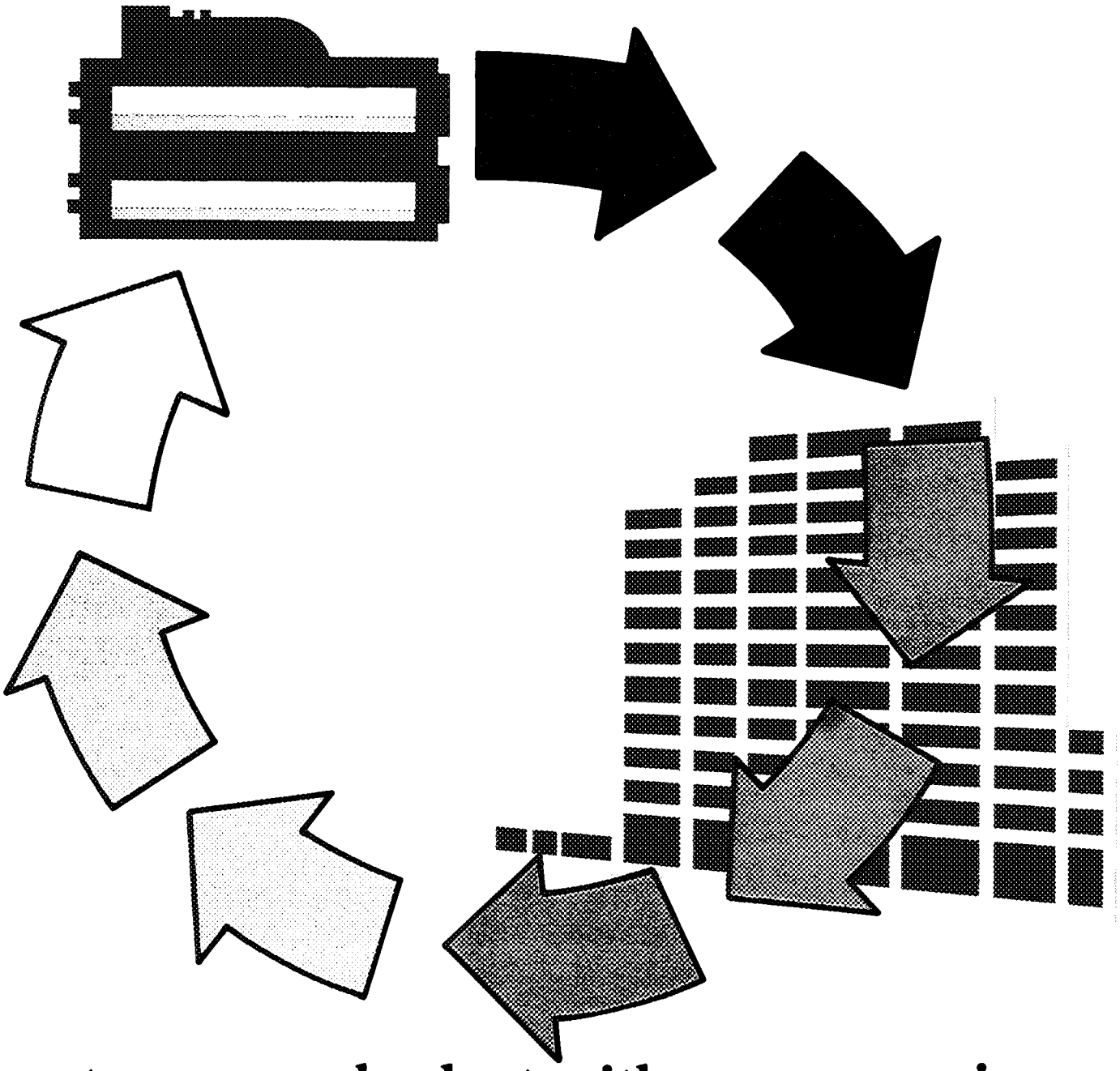
Carrier
Packaged Hermetic Centrifugal Liquid Chillers

19 Series
100-2000 tons
(352-7034 kW)



On stream, on budget with energy-saving solutions to comfort air conditioning and process cooling challenges!

Carrier®

The 19 Series: Built to save energy, save you money and get the job done right

Dr. Willis Carrier invented centrifugal refrigeration in 1922 and today, more than half a century and 25,000 machines later, Carrier hermetic centrifugal liquid chillers still lead the way in comfort air conditioning and process cooling. What's more, the modern day 19 Series centrifugals are specifically designed to afford significant dollar savings on utility bills, in every way possible.

The Carrier 19 Series centrifugal design philosophy has always been to offer a variable line which meets each unique specification while at the same time maintaining low first costs and low operating costs. Incorporated in this philosophy are such features as the 19 Series inline impeller design, hermetically sealed compressor-motors, gear drives and refrigerant options. The success of this concept can be seen in the 25,000 plus machines which have been applied to date.

Carrier's hermetic centrifugals have always used various refrigerants at different tonnage ranges in order to keep the heat exchanger size and cost down. Now, over and above the low first cost concept, Carrier offers refrigerant options to meet your specific job requirements in the most efficient way possible.

The full hermetic line consists of four models, each with a cycle, refrigerant and tonnage range specifically matched to your application demands. From 100 tons (352 kW) to 2,000 tons (7034 kW), the Carrier hermetic centrifugals are capable of performance at levels of .85 KW/Ton (3.0 KW/kW) to .65 KW/Ton (2.3 KW/kW) *and lower,* depending on design conditions. With features such as mix-match capability, high performance heat exchangers, refrigerant options, multi-pass water boxes as well as the 19 Series hermetic compressor designs, a Carrier centrifugal can be optimized to meet any job requirement. The "Low Energy Consumption Curve" illustrates performance levels possible within the tonnage capabilities of the 19 Series hermetic line. You get the most efficient, most reliable, energy-conscious and completely packaged machine for your particular application. The hi-lift capabilities (up to 100 F) make the 19 line ideally suited for brine chilling, ice rink applications and process cooling. In areas with cooling tower restrictions, you can even specify a hi-lift Carrier centrifugal for use with closed circuit water condensing systems. The versatile Carrier centrifugals are also designed for low-lift requirements of today's energy-conscious market.

Carrier's computer approach to matching the machine and capacity to a specific application gives you access to literally thousands of condenser, compressor, cooler, refrigerant and pass combinations. Initial costs are lower because you select only what you need — a smaller package. Operating costs are reduced because the mix-matching of components allows lower energy consumption selections. In addition, a Carrier Sales Engineer has the ability to optimize selections, by varying conditions, thru the use of the Performance Programs. Should your job requirements demand performance other than what is shown in this catalog, contact your Carrier Sales Engineer (refer to page 50 for the office nearest you). Thru computerized selection he will be able to design your "custom built" hermetic centrifugal.

Not only can Carrier Sales Engineers optimize your refrigeration requirements but they can optimize your total system as well. Thru various specialized computer programs, for example, a Carrier Sales Engineer can vary your leaving chilled water temperature a degree or increase your chilled water temperature differential from 10 to 14 F and show how the *total system* is affected with respect to operating costs. In this complex market of low energy consumption as well as low first cost, Carrier can offer you productive ways to reduce your costs.

Energy-saving, precision design: extends compressor motor life, saves on operating costs, increases electrical efficiency

- **Hermetic design**
- **Gear-drive compressors**
- **In-line impeller design**
- **Refrigerant-cooled motors**
- **Solid state capacity control**
- **Thermal purge**
- **55 F (13 C) condenser water**
- **Flash and thermal economizer**
- **Multi-pass water boxes**
- **Compressor-motor-heat exchanger mix-match**

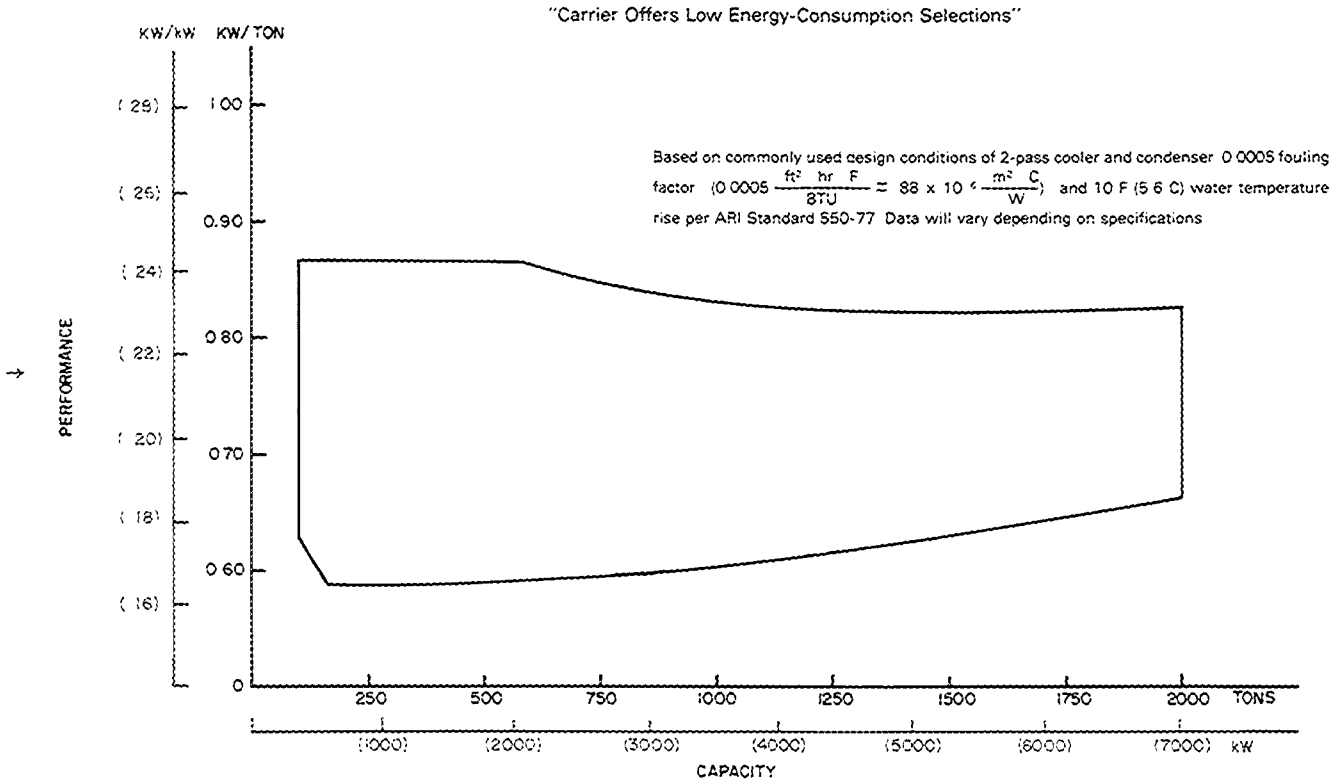
Engineering excellence provides lower first costs and years of trouble-free service

- **Single-unit construction**
- **Factory-wired oil pump starter**
- **Permanent shipping bases**
- **Prepiped motor lubrication package**
- **Storage tank**
- **Factory start-up**
- **Integral chilled water sensor**
- **Elapsed-time indicator**

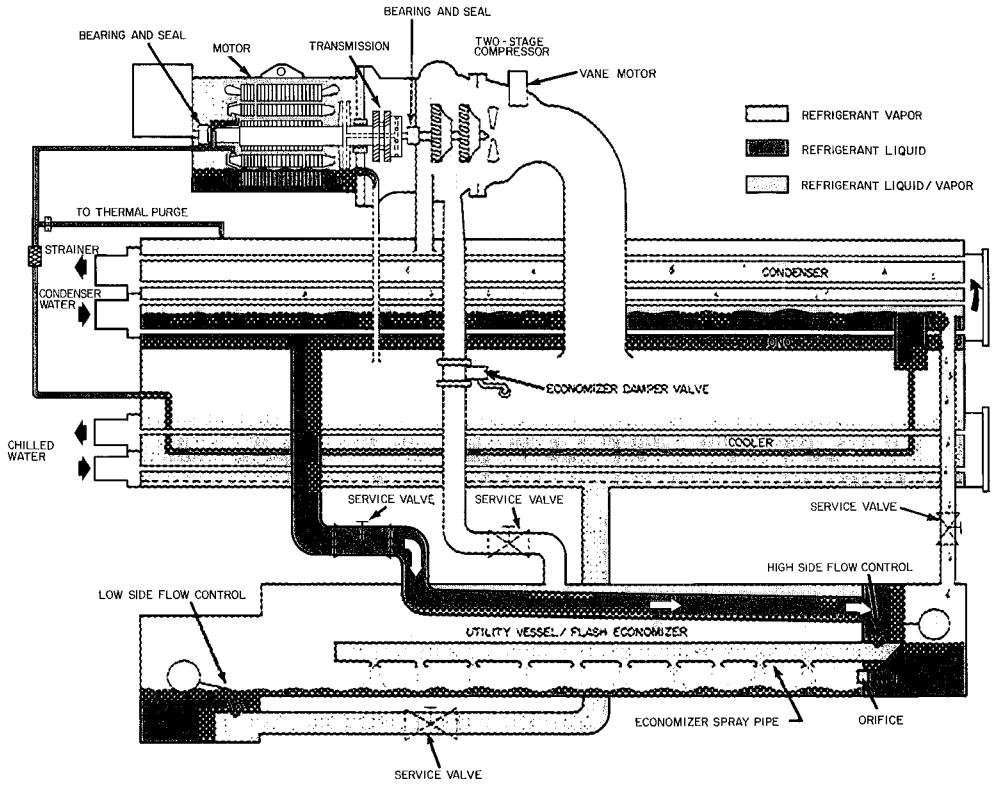
Computer selection saves time, cuts costs

Full line centrifugal service centers assure optimal care of your unit

Convenience options offered for added energy efficiency, 'tailor-made' systems

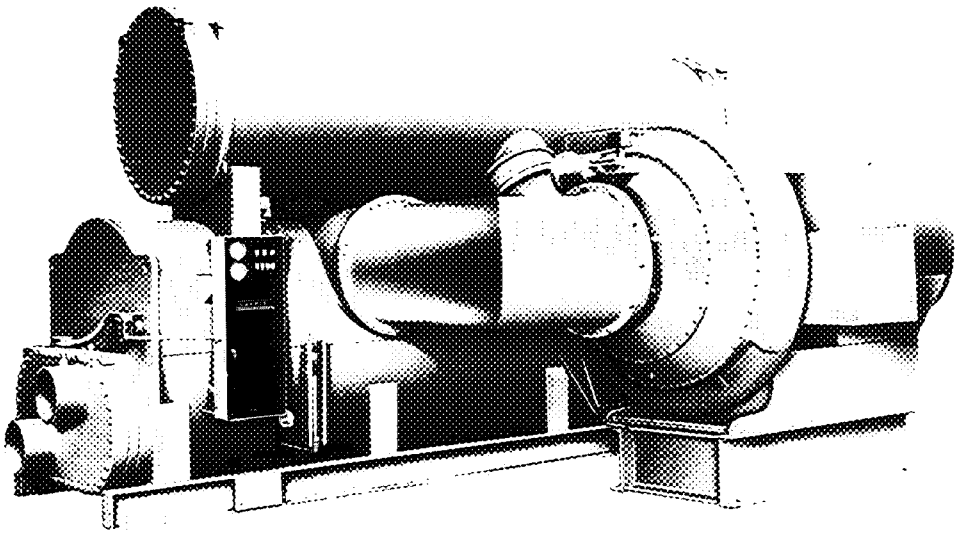


19 Series Centrifugals — The ideal refrigeration cycle



Carrier centrifugals use refrigerant (R-11, 114, 12 or 500) in a standard compression, single- or two-stage refrigeration cycle. System water in the cooler is chilled as its heat is transferred to refrigerant at low temperature and pressure. As heat is removed from the water, the refrigerant vaporizes and is drawn into the compressor at a rate controlled by the degree of the guide vane opening. As the compressor raises the vapor pressure, the saturation temperature of the refrigerant rises above that of the condenser water. Refrigerant vapor is discharged directly into the condenser, where relatively cool condenser water removes heat from the vapor, causing it to condense again to liquid. The heated water leaves the system, returning to a cooling tower or other heat rejection device. The liquefied refrigerant then leaves the condenser, draining into a chamber where a variable metering device regulates refrigerant flow and maintains a liquid seal to prevent vapor from passing into the cooler. As the refrigerant liquid goes thru this metering device, part of it vaporizes because of reduced pressure, cooling the remaining liquid to the temperature at which the cycle began.

Energy-saving, precision design: extends compressor motor life, saves on operating costs, increases electrical efficiency



19CB

Hermetic design

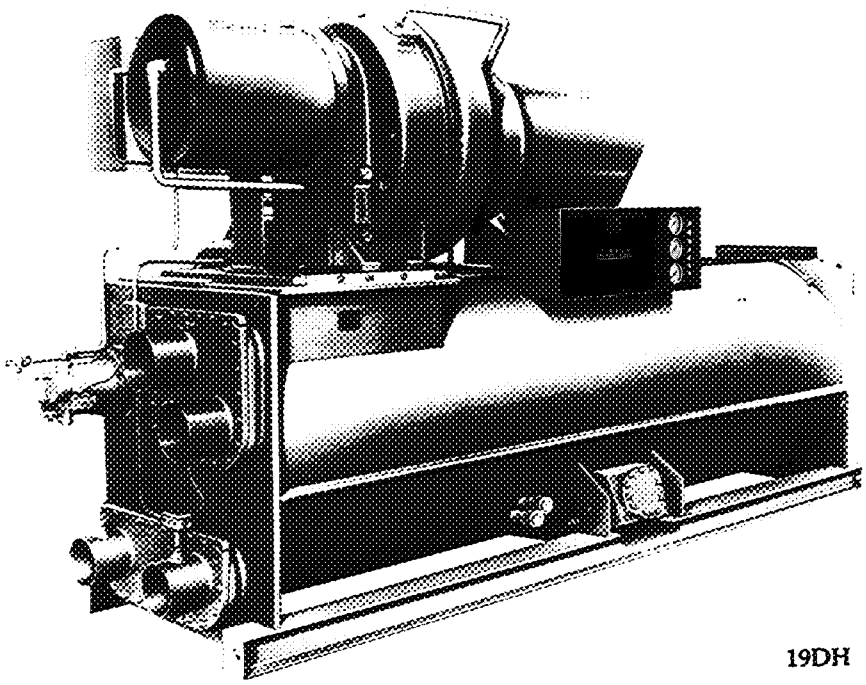
Hermetic compressor design keeps motor free of airborne dirt and moisture. It also isolates motor to keep heat and sound from equipment room. Eliminates shaft seal with its potential refrigerant leakage.

→ Gear driven compressors

Gear driven compressors allow more flexibility in selection than direct drive because gear ratios can be fitted to particular application. Gear driven compressors also allow optimum impeller speed, higher head applications and increased operating efficiency.

Multi-pass water boxes

The complete 19 Series line offers 1,2,3 and 4 pass water boxes on both the coolers and condensers. The result is better heat transfer when needed — reducing operating costs. In addition, all pass arrangements are available at no extra cost.



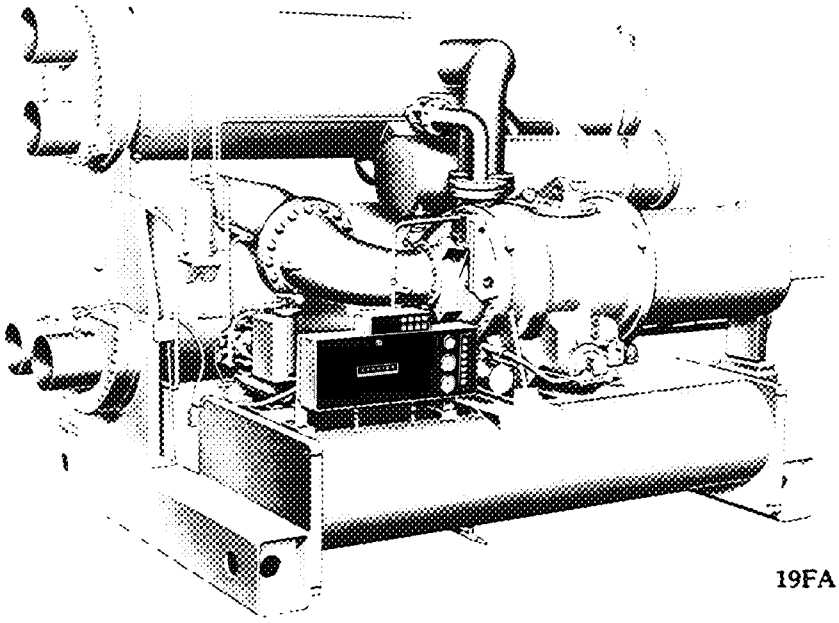
19DH

Refrigerant-cooled motor

All 19 Series compressors have refrigerant-cooled motors that operate at low, even temperatures throughout the motor windings to insure long motor life at high electrical efficiency.

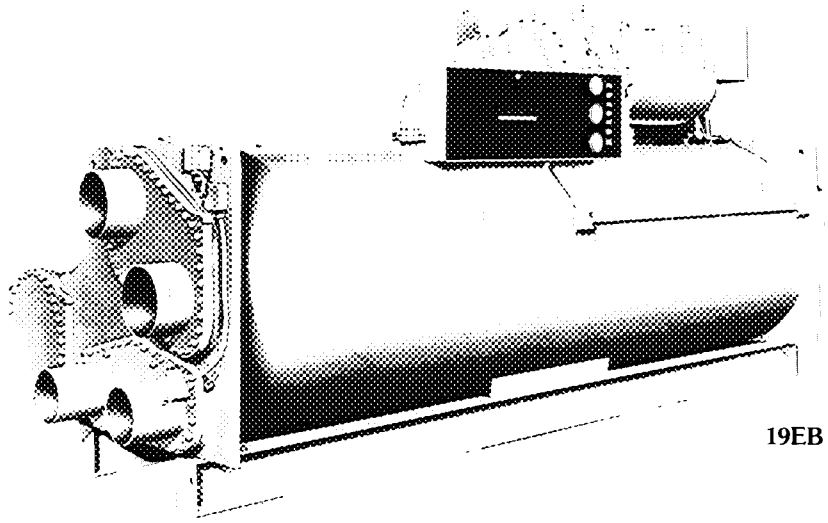
Solid state capacity control

The capacity control module offers solid state compactness and reliability, with smooth and precise capacity modulation from 100% to 10% of full load, without hot gas bypass. It is more efficient in maintaining leaving water temperatures than any other type of control. The convenient, centrally located control center provides fully automatic machine operation, complete with a full complement of safety interlocks. Check operating status at a glance, easily monitor all system operating points. The highly sensitive, factory-installed thermistor probe, solid state amplifier, and guide vane actuator are precisely matched and fully responsive to changes in leaving chilled water temperature. They help to maintain your selected design temperature throughout all operating load conditions. The result is efficient, trouble-free operation with longer life expectancy.



19FA

All control connections can be made quickly to a single terminal strip; and once the solid state control has been calibrated, control settings may be changed without additional field calibration.



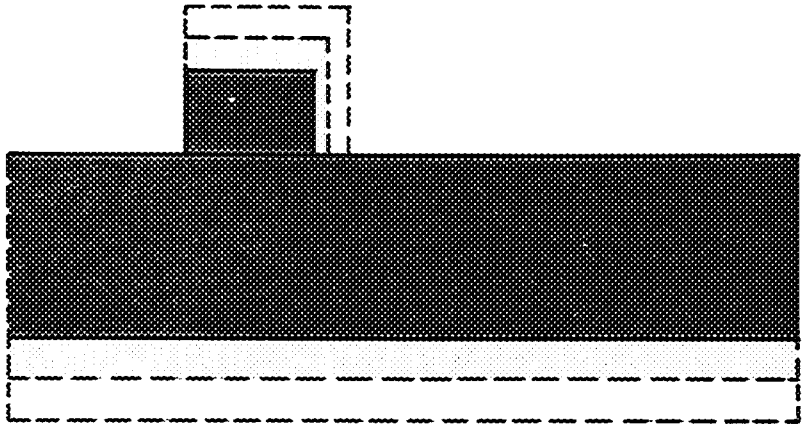
19EB

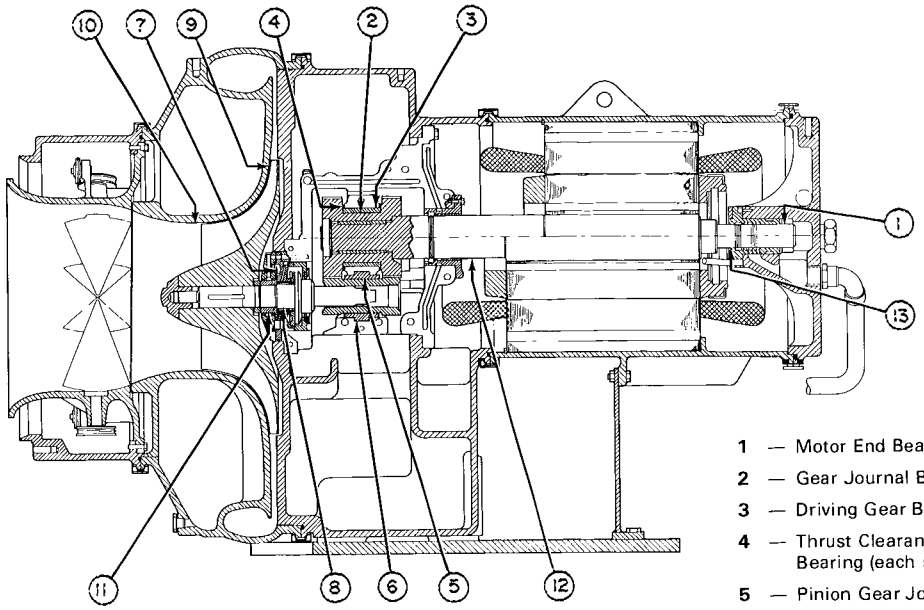
55 F (13 C) condenser water

The Carrier metered refrigerant design allows the 19 Series chillers to operate efficiently with condenser water temperature as low as 55 F (13 C) without condenser water bypass or mixing tanks. The 55 F (13 C) condenser water means reduced head pressures which in turn means lower horsepower requirements The end result is lower energy costs and lower annual operating costs. In addition, the absence of a condenser water bypass and mixing tanks add up to lower first costs and lower installation costs.

Compressor-motor-heat exchanger mix-match

Each model within the 19 Series line has the capability of mix-matching various heat exchanger sizes with an array of compressor-motor combinations. As illustrated, mix-matching allows you to mount a small capacity compressor on a large heat exchanger. This design concept optimizes specified conditions, improving full and part load performance.





19DH

In-line impeller design

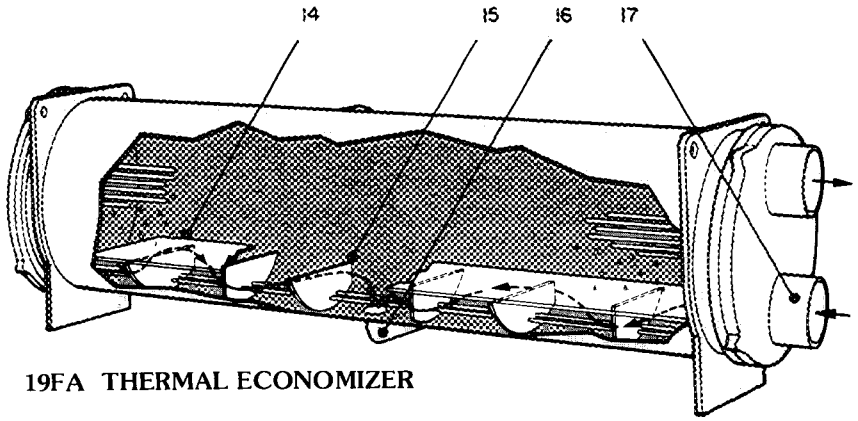
→ In-line impeller design, with diaphragm between stages, allows for more flexibility in compressor component selection, which results in first cost savings on other machine components. Also provides higher head capabilities, prevents uneven loading and allows for routine, easy maintenance.

LEGEND

1 — Motor End Bearing
2 — Gear Journal Bearing
3 — Driving Gear Bearing To Housing
4 — Thrust Clearance on Gear Bearing (each side)
5 — Pinion Gear Journal Bearing
6 — Pinion Gear Bearing To Housing
7 — Thrust Bearing
8 — High-Speed Journal Bearing
9 — Front of Impeller to Volute Wall
10 — Impeller Eye to ID of Inlet Ring
11 — Labyrinth Behind Impeller to Spacer Ring
12 — Labyrinth Behind Transmission and Motor Shell
13 — End-Bell Bearing Labyrinth

Flash and thermal economizer

Two-stage models thru 1,600 ton (5627 kW) capacity feature a thermal economizer. The thermal economizer shown brings warm condensed refrigerant into contact with the inlet (coldest) water tubes where water as low as 55 F (13 C) may be flowing. This low temperature water subcools the refrigerant so when it moves on in the cycle it has greater cooling potential, thus improving cycle efficiency and reducing power/ton requirements. In addition, all two-stage models employ a flash economizer, not shown, to further improve cycle efficiency. The liquefied refrigerant leaves the condenser thru a metering device and flows into the flash economizer where the normal flashing of part of the refrigerant into vapor is used to cool the remaining refrigerant. The flash vapor is diverted directly to the compressor's second stage so that it does not have to be pumped thru the full compression cycle. The flash economizer generates savings and significantly lowers operating costs.



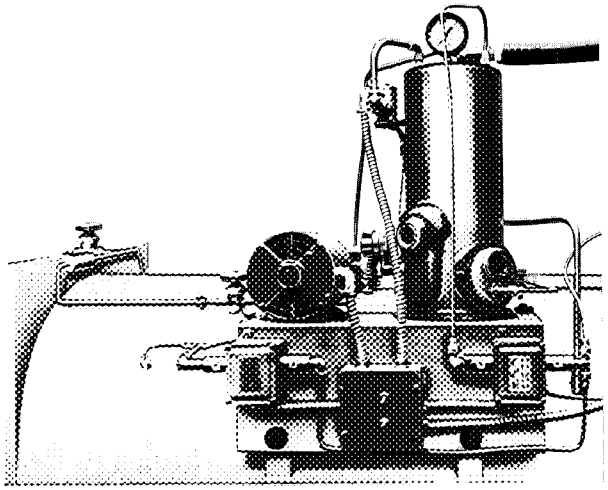
19FA THERMAL ECONOMIZER

LEGEND

14 — Thermal Economizer Partition Plate
15 — Refrigerant Flow Baffle
16 — Refrigerant Liquid Drain Line
17 — Condenser Water Inlet

Thermal purge

The thermal purge effectively removes air, water, and noncondensables from the refrigerant system, promoting greater operating efficiency and lower maintenance costs. It needs no water connections or air-cooled condenser. It performs normal system purging during periods of operation on R-11 and R-114 machines. In addition, on R-11 machines it doubles as a pump for leak testing or machine evacuation after servicing. It also provides recovery of refrigerant under normal purging conditions.



19DH

Engineering excellence provides lower first costs and years of trouble-free service

Single unit construction

Carrier centrifugals are the most completely packaged units of their kind. Chiller is shipped as a single unit complete with integral storage tanks where required. Ready for quick connection to water and electrical sources at the job site. (Compressor is field installed on the 1,600-2,000 ton (5627-7034 kW) models; the heat exchanger and economizer are factory assembled.) In addition, Carrier centrifugals arrive at the job site with controls mounted and pre-wired including the chilled water thermistor. All control connections can be made to a single terminal strip. Single unit construction assures minimum installation time, minimum installation costs.

Factory-wired oil pump starter

Models available for U.L. listing feature a factory-wired oil pump starter The starter is factory wired to the machine with overloads and contactors sized by Carrier for U.L. compliance. The entire assembly is factory mounted to save installation time and field labor costs.

Permanent shipping bases

Rigging can be done faster and the need for costly concrete bases and supports is eliminated with 19 Series permanent shipping bases.

Prepiped motor lubrication package

The oil pump, motor, filter, cooler, pressure controls, and electrical terminals are all prepiped and wired to save on-site labor costs and installation headaches.

