CHILLER

WITH FULL-INVERTER SCREW COMPRESSORS

FGAC 2220 - 3782 AF2(.SL)

Table of contents

Fig. 1: Unit view (example version)

Type code

	FG	A	C	2	220	A	F	2	.SL
	FläktGroup	Condensing	Operating mode	Number of Compressors	Capacity stage	Series	Refrigerant	Supply voltage	Unit model
FG	FläktGroup Series								
A	Air cooled (outdoor installation)								
C	Chiller								
2	2 Screw compressor								
3	3 Screw compressor								
220-602	Unit sizes with 2 compressors: 220, 260, 270, 272, 360, 420, 480, 482, 600, 602								
660-782	Unit sizes with 3 compressors: 660, 720, 722, 782								
A	Unit series A								
F	Refrigerant R1234ze								
2	400 V / 3~ / 50Hz / PE								
_	standard								
.SL	SL unit - especially quiet model								

Fig. 2: Explanation of unit type code

Unit description

FläktGroup chiller with full inverter screw compressors

- Air-cooled for outdoor installation
- ErP 2021-compliant, comfort cooling application range
- High energy efficiency at full and part-load mode
- Refrigerant R-1234ze (GWP 7), safety class A2L (according to ISO 817)
- Capacity range approx. 383 kW to 1.46 MW cooling capacity
- 2 unit models
  - Standard-version (14 unit sizes)
  - SL model, noise-optimized with noise reduction of approx. 9 dB(A) (14 unit sizes)
- Built-in double pump (redundancy) optionally possible, models with standard delivery head or increased delivery head, as on/off pump or inverter pump
- 2-3 refrigeration circuits
- 2-3 semi-hermetic double-rotor compact screw compressors with a flanged oil separator and integrated inverter for capacity control
- Integrated cooling system for the inverter using refrigerant to ensure efficient and safe operation
- Internal Vi-slide to increase efficiency in part-load mode
- Refrigerant leakage sensors integrated (option .O27 or O.28 must be selected to determine the mode of operation)
- Electronic expansion valve
- W-shaped condenser
- Al/Al micro-channel condenser (MCHX)
- Optional Al/Al micro-channel condenser with epoxy polymer coating
- Optional Cu/Al condenser with coated fins or fully coated (instead of MCHX))
- Shell-and-tube heat exchanger as evaporator, incl. internal frost protection heater
- Water-side connections via Victaulic coupling with welding end, optional flange coupling
- Connection side left (view from switch cabinet side)
- Energy-efficient, continuously variable EC fans, which are controlled with different control voltages depending on the high pressure
- Water outlet temperature -2 to +20 °C depending on outdoor temperature*)
- Air-intake temperature from -10 °C to + 46 °C referred to 7 °C water-outlet temperature*)
- Extended operating range down to -15°C*) air inlet temperature (Option .R27)
- *) For details see chart of operating limits
- Power supply 400V / 3 / 50 Hz / PE (without N)
- Numbered connecting terminals
- Built-in phase sequence protection relay
- Automatic circuit breakers for control circuits
- Pump relay for control of one on-site chilled-water pump (option .E30) or two on-site chilled-water pumps with redundancy function (option .E31) for units without pump module selectable
- Demand limit contact to reduce electrical power consumption by deactivating compressors or their capacity steps optional (option .E23)
- FläktGroup controller, black display
- ***Attention: A water filter must be installed on site directly before the evaporator(s) to protect them from contamination and deposits of any kind. The water filter must have a mesh size of 0.9 mm or less.***
- All units of the FGAC 2220-3782 AF2(.SL) series are Eurovent-certified.

Order-related documentation

NOTICE!
For detailed planning please only use the order-related documentation. Detailed dimensional drawings can be obtained on request from your responsible 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.

Options and accessories

Mechanics accessories

Pumps - **There are 4 different variants of built-in pumps available**
- On/Off double pumps with standard head
- On/off double pumps with increased delivery head
- Inverter double pumps with standard head
- Inverter double pumps with increased delivery head

(refer to separate pump data information sheet)

Installation of accessories

Option .I59 or .I26 for SL units - **Rubber isolator**
Anti-vibration isolators with rubber elements to minimize vibration transmission (supplied separately).
The on-site installation of suitable anti-vibration mounts is a prerequisite for warranty claims!

FläktGroup recommends the use of rubber anti-vibration isolators. Alternatively, spring anti-vibration mounts can be used depending on the project specifications.

Option .I54 or .I21 for SL units **Spring anti-vibration mounts**
Anti-vibration mounts with spring elements for reduction of vibration transfer (enclosed).
The on-site installation of suitable anti-vibration mounts is a prerequisite for warranty claims!

There is frequent demand for spring anti-vibration mounts in the UK.

Option .I10 - **Flow switch**
With paddle for installation in the hydraulic circuit at the chilled-water outlet (supplied separately). The on-site installation and wiring of the flow switch is a prerequisite for warranty claims!

Option .I08 - **Chilled-water connections with flanges**
Depending on the unit type, either mounted flanges or separate flange adaptor kit.

Option .I61 or .I65 for SL units - **Protection grille for air-cooled heat exchanger**
Additional protection grille to prevent access to components installed under the air-cooled heat exchangers.

Option .I57 or .I56 for SL units - **Anti-corrosion coating for microchannel heat exchangers (MCHX)**
100 % epoxy-polymer coating using e-coating method for the entire air-cooled microchannel heat exchanger for protection against corrosion, UV radiation, and to ensure enhanced weather-proof features in conditions with average air contamination and application in proximity to sea water with average salt content.
- more than 3120 hours salt spray protection according to ASTM G85-02 A3 (SWAAT)

Option .I52 or .I23 for SL units - **Cu/Al heat exchanger with corrosion-resistant coating for the fins (instead of the microchannel heat exchanger)**
Corrosion-resistant coating for fins of Cu/Al heat exchanger. The use of chemical cleaning methods and protective-paint coating made of polyester resin ensures the following characteristics:
- Corrosion resistance in a salt-spray test according to ASTM B117 for at least 1000 hours
- UV durability

Attention: Change in refrigerant charge volume and unit weight

Option .I51 or .I22 for SL units

- **Cu/Al heat exchanger with polyurethane coating (instead of microchannel heat exchanger)**
  Cu/Al heat exchanger with polyurethane paint. The entire heat exchanger receives protective coating using polyurethane paint, so that the following qualities are ensured:
  - Corrosion resistance in a salt-spray test according to ASTM B117 for at least 3000 hours
  - UV durability
  Attention: Change in refrigerant charge volume and unit weight

Refrigeration circuit accessories

Option .R02

- **Shut-off valves for compressor suction side**
  Service shut-off valve assembled for fast and easy maintenance.

Option .R13

- **LP and HP Pressure Gauges**
  Refrigerant gauge for high and low pressure side for reading off current operating pressures.

