

FläktGroup

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Compressor-Condensing Unit

GLCU 2015-4060 BC1/2(.SL)
TECHNICAL DATA



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FG compressor-condensing units

		G	L	C	U	4	0	6	0	B	C	2	.SL
Air cooled for outdoor installation GLCU 2015-4051 BC1 GLCU 4052-4060 BC2(.SL)		FiaktGroup Series		Condensers	Operation mode	No. of compressors	Capacity stage			Series	Refrigerant	Supply voltage	Design version
GL	Global Large												
C	Air cooled (outdoor installation)												
U	Compressor-condenser units												
2	2 compressors												
4	4 compressors												
015	2 compressor, supply voltage type 1												
018	2 compressor, supply voltage type 1												
020	2 compressor, supply voltage type 1												
030	2 compressor, supply voltage type 1												
041	2 compressor, supply voltage type 1												
051	2 compressor, supply voltage type 1												
052	4 compressor, supply voltage type 2												
060	4 compressor, supply voltage type 2												
B	Unit series B												
C	R 407C												
1	400 V/3~/50 Hz/+N (+PE)												
2	400 V/3~/50 Hz (+PE)												
-	Standard												
.SL	SL unit - especially quiet design (only for units with 4 compressors)												

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These FläktGroup units are air-cooled compressor-condensing units for outdoor installation with axial fans for connection to an on-site air treatment unit (AHU). At the factory, they are filled with refrigeration machinery oil and a nitrogen inert gas filling as well as examined for seal effectiveness so that when the units are installed on-site, only the refrigeration circuit needs to be completed and filled, the electrical connections made, and the function tests performed.

This FläktGroup unit series is only designed for the operation with the refrigerant R-407C.

Directives and regulations

Units meet the following directives and standards:

- Directive on Machinery 2006/42/EC
- Low Voltage Directive 89/336/EEC & 2006/95/EC
- Electromagnetic Compatibility 2004/108/EC
- Pressure Equipment Directive 97/23/EC according to module H1
- Certified Corporate Quality Management System ISO 9001

Components

Basic construction

Frame and panels made of galvanized, plastic-coated sheet steel. The panels of the compressor section are coated with an extremely dense material. The self-supporting structure offers access to the individual components for maintenance and repair work.

Compressor

Fully hermetic, low-vibration and suction-gas cooled scroll compressor complete with oil heating for safe compressor start-up, electronic overheating protection with manual reset and a two-pole electric motor. These 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 units of capacity stage 2015-2051 have one compressor each in two refrigeration circuits.

The units of capacity stage 4052-4060 have 2 compressors each in two refrigeration circuits.

Condensers

Finned tube heat exchanger with copper fins and corrugated aluminium fins. The best possible heat exchanger efficiency is achieved through even spacing of the fins. In order to increase the cooling capacity of the unit, a subcooling circuit is integrated for units with 4 compressors.

Fans

Directly driven axial fans, protection class IP54, with deep-drawn rotor made of sheet steel and 6-pole motor with overheating protection. Assembled in a streamlined form and fitted with a protection grille. In order to ensure the efficiency factor at part-load, the fan groups per refrigeration circuit are separated on the air side.

Refrigeration circuit GLCU 2015-2051 BC1

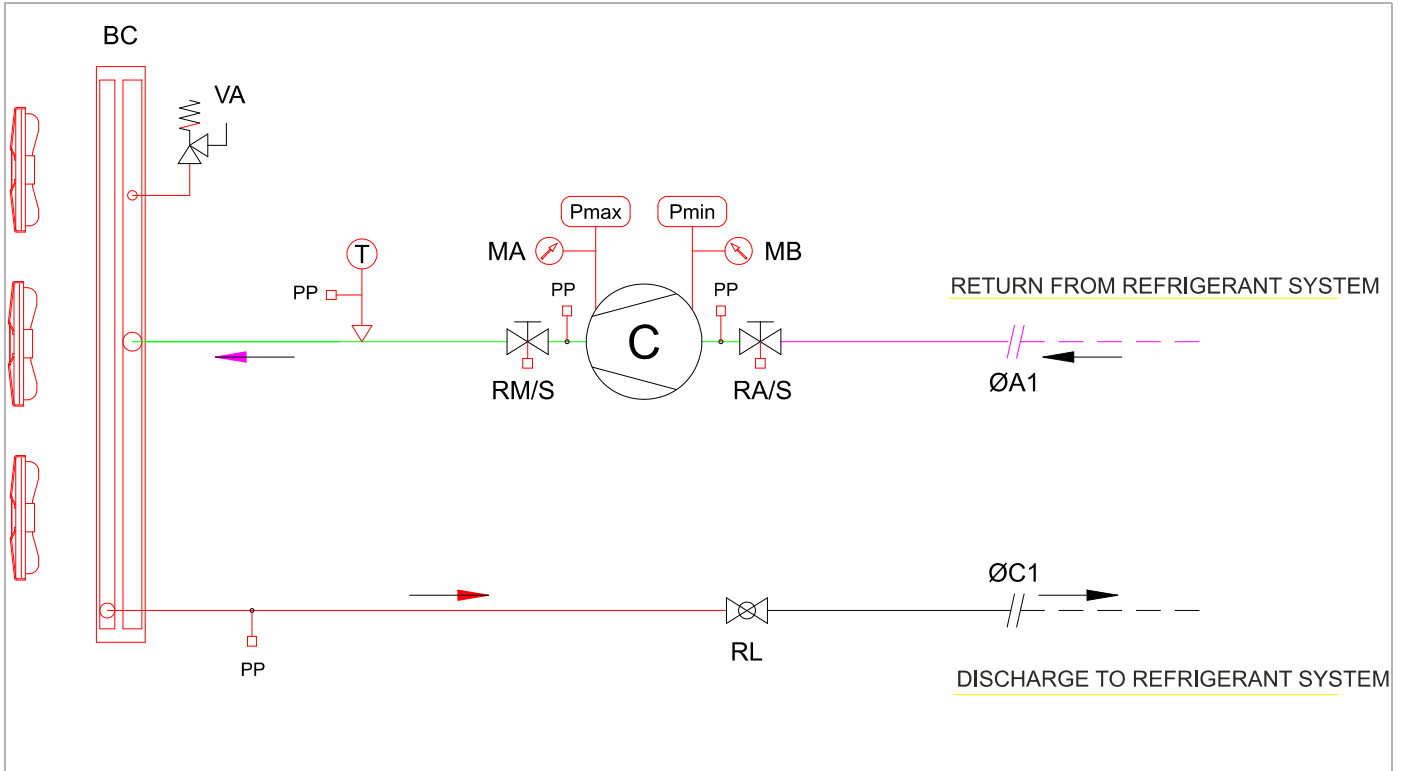


Fig. 1: FZ0812500-0 - Refrigeration circuit scheme GLCU 2015-2051 BC1

Legend	Description	Legend	Description
BC	Air-cooled condenser	RAS	Shut-off valve suction side (optional)
C	Compressor	RL	Fluid line shut-off valve
MA	High-pressure gauge (option .R13)	RMS	Shut-off on discharge side (optional)
MB	Low-pressure gauge (option .R13)	T	Pressure sensor
Pmin	Low-pressure switch	VA	High-pressure safety valve
Pmax	High-pressure switch	øA1	Suction line connection
PP	Service Schrader valve	øC1	Fluid line connection

Refrigeration circuit GLCU 4052-4060 BC2(.SL)

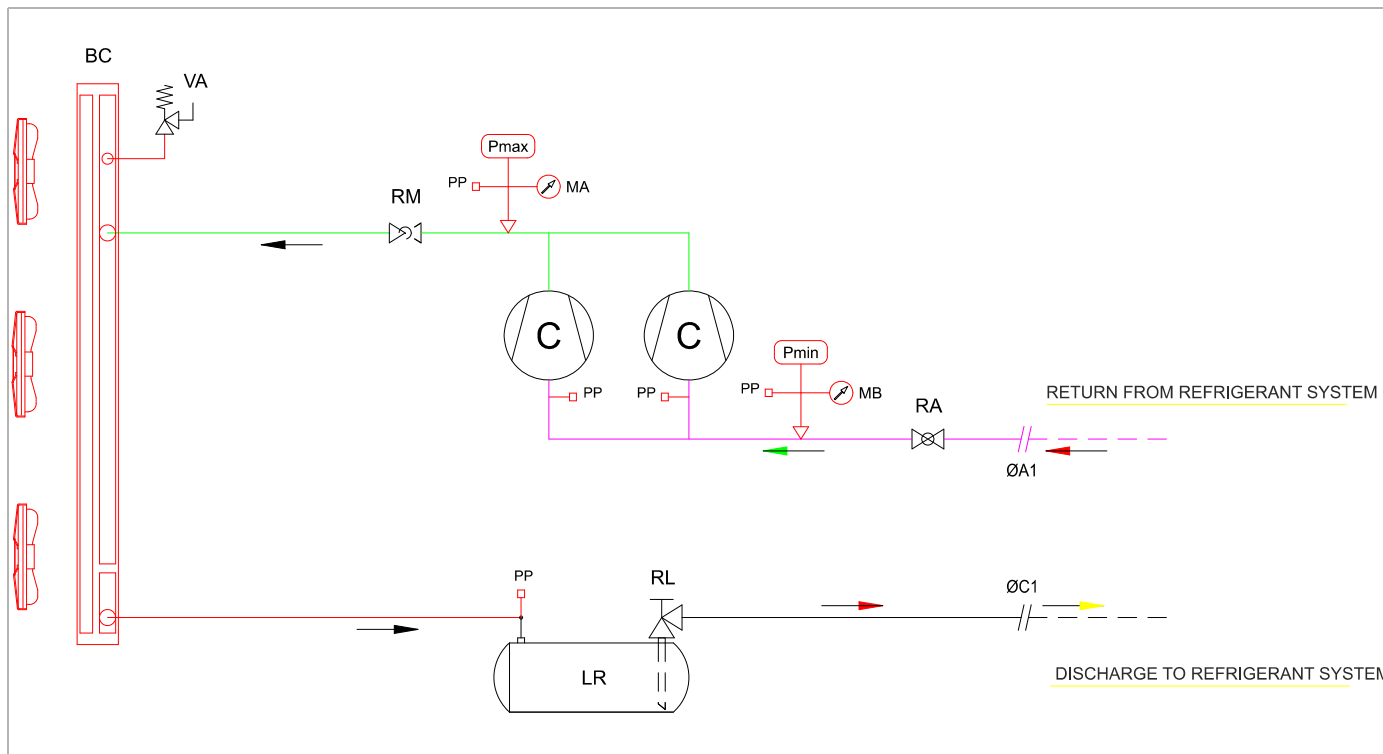


Fig. 2: FZ0825500-0 - refrigerant circuit scheme GLCU 4052-4060 BC2(.SL)

Legend	Description	Legend	Description
BC	Air-cooled condenser	PP	Service Schrader valve
C	Compressor	RA	Shut-off valve suction side (optional)
LR	Liquid receivers	RL	Fluid line shut-off valve
MA	High-pressure gauge (option .R13)	RM	Shut-off on discharge side (optional)
MB	Low-pressure gauge (option .R13)	VA	High-pressure safety valve
Pmin	Low-pressure switch	ØA1	Suction line connection
Pmax	High-pressure switch	ØC1	Fluid line connection

Control cabinet

Control cabinet (IP43), divided into power and control module, manufactured according to EN 60204-1, electromagnetic compatibility as of 2004/108/EC and Low Voltage Directive 2006/95/EC, complete with:

- Control cabinet in a separate casing sealed within the unit
- Transformer for generating control voltage
- Door-locking main isolator
- Motor protection switch and contactor for compressor and fans
- Terminal block control voltage
- Automatic circuit breaker for load and control current circuit
- Phase sequence protection for the compressor
- Contact for external remote ON/OFF
- Contact for general error message
- Contacts for the control of the individual capacity steps
- Fan speed regulation with phase-angle control (230 volt motors) conducted with high pressure (GLCU 2015-2051 BC1)
- Fan controller (ON/OFF) (400 volt motors) conducted in levels with the high pressure (GLCU 4052-4060 BC2)
- Fan speed control with transformer, which provides the fans with different voltages depending on the high pressure (GLCU 4052-4060 BC2.SL)

Electronic controls



Fig. 3: Unit display

Electronic controls of the FläktGroup controller - step III features the following:

- Plain-text and alphanumerical LCD display
- Selection of up to 19 different languages is possible
- Automatic self-diagnosis of the electronic control.
- Display of all analog recorded temperature and pressure values.
- Display of faults in compressors and refrigeration circuits.
- Display of common unit errors.
- Safety times for compressor, such as compressor cycle protection, minimum running time of compressor maximum start-ups per hour.
- Operating hours counter for compressor.
- Automatic compensation of operating hours for compressor.
- Notification about maintenance intervals of the compressor (parameterizable).
- Read out latest 200 alarm messages (FläktGroup controller - step II)
- Service possible via PC and system software.

Electrical accessories

- Option .E03* – **Operation message of compressors (GLCU4052-4060BC2(.SL) only)**
Floating contact for status indication of each compressor

Option .E19/E20



- **Second control connection for remote monitoring and regulation.**
Up to 10 units of the same controller family can be connected to an additional remote control (option .E19 for remote controls up to 200 meters and option .E20 for remote controls up to 500 meters distance).

Fig. 4: Remote control

Installation accessories



Fig. 5: Rubber anti-vibration isolators

Option .I02

– **Anti-vibration isolators**

Anti-vibration isolators with rubber elements to minimize vibration transmission (supplied separately).

Option .I03 /.I23
depending on unit
configuration

– **Air-cooled heat exchanger made of Cu/Al**

Corrosion-resistant coating for fins of the Cu/Al heat exchanger. The use of chemical cleaning methods and a protective-paint coating made of polyester resin ensure the following characteristics:

- Corrosion resistance in a salt spray test for at least 1000 hours according to ASTM B117
- UV durability

Option .I04

– **Protection grille for air-cooled heat exchanger**

Protection grille on external sides of the air-cooled heat exchanger for protecting fins against damage due to shipping and weather

Option .I18 /.I22
depending on design

– **Cu/Al heat exchanger with polyurethane paint coating**

The entire heat exchanger is entirely covered with a protective coating of polyurethane paint so that the following characteristics are ensured:

- Corrosion resistance in a salt spray test for at least 4000 hours according to ASTM B117
- UV durability

Option .I19

– **Additional sound insulation of the compressor section (for model size 2015-2051 only)**

Sound-attenuated hood for individual compressors or entire compressor section for reduction of sound power level by -2dB(A). Depending on the model, unit weight can change.

Accessories and refrigeration components

Option .R06

– **Refrigeration accessories for installation**

A set of refrigeration accessories for condenser-compressor units for on-site assembly in the refrigeration circuit, consisting of

- Expansion valve
- Solenoid valve
- Filter-drier
- Sight glass

The accessories can be considered as a kit for both refrigeration circuits and are supplied separately.

Other accessories

- Code .O01* – **Unit packing with a nylon foil in open timber crate (for model size 2015-2051 only)**
Open timber crate to protect unit against transport damage. The unit is additionally shrink-wrapped in nylon as a protection against weather effects and contamination.

Optional unit versions available

For compressor condensing units GLCU 4052-4060 BC2(.SL): SL Version

- SL unit* Super quiet design – for operation where strict noise protection requirements apply
- Reduced sound values compared to basic model:
- Acoustic attenuation of compressor casing
 - Reduced fan speed - at especially high outdoor temperatures, the fan speed is automatically increased over standard RPM speed
 - Increase of heat exchanger surface of condenser.

These planning documents are directed to specialists and serve the selection of a suitable FläktGroup compressor-condensing unit for an object-specific application.



Note!


For different temperature data, refer to the "Performance Data" tables on page 16 and following.
For operating temperatures outside the specified ranges, please contact your FläktGroup sales representative.

