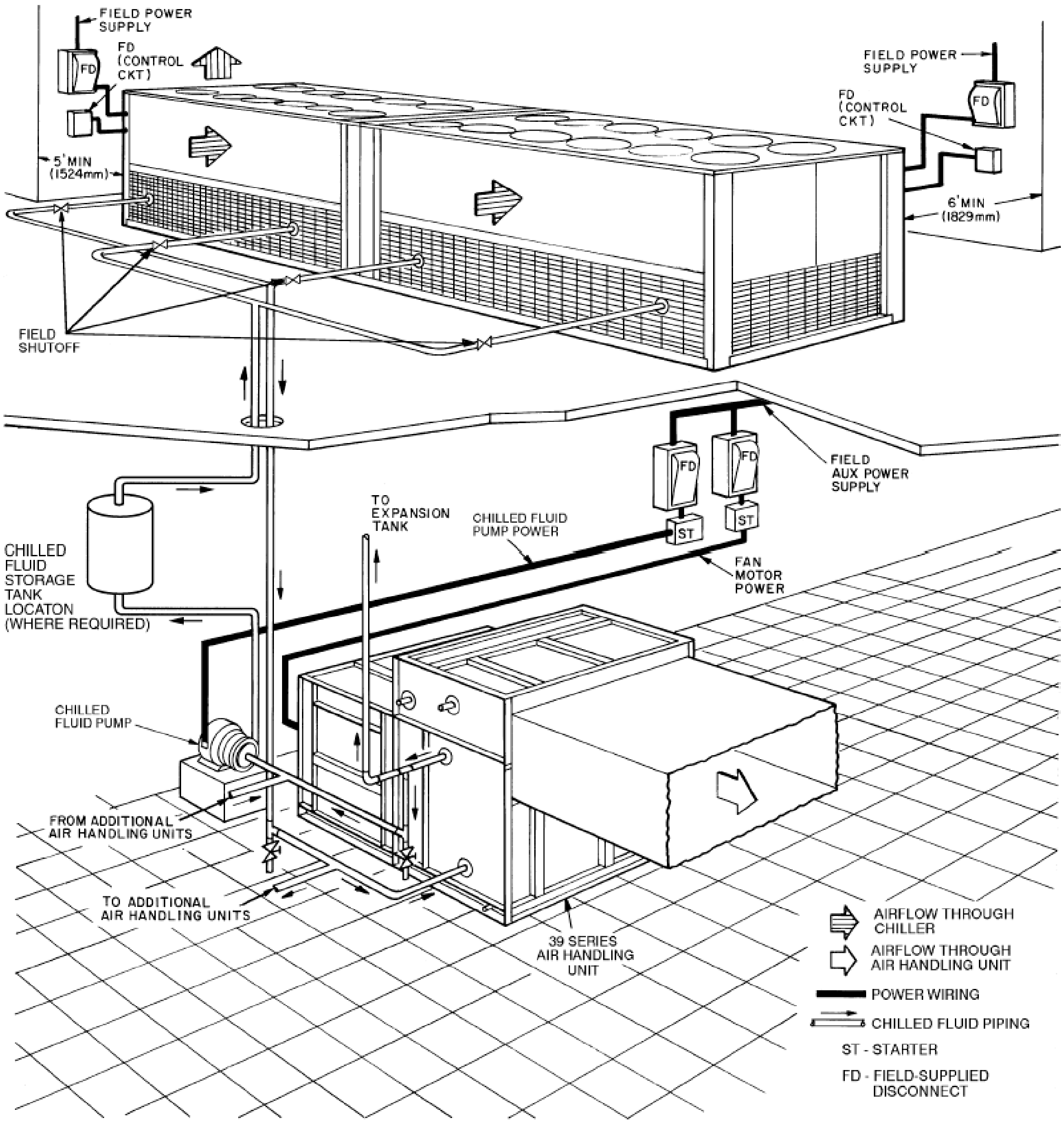
NOTES:

1. Wiring and piping shown are general points-of-connection guides only and are not intended for or to include all details for a specific installation.
2. All wiring must comply with applicable local and national codes.
3. All piping must follow standard piping techniques. Refer to Carrier System Design Manual for details.

