



SARMAAFARIN

Water-Cooled & Remote Air Cooled Screw Chillers

AEROACOUSTIC



Certificate No.: 9190.C308
FORM SSI - 30HC, HA (98)

30HC, HA

60 to 640 Nominal Tons
(211 to 2250 Nominal KW)

Sarma Afarin 30HC-HA Screw Chillers features

- Desirable demanded Cooling
- Wide range of Capacity 60 to 640 nominal Tons
- Chlorine free R-134a HFC Refrigerant
- Positive displacement, twin compressor
- Easy to Use PLC Controller
- Optional User Friendly by Web Monitoring to Ease Remote Control
- Standard & Tropical Ambient Conditions
- Eco-friendly and low noise design
- Exceed Energy Requirement of EN as A+ Energy Grade in 30HA series
- Adjustable Compact footprint Design
- Trustable Low Noise Remote Condenser in 30HA Series

Description

Specify 30HC & HA series chilling packages with screw compressors for use in chilled water air conditioning systems and various types of process cooling applications. The high efficiency compressor is matched with highly efficient heat exchanger to make an impressive chiller. Select from 26 standard models in the capacity range from 60-640 nominal tons, and take advantage of cost and energy saving product, virtually vibration-free, quiet and reliable operation, and easy servicing over many years of machine life.

Starting with installation, these machines are real energy savers. Each is completely factory engineered and assembled to ensure a perfectly balanced refrigeration system that can be installed with minimal field labor, only external water and power connection need be completed at the jobsite to make the water-cooled (30HC) units operational, condenser-less (30HA) models require only the addition of refrigerant line connections to the remote condenser.

All machine components on these multiple compressor units are matched to perform efficiently with low power consumption, particularly at part load conditions.

The 30HC is a packaged unit with one or two condensers having built-in sub-coolers, and a direct expansion cooler with one or two refrigerant circuits, one for each condenser.

The 30HA is a condenser-less 30HC; designed for use in systems with remote water, or air cooled, or evaporative type condensers.

Features/Benefits

- Advanced compressor design utilizing R-134a refrigerant.
- Electronic expansion valve control.
- Easy installation and serviceability.
- Efficient design means reduction in required space.

- Single power entry to unit.
- Double walled, pressure compensated rotor housing: The compression process is extremely stable; therefore no expansion even at high pressure occurs. This will result in additional sound attenuation.
- Quality and reliability with unique design.
- Novation heat exchanger technology.
- Excellent part load performance
- Low inrush current at start: Part winding start reduces starting current and lengthens compressor life.
- Connectivity: The control panel is capable of connecting to the BMS systems using all of the standard protocols upon request.
- Programmed microprocessor user-friendly control system
- Fully equipped: The unit is fully equipped with these components: Capacity control, start unloading, discharge shut-off valve, suction shut-off valve, oil sight glass, insertion type oil heater with sleeve, oil service valve, suction gas filter with large surface area and fine mesh, internal pressure relief valve and electronic protection device SE-E1 and a complete set of sensors.
- Automatically switching: the lead compressor in the sequence can be changed and altered automatically. Equalizes compressor wear and lengthens machine life.

Accessibility and Maintenance

The following features make servicing less and easier:

- Bolted hermetic compressors: The compressors in 30HC/HA chillers are easily removable for servicing or inspection. It takes only minimal field labor to make adjustments or repairs.
- Serviceable filter-drier: Each refrigerant circuit is kept free of moisture and contaminants by a filter-drier. Fully serviceable, it may be cleaned without resorting to the costly alternative of ripping it out and installing another in the line any time that impurities may have had the opportunity to enter the system.
- Moisture-indicating sight glass: Easy-to-read color indicator shows moisture content of the refrigerant directly and makes continuous direct monitoring of the refrigerant system possible.
- Approved, long life bearing with pressure unloading: Robust axial tandem bearings are used, bearing chamber pressure is isolated from compression chamber by sealing element, and pressure unloading of axial bearing is used.
- Large volume motor
- Intelligent electronics: Using a programmed microprocessor based controller, all of the functions of the unit is controlled and monitored precisely.
- Approved optional accessories

All component parts are standard and interchangeable.

Compressor

Screw compressors are of two-shaft rotary displacement designs with newly developed profile geometry (tooth ratio 5:6). The main parts of these compressors are the two rotors (male and female rotor) which are fitted into a closed housing. The rotors are precisely located at both ends in rolling contact bearings (radial and axial) which, in conjunction with the generously sized oil supply chambers, provides optimum emergency running characteristics.

Owing to the specific design this type of compressor does not require any working valves. To protect against reverse running when the compressor is switched off (expansion operation) a check valve is incorporated in the discharge chamber (this valve does not however replace any check valves required by the system design). An internal pressure relief valve is fitted as burst protection. The compressor is driven by a three phase asynchronous motor which is built into the compressor housing. The motor rotor is located on the shaft of the male screw rotor. Cooling is achieved by cold refrigerant vapor which mainly flows through bores in the motor rotor.

This screw compressor set the worldwide standard for technical innovation and efficiency.

Compression Process

With screw compressors, suction, compression and discharge occur in one flow direction. With this process the suction gas is pressed into the profile hallows by the profile peaks. The volume is steadily reduced and it is thereby compressed. The compressed gas is then discharged through a discharge port whose size and geometry is defined to complement mass flow and operating pressure ratio to avoid losses in efficiency due to over and under compression. The internal discharge ports of the compressors are designed for a very wide application range. In view of high efficiency and operational safety a part of discharge channel is integrated into the control slider which enables a volume ratio control at part load condition.

A primary benefit is that the compressors are started slowly, requiring more than six minutes to go from a stop to full-speed condition. This reduces vibration and compressor stresses for longer life. If liquid refrigerant is present at the compressor intake, the slow acceleration easily moves the liquid out without damaging the compressor.

Benefits of Screw Compressors

Further developed geometry

- High stiffness
- Patented highest precision Manufacturing process
- High tip speed
- Higher specific output
- Fewer moving parts
- Less vibration
- Less refrigerant loss
- Capacity control/start unloading
- Discharge shut-off valve

- Suction flange with brazing/welding bushing
- Check valve in discharge gas outlet
- Oil sight glass
- Insertion type oil heater with sleeve
- Oil service valve
- Suction gas filter with large surface area and fine mesh internal pressure relief valve, an internal pressure relief valve is fitted as burst protection.

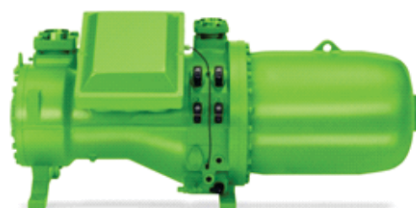


Figure 1-Bitzer Compact Screw Compressor (CSH Series)

Water-Cooled Condenser (HC Models)

In 30HC models separate water-cooled condenser is provided for each refrigerant circuit. They are cleanable, shell-and-tube type with water in the tubes and refrigerant in the shell side. Each condenser circuit is capable of holding the circuit's refrigerant charge and each circuit has its own charging and relief valves.

Sub-cooler

The 30HC units use the technique of sub-cooling (see Fig. 2, page 3) to get more cooling output per unit of electrical input.

Directly from the cooling tower, the coldest condenser water enters the lower part of the shell and circulates immediately thru the steel-jacketed sub-cooler tube assembly, sub-cooling the surrounding leaving liquid refrigerant. So that when the refrigerant reaches the cooler, it has greater cooling potential. This means improved operating efficiencies, and increased system capacity without larger, costlier, and additional power-consuming compressors. As shown in the diagram, the water leaves the sub-cooler and circulates thru the upper condenser tubes. Here it flows thru the 2 additional passes required for condensing the available refrigerant vapor and then leaves the upper part of the condenser to return to the cooling tower.

