

# Operating Instructions G-BH8

2BH851 | 2BH852



**G-Serie**  
**G-Series**

Seitenkanal  
Side Channel



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## 1.1 Content of this document

These operating instructions:

- is part of the side-channel compressor:

Series	G-BH8
Types	2BH851 . . . . .
	2BH852 . . . . .

- describe the safe, proper and efficient use in all phases of its service life.
- must always be available to personnel at the place of use.
- Arranged in the main sections:
  - About these instructions
  - Safety and responsibility
  - Product identification
  - Transportation and storage
  - Mounting
  - Electric power connection
  - Commissioning
  - Operation
  - Troubleshooting
  - Maintenance, repairs and spare parts
  - Decommissioning
  - Technical data







The main section on safety must always be observed. The subsequent main sections can be used as a reference and can be read independently from each other. Cross references provided must be observed.









## 1.2 Target group

These instructions are aimed at operating personnel, qualified personnel, electricians, the operator and planner. See also Staff qualifications and training [→ 9].

## 1.3 Explanation of the terms and symbols

In these instructions symbols and terms will be used to mean the following.

Symbol	Explanation
!	Requirement, pre-requisite
①	One-step handling instructions
1 2 3	Multi-step handling instructions
✓	Result
[→ 54]	Cross reference with page reference
	Additional information, tips
	Direction of rotation arrow
	Direction of conveyance arrow
	General warning sign (warns of risk of injury)
	Electrical voltage warning
	Hot surface warning

Symbol	Explanation
	Disconnect prior to maintenance or repair
	Observe the instructions
	Use foot protection
	Use hand protection
	Use eye protection
	Use head protection
	Use ear protection
	Earth prior to use

Term	Explanation
Plant	Part provided by the user in which the side-channel compressor is installed.
Side-channel compressor = G-BH8 = vacuum pump/compressor	Ready to connect machine for the generation of a vacuum and/or overpressure. The side-channel compressor consists of a compressor and motor, as well as other accessories where applicable.
Motor	Asynchronous motor for driving the side-channel compressor.
Compressor	Mechanical part of side-channel compressor without motor.
Inner chamber of the compressor	Chamber of the compressor part that conveys media.
Substructure	Mounting plate, baseframe or foundation on which the G-BH8 is constructed.
Flexible/rigid	When the lowest eigenfrequency of the system, consisting of the G-BH8 and substructure, lies at least 25% per measurement direction above the rotary frequency of the G-BH8, the substructure is considered to be rigid. All other substructures are considered to be flexible.
Assembly environment	Space in which the side-channel compressor is set up and operated (this may differ from the suction environment).
Suction/discharge environment	Chamber from which the media to be conveyed is suctioned or in which the media to be conveyed is expelled (this may differ from the assembly environment).
Vacuum operation	Operating mode whereby the - pressure at inlet $p_1 < p_{atm.}$ and - pressure at outlet $p_2 = p_{atm.}$
Compressor operation	Operating mode whereby the - pressure at inlet $p_1 = p_{atm.}$ and - pressure at outlet $p_2 > p_{atm.}$
Mixed operation	Operating mode whereby the - pressure at inlet $p_1 < p_{atm.}$ and - pressure at outlet $p_2 > p_{atm.}$

Term	Explanation
Integrated frequency inverter = 2FC4...-1	Frequency inverter that is constructed by the manufacturer on the side-channel compressor.
Electrical cabinet inverter 2FC....-2	Frequency inverter that is supplied by the manufacturer and is not fitted to the side-channel compressor.
Electrical cabinet inverter, third-party manufacturer	A frequency inverter purchased by the operator that can be used with the side-channel compressor.

## 1.4 Changes in comparison to the previous version

This document has been completely revised in comparison to the previous version 01.2012 in terms of the writing and the content.

## 1.5 Other valid documents

In addition to these instructions consider the following documents:

Document number	Purpose
610.00280.40.300	Repair manual with spare parts list and exploded view drawing 2BH8
610.00116.02.000	Installation manual for the spring elements
610.44496.40.000 *	Operating instructions for integrated frequency inverter for 2BH85...-...N
610.44527.21.000 *	Operating instructions for adjacent frequency inverter 3.0-11 kW for 2BH85...-...T <b>OR</b>
610.44526.21.000 *	Operating instructions for adjacent frequency inverter 15-45 kW for 2BH85...-...T <b>OR</b>
— *	Operating instructions for external frequency inverter for 2BH85...-...T
610.00110.02.000 *	Suction filter mounting instructions
610.00112.02.000 *	In-line filter mounting instructions
610.00108.02.000 *	Additional silencer mounting instructions

\*according to the model option or accessories

The manufacturer is not liable for damage caused by the failure to observe these instructions and the related documents [→ 6].

## 2.1 Explanation of warning signs

Warning sign	Explanation
△ DANGER	Danger that failure to observe the measures could lead to death or serious physical injuries.
△ WARNING	Danger that failure to observe the measures could lead to death or serious physical injuries.
△ CAUTION	Danger that failure to observe the measures could lead to minor physical injuries.
NOTICE	Danger that failure to observe the measures could lead to material damage.

## 2.2 Correct use of the equipment

The G-BH8 is a continuous operation machine that is optimised for the generation of a vacuum and pressure. The G-BH8 can be used in buildings, outside and in dusty or damp environments. The protection class is given on the data plate (item 15).

The G-BH8 is equipped with an alternating current drive motor (asynchronous motor) for the frequency inverter operation. These motors are not suitable for mains operation.

The G-BH8

- should only be used within the limits defined in this documentation. In particular, the limits in the following section must be observed:
  - Mounting conditions [→ 19]
  - Permitted conditions for use [→ 43]
  - Electrical data [→ 45]
- only operate when fully assembled and in a technically perfect condition.
- can deliver the following conveyed media:
  - air
  - All non-explosive, non-combustible, non-abrasive and non-toxic gasses and gas/air mixtures, after consultation with the manufacturer

Other operating conditions must be agreed with the manufacturer.

### See also

Data plate [→ 12]

## 2.3 Improper operational modes

It is forbidden to:

- Operation in a potentially explosive area (ATEX).
- Connection in a potentially explosive area (ATEX).
- The conveyance of explosive, combustible, abrasive, unstable, oxidative or toxic media, e.g. dusts, solvents, as well as of fluids and solid matter of any type.
- Use in non-industrial plants, unless essential precautions and protective measures have been taken.
- Operation on the mains without frequency inverter.
- Mobile operation.
- Reverse operation.
- Use in areas with ionising or non-ionising radiation.

- Formation of condensation or liquid separation in the internal space of the G-BH8.
- Changes to the G-BH8 and the accessories, that have not been agreed with the manufacturer.
- Operation outside of the limits defined in these instructions.
- Start-up and operation with overpressure or negative pressure from the plant.

### 2.4 Working in a safety-conscious manner

**Work at a standstill and de-energised** **Work on running or energised vacuum pumps/compressors can lead to serious injuries due to body parts being drawn in or crushed or death due to electric shock.**



Work on the G-BH8 at a standstill only and in a de-energised condition.

1. Disconnect.
2. Secure it to prevent it from being switched back on.
3. Make sure that it is de-energised.
4. Earth it and short-circuit it.
5. Cover or block off adjacent parts which are still supplied with voltage.

**Hot surfaces**

**During operation and after decommissioning, contact with hot surfaces can lead to burns.**



On the G-BH8, temperatures during operation can reach **150°C [302°F]**. The conveyed media on the pressure side (item 8) can reach up to **200°C [392°F]**.

1. Do not touch hot surfaces during operation.
2. Keep hot surfaces clear of highly inflammable materials.
3. Allow the G-BH8 to cool after shutting it down.

**Not fully assembled**

**Operation with exposed parts can lead to serious injuries due to body parts being drawn in or crushed.**

1. Re-attach safety and protective devices and put them back into operation immediately after completion of work.
2. G-BH8 should only be put into operation when fully fitted.

**Changes, additions and conversions** **Changes, additions and conversions may lead to unforeseeable risks and thus to serious injuries or death.**

Changes, additions and conversions to the G-BH8 that are not described anywhere in the documentation must be authorised by the manufacturer.

Only use original parts or parts/auxiliary materials (grease, sealant) approved by the manufacturer. The use of other parts and auxiliary materials may exempt the manufacturer from liability for all resultant consequences.

Keep all notices attached to the G-BH8 in a clearly legible condition:

- Labelling of connections
- rotation arrows
- Rating plate
- Warning signs



## 2.5 Requirements for personnel

### 2.5.1 Staff qualifications and training



All those who will work on the G-BH8 must have read and understood these and all related instructions.

Personnel in training may only work on the G-BH8 under supervision of personnel who have the **required knowledge**.

Only allow work on the G-BH8 to be carried out by personnel with the following knowledge:

Work task	Personnel	Required knowledge
Transportation, storage	Shipper, dealer, qualified personnel for transportation and storage	<ul style="list-style-type: none"> <li>Safe handling with lifting gear such as hoists and fork lift trucks</li> </ul>
Assembly, start-up, correcting faults, shut down, dismantling	Qualified personnel for vacuum pumps and compressors	<ul style="list-style-type: none"> <li>Safe handling of tools</li> <li>Laying and connecting pipes and hoses</li> <li>Mounting mechanical components</li> <li>Knowledge of vacuum pumps and compressors</li> </ul>
Working on the electrical system	Electrician	<ul style="list-style-type: none"> <li>Understanding and safe implementation of circuit diagrams</li> <li>Lay and connect electrical lines</li> <li>Connection of electrical machines, switches, sensors, circuit breakers</li> <li>Analysing and testing electrical systems</li> <li>Assessing the effectiveness of electrical protection measures</li> </ul>
Parameterize the frequency inverter	Qualified personnel for frequency inverters, operator, electricians	<ul style="list-style-type: none"> <li>Knowledge of frequency inverters and how to set them</li> </ul>
Operation	Operation personnel, operator	<ul style="list-style-type: none"> <li>Instructions for occupational safety and for handling vacuum pumps and compressors</li> </ul>
Maintenance repair	Qualified personnel for maintenance and repair	<ul style="list-style-type: none"> <li>Safe handling of tools and materials</li> <li>Disassemble and assemble vacuum pumps and compressors</li> <li>Assess damage to vacuum pumps and compressors</li> </ul>
Disposal	Qualified personnel for disposal	<ul style="list-style-type: none"> <li>Decontaminating polluted materials</li> <li>Re-use of materials and substances</li> <li>Correct and environmentally-friendly disposal of materials and substances</li> </ul>

### 2.5.2 Personal protective equipment



#### WARNING

**Danger of crushing and cutting!**



**Crushing and cutting of body parts due to sharp edges or falling parts on the open G-BH8.**



1. Wear protective gloves, safety footwear and safety goggles for all assembly and disassembly, troubleshooting and maintenance work.



