



DAS HERZ DER FRISCHE

OPERATING INSTRUCTIONS

BETRIEBSANLEITUNG

INSTRUCTION DE SERVICE

KB-203-3

ECOSTAR Luftgekühlte Verflüssigungssätze mit frequenzgeregelten ECOLINE Verdichtern Deutsch	2
ECOSTAR Air-cooled condensing units with frequency-controlled ECOLINE compressors English.....	24
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LHV5E/2DES-3.F1Y

LHV5E/4FE-5.F1Y

LHV5E/4EE-6.F1Y

LHV7E/4FE-5.F1Y

LHV7E/4EE-6.F1Y

LHV7E/4DE-5.F1Y

LHV7E/4CE-6.F1Y

LHV7E/4DE-7.F(3)Y

LHV7E/4CE-9.F(3)Y

LHV7E/4VE-7.F(3)Y

LHV7E/4TE-9.F(3)Y

LHV7E/4PE-12.F(3)Y

LHV7E/4NE-14.F(3)Y

Dokument für Monteure
Document for installers
Document pour des monteurs

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1 Introduction

The statements in this document refer to the EU legislation. They apply equally to the corresponding requirements of the United Kingdom legislation if the product has a UK declaration and is labelled in accordance with UK requirements.

This partly completed machinery is intended for incorporation into systems in accordance with the EU Machinery Directive 2006/42/EC and The Supply of Machinery (Safety) Regulations 2008 of the United Kingdom.

The product is covered by the scope of the EU RoHS Directive 2011/65/EU and The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (as amended) of the United Kingdom.

The air cooled condensing unit also is covered by the scope of the EU Ecodesign Directive 2009/125/EC and The Ecodesign for Energy-Related Products Regulations 2010 of the United Kingdom.

The frequency inverter complies with the EU Directive for Electromagnetic Compatibility 2014/30/EU and The Electromagnetic Compatibility Regulations 2016 of the United Kingdom.

For a pressurised component the EU Pressure Equipment Directive 2014/68/EU and The Pressure Equipment (Safety) Regulations 2016 of the United Kingdom may also be applied.

This product may only be put into operation if it has been installed into systems according to these Mounting/Operating Instructions and if the overall system complies with the applicable legal provisions. Applied standards see conformity document. It is displayed in the BITZER SOFTWARE for the respective product or in the documentation at www.bitzer.de.

This product has been built in accordance with state of the art methods and current regulations. Valves fitted to the product are not part of the product itself.

Keep these Operating Instructions available near the system during the whole lifetime.

Intended use: Condensing or compressor unit for incorporation into refrigeration and air conditioning systems

1.1 Technical documents to be additionally observed

In addition to these instructions, the Operating Instructions and Technical Information for the respective compressors and pressure vessels must be taken into account (accessory kit for condensing unit).

- KB-104 Operating Instructions BITZER ECOLINE and ECOLINE VARISPEED.
- DB-300 Operating Instructions Liquid receivers
- KT-210 ECOLINE VARISPEED: Semi-hermetic reciprocating compressors with mounted suction gas-cooled frequency inverter (FI) F1.
- KT-220 ECOLINE VARISPEED OCTAGON CO₂ VARISPEED: Semi-hermetic reciprocating compressors with mounted suction gas-cooled frequency inverter (FI) F3/4.
- KT-203 Technical Information BITZER ECOSTAR: Air-cooled condensing units with frequency-controlled ECOLINE compressors.
- CB-110 Operating Instructions VARIPACK
- BEST SOFTWARE

The same applies to optional accessories (e.g. operating instructions of the fan manufacturer).

2 Safety

2.1 Qualified and authorised staff

All work done on the products and the systems in which they are or will be installed may only be performed by qualified and authorised staff who have been trained and instructed in all work. The qualification and competence of the qualified staff must correspond to the local regulations and guidelines.

2.2 Residual risks


The products, electronic accessories and further system components may present unavoidable residual risks. Therefore, any person working on it must carefully read this document! The following are mandatory:


- relevant safety regulations and standards
- generally accepted safety rules
- EU directives
- national regulations and safety standards


Depending on the country, different standards are applied when installing the product, for example: EN378, EN60204, EN60335, EN ISO14120, ISO5149, IEC60204, IEC60335, ASHRAE 15, NEC, UL standards.


2.3 Safety references

Safety references are instructions intended to prevent hazards. They must be stringently observed!

 **NOTICE**
Safety reference to avoid situations which may result in damage to a device or its equipment.



 **CAUTION**
Safety reference to avoid a potentially hazardous situation which may result in minor or moderate injury.

 **WARNING**
Safety reference to avoid a potentially hazardous situation which could result in death or serious injury.



 **DANGER**
Safety reference to avoid an imminently hazardous situation which may result in death or serious injury.



2.3.1 General safety references



State of delivery

 **CAUTION**
The condensing unit is filled with a protective charge: Excess pressure 0.2 .. 0.5 bar nitrogen.
Risk of injury to skin and eyes.
 Depressurise the condensing unit!
Wear safety goggles!


For work on the condensing unit once it has been commissioned

 **WARNING**
Compressors or other components of the condensing units may be under pressure!
Serious injuries are possible.
 Depressurise all relevant components!
Wear safety goggles!



 **CAUTION**
Surface temperatures of more than 60°C or below 0°C.
Risk of burns or frostbite.
 Shut off accessible areas and mark them.
Before performing any work on the condensing unit: Switch it off and let it cool down or warm up.

 **CAUTION**
The fins of the condenser have sharp edges!
Risk of lacerations.
 Before performing any work on the condensing unit: Wear protective gloves.

When working on the fans of the heat exchangers: Observe the operating instructions of the fan manufacturer!

 **DANGER**
Rotating fan blades!
Body parts may be injured, bone fractures!
Clothes may be caught and drawn into the protective grating!
Work on the fan only when it is at standstill!

When working on the electrical system and the frequency inverter:

 **DANGER**
Electric shock!
Electric charge > 50 µC! Life-threatening voltages on the connection cable of the frequency inverter and fan even after disconnecting the voltage supply!
 After disconnecting the voltage, wait five minutes before starting work on the electrical system!

3 Classification of the condensing units and their components according to EU directives

The condensing units are intended for incorporation into machines in accordance with the EU Machinery Directive 2006/42/EC. For the incorporated pressurised components, the EU Pressure Equipment Directive 2014/68/EU may be applicable, except for the compressors (see below). The corresponding declarations of conformity and manufacturers' declarations are available.



Information

Condensing units are not considered a "functional whole" according to the PED and do therefore not fall within the scope of Art. 2, 6 "Assemblies". The directive is therefore only applied to the individual components. The same applies to the CE marking. Assessment by a notified body: Bureau Veritas, Paris – "Technical Appraisal" for ASERCOM members PED-TA_ASE_001_01-DEU.



Information

According to Article 1(2) j, ii, semi-hermetic and open drive compressors are excluded from the application range of the PED. This exception is confirmed by the expert opinion of a notified body. Please refer to "Explanations about the product conformity" AC-100 for further explanations. Please refer to AC-100 for the classification of pressurised accessories for compressors.

Pressure equipment in the condensing unit

The piping supplied comes fully assembled in the condensing unit ex works. The pipes have been properly assembled and tested for leaks. No modifications may be made to the pipes.

The pipes and their joints are maintenance-free.

The system's pipes, pressure vessels and other pressure equipment that do not bear a name plate either fall under Article 4 (3) according to PED 2014/68/EU or

have to be classified in Category I according to Article 13.

As components of the condensing unit according to PED Article 1 (2), they are exempt from the application of the Pressure Equipment Directive, since the condensing unit is covered by the 2006/42/EC Directive as partly completed machinery.

Safety instructions and application notes are included in the condensing unit's operating instructions.

