FläktGroup

Process Chiller

AIR-COOLED WITH FREE-COOLING, GLFC 0152-1204BD2(.SL)
TECHNICAL DATA

Product Type Code

FläktGroup Chiller | G L | F | C | 1 8 0 | 6 | B | D | 2 | . | S L |

**FläktGroup Chiller, (air cooled)
for outdoor installation
with free-cooling function**

**GLFC 0152-0612 BD2(.SL)
GLFC 0604-1204 BD2(.SL)**

	FläktGroup Chiller	Mode/unit type	Operating mode	Capacity stage	Number of compressors	Series	Refrigerant	Supply voltage	Design
GL	Global Large								
F	Free-cooling								
C	Chiller								
015, 018	2 compressors								
020, 025,	2 compressors								
030, 035	2 compressors								
041, 045	2 compressors								
051, 055	2 compressors								
061;	2 compressors								
060, 070,	4 compressors								
080, 090,	4 compressors								
100, 110,	4 compressors								
120,	4 compressors								
2	Number of compressors: 2								
4	Number of compressors: 4								
B	Unit series B								
D	R 410A								
2	400 V/3~/50 Hz (+ PE)								
SL	SL-version (Super Low Noise) especially quiet model								

Capacity stage

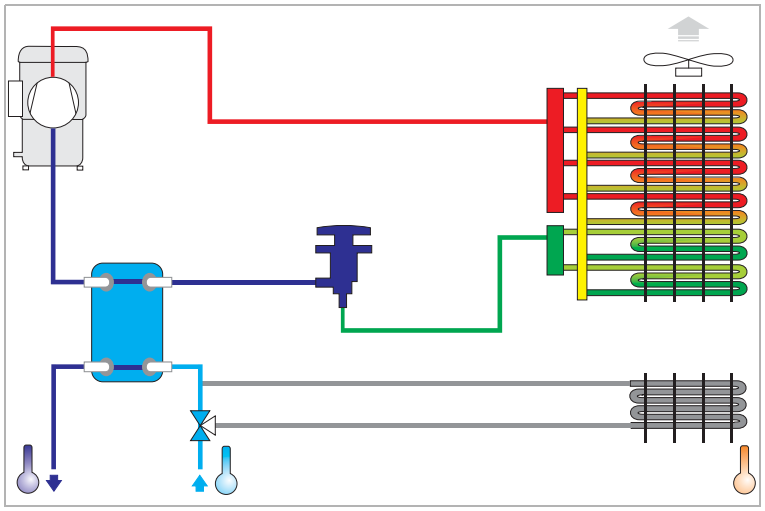
What does "free cooling“ mean?

The general purpose of a chiller is to cool water from 12 °C to 6 °C. 6 °C chilled water can be used for different purposes like comfort air conditioning, cooling in data processing or telecommunication centres, or in different industrial processes.

As standard an air-cooled chilled is equipped with a heat exchanger (in this case a plate heat exchanger) that cools water thanks to evaporation of refrigerant. For evaporation of refrigerant electric drive energy is needed which is in turn mostly consumed by one or more compressors. In order to significantly reduce energy consumption chillers with free cooling are equipped with an additional air-cooled heat exchanger.

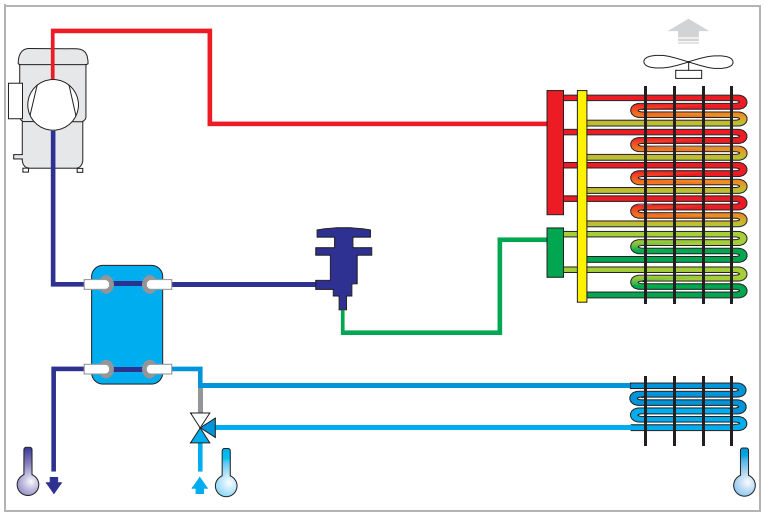
As soon as outdoor air temperature falls 1 °C below the set return temperature of the chilled water system, free cooling is activated to in order to reduce energy consumption. Using an additionally installed 3-way valve, water is not directed into plate heat exchanger but into an additional air-cooled heat exchanger. The latter makes use of the temperature difference between higher water temperature of the system and lower outdoor temperature for water cooling and reduction of energy consumed by compressors. The higher the difference between return temperature of the unit and outdoor temperature - the more electric energy can be saved. Depending on the system design and selected unit type - starting from already 2 °C outdoor temperature difference it can completely be done without electrical operation of compressor.

Operation of free cooling unit:



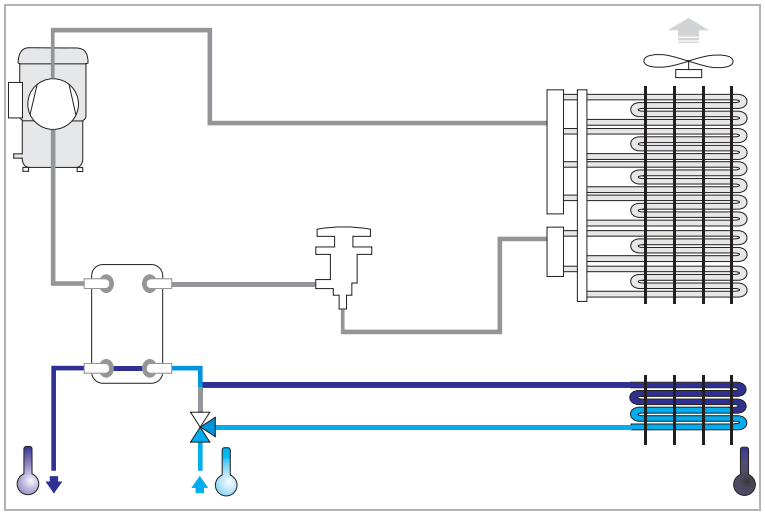
Summer operation:

For cooling during summer operation a 3-way valve directs water not through an additional air-cooled heat exchanger but directly into plate heat exchanger. In such a way the water-side pressure drop is reduced to a minimum. Evaporating refrigerant cools water in the plate heat exchanger, which supplies it to different consumers. Free-cooling function is deactivated and the unit operates as a usual chiller.



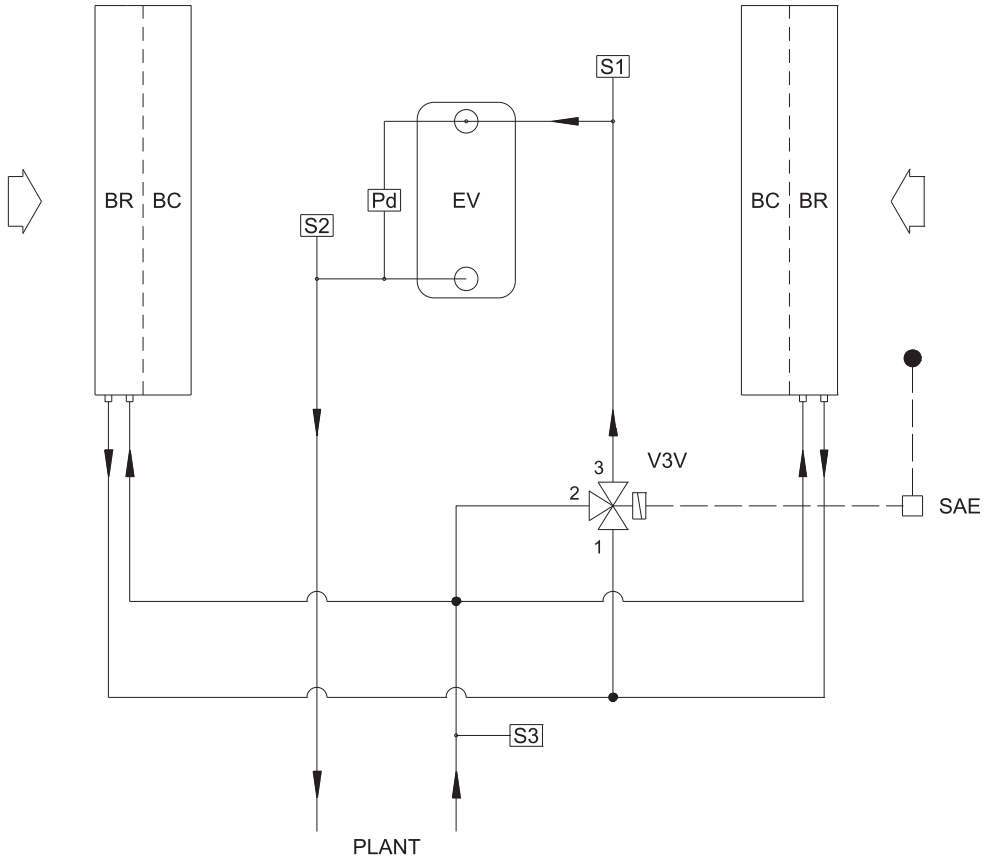
Transition time:

During transition seasons in spring and autumn the unit operates with an additional air-cooled free cooling heat exchanger as well as using usual evaporative cooling. As soon as outdoor air temperature falls 1 °C below the set return temperature of the chilled water system, the 3-way valve is activated and a connection with a free-cooling heat exchanger is enabled. The fans increase their speed in order to cool water as much as possible and thus reduce compressor run time and associated electric power consumption. Now water passes through both heat exchangers. Missing cooling energy, which is not recovered by free cooling, is provided by the one or multiple compressors. Already during transition seasons significant energy savings can be achieved.



Winter operation:

Only free-cooling heat exchanger is activated during winter season. The temperature difference between outdoor air and water setpoint is large enough to operate completely without compressor activation. The only energy consumers of the unit are fan motors, that considerably reduce their speed with falling outdoor temperatures and thus contribute to further energy conservation.



Acronym	Description	Acronym	Description
BC	Air-cooled condenser	S1	Temperature sensor at water inlet EV
BR	Free cooling heat exchanger	S2	Temperature sensor at water outlet EV
EV	Evaporator (plate heat exchanger)	S3	Temperature sensor unit water inlet
Pd	Water side differential pressure switch	V3V	3-way valve
SAE	Outdoor air temperature sensor		

Fig. 1: Hydraulic circuit of GLFC 0152-0612 BD2 and GLFC 0604-1204 BD2

Considerations for designing free cooling systems

The longer operating hours of a unit are - the shorter the amortisation time of a free cooling system is. Classical applications for free cooling units are telecommunication centres, industrial facilities and data processing centres.

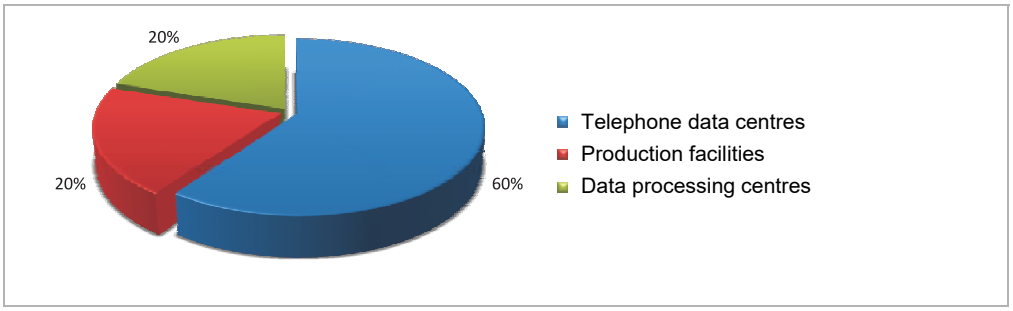


Fig. 2: Percentage weighting for using free cooling units in year-round operation.

A chiller with free cooling should never be dispensed with whenever it comes to year-round cooling. However with consideration to constantly increasing internal loads of a building and depending on the region, it can be reasonable to install a free cooling system for comfort air conditioning instead of a standard chiller.

The higher water temperature in the design stage - the more efficient is the operation of a chiller. Besides, thanks to higher water temperatures the unit can switch in free cooling mode earlier which makes it possible to deactivate compressors. Quite often chillers are designed with 12 °C water inlet and 6 °C water outlet temperatures. However if the unit water inlet temperature is set at 15 °C and outlet temperature at 10 °C - the unit operation turns out to be more efficient in summer compared to previously mentioned lower water temperatures. Moreover, free cooling operation can already be activated starting from 14 °C outdoor temperature and not only from 11 °C, so that further energy savings can be achieved.

In the following example four major European cities demonstrate the savings potential of units with free cooling as compared to standard chillers.

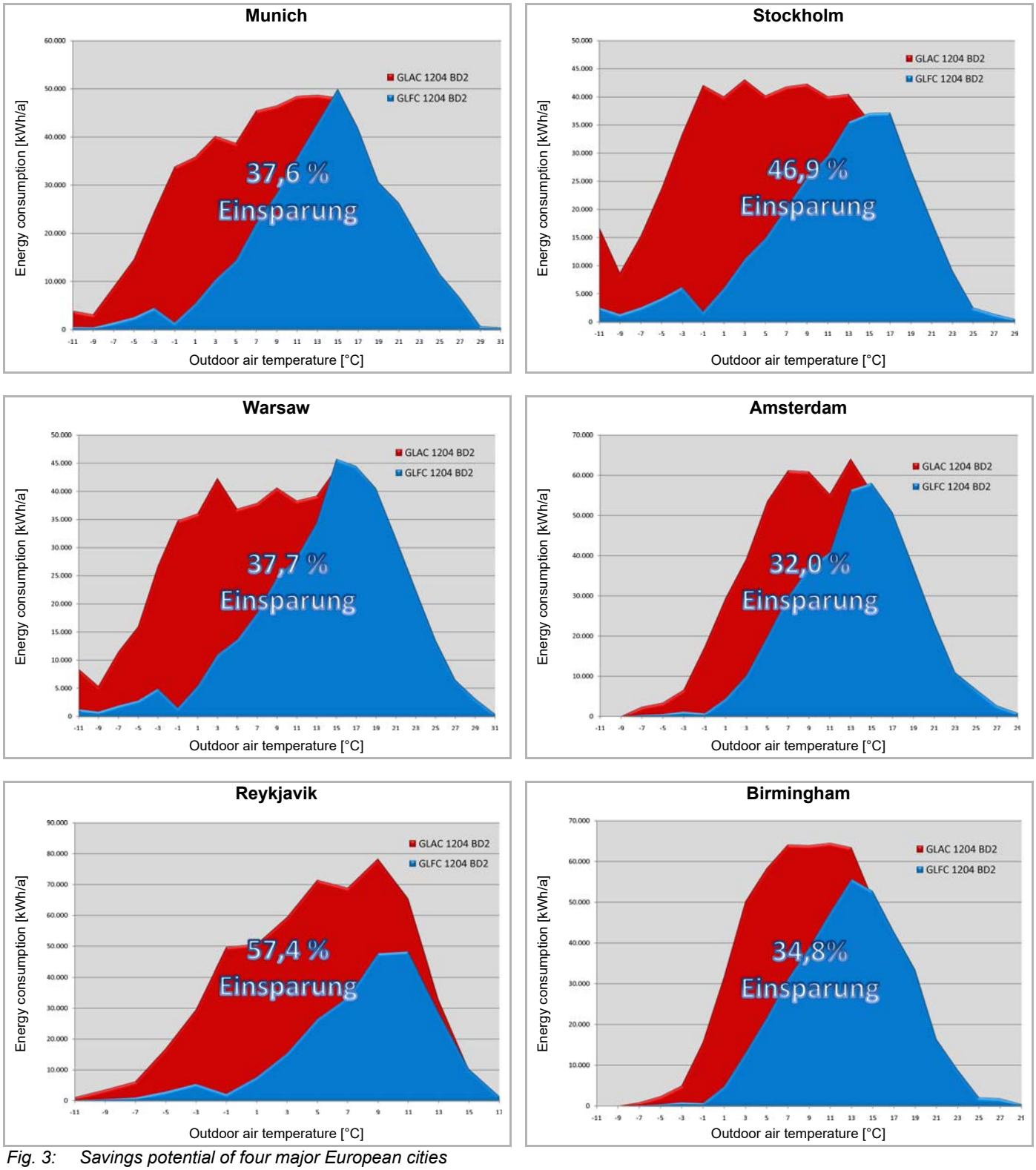


Fig. 3: Savings potential of four major European cities

Data are based on following requirements:
Unit GLFC 1202 BD2
Cooling output 350 kW
Water temperatures: inlet 15 °C/outlet: 10 °C
Year-round operation

Normal or super quiet operation?

