

AIR-COOLED SCREW CHILLER



TRUST AIR CONDITIONING EQUIPMENT CO.
Prepared By: Engineering & R & D Department.



Air cooled screw chiller

Technical service manual

توجه:

شرکت تراست حق تغییر مشخصات دستگاه ها را در جهت بهبود و ارتقای کیفیت برای خود محفوظ می دارد.

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1. Product Line Up

Model	Power Supply	Cooling Capacity (kW)	Quantity of Compressor	Quantity of Fan
CC03-TMCU0376B3O3/1AT1SB	380V/3Ph/50Hz	376	1	6
CC03-TMCU0496B3O3/1AT1SA	380V/3Ph/50Hz	496	1	8
CC03-TMCU0594B3O3/1AT1SA	380V/3Ph/50Hz	594	1	10
CC03-TMCU0720B3O3/1AT1SB	380V/3Ph/50Hz	720	1	10
CC03-TMCU0880B3O3/1AT1SB	380V/3Ph/50Hz	880	2	14
CC03-TMCU0996B3O3/1AT1SA	380V/3Ph/50Hz	996	2	16
CC03-TMCU1203B3O3/1AT1SB	380V/3Ph/50Hz	1203	2	16
CC03-TMCU1419B3O3/1AT1SB	380V/3Ph/50Hz	1419	2	20

2. External Appearance



CC03-TMCU0376B3O3/1AT1SB module



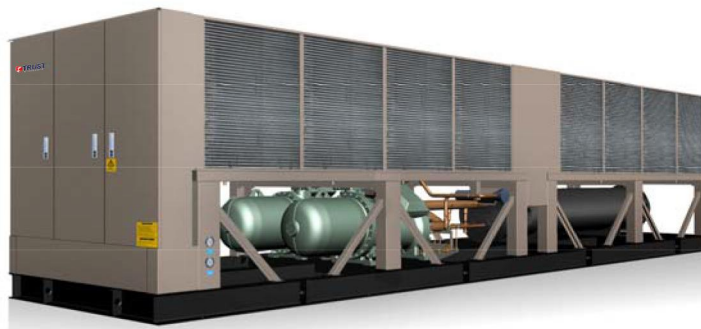
CC03-TMCU0496B3O3/1AT1SA module



CC03-TMCU0594B3O3/1AT1SA module



CC03-TMCU0720B3O3/1AT1SB module



CC03-TMCU0996B3O3/1AT1SA & CC03-TMCU1203B3O3/1AT1SB module



CC03-TMCU1419B3O3/1AT1SB module

3. Features

+ Environmental care

■ R134a refrigerant

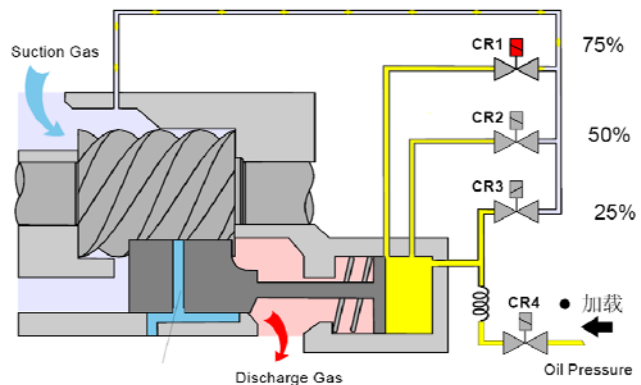
Refrigerant of the HFC group with zero ozone depletion potential.

It is environmentally safe and does not have a phase-out date.



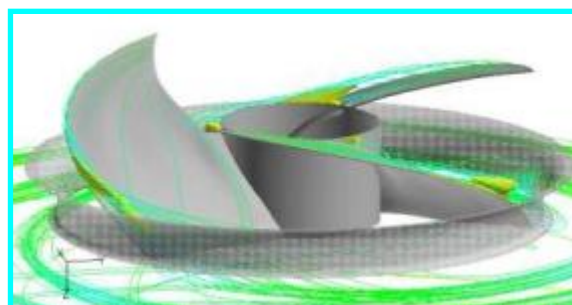
+ Economical Operation Cost

- Extremely high full load and partial load energy efficiency. New twin-rotor screw compressor equipped with a high-efficiency motor and a variable capacity valve that can adjust the capacity of 25%, 50%, 75% and 100% in 4 stages (Stepless control as an option) and permits exact matching of the cooling capacity to the actual load.
- Electronic expansion device permits the operation at a lower condensing pressure and improve the utilization of the evaporator heat exchange surface (superheat control).
- Economizer system with electronic expansion device for increases the cooling capacity. Automatic scheduling of the Chiller's compressors allows the chiller to match the fluctuating cooling load and conserve energy with each unit running at its peak efficiency.



+ Lower operating noise

- The twin-screw compressor adopts the strong points of gapless-loss, high-efficiency cubage, low-noise, few easy workout parts. Double-wall structure not only compensates the pressure, but also significantly reduces the noise. Cast iron structure of the compressor casing and oil separator can reduce the noise significantly.



Air-cooled screw chiller technical manual (PLC series)

- Low-noise fans, made of a composite material are now even quieter and do not generate intrusive low-frequency noise. Rigid fan mounting avoids start-up noise.

Multiple direct drive dynamically balanced propeller fans operate at low tip speeds for maximum efficiency and minimum noise and vibration. A heavy-gauge vinyl-coated fan guard protects each fan.

Outstanding reliability

- Full factory testing of all the units ensures a trouble free start-up. Extensive test makes certain that each safety and operating control is properly adjusted, and operates correctly. The unit has passed full factory test before being delivered to ensure the reliable working on the site.
- Transport simulation test in the laboratory on a vibrating table.

Simple Structure, Easy Installation

- The unit can be placed in service after being connected with power supply and water supply during field installation .Standard flange connection and wire mesh to the electrical panel make the installation easy and simple.