To help you select your FläktGroup compressor-condensing unit, we would like to explain this procedure using the following example:

EXAMPLE

	Input data	→ Result
<p><i>Requirements</i></p> <p>Calculate and determine specific input data beforehand.</p>	<p>Required cooling capacity → $\dot{Q}_e = 42 \text{ kW}$</p> <p>Outdoor temperature → $T_a = 32 \text{ °C}$</p> <p>Evaporating temperature → $T_e = 7 \text{ °C}$</p> <p>Operating limits of the unit → to - 10 °C</p> <p>Available installation location → 5x5 m roof on a building in the business park</p>	<p>→ Initial values for "Performance data" tables from page 16 ff.</p> <p>→ page 20</p> <p>→ see step 2</p>
<p><i>1st Step</i></p> <p>Determine the unit type and its power and operating data based on the tables "Performance data" from page 16 ff.</p>	<p>Determine your temporary unit type → from tables on page 16</p>	<p>→ GLCU 2015 BC1</p> <p>$\dot{Q}_e = 42.1 \text{ kW}$</p> <p>$P = 13.9 \text{ kW}$</p>
<p><i>2nd Step</i></p> <p>Check that the available installation site is large enough for the unit's dimensions, including the necessary clearances for maintenance and air supply (see table on page 13).</p>	<p>Total space requirements (unit+maintenance access) $(A + R3 + R4) \times (B + R1 + R2)$ 2895 mm x 3120 mm (specified in tables on page 13)</p> <p>→ Select a site protected from sun and wind for units to be installed outdoors. Please also remember that an air short circuit must be avoided and that the unit must be protected from heavy snow loads. Detailed information on the units is provided in the operation manuals for the units.</p>	<p>→ Installation possible</p>

Note: Some of the values in the example are rounded off.

You can also use our web-based configuration software for unit configuration Aid@  at <https://www.flaktgroup.com/en/support/selection-tools/aida-selection-tool/>.

Unit type			2015	2018	2020	2025	2030	2041	2051
Refrigeration capacity ¹	\dot{Q}_e	[kW]	40.3	50.4	58.5	71.1	85.2	120.2	148.0
Unit power consumption (total)	P	[kW]	14.8	18.2	20.7	25.9	30.2	38.8	47.4
EER			2.72	2.77	2.83	2.75	2.82	3.10	3.12
Controls			FläktGroup controller - step III						
Fans									
Number of fans		n	4	6	6	8	8	10	10
Total air volume flow		n	13.752	21.744	20.628	29.376	27.504	45.000	45.000
Compressor									
Number of compressors		n	2	2	2	2	2	2	2
Number of refrigeration circuits		n	2	2	2	2	2	2	2
Speeds per unit		n	2	2	2	2	2	2	2
Compressor type 1			ZR 90K3E-TWD-551	ZR 11M3E-TWD-551	ZR 12M3E-TWD-551	ZR 16M3E-TWD-551	SZ 185-4R	SZ 240-4PB	SZ 300-4PB
Compressor type 2			ZR 90K3E-TWD-551	ZR 11M3E-TWD-551	ZR 12M3E-TWD-551	ZR 16M3E-TWD-551	SZ 185-4R	SZ 240-4PB	SZ 300-4PB
Oil type			Refer to identification plate						
Pipe connections									
Liquid line	Ø	mm	22	22	22	22	22	28	28
Suction Line	Ø	mm	28	28	28	35	35	42	42
Filling quantities									
Refrigerant R-407C ²		[kg]	Units are delivered filled with nitrogen						
Oil		[kg]	8.0	8.0	8.0	8.0	13.0	13.0	16.0
Weight									
Transport weight		[kg]	510	570	600	675	775	910	980
Noise levels									
Sound power level ³		[dB(A)]	78	79	79	81	81	85	85
Sound pressure level ⁴		[dB(A)]	46	47	47	49	49	53	53

1) Performance data for input parameters: outdoor temperature T_a 35 °C / evaporating temperature T_e 7 °C (saturated suction gas temperature SST)

2) You determine the approximate refrigerant quantity to fill on the basis of the calculation example in this document

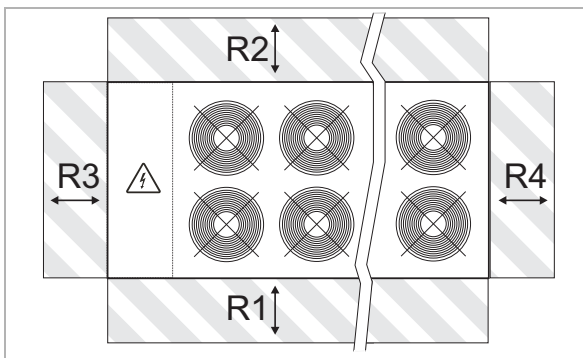
3) For further details refer to „Acustics“ on page 22

4) In 10 m free-field conditions (also refer to „Acustics“ on page 22)

Tab. 1

Unit Type		2015	2018	2020	2025	2030	2041	2051
Power supply	[V/Ph/Hz]	400/3/50+N	400/3/50+N	400/3/50+N	400/3/50+N	400/3/50+N	400/3/50+N	400/3/50+N
Compressor								
Max. power consumption (F.L.I.)	[kW]	2x7.8	2x9.2	2x10.6	2x13.2	2x17.7	2x23.9	2x29
Max. current consumption (F.L.A.)	[A]	2x14.3	2x18.5	2x21.2	2x27	2x29.5	2x38.5	2x47.2
Starting current of each compressor (L.R.A.)	[A]	2x99	2x123	2x134	2x167	2x176	2x215	2x270
Compressor start		Direct start						
Fans ¹								
Max. power consumption (F.L.I.)	[kW]	0.64	0.96	0.96	1.28	1.28	2.45	2.45
Maximum current consumption (F.L.A.)	[A]	2.84	4.26	4.26	5.68	5.68	11	11
Total 1,2,3								
Max. power consumption (F.L.I.)	[kW]	16.2	19.4	22.2	27.7	36.7	50.3	60.5
Max. current consumption (F.L.A.)	[A]	31.4	41.3	46.7	59.7	64.7	88	105
Starting current of entire unit (S.A.)	[A]	116	146	159	200	210	265	328
Maximum connectable cable cross-sections ^{2, 3}								
Rectangular	[mm]	16 x 3	16 x 3	16 x 3	16 x 3	16 x 3	16 x 3	16 x 3
Round	[mm ²]	50	50	50	50	50	50	50
Maximum permissible pre-fuse ratings (fuse type gLgG) ³								
Pre-fuse	[A]	63	63	63	100	100	100	125
Dimensions								
A (length)	[mm]	1695	2195	2195	2745	2745	3245	3245
B (width)	[mm]	1120	1120	1120	1120	1120	1120	1120
H (height)	[mm]	1420	1420	1420	1420	1420	1620	1620
Clearances								
R1	[mm]	1000	1000	1000	1000	1000	1000	1000
R2	[mm]	1000	1000	1000	1000	1000	1000	1000
R3	[mm]	600	600	600	600	600	600	600
R4	[mm]	600	600	600	600	600	600	600

Tab. 2



Clearances for air supply!

Unit must 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.

Fig. 6: Clearances

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.



Note!

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

Unit Type			Basic unit		SL unit	
			4052	4060	4052	4060
Refrigeration capacity ¹	\dot{Q}_e	[kW]	150.8	171.1	141	161.6
Unit power consumption (total)	P	[kW]	56.5	65.9	55.2	64.7
EER			2.67	2.60	2.55	2.50
Controls			FläktGroup controller - step II			
Fans						
Number of fans		n	4	4	4	4
Total air volume flow		n	67.032	61.524	30.672	40.356
Compressor						
Number of compressors		n	4	4	4	4
Number of refrigeration circuits		n	2	2	2	2
Speeds per unit		n	4	4	4	4
Compressor type 1			SZ 160-4R	SZ 185-4R	SZ 160-4R	SZ 185-4R
Compressor type 2			SZ 160-4R	SZ 185-4R	SZ 160-4R	SZ 185-4R
Compressor type 3			SZ 160-4R	SZ 185-4R	SZ 160-4R	SZ 185-4R
Compressor type 4			SZ 160-4R	SZ 185-4R	SZ 160-4R	SZ 185-4R
Oil type			Refer to identification plate			
Pipe connections						
Liquid line	Ø	mm	28	28	28	28
Suction Line	Ø	mm	42	42	42	42
Filling quantities						
Refrigerant R-407C ²		[kg]	Units are delivered filled with nitrogen			
Oil		[kg]	16.0	26.0	16.0	26.0
Weight						
Transport weight		[kg]	1520	1600	1620	1700
Noise levels						
Sound power level ³		[dB(A)]	94	94	79	79
Sound pressure level ⁴		[dB(A)]	62	62	47	47

1) Performance data for input parameters: outdoor temperature T_a 35 °C / evaporating temperature T_e 7 °C

(saturated suction gas temperature SST)

2) You determine the approximate refrigerant quantity to fill on the basis of the calculation example in this document

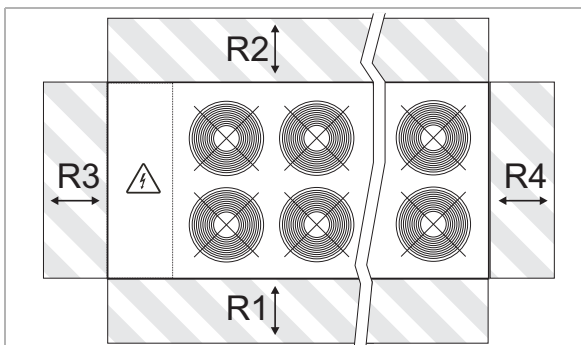
3) For further details refer to „Acoustics“ on page 22

4) In 10 m free-field conditions (also refer to „Acoustics“ on page 22)

Tab. 3

Unit Type			Basic uni		SL unit	
			4052	4060	4052	4060
Power supply		[V/Ph/Hz]	400/3/50	400/3/50	400/3/50	400/3/50
Compressor						
Max. power consumption (F.L.I.)		[kW]	4x14.4	4x17	4x14.4	4x17
Max. current consumption (F.L.A.)		[A]	4x25	4x28.4	4x25	4x28.4
Starting current of each compressor (L.R.A.)		[A]	4x175	4x175	4x175	4x175
Compressor start			Direct start			
Fans ¹						
Max. power consumption (F.L.I.)		[kW]	8.4	8.4	4.8	4.8
Max. current consumption (F.L.A.)		[A]	15.2	15.2	15.2	15.2
Total 1,2,3						
Max. power consumption (F.L.I.)		[kW]	66	76.4	62.4	72.8
Max. current consumption (F.L.A.)		[A]	115	129	115	129
Starting current of entire unit (S.A.)		[A]	265	275	265	275
Maximum connectable cable cross-sections ^{2, 3}						
Rectangular		[mm]	20 x 5	20 x 5	20 x 5	20 x 5
Round		[mm ²]	120	120	120	120
Maximum permissible pre-fuse ratings (fuse type gLgG) ³						
Pre-fuse		[A]	160	160	160	160
dimensions						
A (length)		[mm]	3110	3110	3110	3110
B (width)		[mm]	2220	2220	2220	2220
H (height)		[mm]	1700	1700	1700	2150
Clearances						
R1		[mm]	2000	2000	2000	2000
R2		[mm]	2000	2000	2000	2000
R3		[mm]	1100	1100	1100	1100
R4		[mm]	1100	1100	1100	1100

Tab. 4



Clearances for air supply!

Unit must 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.

Fig. 7: Clearances

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.



Note!

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GLCU2015BC1							
To	Ta	25	30	32	35	40	42
2	Qe	38.92	36.42	35.42	33.91	31.38	30.37
	P	11.48	12.71	13.24	14.05	15.49	16.1
3	Qe	40.34	37.75	36.72	35.16	32.56	31.51
	P	11.61	12.85	13.38	14.21	15.67	16.28
4	Qe	41.77	39.1	38.03	36.43	33.74	32.67
	P	11.73	12.99	13.52	14.36	15.84	16.46
5	Qe	43.21	40.47	39.37	37.71	34.95	33.84
	P	11.85	13.12	13.66	14.51	16.01	16.64
6	Qe	44.68	41.85	40.71	39.01	36.16	-
	P	11.97	13.25	13.8	14.65	16.17	-
7	Qe	46.16	43.24	42.07	40.32	37.39	-
	P	12.08	13.38	13.93	14.79	16.33	-
8	Qe	47.65	44.65	43.45	41.65	38.64	-
	P	12.19	13.5	14.06	14.93	16.49	-
9	Qe	49.16	46.08	44.84	42.99	39.9	-
	P	12.3	13.62	14.18	15.07	16.64	-
10	Qe	50.69	47.51	46.25	44.34	-	-
	P	12.4	13.73	14.3	15.2	-	-
11	Qe	52.24	48.97	47.67	45.71	-	-
	P	12.5	13.84	14.42	15.32	-	-
12	Qe	53.8	50.44	49.1	47.09	-	-
	P	12.6	13.95	14.53	15.44	-	-

GLCU2018BC1							
To	Ta	25	30	32	35	40	42
2	Qe	48.2	45.2	44.0	42.2	39.3	38.1
	P	14.2	15.7	16.4	17.4	19.2	20.0
3	Qe	50.0	46.9	45.6	43.8	40.8	39.6
	P	14.3	15.8	16.5	17.6	19.4	20.2
4	Qe	51.8	48.6	47.3	45.4	42.3	41.0
	P	14.4	16.0	16.7	17.7	19.6	20.4
5	Qe	53.6	50.3	49.0	47.0	43.8	42.5
	P	14.6	16.2	16.8	17.9	19.8	20.6
6	Qe	55.5	52.1	50.7	48.7	45.4	44.0
	P	14.7	16.3	17.0	18.1	20.0	20.8
7	Qe	57.4	53.9	52.5	50.4	46.9	45.6
	P	14.8	16.4	17.1	18.2	20.1	20.9
8	Qe	59.3	55.7	54.2	52.1	48.5	-
	P	14.9	16.6	17.3	18.4	20.3	-
9	Qe	61.2	57.5	56.0	53.8	50.1	-
	P	15.1	16.7	17.4	18.5	20.5	-
10	Qe	63.1	59.3	57.8	55.5	51.8	-
	P	15.2	16.8	17.5	18.6	20.6	-
11	Qe	65.1	61.2	59.6	57.3	53.5	-
	P	15.3	17.0	17.7	18.8	20.8	-
12	Qe	67.1	63.1	61.5	59.1	55.1	-
	P	15.4	17.1	17.8	18.9	20.9	-

GLCU2020BC1							
To	Ta	25	30	32	35	40	42
2	Qe	56.0	52.5	51.1	49.0	45.6	44.3
	P	16.0	17.8	18.6	19.8	21.9	22.7
3	Qe	58.1	54.5	53.0	50.9	47.4	45.9
	P	16.2	18.0	18.8	20.0	22.1	23.0
4	Qe	60.2	56.5	55.0	52.8	49.1	47.7
	P	16.4	18.2	18.9	20.1	22.3	23.2
5	Qe	62.3	58.5	56.9	54.7	50.9	49.4
	P	16.5	18.3	19.1	20.3	22.5	23.4
6	Qe	64.5	60.5	58.9	56.6	52.7	51.1
	P	16.7	18.5	19.3	20.5	22.7	23.6
7	Qe	66.7	62.6	61.0	58.5	54.5	52.9
	P	16.8	18.7	19.4	20.7	22.9	23.8
8	Qe	68.9	64.7	63.0	60.5	56.4	-
	P	16.9	18.8	19.6	20.9	23.1	-
9	Qe	71.1	66.8	65.1	62.5	58.3	-
	P	17.1	19.0	19.8	21.0	23.3	-
10	Qe	73.4	69.0	67.2	64.5	60.2	-
	P	17.2	19.1	19.9	21.2	23.5	-
11	Qe	75.7	71.1	69.3	66.6	62.1	-
	P	17.3	19.2	20.1	21.3	23.6	-
12	Qe	78.0	73.3	71.5	68.7	64.1	-
	P	17.5	19.4	20.2	21.5	23.8	-