Depending on the location and environment where a chiller is installed, it is necessary to keep the sound level at a minimum. As compared to the basic model, the acoustic values of an SL model are reduced thanks to the following measures:

– 30 mm sound insulation of compressor casing
– Increase of heat exchanger surface of condenser
– Reduction of fan speed

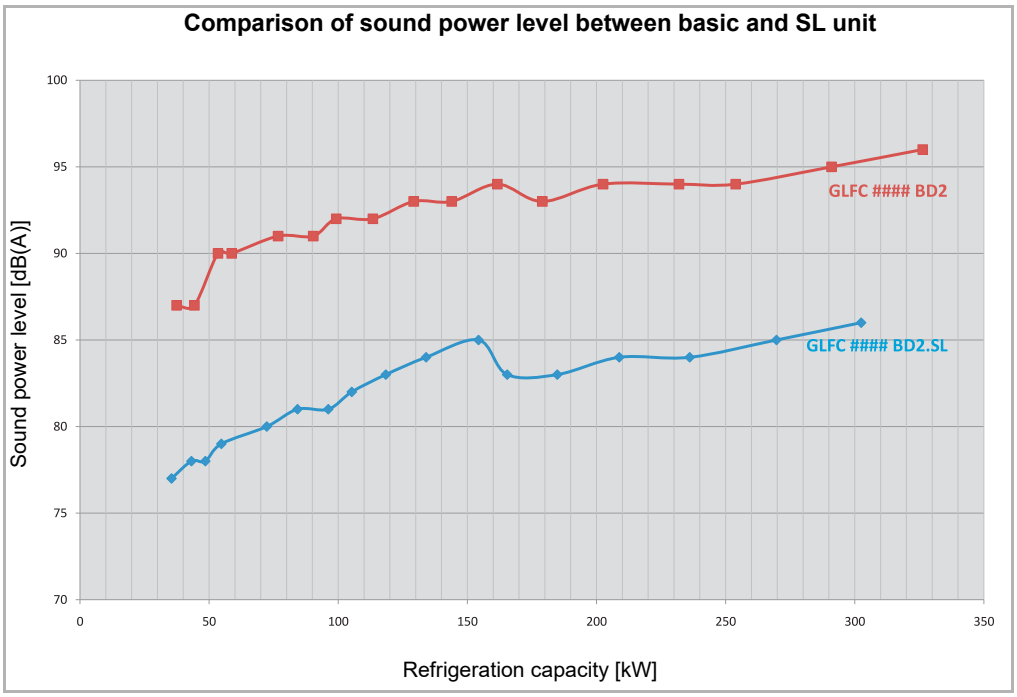


Fig. 4: Comparison of sound power level between basic and SL unit

By taking these measures the sound power level can be reduced by up to 12 dB(A).

NOTE!
The system shall be protected against frost due to the fact that water may come into contact with outdoor air temperatures below 0 °C via air-cooled heat exchanger. FläktGroup recommends o use at least 30% ethylene glycol.

FläktGroup air cooled chiller for outdoor installation with free-cooling function:	
 GLFC 0152-0612 BD2	– with refrigerant R410A – 11 capacity stages – cooling capacity from 35 to 162 kW – 2 Copeland scroll compressors – plate heat exchanger as evaporator – cooling operation up to 46 °C ambient temperature – SL unit version can be supplied with 12 dB(A) lower sound power level

FläktGroup air cooled chiller for outdoor installation with free-cooling function:	
 GLFC 0604-1204 BD2	– with refrigerant R410A – 7 capacity stages – cooling capacity from 140 to 330 kW – 2 independent refrigeration circuits – 4 Copeland scroll compressors – plate heat exchanger as evaporator – cooling operation up to 46 °C ambient temperature – SL unit version can be supplied with 11 dB(A) lower sound power level

The FläktGroup units are **air-cooled chillers designed for outdoor installation with free cooling** and equipped with axial fans.In the factory they are filled with refrigerator oil and refrigerant and a test run is performed, so that when the units are installed on site only chilled water and electrical connections have to be established. A functional test must also be carried out

The FläktGroup unit series are designed only to be used with the refrigerant R410A.

Components

Chiller with high EER

This new unit generation has a high energy efficiency ratio (EER) and uses the refrigerant R410A. An optimum result was achieved by carefully designing all internal components so as to fully exploit the performance characteristics of the specific refrigerant. Particular attention was paid to the surfaces of the heat exchangers, as well as the fans and compressors.

The newly designed condensers have larger exchange surface areas, as do the new evaporators, which enable even better and more efficient distribution of the refrigerant in a liquid and gaseous state. The fans are controlled so as to optimise the air volume flow in each condenser section and therefore ensure that noise levels are kept to a minimum in every operational mode.

The intelligent control of the chilled water outlet temperature reduces fluctuations in relation to the specified setpoint and vastly reduces the time the system needs until it is ready for operation. The precision and rapid reaction of the intelligent control system facilitate optimum control in the event of load fluctuations which means that stable operating conditions can be achieved very quickly, even during part load operation. A carefully dimensioned system implemented in these units produces considerable energy savings and vastly reduces operating costs.

State-of-the-art system of the newest generation

The GLFC unit series are water cooling systems that are particularly suitable for small and medium-sized air conditioning systems, or for systems designed for low water system content. The main difference when compared to conventional units is the intelligent controller system.

Basic construction

The frame and panels are made of galvanized, plastic-coated sheet steel (RAL 9002). The self-supporting construction offers excellent access to the individual components during maintenance and repair work.

Compressor

Fully hermetic, low-vibration and suction-refrigerant cooled Copeland scroll compressor complete with oil heating for safe compressor start-up, electronic overheating protection with manual reset and a two-pole electric motor. These Copeland scroll compressors are also highly economical to run and have a sound power level that is some 6 dB(A) lower than piston compressors.

The sizes 0152-0612 comprise 2 compressors in one refrigeration circuit.
The sizes 0604-1204 comprise 4 compressors, with two compressors integrated in each of two refrigeration circuits.

Fig. 5: Scroll compressor

Fig. 6: Plate heat exchanger

Evaporator

The evaporators used in this unit series are plate heat exchangers made of AISI 316. The advantages of plate heat exchangers are their very compact construction combined with high performance. The channel plates consist of stamped stainless steel plates that are closely connected using a special soldering technique. This means that a high-turbulence flow occurs on both primary and secondary sides which results in an extremely efficient exchange of heat between the refrigerant and the heat transfer medium. This construction also means that the required amount of refrigerant can be reduced to a minimum.

The evaporator is non-permeable and is provided with comprehensive abrasion-resistant insulation. While in operation the evaporator is protected by the differential pressure switch between the chilled water inlet and outlet.

The unit can also be operated with glycol as standard with outlet temperatures of up to 0°C.

Condenser

Finned tube heat exchanger have copper fins and corrugated aluminium fins. The best possible heat exchanger efficiency is achieved through even spacing of the fins.

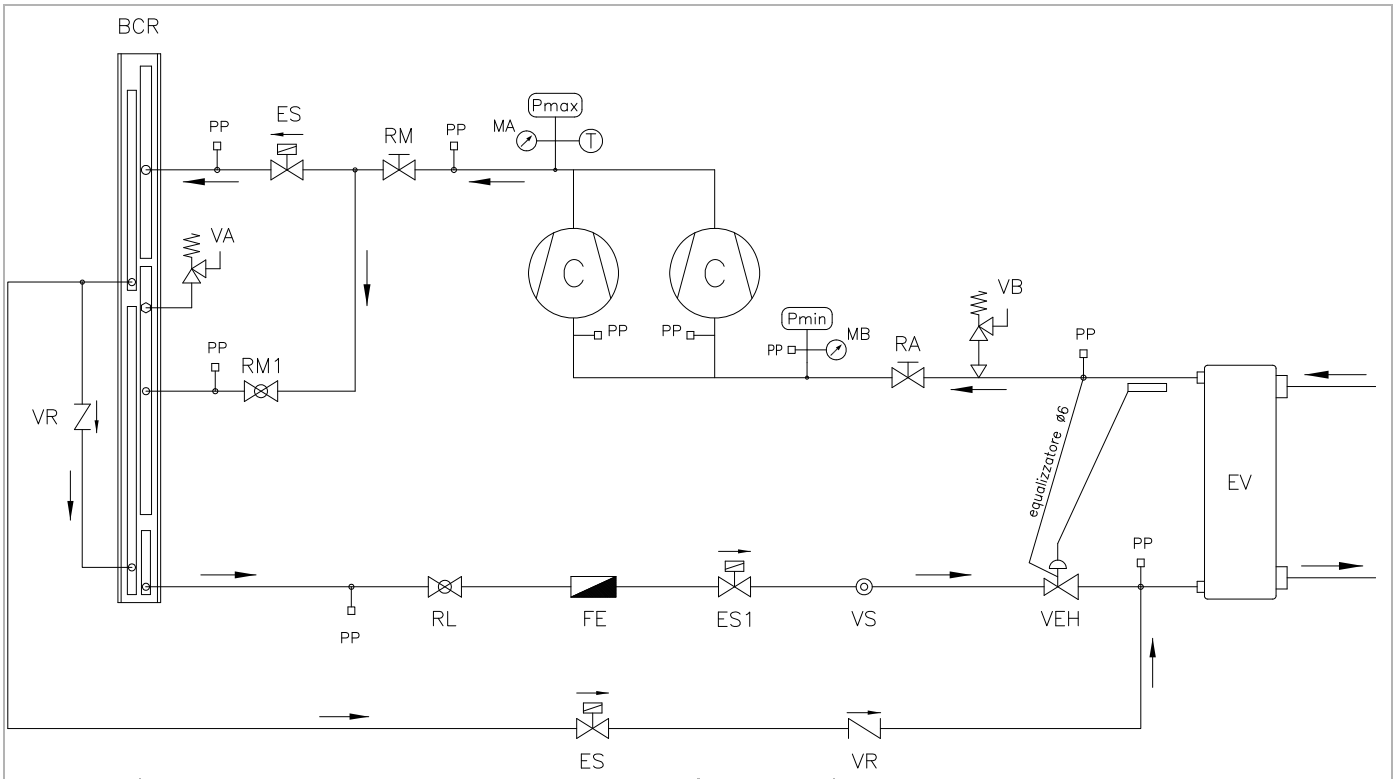
Fans

Direct driven axial fans (protection type IP54) provided with deep drawn rotor made of sheet steel and 6-pole motor with overheating protection and maintenance-free ball bearings. Assembled in a streamlined form and fitted with a protective grille.

3-way valve

Using a 3-way valve and depending on the difference between outdoor air temperature and unit return temperature the regulation system enables or disables water flow to an additional free-cooling heat exchanger or plate heat exchanger. Thank to this regulation water-side pressure drops are reduced to a minimum during summer months. At extremely low outdoor temperatures an optional modulating 3-way valve can be ordered, which prevents water outlet temperature from falling below the setpoint (option .M12).

Refrigeration circuit scheme GLFC 0152-0612 BD2 (.SL)

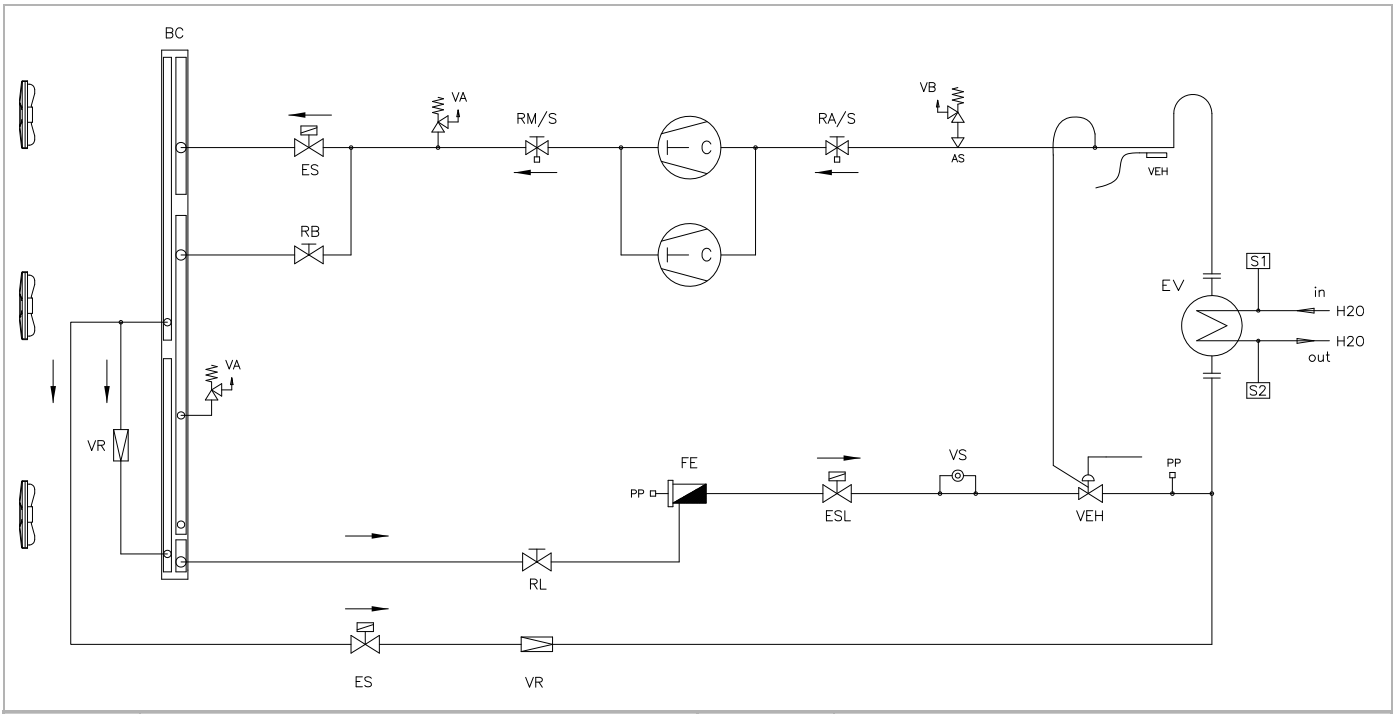


Acronym	Description	Acronym	Description
BCR	Air-cooled condenser	RA	Shut-off valve suction side (optional .R02)
C	Scroll compressor	RL	Shut-off valve on liquid line (only 0452-0612)
ES	Solenoid valve	RM	Shut-off on discharge side (optional .R10)
ES1	Solenoid valve (option .R01)	RM1	Regulating valve
EV	Evaporator	T	Pressure sensor high pressure line
FE	Filter drier	VA	Safety valve discharge line
MA	High-pressure gauge (option .R13)	VB	Safety valve low pressure line
MB	Low-pressure gauge (option .R13)	VEH	Thermostatic expansion valve
Pmin	Low-pressure pressostat	VR	Non-return valve
Pmax	High-pressure pressostat	VS	Sight glass with humidity indicator
PP	Service Schrader valve		

Fig. 7: Refrigeration circuit scheme GLFC 0152-0612 BD2 (.SL)

Note: the sizes 0152-0612 comprise 2 compressors in one refrigeration circuit.