Storage tank

The storage tank is an integral part of the machine design on all R-12 and R-500 units. No additional pipings, fittings or valves are needed. No increased floor space is required which saves you first cost dollars. Servicing or testing may be easily accomplished without time-consuming transfer to separate containers which saves you service dollars. Models using R-114 offer the storage tank as an option at minimal cost. They are constructed to ASME code requirements and include all necessary connections for refrigerant transfer system.

Factory start-up

Carrier start-up service for your machine is included in the purchase price. This assures you of trouble-free, working installation right from the start. It includes refrigerant transfer, leak testing and precision calibrating of the solid state control settings and safety control settings.

Integral chilled-water sensor

A chilled-water thermistor probe is furnished, installed in the leaving chilled water nozzle as part of the machine's standard control system. A signal from the sensitive solid-state device to the central control module automatically initiates immediate adjustments to compressor capacity. This eliminates the need for accessory pneumatic equipment, separate sensing devices, saves you initial equipment cost, and makes installation easier, more economical. As part of the machine's standard control system, it does not have to be specified in another portion of the job, and thus further reduces first and installation costs.

Elapsed-time indicator

Every Carrier centrifugal features an elapsed-time indicator to provide an immediate and constant record of machine operating hours. No over- or underestimating when scheduling maintenance. Mounted outside of the control box for easy visibility.

Full line centrifugal service centers assure optimal care of your unit.

When you specify Carrier, you get a complete service organization unequaled in the industry. Carrier Service Operations is a national organization in over 150 key locations throughout the United States and Canada. This is the one service organization that has grown up with the air conditioning industry. Today, more and more owners rely on Carrier Service Operations for an in-depth, practical approach to energy conservation. This extraordinary full-time commitment to quality maintenance and service proves Carrier's interest in continued customer satisfaction. Your centrifugal, in fact your entire HVAC system, will be in the care of people who are fully versed on the design, manufacture, installation, start-up and maintenance of your equipment.

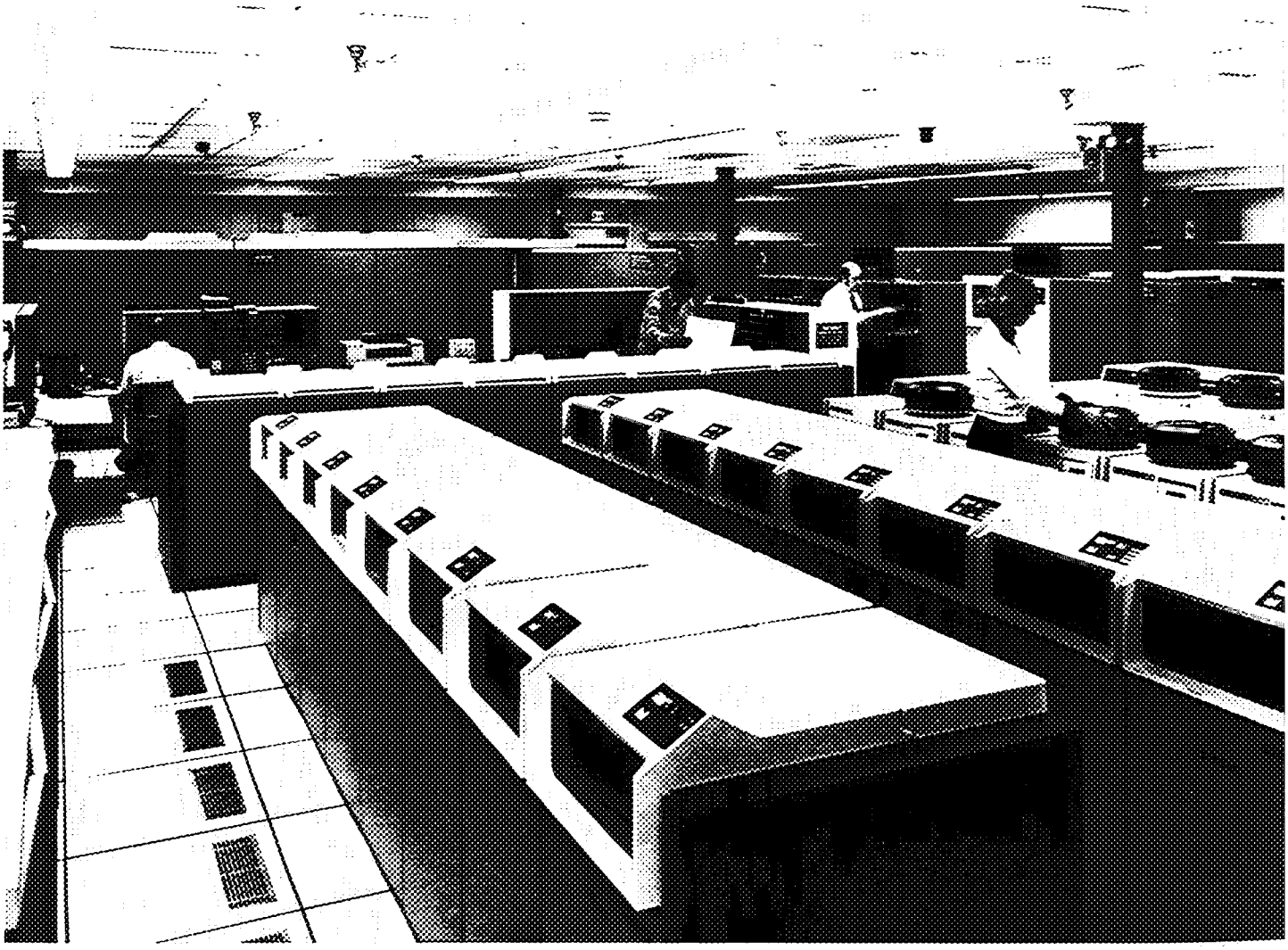
Computer selection means "custom built" machinery — saves design time and lowers cost.

Supplementing the selections in this publication, Carrier has, for your convenience, developed computer selection and performance programs for 19 Series hermetic units that incorporate 800,000 combinations of condenser, compressor, and cooler components. Computerization of this data allows you to take full advantage of Carrier's tremendous job-matching flexibility.

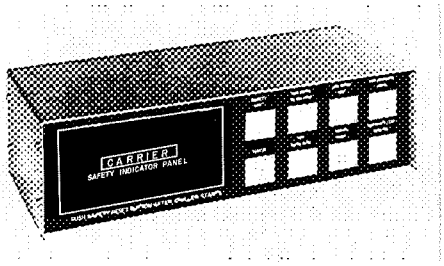
Only Carrier features the truly optimized selection and performance programs which are far superior to the limited combination, manual/ computer compromise selection systems. With Carrier you have the ultimate flexibility — you can specify an entering OR a leaving condenser water temperature; a temperature differential or a water flow rate. This unique service takes a minimal amount of time and it's completely free when you select Carrier.

Remember these advantages you'll get from using Carrier's computer selection service when choosing your 19 Series hermetic centrifugal:

- Fast, accurate equipment selection.
- Comprehensive data, comparing best first cost and best operating cost selection.
- Accurate matching of components at full and part load.
- Reliable forecasting of owning and operating costs.
- A clear picture of how the chiller functions with the other components of your system.
- The capability to vary conditions, optimize selections and define part load conditions with the performance programs.
- Comparative flow rates applied to various condenser water temperatures to assist you in selecting the cooling tower.
- Savings all year long.



Convenience options offered for added energy-efficient, 'tailor-made' systems

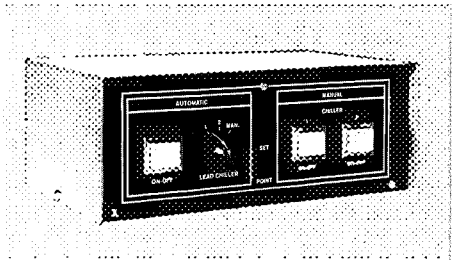


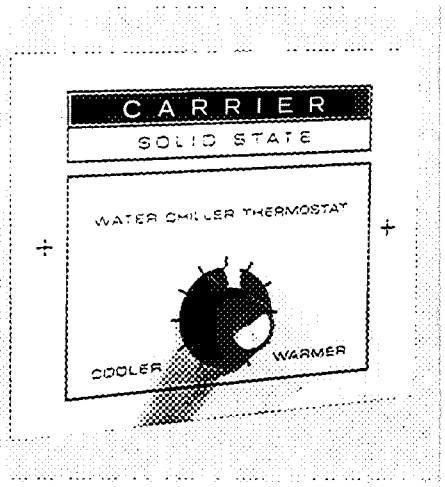
Safety indicator panel

This accessory provides the operator with an instant trouble-shooting capability. Seven panel lights monitor high motor or bearing temperature, low refrigerant temperature, high condenser pressure, starter (overloads and protective devices), low water flow (chilled or condenser), low oil pressure, low chilled water temperature. When safety is tripped, the light goes on. Panel does not affect the integrity of the central control system, is easily connected to the machine without disturbing factory wiring. In addition, a remote sound or light alarm can be easily field installed to alert you, should a safety light be tripped on the indicator panel. Only a simple two-wire hook-up is required.

Pneumatic capacity control

Complete pneumatic control systems are available, if desired, for the centrifugals in the 100 to 2000 ton (352-7034 kW) sizes.





Remote control set point

Select or alter machine chilled water temperature from a remote location by specifying this optional solid state control.

Lead-lag control

Desirable when two or more machines are installed in series or parallel. Centralized control features the following capabilities:

- parallel operation
- series operation with split or common point control
- two or more chiller operations
- uneven sized chillers working together
- independent control of chillers both manually and automatically
- automatic lead-lag operation
- reassignment of lead-lag hierarchy
- automatic standby

Panel lights indicate system operating mode.

Selective insulation

The 19 Series machines are adequately insulated at the factory to meet most application demands. However, additional insulation packages are available for specific machine applications.

Isolation assembly

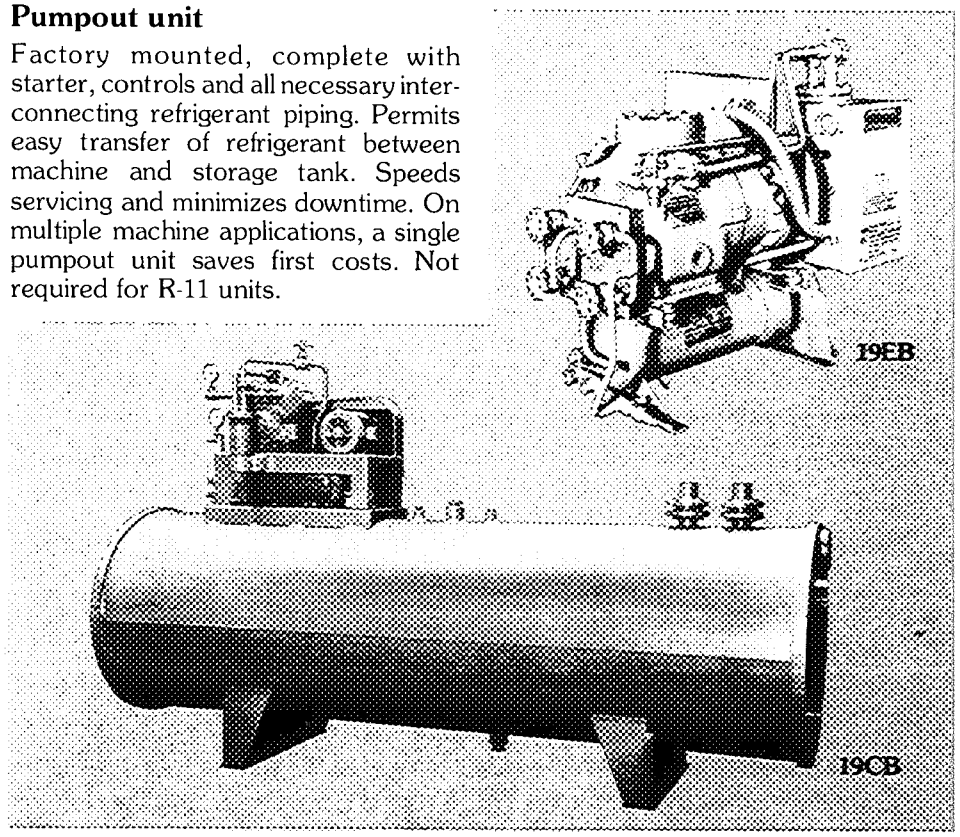
A combination of soleplates, jacking screws, leveling pads and neoprene pads are available in isolation packages. Specify this option for installations requiring special mounting. Isolation pads are shipped at no charge.

Hot gas bypass

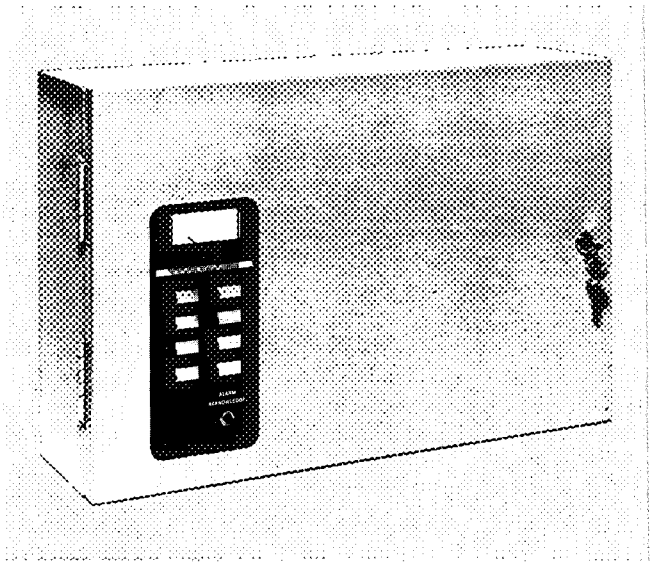
When a machine is expected to run at light load and elevated condensing temperatures or at minimum load for extended periods of time, a hot gas bypass is recommended. The hot gas bypass is factory mounted and wired, manual or automatic. It virtually eliminates compressor surging at extreme part-load conditions and smooths out the machine's full operating cycle, whatever the load fluctuation.

Pumpout unit

Factory mounted, complete with starter, controls and all necessary interconnecting refrigerant piping. Permits easy transfer of refrigerant between machine and storage tank. Speeds servicing and minimizes downtime. On multiple machine applications, a single pumpout unit saves first costs. Not required for R-11 units.

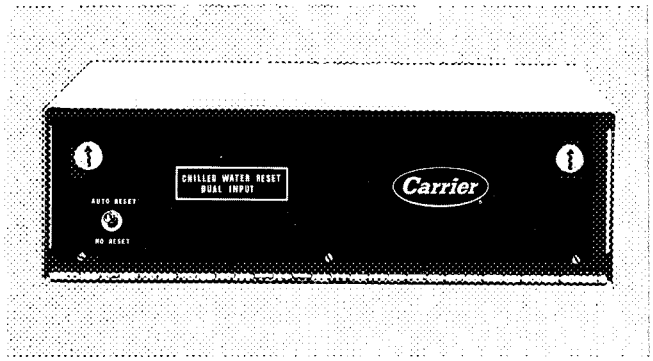


Additional energy-saving options



The power monitor control

An electronic, energy-saving device which continuously monitors building electric demand and sheds preselected loads in stages during peak power usage periods. The power monitor control reduces power consumption and minimizes power demand charges.

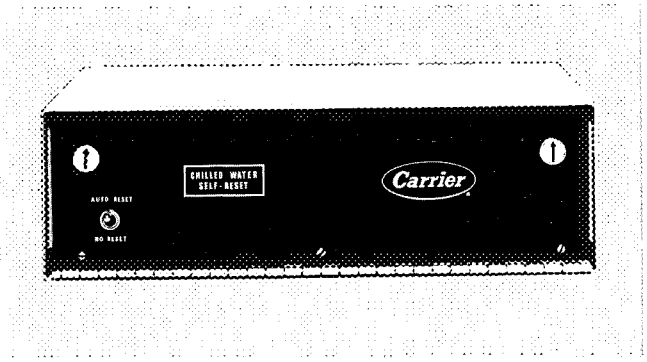


Chilled water reset-dual input

A device that causes the leaving chilled water temperature control set point to change in proportion to a change in a remote temperature such as return chilled water or outdoor air temperature.

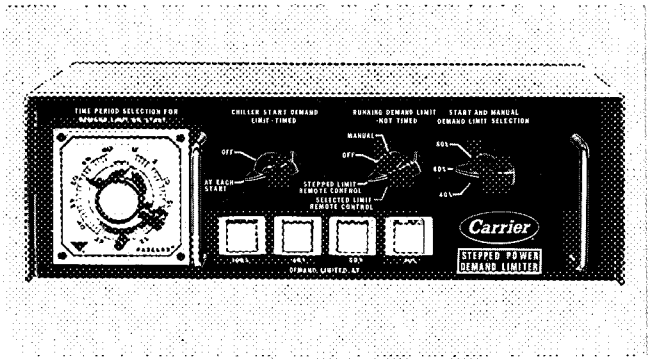
→ Adjustable stepped-reset control

A device that permits leaving chilled water temperature to rise in predetermined adjustable steps. Operator is in control of demand limit so amount of reset is not dependent on machine load but on the amount of change of resistance in the probe circuit.



Chilled water self-reset control

This device permits the leaving chilled water temperature to rise as the load on the machine decreases. The higher the leaving chilled water temperatures, the less work the compressor is forced to do.



→ Stepped power demand limiter

This option makes it possible to limit power demand in four ways:

1. At start-up each chiller can be held to a preselected maximum current draw for any time period of up to one hour.
2. During normal operation, chiller load can be automatically reduced in up to 3 stages in response to increased total building power consumption.
3. Chiller demand can semi-automatically be lowered in a single stage in response to increased total building power consumption.
4. Chiller demand can also be lowered manually.

Stepped power demand limiter minimizes the likelihood of getting demand charges. Also has timer which increases flexibility of operator. Operator can change demand limit without being at controls and can also adjust demand limit manually.

→ PASS-RISE TEMPERATURE ADJUSTMENT (F/C*)

MODEL	WATER TEMP RISE (F)	(C)	COOLER PASSES 1	2	3	4	CONDENSER PASSES 1	2	3	4
19DH	5	2.8	-2 0	+0 5	+1 5	+2 0	+2 0	0	-1 0	-1 5
	6	3.4	-2 5	+0 5	+1 5	+2 0	+2 5	0	-1 0	-1 5
	8	4.4	-2 5	0	+1 5	+2 5	+3 0	0	-1.0	-1 5
	10	5.6	-3 5	0	+1 5	+2 5	+3 5	0	-1 5	-2 0
	12	6.7	-5 0	0	+1 5	+2 5	+4 0	0	-1 5	-2 0
	14	7.8	-6 0	0	+2 0	+3 0	+4 5	0	-1 5	-2 5
	15	8.3	-6 0	-0 5	+2 0	+3 0	+4 5	0	-1 5	-2 5
	20	11.1	—	-0 5	+2 0	+3 5	+5 5	0	-2 0	-3 0
	25	13.9	—	-0.5	+2.5	+4.0	+6.0	0	-2.5	-3.5
19EB	5	2.8	-2 0	+0 5	+2 0	+2 5	+2 0	-0 5	-1 0	-1 5
	6	3.4	-3 0	+0 5	+2 0	+2 5	+2 5	0	-1 0	-1 5
	8	4.4	-4 0	0	+2 0	+2 5	+3 0	0	-1 5	-2 0
	10	5.6	-5 0	0	+2 0	+2 5	+4 0	0	-1 5	-2 0
	12	6.7	-5 5	0	+2 0	+3 0	+4 5	0	-1 5	-2 5
	14	7.8	-6 5	-0 5	+2 0	+3 0	+5 0	0	-1 5	-2 5
	15	8.3	-7 0	-0 5	+2 0	+3 0	+5 0	0	-1 5	-2 5
	20	11.1	-8 5	-1 0	+2 0	+3 5	+6 5	0	-2 0	-3 0
	25	13.9	-10.0	-1.0	+2 0	+3.5	+7 5	0	-2.0	-3.0
19FA	5	2.8	-2 0	+0 5	—	—	+2 0	-0 5	—	—
	6	3.4	-2 5	+0 5	+1 5	—	+2 5	0	-1 5	—
	8	4.4	-3 5	0	+1 5	—	+3 5	0	-1 5	—
	10	5.6	-4 5	0	+1 5	+2 5	+4 0	0	-1 5	-2 0
	12	6.7	-5 5	0	+1 5	+2 5	+4 5	0	-1 5	-2 5
	14	7.8	-6 5	-0 5	+1.5	+3 0	+5 0	0	-1 5	-2 5
	15	8.3	—	-0 5	+2 0	+3 0	+5 5	0	-1 5	-2 5
	20	11.1	—	-0 5	+2 0	+3 0	—	0	-2 0	-3 0
	25	13.9	—	—	+2.0	+3.5	—	—	-2.5	-3.5
19CB	5	2.8	-2 0	0	—	—	+2 0	0	—	—
	6	3.4	-2 5	0	—	—	+2 5	0	—	—
	8	4.4	-3 0	0	+1 5	—	+3 0	0	-1 0	—
	10	5.6	-4 0	0	+1 5	+2 0	+3 5	0	-1 0	-2 0
	12	6.7	-4 5	0	+1 5	+2 5	+3 5	0	-1 5	-2 0
	14	7 8	-5 0	0	+1 5	+2 5	+4 0	0	-1 5	-2 5
	15	8.3	-5 0	0	+2 0	+2 5	+4 5	0	-1 5	-2 5
	20	11.1	—	0	+2 0	+3 0	—	0	-2 0	-3 0
	25	13.9	—	0	+2 5	+3 5	—	0	-2 5	-3 5

NOTE Add to (+) or subtract from (-) design leaving water temperatures per step IV of Selection Procedure
*To convert the temperature adjustment factor to °C, divide by 1 8

CONVERSION TABLE

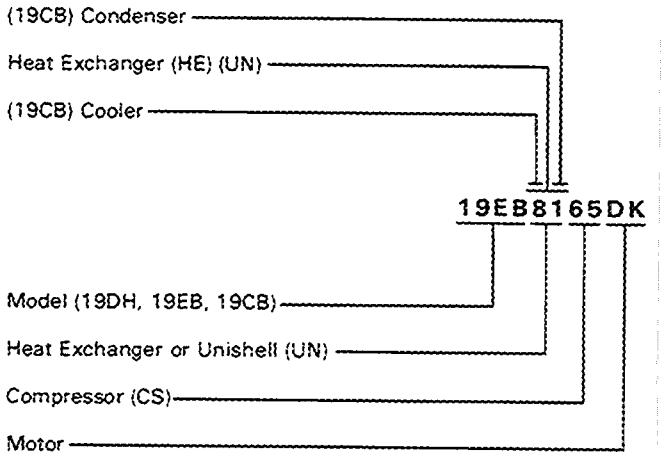
Metric tech	× =	English unit	× =	SI unit
Area				
cm^2			100	mm^2
cm^2	0 1550	in^2	645 2	mm^2
m^2			1 0	m^2
m^2	10 76	ft^2	0 09290	m^2
Length				
mm			1.0	mm
mm	0 03937	in	25 4	mm
mm	0 003281	ft	304 8	mm
m			1 0	m
m	3 281	ft	0 3048	m
Mass				
kg			1 0	kg
kg	2 205	lb	0 4536	kg
Power				
kcal/h			1 163	W
kcal/h	3 968	Btu/h	0 2931	W
HP metric			0 7355	kW
HP metric	0 9863	HP(550 $\frac{ft\ lbs}{s}$)	0 7457	kW
Mcal/h			1 163	kW
Mcal/h	0 3307	Ton refr	3 517	kW

Metric tech	× =	English unit	× =	SI unit
Pressure				
mm w g 4°C			0 009806	kPa
mm w g. 4°C	0 03937	in H_2O 39 2 F	0 2491	kPa
mm Hg 0°C			0 1333	kPa
mm Hg 0°C	0 03937	in Hg 32° F	3.386	kPa
kg/cm^2			98.07	kPa
kg/cm^2	14 22	psi	6 895	kPa
Temperature Interval				
°C			1 0	K
°C	1 8	°F	0.5556	°C
Velocity				
m/s			1 0	m/s
m/s	3.281	ft/s	0 3048	m/s
m/s	196.9	ft/min	0.00508	m/s
Volume/Time				
m^3/h			0 2778	L/s
m^3/h	0 5886	ft^3/min	0 4719	L/s
m^3/h	4 403	U S gal/min	0 06309	L/s
L/h			$2\ 778\times10^{-4}$	L/s
L/h	$4\ 403\times10^{-3}$	U S gal/min	0 06309	L/s

Metric tech	Conversion factor =	English Unit	Conversion factor =	SI unit
Temperature				
°C			°C+273 15	K
°C	(°C×1 8)+32	°F	(°F-32)÷1.8	°C

Using the 19DH,EB,CB model numbers

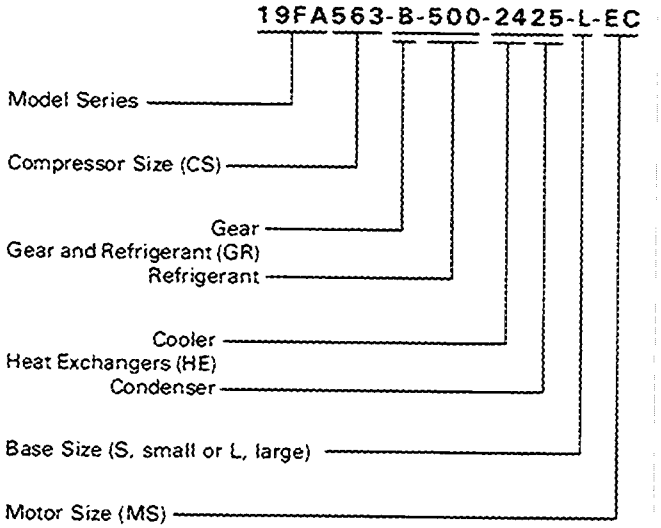
When ordering 19DH, 19EB or 19CB chillers, use the ordering code described below. Chiller nozzle arrangement and compressor voltage must be listed separately.



1 List chiller model in first 4 code number positions
2 Obtain Unishell or heat exchanger size from step V of the Selection Procedure and enter in positions 5 & 6
3 Obtain compressor size from step V of the Selection Procedure and enter in positions 7 & 8
4 Obtain motor size from step VII of the Selection Procedure and enter in positions 9 & 10

Using the 19FA model number

When ordering 19FA chillers, use the ordering system described below.



1 List chiller model in first 4 code number positions
2 Obtain compressor size from step V of the Selection Procedure and enter in positions 5, 6 and 7
3 Also from step V of the Selection Procedure, obtain gear size and refrigerant used Enter gear size in position 8, next enter refrigerant in 9-11 (May only need to use 9 & 10)
4 Obtain heat exchanger size from step V of the Selection Procedure and enter the cooler size in positions 12 & 13 and the condenser size in positions 14 & 15
5 Base size is indicated in position 16
6 Obtain motor size from step VII of the Selection Procedure and enter in positions 17 & 18

Part-load energy requirements

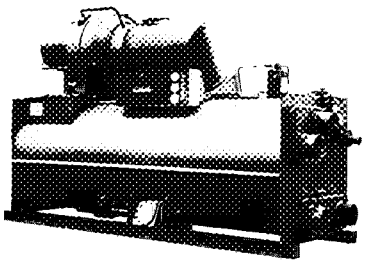
At part load, chiller energy requirements are affected by many variables, such as degree of load, chilled water flow, condenser water flow, entering condenser water temperature, leaving chilled water temperature, and the percentage of compressor loading at design conditions.

Because of these many variables, a typical part-load curve (% Standard Rating Tons versus % Standard Rating Kw Input) may have appreciable inaccuracies when applied to a specific chiller and set of conditions. Carrier, therefore, does not recommend the use of such curves in making operating cost studies.

Instead, thru computer analysis, Carrier will provide you with accurate and detailed information on the energy requirements for your selected chiller at the expected jobsite conditions.

Energy savings can be significant if the chiller can be operated with a relatively low entering condenser water temperature. And, since conditions of design load and design wet-bulb temperature can occur rather infrequently, the opportunity for such savings exists during most of the operating season. Each chiller is capable of operating efficiently with entering condenser water temperatures down to 55 F (13 C). This capability assures you of both energy conservation and excellent part-load performance, because "custom-made chillers" give the best part-load performance.