GLCU2025BC1							
To	Ta	25	30	32	35	40	42
2	Qe	68.7	64.3	62.5	59.8	55.3	53.5
	P	20.1	22.2	23.1	24.4	26.8	27.8
3	Qe	71.2	66.7	64.8	62.0	57.4	55.5
	P	20.4	22.5	23.4	24.7	27.2	28.2
4	Qe	73.7	69.0	67.1	64.3	59.5	57.6
	P	20.7	22.8	23.7	25.0	27.5	28.5
5	Qe	76.3	71.4	69.5	66.5	61.6	59.6
	P	20.9	23.0	23.9	25.3	27.8	28.9
6	Qe	78.8	73.8	71.8	68.8	63.8	-
	P	21.1	23.3	24.2	25.6	28.2	-
7	Qe	81.4	76.3	74.2	71.1	66.0	-
	P	21.4	23.6	24.5	25.9	28.5	-
8	Qe	84.0	78.8	76.6	73.5	68.2	-
	P	21.6	23.8	24.7	26.2	28.8	-
9	Qe	86.7	81.3	79.1	75.8	70.4	-
	P	21.9	24.1	25.0	26.5	29.1	-
10	Qe	89.3	83.8	81.6	78.2	-	-
	P	22.1	24.3	25.3	26.7	-	-
11	Qe	92.0	86.3	84.1	80.6	-	-
	P	22.3	24.5	25.5	27.0	-	-
12	Qe	94.8	88.9	86.6	83.1	-	-
	P	22.5	24.8	25.8	27.3	-	-

T_a [°C] Air inlet temperature:
 T_o [°C] Evaporating temperature (SST)
 Q_e [kW] Cooling capacity

P Unit power consumption (total)
 - Operation outside operating limits

Values in the table from example of page 11

GLCU2030BC1							
To	Ta	25	30	32	35	40	42
2	Qe	82.5	77.3	75.2	71.9	66.1	63.7
	P	23.5	25.9	27.0	28.7	31.7	32.9
3	Qe	85.5	80.1	77.9	74.5	68.5	66.0
	P	23.8	26.2	27.3	29.0	32.0	33.3
4	Qe	88.5	83.0	80.7	77.1	70.9	-
	P	24.0	26.5	27.6	29.3	32.3	-
5	Qe	91.6	85.8	83.5	79.8	73.4	-
	P	24.3	26.8	27.9	29.6	32.6	-
6	Qe	94.6	88.7	86.3	82.5	75.9	-
	P	24.6	27.1	28.2	29.9	33.0	-
7	Qe	97.7	91.6	89.1	85.2	78.3	-
	P	24.8	27.4	28.5	30.2	33.3	-
8	Qe	100.9	94.6	92.0	87.9	80.8	-
	P	25.1	27.6	28.7	30.5	33.6	-
9	Qe	104.1	97.5	94.8	90.6	-	-
	P	25.3	27.9	29.0	30.7	-	-
10	Qe	107.2	100.5	97.7	93.4	-	-
	P	25.5	28.1	29.3	31.0	-	-
11	Qe	110.5	103.5	100.6	96.2	-	-
	P	25.8	28.4	29.5	31.3	-	-
12	Qe	113.7	106.6	103.6	99.0	-	-
	P	26.0	28.6	29.8	31.5	-	-

GLCU2041BC1							
To	Ta	25	30	32	35	40	42
2	Qe	115.0	108.0	105.1	100.8	93.4	90.3
	P	30.1	33.1	34.5	36.6	40.5	42.2
3	Qe	119.3	112.1	109.1	104.6	96.9	93.8
	P	30.4	33.5	34.9	37.1	41.0	42.7
4	Qe	123.6	116.2	113.1	108.4	100.5	97.2
	P	30.8	34.0	35.3	37.5	41.5	43.2
5	Qe	128.1	120.3	117.2	112.3	104.1	100.7
	P	31.2	34.4	35.8	38.0	42.0	43.7
6	Qe	132.5	124.5	121.3	116.3	107.7	104.3
	P	31.5	34.8	36.2	38.4	42.4	44.2
7	Qe	137.0	128.8	125.4	120.2	111.4	107.8
	P	31.9	35.2	36.6	38.8	42.9	44.6
8	Qe	141.6	133.1	129.6	124.3	115.2	111.5
	P	32.3	35.6	37.0	39.3	43.4	45.1
9	Qe	146.2	137.4	133.8	128.3	118.9	115.1
	P	32.6	36.0	37.4	39.7	43.8	45.6
10	Qe	150.9	141.8	138.1	132.4	122.8	-
	P	33.0	36.4	37.8	40.1	44.3	-
11	Qe	155.6	146.2	142.4	136.6	126.6	-
	P	33.3	36.7	38.2	40.5	44.7	-
12	Qe	160.4	150.7	146.8	140.8	130.5	-
	P	33.7	37.1	38.6	41.0	45.1	-

GLCU2051BC1							
To	Ta	25	30	32	35	40	42
2	Qe	141.0	133.1	129.8	124.7	115.6	111.8
	P	36.3	40.3	42.0	44.6	49.3	51.3
3	Qe	146.1	138.0	134.6	129.3	119.8	115.9
	P	36.7	40.8	42.5	45.2	49.9	51.9
4	Qe	151.4	143.0	139.4	133.9	124.1	120.0
	P	37.2	41.3	43.0	45.8	50.5	52.5
5	Qe	156.7	148.0	144.3	138.5	128.4	124.1
	P	37.7	41.8	43.6	46.3	51.1	53.2
6	Qe	162.1	153.0	149.2	143.2	132.7	128.3
	P	38.2	42.4	44.1	46.9	51.7	53.8
7	Qe	167.5	158.1	154.2	148.0	137.1	132.5
	P	38.7	42.9	44.6	47.4	52.3	54.3
8	Qe	173.0	163.3	159.2	152.8	141.5	136.8
	P	39.1	43.4	45.2	47.9	52.9	54.9
9	Qe	178.6	168.5	164.2	157.6	146.0	141.1
	P	39.6	43.9	45.7	48.5	53.4	55.5
10	Qe	184.2	173.8	169.4	162.5	150.5	-
	P	40.1	44.4	46.2	49.0	54.0	-
11	Qe	189.8	179.1	174.5	167.5	155.1	-
	P	40.5	44.8	46.7	49.5	54.5	-
12	Qe	195.6	184.4	179.8	172.5	159.7	-
	P	41.0	45.3	47.2	50.0	55.0	-

T_a [°C] Air inlet temperature:
T_o [°C] Evaporating temperature (SST)
Q_e [kW] Cooling capacity

P Unit power consumption (total)
- Operation outside operating limits

Values in the table from example of page 11

GLCU4052BC2							
To	Ta	25	30	32	35	40	42
2	Qe	144.0	135.6	132.1	126.7	117.3	113.4
	P	46.1	49.9	51.6	54.1	58.8	60.7
3	Qe	149.3	140.7	137.1	131.5	121.7	117.6
	P	46.6	50.4	52.0	54.6	59.3	61.2
4	Qe	154.8	145.8	142.0	136.2	126.1	121.9
	P	47.0	50.8	52.5	55.1	59.8	61.8
5	Qe	160.2	150.9	147.0	141.0	130.6	126.2
	P	47.4	51.3	53.0	55.6	60.3	62.3
6	Qe	165.7	156.1	152.1	145.9	135.1	130.6
	P	47.8	51.7	53.4	56.0	60.8	62.7
7	Qe	171.3	161.4	157.2	150.8	139.6	135.0
	P	48.2	52.1	53.8	56.5	61.2	63.2
8	Qe	177.0	166.7	162.4	155.8	144.2	139.4
	P	48.6	52.6	54.2	56.9	61.7	63.7
9	Qe	182.6	172.0	167.6	160.8	148.9	-
	P	49.0	52.9	54.7	57.3	62.1	-
10	Qe	188.4	177.4	172.9	165.8	153.6	-
	P	49.3	53.3	55.0	57.7	62.5	-
11	Qe	194.2	182.9	178.2	170.9	158.3	-
	P	49.7	53.7	55.4	58.1	62.9	-
12	Qe	200.0	188.4	183.5	176.0	163.1	-
	P	50.0	54.1	55.8	58.5	63.3	-

GLCU4060BC2							
To	Ta	25	30	32	35	40	42
2	Qe	165.0	154.9	150.8	144.3	133.0	128.3
	P	52.8	57.6	59.6	62.9	68.7	71.2
3	Qe	171.0	160.6	156.3	149.6	137.9	133.0
	P	53.4	58.2	60.2	63.5	69.4	71.9
4	Qe	177.0	166.3	161.8	154.9	142.8	137.8
	P	53.9	58.7	60.8	64.1	70.0	72.5
5	Qe	183.2	172.0	167.4	160.2	147.7	142.5
	P	54.4	59.3	61.4	64.7	70.7	73.2
6	Qe	189.3	177.8	173.0	165.6	152.7	147.4
	P	54.9	59.8	62.0	65.3	71.3	73.8
7	Qe	195.6	183.7	178.7	171.1	157.7	152.2
	P	55.4	60.4	62.5	65.9	71.9	74.4
8	Qe	201.8	189.6	184.5	176.6	162.8	-
	P	55.9	60.9	63.1	66.4	72.5	-
9	Qe	208.2	195.5	190.2	182.1	167.9	-
	P	56.4	61.4	63.6	67.0	73.0	-
10	Qe	214.6	201.5	196.1	187.7	173.1	-
	P	56.9	61.9	64.1	67.5	73.6	-
11	Qe	221.0	207.5	201.9	193.3	178.3	-
	P	57.3	62.4	64.6	68.0	74.1	-
12	Qe	227.5	213.6	207.9	199.0	183.5	-
	P	57.8	62.9	65.1	68.5	74.6	-

T_a [°C] Air inlet temperature:
T_o [°C] Evaporating temperature (SST)
Q_e [kW] Cooling capacity

P Unit power consumption (total)
- Operation outside operating limits


Values in the table from example of page 11

GLCU4052BC2.SL							
To	Ta	25	30	32	35	40	42
2	Qe	138.0	129.0	125.3	119.5	117.8	113.9
	P	43.5	47.7	49.5	52.3	54.9	56.9
3	Qe	142.9	133.6	129.7	123.7	122.3	118.1
	P	44.0	48.2	50.1	52.9	55.4	57.4
4	Qe	147.9	138.2	134.2	128.0	126.7	122.4
	P	44.5	48.8	50.6	53.5	55.9	57.9
5	Qe	152.9	142.9	138.7	132.3	131.2	126.8
	P	45.0	49.4	51.2	54.1	56.4	58.4
6	Qe	158.0	147.6	143.3	136.7	135.8	131.2
	P	45.6	49.9	51.8	54.7	56.8	58.9
7	Qe	163.1	152.3	147.9	141.0	140.4	135.6
	P	46.1	50.4	52.3	55.2	57.3	59.3
8	Qe	168.2	157.1	152.5	145.4	145.0	-
	P	46.5	51.0	52.8	55.8	57.7	-
9	Qe	173.4	161.9	157.1	161.8	149.7	-
	P	47.0	51.5	53.4	53.3	58.2	-
10	Qe	178.6	166.7	161.8	166.9	154.4	-
	P	47.5	52.0	53.9	53.7	58.6	-
11	Qe	183.8	171.6	166.5	172.1	159.2	-
	P	48.0	52.5	54.4	54.1	59.0	-
12	Qe	189.1	176.5	171.3	-	-	-
	P	48.4	53.0	54.9	-	-	-

GLCU4060BC2.SL							
To	Ta	25	30	32	35	40	42
2	Qe	159.1	148.5	144.1	137.3	135.4	130.7
	P	50.2	55.4	57.6	61.1	63.9	66.4
3	Qe	164.8	153.7	149.2	142.1	140.4	135.5
	P	50.8	56.1	58.3	61.9	64.5	67.0
4	Qe	170.4	159.0	154.2	146.9	145.5	140.4
	P	51.4	56.7	59.0	62.6	65.1	67.6
5	Qe	176.1	164.3	159.4	151.8	150.6	145.4
	P	52.1	57.4	59.7	63.3	65.7	68.2
6	Qe	181.8	169.6	164.5	156.7	155.8	150.3
	P	52.7	58.1	60.4	64.0	66.3	68.8
7	Qe	187.6	175.0	169.7	161.6	161.0	-
	P	53.3	58.7	61.1	64.7	66.8	-
8	Qe	193.4	180.4	174.9	166.6	166.2	-
	P	53.9	59.4	61.7	65.4	67.4	-
9	Qe	199.3	185.8	180.2	185.8	171.5	-
	P	54.5	60.0	62.4	61.8	67.9	-
10	Qe	205.1	191.2	185.4	191.6	176.9	-
	P	55.1	60.7	63.0	62.3	68.4	-
11	Qe	211.1	196.7	190.8	197.4	182.2	-
	P	55.7	61.3	63.6	62.8	68.9	-
12	Qe	217.0	202.2	196.1	-	-	-
	P	56.2	61.9	64.3	-	-	-

T_a [°C] Air inlet temperature:
T_o [°C] Evaporating temperature (SST)
Q_e [kW] Cooling capacity

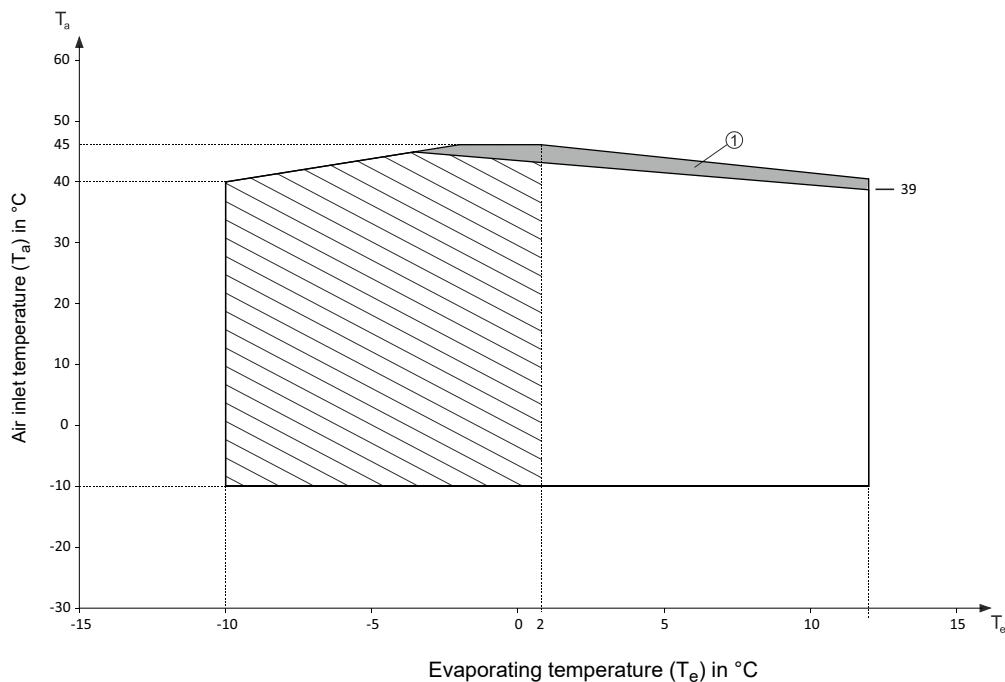
P Unit power consumption (total)
- Operation outside operating limits

 Unit does not work in sound-reduced mode.
The indicated noise levels increase.

Values in the table from example of page 11

Compressor-condensing unit GLCU 2015-2051 BC1

D. 1



The operating limits apply to the continual operation of the unit and for proper commissioning, cleaning, service and set-up/installation of compressor-condensing units and plant.