State of Technique, Accuracy Control

- The sensors related to control and other assemblies are equipped by factory and strictly tested.
- Intelligent control: The unit is controlled by micro-controller(PLC) and has the automatic control functions of fault diagnosis, energy management and anti-freezing monitoring, which ensures the high-efficiency operation of the unit, and more convenient in use. The unit with RS485 open protocol communication interface. BMS compatible. The startup and shutdown of each unit is controlled by the host computer, reducing the running cost to the lowest.
- Complete and safe control system: All electrically control elements are designed and selected with stable quality and reliable function; The unit designed with multiple security measures ensure the safe and reliable running witch including high and low pressure protection, oil pressure difference

protection, anti-freezing protection, water flow protection, power protection, overload protection etc.



Modular design, Flexible combination

- The units adopt modular design, which can makes more unit connect together. The unit can combine 8 modules. Cooling capacity can be within 360kW-7200kW, meanwhile every separate module can operate as master, also each module can be a slave unit with modules combination, more convenient for design and installation.



4. Specification

Single Compressor:

Cooling capacity CC03-TMCU		376B3O3/1AT1SB	496B3O3/1AT1SA	594B3O3/1AT1SA	720B3O3/1AT1SB
	kW	376	496	594	720
Power supply		380V/3P/50Hz			
Rated power consumption	kW	124	159	187	234
Compressor	Type	Semi-hermetic, twin screw compressor			
	Quantity	1	1	1	1
Energy adjustable range%		25%,50%,75%,100% 4-step (50%~100% stepless as option)			
Refrigerant	Type	R134a			
Air Side Heat-exchanger	Type	M shape Heat exchanger, High efficient exchanger tube + aluminum fins			
	Fans Quantity	6	8	10	10
	Air Volume (m ³ /h)	23000×6	23000×8	23000×10	23000×10
	Motor input (kW)	2.8×6	2.8×8	2.8×10	2.8×10
Water Side Heat-exchanger	Type	Shell-and-tube heat-exchanger			
	Water Volume (m ³ /h)	65.4	86	103.2	123.8
	Water pressure drop (kpa)	39	54	56	58
	Inlet/outlet Pipe diameter (mm)	DN125	DN125	DN125	DN150
Water side fouling factor (m ² ·°C/kW)		0.086			
Dimension (mm)	Length (mm)	3810	4680	5880	5880
	width (mm)	2280	2280	2280	2280
	height (mm)	2370	2370	2370	2370
Shipping weight (kg)		3320	4330	5000	5500
Running weight (kg)		3520	4530	5200	5700

Note:

1) Nominal cooling capacities are based on the following conditions:

Chilled water inlet/outlet temp: 12°C/7°C; Outdoor temp (DB/WB):35°C/24°C.

2) The applicable ambient temperature range of R134a air-cooled screw units is 15°C ~ 43°C.

Dual Compressors:

Unit Model CC03-TMCU		880B3O3/1AT1SB	996B3O3/1AT1SA	1203B3O3/1AT1SB	1419B3O3/1AT1SE
Cooling capacity	kW	880	996	1203	1419
Power supply		380V/3P/50Hz			
Rated power consumption	kW	285	318	381	466
Compressor	Type	Semi-hermetic, twin screw compressor			
	Quantity	2	2	2	2
Energy adjustable range%		12.5%、25%、37.5%、50%、62.5%、75%、87.5%、100%			
Refrigerant	Type	R134a			
Air Side Heat-exchanger	Type	M shape Heat exchanger, High efficient exchanger tube + aluminum fins			
	Fans Quantity	14	16	16	20
	Air Volume (m ³ /h)	23000×14	23000×16	23000×16	23000×20
	Motor input (kW)	2.8×14	2.8×16	2.8×16	2.8×20
Water Side Heat-exchanger	Type	Shell-and-tube heat-exchanger			
	Water Volume (m ³ /h)	151.4	172	206.4	244.2
	Water pressure drop (kpa)	70	75	71	69
	Inlet/outlet Pipe diameter (mm)	DN150	DN150	DN200	DN200
Water side fouling factor (m ² ·°C/kW)		0.086			
Dimension (mm)	Length (mm)	8800	9640	9640	11700
	width (mm)	2280	2280	2280	2280
	height (mm)	2430	2430	2430	2430
Shipping weight (kg)		7750	8900	9100	11100
Running weight (kg)		8050	9200	9400	11400

Note:

1) Nominal cooling capacities are based on the following conditions:

Chilled water inlet/outlet temp: 12°C/7°C; Outdoor temp (DB/WB):35°C/24°C.

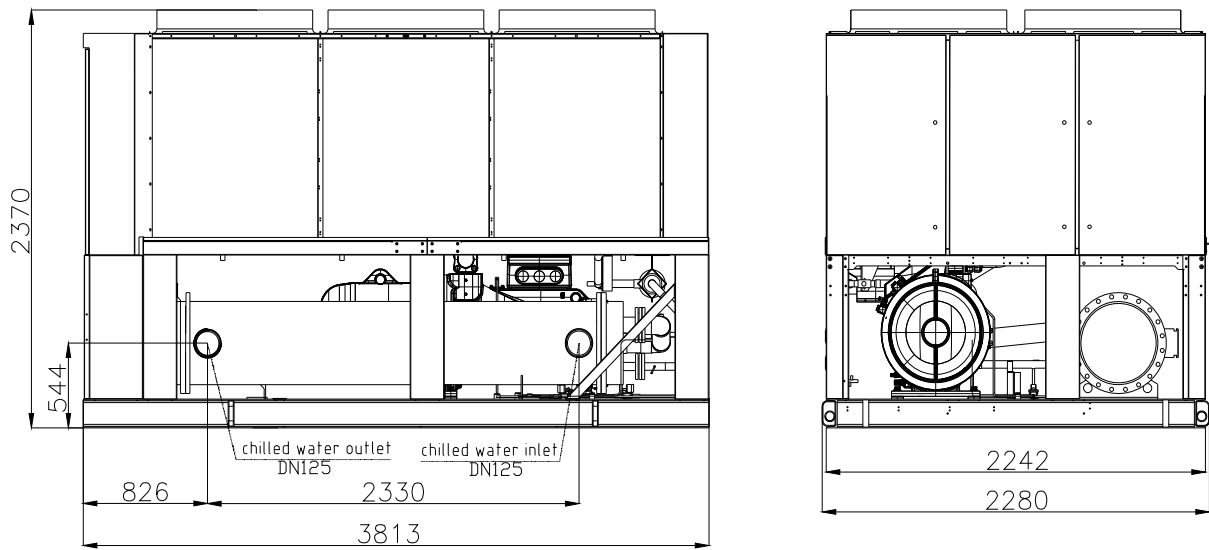
2) The applicable ambient temperature range of R134a air-cooled screw units is 15°C ~ 43°C.

