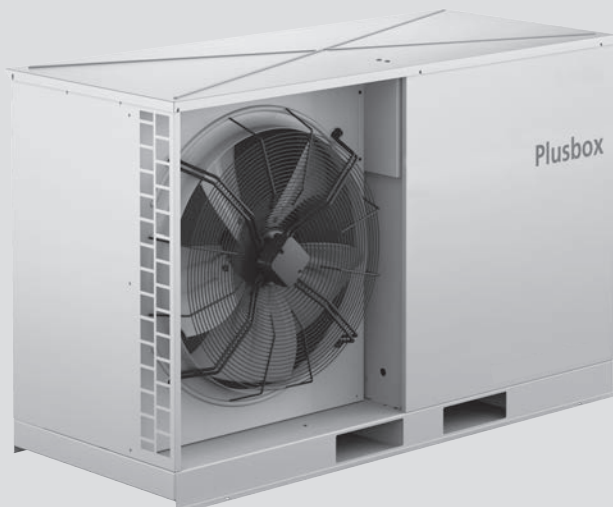




BOCK Plusbox

Assembly instructions

g6284-01.2023-Gb

Translation of the original instructions

SHG(X)34e/215-4 (S)PB	SHG(X)34e/215-4 (S)P&P
SHG(X)34e/255-4 (S)PB	SHG(X)34e/255-4 (S)P&P
SHG(X)34e/315-4 (S)PB	SHG(X)34e/315-4 (S)P&P
SHG(X)34e/380-4 (S)PB	SHG(X)34e/380-4 (S)P&P

SHGX44e/475-4 P&P
SHGX44e/565-4 P&P

BOCK®

colour the world
of tomorrow

About these instructions

Read these instructions before assembly and before using the Plusbox. This will avoid misunderstandings and prevent damage. Improper assembly and use can result in serious or fatal injury.

Observe the safety instructions contained in these instructions and in the compressor instructions. These instructions must be passed onto the end customer along with the unit in which the Plusbox is installed.

Observe also the other documentation included with the Plusbox.

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Note:

According to Commission Regulation (EU) 2015/1095 of 5 May 2015 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for professional condensing units, starting 2016 July 1st in the EU only products may be sold which fulfill minimum efficiency requirements. These minimum efficiency requirements must be documented by a certificate.

The matching certificate for your condensing unit can be created on the Internet on our software (VAP) under <http://vap.bock.de/stationaryapplication/>

1 | Safety

1.1 Identification of safety instructions:



DANGER

Indicates a dangerous situation which, if not avoided, will cause immediate fatal or serious injury.



WARNING

Indicates a dangerous situation which, if not avoided, may cause fatal or serious injury.



CAUTION

Indicates a dangerous situation which, if not avoided, may cause fairly severe or minor injury.



ATTENTION

Indicates a situation which, if not avoided, may cause property damage.



INFO

Important information or tips on simplifying work.

GB

1.2 Qualifications required of personnel



WARNING

Inadequately qualified personnel poses the risk of accidents, the consequence being serious or fatal injury. Work on compressors is therefore reserved for personnel which is qualified to work on pressurized refrigerant systems:

- For example, a refrigeration technician, refrigeration mechatronic engineer. As well as professions with comparable training, which enables personnel to assemble, install, maintain and repair refrigeration and air-conditioning systems. Personnel must be capable of assessing the work to be carried out and recognising any potential dangers.

1 | Safety

1.3 Safety instructions



WARNING

Risk of accidents.

Refrigerating compressors are pressurised machines and as such call for heightened caution and care in handling.

The maximum permissible overpressure must not be exceeded, even for testing purposes.

Risk of burns!

- Depending on the operating conditions, surface temperatures of over 60°C on the discharge side or below 0°C on the suction side can be reached.
- Avoid contact with refrigerant necessarily.
Contact with refrigerant can cause severe burns and skin damage.

1.4 Intended use



WARNING

The Plusbox may not be used in potentially explosive environments!

GB

These assembly instructions describe the standard version of the Plusbox named in the title manufactured by Bock. The Plusbox is intended for installation in a machine (within the EU according to the EU Directives 2006/42/EC Machinery Directive, 2014/68/EU Pressure Equipment Directive).

Commissioning is permissible only if the Plusbox has been installed in accordance with these assembly instructions and the entire system into which it is integrated has been inspected and approved in accordance with legal regulations.

Only refrigerants may be used which are released on

<http://vap.bock.de/stationaryapplication/>

Any other use of the Plusbox is prohibited!