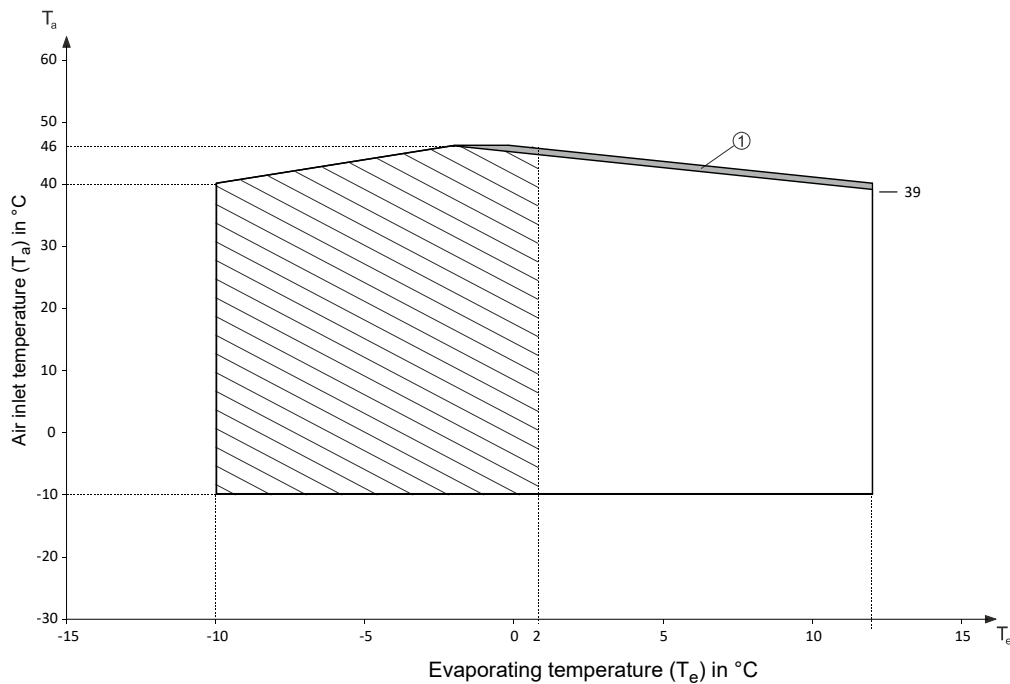
Observe the setup conditions in the Operation Manual!

① Operating range is machine-dependent, see also performance data page 16 ff.

////// Protect air-cooled evaporator from icing.

Compressor-condensing unit GLCU 4052-4060 BC2

D. 2



The operating limits apply to the continual operation of the unit and for proper commissioning, cleaning, service and set-up/installation of compressor-condensing units and plant.

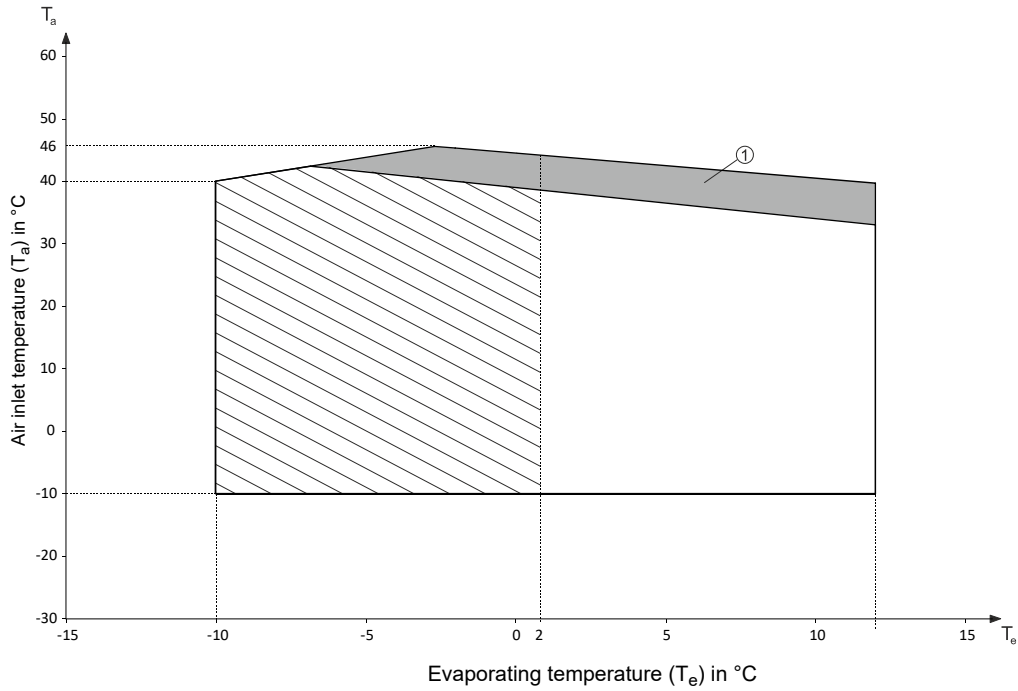
Observe the setup conditions in the Operation Manual!

① Operating range is machine-dependent, see also performance data page 16 ff.

////// Protect air-cooled evaporator from icing.

For detailed design please contact your FläktGroup sales office.

Compressor-condensing unit GLCU 4052-4060 BC2.SL



The operating limits apply to the continual operation of the unit and for proper commissioning, cleaning, service and set-up/installation of compressor-condensing units and plant.

Observe the setup conditions in the Operation Manual!

① Operating range is device-dependent, see also performance data page 16 ff.
 Unit does not work in noise-reduced operation. The indicated noise levels increase.

////// Protect air-cooled evaporator from icing.

For detailed design please contact your FläktGroup sales office.

Unit Type	Total sound level		Octave band [Hz]							
	Sound power ¹ [dB(A)]	Sound pressure level ² [dB(A)]	63	125	250	500	1000	2000	4000	8000
2015	78	46	56	46	45	44	41	37	31	33
2018	79	47	57	58	46	45	42	38	31	35
2020	79	47	59	49	46	45	42	38	31	35
2025	81	49	62	50	48	45	45	41	35	31
2030	81	49	62	50	48	45	45	41	35	31
2041	85	53	66	54	51	49	48	45	40	32
2051	85	53	66	54	51	49	48	45	40	32
4052	94	62	59	58	61	57	56	56	49	44
4060	94	62	59	58	61	57	56	56	49	44
4052 - SL	79	47	49	47	46	45	42	38	32	34
4060 - SL	79	47	49	47	46	45	42	38	32	34

Tab. 5: Sound level

*** Data on operating conditions**

Data applies only to evaporating temperature of 5 °C and air inlet temperature of 35 °C.

¹ Data on sound power

Manufacturer determines the sound power value for Eurovent-certified units in accordance with ISO 9614 and Eurovent 8/1 standards. For units that do not participate in the Eurovent certification program, sound power is determined in accordance with the ISO 3744 standard.



The data 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 surface (Q=2).

The spacing of 10 m refers to the external dimensions of 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 at 10 meters distance

Sound pressure level at 15 m: -3 dB to sound pressure level at 10 meters distance

Sound pressure level at 20 m: -6 dB to sound pressure level at 10 meters distance

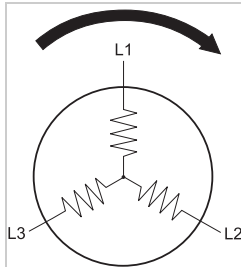
You can also use our web-based configuration software for unit configuration Aid@ at <https://www.flaktgroup.com/en/support/selection-tools/aida-selection-tool/> for a detailed calculation of the sound pressure level depending on the distance.

**Note!**

Only an externally engaged acoustics engineer should carry out specific sound level calculations to be valid for your installation site.

Before you start setting up the unit's electrical connections, check the following points without fail:

- The properties of the mains power supply must comply with EN 60204-1 regulations and the power requirements of the unit.
- Power supply must correspond to the type TN(S).
- Earth leakage circuit breaker must correspond to type A or type B.
- Voltage tolerance of mains power supply must not exceed tolerances $\pm 10\%$ 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 the warranty. To check, use the following formula (see example).
- If phase asymmetry displays a value higher than 3 %, contact the power provider.
- Before commissioning, check if electrical equipment is supplied in such a way that the conformity according to the directive 2004/108/EG (electromagnetic compatibility) is ensured.



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

EXAMPLE

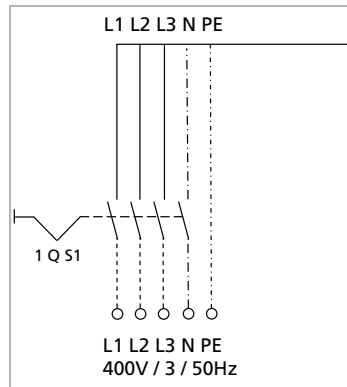
	Input data	→ Result
Requirements Calculate and determine specific input data and measurements beforehand.	Rated voltage → 400 V/50 Hz/3 phases Voltage between phases → L1/L2 = 409 V; L2/L3 = 398 V; L1/L3 = 396 V	
1st Step Determine the average voltage U_m	Average voltage → $U_m = \frac{\sum U}{3}$ $\frac{(409 + 398 + 396)}{3} = 401 \text{ V}$	→ $U_m = 401 \text{ V}$
2nd Step Determine the maximum voltage imbalance ΔU_{\max}	Voltage imbalance ΔU_{\max} in %? → $\Delta U_{\max} = \frac{\text{max. voltage deviation}}{U_m} \times 100$ $U_{\max} = 409 \text{ V}$ $U_m = 401 \text{ V}$ $\frac{(409 - 401) \text{ V}}{401 \text{ V}} \times 100 = 2 \%$	→ $\Delta U_{\max} = 2 \% \checkmark$



Note!

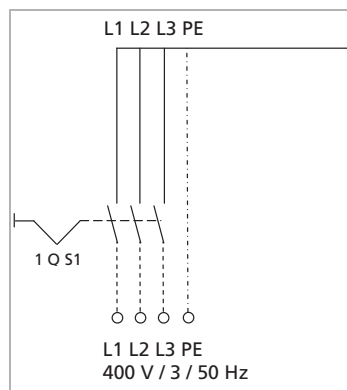
When connecting the supply voltage, make sure you observe the **clockwise rotation direction!** If the rotation direction is incorrect, an adjustment shall be performed by changing the phases using the main connection of the unit. Change the phase sequence of the power supply line at the on-site source, never change the wiring in the unit switch box.

Connecting power supply using the main isolator of chiller



GLCU 2015-2051 BC1


Fig. 8: GLCU mains isolator

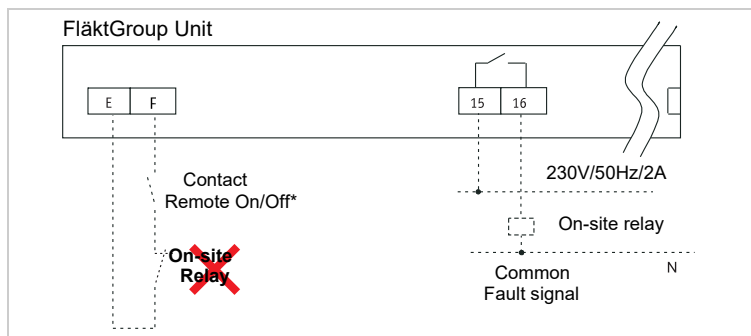


GLCU 4052-4060 BC2(.SL)

Fig. 9: GLCU mains isolator

Integrating common fault signal

	ATTENTION
	<p>Damage to the unit!</p> <p>✗ Do not open the remote on/off contact, e.g. via the changeover contact of the on-site relay, if the system is faulty.</p> <ul style="list-style-type: none"> – As a result, the fault can be reset, – and the cause of the malfunction cannot be determined. – The entire unit stops operating although only one refrigeration circuit is possibly affected.



- Connect the cable for the **common fault signal** (volt-free contact, suitable for 230 V AC / 50 Hz / 2 A). See the enclosed electrical wiring diagram supplied with the unit, terminals 15-16.

Fig. 10: Electric integration of error message

Klemmen: E - F: Remote contact for switching the unit ON and OFF with on-site normally open contact
 15 - 16: General fault signal (on-site voltage max. 230 V / 50 Hz / 2 A / AC)

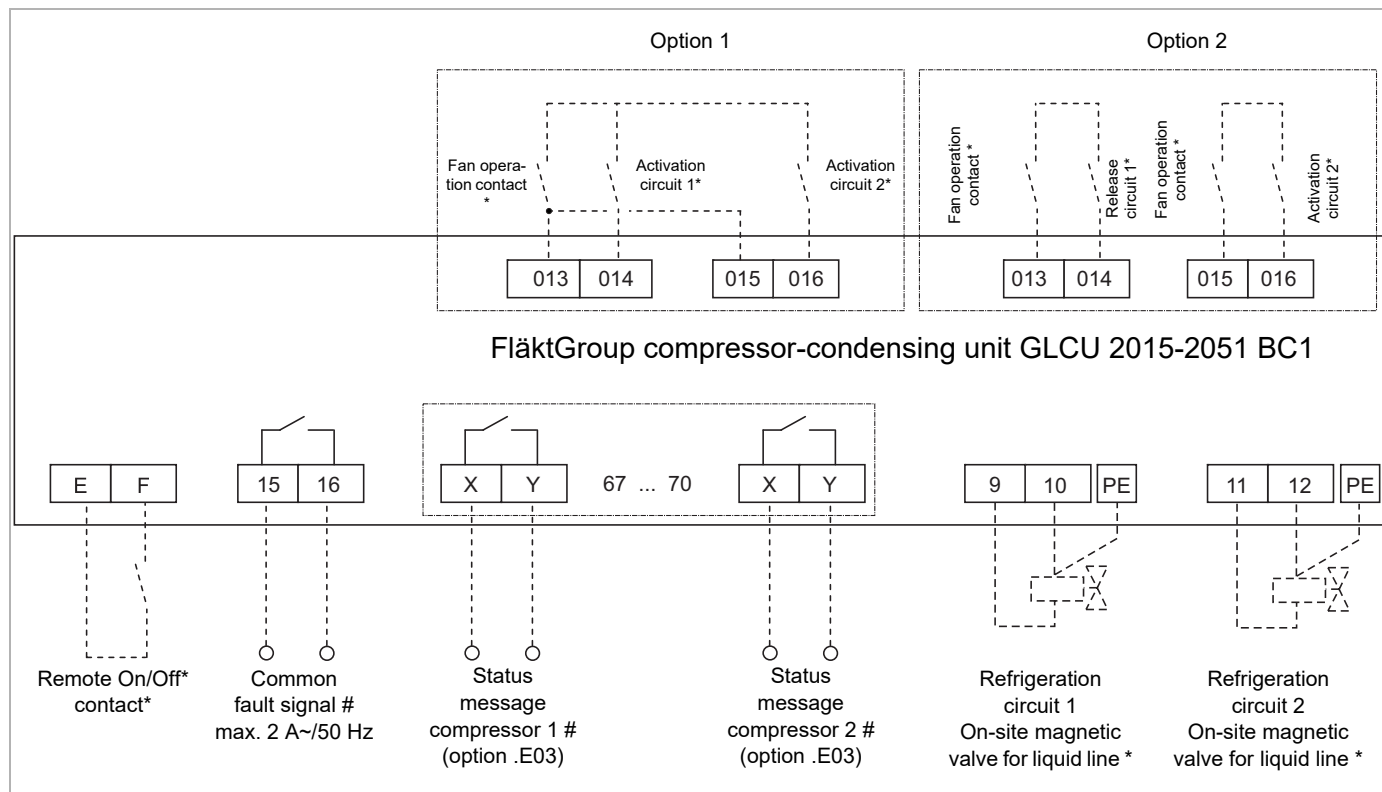


Fig. 11: Electrical integration GLCU 2015-2051 BC1

Legend for drawings:

- Klemmen:**
- E - F:* Remote contact to switch the machine ON and OFF with on-site normally open contact
 - 15 - 16:* General fault signal
 - 67 - 68:* Status message compressor 1 (option .E03)
 - 69 - 70:* Status message compressor 2 (option .E03)
 - 9 - 10* Control of on-site fluid magnetic valve refrigeration circuit 1 (230 V / ~ / 50 Hz)
 - 11 - 12* Control of on-site fluid magnetic valve refrigeration circuit 2 (230 V / ~ / 50 Hz)
 - 013-014:* Release contact refrigeration circuit 1
 - 015-016:* Release contact refrigeration circuit 2
- - - - - On-site cabling
 - # On-site potential required (max. 230 V/50 Hz/2 A)
 - * On-site potential not approved (potential supply is from the controller)