19DH Selection data



19DH*
100-450 TONS
(352-1583 kW)

100 Ton Selections (352 kW)

ADJ. LVG. COND. WTR. TEMP.			ADJUSTED LVG CHILLED WATER TEMPERATURE — F (C)					
			40	42	44	45	46	48
(F)	(C)		(4.4)	(5.6)	(6.7)	(7.2)	(7.8)	(8.9)
85	29.4	UN	42	42	42	42		
		CS	13	13	13	12		
		RE	11	11	11	11	*	*
		MS	AA	AA	AA	AA		
		KW	78	76	74	68		
90	32.2	UN	42	42	42	42	42	
		CS	14	14	13	13	13	
		RE	11	11	11	11	11	*
		MS	AA	AA	AA	AA	AA	
		KW	86	83	78	77	76	
92.5	33.6	UN	42	42	42	42	42	
		CS	15	14	14	13	13	
		RE	11	11	11	11	11	*
		MS	AA	AA	AA	AA	AA	
		KW	92	86	83	80	79	
95	35.0	UN	42	42	42	42	42	
		CS	16	15	15	14	14	
		RE	11	11	11	11	11	*
		MS	AB	AA	AA	AA	AA	
		KW	97	92	89	85	84	
97.5	36.4	UN	42	42	42	42	42	
		CS	17	16	15	15	15	
		RE	11	11	11	11	11	*
		MS	AC	AB	AA	AA	AA	
		KW	107	97	92	91	89	
100	37.8	UN	42	42	42	42	42	
		CS	17	17	16	16	16	
		RE	11	11	11	11	11	*
		MS	AC	AC	AB	AB	AB	
		KW	111	107	97	96	95	

125 Ton Selections (440 kW)

ADJ. LVG. COND. WTR. TEMP.			ADJUSTED LVG. CHILLED WATER TEMPERATURE — F (C)					
			40	42	44	45	46	48
(F)	(C)		(4.4)	(5.6)	(6.7)	(7.2)	(7.8)	(8.9)
85	29.4	UN	42	42	42	42	42	42
		CS	27	20	13	19	12	12
		RE	11	11	11	11	11	11
		MS	AB	AB	AB	AA	AA	AA
		KW	101	97	96	88	87	84
90	32.2	UN	42	42	42	42	42	42
		CS	29	21	20	13	13	13
		RE	11	11	11	11	11	11
		MS	AC	AC	AB	AB	AB	AB
		KW	114	107	100	100	98	95
92.5	33.6	UN	42	42	42	42	42	42
		CS	29	22	21	20	13	13
		RE	11	11	11	11	11	11
		MS	AD	AC	AC	AB	AB	AB
		KW	117	114	106	102	102	98
95	35.0	UN	42	42	42	42	42	42
		CS	30	23	21	21	14	13
		RE	11	11	11	11	11	11
		MS	AD	AD	AC	AC	AC	AB
		KW	125	121	110	108	108	101
97.5	36.4	UN	44	42	42	42	42	42
		CS	24	30	22	22	15	14
		RE	11	11	11	11	11	11
		MS	AE	AD	AD	AC	AC	AC
		KW	136	125	117	115	114	107
100	37.8	UN	44	44	42	42	42	42
		CS	31	24	23	23	22	14
		RE	11	11	11	11	11	11
		MS	AE	AE	AD	AD	AD	AC
		KW	139	135	125	122	116	111

150 Ton Selections (528 kW)

ADJ. LVG. COND. WTR. TEMP.			ADJUSTED LVG. CHILLED WATER TEMPERATURE — F (C)					
			40	42	44	45	46	48
(F)	(C)		(4.4)	(5.6)	(6.7)	(7.2)	(7.8)	(8.9)
85	29.4	UN	46	46	46	44	44	44
		CS	35	27	27	27	26	19
		RE	11	11	11	11	11	11
		MS	AD	AD	AC	AC	AC	AB
		KW	124	116	112	113	105	102
90	32.2	UN	46	46	46	46	46	46
		CS	37	35	27	27	20	19
		RE	11	11	11	11	11	11
		MS	AE	AD	AD	AD	AD	AC
		KW	141	127	119	117	115	105
92.5	33.6	UN	50	46	46	46	46	46
		CS	37	36	28	27	27	20
		RE	11	11	11	11	11	11
		MS	AE	AE	AD	AD	AD	AD
		KW	142	134	127	121	119	115
95	35.0	UN	53	46	46	46	46	46
		CS	37	37	35	28	28	20
		RE	11	11	11	11	11	11
		MS	AE	AE	AE	AE	AD	AD
		KW	141	144	130	128	127	119
97.5	36.4	UN	50	53	46	46	46	46
		CS	47	36	36	29	28	27
		RE	11	11	11	11	11	11
		MS	CB	AE	AE	AE	AE	AD
		KW	156	136	139	136	130	122
100	37.8	UN	50	50	51	50	46	46
		CS	47	47	36	29	29	28
		RE	11	11	11	11	11	11
		MS	CC	CB	AE	AE	AE	AE
		KW	160	156	139	138	138	129

175 Ton Selections (615 kW)

ADJ. LVG. COND. WTR. TEMP.			ADJUSTED LVG CHILLED WATER TEMPERATURE — F (C)					
			40	42	44	45	46	48
(F)	(C)		(4.4)	(5.6)	(6.7)	(7.2)	(7.8)	(8.9)
85	29.4	UN	50	50	51	50	50	50
		CS	43	43	34	34	34	26
		RE	11	11	11	11	11	11
		MS	AE	AE	AE	AE	AE	AD
		KW	138	133	130	130	128	116
90	32.2	UN	50	50	53	51	50	50
		CS	51	44	35	35	35	34
		RE	11	11	11	11	11	11
		MS	CB	CB	AE	AE	AE	AE
		KW	147	144	141	142	141	131
92.5	33.6	UN	50	50	50	53	51	50
		CS	52	44	44	35	35	34
		RE	11	11	11	11	11	11
		MS	CC	CB	CB	AE	AE	AE
		KW	156	150	143	143	142	136
95	35.0	UN	50	50	50	50	53	51
		CS	53	52	44	44	35	34
		RE	11	11	11	11	11	11
		MS	CC	CC	CB	CB	AE	AE
		KW	166	156	148	146	144	138
97.5	36.4	UN	50	50	50	50	50	53
		CS	54	46	45	45	44	34
		RE	11	11	11	11	11	11
		MS	CD	CC	CC	CB	CB	AE
		KW	183	169	157	155	148	140
100	37.8	UN	50	50	50	50	50	50
		CS	54	47	46	45	45	45
		RE	11	11	11	11	11	11
		MS	CD	CD	CC	CC	CC	CB
		KW	189	186	168	160	157	153

LEGEND

CS — Compressor
GR — Gear-Refrigerant
HE — Heat Exchanger
KW — Power Input
MS — Motor Size
RE — Refrigerant
UN — Unishell

→ 200 Ton Selections (703 kW)

ADJ. LVG COND. WTR. TEMP.			ADJUSTED LVG. CHILLED WATER TEMPERATURE — F (C)					
			40	42	44	45	46	48
(F)	(C)		(4.4)	(5.6)	(6.7)	(7.2)	(7.8)	(8.9)
85	29.4	UN	51	51	51	51	51	51
		CS	57	50	49	49	42	42
		RE	11	11	11	11	11	11
		MS	CB	CB	AE	AE	AE	AE
		KW	156	151	140	136	136	130
90	32.2	UN	53	51	51	51	51	51
		CS	58	51	50	50	43	42
		RE	11	11	11	11	11	11
		MS	CC	CC	CB	CB	CB	AE
		KW	166	164	155	152	152	141
92.5	33.6	UN	53	51	51	51	51	51
		CS	59	58	51	50	43	43
		RE	11	11	11	11	11	11
		MS	CD	CC	CC	CC	CC	CB
		KW	176	170	164	156	156	151
95	35.0	UN	53	53	51	51	51	51
		CS	60	52	51	51	51	43
		RE	11	11	11	11	11	11
		MS	CD	CD	CC	CC	CC	CC
		KW	188	175	171	167	164	156
97.5	36.4	UN	53	53	53	53	51	51
		CS	61	59	51	51	51	44
		RE	11	11	11	11	11	11
		MS	CE	CD	CC	CC	CC	CC
		KW	207	181	171	168	169	166
100	37.8	UN	53	53	53	53	53	51
		CS	61	60	52	52	51	51
		RE	11	11	11	11	11	11
		MS	CE	CD	CD	CD	CC	CC
		KW	215	193	181	177	171	169

275 Ton Selections (967 kW)

ADJ. LVG. COND. WTR. TEMP.			ADJUSTED LVG. CHILLED WATER TEMPERATURE — F (C)					
			40	42	44	45	46	48
(F)	(C)		(4.4)	(5.6)	(6.7)	(7.2)	(7.8)	(8.9)
85	29.4	UN	61	61	63	61	61	61
		CS	73	73	64	64	63	56
		RE	11	11	11	11	11	11
		MS	CE	CD	CD	CD	CD	CD
		KW	203	197	195	196	178	171
90	32.2	UN	61	61	65	61	61	61
		CS	81	73	65	66	64	63
		RE	11	11	11	11	11	11
		MS	CL	CE	CE	CL	CE	CD
		KW	219	210	210	223	202	184
92.5	33.6	UN	61	61	65	63	61	61
		CS	82	74	66	66	65	64
		RE	11	11	11	11	11	11
		MS	CL	CL	CL	CL	CE	CE
		KW	233	222	224	224	217	201
95	35.0	UN	61	61	61	65	61	61
		CS	83	75	74	65	67	64
		RE	11	11	11	11	11	11
		MS	CM	CL	CL	CE	CL	CE
		KW	248	236	221	219	241	208
97.5	36.4	UN	61	61	61	61	63	61
		CS	77	76	75	75	66	65
		RE	11	11	11	11	11	11
		MS	CN	CM	CL	CL	CL	CL
		KW	276	251	236	232	234	222
100	37.8	UN	61	61	61	61	65	61
		CS	84	77	76	76	66	66
		RE	11	11	11	11	11	11
		MS	CN	CN	CM	CM	CL	CL
		KW	281	276	250	246	236	236

250 Ton Selections (879 kW)

ADJ. LVG. COND. WTR. TEMP			ADJUSTED LVG. CHILLED WATER TEMPERATURE — F (C)					
			40	42	44	45	46	48
(F)	(C)		(4.4)	(5.6)	(6.7)	(7.2)	(7.8)	(8.9)
85	29.4	UN	63	55	55	55	55	55
		CS	65	66	64	57	63	56
		RE	11	11	11	11	11	11
		MS	CD	CE	CD	CD	CC	CC
		KW	192	204	183	181	167	160
90	32.2	UN	65	57	55	55	55	55
		CS	66	66	65	64	64	57
		RE	11	11	11	11	11	11
		MS	CE	CE	CE	CD	CD	CD
		KW	207	210	201	192	188	182
92.5	33.6	UN	65	61	55	55	55	55
		CS	68	66	66	65	65	57
		RE	11	11	11	11	11	11
		MS	CL	CE	CE	CE	CE	CD
		KW	243	213	215	204	200	188
95	35.0	UN	61	63	57	55	55	55
		CS	76	67	66	66	65	64
		RE	11	11	11	11	11	11
		MS	CL	CL	CE	CE	CE	CD
		KW	224	222	215	218	207	194
97.5	36.4	UN	61	65	57	57	55	55
		CS	77	67	67	66	66	65
		RE	11	11	11	11	11	11
		MS	CM	CL	CL	CE	CL	CE
		KW	248	225	230	219	220	205
100	37.8	UN	61	61	61	57	57	55
		CS	77	77	67	67	66	66
		RE	11	11	11	11	11	11
		MS	CM	CM	CL	CL	CL	CL
		KW	255	248	231	233	221	218

300 Ton Selections (1055 kW)

ADJ. LVG. COND WTR TEMP.			ADJUSTED LVG. CHILLED WATER TEMPERATURE — F (C)					
			40	42	44	45	46	48
(F)	(C)		(4.4)	(5.6)	(6.7)	(7.2)	(7.8)	(8.9)
85	29.4	UN	61	61	61	61	61	63
		CS	80	73	73	72	72	63
		RE	11	11	11	11	11	11
		MS	CL	CL	CE	CD	CD	CD
		KW	223	219	211	197	193	189
90	32.2	UN	61	61	61	61	61	65
		CS	82	81	73	73	73	64
		RE	11	11	11	11	11	11
		MS	CM	CL	CL	CL	CE	CE
		KW	252	236	225	220	217	212
92 5	33.6	UN	61	61	61	61	61	65
		CS	83	81	74	73	73	64
		RE	11	11	11	11	11	11
		MS	CN	CM	CL	CL	CL	CE
		KW	267	243	240	228	224	218
95	35.0	UN	61	61	61	61	61	61
		CS	90	82	75	74	74	73
		RE	11	11	11	11	11	11
		MS	CN	CM	CM	CM	CL	CL
		KW	274	259	255	242	238	223
97 5	36.4	UN	61	61	61	61	61	61
		CS	84	83	82	75	74	74
		RE	11	11	11	11	11	11
		MS	CP	CN	CM	CM	CM	CL
		KW	306	274	258	259	246	238
100	37.8	UN	63	61	61	61	61	61
		CS	84	84	83	76	75	75
		RE	11	11	11	11	11	11
		MS	CP	CP	CN	CN	CM	CM
		KW	307	303	273	274	262	252

→ *For additional tonnage and performance selections contact your nearest Carrier Sales Office (see page 50)

19DH Selection data (cont)

350 Ton Selections (1231 kW)

ADJ. LVG. COND. WTR. TEMP. (F)	(C)		ADJUSTED LVG. CHILLED WATER TEMPERATURE — F (C) 40 (4.4)	42 (5.6)	44 (6.7)	45 (7.2)	46 (7.8)	48 (8.9)
85	29.4	UN	63	63	63	63	63	63
		CS	95	87	80	86	79	72
		RE	11	11	11	11	11	11
		MS	CN	CM	CM	CL	CL	CL
		KW	271	255	247	229	225	220
90	32.2	UN	63	63	63	63	63	63
		CS	97	95	87	80	80	73
		RE	11	11	11	11	11	11
		MS	CP	CN	CM	CM	CM	CM
		KW	309	279	263	259	254	249
92.5	33.6	UN	65	63	63	63	63	63
		CS	97	96	88	87	80	80
		RE	11	11	11	11	11	11
		MS	CP	CP	CN	CN	CM	CM
		KW	311	297	278	265	264	252
95	35.0	UN	65	63	63	63	63	63
		CS	98	97	89	88	81	80
		RE	11	11	11	11	11	11
		MS	CQ	CP	CP	CN	CN	CM
		KW	344	317	296	282	276	261
97 5	36.4	UN	65	65	63	63	63	63
		CS	98	97	90	89	82	81
		RE	11	11	11	11	11	11
		MS	CQ	CP	CP	CP	CN	CN
		KW	352	319	316	300	294	276
100	37.8	UN	72	65	65	63	63	63
		CS	98	91	90	90	89	82
		RE	11	11	11	11	11	11
		MS	CQ	CQ	CP	CP	CP	CN
		KW	358	352	318	321	305	295

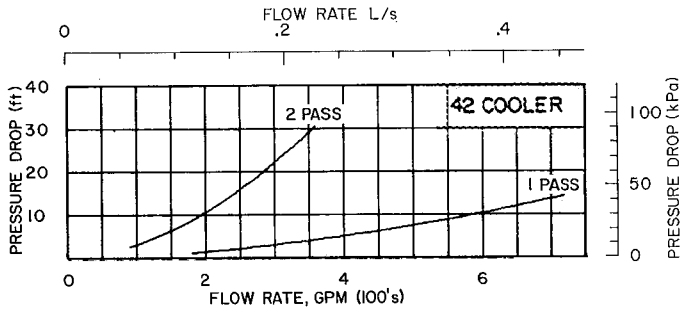
400 Ton Selections (1407 kW)

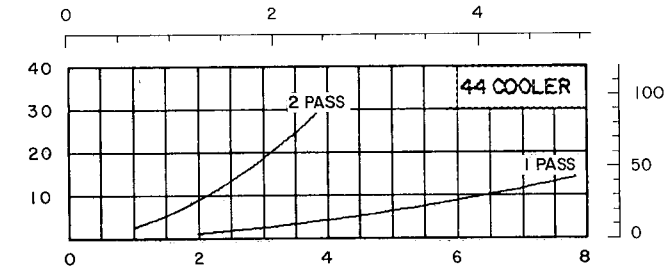
ADJ. LVG. COND. WTR. TEMP. (F)	(C)		ADJUSTED LVG. CHILLED WATER TEMPERATURE — F (C) 40 (4.4)	42 (5.6)	44 (6.7)	45 (7.2)	46 (7.8)	48 (8.9)
85	29.4	UN	76	71	71	71	71	71
		CS	95	95	94	87	86	79
		RE	11	11	11	11	11	11
		MS	CP	CP	CN	CN	CM	CM
		KW	298	301	279	275	256	247
90	32.2	UN	77	72	71	71	71	71
		CS	97	97	95	94	87	80
		RE	11	11	11	11	11	11
		MS	CQ	CQ	CP	CN	CN	CN
		KW	335	339	309	294	288	281
92.5	33.6	UN	78	73	71	71	71	71
		CS	97	97	96	95	94	87
		RE	11	11	11	11	11	11
		MS	CQ	CQ	CQ	CP	CP	CN
		KW	338	344	326	313	299	286
95	35.0	UN		76	71	71	71	71
		CS		97	97	96	95	87
		RE	*	11	11	11	11	11
		MS		CQ	CQ	CQ	CP	CP
		KW		348	350	333	318	297
97.5	36.4	UN		77	73	71	71	71
		CS		97	97	97	96	88
		RE	*	11	11	11	11	11
		MS		CQ	CQ	CQ	CQ	CP
		KW		353	352	356	338	317
100	37.8	UN			76	73	72	71
		CS			97	97	97	89
		RE	*	*	11	11	11	11
		MS			CQ	CQ	CQ	CQ
		KW			358	357	356	334

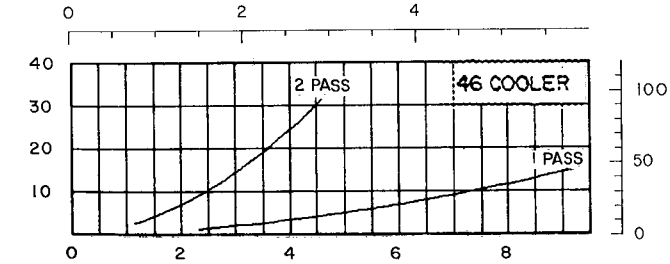
LEGEND

CS — Compressor
GR — Gear-Refrigerant
HE — Heat Exchanger
KW — Power Input
MS — Motor Size
RE — Refrigerant
UN — Unishell

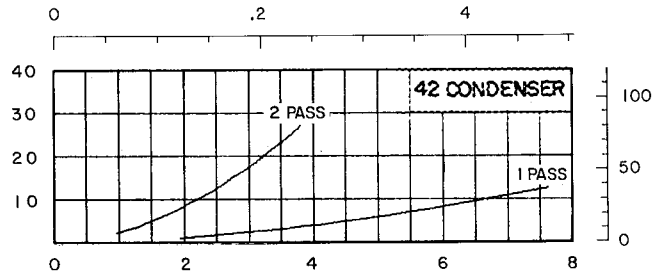
UNISHELL COOLER

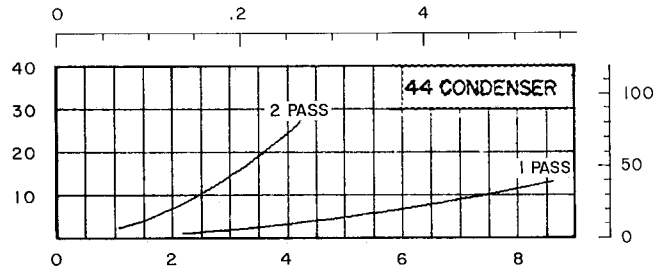


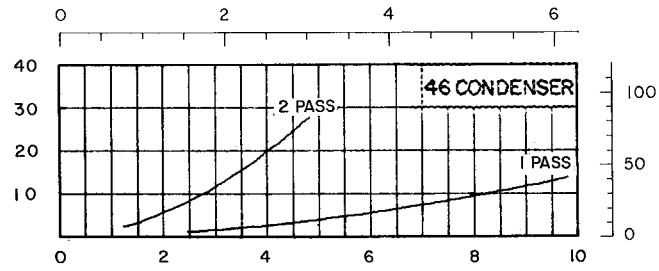




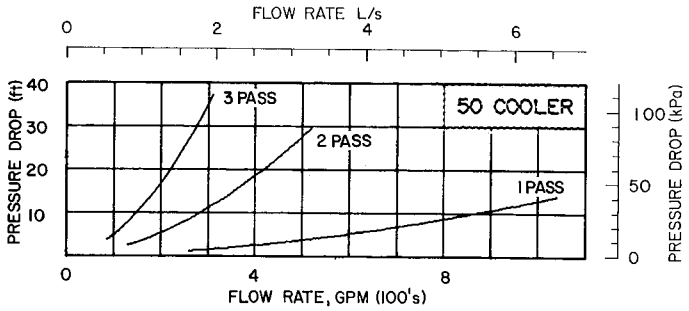
UNISHELL CONDENSER

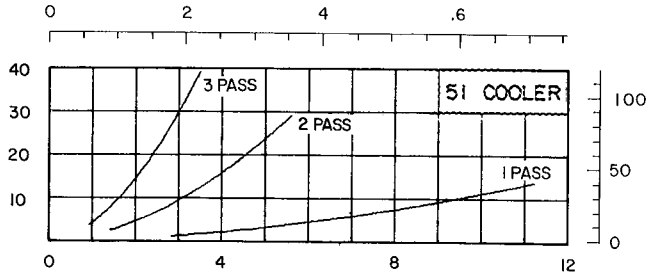


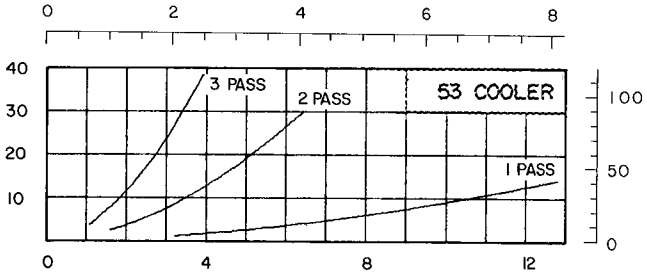


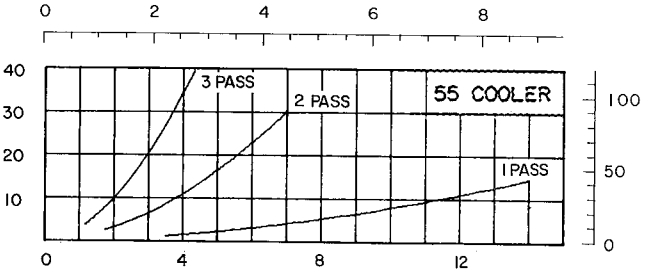


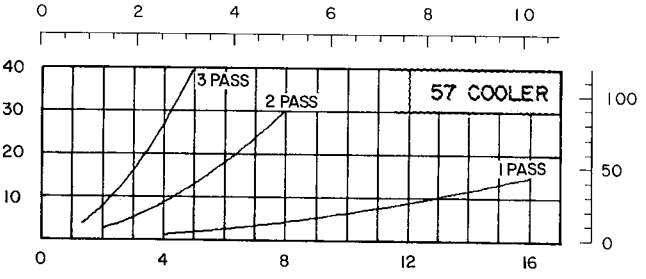
UNISHELL COOLER

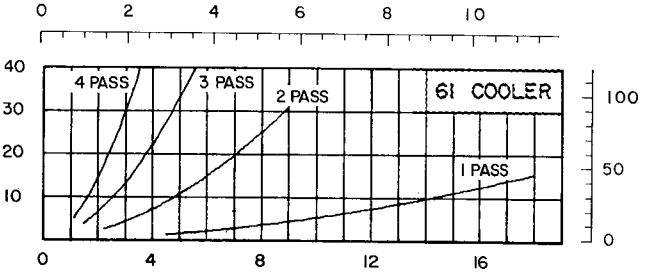












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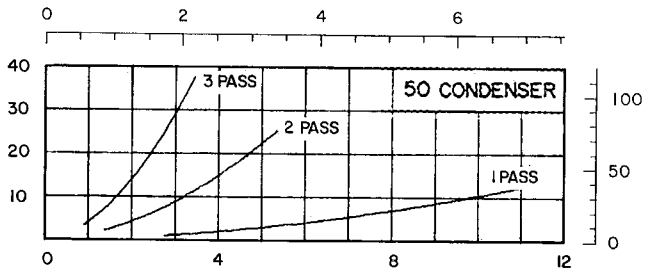
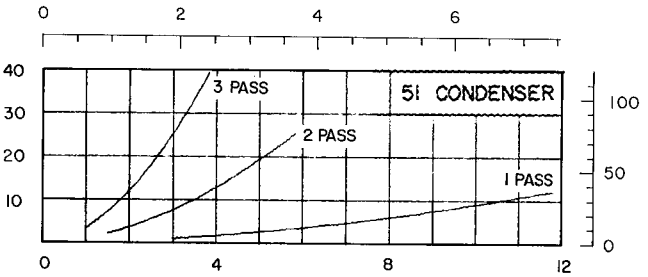
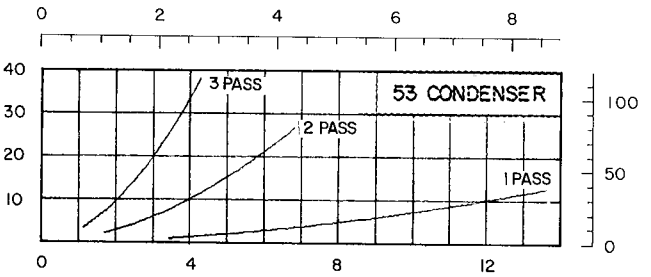
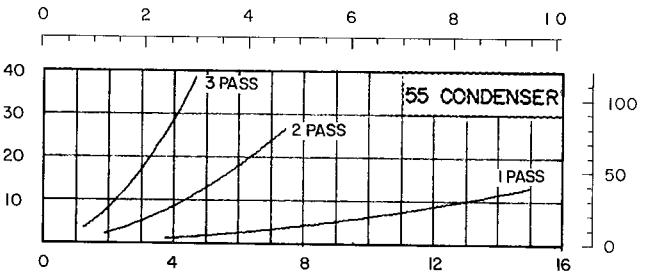
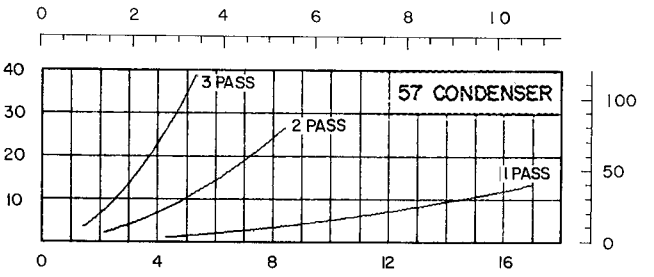
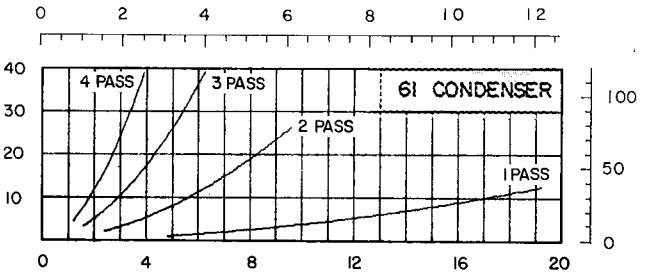






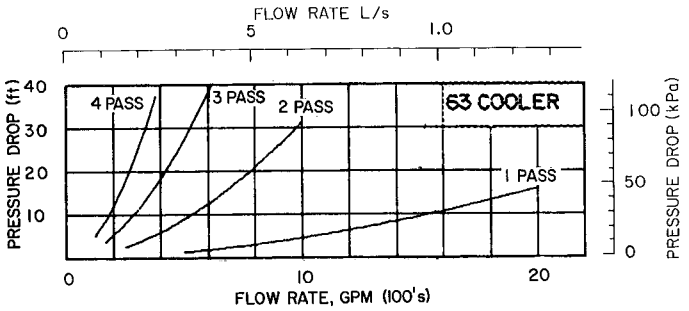


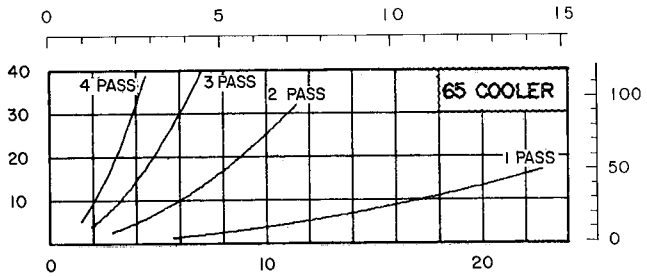


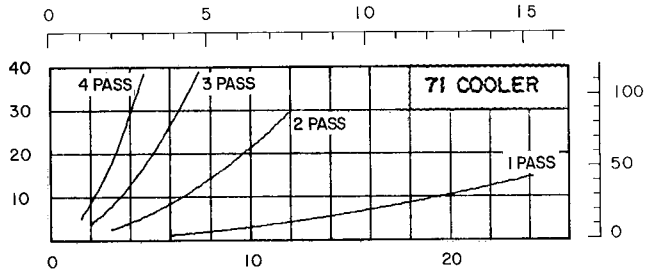


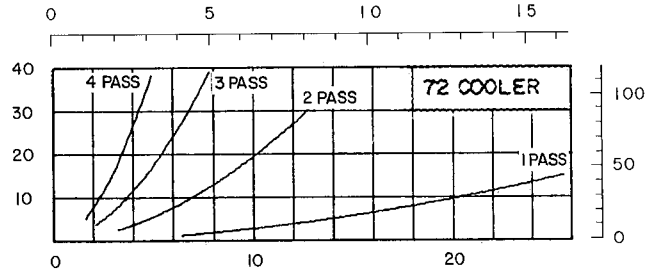
19DH Selection data (cont)

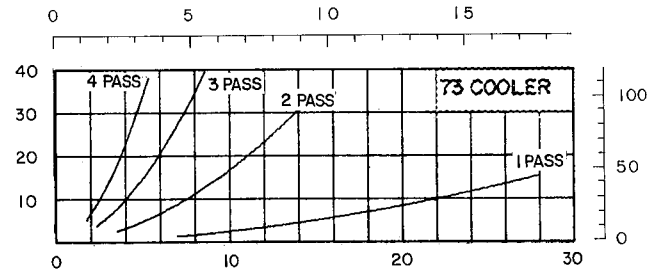
UNISHELL COOLER

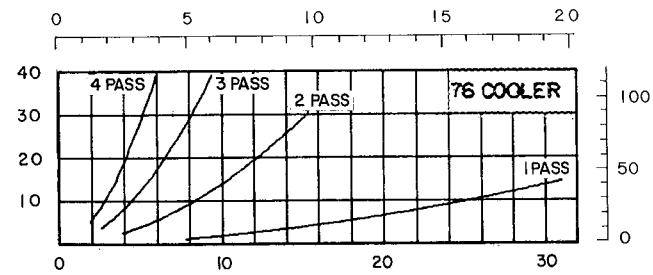




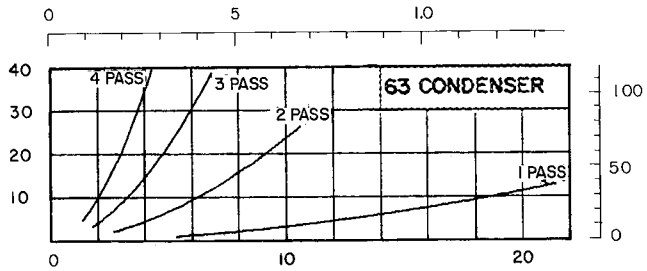


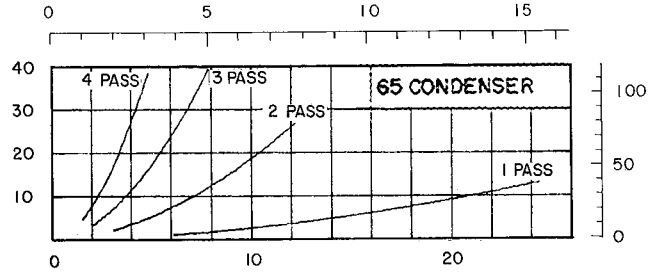


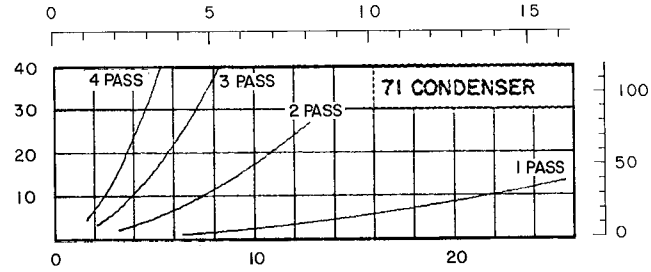


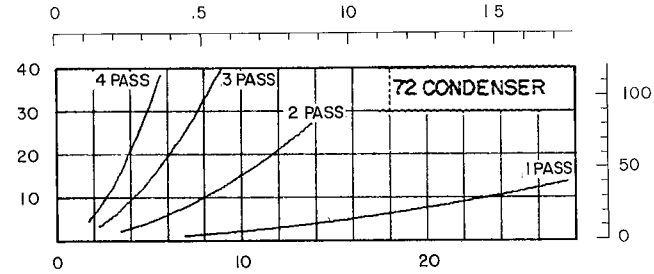


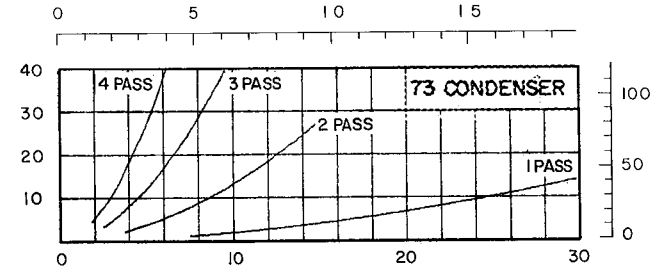
UNISHELL CONDENSER

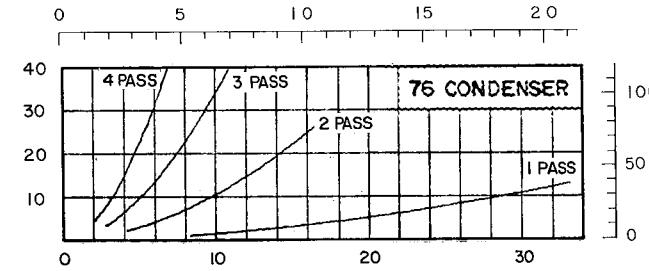




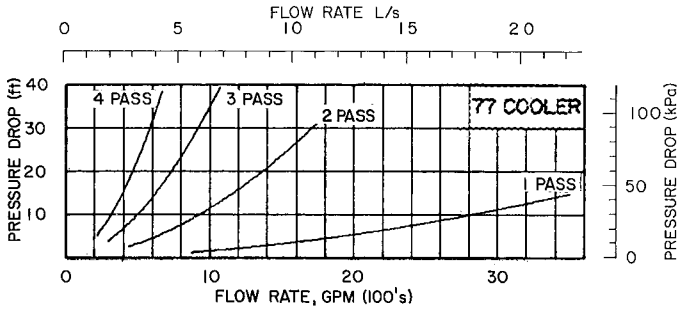


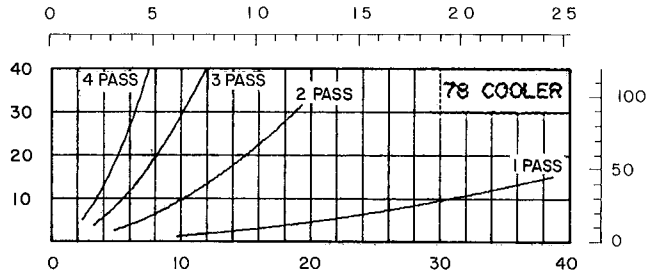




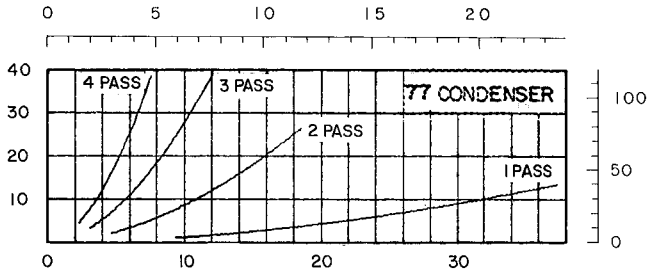


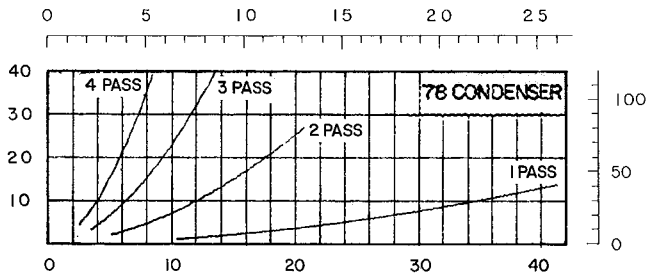
UNISHELL COOLER





UNISHELL CONDENSER





→ Physical data

19DH UNISHELL SIZE	RIGGING WEIGHT (lb)	RIGGING WEIGHT (kg)	OPER WEIGHT (lb)	OPER WEIGHT (kg)	OPER CHARGE R-11 (lb)	OPER CHARGE R-11 (kg)	AREA TO INSULATE (sq ft)	AREA TO INSULATE (m^2)
42	8,400	3810	9,260	4200	500	227	130	12
44	8,500	3856	9,405	4266	525	238	130	12
46	8,600	3901	9,570	4341	550	249	130	12
50	10,000	4536	11,105	5037	575	261	130	12
51	10,200	4627	11,335	5141	575	261	130	12
53	10,400	4717	11,600	5262	600	272	130	12
55	10,600	4808	11,860	5380	625	283	130	12
57	10,800	4899	12,115	5495	625	283	130	12
61	13,900	6305	15,660	7103	775	352	213	20
63	14,200	6441	16,040	7276	810	367	213	20
65	14,400	6532	16,370	7425	850	386	213	20
71	15,800	7167	17,915	8126	975	442	218	20
72	16,000	7257	18,175	8244	985	447	218	20
73	16,300	7394	18,560	8419	1010	458	218	20
76	16,800	7620	19,300	8754	1100	499	218	20
77	17,200	7802	19,870	9013	1150	522	218	20
78	17,500	7938	20,330	9222	1200	544	218	20