Refrigeration circuit scheme GLFC 0604-1204 BD2 (.SL)



Acronym	Description	Acronym	Description
BC	Air-cooled condenser	RL	Shut-off valve on liquid line (only 0904-1204)
C	Scroll compressor	RMS	Shut-off valve on discharge side (option R10)
ES	Solenoid valve	S1	Temperature sensor water inlet
ESL	Solenoid valve (option .R01)	S2	Temperature sensor water outlet
EV	Evaporator	VA	Safety valve discharge line
FE	Filter drier	VB	Safety valve low pressure line
PP	Service Schrader valve	VEH	Thermostatic expansion valve
RAS	Shut-off valve suction side (optional .R02)	VR	Non-return valve
RB	Regulating valve	VS	Sight glass with humidity indicator

Fig. 8: Refrigeration circuit scheme GLFC 0604-1204 BD2 (.SL)

Note: the sizes 0604-1204 comprise 4 compressors, with two compressors integrated in each of two refrigeration circuits.

Switch cabinet

Switch cabinet (IP24), divided into power and control module, manufactured according to EN 60204-1/IEC204-1 regulations, complete with:

- Switch cabinet in a separate casing sealed within the unit
- Transformer for generating the control voltage
- Door locking main isolator
- Motor protection switch and contactors for compressor and fans
- Terminal strip control voltage
- Automatic circuit breaker for load and control current circuit
- Phase sequence protection for the compressor
- Remote On/Off contact
- Contact for general error message
- Clip contact for flow switch
- Operating status message of compressor (.E03)
- Pump relay for controlling chilled water pump by others
- Stage control of fan motors conducted by high pressure

Electronic control system

Fig. 9: Electronic controller

FläktGroup control with LA software uses large black control panel with the following features:

- Plain text alphanumerical LCD display
- Selection between 14 different languages is possible
- Automatic self-diagnostics of electronics
- Display of all analogue recorded temperature and pressure values
- Display of faults in compressors and refrigeration circuits
- Display of general unit faults
- Optional control of chilled water inlet or outlet temperature
- Safety times for compressor, like for example: Compressor cycle protection, minimum run time of compressors or maximum start-ups per hour (depending on type of the control system)
- Operating hours counter for compressor and chilled water pump
- Automatic operating hours compensation for compressor
- Notification about maintenance intervals of compressors and pumps (can be adjusted)
- Read out latest 200 alarm messages
- Service possible via PC and system software
- Pump lead and overrun times for switching unit on and off safely
- Pressure-dependent condenser fan control system
- Setpoint shift via an external 4-20 mA signal

Accessories and special equipment

Accessories for controls

Fig. 10: Remote control

– Operation status message from compressor (.E03)
– Second control connection for remote monitoring. Up to 10 units in the same controller family can be connected to an additional remote control.(option .E19 for remote control up to 200 meters and .E20 for remote control up to 500 meters distance).
– 2nd setpoint via normally open contact by others (option .E22)
– Load shedding contact (option .E23)

Fig. 11: Serial card for connection to a building management system

– Unit information can be called up via the Internet and LAN
– Connection to the building management system with the following protocols using the serial card:
  – Modbus (Siemens, Johnson Controls, Honeywell) (option .E14)
  – LONWORKS® (option .E15)
  – BacNet (option .E17)
  – BacNet over IP (option .E16)

Electrical accessories

– Soft start for compressor drive motors* (option .E06)
– Variable speed control of fan motors for low-noise part load operation (option .E32)

**Each compressor motor is operated via a soft start.*
Soft start reduces the starting current of each compressor to 60% (refer to page 18 and on).
Example of maximum starting current for unit size 1204:

1. *Maximum current consumption of a compressor that is already in operation (58,9 A per compressor, highest current load of a unit with 3 operating compressors with the 4th compressor switching on => 3* 58,9 A = 176,7 A)*
2. *Maximum current consumption of fans (30,4 A)*
3. *Starting current of compressor, that is additionally switched on (310 A * 0,6 = 186 A - factor 0,6 because of soft start)*
4. *Sum of results from step 1 to 3 (176,7 A + 30,4 A + 186 A = 393,1 A)*

Refrigeration circuit accessories

- Solenoid valve on liquid line (option .R01)
- Shut-off valve on compressor suction side (option .R02)
- Shut-off valve on compressor discharge side (option .R10)
- High and low pressure manometer (option .R13)

Accessories installation

- Rubber anti-vibration mounts for unit installation (option.I02) (supplied loose)
- Epoxy coated fins for air cooled Cu/Al condenser (option .I03)
- Protection grille on the condenser outer side (option .I04)
- Flow switch with paddle for installation in hydraulic circuit at unit outlet (supplied loose) (option .I10)

Fig. 12: Water filter

- Water filter for installation in hydraulic circuit at unit inlet (supplied loose) (.I12)
  Before the direct inlet into the heat exchanger (evaporator and condenser) a water filter must be installed, that protects the heat exchanger from dirt and scale. The water filter of „Y-type“ has a mesh width of 0,9 mm. The filter body can be trouble-free removed and cleaned for maintenance purposes without dismantling the valve body.
  Unit types 0152-0302: 2" filter
  Unit types 0352-0452: 2 1/2" filter
  Unit types 0512-0612: 3" filter
  Unit types 0604-0804: 3" filter
  Unit types 1004-1204: 4" filter

- Fin guard silver coating for the Cu-Al condenser (option .I18)
- Additional sound attenuation of compressor section
  (-2 bB(A) sound power level (option .I19)
- Modulating 3-way valve for maintaining constant water temperature at especially low outdoor temperatures (option .M12)

Unit accessories

- Unit packaging with nylon film in open timber crate (option .O01)
- Extended operating range down to -30 °C ambient temperature (special option on request; .O21)

Optionally available unit version

SL-unit Extremely quiet model – operation where strict acoustic protection measures apply. Reduced sound values as compared to basic model:

- Sound attenuated casing for compressor
- Reduced fan speed – at especially high ambient temperatures the fan speed is automatically increased to standard speed
- Increase of heat exchanger surface of condenser.

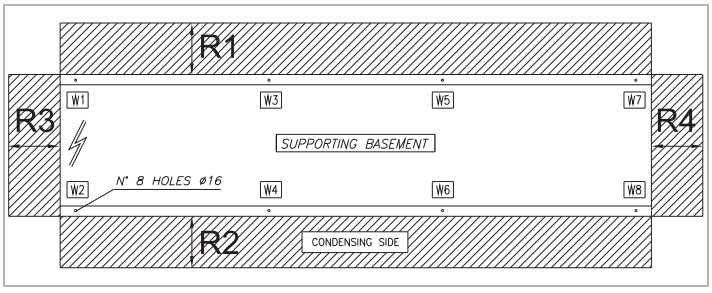
Unit type			0152	0182	0202	0252	0302	0352	0412	0452	0512	0552	0612
Refrigeration capacity [1]	$\dot{Q}_e$	[kW]	37.4	44.3	53.4	58.7	76.7	90.3	99.2	113.4	129.2	143.9	161.6
Compressor power consumption	P_{cpr}	[kW]	13.6	14.9	16.5	19.7	25.9	28.6	33.6	37.1	40.0	48.1	54.5
Total unit power consumption	P	[kW]	15.1	16.4	20.7	23.9	30.1	32.8	37.8	43.4	46.3	54.4	62.9
Chilled water volume flow		[m³/h]	7.2	8.5	10.2	11.2	14.7	17.3	19.0	21.7	24.7	27.5	30.9
Free cooling not activated [2]			Free cooling										
Refrigeration capacity	$\dot{Q}_e$	[kW]	40.6	48.2	58.2	63.6	83.2	98.2	108.0	123.2	140.2	156.0	175.2
Compressor power consumption	P_{cpr}	[kW]	14.0	15.4	16.9	20.1	26.7	29.4	34.8	38.3	41.1	49.1	56.4
Total unit power consumption	P	[kW]	15.5	16.9	21.1	24.3	30.9	33.6	39.0	44.6	47.4	55.4	64.8
Chilled water volume flow		[m³/h]	7.7	9.2	11.1	12.1	15.9	18.7	20.6	23.5	26.7	29.8	33.4
Compliant with ErP													
SEPR HT (ErP EU 2016/2281)			5.57	6.01	4.64	4.57	4.92	5.41	5.42	5.05	5.38	5.39	5.08
Compliant with ERP 2021			✓	✓	-	-	-	✓	✓	✓	✓	✓	✓
Compliant with ERP 2018			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Application			Process cooling high temperature										
Free cooling at 5 °C outdoor temperature [2]													
Refrigeration capacity	$\dot{Q}_e$	[kW]	31.2	35.8	42.4	44.0	55.1	69.8	71.9	83.5	98.7	101.8	114.2
Free-cooling operation as percentage		[%]	76.8	74.3	72.9	69.2	66.2	71.1	66.6	67.8	70.4	65.3	65.2
Free cooling 100 % [2]													
Refrigeration capacity	$\dot{Q}_e$	[kW]	40.6	48.2	58.2	63.6	83.2	98.2	108.0	123.2	140.2	156.0	175.2
Total unit power consumption	P	[kW]	1.5	1.5	4.2	4.2	4.2	4.2	4.2	6.3	6.3	6.3	8.4
Temperature at 100 % free-cooling		[°C]	2.0	1.6	1.3	0.5	-0.1	0.9	0.0	0.2	0.8	-0.3	-0.3
EER		[-]	27.1	32.1	13.9	15.1	19.8	23.4	25.7	19.6	22.3	24.8	20.9
Controls			FläktGroup controller - step II										
Fans			Axial fans										
Number of fans		n	2	2	2	2	2	2	2	3	3	3	4
Total air volume flow		[m³/h]	18720	17280	36000	36000	32040	38880	38880	49320	56520	56520	66240
Compressor			Fully hermetic Copeland scroll compressor										
Number of compressors		n	2	2	2	2	2	2	2	2	2	2	2
Number of refrigeration circuits		n	1	1	1	1	1	1	1	1	1	1	1
Capacity stages per unit		n	2	2	2	2	2	2	2	2	2	2	2
Compressor type 1			ZP 90	ZP 103	ZP 120	ZP 137	ZP 180	ZP 180	ZP 235	ZP 235	ZP 295	ZP 295	ZP 385
Compressor type 2			ZP 90	ZP 103	ZP 120	ZP 137	ZP 180	ZP 235	ZP 235	ZP 295	ZP 295	ZP 385	ZP 385
Oil type			Copeland 3MAF (32 cSt)/CI Emkarate RL 32 CF										
Oil heating		[W]	2x90	2x90	2x90	2x90	2x70	70/120	2x120	120/150	2x150	2x150	2x150
Coil resistance per coil/compressor		[Ω]	1.61	1.37	1.24	1.24	0.70	0.7/0.63	0.63	0.3/0.51	0.51	0.51	0.51
Evaporator			Soldered stainless steel plate heat exchanger										
Minimum chilled water volume flow	$\dot{V}_{e,min}$	[m³/h]	4.4	5.2	6.3	6.9	9.1	10.7	11.8	13.5	15.3	17.1	19.2
Maximum chilled water volume flow	$\dot{V}_{e,max}$	[m³/h]	12.1	14.3	17.1	18.8	24.6	28.9	31.8	36.3	41.3	45.9	51.6
Max. chilled water-side operating pressure		[bar]	10	10	10	10	10	10	10	10	10	10	10
Evaporator inlet connection	R	["]	2	2	2	2	2	2 ½	2 ½	2 ½	2 ½	2 ½	2 ½
Evaporator outlet connection	R	["]	2	2	2	2	2	2 ½	2 ½	2 ½	2 ½	2 ½	2 ½
Filling quantities													
Refrigerant R410A		[kg]	8	10	12	13	16	24	25	26	35	36	37
Oil		[kg]	5	7	7	7	8	9	9	12	14	13	13
Minimum chilled water volume flow		[l]	200	250	300	350	450	500	550	650	700	750	800
Weight													
Operating weight		[kg]	670	710	870	880	1060	1310	1340	1410	1650	1680	1740

1 Performance data for input parameters: chilled water temperatures (input/output) 12/7°C; ambient temperature 35°C; values rounded off.