5. Operating Range

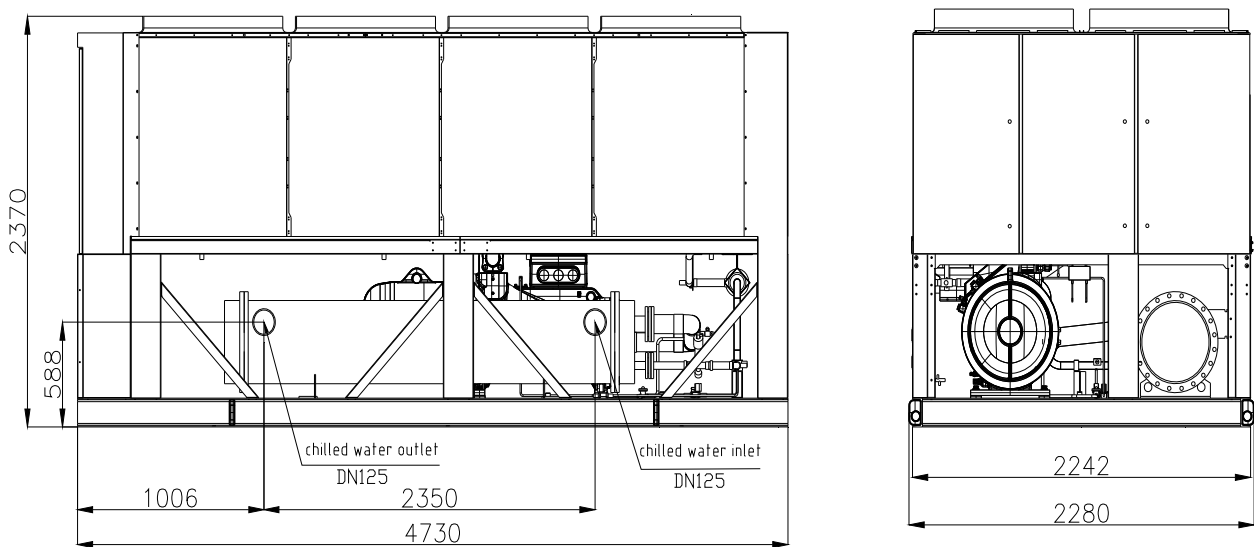
Content	Running range
Ambient Temp.	15°C~43°C(T1)
Leaving water Temp.	5°C~15°C
Water flow volume	Rating flow volume±20%
Max inlet/outlet water Temp. difference	8°C
Fouling factor (m ² .°C/kW)	0.086
Voltage tolerance	Rating Voltage±10%
Phase tolerance	±2%
Power supply frequency	Rating frequency±2%
Evaporator max working pressure on water side	1.0MPa
Compressor max. start count	4 times/h
Environment quality	High corrosive environment and high humidity should be avoided.
Drainage system	The height of water drainage should not be higher than the base of the unit on the spot
Storage and transport temperature	-25°C~55°C
RH(relative air humidity)	In + 40°C does not exceed 50%, + 25°C no more than 90%
Applicable altitude range:	No more than 1000m

6. Outline Dimension

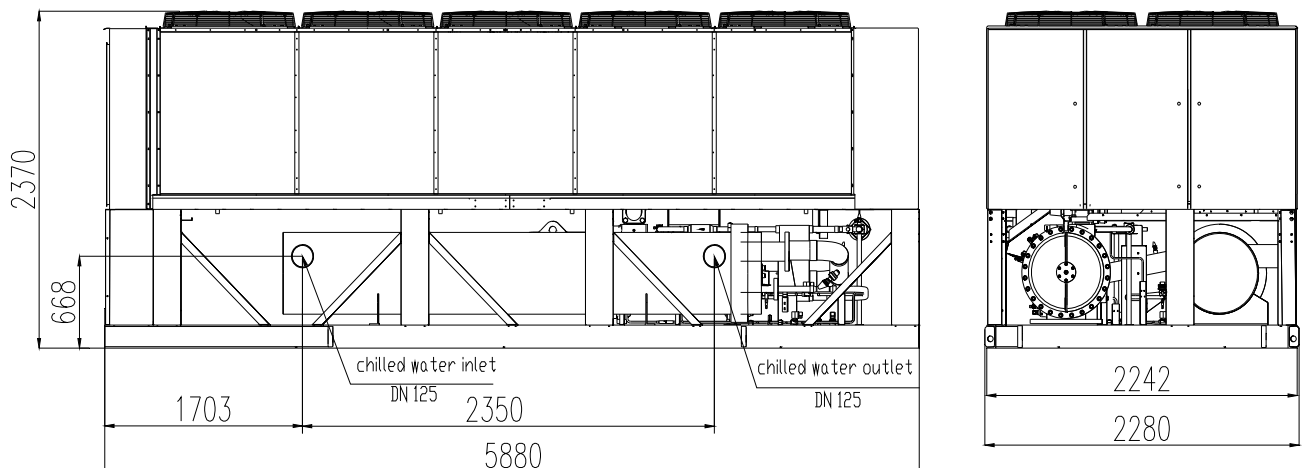
(1) CC03-TMCU0376B3O3/1AT1SB unit (mm)