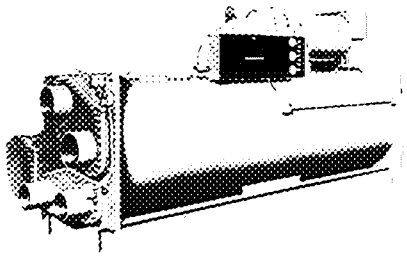
Electrical data

MTR	MAX KW	VOLTS	208	230	460	575	2400	4160
AA	93	FLA per Kw	3 08	2 78	1 39	1 12	—	—
		LRA Star	439	370	185	148	—	—
		LRA Delta	1378	1154	577	462	—	—
AB	105	FLA per Kw	3 08	2 78	1 39	1 12	—	—
		LRA Star	480	402	201	161	—	—
		LRA Delta	1500	1254	627	502	—	—
AC	115	FLA per Kw	3 08	2.78	1 39	1 12	—	—
		LRA Star	528	442	221	177	—	—
		LRA Delta	1648	1380	690	552	—	—
AD	129	FLA per Kw	3 08	2 78	1 39	1 12	—	—
		LRA Star	576	482	241	192	—	—
		LRA Delta	1800	1506	753	602	—	—
AE	144	FLA per Kw	3 08	2.78	1 39	1.12	—	—
		LRA Star	653	546	273	218	—	—
		LRA Delta	2040	1706	853	682	—	—
CA	144	FLA per Kw	—	—	—	—	271	160
		LRA Star	—	—	—	—	—	—
		LRA Delta	—	—	—	—	187	108
CB	156	FLA per Kw	3.04	2 75	1 38	1 10	263	154
		LRA Star	776	650	325	260	—	—
		LRA Delta	2425	2032	1016	813	204	118
CC	172	FLA per Kw	3 04	2.75	1.38	1 10	262	151
		LRA Star	862	722	361	289	—	—
		LRA Delta	2695	2256	1128	903	226	130
CD	200	FLA per Kw	3 04	2 75	1.38	1 10	265	150
		LRA Star	1008	844	422	337	—	—
		LRA Delta	3150	2636	1318	1053	265	153
CE	219	FLA per Kw	3 04	2 75	1 38	1 10	264	151
		LRA Star	1082	908	454	363	—	—
		LRA Delta	3382	2836	1418	1132	284	164
CL	243	FLA per Kw	3 04	2 75	1.38	1 10	263	152
		LRA Star	1219	1020	510	408	—	—
		LRA Delta	3810	3186	1593	1273	320	185
CM	267	FLA per Kw	3 04	2 75	1.38	1.10	266	.155
		LRA Star	1336	1124	562	450	—	—
		LRA Delta	4180	3514	1757	1405	353	204
CN	295	FLA per Kw	3.04	2 75	1 38	1.10	264	153
		LRA Star	1490	1246	623	497	—	—
		LRA Delta	4652	3888	1944	1554	392	226
CP	323	FLA per Kw	3.04	2 75	1 38	1.10	263	.152
		LRA Star	1603	1340	670	536	—	—
		LRA Delta	5010	4190	2095	1674	421	243
CQ	360	FLA per Kw	3.04	2 75	1.38	1 10	264	153
		LRA Star	1789	1502	751	599	—	—
		LRA Delta	5595	4690	2345	1874	474	273

FLA — Full Load Amps
KW — Compressor Power Input (Kilowatts)
LRA — Locked Rotor Amps
MTR — Motor

NOTE Overload Trip Amps = FLA x 1 08

19EB Selection data



19EB*
425-1100 TONS
(1495-3870 kW)

450 Ton Selections (1583 kW)

ADJ. LVG. COND WTR. TEMP. (F)	(C)		ADJUSTED LVG. CHILLED WATER TEMPERATURE — F (C) 40 (4.4)	42 (5.6)	44 (6.7)	45 (7.2)	46 (7.8)	48 (8.9)
85	29.4	UN	71	71	71	71	71	71
		CS	23	21	21	21	21	11
		RE	12	12	12	12	12	12
		MS	DB	DB	DB	DB	DB	DB
		KW	336	314	306	303	299	292
90	32.2	UN	71	71	71	71	71	71
		CS	23	23	21	21	21	21
		RE	12	12	12	12	12	12
		MS	DC	DB	DB	DB	DB	DB
		KW	363	348	328	320	317	310
92.5	33.6	UN	71	71	71	71	71	71
		CS	33	23	23	23	21	21
		RE	12	12	12	12	12	12
		MS	DC	DB	DB	DB	DB	DB
		KW	372	360	350	347	327	320
95	35.0	UN	71	71	71	71	71	71
		CS	25	25	23	23	23	21
		RE	12	12	12	12	12	12
		MS	DD	DC	DB	DB	DB	DB
		KW	396	384	359	357	354	329
97 5	36.4	UN	71	71	71	71	71	71
		CS	35	25	23	23	23	23
		RE	12	12	12	12	12	12
		MS	DD	DD	DC	DC	DB	DB
		KW	412	394	371	366	363	357
100	37.8	UN	71	71	71	71	71	71
		CS	27	35	25	25	23	23
		RE	12	12	12	12	12	12
		MS	DE	DD	DD	DD	DC	DC
		KW	434	416	396	393	375	366

500 Ton Selections (1759 kW)

ADJ. LVG. COND WTR. TEMP. (F)	(C)		ADJUSTED LVG CHILLED WATER TEMPERATURE — F (C) 40 (4.4)	42 (5.6)	44 (6.7)	45 (7.2)	46 (7.8)	48 (8.9)
85	29.4	UN	73	73	73	73	72	72
		CS	31	31	21	21	21	21
		RE	12	12	12	12	12	12
		MS	DB	DB	DB	DB	DB	DB
		KW	356	342	336	329	329	322
90	32.2	UN	73	73	73	73	72	72
		CS	33	33	31	21	21	21
		RE	12	12	12	12	12	12
		MS	DD	DC	DB	DB	DB	DB
		KW	387	381	356	363	360	341
92.5	33.6	UN	73	73	73	73	72	72
		CS	33	33	31	23	23	21
		RE	12	12	12	12	12	12
		MS	DD	DD	DC	DC	DC	DB
		KW	404	390	366	377	377	354
95	35.0	UN	73	73	73	73	72	72
		CS	35	33	33	23	23	31
		RE	12	12	12	12	12	12
		MS	DE	DD	DD	DD	DD	DC
		KW	425	403	395	388	388	366
97.5	36.4	UN	73	73	73	73	72	72
		CS	35	35	33	33	33	23
		RE	12	12	12	12	12	12
		MS	DE	DE	DD	DD	DD	DD
		KW	440	429	406	402	403	389
100	37.8	UN	73	73	73	73	72	72
		CS	37	35	25	33	33	23
		RE	12	12	12	12	12	12
		MS	DF	DE	DE	DD	DD	DD
		KW	468	442	433	416	416	402

550 Ton Selections (1934 kW)

ADJ. LVG. COND WTR. TEMP. (F)	(C)		ADJUSTED LVG. CHILLED WATER TEMPERATURE — F (C) 40 (4.4)	42 (5.6)	44 (6.7)	45 (7.2)	46 (7.8)	48 (8.9)
85	29.4	UN	73	73	73	73	73	73
		CS	43	31	23	31	31	31
		RE	12	12	12	12	12	12
		MS	DD	DD	DD	DC	DB	DB
		KW	409	393	398	364	360	353
90	32.2	UN	73	73	73	73	73	73
		CS	43	33	33	31	31	31
		RE	12	12	12	12	12	12
		MS	DE	DE	DD	DD	DC	DC
		KW	434	419	409	393	383	373
92.5	33.6	UN	73	73	73	73	73	73
		CS	45	43	33	33	31	31
		RE	12	12	12	12	12	12
		MS	DF	DE	DE	DD	DD	DC
		KW	459	432	418	416	399	384
95	35.0	UN	73	73	73	73	73	73
		CS	45	35	33	33	33	31
		RE	12	12	12	12	12	12
		MS	DF	DF	DE	DE	DE	DD
		KW	475	458	435	425	420	397
97.5	36.4	UN	73	73	73	73	73	73
		CS	47	45	35	33	33	33
		RE	12	12	12	12	12	12
		MS	DG	DF	DF	DF	DE	DE
		KW	508	477	460	442	432	423
100	37.8	UN	73	73	73	73	73	73
		CS	47	37	35	35	33	33
		RE	12	12	12	12	12	12
		MS	DH	DG	DF	DF	DF	DE
		KW	524	505	475	468	448	434

600 Ton Selections (2110 kW)

ADJ LVG. COND. WTR TEMP. (F)	(C)		ADJUSTED LVG. CHILLED WATER TEMPERATURE — F (C) 40 (4.4)	42 (5.6)	44 (6.7)	45 (7.2)	46 (7.8)	48 (8.9)
85	29.4	UN	76	76	76	76	76	75
		CS	43	41	25	31	31	31
		RE	12	12	12	12	12	12
		MS	DE	DE	DD	DD	DC	DC
		KW	436	415	401	395	387	381
90	32.2	UN	76	76	76	76	76	75
		CS	37	43	41	33	31	31
		RE	12	12	12	12	12	12
		MS	DG	DF	DE	DE	DE	DD
		KW	501	449	428	431	423	405
92.5	33.6	UN	76	76	76	76	76	75
		CS	45	43	43	33	33	31
		RE	12	12	12	12	12	12
		MS	DG	DF	DF	DF	DE	DE
		KW	494	472	451	445	439	425
95	35.0	UN	76	76	76	76	76	75
		CS	45	45	43	43	33	33
		RE	12	12	12	12	12	12
		MS	DG	DG	DF	DF	DF	DF
		KW	523	495	465	458	453	444
97.5	36.4	UN	76	76	76	76	76	75
		CS	47	45	35	43	43	33
		RE	12	12	12	12	12	12
		MS	DH	DG	DG	DF	DF	DF
		KW	544	513	499	475	466	459
100	37.8	UN	76	76	76	76	76	75
		CS	47	47	45	45	43	33
		RE	12	12	12	12	12	12
		MS	DJ	DH	DG	DG	DG	DG
		KW	572	547	512	507	484	482

LEGEND

CS — Compressor
GR — Gear-Refrigerant
HE — Heat Exchanger
KW — Power Input
MS — Motor Size
RE — Refrigerant
UN — Unishell

650 Ton Selections (2286 kW)

ADJ. LVG. COND. WTR TEMP. (F)	(C)		ADJUSTED LVG. CHILLED WATER TEMPERATURE — F (C) 40 (4.4)	42 (5.6)	44 (6.7)	45 (7.2)	46 (7.8)	48 (8.9)
85	29.4	UN	81	77	77	77	77	77
		CS	43	43	33	41	41	31
		RE	12	12	12	12	12	12
		MS	DG	DF	DF	DE	DE	DD
		KW	482	461	464	425	416	412
90	32.2	UN	81	77	77	77	77	77
		CS	45	45	43	43	41	41
		RE	12	12	12	12	12	12
		MS	DG	DG	DF	DF	DF	DE
		KW	520	506	476	467	456	431
92 5	33.6	UN	81	77	77	77	77	77
		CS	47	45	43	43	43	41
		RE	12	12	12	12	12	12
		MS	DH	DH	DG	DG	DF	DF
		KW	549	523	498	483	476	446
95	35.0	UN	81	77	77	77	77	77
		CS	47	45	45	43	43	33
		RE	12	12	12	12	12	12
		MS	DJ	DH	DH	DG	DG	DG
		KW	571	556	521	510	492	483
97.5	36.4	UN	82	77	77	77	77	77
		CS	47	47	45	37	43	43
		RE	12	12	12	12	12	12
		MS	DJ	DJ	DH	DH	DG	DG
		KW	584	578	541	560	520	492
100	37.8	UN	81	81	77	77	77	77
		CS	65	47	45	45	45	43
		RE	12	12	12	12	12	12
		MS	DK	DJ	DJ	DH	DH	DG
		KW	599	587	573	550	540	510

750 Ton Selections (2638 kW)

ADJ. LVG. COND. WTR. TEMP. (F)	(C)		ADJUSTED LVG. CHILLED WATER TEMPERATURE — F (C) 40 (4.4)	42 (5.6)	44 (6.7)	45 (7.2)	46 (7.8)	48 (8.9)
85	29.4	UN	82	82	82	82	82	82
		CS	47	39	45	45	43	43
		RE	500	500	12	12	12	12
		MS	DH	DH	DH	DH	DG	DG
		KW	554	554	550	536	513	488
90	32.2	UN	82	82	82	82	82	82
		CS	63	49	47	45	45	43
		RE	12	500	500	12	12	12
		MS	DJ	DJ	DH	DJ	DH	DH
		KW	587	591	542	578	559	521
92 5	33.6	UN	82	82	82	82	82	82
		CS	73	63	47	47	45	43
		RE	12	12	500	500	12	12
		MS	DK	DJ	DJ	DH	DJ	DH
		KW	611	588	563	553	578	550
95	35.0	UN	82	82	82	82	82	82
		CS	73	63	63	63	47	45
		RE	12	12	12	12	500	12
		MS	DK	DK	DJ	DJ	DJ	DJ
		KW	630	605	591	586	564	574
97.5	36.4	UN	82	82	82	82	82	82
		CS	65	73	63	63	63	45
		RE	12	12	12	12	12	12
		MS	DL	DK	DK	DK	DK	DJ
		KW	665	637	604	597	592	594
100	37.8	UN	82	82	82	82	82	82
		CS	67	65	65	63	63	63
		RE	12	12	12	12	12	12
		MS	DM	DL	DL	DK	DK	DK
		KW	708	661	644	616	608	599

700 Ton Selections (2462 kW)

ADJ. LVG COND. WTR TEMP. (F)	(C)		ADJUSTED LVG CHILLED WATER TEMPERATURE — F (C) 40 (4.4)	42 (5.6)	44 (6.7)	45 (7.2)	46 (7.8)	48 (8.9)
85	29.4	UN	81	81	81	81	81	81
		CS	47	45	43	43	41	41
		RE	12	12	12	12	12	12
		MS	DJ	DG	DG	DF	DF	DE
		KW	570	520	485	475	463	434
90	32.2	UN	82	81	81	81	81	81
		CS	49	47	45	43	43	41
		RE	500	12	12	12	12	12
		MS	DJ	DJ	DH	DG	DG	DF
		KW	565	575	530	517	498	478
92.5	33.6	UN	81	81	81	81	81	81
		CS	63	47	45	45	43	43
		RE	12	12	12	12	12	2
		MS	DJ	DJ	DH	DH	DG	DG
		KW	570	597	552	539	523	496
95	35.0	UN	81	81	81	81	81	81
		CS	65	63	47	45	45	43
		RE	12	12	12	12	12	12
		MS	DK	DJ	DJ	DH	DH	DG
		KW	603	571	587	560	547	514
97 5	36.4	UN	81	81	81	81	81	81
		CS	65	65	63	45	45	43
		RE	12	12	12	12	12	12
		MS	DK	DK	DJ	DJ	DJ	DH
		KW	622	610	577	589	566	534
100	37.8	UN	81	81	81	81	81	81
		CS	67	65	65	63	45	45
		RE	12	12	12	12	12	12
		MS	DL	DK	DK	DJ	DJ	DJ
		KW	673	628	617	590	577	564

800 Ton Selections (2814 kW)

ADJ LVG COND WTR TEMP. (F)	(C)		ADJUSTED LVG. CHILLED WATER TEMPERATURE — F (C) 40 (4.4)	42 (5.6)	44 (6.7)	45 (7.2	46 (7.8)	48 (8.9)
85	29.4	UN	87	82	82	82	82	82
		CS	47	47	45	45	45	43
		RE	500	500	500	500	500	500
		MS	DJ	DJ	DH	DH	DG	DG
		KW	580	589	547	522	512	478
90	32.2	UN	85	82	82	82	82	82
		CS	71	71	71	47	47	45
		RE	12	12	12	500	500	500
		MS	DJ	DJ	DJ	DJ	DJ	DH
		KW	590	592	579	585	567	530
92.5	33.6	UN	85	82	82	82	82	82
		CS	73	73	71	71	47	45
		RE	12	12	12	12	500	500
		MS	DK	DK	DK	DJ	DJ	DH
		KW	632	635	593	592	597	557
95	35.0	UN	85	82	82	82	82	82
		CS	73	73	63	71	71	47
		RE	12	12	12	12	12	500
		MS	DL	DL	DK	DK	DK	DJ
		KW	644	647	633	607	600	590
97 5	36.4	UN	85	82	82	82	82	82
		CS	75	65	73	63	63	61
		RE	12	12	12	12	12	12
		MS	DM	DM	DL	DL	DK	DK
		KW	692	694	654	641	632	597
100	37.8	UN	85	82	82	82	82	82
		CS	75	75	73	73	63	63
		RE	12	12	12	12	12	12
		MS	DM	DM	DL	DL	DL	DK
		KW	711	714	675	669	654	635

→ *For additional tonnage and performance selections contact your nearest Carrier Sales Office (see page 50)

19EB Selection data (cont)

850 Ton Selections (2989 kW)

ADJ LVG. COND WTR. TEMP.			ADJUSTED LVG. CHILLED WATER TEMPERATURE — F (C)					
			40	42	44	45	46	48
(F)	(C)		(4.4)	(5.6)	(6.7)	(7.2)	(7.8)	(8.9)
85	29.4	UN	85	85	83	83	83	83
		CS	71	71	47	47	45	43
		RE	12	12	500	500	500	500
		MS	DJ	DJ	DJ	DJ	DH	DH
		KW	588	575	592	574	551	522
90	32.2	UN	85	85	85	85	85	83
		CS	73	71	71	71	47	45
		RE	12	12	12	12	500	500
		MS	DL	DK	DK	DJ	DJ	DJ
		KW	643	603	592	591	594	577
92.5	33.6	UN	85	85	85	85	85	85
		CS	73	71	71	71	71	45
		RE	12	12	12	12	12	500
		MS	DL	DK	DK	DK	DK	DJ
		KW	661	625	610	606	598	589
95	35.0	UN	85	85	85	85	85	83
		CS	73	73	71	71	71	71
		RE	12	12	12	12	12	12
		MS	DL	DL	DK	DK	DK	DK
		KW	686	667	631	622	617	613
97.5	36.4	UN	85	85	85	85	85	83
		CS	75	73	73	73	71	71
		RE	12	12	12	12	12	12
		MS	DM	DL	DL	DL	DK	DK
		KW	728	687	675	669	636	631
100	37.8	UN	85	85	85	85	85	85
		CS	75	75	73	73	73	71
		RE	12	12	12	12	12	12
		MS	DN	DM	DM	DL	DL	DL
		KW	748	736	690	688	682	646

1000 Ton Selections (3517 kW)

ADJ. LVG. COND WTR. TEMP.			ADJUSTED LVG. CHILLED WATER TEMPERATURE — F (C)					
			40	42	44	45	46	48
(F)	(C)		(4.4)	(5.6)	(6.7)	(7.2)	(7.8)	(8.9)
85	29.4	UN	89	89	89	87	87	87
		CS	75	81	71	71	71	71
		RE	500	12	12	12	12	12
		MS	DL	DL	DL	DL	DK	DK
		KW	686	661	639	639	637	624
90	32.2	UN	89	89	89	87	87	87
		CS	77	81	81	81	71	71
		RE	500	12	12	12	12	12
		MS	DN	DM	DL	DL	DL	DL
		KW	769	709	685	685	672	654
92.5	33.6	UN	89	89	89	87	87	87
		CS	79	83	81	81	81	71
		RE	500	12	12	12	12	12
		MS	DP	DN	DM	DM	DM	DL
		KW	851	751	703	702	694	674
95	35.0	UN		89	89	87	87	87
		CS		83	73	81	81	71
		RE	*	12	12	12	12	12
		MS		DN	DN	DM	DM	DM
		KW		773	752	730	716	694
97.5	36.4	UN		89	89	87	87	87
		CS		83	83	83	73	71
		RE	*	12	12	12	12	12
		MS		DP	DN	DN	DN	DM
		KW		804	777	777	764	729
100	37.8	UN		89	89	87	87	87
		CS		85	83	83	83	73
		RE	*	12	12	12	12	12
		MS		DP	DN	DN	DN	DN
		KW		850	804	803	792	766

900 Ton Selections (3165 kW)

ADJ. LVG. COND. WTR. TEMP.			ADJUSTED LVG. CHILLED WATER TEMPERATURE — F (C)					
			40	42	44	45	46	48
(F)	(C)		(4.4)	(5.6)	(6.7)	(7.2)	(7.8)	(8.9)
85	29.4	UN	85	85	85	85	85	83
		CS	81	71	71	71	25	45
		RE	12	12	12	12	500	500
		MS	DK	DK	DJ	DJ	DJ	DJ
		KW	626	604	595	588	587	582
90	32.2	UN	85	85	85	85	85	85
		CS	73	71	71	71	71	71
		RE	12	12	12	12	12	12
		MS	DL	DL	DK	DK	DK	DK
		KW	684	649	626	619	613	600
92.5	33.6	UN	85	85	85	85	85	85
		CS	83	73	71	71	71	71
		RE	12	12	12	12	12	12
		MS	DM	DL	DL	DK	DK	DK
		KW	708	686	643	637	631	618
95	35.0	UN	85	85	85	85	85	85
		CS	75	73	73	71	71	71
		RE	12	12	12	12	12	12
		MS	DN	DM	DL	DL	DL	DK
		KW	747	703	691	657	642	637
97.5	36.4	UN	85	85	85	85	85	85
		CS	75	73	73	73	83	71
		RE	12	12	12	12	12	12
		MS	DN	DM	DM	DM	DM	DL
		KW	774	735	707	701	712	649
100	37.8	UN	85	85	85	85	85	85
		CS	77	75	73	73	73	71
		RE	12	12	12	12	12	12
		MS	DP	DN	DM	DM	DM	DL
		KW	834	773	734	719	714	673

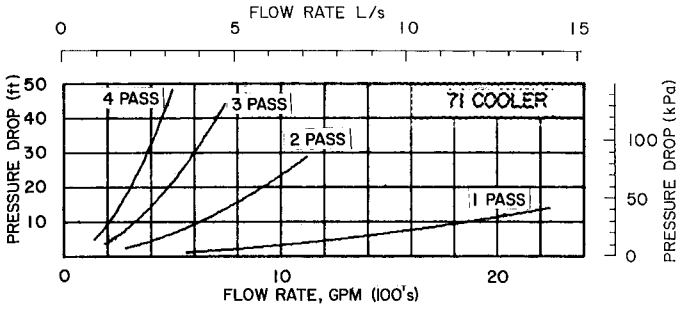
1100 Ton Selections (3869 kW)

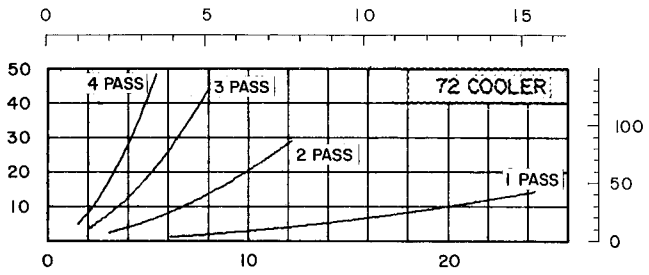
ADJ LVG. COND. WTR. TEMP.			ADJUSTED LVG. CHILLED WATER TEMPERATURE — F (C)					
			40	42	44	45	46	48
(F)	(C)		(4.4)	(5.6)	(6.7)	(7.2)	(7.8)	(8.9)
85	29.4	UN				89	89	89
		CS				73	81	71
		RE	*	*	*	500	12	12
		MS				DL	DM	DL
		KW				680	693	676
90	32.2	UN				89	89	89
		CS				75	81	81
		RE	*	*	*	500	12	12
		MS				DN	DM	DM
		KW				748	739	718
92.5	33.6	UN				89	89	89
		CS				75	81	81
		RE	*	*	*	500	12	12
		MS				DN	DN	DM
		KW				776	772	740
95	35.0	UN					89	89
		CS					73	81
		RE	*	*	*	*	12	12
		MS					DP	DN
		KW					839	762
97.5	36.4	UN					89	89
		CS					77	81
		RE	*	*	*	*	500	12
		MS					DP	DN
		KW					862	802
100	37.8	UN						89
		CS						83
		RE	*	*	*	*	*	12
		MS						DP
		KW						842

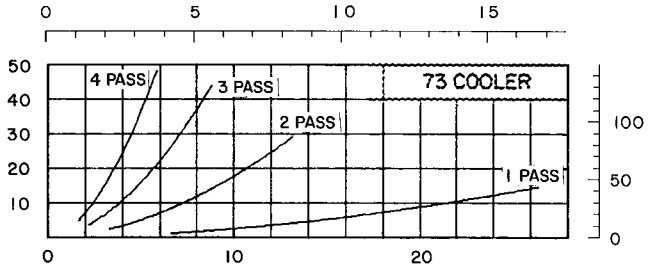
LEGEND

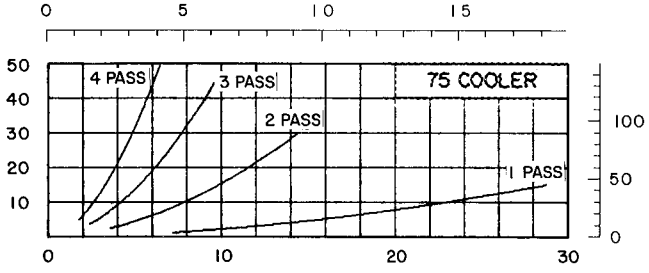
CS — Compressor
GR — Gear-Refrigerant
HE — Heat Exchanger
KW — Power Input
MS — Motor Size
RE — Refrigerant
UN — Unishell

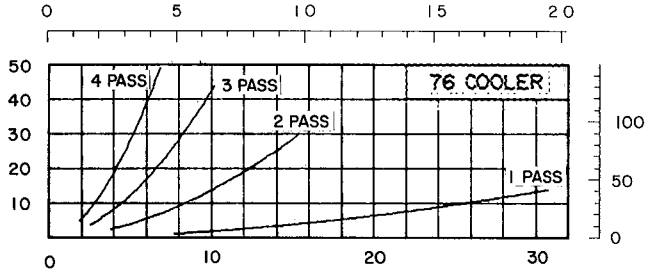
UNISHELL COOLER

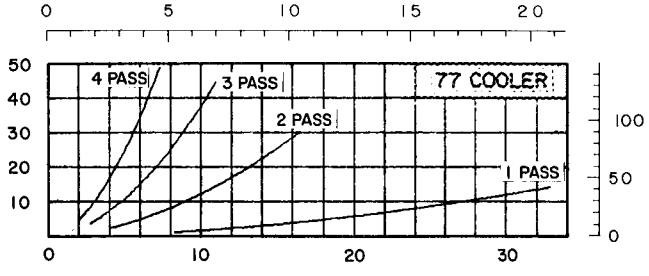




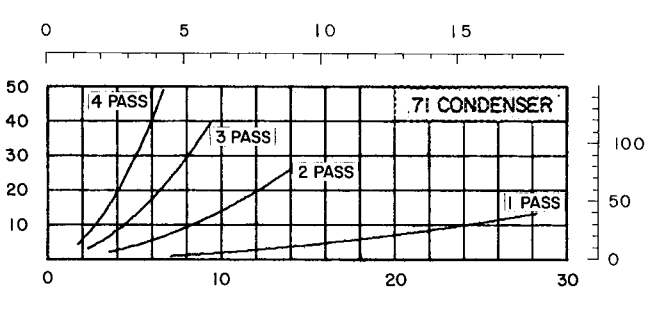


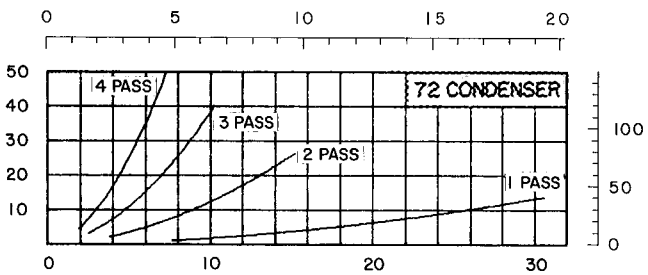


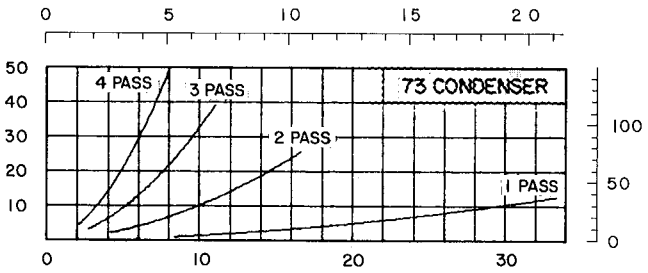


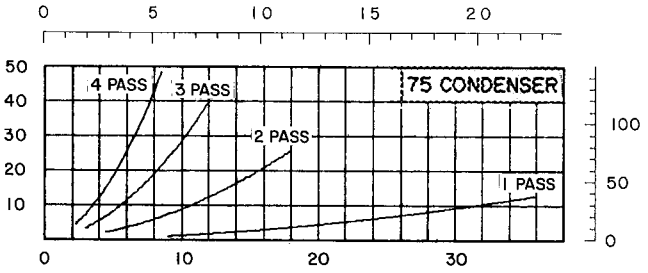


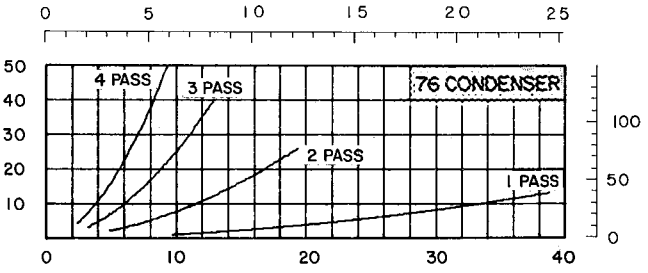
UNISHELL CONDENSER

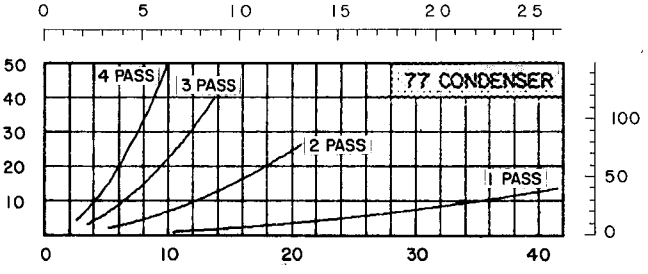






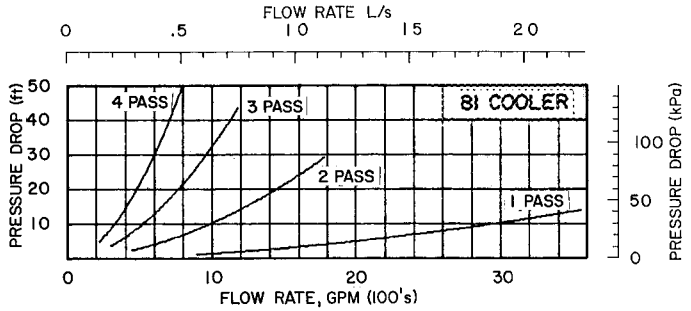


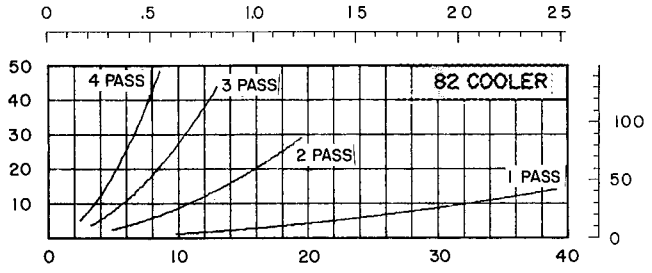


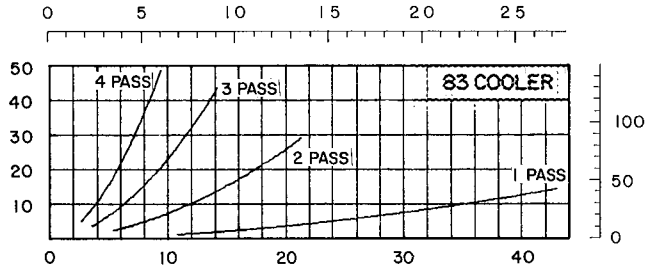


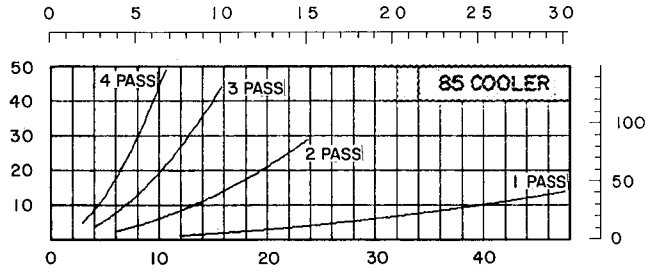
19EB Selection data (cont)