2 | Product description

2.1 Short description

Plusbox Basic

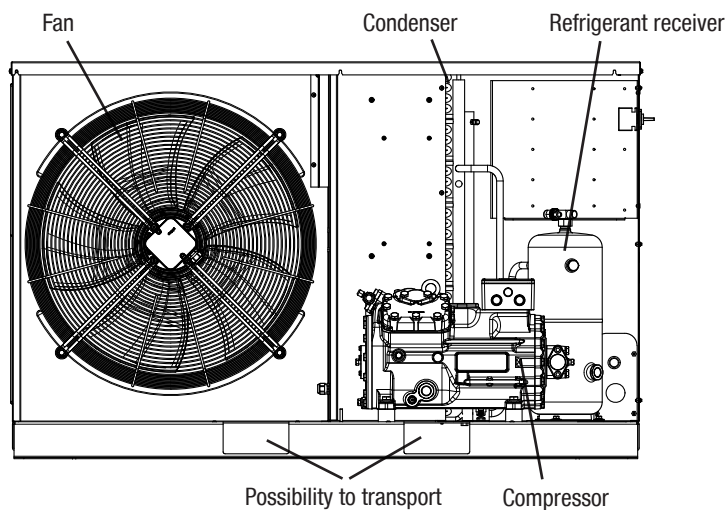


Fig. 1

Plusbox Plug&Play

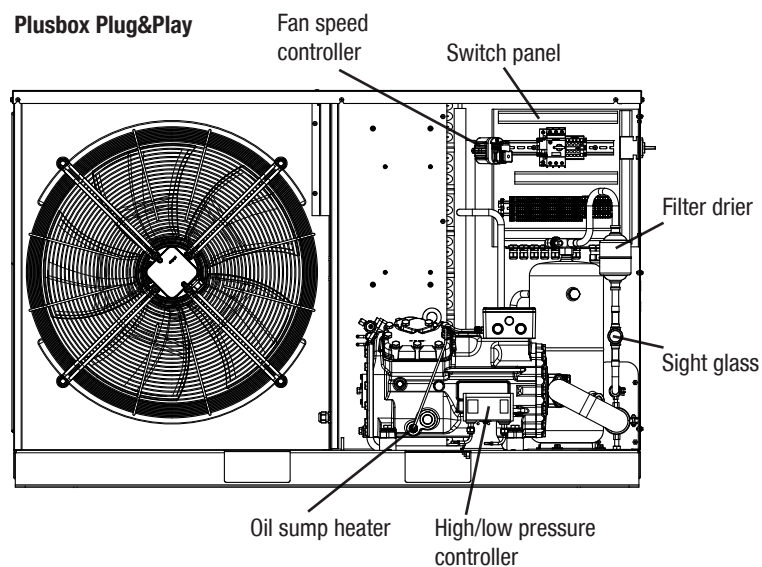


Fig. 2

Dimension and connection values can be found in Chapter 9.

2 | Product description

2.2 Name plate (example)

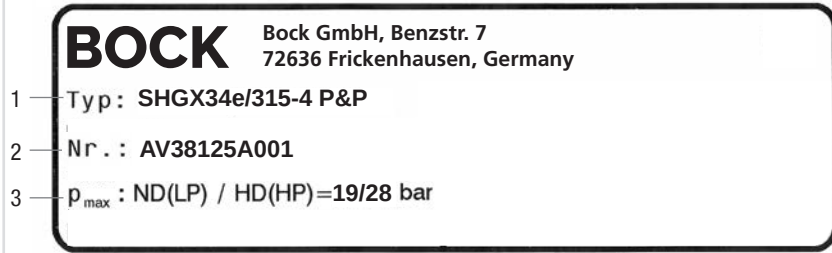
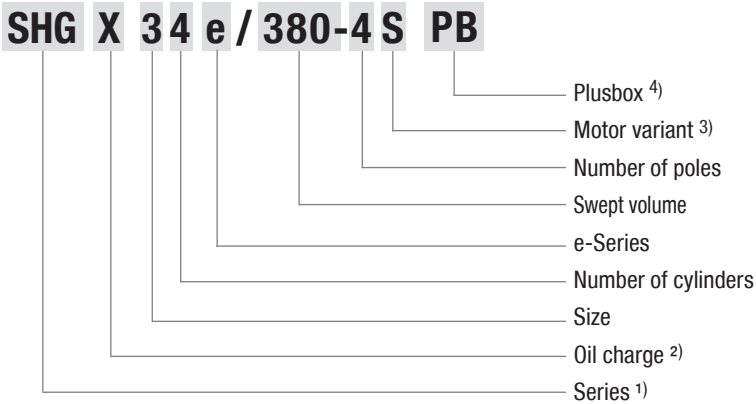


Fig. 3

- 1 Type designation
- 2 Machine number
- 3 ND (LP): Max. admissible operating pressure suction side
HD (HP): Max. admissible operating pressure high-pressure side

2.3 Type key (example)



- ¹⁾ HG - Hermetic Gas-Cooled (suction gas-cooled)
- ²⁾ X - Ester oil charge
- ³⁾ S - Stronger motor
- ⁴⁾ PB = Plusbox,
P&P = Plug and Play

GB

3 | Assembly



INFO

- New compressors are factory-filled with inert gas. Leave this service charge in the compressor for as long as possible and prevent the ingress of air.
- On the Plusbox backside there is a sheet metal in the area of the connection lines. The sheet metal can be moved after releasing the four screws, so the lines can be easier connected.
- Immediately after connecting the Plusbox to the refrigeration system, close the shut-off valves in the suction, discharge lines etc. and evacuate the compressor.
- Check the Plusbox for transport damage before starting any work.

3.1 Setting up



Fig. 4

- Do not lift manually
- Use lifting gear
- Transport preferably via forklift truck, alternatively bolted to a pallet

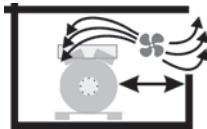


Fig. 5

- Provide adequate clearance for maintenance work.
- Distance from wall to condenser minimum 300 mm.



Fig. 6

- Do not use in a dusty, damp atmosphere or a combustible environment.

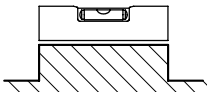


Fig. 7

- Set up on an even surface or frame with sufficient load-bearing capacity. Only set up on a slant after following consulting.
- Preferably on vibration damper or mounting rubbers.

4 | Electrical connection

4 Electrical connection



DANGER

Risk of electric shock! High voltage!
Only carry out work when the electrical system is disconnected from the power supply!

Legend circuit diagram for Plusbox with accessories

FC1	Safety switch main circuit
FC2	Fuse safety chain
QA1	Main switch
QA2	Compressor contactor
QA3	Capacity regulator
QA4	Fan speed controller
MA1	Condenser fan
EC1	compressor motor
EB1	Oil sump heater
INT69 G	Electronic trigger unit INT69 G
BT1	PTC Motor
BT2	Heat protection thermostat (PTC sensor)
BT3	Enabling switch (thermostat/pressostat)
BP1	Safety chain (high/low pressure controller)
BP2	Oil pressure safety switch
X1	Terminal strip switch cabinet
X3	Terminal strip terminal box

GB

to 4.2 Circuit diagram for Plusbox with frequency converter (see Fig. 10)



ATTENTION

For frequency-converter operation:
- Max. permissible ambient temperature -10°C to 40°C.
- Permissible storage temperature -25°C to 65°C.
- For further technical data, see Danfoss technical documentation supplied.

