



Danfoss BOCK HG4 GEA Semi Hermetic Compressor User Guide

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Danfoss BOCK HG4 GEA Semi Hermetic Compressor



Product Information

The product is a compressor manufactured by BOCK, a company based in Germany.

The specific model numbers include:

- HG4/310-4
- HG4/385-4
- HG4/465-4
- HG4/555-4
- HG4/650-4
- HG4/310-4 S
- HG4/385-4 S
- HG4/465-4 S
- HG4/555-4 S
- HG4/650-4 S
- HGX4/310-4
- HGX4/385-4
- HGX4/465-4
- HGX4/555-4
- HGX4/650-4
- HGX4/310-4 S

- HGX4/385-4 S
- HGX4/465-4 S
- HGX4/555-4 S
- HGX4/650-4 S

About these Instructions

These instructions provide guidelines for the assembly and use of the compressor. It is important to read and understand these instructions to avoid any misunderstandings and prevent damage. Improper assembly and use can result in serious or fatal injury. The safety instructions provided in these instructions must be followed. These instructions should be passed on to the end customer along with the compressor unit.

Contents The manual covers various topics including safety instructions, product description, areas of application, compressor assembly, electrical connection, commissioning, maintenance, technical data, dimensions and connections, and declaration of incorporation.

Safety Identification of Safety Instructions The safety instructions are categorized as follows:

- **DANGER!** – Indicates a dangerous situation that can cause immediate fatal or serious injury.
- **WARNING!** – Indicates a dangerous situation that can cause fatal or serious injury.
- **CAUTION!** – Indicates a dangerous situation that can cause fairly severe or minor injury.
- **ATTENTION!** – Indicates a situation that can cause property damage.
- **INFO!** – Provides important information or tips on simplifying work.

Qualifications Required of Personnel

- Work on compressors should only be performed by personnel with the following qualifications:
- Qualified refrigeration technician
- Qualified electrician
- Qualified mechanics engineer

Product Usage Instructions

Safety

Follow the safety instructions provided in the manual to ensure safe operation and prevent any accidents or injuries.

Product Description

The manual provides a short description of the product, including its nameplate and type key. Familiarize yourself with these details to understand the product better.

Areas of Application

Understand the recommended refrigerants, oil changes, and limits of application for the compressor. Ensure you use the correct materials and follow the guidelines provided.

Compressor Assembly

Follow the instructions for storage, transport, setting up, pipe connections, laying suction and pressure lines,

operating the shut-off valves, and operating mode of the lockable service connections.

Electrical Connection

Refer to the provided information for contactor and motor contactor selection. Follow the appropriate circuit diagrams for different motor types and understand the connection process. If applicable, connect the trigger unit MP 10 and perform a functional test. Additionally, connect the oil sump heater if it is included as an accessory.

Commissioning

Before starting up the compressor, make necessary preparations such as a pressure strength test, leak test, evacuation, and refrigerant charge. Follow the start-up procedure and ensure you avoid slugging. Connect the oil level regulator if required.

Maintenance

Prepare for maintenance work and follow the recommended procedures. Make use of recommended spare parts and accessories. Use the specified lubricants or oil for proper functioning. When decommissioning, follow the instructions provided.

Technical Data

Refer to the technical data section for detailed specifications and information about the compressor.

Dimensions and Connections

Find the dimensions and connection details of the compressor in this section. Use this information for installation purposes.

Declaration of Incorporation





Review the declaration of incorporation for any additional information or requirements related to the use of the compressor.

About these instructions


- Read these instructions before assembly and before using the compressor.
- This will avoid misunderstandings and prevent damage.
- Improper assembly and use of the compressor can result in serious or fatal injury.
- Observe the safety instructions contained in these instructions.
- These instructions must be passed onto the end customer along with the unit in which the compressor is installed.

Safety


Identification of safety instructions:

	DANGER! Indicates a dangerous situation which, if not avoided, will cause immediate fatal or serious injury.
	Indicates a dangerous situation which, if not avoided, may cause fatal or serious injury. WARNING!
	Indicates a dangerous situation which, if not avoided, may cause fairly severe or minor injury. CAUTION!
	ATTENTION! Indicates a situation which, if not avoided, may cause property damage.
	INFO! Important information or tips on simplifying work.

Qualifications required of personnel

	<p>WARNING! Inadequately qualified personnel poses the risk of accidents, the consequence being serious or fatal injury. Work on compressors must therefore only be performed by personnel with the qualifications listed below:</p> <ul style="list-style-type: none"> • For example, a refrigeration technician, or refrigeration mechatronics engineer. As well as professions with comparable training, which enable 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 recognizing any potential dangers.
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General safety instructions

	<p>WARNING! • Refrigerating compressors are pressurized machines and therefore require particular caution and care in handling.</p> <ul style="list-style-type: none"> • Risk of burns! Depending on the operating conditions, surface temperatures of over 60 °C on the pressure side or below 0 °C on the suction side can be reached. • The maximum permissible overpressure must not be exceeded, even for testing purposes.

Intended use

These assembly instructions describe the standard version of the HG4 manufactured by Bock. The compressor is intended for use in refrigeration systems in compliance with the limits of application. Only the refrigerant specified in these instructions may be used.

Any other use of the compressor is prohibited!

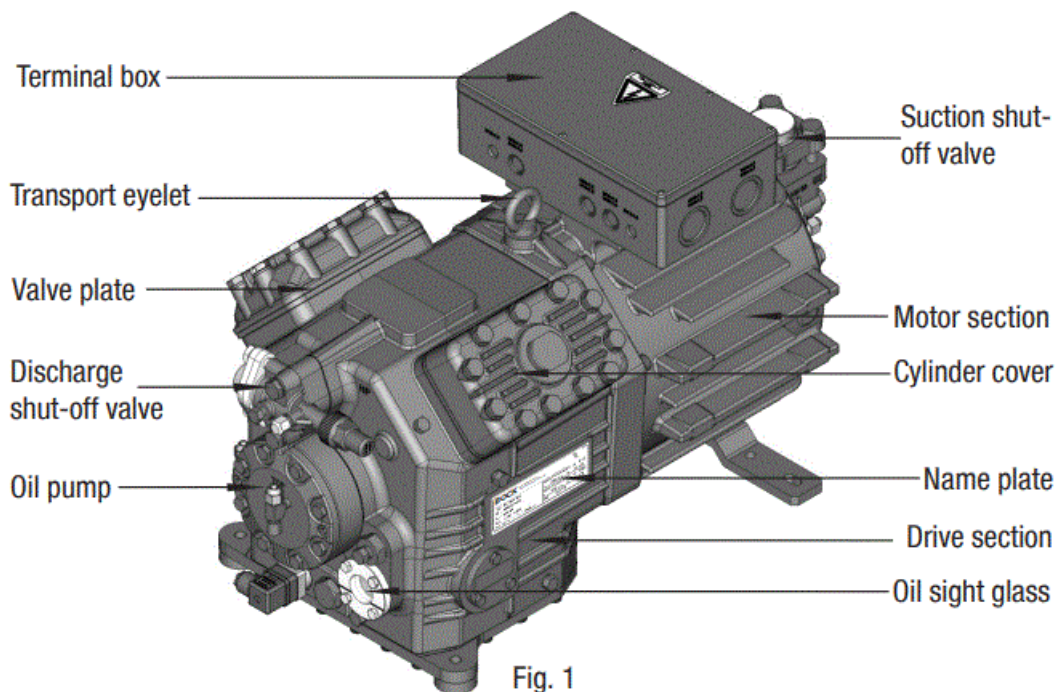
- **WARNING!** The compressor may not be used in potentially explosive environments!
- The Bock refrigerating compressor named in the title is intended for installing in a machine (within the EU according to the EU Directives 2006/42/EC Machinery Directive and 2014/68/EU Pressure Equipment Directive).

Commissioning is only permissible if the compressor 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.