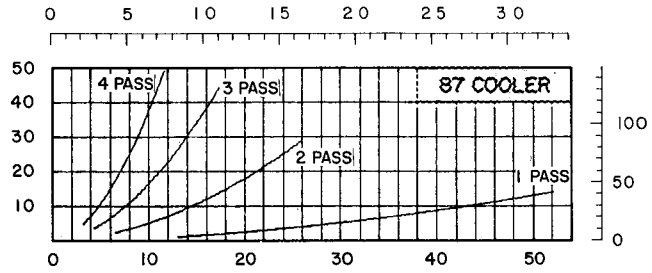
UNISHELL COOLER

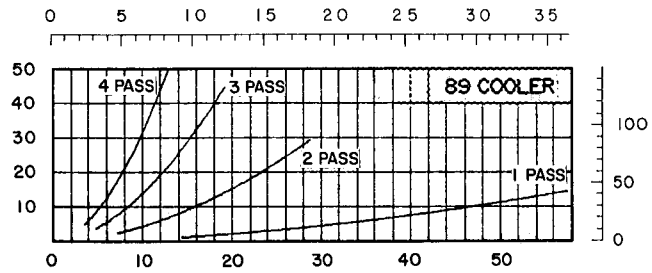




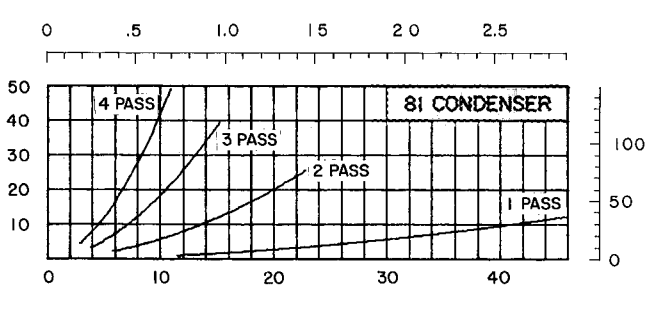


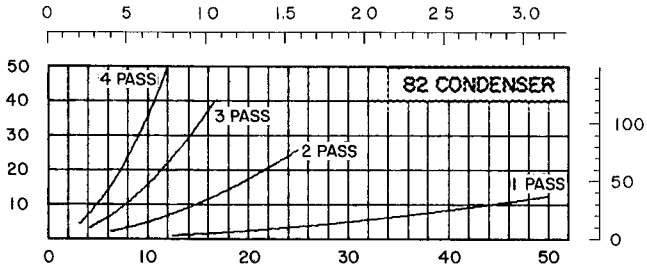


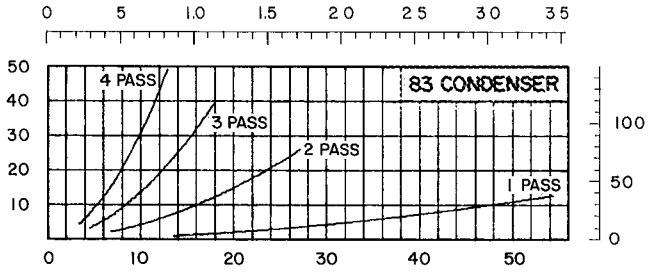


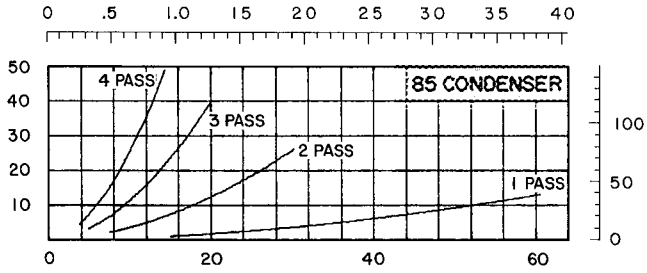


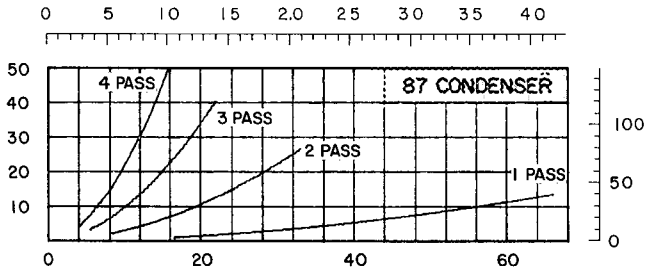
UNISHELL CONDENSER

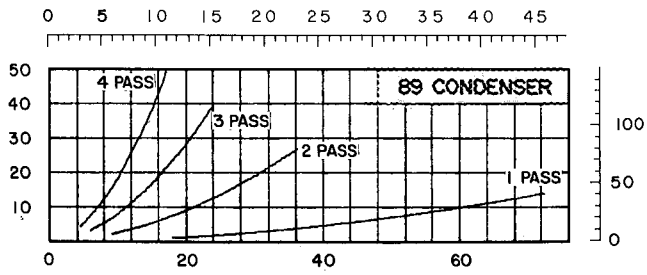












Physical data

19EB UNISHELL SIZE*	RIGGING WEIGHT		OPERATING WEIGHT		OPERATING CHARGE				AREA TO INSULATE	
					R-12		R-500			
	(lb)	(kg)	(lb)	(kg)	(lb)	(kg)	(lb)	(kg)	(sq ft)	(m^2)
71	19,175	8,698	19,975	9,061	2000	907	1784	809	203	18.9
72	19,325	8,766	20,175	9,151	2000	907	1784	809	203	18.9
73	20,675	9,378	21,625	9,809	2180	989	1945	882	211	19.6
75	21,325	9,673	22,350	10,138	2180	989	1945	882	211	19.6
76	22,050	10,002	23,150	10,501	2370	1075	2114	959	221	20.5
77	22,525	10,217	23,675	10,739	2370	1075	2114	959	221	20.5
81 (a)	26,800	12,156	28,375	12,871	2600	1179	2319	1052	293	27.2
81 (b)	28,300	12,837	29,875	13,551	2600	1179	2319	1052	293	27.2
82 (a)	27,125	12,304	28,850	13,086	2650	1202	2364	1072	293	27.2
82 (b)	28,625	12,984	30,350	13,767	2650	1202	2364	1072	293	27.2
83 (a)	27,950	12,678	29,850	13,540	2700	1225	2408	1092	293	27.2
83 (b)	29,450	13,358	31,350	14,220	2700	1225	2408	1092	293	27.2
85 (a)	29,950	13,585	32,040	14,533	3000	1361	2676	1214	303	28.1
85 (b)	31,450	14,265	33,550	15,218	3000	1361	2676	1214	303	28.1
87 (a)	31,300	14,197	33,600	15,241	3100	1406	2765	1254	303	28.1
87 (b)	32,800	14,878	35,100	15,921	3100	1406	2765	1254	303	28.1
89 (a)	34,925	15,842	37,465	16,994	3500	1588	3122	1416	313	29.0
89 (b)	36,425	16,522	38,975	17,679	3500	1588	3122	1416	313	29.0

*(a) — with 11 thru 49 size compressor
(b) — with 51 thru 89 size compressor

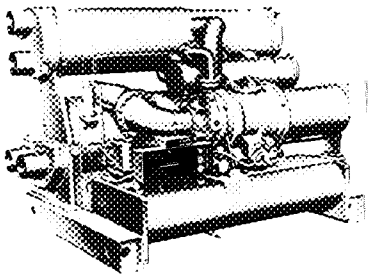
→ Electrical data

MTR	MAX KW	200 V 3.21 FLA/Kw		230 V 2 79 FLA/Kw		380 V 1.69 FLA/Kw		460 V 1.39 FLA/Kw		575 V 1 12 FLA/Kw		MTR	MAX KW	2400 V 270 FLA/Kw	4160 V 156 FLA/Kw	6900 V .094 FLA/Kw
		LRA Star	LRA Delta	LRA Star	LRA Delta	LRA Star	LRA Delta	LRA Star	LRA Delta	LRA Star	LRA Delta			LRA	LRA	LRA
DB	363	2032	6351	1767	5522	1069	3342	883	2761	707	2209	DB	344	442	255	—
DC	388	2032	6351	1767	5522	1069	3342	883	2761	707	2209	DC	369	468	271	—
DD	418	2217	6929	1928	6024	1167	3646	964	3012	771	2410	DD	398	505	292	176
DE	443	2494	7795	2169	6777	1312	4101	1084	3388	867	2711	DE	421	534	308	186
DF	478	2494	7795	2169	6777	1312	4101	1084	3388	867	2711	DF	453	576	333	200
DG	523	—	—	—	—	1458	4557	1205	3765	964	3012	DG	497	630	364	219
DH	561	—	—	—	—	1410	4405	1164	3639	932	2912	DH	533	678	392	236
DJ	597	—	—	—	—	1507	4709	1245	3890	996	3112	DJ	568	722	417	251
DK	639	—	—	—	—	1847	5772	1526	4769	1221	3815	DK	609	774	447	269
DL	692	—	—	—	—	1993	6228	1647	5145	1317	4116	DL	659	837	483	291
DM	746	—	—	—	—	2139	6684	1767	5522	1414	4418	DM	709	900	519	313
DN	807	—	—	—	—	2139	6684	1767	5522	1414	4418	DN	770	1007	618	336
DP	875	—	—	—	—	2139	6684	1767	5522	1414	4418	DP	835	1060	613	370
												DQ	875	1110	644	388

FLA — Full Load Amps
KW — Compressor Power Input (kilowatts)
LRA — Locked Rotor Amps
MTR — Motor

NOTE: Overload Trip Amps = FLA x 1 08

19FA Selection data



19FA*
1000-1600 TONS
(3517-5627 kW)

1200 Ton Selections (4220 kW)

ADJ. LVG COND. WTR TEMP.			ADJUSTED LVG CHILLED WATER TEMPERATURE — F (C)					
			40	42	44	45	46	48
(F)	(C)		(4.4)	(5.6)	(6.7)	(7.2)	(7.8)	(8.9)
85	29.4	CS	561	551	551	557	557	541
		GR	B500	B500	B500	A500	A500	B500
		HE	2224	2224	2224	2224	2224	2224
		MS	EB	EA	EA	EA	EA	EA
		KW	972	946	924	910	887	885
90	32.2	CS	563	553	551	551	551	557
		GR	B500	B500	B500	B500	B500	A500
		HE	2224	2224	2224	2224	2224	2224
		MS	EB	EB	EB	EA	EA	EA
		KW	1057	1027	972	963	957	920
92.5	33.6	CS	563	553	553	551	551	551
		GR	B500	B500	B500	B500	B500	B500
		HE	2225	2224	2224	2224	2224	2224
		MS	EB	EB	EB	EB	EB	EA
		KW	1078	1064	1037	991	969	964
95	35.0	CS	565	563	553	553	553	551
		GR	B500	B500	B500	B500	B500	B500
		HE	2225	2225	2224	2224	2224	2224
		MS	EC	EC	EB	EB	EB	EB
		KW	1139	1077	1062	1052	1045	977
97 5	36.4	CS	565	555	553	553	553	553
		GR	B500	B500	B500	B500	B500	B500
		HE	2225	2225	2225	2224	2224	2224
		MS	EC	EC	EC	EB	EB	EB
		KW	1174	1141	1079	1080	1068	1051
100	37.8	CS	563	565	555	553	553	553
		GR	C500	B500	B500	B500	B500	B500
		HE	2225	2225	2225	2225	2225	2225
		MS	ED	EC	EC	EC	EC	EB
		KW	1216	1176	1146	1097	1078	1066

1100 Ton Selections (3869 kW)

ADJ. LVG COND WTR TEMP.			ADJUSTED LVG CHILLED WATER TEMPERATURE — F (C)					
			40	42	44	45	46	48
(F)	(C)		(4.4)	(5.6)	(6.7)	(7.2)	(7.8)	(8.9)
85	29.4	CS	551	563	555	555	555	545
		GR	B500	A12	A500	A500	A500	A500
		HE	2222	2224	2222	2222	2222	2222
		MS	EA	DP	DP	DP	DP	DP
		KW	883	863	812	793	783	788
90	32.2	CS	553	551	551	563	563	541
		GR	B500	B500	B500	A12	A12	B500
		HE	2224	2222	2222	2224	2224	2222
		MS	EA	EA	EA	DP	DP	DP
		KW	966	915	900	872	857	868
92 5	33.6	CS	553	553	551	551	557	561
		GR	B500	B500	B500	B500	A500	A12
		HE	2224	2224	2224	2222	2222	2224
		MS	EB	EB	EA	EA	EA	DP
		KW	980	965	917	914	889	837
95	35.0	CS	555	553	565	551	563	557
		GR	B500	B500	A12	B500	A12	A500
		HE	2224	2224	2224	2224	2224	2222
		MS	EB	EB	EA	EA	EA	EA
		KW	1047	990	959	936	903	886
97 5	36.4	CS	555	553	553	565	565	551
		GR	B500	B500	B500	A12	A12	B500
		HE	2224	2224	2224	2224	2224	2224
		MS	EB	EB	EB	EB	EA	EA
		KW	1067	1020	998	966	954	935
100	37.8	CS	561	555	553	553	565	543
		GR	B12	B500	B500	B500	A12	B500
		HE	2224	2224	2224	2224	2224	2224
		MS	EC	EC	EB	EB	EB	EB
		KW	1110	1077	1023	1015	984	973

1300 Ton Selections (4572 kW)

ADJ. LVG. COND. WTR TEMP.			ADJUSTED LVG. CHILLED WATER TEMPERATURE — F (C)					
			40	42	44	45	46	48
(F)	(C)		(4.4)	(5.6)	(6.7)	(7.2)	(7.8)	(8.9)
85	29.4	CS	563	561	551	551	551	555
		GR	B500	B500	B500	B500	B500	A500
		HE	2425	2425	2425	2425	2425	2425
		MS	EB	EB	EB	EB	EA	EA
		KW	1073	1006	979	965	966	909
90	32.2	CS	563	563	561	551	551	551
		GR	B500	B500	B500	B500	B500	B500
		HE	2425	2425	2425	2425	2425	2425
		MS	EC	EC	EB	EB	EB	EB
		KW	1142	1104	1041	1030	1010	991
92 5	33.6	CS	565	563	553	561	561	551
		GR	B500	B500	B500	B500	B500	B500
		HE	2425	2425	2425	2425	2425	2425
		MS	ED	EC	EC	EB	EB	EB
		KW	1202	1138	1109	1063	1046	1017
95	35.0	CS	565	561	563	553	553	551
		GR	B500	C500	B500	B500	B500	B500
		HE	2426	2425	2425	2425	2425	2425
		MS	ED	EC	EC	EC	EC	EB
		KW	1227	1178	1138	1123	1106	1046
97.5	36.4	CS	563	565	563	563	553	551
		GR	C500	B500	B500	B500	B500	C500
		HE	2426	2426	2426	2425	2425	2425
		MS	ED	ED	EC	EC	EC	EC
		KW	1267	1224	1160	1156	1143	1129
100	37.8	CS	563	565	565	563	563	553
		GR	C500	B500	B500	B500	B500	B500
		HE	2427	2426	2426	2426	2425	2425
		MS	ED	ED	ED	EC	EC	EC
		KW	1299	1268	1231	1178	1175	1142

LEGEND

- **CS** — Compressor
- **GR** — Gear-Refrigerant
- **HE** — Heat Exchanger
- **KW** — Power Input
- **MS** — Motor Size
- **RE** — Refrigerant
- **UN** — Unishell

1400 Ton Selections (4924 kW)

ADJ. LVG. COND. WTR. TEMP.			ADJUSTED LVG. CHILLED WATER TEMPERATURE — F (C)					
			40	42	44	45	46	48
(F)	(C)		(4.4)	(5.6)	(6.7)	(7.2)	(7.8)	(8.9)
85	29.4	CS	561	561	561	561	551	565
		GR	C500	B500	B500	B500	B500	A500
		HE	2526	2526	2526	2526	2526	2526
		MS	EC	EC	EB	EB	EB	EA
		KW	1151	1081	1051	1036	1023	956
90	32.2	CS	565	563	561	561	561	551
		GR	B500	B500	B500	B500	B500	B500
		HE	2526	2526	2526	2526	2526	2526
		MS	ED	EC	EC	EC	EC	EB
		KW	1261	1187	1121	1097	1080	1054
92.5	33.6	CS	563	561	563	563	561	551
		GR	C500	C500	B500	B500	B500	B500
		HE	2526	2526	2526	2526	2526	2526
		MS	ED	ED	EC	EC	EC	EC
		KW	1300	1220	1182	1169	1117	1088
95	35.0	CS	563	565	563	563	563	561
		GR	C500	B500	B500	B500	B500	B500
		HE	2628	2526	2526	2526	2526	2526
		MS	ED	ED	ED	ED	ED	EC
		KW	1298	1294	1220	1196	1184	1115
97.5	36.4	CS	565	565	561	561	563	563
		GR	B500	B500	C500	C500	B500	B500
		HE	2829	2529	2526	2526	2526	2526
		MS	ED	ED	ED	ED	ED	ED
		KW	1303	1300	1265	1239	1216	1191
100	37.8	CS	565	565	565	565	561	563
		GR	B500	B500	B500	B500	C500	B500
		HE	2931	2829	2528	2527	2526	2526
		MS	ED	ED	ED	ED	ED	ED
		KW	1305	1301	1310	1300	1261	1223

1500 Ton Selections (5276 kW)

ADJ. LVG. COND. WTR. TEMP.			ADJUSTED LVG. CHILLED WATER TEMPERATURE — F (C)					
			40	42	44	45	46	48
(F)	(C)		(4.4)	(5.6)	(6.7)	(7.2)	(7.8)	(8.9)
85	29.4	CS	561	561	561	561	561	551
		GR	C500	C500	B500	B500	B500	B500
		HE	2627	2627	2627	2627	2627	2627
		MS	ED	ED	EC	EC	EC	EB
		KW	1252	1198	1127	1104	1083	1073
90	32.2	CS	561	561	561	563	561	561
		GR	C500	C500	C500	B500	B500	B500
		HE	2829	2627	2627	2627	2627	2627
		MS	ED	ED	ED	ED	EC	EC
		KW	1279	1280	1231	1212	1162	1123
92.5	33.6	CS	561	561	561	561	563	561
		GR	C500	C500	C500	C500	B500	B500
		HE	2930	2629	2627	2627	2627	2627
		MS	ED	ED	ED	ED	ED	EC
		KW	1296	1301	1273	1251	1225	1155
95	35.0	CS		561	561	561	561	561
		GR		C500	C500	C500	C500	B500
		HE	*	2829	2628	2627	2627	2627
		MS		ED	ED	ED	ED	ED
		KW		1309	1298	1290	1270	1198
97.5	36.4	CS		561	561	561	561	563
		GR		C500	C500	C500	C500	B500
		HE	*	2931	2829	2629	2628	2627
		MS		ED	ED	ED	ED	ED
		KW		1303	1301	1307	1295	1264
100	37.8	CS			561	563	563	563
		GR			C500	B500	B500	B500
		HE	*	*	2931	2930	2829	2628
		MS			ED	ED	ED	ED
		KW			1300	1296	1298	1292

1600 Ton Selections (5627 kW)

ADJ. LVG. COND WTR. TEMP.			ADJUSTED LVG. CHILLED WATER TEMPERATURE — F (C)					
			40	42	44	45	46	48
(F)	(C)		(4.4)	(5.6)	(6.7)	(7.2)	(7.8)	(8.9)
85	29.4	CS		561	561	563	561	561
		GR		C500	C500	B500	B500	B500
		HE	*	2729	2728	2728	2728	2728
		MS		ED	ED	ED	EC	EC
		KW		1292	1245	1231	1170	1131
90	32.2	CS		561	561	561	561	561
		GR		C500	C500	C500	C500	B500
		HE	*	2931	2829	2729	2728	2728
		MS		ED	ED	ED	ED	ED
		KW		1301	1299	1291	1282	1198
92 5	33.6	CS			561	561	561	561
		GR			C500	C500	C500	B500
		HE	*	*	2931	2929	2729	2728
		MS			ED	ED	ED	ED
		KW			1296	1305	1308	1249
95	35.0	CS				561	563	563
		GR				C500	B500	B500
		HE	*	*	*	2932	2930	2729
		MS				ED	ED	ED
		KW				1297	1308	1304
97.5	36.4	CS						563
		GR						B500
		HE	*	*	*	*	*	2930
		MS						ED
		KW						1306
100	37.8	CS						
		GR						
		HE	*	*	*	*	*	*
		MS						
		KW						

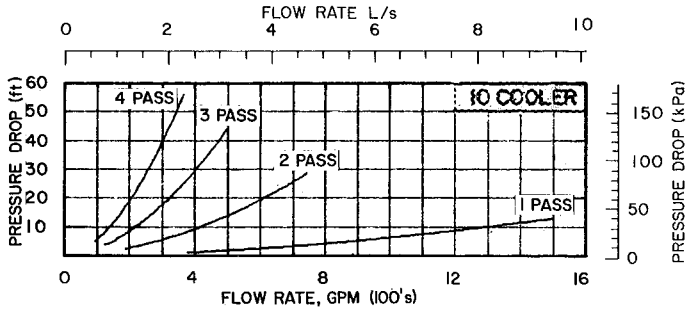
LEGEND

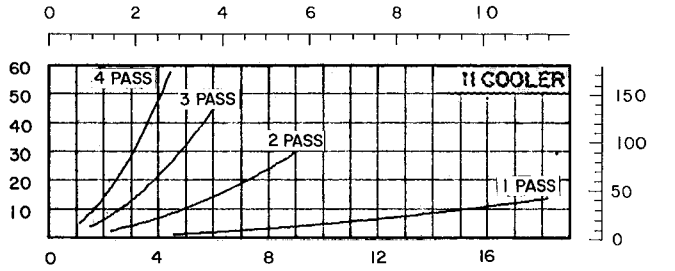
CS — Compressor
GR — Gear-Refrigerant
HE — Heat Exchanger
KW — Power Input
MS — Motor Size
RE — Refrigerant
UN — Unishell

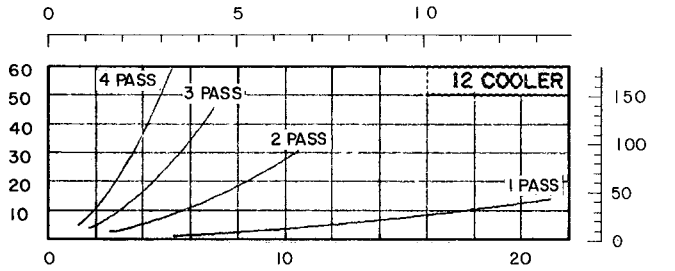
→ *For additional tonnage and performance selections contact your nearest Carrier Sales Office (see page 50)

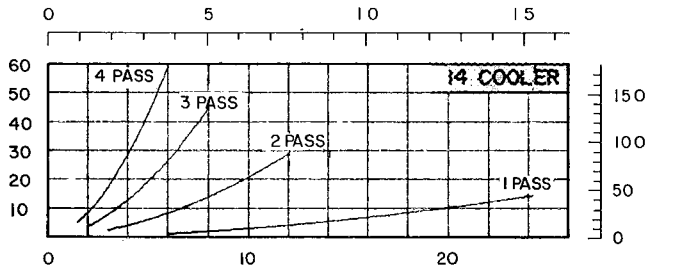
19FA Selection data (cont)