LEGEND

FD — Fused Disconnect
NEC — National Electrical Code (U.S.A.)
ST — Starter
Airflow Through Condenser
Airflow Through Air-Handling Unit
Power Wiring
Control Wiring
Chilled Water Piping

Typical piping and wiring — 30GBN,GBR300-400



NOTES:

1. Chiller must be installed level to maintain proper compressor oil return.
2. Wiring and piping shown are general points-of-connection guides only and are not intended for a specific installation. Wiring and piping shown are for a quick overview of system and are not in accordance with recognized standards.
3. All wiring must comply with applicable local and national codes.
4. All piping must follow standard piping techniques. Refer to Carrier System Design Manual or appropriate ASHRAE (American Society of Heating, Refrigeration, and Air Conditioning Engineers) handbook for details.
5. See Application Data section on page 44 for minimum system fluid volume. This may require the addition of a holding tank to ensure adequate volume.

Guide specifications

Reciprocating Air-Cooled Liquid Chiller

HVAC Guide Specifications

Size Range: **50 to 400 Tons (176 to 1408 kW) Nominal**

Carrier Model Number: **30GTN,GTR,GBN,GBR**

Part 1 — General

1.01 SYSTEM DESCRIPTION

Easy-to-use, microprocessor-controlled air-cooled liquid chiller utilizing reciprocating compressors and long-stroke electronic expansion valves.

1.02 QUALITY ASSURANCE

A. Unit shall be manufactured in a facility registered to ISO 9001 (International Standards Organization) manufacturing quality standard.

E. Unit operation shall be fully tested at the factory.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Unit shall be stored and handled per unit manufacturer's recommendations.

B. Unit controls shall be capable of withstanding 150 F (66 C) storage temperature in the control compartment for an indefinite period of time.

Part 2 — Products

2.01 EQUIPMENT

A. General:

Factory-assembled, single piece, air-cooled liquid chiller. Contained within the unit cabinet shall be all factory wiring, piping, controls, refrigerant charge (R-22), and special features required prior to field start-up.

B. Unit Cabinet:

1. Frame shall be of heavy-gage galvanized steel members.
2. Cabinet shall be galvanized steel casing with a pre-painted finish.
3. Cabinet shall be capable of withstanding 500-hour salt spray test in accordance with the ASTM B-117 standard.

C. Fans:

Condenser fans shall be direct-driven propeller type discharging air vertically upward and shall be equipped with the following features:

1. Permanently lubricated bearings.
2. Steel wire safety guards.
3. Statically and dynamically balanced fan blades.

D. Compressors:

1. Reciprocating semi-hermetic type only.
2. Each equipped with an automatically-reversible oil pump, operating oil charge, suction and discharge shutoff valves, and an insert-type factory-sized crankcase heater to control oil dilution.
3. Each mounted on spring vibration isolators with an isolation efficiency of no less than 95%.
4. Speed shall not exceed 1750 rpm (29.2 r/s).
5. Cycles per hour per compressor shall not exceed 6.

E. Cooler:

1. Shell-and-tube type with removable heads.
2. Tubes shall be internally enhanced seamless-copper type rolled into tube sheets.
3. Equipped with flange type fluid connections.
4. Shell shall be insulated with 3/4-in. (19-mm) PVC foam (closed-cell) with a maximum K factor of 0.28.
5. Design shall incorporate 2 independent direct-expansion refrigerant circuits.
6. Cooler shall be tested and stamped in accordance with ASME Code for a refrigerant working side pressure of 278 psig (1916 kPa).
   Cooler shall have a maximum fluid-side pressure of 300 psig (2068 kPa).

F. Condenser:

1. Coil shall be air-cooled with integral subcooler, constructed of aluminum fins mechanically bonded to seamless copper tubes which are then cleaned, dehydrated, and sealed.
2. Air-cooled condenser coils shall be leak tested at 150 psig (1034 kPa) and pressure tested at 450 psig (3103 kPa).

G. Refrigeration Components:

Refrigerant circuit components shall include hot gas muffler, high side pressure switch, liquid line shutoff valves, suction and discharge shutoff valves, filter drier, moisture-indicating sight glass, stepper motor actuated electronic expansion valve (EXV) or thermostatic expansion valve (TXV), and complete operating charge of refrigerant R-22 and compressor oil.

