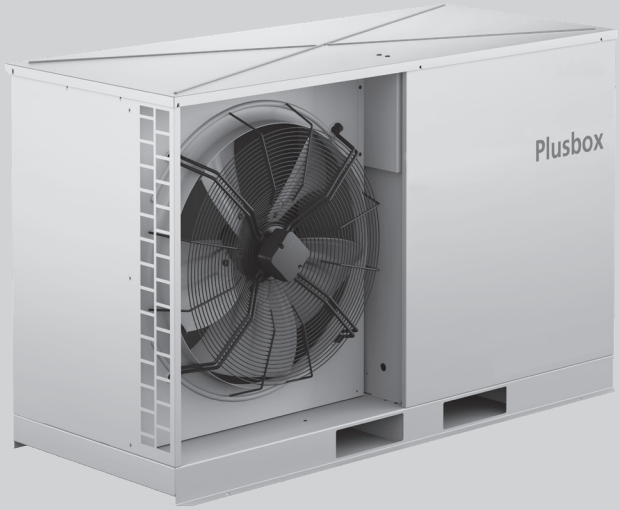
ENGINEERING
TOMORROW



BOCK® Plusbox

Operating guide

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

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

Translation of the original instructions

AQ451018605646en-000201

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.

GB

Contents

GB

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.

1.3 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

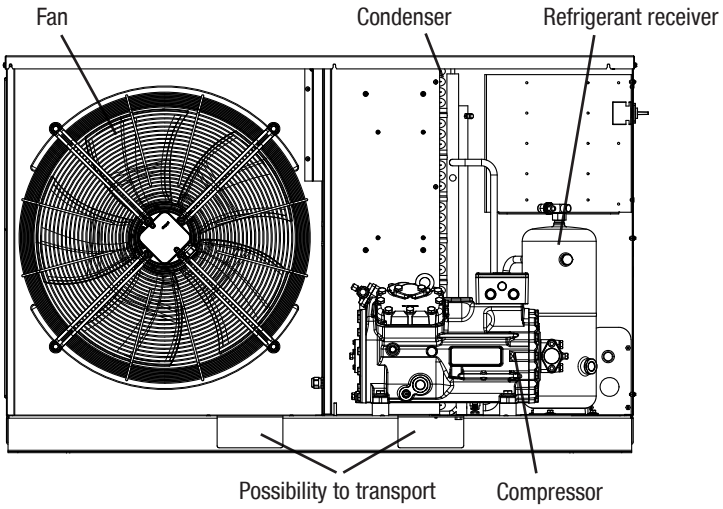


Fig. 1

Plusbox Plug&Play

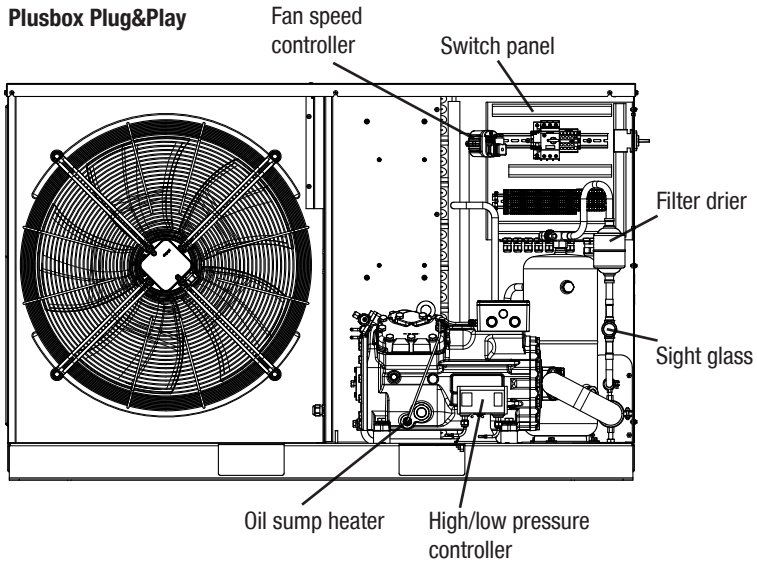


Fig. 2

Dimension and connection values can be found in Chapter 9.

2.2 Name plate (example)

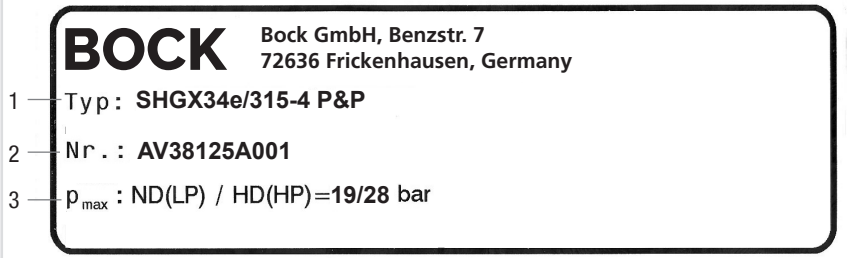
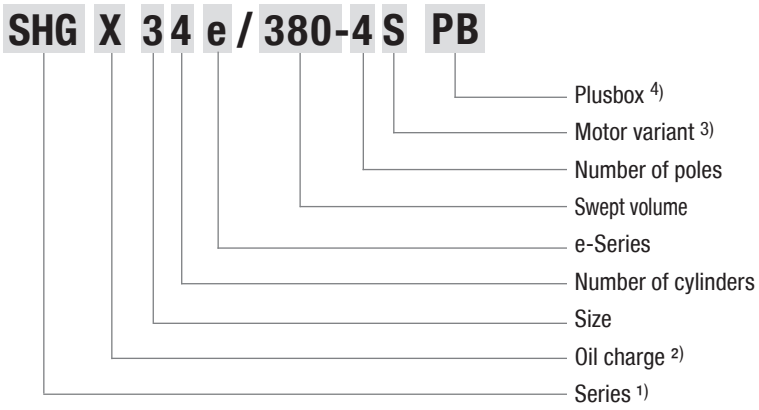


Fig. 3

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)

GB



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

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

GB

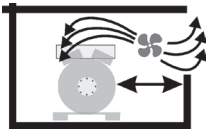


Fig. 5

- 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.