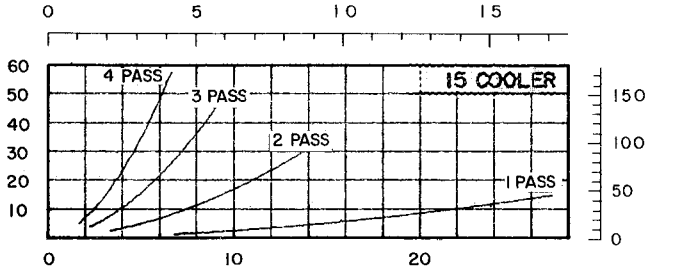
COOLER

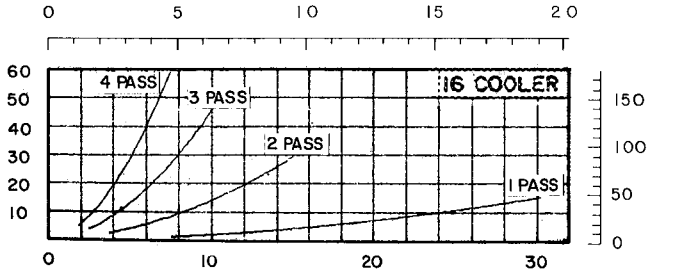




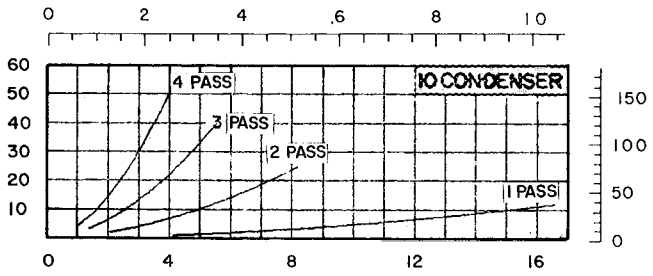


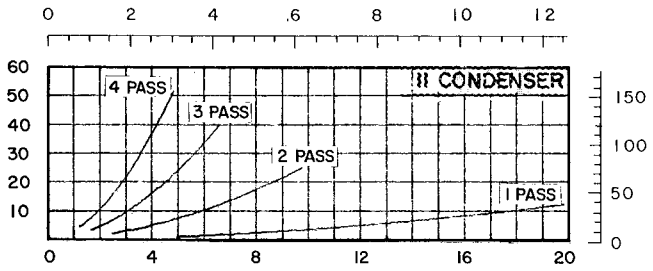


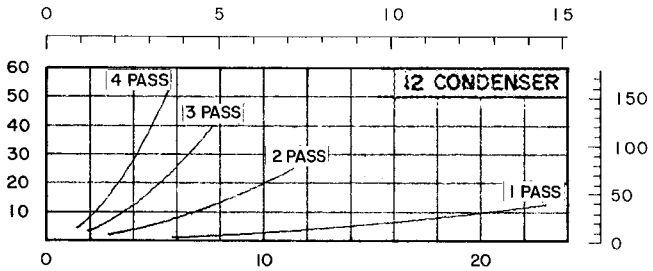


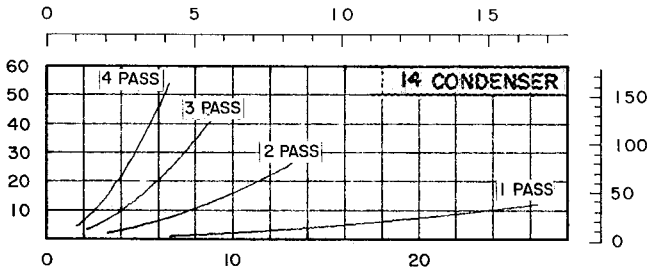


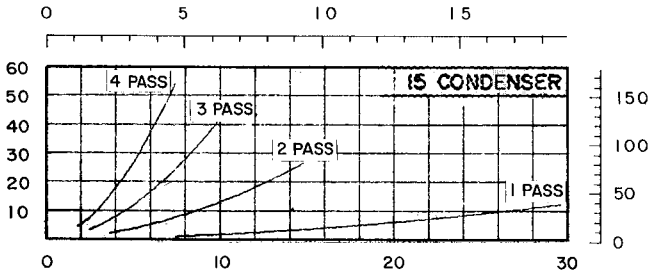
CONDENSER

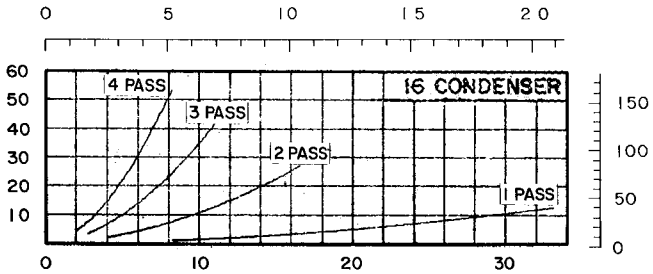




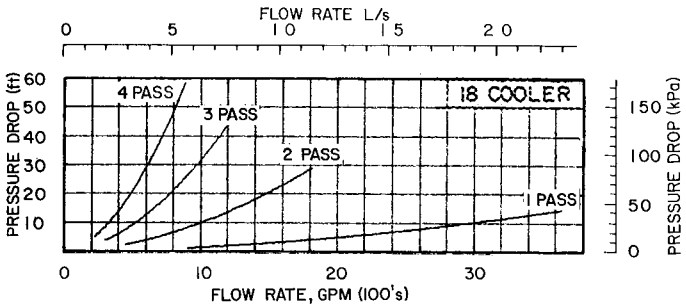


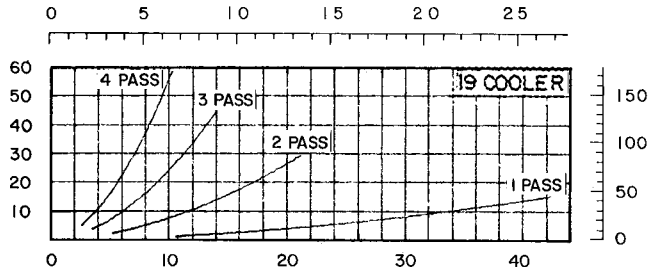


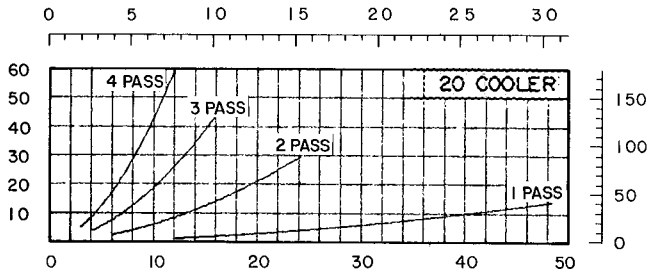


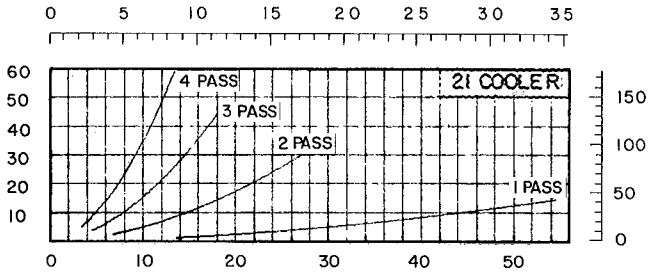


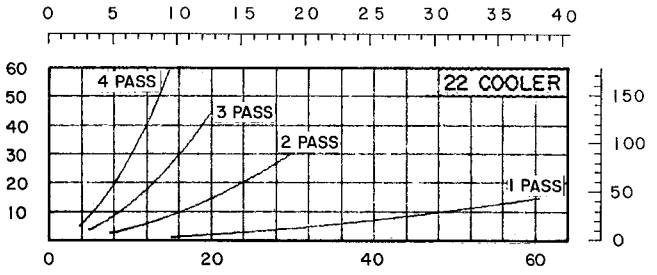
COOLER

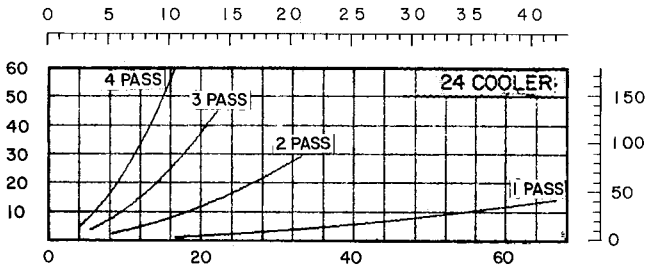




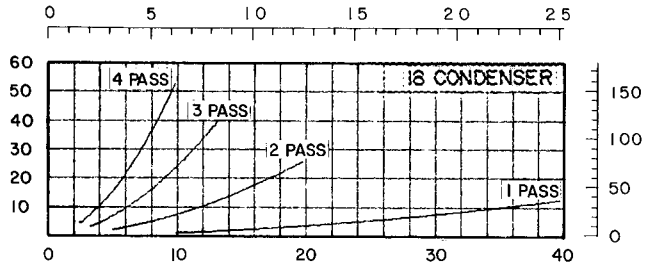


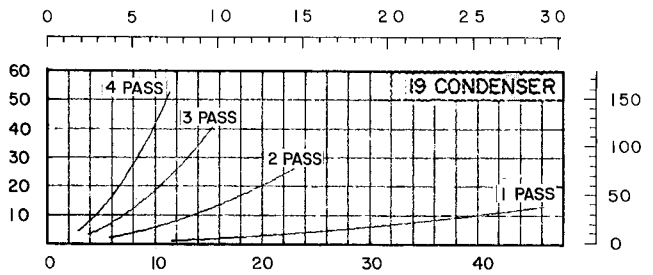


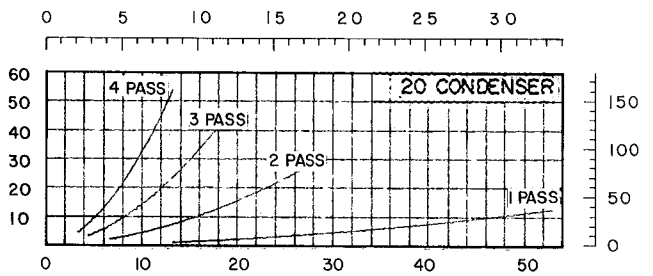


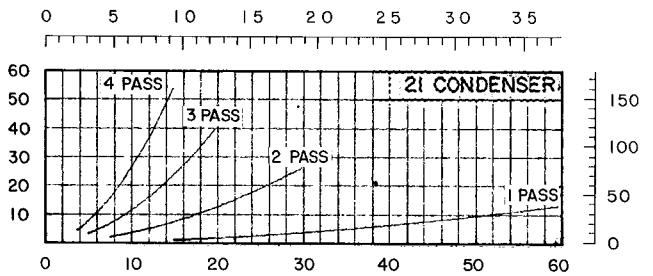


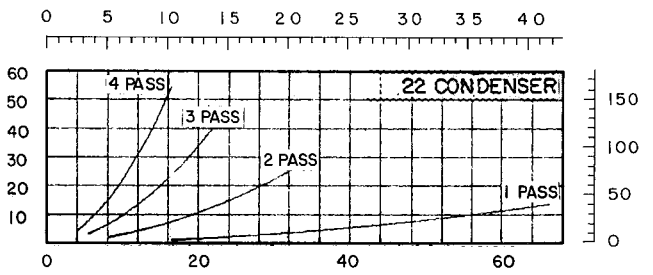
CONDENSER

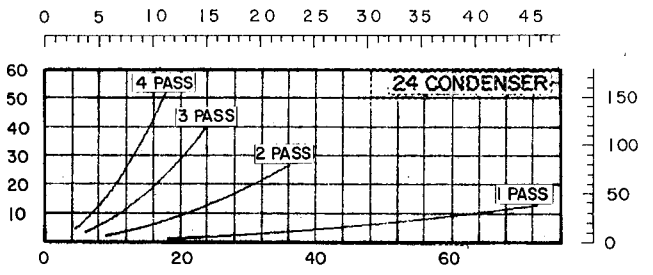






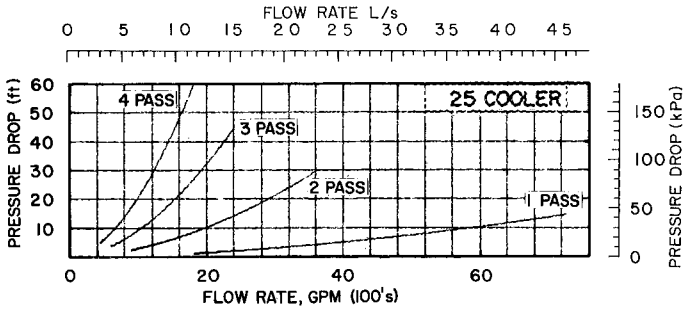


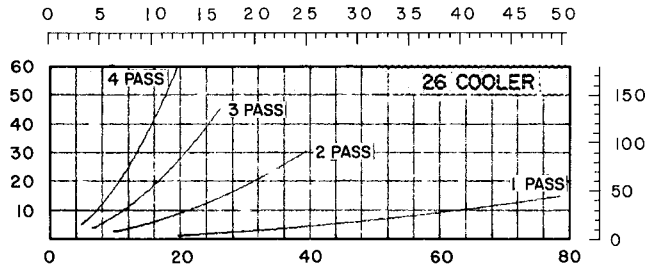


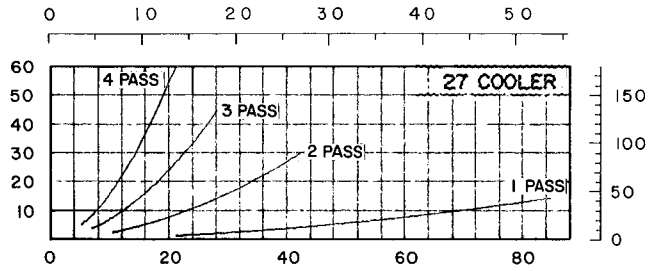


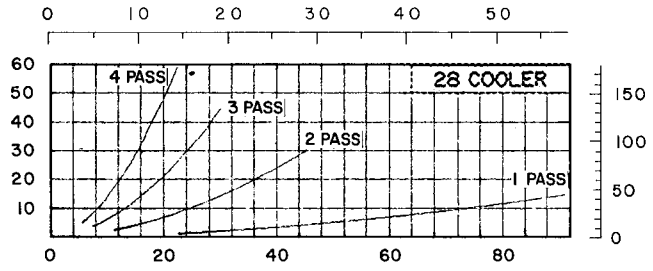
19FA Selection data (cont)

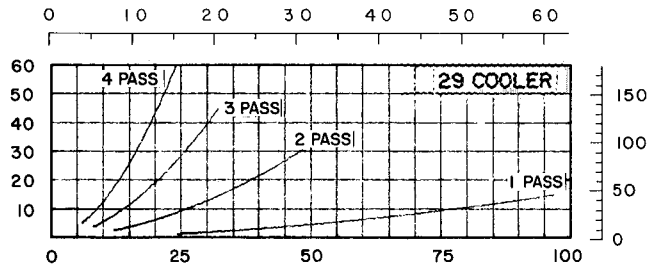
COOLER



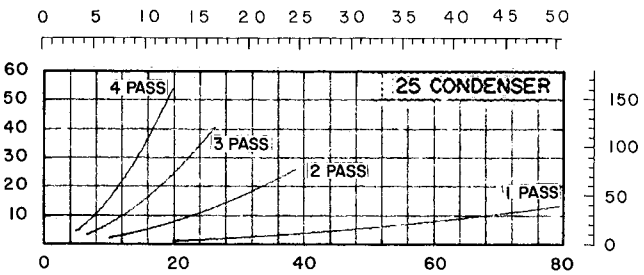


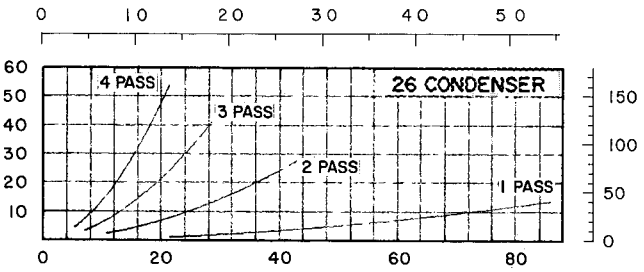


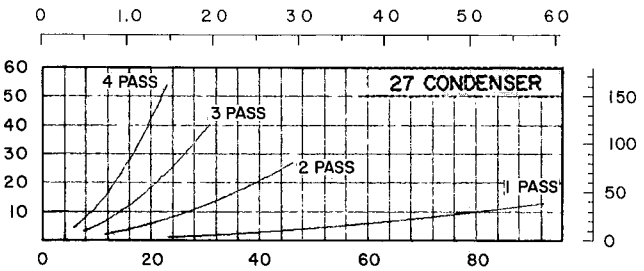


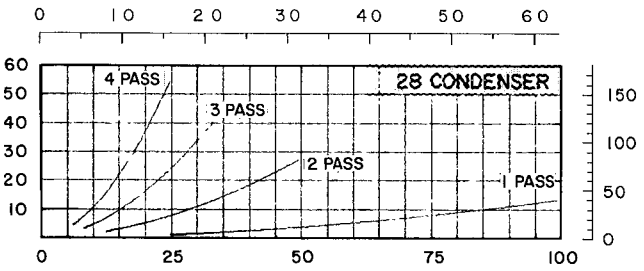


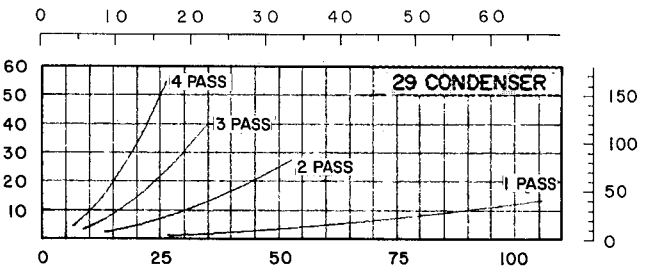
CONDENSER

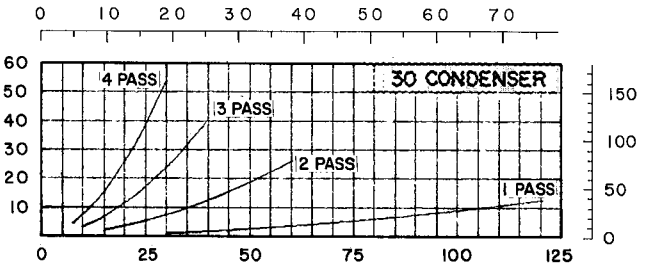












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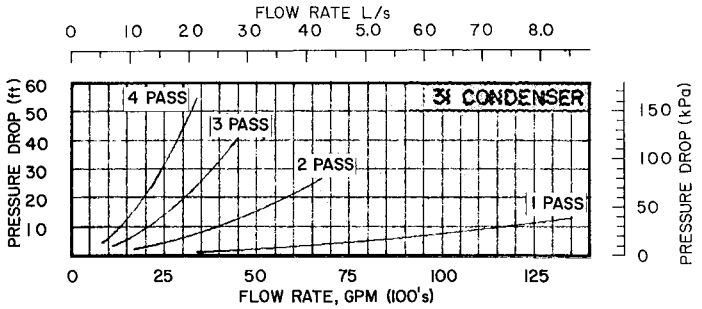
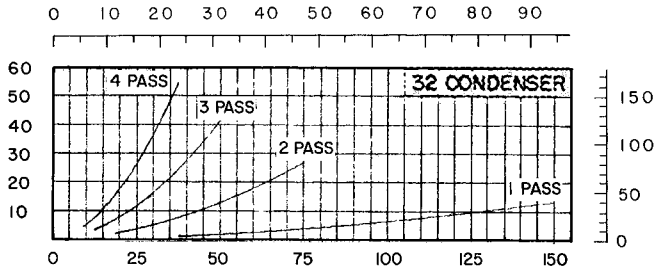




Physical data

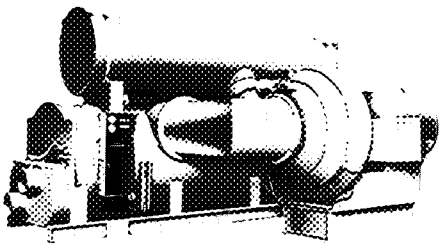
19FA HEAT EXCHANGER	RIGGING WEIGHT		OPERATING WEIGHT		OPERATING CHARGE				AREA TO INSULATE	
					R-12		R-500			
	(lb)	(kg)	(lb)	(kg)	(lb)	(kg)	(lb)	(kg)	(sq ft)	(m^2)
2121	35,600	16,148	37,900	17,191	2580	1170	2150	975	200	18.6
2122	35,900	16,284	38,300	17,373	2580	1170	2150	975	200	18.6
2222	37,680	17,091	40,160	18,216	2700	1225	2250	1021	200	18.6
2224	38,960	17,672	41,530	18,838	2880	1306	2400	1089	200	18.6
2225	39,420	17,881	42,180	19,133	2868	1301	2390	1084	200	18.6
2422	39,480	17,908	42,160	19,123	2892	1312	2410	1093	213	19.8
2425	42,670	19,355	45,620	20,693	3060	1388	2550	1157	213	19.8
2426	43,100	19,550	46,140	20,929	3060	1388	2550	1157	213	19.8
2525	42,780	19,405	45,820	20,784	3096	1405	2580	1170	213	19.8
2526	43,230	19,609	46,360	21,029	3096	1405	2580	1170	213	19.8
2527	44,740	20,294	47,960	21,574	3336	1513	2780	1261	213	19.8
2528	45,050	20,434	48,420	21,963	3336	1513	2780	1261	213	19.8
2529	45,350	20,570	48,820	22,144	3336	1513	2780	1261	213	19.8
2627	45,000	20,412	48,320	21,918	3384	1535	2820	1279	213	19.8
2628	45,310	20,552	48,780	22,126	3384	1535	2820	1279	213	19.8
2629	45,610	20,688	49,170	22,303	3372	1530	2810	1275	213	19.8
2728	48,930	22,194	52,570	23,845	3660	1660	3050	1383	242	22.5
2729	49,240	22,335	52,960	24,022	3660	1660	3050	1383	242	22.5
2828	49,200	22,317	52,930	24,009	3720	1687	3100	1406	242	22.5
2829	49,500	22,453	53,320	24,186	3708	1682	3090	1402	242	22.5
2929	49,780	22,580	53,680	24,349	3780	1715	3150	1429	242	22.5

→ Electrical data

MTR	MAX KW	460 V LRA		575 V LRA		2400 V	4160 V	6900 V
		Star	Delta	Star	Delta	LRA	LRA	LRA
		1.39 FLA/Kw		1.11 FLA/Kw		.270 FLA/Kw	.156 FLA/Kw	.094 FLA/Kw
DM	746	1768	5523	1414	4418	900	519	313
DP	875	1768	5523	1414	4418	1060	613	370
		1.38 FLA/Kw		1.10 FLA/Kw		.264 FLA/Kw	.153 FLA/Kw	.092 FLA/Kw
EA	968	2250	7025	1800	5620	1346	770	469
EB	1080	2510	7845	2010	6275	1502	866	523
EC	1188	2770	8655	2218	6930	1660	958	577
ED	1310	3050	9540	2440	7630	1828	1053	636

FLA — Full Load Amps
KW — Compressor Power Input (kilowatts)
LRA — Locked Rotor Amps
NOTE: Overload Trip Amps = FLA x 1 08

19CB Selection data



19CB*
1600-2000 TONS
(5627-7034 kW)

1600 Ton Selections (5627 kW)

ADJ LVG. COND. WTR TEMP.			ADJUSTED LVG. CHILLED WATER TEMPERATURE — F (C)					
			40	42	44	45	46	48
(F)	(C)		(4.4)	(5.6)	(6.7)	(7.2)	(7.8)	(8.9)
85	29.4	HE	77	77	77	77	77	77
		CS	41	41	41	41	41	41
		RE	114	114	114	114	114	114
		MS	BX	BX	BX	BX	BX	BX
		KW	1144	1120	1098	1088	1079	1057
90	32.2	HE	77	77	77	77	77	77
		CS	41	41	41	41	41	41
		RE	114	114	114	114	114	114
		MS	BY	BY	BX	BX	BX	BX
		KW	1208	1180	1160	1148	1137	1118
92.5	33.6	HE	77	77	77	77	77	77
		CS	41	41	41	41	41	41
		RE	114	114	114	114	114	114
		MS	BY	BY	BY	BY	BX	BX
		KW	1248	1215	1189	1176	1169	1149
95	35.0	HE	77	77	77	77	77	77
		CS	41	41	41	41	41	41
		RE	114	114	114	114	114	114
		MS	BY	BY	BY	BY	BY	BY
		KW	1292	1257	1226	1213	1198	1176
97.5	36.4	HE	77	77	77	77	77	77
		CS	41	41	41	41	41	41
		RE	114	114	114	114	114	114
		MS	BY	BY	BY	BY	BY	BY
		KW	1340	1301	1267	1251	1238	1210
100	37.8	HE	77	77	77	77	77	77
		CS	42	41	41	41	41	41
		RE	114	114	114	114	114	114
		MS	XX	BY	BY	BY	BY	BY
		KW	1409	1349	1310	1294	1278	1249

1700 Ton Selections (5979 kW)

ADJ. LVG. COND. WTR. TEMP.			ADJUSTED LVG. CHILLED WATER TEMPERATURE — F (C)					
			40	42	44	45	46	48
(F)	(C)		(4.4)	(5.6)	(6.7)	(7.2)	(7.8)	(8.9)
85	29.4	HE	77	77	77	77	77	77
		CS	41	41	41	41	41	41
		RE	114	114	114	114	114	114
		MS	BY	BY	BX	BX	BX	BX
		KW	1223	1195	1174	1163	1152	1128
90	32.2	HE	77	77	77	77	77	77
		CS	41	41	41	41	41	41
		RE	114	114	114	114	114	114
		MS	BY	BY	BY	BY	BY	BY
		KW	1300	1264	1236	1221	1209	1186
92.5	33.6	HE	77	77	77	77	77	77
		CS	41	41	41	41	41	41
		RE	114	114	114	114	114	114
		MS	BY	BY	BY	BY	BY	BY
		KW	1344	1304	1272	1257	1243	1218
95	35.0	HE	77	77	77	77	77	77
		CS	41	41	41	41	41	41
		RE	114	114	114	114	114	114
		MS	XX	BY	BY	BY	BY	BY
		KW	1388	1347	1312	1295	1280	1253
97.5	36.4	HE	77	77	77	77	77	77
		CS	42	41	41	41	41	41
		RE	114	114	114	114	114	114
		MS	XX	XX	BY	BY	BY	BY
		KW	1467	1392	1355	1338	1320	1291
100	37.8	HE	77	77	77	77	77	77
		CS	42	41	41	41	41	41
		RE	114	114	114	114	114	114
		MS	XX	XX	XX	XX	BY	BY
		KW	1514	1446	1399	1379	1365	1331

1800 Ton Selections (6330 kW)

ADJ. LVG. COND. WTR. TEMP.			ADJUSTED LVG. CHILLED WATER TEMPERATURE — F (C)					
			40	42	44	45	46	48
(F)	(C)		(4.4)	(5.6)	(6.7)	(7.2)	(7.8)	(8.9)
85	29.4	HE	77	77	77	77	77	77
		CS	41	41	41	41	41	41
		RE	114	114	114	114	114	114
		MS	BY	BY	BY	BY	BY	BY
		KW	1318	1283	1252	1238	1224	1201
90	32.2	HE	77	77	77	77	77	77
		CS	41	41	41	41	41	41
		RE	114	114	114	114	114	114
		MS	XX	BY	BY	BY	BY	BY
		KW	1401	1361	1322	1308	1293	1264
92 5	33.6	HE	77	77	77	77	77	77
		CS	42	41	41	41	41	41
		RE	114	114	114	114	114	114
		MS	XX	XX	BY	BY	BY	BY
		KW	1492	1400	1363	1344	1330	1300
95	35.0	HE	77	77	77	77	77	77
		CS	42	41	41	41	41	41
		RE	114	114	114	114	114	114
		MS	XX	XX	XX	XX	BY	BY
		KW	1536	1447	1402	1382	1369	1338
97.5	36.4	HE	77	77	77	77	77	77
		CS	42	42	41	41	41	41
		RE	114	114	114	114	114	114
		MS	XX	XX	XX	XX	XX	XX
		KW	1585	1537	1451	1427	1408	1372
100	37.8	HE	88	77	77	77	77	77
		CS	42	42	41	41	41	41
		RE	114	114	114	114	114	114
		MS	XX	XX	XX	XX	XX	XX
		KW	1597	1583	1504	1479	1455	1417

1900 Ton Selections (6682 kW)

ADJ. LVG. COND. WTR. TEMP.			ADJUSTED LVG. CHILLED WATER TEMPERATURE — F (C)					
			40	42	44	45	46	48
(F)	(C)		(4.4)	(5.6)	(6.7)	(7.2)	(7.8)	(8.9)
85	29.4	HE	77	77	77	77	77	77
		CS	41	41	41	41	41	41
		RE	114	114	114	114	114	114
		MS	XX	XX	BY	BY	BY	BY
		KW	1422	1374	1341	1325	1309	1278
90	32.2	HE	77	77	77	77	77	77
		CS	42	41	41	41	41	41
		RE	114	114	114	114	114	14
		MS	XX	XX	XX	XX	XX	BY
		KW	1564	1465	1416	1395	1378	1350
92.5	33.6	HE	78	77	77	77	77	77
		CS	42	42	41	41	41	41
		RE	114	114	114	114	114	114
		MS	XX	XX	XX	XX	XX	XX
		KW	1593	1562	1460	1439	1418	1384
95	35.0	HE		78	77	77	77	77
		CS		42	41	41	41	41
		RE	*	114	114	114	114	114
		MS		XX	XX	XX	XX	XX
		KW		1590	1510	1485	1463	1421
97.5	36.4	HE			78	77	77	77
		CS			41	41	41	41
		RE	*	*	114	114	114	114
		MS			XX	XX	XX	XX
		KW			1541	1535	1511	1466
100	37.8	HE			88	78	77	77
		CS			41	41	41	41
		RE	*	*	114	114	114	114
		MS			XX	XX	XX	XX
		KW			1574	1566	1563	1513

LEGEND

CS — Compressor
GR — Gear-Refrigerant
HE — Heat Exchanger
KW — Power Input
MS — Motor Size
RE — Refrigerant
UN — Unishell

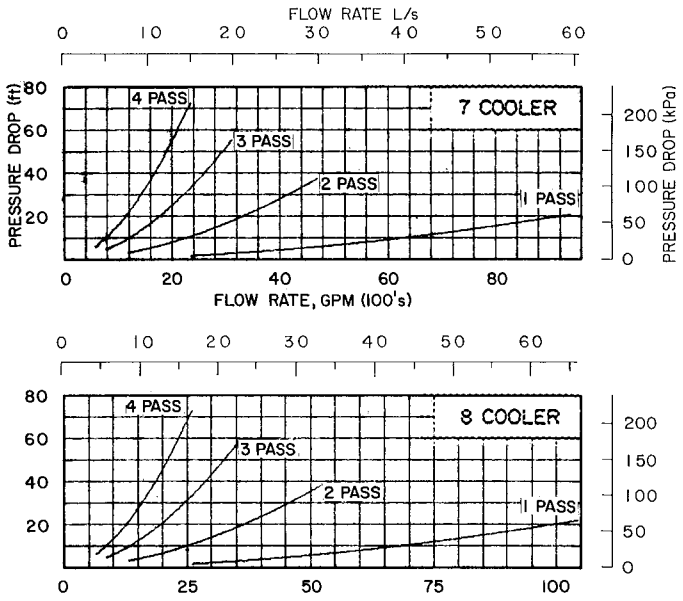
2000 Ton Selections (7034 kW)

ADJ. LVG. COND WTR. TEMP. (F)	(C)		ADJUSTED LVG. CHILLED WATER TEMPERATURE — F (C) 40 (4.4)	42 (5.6)	44 (6.7)	45 (7.2)	46 (7.8)	48 (8.9)
85	29.4	HE		87	87	87	87	87
		CS		41	41	41	41	41
		RE	*	114	114	114	114	114
		MS		XX	XX	XX	XX	BY
		KW		1461	1414	1397	1380	1350
90	32.2	HE		88	88	88	87	87
		CS		42	41	41	41	41
		RE	*	114	114	114	114	114
		MS		XX	XX	XX	XX	XX
		KW		1590	1486	1462	1458	1423
92.5	33.6	HE			88	88	88	87
		CS			41	41	41	41
		RE	*	*	114	114	114	114
		MS			XX	XX	XX	XX
		KW			1534	1508	1484	1462
95	35.0	HE			88	88	88	88
		CS			41	41	41	41
		RE	*	*	114	114	114	114
		MS			XX	XX	XX	XX
		KW			1586	1558	1530	1486
97.5	36.4	HE					88	88
		CS					41	41
		RE	*	*	*	*	114	114
		MS					XX	XX
		KW					1582	1533
100	37.8	HE						88
		CS						41
		RE	*	*	*	*	*	114
		MS						XX
		KW						1582

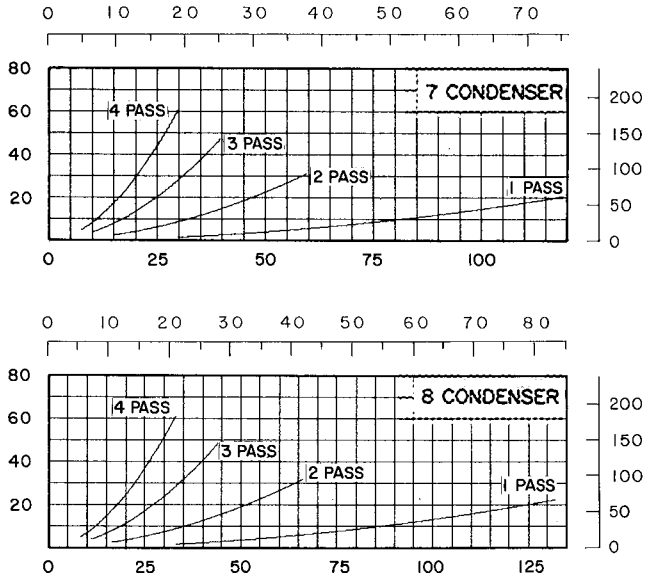
LEGEND

CS — Compressor
GR — Gear-Refrigerant
HE — Heat Exchanger
KW — Power Input
MS — Motor Size
RE — Refrigerant
UN — Unishell

COOLER



CONDENSER



→ *For additional tonnage and performance selections contact your nearest Carrier Sales Office (see page 50)

19CB Selection data (cont)

Physical data

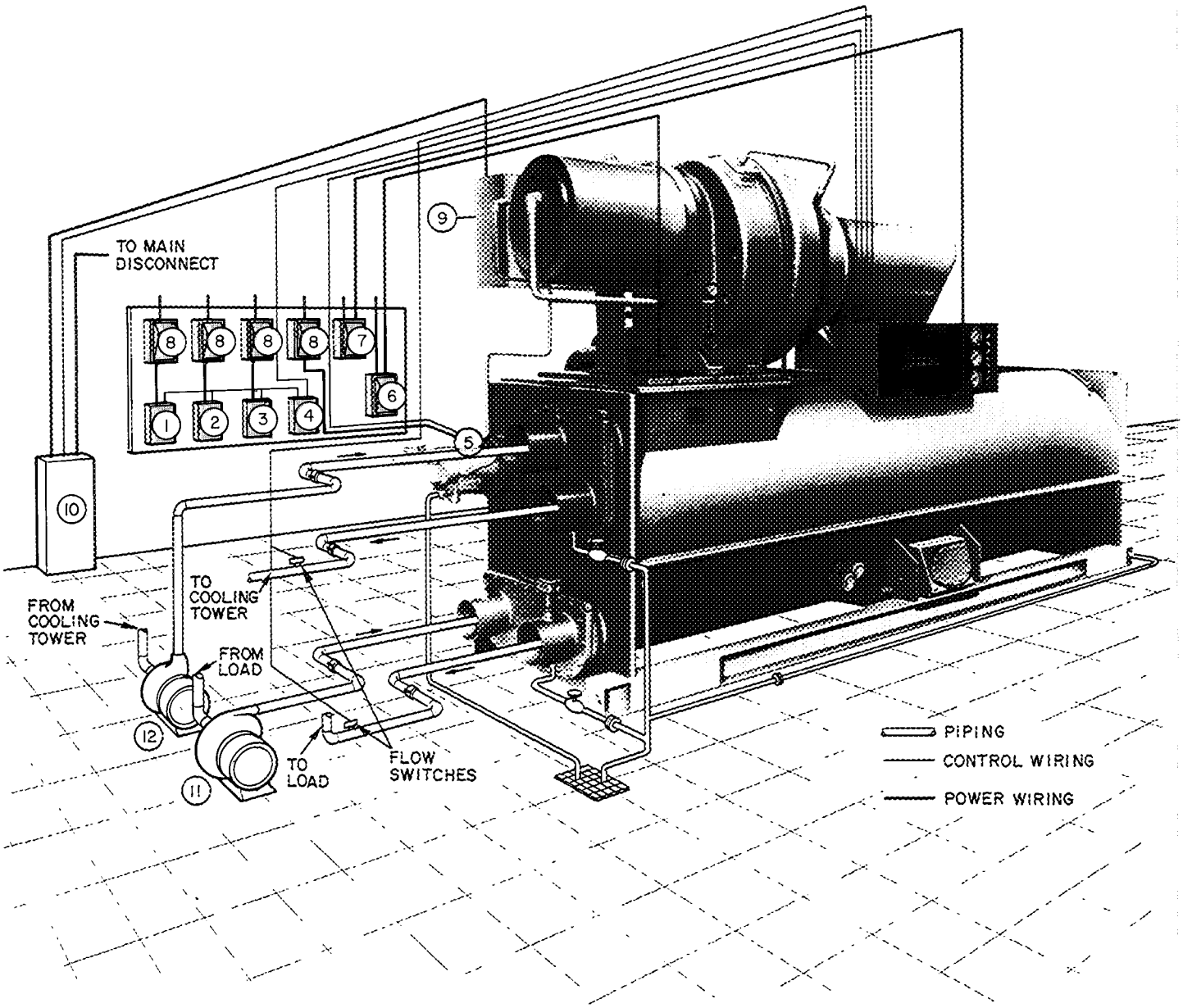
MACHINE SIZE (cooler & condenser)	RIGGING WEIGHT (Heavy Section) (lb)	(kg)	OPERATING WEIGHT (lb)	(kg)	OPERATING CHARGE R-114 (lb)	(kg)	AREA TO INSULATE (sq ft)	(m^2)
77	34,400	15,604	64,240	29,139	5400	2449	350	32.5
78	34,900	15,830	64,930	29,452	5400	2449	350	32.5
87	35,400	16,057	65,430	29,679	5400	2449	350	32.5
88	35,900	16,284	66,110	29,987	5400	2449	350	32.5