Difference, legend circuit diagram for Plusbox with frequency converter

QA2	Compressor relays
QA3	Signal compressor operation
BP3	Pressure transmitter 4-20 mA
KF1	Frequency converter

4.1 Circuit diagram for Plusbox with accessories

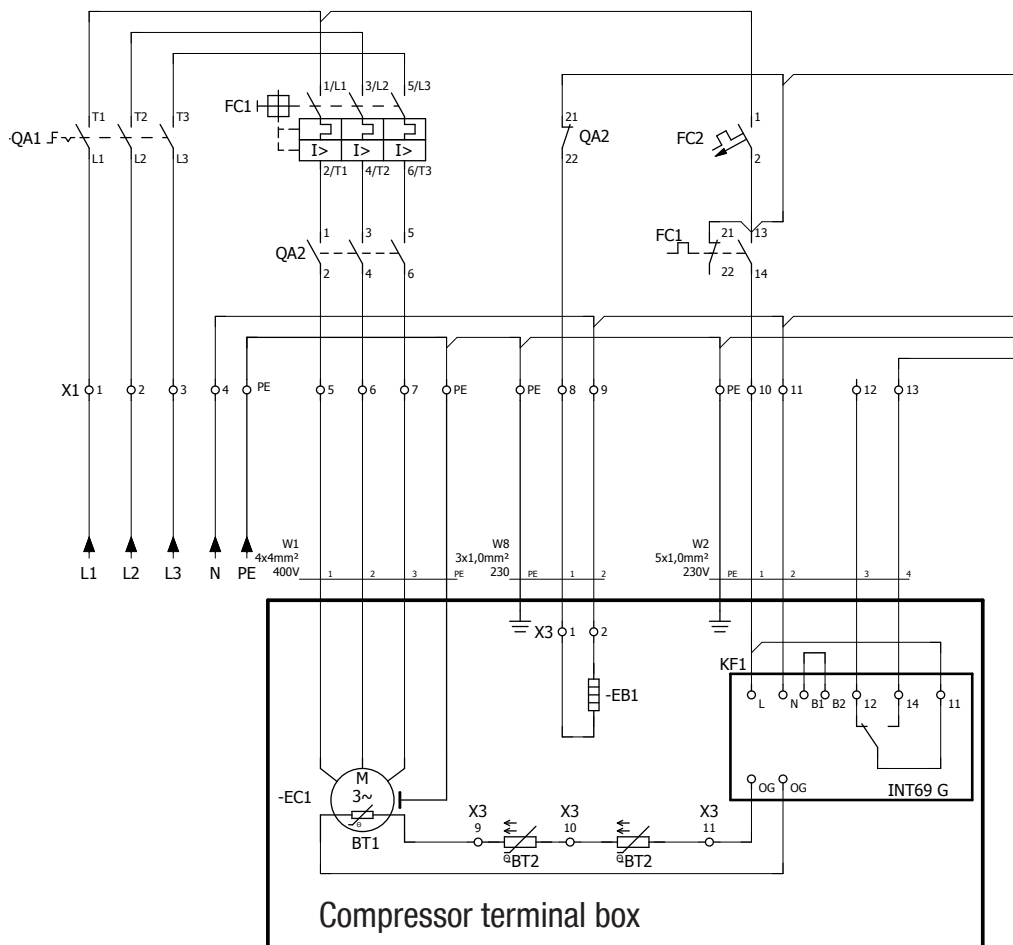
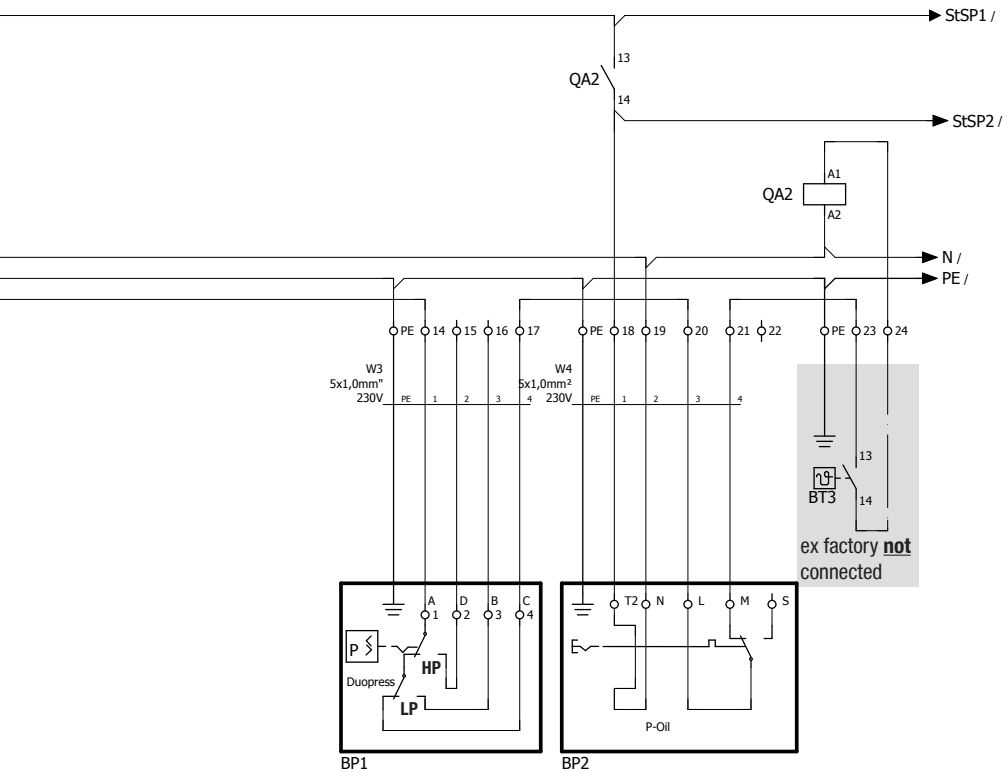