2 Performance data for input parameters: chilled water temperatures (input/output) 15/10°C

Tab. 1

Unit type		0152	0182	0202	0252	0302	0352	0412	0452	0512	0552	0612
Sound values												
Sound power level [1]	[dB(A)]	87	87	90	90	91	91	92	92	93	93	94
Sound pressure level [2]	[dB(A)]	58	58	61	61	62	62	63	63	64	64	65
Compressor												
Maximum power consumption	[kW]	2x9	2x10.1	2x11.8	2x13.2	2x16.9	1x16.9+ 1x22.3	2x22.3	1x22.3+ 1x27.4	2x27.4	1x27.4+ 1x35.8	2x35.8
Maximum current consumption	[A]	2x15.3	2x16.4	2x20.4	2x22.6	2x27.9	1x27.9+ 1x36.1	2x36.1	1x36.1+ 1x45.8	2x45.8	1x45.8+ 1x58.9	2x58.9
Starting current of each compressor	[A]	2x95	2x111	2x118	2x118	2x198	1x198+1 x225	2x225	1x225+1 x272	2x272	1x272+1 x310	2x310
Fans [3]												
Maximum power consumption	[kW]	1.5	1.5	4.2	4.2	4.2	4.2	4.2	6.3	6.3	6.3	8.4
Maximum current consumption	[A]	3	3	7.6	7.6	7.6	7.6	7.6	11.4	11.4	11.4	15.2
Total [3,4,5]												
Maximum power consumption	[kW]	19.5	21.7	27.8	30.6	38.0	43.4	48.8	56.0	61.1	69.5	80.0
Maximum current consumption	[A]	33.6	35.8	48.4	52.8	63.4	71.6	79.8	93.3	103.0	116.1	133.0
Starting current of entire unit	[A]	113.3	130.4	146.0	148.2	233.5	260.5	268.7	319.5	329.2	367.2	384.1
Maximum connectable cable cross-sections [4]												
Rectangular	[mm]	16x3	16x3	16x3	16x3	20x5	20x5	20x5	20x5	20x5	20x5	20x5
Round	[mm²]	50	50	50	50	120	120	120	120	120	120	120
Maximum permissible backup fuse ratings (fuse type gLgG) [5]												
Back up fuse	[A]	80	100	100	125	160	160	160	160	200	200	200
Dimensions												
A (length)	[mm]	2200	2200	2602	2602	2602	3602	3602	3602	4602	4602	4602
B (width)	[mm]	920	920	1104	1104	1104	1104	1104	1104	1104	1104	1104
H (height)	[mm]	1780	1780	2175	2175	2175	2175	2175	2175	2192	2205	2205
Clearances												
R1	[mm]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
R2	[mm]	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
R3	[mm]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
R4	[mm]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000



CLEARANCES FOR AIR SUPPLY!

Air short-circuiting must be excluded! The necessary clearances near and over the unit may exceed the depicted maintenance clearance by many times.

Fig. 13: Clearances

1 According to Eurovent (refer to „Acoustics“ on page 31)

2 In 10 m free field conditions (also refer to „Acoustics“ on page 31)

3 Values are based on the total number of fans operating at maximum speed.

4 Please observe the applicable regional safety regulations and constructional conditions relevant to the dimensioning of the supply line.

5 Please observe the applicable regional standards for cable cross sections and backup fuses.
Voltage tolerance: max. 10%, voltage fluctuation between phases: max. 3%.

NOTE!

For detailed planning please only use the order related documentation. Detailed dimensional drawings can be obtained on request from your relevant FläktGroup sales office. Specifications and technical data are subject to regular updates. The manufacturer reserves the right to make necessary changes to information without prior written notice.

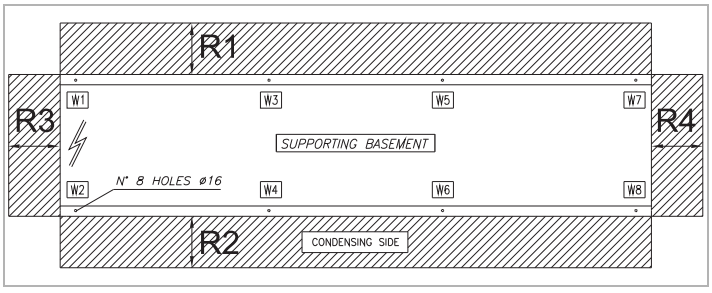
Unit type			0152	0182	0202	0252	0302	0352	0412	0452	0512	0552	0612
Refrigeration capacity [1]	$\dot{Q}_e$	[kW]	35.4	43.1	48.5	54.7	72.3	84.2	96.1	105.2	118.4	134.0	154.3
Compressor power consumption	P_{cpr}	[kW]	14.7	15.6	19.0	21.6	28.3	31.7	35.2	41.2	45.1	52.7	58.0
Total unit power consumption	P	[kW]	15.4	17.1	20.5	23.4	30.0	34.3	37.8	43.7	48.5	56.1	62.4
Chilled water volume flow		[m³/h]	6.8	8.2	9.3	10.5	13.8	16.1	18.4	20.1	22.6	25.6	29.5
Free cooling not activated [2]			Free cooling										
Refrigeration capacity	$\dot{Q}_e$	[kW]	38.2	46.9	52.5	58.8	78.5	91.5	104.7	113.9	127.7	144.5	166.8
Compressor power consumption	P_{cpr}	[kW]	15.1	16.1	19.5	22.1	29.2	32.8	36.4	42.4	46.3	54.4	60.0
Total unit power consumption	P	[kW]	15.7	17.6	21.0	23.8	30.9	35.4	39.0	45.0	49.7	57.8	64.4
Chilled water volume flow		[m³/h]	7.3	9.0	10.0	11.2	15.0	17.5	20.0	21.7	24.4	27.6	31.8
Compliant with ErP													
SEPR HT (ErP EU 2016/2281)			6.03	5.62	5.68	5.45	5.64	5.55	5.82	5.69	5.55	5.61	5.55
Compliant with ERP 2021			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Compliant with ERP 2018			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Application			Process cooling high temperature										
Free cooling at 5 °C outdoor temperature [2]													
Refrigeration capacity	$\dot{Q}_e$	[kW]	24.6	29.5	34	37.8	49.8	58.6	68.7	71.5	80.2	89.8	97.8
Free cooling operation as percentage		[%]	64.4	62.9	64.8	64.3	63.4	64.0	65.6	62.8	62.8	62.1	58.6
Free-cooling 100 % [2]													
Refrigeration capacity	$\dot{Q}_e$	[kW]	38.2	46.9	52.5	58.8	78.5	91.5	104.7	113.9	127.7	144.5	166.8
Total unit power consumption	P	[kW]	0.6	1.5	1.5	1.7	1.7	2.6	2.6	2.6	3.4	3.4	4.4
Temperature at 100 % free-cooling		[°C]	-0.5	-0.9	-0.5	-0.6	-0.8	-0.6	-0.2	-0.9	-0.9	-1.1	-2.1
EER		[-]	63.7	31.3	35.0	34.6	46.2	35.2	40.3	43.8	37.6	42.5	37.9
Controls			FläktGroup controller - step II										
Fans			Axial fans										
Number of fans		n	2	2	2	2	2	3	3	3	4	4	4
Total air volume flow		[m³/h]	11160	17640	15480	17640	21960	27000	31680	31680	36360	39600	42480
Compressor			Fully hermetic Copeland scroll compressor										
Number of compressors		n	2	2	2	2	2	2	2	2	2	2	2
Number of refrigeration circuits		n	1	1	1	1	1	1	1	1	1	1	1
Capacity stages per unit		n	2	2	2	2	2	2	2	2	2	2	2
Compressor type 1			ZP 90	ZP 103	ZP 120	ZP 137	ZP 180	ZP 180	ZP 235	ZP 235	ZP 295	ZP 295	ZP 385
Compressor type 2			ZP 90	ZP 103	ZP 120	ZP 137	ZP 180	ZP 235	ZP 235	ZP 295	ZP 295	ZP 385	ZP 385
Oil type			Copeland 3MAF (32 cSt)/CI Emkarate RL 32 CF										
Oil heating		[W]	2x90	2x90	2x90	2x90	2x70	70/120	2x120	120/150	2x150	2x150	2x150
Coil resistance per coil/compressor		[Ω]	1.61	1.37	1.24	1.24	0.70	0.7/0.63	0.63	0.63/0.51	0.51	0.51	0.51
Evaporator			Soldered stainless steel plate heat exchanger										
Minimum chilled water volume flow	$\dot{V}_{e,min}$	[m³/h]	4.4	5.2	6.3	6.9	9.1	10.7	11.8	13.5	15.3	17.1	19.2
Maximum chilled water volume flow	$\dot{V}_{e,max}$	[m³/h]	12.1	14.3	17.1	18.8	24.6	28.9	31.8	36.3	41.3	45.9	51.6
Max. chilled water-side pressure		[bar]	10	10	10	10	10	10	10	10	10	10	10
Evaporator inlet connection	R	["]	2	2	2	2	2	2 ½	2 ½	2 ½	2 ½	2 ½	2 ½
Evaporator outlet connection	R	["]	2	2	2	2	2	2 ½	2 ½	2 ½	2 ½	2 ½	2 ½
Filling quantities													
Refrigerant R410A		[kg]	10	12	15	15	23	24	33	34	35	40	50
Oil		[kg]	5	7	7	7	8	9	9	12	14	13	13
Minimum chilled water volume flow		[l]	200	250	300	350	450	500	550	650	700	750	800
Weight													
Operating weight		[kg]	680	860	920	940	1240	1350	1590	1610	1690	1920	2000

1 Performance data for input parameters: chilled water temperatures (input/output) 12/7°C; ambient temperature 35°C; values rounded off.

2 Performance data for input parameters: chilled water temperatures (input/output) 15/10°C

Tab. 2

Unit type		0152	0182	0202	0252	0302	0352	0412	0452	0512	0552	0612
Sound values												
Sound power level [1]	[dB(A)]	77	78	78	79	80	81	81	82	83	84	85
Sound pressure level [2]	[dB(A)]	48	49	49	50	51	52	52	53	54	55	56
Compressor												
Maximum power consumption	[kW]	2x9	2x10.1	2x11.8	2x13.2	2x16.9	1x16.9+ 1x22.3	2x22.3	1x22.3+ 1x27.4	2x27.4	1x27.4+ 1x35.8	2x35.8
Maximum current consumption	[A]	2x15.3	2x16.4	2x20.4	2x22.6	2x27.9	1x27.9+ 1x36.1	2x36.1	1x36.1+ 1x45.8	2x45.8	1x45.8+ 1x58.9	2x58.9
Starting current of each compressor	[A]	2x95	2x111	2x118	2x118	2x198	1x198+ 1x225	2x225	1x225+ 1x272	2x272	1x272+ 1x310	2x310
Fans [3]												
Maximum power consumption	[kW]	0.94	2.4	2.4	2.4	2.4	3.6	3.6	3.6	4.8	4.8	4.8
Maximum current consumption	[A]	1.8	7.6	7.6	7.6	7.6	11.4	11.4	11.4	15.2	15.2	15.2
Total [3,4,5]												
Maximum power consumption	[kW]	18.9	22.6	26.0	28.8	36.2	42.8	48.2	53.3	59.6	68.0	76.4
Maximum current consumption	[A]	32.4	40.4	48.4	52.8	63.4	75.4	83.6	93.3	106.8	119.9	133.0
Starting current of entire unit	[A]	112.1	135.0	146.0	148.2	233.5	264.3	272.5	319.5	333.0	371.0	384.1
Maximum connectable cable cross-sections [4]												
Rectangular	[mm]	16x3	16x3	16x3	16x3	20x5	20x5	20x5	20x5	20x5	20x5	20x5
Round	[mm²]	50	50	50	50	120	120	120	120	120	120	120
Maximum permissible backup fuse ratings (fuse type gLgG) [5]												
Back up fuse	[A]	80	100	100	125	160	160	160	160	200	200	200
Dimensions												
A (length)	[mm]	2200	2602	2602	2602	3602	3602	4602	4602	4602	4602	4602
B (width)	[mm]	920	1104	1104	1104	1104	1104	1104	1104	1104	1277	1277
H (height)	[mm]	1780	2175	2175	2175	2175	2175	2205	2175	2205	2350	2350
Clearances												
R1	[mm]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
R2	[mm]	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000
R3	[mm]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
R4	[mm]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000



CLEARANCES FOR AIR SUPPLY!

Air short-circuiting must be excluded! The necessary clearances near and over the unit may exceed the depicted maintenance clearance by many times.

Fig. 14: Clearances

1 According to Eurovent (refer to „Acoustics“ on page 31)

2 In 10 m free field conditions (also refer to „Acoustics“ on page 31)

3 Values are based on the total number of fans operating at maximum speed.

4 Please observe the applicable regional safety regulations and constructional conditions relevant to the dimensioning of the supply line.

5 Please observe the applicable regional standards for cable cross sections and backup fuses.
Voltage tolerance: max. 10%, voltage fluctuation between phases: max. 3%.

NOTE!

For detailed planning please only use the order related documentation. Detailed dimensional drawings can be obtained on request from your relevant FläktGroup sales office. Specifications and technical data are subject to regular updates. The manufacturer reserves the right to make necessary changes to information without prior written notice.