Electrical data

MTR	MAX KW	VOLTS	440	460	480	550	2300	4160
BX	1176	FLA/Kw	1 423	1 37	1 305	1 139	272	151
		LRA Star	2100	2190	2280	1680	—	—
		LRA Delta	6600	6950	7300	5300	1310	735
		OLTA	1.537	1.47	1.410	1.230	.294	.162
BY	1376	FLA/Kw	1 437	1 38	1 318	1 150	274	152
		LRA Star	2650	2775	2900	2100	—	—
		LRA Delta	8400	8800	9150	6650	1370	830
		OLTA	1.549	1.48	1.422	1.242	.296	.164
XX	1602	FLA/Kw	1 428	1.37	1 305	1 141	273	151
		LRA Star	3000	3100	3200	2400	—	—
		LRA Delta	9400	9750	10100	7500	1750	1050
		OLTA	1 543	1 47	1 414	1 234	296	164

FLA — Full Load Amps per ea kw input
KW — Compressor Power Input (kilowatts)
LRA — Locked Rotor Amps
OLTA — Overload Trip Amps per ea kw input

Typical piping and wiring



LEGEND

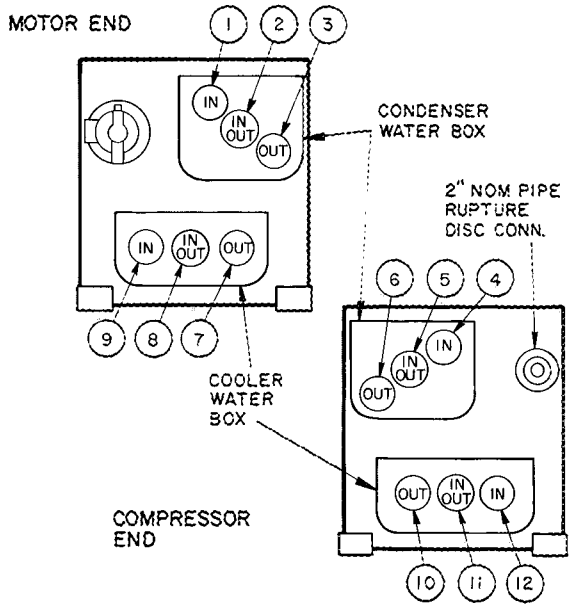
1 — Cooling Tower Fan Starter
2 — Condenser Water Pump Starter
3 — Cooler Water Pump Starter
4 — Pilot Relay
5 — Oil Pump Starter
6 — Fused Disconnect for Oil Heater and Thermostat
7 — Fused Disconnect for Purge System
8 — Fused Disconnect
9 — Compressor Motor Terminal Box
10 — Compressor Motor Starter
11 — Cooler Water Pump
12 — Condenser Water Pump

NOTES:

1 Wiring and piping shown are for general point-of-connection only and are not intended to show details for a specific installation Certified field wiring and dimensional diagrams for specific 19 Series machines are available on request
2 All wiring must comply with applicable codes
3 Refer to Carrier System Design Manual for details regarding piping techniques
4 A separate 115-volt fused power source for controls is required unless compressor motor control is furnished with a transformer
5 Provide a separate fused 115-volt power source for oil heater and thermostat

Nozzle arrangements

→ 19DH



COOLER NOZZLE NO.			ARR
Pass	In	Out	
1	11	8	P
	8	11	Q
2	12	10	R
	9	7	S
3*	12	7	T
	9	10	U
4†	12	10	H
	9	7	J

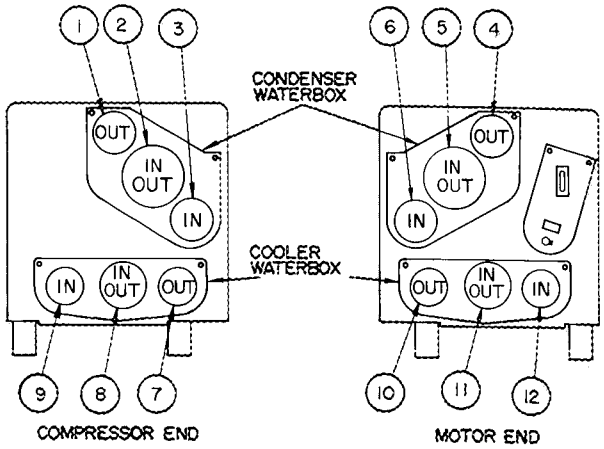
CONDENSER NOZZLE NO.			ARR
Pass	In	Out	
1	2	5	W
	5	2	X
2	4	6	Y
	1	3	Z
3*	4	3	M
	1	6	N
4†	4	6	K
	1	3	L

*3-pass available on 50 thru 78 Size Unishells only
†4-pass available on 61 thru 78 Size Unishells only

Complete nozzle arrangement consists of the cooler arrangement followed by the condenser arrangement For example

2-pass cooler with leaving nozzle Number 10 = Arr R
1-pass condenser with leaving nozzle Number 2 = Arr X
Complete nozzle arrangement = RX

→ 19EB



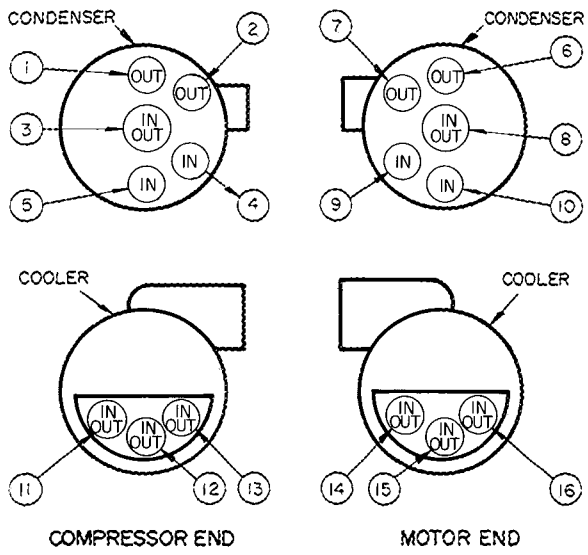
COOLER NOZZLE NO.			ARR
Pass	In	Out	
1	11	8	P
	8	11	Q
2	12	10	R
	9	7	S
3	12	7	T
	9	10	U
4	12	10	H
	9	7	J

CONDENSER NOZZLE NO			ARR
Pass	In	Out	
1	2	5	W
	5	2	X
2	6	4	Y
	3	1	Z
3	3	4	M
	6	1	N
4	6	4	K
	3	1	L

Complete nozzle arrangement consists of cooler arrangement followed by condenser arrangement For example

2-pass cooler with leaving nozzle Number 10 = Arr R
1-pass condenser with leaving nozzle Number 2 = Arr X
Complete nozzle arrangement = RX

19FA



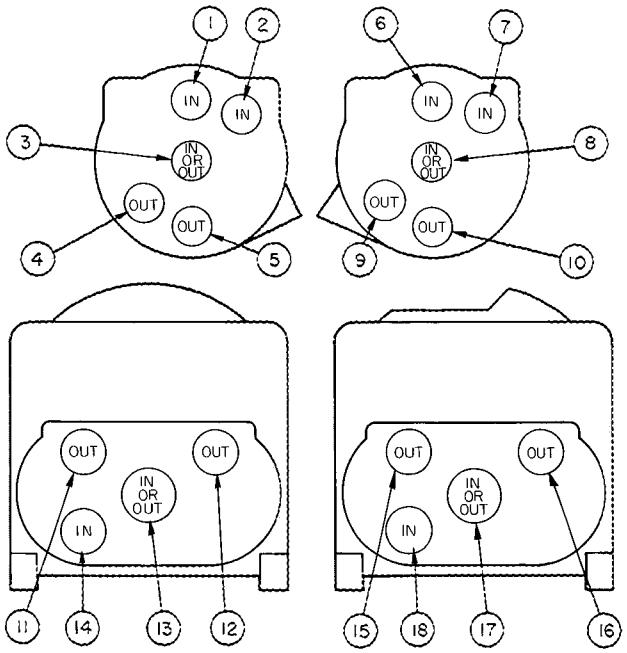
COOLER NOZZLE NO			ARR
Pass	In	Out	
1	12	15	A
	15	12	B
2	11	13	C
	13	11	D
	14	16	E
	16	14	F
3	11	14	G
	13	16	H
	14	11	J
	16	13	K
4	11	13	L
	13	11	M
	14	16	N
	16	14	P

CONDENSER NOZZLE NO.			ARR
Pass	In	Out	
1	3	8	Q
	8	3	R
2	5	1	S
	10	6	T
3	4	7	U
	9	2	V
4	4	2	W
	9	7	X

Complete nozzle arrangement consists of cooler arrangement followed by condenser arrangement For example:

2-pass cooler with leaving nozzle Number 14 = Arr F
1-pass condenser with leaving nozzle Number 3 = Arr R
Complete nozzle arrangement = FR

19CB



COOLER NOZZLE NO.			ARR
Pass	In	Out	
1	13	17	P
	17	13	Q
2	14	12	R
	18	16	S
3	14	16	T
	18	12	U
4	14	11	V
	18	15	W

CONDENSER NOZZLE NO.			ARR
Pass	In	Out	
1	3	8	E
	8	3	X
2	2	4	Y
	7	9	Z
3	1	10	O
	6	5	N
4	1	5	A
	6	10	C

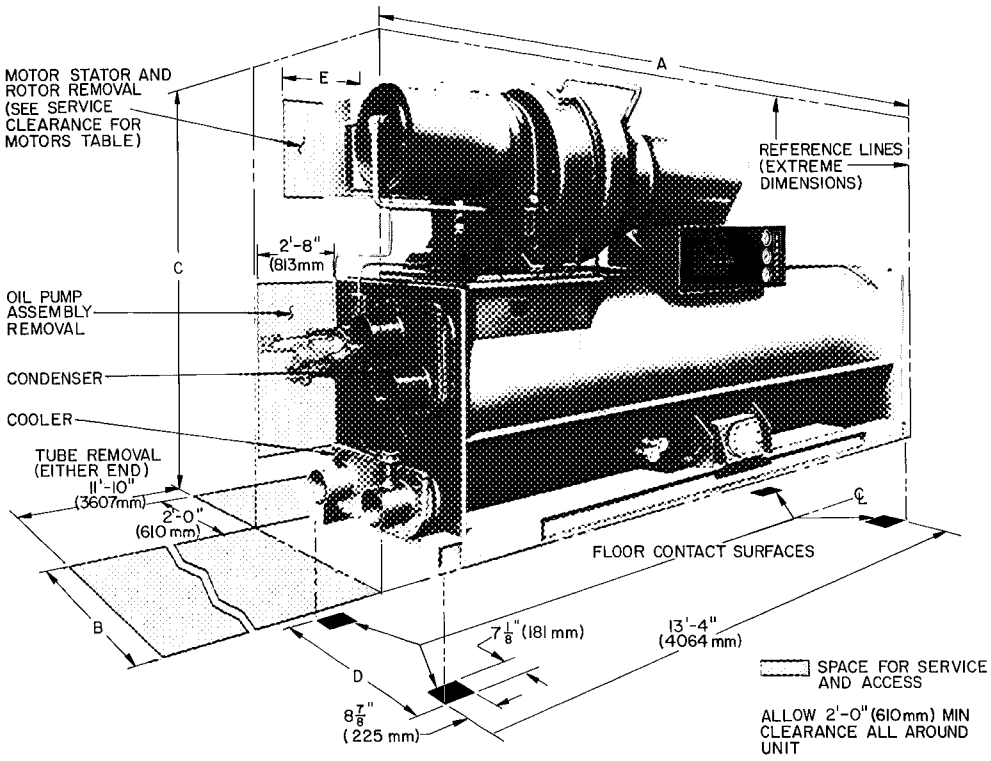
FRAME SIZE 7 & 8	NOZZLE SIZE (in.) Schedule 20 pipe Passes			
	1	2	3	4
Cooler	16	12	10	10
Condenser	16	14	10	10

Complete nozzle arrangement consists of the cooler arrangement followed by the condenser arrangement For example

2-pass cooler with leaving nozzle Number 16 = Arr S
1-pass condenser with leaving nozzle Number 8 = Arr E
Complete nozzle arrangement = SE

Dimensions

19DH



Certified dimension drawings available on request

UNISHELL SIZES 19DH	DIMENSIONS (ft-in.) (mm) Length* A		Width B		Height C		D		NOZZLE SIZE (in.) Cooler Passes 1	2	3	4	Condenser Passes 1	2	3	4
42,44,46	14-3-3/4	4362	3- 7-1/4	1099	6- 4-3/4	1949	3-3-1/8	994	6	4	—	—	6	4	—	—
50,51,53, 55,57	14-3-3/4	4362	3- 7-1/4	1099	6-10-1/2	2096	3-3-1/8	994	8	6	6	—	8	6	4	—
61,63,65	14-3-3/4	4362	4- 5-1/2	1359	8- 0-1/2	2451	4-1-1/8	1248	8	6	6	6	10	8	6	6
71,72,73	14-3-3/4	4362	4-11-1/4	1505	8- 9-1/2	2680	4-9-1/8	1451	10	8	8	6	10	8	6	6
76,77,78	14-3-3/4	4362	4-11-1/4	1505	8- 9-1/2	2680	4-9-1/8	1451	12	8	8	6	12	10	8	6

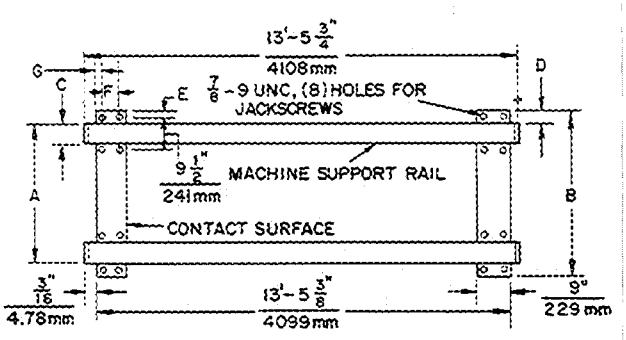
*Length shown is chiller with nozzle on drive end only For length with nozzles at both ends, add 6-1/4 in (159 mm)

SERVICE CLEARANCE FOR MOTORS (ft-in.)

DESIGN CENTER VOLTAGES	SIZE Unishell	Compr	Motor	CLEARANCE (E) (in.)	(mm)
208,230, 460,575	42 thru 65	12 thru 38	AA thru AE	1-1	330
	50 thru 78	43 thru 68	AE CB thru CL	1-3-1/4	387
	61 thru 78	72 thru 98	CD thru CQ		
2400 & 4160	50 thru 78	43 thru 68	CA thru CL	2-0-1/4	616
	61 thru 78	72 thru 98	CD thru CQ		

Service access should be provided per ANSI Standard B9.1, NFPA 70 (NEC) and local safety codes Clear space adequate for inspection, servicing and rigging of all major components of the chiller is required Selected component removal spaces, with no allowance for access or rigging are shown in phantom

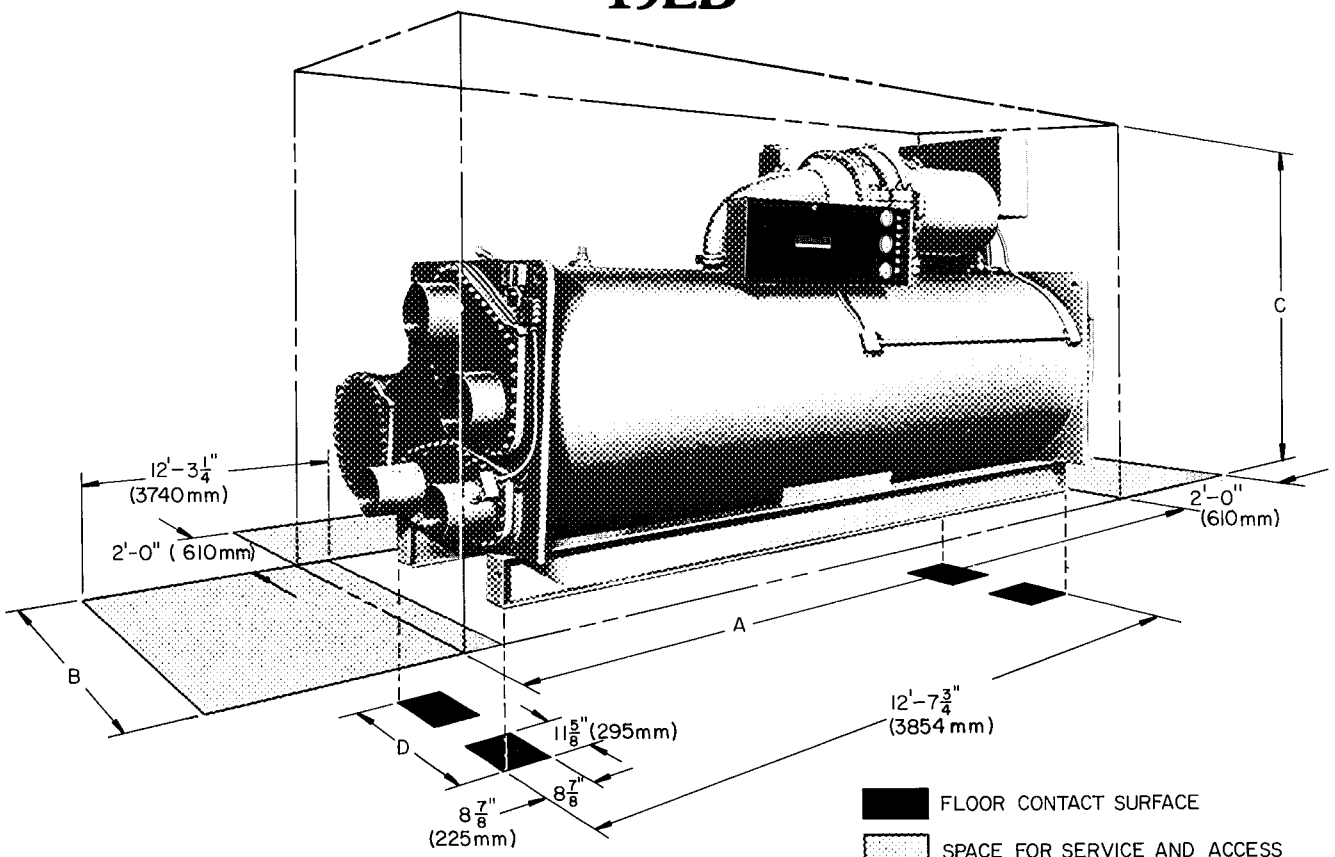
MACHINE CONTACT SURFACES WITH OPTIONAL SOLEPLATES



UNISHELL SIZE* 19DH	DIMENSIONS (ft-in.) (mm) A	B	C	D	E	F	G
42-57	3-10 914	3-8 1118	0-4 102	0-4 102	0-1-1/2 38	0-4 102	0-2-1/2 64
61-65	3-11 1194	4-5 1346	0-5 127	0-3 76	0-1-1/2 38	0-6 152	0-1-1/2 38
71-78	4- 7 1397	5-1 1549	0-5 127	0-3 76	0-1 25	0-5 127	0-2 50

*See machine informative plate

19EB



Certified dimension drawings available on request

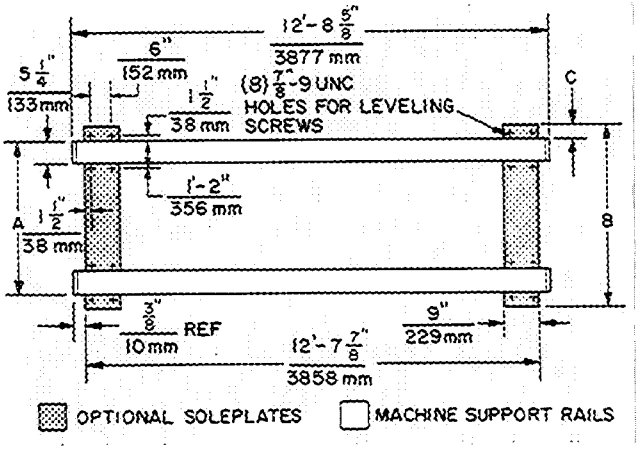
	COMPR SIZE	UNISHELL SIZE 19EB	DIMENSIONS (ft-in.) (mm) Length A*†		Width B		Height C‡		D		NOZZLE SIZE (in.) Cooler Passes 1	2	3	4	Condenser Passes 1	2	3	4
		71,72	14-1	4293	6- 1-1/2	1867	8-0	2438	3- 4-3/8	1026	10	8	6	6	10	8	8	6
		73,75	14-1	4293	6- 5-1/2	1969	8-4	2540	3- 6-3/8	1076	10	8	8	6	12	10	8	8
→	11-49	76,77	14-1/2	4305	6-8	2032	8-6	2591	3-10-3/8	1178	12	8	8	6	12	10	8	8
		81,82,83	14-1	4293	7-10-3/4	2407	9-0	2743	4- 2-1/2	1283	14	10	10	6	16	12	10	10
		85,87	14-1-1/4	4299	8- 2-1/2	2502	9-3	2819	4- 6-5/8	1387	16	12	10	8	16	12	10	10
		89	14-0	4267	8- 4-3/4	2559	9-6	2896	4-10-1/2	1486	16	12	12	8	16	12	12	12
		81,82,83	14-1	4293	7-10-3/4	2407	9-3	2819	4- 2-1/2	1283	14	10	10	6	16	12	10	10
→	51-89	85,87	14-1-1/4	4299	8- 2-1/2	2502	9-6	2896	4- 6-5/8	1387	16	12	10	8	16	12	10	10
		89	14-0	4267	8- 4-3/4	2559	9-9	2972	4-10-1/2	1486	16	12	12	8	16	12	12	12

*Machine length including nozzles on one end Add 8 in (203 mm) if nozzles are on both ends

†With high-voltage (2400-4160 v) terminal box, add 1 ft-2 in (356 mm) to dimension A if any nozzles are on suction end (shown) Add 6 in (152 mm) only, if suction-end water boxes are blank

‡Subtract 1 ft-1 in (330 mm) from height on high-voltage (2400-4160 v) machines

MACHINE CONTACT SURFACES WITH OPTIONAL SOLEPLATES



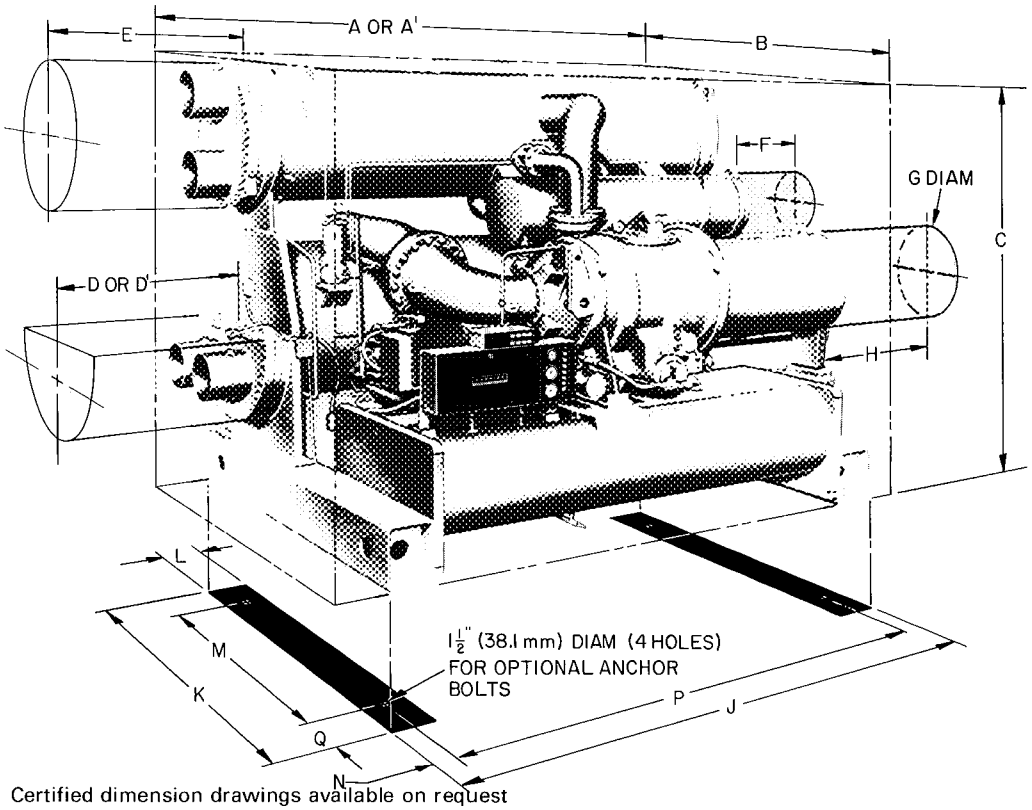
	UNISHELL SIZE*	DIMENSIONS (ft-in.) (mm) A		B		C	
	71,72	2-10	864	3-10	1168	0-6	152
	73,75	3- 0	914	4- 0	1219	0-6	152
→	76,77	3- 4	1016	4- 4	1321	0-6	152
	81,82,83	3-8-1/8	1121	4-7-7/8	1419	0-5-7/8	149
	85,87	4-0-1/4	1226	5- 0	1524	0-5-7/8	149
	89	4-4-1/8	1324	5-3-7/8	1622	0-5-7/8	149

*See machine informative plate

Service access should be provided per ANSI Standard B9 1, NFPA 70 (NEC) and local safety codes. Clear space adequate for inspection, servicing and rigging of all major components of the chiller is required Selected component removal spaces, with no allowance for access or rigging are shown in phantom

Dimensions (cont)

19FA



SPACE REQUIRED FOR TUBE REMOVAL, EITHER END

SPACE REQUIRED FOR FLOAT BOX MAINTENANCE

SPACE REQUIRED FOR REMOVAL OF STATOR AND ROTOR

MACHINE CONTACT SURFACE

Certified dimension drawings available on request

DIMENSIONS (ft-in.) (mm)

COMPR SIZE	BASE SIZE	COOLER SIZE		CONDENSER SIZE	LENGTH*		WIDTH	HEIGHT		SPACE FOR SERVICE Tubes Cooler		Cond	Econ
		Short	Long		A	A'	B	C		D	D'	E	F
		10,11,12	40,41,42	10,11,12		18-11-1/4		7-4-1/2	2248				
				14,15,16		(5772)		7-6-1/4	2292				
421				10,11,12				7-2-3/4	2203				
thru	S	14,15,16	44,45,46	14,15,16	14-4-1/2	19- 0-3/4	8-6	7- 7	2311				
469				18,19	(4382)	(5810)	(2591)	7- 9	2362				
				14,15,16				7- 7	2311				
		18,19	48,49	18,19		19- 1-1/2		7- 9	2362				
				20,21,22		(5829)		8-1-1/4	2470	12-3	17-1	12-3	1-0
421				18,19			—	8-11	2718	(3734)	(5207)	(3734)	(305)
thru		20,21,22	50,51,52	20,21,22				9- 3	2819				
569				24,25,26				9-8-1/4	2953				
	L			20,21,22	14-8-3/4	19- 6-1/2	10-0	9-9-3/4	2991				
531		24,25,26	54,55,56	24,25,26	(4480)	(5956)	(3048)	10- 3	3124				
thru				27,28,29				10- 5	3175				
569				24,25,26				11- 0	3353				
		27,28,29	57,58,59	27,28,29				11- 2	3404				

*Length including nozzles on both ends Dimensions A' and D' apply to machines with long coolers (Sizes 40 thru 59)

NOZZLE SIZES

COOLER SIZE	CONDENSER SIZE	NOZZLE SIZES (in)*							
		Cooler Passes				Condenser Passes			
		1	2	3	4	1	2	3	4
10,11,12 40,41,42	10,11,12	10	6	5	5	10	8	6	5
14,15,16 44,45,46	14,15,16	10	8	6	6	12	8	6	6
18,19 48,49	18,19	12	10	8	6	14	10	8	8
20,21,22 50,51,52	20,21,22	16	10	10	8	16	12	10	8
24,25,26 54,55,56	24,25,26	18	12	10	10	18	12	10	10
27,28,29 57,58,59	27,28,29	20	14	12	10	20	14	12	10

*5- and 6-in nozzles are Schedule 40 8-, 10-, and 20-in nozzles are Schedule 20 12-in nozzles are 250W, 312W, or 375W 14-, 16-, and 18-in nozzles are 312W or 375W

MACHINE CONTACT SURFACES

BASE SIZE	DIMENSIONS (ft-in) (mm)						
	J	K	L	M	N	P	Q
S	12-11 3937	8-6 2591	0-8 203	6-6 1981	0-4 102	12-3 3734	1-0 305
L	13-2-3/4 4032	10-0 3048	1-0 305	8-0 2438	0-6 152	12-2-3/4 3727	1-0 305

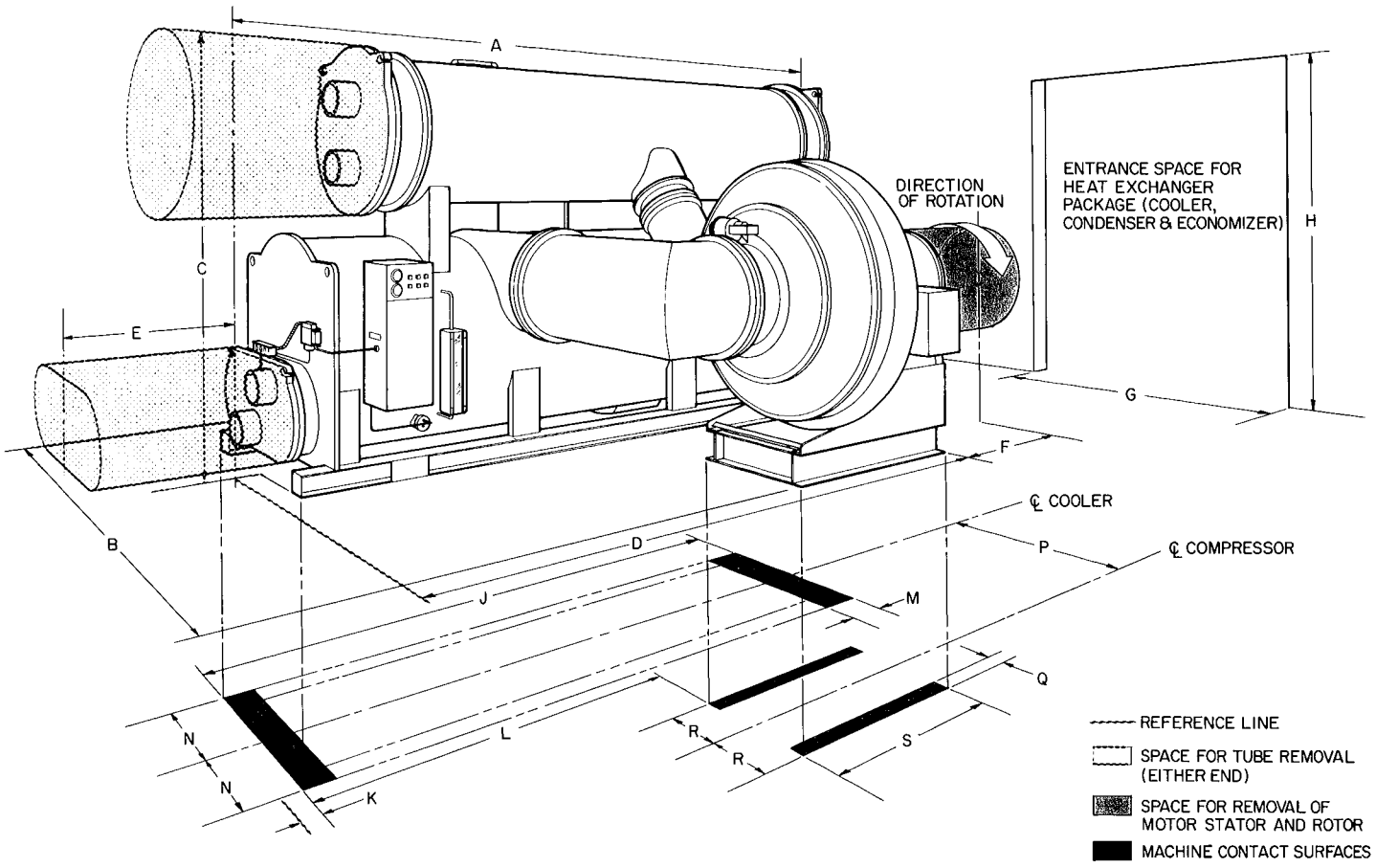
SERVICE CLEARANCE FOR MOTORS (ft-in.) (mm)