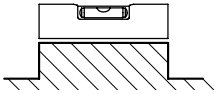


Fig. 7

- 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

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 relais
QA3	Signal compressor operation
BP3	Pressure transmitter 4-20 mA
KF1	Frequency converter

4.1 Circuit diagram for Plusbox with accessories

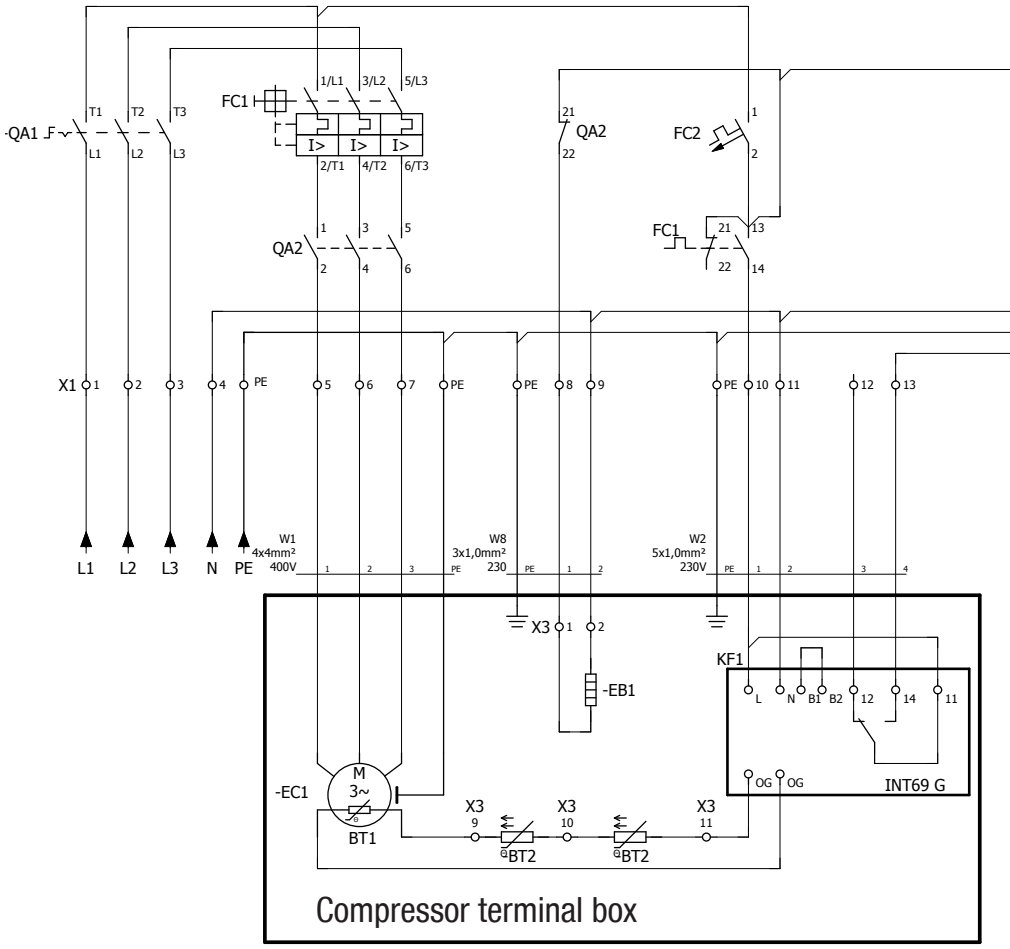
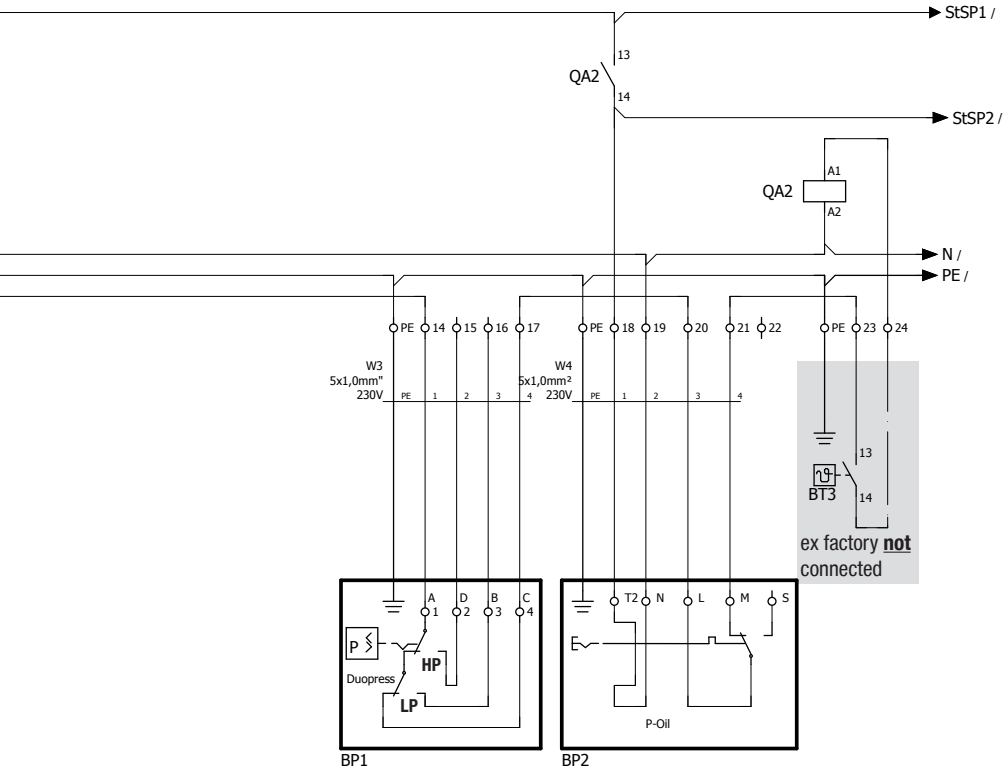