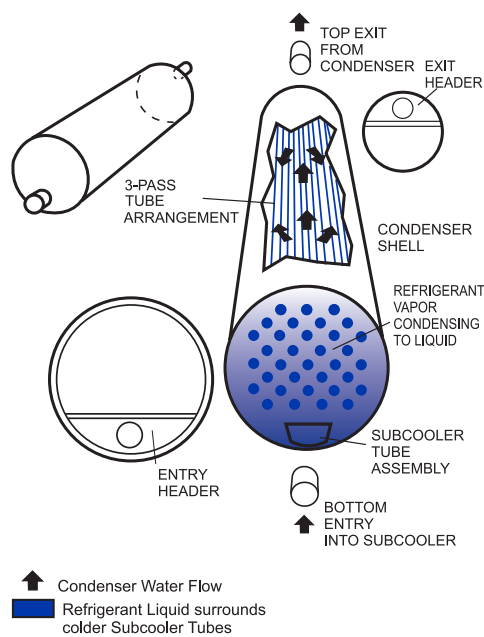


Figure 2-Shell & Tube condenser

Control System

- PLC Controller is an advanced numeric control system that combines intelligence with great operating simplicity.
- PLC controller ensures intelligent leaving water temperature control and optimizes energy requirements.
- The PI control algorithm with permanent compensation for the difference between the Evaporator entering and leaving temperature, anticipates load variations, guarantees leaving water temperature stability and prevents unnecessary compressor cycling.
- The long-stroke electronic expansion valves (EXV), control via heat exchange in the evaporator, and allows a significant energy efficiency improvement at part load conditions, and faultless chiller operation in a wider temperature range.
- Adjustable ramp loading, according to the inertia of the application, avoids load increases that are too fast and too frequent, increasing unit life and limiting power consumption peaks.
- Several capacity loading possibilities ensure improved start-up at low outdoor air temperature, and permit use of one of the refrigerant circuits as a back-up circuit.
- PLC Controller ensures preventive protection and enhances chiller reliability.
- Equalization of compressor operating hours
- PLC Controller monitors all chiller safety parameters. The Alarm Key facilitates immediate location of faults and in certain cases the conditions causing the alarm.
- PLC Controller offers extended communications capabilities
- Clear and easy-to-understand operator interface.

The LEDs, numeric displays and touch keys are well-positioned. The user immediately knows all operating parameters: pressures, temperatures, etc.

- The extensive chiller remote control capabilities (wired connection) allow integration into building monitoring systems (see Technical Description).
- Control of the customer's water pump (two pumps).

Compressor Sound Box

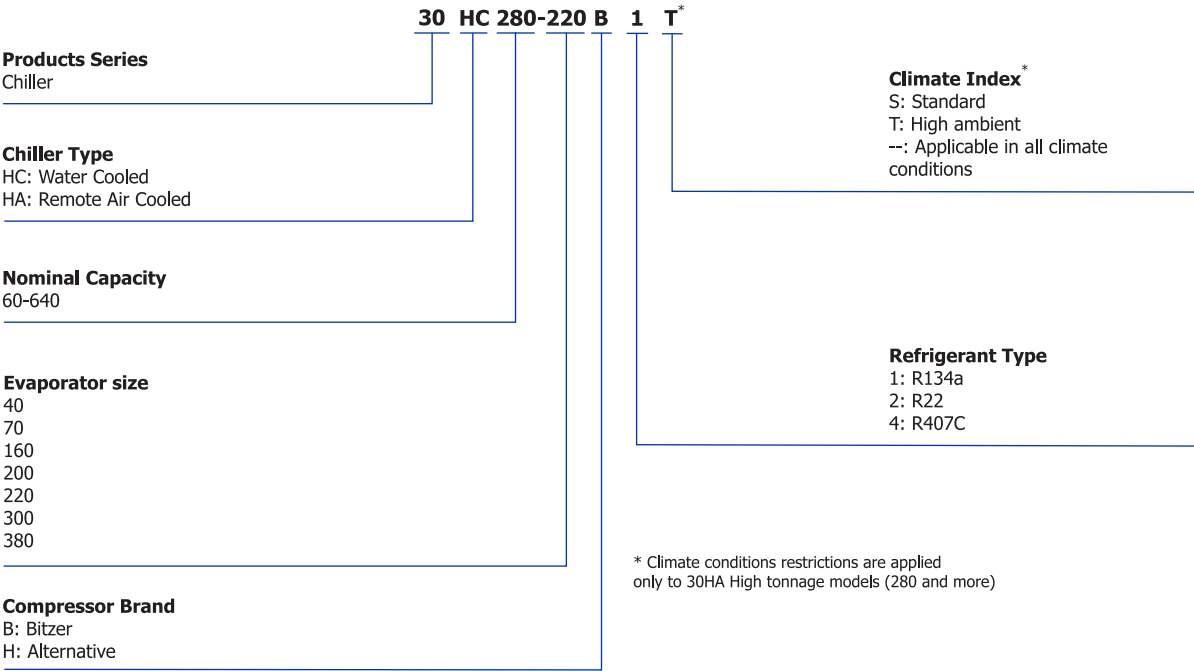
SSI Compressor Soundproof box is designed to reduce the noise of compressors. The interior of the box is lined with acoustic sound proofing foam insulation to reduce vibration and noise. The box has removable doors that allows for easy access to the air compressor and components. This compressor sound proof box is ideal for any place in which the noise is a major issue and can be supplied by SSI as an option.

Factory Testing

All SSI Applied screw chillers are factory-tested prior to shipment. Operating and safety controls are checked for correct settings and operation. This testing helps reduce field start-up issues and maintain critical construction schedules.



Model number nomenclature



* Climate conditions restrictions are applied only to 30HA High tonnage models (280 and more)

UNIT 30HC	Capacity		Power	Full Capacity	
	kWR	TONS	kW	COP	EER
60-40	139	39	30	4.56	15.55
80-40	181	52	42	4.35	14.84
100-70	244	69	51	4.80	16.38
120-70	277	79	61	4.56	15.55
140-160	333	95	70	4.77	16.28
160-160	391	111	85	4.62	15.76
180-160	440	125	96	4.59	15.65
200-200	481	137	103	4.69	16.00
220-200	514	146	109	4.72	16.11
235-200	536	152	115	4.64	15.85
250-220	594	169	123	4.82	16.43
265-220	629	179	132	4.78	16.30
280-220	676	192	136	4.97	16.96
300-220	728	207	147	4.94	16.85
320-300	837	238	161	5.20	17.76
340-300	893	254	172	5.19	17.72
360-300	942	268	182	5.18	17.69
390-300	1001	285	195	5.13	17.52
420-300	1052	299	206	5.10	17.39
420-380	1129	321	209	5.41	18.45
450-380	1198	341	223	5.38	18.34
480-380	1258	358	235	5.35	18.25
520-380	1304	371	255	5.12	17.45
560-380	1343	382	272	4.94	16.86
600-380	1396	397	281	4.97	16.96
640-380	1442	410	289	4.99	17.04

LEGEND

COP - Coefficient of Performance kWR - kilowatt of Refrigeration
 EER - Energy Efficiency Ratio

1. Rated in accordance with AHRI Standard 550/590 at standard rating conditions.
2. Standard rating conditions are as follows:
 Chilled Water Entering Temperature: 54°F, Leaving Temperature: 44°F
 Condenser Entering Water Temperature: 85°F

UNIT 30HA	Capacity		Power	Full Capacity	
	kWR	TONS	kW	COP	EER
60-40	126	36	38	3.32	11.34
80-40	166	47	52	3.22	11.00
100-70	220	62	62	3.55	12.10
120-70	248	71	75	3.32	11.33
140-160	297	84	85	3.48	11.86
160-160	353	100	103	3.42	11.66
180-160	399	113	117	3.40	11.59
200-200	434	123	125	3.46	11.82
220-200	463	132	133	3.48	11.88
235-200	483	137	141	3.42	11.69
250-220	534	152	150	3.55	12.11
265-220	566	161	161	3.52	12.02
280-220S	626	178	185	3.38	11.55
300-220S	672	191	201	3.34	11.41
320-300S	762	217	219	3.49	11.90
340-300S	817	232	232	3.53	12.04
360-300S	866	246	243	3.56	12.16
390-300S	922	262	264	3.50	11.93
420-300S	970	276	282	3.45	11.76
420-380S	1041	296	285	3.65	12.46
450-380S	1105	314	304	3.64	12.42
480-380S	1161	330	320	3.63	12.38
520-380S	1200	341	344	3.49	11.92
560-380S	1234	351	364	3.39	11.57
600-380S	1285	365	378	3.40	11.62
640-380S	1329	378	389	3.42	11.65
280-220T	470	134	246	1.91	6.52
300-220T	505	144	263	1.92	6.55
320-300T	543	154	281	1.93	6.59
340-300T	586	167	290	2.02	6.89
360-300T	625	178	303	2.06	7.03
390-300T	673	191	332	2.03	6.93
420-300T	715	203	360	1.99	6.79
420-380T	767	218	366	2.10	7.17
450-380T	814	231	387	2.10	7.17
480-380T	855	243	406	2.11	7.20
520-380T	880	250	434	2.03	6.93
560-380T	901	256	462	1.95	6.65
600-380T	944	268	474	1.99	6.79
640-380T	981	279	486	2.02	6.89