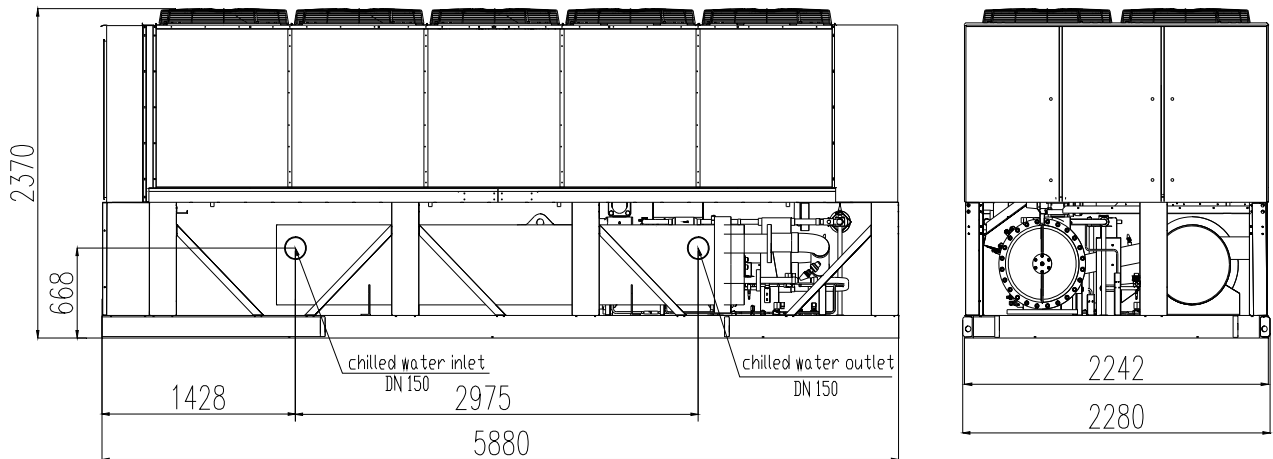
(2) CC03-TMCU0496B3O3/1AT1SA unit (mm)



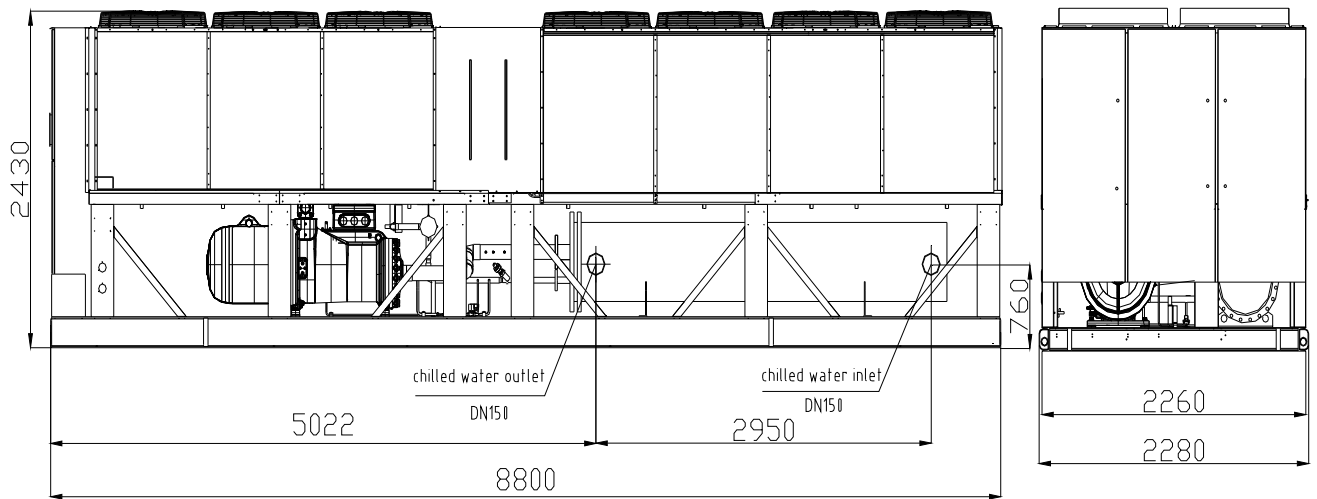
(3) CC03-TMCU0594B3O3/1AT1SA unit (mm)



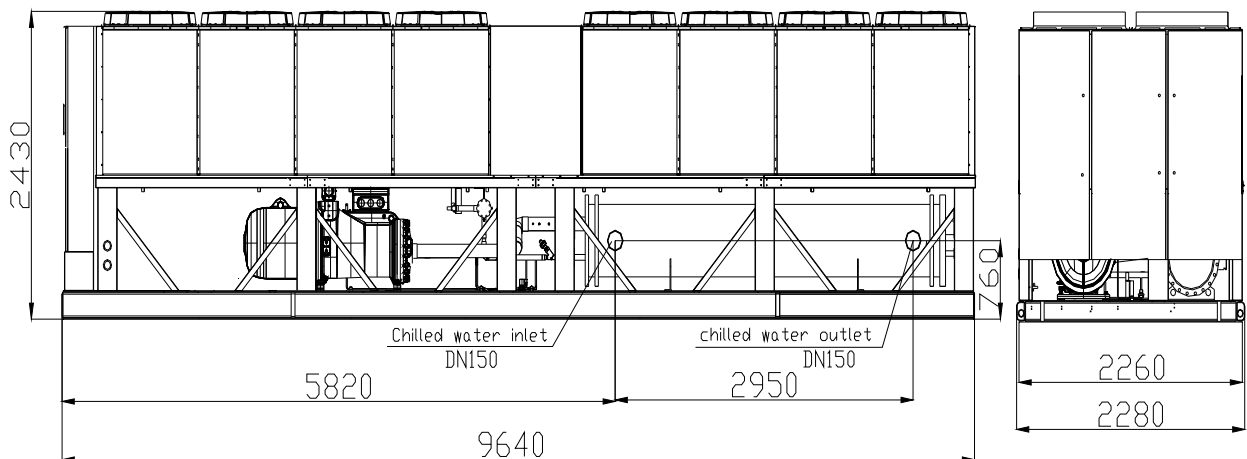
(4) CC03-TMCU0720B3O3/1AT1SB unit (mm)