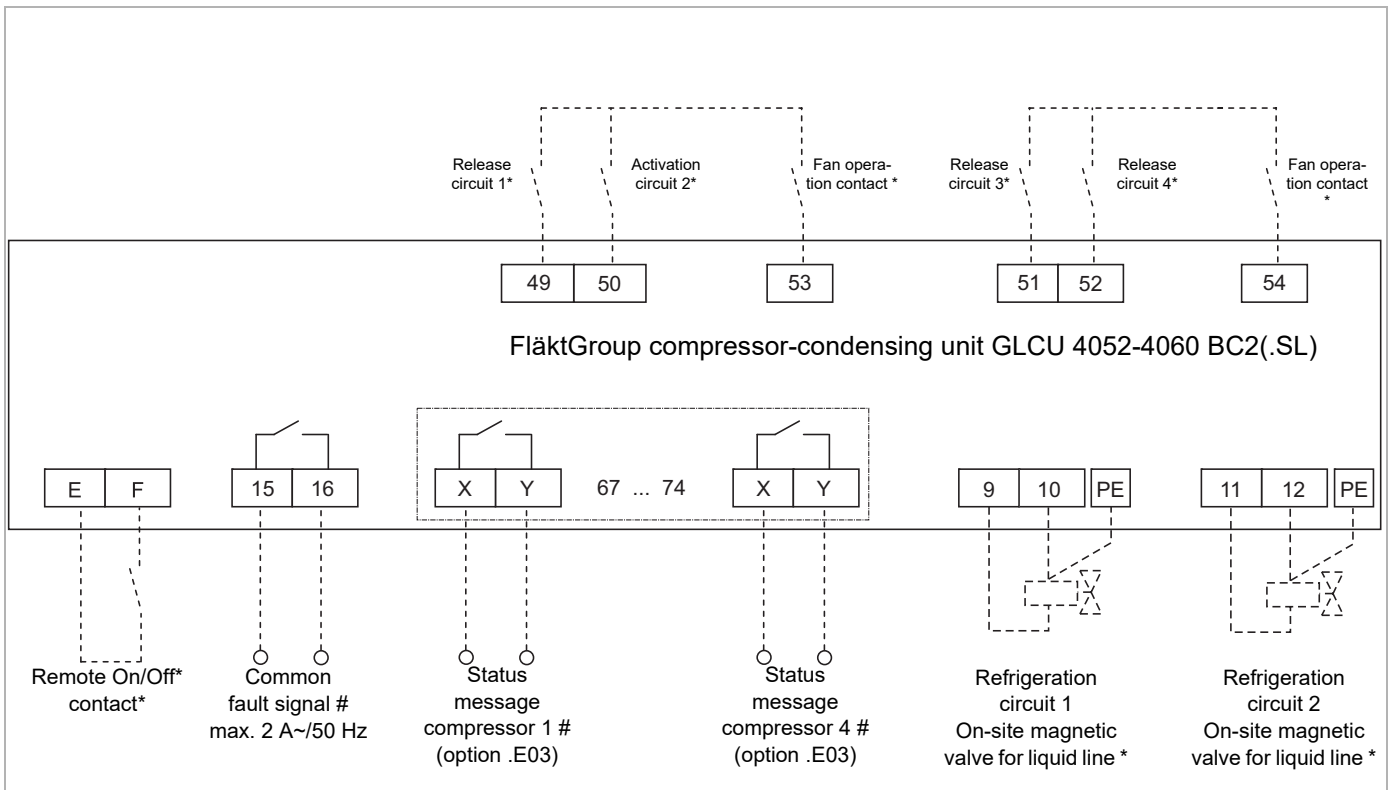


Fig. 12: Electrical connection GLCU 4052-4060 BC2(.SL)

Legend for drawings:

- Klemmen:**
- E - F: Remote contact to switch the machine ON and OFF with on-site normally open contact
 - 15 - 16: General fault signal
 - 67 - 68: Status message compressor 1 (option .E03)
 - 69 - 70: Status message compressor 2 (option .E03)
 - 71 - 72: Status message compressor 3 (option .E03)
 - 73 - 74: Status message compressor 4 (option .E03)
 - 9 - 10: Control of on-site fluid magnetic valve refrigeration circuit 1 (230 V / ~ / 50 Hz)
 - 11 - 12: Control of on-site fluid magnetic valve refrigeration circuit 2 (230 V / ~ / 50 Hz)
 - 53-49: Release contact refrigeration circuit 1, level 1
 - 53-50: Release contact refrigeration circuit 1, level 2
 - 54-51: Release contact refrigeration circuit 2, level 3
 - 54-52: Release contact refrigeration circuit 2, level 4
- On-site cabling
 # On-site potential required (max. 230 V/50 Hz/2 A)
 * On-site potential not approved (potential supply is from the controller)

Refrigerant lines

Only copper refrigerant lines meeting DIN EN12735-1 standards may be used. The requirements asked refer especially to:

- Quality of internal surfaces
- Sealed pipe ends
- Pipe labeling
- Testing
- Pressure resistance

Line lengths and dimensions

The piping lengths should be as short as possible. Please determine the maximum distance as well as the maximum difference in height between the unit GLCU and the evaporator from the following the "Erection and installation example" ETA page 29.

When dimensioning the pipes, make sure that oil transportation is ensured under all operating conditions. Oil transportation must be ensured using the corresponding pipe dimensioning and pipe routing.

EXAMPLE 1

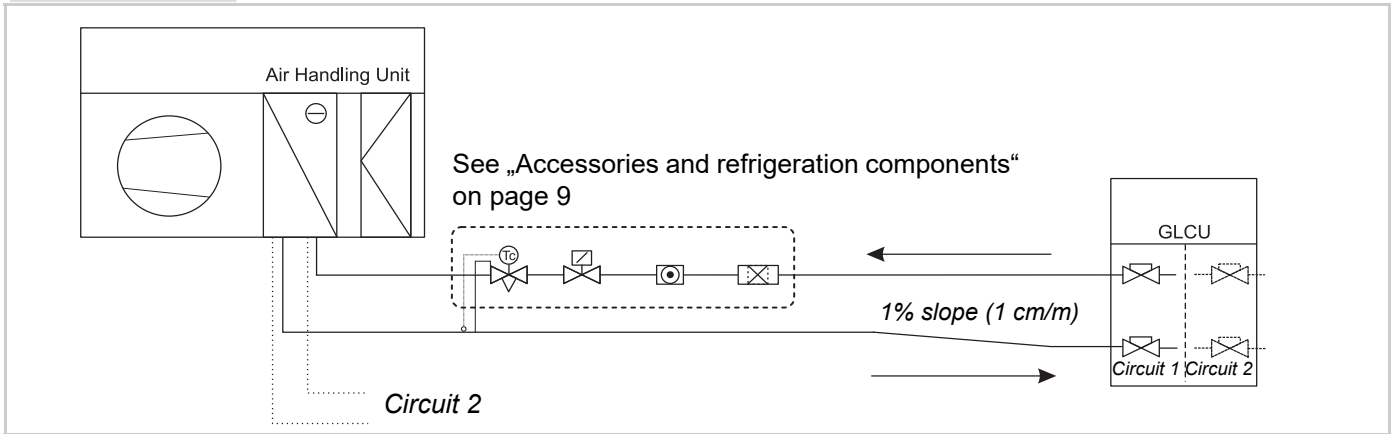


Fig. 13: Example 1: Evaporator (AHU) and compressor-condensing unit (GLCU) at the same height as the horizontal pipe routing

EXAMPLE 2

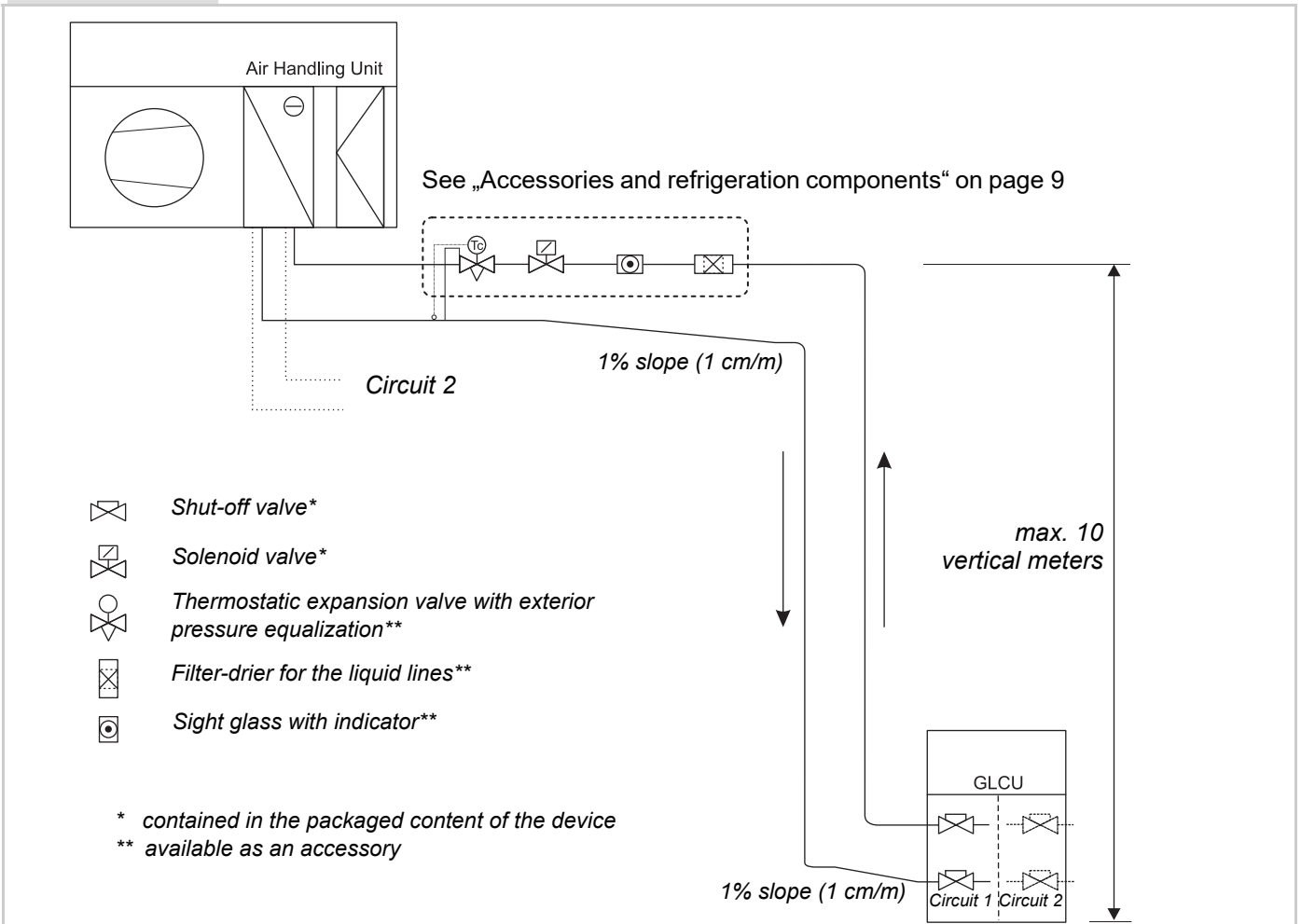


Fig. 14: Example 2: Evaporator (AHU) above the compressor-condenser unit (GLCU)

EXAMPLE 3

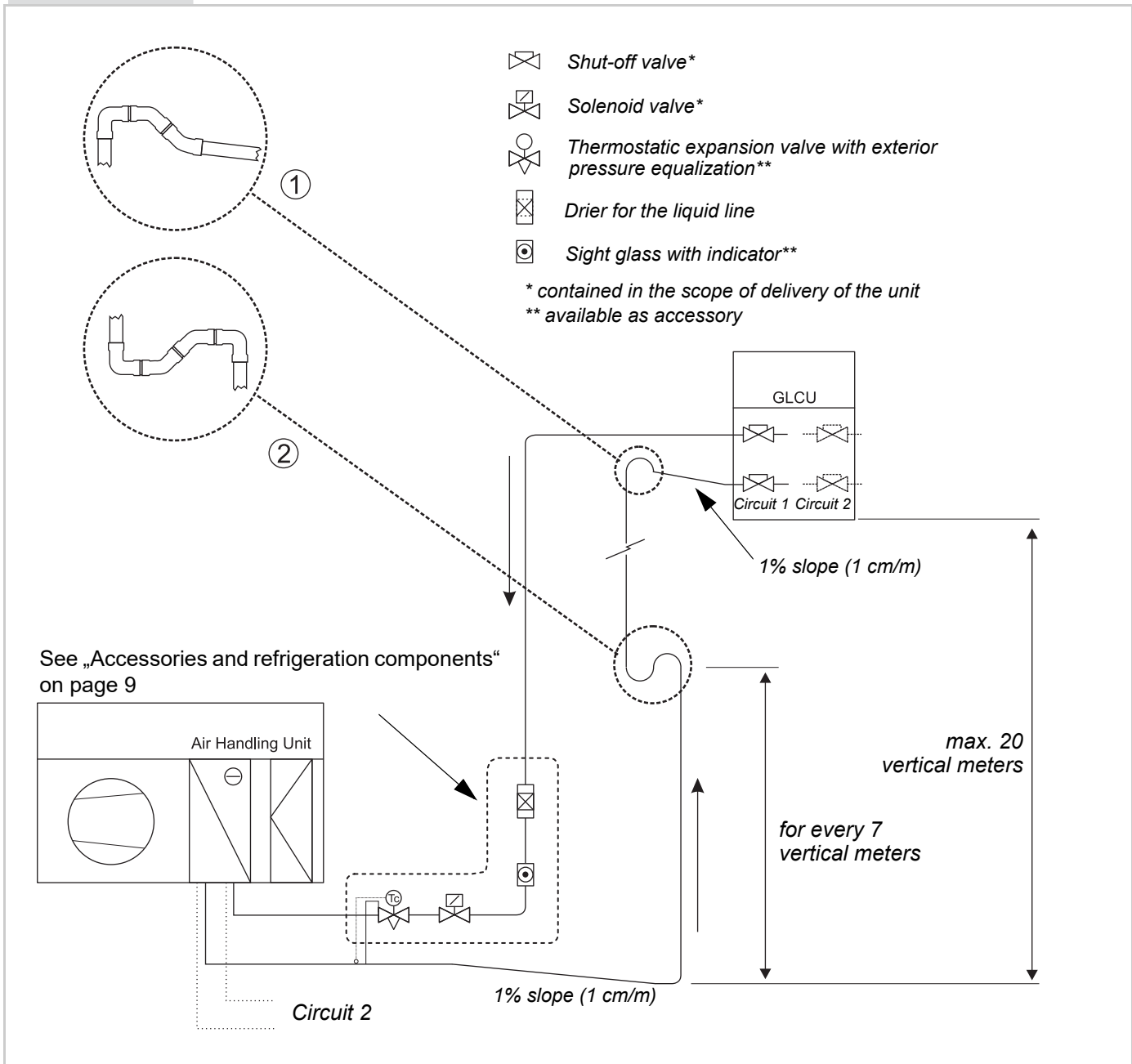


Fig. 15: Example 3: Compressor-condensing unit (GLCU) above the evaporator (AHU)

- 1: Top oil trap absolutely required
 - 1x 90° bend
 - 2x 45° bend
- 2: Oil trap every 7 m absolutely required
 - max. 2 oil trap on 20 m
 - 2x 90° bend
 - 2x 45° bend



Important Note!