Component	PED ①	MD	Comments
Compressor, semi-hermetic	Art. 1 (2) j, ii	X	For accessories, see explanation AC-100
Discharge gas shut-off valve	Art. 1 (2) f	X	≤ DN32 / PS 32 bar
Suction gas shut-off valve	Art. 1 (2) f	X	≤ DN50 / PS 19 bar
Condenser, air-cooled	Art. 1 (2) f	X	≤ DN32 / PS 32 bar
Condenser fan		X	
Liquid line, condensate line	Art. 1 (2) f	X	≤ DN25 / PS 32 bar
Pipe joints	Art. 1 (2) f	X	≤ DN50 all joints
Discharge gas line	Art. 1 (2) f	X	≤ DN25 / PS 32 bar
Suction gas line	Art. 1 (2) f	X	≤ DN50 / PS 19 bar
Solenoid valve with injection nozzle (RI)	Art. 1 (2) f	X	≤ DN25 / PS 32 bar
Liquid receiver	II		6.25 .. 31.25 dm ³ / PS 32 bar
Liquid shut-off valve	Art. 1 (2) f	X	≤ DN25 / PS 32 bar
Oil separator	Art. 1 (2) f	X	< 6.25 dm ³ / PS 32 bar
Check valve	Art. 1 (2) f	X	≤ DN32 / PS 32 bar
Filter drier	Art. 1 (2) f	X	< 1 dm ³ / PS 32 bar
Sight glass	Art. 1 (2) f	X	< 1 dm ³ / PS 32 bar
HP limiter/HP cut-out	IV		With safety function
Safety pressure cut-out	IV		With safety function
LP limiter	Art. 1 (2) f	X	< 1 dm ³ / PS 32 bar
Pulsation muffler	Art. 1 (2) f	X	< 1 dm ³ / PS 32 bar
Discharge gas temperature sensor	Art. 1 (2) f	X	≤ DN25 / PS 32 bar
Suction gas temperature sensor	Art. 1 (2) f	X	≤ DN25 / PS 32 bar
High pressure transmitter	Art. 1 (2) f	X	< 1 dm ³ / PS 32 bar
Low pressure transmitter	Art. 1 (2) f	X	< 1 dm ³ / PS 32 bar
Ambient temperature sensor	Art. 1 (2) f	X	≤ DN25 / PS 32 bar
OLC-K1 / Delta PII / MP54/55	Art. 1 (2) f	X	< 1 dm ³ / PS 32 bar

Tab. 1: Classification of the ECOSTAR components according to the EU Pressure Equipment Directive

PED 2014/68/EU, MD 2006/42/EC

① Fluid group 2 according to PED (refrigerant group A1 / EN378). Maximum allowable pressure PS: 32 bar (HP), 19 bar (LP)

4 State of delivery and schematic design of the ECOSTAR condensing units

- Protective gas charge: Excess pressure approx. 0.2 .. 0.5 bar.

- For the technical data, see brochures of the condensing units: KP-210.

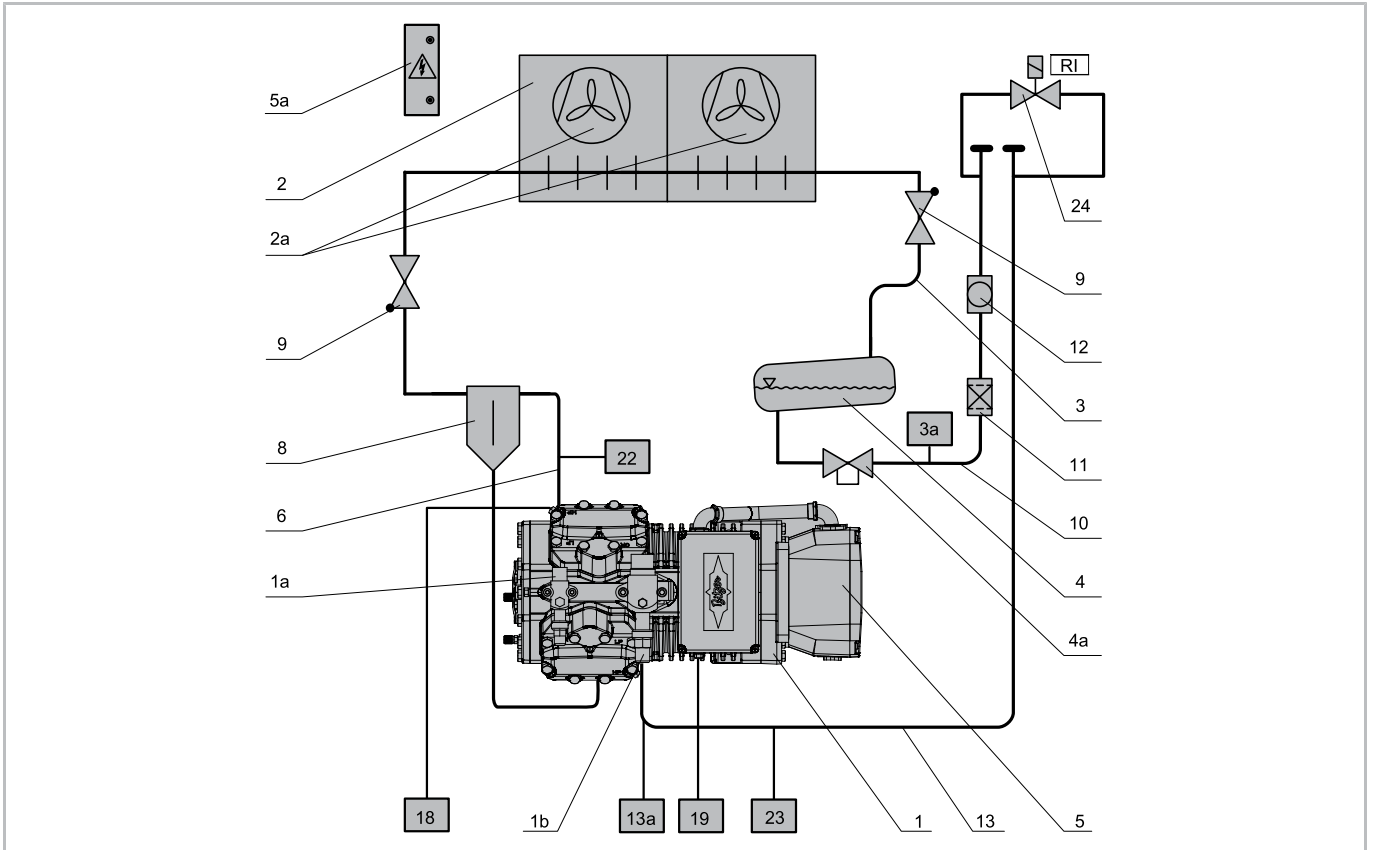


Fig. 1: Schematic design of the ECOSTAR condensing units (example LHV7E/..)

Component	Scope of delivery	
	Stand.	Opt.
1 Compressor, semi-hermetic	x	
1a Discharge gas shut-off valve	x	
1b Suction gas shut-off valve	x	
2 Condenser, air-cooled	x	
2a Condenser fan	x	
3 Liquid line pipe joints	x	
3a High pressure transmitter	x	
4 Liquid receiver	x	
4a Liquid shut-off valve	x	
5 Frequency inverter	x	
5a Terminal box of the condensing unit	x	
6 Discharge gas line pipe joints	x	
8 Oil separator		x

Component	Scope of delivery	
	Stand.	Opt.
9 Check valve		x
10 Liquid line pipe joints	x	
11 Filter drier	x	
12 Sight glass	x	
13 Suction line pipe joints	x	
13a Low pressure transmitter	x	
18 HP limiter/ HP cut-out	x	
19 LP limiter	x	
22 Discharge gas temperature sensor	x	
23 Suction gas temperature sensor	x	
24 Solenoid valve with injection nozzle (RI)		x

Tab. 2: Legend and state of delivery ECOSTAR condensing units

5 Application ranges

Permitted refrigerant ① depending on compressor model	R134a, R404A, R407A, R407C, R407F, R448A, R449A, R450A, R507A, R513A, R22
Oil charge ②	$t_c < 70^\circ\text{C}$ BITZER BSE32 R22: BITZER B5.2
Maximum allowable pres- sure (PS)	LP: 19 bar, HP: 32 bar

Permitted refrigerant and application limits see BITZER SOFTWARE.

- ① Further refrigerants upon request.
- ② For alternative oils see Technical Information KT-500.



WARNING

Risk of bursting due to counterfeit refrigerants! Serious injuries are possible! Purchase refrigerants only from reputable manufacturers and reliable distributors!

5.1 Maximum allowable pressure

The whole system must be designed and operated in order to guarantee that the maximum allowable pressure (PS) cannot be exceeded in any part of the system.