Fig. 8


StSP1 /
13
QA2
14
StSP2 /
A1
QA2
A2
N /
PE /
PE 14 15 16 17
PE 18 19 20 21 22
PE 23 24
W3
5x1,0mm²
230V
PE 1 2 3 4
W4
5x1,0mm²
230V
PE 1 2 3 4
13
BT3
14
ex factory **not**
connected
A 1
D 2
B 3
C 4
P
HP
Duopress
LP
BP1
T2 N L M S
P-Oil
BP2

4.1 Circuit diagram for Plusbox with accessories -continuation-

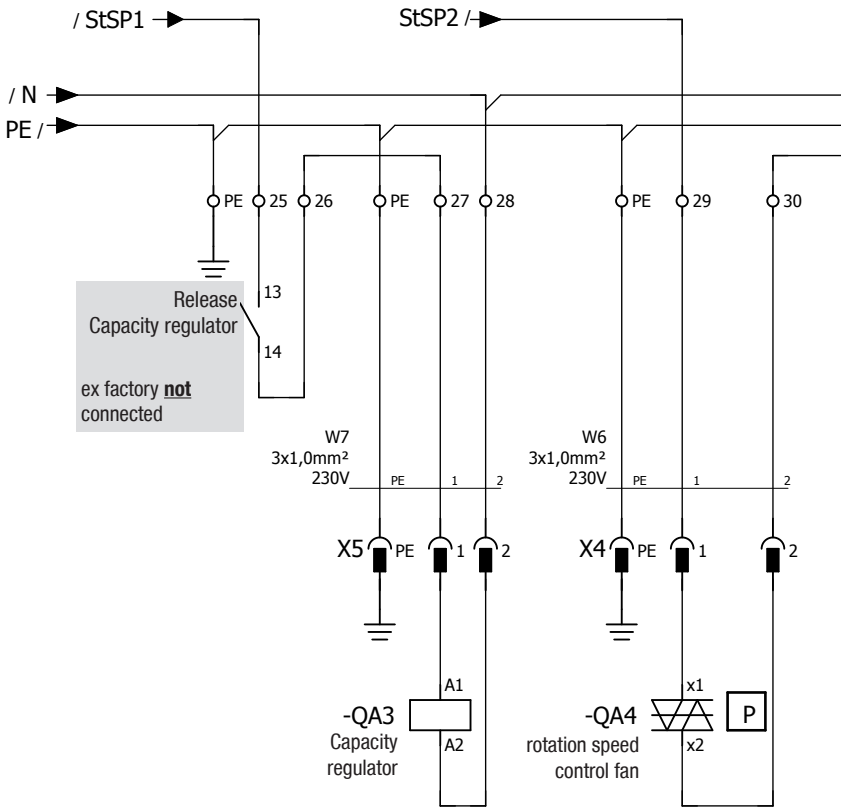
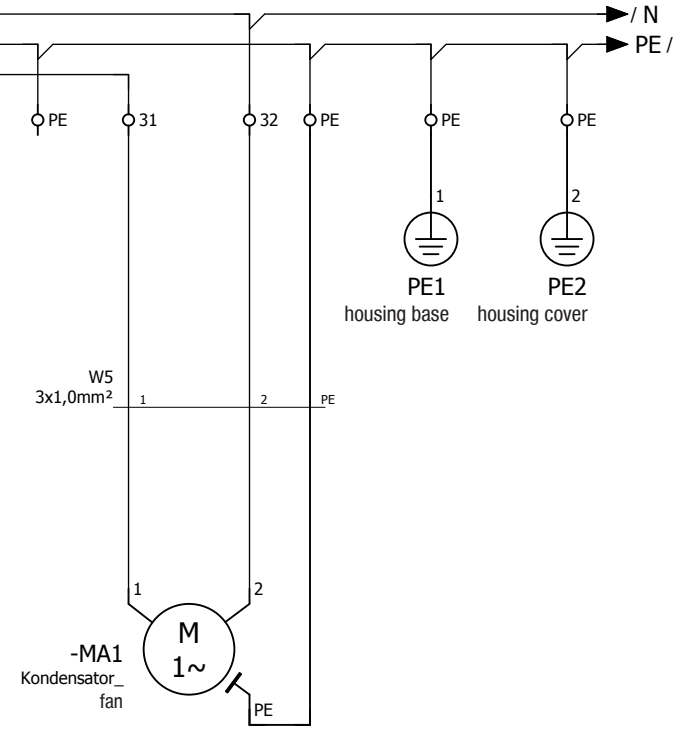


Fig. 9


/ N
PE /
PE
31
32
PE
PE
PE
1
2
PE1
housing base
PE2
housing cover
W5
3x1,0mm²
1
2
PE
1
2
M
1~
-MA1
Kondensator_
fan
PE

