Lightstream Turbo

AIR-COOLED CHILLERS WITH TURBOCOR COMPRESSORS

300-1600kW

- HIGH ENERGY EFFICIENCY AT FULL AND PART LOADS
- TURBOCOR OIL-FREE COMPRESSOR TECHNOLOGY
- DEMAND-RESPONSIVE SOLUTION
- REFRIGERANTS R134A, LOW-GWP R1234ZE

TURBOCOR | R134A/R1234ZE | EC-FANS | MICROCHANNEL | FREECOOLING

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Turbocor compressors

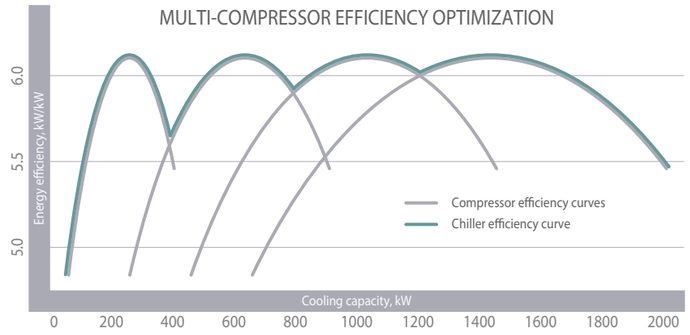
Substantial savings in operating costs of up to 35%*

Turbocor compressors offer the outstanding energy savings from digitally controlled, frictionless two-stage centrifugal compression and guarantees significant reductions in operating cost and environmental emissions associated with energy production. The oil-free design of Turbocor compressors eliminates the potential for efficiency robbing oil contamination and all of the oil management accessories: pumps, separators, filters, plus oil disposal.

Compressor soft-start draws only 2 amps and reduces mechanical stress, as well as the electrodynamic stresses on the power cables and electrical distribution network, extending the overall lifespan of the system.

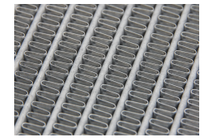
The chiller controls ensures the optimum efficiency across the whole operating range of the chiller and guarantees the chiller to work within the safe limits. To achieve the best possible efficiency for multi-compressor chillers, compressor management software constantly monitors the actual cooling demand and selects the most efficient combination of the compressors to match. The software regulates optimum rotation speed and compression ratio, positions the inlet guide vanes and controls bypass valves.

* compared to leading competitor screw chiller over an annual running in Central Europe region