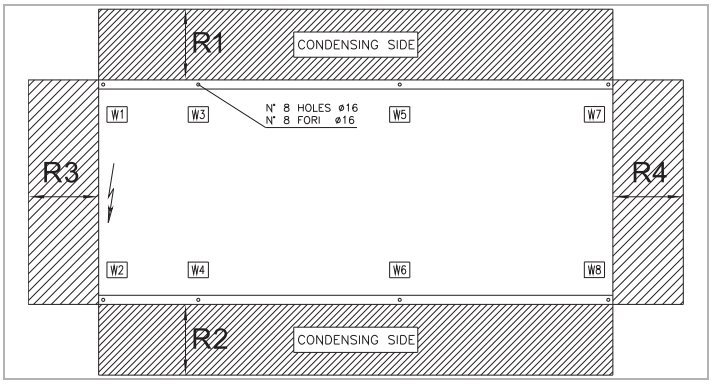
Unit type			0604	0704	0804	0904	1004	1104	1204
Refrigeration capacity [1]	$\dot{Q}_e$	[kW]	153.7	179	202.5	231.9	253.9	291	326.3
Compressor power consumption	P_{cpr}	[kW]	51.6	57.8	65	71.6	81.8	94.4	107.5
Total unit power consumption	P	[kW]	60.0	66.2	77.6	84.2	94.4	107.0	124.3
Chilled water volume flow		[m³/h]	29.4	34.2	38.7	44.3	48.5	55.6	62.4
Free cooling not activated [2]			Free cooling						
Refrigeration capacity	$\dot{Q}_e$	[kW]	166.8	194.7	220.6	252.1	275.2	315.6	353.9
Compressor power consumption	P_{cpr}	[kW]	53.1	59.6	67.2	73.8	84.2	97.2	110.8
Total unit power consumption	P	[kW]	61.5	68.0	79.8	86.4	96.8	109.8	127.6
Chilled water volume flow		[m³/h]	31.8	37.1	42.1	48.1	52.5	60.2	67.5
Compliant with ErP									
SEPR HT (ErP EU 2016/2281)			5.27	5.48	4.97	5.45	5.47	5.72	5.34
Compliant with ERP 2021			✓	✓	-	✓	✓	✓	✓
Compliant with ERP 2018			✓	✓	✓	✓	✓	✓	✓
Application			Process cooling high temperature						
Free cooling at 5 °C outdoor temperature [2]									
Refrigeration capacity	$\dot{Q}_e$	[kW]	128.8	134.5	156.3	192.8	199.3	227.4	253.6
Free-cooling operation as percentage		[%]	77.2	69.1	70.9	76.5	72.4	72.1	71.7
Free cooling 100 % [2]									
Refrigeration capacity	$\dot{Q}_e$	[kW]	166.8	194.7	220.6	252.1	275.2	315.6	353.9
Total unit power consumption	P	[kW]	8.4	8.4	12.6	12.6	12.6	12.6	16.8
Temperature at 100 % free-cooling		[°C]	2.0	0.5	0.9	1.9	1.2	1.1	1.0
EER		[-]	19.9	23.2	17.5	20.0	21.8	25.0	21.1
Controls			FläktGroup controller - step II						
Fans			Axial fans						
Number of fans		n	4	4	6	6	6	6	8
Total air volume flow		[m³/h]	78120	75600	93960	102600	102600	111960	131760
Compressor			Fully hermetic Copeland scroll compressor						
Number of compressors		n	4	4	4	4	4	4	4
Number of refrigeration circuits		n	2	2	2	2	2	2	2
Capacity stages per unit		n	4	4	4	4	4	4	4
Compressor type 1			ZP 180 KCE	ZP 180 KCE	ZP 235 KCE	ZP 235 KCE	ZP 295 KCE	ZP 295 KCE	ZP 385 KCE
Compressor type 2			ZP 180 KCE	ZP 235 KCE	ZP 235 KCE	ZP 295 KCE	ZP 295 KCE	ZP 385 KCE	ZP 385 KCE
Compressor type 3			ZP 180 KCE	ZP 180 KCE	ZP 235 KCE	ZP 235 KCE	ZP 295 KCE	ZP 295 KCE	ZP 385 KCE
Compressor type 4			ZP 180 KCE	ZP 235 KCE	ZP 235 KCE	ZP 295 KCE	ZP 295 KCE	ZP 385 KCE	ZP 385 KCE
Oil type			Arctic EAL 22 CC						
Oil heating		[W]	4 x 70	2 x 2/2 x 2	4 x 120	2 x 2/2 x 2	4 x 150	4 x 150	4 x 150
Coil resistance per coil/compressor		[Ω]	4 x 0.70	2 x 0.7/2 x 0.63	4 x 0.63	2 x 0.63/2 x 0.51	4 x 0.51	2 x 0.51/2 x 0.35	4 x 0.35
Evaporator			Soldered stainless steel plate heat exchanger						
Minimum chilled water volume flow	$\dot{V}_{e,min}$	[m³/h]	18.3	21.3	24.1	27.6	30.2	34.7	38.9
Maximum chilled water volume flow	$\dot{V}_{e,max}$	[m³/h]	49.1	57.1	62.1	62.1	62.4	78.1	80.2
Max. chilled water-side operating pressure		[bar]	10	10	10	10	10	10	10
Evaporator inlet connection	Rp	["]	3	3	3	4	4	4	4
Evaporator outlet connection	Rp	["]	3	3	3	4	4	4	4
Filling quantities									
Refrigerant R410A		[kg]	28	40	41	47	49	60	61
Oil		[kg]	17	18	19	23	27	26	25
Minimum chilled water volume flow		[l]	850	1000	1100	1250	1400	1600	1800
Weight									
Operating weight		[kg]	2200	2330	2510	2880	2940	3260	3400

1 Performance data for input parameters: chilled water temperatures (input/output) 12/7°C; ambient temperature 35°C; values rounded off.

2 Performance data for input parameters: chilled water temperatures (input/output) 15/10°C

Tab. 3

Unit type		0604	0704	0804	0904	1004	1104	1204
Sound values								
Sound power level [1]	[dB(A)]	93	93	94	94	94	95	96
Sound pressure level [2]	[dB(A)]	64	64	65	65	65	66	67
Compressor								
Maximum power consumption	[kW]	4x16.9	2x16.9+2x22.3	4x22.3	2x22.3+2x27.4	4x27.4	2x27.4+2x35.8	4x35.8
Maximum current consumption	[A]	4x27.9	2x27.9+2x36.1	4x36.1	2x36.1+2x45.8	4x45.8	2x45.8+2x58.9	4x58.9
Starting current of each compressor	[A]	4x198	2x198+2x225	4x225	2x225+2x272	4x272	2x272+2x310	4x310
Fans [3]								
Maximum power consumption	[kW]	8.4	8.4	12.6	12.6	12.6	12.6	16.8
Maximum current consumption	[A]	15.2	15.2	22.8	22.8	22.8	22.8	30.4
Total [3,4,5]								
Maximum power consumption	[kW]	76.0	86.8	101.8	112	122.2	139.0	160.0
Maximum current consumption	[A]	126.8	143.2	167.2	186.6	206.0	232.2	266.0
Starting current of entire unit	[A]	296.9	332.1	356.1	412.9	432.2	483.3	517.1
Maximum connectable cable cross-sections [4]								
Rectangular	[mm]	20x5	20x5	20x5	20x5	2x20x5	2x20x5	2x20x5
Round	[mm²]	120	120	120	120	240	240	240
Maximum permissible backup fuse ratings (fuse type gLgG) [5]								
Back up fuse	[A]	160	200	250	250	315	315	400
Dimensions								
A (length)	[mm]	4110	4110	4110	5110	5110	5110	5110
B (width)	[mm]	2220	2220	2220	2220	2220	2220	2220
H (height)	[mm]	2150	2150	2150	2150	2150	2480	2480
Clearances								
R1	[mm]	2000	2000	2000	2000	2000	2000	2000
R2	[mm]	2000	2000	2000	2000	2000	2000	2000
R3	[mm]	1000	1000	1000	1000	1000	1000	1000
R4	[mm]	1000	1000	1000	1000	1000	1000	1000



CLEARANCES FOR AIR SUPPLY!

Air short-circuiting must be excluded! The necessary clearances near and over the unit may exceed the depicted maintenance clearance by many times.

Fig. 15: Clearances

1 According to Eurovent (refer to „Acoustics“ on page 31)

2 In 10 m free field conditions (also refer to „Acoustics“ on page 31)

3 Values are based on the total number of fans operating at maximum speed.

4 Please observe the applicable regional safety regulations and constructional conditions relevant to the dimensioning of the supply line.

5 Please observe the applicable regional standards for cable cross sections and backup fuses.
Voltage tolerance: max. 10%, voltage fluctuation between phases: max. 3%.

NOTE!

For detailed planning please only use the order related documentation. Detailed dimensional drawings can be obtained on request from your relevant FläktGroup sales office. Specifications and technical data are subject to regular updates. The manufacturer reserves the right to make necessary changes to information without prior written notice.

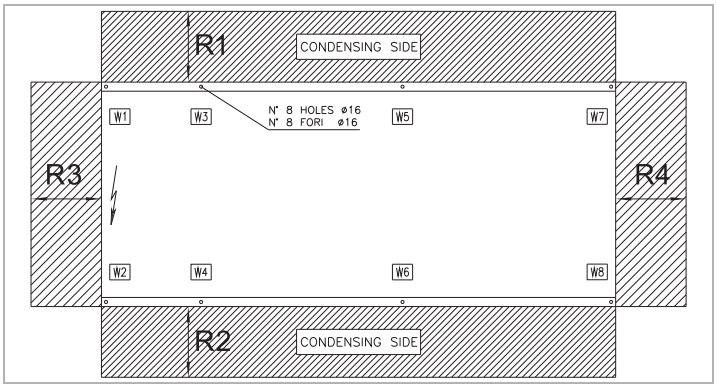
Unit type			0604	0704	0804	0904	1004	1104	1204
Refrigeration capacity [1]	$\dot{Q}_e$	[kW]	142.5	165.4	184.8	208.8	236.1	269.7	302.5
Compressor power consumption	P_{cpr}	[kW]	57.6	64.8	74.0	82.8	90.2	104.5	119.0
Total unit power consumption	P	[kW]	61.0	70.0	79.2	88.0	95.4	109.7	125.9
Chilled water volume flow		[m³/h]	27.2	31.6	35.3	39.9	45.1	51.5	57.8
Free cooling not activated [2]									
Refrigeration capacity	$\dot{Q}_e$	[kW]	154.7	179.9	201.2	226.0	254.6	291.0	326.4
Compressor power consumption	P_{cpr}	[kW]	59.6	67.3	77.0	85.7	92.9	108.0	123.2
Total unit power consumption	P	[kW]	63.0	72.5	82.2	90.9	98.1	113.2	130.1
Chilled water volume flow		[m³/h]	29.5	34.3	38.4	43.1	48.6	55.5	62.3
Compliant with ErP									
SEPR HT (ErP EU 2016/2281)			5.88	5.67	5.59	5.91	5.96	6.09	5.82
Compliant with ERP 2021			✓	✓	✓	✓	✓	✓	✓
Compliant with ERP 2018			✓	✓	✓	✓	✓	✓	✓
Application			Process cooling high temperature						
Free cooling at 5 °C outdoor temperature [2]									
Refrigeration capacity	$\dot{Q}_e$	[kW]	96.7	112.2	115.0	140.2	147.6	166.0	187.9
Free-cooling operation as percentage		[%]	62.5	62.4	57.2	62.0	58.0	57.0	57.6
Free cooling 100 % [2]									
Refrigeration capacity	$\dot{Q}_e$	[kW]	154.7	179.9	201.2	226	254.6	291	326.4
Total unit power consumption	P	[kW]	3.4	5.2	5.2	5.2	5.2	5.2	6.9
Temperature at 100 % free-cooling		[°C]	-1	-1	-2.5	-1.1	-2.2	-2.5	-2.4
EER		[-]	45.5	34.6	38.7	43.5	49.0	56.0	47.3
Controls			FläktGroup controller - step II						
Fans			Axial fans						
Number of fans		n	4	6	6	6	6	6	8
Total air volume flow		[m³/h]	42120	51480	48960	55800	53640	59400	67680
Compressor			Fully hermetic Copeland scroll compressor						
Number of compressors		n	4	4	4	4	4	4	4
Number of refrigeration circuits		n	2	2	2	2	2	2	2
Capacity stages per unit		n	4	4	4	4	4	4	4
Compressor type 1			ZP 180 KCE	ZP 180 KCE	ZP 235 KCE	ZP 235 KCE	ZP 295 KCE	ZP 295 KCE	ZP 385 KCE
Compressor type 2			ZP 180 KCE	ZP 235 KCE	ZP 235 KCE	ZP 295 KCE	ZP 295 KCE	ZP 385 KCE	ZP 385 KCE
Compressor type 3			ZP 180 KCE	ZP 180 KCE	ZP 235 KCE	ZP 235 KCE	ZP 295 KCE	ZP 295 KCE	ZP 385 KCE
Compressor type 4			ZP 180 KCE	ZP 235 KCE	ZP 235 KCE	ZP 295 KCE	ZP 295 KCE	ZP 385 KCE	ZP 385 KCE
Oil type			Arctic EAL 22 CC						
Oil heating		[W]	4 x 70	2 x 2/2 x 2	4 x 120	2 x 2/2 x 2	4 x 150	4 x 150	4 x 150
Coil resistance per coil/compressor		[Ω]	4 x 0.70	2 x 0.7/2 x 0.63	4 x 0.63	2 x 0.63/2 x 0.51	4 x 0.51	2 x 0.51/2 x 0.35	4 x 0.35
Evaporator			Soldered stainless steel plate heat exchanger						
Minimum chilled water volume flow	$\dot{V}_{e,min}$	[m³/h]	18.3	21.3	24.1	27.6	30.2	34.7	38.9
Maximum chilled water volume flow	$\dot{V}_{e,max}$	[m³/h]	49.1	57.1	62.1	62.1	62.4	78.1	80.2
Max. chilled water-side operating pressure		[bar]	10	10	10	10	10	10	10
Evaporator inlet connection	Rp	["]	3	3	3	4	4	4	4
Evaporator outlet connection	Rp	["]	3	3	3	4	4	4	4
Filling quantities									
Refrigerant R410A		[kg]	39	40	52	47	62	76	77
Oil		[kg]	17	18	19	23	27	26	25
Minimum chilled water volume flow		[l]	850	1000	1100	1250	1400	1600	1800
Weight									
Operating weight		[kg]	2280	2410	2580	2880	3040	3380	3520

1 Performance data for input parameters: chilled water temperatures (input/output) 12/7°C; ambient temperature 35°C; values rounded off.

2 Performance data for input parameters: chilled water temperatures (input/output) 15/10°C

Tab. 4

Unit type		0604	0704	0804	0904	1004	1104	1204
Sound values								
Sound power level [1]	[dB(A)]	82	83	83	84	84	85	86
Sound pressure level [2]	[dB(A)]	53	54	54	55	55	56	57
Compressor								
Maximum power consumption	[kW]	4x16.9	2x16.9+2x22.3	4x22.3	2x22.3+2x27.4	4x27.4	2x27.4+2x35.8	4x35.8
Maximum current consumption	[A]	4x27.9	2x27.9+2x36.1	4x36.1	2x36.1+2x45.8	4x45.8	2x45.8+2x58.9	4x58.9
Starting current of each compressor	[A]	4x198	2x198+2x225	4x225	2x225+2x272	4x272	2x272+2x310	4x310
Fans [3]								
Maximum power consumption	[kW]	4.8	7.2	7.2	7.2	7.2	7.2	9.6
Maximum current consumption	[A]	15.2	22.8	22.8	22.8	22.8	22.8	30.4
Total [3,4,5]								
Maximum power consumption	[kW]	72.4	85.6	96.4	106.6	116.8	133.6	152.8
Maximum current consumption	[A]	126.8	150.8	167.2	186.6	206.0	232.2	266.0
Starting current of entire unit	[A]	296.9	339.7	356.1	412.8	432.2	483.3	517.1
Maximum connectable cable cross-sections [4]								
Rectangular	[mm]	20x5	20x5	20x5	20x5	2x20x5	2x20x5	2x20x5
Round	[mm²]	120	120	120	120	240	240	240
Maximum permissible backup fuse ratings (fuse type gLgG) [5]								
Back up fuse	[A]	160	200	250	250	315	315	400
Dimensions								
A (length)	[mm]	4110	4110	4110	5110	5110	5110	5110
B (width)	[mm]	2220	2220	2220	2220	2220	2220	2220
H (height)	[mm]	2150	2150	2150	2180	2180	2430	2430
Clearances								
R1	[mm]	2000	2000	2000	2000	2000	2000	2000
R2	[mm]	2000	2000	2000	2000	2000	2000	2000
R3	[mm]	1000	1000	1000	1000	1000	1000	1000
R4	[mm]	1000	1000	1000	1000	1000	1000	1000



CLEARANCES FOR AIR SUPPLY!

Air short-circuiting must be excluded! The necessary clearances near and over the unit may exceed the depicted maintenance clearance by many times.

Fig. 16: Clearances

1 According to Eurovent (refer to „Acoustics“ on page 31)

2 In 10 m free field conditions (also refer to „Acoustics“ on page 31)

3 Values are based on the total number of fans operating at maximum speed.

4 Please observe the applicable regional safety regulations and constructional conditions relevant to the dimensioning of the supply line.