4.2 Circuit diagram for Plusbox with frequency converter

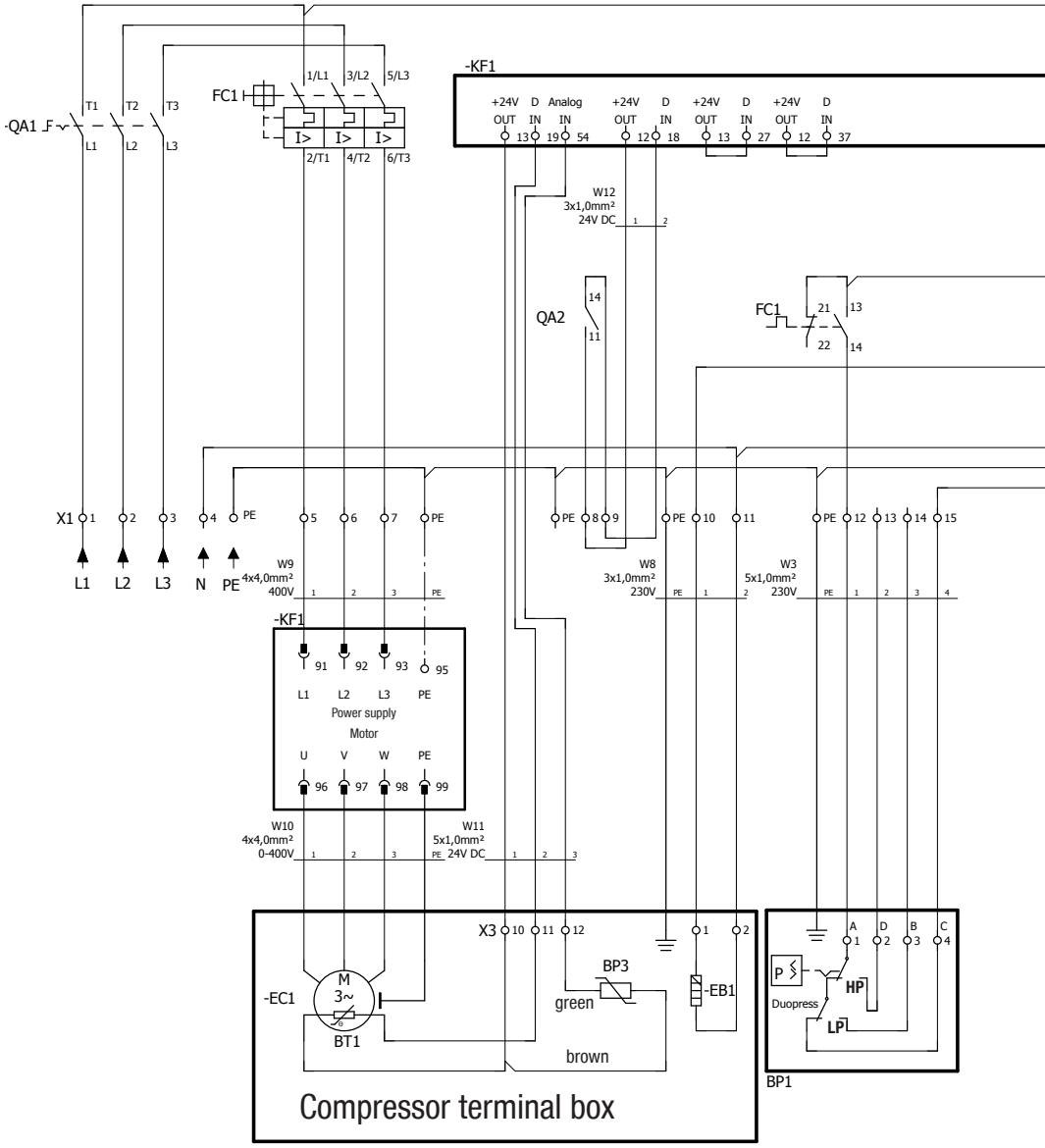
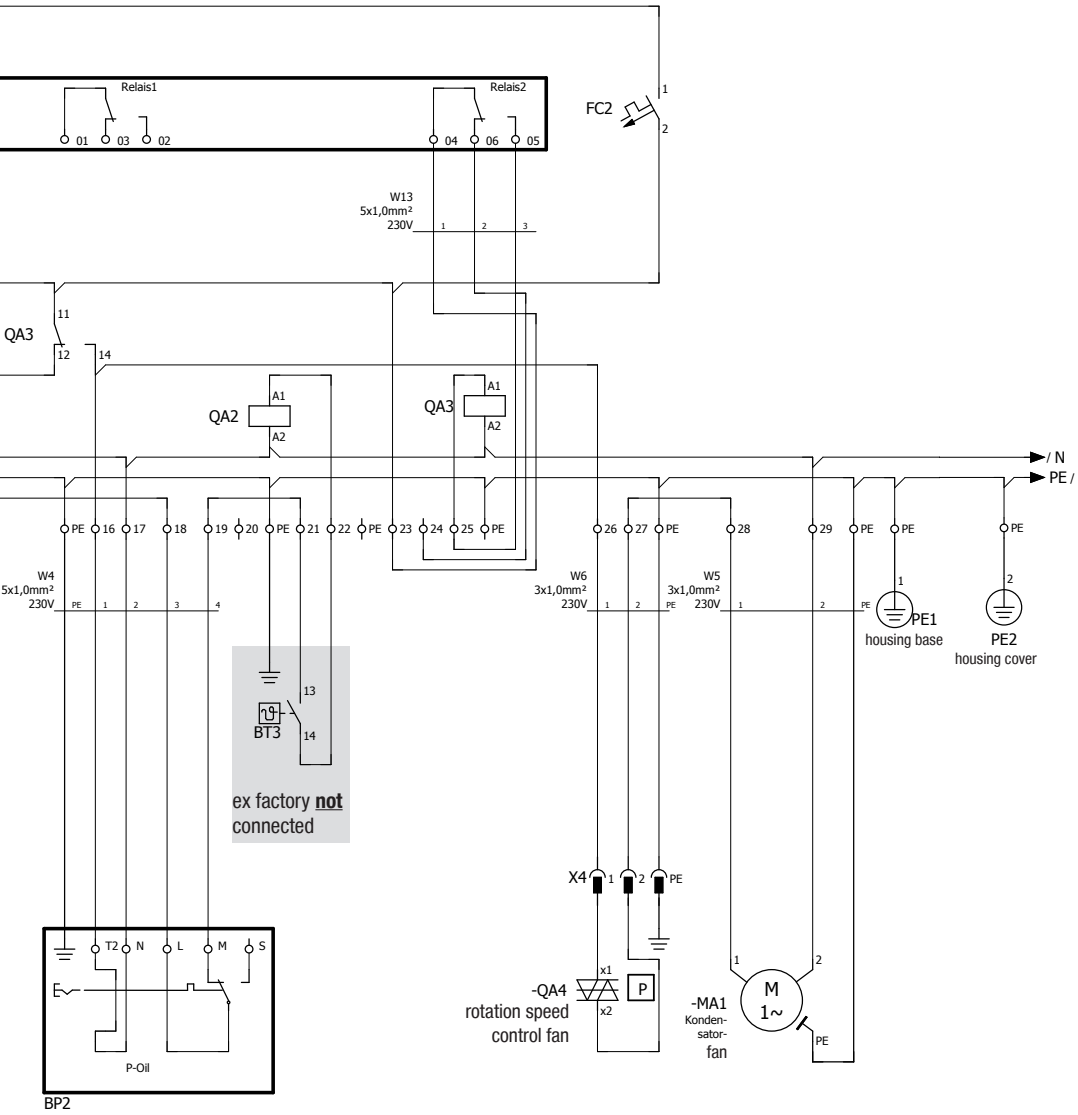