Condensing coils

Highly efficient microchannel heat exchangers

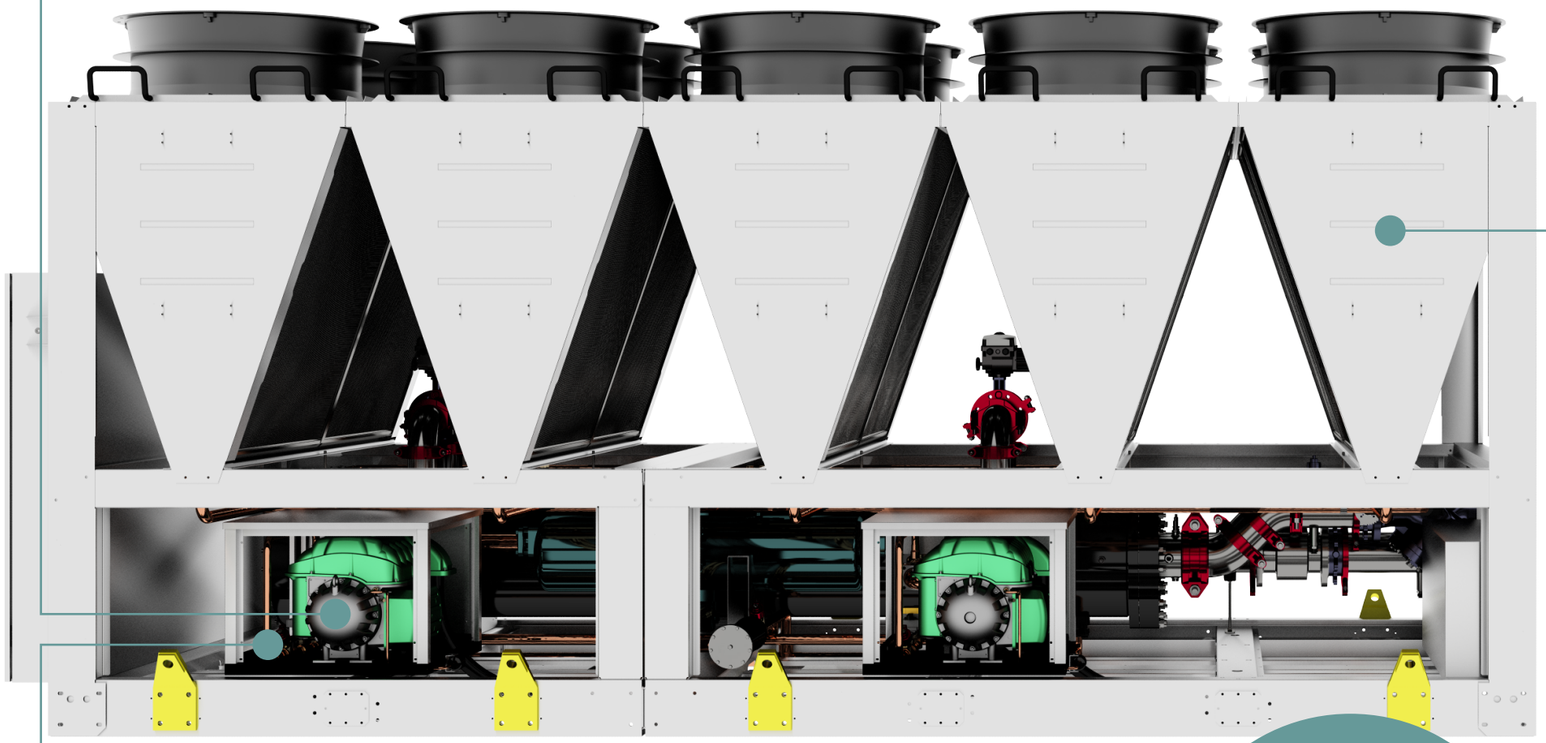


Microchannel condensers used in Lighstream Turbo design give a number of advantages, including higher heat transfer rate, low airside pressure drops, and closer approach temperatures. The end result is up to 40% higher energy efficiency in comparison to traditional fin/tube heat exchanger design.

Smaller coil face, thin design, up to 50% less weight, and less refrigerant charge translate to lower system cost*. Microchannel condensers used in Lightstream Turbo chillers are true HVAC coils developed and optimized especially for refrigeration applications and enable remarkable low condensing temperatures.

Based on all-aluminium construction, microchannel coils are subject to significantly less corrosion*, in that there are no dissimilar metals.

* compared to regular copper/aluminium finned tube coil designs



Economizer

Further improves compressor efficiency

Turbocor compressors use two-stage centrifugal compression technology: the first-stage impeller raises the pressure of the refrigerant vapor halfway from the suction pressure to the condenser pressure, and the second-stage impeller raises the pressure the rest of the way. This allows using an interstage economizer, which provides advantages of capacity and efficiency improvements of up to 10% as a result of further subcooling of the liquid refrigerant.

Lightstream Turbo chiller offers two types of economizer arrangements: subcooler – standard for compressors with an economizer port – or flash tank – available on request.

SEASONAL

5.94

EFFICIENCY

High-efficient solution

Extra condenser sections for H-series models

Lightstream Turbo H-series chillers feature extra condenser banks. This enables remarkable lower condensing temperatures and translates to 15% higher energy efficiency rates compared to standard Lightstream Turbo models.

A side advantage of using oversized condensers is a reduced fan rotation speed and, as a result, lower sound output.

Advanced fan system

EC-type fans with reduced power consumption

Lightstream Turbo's new generation fan system not only reduces power consumption by up to 30% while easily managing the extraordinary high volume flows – it also works at much reduced operating noise.

The smart fan system includes the unique fans with bionic wing concept, the most advanced EC motor technology, and multifunctional air diffusers, resulting in an extra economic efficiency for the customers.

EC motor technology does not provide savings only during full-load operation - it is exactly when operating under partial load that EC motors lose much less of their efficiency.

SAVINGS UP TO

25%

IN OPERATING COST

Intelligent controls

Centralized chilled water plant control

The controls of Lightstream Turbo chillers is a sophisticated controller with advanced software developed for efficient operation of air-cooled and free cooling chillers. It manages and optimizes the chiller's performance, giving the complete control over the system for plant operator.