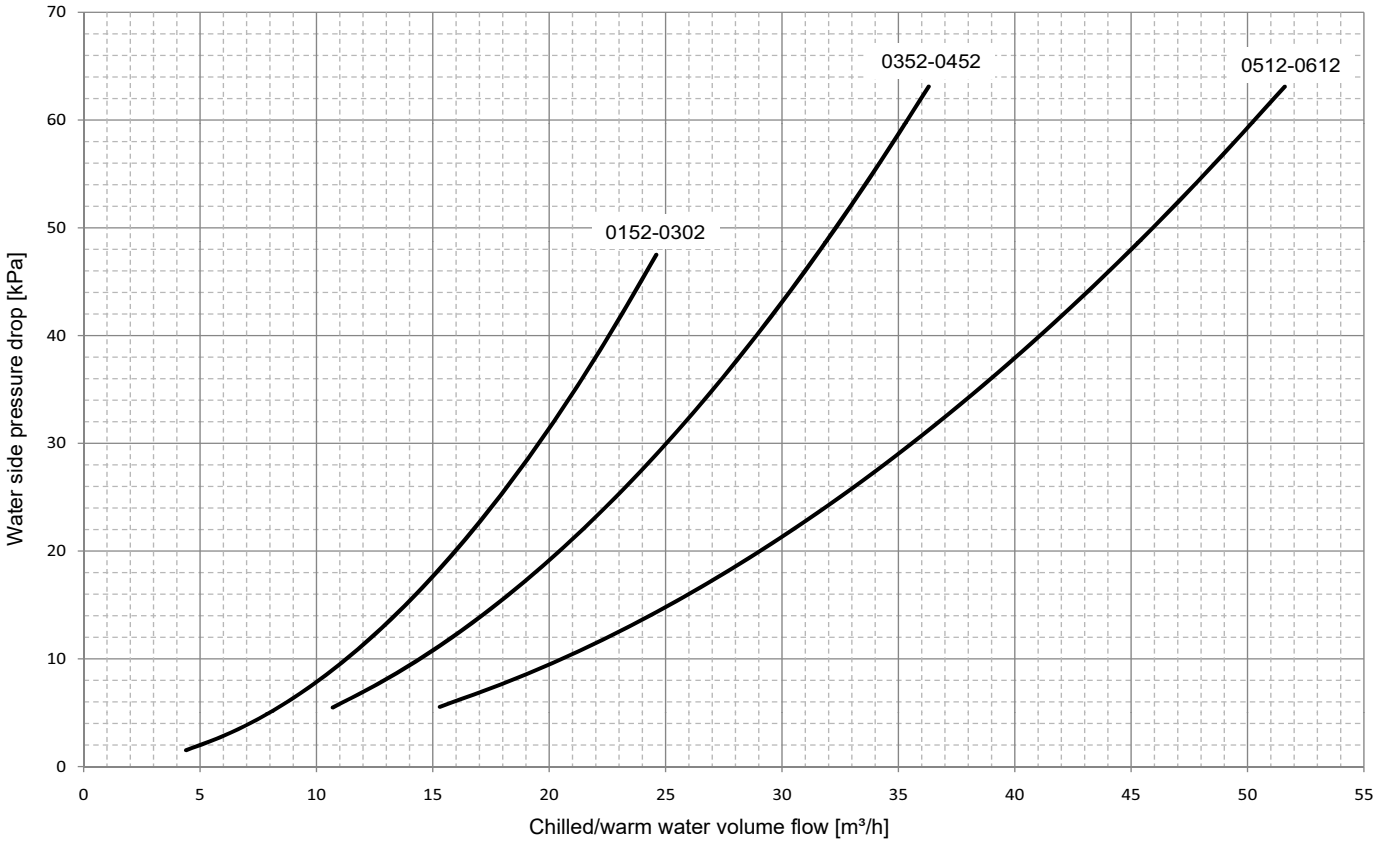
5 Please observe the applicable regional standards for cable cross sections and backup fuses.
Voltage tolerance: max. 10%, voltage fluctuation between phases: max. 3%.

NOTE!

For detailed planning please only use the order related documentation. Detailed dimensional drawings can be obtained on request from your relevant FläktGroup sales office. Specifications and technical data are subject to regular updates. The manufacturer reserves the right to make necessary changes to information without prior written notice.

Pressure drop of optional water filter (option .I12) GLFC 0152-0612 BD2 (.SL)

D. 1



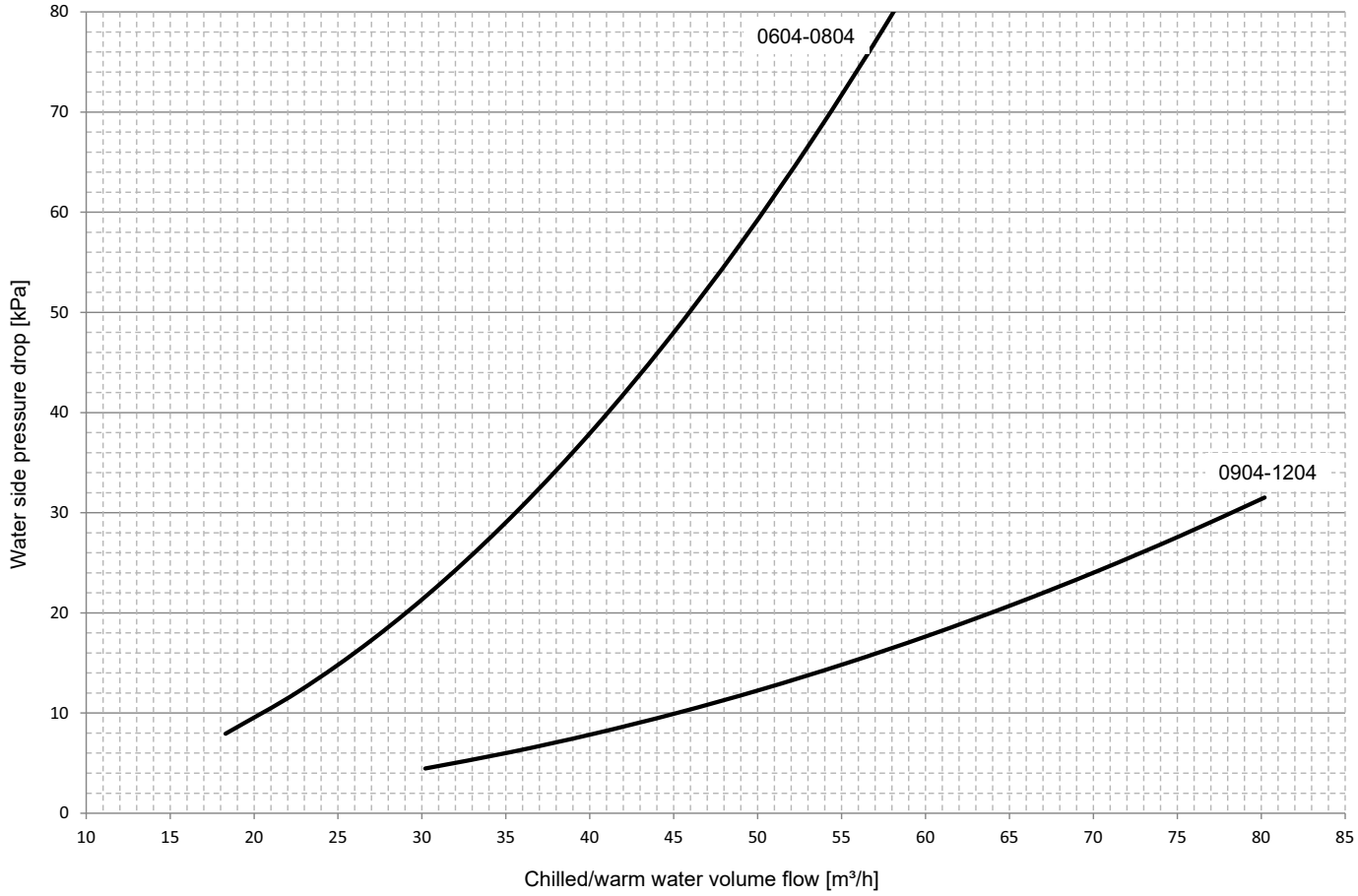
Connection diameter for water filter amounts to 2" with size 0152-0302
0352-0452: 2 ½"
0512-0612: 3"

DAMAGE TO THE UNIT!

Under all circumstances please remember to install a water filter before direct inlet into the water side heat exchanger. With water cooled units both the evaporator and condenser must be protected. The water filter prevents formation of dirt and scale on heat exchangers. The water filter can be optionally ordered and is a requirement for safe and trouble-free operation of the unit and in such a way this requirement constitutes an integral part for the validity of the guarantee.

Pressure drop of optional water filter (option .I12) GLFC 0604-1204 BD2 (.SL)

D. 2

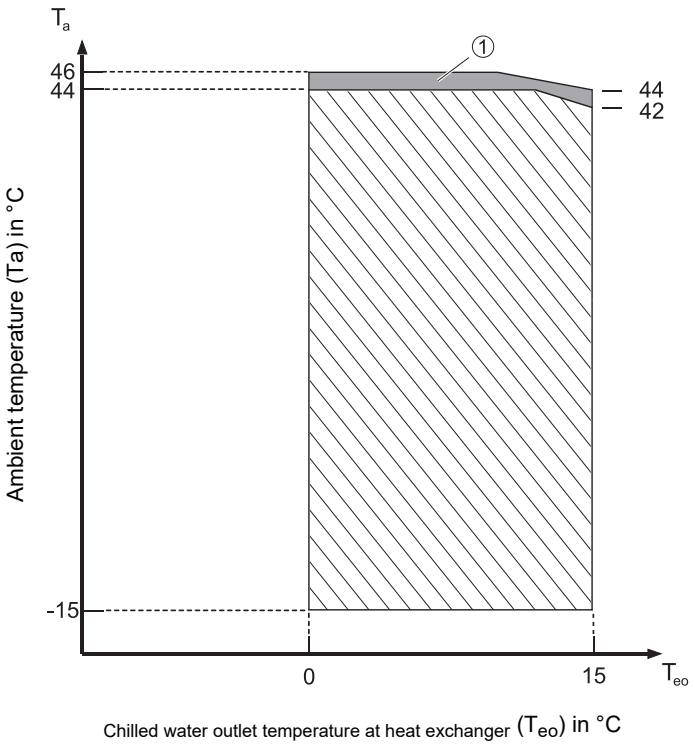


Connection diameter for water filter amounts to 3" with size 0604-0804
0904-1204: 4"

DAMAGE TO THE UNIT!

Under all circumstances please remember to install a water filter before direct inlet into the water side heat exchanger. With water cooled units both the evaporator and condenser must be protected. The water filter prevents formation of dirt and scale on heat exchangers. The water filter can be optionally ordered and is a requirement for safe and trouble-free operation of the unit and in such a way this requirement constitutes an integral part for the validity of the guarantee.

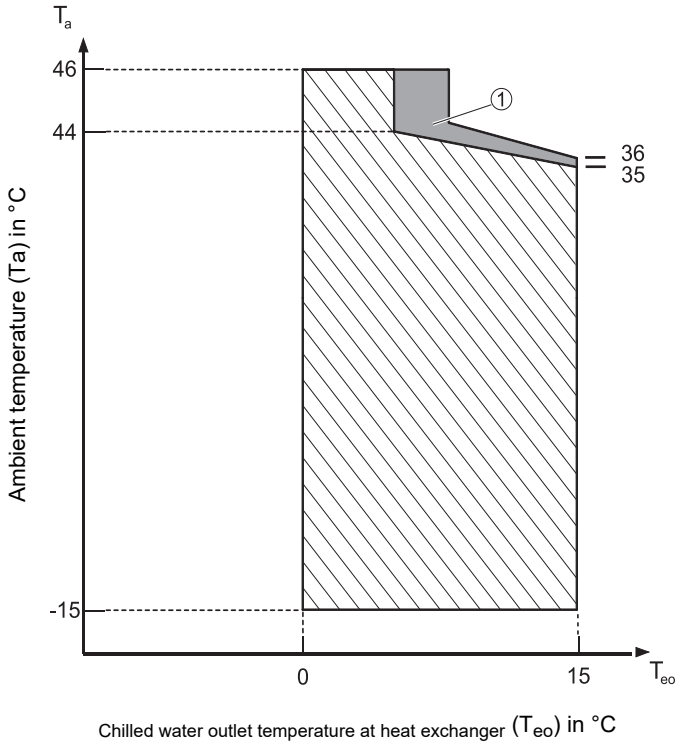
Basic unit GLFC 0152-1204 BD2



Chilled water outlet temperature at heat exchanger (T_{eo}) in °C

SL unit GLFC 0152-1204 BD2.SL

D. 3



Chilled water outlet temperature at heat exchanger (T_{eo}) in °C

The operating limits apply for continuous operation of the unit and the water pump given that the correct commissioning, cleaning, maintenance and setup/installation of the unit and the system is carried out.

For operational reasons water must be protected from freezing by adding glycol. FläktGroup recommends the use of at least 30% ethylene glycol.

① *Unit dependent operating range.*

		GLFC …. BD2	
		Evaporator	
		Min	Max
Water in	[°C]	5	23
Water out	[°C]	0	15
Δ T	[K]	3	8

Tab. 5

For detailed design please contact your FläktGroup sales office.

NOTE!

The system shall be protected against frost due to the fact that water may come into contact with outdoor air temperatures below 0 °C via air-cooled heat exchanger. FläktGroup recommends o use at least 30% ethylene glycol.

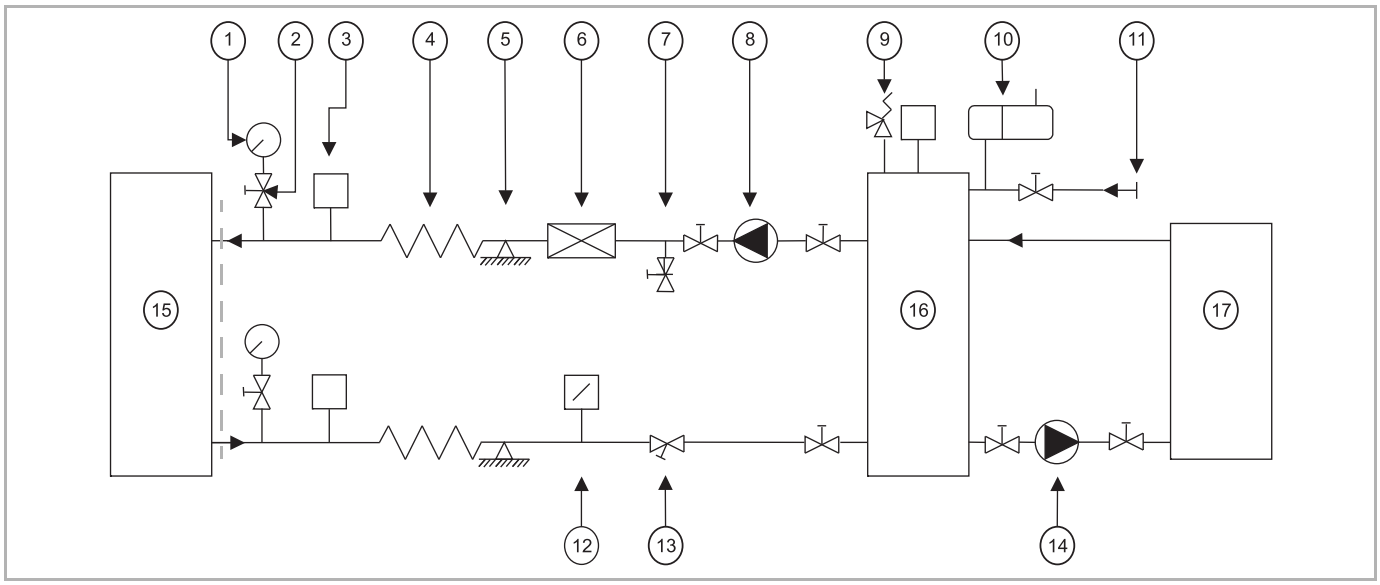


Fig. 17: Hydraulic circuit of twin-circuit buffer tank

1: Pressure gauge
2: Shut-off cock
3: Automatic venting
4: Vibration damping connection
5: Unit-independent pipeline fixing point
6: Water filter (maximum mesh size 1 mm²)
7: Drain valve
8: Pump – primary circuit
9: Safety valve
10: Expansion tank
11: Filling valve
12: Flow switch
13: Balancing valve
14: Pump – secondary circuit
15: FläktGroup unit
16: Buffer tank/hydraulic switch suitable for chilled water systems
17: Consumer

Items 4, 5, 6 and 12 are also specified by FläktGroup in addition to the internal parts required by legal regulations.