LEGEND

COP - Coefficient of Performance **kWR** - kilowatt of Refrigeration

EER - Energy Efficiency Ratio

1. Rated in accordance with AHRI Standard 550/590 at standard rating conditions.
2. Standard rating conditions are as follows:
 Chilled Water Entering Temperature: 54°F, Leaving Temperature: 44°F
 Saturated Discharge Temperature: 120°F for Standard & 149°F for High Ambient Conditions

PHYSICAL DATA



Unit 30HC, HA		60-40	80-40	100-70	120-70	140-160	160-160	180-160	200-200	220-200	235-200	250-220	265-220
Refrigerant Type		R134a											
Compressor	Bitzer	CSH Series											
	Oil Chg.(gal)	4	5.8	5.4	8	8	11.6	11.6	11.6	11.6	10.8	10	10
	Alternative	Applicable											
	%CAP Circuit 1	100	100	50	50	50	50	50	55	50	53	50	53
	%CAP Circuit 2	0	0	50	50	50	50	50	45	50	47	50	47
	Control Steps	4	4	8	8	8	8	8	8	8	8	8	8
Cooler	Type	Shell & Tube With Enhanced Copper Tubes											
	Working Pressure (Psig)	Refrigerant Side=235						Water Side=150					
	Shell, Net Volume (gal)	16	16	22	22	51	51	51	46	46	46	60	60
	Model	040	040	070	070	160	160	160	200	200	200	220	220
	Connection (in)	3	3	4	4	6	6	6	6	6	6	6	6
Condenser-30HC Only	Type	Shell & Tube With Enhanced Copper Tubes											
	Working Pressure (Psig)	Refrigerant Side=385						Water Side=250					
	Model Circuit 1	43	54	43	43	54	54	70	84	84	97	97	97
	Model Circuit 2	NA	NA	43	43	54	54	70	70	84	84	97	97
Eco*	30HC	NA											
	30HA	NA											
Dimensions**	Weight (lb.)***												
	30HC	4638	5520	6198	6876	8126	9514	9698	11429	11764	12061	12734	12780
	30HA	3715	4431	4468	5120	6068	7412	7412	8183	8205	8227	8585	8607
	Height (Inch)												
	30HC	72.8	79.7	73.6	74.4	77.8	84.4	84.4	110.4	110.4	110.4	110.4	110.4
	30HA	66.9	66.9	66.9	66.9	66.9	67.5	67.5	84.4	84.4	84.4	84.4	84.4
	Width (Inch)												
	30HC	66.6	66.6	61.1	61.1	61.1	61.1	61.1	70.9	70.9	70.9	70.9	70.9
	30HA	48.9	48.9	49.8	49.8	53.2	53.2	53.2	70.9	70.9	70.9	70.9	70.9
	Length (Inch)												
	30HC	100.5	111	110.8	122.3	129.4	137	137	142.2	142.2	142.2	142.2	142.2
	30HA	100.5	100.5	110.8	122.3	129.4	137	137	142.2	142.2	142.2	142.2	142.2

*Economizer

**Dimensions are approximate and may be subject to change.

***Weight: the introduced weight is Approximate Operating weight.

PHYSICAL DATA



		280-220	300-220	320-300	340-300	360-300	390-300	420-300	420-380	450-380	480-380	520-380	560-380	600-380	640-380
Refrigerant Type		R-134a													
Compressor	Bitzer	CSH Series													
	Oil Chg.(gal)	10	13	16	16	16	16	16	16	16	16	16.5	17	17	17
	Alternative	Applicable													
	%CAP Circuit 1	50	54	50	53	50	54	50	50	53	50	54	50	53	50
	%CAP Circuit 2	50	46	50	47	50	46	50	50	47	50	46	50	47	50
	Control Steps	8													
Cooler	Type	Shell & Tube With Enhanced Copper Tubes													
	Working Pressure (Psig)	Refrigerant Side=235							Water Side=150						
	Shell, Net Volume (gal)	60	60	100	100	100	100	100	148	148	148	148	148	148	148
	Model	220	220	300	300	300	300	300	380	380	380	380	380	380	380
	Connection (in)	6	6	10	10	10	10	10	10	10	10	10	10	10	10
Eco*	30HC	NA													
	30HA-S	Available													
	30HA-T	NA													
Condenser-30HC Only	Type	Shell & Tube With Enhanced Copper Tubes													
	Working Pressure (Psig)	Refrigerant Side=385							Water Side=250						
	Model Circuit 1	97	125	125	125	125	160	160	160	200	200	225	225	225	225
	Model Circuit 2	97	97	125	125	125	125	160	160	160	200	200	225	225	225
Dimensions**	Weight (lb.)***														
	30HC	12978	14813	17585	17647	17733	18325	18910	20490	20936	21381	22111	22838	22962	23082
	30HA-S	8805	10591	13154	13176	13198	13331	13464	14990	15035	15080	15277	15474	15563	15652
	30HA-T	8706	10492	13055	13077	13099	13232	13365	14891	14936	14981	15178	15375	15464	15553
	Height (Inch)														
	30HC	113.5	115	118.3	118.3	118.3	118.3	118.3	126	126	126	126.8	126.8	126.8	126.8
	30HA-S,T	84.4	85.9	89.2	89.2	89.2	89.2	89.2	95.7	95.7	95.7	96.5	96.5	96.5	96.5
	Width (Inch)														
	30HC	78.7	74.8	74.8	74.8	74.8	74.8	74.8	74.8	74.8	74.8	74.8	74.8	74.8	74.8
	30HA-S,T	78.7	74.8	74.8	74.8	74.8	74.8	74.8	74.8	74.8	74.8	74.8	74.8	74.8	74.8
	Length (Inch)														
	30HC	146.1	181.6	222.9	222.9	222.9	222.9	222.9	222.9	222.9	222.9	222.9	222.9	222.9	222.9
	30HA-S,T	146.1	181.6	222.9	222.9	222.9	222.9	222.9	222.9	222.9	222.9	222.9	222.9	222.9	222.9

*Economizer

**Dimensions are approximate and may be subject to change.

***Weight: the introduced weight is Approximate Operating weight.

Cooler Model	10HC	040	070	160	200	220	300	380
Shell Net. Vol. †	gal	16	22	51	46	60	106	148
Shell OD	inch	10 ¾	12 ¾	16	18	18	20	24
Shell Length**	inch	81 ¾	81 ¾	107 ¾	81 ¾	107 ¾	146	146
Refrigerant Ckts.	No.	1	2	2	2	2	2	2
Max. Design Working Pressure	psig	Refrigerant Side: 235				Water Side: 150		
Water Inlet & Outlet Connection	inch	3 ASA**	4 ASA	6 ASA	6 ASA	6 ASA	10 ASA	10 ASA
Cooler Drain Connection	inch	¾ MPT	¾ MPT	¾ MPT	¾ MPT	¾ MPT	¾ MPT	¾ MPT

† Includes nozzles.

* Between tube sheets.

** ASA (American Standard Association) flat face flange.

Condenser Model		043	054	070	084	097	125	160	200	225
Dimension OD	inch	12 ¾	12 ¾	12 ¾	14	14	16	16	16	18
Overall Length	inch	70	86	86	86	109 ¾	107 ½	137	137	137
Net Water Volume	gal	9	10	11	18	23	27	34	40	49
Water Connection* Inlet IPS ** outlet IPS **	inch	3 3	3 3	3 3	2 ½ (2) 4	2 ½ (2) 4	5 5	5 5	5 5	5 5
Water Passes	No.	3	3	3	3 or 6	3 or 6	2	2	2	2
Max. Design Working Pressure	psig									

IPS: Iron Pipe Size

*Data is for 3-pass only. For 6-pass, inlet and outlet connections are 2 ½ inches.

**Field welded (flange with weld stub provided for all connections.) 4-in. condenser connection are equipped with welding neck Flanges bolted to the condensers and designed for field welding of field-supplied 4in.schedule 40 pipe.

NOTE:

1. 2 ½ in, condenser connections are equipped with slip-on Flanges bolted to the condensers and designed for field welding of field supplied 2 ½ -in.4-in, condenser connection are equipped with welding neck Flange bolted to the condensers and designed for field welding of field-supplied 4 in.

2. Water outlet and inlet flanges are rated in accordance With ANSI/ASME B 16-5 (AMERICAN National Standards institute/American Society of Mechanical Engineers) latest revision.