Fig. 8



4.1 Circuit diagram for Plusbox with accessories -continuation-

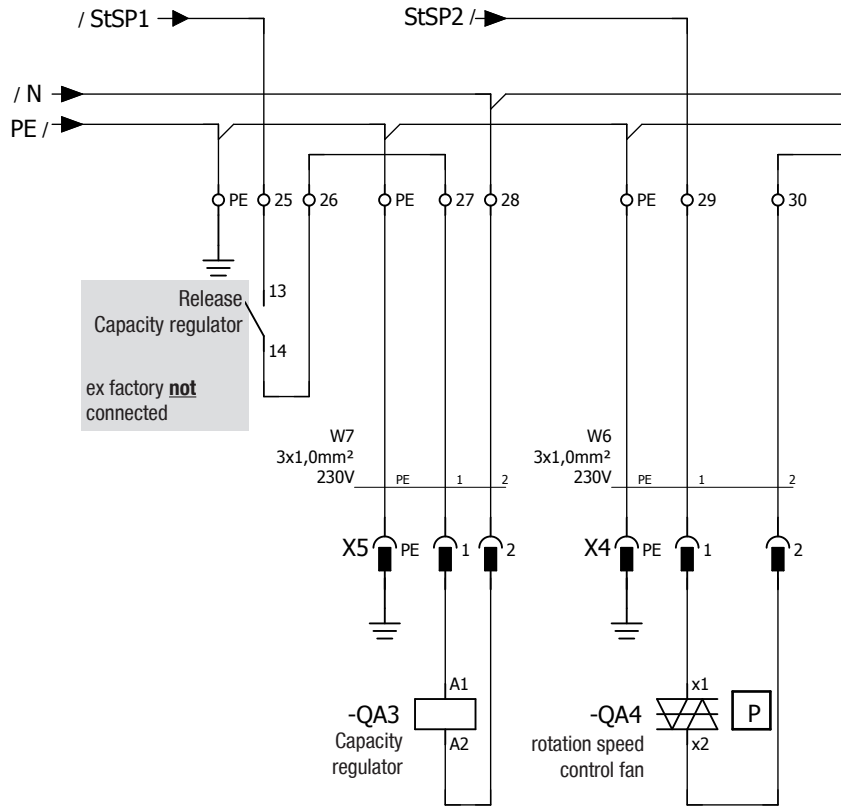
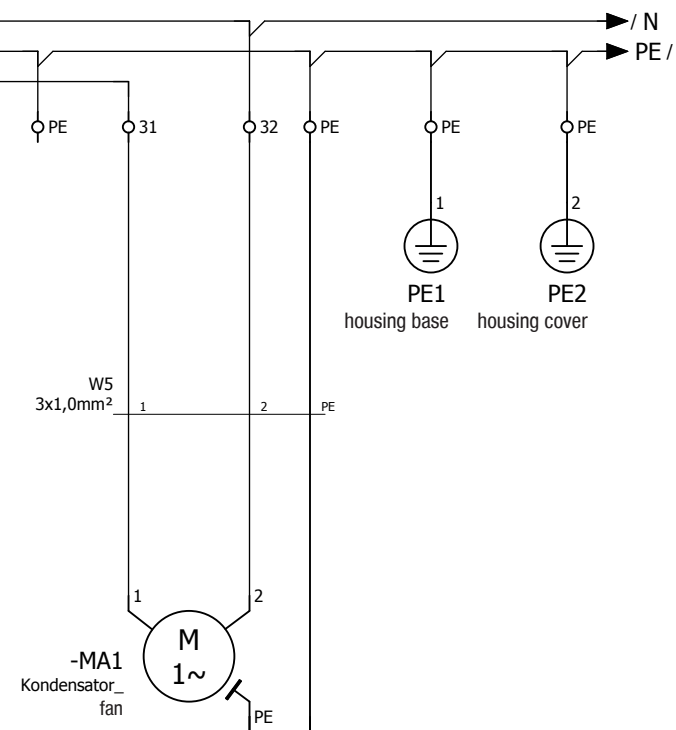