Pressure relief valves on receivers (pressure vessels) are absolutely necessary if:

- it is to be expected that the maximum allowable pressure will be exceeded due to external heat sources (e.g. fire).
- the entire refrigerant charge of the system is more than 90% of the pressure vessel volume at 20°C (capacity). The vessel volume is defined as the volume between the valves that are installed upstream and downstream of a pressure vessel and can be shut off during operation.
- a check valve is located between condenser and receiver.

A pressure relief valve can be mounted at the customer's, taking into account current standards and regulations.

Safety switching devices

According to local regulations, it may be necessary to provide additional pressure-limiting safety switching devices.

6 Mounting

6.1 Transporting the condensing unit

The condensing unit is delivered on a pallet. Remove the two longitudinal boards at the front and back of the pallet so that the condensing unit only rests on the two lateral squared timbers. Then use a forklift and slide the forks from the front into the guide rails (see figure 3, page 32) under the condensing unit. Lift the condensing unit and remove the lateral squared timbers. Alternatively, pass lifting straps through the outer feet of the condensing unit and lift the condensing unit. In doing so, maintain a minimum distance of >1.1 m between the suspension eye and the device. See also included information sheet 378 203 91.

6.1.1 Transport locks for condensing units

To avoid transport damage to condensing units in their state of delivery, the vibration dampers of the compressors are blocked by transport locks. It is absolutely necessary to remove or loosen these locks after mounting.

6.2 Installing the condensing unit

The place of installation must have sufficient load-carrying capacity and must be level, vibration-resistant and have sufficient space upwards (for unhindered air outlet of the fans) (see figure 2, page 31).

During system design, take the minimum and maximum loads into account. Design pipework and risers according to the generally known rules for compound systems. Contact BITZER if the system is operated under extreme conditions (e.g. aggressive atmosphere, low outdoor temperatures, etc.).

Ensure good accessibility for maintenance and service work!



NOTICE

When installing the condensing unit in areas where extreme wind loads may occur, screw it always firmly to the ground! If installed on a roof, provide sufficient lightning protection!

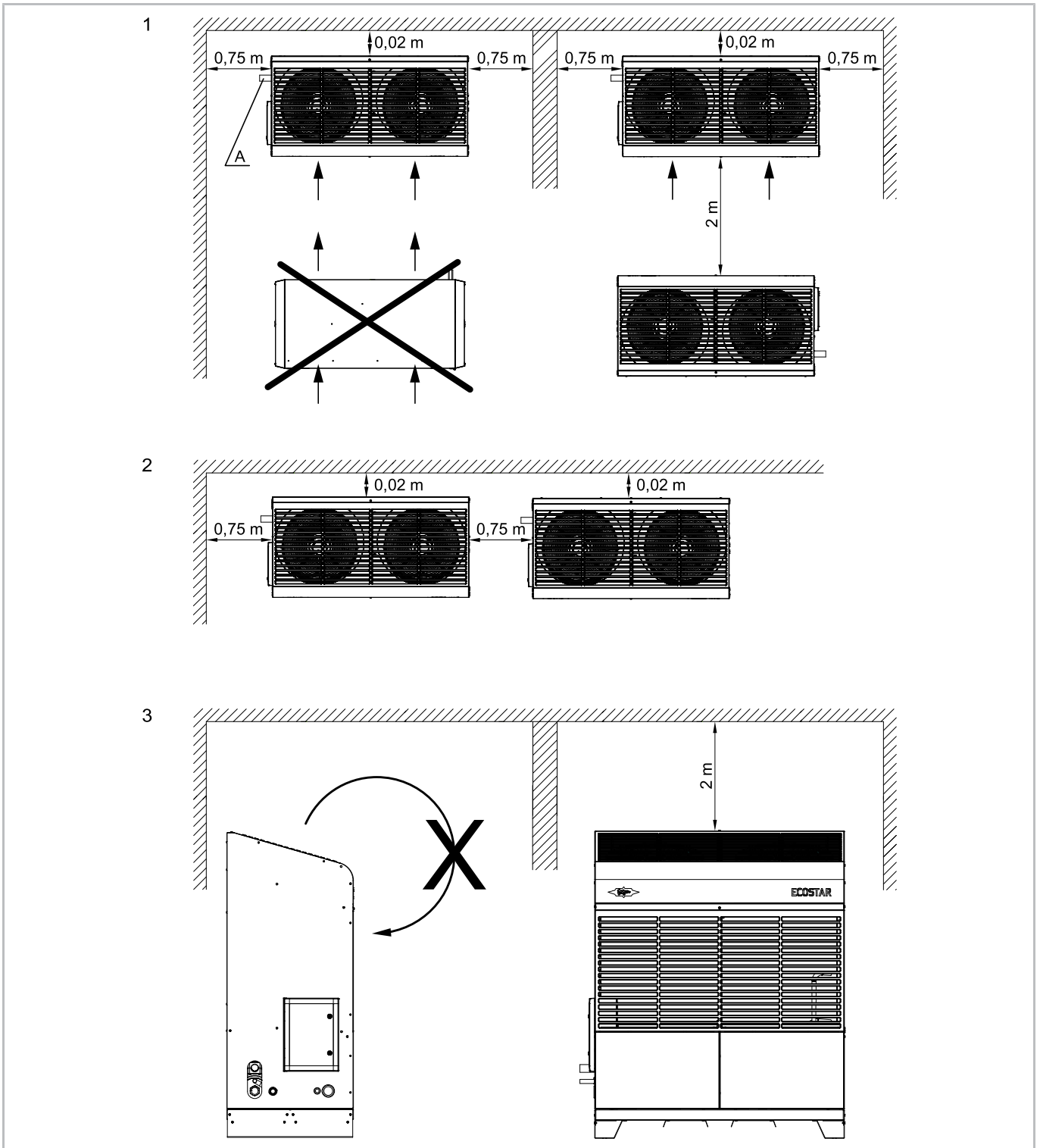


Fig. 2: Place of installation and minimum distances of ECOSTAR condensing unit (example LHV7E/..)

A	Suction gas line and liquid line
	Wall
→	Air flow

NOTICE
Do not mix fresh air with condenser air!

6.3 Pipelines

The pipelines must be as short as possible in order to minimise pressure drops and to keep the refrigerant quantity available in the pipeline system as low as possible.



NOTICE

During soldering work on the suction gas line: Protect the low pressure transmitter, the suction gas temperature sensor and the insulation against excess heat, max. 120°C!



NOTICE

During soldering work on the liquid line, protect the sight glass from overheating (max. 120°C)! The sight glass contains an O-ring.