Control software can be directly linked to the existing building management system. Integration with a BMS allows collecting and analyzing operating data of chilled water plant and helps to maintain optimal equipment settings, save energy, identifies trouble-prone areas, provides maintenance schedules and generate safety and security alarms.

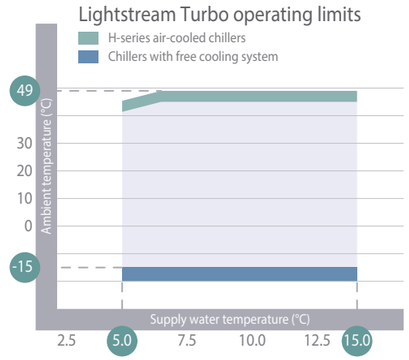
For the efficient operation of multiple units on a single chilled water plant, the sequencing software permits interlinked operation of the complete system, thus providing optimal temperature control and minimal energy consumption.

Future-proof solution

ErP 2021 COMPLIANT

Energy savings and environmental matters have been a significant concern during the past years, today more crucial than ever. In this context, the European Union introduced regulations for energy-related products, whose implementation takes place in several tiers.

EU Regulation 2016/2281 which came into effect on 01.01.2018, defines minimum energy efficiency rates for air conditioning and refrigeration equipment in European Union. Furthermore, more stringent limits will be set in 2021. Kaltra is already prepared for the future ErP (Energy-related products) regulations with its new future-proof chiller lineups, including Lightstream Turbo range which exceeds these requirements.



Free cooling system

Generates energy savings of up to 50%

The Lightstream Turbo chillers can supply water with fairly high temperatures, thus maximizing the amount of time the system can produce chilled water without running in mechanical cooling mode. When running in concurrent free cooling and mechanical cooling mode, the chiller keeps the condensing temperature within a certain range to allow the maximum fan airflow and achieve the most free cooling.

Compared to conventional air-cooled chillers, Lightstream Turbo equipped with free cooling system generates the energy savings of up to 50% and return the investments within a short timeframe.

Flooded evaporator

Optimized for close approach temperatures

The design of the Lightstream Turbo evaporators provides optimum system efficiency at both full and partial load operation. The tubes in flooded evaporator are fully immersed in liquid refrigerant and enable a smaller approach temperature between the refrigerant temperature in its shell and chilled water temperature in the tubes to be achieved.

With flooded evaporator, the compressors operate at higher saturated evaporation temperature and generate more cooling capacity with the same power input.

Eco-friendly gas

Low-GWP refrigerant option

The lineup of Lightstream Turbo chillers includes the models that use low-GWP, zero ozone depletion potential refrigerant R1234ze with the GWP value of 1. Hydrofluoro-olefin (HFO) based R1234ze refrigerant fulfills EU regulatory requirements for reducing the use of high global warming potential (GWP) substances. Its energy efficiency and capacity match those for R134a, while its environmental impact largely reduced.

With refrigerant R1234ze, Lightstream Turbo chiller is the environmentally-friendly leader of the range, while achieving the best energy performance levels for applications.

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Technical Specifications - R1234ze