Fig. 9



4.2 Circuit diagram for Plusbox with frequency converter

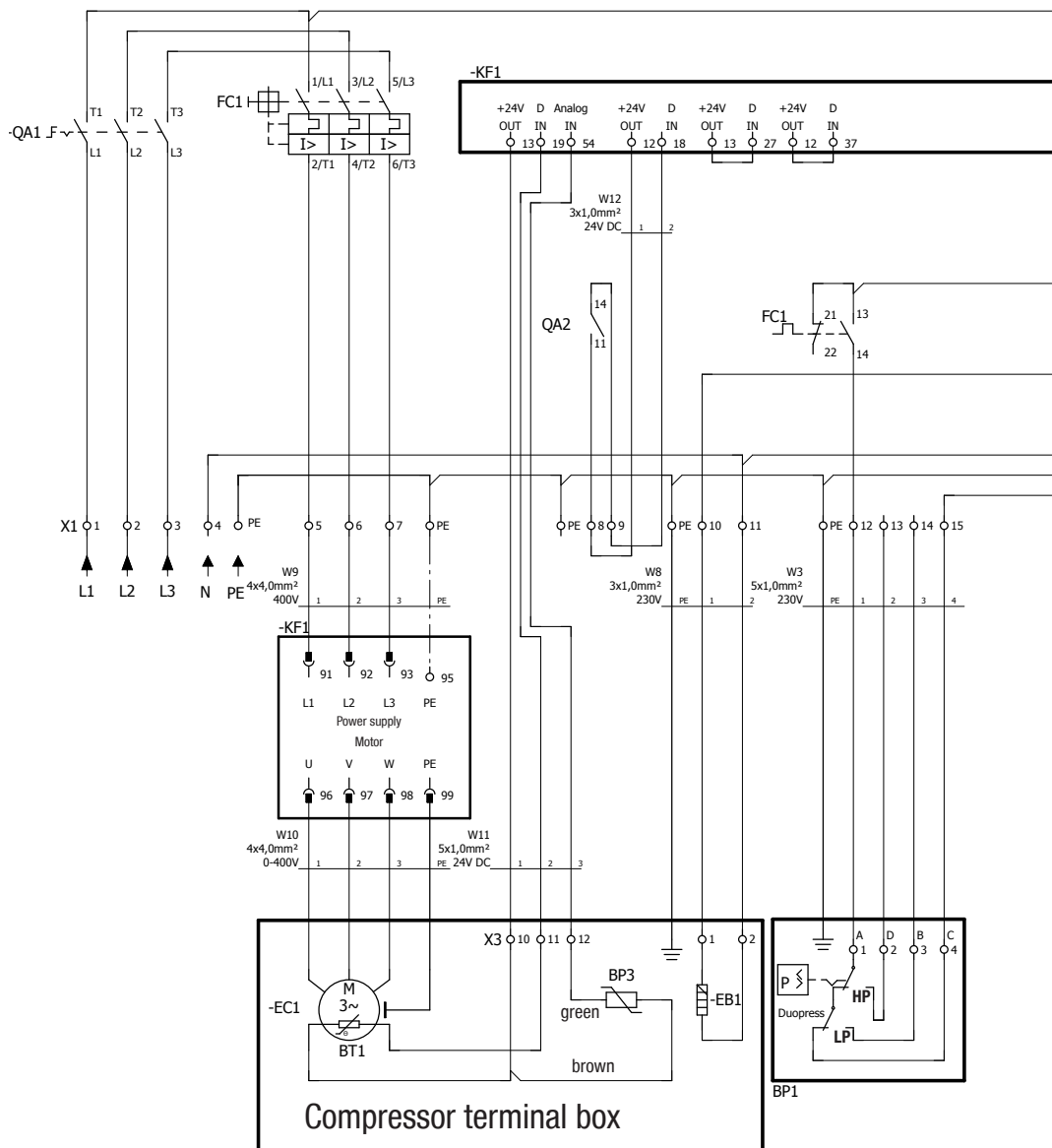
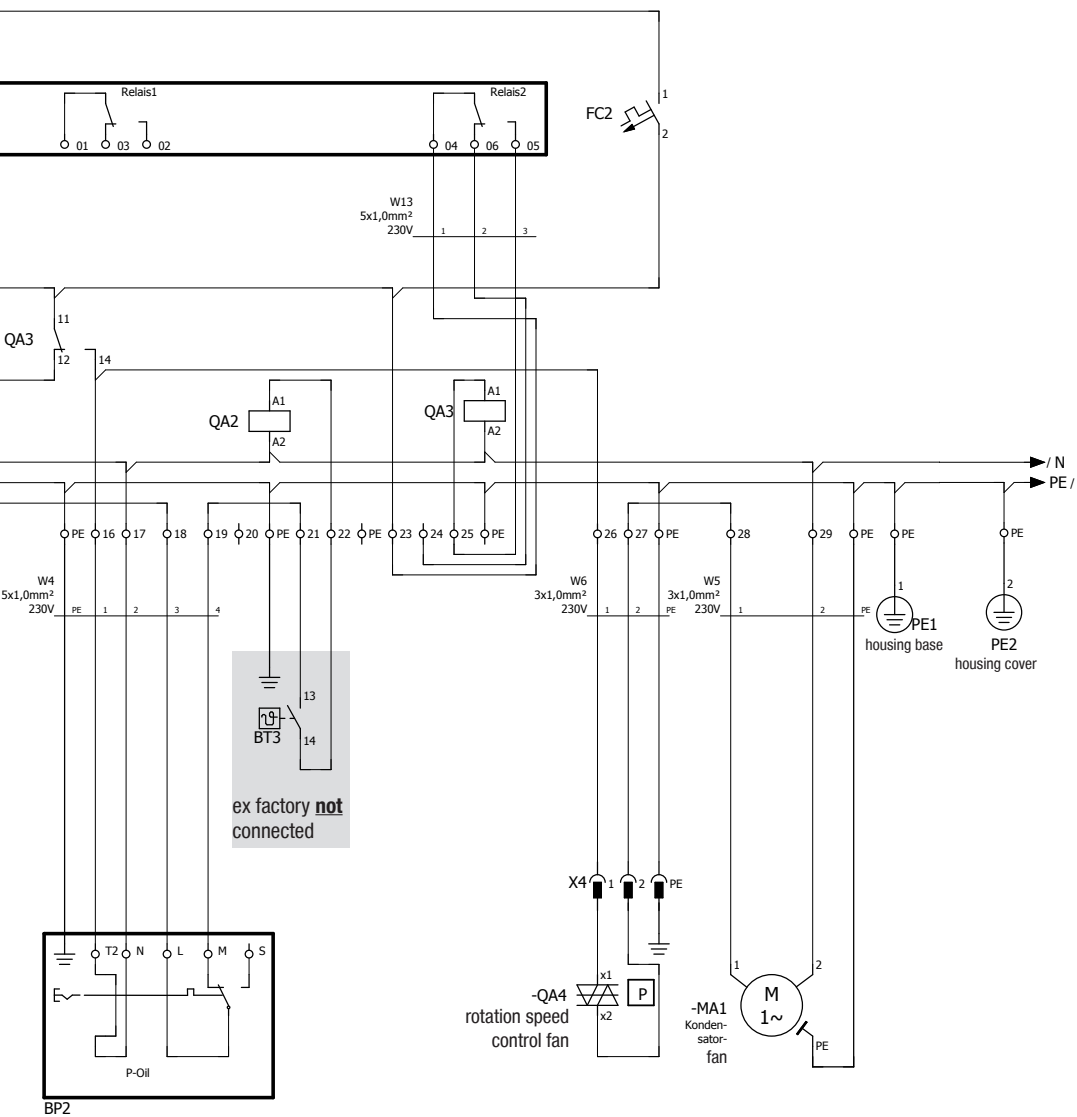


Fig. 10



5 | Commissioning

5.1 Commissioning Plusbox without EFCe

Commissioning according to the assembly instructions of the compressor.