6.4 Connections and dimensional drawing

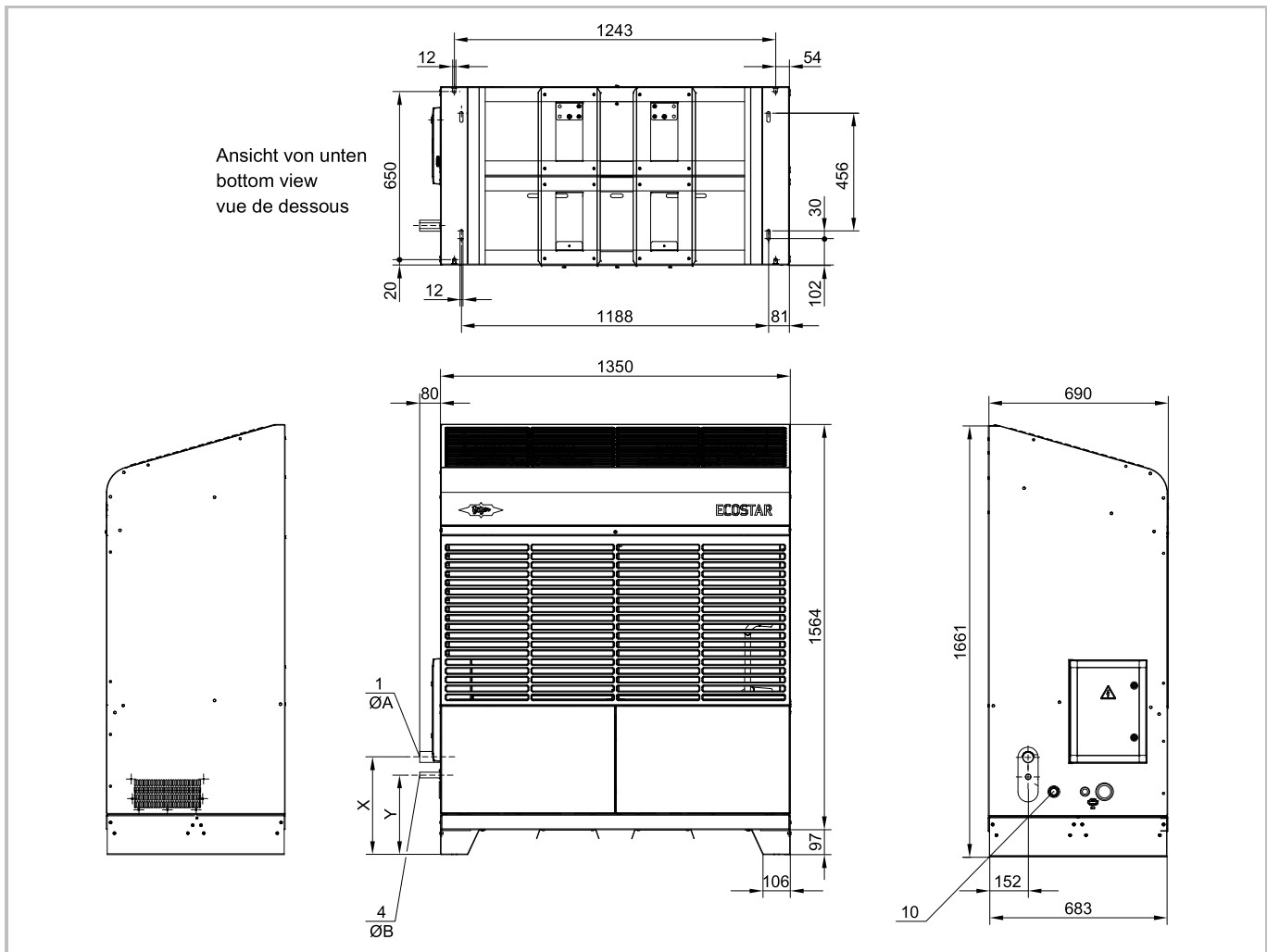


Fig. 3: LHV5 .. LHV7

Type	ØA	ØB	X	Y
	mm	mm	mm	mm
LHV5/2DES-3.F1Y	22	16	372	310
LHV5E/4FE-5.F1Y	28	16	375	310
LHV5E/4EE-6.F1Y	28	16	375	310
LHV7E/4FE-5.F1Y	28	16	375	310
LHV7E/4EE-6.F1Y	28	16	375	310
LHV7E/4DE-5.F1Y	35	22	383	308
LHV7E/4CE-6.F1Y	35	22	383	308
LHV7E/4DE-7.F(3)Y	35	22	383	308
LHV7E/4CE-9.F(3)Y	35	22	383	308
LHV7E/4VE-7.F(3)Y	42	22	383	308
LHV7E/4TE-9.F(3)Y	42	22	383	308
LHV7E/4PE-12.F(3)Y	42	22	383	308
LHV7E/4NE-14.F(3)Y	42	22	383	308

Connection points	
1	Suction gas valve
4	Refrigerant outlet (liquid line)
10	Sight glass

Tab. 3: Connection points

Dimensions (if specified) may have tolerances according to EN ISO 13920-B.

7 Electrical connection

According to the EU Machinery Directive 2006/42/EC annex I, the products and their electrical accessories are subject to the protection objectives of the EU Low Voltage Directive 2014/35/EU. For any work performed on the electrical system: EN60204-1, the IEC60364 series of safety standards and national safety regulations must be observed.

When working on the electrical system and the frequency inverter:



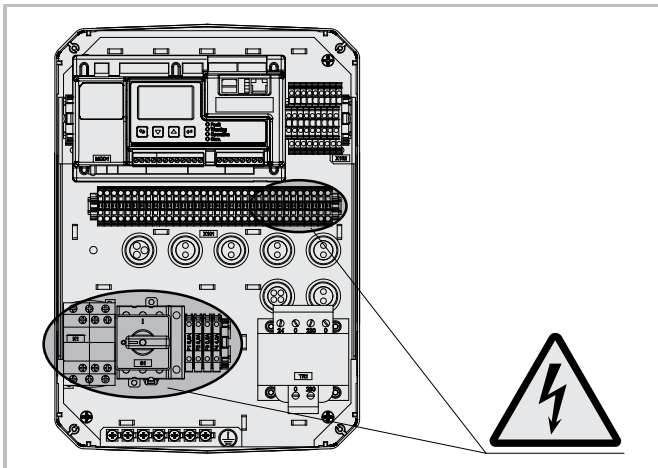
DANGER

Electric shock!



Electric charge > 50 μ C! Life-threatening voltages on the connection cable of the frequency inverter and fan even after disconnecting the voltage supply!

After disconnecting the voltage, wait five minutes before starting work on the electrical system!



The areas marked dark in the illustration are those where voltage can still be present after the supply voltage has been switched off. This is the connection area of the power cables of the frequency inverter and the EC fans. Special care must be taken there.

7.1 State of delivery

The condensing unit is delivered fully wired. All options are already programmed in the controller. The cable connections between the controller and terminal strips in the terminal box are pre-fitted. For connection of the power and communication cables, see the following chapters.

7.1.1 Representation of components and cables

Components

- Standard scope of supply
These components are filled in grey in the schematic diagrams, slightly darker than the optional components.
- Optionally available components are filled in light grey.
- Components not included in the BITZER portfolio are filled in white.
- Components that are not included in each condensing unit are shown dashed.
- Retrofittable options: The cable connections are shown as an arrow to the respective terminal.

Motor connection in the terminal box

The terminal plates of the compressors vary depending on the motor power. Therefore, the motor connection is only shown schematically and surrounded by a dashed line. There is an adhesive label on the inside of the terminal box cover that describes the motor connection in detail.