  FläktGroup recommends the selection of the built-in pressure gauges.

Option .R19

- **Safety valve in double configuration for high and low-pressure side**
  Two safety valves are connected via a changeover valve on the high and low-pressure side each. By using a changeover valve a trouble-free and fast replacement of safety valves without refrigerant loss is possible for maintenance and service jobs.

Option .R27

- **High-pressure control for operation at very low air-intake temperatures**
  High-pressure control on the refrigeration circuit side to guarantee operation down to -15 °C air-intake temperatures.
  Refer to the charts of operating limits for the exact operating range.
  Attention: Change in refrigerant charge volume and unit weight. Prices on request.

  FläktGroup recommends option .R27 only for projects with special requirements. Alternatively, the activation of the unit can be withdrawn if the outdoor temperature falls below the minimum value (-10 °C).

Electrical accessories

Option .E02

(available for UK)

- **Cabling in colour sequence: L1: brown L2: black L3: grey**
  The wiring of the load circuit for the unit is carried out in the following colour sequence:
  L1: brown, L2: black, L3: grey
  This colour sequence is frequently requested in Great Britain.

Option .E03

- **Operation message of compressor**
  Floating contacts for status indication of each respective compressor.

Option .E21

- **Sliding setpoint via a 4-20 mA signal provided on-site**
  Shifting the chilled-water setpoint value in a fixed range via a 4-20 mA signal provided on-site. Changing the setpoint, e.g. during night operation, can result in significant savings potential.

Option .E22

- **2nd setpoint via on-site normally open contact.**
  External changeover between two setpoint values set for unit by closing a field-provided floating contact. Raising the setpoint, e.g. during night mode operation, can realize significant savings potential.

Option .E23

- **Demand limit / load limitation**
  Reduction of electrical power consumption by deactivating compressors or their capacity stages (demand limit switch) by opening an on-site floating contact. This function is used if a full electrical power supply is unavailable.

Option .E13

(only for units with built-in pumps)

- **Frost protection heating for pipework and pump**
  Required when the unit is operated below 0 °C outside temperature regardless of the design with or without glycol; absolutely necessary when operating without glycol to prevent freezing in standby mode.

  In locations where the outdoor temperature can fall below -10 °C, the unit must be configured with a water-glycol mixture.

Option .E58

- **Heating for switch cabinet**
  To guarantee the operating range of the electrical components during year-round operation and to avoid condensation building up in the switch cabinet in areas with high relative humidity.

  FläktGroup recommends to select the switch cabinet heating for all delivery areas.

Option .E71

- **Switch cabinet with socket 230 V**
  To facilitate service work, there is a socket in the switch cabinet which can be used, for example, for a laptop power supply or a flashlight (230 V, max. 500VA).

  FläktGroup recommends selecting the built-in socket if the customer has special requirements.

Option .E78

- **Switch cabinet lighting**
  To facilitate service work, for example in poor visibility conditions or when working in the dark season when no lighting or connection for a portable rod lamp is available on site.

  FläktGroup recommends selecting the built-in lighting for special customer requirements.

For units without built-in pumps, one of the four following option numbers must be ordered to define the hardware control of the on-site pump:

Option .E04 - **Relay for actuating one on-site chilled water pump**
An on/off pump provided on-site is controlled via a floating contact.

Option .E34 - **Relay for actuating two parallel on-site chilled-water pumps**
Two on-site on/off pumps are controlled via two floating contacts. To increase system availability, the pumps are alternately activated by the controller; if one pump fails, the system automatically switches to the other pump permanently. The pumps must be fitted on-site with non-return valves.

Option .E30 - **0-10 V signal for controlling a customer supplied inverter chilled-water pump**
A speed-controlled inverter pump provided on-site is controlled by a 0-10 V signal. In addition, there is a floating contact for enabling the pump.

Option .E31 - **0-10 V signal for controlling two parallel inverter chilled-water pumps provided on-site**
Two on-site speed-regulated inverter pumps are controlled by a common 0-10 V signal. In addition, there are two floating contacts for activating the pumps. To increase system availability, the pumps are alternately activated by the release contact of the controller; if one pump fails, the system automatically switches to the other pump permanently. The pumps must be fitted on-site with non-return valves.

Accessories for controls

Serial card for connection to a building management system - **Unit connection to the building management system (BMS) using a serial card.**

The following protocols are used to transmit digital and analog values:
- Readout of error messages
- Retrieval of temperature and pressure values provided by the controller
- Operating status of individual compressors
- Enabling the unit
- Setpoint shift

Option .E14 - **Modbus (RS485),**
Built-in modbus interface for connection to the building management system.

Option .E15 - **LonWorks® ,**
Built-in LonWorks interface for connection to the building management system.

Option .E16 - **BACnet via IP,**
Built-in BACnet via IP interface for connection to the building management system.

Option .E17 - **BACnet via MS/TP RS485,**
Built-in BACnet via MS/TP RS485 interface for connection to the building management system.

Option .E19/E20 - **Second control connection for remote monitoring and regulation.**
Up to 10 units in the same controller family can be connected to an additional remote control.
Option .E19 for remote controls up to 200 meters away
Option .E20 for remote controls up to 500 meters away

For units with built-in inverter pumps or on-site inverter pump(s), one of the following three option numbers must be ordered to define the software type of pump control:

Option .E84

(only when using inverter pumps)

- **Setting constant pump speed**
  on the unit controller for built-in pumps with variable speed. The speed is adjusted once during commissioning so that the required water-volume flow passes through the evaporator.

Option .E85

(only when using inverter pumps)

- **VPS-D control**
  In order to exploit further potential energy savings, the speed of the on-site or installed inverter pump(s) is reduced down to 50% in part-load mode As far as possible, the Delta T at the evaporator is kept constant on the water side during part-load mode. VPS-D is intended for systems without system separation, a single-circuit buffer storage tank and a distributor with overflow to the collector. For the consumer circuits, additional on-site pumps with on-site control are required, which are usually designed as pressure-controlled inverter pumps in conjunction with 2-way valves at the consumers. Included in delivery are two separately supplied temperature sensors as well as an extended controller hardware with the required connection points. The temperature sensors must be installed on-site at the water inlet to the manifold and in the overflow pipe in immersion wells with heat-conducting paste. Measurement at the temperature sensors has a higher-ranking influence on the pump speed and always ensures an overflow from the distributor to the collector.

  It should be noted that
  - the hydraulic system is designed so that the primary circuit pump(s) can always deliver at least 50% of the water volume. If this value is not reached, the unit will malfunction.
  - the overflow line is designed for 50% of the nominal water flow rate
  - the flow monitor is calibrated to a value of 35% of the nominal water volume flow. For this purpose, the maximum pipe cross-section in the area of the flow monitor must be observed in order to ensure proper functioning.

  Observe the separate planning instructions and hydraulic diagrams for VPS-D systems.