COMPR SIZE	MOTOR SIZE	SERVICE SPACE REQ'D (ft-in) (mm)			
		G diam		H length	
421	CB-CN	1-9	533	2- 7-1/4	794
thru	DB-DH	1-11-1/4	591	3-2	965
469	DK-DM	1-11-1/4	591	3- 7-1/2	1105
531	DF-DH	1-11-1/4	591	3-2	965
thru	DK-DP	1-11-1/4	591	3- 7-1/2	1105
569	EA-ED	2- 2-3/4	679	3-10-1/4	1175

Service access should be provided per ANSI Standard B9 1, NFPA 70 (NEC) and local safety codes Clear space adequate for inspection, servicing and rigging of all major components of the chiller is required Selected component removal spaces, with no allowance for access or rigging are shown in phantom

Dimensions (cont)

19CB



Certified dimension drawings available on request

HEAT EXCHANGER COMBINATION (cooler & condenser)	DIMENSIONS (ft-in) (mm)				NOZZLE SIZES (in.)								MINIMUM SERVICE CLEARANCE (ft-in.) (mm)			MINIMUM ENTRANCE REQ. (ft-in.) (mm)	
					Cooler Passes				Condenser Passes				Tubes E		Motor F		
	Length A	Width B	Height C	D	1	2	3	4	1	2	3	4	Cooler	Cond		Width G	Height H
77,78,87,88	18-0-7/8	14-4-5/8	9-10	16-0-5/8	16	12	10	10	16	14	10	10	15-3	13-7	9-2	9-0	10-4
	5509	4385	2997	4893									4648	4140	2794	2743	3145

HEAT EXCHANGER COMBINATION (cooler & condenser)	CONTACT SURFACES (ft-in.) (mm)								
	J	K	L	M	N	P	Q	R	S
77,78,87,88	16-11	0-6-3/4	9-7-7/8	1-3	2-11-3/8	6-8	0-6	1-7-1/2	5-10
	5156	171	2943	381	899	2032	152	495	1778

Service access should be provided per ANSI Standard B9 1, NFPA 70 (NEC) and local safety codes Clear space adequate for inspection, servicing and rigging of all major components of the chiller is required Selected component removal spaces, with no allowance for access or rigging are shown in phantom

Electrical data (all models)

CONTROL TRANSFORMER REQUIREMENTS

MODEL	19DH	19EB	19FA	19CB
→ Standard Met Control Circuit	ANSI C89 1/NEMA ST1			
Inrush va	1800	1800	390*	511
Sealed va	550	550	270*	133
Purge System				
Inrush va	3014	—	—	44
Sealed va	528	—	—	27
Oil Heater				
Inrush va	1000	1500	1000	750
Sealed va	—	—	1000	—

*Values shown are for electronic control circuit Values for pneumatic control circuit are Inrush va, 350, Sealed va, 250

NOTE Oil heater must be on separate circuit providing continuous service

Compressor motor controllers

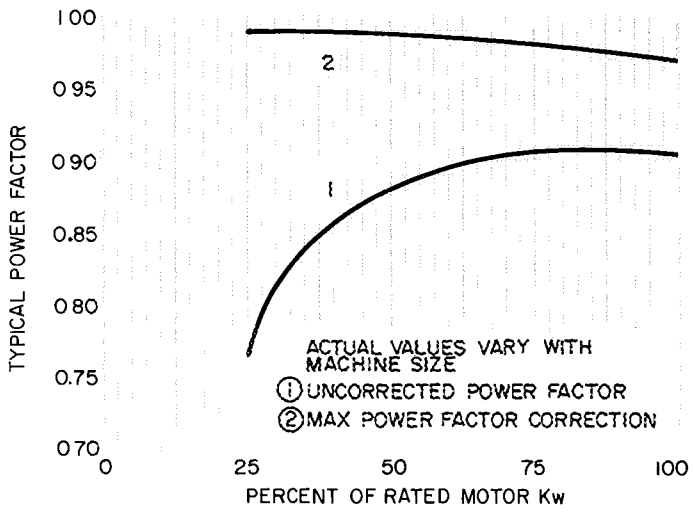
Compressor motors as well as controls and accessories require the use of starting equipment systems specifically designed for 19 Series chillers. Refer to Application Data, Starting Equipment publications or consult Carrier regarding design information for selection of controllers.

Capacitors

Power factor considerations may indicate use of capacitors Properly sized capacitors improve power factors as illustrated in the Typical Power Factors curve

However, the P.F. of Carrier are so high that correction is usually not necessary.

TYPICAL POWER FACTORS



→ ELECTRICAL DATA

ITEM	HP	DESIGN CENTER VOLTAGE	SUPPLY VOLTAGE	FULL LOAD AMPS	LOCKED ROTOR AMPS
OIL PUMP			3-Phase, 60-Hz		
		220	200-240	1 6	11 5
19DH	1/2	430	380-480	9	5 62
		575	550-600	6	4 55
		220	200-240	3 52	27 8
19EB	1	430	380-480	1 77	13 4
		575	550-600	1 28	9 62
		220	200-240	5 2	28 2
19FA	1-1/2	430	380-480	2 6	13 3
		575	550-600	2 1	10 7
		—	208-220	2 2	—
19CB	1/2	—	440-480	1 1	—
		—	550	0.9	—
PURGE PUMP 19DH	1/6	—	1-Phase, 60-Hz 115	4 4	—
PUMPOUT COMPRESSOR			3-Ph, 60-Hz		
		208	—	8 8	48 5
19EB	2	230	—	7 6	43 0
		460	—	3.8	22 5
		208	—	8 8	48 5
19FA	2	230	—	7 6	43 0
		460	—	3.8	22.5
19CB	5	220/240 v Data available on request			

NOTES:
Listed motor voltages are design voltages Motors are suitable for use with supply voltages as noted, and will operate satisfactorily at 10% below the minimum and at 10% above the maximum supply voltage

200 v — for use on 200- to 208-v systems
230 v — for use on 220- to 240-v systems
380 v — for use on 360- to 400-v systems
460 v — for use on 440- to 480-v systems
575 v — for use on 550- to 600-v systems
2400 v — for use on 2300- to 2500-v systems
4160 v — for use on 4000- to 4300-v systems
6900 v — for use on 6600- to 7200-v systems

To establish electrical data for your selected voltage, if other than listed voltage, use the following formulas

$$\text{FLA} = \text{listed FLA} \times \frac{\text{listed voltage}}{\text{selected voltage}}$$

$$\text{OLTA} = \text{listed OLTA} \times \frac{\text{listed voltage}}{\text{selected voltage}}$$

$$\text{LRA} = \text{listed LRA} \times \frac{\text{selected voltage}}{\text{listed voltage}}$$

EXAMPLE Find the full load amperage for a motor listed at 1 12 amps per kw input and 550 volts

$$\text{FLA} = 1\ 12 \times \frac{575}{550} = 1\ 17$$

LEGEND: FLA — Full Load Amps per kw input
LRA — Locked Rotor Amps
OLTA — Overload Trip Amps (= FLA x 1 08)

Controls

→ SAFETY AND CONTROL COMPONENT FEATURES

FEATURE	APPLIES TO THE 19DH	19EB	19FA	19CB
SAFETY CUTOUTS:				
Bearing High Temperature	*	*	*	*
Motor High Temperature	*	*	*	*
Gas Discharge High Temperature	—	*	*	—
Refrigerant High Pressure (Condenser)	*	*	*	*
Refrigerant Low Pressure (Cooler)	—	*	—	—
Refrigerant Low Temperature (Cooler)	*	—	*	*
Oil Pump Motor Overload	*	*	✓	✓
Lube Oil Low Pressure	*	*	*	*
Impeller Displacement Limit	—	*	*	—
Cooler and Condenser Water Flow Switches	✓	✓	✓	✓
INTERLOCKS:				
Unloaded (Vanes Closed) Start	*	*	*	*
Pre-Lube and Post-Lube (via Program Timer)	*	*	*	*
Starting Sequence (via Program Timer)	*	*	*	*
Low Chilled Water Temp/Recycle Sequence (via Program Timer)	*	*	*	*
Oil Cooler Water Flow (Solenoid)	*	*	*	*
Machine Manual Reset after Safety Cutout	*	*	*	*
CAPACITY CONTROL:				
Guide Vane Actuator	*	*	*	*
Solid State Leaving Chilled Water Control	*	*	*	*
Motor Current (demand) Limit — Adjustable 40-100%	*	*	*	*
Manual Leaving Chilled Water Reset	*	*	*	*
OTHERS:				
Elapsed Time Indicator	*	*	*	*
Start Counter	*	*	*	—
Manual (Local) Start	*	*	*	*
Auto. (Remote) Start	#	#	#	#
Pneumatic Leaving Chilled Water Control	—	—	#	#
Pneumatic LCW Control Transducer	#	#	—	—
Safety Indicator panel	#	#	#	#
Lead-Lag Panel	#	#	#	#
Mounted Oil Pump Starter	*	*	✓	✓

*Factory supplied and installed
✓ Required — Field- and/or Factory-Option Supplied
#Optional
— Not applicable to this unit

Control system

The safety controls of each Carrier centrifugal chiller are factory wired and mounted to ensure machine protection against condenser high pressure, cooler low temperature, bearing or motor overtemperature, motor overload and oil low pressure. Other safety controls ensure no-load starting of compressor and prevent compressor restart until a safe, preset interval has elapsed.

The capacity control system is a fully automatic, modular, solid state system for precise control of machine capacity at all loads. When it is desirable to use pneumatic controls to interface with a complete pneumatic system, control interface devices or complete pneumatic control systems are available.

The operating capacity of each chiller is matched directly with the need for cooling. As cooling needs change, guide vanes in the refrigerant vapor stream entering the compressor change position to maintain the selected chilled water (brine) temperature.

The changes in vane position are initiated by a solid state thermistor in the chilled water line. This probe constantly relays any variations in water temperature to a solid state capacity control module in the chiller control center. The control module, in turn, amplifies and modulates the probe signals. The amplified signals cause a guide vane actuator motor to adjust the guide vane position as required.

If chilled water temperature drops below the selected design temperature, the actuator moves the guide vanes towards a closed position; the rate of refrigerant evaporation slows and chiller capacity decreases. A rise in chilled water temperature above the set point causes the actuator to move the vanes towards a more open position. Refrigerant begins to evaporate at a more rapid rate and chiller capacity increases.

Built-in safeguards in the capacity control system prevent motor overload. When motor full load current is reached, the guide vanes stop opening immediately If motor current continues to increase, the guide vanes begin to close until motor current is reduced. To minimize start-up current demand, capacity control interlocks keep the guide vanes in a closed (minimum capacity) position until the compressor motor reaches run condition.

Control sequence

Before the chiller can start, the condenser and chilled water pumps must be operating. Field-supplied pilot relays for pumps and fan are normally applied as shown in the Typical Control Wiring Schematic.

Closing the chiller ON-STOP switch energizes the temperature control circuits in the compressor safety system. Once these temperature sensing circuits have been energized, the circuits containing pressure sensing devices can be energized. If condenser pressure and cooler refrigerant pressure/temperature are satisfactory, the machine control circuit can then be energized by pressing chiller START button. A program timer now begins a series of 4 timed steps (PT-1 thru -4) to ensure the proper sequencing of the oil pump and compressor start.

When the compressor motor reaches RUN condition, a normally open contact closes to energize holding relay K3. This locks in control circuit power to oil pump and water pump motors whenever the chiller compressor is operating. Energizing the K2 and K3 relays also permits the capacity control circuit to position the compressor guide vanes as required to maintain the selected chilled water temperature.

To guard against stress or damage to the compressor motor, the program timer keeps the chiller control circuit de-energized for approximately 15 minutes after a compressor stop.

The chiller is stopped by pressing the ON-STOP switch. The auxiliary water pumps and fan motor are stopped by pressing the field-supplied STOP button.

Typical control components

Condenser high-pressure cutout (manual reset) — Shuts down compressor if condenser pressure rises above cutout set point.

Bearing high-temperature cutout — Prevents damage to motor and compressor bearings from excessive temperature. Keeps compressor from starting or shuts compressor off if bearing temperature reaches set point. Chiller ON-STOP button must be opened and reclosed to reset this safety circuit.

Motor winding high-temperature cutout — Prevents compressor start or shuts compressor off if motor winding temperature reaches set point. Requires opening and reclosing chiller ON-STOP button to reset.

Cooler low-refrigerant cutout — Switch trips when refrigerant charge is low, shutting off compressor. Switch protects the cooler tubes from freeze-up if water flow drops off or chilled water thermostat is set too low. Switch requires manual reset.

Oil low-pressure cutout — Prevents compressor start until oil pressure is adequate for good bearing lubrication. Automatically stops compressor if oil pressure falls to set point. Coastdown lubrication is provided in the compressor.

Chilled water low-temperature recycle switch — Stops compressor when chilled water temperature drops to a point indicating minimum refrigeration load. Allows chiller to recycle automatically when water temperature rises to a point that indicates need for further cooling. Also provides protection against tube freeze-up.

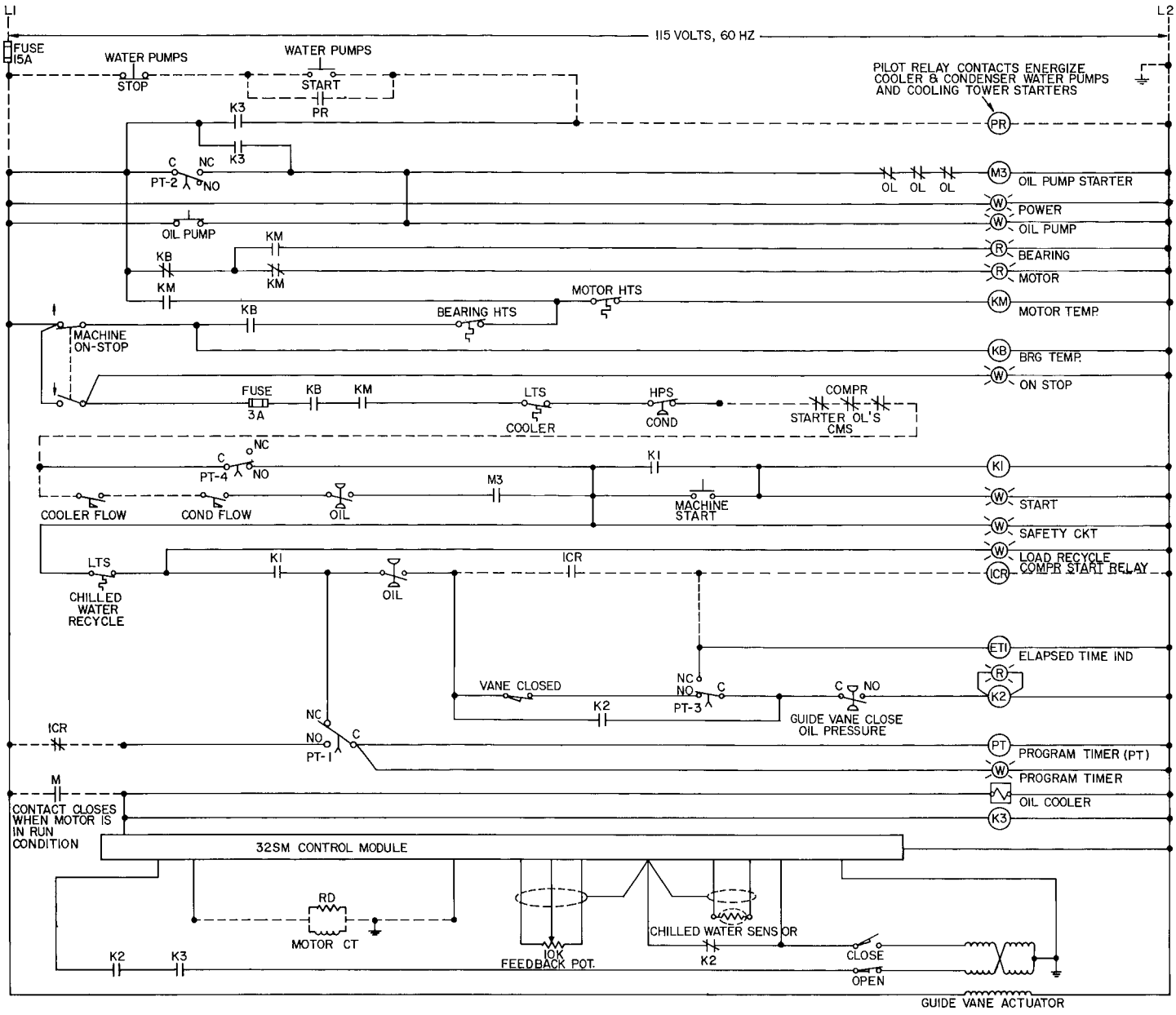
Vane closed switch — Prevents compressor start unless compressor inlet guide vanes are in closed position. Ensures no-load starting.

Capacity control module (solid state) — Transmits signals from temperature sensing element in the chilled water line to compressor guide vane actuator. Provides precise control of vane position, and hence, machine capacity at all loads. Module contains a motor load control that overrides the chilled water temperature control and closes the guide vanes to prevent motor overload.

Guide vane actuator — Motor opens and closes compressor guide vanes in response to signals from capacity control module.

Program timer — Sequences the start of oil pump and compressor motor to ensure adequate lubrication before compressor starts during operation and as the compressor coasts down at shutdown. The program timer also provides a 15-minute delay between any compressor stop and subsequent start-up.

Typical control schematic



LEGEND

C — Common
CMS — Compressor Motor Starter
CT — Current Transformer
HPS — High-Pressure Cutout Switch
HTS — High-Temperature Cutout Switch
K — Relay
LTS — Low-Temperature Cutout Switch
NC — Normally Closed
NO — Normally Open
OL — Overload
RD — Signal Resistor
○ Component Terminal
——— Factory Wiring
– – – – Field Wiring
● Junction

Guide specifications

Furnish and install — Hermetic centrifugal liquid chilling package(s) suitable for chilling water as shown when supplied with condenser water and electric power as shown on the plans.

Selection — Each unit shall allow for water side fouling factor of .0005 in the cooler tubes and .0005 in the condenser tubes. Cooler and condenser water pressure drops shall not exceed those shown on plans. The kw power draw shall not exceed that shown on plans. Machine shall be rated in conformance with the most recent ARI Standard 550. Each unit shall conform to ANSI/ASHRAE 15-1978 Safety Codes.

Water chiller shall be complete with compressor and motor, evaporator, condenser, lubrication system, capacity control and controller, motor starter, instrument and control panel mounted and factory wired on the machine, purge system and other items as herein specified.

For capacities thru 1500 tons, the machine shall be shipped completely factory assembled with all refrigerant piping and control wiring factory installed. Models utilizing R-12 and R-500 shall be shipped pre-charged. Machines operating on R-11 and R-114 shall be charged at the job site.

Compressor shall be of high performance single- or multi-stage hermetic design. Multi-stage designs shall include interstage flash economizer for maximum cycle efficiency and lowest operating cost. A thrust bearing of the Kingsbury type with forced-feed lubrication shall axially position the shaft under unidirectional thrust loading. To prevent potential machine hazards, the impeller shall be designed so that the thrust loading is positive and unidirectional under all operating conditions.

Friction losses shall be maintained at a minimum by an impeller design utilizing precision shaft placement. Impeller shall be of an in-line design for even unloading and ease of maintenance. Multi-stage compressors shall have diaphragms between stages. Impellers shall be overspeed tested a minimum of 20% above operating conditions.

Babbitt-lined journal bearings to be self-aligning type, pressure lubricated. Compressor transmission gears must be arranged for visual inspection without disassembly or removal of compressor casing or impeller. The gears are to be of the double-helical design, symmetrical and center supported by a spherically seated, self-aligning bearing.

Compressor shall be capable of operation without surge, cavitation or undue vibration from full load to 10% load without hot gas bypass when supplied with design entering water quantity.

Force-feed lubrication system with a hermetic motor driven oil pump shall be furnished as part of the water chiller. System shall be complete with oil pump, oil cooler, pressure regulator, oil filters, thermostatically controlled oil heater and necessary motor controls. Oil pumps shall be energized prior to chiller motor energization. Oil pump starter shall be factory supplied and mounted on the chiller and factory wired with only field power leads required. (On 19DH and 19EB units only.) Should a substitute oil pump starter be offered that is not factory mounted, all required extra field mounting and wiring is to be done at no cost to the owner.

Oil pump controls are to have delayed action so that oil pressure is provided during machine coastdown. Oil pump is to be provided with a separate 460-volt, 3-phase, 60-Hertz power source. Oil pump shall have momentary switches to permit only manual operation of pump when compressor is not operating. When compressor is not operating, automatic operation modes are unacceptable since they are conducive to refrigerant absorption.

Motors shall be of the single-speed, non-reversing squirrel-cage induction type, and shall be suitable for voltage as shown on plans. The design speed shall be 3550 rpm. The motor shall be suitable for operation in a refrigerant atmosphere. Compressor motor to be cooled by atomized subcooled refrigerant in contact with the motor windings. Water jacket designs are not acceptable, as they produce substantial temperature gradients throughout the motor windings. Motor stator shall be arranged for service or removal without complete compressor disassembly or breaking of main refrigerant piping connections. Full-load operation of the motor shall not exceed nameplate rating. Motor shall be built for connection to Star Delta type reduced voltage starter.

Evaporator and condenser shall be fabricated with integrally-finned copper tubing rolled into the tube sheets in both the evaporator and condenser as well as expanded into the tube support sheets in the evaporator. Tubing shall be finned except in the area adjacent to and in contact with the tube and tube support sheets. Tube support sheets shall be spaced at approximately 2-1/2 ft. intervals to maintain proper tube spacing and to minimize tube vibration and wear.

Tubes shall be removable from either end of the heat exchanger without affecting strength and durability of the tube sheet and without causing leakage at adjacent tubes.

Water boxes are to be machine welded to the heat exchanger tube sheet and to be equipped with tapped drain and vent connections.

Machines using R-12 and R-500 shall be equipped with a thermal economizer built into the condenser for increased cycle efficiency.

Construction and materials for the heat exchangers shall conform to ANSI B9.1 Safety Code for mechanical refrigeration (which in turn requires conformance to the ASME Code for Unfired Pressure Vessels where applicable).

Cooling tower bypass valve and associated piping are not required for proper operation of the specified chiller at design load. If a substitute chiller is supplied, it must be capable of operating with condenser water temperatures as low as 55 F without the need of cooling tower bypass. Otherwise, a cooling tower bypass valve, bypass piping and all associated controls must be supplied and installed by the contractor at no cost to the owner. Working drawings pertaining to cooling tower bypass shall be prepared by the contractor and submitted for approval.

Structural steel shipping skids shall be furnished with each machine to facilitate transfer of machine from transporting conveyance to job site and to provide most effective lifetime support for the machine. Substitute machines without these supports shall be properly supported by the contractor at no cost to the owner. Vibration isolation shall be provided in accordance with specifier's recommendations.

Guide specifications (cont)

Controls shall be solid state, fully automatic and "fail-safe." Safety shutdown shall be provided for low refrigerant temperature or pressure, bearing high temperature, high refrigerant pressure, motor temperature and motor overload. Each of the above controls shall have manual reset flags. Recycle shutdown shall be provided for low oil pressure and low chilled water temperature. These controls shall be automatic reset. Motor shall be protected against drawing more than rated full load amperes. Motor-driven elapsed running time meter shall be factory installed on each machine. Solid state chilled water controller shall be located within control panel and capable of throttling range setting of 1.5 F. Pneumatic control with automatic reset, which meets the 1.5 F throttling range requirements, will be acceptable. If such pneumatic control is used, the refrigeration machine manufacturer shall furnish the chilled water controller and shall be responsible for all required pneumatic work and any additional electrical work not shown on plans.

Each safety switch shall be wired across its own set of terminals for easy isolation.

Demand limiter — Demand Limiter Device shall be provided within the standard control panel so that maximum current may be manually set to any fraction between 40% and 100% of full load amperes. Limiters with 4-point settings in the control panel are not acceptable.

Chiller shall be equipped with instrument gage and control panel indicating condenser pressure, evaporator pressure and oil pressure. Panel shall contain switches permitting manual or automatic operation of oil pump and purge pump. In addition to gages, pilot lights and switches, the panel shall contain evaporator low temperature or pressure cutout, condenser high pressure cutout, and differential oil pressure controller interlocked so that compressor will only operate if adequate oil pressure is maintained to bearings. High pressure cutout and evaporator low temperature cutout shall be arranged in a lockout circuit provided with reset buttons. Panel shall also operate the capacity control mechanism to limit the load on compressor motor to a safe maximum.

Purge system supplementing the instrument and control panel shall be a self-contained purge system provided with any necessary devices for evacuating air and water vapor from the system and for condensing, separating and returning refrigerant to the system. Compression type purges are not acceptable as they are susceptible to leaks. If city or other water piping is required for purge operation, chiller manufacturer shall include same in his bid.

Refrigerant — If low-pressure (R-11) refrigerant is used, machine shall be furnished with a factory-installed, wired and piped purge unit suitable for removing noncondensible gases and water which may enter the machine and for reclaiming refrigerant. If high-pressure (R-12 or R-500) refrigerant is used, machine shall come factory equipped with a refrigerant storage vessel and pumpout compressor (for multiple ____ may be used). Storage vessel shall be external to the cooler and condenser and of sufficient capacity that the entire charge may be transferred to the vessel with 20% excess volume remaining in the vessel and a pumpout compressor factory installed (for multiple machine installations one pumpout may be used).

Refrigerant flow control shall be by means of a positive metering device either float or pressure operated. The chiller shall be capable of operating with entering condensing water temperatures of 55 F. If a tower water bypass valve is required to maintain a condensing pressure head with 55 F entering water, the chiller manufacturer shall include same in his bid.

Chiller manufacturer shall furnish magnetic motor starters, Star-Delta closed transition type, with suitable 3-leg overloads. Starters shall be furnished with NEMA 1 enclosures for installation by the electrical contractor. The disconnect, protection devices and control voltage shall be provided by others.

Electrical — Electrical contractor shall furnish and install all electrical lines, disconnect switches, circuit breakers, auxiliary starters, and shall install the main starter and the control wiring according to the diagram furnished by the centrifugal refrigerating machine manufacturer.

Piping — Piping contractor shall make water connections to the oil cooler, and such other water supply, drain and vent connections as are required by the drawings and local codes.

Initial refrigerant and oil charge shall be provided.

Water chiller unit performance data shall be submitted for approval.

Nameplates — Chiller shall bear firmly attached metal plates which state name of manufacturer, chiller unit model number, compressor type and refrigerant used.

Operating and maintenance instructions prepared by chiller manufacturer shall be included in Operating and Maintenance Instructions herein before specified.

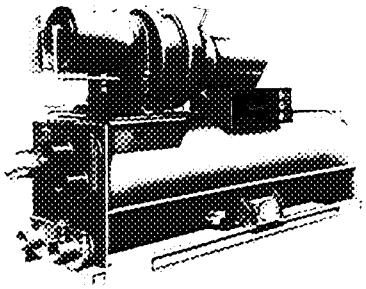
Start-up — Chillers shall be leak tested, refrigerant pressure tested, evacuated, dehydrated, charged, started, controls calibrated, and operating instructions given to owner's personnel by a factory trained service mechanic employed by the chiller manufacturer. Start-up supervision will not be acceptable.

The drawings are based on a Carrier machine. If another manufacturer is substituted, that manufacturer shall be responsible for all electrical, mechanical, structural or architectural changes.

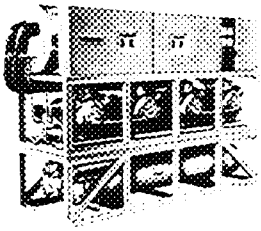
Equivalent material which qualifies to meet the above specification will be acceptable. Manufacturers other than Carrier, shall submit a 1/2-in. scale plan and section drawing showing proper fit and clearance for tube pull, motor or compressor removal, other maintenance clearances required and rigging clearance needed within the mechanical room.

Guarantee — All equipment furnished under this section of the specifications shall be guaranteed against defective workmanship and material for a period of one (1) year from date of beneficial use to the owner or 18 months from time of delivery whichever occurs first.

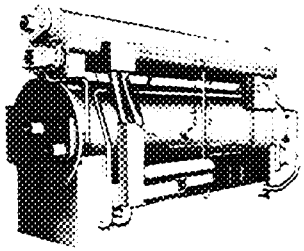
Build your system around matched Carrier components



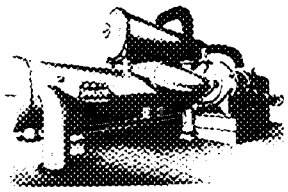
HERMETIC CENTRIFUGAL



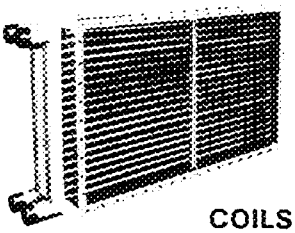
RECIPROCATING



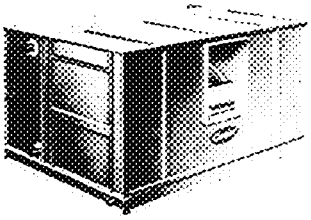
ABSORPTION



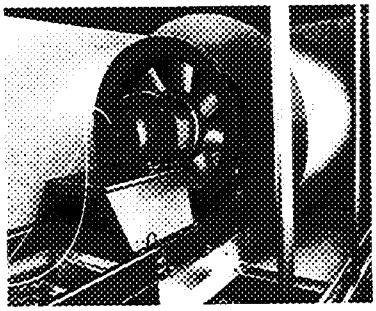
OPEN-DRIVE CENTRIFUGAL



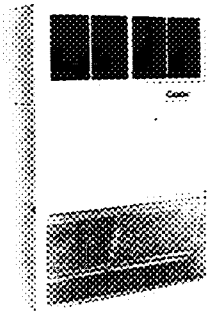
COILS



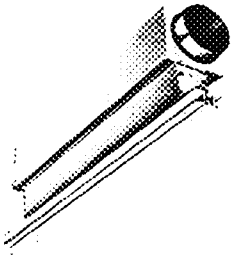
CENTRAL STATION



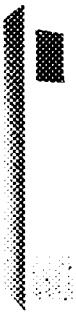
FANS

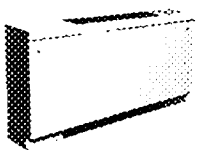


PACKAGED FAN COILS



VARIABLE VOLUME





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Book	2
Tab	5a

Form 19-2P Supersedes 19-1P Printed in U S A 9-79 PC 211 Catalog No 521-907