Fig. 10


Relais1
01
03
02
Relais2
04
06
05
FC2
1
2
W13
5x1,0mm²
230V
1
2
3
QA3
11
12
14
QA2
A1
A2
QA3
A1
A2
/ N
PE /
PE
16
17
18
19
20
PE
21
22
PE
23
24
25
PE
26
27
PE
28
29
PE
PE
PE
W4
5x1,0mm²
230V
PE
1
2
3
4
W6
3x1,0mm²
230V
1
2
PE
W5
3x1,0mm²
230V
1
2
PE
1
PE1
housing base
2
PE2
housing cover
13
BT3
14
ex factory **not**
connected
X4
1
2
PE
T2
N
L
M
S
P-Oil
BP2
x1
P
x2
-QA4
rotation speed
control fan
1
2
M
1~
-MA1
Konden-
sator-
fan
PE

5 | Commissioning

5.1 Commissioning Plusbox without EFCe

Commissioning according to the assembly instructions of the compressor.

Check the funtion 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 funtion 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:

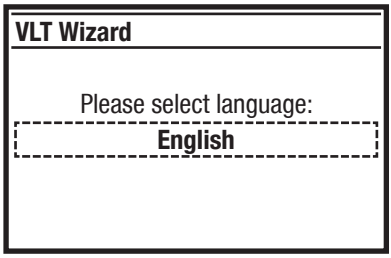
GB

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

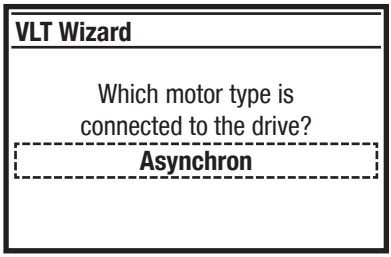
Here take a look what you need to set values and parameters specifically for the Bock Plusbox.

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

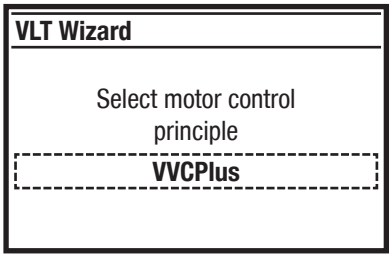
Follow the instructions of the startup wizard. This should appear when you start first. Also, the setup wizard can be launched from the Quick Menu.



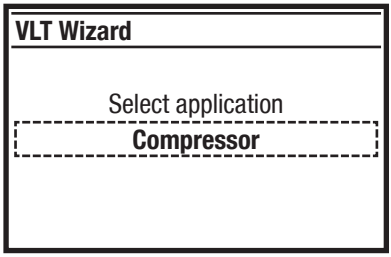
1. Set the desired language.



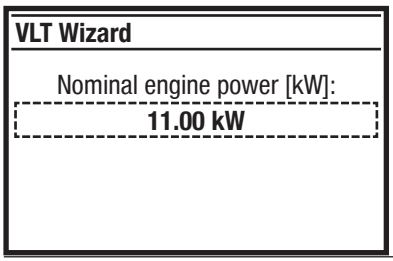
2. Set the motor type, which is connected to the drive.