Option .E86

(only when using inverter pumps)

- **VPS-E control**
  In order to exploit further potential energy savings, the speed of the on-site or installed inverter pump(s) is reduced to 50% in part-load mode. As far as possible, the Delta T at the evaporator is kept constant on the water side during part-load mode. VPS-E is intended for systems with system separation (plate heat exchangers) and a single-circuit buffer tank on the primary side. For the consumer circuits on the secondary side of the system separation (plate heat exchanger), one or more additional on-site pumps with on-site control are required, which are usually designed as pressure-controlled inverter pumps in conjunction with 2-way valves at the consumers. Alternatively, the system can be used for single circuit systems with single-circuit buffer and a single consumer with 3-way valve. A corresponding software for the function is included in the scope of delivery.

  It should be noted that
  - the hydraulic system is designed so that the primary circuit pump(s) can always deliver at least 50% of the water volume. If this value is not reached, the unit will malfunction.
  - the flow monitor is calibrated to a value of 35% of the nominal water volume flow. For this purpose, the maximum pipe cross-section in the area of the flow monitor must be observed in order to ensure proper functioning.

  Observe the separate planning instructions and hydraulic diagrams for VPS-E systems.

Other accessories

Option .O10 - **Operation with chilled-water temperatures below 0°C**
Option is required for operation with chilled-water outlet temperatures below 0°C.

Option .O24 or .O32 for SL-units - **Increased thermal insulation of the evaporator**
Double-layer thermal insulation of the evaporator to prevent condensation when the unit is operated below -10 °C outdoor temperature.

Only required for units without integrated pumps and operation below -10 °C outdoor temperature.

Option .O25 or .O33 for SL-units - **Increased thermal insulation of the evaporators, pipes and pumps**
Double-layer thermal insulation of the evaporator, piping and pumps to prevent condensation.

Only required for units with integrated pumps and operation below -10 °C outdoor temperature.

One of the following two options must be selected as an A2L refrigerant (low flammability) is used.

Option .O27 - **Refrigerant leak detection (Alarm)**
The compressor section is monitored for leaking medium. A refrigerant leakage is triggered by an error message from the controller.

Option .O28 - **Refrigerant leak detection (compressor switch off)**
The compressor section is monitored for leaking medium. In the event of refrigerant leakage, the compressor is switched off and an error message is triggered by the controller.

Option .O14 or .O26 for SL-units - **Unit stabilization for shipping**
Additionally reinforced frame construction to stabilize unit during shipping.

Only required in special delivery areas.

Option .O11 - **Packing of the unit with nylon cover**
The unit is shrink-wrapped in nylon foil for transport and storage to protect it from weather and dirt.

FläktGroup recommends nylon packaging for all delivery areas.

Operating limits

On the water side, the operating limits according to Table 1, and on the air and water side, the limits of the selected options according to the following chart must be observed.

Tab.1: Operating limits of water (glycol) circuit

		Min	Max
Water inlet	[°C]	1	28
Water outlet	[°C]	-2	20
D T at water outlet temp. > 5°C	[K]	4	8
D T at water outlet temp. ≤ 5 °C	[K]	3	5

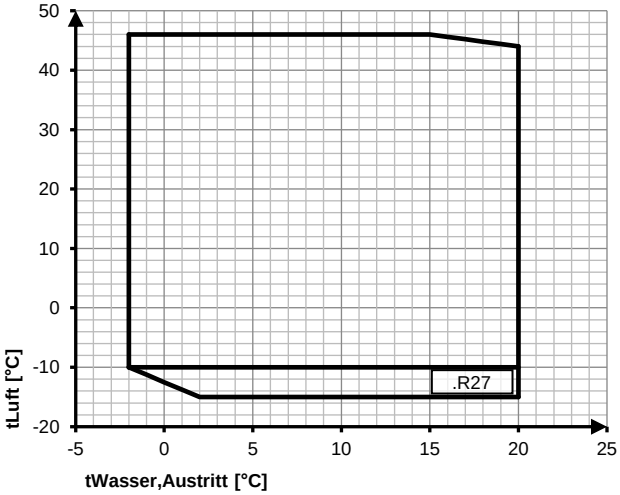


Fig. 3: Operating range for standard and SL units

Standard configuration continuously variable EC fans.

Operating range -10 °C to 46 °C air-intake temperature based on a water-outlet temperature of 7 °C.
Option .R27 required for temperatures below -10 °C
Option .O10 required for water outlet temperatures below 0 °C

Notices for all diagrams

The unit is prepared for the selected operating range during the end-of-line test. Please attach the technical order information to the order.

For operational reasons, water at evaporator outlet temperatures below 5°C must be protected from freezing by adding glycol.
FläktGroup recommends the use of at least 30% ethylene glycol.

The unit must be protected from freezing at ambient temperatures less than 5°C.
For this purpose, frost protection heating for the evaporator is provided as standard on units without pumps.
For units with integrated pumps, an anti-freeze heater for pipes and pumps is available under option number .E13.
The anti-freeze heaters are designed for outdoor temperatures down to -10 °C. In installation locations where colder outdoor temperatures may occur, the unit must be configured with glycol.