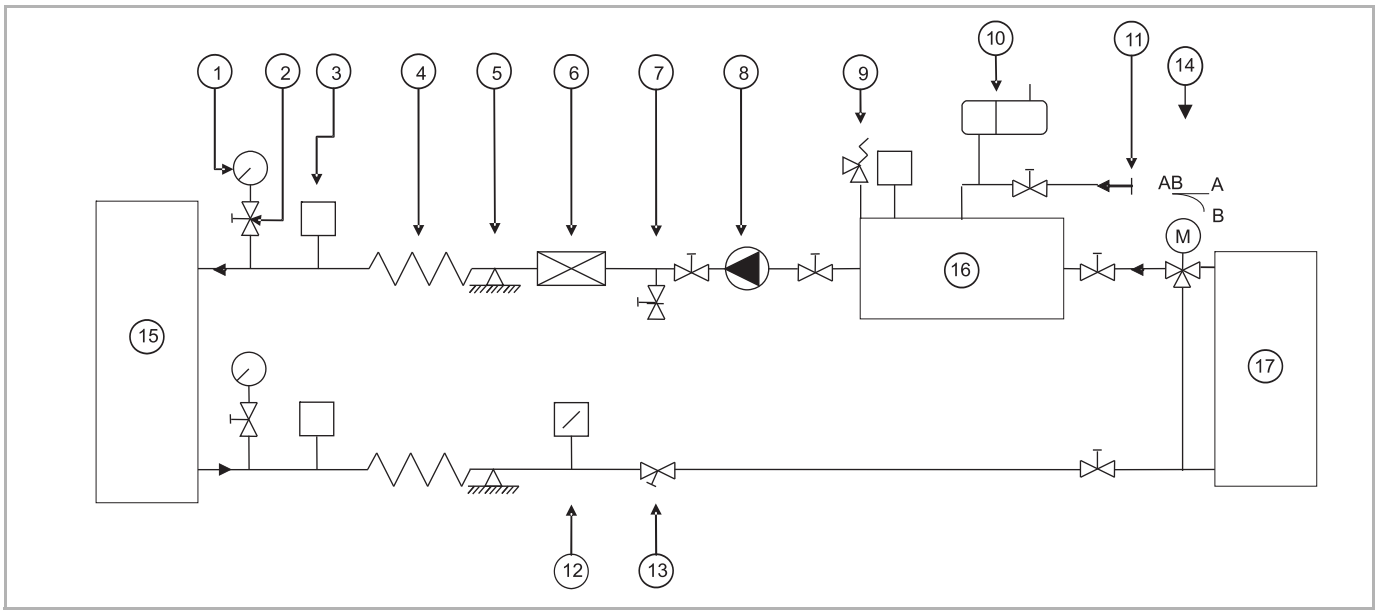


Fig. 18: Hydraulic circuit of single-circuit buffer tank

1: Pressure gauge
2: Shut-off cock
3: Automatic venting
4: Vibration damping connection
5: Unit-independent pipeline fixing point
6: Water filter (maximum mesh size 1 mm²)
7: Drain valve
8: Pump – primary circuit
9: Safety valve
10: Expansion tank
11: Filling valve
12: Flow switch
13: Balancing valve
14: 3-way valve with bypass switch
15: FläktGroup unit
16: One-circuit buffer tank
17: Consumer

Items 4, 5, 6 and 12 are also specified by FläktGroup in addition to the internal parts required by legal regulations.

DAMAGE TO THE UNIT!

Under all circumstances please remember to install a water filter before direct inlet into the water side heat exchanger. With water cooled units both the evaporator and condenser must be protected. The water filter prevents formation of dirt and scale on heat exchangers. The water filter can be optionally ordered and is a requirement for safe and trouble-free operation of the unit and in such a way this requirement constitutes an integral part for the validity of the guarantee.

	Total sound level		Octave band [Hz]							
	Sound power [1] [dB(A)]	Sound pressure level [2] [dB(A)]	Sound pressure level [2] [dB]							
		10 m	63	125	250	500	1000	2000	4000	8000
Basic unit – 2 compressors										
0152	87	58	62	59	57	53	54	50	42	34
0182	87	58	62	59	57	53	54	50	42	34
0202	90	61	65	62	60	56	57	53	45	37
0252	90	61	65	62	60	56	57	53	45	37
0302	91	62	66	63	61	57	58	54	46	38
0352	91	62	66	63	61	57	58	54	46	38
0412	92	63	67	64	62	58	59	55	47	39
0452	92	63	67	64	62	58	59	55	47	39
0512	93	64	68	65	63	59	60	56	48	40
0552	93	64	68	65	63	59	60	56	48	40
0612	94	65	69	66	64	60	61	57	49	41
SL unit – 2 compressors										
0152	77	48	60	53	49	43	44	37	30	23
0182	78	49	58	54	51	44	45	35	28	22
0202	78	49	58	54	51	44	45	35	28	22
0252	79	50	59	55	52	45	46	36	29	23
0302	80	51	60	56	53	46	47	37	30	24
0352	81	52	61	57	54	47	48	38	31	25
0412	81	52	61	57	54	47	48	38	31	25
0452	82	53	62	58	55	48	49	39	32	26
0512	83	54	63	59	56	49	50	40	33	27
0552	84	55	64	60	57	50	51	41	34	28
0612	85	56	65	61	58	51	52	42	35	29

Data for operating conditions
Data apply to outdoor temperatures up to 35 °C in cooling mode
At higher temperatures the fan speed is increased automatically and the sound values rise.

[1] Specification of sound power (EUROVENT certified value):
The producer specifies the sound power value on the basis of conducted measurement in accordance with the ISO 3744 norm as required by the EUROVENT certification (sound samples Eurovent 8/1).

NOTE!
This certification expressly refers to sound power in dB(A), which thus constitutes obligatory data in this case.

[2] Specification of sound pressure level:
Sound pressure level at free field conditions with reflected surface (Q factor =2) and in 10 meters distance from the unit.
For the sound pressure level the following correction values can be used:
Sound pressure level at 5 m: +5 dB to sound pressure level in 10 meters distance
Sound pressure level at 15 m: -3 dB to sound pressure level in 10 meters distance
Sound pressure level at 20 m: -6 dB to sound pressure level in 10 meters distance
The values of octave band are average values calculated from sound power level.

NOTE!
Specific sound level calculations, that are valid for particular installation location, can only be carried out by an acoustics engineer, commissioned by third party.

	Total sound level		Octave band [Hz]							
	Sound power [1] [dB(A)]	Sound pressure level [2] [dB(A)]	Sound pressure level [2] [dB]							
		10 m	63	125	250	500	1000	2000	4000	8000
Basic unit – 4 compressors										
0604	93	64	64	64	62	60	59	58	50	42
0704	93	64	64	64	62	60	59	58	50	42
0804	94	65	65	65	63	61	60	59	51	43
0904	94	65	65	65	63	61	60	59	51	43
1004	94	65	65	65	63	61	60	59	51	43
1104	95	66	66	66	64	62	61	60	52	44
1204	96	67	67	67	65	63	62	61	53	45
SL unit – 4 compressors										
0604	82	53	57	55	56	51	47	41	36	29
0704	83	54	58	56	57	52	48	42	37	30
0804	83	54	58	56	57	52	48	42	37	30
0904	84	55	59	57	58	53	49	43	38	31
1004	84	55	59	57	58	53	49	43	38	31
1104	85	56	60	58	59	54	50	44	39	32
1204	86	57	61	59	60	55	51	45	40	33

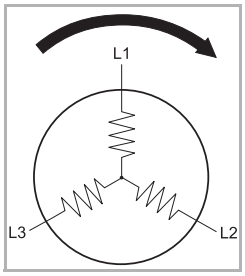
Data for operating conditions
Data apply to outdoor temperatures up to 35 °C in cooling mode
At higher temperatures the fan speed is increased automatically and the sound values rise.

[1] Specification of sound power (EUROVENT certified value):
The producer specifies the sound power value on the basis of conducted measurement in accordance with the ISO 3744 norm as required by the EUROVENT certification (sound samples Eurovent 8/1).

NOTE!
This certification expressly refers to sound power in dB(A), which thus constitutes obligatory data in this case.

[2] Specification of sound pressure level:
Sound pressure level at free field conditions with reflected surface (Q factor =2) and in 10 meters distance from the unit.
For the sound pressure level the following correction values can be used:
Sound pressure level at 5 m: +5 dB to sound pressure level in 10 meters distance
Sound pressure level at 15 m: -3 dB to sound pressure level in 10 meters distance
Sound pressure level at 20 m: -6 dB to sound pressure level in 10 meters distance
The values of octave band are average values calculated from sound power level.

NOTE!
Specific sound level calculations, that are valid for particular installation location, can only be carried out by an acoustics engineer, commissioned by third party.



Before you start setting up the unit's electrical connections, check the following:

– The properties of the mains power supply must comply with EN 60204-1 regulations and the power requirements of the unit.
– The mains power supply voltage must have a rating of ± 10% with a maximum phase difference of 3%. Do not operate the motors if the voltage difference between the phases exceeds 3% as this will invalidate all warranty claims. To check - use the following formula (see example).

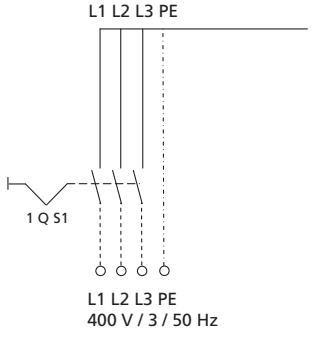
$$\text{Voltage imbalance } \Delta U_{max} = \frac{\text{Max. voltage imbalance from average value}}{\text{average voltage } U_m} \times 100$$

EXAMPLE

	Input data		**Result**
Requirements You must first determine certain input data/measured values.	Nominal voltage Voltage between phases	↟ 400 V/50 Hz/3 phases ↟ L1/L2 = 409 V; L2/L3 = 398 V; L1/L3 = 396 V	
1. Step Determine the average voltage U_m	Average voltage	↟ $U_m = \frac{\Sigma U}{3}$ $\frac{(409 + 398 + 396)}{3} = 401\ V$	↟ **U_m = 401 V**
2. Step Determine the maximum voltage deviation ΔU_{max}	Voltage imbalance ΔU_{max} in %? U_{max} = 409 V U_m = 401 V	↟ $\Delta U_{max} = \frac{\text{max. voltage imbalance}}{U_m} \times 100$ $\frac{(409 - 401)\,V}{401\ V} \times 100 = 2\ \%$	↟ **ΔU_{max} = 2 % ✓**

NOTE!
When connecting the supply voltage, make sure you observe the **clockwise rotating direction**!

Connecting power supply using the main isolator of chiller



GLFC 0152-0612 BD2(.SL)
GLFC 0604-1204 BD2(.SL)

Fig. 19: GLFC main isolator

Integrating flow switch

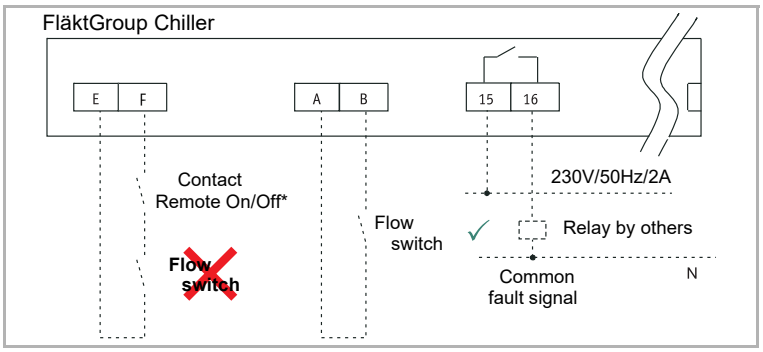


Fig. 20: Electrical integration of flow switch

Terminals: A - B: Connecting the flow switch by others
E - F: Remote contact for switching the unit off and on via NO contact by others
15 - 16: Common fault signal (voltage by others max. 230 V AC/50 Hz/2 A)

DAMAGE TO THE UNIT.

✗ Do not use the flow switch to switch the remote On/Off contact.

✓ Connect the flow switch to terminals A-B in the chiller's switch cabinet. The flow switch acts as a safety device and not as a regular switching device for the unit.

Integrating common fault signal

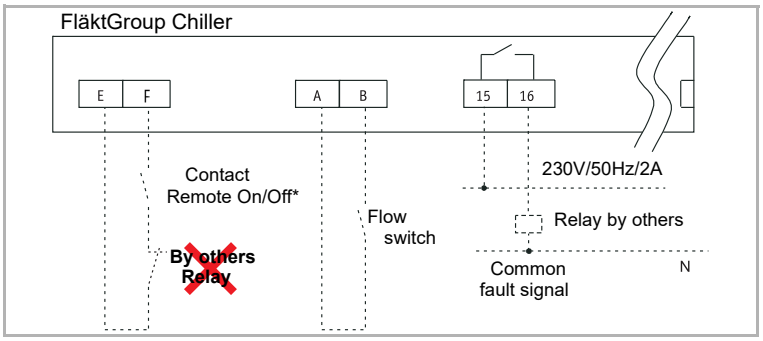


Fig. 21: Electric integration of error message

Terminals: A - B: Connecting the flow switch by others
E - F: Remote contact for switching the unit off and on via NO contact by others
15 - 16: Common fault signal (voltage by others max. 230 V AC/50 Hz/2 A)

DAMAGE TO THE UNIT.

✗ Do **not** open the remote on/off contact, e.g. via the changeover contact of the relay by others, if there is a fault in the system.