PERFORMANCE DATA

LWT: 44 °F*		Water-Cooled																		
R134a		Condenser Entering Water Temperature (°F)																		
MODEL 30HC	75				85				90				95				100			
	CAP. (TON)	PI (KW)	EVP. FLOW (GPM)	CND. FLOW (GPM)	CAP. (TON)	PI (KW)	EVP. FLOW (GPM)	CND. FLOW (GPM)	CAP. (TON)	PI (KW)	EVP. FLOW (GPM)	CND. FLOW (GPM)	CAP. (TON)	PI (KW)	EVP. FLOW (GPM)	CND. FLOW (GPM)	CAP. (TON)	PI (KW)	EVP. FLOW (GPM)	CND. FLOW (GPM)
60-40	42	26.9	100.9	119.2	39.4	30.4	94.7	115.4	38.2	32.2	91.6	113.6	37.3	33.5	89.4	112.3	35.9	35.5	86.1	110.3
80-40	54.5	36.8	130.8	155.9	51.6	41.7	123.7	152.2	50.1	44.1	120.2	150.3	49.1	45.9	117.8	149.1	47.5	48.7	114.0	147.3
100-70	73.9	45.2	177.3	208.2	69.4	50.9	166.6	201.3	67.2	53.7	161.3	197.9	65.7	55.7	157.6	195.6	63.3	58.9	151.9	192.1
120-70	84.1	53.8	201.8	238.5	78.9	60.9	189.3	230.9	76.3	64.4	183.1	227.1	74.5	67.0	178.8	224.5	71.7	71.1	172.2	220.6
140-160	101.1	61.8	242.6	284.7	94.7	69.8	227.4	275.0	91.6	73.9	219.8	270.2	89.4	76.7	214.5	266.9	86.0	81.3	206.4	261.9
160-160	117.6	74.8	282.2	333.3	111.0	84.5	266.5	324.2	107.8	89.4	258.6	319.6	105.5	92.9	253.2	316.6	102.1	98.5	244.9	312.2
180-160	132.4	84.9	317.8	375.7	125.1	95.9	300.3	365.8	121.5	101.5	291.6	360.9	119.0	105.5	285.6	357.6	115.1	111.9	276.4	352.7
200-200	144.7	90.7	347.2	409.1	136.7	102.5	328.1	398.0	132.7	108.4	318.5	392.5	129.9	112.7	311.9	388.8	125.6	119.6	301.5	383.2
220-200	154.5	96.1	370.9	436.5	146.0	108.8	350.4	424.7	141.8	115.1	340.2	418.7	138.8	119.6	333.1	414.7	134.1	127.0	321.9	408.5
235-200	161.2	101.9	386.9	456.4	152.3	115.3	365.4	444.1	147.8	122.0	354.7	438.0	144.7	126.9	347.2	433.8	139.9	134.7	335.7	427.6
250-220	179.3	109.3	430.4	504.9	169.0	123.4	405.5	489.7	163.8	130.5	393.1	482.1	160.2	135.5	384.6	477.1	154.8	143.7	371.5	469.6
265-220	189.8	116.5	455.4	534.9	178.9	131.7	429.3	519.1	173.4	139.2	416.2	511.2	169.7	144.7	407.2	505.9	163.9	153.4	393.5	498.2

PERFORMANCE DATA

LWT: 44 °F*		Water-Cooled - continue																			
R134a		Condenser Entering Water Temperature (°F)																			
		75				85				90				95				100			
MODEL 30HC	CAP. (TON)	PI (KW)	EVP. FLOW (GPM)	CND. FLOW (GPM)	CAP. (TON)	PI (KW)	EVP. FLOW (GPM)	CND. FLOW (GPM)	CAP. (TON)	PI (KW)	EVP. FLOW (GPM)	CND. FLOW (GPM)	CAP. (TON)	PI (KW)	EVP. FLOW (GPM)	CND. FLOW (GPM)	CAP. (TON)	PI (KW)	EVP. FLOW (GPM)	CND. FLOW (GPM)	
280 - 220	202.7	123.6	486.6	570.9	192.2	136	461.3	554.1	187.0	143.5	448.7	546.6	181.7	151	436.1	539.1	176.4	158.5	423.4	531.6	
300 - 220	218.1	134.4	523.4	615.1	207.0	147.4	496.8	597.4	201.5	155.5	483.5	589.6	195.9	163.6	470.2	581.8	190.4	171.7	456.9	574.0	
320 - 300	250.8	147.4	602.0	702.6	237.9	160.7	570.9	680.6	230.8	168.7	553.9	669.0	223.6	177.5	536.6	657.8	216.1	187.2	518.6	646.4	
340 - 300	266.7	156.0	640.2	746.6	253.8	171.9	609.1	726.3	246.7	180.6	592	715.2	239.3	189.9	574.3	703.9	231.4	199.8	555.4	691.7	
360 - 300	280.9	163.7	674.1	785.7	267.9	181.8	643.0	767.0	260.7	191.1	625.8	756.2	253.2	200.8	607.7	744.7	245.1	211	588.2	732.2	
390 - 300	299.3	176	718.2	838.3	284.7	195.0	683.2	816.3	276.9	205.4	664.5	804.6	268.9	216.3	645.4	793.0	260.4	228	625.0	780.5	
420 - 300	315.1	186.5	756.1	883.4	299.1	206.4	717.7	858.6	290.7	217.6	697.7	846.2	282.3	229.6	677.5	834.2	273.5	242.5	656.4	821.9	
420 - 380	338.1	188.9	811.4	940.2	320.9	208.7	770.2	912.6	312.1	219.9	749.0	899.1	302.9	232	727.0	885.3	293.5	244.9	704.4	871.5	
450 - 380	358.8	201.6	861	998.6	340.6	222.9	817.4	969.5	331.1	234.8	794.7	954.9	321.5	247.8	771.6	940.7	311.5	261.6	747.6	926.1	
480 - 380	376.9	212.8	904.5	1049.7	357.8	235.2	858.7	1019.2	347.8	247.9	834.6	1003.8	337.7	261.5	810.5	988.9	327.3	276.1	785.5	974.0	
520 - 380	383.4	226.5	920.2	1074.8	370.7	254.9	889.6	1063.5	360.2	268.5	864.5	1047.7	349.7	282.8	839.3	1032.3	339.6	298.9	815	1019	
560 - 380	389.0	238.4	933.7	1096.3	381.7	271.7	916.1	1101.5	370.9	286.1	890.1	1085.4	360.0	301.1	864.0	1069.5	350.3	317.6	840.7	1057.5	
600 - 380	412.0	249.1	988.9	1158.9	396.8	280.9	952.4	1144.1	385.7	296.0	925.6	1127.6	374.4	311.7	898.6	1111.3	363.3	327.4	871.9	1095.3	
640 - 380	432.2	258.6	1037.1	1213.6	410.1	288.9	984.2	1181.3	398.6	304.7	956.6	1164.5	387	321.1	928.8	1117.7	374.9	338.2	899.8	1130.5	

LWT - Leaving Chilled Water Temperature

CND. - Condenser

EVP. - Evaporator

CAP. - Capacity, Tons Of Refrigeration

KW - Compressor Motor Input At Rated Voltage (kW)