Lightstream Turbo		T300	T350	T400	T500	T600	T700	T800	T900	T1000	T1200	T1400
S-series (air-cooled chillers)		F3/1	F3/1	F4/1	F5/1	F6/1	F7/1	F7/1	F8/1	F9/1	F11/1	F12/1
		S	S	S	S	S	S	S	S	S	S	S
Frame size		F3	F3	F4	F5	F6	F7	F7	F8	F9	F11	F12
Cooling capacity[1]	kW	280	340	430	550	680	755	830	960	1080	1285	1350
Energy efficiency (EER)	kW/kW	3.80	3.50	3.69	3.72	3.50	3.67	3.68	3.53	3.65	3.59	3.68
ESEER	kW/kW	4.92	5.46	4.89	5.28	5.70	5.08	5.16	5.77	5.12	5.60	5.94
Power input	kW	73.6	97.1	116.4	147.7	194.2	205.7	225.7	272.3	295.8	357.9	366.4
Absorbed current	A	123	160	193	244	323	342	372	450	489	592	606
Net weight	kg	3250	3300	4300	5370	6030	7460	7630	8380	9720	11030	11700
Compressors		Turbocor compressors										
Quantity		1	1	2	2	2	3	3	3	4	4	4
Power input	kW	60.0	83.5	98.3	125.0	167.0	174.0	194.0	236.0	255.0	308.0	312.0
Absorbed current	A	96.5	134.0	158.0	200.0	270.0	280.0	310.0	380.0	410.0	495.0	500.0
Fans		EC-motor axial fans										
Quantity		6	6	8	10	12	14	14	16	18	22	24
Airflow	m^3/h	156000	156000	208000	260000	312000	364000	364000	416000	468000	572000	624000
Power input	kW	13.6	13.6	18.1	22.7	27.2	31.7	31.7	36.3	40.8	49.9	54.4
Absorbed current	A	26.4	26.4	35.2	44.0	52.8	61.6	61.6	70.4	79.2	96.8	105.6
Evaporator		Flooded shell-and-tube										
Water flow	m^3/h	48	58	73	95	118	130	143	165	186	220	232
Water volume	L	44.5	44.5	57.0	85.2	85.2	146.0	146.0	146.0	276.5	276.5	276.5
Refrigeration circuits		R1234ze										
Quantity		1	1	1	1	1	1	1	1	1	1	1
Charge	kg	190	190	180	215	215	360	360	360	480	480	480

(1) Fluid: water 100%; Fluid inlet/outlet temperatures: 15/10°C; Ambient temperature: 35°C

Lightstream Turbo		T300	T400	T500	T600	T700	T800	T900	T1000	T1200
H-series (air-cooled chillers)		F4/1	F4/1	F5/1	F6/1	F8/1	F8/1	F10/1	F12/1	F12/1
		F4/1	F4/1	F5/1	F6/1	F8/1	F8/1	F10/1	F12/1	F12/1
Frame size		F4	F4	F5	F6	F8	F8	F10	F12	F12
Cooling capacity[1]	kW	425	545	650	745	815	945	1085	1260	1325
Free cooling capacity[2]	kW	430	540	645	750	775	890	1010	1210	1300
Energy efficiency (EER)	kW/kW	3.22	3.52	3.36	3.32	3.43	3.32	3.40	3.40	3.36
ESEER	kW/kW	4.62	5.08	5.52	4.84	5.12	5.52	5.07	5.43	5.60
Power input	kW	131.8	154.8	193.7	224.7	237.7	284.6	319.6	370.5	394.4
Absorbed current	A	215	254	317	368	388	462	521	605	643
Net weight	kg	4860	6070	6870	8460	8630	9520	11000	12590	13400
Compressors		Turbocor compressors								
Quantity		2	2	2	3	3	3	4	4	4
Power input	kW	112.0	130.0	164.0	190.0	203.0	245.0	275.0	316.0	335.0
Absorbed current	A	180.0	210.0	264.0	306.0	326.0	392.0	442.0	508.0	537.0
Fans		EC-motor axial fans								
Quantity		8	10	12	14	14	16	18	22	24
Airflow	m^3/h	190000	237500	285000	332500	332500	380000	427500	522500	570000
Power input	kW	19.8	24.8	29.7	34.7	34.7	39.6	44.6	54.5	59.4
Absorbed current	A	35.2	44.0	52.8	61.6	61.6	70.4	79.2	96.8	105.6
Evaporator		Flooded shell-and-tube								
Water flow	m^3/h	73	95	114	130	143	165	190	220	232
Water volume	L	57.0	85.2	85.2	146.0	146.0	146.0	276.5	276.5	276.5
Refrigeration circuits		R1234ze								
Quantity		1	1	1	1	1	1	1	1	1
Charge	kg	180	215	215	360	360	360	480	480	480

(1) Fluid: ethylene glycol 20%; Fluid inlet/outlet temperatures: 15/10°C; Ambient temperature: 35°C

(2) Ambient temperature: 1°C

Frame sizes

Frame size		F3	F4	F5	F6	F7	F8	F9	F11	F12
Length	mm	3825	4945	6065	7185	8305	9425	10545	12785	13905
Width	mm	2250	2250	2250	2250	2250	2250	2250	2250	2250
Height	mm	2375	2375	2375	2375	2375	2375	2375	2375	2375