General Data

Tab.2: General data for standard units with 2 compressors

Unit type FGAC #### AF2			2220	2260	2270	2272	2360	2420	2480
Performance data (catalog) - [6]									
Refrigeration capacity [1]	Qe	[kW]	383	418	487	535	642	726	843
Power consumption [5]	P	[kW]	117.7	130.2	147.7	168.4	211.1	237.1	281.3
EER			3.25	3.21	3.30	3.18	3.04	3.06	3.00
ESEER			5.01	5.17	5.13	5.03	4.96	5.00	4.95
Chilled water flow rate	Ve	[m³/h]	65.9	71.9	83.8	92.1	110.5	125.0	145.2
Pressure drop	Δpe	[kPa]	35.3	42.1	30.1	36.4	46.1	46.8	30.8
ERP conformity									
SEER (EU 2016/2281) [7]			5.18	5.26	5.26	5.18	5.09	5.18	5.09
η_S (EU 2016/2281) [7]		[%]	204	207	208	204	201	204	201
ERP-compliant 2021			☑	☑	☑	☑	☑	☑	☑
Application			Comfort	Comfort	Comfort	Comfort	Comfort	Comfort	Comfort
Performance values according to EN14511-3:2011									
Refrigeration capacity [1]	Qe	[kW]	381.5	416.4	485.7	533.2	639.7	723.4	841.1
EER			3.21	3.16	3.26	3.14	3.00	3.02	2.97
ESEER			4.79	4.89	4.94	4.81	4.70	4.75	4.77
Eurovent Class			A	A	A	A	B	B	B
Controller			FläktGroup controller with TA software and large display						
Fans			**Axial Fans**						
Fan Quantity		n	6	7	8	8	10	12	12
Total air volume flow		[m³/h]	114840	133992	153108	153108	191412	229680	229680
Compressors			**Double rotor screw compressor with integrated inverter**						
Number of compressors			2	2	2	2	2	2	2
Number of refrigeration circuits			2	2	2	2	2	2	2
Minimum part-load speed		[%]	13	13	13	13	13	13	13
Evaporator (chilled-water side)									
Min. water mass flow	$V_{e,min}$	[m³/h]	33.0	33.0	57.0	57.0	57.0	63.0	90.0
Max. water mass flow	$V_{e,max}$	[m³/h]	97.0	97.0	160.0	160.0	169.0	181.0	230.0
MAX WORKING PRESSURES	p_{max}	[bar]	10	10	10	10	10	10	10
Minimum chilled-water system content		[l]	1300	1500	1700	1900	2200	2500	3000
Water charge of heat exchanger		[l]	116	116	133	133	124	230	275
Evaporator connection	VICTAULIC[2]		5“	5“	6“	6“	6“	6“	8“
Refrigeration circuit charge									
Refrigerant R1234ze [3,4] (GWP 7)		[kg]	63	70	81	86	108	124	134
Oil charge		[kg]	36	36	36	36	36	36	70
Connectable cable cross-sections [8]									
Rectangular	Min Max	[mm] [mm]	2x32x6	2x32x6	2x32x6	2x32x6	2x40x5 2x63x5	2x40x5 2x63x5	2x40x5 2x63x5
Round	Min Max	[mm²] [mm²]	2 x185	2 x185	2 x185	2 x185	2 x 185 2 x 300	2 x 185 2 x 300	2 x 185 2 x 300
Dimensions and weight									
A (length)		[mm]	4150	5400	5400	5400	6650	7900	7900
B (width)		[mm]	2260	2260	2260	2260	2260	2260	2260
H (height)		[mm]	2500	2500	2500	2500	2500	2500	2500
Weight [4,5]		[kg]	4670	5190	5330	5340	5780	6680	7600

1) Performance data for input parameters: chilled water temperatures (inlet/outlet) 12/7°C; ambient temperature 35°C; values partially rounded off
2) Victaulic coupling supplied separately, with transition to welding end (units without pumps)
3) For exact refrigerant charge volume, refer to the unit identification plate.
4) Applies to units with micro-channel heat exchanger as condenser
5) Based on the entire unit (without pumps)
6) Data apply to input parameters as described under 1) and without glycol; conversion required when using glycol
7) Applies to units in standard configuration without pumps
8) Please observe the regionally applicable safety regulations and constructional conditions relevant to the dimensioning of the supply line.

Tab.2: General data for standard units with 2 compressors (continued)

Unit type FGAC #### AF2			2482	2600	2602	3660	3720	3722	3782
Performance data (catalog) - [6]									
Refrigeration capacity [1]	Qe	[kW]	916	994	1038	1146	1280	1399	1463
Power consumption [5]	P	[kW]	305.7	322.1	340.6	379.0	423.0	471.2	499.3
EER			3.00	3.09	3.05	3.02	3.03	2.97	2.93
ESEER			4.87	4.98	4.93	4.95	4.93	4.92	4.90
Chilled water flow rate	Ve	[m³/h]	157.6	171.1	178.7	197.2	220.4	240.8	251.8
Pressure drop	Δpe	[kPa]	47	42.8	43.8	40.1	40.8	48.7	53.3
ERP conformity									
SEER (EU 2016/2281) [7]			5.06	5.13	5.09	5.11	5.04	5.04	5.00
η_S (EU 2016/2281) [7]		[%]	199	202	201	201	198	198	197
ERP-compliant 2021			☑	☑	☑	☑	☑	☑	☑
Application			Comfort	Comfort	Comfort	Comfort	Comfort	Comfort	Comfort
Performance values according to EN14511-3:2011									
Refrigeration capacity [1]	Qe	[kW]	912.6	991	1035	1143	1276	1394	1458
EER			2.96	3.05	3.01	2.99	2.99	2.93	2.89
ESEER			4.63	4.75	4.70	4.74	4.73	4.69	4.66
Eurovent Class			B	B	B	B	B	B	C
Controller			FläktGroup controller with TA software and large display						
Fans			**Axial Fans**						
Fan Quantity		n	14	16	16	18	18	19	20
Total air volume flow		[m³/h]	267948	306252	306252	344520	344520	363636	382788
Compressors			**Double rotor screw compressor with integrated inverter**						
Number of compressors			2	2	2	3	3	3	3
Number of refrigeration circuits			2	2	2	3	3	3	3
Minimum part-load speed		[%]	13	13	13	8	8	8	8
Evaporator (chilled-water side)									
Min. water mass flow	$V_{e,min}$	[m³/h]	69.0	90.0	90.0	112.0	150.0	150.0	150.0
Max. water mass flow	$V_{e,max}$	[m³/h]	202.0	230.0	241.0	362.9	350.0	350.0	350.0
MAX WORKING PRESSURES	p_{max}	[bar]	10	10	10	10	10	10	10
Minimum chilled-water system content		[l]	3200	3500	3700	4000	4500	4900	5100
Water charge of heat exchanger		[l]	210	275	265	310	550	550	550
Evaporator connection	VICTAULIC[2]		8“	8“	8“	8“	8“	8“	8“
Refrigeration circuit charge									
Refrigerant R1234ze (GWP 7) [3,4]		[kg]	139	167	171	189	195	203	218
Oil charge		[kg]	70	70	70	105	105	105	105
Connectable cable cross-sections [8]									
Rectangular	Min Max	[mm] [mm]	2x40x5 2x63x5	2x50x5 2x63x5	2x50x5 2x63x5	2x50x5 2x63x5	2x60x5 2x63x5	2x60x5 2x63x5	2x60x5 2x63x5
Round	Min Max	[mm²] [mm²]	2 x 185 2 x 300	2 x 240 4 x 185	2 x 240 4 x 185	2 x 240 4 x 185	 4 x 185	 4 x 185	 4 x 185
Dimensions and weight									
A (length)		[mm]	9150	10400	10400	11650	11650	12900	12900
B (width)		[mm]	2260	2260	2260	2260	2260	2260	2260
H (height)		[mm]	2500	2500	2500	2500	2500	2500	2500
Weight [4.5]		[kg]	7960	8600	8600	10980	11660	12170	12290

1) Performance data for input parameters: chilled water temperatures (inlet/outlet) 12/7°C; ambient temperature 35°C; values partially rounded off
2) Victaulic coupling supplied separately, with transition to welding end (units without pumps)
3) For exact refrigerant charge volume, refer to the unit identification plate.
4) Applies to units with micro-channel heat exchanger as condenser
5) Based on the entire unit (without pumps)
6) Data apply to input parameters as described under 1) and without glycol; conversion required when using glycol
7) Applies to units in standard configuration without pumps
8) Please observe the regionally applicable safety regulations and constructional conditions relevant to the dimensioning of the supply line.