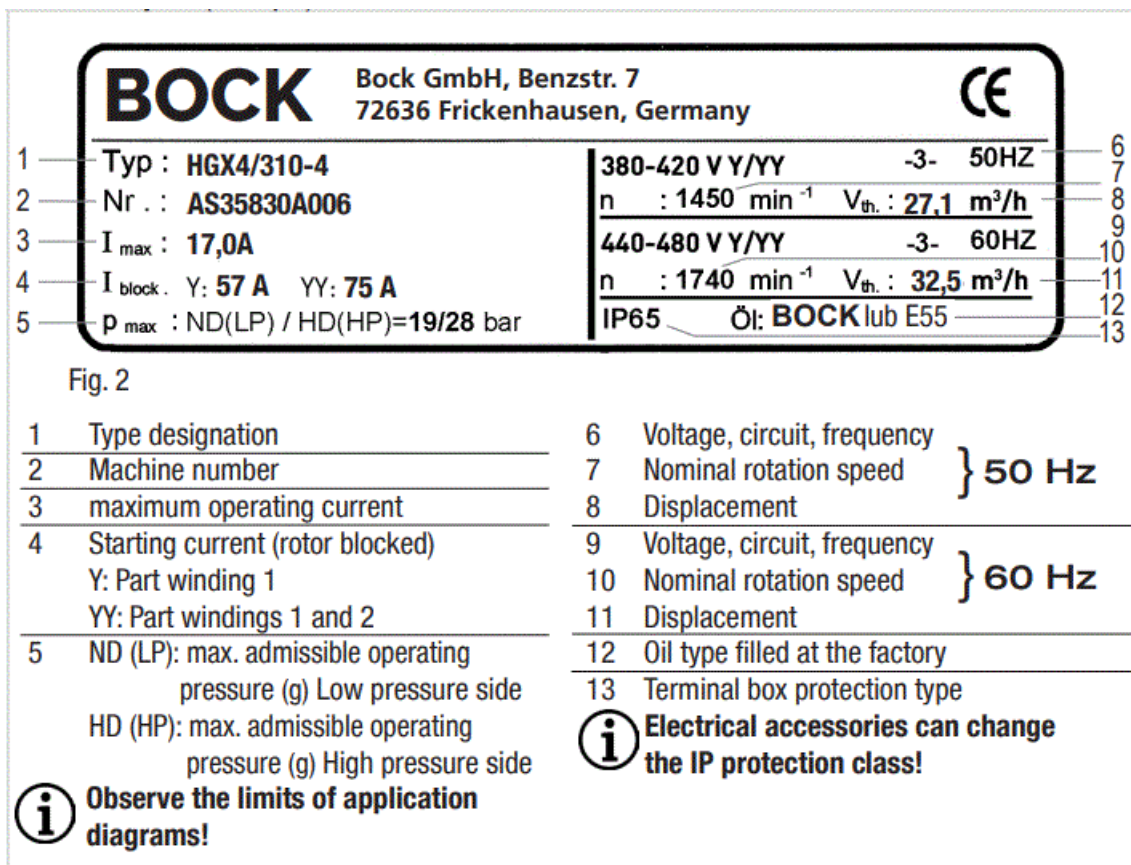
Product description

Short description

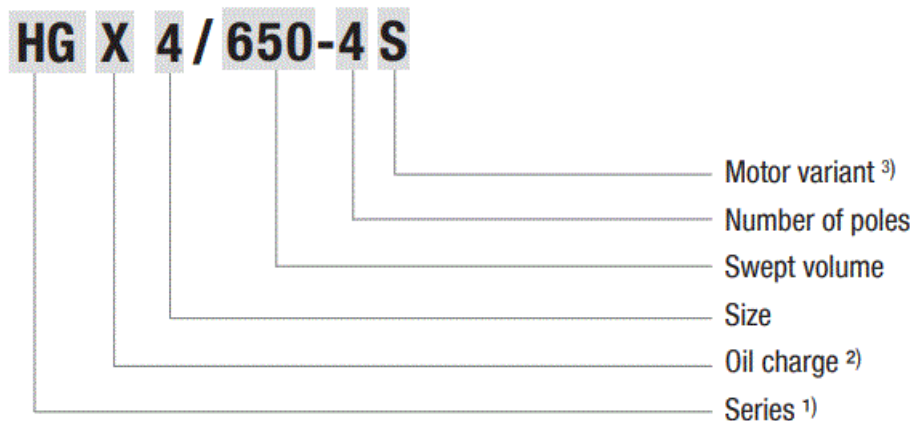
- Semi-hermetic four-cylinder reciprocating compressor with suction-gas cooled drive motor.
- Flange-mounted drive motor on the compressor case.
- Preferred application range: normal refrigerating and air-conditioning.



Name plate(example)



Type key(example)



1. HG – Hermetic Gas-cooled (suction gas-cooled)
2. X – Ester oil charge (HFC refrigerant, e.g. R134a, R404A/R507, R407C)
3. S – More powerful motor, e.g. for air-conditioning applications

Areas of application

Refrigerants

- HFKW / HFC: R134a, R404A/R507, R407C
- (H)FCKW / (H)CFC: R22

Oil charge

- The compressors are filled at the factory with the following oil type:

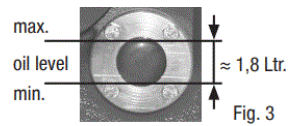
- for R134a, R404A/R507, R407C BOCK lub E55
- for R22 BOCK lub A46
- Compressors with ester oil charge (BOCK lub E55) are marked with an X in the type designation (e.g. HGX4/650-4).

INFO! For refilling, we recommend the above oil types.

Alternatives: see chapter 7.4

ATTENTION!

The oil level must be in the visible part of the sight glass; damage to the compressor is possible if over-filled or underfilled!



Limits of application

- **ATTENTION!** Compressor operation is possible within the operating limits.
- These can be found in Bock compressor selection tool (VAP) under vap.bock.de. Observe the information given there.
- Permissible ambient temperature (-20°C) – (+60°C)
- Max. permissible discharge end temperature 140 °C
- Max. permissible switching frequency 12x /h.
- A minimum running time of 3 min. steady-state condition (continuous operation) must be achieved.
- For operation with supplementary cooling:
- Use only oils with high thermal stability.
- Avoid continuous operation near the threshold.
- For operation with capacity regulator:
- Continuous operation, when the capacity regulator is activated, is not permissible and can cause damage to the compressor.
- The suction gas superheat temperature may need to be reduced or set individually when operating near to the threshold.
- When the capacity regulator is activated, the gas velocity in the system can not under certain circumstances ensure that sufficient oil is transported back to the compressor.
- For operation with frequency converter:
- The maximum current and power consumption must not be exceeded. In the case of operation above the mains frequency, the application limit can therefore be limited.
- When operating in the vacuum range, there is a danger of air entering on the suction side. This can cause chemical reactions, a pressure rise in the condenser and an elevated compressed-gas temperature. Prevent the ingress of air at all costs!