*Cooler Water Temperature Rise Of 10F

For other rating conditions please contact SSI Sales Department

PERFORMANCE DATA

LWT: 44 °F*		Remote Air-Cooled																		
R134a	Saturated Discharge Temperature (SDT) (°F)																			
MODEL 30HA	110				120				130				140				149			
	CAP. (TON)	PI (KW)	EVP. FLOW (GPM)	T.H.R (TON)	CAP. (TON)	PI (KW)	EVP. FLOW (GPM)	T.H.R (TON)	CAP. (TON)	PI (KW)	EVP. FLOW (GPM)	T.H.R (TON)	CAP. (TON)	PI (KW)	EVP. FLOW (GPM)	T.H.R (TON)				
60-40	38.2	33.8	91.7	47.8	35.7	37.8	85.7	46.5	32.3	41.6	77.6	44.2	30.2	47.5	72.4	43.7	27.2	53.3	65.4	42.4
80-40	50.1	46.1	120.1	63.2	47.2	51.6	113.4	61.9	43.6	58.3	104.5	60.2	41.0	65.5	98.5	59.7	37.7	74.3	90.5	58.8
100-70	66.8	55.8	160.3	82.7	62.5	61.9	149.9	80.1	57.2	68.2	137.3	76.6	53.1	76.9	127.4	75.0	48.2	86.1	115.7	72.7
120-70	75.7	67.0	181.7	94.8	70.6	74.8	169.5	91.9	64.5	83.0	154.7	88.1	59.4	94.0	142.6	86.1	53.4	105.6	128.2	83.5
140-160	90.7	76.6	217.7	112.5	84.5	85.4	202.7	108.8	77.1	94.8	185.1	104.1	70.8	107.2	169.9	101.3	63.6	120.4	152.6	97.8
160-160	106.8	92.6	256.4	133.2	100.5	103.4	241.2	129.9	93.1	115.4	223.4	125.9	86.6	131.0	208.0	123.9	79.2	148.5	190.2	121.5
180-160	120.4	105.0	289.0	150.3	113.3	117.4	272.0	146.7	105.1	131.1	252.3	142.4	97.9	148.9	234.9	140.2	89.6	168.8	215.0	137.6
200-200	131.4	112.2	315.4	163.3	123.5	125.3	296.4	159.1	114.3	140.1	274.3	154.1	106.0	159.0	254.5	151.3	96.8	180.3	232.3	148.1
220-200	140.3	119.0	336.8	174.2	131.7	133.0	316.0	169.5	121.7	148.8	292.1	164.0	112.6	168.9	270.3	160.6	102.6	191.6	246.3	157.1
235-200	146.3	126.2	351.0	182.1	137.4	141.1	329.7	177.5	127.2	157.9	305.3	172.1	117.9	179.2	283.0	168.9	107.6	203.2	258.3	165.4
250-220	161.9	134.8	388.6	200.3	151.9	150.4	364.5	194.6	140.6	168.2	337.4	188.4	130.2	190.6	312.4	184.4	118.7	216.0	284.8	180.1
265-220	171.4	143.8	411.4	212.3	160.8	160.6	386.0	206.5	149.0	179.6	357.5	200.0	137.9	203.5	331.1	195.8	125.8	230.7	301.9	191.4

PERFORMANCE DATA

LWT: 44 °F*	Remote Air-Cooled - Standard (S Series)															
R134a	Saturated Discharge Temperature (SDT) (°F)															
MODEL 30HA-S	110				120				130				140			
	CAP. (TON)	PI (KW)	EVP. FLOW (GPM)	T.H.R (TON)	CAP. (TON)	PI (KW)	EVP. FLOW (GPM)	T.H.R (TON)	CAP. (TON)	PI (KW)	EVP. FLOW (GPM)	T.H.R (TON)	CAP. (TON)	PI (KW)	EVP. FLOW (GPM)	T.H.R (TON)
280 - 220	189.8	164.5	455.5	237.8	178.1	185.2	425.7	230.8	166.5	212.3	390.1	226.7	154.8	234.0	373.3	221.2
300 - 220	203.4	180.0	488.1	254.6	191	201.0	456.6	248.2	178.7	225.0	418.9	242.7	166.4	253.0	401.1	238.5
320 - 300	231.7	196.6	556.0	287.6	216.6	218.5	519.8	278.7	200.7	243.7	481.6	269.9	184.1	271.6	441.8	261.3
340 - 300	248	209.3	595.3	307.5	232.3	231.5	557.6	298.2	215.5	256.9	517.3	288.6	197.8	285.5	474.8	279.0
360 - 300	262.6	220.6	630.2	325.3	246.3	243.0	591.2	315.4	228.7	268.7	549.0	305.1	210.1	297.9	504.2	294.8
390 - 300	279	238.2	669.5	346.7	262.2	263.7	629.3	337.2	244.4	292.7	586.5	327.6	225.8	324.7	541.8	318.1
420 - 300	293	253.3	703.2	365	275.8	281.5	661.9	355.8	257.8	313.2	618.7	346.8	239.2	347.8	574.1	338.1
420 - 380	314.5	256.6	754.8	387.5	295.9	285.0	710.2	377	276.6	316.8	663.7	366.6	256.5	351.6	615.5	356.4
450 - 380	333.8	273.3	801.0	411.5	314.1	303.6	753.8	400.4	293.5	337.5	704.5	389.5	272.3	374.6	653.5	378.8
480 - 380	350.6	287.9	841.4	432.4	330	319.8	791.9	420.9	308.4	355.6	740.2	409.5	286.1	394.7	686.6	398.3
520 - 380	362.9	310.8	870.9	451.3	341.3	343.6	819.0	439	318.6	381.0	764.6	426.7	294.9	421.0	707.9	414.6
560 - 380	373.4	331.0	896.2	467.4	350.9	363.9	842.3	454.4	327.3	401.6	785.4	441.4	302.5	443.5	726.1	428.6
600 - 380	388.5	342.0	932.4	485.7	365.3	378.0	876.8	472.6	341.1	416.8	818.7	459.6	316.1	460.2	758.6	446.9
640 - 380	401.6	352.2	964.0	501.8	377.9	389.1	907.1	488.6	353.3	430.0	847.9	475.6	327.9	474.8	787.0	462.9

PERFORMANCE DATA

LWT: 44 °F*		Remote Air-Cooled - High Ambient (T Series)															
R134a		Saturated Discharge Temperature (°F)															
		140				143				147				149			
MODEL 30HA-T	CAP. (TON)	PI (KW)	EVP. FLOW (GPM)	T.H.R (TON)	CAP. (TON)	PI (KW)	EVP. FLOW (GPM)	T.H.R (TON)	CAP. (TON)	PI (KW)	EVP. FLOW (GPM)	T.H.R (TON)	CAP. (TON)	PI (KW)	EVP. FLOW (GPM)	T.H.R (TON)	
280 - 220	146.4	217.4	351.3	208.2	142.1	227.0	341.0	206.6	136.3	239.9	327.1	204.4	133.6	246.0	320.6	203.4	
300 - 220	157.4	234.4	377.8	224.1	152.8	244.0	366.6	222.2	146.5	256.9	351.6	219.7	143.5	263.0	344.5	218.5	
320 - 300	173.1	249.2	415.4	244.0	166.8	258.3	400.4	240.2	158.4	273.4	380.2	236.1	154.4	280.6	370.6	234.2	
340 - 300	186.3	254.6	447.0	258.7	179.7	266.5	431.3	255.5	170.9	282.3	410.1	251.2	166.7	289.9	400	249.1	
360 - 300	198.0	265.8	475.1	273.6	191.1	278.9	458.7	270.4	181.9	295.5	436.6	265.9	177.6	303.2	426.2	263.8	
390 - 300	212.3	294.9	509.4	296.1	205.3	307.5	492.7	292.7	195.9	324.4	470.1	288.1	191.4	332.5	459.4	285.9	
420 - 300	224.5	322.1	538.8	316.1	217.4	334.9	521.8	312.6	207.8	352.2	498.8	307.9	203.3	360.3	488.0	305.7	
420 - 380	240.8	324.8	578.0	333.2	233.2	338.5	559.6	329.4	222.8	357.2	534.8	324.4	218.0	365.8	523.1	322.0	
450 - 380	255.6	343.2	613.5	353.2	247.5	357.8	594.0	349.2	236.6	377.4	567.8	343.9	231.4	386.8	555.4	341.4	
480 - 380	268.6	360.1	644.6	371.0	260.1	375.4	624.1	366.8	248.6	396.1	596.7	361.2	243.2	405.8	583.7	358.6	
520 - 380	277.0	386.1	664.8	386.8	268.0	402.3	643.2	382.4	255.9	424.1	614.1	376.5	250.2	434.3	600.4	373.7	
560 - 380	284.2	411.5	682.1	401.2	274.8	428.4	659.5	396.6	262.1	451.3	629.1	390.4	256.1	462.1	614.8	387.5	
600 - 380	296.7	423.0	712.2	417.0	287.2	440.1	689.3	412.3	274.3	463.3	658.4	406.0	268.3	474.1	643.9	403.1	
640 - 380	307.7	434.5	738.5	431.2	298.0	452.0	715.3	426.5	285.0	475.4	684.1	420.2	278.9	486.3	669.3	417.2	

LWT - Leaving Chilled Water Temperature
EVP - Evaporator
CAP - Capacity, Tons Of Refrigeration
KW - Compressor Motor Input At Rated Voltage (kW)
*Cooler Water Temperature Rise Of 10F
For other rating conditions please contact SSI Sales Department