Maximum height difference of the evaporator above GLCU: 10 m
 Maximum height difference of the GLCU above evaporator: 20 m
 Maximum piping length equivalent: 50 m

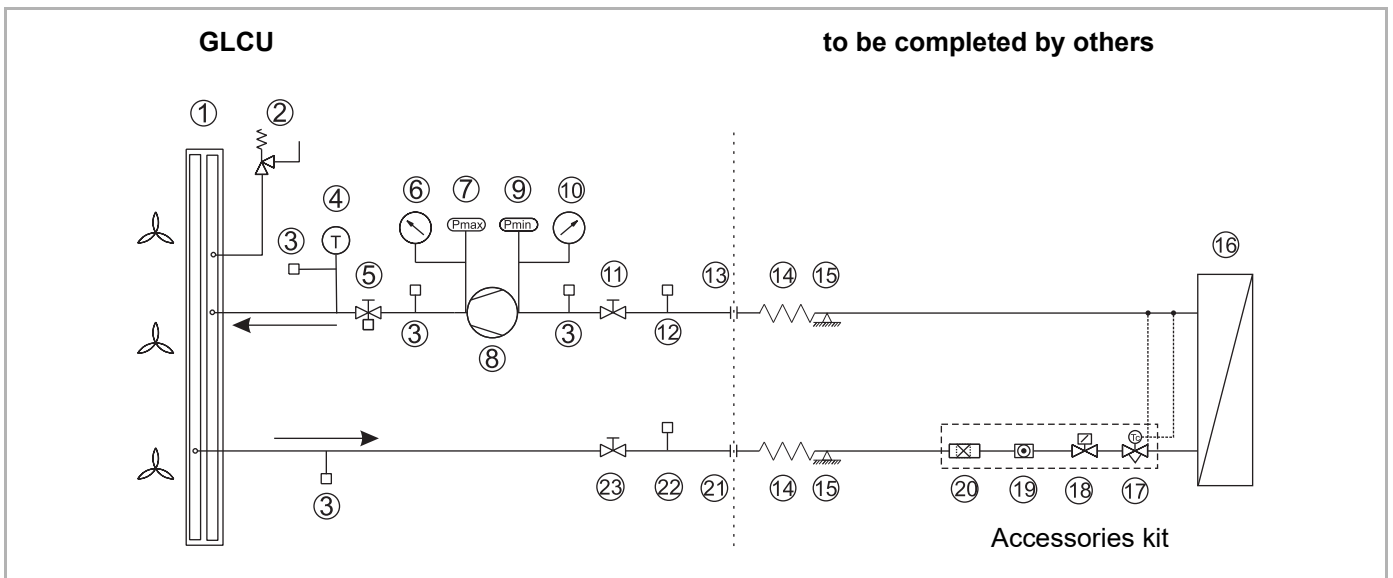


Fig. 16: Schematic design of the cooling circuit

- 1: Condenser
- 2: Safety valve
- 3: Service port
- 4: Pressure transducer
- 5: Shut-off valve in hot gas line
- 6: High-pressure gauge
- 7: High-pressure switch
- 8: Compressor
- 9: Low-pressure switch
- 10: Low-pressure gauge
- 11: Shut-off valve for the suction line
- 12: Service port
- 13: Connection to suction line
- 14: Vibration damping connection
- 15: Unit-independent pipeline fixing point
- 16: Evaporator
- 17: Thermostatic expansion valve with external pressure equalisation
- 18: Solenoid valve
- 19: Sight glass with humidity indicator
- 20: Drier for the liquid line
- 21: Connection to the liquid line
- 22: Service port
- 23: Shut-off valve of the liquid line

- **Items 17 to 20 as well as 14/15 are also specified by FläktGroup in addition to the internal parts required by legal regulations.**

Dimensioning the refrigerant line between GLCU and evaporator *

Unit size GLCU		2015	2018	2020	2025	2030	2041	2051
Equivalent line lengths Range 1 0 - 30 m								
Horizontal suction line	ø mm	28	35	35	42	42	54	54
Vertical suction line**	ø mm	28	35	35	42	42	54	54
Liquid line	ø mm	18	18	22	22	22	22	22
Equivalent line length Range 2 30 - 50 m								
Horizontal suction line	ø mm	35	35	35	42	42	54	54
Vertical suction line**	ø mm	28	35	35	42	42	54	54
Liquid line	ø mm	18	18	22	22	22	22	22

* The dimensioning of the refrigerant lines between GLCU and evaporator refer to 100% cooling capacity without hot gas bypass!

In any case; examine the dimensioning of the refrigerant pipes using the case example!

Pay attention to power losses due to power length!

** only for flow direction from bottom to top. otherwise select the larger cross-section!

values from example calculations (next page)

Tab. 6: Dimensioning of refrigerant lines

Pipe diameter (outside)	ø mm	16	18	22	28	35	42	54
Equivalent line length								
90° bend	m eq.	0,48	0,5	0,6	0,8	1,1	1,5	2
45° bend	m eq.	0,25	0,35	0,45	0,6	0,8	1	1,5

Tab. 7: Factor for equivalent line length

Dimensioning of refrigerant lines for units GLCU 4052-4060 BC2(.SL) must be calculated individually depending on the on-site installation conditions and considering the minimum load reduction.

Example for the calculation of **equivalent pipe lengths** for **example 3**, see page 30:

EXAMPLE

	Input data	Result																																																															
<p>Requirements</p> <p>First you must determine or specify some input data.</p>	Selected unit type	→ GLCU 2015 BC1																																																															
	Total distance AHU->GLCU	→ 25 m																																																															
	Number of 90° bends in the suction line	→ 5 pieces																																																															
	Number of 45° bends in the suction line	→ 4 pieces																																																															
	Number of 90° bends in the liquid line	→ 3 pieces																																																															
<p>In the Appendix find the form sheet "Template for the calculation of the equivalent piping length", here as excerpt with example values:</p>																																																																	
<p>1st Step</p> <p>Select the dimensioning of the respective pipework based on the simple distance from the Tabelle 6 auf Seite 32 in range 1 (0 m - 30 m).</p>	<p>Input values (according to distance calculation and table)</p> <p>One-way distance calculation = <input type="text" value="25"/> m</p> <p>Pipe diameter selected according to one-way distance calculation</p> <p>For selection, see dimensioning of pipe: Suction gas line = <input type="text" value="28"/> mm</p> <p>For selection, see dimensioning of pipe: Liquid line = <input type="text" value="18"/> mm</p>																																																																
<p>2nd Step</p> <p>Now calculate the equivalent piping for the suction line according to the formula.</p> <p>Add the total distance GLCU-AHU and the equivalent lengths of the individual bends.</p> <p>* Factor for equivalent length, compare Tabelle 7 auf Seite 32.</p>	<p>Suction gas line (calculation of equivalent pipe length)</p> <p><i>one-way distance between GLCU and AHU + (number of bends x equivalent length) = result</i></p> <p>One-way distance between GLCU and AHU = <input type="text" value="25"/> m</p> <table border="1"> <thead> <tr> <th>Diameter Suction line</th> <th>Number of bends</th> <th></th> <th>Factor for equivalent length</th> <th></th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>28 mm 90°</td> <td><input type="text" value="5"/></td> <td>x</td> <td>0.8</td> <td>=</td> <td><input type="text" value="4"/></td> <td>m</td> </tr> <tr> <td>28 mm 45°</td> <td><input type="text" value="4"/></td> <td>x</td> <td>0.6</td> <td>=</td> <td><input type="text" value="2.4"/></td> <td>m</td> </tr> <tr> <td>35 mm 90°</td> <td><input type="text"/></td> <td>x</td> <td>1.1</td> <td>=</td> <td><input type="text"/></td> <td>m</td> </tr> <tr> <td>35 mm 45°</td> <td><input type="text"/></td> <td>x</td> <td>0.8</td> <td>=</td> <td><input type="text"/></td> <td>m</td> </tr> <tr> <td>42 mm 90°</td> <td><input type="text"/></td> <td>x</td> <td>1.5</td> <td>=</td> <td><input type="text"/></td> <td>m</td> </tr> <tr> <td>42 mm 45°</td> <td><input type="text"/></td> <td>x</td> <td>1</td> <td>=</td> <td><input type="text"/></td> <td>m</td> </tr> <tr> <td>54 mm 90°</td> <td><input type="text"/></td> <td>x</td> <td>2</td> <td>=</td> <td><input type="text"/></td> <td>m</td> </tr> <tr> <td>54 mm 45°</td> <td><input type="text"/></td> <td>x</td> <td>1.5</td> <td>=</td> <td><input type="text"/></td> <td>m</td> </tr> </tbody> </table> <p>Overall result, equivalent metres = <input type="text" value="31.4"/> m</p>		Diameter Suction line	Number of bends		Factor for equivalent length				28 mm 90°	<input type="text" value="5"/>	x	0.8	=	<input type="text" value="4"/>	m	28 mm 45°	<input type="text" value="4"/>	x	0.6	=	<input type="text" value="2.4"/>	m	35 mm 90°	<input type="text"/>	x	1.1	=	<input type="text"/>	m	35 mm 45°	<input type="text"/>	x	0.8	=	<input type="text"/>	m	42 mm 90°	<input type="text"/>	x	1.5	=	<input type="text"/>	m	42 mm 45°	<input type="text"/>	x	1	=	<input type="text"/>	m	54 mm 90°	<input type="text"/>	x	2	=	<input type="text"/>	m	54 mm 45°	<input type="text"/>	x	1.5	=	<input type="text"/>	m
Diameter Suction line	Number of bends		Factor for equivalent length																																																														
28 mm 90°	<input type="text" value="5"/>	x	0.8	=	<input type="text" value="4"/>	m																																																											
28 mm 45°	<input type="text" value="4"/>	x	0.6	=	<input type="text" value="2.4"/>	m																																																											
35 mm 90°	<input type="text"/>	x	1.1	=	<input type="text"/>	m																																																											
35 mm 45°	<input type="text"/>	x	0.8	=	<input type="text"/>	m																																																											
42 mm 90°	<input type="text"/>	x	1.5	=	<input type="text"/>	m																																																											
42 mm 45°	<input type="text"/>	x	1	=	<input type="text"/>	m																																																											
54 mm 90°	<input type="text"/>	x	2	=	<input type="text"/>	m																																																											
54 mm 45°	<input type="text"/>	x	1.5	=	<input type="text"/>	m																																																											
<p>3rd Step</p> <p>Now calculate the equivalent piping according to the formula for the liquid line.</p> <p>Add the total distance GLCU-AHU and the equivalent lengths of the individual bends.</p> <p>* Factor for equivalent length, compare Tabelle 7 auf Seite 32.</p>	<p>Liquid line (calculation of equivalent pipe length)</p> <p><i>one-way distance between GLCU and AHU + (number of bends x equivalent length) = result</i></p> <p>One-way distance between GLCU and AHU = <input type="text" value="25"/> m</p> <table border="1"> <thead> <tr> <th>Diameter Liquid line</th> <th>Number of bends</th> <th></th> <th>Factor for equivalent length</th> <th></th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>18 mm 90°</td> <td><input type="text" value="3"/></td> <td>x</td> <td>0,5</td> <td>=</td> <td><input type="text" value="1,50"/></td> <td>m</td> </tr> <tr> <td>18 mm 45°</td> <td><input type="text"/></td> <td>x</td> <td>0,35</td> <td>=</td> <td><input type="text"/></td> <td>m</td> </tr> <tr> <td>22 mm 90°</td> <td><input type="text"/></td> <td>x</td> <td>0,6</td> <td>=</td> <td><input type="text"/></td> <td>m</td> </tr> <tr> <td>22 mm 45°</td> <td><input type="text"/></td> <td>x</td> <td>0,45</td> <td>=</td> <td><input type="text"/></td> <td>m</td> </tr> </tbody> </table> <p>Overall result, equivalent metres = <input type="text" value="26,5"/> m</p>		Diameter Liquid line	Number of bends		Factor for equivalent length				18 mm 90°	<input type="text" value="3"/>	x	0,5	=	<input type="text" value="1,50"/>	m	18 mm 45°	<input type="text"/>	x	0,35	=	<input type="text"/>	m	22 mm 90°	<input type="text"/>	x	0,6	=	<input type="text"/>	m	22 mm 45°	<input type="text"/>	x	0,45	=	<input type="text"/>	m																												
Diameter Liquid line	Number of bends		Factor for equivalent length																																																														
18 mm 90°	<input type="text" value="3"/>	x	0,5	=	<input type="text" value="1,50"/>	m																																																											
18 mm 45°	<input type="text"/>	x	0,35	=	<input type="text"/>	m																																																											
22 mm 90°	<input type="text"/>	x	0,6	=	<input type="text"/>	m																																																											
22 mm 45°	<input type="text"/>	x	0,45	=	<input type="text"/>	m																																																											
<p>4th Step</p> <p>The dimensioning of the individual piping systems are tested and corrected if necessary with the calculated equivalent lengths in the Tabelle 6 auf Seite 32. In the example, a greater cross-section results for the suction line from range 2 (30 m - 50 m).</p>																																																																	

Complete an approximate calculation of the refrigerant charge

Unit size GLCU - BC1		2015	2018	2020	2025	2030	2041	2051
① Basic charge for each circuit	[kg]	4	4,5	5,5	6,5	8	10	14

Unit size GLCU - BC2		4052	4060
① Basic charge for each circuit	[kg]	19	21

Tab. 8: Basic charge

Diameter	ø mm	16	18	22	28	35	42	54
② liquid line	[kg/m]	0,178	0,233	0,364	-	-	-	-
③ suction line	[kg/m]	-	-	-	0,016	0,024	0,033	0,040

Tab. 9: Additional filling

Formula for estimating the refrigerant calculation:

$$\text{Refrigerant charge for each circuit [kg]} = \text{①} + \text{②} \times L_{FL} + \text{③} \times L_{SL} + \text{④} \times 0.2$$

① Basic charge depending on the unit size in [kg]

② Additional charge for the liquid line in [kg/m]

③ Additional charge for the suction line in [kg/m]

④ Content volume of the evaporator in [dm³]

L_{FL} Length of the liquid line in [m]

L_{SL} Length of the suction line in [m]

Example for the determination of the estimated refrigerant charge for example 3 on: page 30:

EXAMPLE		
	Input data	→ Result
<p><i>Requirements</i></p> <p>First calculate and determine specific input data and measurements.</p>	<p>Selected unit type: → GLCU 2015 BC1</p> <p>Simple distance AHU-GLCU → 25 m</p> <p>Gas suction line → ø 35 mm -> 0.024 kg/m</p> <p>Liquid line → ø 18 mm -> 0.233 kg/m</p> <p>Basic charge for each circuit → 4 kg</p> <p>Content volume of the evaporator → 4 dm³ (assumption in the example)</p>	
<p><i>Calculation</i></p> <p>Calculate the refrigerant filling according to the formula for estimating the refrigerant requirements (see above).</p>	<p>Refrigerant filling: → Refrigerant charge for each circuit = ① + ② x L_{FL} + ③ x L_{SL} + ④ x 0.2</p> <p style="border: 1px solid black; padding: 2px;">4 kg + 0.233 kg/m x 25 m_{FL} + 0.024 kg/m x 25 m_{SL} + 4 dm³ x 0.2 = 10.5 kg</p> <p>Refrigerant filling for each circuit → 10.5 kg</p> <p>Total for both circuits = 2 x 10.5 kg → 21.0 kg</p>	

Template for calculation of equivalent pipe length

Input values (according to distance calculation and table)					
		One-way distance calculation =	25	m	
Pipe diameter selected according to one-way distance calculation					
For selection, see dimensioning of pipe:		Suction gas line =	28	mm	
For selection, see dimensioning of pipe:		Liquid line =	18	mm	
Suction gas line (calculation of equivalent pipe length)					
<i>one-way distance between GLCU and AHU + (number of bends x equivalent length) = result</i>					
		One-way distance between GLCU and AHU =	25		
Diameter Suction line	Number of bends		Factor for equivalent length		
28 mm 90°	5	x	0.8	=	4
28 mm 45°	4	x	0.6	=	2.4
35 mm 90°		x	1.1	=	
35 mm 45°		x	0.8	=	
42 mm 90°		x	1.5	=	
42 mm 45°		x	1	=	
54 mm 90°		x	2	=	
54 mm 45°		x	1.5	=	
Overall result, equivalent metres					31.4
Liquid line (calculation of equivalent pipe length)					
<i>one-way distance between GLCU and AHU + (number of bends x equivalent length) = result</i>					
		One-way distance between GLCU and AHU =	25		
Diameter Liquid line	Number of bends		Factor for equivalent length		
18 mm 90°	3	x	0,5	=	1,50
18 mm 45°		x	0,35	=	
22 mm 90°		x	0,6	=	
22 mm 45°		x	0,45	=	
Overall result, equivalent metres					26,5
Comparison of results					
Are the overall results still in the same range as the input values?					
Yes: Calculation complete. Use pipe cross-sections that correspond with the input v					
No: Use pipe cross-section from new relevant area.					
Pipe diameter selected according to equivalent distance calculation					
		New selection of suction gas line (from table DF-4):	35	mm	
		New selection of liquid line (from table DF-4):	18	mm	
Maximum pipe distances					
maximum equivalent pipe length:					50 m
maximum vertical distance of GLCU above evaporator:					20 m
maximum vertical distance of GLCU below evaporator:					10 m