7.1.2 Wiring diagram part 1

see figures 4, 5 and 6 on the following three pages

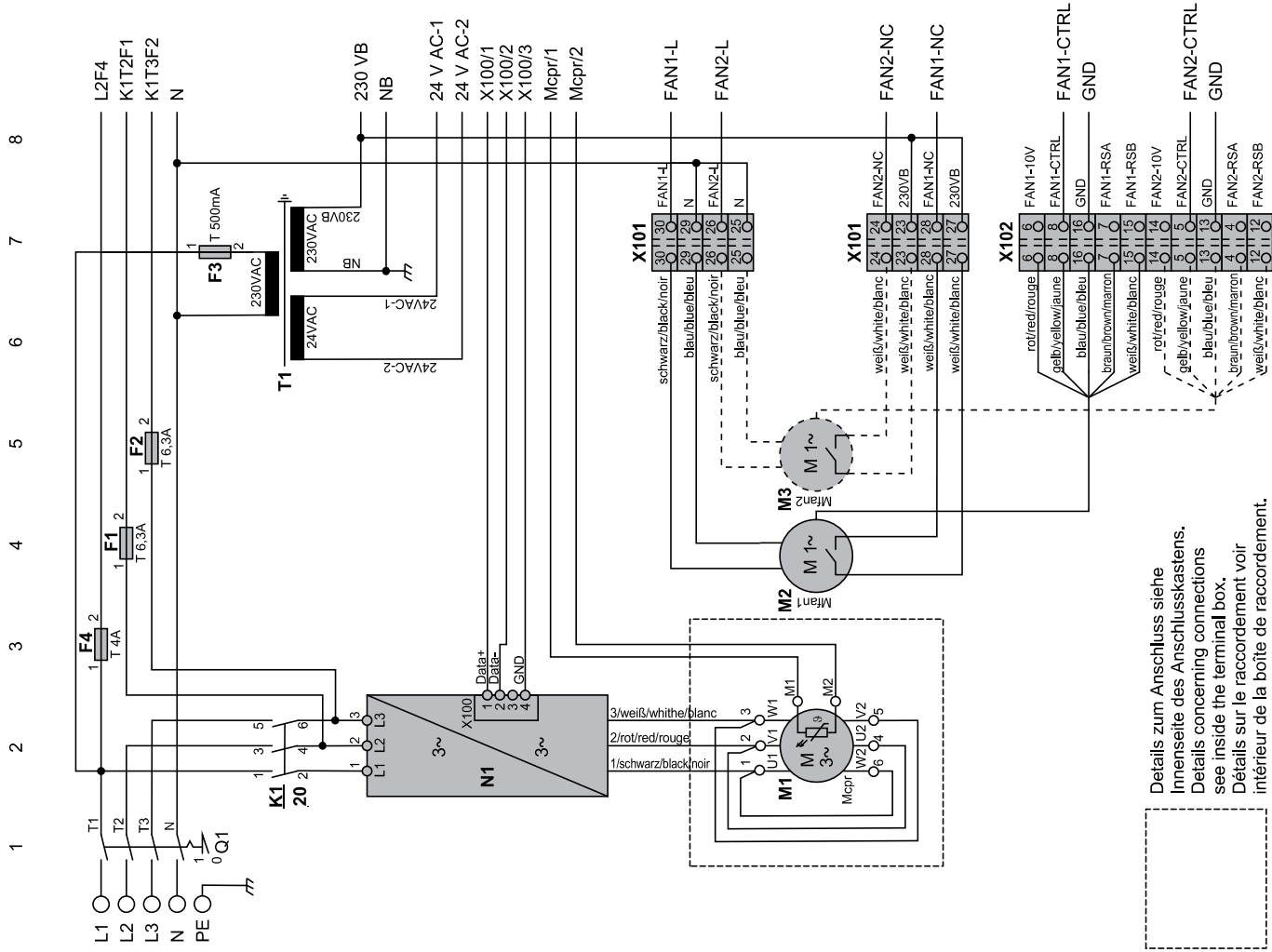


Fig. 4: Wiring diagram part 1: State of delivery LHV..F1Y

Details zum Anschluss siehe
 Innenseite des Anschlusskastens.
 Details concerning connections
 see inside the terminal box.
 Détails sur le raccordement voir
 intérieur de la boîte de raccordement.