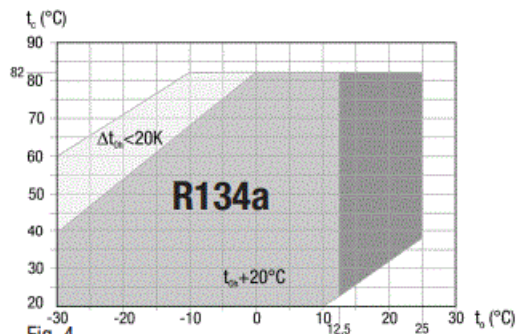


Fig. 4

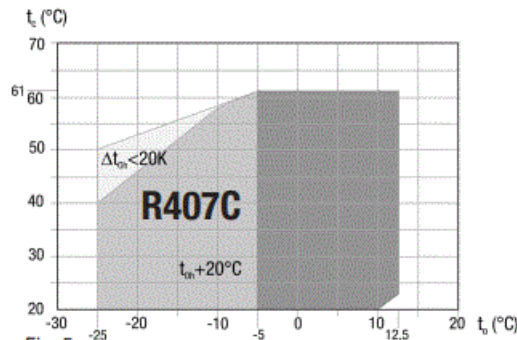


Fig. 5

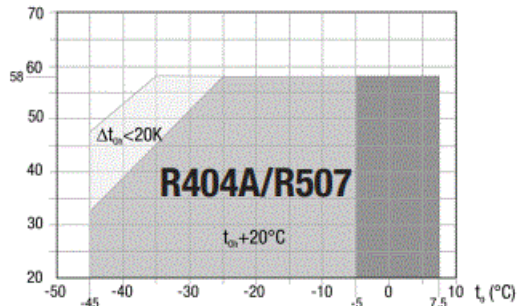


Fig. 6

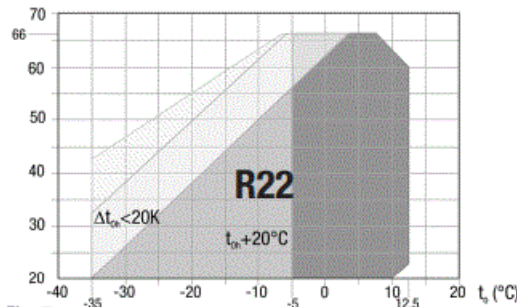
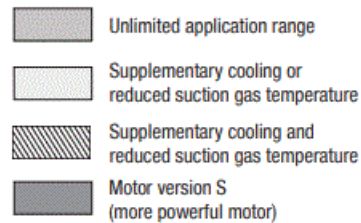


Fig. 7



t_o Evaporation temperature (°C)

t_c Condensing temperature (°C)

Δt_{oh} Suction gas superheat (K)

t_{oh} Suction gas temperature (°C)

Max. permissible operating pressure (LP/HP)¹⁾: 19/28 bar

¹⁾ LP = Low pressure

HP = High pressure

Design for other areas on request

Compressor 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.
- Check the compressor for transport damage before starting any work.

Storage and transport

- Storage at (-30°C) – (+70°C), maximum permissible relative humidity 10% – 95%, no condensation
- Do not store in a corrosive, dusty, vaporous atmosphere or in a combustible environment.
- Use transport eyelet.
- Do not lift manually!

- Use lifting gear!

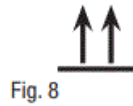


Fig. 8



Fig. 9

Setting up

- **ATTENTION!** Attachments (e.g. pipe holders, additional units, fastening parts, etc.) directly to the compressor are not permissible!
- Provide adequate clearance for maintenance work.
- Ensure adequate compressor ventilation.
- Do not use in a corrosive, dusty, damp atmosphere or a combustible environment.
- Setup on an even surface or frame with sufficient load-bearing capacity.
- Single compressor preferably on vibration damper.
- Duplex and parallel circuits always rigid.

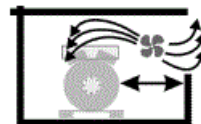


Fig. 10



Fig. 11

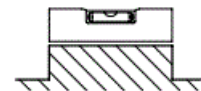


Fig. 12

Pipe connections

- **ATTENTION!** Superheating can damage the valve.
- Remove the pipe supports from the valve for soldering.
- Only solder using inert gas to inhibit oxidation products (scale).
- The pipe connections have graduated inside diameters so that pipes with standard millimetre and inch dimensions can be used.
- The connection diameters of the shut-off valves are rated for maximum compressor output. The actual required pipe cross section must be matched to the output. The same applies for non-return valves.

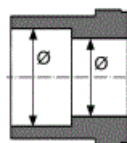


Fig. 13: graduated internal diameter

Pipes

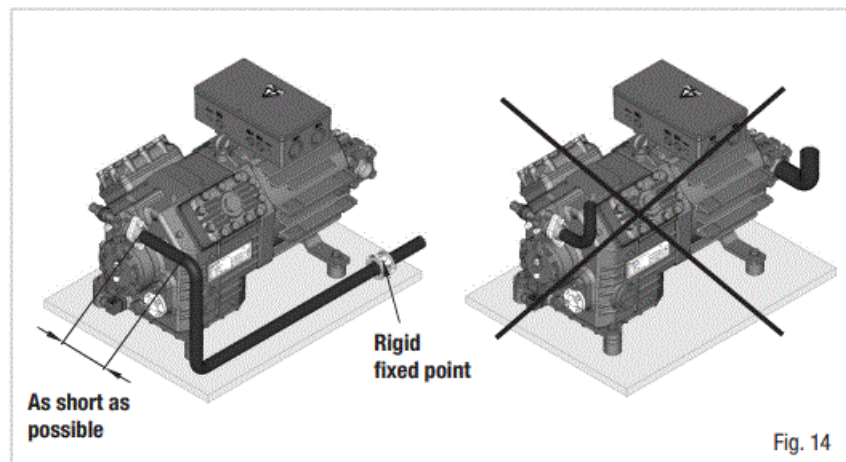
- Pipes and system components must be clean and dry inside and free of scale, swarf and layers of rust and phosphate. Only use air-tight parts.
- Lay pipes correctly. Suitable vibration compensators must be provided to prevent pipes being cracked and broken by severe vibrations.
- Ensure a proper oil return.
- Keep pressure losses to an absolute minimum.

Laying suction and pressure lines

- **INFO!** Proper layout of the suction and pressure lines directly after the compressor is integral to the smooth running and vibration behaviour of the system.
- **ATTENTION!** Improperly installed pipes can cause cracks and tears which can result in a loss of refrigerant,

A rule of thumb:

- Always lay the first pipe section starting from the shut-off valve downwards and parallel to the drive shaft.



Operating the shut-off valves

- Before opening or closing the shut-off valve, release the valve spindle seal by approx. $\frac{1}{4}$ of a turn counter-clockwise.
- After activating the shut-off valve, re-tighten the adjustable valve spindle seal clockwise.

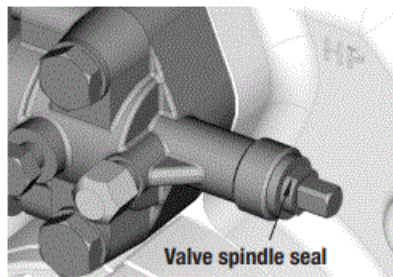


Fig. 15

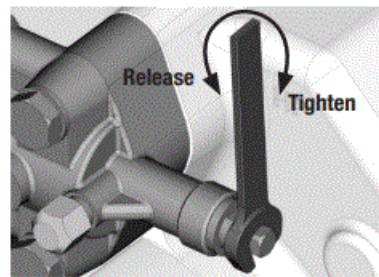


Fig. 16

4.7 Operating mode of the lockable service connections

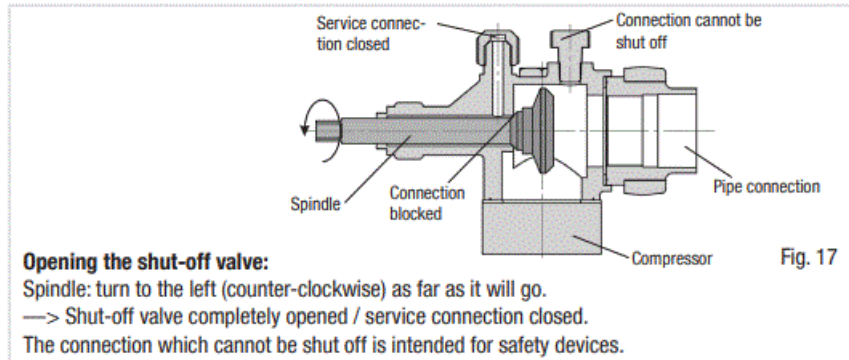


Fig. 17

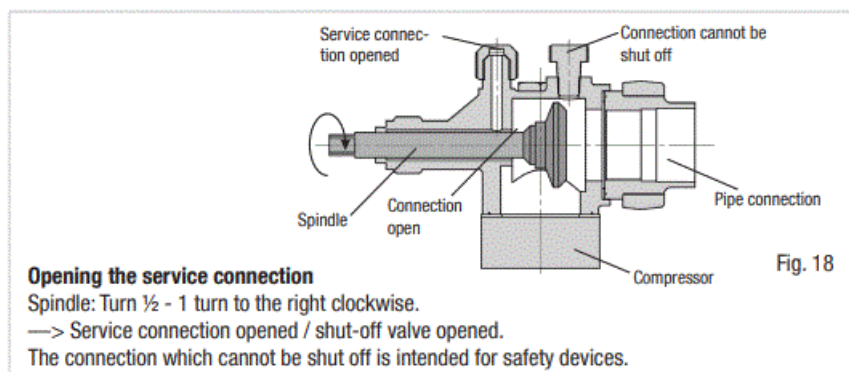


Fig. 18

- After activating the spindle, generally fit the spindle protection cap again and tighten with 14-16 Nm. This serves as a second sealing feature during operation.