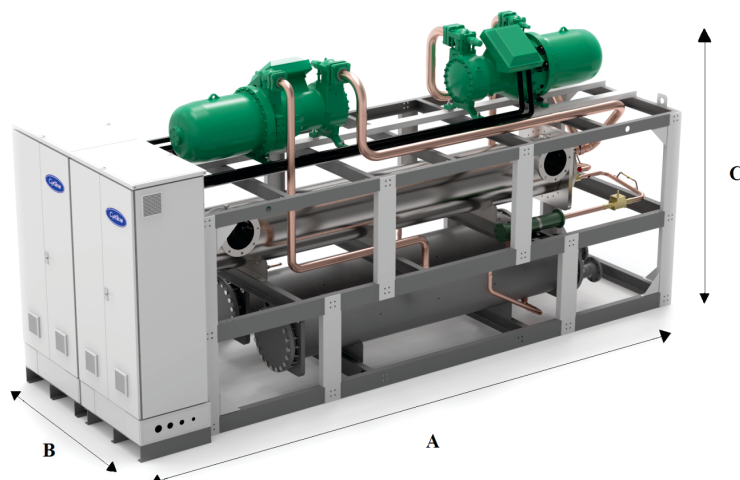


Figure 3- 30HC units dimensions

UNIT	30HC								
	60-40	80-40	100-70	120-70	140-160	160-160	180-160	200-200	220-200
Length A(mm)	2553	2819	2814	3106	3287	3480	3480	3612	3612
Width B(mm)	1693	1693	1552	1552	1552	1552	1552	1800	1800
Height C(mm)	1850	2024	1868	1890	1976	2143	2143	2804	2804
Weight (Kg)	2104	2504	2811	3119	3686	4316	4399	5184	5336

UNIT	30HC								
	235-200	250-220	265-220	280-220	300-220	320-300	340-300	360-300	390-300
Length A(mm)	3612	3612	3612	3712	4612	5662	5662	5662	5662
Width B(mm)	1800	1800	1800	2000	1900	1900	1900	1900	1900
Height C(mm)	2804	2804	2804	2884	2921	3006	3006	3006	3006
Weight (Kg)	5471	5776	5797	5879	6710	7966	7994	8033	8301

UNIT	30HC							
	420-300	420-380	450-380	480-380	520-380	560-380	600-380	640-380
Length A(mm)	5662	5662	5662	5662	5662	5662	5662	5662
Width B(mm)	1900	1900	1900	1900	1900	1900	1900	1900
Height C(mm)	3006	3201	3201	3201	3221	3221	3221	3221
Weight (Kg)	8566	9282	9484	9686	10016	10346	10402	10456

*Dimensions and weights are approximate and may be subject to change.

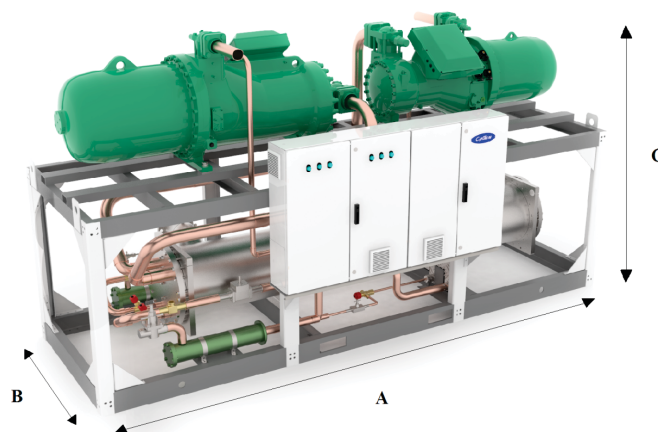


figure4-30HA units dimensions

UNIT	30HA								
	60-40	80-40	100-70	120-70	140-160	160-160	180-160	200-200	220-200
Length A(mm)	2553	2553	2814	3106	3287	3480	3480	3612	3612
Width B(mm)	1242	1242	1265	1265	1351	1351	1351	1800	1800
Height C(mm)	1700	1700	1700	1700	1700	1714	1714	2144	2144
Weight (Kg)	1685	2010	2027	2323	2752	3362	3362	3712	3722

UNIT	30HA							
	235-200	250-220	265-220	280-220	300-220	320-300	340-300	360-300
Length A(mm)	3612	3612	3612	3712	4612	5662	5662	5662
Width B(mm)	1800	1800	1800	2000	1900	1900	1900	1900
Height C(mm)	2144	2144	2144	2144	2181	2266	2266	2266
Weight (Kg) -S	3732	3894	3904	3989	4798	5959	5969	5979
Weight (Kg) -T	3732	3894	3904	3944	4753	5914	5924	5934

UNIT	30HA								
	390-300	420-300	420-380	450-380	480-380	520-380	560-380	600-380	640-380
Length A(mm)	5662	5662	5662	5662	5662	5662	5662	5662	5662
Width B(mm)	1900	1900	1900	1900	1900	1900	1900	1900	1900
Height C(mm)	2266	2266	2431	2431	2431	2451	2451	2451	2451
Weight (kg)-S	6039	6099	6790	6811	6831	6920	7010	7050	7090
Weight (kg)-T	5994	6054	6745	6766	6786	6875	6965	7005	7045

*Dimensions and weights are approximate and may be subject to change.

380-400, 3, 50 CYCLE, PW/Y/Δ				
UNIT 30HC, HA	POWER (KW)		FULL LAOD AMPER (A)	
	30HC	30HA	30HC	30HA
60 ~ 40	36.2	53.7	67	93.2
80 ~ 40	49.9	75.5	84	123.2
100 ~ 70	59.6	87	110.8	152.6
120 ~ 70	72.4	107.4	134	186.4
140 ~ 160	82.2	122	150.8	210
160 ~ 160	99.8	151	168	246.4
180 ~ 160	113.8	172	196.4	290.4
200 ~ 200	121.6	183.8	214.9	313.7
220 ~ 200	129.4	195.6	233.4	337
235 ~ 200	137.4	207.7	249.3	359
250 ~ 220	145.4	219.8	265.2	381
265 ~ 220	155.5	235	282.2	406.5
280 ~ 220	165.6	250.2	299.2	432
300 ~ 220	179.5	267.1	318.6	458
320 ~ 300	193.4	284	338	484
340 ~ 300	205.8	299.7	355.8	507
360 ~ 300	218.2	315.4	373.6	530
390 ~ 300	235.1	341.7	409.8	580
420 ~ 300	252	368	446	630
420 ~ 380	252	368	446	630
450 ~ 380	268.4	392	472	670
480 ~ 380	284.8	416	498	710
520 ~ 380	305.8	442	535	754
560 ~ 380	326.8	468	572	798
600 ~ 380	338.5	487	597	833
640 ~ 380	350.2	506	622	868

For selection of cables and fuses the full load amper and power must be considered.

Pressure Drop

In shell and tube heat exchangers, both excessively high and excessively low fluid flow rates should be avoided. Excessively high fluid flow rates and correspondingly high tube velocities will result in high fluid pressure drop, high pumping power, and potentially tube erosion or corrosion damage.

Excessively low fluid flow rates and correspondingly low velocities should also be avoided as they will result to poor heat transfer, high compressor power, sedimentation and tube fouling.

In the following diagrams, the pressure drop of evaporator and condenser is displayed in terms of water flow rate.