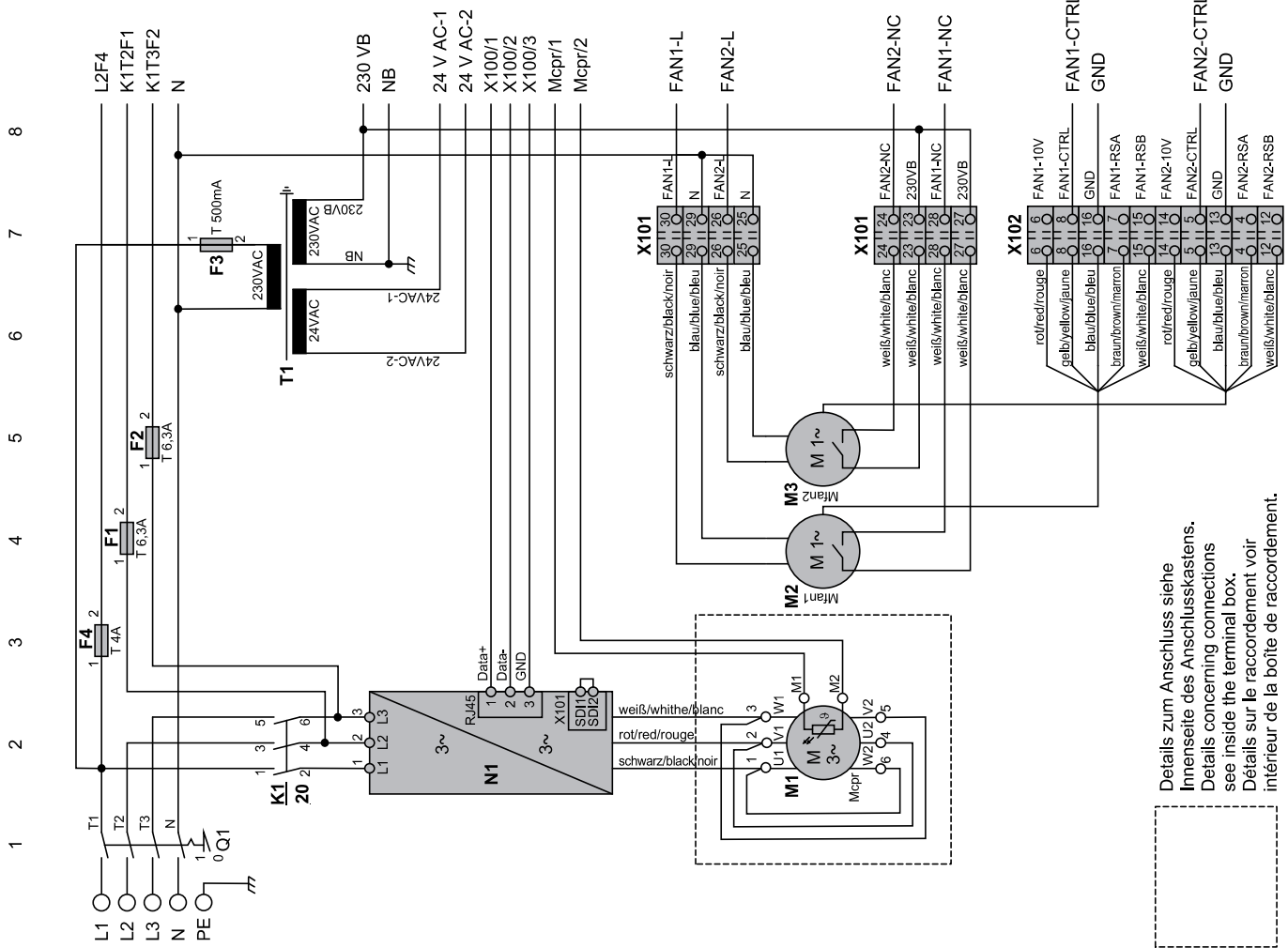


Fig. 5: Wiring diagram part 1: State of delivery LHV7E..F3Y

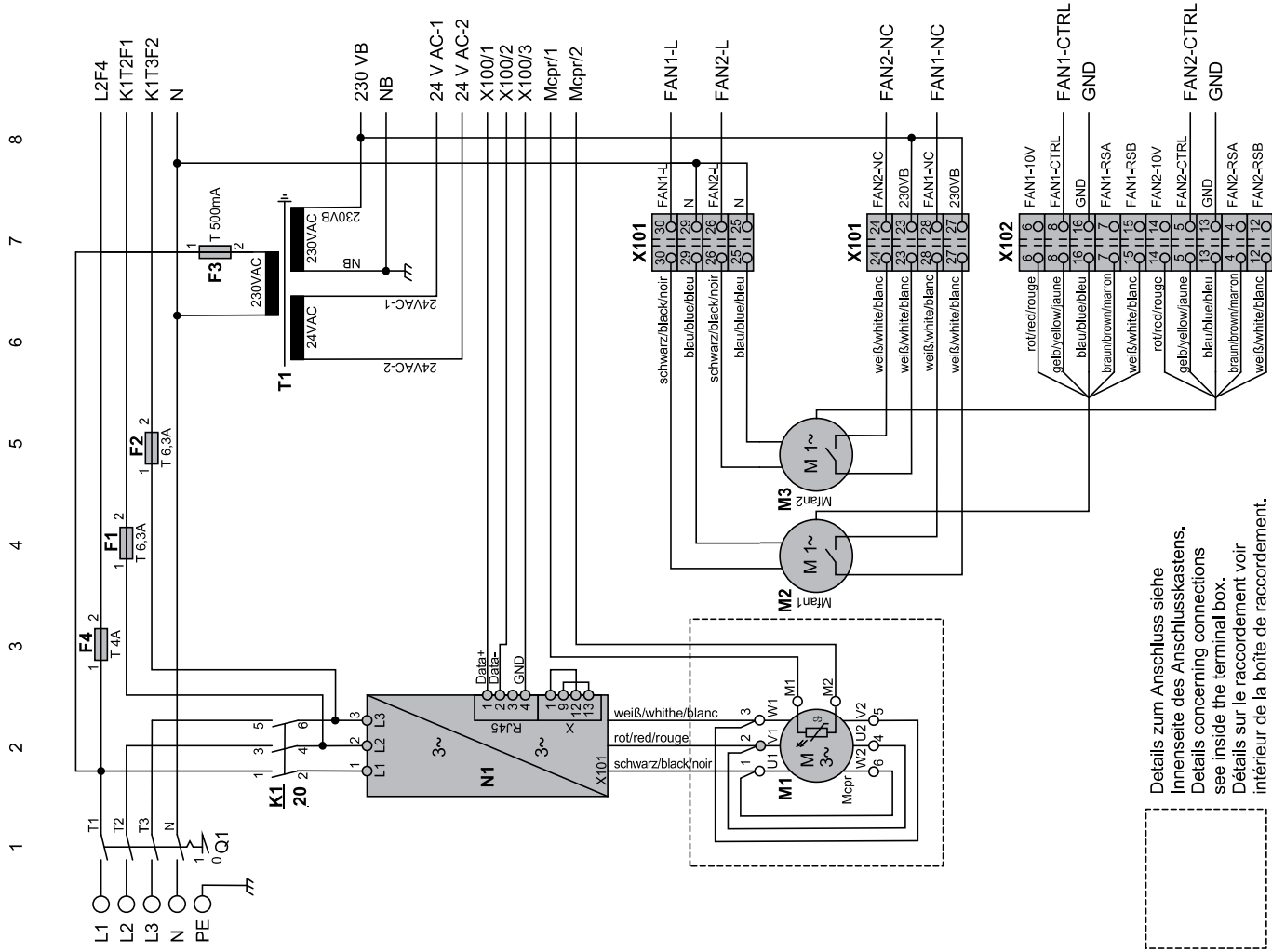


Fig. 6: Wiring diagram part 1: State of delivery LHV7E..FY

7.1.3 Wiring diagram part 2

see figures 7 and 8 on the following two pages

Details zum Anschluss siehe
 Innenseite des Anschlusskastens.
 Details concerning connections
 see inside the terminal box.
 Détails sur le raccordement voir
 intérieur de la boîte de raccordement.