3. Set the motor control principle.

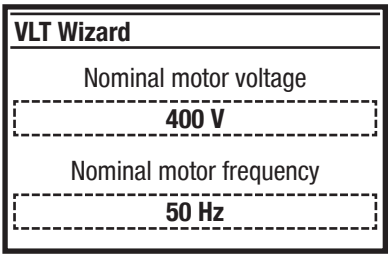


4. Set the desired application.

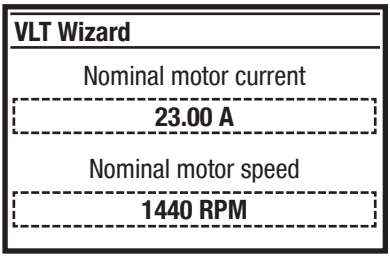


5. Set the nominal engine power.

GB

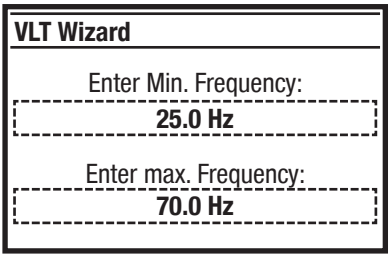


6. Set nominal motor voltage and frequency.

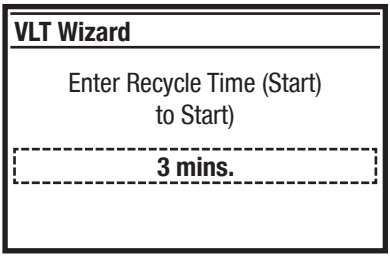


7. Set nominal motor current and speed.

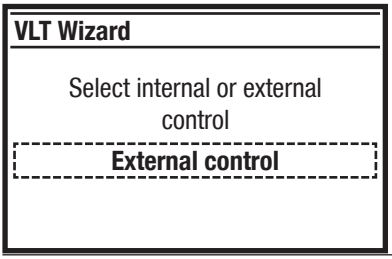
GB



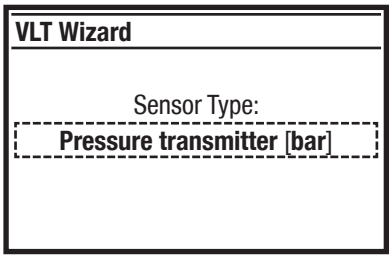
8. Set the desired minimum and maximum frequency. They are between 25 and 70 Hz.



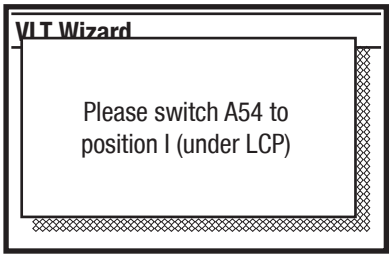
9. Set the desired recycle time. We recommend 3 minutes.



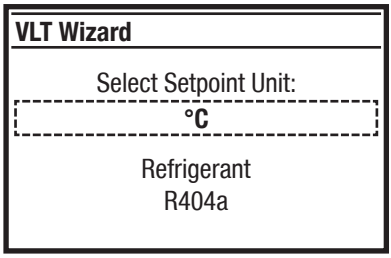
10. This setting depends on the application.
Factory setting: Internal regulation



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

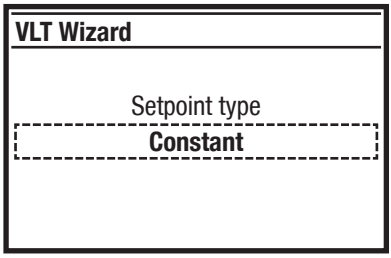


12. Check switch position below the user interface.
    Set A54 to position (I)
    Message is only displayed if switch is not set to I

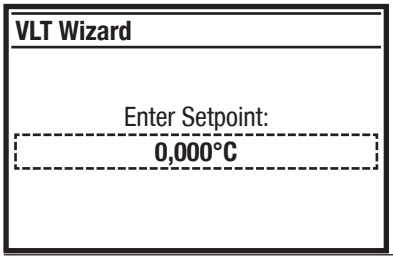


13. Set the setpoint unit, depending on the system.
    Select refrigerant used.

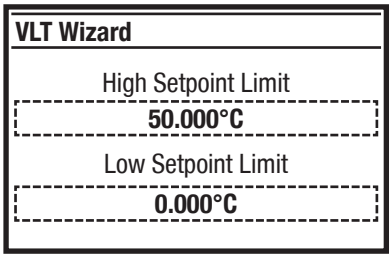
GB



14. Select setpoint type.
    Recommended setting: Constant

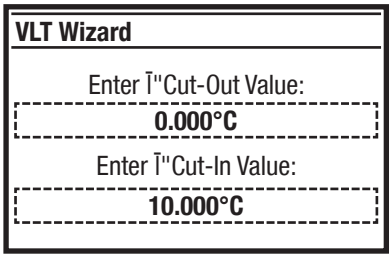


15. Adjust setpoint, depending to the system.



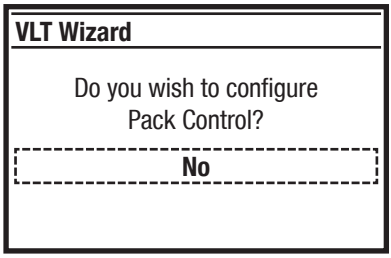
16. This setting depends to the system.
    Set maximum setpoint limit.

    Set minimum setpoint limit.

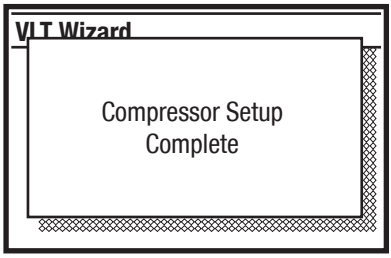


17. This setting depends to the system.
    (Pump-Down frequency converter)
    Set switch-off value

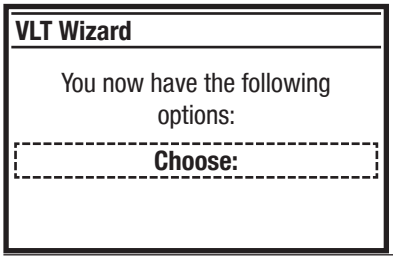
    Set switch-on value



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



19. Compressor setup completed.



20. Switch to main menu.

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

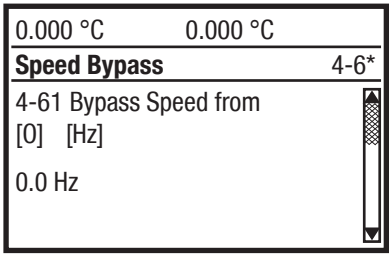
25. Adjusting the digital inputs:
From the main menu:
Set parameter 5-12 to [0] without function.