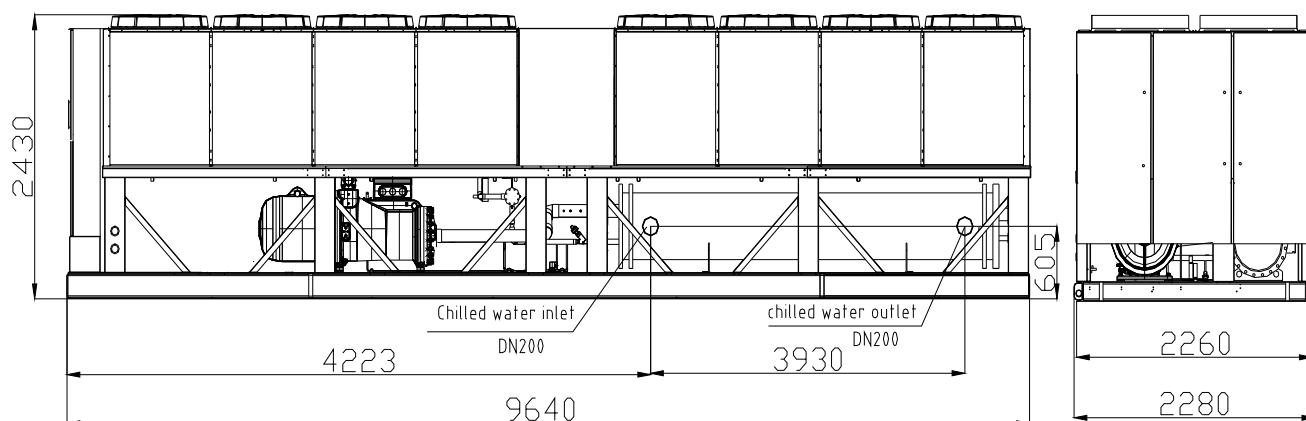
(5) CC03-TMCU0880B3O3/1AT1SB unit (mm)



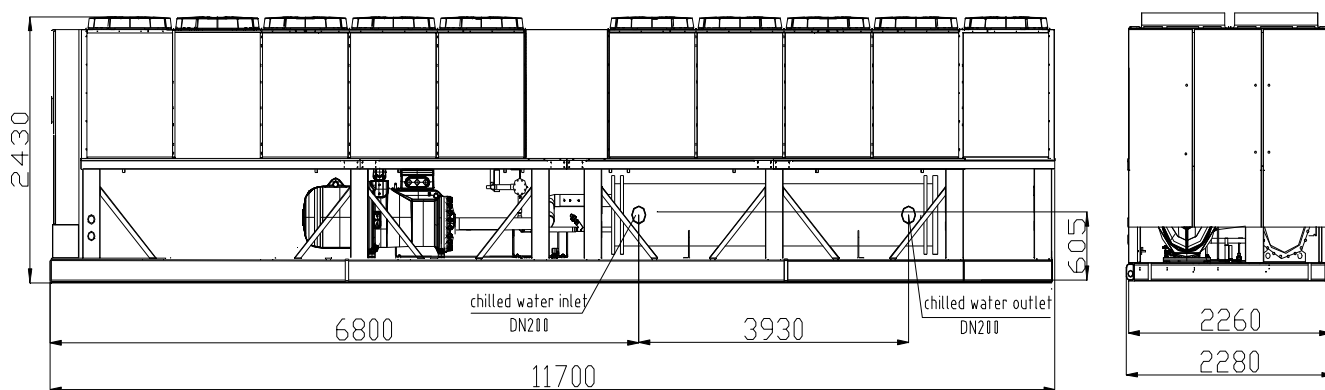
(6) CC03-TMCU0996B3O3/1AT1SA unit (mm)



(7) CC03-TMCU1203B3O3/1AT1SB unit (mm)



(8) CC03-TMCU1419B3O3/1AT1SB unit (mm)



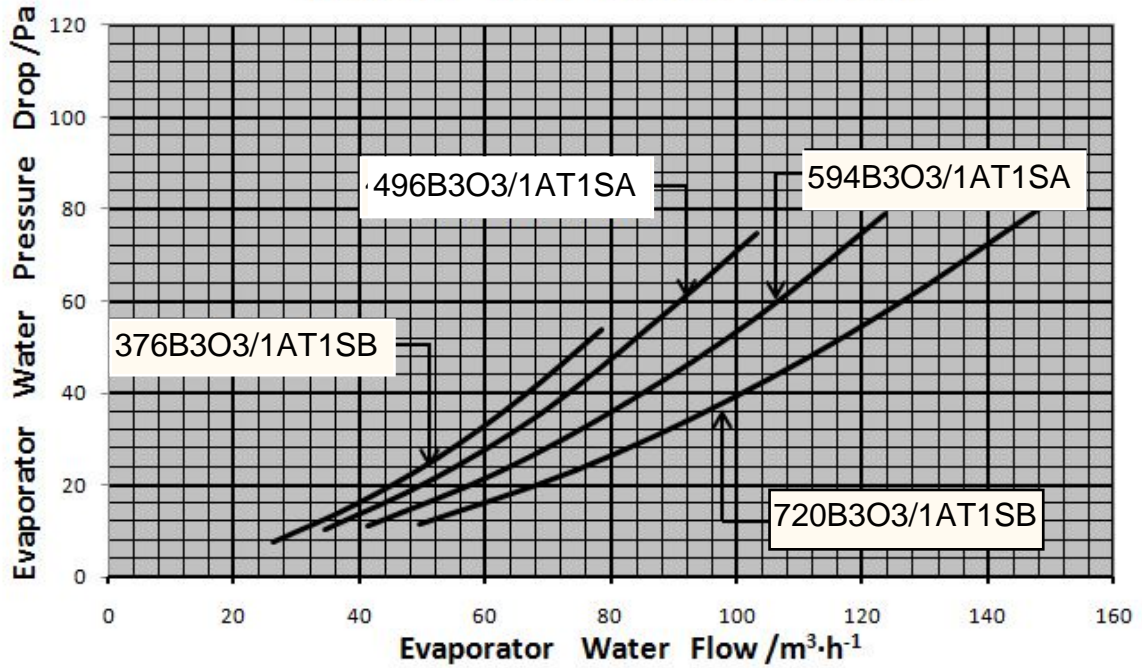
7. Water Flow – Water Drop Pressure Curve

Balance the chilled water flow through the evaporator. The flow rates must fall between the minimum and maximum values shown in the below table. Flow rates below the minimum values shown will result in laminar flow which will reduce efficiency, cause erratic operation of the electronic expansion valve and could cause low temperature cutouts. On the other hand, flow rates exceeding the maximum values shown can cause erosion on the evaporator water connections and tubes, even piping breaking.