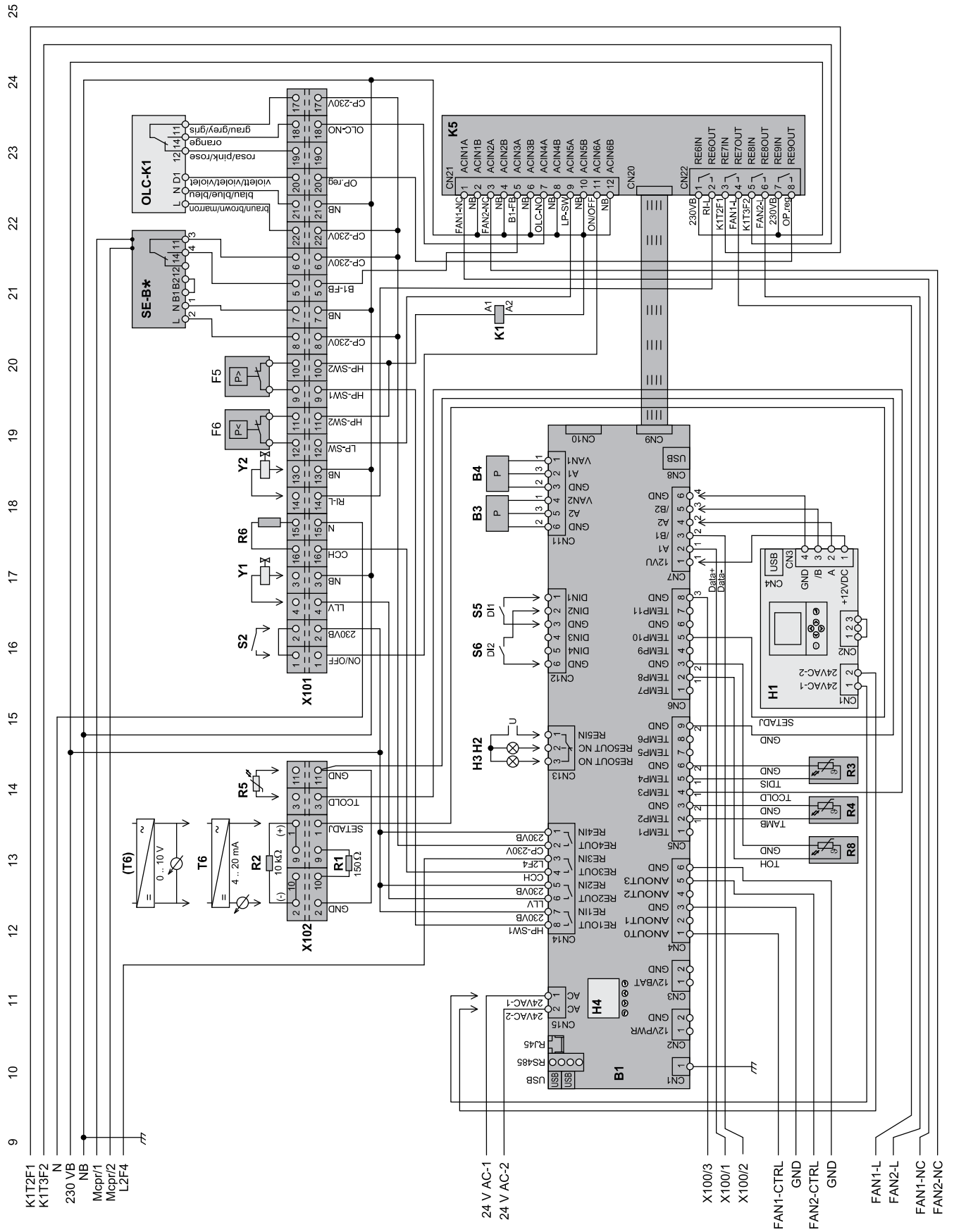


Fig. 7: Wiring diagram part 2: State of delivery LHV5E/2DES-3.F1Y

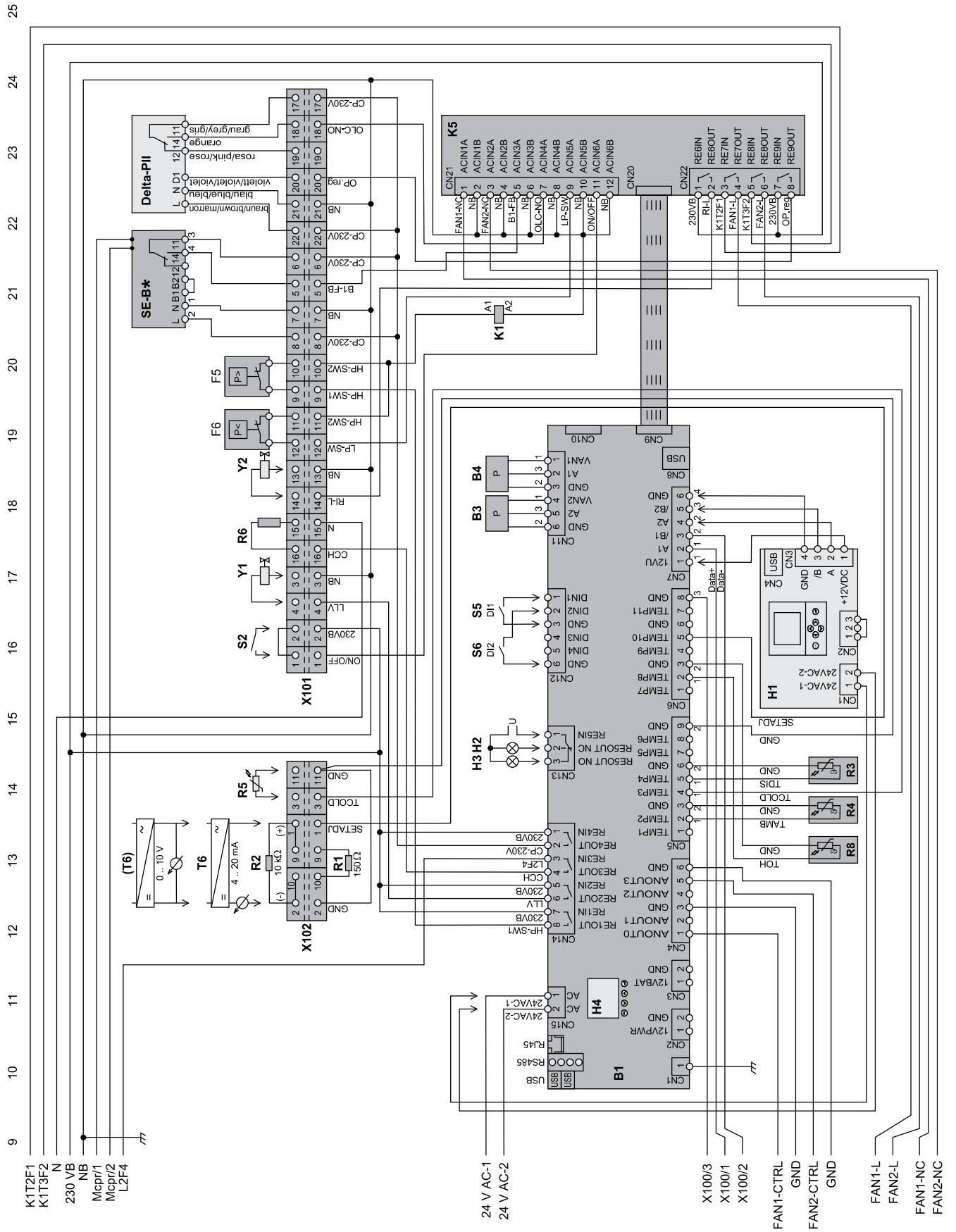


Fig. 8: Wiring diagram part 2: State of delivery LHV5E/4FE-5.F1Y to LHV7E/4NE-14.F(3)Y

7.1.4 Components of wiring diagrams

Components without further terminal strips

F3: Control circuit fuse

F4: Oil heater fuse

K1: Main contactor

M1: Compressor

N1: Frequency inverter (FI)

Q1: Main switch

T1: Transformer

Components containing terminal strips

B1: Controller terminal strip	Component	Terminal	Designation
direkt integriert	2x Mini-B-USB		data connection
	RS485		Modbus connection
	RJ45		Ethernet connection
	Bluetooth		data connection
	H4		integrated display
CN5	R3	5, 6	discharge gas temperature sensor
	R4	2, 3	ambient temperature sensor
CN6	R8	2, 3	suction gas temperature sensor
CN7	H1	1, 4, 5, 6	external display (data connection at CN3)
CN11	B3	4, 5, 6	high pressure transmitter
	B4	1, 2, 3	low pressure transmitter
CN12	S5	1, 3	potential-free contact for DI1

B1: Controller terminal strip	Component	Terminal	Designation
	S6	2, 6	potential-free contact for DI2
CN13			status message (potential-free)
	H2	2, 1	signal light: ready-to-operate
	H3	3, 1	signal light: fault
CN15	H1	1, 2	external display (voltage supply at CN1)

K5: Relay module terminal strip	Component	Terminal	Designation
CN22	F1	1	fuse of fan 1
	F2	3	fuse of fan 2

Terminal strip X101	Component	Terminal	Designation
X101	SE-B*	5, 6, 7, 8	compressor protection device
	Delta-PII	17, 18, 19, 20, 21, 22	oil pressure monitoring
	OLC-K1	17, 18, 19, 20, 21, 22	oil level monitoring
	F5	9, 10 (PE)	high pressure switch
	F6	11, 12	low pressure limiter
	M2	27, 28, 29, 30, PE	fan 1 (supply/ alarm)
	M3	23, 24, 25, 26, PE	fan 2 (supply/ alarm)

Ter- minal strip X101	Com- ponent	Ter- minal	Designation
	R6	15, 16	oil heater
	S2	1, 2	external release
	Y1	3, 4	solenoid valve in liquid line
	Y2	14, 13	RI solenoid valve (refrigerant injection)

Ter- minal strip X102	Com- ponent	Ter- minal	Designation
X102	M2	6, 7, 8, 15, 16	fan 1 (set point/ BUS)
	M3	4, 5, 12, 13, 14	fan 2 (set point/ BUS)
	R1, R2		resistors
	R5	3, 11	sensor for cold store temperature
	K1		compressor contactor

7.2 Prepare electrical connections

- ▶ Open terminal box of condensing unit.
- ▶ Switch off main switch in terminal box.
- ▶ Remove main fuse.
- ▶ Wait for at least 5 minutes.

- ▶ Before touching, earth every terminal and cable end.
- ▶ Open front of weather protective housing:
- ▶ Loosen the screw on top of front grating.
- ▶ Remove front grating.
- ▶ Remove lower covering plates.

7.3 Connecting the condensing unit electrically

NOTICE
Protect controller B1 from overvoltage!
Apply a maximum voltage of 24 V to B1 and connect condensing unit to neutral conductor!

7.3.1 Power connection

These five electrical connections are mandatory for the condensing unit to function.

- ▶ Route power connection cable through the large cable bushing below the terminal box into the housing of the condensing unit.
- ▶ Route power connection cable out of the housing of the condensing unit through the screwed cable bushing M40 from below into terminal box.
- ▶ Connect L1, L2, L3, N and PE, figure see KT-203.
- ▶ Attach protection caps against contact.
- ▶ Check voltage between all phase conductors and the neutral conductor.

7.3.2 Communication cables

All these connections are optional.

- ▶ Route all communication cables through the little cable bushing below the terminal box into the housing of the condensing unit et through a screwed M25x1.5 cable bushing from below into terminal box.