Check the function of the safety chain and set the High-/Low pressure monitoring. Set the fan speed controller according to the operating conditions of the plant.

5.2 Commissioning Plusbox with EFCe

Commissioning according to the assembly instructions of the compressor.

Check the function of the safety chain and set the High-/Low pressure monitoring. Set the fan speed controller according to the operating conditions of the plant.

Commissioning EFCe:



Note the enclosed Danfoss product manual. The function and operation of the user interface are described there.

Here take a look what you need to set values and parameters specifically for the Bock Plusbox.

Due to software updates of the company Danfoss, differences may appear to the instructions shown here.

Follow the instructions of the startup wizard. This should appear when you start first. Also, the setup wizard can be launched from the Quick Menu.

5 | Commissioning

VLT Wizard

Please select language:

English

1. Set the desired language.

VLT Wizard

Which motor type is
connected to the drive?

Asynchron

2. Set the motor type, which is connected to
the drive.

VLT Wizard

Select motor control
principle

VVCPlus

3. Set the motor control principle.

GB

VLT Wizard

Select application

Compressor

4. Set the desired application.

VLT Wizard

Nominal engine power [kW]:

11.00 kW

5. Set the nominal engine power.

5 | Commissioning

VLT Wizard
Nominal motor voltage
400 V
Nominal motor frequency
50 Hz

6. Set nominal motor voltage and frequency.

VLT Wizard
Nominal motor current
23.00 A
Nominal motor speed
1440 RPM

7. Set nominal motor current and speed.

VLT Wizard
Enter Min. Frequency:
25.0 Hz
Enter max. Frequency:
70.0 Hz

8. Set the desired minimum and maximum frequency. They are between 25 and 70 Hz.

VLT Wizard
Enter Recycle Time (Start to Start)
3 mins.

9. Set the desired recycle time.
We recommend 3 minutes.

VLT Wizard
Select internal or external control
External control

10. This setting depends on the application.
Factory setting: Internal regulation

GB

5 | Commissioning

VLT Wizard

Sensor Type:

Pressure transmitter [bar]

11. Setting at internal control:
Pressure transmitter (bar)

VLT Wizard

Please switch A54 to
position I (under LCP)

12. Check switch position below the user interface.
Set A54 to position (I)
Message is only displayed if switch is not set to I

VLT Wizard

Select Setpoint Unit:

°C

Refrigerant
R404a

13. Set the setpoint unit, depending on the system.
Select refrigerant used.

GB

VLT Wizard

Setpoint type

Constant

14. Select setpoint type.
Recommended setting: Constant

VLT Wizard

Enter Setpoint:

0,000°C

15. Adjust setpoint, depending to the system.

5 | Commissioning

VLT Wizard

High Setpoint Limit

50.000°C

Low Setpoint Limit

0.000°C

16. This setting depends to the system.
Set maximum setpoint limit.
- Set minimum setpoint limit.

VLT Wizard

Enter T"Cut-Out Value:

0.000°C

Enter T"Cut-In Value:

10.000°C

17. This setting depends to the system.
(Pump-Down frequency converter)
- Set switch-off value
- Set switch-on value

VLT Wizard

Do you wish to configure
Pack Control?

No

18. This setting depends to the system.
Factory setting: No

VLT Wizard

Compressor Setup
Complete

19. Compressor setup completed.

VLT Wizard

You now have the following
options:

Choose:

20. Switch to main menu.

GB

5 | Commissioning

Analog input 54

6-24 Terminal 54 Skal.
Low Ref./ Feedb. Value
-1.000

21. Adjusting the pressure transmitter:
From the main menu:
Set parameter 6-24 to -1.

Analog input 54

6-25 Terminal 54 Skal.
High Ref./ Feedb. Value
19.000

22. Adjusting the pressure transmitter:
From the main menu:
Set parameter 6-25 to 19.

Motor Temperature

1-90 Motor Thermal
Protection
[2] Thermistor shutdown.

23. Adjusting the motor temperature:
From the main menu:
Set parameters 1-90 to [2] Thermistor
shutdown.

GB

Motor Temperature

1-93 Thermistor connection
[4] Digital input 19

24. Adjusting the motor temperature:
From the main menu:
Set parameters 1-93 to [4] Digital input 19.

Digital inputs

5-12 Terminal 27
Digital input
[0] without function

25. Adjusting the digital inputs:
From the main menu:
Set parameter 5-12 to [0] without function.

5 | Commissioning

This completes the setting of the EFCe.
To start the compressor, press the button

Auto on. The compressor starts if:

- Relais QA2 has attracted
- Delay time has elapsed (3 minutes)
- Suction pressure is high enough
- No other parameters were change.

If other parameters were changed, we recommend to reset the EFCe to factory settings. Afterwards have a look at the Danfoss product manual. Follow again the instructions of the startup wizard.

5 | Commissioning

0.000 °C	0.000 °C
Speed Bypass	
4-6*	
4-61 Bypass Speed from	
[0] [Hz]	
0.0 Hz	

0.000 °C	0.000 °C
Speed Bypass	
4-6*	
4-63 Bypass Speed to	
[0] [Hz]	
0.0 Hz	

If during operation disturbing vibrations occur with certain frequencies, you have the option to skip them:

From the main menu:

Parameter 4-61 = Bypass speed from...

Parameter 4-63 = Bypass speed to...

6 | Running

6.1 Status Messages

Status		
-5.000 °C	-10.6 °C	0.00 A
0.0 Hz		
3940 kWh		
Auto Remote Cut-out		

- 1. Auto Remote Cut-out**
LP switch triggered in the inverter (cut out VLT).
If the back-up is below the cut out value.
(Pump - "Down" frequency converter)

Status		
-5.000 °C	-6.554 °C	9.25 A
25.0 Hz		
3939 kWh		
Auto Remote Run on ref.		

- 2. Auto Remote Run on ref.**
Setpoint value reached.