Tab.2: General data for SL units (particularly quiet version) with 2 compressors

Unit type FGAC #### AF2.SL			2220	2260	2270	2272	2360	2420	2480
Performance data (catalog) - [6]									
Refrigeration capacity [1]	Qe	[kW]	377	421	481	527	633	718	833
Power consumption [5]	P	[kW]	116.8	125.4	145.9	167.1	207.2	234.4	269.9
EER			3.23	3.36	3.30	3.16	3.06	3.06	3.09
ESEER			5.02	5.22	5.13	5.05	4.95	5.02	5.05
Chilled water flow rate	Ve	[m³/h]	64.9	72.5	82.8	90.8	109.0	123.6	143.4
Pressure drop	Δpe	[kPa]	34.3	42.8	29.4	35.3	44.8	45.9	38.9
ERP conformity									
SEER (EU 2016/2281) [7]			5.18	5.32	5.26	5.18	5.09	5.19	5.09
η_S (EU 2016/2281) [7]		[%]	204	210	207	204	200	204	200
ERP-compliant 2021			☑	☑	☑	☑	☑	☑	☑
Application			Comfort	Comfort	Comfort	Comfort	Comfort	Comfort	Comfort
Performance values according to EN14511-3:2011									
Refrigeration capacity [1]	Qe	[kW]	376.1	419.8	479.5	525.7	631	715.7	830.5
EER			3.19	3.31	3.26	3.12	3.01	3.02	3.05
ESEER			4.81	4.94	4.94	4.84	4.71	4.77	4.84
Eurovent Class			A	A	A	A	B	B	B
Controller			FläktGroup controller with TA software and large display						
Fans			**Axial Fans**						
Fan Quantity		n	6	8	8	8	10	12	14
Total air volume flow		[m³/h]	103716	138276	138276	138276	172872	207432	241992
Compressors			**Double rotor screw compressor with integrated inverter**						
Number of compressors			2	2	2	2	2	2	2
Number of refrigeration circuits			2	2	2	2	2	2	2
Minimum part-load speed		[%]	13	13	13	13	13	13	13
Evaporator (chilled-water side)									
Min. water mass flow	$V_{e,min}$	[m³/h]	33.0	33.0	57.0	57.0	57.0	63.0	69.0
Max. water mass flow	$V_{e,max}$	[m³/h]	97.0	97.0	160.0	160.0	169.0	181.0	202.0
MAX WORKING PRESSURES	p_{max}	[bar]	10	10	10	10	10	10	10
Minimum chilled-water system content		[l]	1300	1500	1700	1900	2200	2500	3000
Water charge of heat exchanger		[l]	116	116	133	133	124	230	210
Evaporator connection	VICTAULIC[2]		5“	6“	6“	6“	6“	6“	6“
Refrigeration circuit charge									
Refrigerant R1234ze (GWP 7) [3,4]		[kg]	63	73	81	86	108	124	134
Oil charge		[kg]	36	36	36	36	36	36	70
Connectable cable cross-sections [8]									
Rectangular	Min Max	[mm] [mm]	 2x32x6	 2x32x6	2x40x5 2x63x5	2x40x5 2x63x5	2x40x5 2x63x5	2x40x5 2x63x5	2x50x5 2x63x5
Round	Min Max	[mm²] [mm²]	 2 x 185	 2 x 185	2 x 185 2 x 300	2 x 185 2 x 300	2 x 185 2 x 300	2 x 185 2 x 300	2 x 240 4 x 185
Dimensions and weight									
A (length)		[mm]	4150	5400	5400	5400	6650	7900	9150
B (width)		[mm]	2260	2260	2260	2260	2260	2260	2260
H (height)		[mm]	2500	2500	2500	2500	2500	2500	2500
Weight [4.5]		[kg]	4900	5530	5640	5640	6090	7000	8250

1) Performance data for input parameters: chilled water temperatures (inlet/outlet) 12/7°C; ambient temperature 35°C; values partially rounded off
2) Victaulic coupling supplied separately, with transition to welding end (units without pumps)
3) For exact refrigerant charge volume, refer to the unit identification plate.
4) Applies to units with micro-channel heat exchanger as condenser
5) Based on the entire unit (without pumps)
6) Data apply to input parameters as described under 1) and without glycol; conversion required when using glycol
7) Applies to units in standard configuration without pumps
8) Please observe the regionally applicable safety regulations and constructional conditions relevant to the dimensioning of the supply line.

Tab.3: General data for SL units (particularly quiet version) with 2 or 3 compressors (continued)

Unit type FGAC #### AF2.SL			2482	2600	2602	3660	3720	3722	3782
Performance data (catalog) - [6]									
Refrigeration capacity [1]	Qe	[kW]	903	972	1024	1141	1262	1391	1458
Power consumption [5]	P	[kW]	303.4	318.4	337.4	376.1	416.2	468.8	499.7
EER			2.98	3.05	3.04	3.03	3.03	2.97	2.92
ESEER			4.89	4.98	4.95	4.96	5.02	4.99	4.90
Chilled water flow rate	Ve	[m³/h]	155.4	167.4	176.3	196.4	217.3	239.4	250.9
Pressure drop	Δpe	[kPa]	45.7	40.9	42.6	39.7	39.7	48.1	30.9
ERP conformity									
SEER (EU 2016/2281)[7]			5.06	5.12	5.10	5.12	5.11	5.10	4.98
η_S (EU 2016/2281) [7]		[%]	199	202	201	202	202	201	196
ERP-compliant 2021			☑	☑	☑	☑	☑	☑	☑
Application			Comfort	Comfort	Comfort	Comfort	Comfort	Comfort	Comfort
Performance values according to EN14511-3:2011									
Refrigeration capacity [1]	Qe	[kW]	899.8	969.3	1021	1138	1258	1386	1455
EER			2.94	3.02	3.00	3.00	3.00	2.93	2.89
ESEER			4.66	4.77	4.73	4.76	4.82	4.75	4.75
Eurovent Class			B	B	B	B	B	B	C
Controller			FläktGroup controller with TA software and large display						
Fans			**Axial Fans**						
Fan Quantity		n	14	16	16	18	19	20	20
Total air volume flow		[m³/h]	241992	276588	276588	311148	328428	345708	345708
Compressors			**Double rotor screw compressor with integrated inverter**						
Number of compressors			2	2	2	3	3	3	3
Number of refrigeration circuits			2	2	2	3	3	3	3
Minimum part-load speed		[%]	13	13	13	8	8	8	8
Evaporator (chilled-water side)									
Min. water mass flow	$V_{e,min}$	[m³/h]	69.0	90.0	90.0	112.0	150.0	150.0	180.0
Max. water mass flow	$V_{e,max}$	[m³/h]	202.0	230.0	241.0	362.9	350.0	350.0	380.2
MAX WORKING PRESSURES	p_{max}	[bar]	10	10	10	10	10	10	10
Minimum chilled-water system content		[l]	3200	3500	3700	4000	4500	4900	5100
Water charge of heat exchanger		[l]	210	275	265	310	550	550	500
Evaporator connection	VICTAULIC[2]		8“	8“	8“	8“	8“	8“	8“
Refrigeration circuit charge									
Refrigerant R1234ze (GWP 7) [3,4]		[kg]	139	167	171	189	204	213	223
Oil charge		[kg]	70	70	70	105	105	105	105
Connectable cable cross-sections [8]									
Rectangular	Min Max	[mm] [mm]	2x50x5 2x63x5	2x50x5 2x63x5	2x50x5 2x63x5	2x60x5 2x63x5	3x50x8	3x50x8	3x50x8
Round	Min Max	[mm²] [mm²]	2 x 240 4 x 185	2 x 240 4 x 185	2 x 240 4 x 185	4 x 185	--	--	--
Dimensions and weight									
A (length)		[mm]	9150	10400	10400	11650	12900	12900	12900
B (width)		[mm]	2260	2260	2260	2260	2260	2260	2260
H (height)		[mm]	2500	2500	2500	2500	2500	2500	2500
Weight [4,5]		[kg]	8290	8930	8930	11460	12540	12710	12650