Anti-vibration isolators for each unit model

GLCU #### BC1	2015	2018	2020	2025
	4 x AA100N	4 x AA100N	4 x AA100N	4 x AA100N
GLCU #### BC1	2030	2041	2051	
	4 x AA100N	6 x AA200N	6 x AA200N	
GLCU #### BC2	4052		4060	
	6 x AA300N		6 x AA300N	
GLCU #### BC2.SL	4052		4060	
	6 x AA300N		6 x AA300N	

Tab. 10

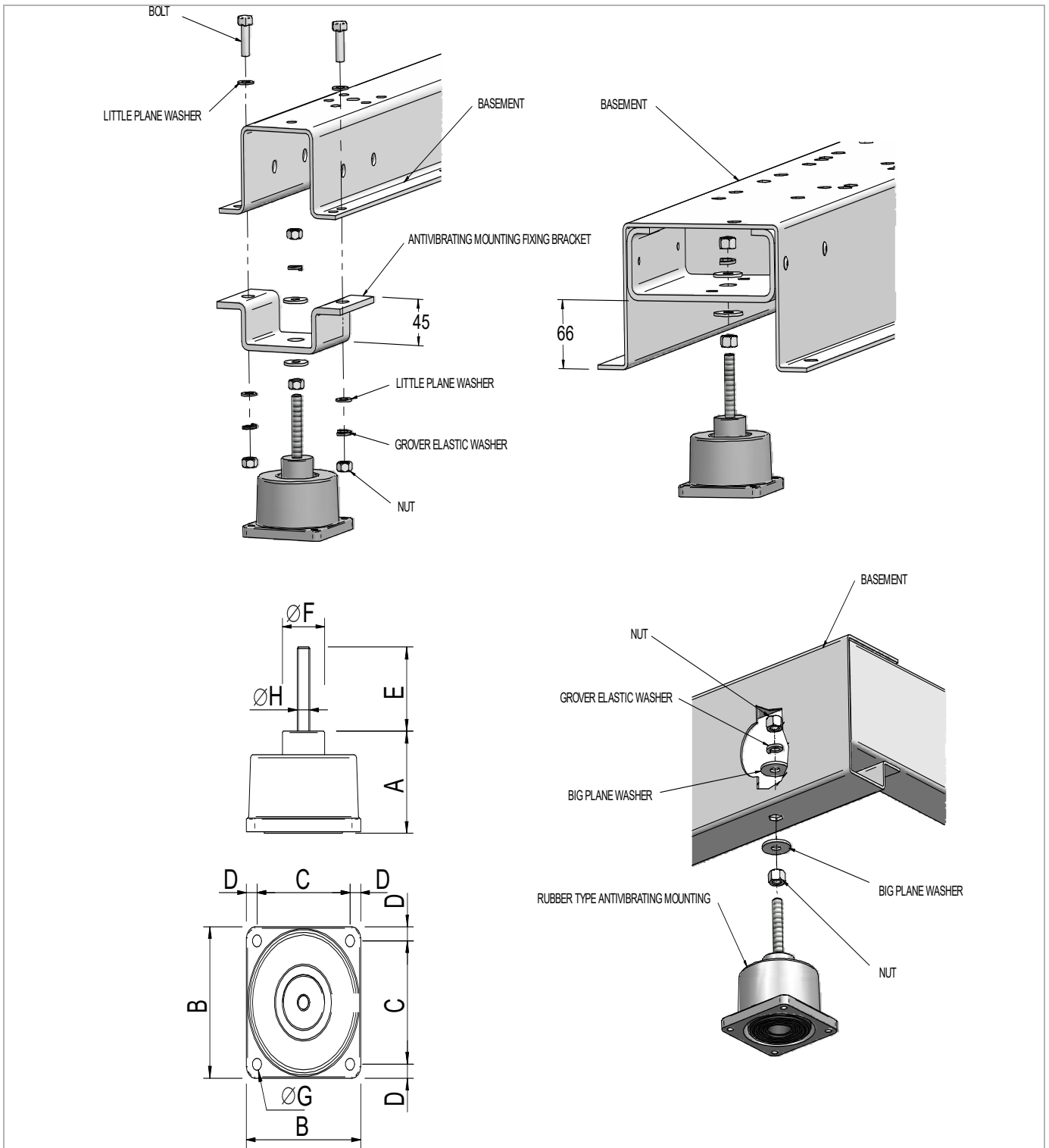


Fig. 17: Installation of anti-vibration isolators

Type	A	B	C	D	E	ØF	ØG	ØH
AA100N	80	60	41	25	6,5	67	8	M12
AA200N	108	75	55	40	8,5	90	10	M12
AA300N	135	81	64	60	10,5	110	10,5	M14