Electrical connection

	<p>DANGER! High voltage! Risk of electric shock! Only carry out work when the electrical system is disconnected from the power supply!</p>
	<p>ATTENTION! When attaching accessories with an electrical cable, a minimum bending radius of 3 x the cable diameter must be maintained for laying the cable.</p>
	<p>INFO! Connect the compressor motor in accordance with the circuit diagram (see inside of terminal box).</p> <p>Use suitable cable entry point of the correct protection type (see name plate) for routing cables in to the terminal box. Insert the strain reliefs and prevent chafe marks on the cables. Compare the voltage and frequency values with the data for the mains power supply.</p> <p>Only connect the motor if these values are the same.</p>

Information for contactor and motor contactor selection

- All protection devices and switching or monitoring units must be fitted in accordance with the local safety regulations and established specifications (e.g. VDE) as well as with the manufacturer's information. Motor protection switches are required! Motor contactors, feed lines, fuses and motor protection switches must be rated on the basis of the maximum working current (see name plate). For motor protection use a current-dependent and time-delayed overload protection device for monitoring all three phases. Set the overload protection device so that it must be actuated within 2 hours, if there is 1.2 times the max. working current.

Standard motor, design for direct or part winding start

Designation on the name plate	Sticker on the terminal box
	

Compressors with this marking are suitable for direct or partial winding start. The motor winding is subdivided into two parts: Partial winding 1 = 66% and part winding 2 = 33%. This winding division reduces the start-up current needed for a part winding start to approx. 65% of that for a direct start.

INFO! A mechanical unloaded start with bypass solenoid valve is not required.

Basic circuit diagram for part winding start with standard motor

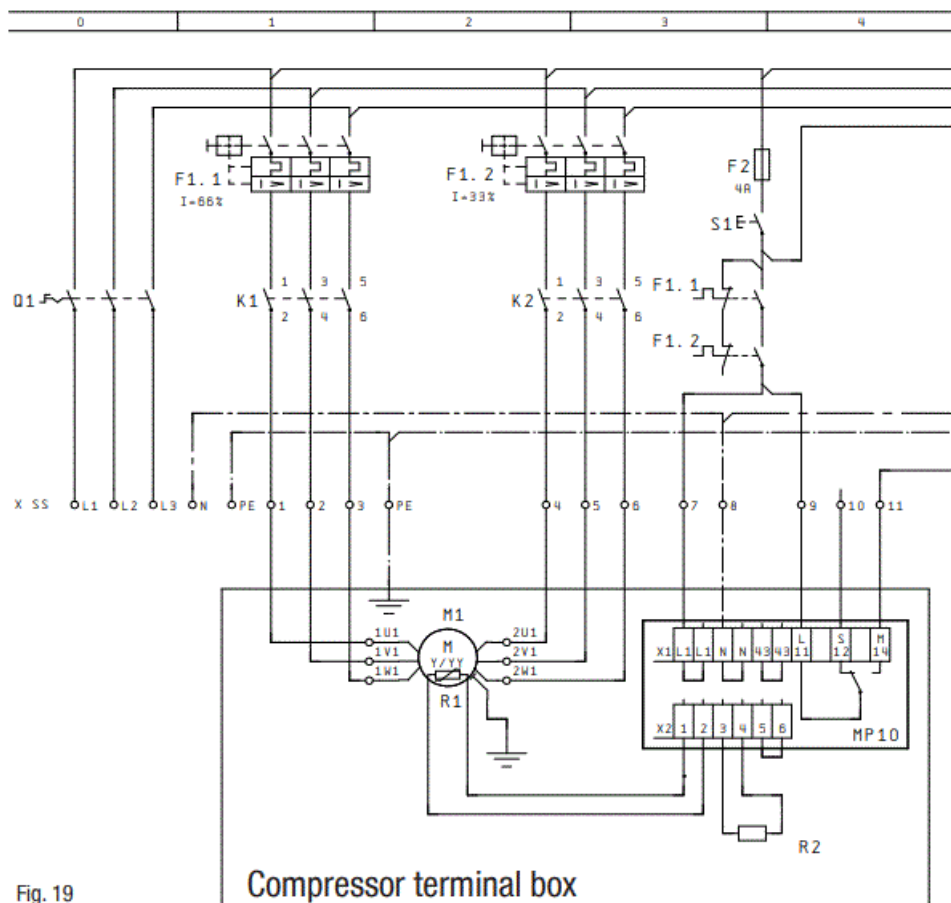
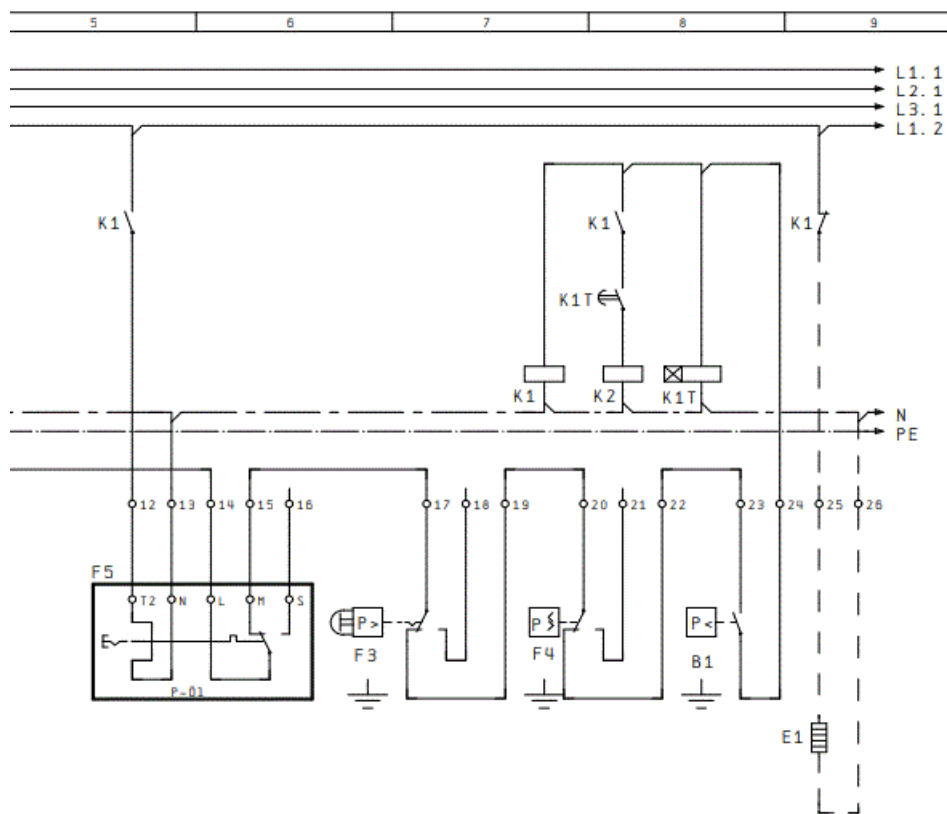


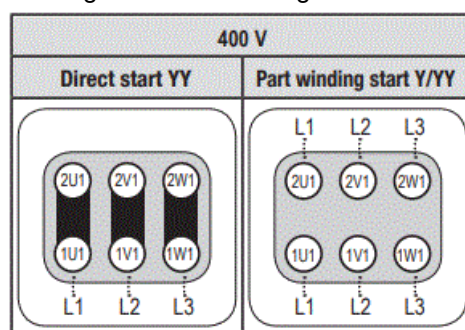
Fig. 19

R1	Cold conductor (PTC sensor) motor winding
R2	Thermal protection thermostat (PTC sensor)
F1.1 /1.2	2 motor protection switches (66% / 33% of I A total)
F2	Control power circuit fuse
F3	High pressure safety monitor
F4	Safety chain (high/low pressure monitoring)
F5	Oil differential pressure monitor
B1	Release switch (thermostat)



Q1	Main switch
M1	Compressor motor
K1	Mains contactor (part winding 1)
K2	Mains contactor (part winding 2)
K1T	Delay relay max. 1s
S1	Control voltage switch
E1	Oil sump heater


The motor is wired for direct start (YY) at the factory. For part winding start Y / YY, the bridges must be removed and the motor feed line connected according to the circuit diagram:



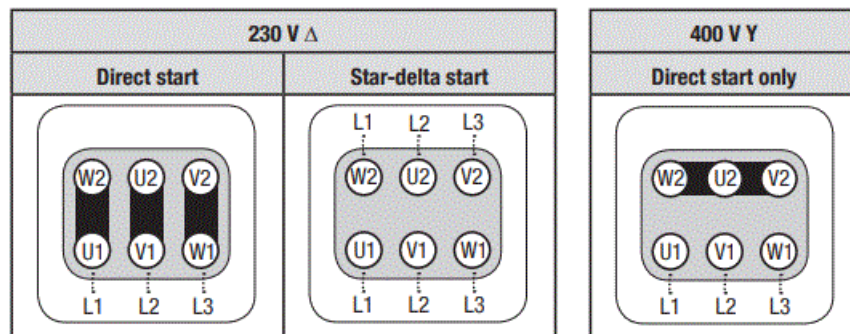
ATTENTION! Failure to do this results in opposed rotary fields and results in damage to the motor. After the motor starts up via partial winding 1, partial winding 2 must be switched on after a maximum delay of one second . Failure to comply can adversely affect the service life of the motor.

Special motor: design for direct or star-delta start

A mechanical unloaded start with bypass solenoid valve (accessories) is required for the star-delta start.

Designation on the name plate	Sticker on the terminal box
Δ / Y	 Motor Δ / Y

Star-delta start-up is only possible for 230 V power supply. Example:



Basic circuit diagram for star-delta start with special motor

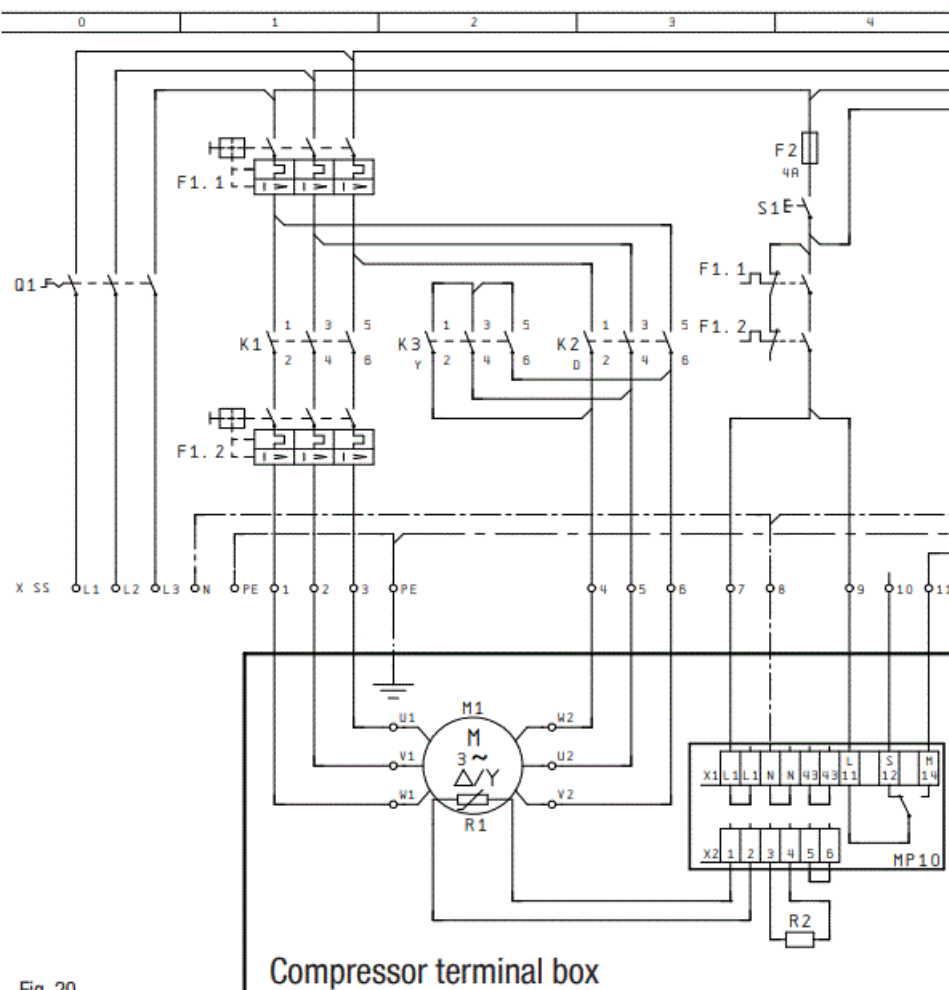
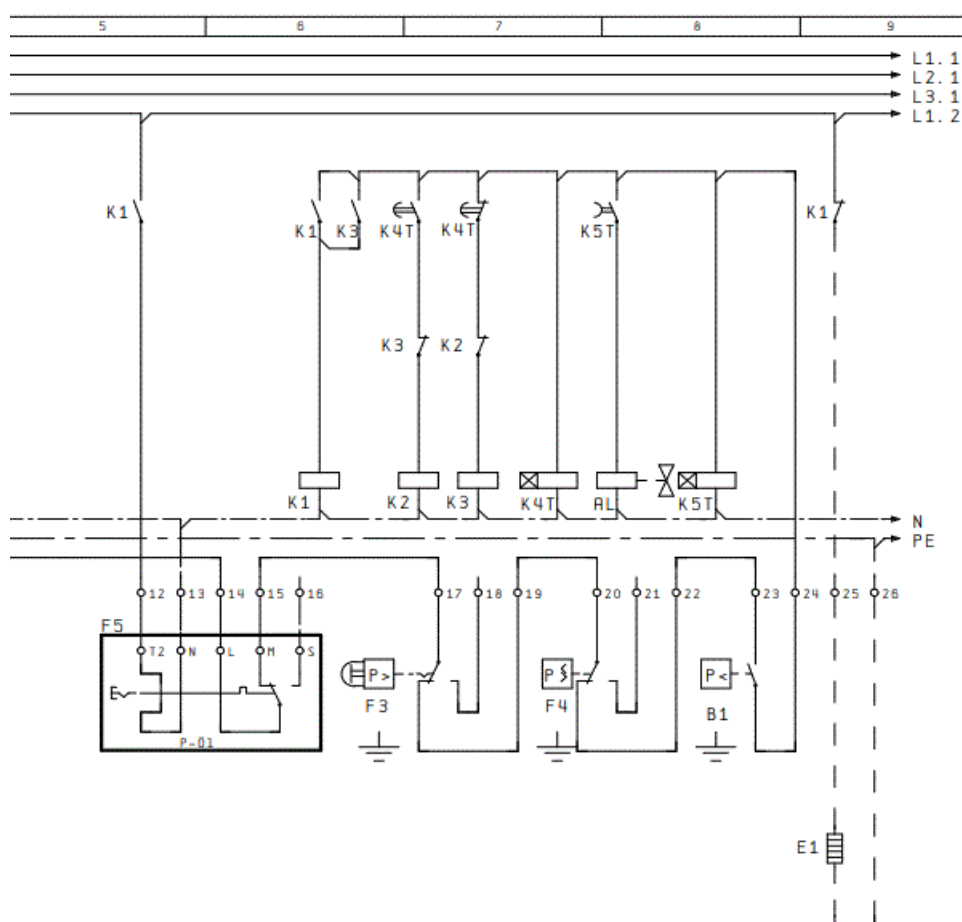


Fig. 20

R1	Cold conductor (PTC sensor) motor winding
R2	Thermal protection thermostat (PTC sensor)
F1.1 /1.2	2 motor protection switches
F2	Control power circuit fuse
F3	High pressure safety monitor
F4	Safety chain (high/low pressure monitoring)
F5	Oil differential pressure monitor
B1	Enabling switch (thermostat)
Q1	Main switch



M1	Compressor motor
K1	Mains contactor
K2	D-contactor
K3	Y-contactor
K4T	Delay relay for contactor changeover
K5T	Delay relay for start unloader
S1	Control voltage switch
AL	Start unloader
E1	Oil sump heater

Electronic trigger unit MP 10

- The compressor motor is fitted with cold conductor temperature sensors (PTC) connected to the electronic trigger unit MP 10 in the terminal box. Readiness to operate is signalled by the H3 LED (green) after the power supply is applied. In the case of excess temperature in the motor winding, the unit switches off the compressor and the H1 LED lights red.
- The hot gas side of the compressor can also be protected against overtemperature using a thermal protection thermostat (accessory). The H2 LED (red) is provided for the protection function.
- The unit trips when an overload or inadmissible operating conditions occur. Find and remedy the cause.
- The unit has a restart prevention device. After you have rectified the fault, either interrupt the mains voltage. This unlocks the restart pre-vention device and the LEDs H1 and H2 go out.

Connection of the trigger unit MP10

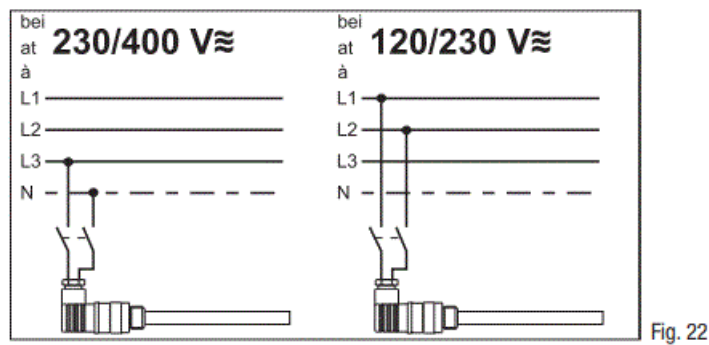
- Connect the trigger unit MP10 in accordance with the circuit dia-gram. Protect the trigger unit with a delayed-action fuse (F) of max. 4 A. In order to guarantee the protection function, install the trigger unit as the first element in the control power circuit.

Temperature monitoring connections:

- **Motor winding:** Terminals 1 – 2
- **Thermal protection thermostat:** Terminals 3 – 4
- **Restart prevention:** Terminals 5 – 6

ATTENTION!

- Terminals 1 – 6 on the trigger unit MP 10 and terminals PTC 1 and PTC 2 on the compressor terminal board must not come into contact with mains voltage. This would destroy the trigger unit and PTC sensors.
- The supply voltage at L1-N (+/- for DC 24 V version) must be identical to the voltage at terminals 11, 12, 14 and 43.

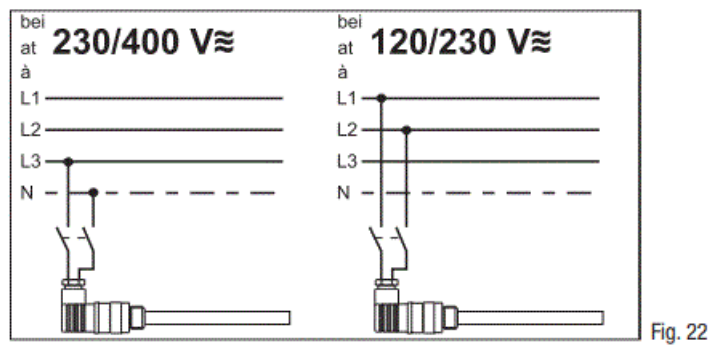


Function test of the trigger unit MP 10

- Before start-up, troubleshooting or making changes to the control power circuit, check the functionality of the trigger unit:

Pos	Procedure	LED H1	LED H2	LED H3
		red	red	green
1	• Interrupt power supply (L1 or S1)	OFF	OFF	OFF
	• Release the motor temperature sensor connection (1 or 2)			
	• Release the hot gas temperature sensor (if installed) (3 or 4)			
2	• Restore the power supply (L1 or S1)	ON	ON	ON
	• Function check of motor temperature sensor: operational			
	• Function check of hot gas temperature sensor: operational			
3	• Interrupt power supply again (L1 or S1)	OFF	OFF	OFF
	• Reconnect terminals 1 or 2 and/or 3 or 4			
4	• Restore the power supply (L1 or S1):	OFF	OFF	ON
	• MP 10 is operational again			

- The compressor and the trigger unit MP10 are operational when the H3 LED (green) lights.
- During compressor standstill and depending on the pressure and ambient temperature, refrigerant diffuses into the compressor's lubricating oil. This reduces the oil's lubricating ability. When the compressor is started, the refrigerant contained in the oil evaporates due to the decline in pressure. This can result in oil foaming and oil exodus which can result in oil hammer in certain circumstances.
- Operation mode:** The oil sump heater operates when the compressor is shut down.
- The oil sump heater is switched off when the compressor starts.
- Connection:** Connect the oil sump heater via an auxiliary contact (or parallel-wired auxiliary contactor)
- Electrical data:** 230 V – 1 – 50/60 Hz, 80



- **ATTENTION!** Connection to the current path of the safety control chain is not permitted

Commissioning

Preparations for start-up

- In order to protect the compressor against inadmissible operating conditions, high-pressure and low-pressure pressostats controls are mandatory on the installation side.
- The compressor has undergone trials in the factory and all functions have been tested. There are therefore no special running-in instructions.
- Check the compressor for transport damage!

Pressure strength test

- The compressor has been tested in the factory for pressure integrity. If however the entire system is to be subjected to a pressure integrity test, this should be carried out in accordance with EN 378-2 or a corresponding safety standard without the inclusion of the compressor.

Leak test

- **DANGER!** Risk of bursting!
- The compressor must only be pressurised using nitrogen (N₂). Never pressurise with oxygen or other gases!
- The maximum permissible overpressure of the compressor must not be exceeded at any time during the testing process (see name plate data)! Do not mix any refrigerant with the nitrogen as this could cause the ignition limit to shift into the critical range.
- Carry out the leak test on the refrigerating plant in accordance with EN 378-2 or a corresponding safety standard, while always observing the maximum permissible overpressure for the compressor.

Evacuation

- **ATTENTION!** Do not start the compressor if it is under vacuum. Do not apply any voltage – even for test purposes (must only be operated with refrigerant).
- Under vacuum, the spark-over and creepage current distances of the terminal board connection bolts shorten; this can result in winding and terminal board damage.
- First evacuate the system and then include the compressor in the evacuation process. Relieve the compressor pressure.
- Open the suction and pressure line shut-off valves.

- Evacuate the suction and discharge pressure sides using the vacuum pump.
- At the end of the evacuation process, the vacuum should be < 1.5 mbar when the pump is switched off. Repeat this process as often as is required.

Refrigerant charge

- **CAUTION!** Wear personal protective clothing such as goggles and protective gloves!
- Make sure that the suction and pressure line shut-off valves are open.
- With the compressor switched off, add the liquid refrigerant directly to the condenser or receiver, breaking the vacuum.
- If the refrigerant needs topping up after starting the compressor, it can be topped up in vapour form on the suction side, or, taking suitable precautions, also in liquid form at the inlet to the evaporator.

INFO!

- Avoid overfilling the system with refrigerant!
- In order to prevent shifts in concentration, zeotropic refrigerant blends (e.g. R407C) must always only be added to the refrigerating system in liquid form.
- Do not pour liquid refrigerant through the suction line shut-off valve on the compressor.
- It is not permissible to mix additives with the oil and refrigerant.

Start-up

- **WARNING!** Ensure that both shut-off valves are open before starting the compressor!
- Check that the safety and protection devices (pressure switch, motor protection, electrical contact protection measures, etc.) are functioning properly.
- Switch on the compressor and let it run for at least 10 minutes.
- **Check the oil level** : The oil must be visible in the sight glass.
- **ATTENTION!** If larger quantities of oil have to be topped up, there is a risk of oil impact effects. If this is the case, check the oil return!

Avoid slugging

- **ATTENTION!** Slugging can result in damage to the compressor and cause refrigerant to leak.

To prevent slugging:

- The complete refrigeration plant must be properly designed.
- All components must be compatibly rated with each other with regard to output (particularly the evaporator and expansion valves).
- Suction gas superheating at the compressor input should be min. $7 - 10$ K (check the setting of the expansion valve).
- The system must reach a state of equilibrium.
- Particularly in critical systems (e.g. several evaporator points), measures such as the use of liquid traps,

solenoid valve in the liquid line, etc. are recommended.

- There should be no movement of refrigerant in the compressor while the system is at a standstill.

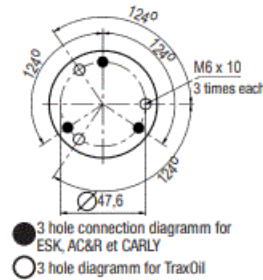
Connection of oil level regulator

- Oil level regulation systems have proven themselves with parallel circuits of several compressors. The connection "O" is provided for installing an oil level regulator (see dimensions drawing). All common oil level regulators from AC&R, ESK and Carly as well as the OM3 TraxOil oil level regulation system from Alco can be connected directly without adapters (see Fig. 21). A sight glass on the oil level regulator is not required.



Mechanical oil level regulator
at the "O" connection

Fig. 23



Maintenance

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.

Work to be carried out

- In order to guarantee optimum operational reliability and service life of the compressor, we recommend carrying out servicing and inspection work at regular intervals:

Oil change:

- not mandatory for factory-produced series systems.
- for field installations or when operating near the application limit: for the first time after 100 to 200 operating hours, then approx. every 3 years or 10,000 – 12,000 operating hours. Dispose of used oil according to the regulations; observe national regulations.
- **Annual checks:** Oil level, leak tightness, running noises, pressures, temperatures, function of auxiliary devices such as oil sump heater, pressure switch.

Spare part recommendation/accessories

- Available spare parts and accessories can be found on our compressor selection tool under vap.bock.de as well as at bockshop.bock.de.
- Only use genuine Bock spare parts!

Lubricants / oil

- The oil type filled as standard in the factory is marked on the name plate, and this should always be used, even in the case of maintenance units. Alternative oil types can vary significantly in quality due to additives or inferior raw materials by the manufacturer. Validation within the compressors entire operating limits can not be guaranteed, if such alternative oil types are used. It is for this reason, that we only recommend the use of oil from Bock! Bock assumes no liability for any damage arising from alternative oil types.

Refrigerants	Bock standard oil types
HFC (e.g. R134a/R407C)	BOCK lub E55
HCFC (e.g. R22)	BOCK lub A46

Decommissioning

Close the shut-off valves on the compressor. Drain the refrigerant (it must not be discharged into the environment) and dispose of it according to the regulations. When the compressor is depressurised, undo the fastening screws of the shut-off valves. Remove the compressor using an appropriate hoist. Dispose of the oil inside in accordance with the applicable national regulations.

Technical data

Type	No. of cylinders	Displacement 50 / 60 Hz (1450 / 1740 rpm)	Electrical data ③				Weight	Connections ④		Oil charge	Sound pressure level	
			Voltage ①	Max. Operating current ② PW 1 + 2	Max. power consumption ②	Starting current (rotor locked) PW 1 / PW 1 + 2		Dis-charge line DV	Suction line SV		L / M / H ⑤	
		m³/h	A	kW	A	kg	mm (inch)	mm (inch)	Ltr.	dB(A)		
HG4/310-4	4	27,1 / 32,5	380-420 V VYYY - 3 - 50 Hz PW 440-480 V VYYY - 3 - 60 Hz PW PW = Part Winding Winding ratio : 66% / 33%	16	8,5	50 / 65	147	22 (7/8)	28 (1 5/8)	2,7	59 / 60 / 60	
HG4/310-4 S		27,1 / 32,5		18	9,0	57 / 75	149					
HG4/385-4		33,5 / 40,2		18	9,5	57 / 75	149					
HG4/385-4 S		33,5 / 40,2		27	12,5	82 / 107	152					
HG4/465-4		40,5 / 48,6		18	11,0	57 / 75	148	28 (1 1/8)	35 (1 3/8)		64 / 63 / 62	
HG4/465-4 S		40,5 / 48,6		27	13,0	82 / 107	151					
HG4/555-4		48,2 / 57,8		27	12,9	82 / 107	150				66 / 64 / 62	
HG4/555-4 S		48,2 / 57,8		34	15,2	107 / 140	153					
HG4/650-4		56,6 / 67,9		27	15,7	82 / 107	152				42 (1 5/8)	69 / 66 / 63
HG4/650-4 S		56,6 / 67,9		34	18,4	107 / 140	155					

① Tolerance (± 10%) relative to the mean value of the voltage range.
Other voltages and types of current on request.

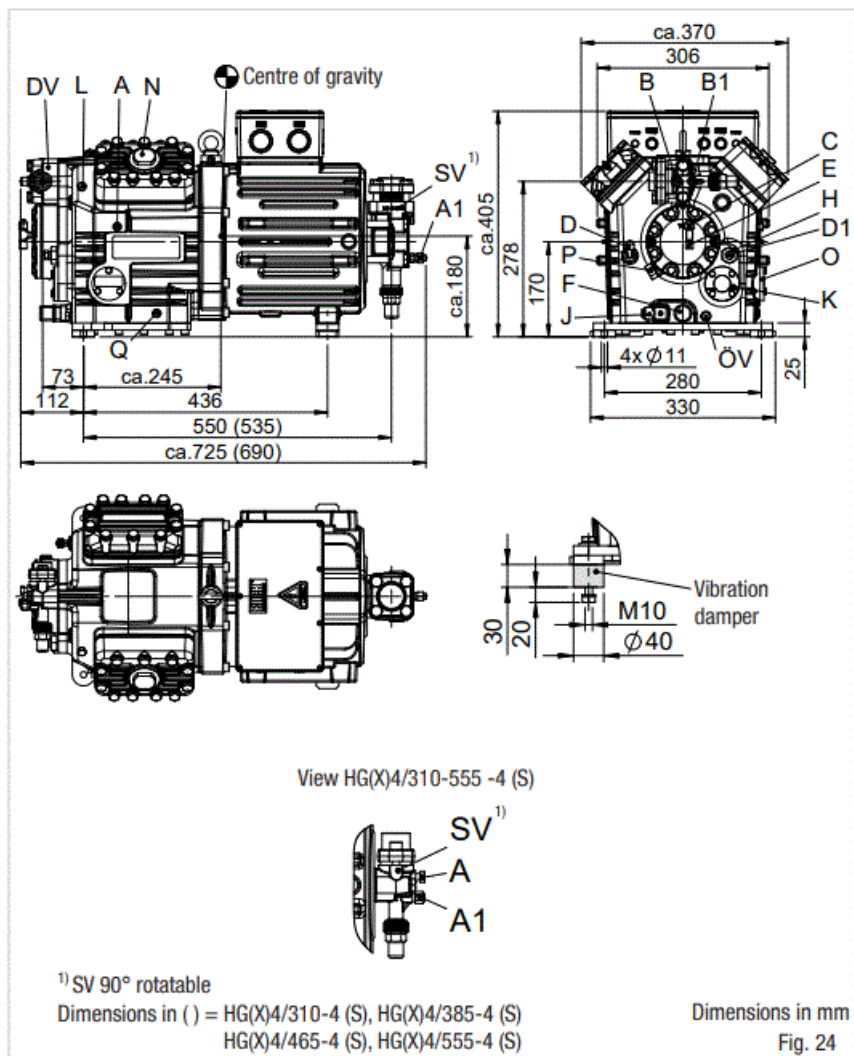
② - The specifications for max. power consumption apply for 50Hz operation.
For 60Hz operation, the specifications have to be multiplied by the factor 1.2. The max. working current remains unchanged.
- Take account of the max. operating current / max. power consumption for design of fuses, supply lines and safety devices. Fuse: Consumption category AC3

③ All specifications are based on the average of the voltage range

④ For solder connections

⑤ L = low temperature (-35 / 40 °C), M = normal cooling (-10 / 45 °C), H = air conditioning (5 / 50°C) sound pressure level measured in low reflection measuring area, measuring distance 1m.
Compressor operation at 50 Hz (1450 rpm), refrigerant R404A.
Values stated are average values, tolerance ± 2 dB(A).

Dimensions and connections



SV DV	Suction line see technical data, Chapter 8 Discharge line	
A	Connection suction side, not lockable	1/8" NPTF
A1	Connection suction side, lockable	7/16" UNF
B	Connection discharge side, not lockable	1/8" NPTF
B1	Connection discharge side, lockable	7/16" UNF
C	Connectoin oil pressure switch OIL	7/16" UNF
D	Connection oil pressure switch LP	7/16" UNF
D1	Connection oil return from oil separator	1/4" NPTF
E	Connection oil pressure gauge	7/16" UNF
F	Oil drain	M22 x 1,5
H	Oil charge plug	M22 x 1,5
J	Oil sump heater (accessories)	M22 x 1,5
K	Sight glass	—
L	Connection thermal protection thermostat	1/8" NPTF
N	Connection capacity controller	M48 x 1,5
O	Connection oil level regulator	3 x M6
ÖV	Connection oil service valve	1/4" NPTF
P	Connection oil differential pressure sensor	M20 x 1,5
Q	Connection oil temperature sensor	1/8" NPTF

Declaration of incorporation

- Declaration of incorporation for incomplete machinery in accordance with EC Machinery Directive 2006/42/EC, Annex II 1. B
- **Manufacturer:** Bock GmbH
- Benzstraße 7
- 72636 Frickenhausen, Germany
- We, as manufacturer, declare in sole responsibility that the incomplete machinery
- **Name:** Semi-hermetic compressor
- **Types:** HG(X)12P/60-4 S (HC)HG(X)88e/3235-4(S) (HC)
- **UL-HGX12P/60 S 0,7**..... UL-HGX66e/2070 S 60
- **HGX12P/60 S 0,7 LG** HGX88e/3235 (ML/S) 95 LG

- **HG(X)22(P)(e)/125-4 A** HG(X)34(P)(e)/380-4 (S) A
- **HGX34(P)(e)/255-2 (A)** HGX34(P)(e)/380-2 (A)(K)
- **HA(X)12P/60-4** HA(X)6/1410-4
- **HAX22e/125 LT 2 LG** HAX44e/665 LT 14 LG
- **HGX12e/20-4 (ML/S) CO2 (LT)** HGX44e/565-4 S CO2
- **UL-HGX12e/20 (S/ML) 0,7 CO2 (LT)...** UL-HGX44e/565 S 31 CO2
- **HGX12/20-4 (ML/S/SH) CO2T**..... HGX46/440-4 (ML/S/SH) CO2 T
- **UL-HGX12/20 ML(P) 2 CO2T**..... UL-HGX46/440 ML(P) 53 CO2T
- **HGZ(X)7/1620-4** HGZ(X)7/2110-4
- **HGZ(X)66e/1340 LT 22**..... HGZ(X)66e/2070 LT 35
- **HRX40-2 CO2 T H**..... HRX60-2 CO2 T H

Name: Open type compressor

- **Types: F(X)2** F(X)88/3235 (NH3)
- **FK(X)1**..... FK(X)3
- **FK(X)20/120 (K/N/TK)**..... FK(X)50/980 (K/N/TK)
- **Serial number: BC00000A001** – BN99999Z999 complies with the following provisions of the above-mentioned Directive:
 - According to Annex I, points 1.1.2, 1.1.3, 1.1.5, 1.3.2, 1.3.3, 1.3.7, 1.5.1, 1.5.2, 1.5.13 and 1.7.1 to 1.7.4 (excepted 1.7.4 f) are fulfilled.
 - Applied harmonised standards, in particular: EN ISO 12100 :2010 Safety of machinery — General principles for design — Risk assessment and risk reduction EN 12693 :2008 Refrigerating systems and heat pumps — Safety and environmental requirements — Positive displacement refrigerant compressors
- **Remarks:** We also declare that the special technical documentation for this incomplete machine has been created in accordance with Annex VII, Part B and we obligate to provide these upon reasoned request from the individual national authorities by data transfer.
- Commissioning is prohibited until it has been confirmed that the machinery into which the incomplete machine above is to be incorporated complies with the EC Machinery Directive and an EC Declaration of Conformity, Annex II. 1. A exists.

Bock GmbH

- Authorized person for compiling and handing Alexander Layh over technical documentation: Benzstraße 7
72636 Frickenhausen, Germany
- Frickenhausen, 04th of January 2021 i. A. Alexander Layh, Global Head of R&D

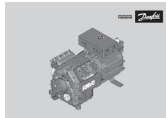
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Documents / Resources

 <p>BOCK® HG4 Covering guide</p> <table><tr><td>Model</td><td>Capacity (m³/h)</td><td>Power (kW)</td><td>Weight (kg)</td></tr><tr><td>HG4-310-4</td><td>310</td><td>1.5</td><td>15</td></tr><tr><td>HG4-385-4</td><td>385</td><td>1.8</td><td>18</td></tr><tr><td>HG4-465-4</td><td>465</td><td>2.2</td><td>22</td></tr><tr><td>HG4-555-4</td><td>555</td><td>2.5</td><td>25</td></tr><tr><td>HG4-650-4</td><td>650</td><td>3.0</td><td>30</td></tr><tr><td>HGX4-310-4</td><td>310</td><td>1.5</td><td>15</td></tr><tr><td>HGX4-385-4</td><td>385</td><td>1.8</td><td>18</td></tr><tr><td>HGX4-465-4</td><td>465</td><td>2.2</td><td>22</td></tr><tr><td>HGX4-555-4</td><td>555</td><td>2.5</td><td>25</td></tr><tr><td>HGX4-650-4</td><td>650</td><td>3.0</td><td>30</td></tr></table>	Model	Capacity (m³/h)	Power (kW)	Weight (kg)	HG4-310-4	310	1.5	15	HG4-385-4	385	1.8	18	HG4-465-4	465	2.2	22	HG4-555-4	555	2.5	25	HG4-650-4	650	3.0	30	HGX4-310-4	310	1.5	15	HGX4-385-4	385	1.8	18	HGX4-465-4	465	2.2	22	HGX4-555-4	555	2.5	25	HGX4-650-4	650	3.0	30	<p>Danfoss BOCK HG4 GEA Semi Hermetic Compressor [pdf] User Guide</p> <p>HG4-310-4, HG4-385-4, HG4-465-4, HG4-555-4, HG4-650-4, HG4-310-4 S, HG4-385-4 S, HG4-465-4 S, HG4-555-4 S, HG4-650-4 S, HGX4-310-4, HGX4-385-4, HGX4-465-4, HGX4-555-4, HGX4-650-4, HGX4-310-4 S, HGX4-385-4 S, HGX4-465-4 S, HGX4-555-4 S, HGX4-650-4 S, BOCK HG4 GEA Semi Hermetic Compressor, GEA Semi Hermetic Compressor, Semi Hermetic Compressor, Compressor</p>
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HGX4-650-4	650	3.0	30																																										

References

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