1) Performance data for input parameters: chilled water temperatures (inlet/outlet) 12/7°C; ambient temperature 35°C; values partially rounded off
2) Victaulic coupling supplied separately, with transition to welding end (units without pumps)
3) For exact refrigerant charge volume, refer to the unit identification plate.
4) Applies to units with micro-channel heat exchanger as condenser
5) Based on the entire unit (without pumps)
6) Data apply to input parameters as described under 1) and without glycol; conversion required when using glycol
7) Applies to units in standard configuration without pumps
8) Please observe the regionally applicable safety regulations and constructional conditions relevant to the dimensioning of the supply line.

Noise levels

Tab.4: Noise levels

Unit type	Total sound level		Octave band [Hz]							
			Sound power level [dB]							
FGAC…	Sound power [dB(A)] 1)	Sound pressure level [dB(A)] 10 m 2)	63	125	250	500	1000	2000	4000	8000
Standard units										
2220AF2	99	67	100	100	97	96	95	91	83	73
2260AF2	100	68	101	101	98	97	96	92	84	74
2270AF2	100	68	101	101	98	97	96	92	84	74
2272AF2	101	69	102	102	99	98	97	93	85	75
2360AF2	101	68	102	102	99	98	97	93	85	75
2420AF2	103	70	104	104	101	100	99	95	87	77
2480AF2	105	72	106	106	103	102	101	97	89	79
2482AF2	105	72	106	106	103	102	101	97	89	79
2600AF2	105	72	106	106	103	102	101	97	89	79
2602AF2	105	72	106	106	103	102	101	97	89	79
3660AF2	105	72	106	106	103	102	101	97	89	79
3720AF2	105	72	106	106	103	102	101	97	89	79
3722AF2	106	73	107	107	104	103	102	98	90	80
3782AF2	106	73	107	107	104	103	102	98	90	80
SL units (super-quiet model)										
2220AF2.SL	92	60	93	93	90	89	88	84	76	66
2260AF2.SL	93	61	94	94	91	90	89	85	77	67
2270AF2.SL	93	61	94	94	91	90	89	85	77	67
2272AF2.SL	94	62	95	95	92	91	90	86	78	68
2360AF2.SL	94	61	95	95	92	91	90	86	78	68
2420AF2.SL	96	63	97	97	94	93	92	88	80	70
2480AF2.SL	96	63	97	97	94	93	92	88	80	70
2482AF2.SL	96	63	97	97	94	93	92	88	80	70
2600AF2.SL	96	63	97	97	94	93	92	88	80	70
2602AF2.SL	96	63	97	97	94	93	92	88	80	70
3660AF2.SL	96	63	97	97	94	93	92	88	80	70
3720AF2.SL	96	63	97	97	94	93	92	88	80	70
3722AF2.SL	97	64	98	98	95	94	93	89	81	71
3782AF2.SL	97	64	98	98	95	94	93	89	81	71

Data on operating conditions
Data applies only to water inlet and outlet temperature of 12 °C/ 7 C° and ambient air temperatures of 35 °C. All specifications apply to units without pumps.

1) Specification of sound power (EUROVENT certified value)
Manufacturer determines the sound power value for Eurovent-certified units in accordance with ISO 9614 standard.
This certification expressly refers to sound power in dB(A), which thus constitutes obligatory data in this case.

2) Specification of sound pressure level
The sound pressure level is determined according to enveloping surface method with a reflecting plane (Q = 2) The distance of 10 m refers to the external dimensions of the unit. For sound pressure level the following corrections can be used:
Sound pressure level at 5 m: +5 dB as compared to sound pressure level at 10 meters distance.
Sound pressure level at 15 m: -3 dB as compared to sound pressure level at 10 meters distance.
Sound pressure level at 20 m: -6 dB as compared to sound pressure level at 10 meters distance.
Only an externally engaged acoustics engineer should carry out specific sound level calculations to be valid for your installation site.

Footprint

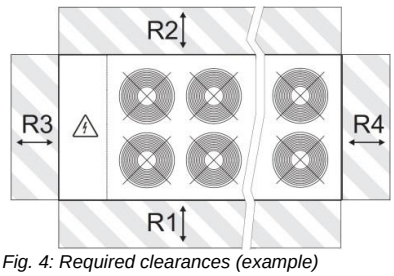


Fig. 4: Required clearances (example)

CLEARANCE FOR AIR SUPPLY!
Unit must be able to freely discharge air upwards. Air short-circuiting must be impossible! The necessary clearances near and over the unit may exceed the depicted maintenance clearance by many times.