2. In addition, wear head protection for transportation and overhead work.



#### WARNING

**Risk of injury!**

**Serious injuries due to body parts and hair being sucked or drawn in (vacuum) or due to projected particles (pressure).**

1. Wear eye protection and tight clothes for all work when in operation.

2. Wear a hair net for long hair.

3. Remove jewellery and rings.



#### WARNING

**Hearing damage!**

**Hearing damage due to time spent in the excessive noise area when there are adverse operating conditions or noise due to suddenly ejected media at the discharge nozzles or piping.**

① Wear ear protection when remaining in the excessive noise area.

## 2.6 Requirements of the operator

**⚠ WARNING****Explosion and burst risk!**

**Any machine that is operated at a pressure or speed that is beyond that which is permitted, can explode or burst and cause serious injuries due to parts flying off and suddenly ejected conveyed media.**

1. The operator must ensure that the pressure differences acting on the side-channel compressor [→ 44] are not exceeded.
2. The operator must ensure that the Maximum speeds [→ 43] are not exceeded.

**⚠ WARNING****Danger of suffocation!**

**As the G-BH8 is not 100% leak-proof, the conveyance of media other than air can lead to suffocation.**

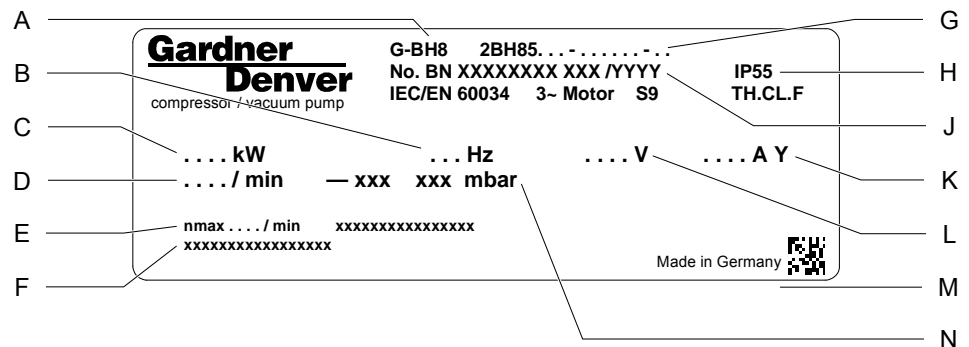
- ① Adhere to the safety measures described for the conveyed media used (if necessary, check and monitor leakage rates).

The operator ensures that:

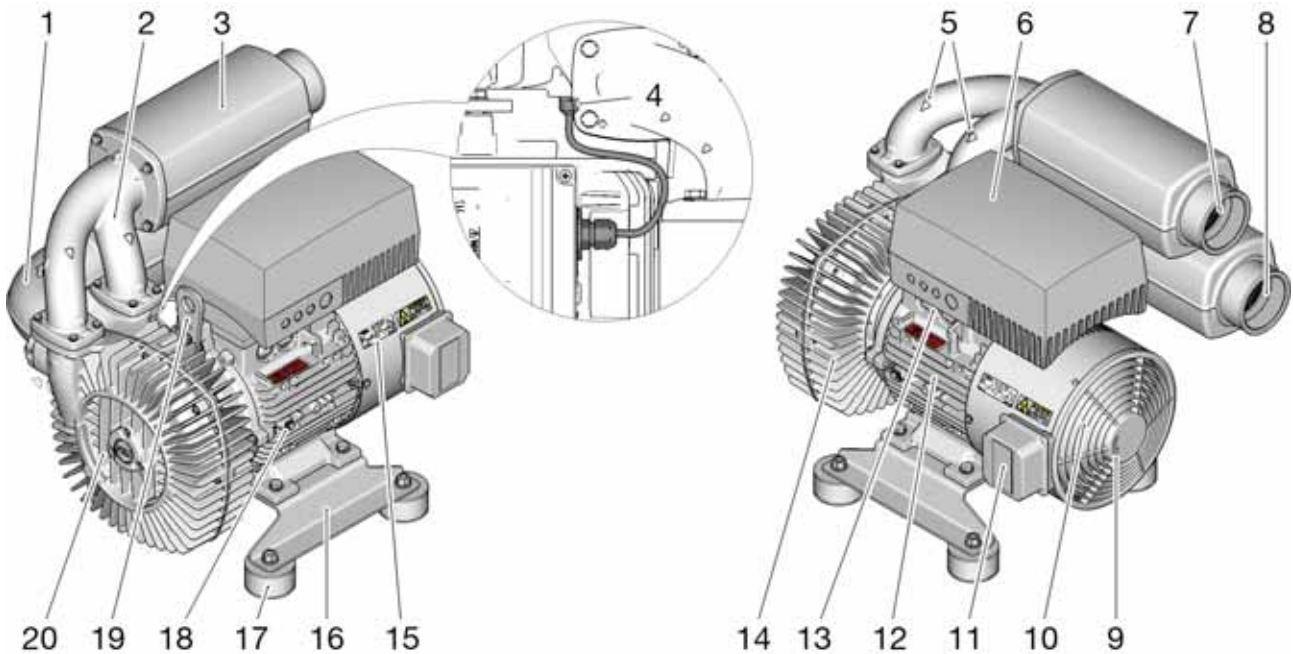
- All work on the G-BH8 is carried out by:
  - personnel that have the necessary Staff qualifications and training [→ 9]
  - personnel that have been sufficiently informed of these instructions and all related documents [→ 6]
- Assignment, responsibility and supervision of personnel is regulated.
- The content of these and locally applicable instructions are always available to personnel.
- Personnel are informed of the conveyed media and the emergency safety measures, so as to prevent injuries.
- All local and plant-specific safety measures are adhered to, such as:
  - Prevention of accidents
  - safety and operating regulations
  - Utility company regulations
  - Standards and laws
- Hot surfaces such as pipes and hoses are inaccessible during operation are provided with a suitable safeguard (e.g. perforated metal cover or wire covering) or are insulated.
- Hot surfaces, such as pipes and hoses, that do not have their own safeguard, are supplied with warning signs.
- The free drawing in or emission of the conveyed media does not place any personnel in danger.
- Dangers due to electrical energy are not possible.



## 3.1 Data plate



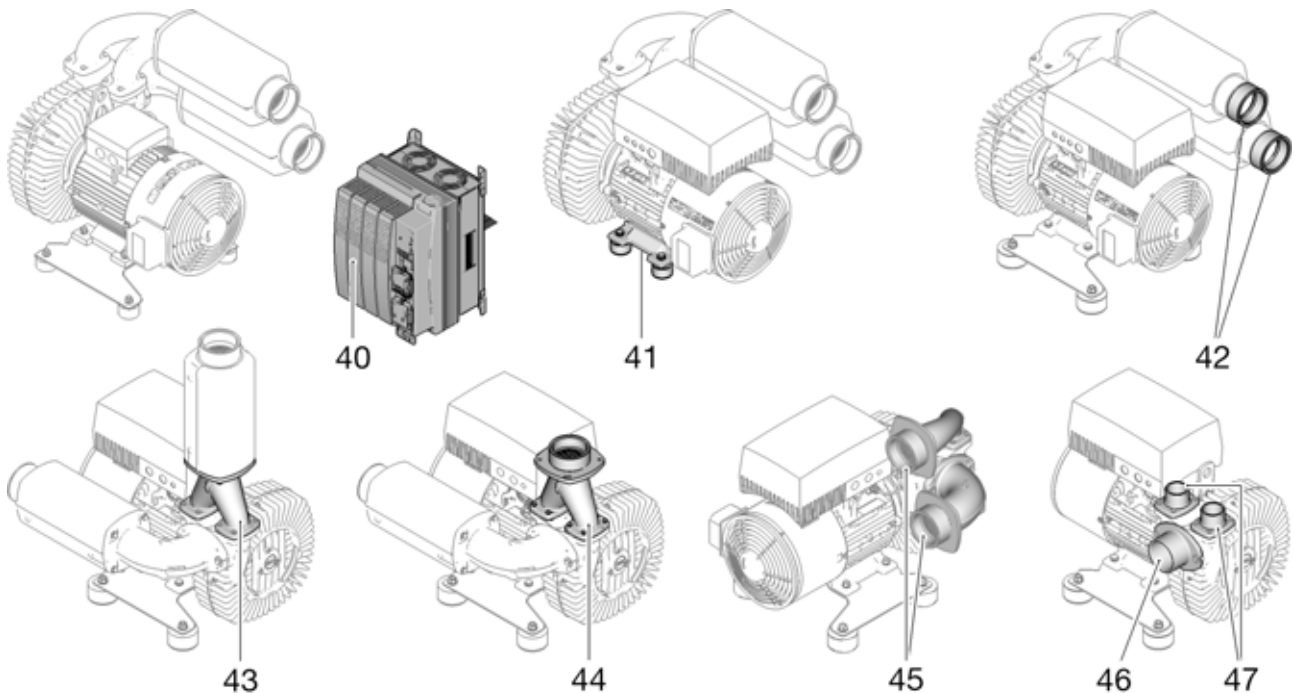
- |   |   |
|---|---|
| A Series  | G Type  |
| B Frequency   | H Protection class  |
| C Motor output power                                  | J Serial number/year of manufacture   |
| D Rated rpm   | K Voltage in star connection  |
| E Maximum speed and optional manufacturer information | L Current in star connection  |
| F optional customer information                       | M Serial number/year of manufacture as QR code                                    |
|   | N Pressure differences for rated rpm  |
|   | N <sub>1</sub> values with a negative sign apply to vacuum and vacuum operation   |
|   | N <sub>2</sub> values with no sign apply to overpressure and compressor operation |

**3.2 Structure**


- |    |   |    |                                     |
|----|---|----|-------------------------------------|
| 1  | Pressure side elbow                               | 11 | Auxiliary ventilator terminal boxes |
| 2  | Suction side elbow                                | 12 | Asynchronous motor                  |
| 3  | Silencer  | 13 | Motor terminal boxes                |
| 4  | Bimetal switch in the compressor housing          | 14 | Compressor housing                  |
| 5  | Direction of conveyance arrows                    | 15 | Rating plate                        |
| 6  | Integrated frequency inverter 2FC4...-1           | 16 | Assembly foot                       |
| 7  | Suction side connection                           | 17 | Spring mounts                       |
| 8  | Discharge-side connection                         | 18 | Earth connection                    |
| 9  | Direction of rotation arrow, auxiliary ventilator | 19 | Lifting attachment                  |
| 10 | Auxiliary ventilator                              | 20 | Compressor cover                    |

## 3.3 Options

The G-BH8 can be delivered with the following options



40 Electrical cabinet inverter 2FC....-2

41 Assembly on the motor foot

42 NPT thread adapter

43 Suction side with Y-pipe

44 Suction side with Y-pipe without silencer

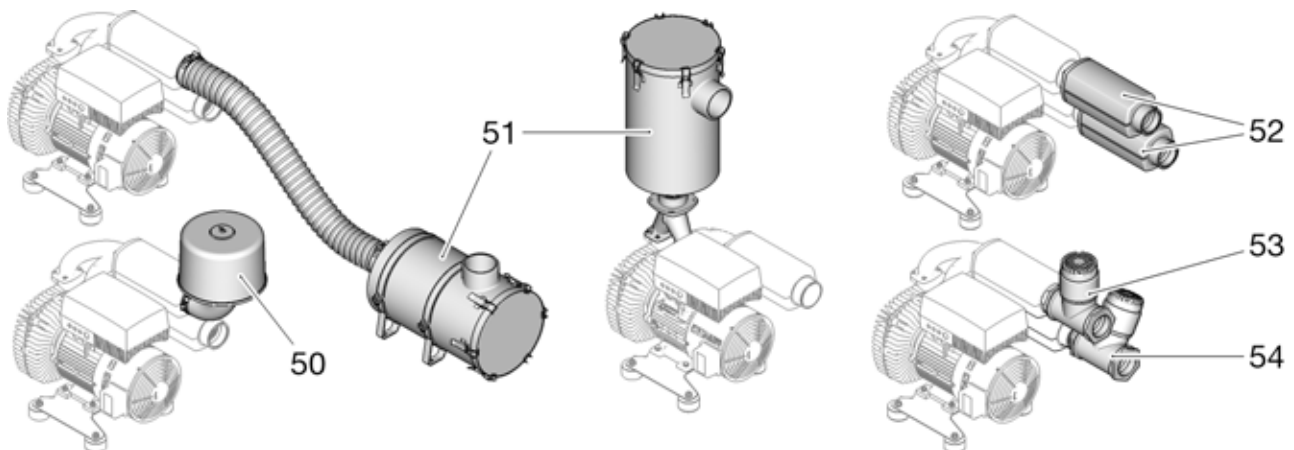
45 Suction side and/or discharge side with elbow without silencer

46 Discharge side with hose flange without silencer

47 Suction side with hose flange without silencer

## 3.4 Ancillaries

The following original accessories are available from the manufacturer



50 Suction filter

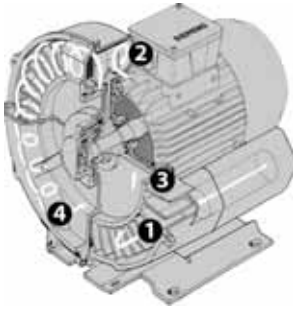
51 In-line filter

52 Additional silencers

53 Vacuum shut-off valve

54 Pressure limiting valve

### 3.5 Function principle



With side-channel compressors, the impeller rotates contact-free in the compressor housing.

The conveyed media is suctioned through the inlet (1) and accelerated spirally in the direction of rotation of the side channel.

The conveyed media is accelerated by the centrifugal force in the radial blades in the direction of the side channel (2) inner wall, and from there is again supplied to the impeller (3). As such, the conveyed media is supplied with kinetic energy in the direction of rotation and the pressure increases.

Due to the reduced cross section on the interruptor, the conveyed media is stripped from the blades and expelled via the outlet (4).

Side-channel compressors always show a pressure difference and as such, can be used as vacuum pumps or compressors.

**3.6 EU declaration of conformity**

**EU declaration of conformity**

**Gardner  
Denver**

**Manufacturer:** Gardner Denver Deutschland GmbH  
Industriestraße 26  
97616 Bad Neustadt  
Germany

**Representative for the compilation of technical documents:** Holger Krause  
Industriestraße 26  
97616 Bad Neustadt  
Germany

**Designation of the machine:** Vacuum pump/compressor  
Series G-BH8  
Types 2BH851 ...-.....-...  
2BH852 ...-.....-...

**The machine described above meets the following applicable Community harmonisation legislation:**

**2006/42/EC** European Parliament and Council Directive 2006/42/EC from 17th May 2006 on machinery and amending Directive 95/16/EC.

**2004/108/EC** Directive 2004/108/EC of the European Parliament and Council from 15th December 2004 for the application of the legal regulations of the EU member states concerning electrical devices and repealing Directive 89/336/EEC

**Harmonised standards applied:**

**EN 1012-1:2010** Compressors and vacuum pumps - Safety requirements - Part 1: Compressors

**EN 1012-2:1996 +A1:2009** Compressors and vacuum pumps - Safety requirements - Part 2: Vacuum pumps

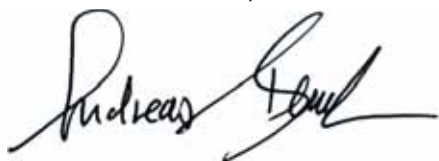
**EN ISO 12100:2010** Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010)

**EN 60204-1:2006** Safety of machinery - Electrical equipment of machines Part 1: General requirements IEC 60204-1:2005 (amended)

**EN 60034-1:2010/ AC: 2010** Rotating electrical machines - Part 1: Rating and performance IEC 60034-1:2010 (amended)

Bad Neustadt, 26.07.2013

*(Place and date of issue)*



Andreas Bernklau, Product management/Authorised signatory

*(Name and function)*



Dr. Rudi Dittmar, Development

*(Name and function)*

664.00280.40.000



## 4.1 Unpacking and checking the condition of delivery

The G-BH8 is secured onto a pallet or foot plate and protected by a cardboard box for delivery.

1. Remove the packaging.  
**NOTICE! First remove the transport protection on the connection openings before connecting the pipes and hoses.**
2. Check the G-BH8 for transport damage.  
**NOTICE! Report any transport damage to the manufacturer immediately.**
3. Check that the G-BH8 delivered complies with the order.
4. Check that accessories delivered with it are complete.
5. Loosen the fixing screws on the assembly foot (item 17, Structure [→ 13]) or on the motor foot (item 41, Structure [→ 13]).
6. Dispose of packaging material in accordance with the valid local regulations.

## 4.2 Lifting and transporting

 **WARNING**

**Danger of crushing and cutting!**

**Danger of crushing and cutting of body parts due to tipping or falling loads during transportation.**

1. The G-BH8 may only be transported horizontally.
2. The load-bearing capacity of the lifting gear and load-handling devices must correspond to the mass [→ 41] of the G-BH8.
3. Secure the G-BH8 to prevent it from toppling or falling.
4. Do not remain under supported loads.
5. Set the G-BH8 down on a horizontal surface.

**NOTICE**

**Mechanical damage!**

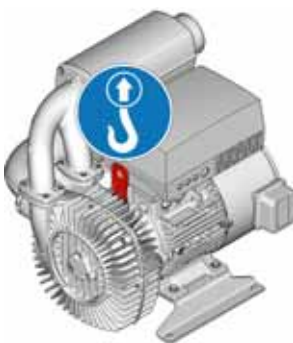
**G-BH8 can be damaged during transportation due to impacts, tipping or falling over.**

1. The G-BH8 should not be exposed to impacts and blows during transportation.  
✓ maximum linear acceleration: 1g
2. Secure the G-BH8 from tipping or falling over.

### Transportation with a crane

! All G-BH8 are equipped with a lifting attachment (item 20, Structure [→ 13]). This lifting attachment is exclusively designed for the mass of the G-BH8, including the original accessories (except for the in-line filter, item 51, Structure [→ 13]).

1. Detach the fitted in-line filter (item 51, Structure [→ 13]) before transportation of the G-BH8.
2. Check that the lifting attachment is firmly fastened and retighten as necessary.
3. Attach the crane hook to the lifting attachment.
4. Lifting and transporting the G-BH8.
5. Place the G-BH8 down and, if necessary, secure from slipping and falling.
6. Remove the crane hook after transportation.



## 4.3 Storage

**NOTICE**

**Mechanical damage and corrosion!**

**Failure to adhere to the storage conditions can lead to mechanical damage and corrosion or can shorten the re-greasing interval.**

1. Adhere to the storage conditions.
2. The maintenance intervals of the ball bearings (Maintenance [→ 38]) become shorter as the time of storage increases.

1. Connect all suction vents so that no dirt or solid particles can enter.
2. Turn the rotor once per year so as to avoid permanent standstill marks.

Storage and standstill conditions	permitted values	
ambient pressure	atmospheric	
composition of the environment	dry, dust-free atmosphere (relatively humid < 60%)	
Ambient temperature	<b>-20°C to +40°C</b>	-4°F to +104°F
static impacts	none	
jerky impacts	none	
Speed of oscillation $V_{\text{eff}}$	<b>&lt;1.5 mm/s</b>	<0.059 in/s

## 5.1 Measures after long-term storage

### Replace ball bearings and radial shaft seal

! When the length of storage until assembly is exceeded by **4 years** for the storage conditions provided in Storage [→ 18].

1. Replace the rolling bearing.
2. Clean adjacent bearing areas for open ball bearings and re-grease.
3. Replace and grease the radial shaft seal.

If the bearing conditions vary (Storage [→ 18]), a reduced ball bearing service life is to be expected.

### Measuring the motor insulation resistance

- ① Measuring the motor insulation resistance.
  - ✓ Value  $>1 \text{ k}\Omega$  per volt of measured voltage: no measures necessary.
  - ✓ Value  $\leq 1 \text{ k}\Omega$  per volt of measured voltage: Dry winding.

## 5.2 Mounting conditions

At the place of assembly,

- Adhere to the Permitted conditions for use [→ 43].
- No outlet air from other machines in the suction area of the motor fan or auxiliary ventilator.
- Provide ventilation facilities, so that the permissible Maximum temperatures [→ 43] are not exceeded.
- Sufficient room is provided for installation and removal of pipelines and maintenance and repair work, particularly for removing and installing the G-BH8.
- Even, horizontal and stable installation surface or baseframe provided, whose dimensions and load-bearing capacity are designed for the G-BH8.
- The maximum tolerance for the evenness of the assembly surface is **0.5 mm** [0.197 in].
- External oscillations  **$>1.5 \text{ mm/s}$**  [0.06 in/s], shock loads, linear or rotary accelerations are not permitted.
- When installing outdoors, protective measures against the effects of weather such as rain, direct sunlight, lightening, snow or ice (e.g. a protective roof) must be provided.
- External mechanical loads are not permitted on the G-BH8 and its attachments (e.g. piping without support, ascending the G-BH8 and its attachments)
- For installation in enclosed spaces and for conveyed media other than air, leaks from the G-BH8 must be considered.
- When operating without silencers and direct extraction from the environment or direct discharge into the environment, effective noise protection measures must be provided.

## 5.3 Reduction of oscillations and noises

Noise emissions and vibrations can be reduced by the following measures.

- Do not set up the G-BH8 in set-up areas that conduct or radiate sound.
- Equip installation surfaces with intermediate layers of noise damping material.
- Use additional silencers (accessory).

Always construct the G-BH8 flexibly on spring elements.

## 5.4 Set up

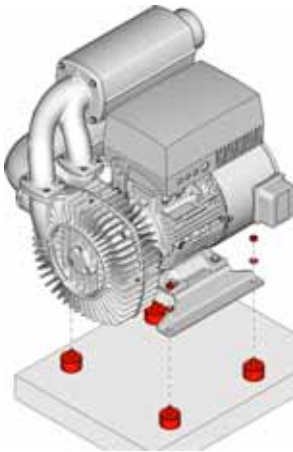
The G-BH8 must always be screwed to a fixed installation surface (e.g. floor) or a baseframe.

Installation without spring elements is not permitted.

The following assembly options are permitted:

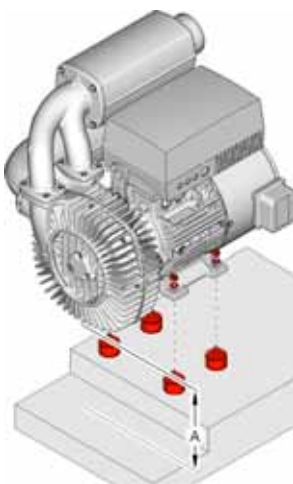
- horizontally on the assembly foot (item 17, Structure [→ 13]).
- Horizontally on the assembly foot (item 41, Structure [→ 13]).

### 5.4.1 Horizontal set-up on the assembly foot



1. Mark the fixing points through the holes in the assembly foot (item 17, Structure [→ 13]) or referring to the dimensional drawing.
2. Lift the G-BH8 away and drill the holes for the fixing points.
3. Fit the supplied spring elements (item 18, Structure [→ 13]) on the assembly surface with suitable fixtures.
4. Fit the G-BH8 with assembly foot on the spring elements.
5. Screw the assembly foot to all fitting points using the supplied fixtures.

### 5.4.2 Horizontal set-up on the motor foot

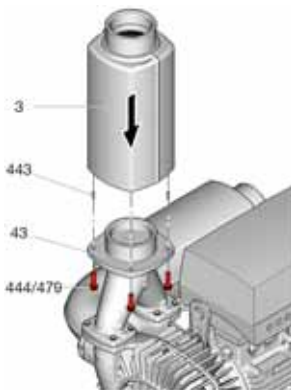


! For assembly on the motor foot (item 41, Structure [→ 13]) the compressor must not come into contact with the assembly surface. The minimum distance **A** of the compressor to the assembly surface is **30 mm** (1.20 in)

1. Mark the fixing points through the holes in the motor foot or referring to the dimensional drawing.
2. Lift the G-BH8 away and drill the holes for the fixing points.
3. Fit the supplied spring elements (item 18, Structure [→ 13]) on the assembly surface with suitable fixtures.
4. Fit the G-BH8 with motor foot on the spring elements.
5. Screw the motor foot to all fitting points using the supplied fixtures.

## 5.5 Fit loose silencer and accessories

### Fit loose silencer



! For G-BH8 with Y-pipe on the suction side (item 43), the silencer is enclosed separately due to technical packaging reasons and must be fitted by the operator.

1. Remove transport protection.
2. Position the silencer (item 3) on the Y-pipe with dowel pins (443) and secure using screws (444) and washers (479).

### Mount the accessories

- ① Fit accessories included separately on the G-BH8 according to the enclosed owner's manual.

## 5.6 Connecting pipelines and hoses

### ⚠ WARNING

#### Risk of injury due to overpressure!

**Suddenly ejected conveyed media such as impurities and solid particles or pressure surges can lead to serious injuries.**

1. Dimension pipes and hoses, securing elements, fittings and containers sufficiently and align them to the maximum pressures.
2. Connect the G-BH8 and the system de-energised and flexibly (e.g. using hoses or compensators).
3. Do not fit pipes, hoses, securing elements, fittings and containers to the G-BH8 and secure from damage.
4. Prevent the entry of solid particles and fluids in the G-BH8 (clean pipes and hoses after assembly, use an extraction or in-line filter if necessary).
5. Protect the G-BH8 from non-permitted pressure levels from the plant (e.g. pressure limiting valve, pressure switch).
6. For compressor operation, the pressure on the pressure connectors of the G-BH8 must be monitored using a suitable pressure indicator. When the permissible discharge pressure is exceeded, switch the G-BH8 off.
7. After switching off, ensure that no conveyed media can flow through the G-BH8 (external drive through conveyed media), install a check valve if necessary.
8. With a free-blowing discharge side or for hosing on the discharge side hose flange (item 46), secure the danger area from hot conveyed media and projected particles with deflection plates or a collection basket.

### ⚠ WARNING

**Serious injuries due to suction and drawing in of body parts and hair during compressor operation!**

- ① For free drawing in from the environment, provide safety measures that prevent the drawing in of body parts and hair.

**WARNING**

**Risk of burns due to temperatures of up to approx. 200°C [392°F]!  
Contact with hot surfaces, pipes and hoses, can lead to burns.**

1. Fit pipes and hoses with sufficient distance from highly inflammable materials (e.g. wood, plastic).
2. Provide hot surfaces, such as pipes and hoses with a suitable safeguard (e.g. perforated metal cover or wire covering) or isolate them.
3. Hot surfaces, such as pipes and hoses, that do not have their own safeguard, are supplied with warning signs.

**NOTICE**

**Pressure loss due to reduced cross section of the pipes and hoses!**

- ① As possible, make the cross section of the pipes and hoses the same length or longer than the connections of the G-BH8.

The conveyed media is suctioned via the suction side (item 7, Structure [→ 13]) and expelled via the pressure side (item 8, Structure [→ 13]). The direction of conveyance of the conveyed media is marked by an arrow (item 5, Structure [→ 13]).

G-BH8 can be connected with hoses (flange connection) or with pipes (inner thread).

! On delivery, all connection openings are closed with a transport protection. This is to prevent foreign objects from entering G-BH8.

1. Remove the transport protection from the connection openings.
2. If the pressure connector of the G-BH8 is not connected with a pipe or a hose, the customer must provide sound protection measures or personal protective equipment.
3. For impurities in the conveyed media, fit a filter (accessories) in the suction line.
4. Connect the pipe or hose of the system pressure line to the discharge side connection (item 8, Structure [→ 13]).
5. Connect the pipe or hose of the system suction line to the suction side connection (item 7, Structure [→ 13]).

## 6.1 General installation regulations



### **⚠ DANGER**

#### **Lethal electric shock on the housing due to the air gap being too small!**

! Air gaps between non-insulated, voltage active components and the earth must be at least **5.5 mm** [0.217 in] to one another (for a measured voltage of  $U_N \leq 690$  V).

1. Avoid projecting cable ends.
2. Ensure electrical connections are durably resilient.



### **⚠ DANGER**

#### **Lethal electric shock due to contact voltage on the housing!**



1. Implement protection from contact voltage according to IEC 60204-1. Use the earth connection in the terminal box (equipotential bonding protection). For operation on the frequency inverter, observe the manufacturer's operating instructions for the frequency inverter.
2. If necessary, connect the equipotential bonding function to the second earth connection (item 19, Structure [→ 13]).
3. Keep the terminal box free of foreign objects, dirt and moisture.
4. Seal terminal box lid and cable feed openings so that they are dust and water tight.

### **NOTICE**

#### **Mains operation with a non-earthed star point can destroy the G-BH8!**

- ① Mains operation of the G-BH8 with a non-earthed star point is not permitted.

### **NOTICE**

#### **Destruction of the asynchronous motor due to incorrect electrical operation or incorrect control!**

! The G-BH8 is equipped with an **asynchronous motor**.

- ① Adjust the electrical operation and control to the asynchronous motor.

The electrical installation must correctly fulfil the requirements of IEC 60204-1, IEC 60204-11 and IEC 61010-1 in accordance with the ambient and operating conditions.

The electrical installation must also be implemented according to the applicable national, local and plant-specific stipulations, as well as the requirements of the power supply company.

The conditions at the place of use must comply with the details on the data plate of the frequency inverter.

The electrical installation must:

- Be correctly attached and protected.
- Be kept away from hot surfaces.
- Be electrically isolated to a sufficient degree.
- Be constructed and fitted in such a way that the following faults do not lead to damage:
  - short circuits
  - mechanical impacts
  - power supply failures or surges
  - electromagnetic fields
  - earth connections

The electrical equipment and control must not put the protective devices of the drive system and the motor protection (e.g. PTC resistor, bimetal switch, frequency inverter current limit) out of operation.

When the power supply fails or surges, the control must prevent the G-BH8 from remaining in operation or starting up.

Protective devices and switches must fulfil the failure safety conditions.

### Overcurrent protection of the main circuit

The power supply must be equipped with an overcurrent protection according to IEC 60204-1, 7.2. Electrical data, see Data plate [→ 12].

### Separator for the electrical energy supply

A separator for the electrical energy supply must be provided and:

- implemented according to IEC 60204-1, 5.3 and 5.5 (for electrical data, see Data plate [→ 12]).
- The separator for the electrical energy supply must be clearly and visibly marked.

## 6.2 Additional installation requirements for frequency inverters

### *NOTICE*

#### **Destruction of the isolation system due to excessive frequency inverter voltages!**

! The standard isolation system of the motor is designed for frequency inverter input voltages of up to 460 V, and frequency inverter output voltage rise times > 0.1 µs.

- ① For higher input voltages or shorter rise times, special measures must be taken, such as an output filter.

When establishing the electrical connection of a frequency inverter:

- connect the PTC resistor, when the PTC resistor is activated, the G-BH8 must switch off.
- Manufacturer's operating instructions for the frequency inverter

## 6.3 Controls

Controls and instruments must be constructed and arranged in such a way that:

- They are easily visible and accessible, and can also be operated without excessive effort.
- The operating personnel understand the functions.
- Operating faults are prevented.

A control system must correspond to ISO 12100, 4.11; IEC 60204-1, 9.4 and ISO 13849-1.

When the power supply fails, a "system with oriented failure mode" according to ISO 12100, 6.2.12.3 must be used.

Start and stop devices must be clearly marked in accordance with ISO 13850 and IEC 60417.

### EMERGENCY OFF function

An EMERGENCY OFF function must be provided when a dangerous situation can occur that must be rectified manually (see ISO 12100, 5.5.2)

- Implement the EMERGENCY off function according to EN 418 and EN 50099.
- Implement a manual EMERGENCY OFF function according to ISO 13849-1, 5 (in particular 5.2.1).



- The stop category and colour of the EMERGENCY OFF function must correspond to ISO 13850.
- If a risk assessment determines that the normal switch can fulfil the EMERGENCY OFF function, this should be labelled accordingly.

After an EMERGENCY OFF, start-up is only possible via a deliberate, manually-triggered procedure.

### Manual reset

A manual reset after a stop command must correspond to ISO 13849-1, 5.5.2 and IEC 60204-1, 9.2.5.3 and 9.2.5.4.

### Start and new start

The requirements of a start and new start, must correspond to ISO 13849-1, 5.2.3.

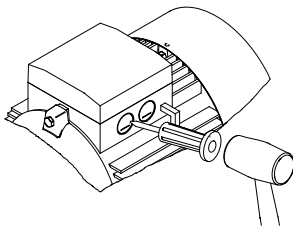


If the G-BH8 is equipped with an automatic or remote-controlled start control, it must be labelled with the sign to the left.

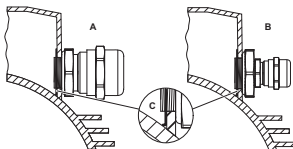
An automatic or remote-controlled start during maintenance or repair must be prevented by a latch, which is contained in the control system (e.g. key transfer system or protected password for software-controlled systems).

## 6.4 Prepare the motor terminal box

This section does not apply to G-BH8 with integrated frequency inverter 2FC....-1 (item 6, Structure [→ 13]).



1. Remove the blind plugs.  
OR  
carefully knock the scale out.



2. Insert screw fittings.  
Fit reducer when using a positive temperature coefficient (PTC) resistor.

## 6.5 Connect the frequency inverter to the mains

### *NOTICE*

**Failure to reach the pressure values due to insufficient voltages on the motor terminal board!**

- ① For operation of the G-BH8 on the frequency inverter, the voltages given on the rating plate must be adhered to on the motor terminal board.

### *NOTICE*

**G-BH8 with UL approval may not be operated in the USA without testing the frequency inverter. The test must be performed by a suitable testing agency!**

- ① G-BH8 must be certified by a suitable testing agency.

### 6.5.1 Connect the integrated frequency inverter

#### Connect the integrated frequency inverter 2FC4...-1NE

- ① Connect the integrated frequency inverter 2FC4...-1NE (item 6, Structure [→ 13]) according to the operating instructions 610.44496.40.000.

#### Connect the integrated frequency inverter from the third-party manufacturer

### *NOTICE*

**Mechanical damage!**

**Integrated frequency inverters from third-party manufacturers can overload the foot and lifting attachment or damage the bearing due to the oscillations.**

- ① Do not fit integrated frequency inverters from third-party manufacturers to the G-BH8.

### 6.5.2 Connect the electrical cabinet inverter

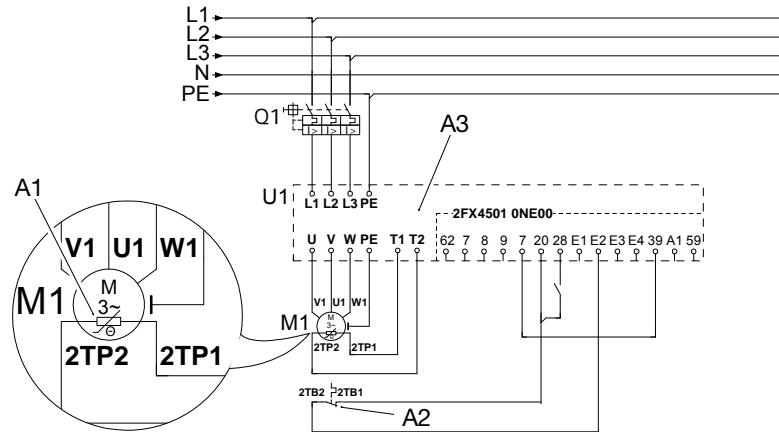
For operation with electrical cabinet inverters, observe

- The G-BH8 is equipped with an asynchronous motor and must be controlled correspondingly.
- High-frequency current and voltage harmonics in the motor supply wiring can cause electro-magnetic interference. This is dependant on the type of the frequency inverter (type, manufacture, voltage supply measures).
- Observe manufactures EMC notes for the frequency inverter.
- If necessary, use screened cables/wiring. To provided the optimum screening, the screening must be connected to the metal terminal box using a large-area metal conducting fastener.
- For G-BH8 with installed sensors (e.g. PTC resistor), there is a possibility of interfering voltages occurring in the sensor wiring, but this depends on the type of frequency inverter.
- Observe [→ 43] revolution limits.

## Electrical cabinet inverter 2FC....-2

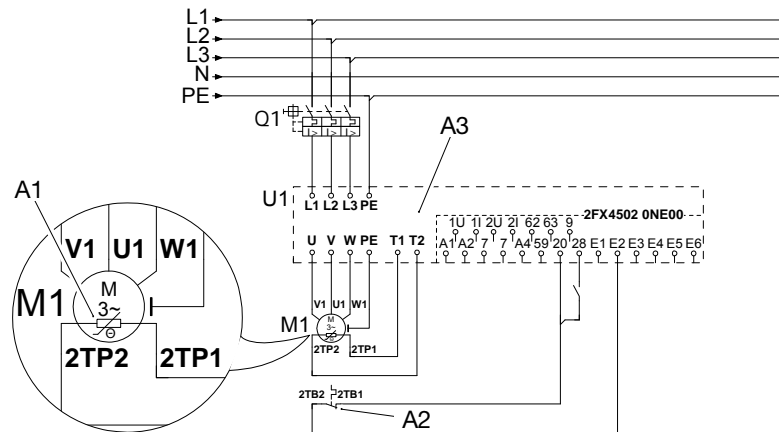
1. Open the terminal box cover of the motor (item 13, Structure [→ 13]).
2. Connect the electrical cabinet inverter 2FC....-2 (item 40, Options [→ 14]) in accordance with the operating instructions 610.44526.40.000 (15-45 kW) or 610.44527.40.000 (3,0-11 kW).
3. Connect the bimetal switch in the compressor housing (item 4, Structure [→ 13]) and the PTC resistor according to the subsequent examples.
4. Close the terminal box cover.

**Circuit diagram with control terminal module 2FX4501 and PTC resistor evaluation via frequency inverter 2FC....-2**



- A1 PTC resistor
- A2 Bimetal switch
- A3 Frequency inverter

**Circuit diagram with application module 2FX4502 and PTC resistor evaluation via frequency inverter 2FC....-2**

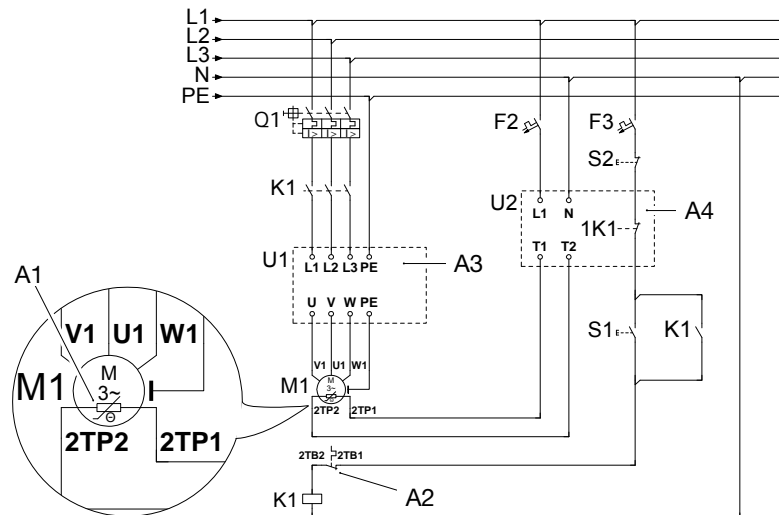


- A1 PTC resistor
- A2 Bimetal switch
- A3 Frequency inverter

## Connect the electrical cabinet inverter from a third-party manufacturer

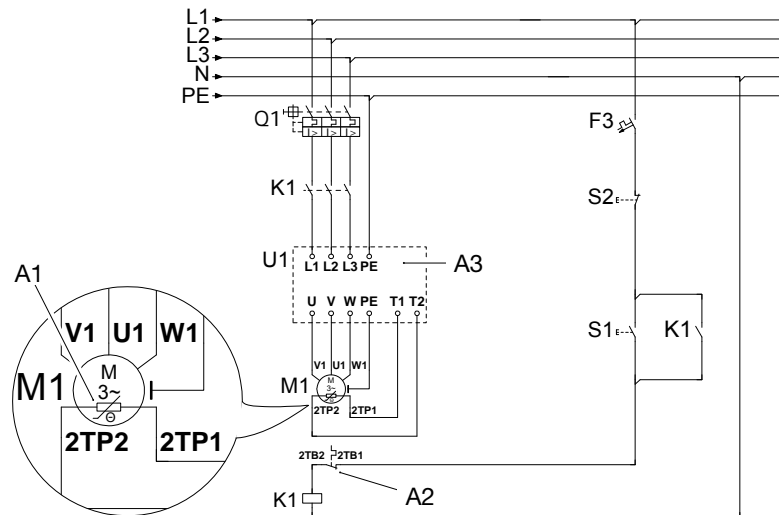
1. Open the terminal box cover of the motor (item 13, Structure [→ 13]).
2. Connect electrical cabinet inverters according to the circuit diagram in the motor terminal box cover and the manufacturer's operating instructions for the frequency inverter.
3. Connect the bimetal switch in the compressor housing (item 4, Structure [→ 13]) and the PTC resistor according to the subsequent examples.
4. Close the terminal box cover.

### Circuit diagram with suitable PTC resistor and evaluation unit



- |    |                |    |                                  |
|----|----------------|----|----------------------------------|
| A1 | PTC resistor   | A3 | Frequency inverter               |
| A2 | Bimetal switch | A4 | PTC resistor and evaluation unit |

### Circuit diagram with PTC resistor evaluation via the frequency inverter



- |    |                |    |                    |
|----|----------------|----|--------------------|
| A1 | PTC resistor   | A3 | Frequency inverter |
| A2 | Bimetal switch |    |                    |

## 6.6 Connect auxiliary ventilator

**⚠ DANGER****Lethal electric shock on the housing due to the air gap being too small!**

! Air gaps between non-insulated, voltage active components and the earth must be at least **5.5 mm** [0.217 in] to one another (for a measured voltage of  $U_N \leq 690$  V).

1. Avoid projecting cable ends.
2. Ensure electrical connections are durably resilient.

**⚠ DANGER****Lethal electric shock due to arcing on the housing!**

! The terminal box must be free of foreign objects, dirt and moisture.

- ① Seal terminal box lid and cable feed openings so that they are dust and water tight.

**NOTICE****Destruction due to overheating!**

**For operation without the auxiliary ventilator running, the G-BH8 can overheat and be destroyed.**

- ① Provide forced switching that prevents an operation of the G-BH8 without the auxiliary ventilator running.
1. Carefully remove blind plugs.
  2. Insert screws.
  3. Connect earth conductor to terminal.
  4. Connect switch stirrup according to circuit diagram in the terminal box.  
Note torque settings for terminal plate connections.  
For connections with a terminal clip, route the conductor so that both pin ends are at approx. equal clip height.  
Earth conductor and exterior earth conductor must be bent into a "U" shape.  
All other conductors must be bent into a "U" shape or connected using a suitable terminal end.
  5. Connect the auxiliary ventilator to a separate mains connection.

## 6.7 Parameterize the frequency inverter

### *NOTICE*

**The G-BH8 fails due to an overload of the motor!**

! G-BH8 are not ventilators! Operation with the setting "**Variable torque**" or "**Square characteristic**" is not permitted.

① Always operate G-BH8 with operating mode "**Constant torque**" or "**Linear characteristic**".

A clock frequency between 4 and 8 kHz is recommended.

### 6.7.1 Parameterize integrated frequency inverters

#### Parameterize integrated frequency inverter 2FC4...-1

The integrated frequency inverter **2FC...-1** is already parameterized on delivery. Brake and acceleration times must be adapted to the process. Other settings are not compulsory.

### 6.7.2 Parameterize electrical cabinet inverters

#### Electrical cabinet inverter 2FC...-2, adjust the parameters with the keypad

! Remove the keypad after an operating error and reconnect it. Reset the connection parameters.

1. Plug in the keypad and wait approx. 3 seconds.
  - ✓ The keypad carries out a self-test.
2. Set the values according to the table.

Code no.	Parameter designation	Type	Value	Important
C0010	minimum output frequency [Hz]	all	<b>50</b>	C0010 only limits the analogue input 1
C0011	maximum output frequency [Hz]	2BH851..-1...0	<b>167</b>	Field-weakening range: 167-200 Hz For performance data see data sheet
		2BH852..-1...0	<b>200</b>	
		2BH852..-1..T.2	<b>235</b>	
C0012	Run-up time main set value [s]	all	<b>25</b>	reference: Frequency change 0 Hz ... C0011 for minimum run-up time see Maximum speeds [→ 43]
C0013	Elapsed time main set value [s]	all	<b>30</b>	reference: Frequency change C0011 ... 0 Hz for minimum elapsed time see Maximum speeds [→ 43]
C0015	Nominal frequency inverter [Hz]	2BH851	<b>167</b>	
		2BH852	<b>245</b>	
C0411	Level inversion digital inputs	all	<b>0</b>	Setting only possible after replacing in <b>ALL-Menu</b>

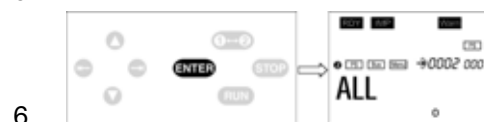
## Electrical cabinet inverters 2FC....-2, replace ALL-Menu and Parameter 0411 settings

! Remove the keypad after an operating error and reconnect it. To connect, begin again with Step 1.

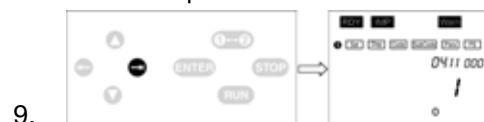
! Perform the key operations once, if not otherwise stated.

1. Plug in the keypad and wait approx. 3 seconds.

✓ The keypad carries out a self-test.



✓ Select parameter **0411**.



✓ Set to value **0**.



12. Remove keypad.

✓ Parameter **0411** set.

## Parameterize electrical cabinet inverters from third-party manufacturers

To set the optimum process parameters within the limits defined in these instructions, see Data plate [→ 12] and the operating instructions of the frequency inverter manufacturer.

## 7.1 Measures after a long shut-down period

### Replace ball bearings and radial shaft seal

! When the time at a standstill exceeds **4 years** since the last commissioning.

1. Replace the rolling bearing.
2. Clean adjacent bearing areas for open ball bearings and re-grease.
3. Replace and grease the radial shaft seal.

If the standstill conditions vary (Storage [→ 18]), a reduced ball bearing service life is to be expected.

### Measuring the motor insulation resistance

- ① Measuring the motor insulation resistance.
  - ✓ Value >1 kΩ per volt of measured voltage: no measures necessary.
  - ✓ Value ≤1 kΩ per volt of measured voltage: Dry winding.

## 7.2 Tests during commissioning or re-commissioning

Prior to commissioning or re-commissioning of the G-BH8, test that

- Is the G-BH8 properly fitted and aligned?
- all pipes and hoses are correctly connected and sealed
- all fixing screws, connecting elements and electrical connections are fixed at the given tightening torques
- Do the operating conditions match the data plate details given above?
- Are the maximum speeds being monitored and adhered to through the control?
- Have all protection measures been completed?
- Cooling air supply not affected?
- Is the auxiliary ventilator ready for operation?

## 7.3 Check the direction of rotation

### Test the direction of rotation of the compressor

1. Switch on the G-BH8 briefly and then switch it off again.
2. **⚠ WARNING! With incorrect electrical connection: Risk of injury due to drawing in and suction! Do not perform the overpressure test with your hands!**  
Perform the overpressure test with a sheet of paper on the discharge side (item 8, Structure [→ 13]).
  - ✓ Overpressure present: direction of rotation is correct, no measures
  - ✓ Negative pressure present: Direction of rotation incorrect, change direction of rotation by interchanging two phases of electrical supply line

### Test the direction of rotation of the auxiliary ventilator

1. Switch on the G-BH8 briefly and then switch it off again.
2. Hold a sheet of paper in front of the air grille of the auxiliary ventilator (item 9, Structure [→ 13]).
  - ✓ The sheet is suctioned: direction of rotation is correct, no measures
  - ✓ The sheet is blown off: Direction of rotation incorrect, change direction of rotation by interchanging two phases of electrical supply line



#### 7.4 Sensors function check

- ① Check the control for error messages by disconnecting the sensors (e.g. PTC resistor, bimetal switch).
  - ✓ Remedy the cause of the error for any malfunctions.

#### 7.5 Measure the acoustic emissions

- ! It is necessary to measure the acoustic emissions for G-BH8 without piping or G-BH8 without silencers and with piping.
- 1. Ensure that all persons in the potentially excessive noise area of the G-BH8 wear ear protection.
- 2. Switch the G-BH8 on.
- 3. Measure sound during operation.
- 4. Switch the G-BH8 OFF.
- 5. If necessary, provide sound protection measures (e.g. additional silencers, ear protection, designation of noise areas).

#### 7.6 Measure oscillations

It is recommended to carry out oscillation measurements for the prescribed operating speeds. If the permitted Speed of oscillation [→ 45] is exceeded, provide measures for Reduction of oscillations and noises [→ 19].

**! WARNING**

**Danger of burns due to hot surfaces, pipes, hoses and media**  
**Temperatures of approx. 150°C [302°F] are possible on the surfaces of the G-BH8. The outlet air can reach 200°C [392°F]. Contact with hot surfaces can lead to burns!**

1. Do not touch surfaces provided with warning signs.
2. Allow to cool after removing from service

**8.1 Switch on**

1. If fitted, open the shut-off devices in the suction/pressure lines.
2. Switch the power supply and auxiliary ventilator on.
  - ✓ The G-BH8 begins to suction conveyed media.

**8.2 Switch off**

1. Switch the power supply and auxiliary ventilator off.
  - ✓ The G-BH8 interrupts the suction of the conveyed media. The pressure will be slowly reduced.
2. If fitted, close shut-off devices in suction and pressure lines.

**8.3 Switch off in emergency**

1. The G-BH8 can be switched off in emergency without any particular precautions.
  - ✓ If the brakes of the G-BH8 are actively employed, restarting in the opposite direction of rotation must be prevented.
2. Determine the cause.
3. Rectify the risk.
4. Put the G-BH8 back into operation [→ 32].



## ⚠ DANGER

### Lethal electric shock!

The frequency inverter continues to be live after the intermediate circuit voltage has been switched off, and slowly becomes de-energised.

1. After switching off, wait for **at least 3 minutes**.
2. Before opening the frequency inverter, ensure that it is de-energised.

## ⚠ WARNING

### Danger of crushing and cutting as well as burns!

Work on the G-BH8 when it is running can lead to serious injuries. Contact with hot surfaces, pipes and hoses, can lead to burns.

1. Switch the G-BH8 off and disconnect it from the power supply.
2. Wait until the impeller stops.
3. Allow G-BH8 to cool down.
4. Use personal protective equipment.

### Voiding of the warranty!

The opening of the G-BH8 by the operator within the warranty period can lead to voiding of the warranty.

Fault	Cause	Corrective measure	To be carried out by
G-BH8 does not run and does not make any noises.	Power supply failure of the G-BH8.	① Correct the power failure by checking/clearing fuses, terminals or power supply lines.	Electrician
	Intermediate circuit voltage of the frequency inverter is too low.	① Check mains voltage and frequency inverter.	Electrician
	Frequency inverter blocked.	① Use controller block. Controller block can be placed on multiple sources.	Owner
	Target value of the frequency inverter 2FC is "0".	① Specify target value.	Owner
	Frequency inverter 2FC error message "EEr" during commissioning (level inversion)	① Switch level inversion off (C0411 = 0).	Owner
	Frequency inverter 2FC bimetal switch in compressor housing is triggered and error message "EEr"	① Match to the operating conditions.	Owner
G-BH8 does not start up and makes noises.	break in one of the power supply lines.	① Correct the break in fuses, terminals or power supply lines.	Electrician
	Impeller rubs or rotor is jammed.	① Open G-BH8, remove foreign bodies, clean or replace parts.	Service*
	Impeller faulty.	① Replace impeller.	Service*
	Ball bearing is faulty.	① Replace the rolling bearing.	Service*
G-BH8 turns unevenly.	Underexcitation or overexcitation of the frequency inverter motor.	① Check the parameterisation.	Owner

Fault	Cause	Corrective measure	To be carried out by
After controller release, frequency inverter goes into error error message "OC3" on frequency inverter 2FC	Differential pressure does not correspond to the details on the data plate.	① Reduce differential pressure.	Owner
	Impeller rubs or rotor is jammed.	① Open G-BH8, remove foreign bodies, clean or replace parts.	Service*
	Ball bearing in motor or compressor part faulty.	① Replace the rolling bearing.	Service*
		① If necessary, clean filters, silencers and connecting pipes.	Service*
G-BH8 does not reach the required speed or shows no or too little differential pressure	Incorrect direction of rotation.	① Check [→ 32] the direction of rotation.	Electrician
	Incorrect target speed for the frequency inverter	① Correct the target speed.	Qualified personnel
	Fluctuating density of conveyed media.	① Take into account recalculation of pressure values. Consult the manufacturer.	Manufacturer
	Analogue input on frequency inverter incorrectly configured.	① Match the setting to the adjacent analogue signal.	Owner
	Maximum output frequency on frequency inverter too low.	① Increase maximum output frequency. Do not exceed the maximum speeds given on the data plate.	Owner
	Suction filter or in-line filter clogged	① Clean filter inserts and replace as necessary.	Qualified personnel
	Protective grid of additional silencer blocked	① Clean protective grid.	Qualified personnel
	Leaks on the plant.	① Seal the unit.	Qualified personnel
	Silencer protective grid clogged.	① Remove foreign bodies and clean the protective grid.	Service*
	Radial shaft seal faulty.	① Replace the radial shaft seal.	Service*
	Change to the blade profile due to soiling.	① Clean the impeller, check for wear and replace as necessary.	Service*
G-BH8 runs, frequency inverter 2FC target values are "0"	Minimum output frequency <0 Hz set.	No error, as due to the minimum output frequency default, the G-BH8 always starts up with a frequency <0 Hz, see Maximum speeds [→ 43].	—
The motor uses too much power when starting up.	Rpm increase (start-up voltage) of frequency inverter set too high or too low.	① Correct the setting.	Owner

Fault	Cause	Corrective measure	To be carried out by
Abnormal flow noises	Flow rate too high.	① Clean pipe/hoses, use pipes/hoses with a larger cross section if necessary.	Qualified personnel
	Silencer inserts dirty or faulty.	① Clean the silencer inserts, check for wear and replace as necessary.	Service*
Abnormal running noises or oscillations	Spring elements faulty.	① Replace spring elements.	Qualified personnel
	Ball bearing in motor or compressor part faulty.	① Replace the rolling bearing.	Service*
Vibrations too high	Spring elements faulty.	① Replace spring elements.	Qualified personnel
G-BH8 defective	Screw connections loose on pressure or suction side or on compressor cover	① Tighten screws.	Owner
	Pressure side elbow seal (O-ring) defective	① Check elbow seals and replace if necessary.	Service*
	Radial shaft seal faulty.	① Check the radial shaft seal and replace as necessary.	Service*
Other error messages on frequency inverter.	See manufacturer's operating instructions for the frequency inverter	① See manufacturer's operating instructions for the frequency inverter	User/electrician

\* Correction by qualified personnel for repair is possible when the repair manual is available.

10.1 Maintenance



**⚠ DANGER**

**Lethal electric shock!**

**The frequency inverter continues to be live after the intermediate circuit voltage has been switched off, and slowly becomes de-energised.**

1. After switching off, wait for **at least 3 minutes**.
2. Before opening the frequency inverter, ensure that it is de-energised.

**⚠ WARNING**

**Danger of crushing and cutting as well as burns!**

**Work on the G-BH8 when it is running can lead to serious injuries. Contact with hot surfaces, pipes and hoses, can lead to burns.**

1. Switch the G-BH8 off and disconnect it from the power supply.
2. Wait until the impeller stops.
3. Allow G-BH8 to cool down.
4. Use personal protective equipment.

To guarantee safe operation of the G-BH8, the following maintenance intervals are recommended. They are dependent on the operating conditions and must be adjusted by the user as necessary.

Interval	Maintenance measure	To be carried out by
Depending on the concentration of the particles of dirt in the ambient air (at least every 1000 h)	① Check the auxiliary ventilator or fan guard and cooling ribs of the motor for dirt and if necessary clean with compressed air.	Operating personnel
	① Check silencers, silencer inserts and protective grids (item 3, Structure [→ 13]) as well as, if necessary, the suction filter (item 50, Ancillaries [→ 14]) or in-line filter (item 51, Ancillaries [→ 14]) for dirt, and if necessary clean or replace.	Qualified personnel
annual	① Check the control for error messages by disconnecting the sensors (e.g. bimetal switch, PTC resistor). Remedy the cause of the error for any malfunctions.	Electrician

Interval	Maintenance measure	To be carried out by														
20,000 h or 2.5 years	<ol style="list-style-type: none"> <li>Replace the rolling bearing.</li> <li>Clean adjacent bearing areas for open ball bearings and re-grease. Grease: <b>Klüberquiet BQH 72-102</b></li> <li>Replace and grease the radial shaft seal. Grease: <b>Klüberquiet BQH 72-102</b></li> </ol> <p>Maintenance intervals have been determined for the following ambient and operating conditions:</p> <ul style="list-style-type: none"> <li>Temperature of the assembly environment: <b>+20°C</b> [+68°F]</li> <li>Conveyed media temperature on the suction side: <b>+40°C</b> [+104°F]</li> <li>Conveyed media: air</li> <li>Maximum pressure difference according to the rating plate (item N Data plate [→ 12])</li> <li>2BH851 for <math>n_{max}</math> in continuous operation</li> <li>2BH852 for operation with speed change (operating mode S9 as per IEC 60034-1). The following distribution of operating hours is the basis for potential operating speeds.</li> </ul> <table border="1"> <thead> <tr> <th>Speed [min<sup>-1</sup>]</th> <th>Total operating hours per speed [h]</th> </tr> </thead> <tbody> <tr> <td>14.000</td> <td>3.000</td> </tr> <tr> <td>12.000</td> <td>6.000</td> </tr> <tr> <td>10.000</td> <td>6.000</td> </tr> <tr> <td>8.000</td> <td>3.000</td> </tr> <tr> <td>6.000</td> <td>2.000</td> </tr> <tr> <td colspan="2">Sum of operating hours = 20,000</td> </tr> </tbody> </table>	Speed [min <sup>-1</sup> ]	Total operating hours per speed [h]	14.000	3.000	12.000	6.000	10.000	6.000	8.000	3.000	6.000	2.000	Sum of operating hours = 20,000		Service*
	Speed [min <sup>-1</sup> ]	Total operating hours per speed [h]														
14.000	3.000															
12.000	6.000															
10.000	6.000															
8.000	3.000															
6.000	2.000															
Sum of operating hours = 20,000																
<p>Different ambient and operating conditions increase (e.g. lack of continuous operation, lower pressure differences) or reduce (e.g. operation at <math>n_{max}</math>, long storage time) the values. Detailed statements are only possible when taking the actual ambient and operating conditions into consideration.</p>																

\* Maintenance and repair by qualified personnel is possible when the repair manual is available.

## 10.2 Repairs and complaints

Please consult the service department regarding repairs and complaints before sending them to the manufacturer.

- Gardner Denver Deutschland GmbH  
Industriestraße 26  
97616 Bad Neustadt  
Tel.: +49 9771 6888 2000  
Fax: +49 9771 6888 11 2000  
E-mail: er.service-nes@gardnerdenver.com  
Internet: www.gd-elmorietschle.com

## 10.3 Ordering spare parts

**Spare parts order as per repair manual.**

## 11.1 Decommissioning



### DANGER

**Lethal electric shock!**

**The frequency inverter continues to be live after the intermediate circuit voltage has been switched off, and slowly becomes de-energised.**

1. After switching off, wait for **at least 3 minutes**.
2. Before opening the frequency inverter, ensure that it is de-energised.

### WARNING

**Danger of crushing and cutting as well as burns!**

**Work on the G-BH8 when it is running can lead to serious injuries. Contact with hot surfaces, pipes and hoses, can lead to burns.**

1. Switch the G-BH8 off and disconnect it from the power supply.
2. Wait until the impeller stops.
3. Allow G-BH8 to cool down.
4. Use personal protective equipment.

! The G-BH8 can remain in the unit or be dismantled for storage.

1. Disconnect the G-BH8 from the power supply.
2. Depressurise the pipes.
3. G-BH8 Store [→ 18] or disassemble (Disposal [→ 40]).

## 11.2 Disassembly

1. Disconnect the G-BH8 from all electrical connections.
2. Dismantle the piping and hoses.
3. Close connections that are open.
4. Loosen the G-BH8 from the installation surface.
5. G-BH8 store [→ 18] or dispose [→ 40].

## 11.3 Disposal

### WARNING

**Burns, chemical burns or poisoning!**

**Burns, chemical burns or poisoning due to contact with harmful substances remaining in the G-BH8.**

- ① Decontaminate the G-BH8 as instructed by the manufacturer of the hazardous substances.

! When performing disposal, adhere to the following:

1. Dismantle the G-BH8.
2. Collect liquids and grease and dispose of them separately in accordance with the valid local regulations.
3. Dispose of components according to the valid local regulations or recycle them.



## 12.1 Mechanical data

### 12.1.1 Weight

Type	[kg]	[lbs]
2BH851	85	188
2BH852	95	210

### 12.1.2 Connection dimensions

#### Fittings dimensions - internal threads

The internal thread is arranged according to the order as an ISO 228-G pipe thread or as an American NPT pipe thread.

The NPT thread can be recognised by the adapter (item 42, Options [→ 14]).

Type	Thread
2BH8 without item 42	G 3
2BH8 with item 42	NPT 3-8

#### Fittings dimensions - hose connections

Hoses can be connected to all connection flanges.

Type	Ø [mm]	Ø [in]
2BH8	102	4.02

For further dimensions, see dimensional drawing.

### 12.1.3 Tightening torque values

The values apply if no other specifications are available.

#### Steel screws

Tightening torques for non-electrical connections for nuts of strength class 8 and screws of strength class 8.8 according to ISO 898-1.

Thread	Non-electrical		Electrical*	
	[Nm]	[ft lbs]	[Nm]	[ft lbs]
M4	---	---	<b>0,8 – 1,2</b>	0.60 – 0.90
M5	<b>4,2 – 5,0</b>	3.10 – 3.70	<b>1,8 – 2,5</b>	1.33 – 1.84
M6	<b>7,5 – 9,0</b>	5.55 – 6.65	<b>2,7 – 4,0</b>	2.00 – 3.00
M8	<b>18 – 22</b>	13.3 – 16.2	---	---

\* applicable for terminal plate connections, except for terminal strips

#### Cable and wiring screw connections

Thread	Metal		Plastic	
	[Nm]	[ft lbs]	[Nm]	[ft lbs]
M12x1.5	<b>4,0 – 6,0</b>	2.95 – 4.42	<b>2,0 – 3,0</b>	1.48 – 2.21
M16x1.5	<b>5,0 – 7,5</b>	3.69 – 5.53	<b>2,0 – 3,0</b>	1.48 – 2.21
M25x1.5	<b>6,0 – 9,0</b>	4.42 – 6.64	<b>2,0 – 3,0</b>	1.48 – 2.21
M32x1.5	<b>8,0 – 12</b>	5.90 – 8.85	<b>4,0 – 6,0</b>	2.95 – 4.42
M40x1.5	<b>8,0 – 12</b>	5.90 – 8.85	<b>4,0 – 6,0</b>	2.95 – 4.42

#### Spring mounts

Thread	[Nm]	[ft lbs]
M12	<b>35 – 42</b>	26 – 31

#### Pipe thread according to ISO 228-1, EN 10226-1 and NPT thread

Thread	[Nm]	[ft lbs]
G 3 / NPT 3-8	<b>80 – 130</b>	59 – 96

## 12.2 Permitted conditions for use

Any deviations from the following **permissible operating conditions** must be agreed with the manufacturer.

### 12.2.1 Installation height

The maximum installation height is **1000 m ü. NHN** (3280 ft above NHN) provided that no other installation height is specified on the rating plate [→ 12] under item F.

### 12.2.2 Maximum speeds

#### Governed speeds when using a frequency inverter

Type	Minimum		Maximum
	[min <sup>-1</sup> ]	[Hz]	[min <sup>-1</sup> ]
2BH851	600	10	See item E Rating plate [→ 12]
2BH852	900	15	

#### Maximum speed change permitted

Type	Speed increase (start-up) [Hz/s]	Speed decrease (braking) [Hz/s]
2BH851	33	52
2BH852	16,5	31

### 12.2.3 Maximum temperatures

Different maximum temperatures are indicated on the rating plate [→ 12] under item F.

#### Maximum temperature of conveyed media

Type	Minimum		Maximum	
	°C	°F	°C	°F
2BH8	-20	-4	+40	+104

#### Maximum ambient temperature

Type	Minimum		Maximum	
	°C	°F	°C	°F
2BH8	-20	-4	+40	+104

### 12.2.4 Permissible pressure differences between the suction and pressure side in operation

Type	Compressor operation [mbar]	Vacuum operation [mbar]
2BH8	Item N <sub>2</sub> , Data plate [→ 12]	Item N <sub>1</sub> , Data plate [→ 12]

Loss of piping must be considered.

### 12.2.5 Pressure differences acting on the side-channel compressor

#### Maximum permissible pressure differences between the suction or pressure side and assembly environment in operation

Application examples:

- Pressure of assembly environment  $\neq$  atmospheric pressure
- Mixed operation

Type	Compressor operation [mbar]	Vacuum operation [mbar]
2BH8	Item N <sub>2</sub> , Data plate [-> 12]	Item N <sub>1</sub> , Data plate [-> 12]

#### Maximum permissible pressure differences between the suction or pressure side and assembly environment at a standstill

Application example:

- static leak test

1. A long-term, **constant pressure load** can lead to the ball bearing becoming degreased.
2. A long-term, **changing pressure load** at a standstill is not permitted.

Type	Pressure difference overpressure		Pressure difference vacuum	
	[mbar]	[psi]	[mbar]	[psi]
2BH8	1500	21.7	-600	-8.70

### 12.2.6 Relative humidity

#### Ambient relative humidity

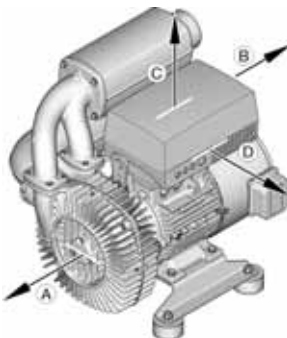
Maximum 60% at +40°C (+104°F)

#### Relative humidity of conveyed media

Condensate formation is not permitted in the G-BH8.

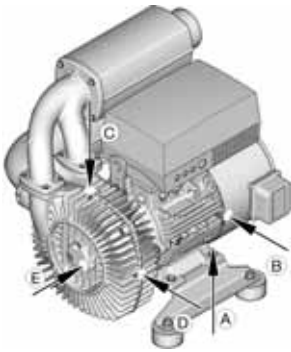
### 12.2.7 Minimum distances for heat dissipation

Adhere to the following minimum distances for heat dissipation:



Type	[mm]				[in]			
	A	B	C	D	A	B	C	D
2BH85....-...N	40	30	100	100	1.58	1.18	3.94	3.94
2BH85....-...T	40	30	0	0	1.58	1.18	0	0

### 12.2.8 Speed of oscillation



#### Maximum permissible oscillation speed for the constructed machine

Installation	[mm/s]	[in/s]
Flexible	4,5	0.177

The oscillation speed must be determined at the following measuring points

- on the motor side
  - vertical (screw connection of auxiliary ventilator and motor - A)
  - horizontal (screw connection of auxiliary ventilator and motor - B)
- on the compressor part
  - vertically (compressor cover - C)
  - horizontally (compressor cover - D)
  - axially (compressor cover next to the Elmo Rietschle logo - E)

### 12.3 Electrical data

Any deviations from the following **electrical data** must be agreed with the manufacturer.

The electrical data are provided on the Data plate [→ 12].

#### 12.3.1 Increased operating cycle frequency

For operation on the frequency inverter, there are no limits for increased operating cycle frequency.

The manufacturer's instructions for the frequency inverter must be adhered to.

#### 12.3.2 Frequency inverter parameters

The data for parameterization of the frequency inverter are provided on the Data plate [→ 12] and in the manufacturer's instructions for the frequency inverter.

#### 12.3.3 Bimetal switch in the compressor housing

<b>Contact version</b>	Open
<b>Maximum voltage</b>	250 V AC 50/60 Hz – 24 V DC
<b>Maximum current</b>	1.6 A AC/DC

### 12.4 Pressure differences generated by the side-channel compressor

#### Maximum pressure differences generated in operation

Type	Compressor operation [mbar]	Vacuum operation [mbar]
2BH8	Item N <sub>2</sub> , Data plate [→ 12]	Item N <sub>1</sub> , Data plate [→ 12]

The pressure differences given on the rating plate (item N, Data plate [→ 12]) have a tolerance of ±10% and apply to the permissible operating conditions [→ 43] and to the conveyed media of air.

### 12.5 Acoustic emissions

Measured area sound pressure level  $L_{pA}$  in accordance with ISO 3744, measured at a distance of 1 m for 70%  $\Delta p_{max}$  and connected supply lines, tolerance  $\pm 3$  dB(A).

Type	Compressor operation [dB(A)]		Vacuum operation [dB(A)]	
	167 Hz	235 Hz	167 Hz	235 Hz
2BH851	77	—	77	—
2BH852	—	77	—	77





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**Denver**

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