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.

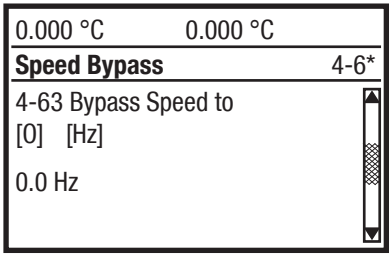
GB



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

From the main menu:

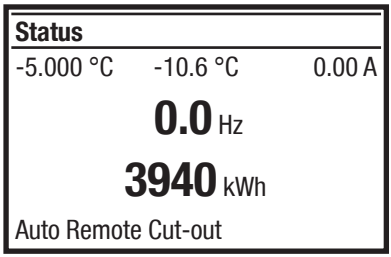
Parameter 4-61 = Bypass speed from...



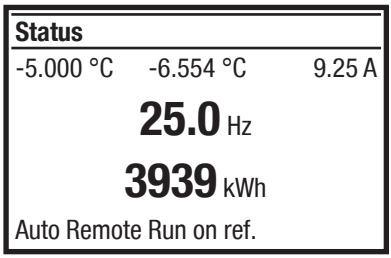
Parameter 4-63 = Bypass speed to...

GB

6.1 Status Messages

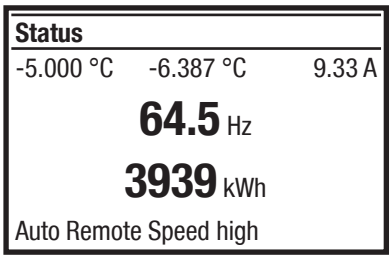


1. Auto Remote Cut-out
LP switch triggered in the inverter (cut out VLT).
If the back-up is below the cut out value.
(Pump - "Down" frequency converter)



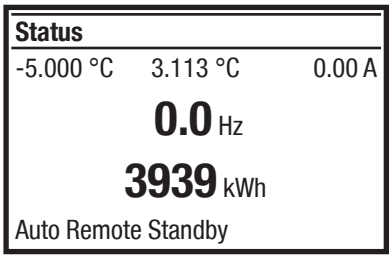
2. Auto Remote Run on ref.
Setpoint value reached.

GB



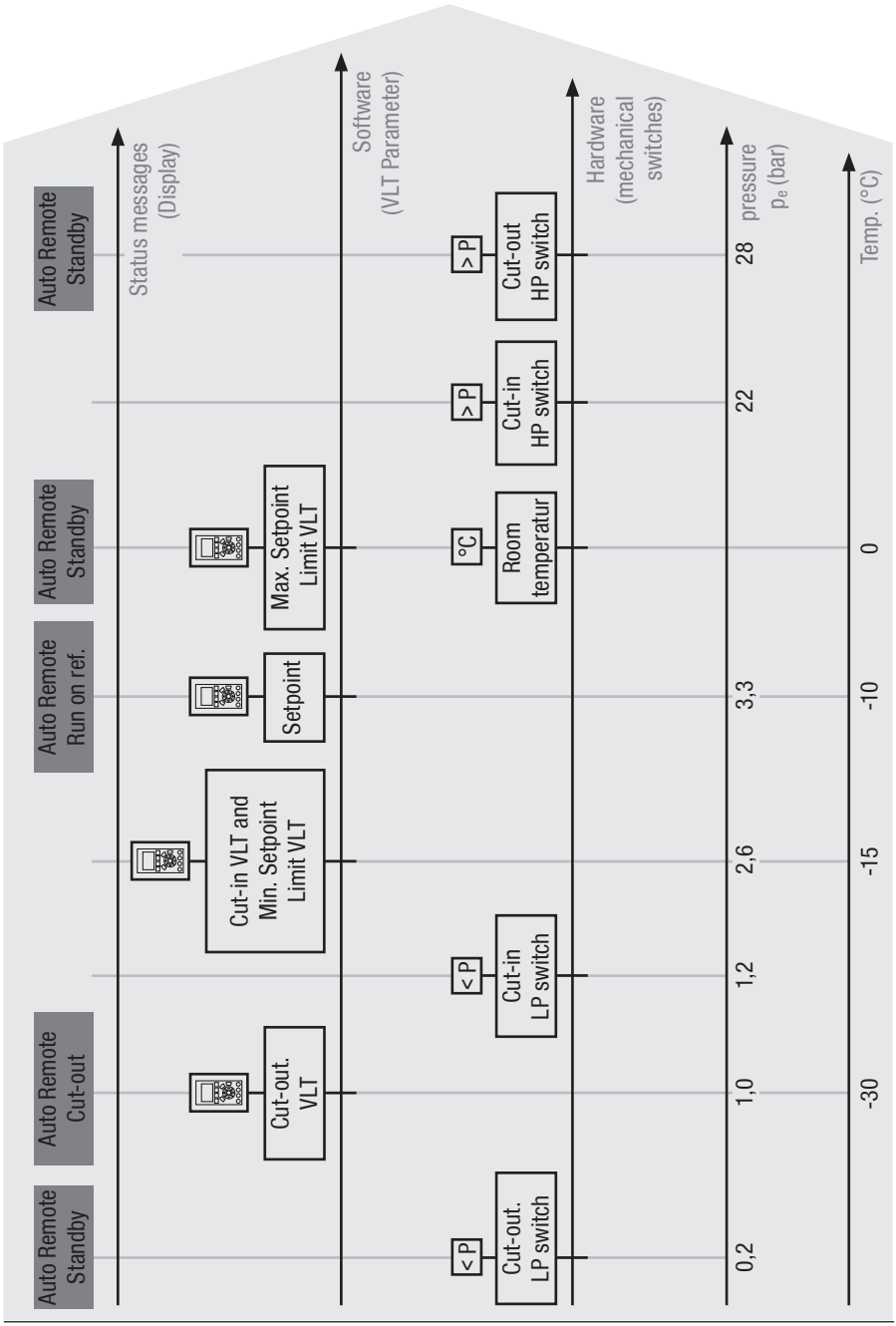
3. Auto Remote Speed high
In conjunction with current limit (W59)
- Imax reached
- Rotation speed of the compressor is not increased

e.g. if suction pressure too high when compressor first commissioned.