Tab.5: Clearances

All unit sizes		R1	R2	R3	R4
Required clearances	[mm]	2000	2300	1500	1500

Anti-vibration mounts

Tab.6: Required anti-vibration mounts depending on unit model

Unit type	Rubber isolator		Spring anti-vibration mounts	
FGAC…	FläktGroup sales number (complete as accessory)	FläktGroup individual part designation	FläktGroup sales number (complete as accessory)	FläktGroup individual part designation
Standard units				
2220AF2	FGZAC2220AF.I59	8 x FZ 400-57	FGZAC2220AF.I54	8 x SR21-1000
2260AF2	FGZAC2260AF.I59	8 x FZ 600-51	FGZAC2260AF.I54	8 x SR21-1000
2270AF2	FGZAC2270AF.I59	8 x FZ 600-51	FGZAC2270AF.I54	8 x SR21-1000
2272AF2	FGZAC2272AF.I59	8 x FZ 600-51	FGZAC2272AF.I54	8 x SR21-1000
2360AF2	FGZAC2360AF.I59	10 x FZ 400-57	FGZAC2360AF.I54	10 x SR21-1000
2420AF2	FGZAC2420AF.I59	12 x FZ 400-57	FGZAC2420AF.I54	12 x SR21-800
2480AF2	FGZAC2480AF.I59	12 x FZ 400-57	FGZAC2480AF.I54	12 x SR21-1000
2482AF2	FGZAC2482AF.I59	14 x FZ 400-57	FGZAC2482AF.I54	14 x SR21-1000
2600AF2	FGZAC2600AF.I59	14 x FZ 400-57	FGZAC2600AF.I54	14 x SR21-1000
2602AF2	FGZAC2602AF.I59	14 x FZ 400-57	FGZAC2602AF.I54	14 x SR21-1000
3660AF2	FGZAC3660AF.I59	18 x FZ 400-57	FGZAC3660AF.I54	18 x SR21-1000
3720AF2	FGZAC3720AF.I59	18 x FZ 400-57	FGZAC3720AF.I54	18 x SR21-1000
3722AF2	FGZAC3722AF.I59	18 x FZ 600-51	FGZAC3722AF.I54	18 x SR21-1000
3782AF2	FGZAC3782AF.I59	18 x FZ 600-51	FGZAC3782AF.I54	18 x SR21-1000
SL units (especially quiet model)				
2220AF2.SL	FGZAC2220AF.I26	8 x FZ 400-57	FGZAC2220AF.I21	8 x SR21-1000
2260AF2.SL	FGZAC2260AF.I26	8 x FZ 600-51	FGZAC2260AF.I21	8 x SR21-1000
2270AF2.SL	FGZAC2270AF.I26	8 x FZ 600-51	FGZAC2270AF.I21	8 x SR21-1000
2272AF2.SL	FGZAC2272AF.I26	8 x FZ 600-51	FGZAC2272AF.I21	8 x SR21-1000
2360AF2.SL	FGZAC2360AF.I26	10 x FZ 400-57	FGZAC2360AF.I21	10 x SR21-1000
2420AF2.SL	FGZAC2420AF.I26	12 x FZ 400-57	FGZAC2420AF.I21	12 x SR21-800
2480AF2.SL	FGZAC2480AF.I26	14 x FZ 400-57	FGZAC2480AF.I21	14 x SR21-800
2482AF2.SL	FGZAC2482AF.I26	14 x FZ 400-57	FGZAC2482AF.I21	14 x SR21-1000
2600AF2.SL	FGZAC2600AF.I26	14 x FZ 400-57	FGZAC2600AF.I21	14 x SR21-1000
2602AF2.SL	FGZAC2602AF.I26	14 x FZ 400-57	FGZAC2602AF.I21	14 x SR21-1000
3660AF2.SL	FGZAC3660AF.I26	18 x FZ 400-57	FGZAC3660AF.I21	18 x SR21-1000
3720AF2.SL	FGZAC3720AF.I26	18 x FZ 600-51	FGZAC3720AF.I21	18 x SR21-1000
3722AF2.SL	FGZAC3722AF.I26	18 x FZ 600-51	FGZAC3722AF.I21	18 x SR21-1000
3782AF2.SL	FGZAC3782AF.I26	18 x FZ 600-51	FGZAC3782AF.I21	18 x SR21-1000

NOTICE!

If the units are operated without the appropriate anti-vibration mounts, the warranty is void!
FläktGroup recommends the use of rubber anti-vibration isolators. Alternatively, spring anti-vibration mounts can be used depending on the project specifications.

Electrical Data

Tab.7: Electrical data

Unit type			Compressors			Fans[3]		Total [1) 2) 3)]		
FGAC…	Power supply	n	F.L.I. [kW]	F.L.A. [A]	L.R.A. [A]	F.L.I. [kW]	F.L.A [A]	F.L.I. [kW]	F.L.A. [A]	S.A.
Standard units										
2220AF2	400/3/50	2	2 x 75.5	2 x 126	2 x 20	11.7	18.0	163	273	< F.L.A.
2260AF2	400/3/50	2	2 x 83.6	2 x 139	2 x 20	13.7	21.0	181	301	< F.L.A.
2270AF2	400/3/50	2	2 x 93.3	2 x 154	2 x 20	15.6	24.0	202	333	< F.L.A.
2272AF2	400/3/50	2	2 x 104	2 x 170	2 x 20	15.6	24.0	224	366	< F.L.A.
2360AF2	400/3/50	2	2 x 133	2 x 214	2 x 20	19.5	30.0	286	461	< F.L.A.
2420AF2	400/3/50	2	2 x 152	2 x 243	2 x 20	23.4	36.0	328	526	< F.L.A.
2480AF2	400/3/50	2	2 x 163	2 x 262	2 x 20	23.4	36.0	349	564	< F.L.A.
2482AF2	400/3/50	2	2 x 179	2 x 287	2 x 20	27.3	42.0	385	620	< F.L.A.
2600AF2	400/3/50	2	2 x 189	2 x 303	2 x 20	31.2	48.0	409	659	< F.L.A.
2602AF2	400/3/50	2	2 x 198	2 x 317	2 x 20	31.2	48.0	427	687	< F.L.A.
3660AF2	400/3/50	3	3 x 151	3 x 242	3 x 20	35.1	54.0	488	785	< F.L.A.
3720AF2	400/3/50	3	3 x 163	3 x 262	3 x 20	35.1	54.0	524	845	< F.L.A.
3722AF2	400/3/50	3	3 x 181	3 x 290	3 x 20	37.1	57.0	580	933	< F.L.A.
3782AF2	400/3/50	3	3 x 189	3 x 303	3 x 20	39.0	60.0	606	975	< F.L.A.