Status		
-5.000 °C	-6.387 °C	9.33 A
64.5 Hz		
3939 kWh		
Auto Remote Speed high		

- 3. Auto Remote Speed high**
In conjunction with current limit (W59)
- lmax reached
- Rotation speed of the compressor is not increased
e.g. if suction pressure too high when compressor
first commissioned.

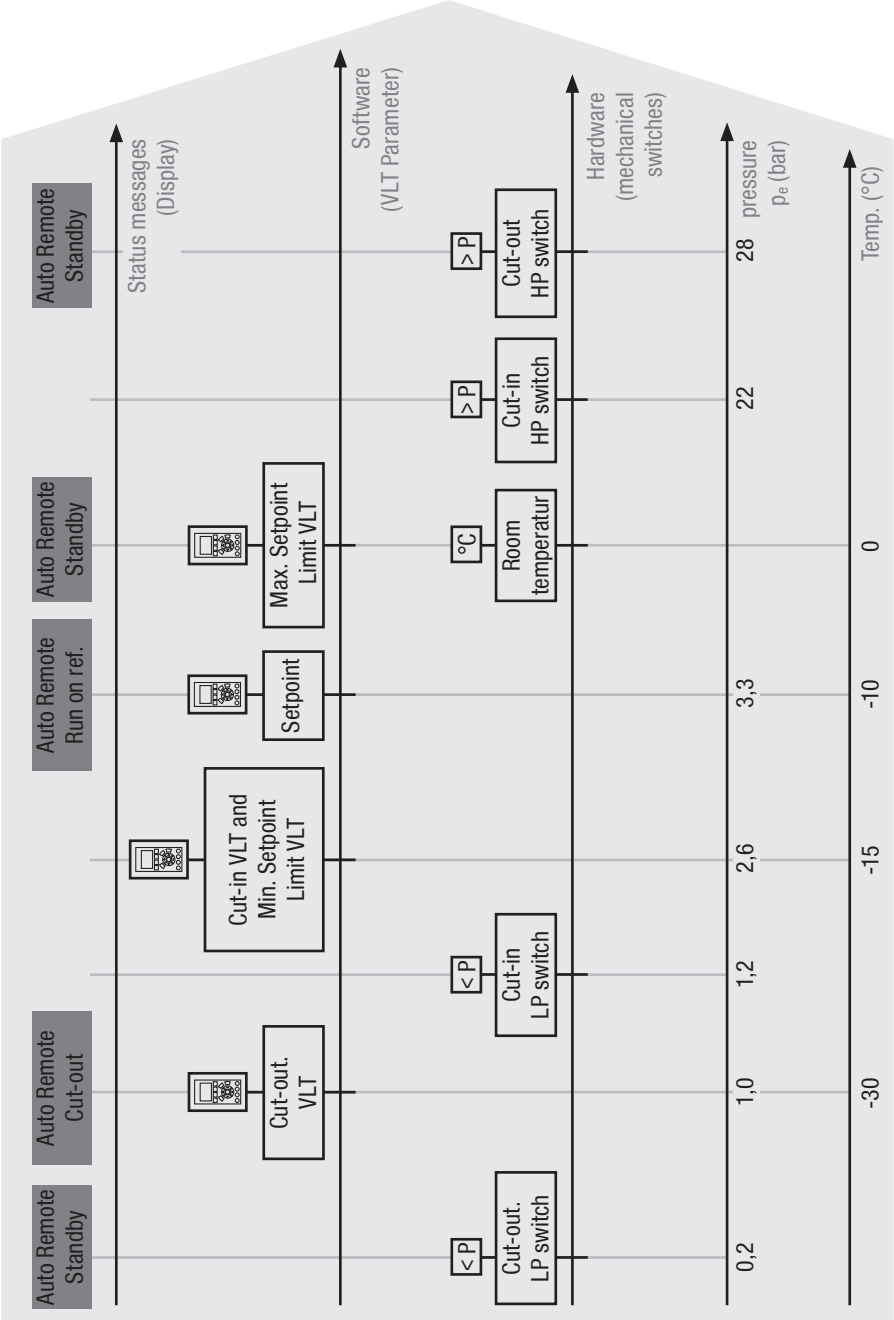
Status		
-5.000 °C	3.113 °C	0.00 A
0.0 Hz		
3939 kWh		
Auto Remote Standby		

- 4. Auto Remote Standby**
No release by the inverter / safety chain is not
open.

GB

6 | Running

6.2 Application Example



7 | Maintenance

7.1 Preparation



WARNING

Before starting any work on the compressor:

- Switch off the compressor and secure it to prevent a restart.
- Relieve compressor of system pressure.
- Prevent air from infiltrating the system!

After maintenance has been performed:

- Connect safety switch.
- Evacuate compressor.
- Release switch-on lock.

7.2 Work to be carried out

To avoid system-related problems, the following service work must be carried out on the Plusbox:

- Cleaning: A dirty condenser leads to performance losses!
Visual inspections and possible condenser cleaning therefore required on a monthly base.
 - Prior to cleaning, mask the ventilation apertures between condenser/fan and machine room and then remove again before subsequent start-up**Neither dirt nor moisture are allowed to penetrate the machine room.**
 - We recommend using compressed air and a soft brush for cleaning.
- Further maintenance work in accordance with the instructions for assembly on the compressor.