Tab. 11 Size in mm

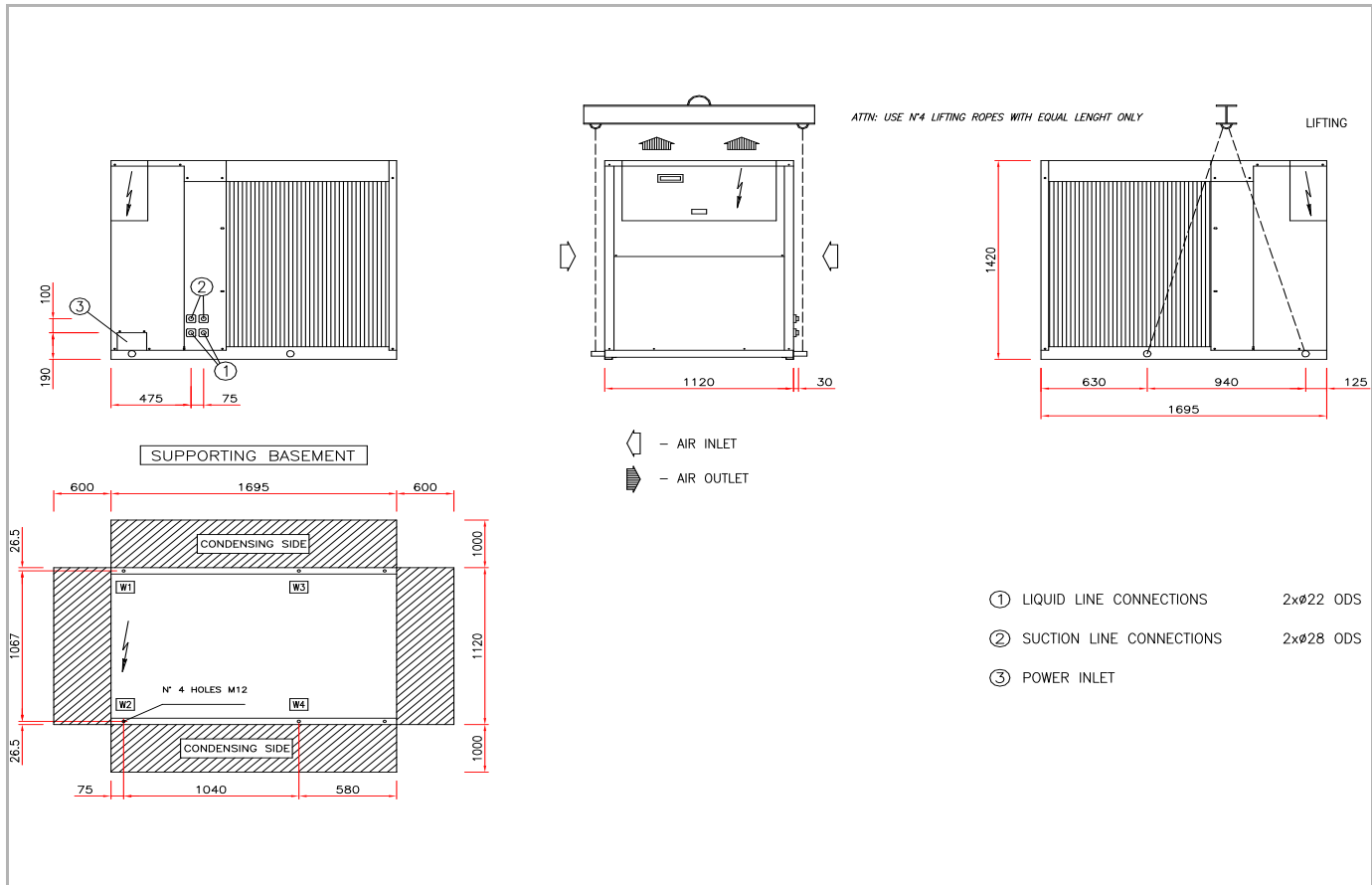


Fig. 18: D4612500-1 - GLCU 2015 BC1

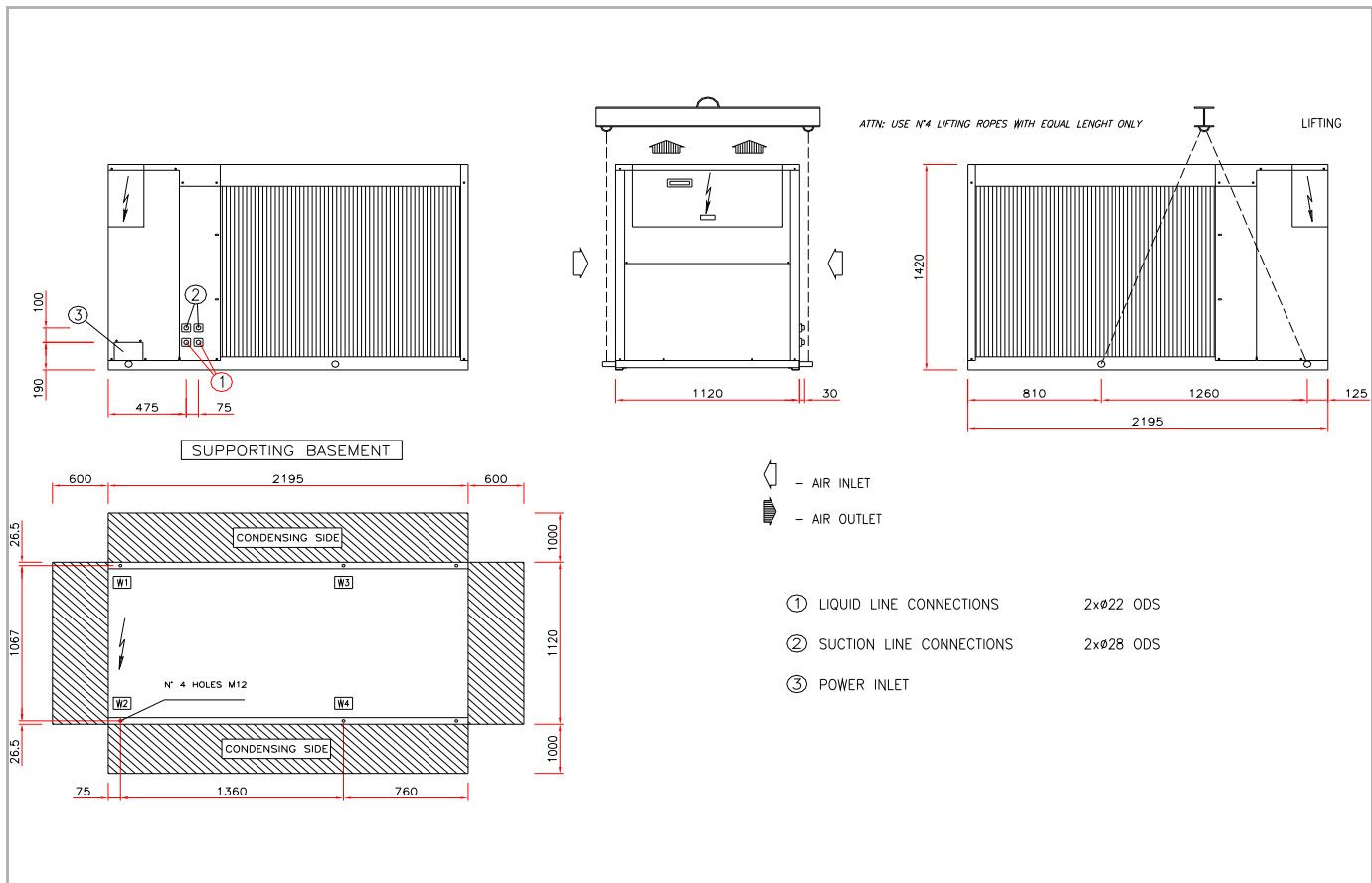


Fig. 19: D4613500-1 - GLCU 2018-2020 BC1

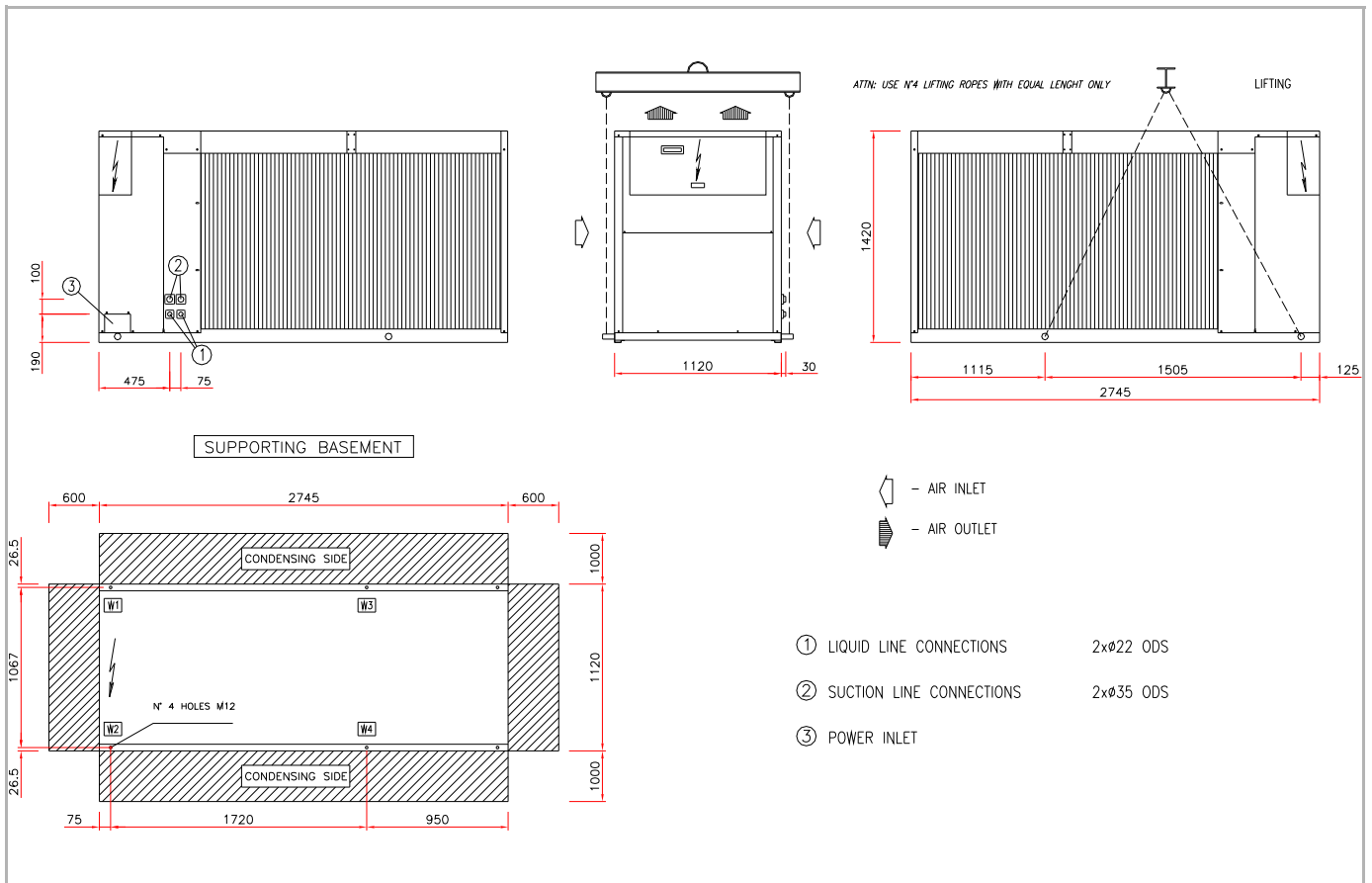


Fig. 20: D4615500-1 - GLCU 2025-2030 BC1

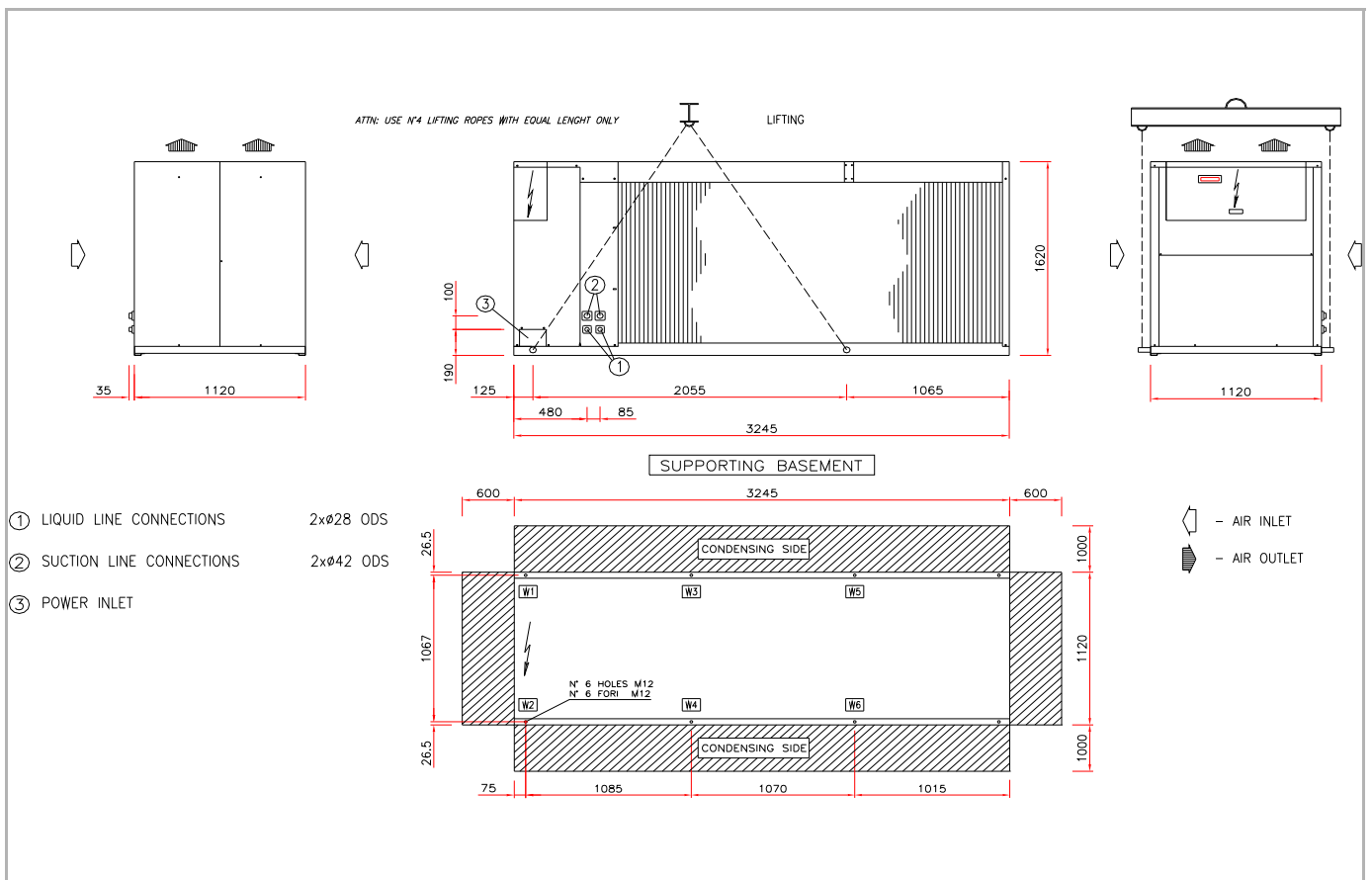


Fig. 21: D4622500-0 - GLCU 2041-2051 BC1

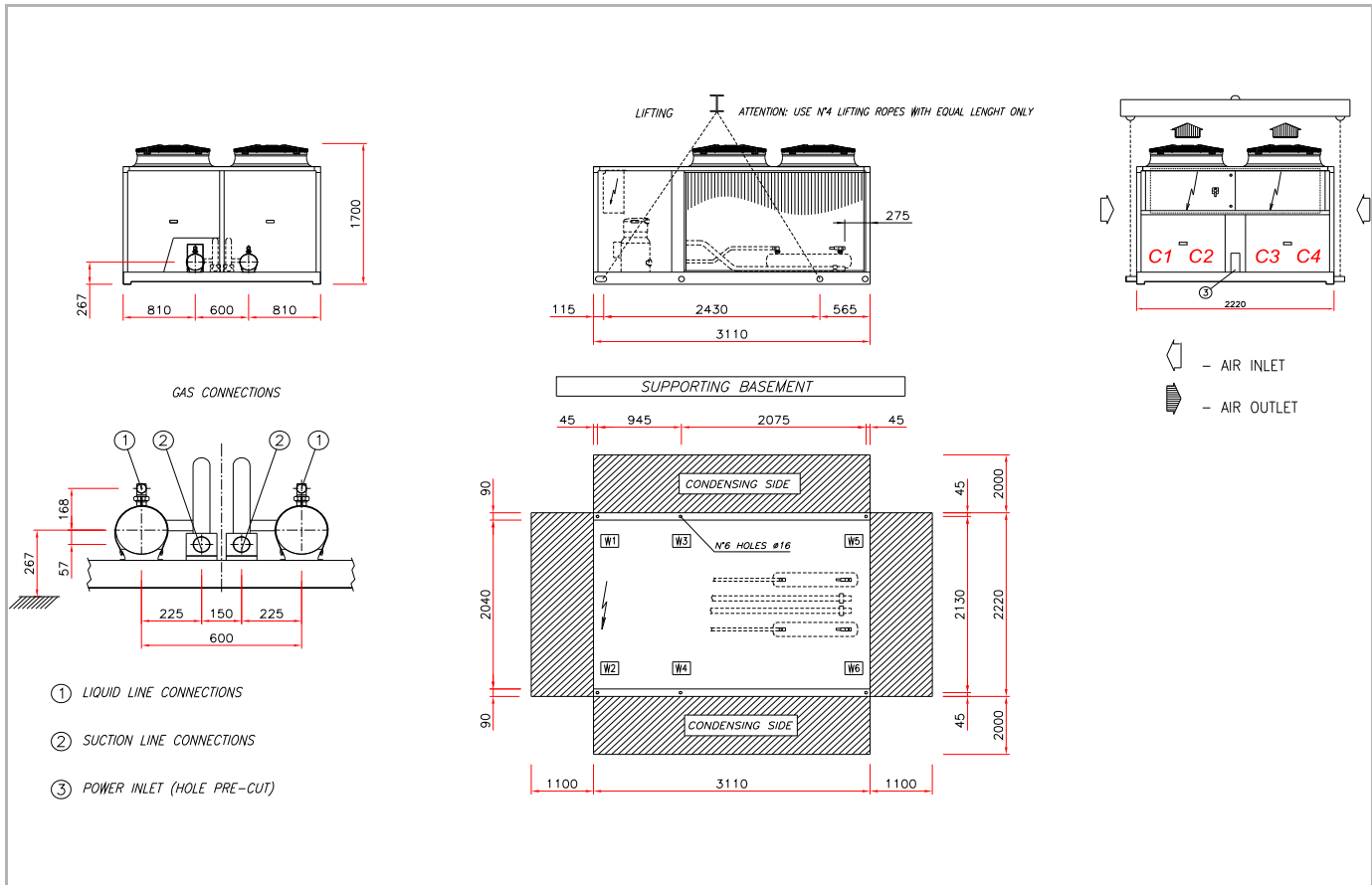


Fig. 22: D4625500-3 - GLCU 4052 BC2(SL)

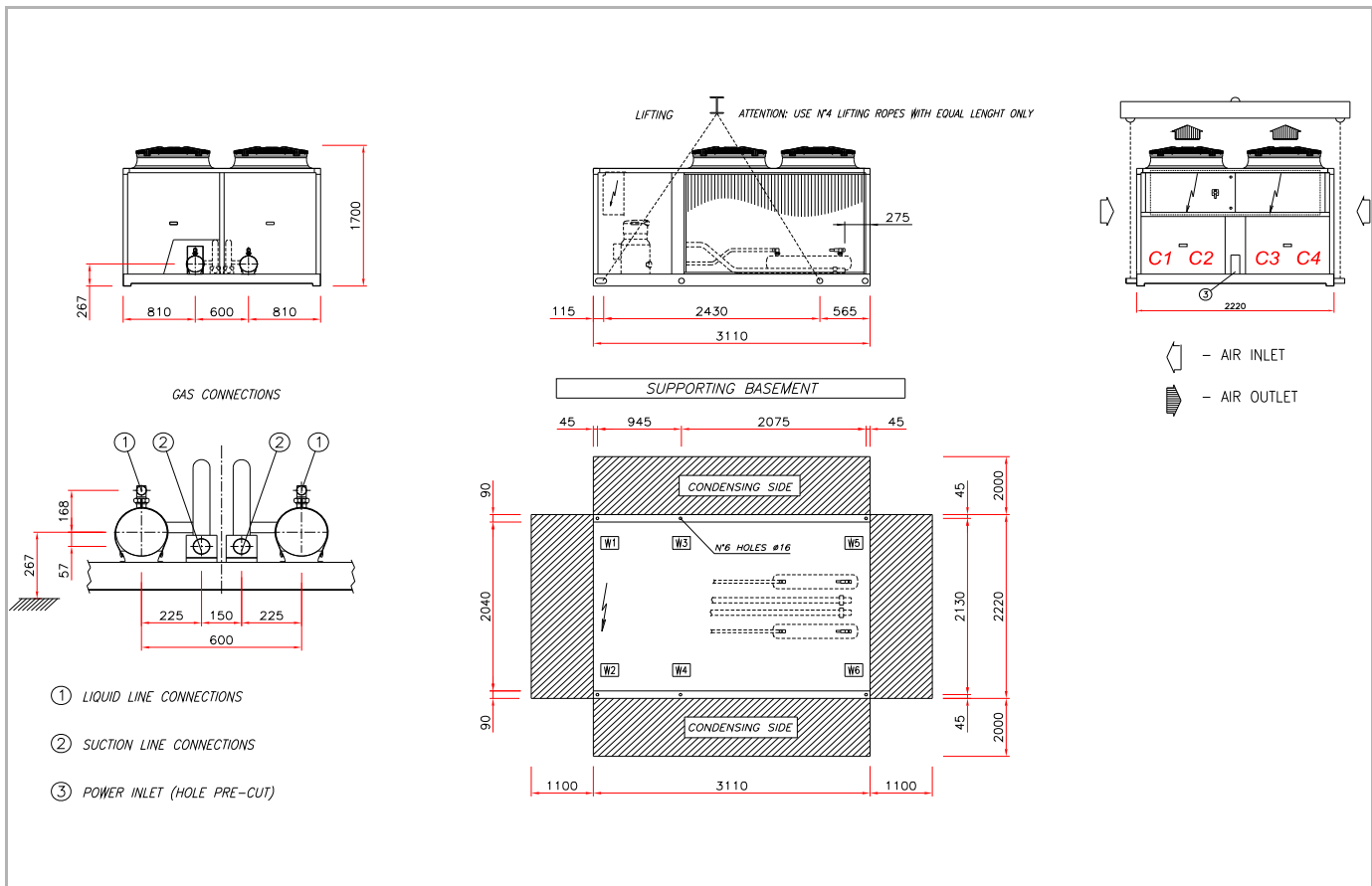


Fig. 23: D4627500-2 - GLCU 4060 BC2

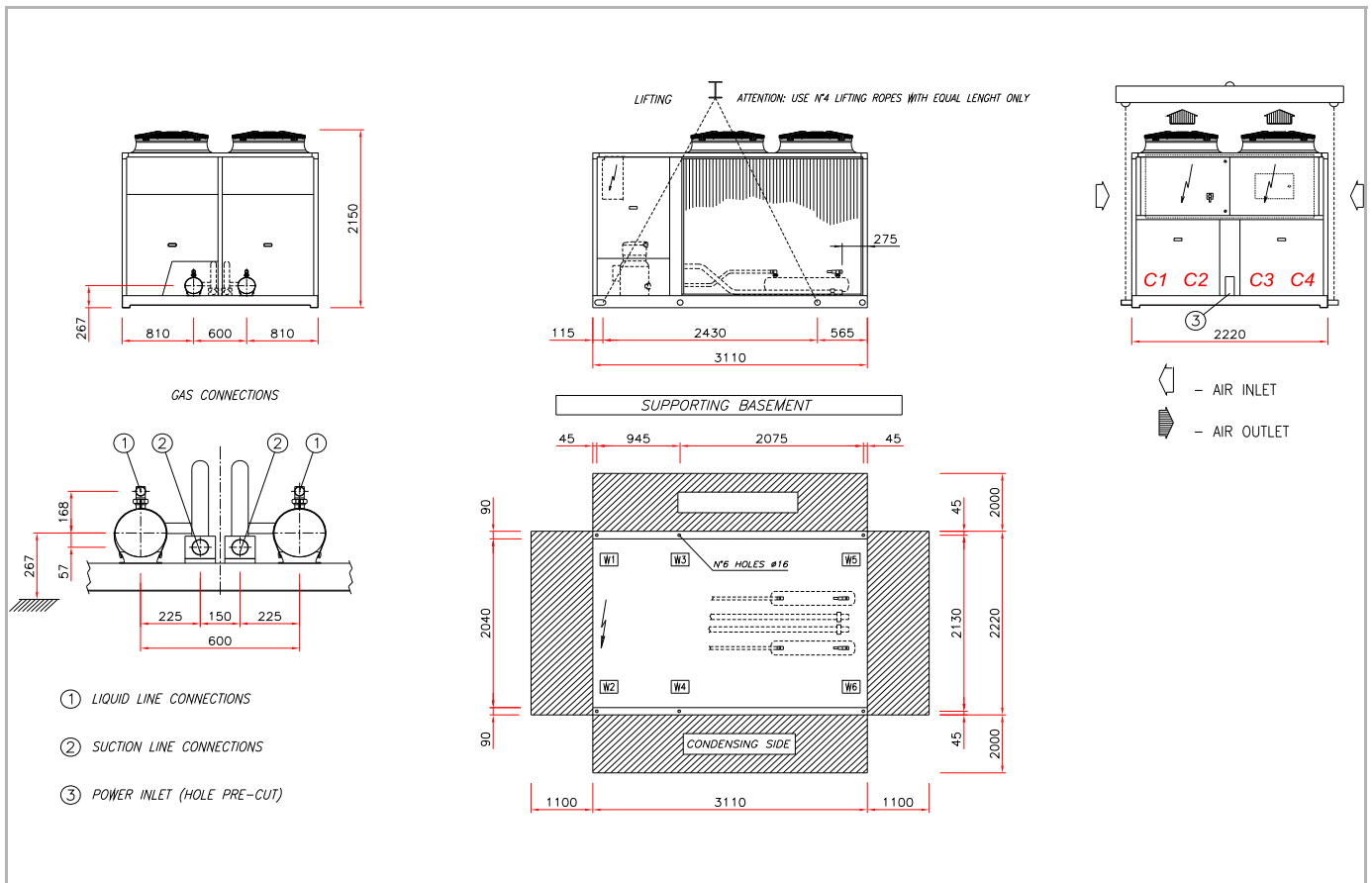


Fig. 24: D4627501-2 - GLCU 4060 BC2.SL

Legend of the dimensional drawing

Acronym	Description
1	Connection of the liquid line [ODS] (take the diameter of the pipe from the technical data on page 12 ff.)
2	Connection of the suction line [ODS] (take the diameter of the pipe from the technical data at page 12* ff.)
3	Inlet power supply

Tab. 12: Legend of the dimensional drawing for GLCU 2015-4060 BC1/2(.SL)



Note!

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.

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