Technical Specifications - R134a

Lightstream Turbo		T300	T350	T400	T500	T600	T700	T800	T900	T1000	T1100	T1200	T1300	T1500	T1600
S-series (air-cooled chillers)		F3/1	F3/1	F4/1	F4/1	F5/1	F6/1	F6/1	F7/1	F8/1	F8/1	F9/1	F10/1	F12/1	F12/1
		S	S	S	S	S	S	S	S	S	S	S	S	S	S
Frame size		F3	F3	F4	F4	F5	F6	F6	F7	F8	F8	F9	F10	F12	F12
Cooling capacity[1]	kW	300	370	410	520	610	680	790	870	930	1040	1150	1290	1490	1580
Energy efficiency (EER)	kW/kW	3.86	3.69	3.85	3.56	3.62	3.70	3.90	3.64	3.75	3.56	3.57	3.48	3.71	3.59
ESEER	kW/kW	4.95	5.38	5.10	5.32	5.39	5.30	5.88	5.18	5.62	5.42	5.32	5.65	5.56	5.58
Power input	kW	77.8	100.2	106.6	145.9	168.4	183.8	202.8	239.3	247.8	291.8	322.2	370.7	401.6	439.6
Absorbed current	A	125	162	173	236	273	299	329	389	402	472	522	600	652	714
Net weight	kg	2560	2630	3380	3660	4200	5060	5240	5750	6780	7070	7650	8020	9430	9540
Compressors		Turbocor compressors													
Quantity		1	1	2	2	2	2	3	3	3	4	4	3	4	4
Power input	kW	64.4	86.8	88.7	128.0	146.0	157.0	176.0	208.0	212.0	256.0	282.0	326.0	348.0	386.0
Absorbed current	A	102.0	139.0	142.0	205.0	234.0	252.0	282.0	334.0	340.0	410.0	452.0	522.0	558.0	620.0
Fans		AC-motor axial fans													
Quantity		6	6	8	8	10	12	12	14	16	16	18	20	24	24
Airflow	m^3/h	144000	144000	192000	192000	240000	288000	288000	336000	384000	384000	432000	480000	576000	576000
Power input	kW	13.4	13.4	17.9	17.9	22.4	26.8	26.8	31.3	35.8	35.8	40.2	44.7	53.6	53.6
Absorbed current	A	23.4	23.4	31.2	31.2	39.0	46.8	46.8	54.6	62.4	62.4	70.2	78.0	93.6	93.6
Evaporator		Flooded shell-and-tube													
Water flow	m^3/h	52	63	70	90	105	117	135	150	160	180	198	222	256	272
Water volume	L	47.0	60.0	60.0	84.0	84.0	84.0	125.0	125.0	198.0	253.0	253.0	253.0	300.0	300.0
Refrigeration circuits		R134a													
Quantity		1	1	1	1	1	1	1	1	1	1	1	1	1	1

(1) Fluid: water 100%; Fluid inlet/outlet temperatures: 15/10°C; Ambient temperature: 35°C

Lightstream Turbo		T400	T500	T600	T700	T800	T900	T1000	T1100	T1200	T1300	T1500	T1600
F-series (free cooling chillers)		F4/1	F4/1	F5/1	F6/1	F6/1	F7/1	F8/1	F8/1	F9/1	F10/1	F12/1	F12/1
		F	F	F	F	F	F	F	F	F	F	F	F
Frame size		F4	F4	F5	F6	F6	F7	F8	F8	F9	F10	F12	F12
Cooling capacity[1]	kW	400	510	600	715	770	855	930	1020	1125	1260	1455	1550
Free cooling capacity[2]	kW	420	460	560	675	690	790	855	915	1025	1140	1350	1380
Energy efficiency (EER)	kW/kW	3.70	3.46	3.52	3.38	3.75	3.53	3.71	3.46	3.45	3.36	3.53	3.49
ESEER	kW/kW	5.07	5.06	5.15	5.35	5.34	5.03	5.24	5.20	5.27	5.83	5.76	5.60
Power input	kW	108.2	147.5	170.4	211.3	205.3	242.1	251	295	325.9	374.8	412.5	444.5
Absorbed current	A	261	322	261	317	327	405	332	405	408	512	413	515
Net weight	kg	3780	4060	4700	5660	5840	6450	7580	7870	8550	9020	10630	10740
Compressors		Turbocor compressors											
Quantity		2	2	2	2	3	3	3	4	4	3	4	4
Power input	kW	88.7	128.0	146.0	182.0	176.0	208.0	212.0	256.0	282.0	326.0	354.0	386.0
Absorbed current	A	142.0	205.0	234.0	290.0	282.0	334.0	340.0	410.0	452.0	522.0	568.0	620.0
Fans		AC-motor axial fans											
Quantity		8	8	10	12	12	14	16	16	18	20	24	24
Airflow	m^3/h	170000	170000	212500	255000	255000	297500	340000	340000	382500	425000	510000	510000
Power input	kW	19.5	19.5	24.4	29.3	29.3	34.1	39.0	39.0	43.9	48.8	58.5	58.5
Absorbed current	A	31.2	31.2	39.0	46.8	46.8	54.6	62.4	62.4	70.2	78.0	93.6	93.6
Evaporator		Flooded shell-and-tube											
Water flow	m^3/h	72	92	107	128	138	153	163	183	201	226	260	277
Water volume	L	60.0	84.0	84.0	84.0	125.0	125.0	198.0	253.0	253.0	253.0	300.0	300.0
Refrigeration circuits		R134a											
Quantity		1	1	1	1	1	1	1	1	1	1	1	1

(1) Fluid: ethylene glycol 20%; Fluid inlet/outlet temperatures: 15/10°C; Ambient temperature: 35°C

(2) Ambient temperature: 1°C

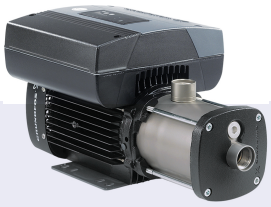
Frame sizes

Frame size		F3	F4	F5	F6	F7	F8	F9	F10	F12
Length	mm	3525	4645	5765	6885	8005	9125	10245	11365	13605
Width	mm	2250	2250	2250	2250	2250	2250	2250	2250	2250
Height	mm	2295	2295	2295	2295	2295	2295	2295	2295	2295

Technical Specifications - H-series

Lightstream Turbo		T300	T400	T500	T600	T700	T800	T900	T1000	T1200
H-series (air-cooled chillers)		F4/1	F4/1	F5/1	F6/1	F8/1	F8/1	F10/1	F12/1	F12/1
		F4/1	F4/1	F5/1	F6/1	F8/1	F8/1	F10/1	F12/1	F12/1
Frame size		F4	F4	F5	F6	F8	F8	F10	F12	F12
Cooling capacity[1]	kW	320	380	455	530	635	760	890	955	1140
Energy efficiency (EER)	kW/kW	4.30	3.83	3.94	4.12	4.27	3.84	3.99	4.28	3.84
ESEER	kW/kW	5.78	4.97	5.18	5.62	5.90	5.30	5.48	5.90	5.48
Power input	kW	74.4	100.0	115.5	128.6	148.8	197.8	223.0	223.2	297.2
Absorbed current	A	135	174	205	232	269	347	396	402	522
Net weight	kg	4150	4150	4915	6180	7710	7940	9720	11385	11385
Compressors		Turbocor compressors								
Quantity		1	1	1	2	2	2	2	3	3
Power input	kW	62.0	87.6	100.0	110.0	124.0	173.0	192.0	186.0	260.0
Absorbed current	A	99.5	139.0	161.0	179.0	199.0	277.0	308.0	296.0	416.0
Fans		EC-motor axial fans								
Quantity		8	8	10	12	16	16	20	24	24
Airflow	m^3/h	178000	178000	222500	276000	356000	356000	445000	534000	534000
Power input	kW	12.4	12.4	15.5	18.6	24.8	24.8	31.0	37.2	37.2
Absorbed current	A	35.2	35.2	44.0	52.8	70.4	70.4	88.0	105.6	105.6
Evaporator		Flooded shell-and-tube								
Water flow	m^3/h	55	65	78	92	110	130	153	164	196
Water volume	L	44.0	57.0	57.0	85.2	85.2	120.0	247.0	147.0	190.0
Refrigeration circuits		R134a								
Quantity		1	1	1	1	1	1	1	1	1

(1) Fluid: water 100%; Fluid inlet/outlet temperatures: 15/10°C; Ambient temperature: 35°C



Circulation pumps

Lightstream Turbo chillers can be equipped with factory-installed variable or fixed-speed pumps. The pumps feature reduced life-cycle costs, optimized efficiency, and high standard of corrosion protection thanks to cataphoretic coating. Variable-speed pumps have a broad performance range, which enables them to perform efficiently under widely varied conditions and to meet a wide range of requirements. Based on the required performance, customers may select from inline - single or twin - or end-suction pumps installed in soundproof enclosures.

Flow control

Chillers can be configured for constant or variable flow depending on a configuration of chilled water system. For the systems with a primary-only circuit, constant pressure differential or constant temperature differential flow control can be selected, while constant temperature differential control is available for primary/secondary systems. Flow control logic dynamically adjusts the pump speed based on the actual load, thus optimizing pump energy consumption and ensuring the stable operation of the chilled water plant.

Grooved connections

We use a piping system with grooved couplings because of its rigidity, flexibility, noise and vibration attenuation, and ease of installation and maintenance. The groove is made by cold forming or machining a groove into the end of a pipe. A gasket encompassed by the coupling housing is wrapped around the two grooved pipe ends, and the key sections of the coupling housing engage the grooves. The bolts and nuts are tightened with a socket wrench or impact wrench.

Frame sizes

Frame size		F4	F5	F6	F8	F10	F12
Length	mm	4945	6065	7185	9425	11665	13905
Width	mm	2250	2250	2250	2250	2250	2250
Height	mm	2375	2375	2375	2375	2375	2375

Package, options and accessories

Description	S-series R1234ze	S-series R134a	F-series R1234ze	F-series R134a	H-series R134a		S-series R1234ze	S-series R134a	F-series R1234ze	F-series R134a	H-series R134a
General											
Free cooling system	□	□	■	■	□	Anti-vibration supports	□	□	□	□	□
Low noise design	□	□	□	□	■	Anti-vibration springs	□	□	□	□	□
Ultra-low noise design					□	E-coated condenser coils	□	□	□	□	□
Soundproof compressor boxes	■	■	■	■	■	E-coated free cooling coils	□	□	□	□	□
Airside											
EC-type axial fans	■	□	■	□	■	Fan diffusers	□	□	□	□	□
AC-type axial fans	□	■	□	■	□	Soundproof air discharge plenum	□	□	□	□	□
Waterside											
Single pump w/ heater (opt.)	□	□				Grooved water connections	■	■	■	■	■
Dual pump w/ heater (opt.)	□	□				Flanged water connections	□	□	□	□	□
Flowmeter	□	□	□	□	□	2x 2-way freecooling valves			■	■	
External pump control	□	□	□	□	□	Automatic air vents	□	□	■	■	□
Refrigerant side											
Electronic expansion valves	■	■	■	■	■	Safety valves on high/low sides	■	■	■	■	■
Electronic bypass valve	■	■	■	■	■	Service valves on high/low sides	■	■	■	■	■
Thermal insulation	■	■	■	■	■	Gas leakage detection	■		■		
Pressure indication on high/low sides	■	■	■	■	■	High-efficient refrigerant filter	□		□		
Flooded-type evaporator	■	■	■	■	■	Evaporator immersion heater	□	□	□	□	□
Electric and controls											
BMS connectivity	■	■	■	■	■	Energy monitoring	□	□	□	□	□
SNMP connectivity	□	□	□	□	□	Sequence management	□	□	□	□	□
GSM connectivity	□	□	□	□	□	Electrical panel heater	□	□	□	□	□
Touch screen HMI	■	■	■	■	■	Remote monitoring software	□	□	□	□	□
Quick restart	□	□	□	□	□	Electrical panel lighting	□	□	□	□	□

■ Standard feature
□ Optional feature

Model identification

Lightstream Turbo **T 800 F 8 / 1 - FC - H - N - R134a**

Type of compressors	T	Turbocor oil-free compressor
Nominal cooling capacity		kW
Type of evaporator	F	Flooded-type
Condenser size		Number of V-banks
Number of refrigeration circuits		
Optional	FC	Free cooling system
Model specific info	S	Standard condenser (S-series)
	H	Enlarged condenser (H-series)
Noise level	N	Normal
	L	Low
	U	Ultra-low
Refrigerant type		ASHRAE number

TOTAL **165** MODELS

The development of Kaltra products and services is continuous and the information in this document may not be up to date. Please check the current position with Kaltra.