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

6.2 Application Example



GB

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.

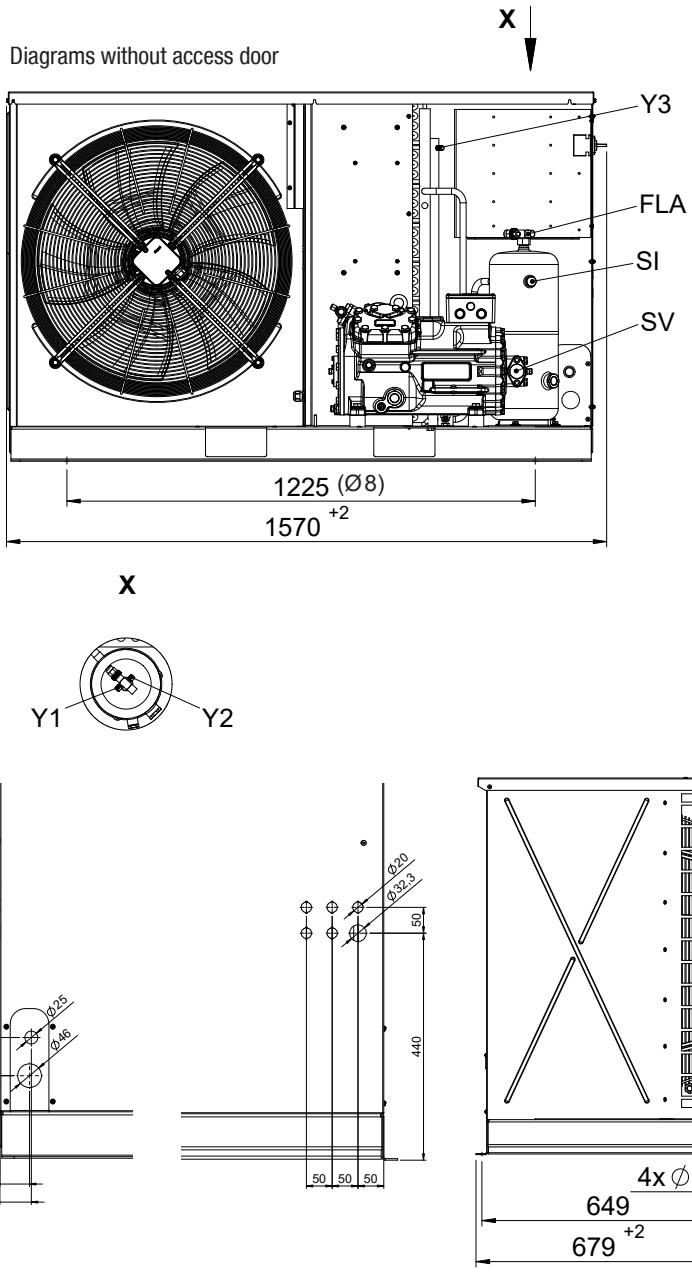
GB

Type SHG	Compressor			Fan / condenser ②			Receiver capacity	Tube diameter		Noise level	Weight
	Displacement 50 Hz (1450 rpm)	Voltage ①	Max. working current	Max. working current 50 Hz	Max. power consumption 50 Hz	Air flow 50 Hz		Liquid line	Suction line	10m	
	m³/h		A	A	W	m³/h	Liters	inch	inch	dBA	kg
			Δ / Y								
34e/215-4 P&P	18,80	220-240 V Δ / 380-420 V Y - 3 - 50 Hz	14,0 / 8,1	2,60	600	7895	8,0	1/2"	1 1/8"	47	196
34e/215-4 S P&P	18,80		18,3 / 10,5	2,60	600	7895	8,0	1/2"	1 1/8"	47	201
34e/255-4 P&P	22,10		17,0 / 9,8	2,60	600	7895	8,0	1/2"	1 1/8"	47	195
34e/255-4 S P&P	22,10		21,1 / 12,2	2,60	600	7895	8,0	1/2"	1 1/8"	47	200
34e/315-4 P&P	27,30		21,1 / 12,2	2,60	600	7895	8,0	1/2"	1 1/8"	47	198
34e/315-4 S P&P	27,30		25,5 / 14,7	2,60	600	7020	10,0	5/8"	1 3/8"	47	207
34e/380-4 P&P	33,10		26,1 / 15,1	2,60	600	7020	10,0	5/8"	1 3/8"	47	203
34e/380-4 S P&P	33,10		31,2 / 18,0	2,60	600	7020	10,0	5/8"	1 3/8"	47	206
44e/475-4 P&P	41,30	③	PW 1+2 / 19,0	2,60	600	7020	10,0	5/8"	1 3/8"	47	334
44e/565-4 P&P	49,20		22,0	2,60	600	7020	10,0	5/8"	1 3/8"	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 Y/YY - 3 - 50 Hz PW



Dimensions in mm

Fig. 11

9 | Dimensions and connections

SHG	Connections ①					
	SV	FLA	SI	Y1	Y2	Y3
Type	mm I inch	mm I 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

ENGINEERING
TOMORROW

Danfoss A/S
Climate Solutions • danfoss.com • +45 7488 2222