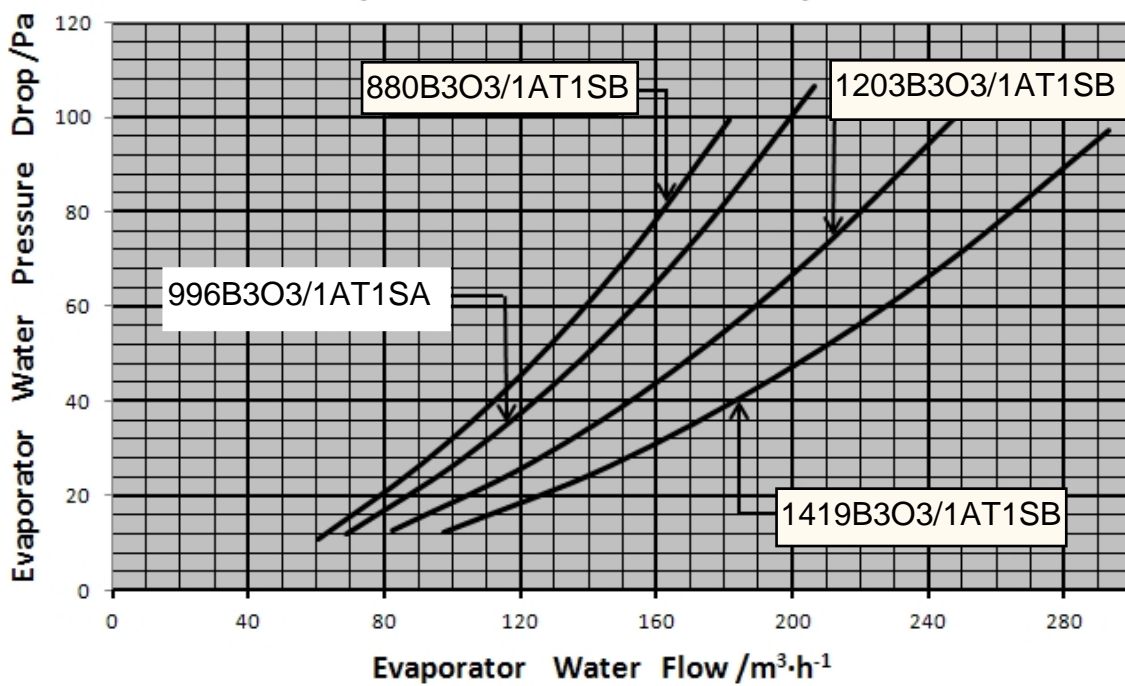
Variable chilled water flow through the evaporator while the compressor(s) are operating is not recommended. The chiller control set points are based upon a constant flow and variable temperature.

Unit Model	MIN. FLOW RATE		MAX. FLOW RATE	
	m ³ /h	GPM	m ³ /h	GPM
376B3O3/1AT1SB	46	201	85	374
496B3O3/1AT1SA	60	265	112	492
594B3O3/1AT1SA	72	318	134	590
720B3O3/1AT1SB	87	381	161	708
880B3O3/1AT1SB	106	466	197	866
996B3O3/1AT1SA	120	530	224	984
1203B3O3/1AT1SB	144	636	268	1181
1419B3O3/1AT1SB	171	752	317	1397

Evaporator Water Pressure Drop Curve



Evaporator Water Pressure Drop Curve



Appendix 3: capacity table

Model	Outlet Temp.	Ambient temperature													
		15		20		25		30		35		40		43	
		Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw
376	5	418.0	93.0	397.3	101.4	380.6	108.1	362.3	115.7	349.8	120.8	324.3	130.8	310.1	137.1
	6	436.0	94.5	414.3	103.0	396.6	109.7	376.9	117.3	362.5	122.4	337.5	132.6	322.0	138.8
	7	453.9	96.0	431.3	104.5	412.6	111.3	392.0	119.0	376.0	124.0	350.6	134.3	334.5	140.6
	8	471.9	97.5	448.3	106.1	428.6	112.9	407.0	120.6	390.7	125.8	363.8	136.1	347.1	142.4
	9	489.8	99.0	465.3	107.6	444.7	114.5	422.1	122.3	404.8	127.5	376.9	137.8	359.7	144.2
	10	507.8	100.4	482.3	109.2	460.7	116.1	437.2	123.9	417.2	129.0	390.1	139.6	370.7	145.7
	11	525.8	101.9	499.3	110.7	476.7	117.7	452.2	125.6	433.1	131.0	403.2	141.4	384.9	147.7
	12	543.7	103.4	516.3	112.2	492.8	119.3	467.3	127.2	447.2	132.7	416.3	143.1	397.5	149.5
	13	561.7	104.9	533.3	113.8	508.8	120.9	482.3	128.9	461.3	134.4	429.5	144.9	410.0	151.3
	14	579.6	106.4	550.3	115.3	524.8	122.5	497.4	130.6	475.4	136.1	442.6	146.7	422.6	153.1
15	597.6	107.9	567.3	116.9	540.8	124.1	512.5	132.2	490.5	138.0	455.8	148.4	436.0	155.0	
496	5	527.4	120.7	504.5	131.3	489.1	139.4	470.0	148.9	461.8	154.7	431.7	167.6	413.1	175.3
	6	552.2	122.1	527.8	132.8	510.5	141.2	489.6	150.7	478.4	156.8	447.9	169.8	428.7	177.8
	7	576.9	123.4	551.1	134.3	532.3	143.0	509.9	152.7	496.0	159.0	465.3	172.3	445.4	180.3
	8	601.6	124.7	574.5	135.8	554.0	144.7	530.3	154.7	515.6	161.5	482.7	174.7	462.2	182.8
	9	626.3	126.0	597.8	137.3	575.8	146.5	550.6	156.7	534.3	163.8	500.1	177.2	478.9	185.3
	10	651.0	127.3	621.2	138.8	597.6	148.3	570.9	158.7	550.5	165.8	517.5	179.6	493.2	187.5
	11	675.7	128.7	644.5	140.3	619.4	150.0	591.2	160.7	571.5	168.5	535.0	182.1	512.4	190.4
	12	700.4	130.0	667.8	141.8	641.2	151.8	611.6	162.7	590.2	170.8	552.4	184.5	529.2	192.9
	13	725.0	131.3	691.2	143.3	663.0	153.6	631.9	164.7	608.8	173.2	569.8	187.0	545.9	195.4
	14	749.7	132.6	714.5	144.8	684.7	155.3	652.2	166.7	627.4	175.5	587.2	189.4	562.6	197.9
15	774.3	133.9	737.9	146.4	706.9	157.1	673.3	168.8	647.5	178.0	605.9	192.1	580.6	200.6	