– The error can in such a way be reset.
– The cause of the malfunction cannot be determined.
– The entire unit stops operating although it is possible that only one refrigeration circuit is affected.

NOTE:

Under all circumstances please remember to install an additional flow switch at chilled water outlet of the unit and connect it to terminals A-B in the switch cabinet of the unit. The additional flow switch can be optionally ordered and is a requirement for safe and trouble-free operation of the unit and in such a way this requirement constitutes an integral part for the validity of the guarantee.

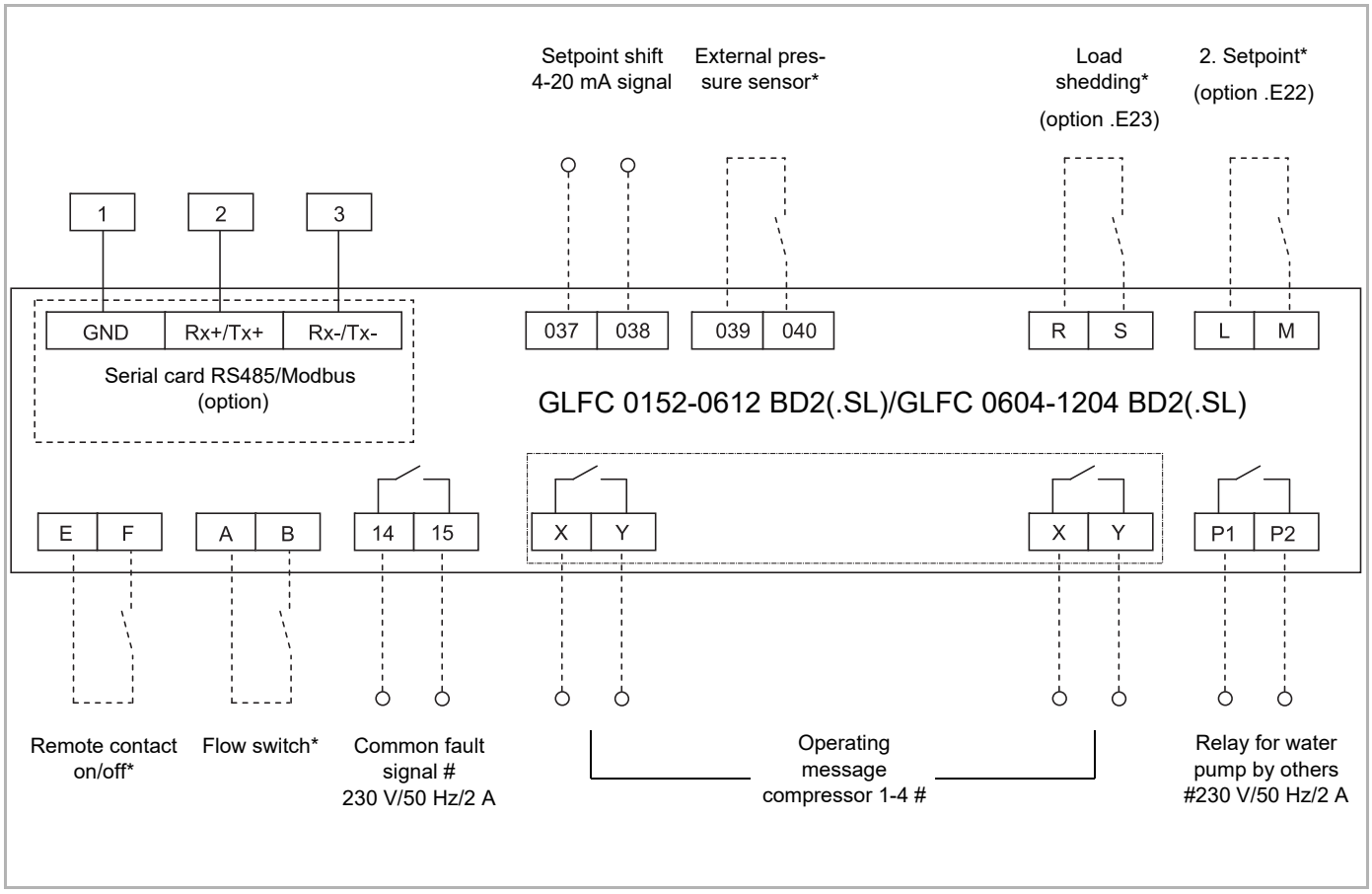


Fig. 22: GLFC electrical integration

Terminals:

A - B:	*Connecting the flow switch by others*
E - F:	*Remote contact for switching the unit off and on via the NO contact by others*
L - M:	*Activation of 2nd setpoint via NO contact by others (option .E22)*
R - S:	*Load shedding by unit, capacity limitation via NC contact by others (option .E23)*[2]
P1 - P2:	*Relay for controlling pump by others*
14 - 15:	*Common fault signal (voltage by others max. 2 A / AC / 50 Hz)*
X - Y:	*74 - 75: Operating message compressor 1 (0152-0612)*
	76 - 77 Operating message compressor 2 (0152-0612)
	67 - 68 Operating message compressor 1 (0604-1204)
	69 - 70 Operating message compressor 2 (0604-1204)
	71 - 72 Operating message compressor 3 (0604-1204)
	73 - 74 Operating message compressor 4 (0604-1204)
037-038:	*Setpoint shift via 4-20 mA signal*
039-040:	*Error contact by others* [1)]
1 - 2 - 3 :	*Connection to serial card (option)*[3)]
- - - - - - - -	*Cabling by others*
#	*potential to be supplied by others (max. 230 V / 50 Hz / 2 A)*
*	*potential may not be supplied by others (supplied by controller)*

[1] *The unit is stopped by opening a contact by others and an error message appears. The contact can also be used to stop the unit if the water pressure in the connected water network drops (pressure switch by others).*

[2] *Reduction of refrigeration capacity (load shedding switch) and of electrical power consumption by opening a potential-free contact by others.*

[3] *The serial card is required to link the unit to a building management system.*

Weight Data Chillers

GLFC #### BD2(.SL)	0152	0182	0202	0252	0302	0352	0412	0452	0512	0552	0612
Operating weight	670	710	870	880	1060	1310	1340	1410	1650	1680	1740

GLFC #### BD2.SL	0152	0182	0202	0252	0302	0352	0412	0452	0512	0552	0612
Operating weight	680	860	920	940	1240	1350	1590	1610	1690	1920	2000

GLFC #### BD2	0604	0704	0804	0904	1004	1104	1204
Operating weight	2200	2330	2510	2880	2940	3260	3400

GLFC #### BD2.SL	0604	0704	0804	0904	1004	1104	1204
Operating weight	2280	2410	2580	2880	3040	3380	3520

Tab. 6: All weight in kg

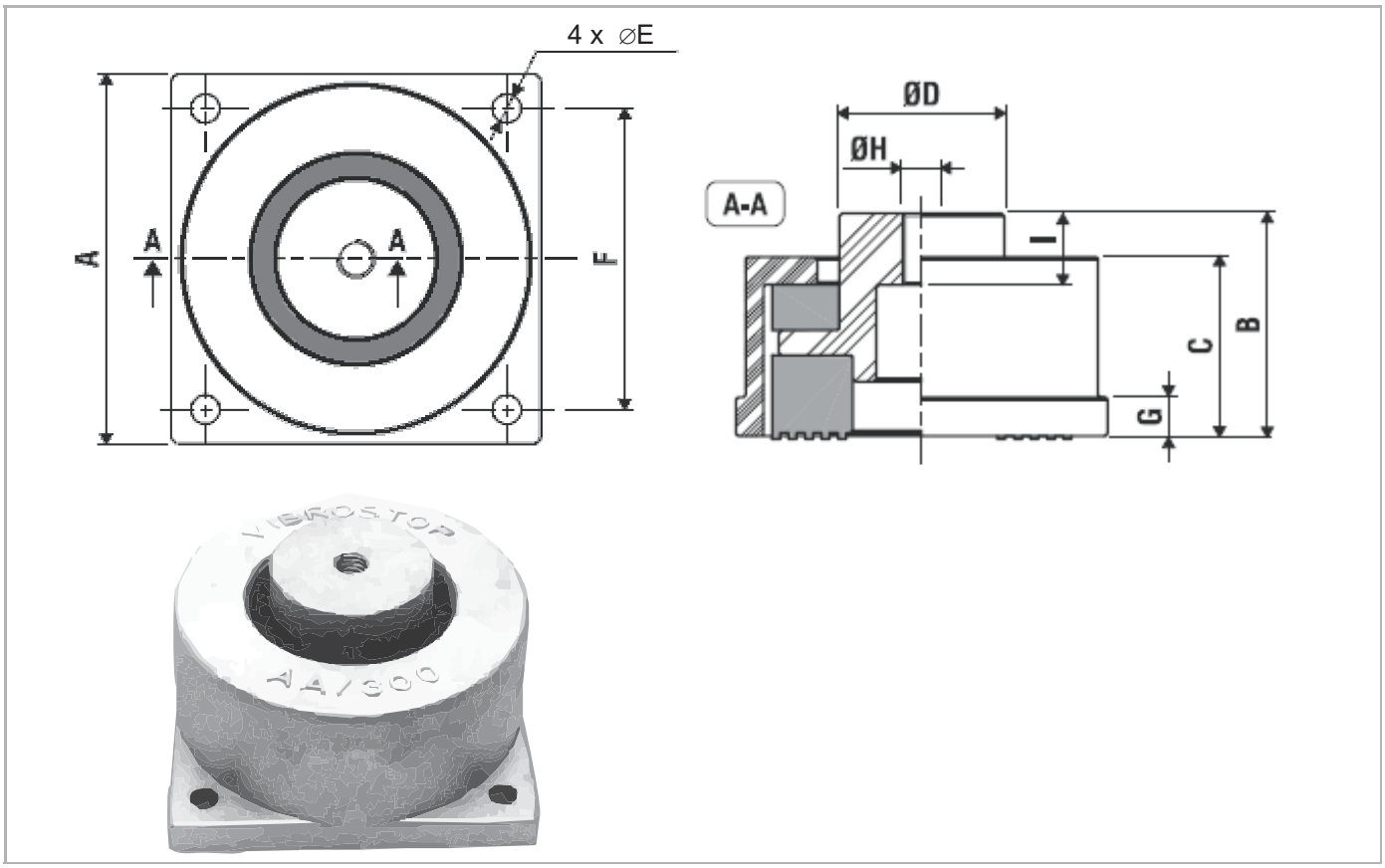
Unit	Weight distribution in kg							
	W1	W2	W3	W4	W5	W6	W7	W8
GLFC 0152 BD2	191	185	150	144	-	-	-	-
GLFC 0152 BD2.SL	191	191	149	149	-	-	-	-
GLFC 0182 BD2	196	204	151	159	-	-	-	-
GLFC 0182 BD2.SL	254	236	194	176	-	-	-	-
GLFC 0202 BD2	257	237	198	178	-	-	-	-
GLFC 0202 BD2.SL	260	265	195	200	-	-	-	-
GLFC 0252 BD2	261	239	201	179	-	-	-	-
GLFC 0252 BD2.SL	267	269	201	203	-	-	-	-
GLFC 0302 BD2	326	294	236	204	-	-	-	-
GLFC 0302 BD2.SL	264	265	206	207	149	149	-	-
GLFC 0352 BD2	277	268	222	214	168	160	-	-
GLFC 0352 BD2.SL	283	275	229	221	175	167	-	-
GLFC 0412 BD2	287	272	230	216	174	160	-	-
GLFC 0412 BD2.SL	255	259	214	219	178	183	138	143
GLFC 0452 BD2	304	286	244	226	184	166	-	-
GLFC 0452 BD2.SL	262	264	219	221	181	183	139	140
GLFC 0512 BD2	272	269	228	225	188	185	143	140
GLFC 0512 BD2.SL	277	274	233	230	193	190	148	145
GLFC 0552 BD2	280	273	234	227	193	186	147	140
GLFC 0552 BD2.SL	315	310	267	262	218	213	170	165
GLFC 0612 BD2	290	279	244	233	202	191	156	145
GLFC 0612 BD2.SL	324	328	273	277	223	227	172	176
GLFC 0604 BD2	331	331	332	332	218	218	219	219
GLFC 0604 BD2.SL	338	338	342	342	228	228	232	232
GLFC 0704 BD2	351	351	352	352	231	231	232	232
GLFC 0704 BD2.SL	356	356	361	361	242	242	247	247
GLFC 0804 BD2	375	375	378	378	250	250	253	253
GLFC 0804 BD2.SL	381	381	386	386	259	259	264	264
GLFC 0904 BD2	388	388	391	391	397	397	264	264
GLFC 0904 BD2.SL	388	388	391	391	397	397	264	264
GLFC 1004 BD2	402	402	402	402	402	402	263	263
GLFC 1004 BD2.SL	410	410	413	413	419	419	278	278
GLFC 1104 BD2	443	443	445	445	447	447	294	294
GLFC 1104 BD2.SL	453	453	458	458	467	467	312	312
GLFC 1204 BD2	462	462	464	464	467	467	307	307
GLFC 1204 BD2.SL	471	471	476	476	487	487	325	325

Tab. 7

GLFC #### BD2(.SL)	0152	0182	0202	0252	0302	0352	0412	0452	0512	0552	0612
Basic unit	4 x AA200N	4 x AA200N	4 x AA200N	4 x AA200N	4 x AA200N	6 x AA200N	6 x AA200N	6 x AA200N	8 x AA200N	8 x AA200N	8 x AA200N
SL-unit	4 x AA200N	4 x AA200N	4 x AA200N	4 x AA200N	6 x AA200N	6 x AA200N	8 x AA200N	8 x AA200N	8 x AA200N	8 x AA200N	8 x AA200N

GLFC #### BD2(.SL)	0604	0704	0804	0904	1004	1104	1204
Basic unit	8 x AA300N	8 x AA300N	8 x AA300N	8 x AA400N	8 x AA400N	8 x AA400N	8 x AA400N
SL-unit	8 x AA300N	8 x AA300N	8 x AA300N	8 x AA400N	8 x AA400N	8 x AA400N	8 x AA400N

Tab. 8



Type	A	B	C	ØD	ØE	F	G	H	I
AA200N	108	75	55	40	8.5	90	10	M12	26
AA300N	135	81	64	60	10.5	110	12	M14	24
AA400N	155	95	80	65	12.5	125	15	M14	25
AA600N	175	100	77	70	14	140	15	M16	30
AA800N	180	120	92	75	15	150	16	M18	35
AA1000N	200	155	118	100	16	162	20	M20	35
AA1500N	220	155	120	80	17	182	18	M20	110

Tab. 9

Notes

FläktGroup

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FläktGroup is the European market leader for smart and energy efficient Indoor Air and Critical Air solutions to support every application area. We offer our customers innovative technologies, high quality and outstanding performance supported by more than a century of accumulated industry experience. The widest product range in the market, and strong market presence in 65 countries worldwide, guarantee that we are always by your side, ready to deliver Excellence in Solutions.

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