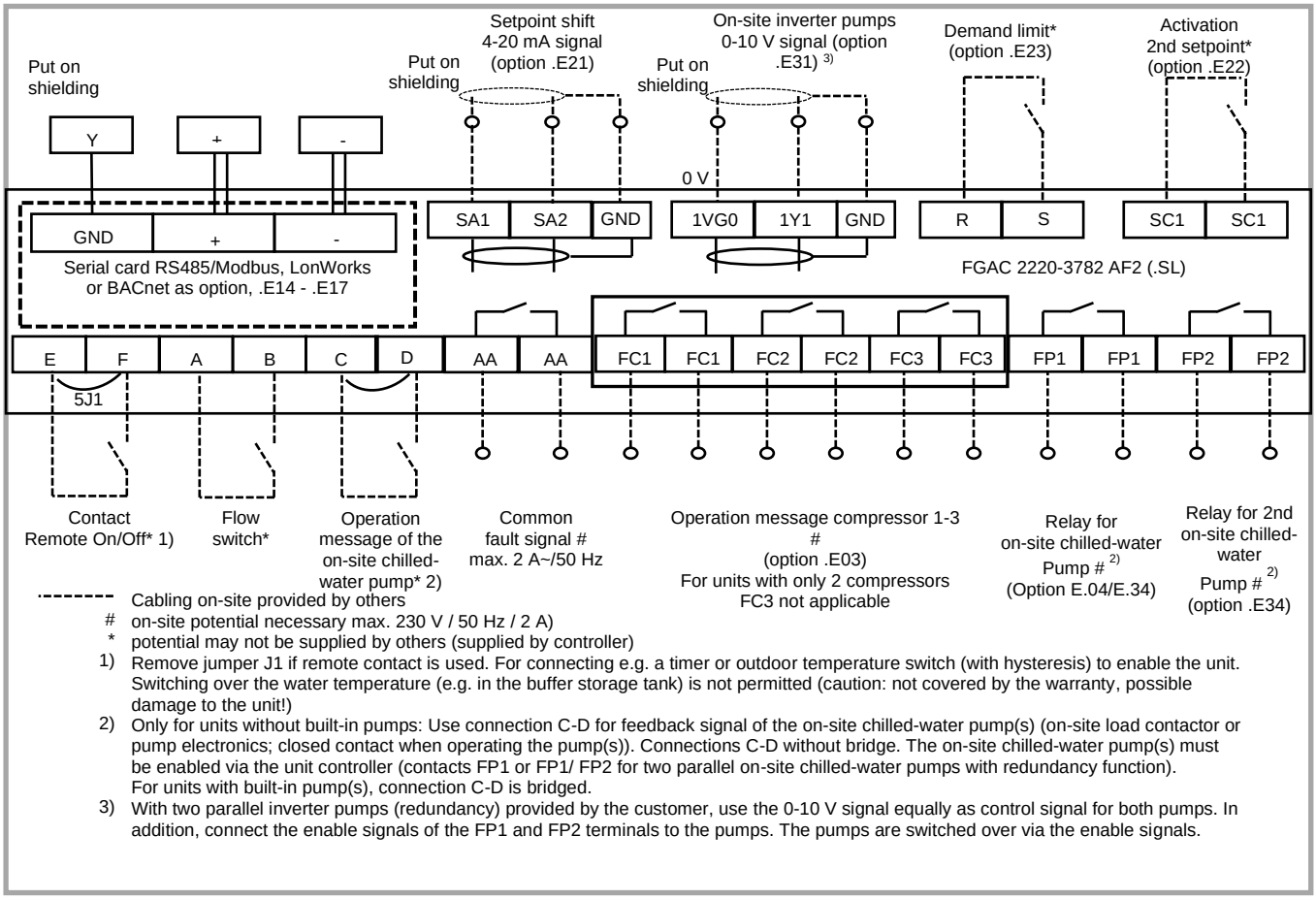
Unit type			Compressors			Fans[3]		Total [1) 2) 3)]		
FGAC…	Power supply	n	F.L.I. [kW]	F.L.A. [A]	L.R.A. [A]	F.L.I. [kW]	F.L.A [A]	F.L.I. [kW]	F.L.A. [A]	S.A.
SL units (especially quiet model)										
2220AF2.SL	400/3/50	2	2 x 75.5	2 x 126	2 x 20	11.7	18.0	163	273	< F.L.A.
2260AF2.SL	400/3/50	2	2 x 83.6	2 x 139	2 x 20	15.6	24.0	183	304	< F.L.A.
2270AF2.SL	400/3/50	2	2 x 93.3	2 x 154	2 x 20	15.6	24.0	202	333	< F.L.A.
2272AF2.SL	400/3/50	2	2 x 104	2 x 170	2 x 20	15.6	24.0	224	366	< F.L.A.
2360AF2.SL	400/3/50	2	2 x 133	2 x 214	2 x 20	19.5	30.0	286	461	< F.L.A.
2420AF2.SL	400/3/50	2	2 x 152	2 x 243	2 x 20	23.4	36.0	328	526	< F.L.A.
2480AF2.SL	400/3/50	2	2 x 163	2 x 262	2 x 20	27.3	42.0	353	570	< F.L.A.
2482AF2.SL	400/3/50	2	2 x 179	2 x 287	2 x 20	27.3	42.0	385	620	< F.L.A.
2600AF2.SL	400/3/50	2	2 x 189	2 x 303	2 x 20	31.2	48.0	409	659	< F.L.A.
2602AF2.SL	400/3/50	2	2 x 198	2 x 317	2 x 20	31.2	48.0	427	687	< F.L.A.
3660AF2.SL	400/3/50	3	3 x 151	3 x 242	3 x 20	35.1	54.0	488	785	< F.L.A.
3720AF2.SL	400/3/50	3	3 x 163	3 x 262	3 x 20	37.1	57.0	526	849	< F.L.A.
3722AF2.SL	400/3/50	3	3 x 181	3 x 290	3 x 20	39.0	60.0	582	936	< F.L.A.
3782AF2.SL	400/3/50	3	3 x 189	3 x 303	3 x 20	39.0	60.0	606	975	< F.L.A.

All values refer to units without built-in pumps. For units with built-in pumps, the pump data must be added.

n Number of compressors
F.L.I. El. FULL LOAD INPUT
F.L.A. Operating current
L.R.A. Starting current of each compressor
S.A. Starting current of entire unit

1) Please observe the regionally applicable safety regulations and constructional conditions relevant to the dimensioning of the supply line.
2) Please observe the regionally applicable standards for cable cross-sections and backup fuses. Voltage tolerance: max. 10%, voltage imbalance between phases: max. 3%.
3) Values are based on the total number of fans operating at maximum speed.

Terminal scheme



Cabling on-site provided by others
\# on-site potential necessary max. 230 V / 50 Hz / 2 A)
* potential may not be supplied by others (supplied by controller)

1) Remove jumper J1 if remote contact is used. For connecting e.g. a timer or outdoor temperature switch (with hysteresis) to enable the unit. Switching over the water temperature (e.g. in the buffer storage tank) is not permitted (caution: not covered by the warranty, possible damage to the unit!)
2) Only for units without built-in pumps: Use connection C-D for feedback signal of the on-site chilled-water pump(s) (on-site load contactor or pump electronics; closed contact when operating the pump(s)). Connections C-D without bridge. The on-site chilled-water pump(s) must be enabled via the unit controller (contacts FP1 or FP1/ FP2 for two parallel on-site chilled-water pumps with redundancy function). For units with built-in pump(s), connection C-D is bridged.
3) With two parallel inverter pumps (redundancy) provided by the customer, use the 0-10 V signal equally as control signal for both pumps. In addition, connect the enable signals of the FP1 and FP2 terminals to the pumps. The pumps are switched over via the enable signals.

Fig. 5: Terminal scheme