Model	Outlet Temp.	Ambient temperature													
		15		20		25		30		35		40		43	
		Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw
594	5	634.0	133.6	609.2	147.7	591.0	159.7	569.4	172.7	557.4	182.6	526.4	198.7	507.2	208.6
	6	653.3	135.9	627.9	150.1	609.5	162.0	587.5	175.1	575.2	184.8	543.7	201.2	524.0	211.1
	7	674.0	138.5	647.9	152.8	629.3	164.6	606.9	177.6	594.0	187.0	562.2	203.7	541.8	213.8
	8	694.6	141.2	667.9	155.5	649.1	167.2	626.3	180.2	614.5	189.5	580.7	206.3	559.7	216.5
	9	715.3	143.8	687.9	158.2	668.9	169.8	645.7	182.8	634.1	191.9	599.3	208.8	577.5	219.2
	10	735.9	146.4	705.4	160.2	688.7	172.4	665.1	185.4	651.3	194.0	617.8	211.4	593.2	221.6
	11	756.6	149.1	727.9	163.5	708.5	175.0	684.4	188.0	673.4	196.6	636.3	213.9	613.2	224.5
	12	777.2	151.7	747.9	166.2	728.3	177.6	703.8	190.6	693.1	199.0	654.9	216.5	631.1	227.2
	13	797.9	154.3	767.9	168.9	748.1	180.2	723.2	193.1	712.8	201.3	673.4	219.0	648.9	229.9
	14	818.5	157.0	787.9	171.6	767.9	182.8	742.6	195.7	732.4	203.7	691.9	221.6	666.8	232.6
	15	840.6	159.9	809.2	174.6	789.0	185.4	763.2	198.5	753.5	206.2	711.7	224.3	685.7	235.4
720	5	767.1	177.6	744.1	189.9	717.3	204.2	690.5	218.7	676.9	227.9	636.8	247.1	611.2	259.2
	6	790.8	180.9	767.3	193.6	739.5	207.8	711.8	222.1	697.9	230.8	657.0	250.3	630.8	262.6
	7	815.4	184.8	791.4	197.4	763.2	211.5	735.1	225.6	720.0	234.0	678.5	253.9	650.9	266.3
	8	840.0	188.6	815.5	201.1	787.0	215.1	758.4	229.1	744.1	237.6	699.9	257.5	671.1	269.9
	9	864.6	192.4	839.6	204.9	810.7	218.7	781.8	232.6	767.3	241.0	721.3	261.2	691.2	273.5
	10	887.3	195.2	863.7	208.6	834.4	222.3	805.1	236.1	787.8	243.7	742.8	264.8	709.9	276.7
	11	913.7	200.1	887.8	212.4	858.1	226.0	828.5	239.6	813.5	247.8	764.2	268.4	731.4	280.8
	12	938.3	203.9	911.9	216.1	881.8	229.6	851.8	243.1	836.6	251.3	785.7	272.1	751.5	284.5
	13	962.9	207.7	936.0	219.9	905.6	233.2	875.1	246.6	859.7	254.7	807.1	275.7	772.5	288.4
	14	987.5	211.6	960.1	223.6	929.3	236.8	898.5	250.1	882.8	258.1	828.5	279.4	751.7	268.9
	15	1013.0	215.9	985.2	227.3	954.5	240.5	923.8	253.7	907.4	261.9	851.2	283.4	773.6	272.9