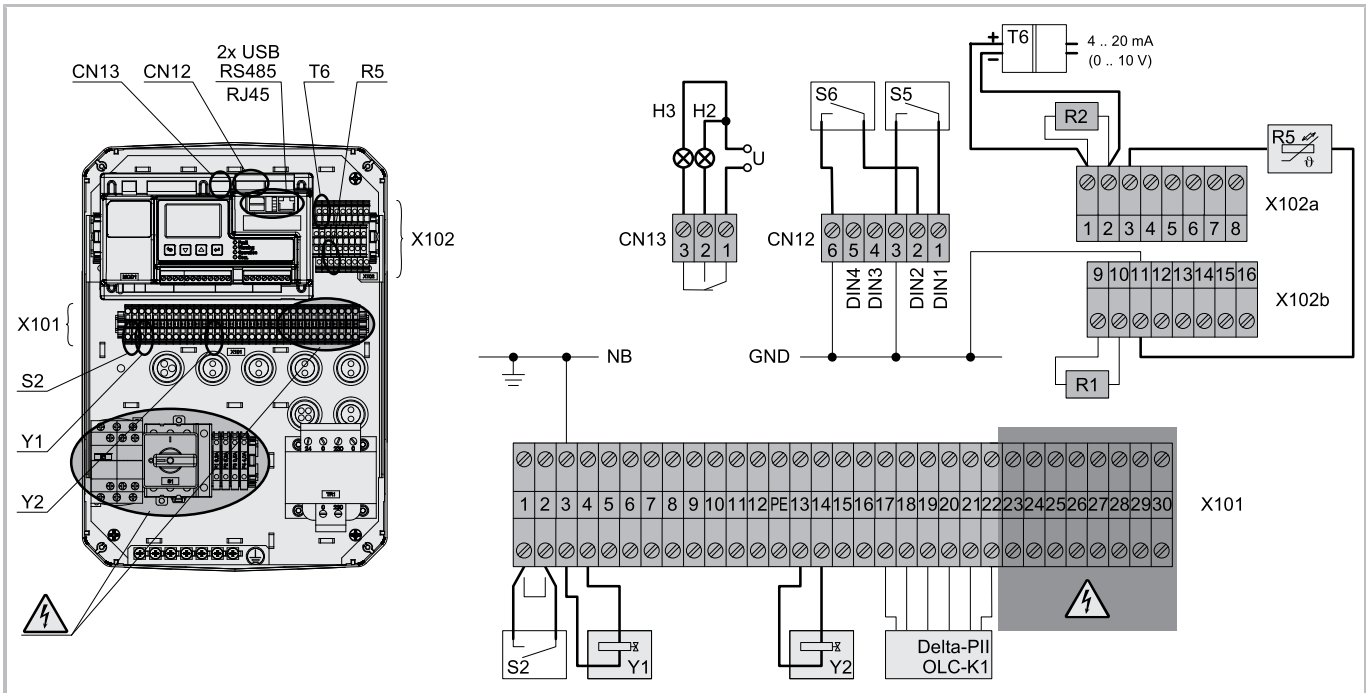


Fig. 9: Connection positions of all communication cables

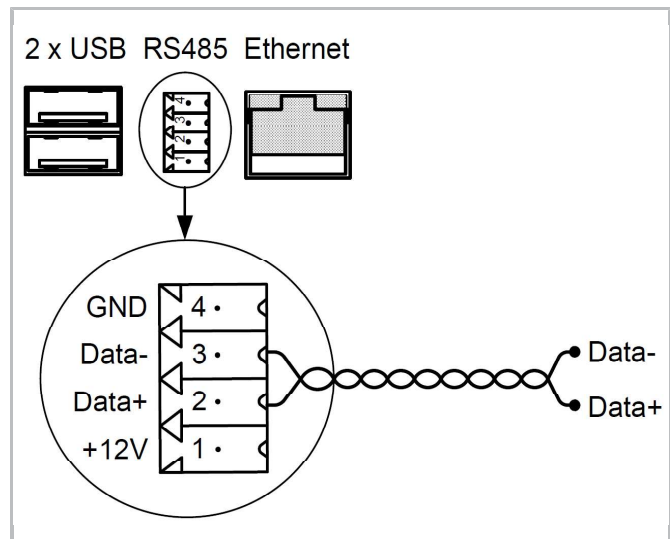
This diagram shows the position of the terminals in the terminal box on the left and a schematic diagram of cables and terminals on the right. The cables shown in thin lines are wired as delivered. Thick lines represent the cables that can be terminated on site.

Dark lines represent the areas where voltage can be present even after the main switch has been switched off. This is the connection area of the power cables of the frequency inverter and the EC fans. Do not work in the connection box until five minutes after the main switch has been switched off and all poles have been disconnected from the power supply!

Data cable for superior controller

Several options are available for communication with the superior system controller. These connections can also be used for a controlled network of up to four ECOSTAR.

- 2x Mini-B-USB
- Modbus RS485
- RJ45 (Ethernet)
- integrated Bluetooth chip



Connecting optional components

H1	external display, option An B1, terminal strips CN7 terminals 1, 4 to 6 and CN15 terminals 1 et 2. Do not remove existing cables from CN15.
H2	signal light: ready-to-operate, option An CN13 terminals 1 and 2.
H3	signal light: fault, option An CN13 terminals 1 and 3.
R5	sensor for cold store temperature, option An X102 terminals 3 and 11.

S2	external release, option An X101 terminals 1 and 2. To do this, remove the bridge from these terminals.
S5	digital input DI1, option An CN12 terminals 1 and 3.
S6	digital input DI2, option An CN12 terminals 2 and 6.
T6	Isolation amplifier for set point adjustment, option An X102 terminals 1 and 2. If voltage-dependent set point adjustment is selected (0 ... 10 V): Remove resistor R2.
Y1	solenoid valve in liquid line, option An X101 terminals 3 and 4.
Y2	RI solenoid valve (refrigerant injection), option An X101 terminals 14 and 13.
Delta-P11 or OLC -D1	oil monitoring, can be retrofitted depending on compressor model An X101 terminals 17 to 22.

For further information on electrical connection and function of the components, see Technical Information KT-203.

External display H1

The schematic representation of the terminal box above does not show the connections for the external display.

For details on the connection, see the wiring diagrams.

8 Commissioning

For a detailed description, please refer to the Operating Instructions KB-104 of the compressor:

- Check tightness
- Evacuate
- Refrigerant charge
- Checks before starting
- Compressor start
- Settings on the controller
 - Preferably with BEST SOFTWARE via Modbus or with BEST App via Bluetooth

– Further explanations can be found in BEST SOFTWARE

- A few days after commissioning, read out the data log and save it with BEST.

8.1 Reset authorisation codes and Bluetooth password to factory settings

Keep the signal contact between terminal 4 and 6 on terminal strip CN12 closed for at least 5 seconds.

The authorisation codes for the display, the passwords for the web server and the Bluetooth password will then be reset to factory settings.

- Authorisation code "Guest": 1
- Authorisation code "Installer" and Bluetooth password for firmware versions < 5: 2
- Bluetooth password for firmware versions ≥ 5: 8670

8.2 Lubrication / oil level check

During commissioning, check the oil level under minimum and maximum load conditions (25 or 30/87 Hz). Check it again after a few days of operation. If the oil level is permanently below ¼ sight glass height, the missing oil quantity must be added. Document the added quantities and keep the documents ready at the place of installation.

For critical applications, use oil monitoring (contact BITZER):

- OLC-K1 for 2DES-3.F1Y (for further information, see KT-180).
- Delta-P11 for 4FE-5.F1Y .. 4NE- 14.F(3)Y (for further information, see KT-170).

8.3 Vibrations and frequencies

The pulse frequency of the gas column in the discharge gas line and the excitation frequency on the compressor feet and on the pipes vary depending on the compressor speed. This may lead to resonance effects in the pipes and in other system components.

Check the system carefully over the entire speed range to detect any abnormal vibration; check pipes and capillary tubes in particular. In case of strong vibrations, take mechanical measures: for example use pipe clamps or install vibration dampers.



NOTICE

Risk of burst pipes and leakages on the compressor and system components!
Avoid strong vibrations!

9 Operation

9.1 Regular tests

The condensing unit must be checked by a specialist at regular intervals. The inspection intervals depend on the refrigerant, the coolant and the operation mode. They must be defined by the end user.



CAUTION

Risk of injury due to escaping vapour on the pressure relief valve
Do not work in the area where the vapour escapes from the pressure relief valve!

Check the following items:

- Oil level of the compressor.
- Evaporation temperature.
- Suction gas temperature.
- Condensing temperature.
- Difference between condensing temperature and air inlet temperature into the condenser.
- Discharge gas temperature.
- Oil temperature.
- Cycling rate.
- Current consumption of the compressor.
- Current consumption of the condenser fan(s).
- Visual inspection of cables and components and check of electrical connection points.



DANGER

Fire hazard caused by damaged electrical components!



Replacement of electrical components if damage, traces of smoke or abnormal discolourations are detected.

- Tightness of the refrigerating circuit.
- Suction gas superheat.

Update the data protocol and compare it with previous measurements. Read out the data log, save and compare it using BEST SOFTWARE or the app. In case of larger deviations, determine the source and correct it. Also check the following items and perform maintenance work if necessary:

- Contamination of the condenser.
- Unhindered air flow to and from the condensing unit.
- Refrigerant charge (level in liquid sight glass).

- Humidity of the refrigerant (moisture indicator) – replace the filter drier if necessary.
- Test the fan function.
- Check pipelines and fans for abnormal vibrations.
- Check safety-relevant parts, for example pressure limiter, motor protection device.
- Check the ventilation slot of the frequency inverter for contamination and clean it if necessary.

For information about oil change and further maintenance work, please refer to the operating instructions of the compressor and the pressure vessel.

10 Decommissioning

10.1 Standstill

Leave the oil heater switched on until disassembly. This prevents increased refrigerant concentration in the oil.

10.2 Disassembly of the condensing unit or of components



WARNING

Compressors or other components of the condensing units may be under pressure!



Serious injuries are possible.

Depressurise all relevant components!
Wear safety goggles!



WARNING

Risk of electrical shock!



Voltage may be present on electrical components!

Disconnect the voltage supply! Remove the fuses!

Close the shut-off valves upstream and downstream of the component in question. Extract the refrigerant. Do not vent the refrigerant, but dispose of it properly!

Loosen screwed joints or flanges on the compressor valves. Remove the compressor from the system; use hoisting equipment if necessary.

10.3 Drain oil

Refer to the Operating Instructions for compressor and oil separator.

Dispose of waste oil properly!

**CAUTION**

When the system has been in operation, the temperature of the oil in the compressor and in the oil separator may be over 60°C.



Serious burns are possible.

Before performing any work on the condensing unit: switch off the system and allow it to cool down.

10.4 Remove or dispose of the compressor and other components

Remove the refrigerant and the oil (see above). Disposal of individual components or of the complete condensing unit:

- Close open connections gas-tight (e.g. shut-off valves, flange, screwed joints).
- If necessary, transport heavy components with hoisting equipment.
- Have the components repaired or dispose of them properly.