H. Controls, Safeties, and Diagnostics:

1. Controls:
   a. Unit controls shall include the following minimum components:
      1) Microprocessor.
      2) Power and control circuit terminal blocks.
      3) ON/OFF control switch.
      4) Replaceable solid-state relay panel.
      5) Clear language, expandable, alpha numeric diagnostic display/set point panel.
      6) Thermistor installed to measure saturated condensing temperature, cooler saturation temperature, compressor return gas temperature, and cooler entering and leaving fluid temperatures.
   b. Unit controls shall be capable of performing the following functions:
      1) Automatic circuit lead/lag (accessory required for 040-070 sizes).
      2) Pumpout at beginning and end of every circuit cycle.
      3) Capacity control based on leaving chilled fluid temperature and compensated by rate of change of return-fluid temperature.
      4) Limiting of the chilled fluid temperature pulldown rate at start-up to 1° F (.56° C) per minute to prevent excessive demand spikes (charges) at start-up.
      5) Seven-day time schedule.
      6) Leaving chilled fluid temperature reset from return fluid, outdoor-air temperature, space temperature, or 4 to 20 mA input.
      7) Demand limit control with 2-stage control (0 to 100% each) or through 4 to 20 mA input (0 to 100%).

2. Safeties:
   a. Unit shall be equipped with thermistors and all necessary components in conjunction with the control system to provide the unit with the following protections:
      1) Loss of refrigerant charge protection.
      2) Low fluid flow detection.
      3) Low chilled fluid temperature protection.
      4) Low and high superheat protection.
      5) Low control voltage (to unit) protection.
      6) High-pressure switch.
      7) Low oil protection for each compressor circuit
      8) Ground current compressor protection.
   b. Compressors shall be equipped with the following manual-reset type protections:
      1) Pressure overload.
      2) Electrical overload through the use of definite-purpose contactors and calibrated, ambient compensated, magnetic trip circuit breakers. Circuit breakers shall open all 3 phases in the event of an overload in any one phase (single-phasing condition).
   c. Fan motors shall have inherent overcurrent protection.
3. Diagnostics:
   a. The diagnostic display module shall be capable of indicating the safety lockout condition by displaying a code for which an explanation may be scrolled at the display. Information included for display shall be:
      1) Compressor lockout.
      2) Loss of charge.
      3) Low fluid flow.
      4) Low oil pressure.
      5) Cooler freeze protection.
      6) High or low suction superheat.
      7) Thermistor malfunction.
      8) Entering and leaving-fluid temperature.
      9) Evaporator and condenser pressure.
      10) Electronic expansion valve positions.
      11) All set points.
      12) Time of day.
   b. Display module, in conjunction with the microprocessor, must also be capable of displaying the output (results) of a service test. Service test shall verify operation of every switch, thermistor, fan, and compressor before chiller is started.

I. Operating Characteristics:
1. Unit shall be capable of starting and running fully loaded at outdoor ambient temperatures from 0° F to 125 F (–18 to 52 C), without special controls.
2. Unit shall be capable of starting up with 95 F (35 C) entering-fluid temperature to the cooler.
3. Multi-step cooling capacity control shall be accomplished through the use of unloaders and compressor staging.
4. Two refrigerant circuits shall be provided to protect against loss of total capacity.
5. Unit shall have automatic lead/lag feature to automatically alternate the lead circuit to ensure even compressor wear.

J. Motors:
1. Compressor motors shall be cooled by suction gas passing around motor windings.
2. Condenser-fan motors shall be 3-phase type with permanently lubricated bearings and Class B insulation.
3. Fan motors are totally enclosed, air-over (TEAO) type in accordance with IP-55.

K. Electrical Requirements:
1. Unit primary electrical power supply (3-phase) shall be connected to a single location.
2. Unit control power (single-phase) shall be connected to a separate entry point.
3. Unit shall be shipped with factory control and power wiring installed.

Carrier
A United Technologies Company

Carrier International Sdn. Bhd., Malaysia