8 | Technical data

Type	Compressor		Fan / condenser ②			Receiver capacity	Tube diameter		Noise level	Weight
	Displacement 50 Hz (1450 rpm)	Max. working current ①	Max. working current 50 Hz	Max. power consumption 50 Hz	Air flow 50 Hz		Liquid line	Suction line		
SHG	m³/h	A	A	W	m³/h	Liters	inch	inch	dBA	kg
		Δ / γ								
	18,80	14,0 / 8,1	2,60	600	7895	8,0	1½"	1⅞"	47	196
	18,80	18,3 / 10,5	2,60	600	7895	8,0	1½"	1⅞"	47	201
	22,10	17,0 / 9,8	2,60	600	7895	8,0	1½"	1⅞"	47	195
	22,10	21,1 / 12,2	2,60	600	7895	8,0	1½"	1⅞"	47	200
	27,30	21,1 / 12,2	2,60	600	7895	8,0	1½"	1⅞"	47	198
	27,30	25,5 / 14,7	2,60	600	7020	10,0	5⁄8"	1⅜"	47	207
	33,10	26,1 / 15,1	2,60	600	7020	10,0	5⁄8"	1⅜"	47	203
	33,10	31,2 / 18,0	2,60	600	7020	10,0	5⁄8"	1⅜"	47	206
	41,30	PW 1+2 19,0	2,60	600	7020	10,0	5⁄8"	1⅜"	47	334
	49,20	22,0	2,60	600	7020	10,0	5⁄8"	1⅜"	47	335

① Tolerance (± 10 %) relates to the mean value of the voltage range.

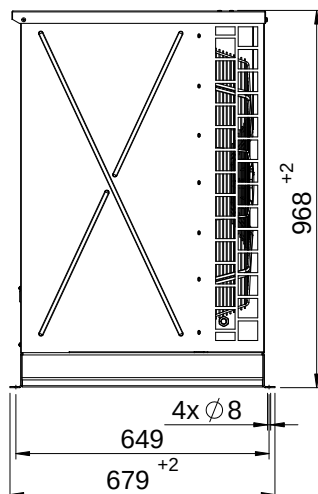
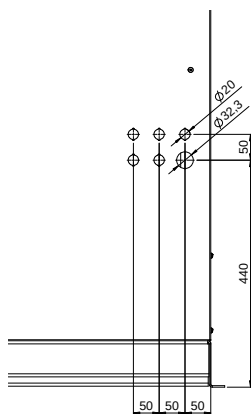
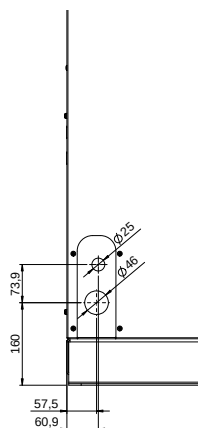
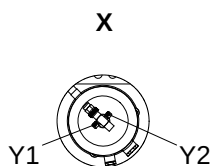
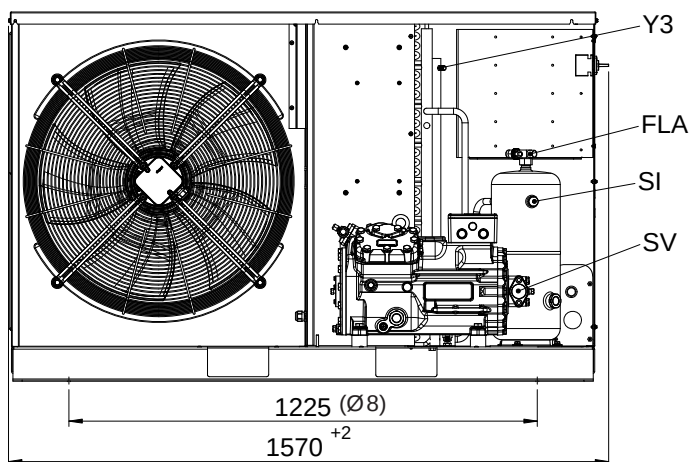
Other voltages and current types on request.

② 230 V - 1 - 50 Hz

③ 380-420 V γ/γγ - 3 - 50 Hz PW

9 | Dimensions and connections

Diagrams without access door



Dimensions in mm

Fig. 11

96284-01.2023-DGbF

9 | Dimensions and connections

SHG Type	Connections ①					
	SV	FLA	SI	Y1	Y2	Y3
	mm l inch	mm l inch	inch	inch	inch	inch
SHG34e/215-4 PB	28 / 1 1/8	16 / 5/8	1/2 NPTF	7/16 UNF	7/16 UNF	7/16 UNF
SHG34e/215-4 S PB	28 / 1 1/8	16 / 5/8	1/2 NPTF	7/16 UNF	7/16 UNF	7/16 UNF
SHG34e/255-4 PB	28 / 1 1/8	16 / 5/8	1/2 NPTF	7/16 UNF	7/16 UNF	7/16 UNF
SHG34e/255-4 S PB	28 / 1 1/8	16 / 5/8	1/2 NPTF	7/16 UNF	7/16 UNF	7/16 UNF
SHG34e/315-4 PB	28 / 1 1/8	16 / 5/8	1/2 NPTF	7/16 UNF	7/16 UNF	7/16 UNF
SHG34e/315-4 S PB	35 / 1 3/8	16 / 5/8	1/2 NPTF	7/16 UNF	7/16 UNF	7/16 UNF
SHG34e/380-4 PB	35 / 1 3/8	16 / 5/8	1/2 NPTF	7/16 UNF	7/16 UNF	7/16 UNF
SHG34e/380-4 S PB	35 / 1 3/8	16 / 5/8	1/2 NPTF	7/16 UNF	7/16 UNF	7/16 UNF
SHG44e/475-4 P&P	35 / 1 3/8	16 / 5/8	1/2 NPTF	7/16 UNF	7/16 UNF	7/16 UNF
SHG44e/565-4 P&P	35 / 1 3/8	16 / 5/8	1/2 NPTF	7/16 UNF	7/16 UNF	7/16 UNF

SV = Suction line shut off valve

FLA = Liquid outlet

SI = Connection safety valve

Y1 = Connection liquid side, lockable

Y2 = Connection liquid side, not lockable

Y3 = Schrader-connection speed controller fan

① Further compressor connections can be found in the assembly instructions of the compressor.

GB

10 | Service

Dear customer,

if you have any questions about installation, operation and accessories, please contact our technical service or specialist wholesaler and/or our representative. The Bock service team can be contacted by phone, **+49 (0)7022 9454-0** or via **service@bock.de**

Yours faithfully Bock GmbH



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