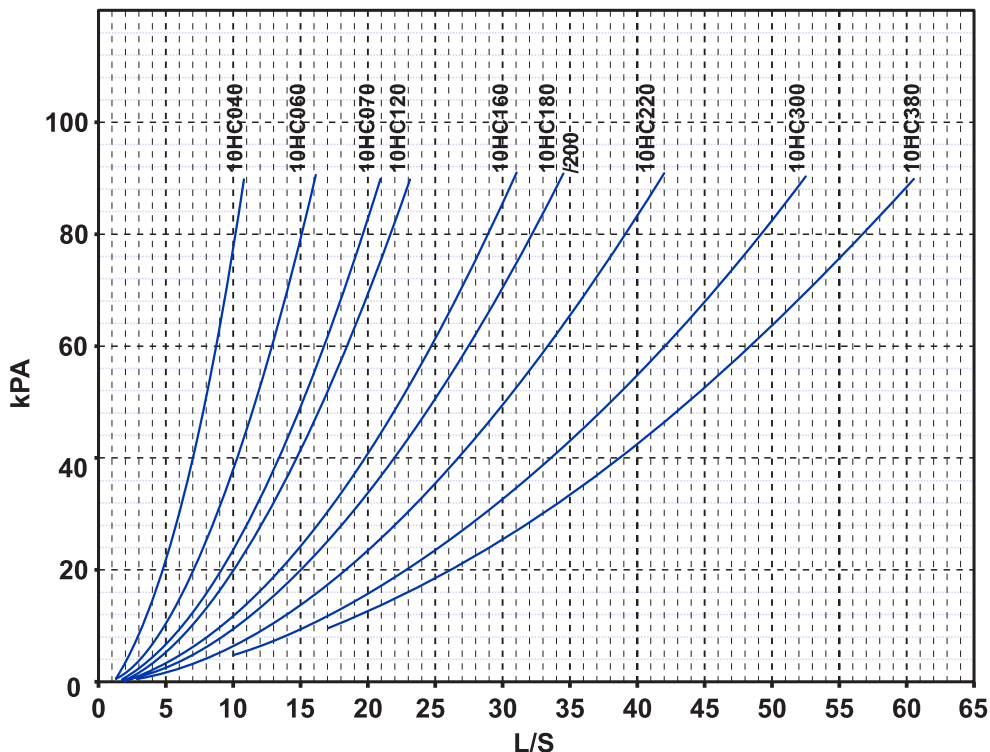


Figure 5 - Cooler pressure drop, SI units

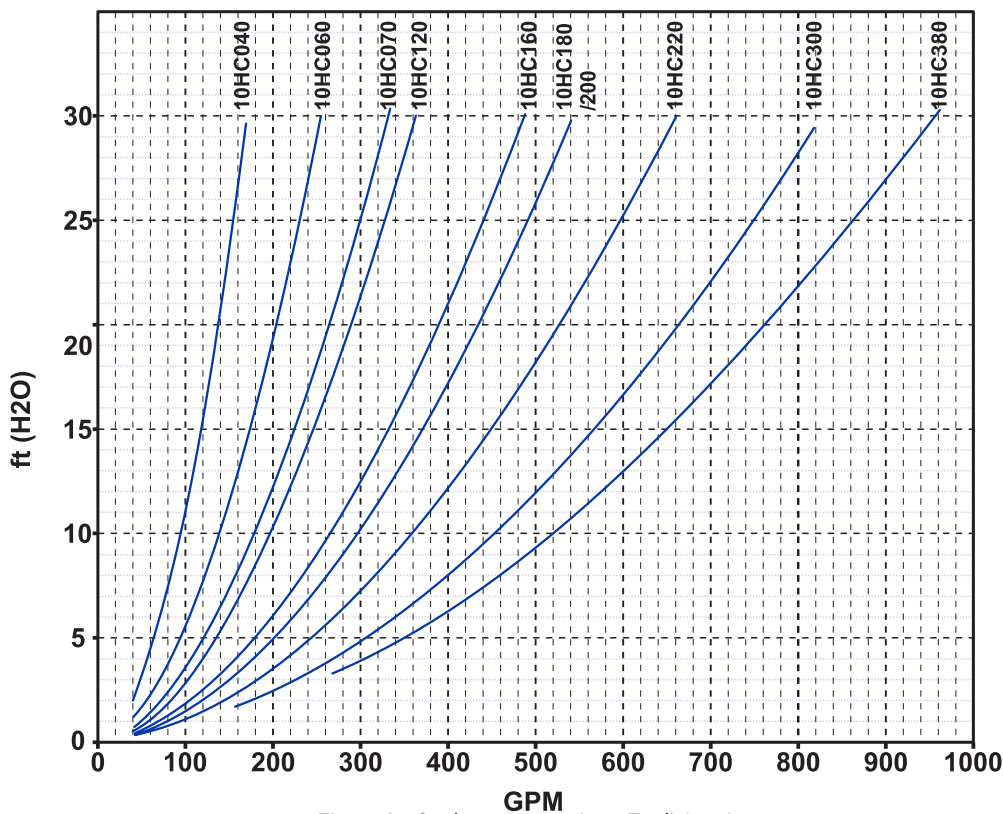


Figure 6 - Cooler pressure drop, English units

CHARTS

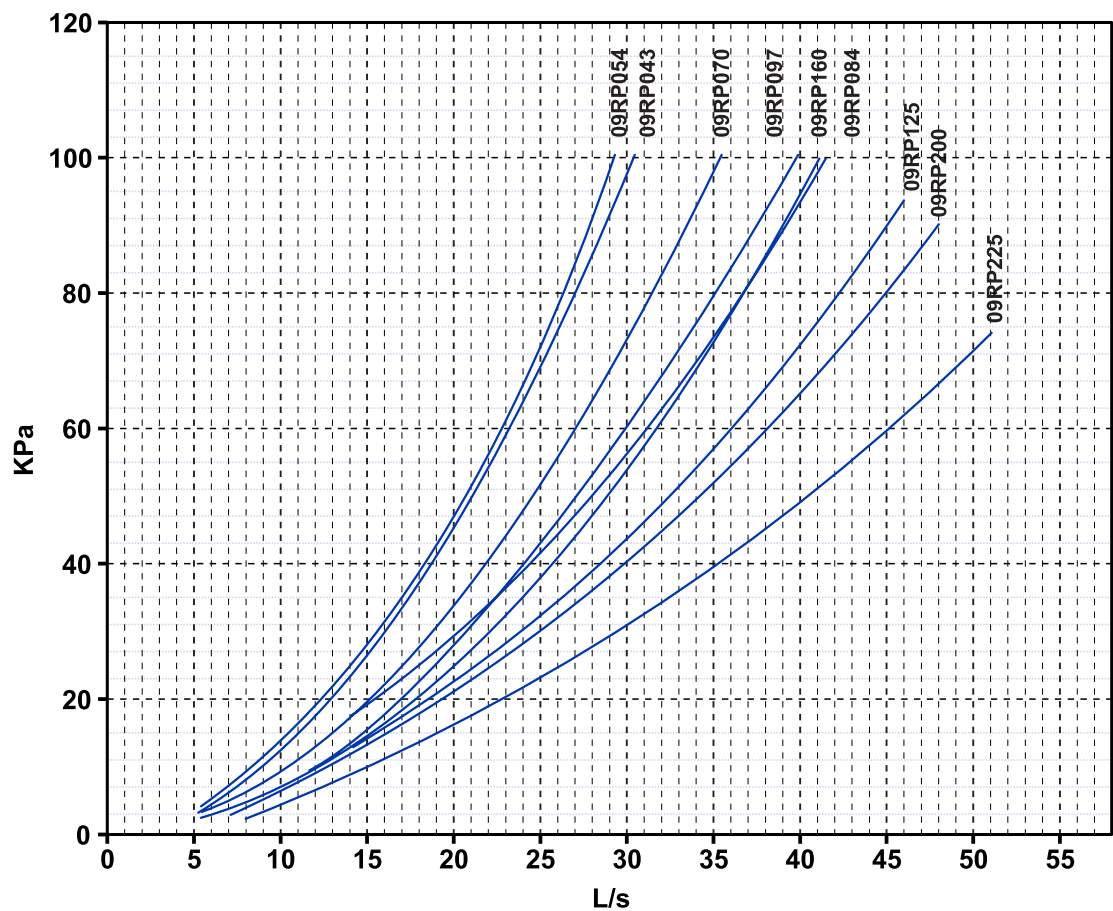


Figure 7 - Condenser pressure drop, SI units

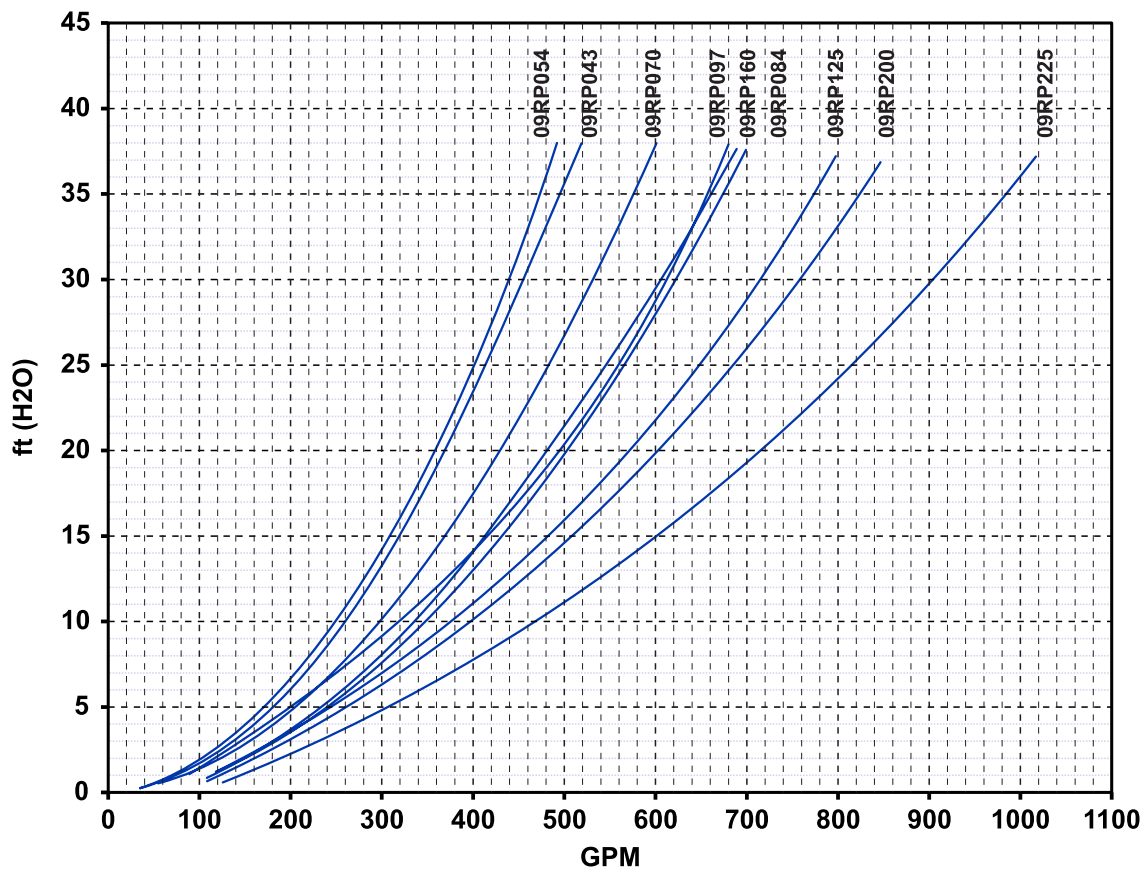
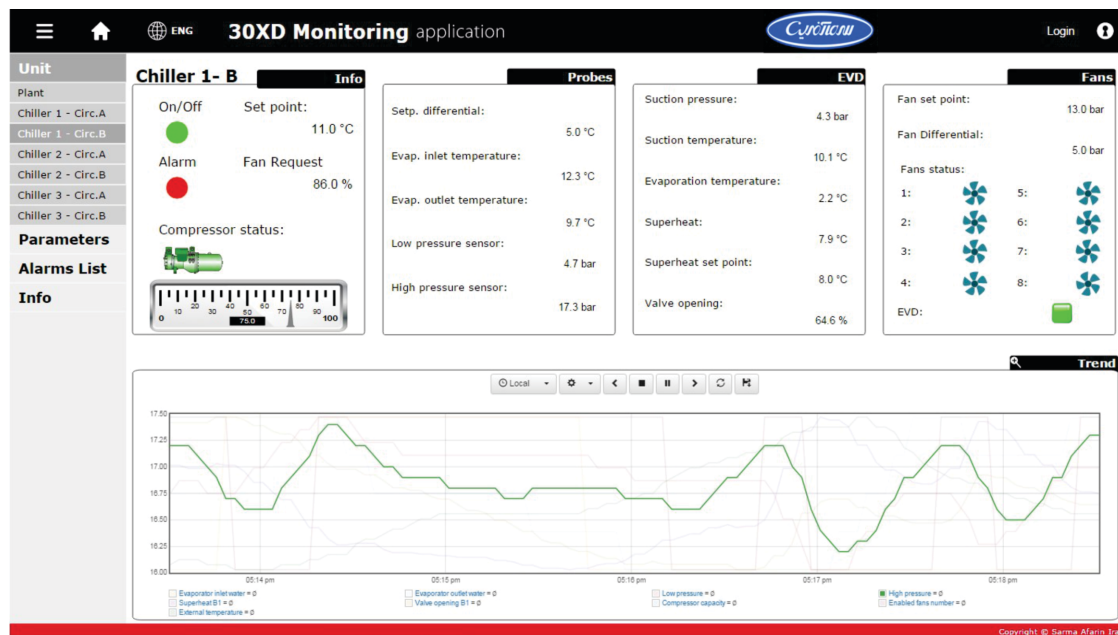


Figure 8 - Condenser pressure drop, English units

The remote monitoring system is provided by Sarmaafarin on its chillers and packages on request of customers. By directly connecting the monitoring system to the main control unit, all information and alarms can be transmitted to any location via a fixed connection line. Real time monitoring of operating conditions on installed units, recording of data in abnormal situations, maintenance management and

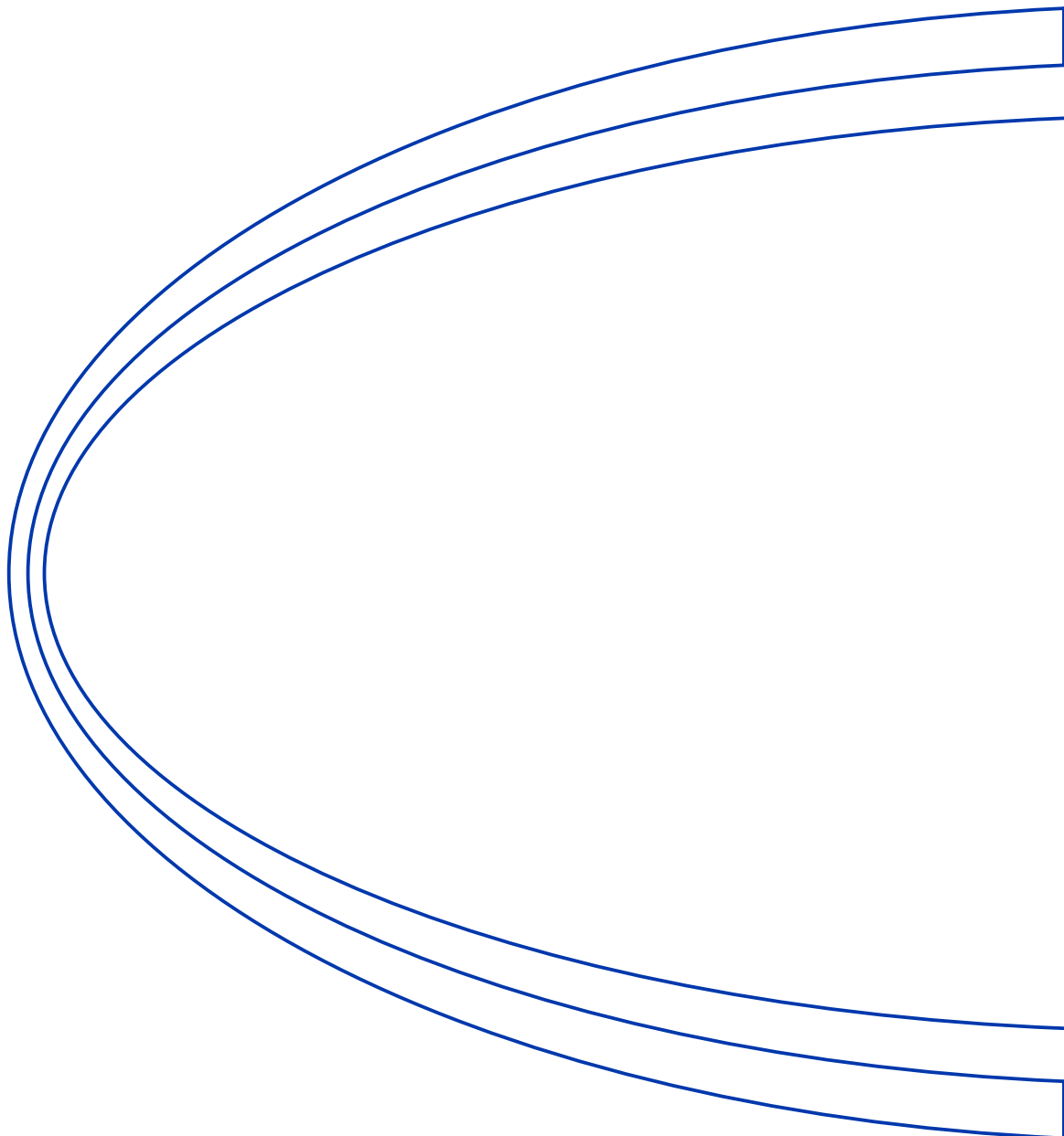
setting desired temperature in the home from a smart phone, are just some of many opportunities provided to designers and users of home systems at any time and from anywhere. Storing customer information for at least one year has a significant impact on the proper functioning and operational life of the system, making it easier to maintain the system.



Features and Benefits of Monitoring

- Observation of important parameters at any moment
- Displaying the current status of system on a chart based on live data
- Recording important values in the case of abnormal events
- Quick diagnosis of system faults and troubleshooting from anywhere
- Customized pages for the customer
- Selecting important parameters, notifications and warnings by the custom
- Applicable settings via PC or Smart phone
- Different access levels with specific passwords for users
- Collecting and building an annual archive of information





Sanaye Sarmaafarin Iran

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