Model	Outlet Temp.	Ambient temperature													
		15		20		25		30		35		40		43	
		Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw
880	5	953.4	216.6	910.2	235.5	878.1	249.9	840.4	267.1	818.7	277.7	765.1	300.7	732.2	314.9
	6	995.4	218.4	949.8	236.9	914.9	252.9	874.6	270.2	848.6	281.2	794.1	304.7	758.6	318.8
	7	1037.3	220.8	989.4	239.5	951.9	256.0	909.2	273.6	880.0	285.0	823.8	308.8	787.0	323.0
	8	1079.1	223.2	1028.9	242.2	988.8	259.1	943.7	277.0	912.1	289.1	853.4	313.0	815.4	327.2
	9	1121.0	225.5	1068.4	244.8	1025.8	262.2	978.2	280.5	943.9	293.1	883.0	317.1	843.7	331.4
	10	1162.9	227.9	1107.9	247.5	1062.8	265.2	1012.7	283.9	975.7	297.1	912.7	321.2	872.1	335.6
	11	1204.7	230.3	1147.5	250.2	1099.7	268.3	1047.3	287.3	1007.4	301.0	942.3	325.3	900.5	339.8
	12	1246.6	232.7	1187.0	252.8	1136.7	271.4	1081.8	290.7	1039.2	305.0	971.9	329.4	928.8	344.0
	13	1288.4	235.0	1226.5	255.5	1173.7	274.4	1116.3	294.1	1071.0	308.9	1001.5	333.6	957.2	348.2
	14	1330.3	237.4	1266.1	258.1	1210.7	277.5	1150.8	297.6	1102.7	312.9	1031.2	337.7	985.6	352.4
	15	1372.0	240.3	1305.5	262.1	1247.8	280.6	1185.7	301.3	1136.3	317.2	1061.4	341.9	1015.9	357.0
996	5	1047.0	244.0	1002.7	264.9	975.8	280.5	940.2	298.8	929.6	309.6	869.0	335.4	831.3	351.3
	6	1107.1	246.2	1058.0	267.4	1024.5	283.6	983.2	302.4	961.8	313.7	900.6	339.9	861.2	355.8
	7	1156.0	248.3	1104.1	269.9	1067.2	286.8	1022.8	306.1	996.0	318.0	934.0	344.6	893.4	360.7
	8	1204.9	250.3	1150.3	272.4	1110.0	290.0	1062.5	309.8	1033.4	322.8	967.5	349.4	925.5	365.5
	9	1253.8	252.4	1196.4	274.9	1152.7	293.1	1102.1	313.5	1069.2	327.3	1001.0	354.2	957.7	370.4
	10	1302.8	254.5	1260.9	277.5	1195.5	296.3	1141.8	317.2	1105.0	331.9	1034.4	358.9	985.3	374.5
	11	1351.7	256.6	1288.6	280.0	1238.2	299.5	1181.4	320.9	1140.9	336.4	1067.9	363.7	1022.0	380.2
	12	1400.6	258.7	1334.8	282.5	1280.9	302.6	1221.1	324.6	1176.7	341.0	1101.4	368.4	1054.1	385.0
	13	1449.6	260.8	1380.9	285.0	1323.7	305.8	1260.7	328.3	1212.5	345.5	1134.8	373.2	1086.3	389.9
	14	1498.5	262.9	1427.0	287.5	1366.4	308.9	1300.4	331.9	1248.3	350.1	1168.3	378.0	1118.4	394.8
	15	1536.3	264.9	1464.0	290.1	1403.2	312.1	1336.7	335.8	1286.7	355.0	1203.6	383.0	1152.8	400.1

Model	Outlet Temp.	Ambient temperature													
		15		20		25		30		35		40		43	
		Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw	Cooling Capacity /kw	Power Input /kw
1203	5	1316.6	271.8	1260.9	299.9	1216.0	323.3	1165.7	350.3	1131.1	370.7	1065.1	402.6	1024.8	422.0
	6	1367.3	274.4	1308.5	303.0	1259.8	327.2	1206.0	354.6	1166.1	375.7	1098.5	408.1	1056.8	427.7
	7	1417.8	276.9	1356.1	306.1	1304.3	331.0	1247.5	359.1	1203.0	381.0	1134.0	413.9	1090.7	433.7
	8	1468.3	279.4	1403.7	309.2	1348.8	334.9	1289.0	363.6	1242.7	386.8	1169.5	419.7	1124.5	439.7
	9	1518.8	282.0	1451.3	312.3	1393.3	338.7	1330.5	368.1	1281.0	392.3	1205.0	425.6	1158.4	445.8
	10	1569.3	284.5	1498.9	315.4	1437.8	342.6	1372.0	372.7	1315.1	397.1	1240.5	431.4	1188.5	451.1
	11	1619.8	287.0	1546.5	318.4	1482.3	346.5	1413.5	377.2	1357.6	403.3	1276.0	437.3	1226.2	457.8
	12	1670.3	289.6	1594.1	321.5	1526.8	350.3	1455.0	381.7	1395.8	408.9	1311.5	443.1	1260.0	463.8
	13	1720.8	292.1	1641.7	324.6	1571.3	354.2	1496.5	386.2	1434.1	414.4	1347.0	449.0	1293.9	469.9
	14	1771.3	294.7	1689.3	327.7	1615.8	358.0	1538.0	390.8	1472.4	419.9	1382.5	454.8	1327.8	475.9
	15	1821.6	297.1	1736.9	330.8	1661.0	361.9	1580.7	395.5	1513.1	425.8	1420.0	461.0	1363.6	482.3
1419	5	1516.8	353.6	1469.6	378.0	1416.0	406.7	1362.3	435.6	1331.3	453.7	1255.0	492.3	1206.7	516.6
	6	1562.6	360.0	1515.5	385.4	1460.4	413.8	1405.3	442.3	1375.8	459.7	1296.5	498.7	1245.4	523.4
	7	1610.9	367.5	1563.1	392.7	1507.4	421.0	1451.6	449.2	1419.0	466.0	1339.2	505.9	1285.2	530.6
	8	1659.2	375.0	1610.7	400.1	1554.3	428.1	1497.9	456.1	1468.8	473.3	1381.8	513.1	1325.0	537.8
	9	1707.6	382.5	1658.3	407.5	1601.3	435.3	1544.2	463.0	1515.3	480.2	1424.4	520.3	1364.7	545.0
	10	1755.9	390.0	1705.9	414.9	1648.2	442.4	1590.5	469.9	1561.8	487.0	1467.1	527.5	1404.5	552.1
	11	1804.2	397.5	1753.5	422.2	1695.2	449.6	1636.7	476.9	1608.3	493.8	1509.7	534.7	1444.2	559.3
	12	1852.6	405.0	1801.1	429.6	1742.1	456.7	1683.0	483.8	1654.8	500.7	1552.3	541.9	1484.0	566.5
	13	1900.9	412.5	1848.7	437.0	1789.1	463.8	1729.3	490.7	1701.3	507.5	1595.0	549.1	1525.4	574.3
	14	1949.2	420.0	1896.3	444.3	1836.0	471.0	1775.6	497.6	1747.8	514.3	1637.6	556.3	1491.7	535.5
	15	2000.1	428.5	1945.7	451.7	1885.5	478.1	1825.3	504.8	1794.5	521.6	1681.4	564.3	1538.1	543.9



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برترین نام و نشان های تجاری ایران

