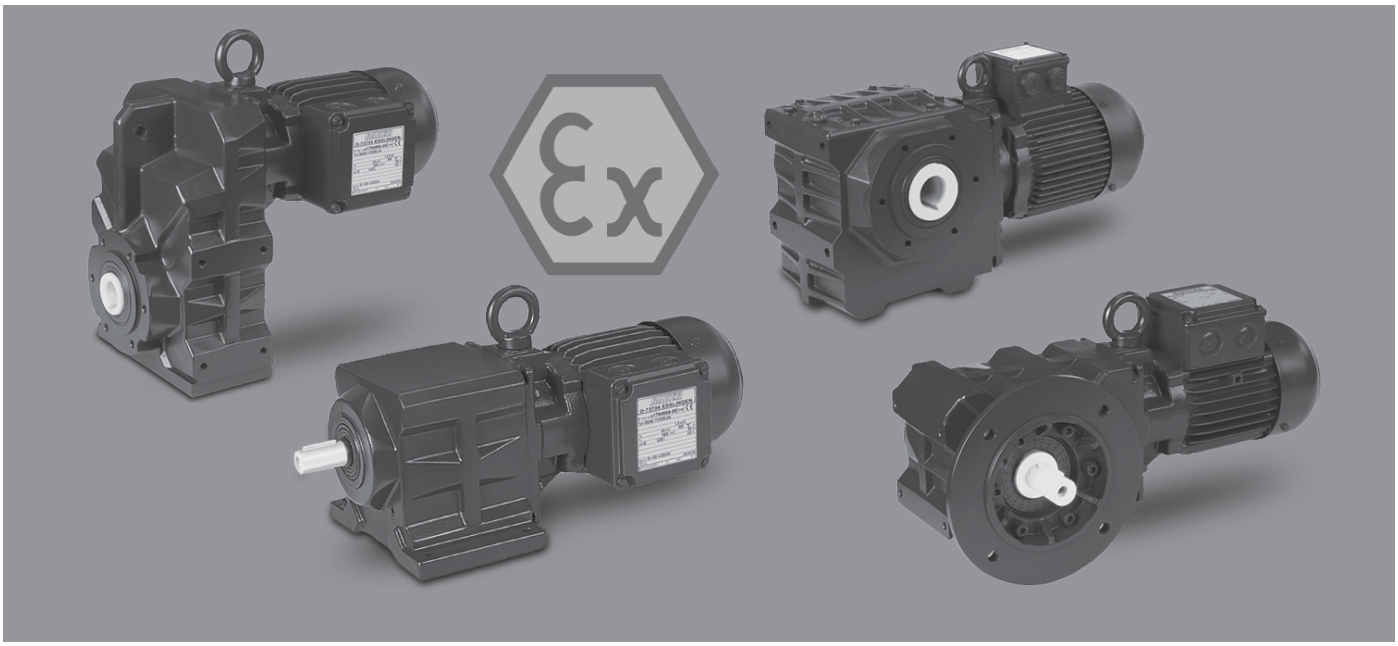
Gear series **BG.. / BF.. / BK.. / BS.. / BM ..**
Motor series **D.X. / S.X.**

Drive units **SN / C-IEC / C-NEMA**

English



Digital documentation

Scan the QR code to view and download more languages.

https://rrx.link/mcmp8416

BG Сканирайте QR кода, за да видите и да изтеглите още езици.

CN 扫描二维码以查看和下载更多语言。

CZ Pro zobrazení a stažení dalších jazyků naskenujte QR kód.

DE Scannen Sie den QR-Code, um weitere Sprachen anzusehen und herunterzuladen.

DK Scan QR-koden for at se og downloade flere sprog.

EE Muude keelte nägemiseks ja alla laadimiseks skannige QR-kood.

EN Scan the QR code to view and download more languages.

ES Escanee el código QR para ver y descargar más idiomas.

FI Skannaa QR-koodi nähdäksesi muut kielet ja ladataksesi sisältöä.

FR Scanner le code QR pour afficher et télécharger d'autres langues.

GR Σαρώστε τον γραμμωτό κώδικα QR, για να δείτε και να κατεβάσετε περισσότερες γλώσσες.

HR Skenirajte QR kod za pregled i preuzimanje drugih jezika.

HU További nyelvek megtekintéséhez és letöltéséhez olvassa be a QR-kódot.

IT Scansiona il codice QR per visualizzare e scaricare altre lingue.

LT Nuskaitykite QR kodą, jei norite peržiūrėti ir atsisiųsti daugiau kalbų

LV Noskenējiet QR kodu, lai skatītu un lejupielādētu citas valodas.

NL Scan de QR-code om meer talen te bekijken en te downloaden.

NO Skann QR-koden for å se og laste ned flere språk.

PL Zeskanować kod QR, aby zobaczyć i pobrać inne języki.

PT Ler o código QR para ver e descarregar mais idiomas.

RO Scanați codul QR, pentru a vizualiza și descărca și alte limbi.

RU Отсканируйте QR-код, чтобы просмотреть и загрузить другие языки.

SE Skanna QR-koden för att se och ladda ned fler språk.

SI Naskenujte QR kód, aby ste si mohli pozrieť a stiahnuť dokumentáciu v ďalších jazykoch.

SK Skenirajte QR kodo, da si ogledate in prenesete dodatne jezike.

TR Daha fazla dil görüntülemek ve indirmek için QR kodunu tarayın.

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1 About this documentation

These Assembly and Operating Instructions (hereinafter referred to as "documentation") are an integral part of the product. It is intended for persons carrying out work associated with the product and contains important information on safety and safe handling of the product. All safety instructions and work steps specified must be followed in order to work safely with the device.

▶ Read this document carefully before starting any work.
▶ Observe the documentation for additionally installed or attached equipment.
▶ Observe the information in this documentation during installation, commissioning and maintenance of explosion-protected three-phase motors in addition to the general installation regulations.

Any equipment independently attached to or fitted in the motors, such as rotary encoders, have their own operating instructions.

▶ Keep all documentation in the immediate vicinity of the device, accessible to personnel at all times, and in legible condition

For purposes of better presentation, the figures in this document are not to scale and may differ from the actual version.

▶ Should anything be unclear, please contact Bauer Gear Motor.

You can download the complete operating instructions in digital form with a larger font size here:

https://rrx.link/mcmp8416

Further documentation can be found at unter www.bauergears.com.

1.1 Product name

Product designations mentioned in this document are trademarks of Bauer Gear Motor, some with a registered trademark ®.

1.2 Validity

This document applies to the following series:

- Gear series BG.. / BF.. / BK.. / BS..
- Motor series D.X./S.X.

1.3 Applicable documents

The following documents form part of these Assembly and Operating Instructions:

- Connection diagram (included in scope of supply)
- Manufacturer documentation of supplier components

1.4 Symbols and means of representation

1.4.1 Warnings

Warnings are used in this document to warn of situations that could cause damage to property and personal injury.

▶ Read and observe warning notices.

▶ Follow all steps marked with the warning symbol and warning word.

Safety Alert Symbol	Signal Word	Meaning
	**DANGER**	indicates a hazardous situation which, if not avoided, will result in death or serious injury.
	**WARNING**	indicates a hazardous situation which , if not avoided, could result in death or serious injury.
	**CAUTION**	indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
–	***NOTICE***	indicates practices not related to physical injury and which, if not avoided, could result in property damages.

1.4.2 Symbols and means of representation

Symbol	Meaning
	means “additional information”
▶	Symbol for an action: You must do something here. ▶ If there are several steps, follow the order given.
▷	Symbol for an action in a safety and warning notice: You must do something here. ▶ If there are several steps, follow the order given.

1.5 Abbreviations

Abbreviation	Definition	Description
AC	Alternating current	AC current
BG	-	Helical gear
BF	-	Shaft-mounted gear
BK	-	Bevel
BS	-	Worm gear
DC	Direct current	DC current
EMC	Electromagnetic compatibility	-
HL	Manual release	-
OK	Okay	-
IP	Ingress protection	Protection rating, indicates protection for active parts against contact, ingress of foreign bodies and water
NN	Normal-null ("standard elevation zero”)	-
PMSM	Permanent magnet synchronous motor	-
RL	Backstop, blocking direction left	-
RR	Backstop, blocking direction right	-
SSV	Shrink disc connection	-
UB	Non-ventilated	-
USIT	Gaskets	USIT rings
UVV	Accident prevention regulations	-
VD	Sealing cover	-
VK	Sealing cap	-
ZV	Shaft with square end	Second motor shaft end
ZW	Shaft with key	Second motor shaft end

1.6 Copyright

Bauer Gear Motor reserves all rights regarding this document. No part of this document may be reproduced, redistributed, modified, or otherwise utilised.

2 Safety

The safety instructions serve to prevent personal injury and material damage. They relate only to the drive unit (product) concerned in this document.

▶ When using special options/components: Also refer to additional product-specific documents provided.

The product is part of a drive system and may only be put into operation if it has been properly determined that the machine or system can be operated safely.

▶ Operate the product only in accordance with the information in this document and with the information on the name plate.

▶ Only operate the entire drive unit (product) in the mounting position specified on the name plate.



WARNING!
Failure to observe the documentation
Serious or fatal injuries may result.
▷ Before using the product, carefully read this documentation and all other relevant documents.



WARNING!
Removal of explosion protection
Improper handling of the product during all phases of operation, as well as damage to property, can lead to a loss of explosion protection and an explosion hazard.
Serious or fatal injuries may result.
▷ Before using the product, carefully read this documentation and all other relevant documents, and pay close attention to and follow all information contained in this documentation.
If in doubt, consult Bauer Gear Motor.

The operator must ensure that all persons entrusted to work on the product have read and understood this document and that they follow the safety instructions given.

▶ Keep this document near the product in a place accessible to the operator.

2.1 Intended use

The products are gearboxes, three-phase motors, and geared motors – a unit made up of a mechanical motor and an integral three-phase motor.

- The products are intended exclusively for use in machines and systems.
- The products are intended to be installed in other machines.
- The products are suitable for use in potentially explosive areas.
- Products must not be used in highly charge-generating processes, such as intentional dust clouds or at a distance of less than 1 m from high-voltage electrodes.

The label indicates that the product can be used and in which zone the product may be used. The following information on the rating plate identifies the product as explosion-protected equipment that has been designed, manufactured and approved in accordance with the applicable directives and standards required for operation in potentially explosive areas, its design and assigned zone(s):

- Type of explosion protection
- Explosion group
- Temperature class
- Equipment protection level

The stated device protection level classifies the motor in the zoning scheme of the production site.

▶ Operate products only in accordance with the rated data specified on the rating plate.

Putting them into service is not allowed until the conformity of the end product with Directive 2006/42/EC has been verified.

Example marking	Fundamental compliance with Directive 2014/34/EC - execution according to standard	Use in zone:
Motor		
II 2G Ex eb IIC T3 Gb	EN 60079-0 / EN 60079-7	1 or 2
II 3G Ex ec IIC T3 Gb	EN 60079-0 / EN 60079-7	2
II 2D Ex tb IIIC T160°C Db	EN 60079-0 / EN 60079-31	21 or 22
II 3D Ex tb IIIC T160°C Dc	EN 60079-0 / EN 60079-31	22
Gearbox		
II 2G Ex h IIC T1...T4 Gb	EN 80079-36 / EN 80079-37	1 or 2
II 2G Ex h IIIC T160°C...120°C Db	EN 80079-36 / EN 80079-37	21 or 22

2.2 Explosion protection

2.2.1 Installation regulations

In addition to the applicable installation regulations for non-explosion-protected electrical equipment (DIN VDE 0100), the following provisions must be observed:

Electrical installations in potentially explosive areas

- For gas explosion protection: EN 60079-14 / VDE 0165-1
- For dust explosion protection: EN 60079-14 /VDE 0165-1

Testing and maintenance
- For gas explosion protection: EN 60079-17 / VDE 0165-10-1
- For dust explosion protection: EN 60079-17 / VDE 0165-10-1

Repair and refurbishment
(taking TRBS/TRGS into account)
- For gas explosion protection: EN 60079-19 / VDE 0165-20-1

Directives, regulations and rules on the duties of the operator
The following directives, regulations and rules apply to the operator:
- Directive 1999/92/EG
  - National implementation initially as ElexV
  - Industrial Safety Regulation (BetrSichV)
- associated Technical Rules for Operational Safety (TRBS/TRGS).

2.2.2 Modifications and repairs

If the following provisions are not observed, the motor is no longer classified as explosion-protected and the marking on the product must be removed.
▶ Do not modify the product in any way.
▶ Rectify damage to the product immediately and install only original spare parts.
▶ Damaged screws may only be replaced by screws of the same size and quality (at least A2-70).
▶ Replace damaged terminal box seal with original parts.
▶ Modifications and repairs may only be carried out by the manufacturer, repair shops or workshops with the necessary knowledge.
▶ Before putting the product back into operation:
  - Have the correct execution of the work and compliance with the regulations checked by a notified body in accordance with EU and EC Directives 2014/34/EU and 99/92/EC (in Germany: by an expert in accordance with the "Industrial safety Regulation"; abroad: in accordance with the applicable national regulations).
  - Confirm correct execution of the work and compliance with the regulations by marking on the motor or by issuing a test report.

Maintaining explosion protection in operation
▶ Avoid excessive transition resistances and excessive heating of the contact points:
  - Tighten all contact screws and nuts of the electrical connections to the specified tightening torques (Tab. 17, p. 44).
  - For third-party motors, follow the instructions in the motor manufacturer's operating manual.
▶ Exercise extreme care when connecting the power cables. Observe specifications for creepage distances and clearances.
▶ Check the seal of the terminal box for damage after each opening and replace if necessary.
▶ Ensure the protection class of the connection compartments:
  - Use sealing parts of the cable entries and connection compartments properly, as well as insertion parts intended for strain relief or as anti-twist protection for the mains cables.

Corrosion Resistance
▶ Provide corrosion protection by using non-curing sealing materials or sealing grease.
  - Approved sealing materials (in addition to commercially available corrosion protection greases): Hylomar from Marston-Domsel or Admosit and Fluid-D from Teroson.
▶ Observe the manufacturer's instructions for use.

Screws
▶ Make sure that the screws are present in the number of fixing holes provided. Tighten all screws to the specified torque (Tab. 17, p. 44 and Tab. 26, p. 65).
  - For third-party motors, follow the instructions in the motor manufacturer's operating manual.

Monitor units
▶ Ensure that the monitor units comply with the requirements of Directive 2014/34/EU and EN 1127-1.

2.3 Improper use

The following is considered improper or incorrect use:
- Changes to product
- Use in potentially explosive areas other than those specified as permitted on the product labelling
- Use in designs other than those specified on the rating plate

2.4 Personnel qualification

Knowledge of this documentation is a prerequisite for all persons.
▶ Only qualified personnel are permitted to perform any work with or on the product.

Person group	Required qualifications
Electrician	• Specific and general education and training as an electrician • At least 2 years of relevant professional experience • Knowledge of how drive units work and how to handle them • Knowledge of the different ignition protection types and installation procedures, relevant rules and regulations as well as the general principles of area classification have been conveyed • Experience using common work tools • Routine use of smartphones (e.g. videos), PC/tablet
Mechanic	• Specific and general training as a mechanic • At least 2 years of relevant professional experience • Knowledge of how drive units work and how to handle them • Experience using common work tools • Routine use of smartphones (e.g. videos), PC/tablet.

Qualified personnel must be familiar with and observe the IEC 60364/IEC 60664 standards as well as national occupational safety and accident prevention regulations and environmental regulations.

Training courses
Bauer Gear Motor GmbH offers disassembly and assembly training at regular intervals both at its headquarters and on site. Training content and dates can be found at www.bauergears.com/sales-and-service/gear-motor-academy/ under "Gear Motor Academy". Register for training courses online at www.bauergears.com/sales-and-service/gear-motor-academy/ under "Gear Motor Academy Registration". Coordinate individual training sessions with head office.

Personnel qualification for explosion hazard area
▶ Work on the product in the EX area may only be carried out by qualified personnel (in accordance with DIN EN 60079-17/VDE 0165-10-1).
Appropriate ongoing education or training shall be undertaken by personnel on a regular basis. Evidence of the relevant experience and training should be made available.

Person group	Required qualifications
Expert personnel	• in addition to the above-listed prerequisites: • Knowledge of the different ignition protection types and installation procedures, relevant rules and regulations and the general principles of area classification have been conveyed
Competent person in a management role	• adequate knowledge in the field of explosion protection • Familiarity with the local conditions and the plant itself • bears overall responsibility • Control of the inspection systems for the electrical equipment within the potentially explosive areas

2.5 Residual risks

Hazardous voltage
Serious or fatal injuries may result.
▷ Before working on electrical components of the product, ensure that there is no voltage.
▷ Take appropriate measures to prevent unintentional or accidental restart, such as removing fuses, assigning personnel to monitor, placing warning signs, etc.

Electric shock due to regenerative operation with permanent magnet synchronous motors (PMSM)
Serious to fatal injuries due to regenerative operation can result. When the drive is driven by the output shaft, the motor induces a voltage that is present at the motor terminals.
▷ Prevent the output shaft from turning, e.g. by blocking it mechanically.

Magnetic fields
Serious or fatal injuries may result.
▷ Persons with pacemakers and implants are prohibited from standing near the product and handling the product.

Automatic restart
Serious or fatal injuries may result from persons being drawn-in and caught.
▷ Before starting maintenance and repair work, make sure that the machine/system cannot be switched on again.
▷ During commissioning, ensure that no unauthorised persons are in the hazard zone.
▷ Place warning signs.
▷ Keep a safe distance from moving parts.

Improper assembly or disassembly
Serious to fatal injuries and property damage can result.
▷ Ensure that only authorised personnel are present on site.
▷ Only perform assembly and installation work when the machine/system is standing idle.
▷ Only perform work on the product when it is at a standstill and safeguarded from being inadvertently switched on, and the connection voltage is safely disconnected.
▷ Secure heavy components and attachments from falling.
▷ Ensure there is sufficient safety clearance, e.g. by using barriers as necessary.

Rotating parts
Serious or fatal injuries may result from persons being drawn-in and caught.
▷ Before starting maintenance and repair work, make sure that the machine/system cannot be switched on again.
▷ Do not work on couplings, brakes, or backstops unless they are safeguarded against a unit automatically starting up, a trolley/shuttle rolling, or a load dropping or even falling, etc.

Parts breaking loose
Parts may break loose and cause minor to moderate injury.
▷ Wear safety glasses during assembly and disassembly.

Hot surfaces
Serious injury from skin burns may result.
▷ Allow hot product surfaces to cool before touching them.
▷ Suitable protective gloves must be worn when working on hot product components.

Explosive atmosphere
Dust tightness (IP6X) is no longer ensured due to a damaged or incorrectly installed seal on the terminal box. An explosive atmosphere can form in the vicinity of live components.
Serious or fatal injuries may result.
▷ Check the seal of the terminal box after each opening and replace it with an original spare part if damaged.
▷ Close the terminal box cover correctly.
▷ Use and install approved cable entries in accordance with the manufacturer's specifications.

Damaged or incorrectly fitted terminal box seal
Due to a damaged or incorrectly installed seal on the terminal box, leak tightness against water jets (IPX5) is no longer ensured. Ingress of water in the area of live components can lead to a short circuit, material damage and immediate machine standstill.
▷ Check the seal of the terminal box after each opening and replace it with an original spare part if damaged.
▷ Close the terminal box cover correctly.
▷ Use and install approved cable entries in accordance with the manufacturer's specifications.

Frozen surfaces
Serious injury from cold burns on skin
▷ Allow cold product surfaces to warm before touching them.
▷ Suitable protective gloves must be worn when working on frozen product components.

High noise emissions
Hearing damage may result
▷ Wear hearing protection.

Forces and torques when separating transmission elements
Serious or fatal injuries may result.
▷ Only loosen and disconnect transmission elements such as couplings, chain and belt drives, etc. if no force or torque is acting on the output shaft.
▷ With shaft-mounted gears, only remove the torque arms if no force or torque is being applied.
▷ Only remove the shaft-mounted gear if no force or torque is being applied.

Non-approved spare parts
Serious to fatal injuries and material damage from drive failure, crashes, blockages, unexpected system downtimes, etc. due to the use of non-approved spare parts
▷ Use only approved spare parts.

Falling products
Improper transport of the product can result in serious injury or death.
▷ Only use suitable lifting and transport equipment.
▷ Make sure that lifting or transport equipment is approved for the specified weight.

Suspended loads
Serious or fatal injuries may result.
▷ Do not walk under suspended loads.

Unsecured loads
Serious or fatal injuries may result.
The product can also be equipped with a manual release. Manually releasing the de-energized motor can cause loads to move freely.
▷ Before operating the manual release: Secure loads.
▷ After manual release (with lockable manual release): First release the locking mechanism, then release the load.

Improper transport, storage and installation
Improper transport, storage, and installation can damage corrosion-resistant paint coatings and lead to corrosion. Mechanical damage (scratches, chipping), chemical degradation by acids or alkalis or thermal damage caused by sparks, welding beads and heat lead to corrosion and failure of the external protection.
▷ Make sure that paint coatings are protected properly during transport, storage and installation.
▷ Have damage to paint coating repaired professionally. Observe permissible paint layer thicknesses.

Exceeding permissible limit values
Heat, centrifugal force, and demagnetisation in the permanent magnets can lead to overloading, gear damage, and damage to the system/machine.
▷ Use the values for torque limit, limiting currents, and limit speed on the rating plate.

Attachment element pressure points
Pressure marks from attachment elements can damage corrosion-resistant paint coatings and lead to corrosion.
▷ Have damage to paint coating repaired professionally.

Incorrect installation positions and ambient temperatures
Material damage may occur
▷ Ensure compliance with the specified permissible installation orientations and ambient temperature ranges.

2.6 Pictograms on product

Symbol	Meaning
	The geared motor is suitable for use in potentially explosive atmospheres.
	This is not a lifting point.
	Hot surface, can cause burns.
	Operate permanent magnet synchronous motor only via inverter.
	Rotation direction of the geared motor

2.7 Personal protective equipment

All specialist personnel must wear the necessary work/protective clothing.
▶ Wear hearing protection for high noise emissions.
▶ Wear suitable protective gloves if coming into contact with hot or frozen components.
▶ Wear safety shoes.
▶ Wear safety glasses when installing electrical equipment.

2.8 Safety devices

Do not disable local monitoring and protection devices when working on the product.

2.9 Environmental protection and disposal

▶ Dispose of gearboxes, motors, and geared motors in accordance with applicable local regulations.
▶ Collect old lubricant (waste oil, grease) and dispose of properly.

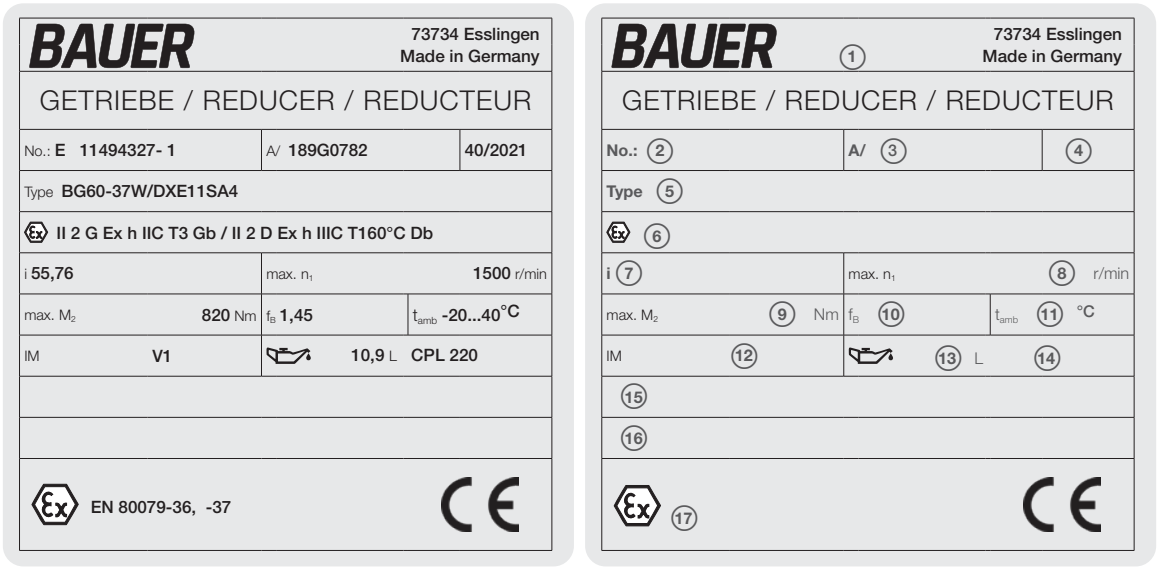
3 Product description

3.1 Product identification: geared motor

Geared motors are used to drive slow-running machines, devices, and systems. Products are identified using the type codes described below.

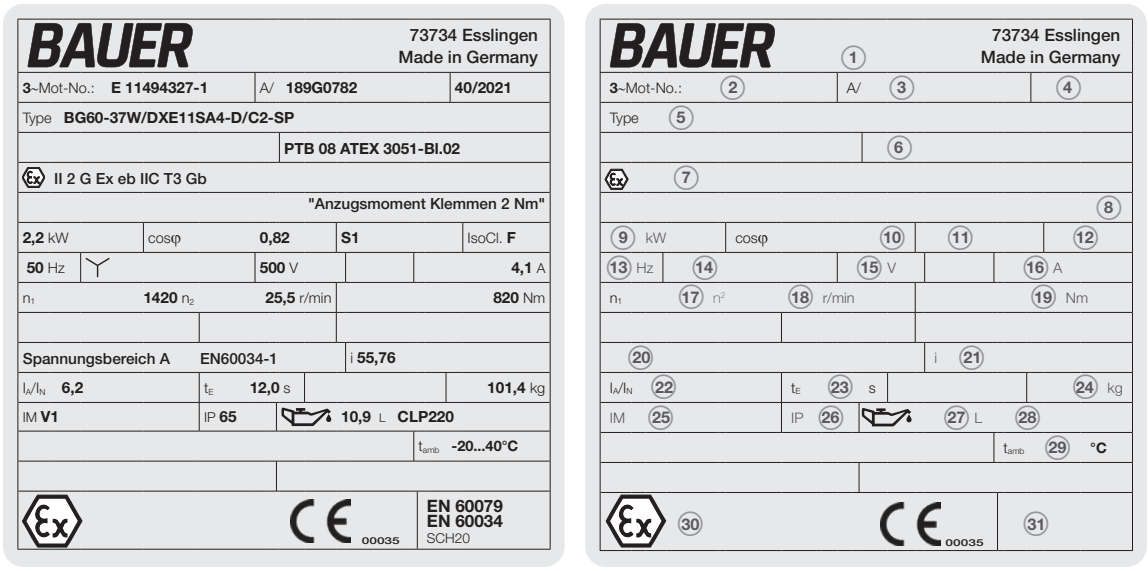
3.1.1 Rating plate/type plate

All essential data and information is stated on the rating plate in accordance with EN 60034.



Example illustration of the rating plates

1 Manufacturer
2 Motor number
3 Article number
4 Production date (week/year)
5 Type designation
6 ATEX labelling
7 Gear reduction ratio
8 Max. input speed, gearbox
9 Max. output speed of gearbox
10 Service factor
11 Permissible ambient temperature range
12 Installation position
13 Lubricant quantity
14 Lubricant class
15 Space for additional information
16 Space for additional information
17 Approvals and standards complied with



Example illustration of the rating plates

1 Manufacturer
2 Motor number
3 Article number
4 Production date (week/year)
5 Type designation
6 Type examination certificates
7 ATEX labelling
8 Additional information
9 Rated power
10 Power factor
11 Operating mode
12 Heat class
13 Rated frequency
14 Motor connection (e.g. Y)
15 Rated voltage
16 Rated current
17 Rated motor speed
18 Output speed of gearbox
19 Rated torque at output shaft
20 Additional normative information
21 Gear reduction ratio
22 Factor starting current to rated current
23 Warm-up period
24 Drive weight
25 Installation position
26 Protection rating
27 Lubricant quantity
28 Lubricant class
29 Permissible ambient temperature range
30 Approval
31 Standards complied with

3.1.2 Type code/type designation geared motors

BK 50 Z - 1 1 U W A / D.. 09L A 4 - TF - S / ES 010 A 9 HN / C2

① ② ③ ④

1 Gear type, size, and design
2 Motor type, size, and integrated designs
3 Motor attachments
4 Additional options

A complete breakdown can be found in all of our catalogues in chapter 3, see www.bauergears.com.

3.1.3 Type code/type designation of gearbox with standard motor attachment

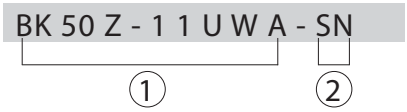
BK 50 Z - 1 1 U W A - C/IEC

① ②

1 Gear type, size, and design
2 Type of operation

A complete breakdown can be found in all of our catalogues in chapter 3, see www.bauergears.com.

3.1.4 Type code/type designation with free input shaft



1 Gear type, size, and design
2 Type of operation

A complete breakdown can be found in all of our catalogues in chapter 3, see www.bauergears.com.

3.2 Gear types and designations

BK	20	Z	X	-	6	4	U	A
①	②	③	④	⑤	⑥	⑦	⑧	⑨

1 Gearbox type*
2 Gearbox size
3 Pre-stage
4 Reinforced bearing
5 Placeholder
6 Code number for gearbox version
7 Code number for output shaft version
8 Position of gearbox version (optional)
9 Additional version (optional)
10 C: Standard motor attachment option (IEC/NEMA)
SN: free, input shaft end

*)
BG Helical gear
BF Shaft-mounted gear
BK Bevel gear
BS Worm gear
BM Monorail

3.3 Motor types and designations

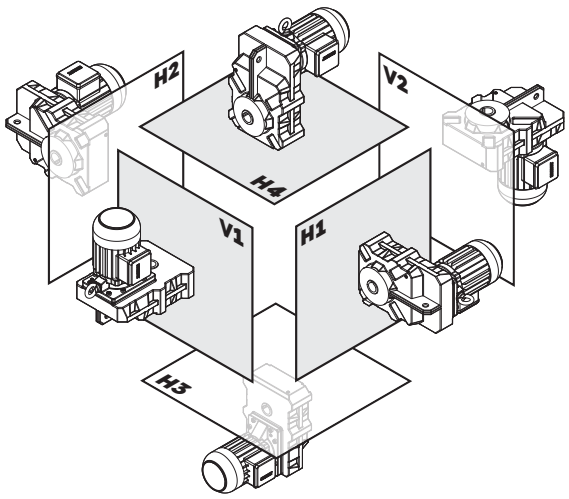
D	NF	XN	P	E	09	L	A	4	C	1	-TF
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫

1 Motor type*
2 Installation type (not required for geared motor)
3 Motor design
4 Efficiency class
5 Country-specific version of efficiency class
6 Motor size
7 Core length
8 Design status
9 Number of poles
10 Rotor material
11 Rotor material grade
12 Additional versions

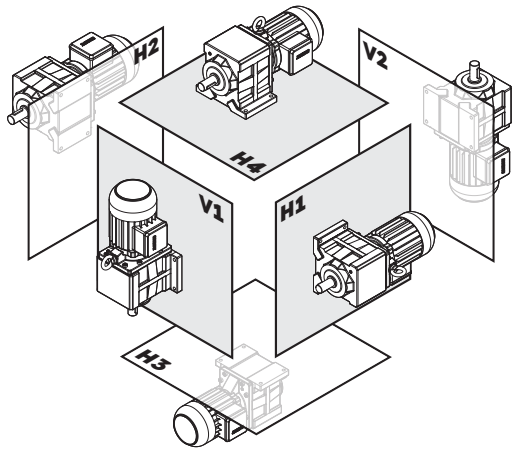
*)
D Three-phase motor
S PMSM (permanent magnet synchronous motor)

3.3.1 Installation positions

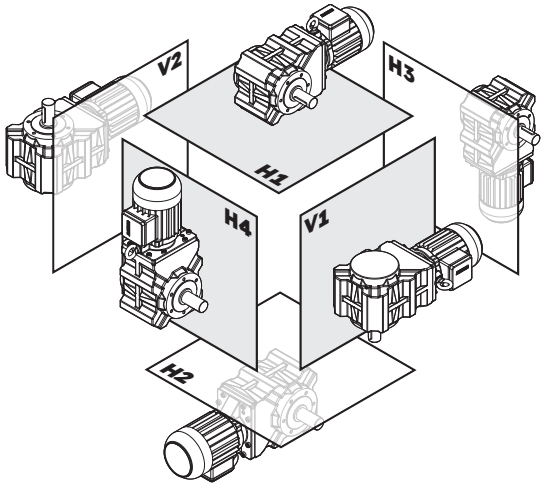
BF gearbox



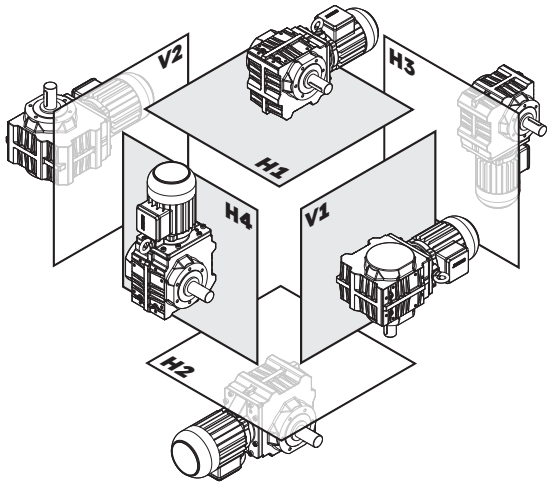
BG gearbox



BK gearbox



BS gearbox



BM gearbox

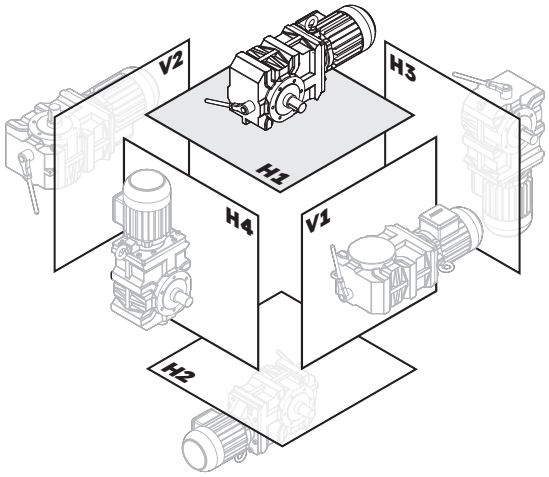


Fig. 1: mounting positions

Inclined installation positions - Explanation of the abbreviations on the type plate

Information on rating plate (example)	Explanation
H4/V1 30° Example for BG	[Installation position 1] / [Installation position 2] [Deviation value] • Installation position 1: Output installation position • Installation position 2: Installation position in which the gearbox is rotated • Deviation value: Twist angle in degrees [°]
	The actuators are used stationary in installation position H4, but rotated by 30° in direction V1.

Tab. 1: Inclined installation positions

Multiple installation positions - Explanation of the abbreviations on the type plate

Information on rating plate (example)	Explanation
H1-V2 Example for BG	[Installation position 1] - [Installation position 2]
	The actuators may be used stationary in ALL installation positions (H1 to V2).
H1,H2,V2 Example for BG	[Installation position 1] , [Installation position 2] , [Installation position 3]
	The drives may be used stationary in exactly the specified installation positions H1, H2 and V2.

Tab. 2: Multiple installation positions

Swivelling installation positions - Explanation of the abbreviations on the type plate

Information on rating plate (example)	Explanation
V2/H4/V1 Example for BG	[Installation position] / [End position] / [Intermediate position] • Installation position: Output installation position • End position: Position of the gearbox after swivelling over the intermediate position • Intermediate position: Position that the gearbox assumes when swivelling
	The actuators may be used in variable installation positions within a swivelling range between installation position V2 via intermediate position H4 to end position V1.

Tab. 3: Swivelling installation positions

NOTICE

Incorrect service intervals

The lubricant quantity for swivel mounting positions is adapted for use in different positions. Operation with an adapted (= increased) lubricant quantity without gearbox ventilation leads to higher internal gearbox pressure and reduces the service life of the shaft seals.

▷ Only operate the product in the installation position, intermediate position and end position specified on the type plate.

▷ Adjust the division of the service intervals.

3.4 Functional description

3.4.1 Three-phase motor

Induction motor

Bauer geared motors and Bauer motors for three-phase connection are supplied with specially designed asynchronous technology.

This design enables maximum operational reliability with high torque and low inrush current.

Permanent magnet synchronous motor

PMSM motor rotors are equipped with embedded permanent magnets.

3.4.2 Brakes for zone 2, 22

Spring-loaded brakes
In addition to holding loads at rest (holding brakes), the spring-loaded brake is used to decelerate masses rotating and moving linearly (service brakes) in order to shorten undesired over-travel distances and times.
The brake releases electromagnetically.
When de-energized, braking force is generated by spring pressure.
Since this system also applies braking in the event of an unintentional power failure, it can be regarded as a safety brake in the sense of accident prevention regulations.
During braking, the kinetic energy of the moments of inertia is converted into heat via the brake disc. The asbestos-free brake disc is resistant to wear and heat.

Brake attachment
- Brake for zone 22: Brakes are attached under the fan cover
- Brake for zone 2, 2/22: Brakes are attached on the fan cover

3.4.3 Gearbox ventilation

The gearboxes are dimensioned in such a way that no gearbox ventilation is required in many installation positions.
Install a pressure relief valve as necessary.

3.4.4 Sensor system for zone 2, 22

Incremental rotary encoders
Incremental rotary encoders (impulse generators/encoders) determine the position of motor shafts. Rotational movement is processed by the incremental rotary encoder and output as an electrical signal. An impulse disc with a certain number of periods per revolution detects step angles.

Absolute rotary encoders
Absolute rotary encoders detect both angular and rotational movements and convert these into electrical signals.

3.4.5 Backstop (RR, RL)

Specify blocking direction right (RR) or left (RL) when ordering.
The reference is a view of the gearbox mounting side. If the mounting side is not clearly defined, gearbox side V (front) is taken as a basis.

3.4.6 Second motor shaft end (ZW, ZV)

With this shaft end, half of the rated power can be transferred with a central drive. Permissible radial load on request. Covers are not included in scope of supply.

3.4.7 Rain cover above fan cover (D)

For motors with a vertical or >45° vertically rotated design (motor shaft), the use of a protective roof over the fan cowl is recommended.

3.4.8 Oil expansion tank

The oil expansion tank is used in critical drive configurations to maintain the build-up of pressure in the gearbox resulting from the volumetric expansion of the oil within the permissible range during operation.

3.4.9 Heating the motor for zone 2, 22

To dry motor windings after long storage periods, the motor can be heated actively, e.g. standstill heating via heater bands, see also chapter 6.9.10, p. 46.
Heating is also provided in order to ensure that the motors/geared motors start up reliably after being idle for a long period of time in very cold locations.

3.4.10 Standard motor attachment

The input assembles are intended for assembly with standard motors in sizes up to and including IEC280 or NEMA405 by means of a compression coupling.

3.4.11 Free input shaft end

The drive parts are equipped with a freely accessible cylindrical shaft end with key.

4 Scope of supply

The geared motor is delivered as a ready-to-use unit (filled with lubricant).
Accessories ordered separately, e.g. shrink disc connections or rubber buffers for torque arm, are attached to the product or otherwise enclosed with delivery.
The gearboxes are delivered from the factory with the type and quantity of lubricant specified on the rating plate.

5 Transport and storage

5.1 Incoming goods

NOTICE
Incomplete and damaged products
Obstruction and complication of operational processes
▷ Do not install or commission damaged products.

▶ Immediately check delivery for completeness upon receipt.
▶ Verify that the technical design of the product corresponds to the order.
▶ Check rating plate.
▶ Inspect products for packaging and shipping damage.
▶ Report any damage to the transport company immediately.

The product is delivered assembled.
Any additional equipment is supplied separately and packaged as an "accessory pack".

5.2 Transportation

NOTICE
Improper transport
Material damage may result. The ring eyelet attached close to the centre of gravity does not guarantee that the product will remain in a horizontal position.
▷ Observe the specifications for proper transport.
▷ Lift the product slowly and ensure that it remains in a horizontal position by attaching the lifting gear (additional loops) appropriately.
▷ Do not install or commission damaged products..

With our products, only eye bolts pursuant to DIN 580 are permitted for use as lifting points for lifting equipment. The eye bolts are only designed for the weight force of the gearbox/motor/geared motor. Additional loads are not permitted.
Only one lifting point is provided per product.

▶ When lifting and transporting heavy loads, follow internal factory specifications for handling loads.
▶ Only use suitable lifting and transport equipment.
▶ See the rating plate for the product weight.
▶ Make sure that the lifting or transport equipment is approved for the specified weight.
▶ Only use the provided lifting points for lifting and transporting.
▶ For geared motors with pre-stages (Z) or intermediate gears (G), use only the eye bolt closest to the main gearbox.
▶ Make sure that the eye bolts are completely tightened.
  • The eye bolt(s) should lie flat on the housing surface.

5.3 Storage

NOTICE
Improper storage
Material damage may result.
▷ Observe the specifications for proper storage.
▷ Do not install or commission improperly stored products.

5.3.1 Short-term storage

If the product is not installed immediately as intended, it can be stored for up to 9 months without taking any special measures.
▶ If possible, store the product in the intended installation position.
▶ Store product in a dry place.
▶ Avoid temperature fluctuations outside the normal range of -20 to +40 °C.
▶ Do not subject product to shocks or vibrations.
▶ Have transport damage to paint or corrosion protection repaired professionally.

5.3.2 Long-term storage

☑ Storage space requirements
☑ Storage space is dry, dust-free, ventilated, and free of vibrations (permissible vibrations v_{eff} <0.2 mm/s).
☑ Storage temperature range: -20°C to +40°C with minor fluctuations.
☑ Air in the room should be free from aggressive, corrosive, or radioactive elements.
☑ Do not expose product to direct sunlight or any other source of UV radiation.

Preparation for storage

NOTICE
Improper storage
Improper storage can damage corrosion-resistant paint layers and thus lead to corrosion. Mechanical damage (scratches, slivers), chemical corrosion from acids or alkali, or thermal damage from flying sparks, welding beads, and heat will cause the external protection to deteriorate and fail.
▷ Observe the specifications for proper storage.

▶ Check the exterior paintwork. Repair any damage if necessary. Observe the permissible paint layer thicknesses.
▶ Check the corrosion protection on bare metal parts (shafts, hollow shafts, flanges, etc.). Repair any damage if necessary.
▶ Replace the vent valve with a suitable screw plug.

During the storage time
Do not stack products on top of each other.
▶ Store the product on a hollow base.
▶ Cover product when stored.
▶ Products that require the oil to be refilled during normal operation must be turned 180° at 6-month intervals to ensure all bearings and gears on the reverse side are covered with lubricant.
  • On special request, the product can be prepared for long-term storage and completely filled with lubricant. In this case, there is no need to turn the product during storage.
▶ To prevent the sealing ring/sealing lips from sticking or hardening, we recommend turning the product every six months.

6 Installation

6.1 Requirements for installation site

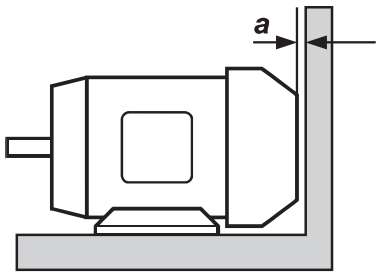
NOTICE
Incorrect installation positions and ambient temperatures
Material damage may result.
▷ Observe the information on authorised installation positions and ambient temperatures.

The product may only be operated in the installation position and ambient temperature specified on the rating plate.

▶ Any change to the installation position specified on the nameplate is only permitted after consultation with BAUER GEAR MOTOR!

▶ Make sure that the air inlet and outlet of the fan cowl are not obstructed.
- Obstruction of the air inlet and air outlet can lead to the heating of the drive exceeding the permitted temperature class.

▶ In operations with heavy soiling: Also check and clean the airways regularly.

Motor size	Minimum distance of an obstacle in front of the air inlet opening [mm]	
to D .. 16	100	
D .. 18 to D ... 22	100	
from D .. 25	125	

Tab. 4: Minimum distance in front of air inlet opening

6.1.1 Substructure

☑ The substructure is torsion-resistant and vibration-damping.
☑ Mounting surfaces for gearbox feet or gearbox flanges are flat.
▶ Do not clamp transmission flanges and gearbox feet against each other.
- Max. Permissible flatness errors: see Chapter16.2, p. 64

6.1.2 Cooling air supply and heat emission

☑ Cooling air supply to the motor is unobstructed (at least 10 cm away from the air inlet in the fan cover): see Tab. 4, p. 24
☑ Heat dissipation via radiation and convection is unimpeded, no enclosure

6.1.3 Installation

▶ Have any damage to paint coating caused during transport, installation, and assembly repaired professionally before commissioning.
▶ For upright motors or those rotated into an upright position (motor shaft):
- Foreign objects must be prevented from falling into the fan cowl, e.g. by means of a suitable protective roof over the fan cowl, see chapter 3.4.7, p. 21.

▶ Check the product at regular intervals with regard to fastening and tightness of cabling.
▶ Remove any deposits of dust and dirt.

Installation outdoors or in damp rooms
Geared motors starting from motor size 63 (D06...) are suitable as standard for protection rating IP65 and for use outdoors or in damp rooms. For corrosion reasons, use increased corrosion protection (CORO1 ... CORO5-M and Im2).

Direct sunlight, e.g. when installed outdoors, is not permitted.
▶ Use suitable covers that do not accumulate heat.

6.2 Mechanical installation

Unless otherwise specified, the tightening torques for screw connections in accordance with Tab. 26, p. 65 must be selected.

6.2.1 Required tools and aids

The following tools and aids are required for mechanical installation:
- Disassembly/assembly aids
- Transport devices
- Lifting equipment
- Hand tools such as wrenches, screwdrivers, etc.
- Torque wrench for checking tightening torques
- Mounting tools for shaft-mounted gearboxes as well as couplings, chain/gearwheels etc.
- Cleaner for degreasing shafts for shrink disc connections
- