Chiller

SysFreeCool

Free-cooling module
Engineering Data Manual

100 to 550 kW

systemair

Key points

Free-cooling function is used when cooling operation is required in combination with low ambient temperature availability.

Two typical application are:

- Process cooling: need for cooling operation with constant load all year around, in example industrial process or server room temperature control
- Air conditioning: need for constant cooling operation due to high building internal loads (lights / people / indoor activity)

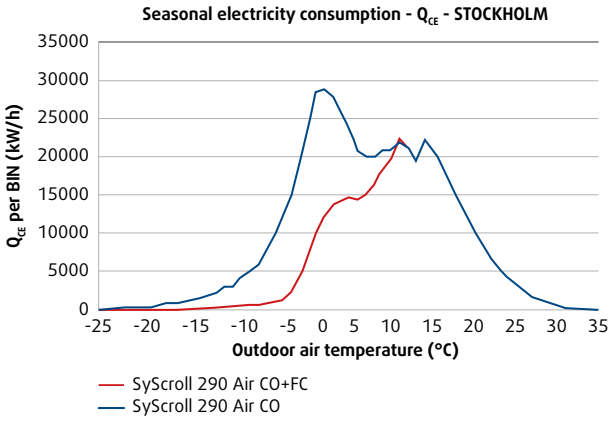
Three operating modes are possible:

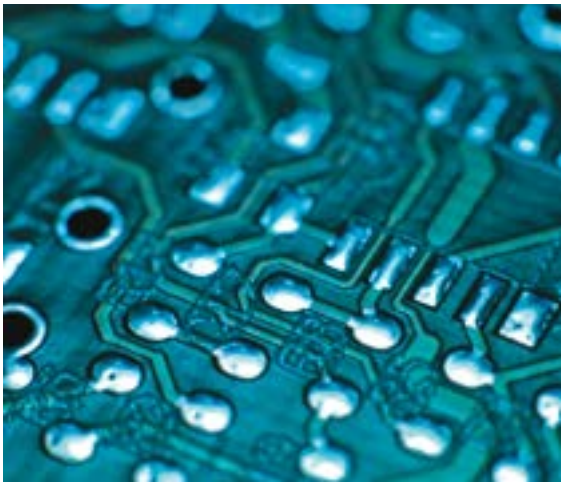
- No free cooling (Hot season): cooling capacity is totally covered by refrigerant cycle (chiller) because outdoor air temperature is higher than return water temperature. In this case free cooling coil is by-passed through 3-ways valve
- Partial free cooling (Intermediate season): cooling capacity is provided in part by free-cooling coil and in part by refrigerant cycle (chiller). 3-ways valve is fully open towards the coil, while chiller is operating in partial mode, since brine temperature exiting from free-cooling coil is higher than chiller water set-point
- Total free cooling (Cold season): cooling capacity is totally covered by free-cooling coil. 3-ways valve is fully open towards the coil, while chiller is in OFF, since brine temperature exiting from free-cooling coil is equal or lower than chiller water set-point

Main advantages of free-cooling module if compared to the standard integrated free-cooling solution are:

- Flexibility: thanks to the fact that the module is physically independent from the unit it is possible to choose the best size matching, according required free-cooling capacity and sound level
- Fan deck independency: there's no need to find a compromise between chiller and free-cooling fan deck management. In partial free-cooling operation, chiller fan deck is typically part loaded (due to low outdoor ambient temperature, unit part loaded operation and – as a consequence – low condensing pressure) while free-cooling fan deck has to run at max speed in order to catch the maximum available energy from outdoor environment, due to the limited difference between outdoor air temperature and return water temperature

Free-cooling technology allows significant energy saving, rapid investment pay-back and a remarkable CO_2 seasonal indirect production decrease.





Specifications

General
Free cooling option is developed in two versions:
- Slave: the module can be linked to a unit of the SyScroll range with structural and hydronic links. In this case the chiller and the free-cooling module will be delivered as a monoblock unit from factory
- Stand-alone: an independent module to be linked to Systemair existing air cooled range but also to existing units (already on field), acting as an intelligent pre-cooler

10 sizes are available, with a nominal[1] capacity range from 100 to 550 kW

Each module can be supplied with 2 acoustic options:
- Basic Low Noise (-): delta connected fan motors, controlled through fan speed controller
- Low Noise (L): star connected fan motors, controlled through fan speed controller

To increase their field of application, 2 additional versions are available:
- EC version: same equipment as the Basic version, but the units are fitted with brushless fan motors to ensure low energy consumption
- HPF (High Pressure Fans) version: same equipment as the Basic version, but the units are fitted with brushless fan motors providing external static pressure up to 120 Pa

Conformity with directives
- The following applies to all the sizes and versions:
- Machine Directive: 2006/42/EC
- Electromagnetic Compatibility Directive: 2004/108/EC
- Pressure Equipment Directive: 2014/68/EU

Cabinet and structure
Cabinet and structure are made of heavy gauge galvanized steel coated with polyester powder based painting (RAL 7040). All parts of the structure are totally fastened with non-corrosive screws and bolts.

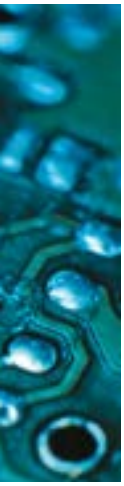
Air heat exchangers
Air heat exchangers are made of seamless copper tubes, arranged in staggered rows, mechanically expanded into corrugated aluminium fins.

Condenser fans
For each size and acoustic version, large diameter, direct drive axial type fans with asynchronous three-phase motors are used.
Dedicated fans with electronic brushless type motors are used in EC and HPF versions.
Fans are always equipped with externally mounted nozzle profile housing ensuring low sound levels.

Hydraulic circuit
Besides air heat exchangers, hydraulic circuit is including copper pipes to connect free-cooling coils to hydraulic manifolds, 3-way flow distribution valve, air vent and drain valves

Electrical board
Metal case, externally arranged at one end of the module, with IP44 protection rating, complete with grille for natural air ventilation.

[1] Data refers to 15 (°C) Return brine temperature, 10 (°C) Leaving brine temperature, 0 [°C] Outdoor air temperature; 30% ethylene glycol.



Control and safety devices

Each module is fitted with the following devices

Safety:

- Power disconnect switch with an emergency stop function
- Antifreeze temperature sensor, set to +4 (°C)
- Safety valve, set to 6 (bar)

Control:

- Return brine temperature probe
- Leaving brine temperature probe
- Outdoor air temperature probe

Electronic control

A dedicated controller is provided both on Slave and Stand-alone versions, providing following functions:

- Management of fan motors
- Management of 3-ways valve
- Return brine temperature set-point setting
- Antifreeze protection
- Management of external interlocks
- Remote ON/OFF
- Remote alarm signalling

The controller can also clearly show all control parameters through a liquid crystal display, such as:

- Return brine temperature
- Leaving brine temperature
- Outdoor air temperature
- Brine set-point
- Display of the various alarm and operation status:
  - flow switch signal for lack of water
  - fan motors thermal protection
  - faulty sensors

Standard equipment

- Set point timer/clock card
- Fan speed control
- Sequence phase control
- Control circuit transformer 400 V/230 V
- Power supply without neutral
- Hour meter
- Main switch
- Insulated cover for actuator

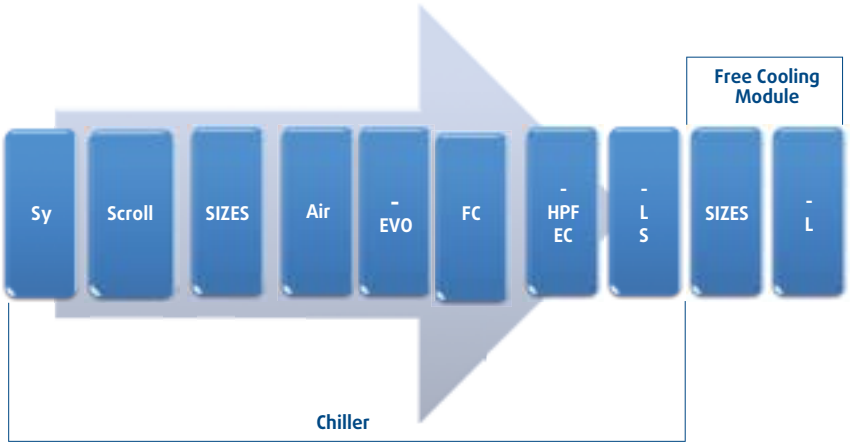
Factory-installed options

- ModBus protocol kit for BMS
- Automatic circuit breaker
- E-coating for AL/CU fins
- Coils with copper fins
- Coil grilles
- Free-cooling grilles
- High static pressure fan motors - HPF Version
- Brushless fan motors – EC Version

Field-installed accessories

- Remote ON/OFF control
- Remote keyboard panel
- Spring anti-vibration
- Water filter

Nomenclature



In case of Slave version, unit nomenclature will characterize free-cooling module, though FC suffix, two numbers describing number of V modules and number of coil rows

Example:

SyScroll 200 Air EVO CO L to be matched with free-cooling module with 2 V modules and 4 rows coil, with EC fan motors in low noise execution

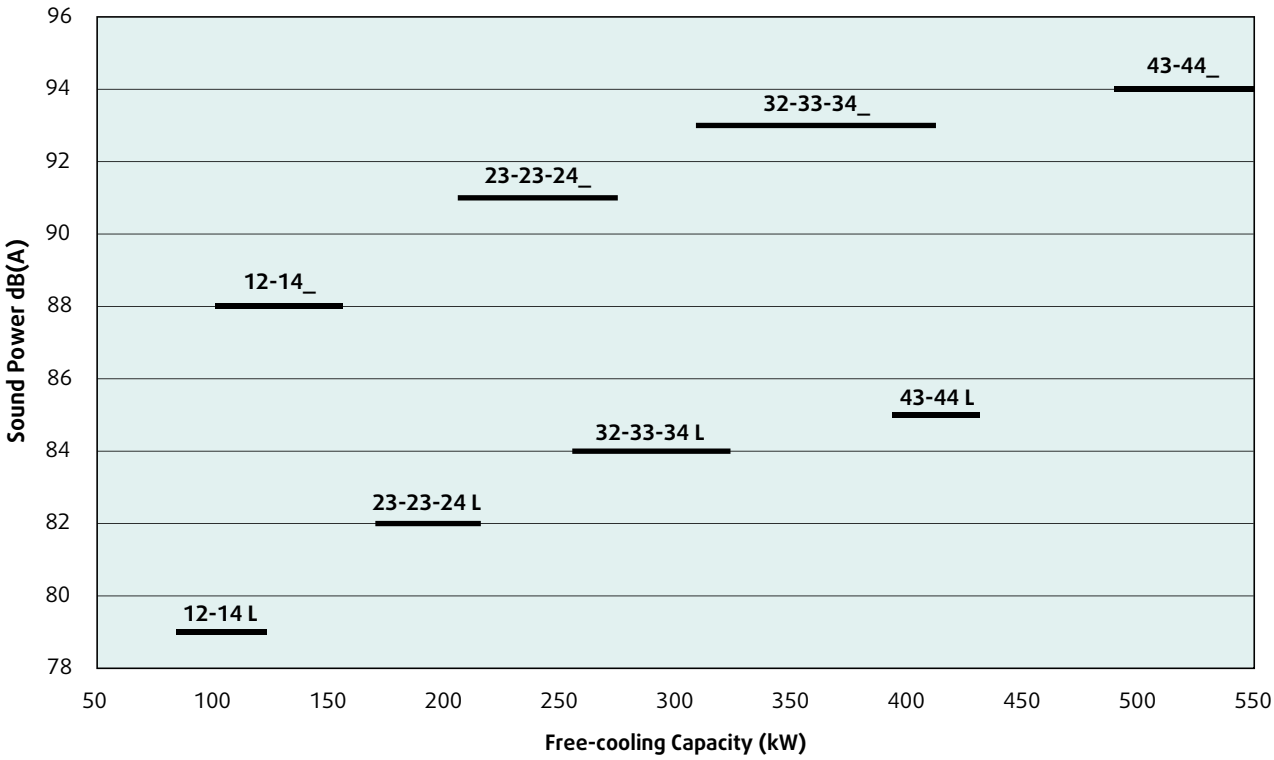
Unit nomenclature: **SyScroll 200 Air EVO FC EC L 24 L**

In case of Stand-alone version, unit nomenclature will be dedicated (SysFreeCool) and also in this case two numbers will describe number of V modules and number of coil rows, plus additional suffix will describe noise level

Example:

Free-cooling module with 4 V modules and 3 rows coil, in low noise execution

Unit nomenclature: **SysFreeCool 43 L**



In case a Stand Alone module is selected, compatibility between module and chiller unit to be matched is defined by allowed flow rate range (refer to technical data).

Configuration

Following modules are available in order to cover a wide capacity range:

- 1V: equipped with two coils and two fan motors
- 2V: equipped with four coils and four fan motors
- 3V: equipped with six coils and six fan motors
- 4V: equipped with eight coils and eight fan motors

Each module is be available in further versions, according coil row number, sound level emission

Following table is summarizing allowed combination between free-cooling modules and SyScroll Air range.
The table is valid for Slave version

SyScroll Air CO			Free-cooling module			SyScroll Air FC
Assembly view	Size		Assembly view	Size		Assembly view
	240 270 290 320	+		23 24 32	=	
	360 420			33 34		
	470 540			33 34		
	590 660			43 44		

SyScroll Air EVO CO			Free-cooling module			SyScroll Air EVO FC
Assembly view	Size		Assembly view	Size		Assembly view
	200	+		22	=	
	230 260 280			23 24 32		
	300 330 360			23 24		

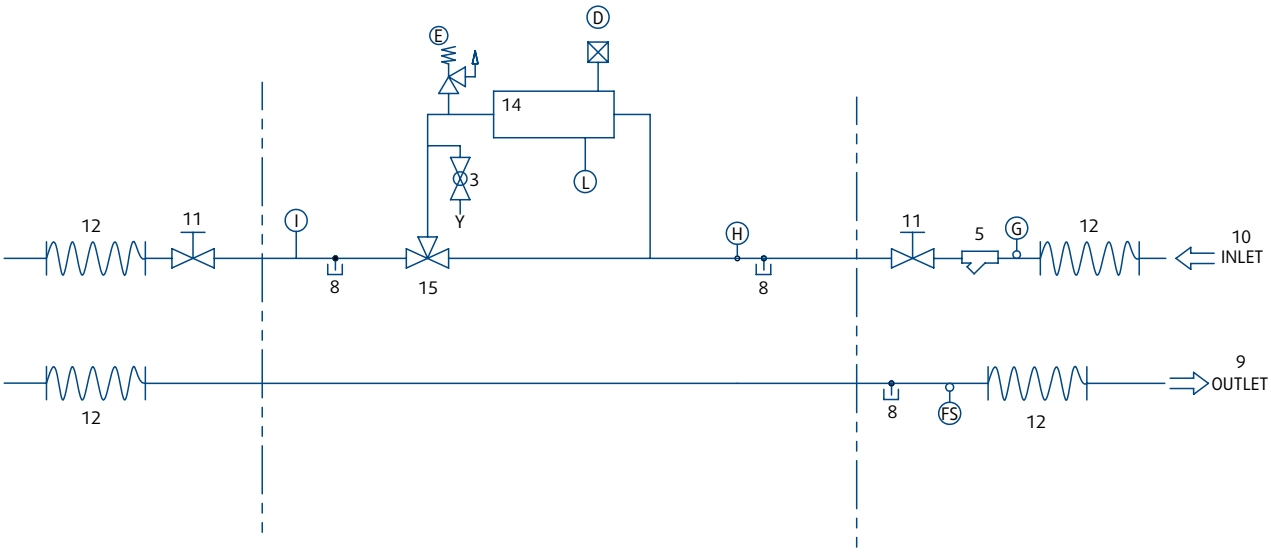
Following picture is showing cooling capacity field where it is possible to have stand-alone, slave or both configuration

V	VV	VVV	VVVV
Stand-alone	Slave / Stand-alone		
			

85				200				300			400		550

Cooling Capacity (kW)

Hydraulic Diagram - Stand alone



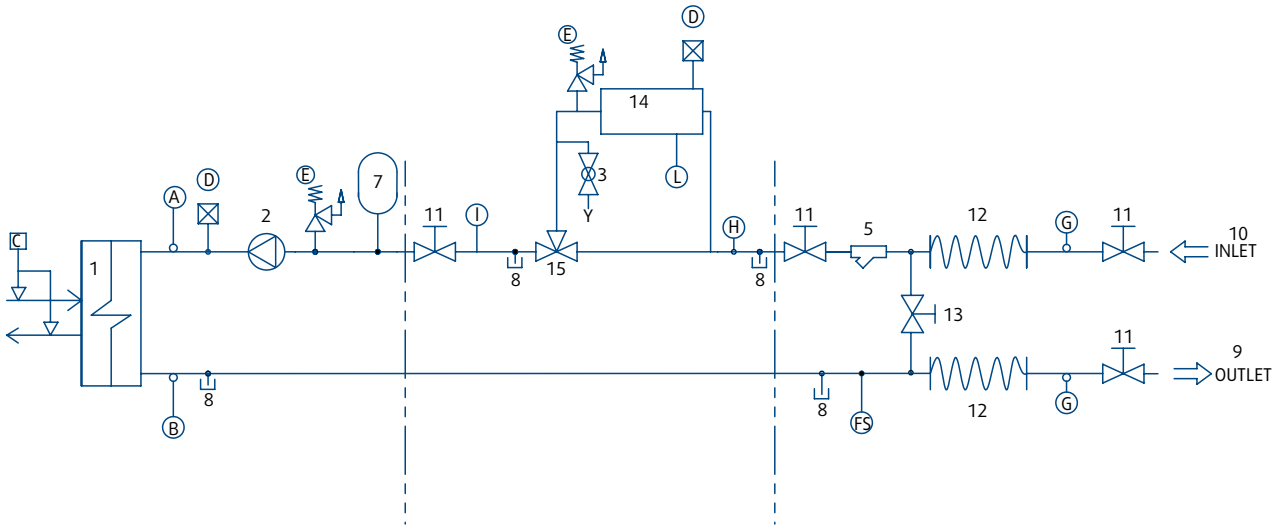
COMPONENTS

1 Plate heat exchanger
2 Pump
3 Draining valve
4 Water buffer tank
5 Water filter
6 Non-return valve
7 Pressure expansion tank
8 Pressure point/drainage
9 Water outlet
10 Water inlet
11 Globe valve
12 Flexible pipes
13 By pass valve
14 Free cooling coils
15 3 way valve

SAFETY/CONTROL DEVICES

A Inlet water temperature sensor chiller
B Outlet water temperature sensor chiller
C Water differential pressure switch
D Vent valve
E Water safety valve (6 bar)
FS Flow switch
G Thermometer
H Inlet water temperature sensor free cooling
I Outlet water temperature sensor free cooling
L Air temperature sensor free cooling

Hydraulic Diagram - Slave: 1P



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G Thermometer
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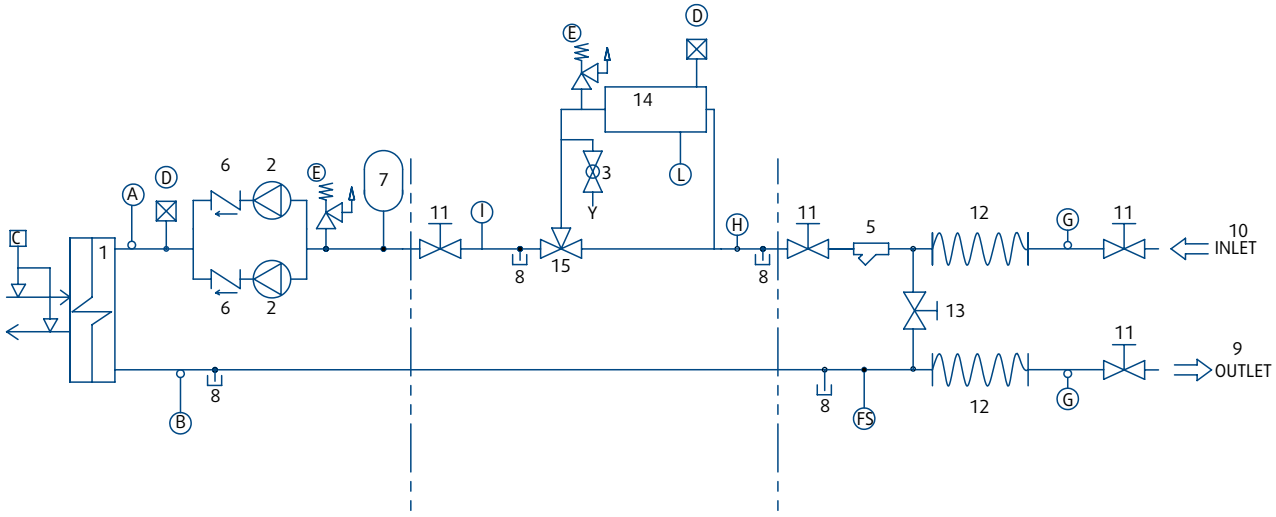
I Outlet water temperature sensor free cooling
L Air temperature sensor free cooling

Hydraulic Diagram - Slave: 2P



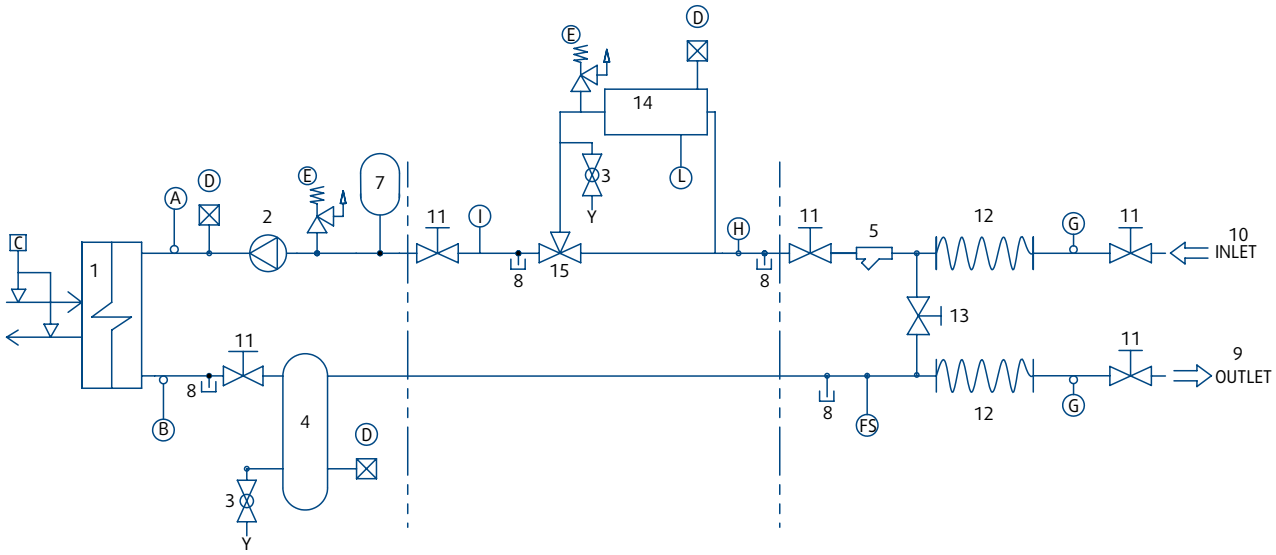
COMPONENTS

1	Plate heat exchanger
2	Pump
3	Draining valve
4	Water buffer tank
5	Water filter
6	Non-return valve
7	Pressure expansion tank
8	Pressure point/drainage
9	Water outlet
10	Water inlet
11	Globe valve
12	Flexible pipes
13	By pass valve
14	Free cooling coils
15	3 way valve

SAFETY/CONTROL DEVICES

A	Inlet water temperature sensor chiller
B	Outlet water temperature sensor chiller
C	Water differential pressure switch
D	Vent valve
E	Water safety valve (6 bar)
FS	Flow switch
G	Thermometer
H	Inlet water temperature sensor free cooling
I	Outlet water temperature sensor free cooling
L	Air temperature sensor free cooling

Hydraulic Diagram - Slave: 1P+T



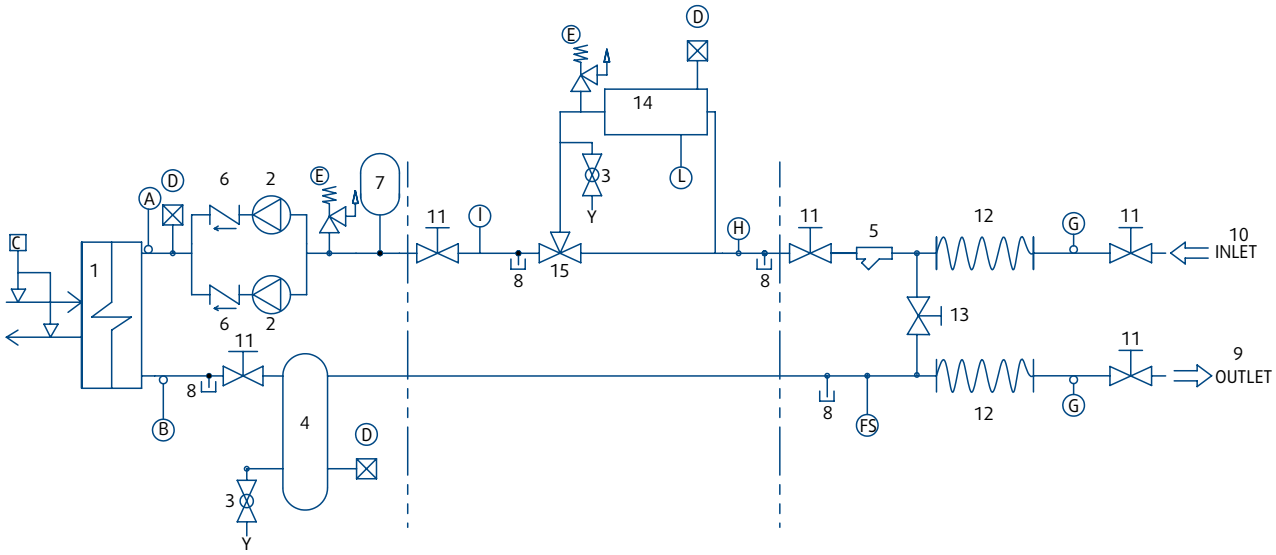
COMPONENTS

1	Plate heat exchanger
2	Pump
3	Draining valve
4	Water buffer tank
5	Water filter
6	Non-return valve
7	Pressure expansion tank
8	Pressure point/drainage
9	Water outlet
10	Water inlet
11	Globe valve
12	Flexible pipes
13	By pass valve
14	Free cooling coils
15	3 way valve

SAFETY/CONTROL DEVICES

A	Inlet water temperature sensor chiller
B	Outlet water temperature sensor chiller
C	Water differential pressure switch
D	Vent valve
E	Water safety valve (6 bar)
FS	Flow switch
G	Thermometer
H	Inlet water temperature sensor free cooling
I	Outlet water temperature sensor free cooling
L	Air temperature sensor free cooling

Hydraulic Diagram - Slave: 2P+T



COMPONENTS

1	Plate heat exchanger
2	Pump
3	Draining valve
4	Water buffer tank
5	Water filter
6	Non-return valve
7	Pressure expansion tank
8	Pressure point/drainage
9	Water outlet
10	Water inlet
11	Globe valve
12	Flexible pipes
13	By pass valve
14	Free cooling coils
15	3 way valve

SAFETY/CONTROL DEVICES

A	Inlet water temperature sensor chiller
B	Outlet water temperature sensor chiller
C	Water differential pressure switch
D	Vent valve
E	Water safety valve (6 bar)
FS	Flow switch
G	Thermometer
H	Inlet water temperature sensor free cooling
I	Outlet water temperature sensor free cooling
L	Air temperature sensor free cooling

Operating Limits*

SysFreeCool				12	14	22	23	24	32	33	34	43	44
Brine	Minimum temperature[1]		°C	-10									
	Maximum operating pressure		bar	6									
				Min./Max.									
Ambient	Outdoor air temperature		°C	-20 to +50									
	External static pressure	Standard fans	Pa	0									
		High pressure fans	Pa	< 120									
Power supply voltage[2]			V	400 V, 3 Ø, 50 Hz (nominal)									

* Operating limits refer to free-cooling module. Concerning chiller to be matched to free-cooling module, operating limit can be found inside chiller engineering data manual.
[1] Liquid with appropriate % of glycol.
[2] Voltage 400V +/- 10%.

Physical Data - SysFreeCool_ - (STD -HPF)

Model		12	14	22	23	24
Nominal capacity[1]	kW	101	156	206	245	275
Nominal Water Flow	m³/h	19,0	29,4	38,7	46,0	51,7
Total pressure drop[1]	kPa	44	83	74	43	49
Fans						
Number of fans		2	2	4	4	4
Nominal speed	rpm	900	900	900	900	900
Total airflow	m³/h	45.400	41.000	90.000	85.200	80.400
Total input power	kW	4,2	4,2	8,4	8,4	8,4
Total input power*	kW	6,2	6,2	12,4	12,4	12,4
Water Connections						
Type				Male GAS Threaded		
Inlet Diameter	inch	2" 1/2	2" 1/2	2" 1/2	3"	3"
Outlet Diameter	inch	2" 1/2	2" 1/2	2" 1/2	3"	3"
Water Flow Range						
Min water flow	m³/h	11,1	12,5	17,4	27,2	28,7
Max water flow	m³/h	30,0	33,8	47,2	73,6	77,8
Weight						
Shipping	kg	624	664	912	965	1.005
Operating	kg	669	733	1.002	1.075	1.139
Dimensions						
Length	mm		2.146		2.124	
Width	mm		1.097		2.146	
Height	mm		2.519		2.519	
Acoustical data						
Sound power level[2]	dB(A)	88	88	91	91	91
Sound pressure level at 10 m[3]	dB(A)	56	56	59	59	59

[1] Data refers to 15 (°C) return brine temperature, 10 (°C) leaving brine temperature, 0 (°C) outdoor air temperature; 30% EG.
[2] Sound levels are at fully loaded conditions. Sound power level values refer to ISO standard 3744.
[3] Sound pressure levels refer to ISO Standard 3744, parallelepiped shape.
* HPF version.

Model		32	33	34	43	44
Nominal capacity[1]	kW	309	367	413	490	550
Nominal Water Flow	m³/h	58,0	69,0	77,5	92,0	103,4
Total pressure drop[1]	kPa	70	51	57	43	49
Fans						
Number of fans		6	6	6	8	8
Nominal speed	rpm	900	900	900	900	900
Total airflow	m³/h	135.000	127.800	120.600	170.400	160.800
Total input power	kW	12,6	12,6	12,6	16,8	16,8
Total input power*	kW	18,6	18,6	18,6	24,8	24,8
Water Connections						
Type		Male GAS Threaded		Victaulic		
Inlet Diameter	inch	3″	4″	4″	5″	5″
Outlet Diameter	inch	3″	4″	4″	5″	5″
Water Flow Range						
Min water flow	m³/h	26,8	37,5	39,7	54,3	57,5
Max water flow	m³/h	72,6	101,6	107,4	147,2	155,6
Weight						
Shipping	kg	1.336	1.404	1.464	1.800	1.880
Operating	kg	1.466	1.574	1.670	2.070	2.198
Dimensions						
Length	mm		3.176		4.228	
Width	mm		2.146		2.146	
Height	mm		2.519		2.519	
Acoustical data						
Sound power level[2]	dB(A)	93	93	93	94	94
Sound pressure level at 10 m[3]	dB(A)	61	61	61	62	62

[1] Data refers to 15 (°C) return brine temperature, 10 (°C) leaving brine temperature, 0 (°C) outdoor air temperature; 30% EG.
[2] Sound levels are at fully loaded conditions. Sound power level values refer to ISO standard 3744.
[3] Sound pressure levels refer to ISO Standard 3744, parallelepiped shape.
* HPF version.

Physical Data - SysFreeCool_L - (STD)

Model		12	14	22	23	24
Nominal capacity[1]	kW	84,4	123,5	170,3	197,0	215,9
Nominal Water Flow	m³/h	15,9	23,2	32,0	37,0	40,6
Total pressure drop[1]	kPa	31	52	50	28	30
Fans						
Number of fans		2	2	4	4	4
Nominal speed	rpm	700	700	700	700	700
Total airflow	m³/h	34.000	30.000	66.400	62.000	58.000
Total input power	kW	2,3	2,3	4,6	4,6	4,6
Water Connections						
Type				Male GAS Threaded		
Inlet Diameter	inch	2" 1/2	2" 1/2	2" 1/2	3"	3"
Outlet Diameter	inch	2" 1/2	2" 1/2	2" 1/2	3"	3"
Water Flow Range						
Min water flow	m³/h	11,1	12,5	17,4	27,2	28,7
Max water flow	m³/h	30,0	33,8	47,2	73,6	77,8
Weight						
Shipping	kg	624	664	912	965	1.005
Operating	kg	669	733	1.002	1.075	1.139
Dimensions						
Length	mm	2.146			2.124	
Width	mm	1.097			2.146	
Height	mm	2.519			2.519	
Acoustical data						
Sound power level[2]	dB(A)	79	79	82	82	82
Sound pressure level at 10 m[3]	dB(A)	47	47	50	50	50

[1] Data refers to 15 (°C) return brine temperature, 10 (°C) leaving brine temperature, 0 (°C) outdoor air temperature; 30% EG.
[2] Sound levels are at fully loaded conditions. Sound power level values refer to ISO standard 3744.
[3] Sound pressure levels refer to ISO Standard 3744, parallelepiped shape.

Model		32	33	34	43	44
Nominal capacity[1]	kW	255,4	295,5	323,8	394,0	431,8
Nominal Water Flow	m³/h	48,0	55,5	60,8	74,0	81,1
Total pressure drop[1]	kPa	48	33	35	28	30
Fans						
Number of fans		6	6	6	8	8
Nominal speed	rpm	700	700	700	700	700
Total airflow	m³/h	99.600	93.000	87.000	124.000	116.000
Total input power	kW	6,9	6,9	6,9	9,2	9,2
Water Connections						
Type		Male GAS Threaded		Victaulic		
Inlet Diameter	inch	3″	4″	4″	5″	5″
Outlet Diameter	inch	3″	4″	4″	5″	5″
Water Flow Range						
Min water flow	m³/h	26,8	37,5	39,7	54,3	57,5
Max water flow	m³/h	72,6	101,6	107,4	147,2	155,6
Weight						
Shipping	kg	1.336	1.404	1.464	1.800	1.880
Operating	kg	1.466	1.574	1.670	2.070	2.198
Dimensions						
Length	mm		3.176		4.228	
Width	mm		2.146		2.146	
Height	mm		2.519		2.519	
Acoustical data						
Sound power level[2]	dB(A)	84	84	84	85	85
Sound pressure level at 10 m[3]	dB(A)	52	52	52	53	53

[1] Data refers to 15 (°C) return brine temperature, 10 (°C) leaving brine temperature, 0 (°C) outdoor air temperature; 30% EG.
[2] Sound levels are at fully loaded conditions. Sound power level values refer to ISO standard 3744.
[3] Sound pressure levels refer to ISO Standard 3744, parallelepiped shape.

Electrical data

Fans electrical data @ 400V/3/50Hz

Unit _	Standard AC fans 080 6 poles 400V-3-50		
Size	Number	Nominal power (kW) Δ	Max. running current (A) Δ
12-14	2	2,1	4,1
22-23-24	4	2,1	4,1
32-33-34	6	2,1	4,1
43-44	8	2,1	4,1

Unit L	Standard AC fans 080 6 poles 400V-3-50		
Size	Number	Nominal power (kW) Y	Max. running current (A) Y
12-14	2	1,15	2,2
22-23-24	4	1,15	2,2
32-33-34	6	1,15	2,2
43-44	8	1,15	2,2

Unit HPF/EC	EC fans 080 400V-3-50		
Size	Number	Nominal power (kW)	Max. running current (A)
12-14	2	3,1	4,8
22-23-24	4	3,1	4,8
32-33-34	6	3,1	4,8
43-44	8	3,1	4,8

Total electrical data @ 400V/3/50Hz

Unit _			12-14	22-23-24	32-33-34	43-44
Current input	Nominal	A	8,2	16,4	24,6	32,8
	Maximum	A	8,2	16,4	24,6	32,8
Power input	Nominal	kW	4,2	8,4	12,6	16,8
	Maximum	kW	4,2	8,4	12,6	16,8
Max Start-up current		A	8,2	16,4	24,6	32,8
Unit (aM) fuses		A	16	25	40	50
Phase wire section		mm^2	6	6	16	16

Unit L			12-14	22-23-24	32-33-34	43-44
Current input	Nominal	A	4,4	8,8	13,2	17,6
	Maximum	A	4,4	8,8	13,2	17,6
Power input	Nominal	kW	2,3	4,6	6,9	9,2
	Maximum	kW	2,3	4,6	6,9	9,2
Max Start-up current		A	4,4	8,8	13,2	17,6
Unit (aM) fuses		A	16	25	40	50
Phase wire section		mm^2	6	6	16	16

Unit HPF/EC			12-14	22-23-24	32-33-34	43-44
Current input	Nominal	A	9,6	19,2	28,8	38,4
	Maximum	A	9,6	19,2	28,8	38,4
Power input	Nominal	kW	6,2	12,4	18,6	24,8
	Maximum	kW	6,2	12,4	18,6	24,8
Max Start-up current		A	9,6	19,2	28,8	38,4
Unit (aM) fuses		A	16	25	40	50
Phase wire section		mm^2	6	6	16	16

Sound Data

Model	Frequency (Hz)								Sound Power dB(A)	Sound Pressure dB(A)*
	63	125	250	500	1000	2000	4000	8000		
_										
12	97	91	88	84	85	79	71	65	88	56
14	98	91	87	85	84	80	72	65	88	56
22	103	93	90	86	87	81	74	67	91	59
23	104	93	90	87	87	82	73	66	91	59
24	105	92	91	87	86	82	74	66	91	59
32	106	95	93	88	89	82	75	67	93	61
33	107	95	93	88	89	83	76	68	93	61
34	109	96	93	88	90	82	75	68	93	61
43	110	97	95	89	91	83	78	70	94	62
44	111	97	94	88	90	82	77	68	94	62
L										
12	85	79	76	76	75	69	62	55	79	47
14	86	79	77	75	75	70	63	55	79	47
22	88	81	80	79	79	73	65	58	82	50
23	89	82	79	79	79	74	66	58	82	50
24	90	82	80	78	79	74	67	59	82	50
32	94	85	82	79	80	76	69	61	84	52
33	94	84	82	80	81	76	70	62	84	52
34	95	84	83	80	80	75	69	62	84	52
43	97	85	85	81	81	77	70	64	85	53
44	98	85	85	82	81	76	70	65	85	53

* Sound pressure level at 10 m. Values refers to ISO Standard 3744 with parallepiped shape.
* Sound data valid in max air flow rate condition.

Free-cooling Capacities - SysFreeCool_ - (STD -HPF)

Model	LWT °C	Outdoor Air Temperature °C													
		10		7		5		2		0		-2		-5	
		Cool	LWT	Cool	LWT	Cool	LWT	Cool	LWT	Cool	LWT	Cool	LWT	Cool	LWT
		kW	°C	kW	°C	kW	°C	kW	°C	kW	°C	kW	°C	kW	°C
12	15	34,0	13,3	54,2	12,3	67,6	11,7	87,8	10,7	101,2	10,0	114,7	9,3	134,8	8,3
	12	13,1	11,4	33,3	10,4	46,7	9,7	66,9	8,7	80,3	8,0	93,7	7,4	113,9	6,4
	10			19,3	9,0	32,8	8,4	52,9	7,4	66,4	6,7	79,8	6,1	100,0	5,1
	7					11,8	6,4	32,0	5,4	45,4	4,8	58,9	4,1	79,0	3,1
	5							18,1	4,1	31,5	3,4	44,9	2,8	65,1	1,8
14	15	52,3	13,3	83,5	12,3	104,3	11,7	135,5	10,7	156,2	10,0	177,0	9,4	208,2	8,4
	12	20,7	11,3	51,8	10,3	72,6	9,7	103,8	8,7	124,6	8,0	145,4	7,4	176,6	6,4
	10			30,8	9,0	51,6	8,4	82,7	7,4	103,5	6,7	124,3	6,0	155,5	5,0
	7					19,9	6,4	51,1	5,4	71,9	4,7	92,7	4,0	123,9	3,0
	5							30,0	4,0	50,8	3,4	71,6	2,7	102,8	1,7
22	15	69,5	13,3	110,4	12,3	137,7	11,7	178,6	10,7	205,9	10,0	233,2	9,3	274,1	8,3
	12	27,0	11,3	67,9	10,3	95,2	9,7	136,1	8,7	163,4	8,0	190,7	7,4	231,6	6,4
	10			39,6	9,0	66,9	8,4	107,8	7,4	135,1	6,7	162,4	6,1	203,3	5,1
	7					24,4	6,4	65,3	5,4	92,6	4,8	119,9	4,1	160,8	3,1
	5							37,0	4,1	64,2	3,4	91,5	2,8	132,4	1,8
23	15	81,1	13,3	130,2	12,3	163,0	11,7	212,1	10,7	244,9	10,0	277,6	9,3	326,8	8,3
	12	30,4	11,4	79,5	10,4	112,3	9,7	161,4	8,7	194,2	8,0	227,0	7,4	276,1	6,4
	10			45,8	9,1	78,5	8,4	127,7	7,4	160,4	6,7	193,2	6,0	242,3	5,0
	7					27,9	6,4	77,0	5,4	109,8	4,8	142,5	4,1	191,7	3,1
	5							43,3	4,1	76,0	3,4	108,8	2,8	157,9	1,8
24	15	90,3	13,4	145,7	12,3	182,7	11,7	238,1	10,7	275,1	10,0	312,1	9,3	367,5	8,3
	12	33,3	11,4	88,8	10,4	125,7	9,7	181,2	8,7	218,1	8,0	255,1	7,4	310,5	6,3
	10			50,8	9,1	87,8	8,4	143,2	7,4	180,2	6,7	217,1	6,0	272,6	5,0
	7					30,8	6,4	86,3	5,4	123,2	4,8	160,2	4,1	215,6	3,1
	5							48,3	4,1	85,3	3,4	122,2	2,8	177,7	1,8
32	15	104,3	13,3	165,7	12,3	206,6	11,7	268,0	10,7	308,9	10,0	349,8	9,3	411,2	8,3
	12	40,5	11,3	101,9	10,3	142,8	9,7	204,2	8,7	245,1	8,0	286,0	7,4	347,4	6,4
	10			59,4	9,0	100,3	8,4	161,7	7,4	202,6	6,7	243,5	6,1	304,9	5,1
	7					36,6	6,4	97,9	5,4	138,9	4,8	179,8	4,1	241,2	3,1
	5							55,4	4,1	96,4	3,4	137,3	2,8	198,7	1,8
33	15	121,6	13,3	195,3	12,3	244,4	11,7	318,2	10,7	367,3	10,0	416,4	9,3	490,1	8,3
	12	45,6	11,4	119,3	10,4	168,5	9,7	242,2	8,7	291,3	8,0	340,5	7,4	414,2	6,4
	10			68,7	9,1	117,8	8,4	191,5	7,4	240,7	6,7	289,8	6,0	363,5	5,0
	7					41,8	6,4	115,5	5,4	164,7	4,8	213,8	4,1	287,5	3,1
	5							64,9	4,1	114,0	3,4	163,2	2,8	236,9	1,8
34	15	135,5	13,4	218,6	12,3	274,1	11,7	357,2	10,7	412,7	10,0	468,1	9,3	551,3	8,3
	12	50,0	11,4	133,2	10,4	188,6	9,7	271,8	8,7	327,2	8,0	382,7	7,4	465,8	6,3
	10			76,2	9,1	131,7	8,4	214,8	7,4	270,3	6,7	325,7	6,0	408,9	5,0
	7					46,2	6,4	129,4	5,4	184,8	4,8	240,3	4,1	323,4	3,1
	5							72,5	4,1	127,9	3,4	183,3	2,8	266,5	1,8
43	15	162,1	13,3	260,4	12,3	325,9	11,7	424,2	10,7	489,7	10,0	555,2	9,3	653,5	8,3
	12	60,8	11,4	159,1	10,4	224,6	9,7	322,9	8,7	388,4	8,0	453,9	7,4	552,2	6,4
	10			91,6	9,1	157,1	8,4	255,4	7,4	320,9	6,7	386,4	6,0	484,7	5,0
	7					55,8	6,4	154,1	5,4	219,6	4,8	285,1	4,1	383,4	3,1
	5							86,5	4,1	152,0	3,4	217,6	2,8	315,8	1,8
44	15	180,6	13,4	291,5	12,3	365,4	11,7	476,3	10,7	550,2	10,0	624,1	9,3	735,0	8,3
	12	66,7	11,4	177,6	10,4	251,5	9,7	362,4	8,7	436,3	8,0	510,2	7,4	621,1	6,3
	10			101,6	9,1	175,6	8,4	286,4	7,4	360,4	6,7	434,3	6,0	545,2	5,0
	7					61,7	6,4	172,5	5,4	246,5	4,8	320,4	4,1	431,3	3,1
	5							96,6	4,1	170,5	3,4	244,4	2,8	355,3	1,8

Data are provided considering nominal water flow for each module, calculated with 15-10°C inlet/outlet, free cooling water temperature and 0°C outdoor air temperature and 30% Gly.Eth.

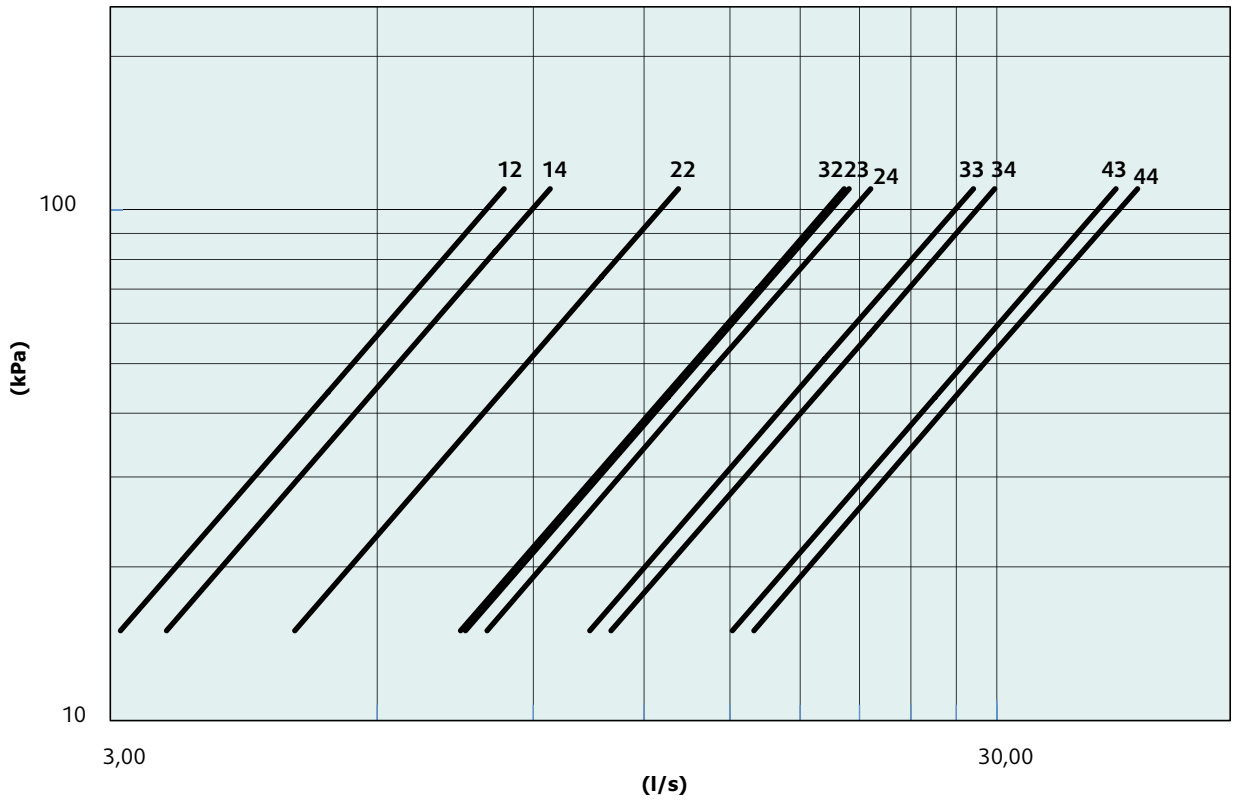
Free-cooling Capacities – SysFreeCool L - (STD)

Model	LWT °C	Outdoor Air Temperature °C													
		10		7		5		2		0		-2		-5	
		Cool	LWT	Cool	LWT	Cool	LWT	Cool	LWT	Cool	LWT	Cool	LWT	Cool	LWT
		kW	°C	kW	°C	kW	°C	kW	°C	kW	°C	kW	°C	kW	°C
12	15	27,7	13,4	44,7	12,3	56,1	11,7	73,1	10,7	84,4	10,0	95,8	9,3	112,8	8,3
	12	10,2	11,4	27,2	10,4	38,6	9,7	55,6	8,7	66,9	8,0	78,2	7,4	95,3	6,4
	10			15,5	9,1	26,9	8,4	43,9	7,4	55,2	6,7	66,6	6,1	83,6	5,0
	7					9,4	6,4	26,4	5,4	37,7	4,8	49,1	4,1	66,1	3,1
	5							14,7	4,1	26,0	3,5	37,4	2,8	54,4	1,8
14	15	39,5	13,4	64,7	12,4	81,5	11,7	106,7	10,7	123,5	10,0	140,3	9,3	165,5	8,3
	12	14,3	11,4	39,5	10,4	56,3	9,7	81,5	8,7	98,3	8,0	115,1	7,3	140,3	6,3
	10			22,7	9,1	39,5	8,4	64,7	7,4	81,5	6,7	98,3	6,0	123,5	5,0
	7					14,3	6,4	39,5	5,4	56,3	4,7	73,1	4,0	98,3	3,0
	5							22,7	4,1	39,5	3,4	56,3	2,7	81,5	1,7
22	15	55,9	13,4	90,2	12,3	113,1	11,7	147,4	10,7	170,3	10,0	193,2	9,3	227,5	8,3
	12	20,8	11,4	55,1	10,4	78,0	9,7	112,3	8,7	135,2	8,0	158,0	7,4	192,4	6,3
	10			31,7	9,1	54,6	8,4	88,9	7,4	111,8	6,7	134,6	6,0	169,0	5,0
	7					19,4	6,4	53,8	5,4	76,6	4,7	99,5	4,1	133,8	3,1
	5							30,4	4,1	53,2	3,4	76,1	2,8	110,4	1,8
23	15	62,6	13,4	102,9	12,4	129,8	11,7	170,1	10,7	197,0	10,0	223,9	9,3	264,2	8,3
	12	21,8	11,4	62,1	10,4	89,0	9,7	129,3	8,7	156,2	8,0	183,0	7,3	223,4	6,3
	10			34,9	9,1	61,7	8,4	102,1	7,4	128,9	6,7	155,8	6,0	196,1	5,0
	7					20,9	6,5	61,2	5,4	88,1	4,8	115,0	4,1	155,3	3,0
	5							34,0	4,1	60,9	3,5	87,8	2,8	128,1	1,7
24	15	68,9	13,4	113,0	12,4	142,4	11,7	186,5	10,7	215,9	10,0	245,3	9,3	289,4	8,3
	12	24,3	11,4	68,4	10,4	97,8	9,7	141,9	8,7	171,3	8,0	200,7	7,3	244,8	6,3
	10			38,6	9,1	68,0	8,4	112,1	7,4	141,5	6,7	170,9	6,0	215,0	5,0
	7					23,4	6,5	67,5	5,4	96,9	4,8	126,3	4,1	170,4	3,0
	5							37,8	4,1	67,2	3,4	96,6	2,8	140,7	1,7
32	15	83,8	13,4	135,3	12,3	169,6	11,7	221,1	10,7	255,4	10,0	289,7	9,3	341,2	8,3
	12	31,2	11,4	82,6	10,4	117,0	9,7	168,4	8,7	202,8	8,0	237,1	7,4	288,6	6,3
	10			47,5	9,1	81,8	8,4	133,3	7,4	167,6	6,7	202,0	6,0	253,4	5,0
	7					29,2	6,4	80,7	5,4	115,0	4,7	149,3	4,1	200,8	3,1
	5							45,5	4,1	79,9	3,4	114,2	2,8	165,7	1,8
33	15	93,9	13,4	154,4	12,4	194,7	11,7	255,2	10,7	295,5	10,0	335,8	9,3	396,3	8,3
	12	32,6	11,4	93,1	10,4	133,4	9,7	193,9	8,7	234,2	8,0	274,6	7,3	335,0	6,3
	10			52,3	9,1	92,6	8,4	153,1	7,4	193,4	6,7	233,7	6,0	294,2	5,0
	7					31,4	6,5	91,9	5,4	132,2	4,8	172,5	4,1	233,0	3,0
	5							51,0	4,1	91,4	3,5	131,7	2,8	192,2	1,7
34	15	103,3	13,4	169,5	12,4	213,6	11,7	279,7	10,7	323,8	10,0	367,9	9,3	434,1	8,3
	12	36,4	11,4	102,6	10,4	146,7	9,7	212,8	8,7	256,9	8,0	301,0	7,3	367,2	6,3
	10			58,0	9,1	102,1	8,4	168,2	7,4	212,3	6,7	256,4	6,0	322,6	5,0
	7					35,2	6,5	101,3	5,4	145,4	4,8	189,5	4,1	255,7	3,0
	5							56,7	4,1	100,8	3,4	144,9	2,8	211,1	1,7
43	15	125,2	13,4	205,8	12,4	259,6	11,7	340,2	10,7	394,0	10,0	447,7	9,3	528,4	8,3
	12	43,5	11,4	124,2	10,4	177,9	9,7	258,6	8,7	312,3	8,0	366,1	7,3	446,7	6,3
	10			69,7	9,1	123,5	8,4	204,1	7,4	257,9	6,7	311,6	6,0	392,3	5,0
	7					41,8	6,5	122,5	5,4	176,2	4,8	230,0	4,1	310,6	3,0
	5							68,0	4,1	121,8	3,5	175,6	2,8	256,2	1,7
44	15	137,8	13,4	226,0	12,4	284,8	11,7	373,0	10,7	431,8	10,0	490,6	9,3	578,8	8,3
	12	48,6	11,4	136,8	10,4	195,6	9,7	283,8	8,7	342,6	8,0	401,4	7,3	489,6	6,3
	10			77,3	9,1	136,1	8,4	224,3	7,4	283,1	6,7	341,9	6,0	430,1	5,0
	7					46,9	6,5	135,1	5,4	193,9	4,8	252,7	4,1	340,9	3,0
	5							75,6	4,1	134,4	3,4	193,2	2,8	281,4	1,7

Data are provided considering nominal water flow for each module, calculated with 15-10°C inlet/outlet, free cooling water temperature and 0°C outdoor air temperature and 30% Gly.Eth.

Brine Pressure Drop

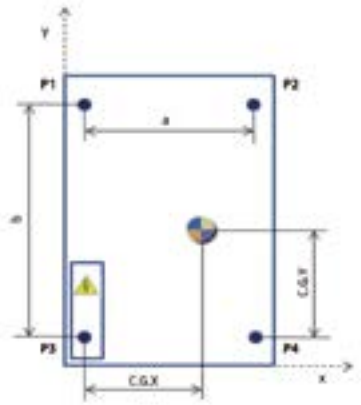
Size	Nom. Capacity	Qnom.	Qmax.	Qmin.	K	Dp nom	DP max	DP min
	kW	l/h	l/h	l/h	kPa/(l/h)^2	kPa	kPa	kPa
12	101,2	19.016	30.032	11.090	1,220E-07	44	110	15
14	156,2	29.352	33.849	12.500	9,601E-08	83	110	15
22	205,9	38.686	47.228	17.440	4,932E-08	74	110	15
23	244,9	46.001	73.576	27.170	2,032E-08	43	110	15
24	275,1	51.682	77.824	28.738	1,816E-08	49	110	15
32	308,9	58.028	72.645	26.826	2,084E-08	70	110	15
33	367,3	69.002	101.628	37.529	1,065E-08	51	110	15
34	412,7	77.523	107.381	39.653	9,540E-09	57	110	15
43	489,7	92.002	147.152	54.340	5,080E-09	43	110	15
44	550,2	103.364	155.647	57.477	4,541E-09	49	110	15



* Data refers to STD units.

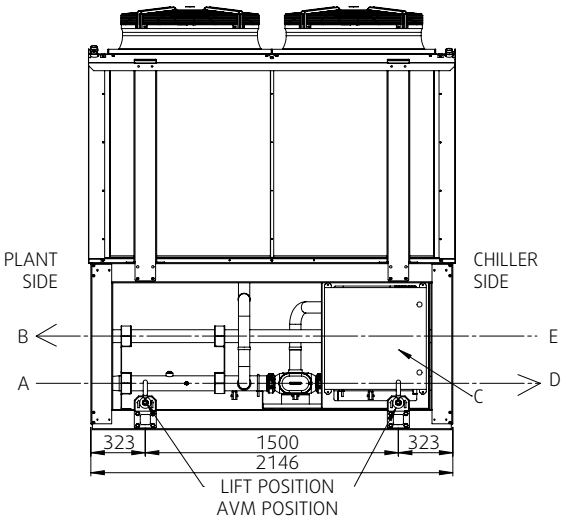
Weights Distributions

Size	Weight distribution				Operating weight	Shipping weight	P1-P4 coordinates		CG coordinates	
	F1	F2	F3	F4			a	b	x	y
	kg	kg	kg	kg	kg	kg	mm	mm	mm	mm
12	165	149	186	169	669	624	1.014	1.500	520	1.024
14	181	165	202	185	733	664	1.014	1.500	522	1.028
22	246	223	278	255	1.002	912	2.070	956	1.026	1.032
23	264	241	296	273	1.075	965	2.070	956	1.029	1.034
24	280	257	312	289	1.139	1.005	2.070	956	1.031	1.035
32	355	333	400	377	1.466	1.336	2.070	2.056	1.041	1.549
33	382	359	428	405	1.574	1.404	2.070	2.056	1.043	1.552
34	405	383	452	430	1.670	1.464	2.070	2.056	1.045	1.554
43	511	479	556	524	2.070	1.800	2.070	3.060	1.041	2.048
44	543	511	588	556	2.198	1.880	2.070	3.060	1.043	2.052

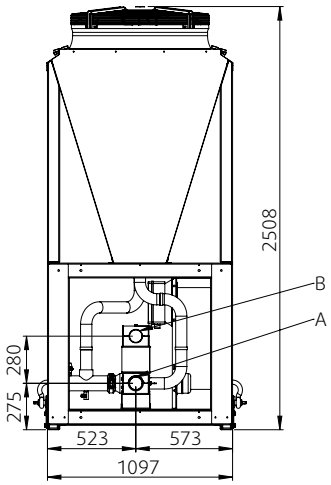


Dimensions - SysFreeCool 12-14 (stand-alone)

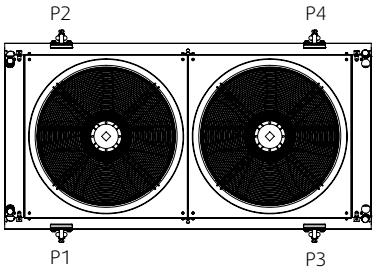
Front view



Side view



Top View

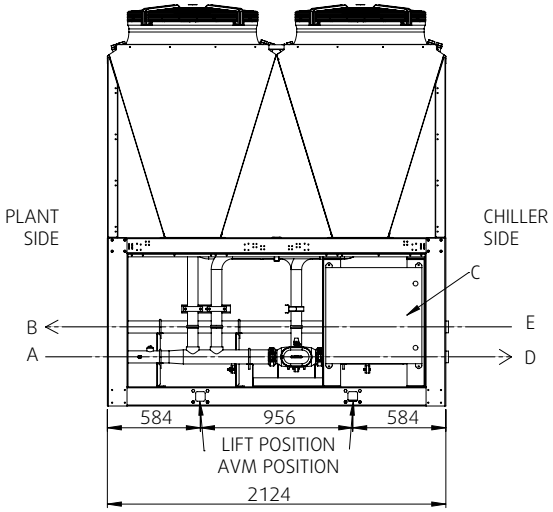


A WATER IN 2-1/2" GAS M
B WATER OUT 2-1/2" GAS M
D WATER OUT 2-1/2" GAS M
E WATER IN 2-1/2" GAS M

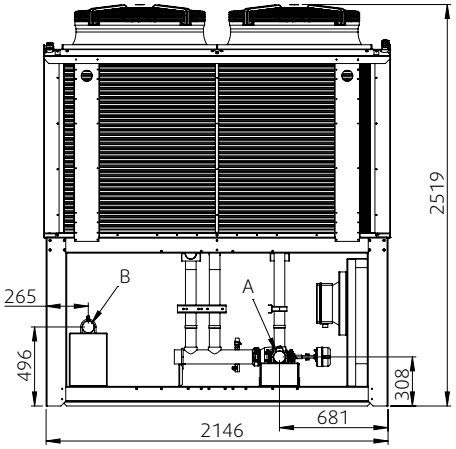
C - ELECTRICAL POWER SUPPLY

Dimensions - SysFreeCool 22-23-24 (stand-alone)

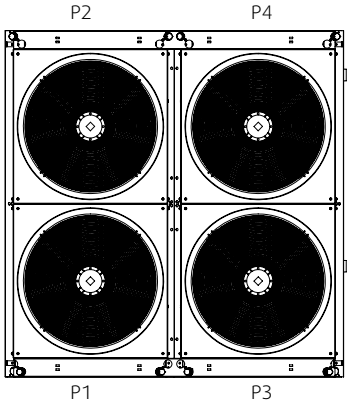
Front view



Side view



Top View



SIZE 22

A WATER IN 2" 1/2 GAS M
D WATER OUT 2"-1/2 GAS M
E WATER IN 2 1/2 GAS M
B WATER OUT 2"-1/2 GAS M

C ELECTRICAL POWER SUPPLY

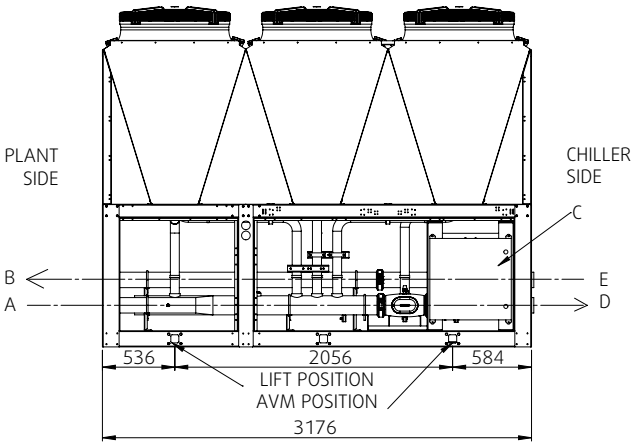
SIZES 23-24

A WATER IN 3" GAS M
D WATER OUT 3" GAS M
E WATER IN 3" GAS M
B WATER OUT 3" GAS M

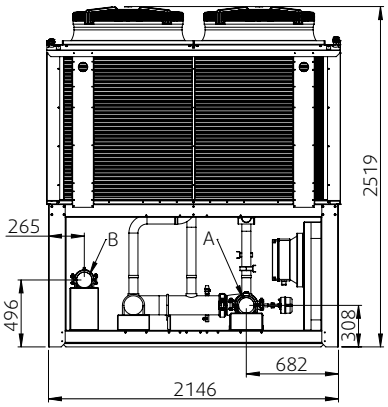
C ELECTRICAL POWER SUPPLY

Dimensions - SysFreeCool 32-33-34 (stand-alone)

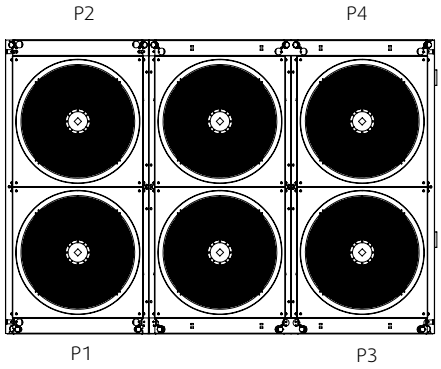
Front view



Side view



Top View



SIZE 32

A WATER IN 3" GAS M
B WATER OUT 3" GAS M
D WATER OUT 3" GAS M
E WATER IN 3" GAS M

C ELECTRICAL POWER SUPPLY

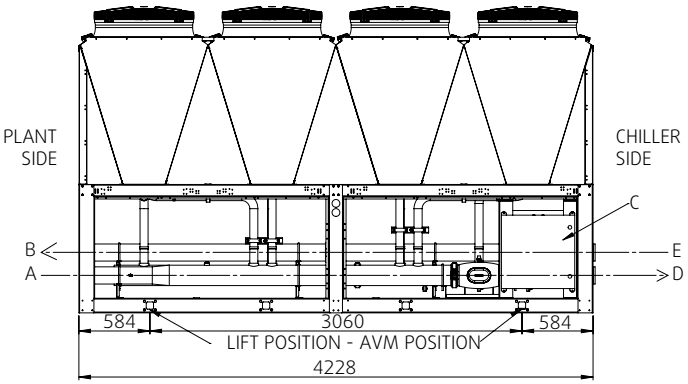
SIZES 33-34

A WATER IN 4" VICTAULIC
B WATER OUT 4" VICTAULIC
D WATER OUT 4" VICTAULIC
E WATER IN 4" VICTAULIC

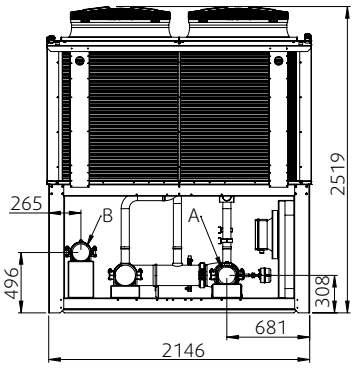
C ELECTRICAL POWER SUPPLY

Dimensions - SysFreeCool 43-44 (stand-alone)

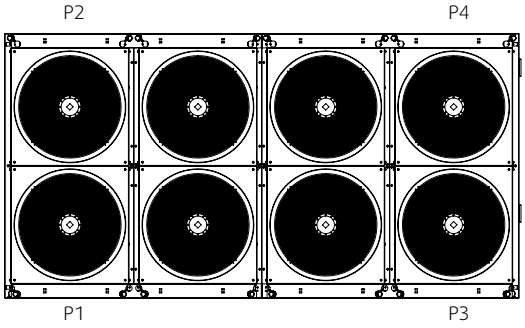
Front view



Side view



Top View



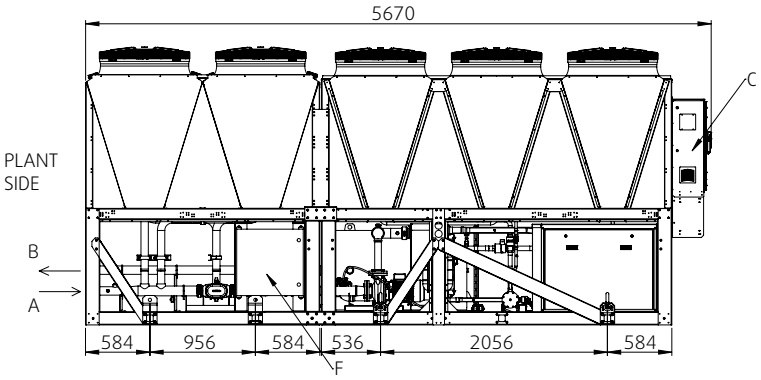
SIZES 43-44

A WATER IN 5" VICTAULIC
B WATER OUT 5" VICTAULIC
D WATER OUT 5" VICTAULIC
E WATER IN 5" VICTAULIC

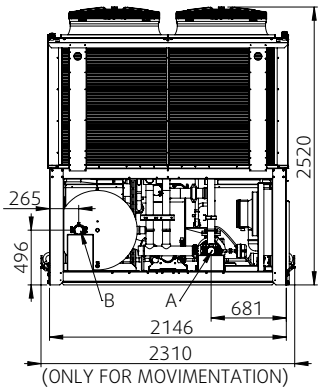
C ELECTRICAL POWER SUPPLY

Dimensions - SyScroll 200 Air EVO FC 22 / SyScroll 230-280 Air EVO FC 23-24 / SyScroll Air 240-320 FC 23-24 (slave)

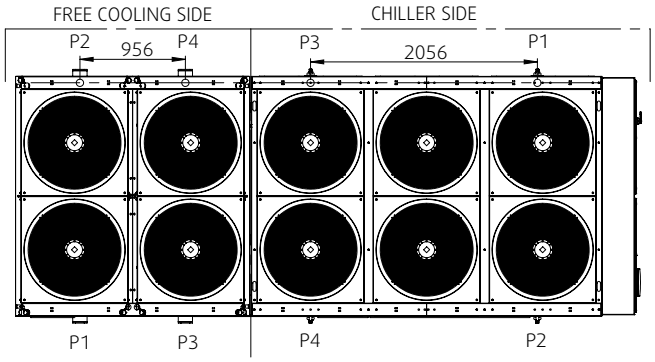
Front view



Side view



Top View



SYSCROLL 240-320 AIR FC 23-24
SYSCROLL 230-280 AIR EVO FC 23-24
A WATER IN 3" GAS M
B WATER OUT 3" GAS M

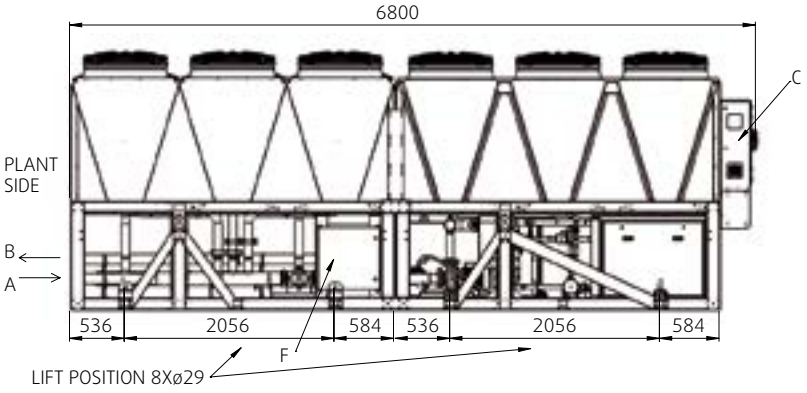
C ELECTRICAL POWER SUPPLY
F ELECTRICAL POWER SUPPLY FREE COOLING

SYSCROLL 200 AIR EVO FC 22
A WATER IN 2-1/2" GAS M
B WATER OUT 2-1/2" GAS M

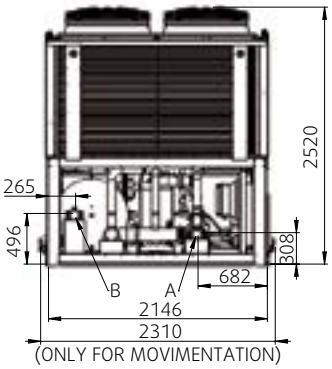
C ELECTRICAL POWER SUPPLY CHILLER
F ELECTRICAL POWER SUPPLY FREE COOLING

Dimensions - SyScroll 230-280 Air EVO FC 32 / SyScroll Air 240-320 FC 32 (slave)

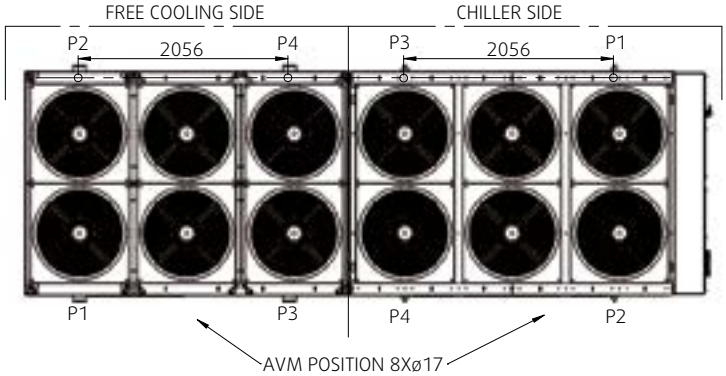
Front view



Side view



Top View

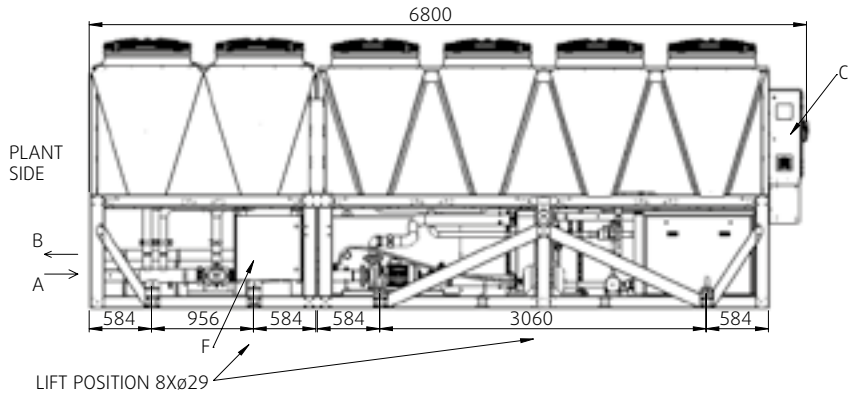


SYSCROLL 240-320 AIR FC 32
SYSCROLL 230-280 AIR EVO FC 32
A WATER IN 3" VICTAULIC
B WATER OUT 3" VICTAULIC

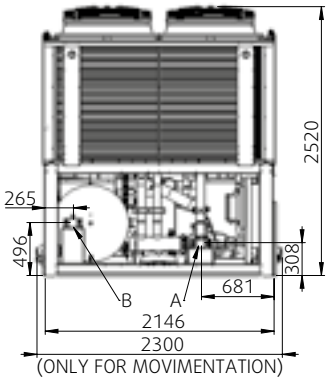
C ELECTRICAL POWER SUPPLY
F ELECTRICAL POWER SUPPLY FREE COOLING

Dimensions - SyScroll 300-360 Air EVO FC 23-24 (slave)

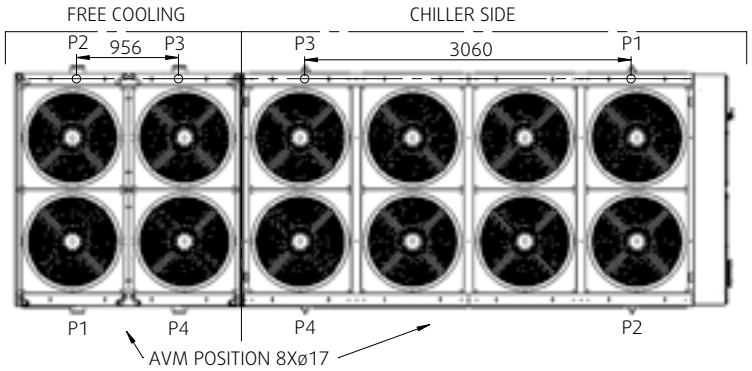
Front view



Side view



Top View

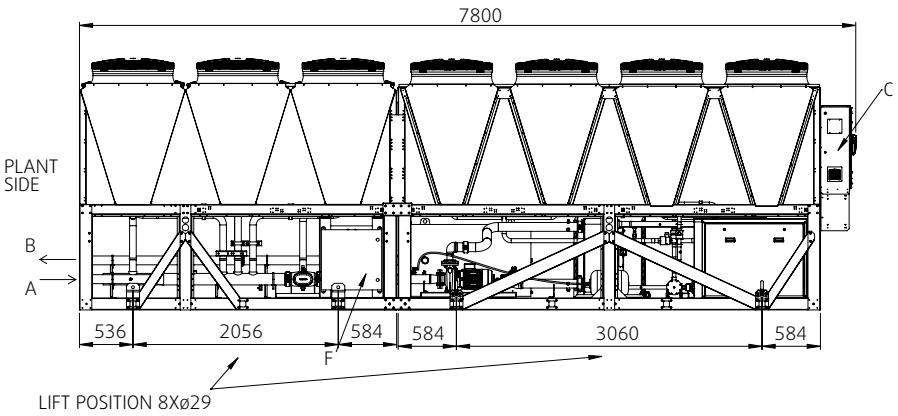


SYSCROLL 300-360 AIR EVO FC 23-24
A WATER IN 3" GAS M
B WATER OUT 3" GAS M

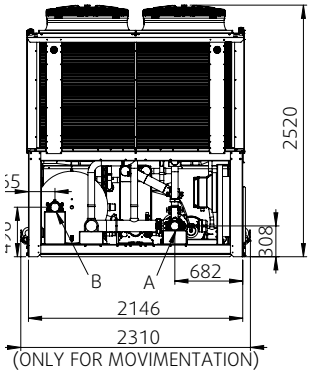
C ELECTRICAL POWER SUPPLY CHILLER
F ELECTRICAL POWER SUPPLY FREE COOLING

Dimensions - SyScroll 300-360 Air EVO FC 32 / SyScroll Air 360-420 FC 33-34 (slave)

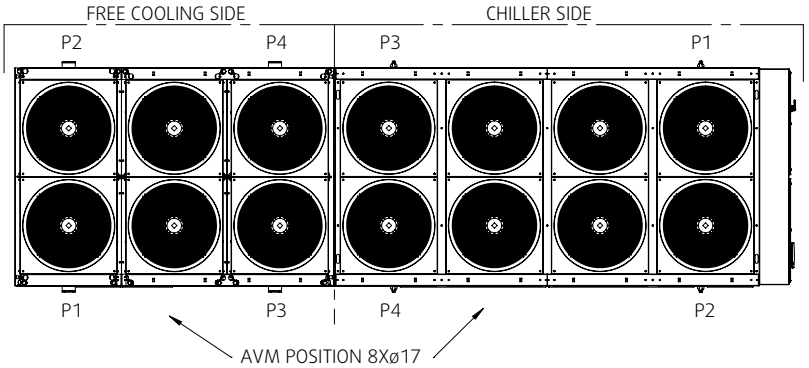
Front view



Side view



Top View



SYSCROLL 360-420 AIR FC 33-34
A WATER IN 4" VICTAULIC
B WATER OUT 4" VICTAULIC

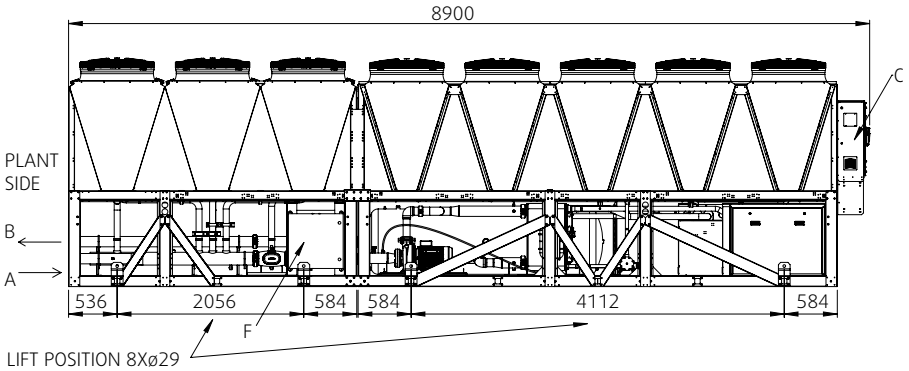
C ELECTRICAL POWER SUPPLY CHILLER
F ELECTRICAL POWER SUPPLY FREE COOLING

SYSCROLL 300-360 AIR EVO FC 32
A WATER IN 3" VICTAULIC
B WATER OUT 3" VICTAULIC

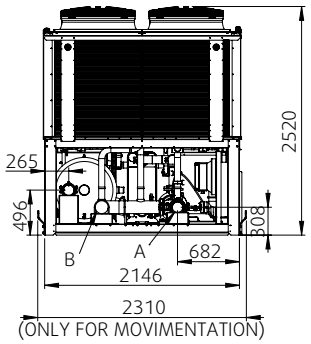
C ELECTRICAL POWER SUPPLY CHILLER
F ELECTRICAL POWER SUPPLY FREE COOLING

Dimensions - SyScroll Air 470-540 FC 33-34 (slave)

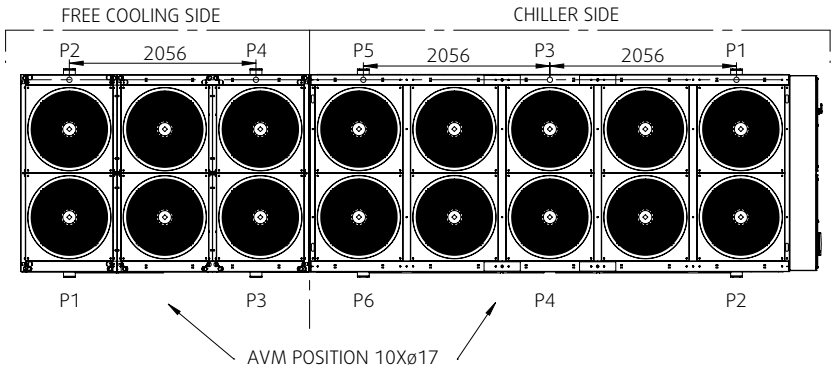
Front view



Side view



Top View

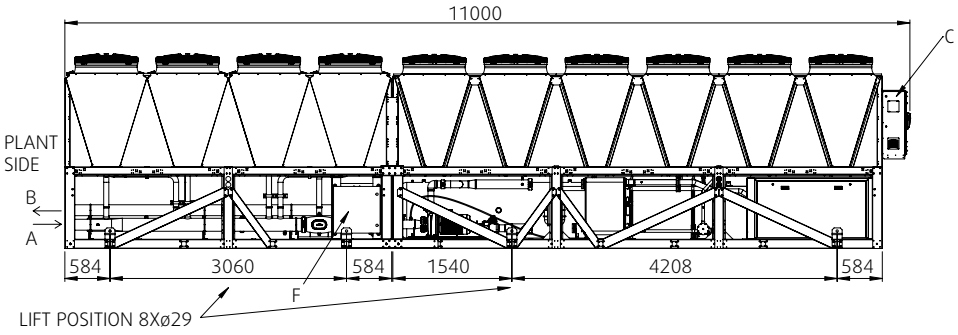


SYSCROLL 470-540 AIR FC 33-34
A WATER IN 4" VICTAULIC
B WATER OUT 4" VICTAULIC

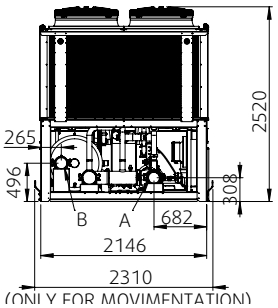
C ELECTRICAL POWER SUPPLY CHILLER
F ELECTRICAL POWER SUPPLY FREE COOLING

Dimensions - SyScroll Air 590-660 FC 43-44 (slave)

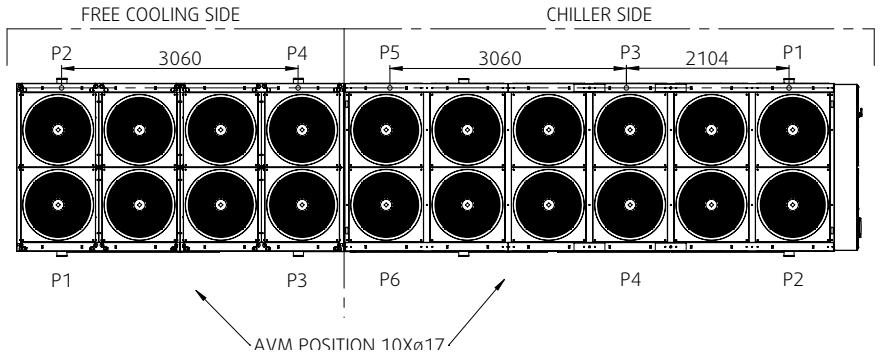
Front view



Side view



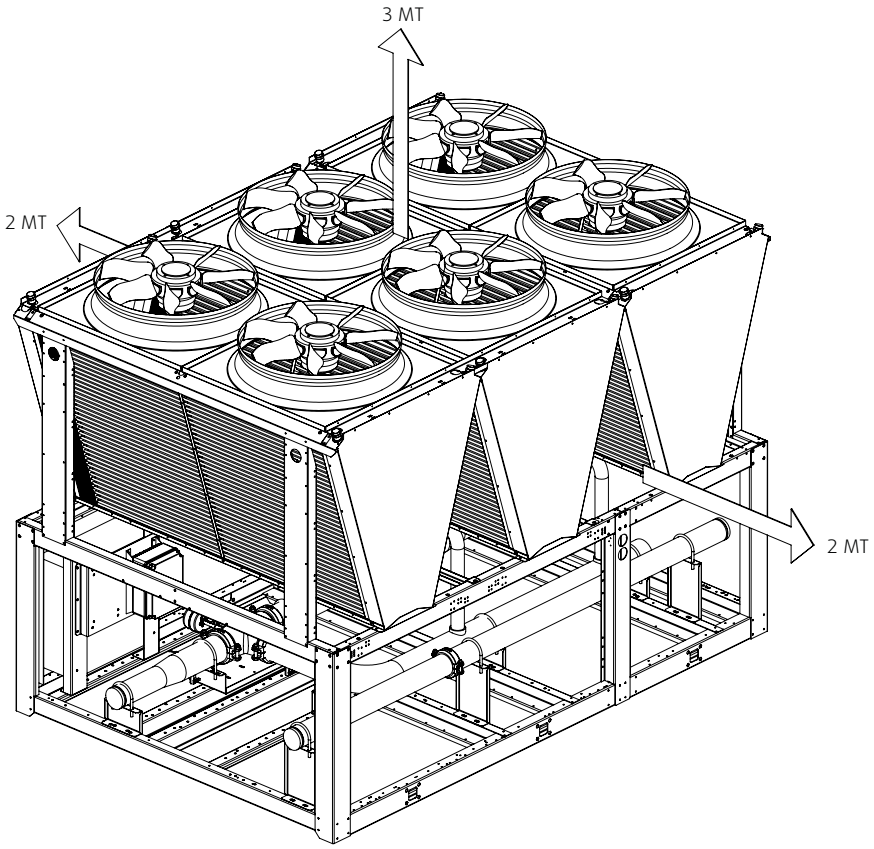
Top View



SYSCROLL 590-660 AIR FC 43-44
A WATER IN 5" VICTAULIC
B WATER OUT 5" VICTAULIC

C ELECTRICAL POWER SUPPLY CHILLER
F ELECTRICAL POWER SUPPLY FREE COOLING

Space Requirements



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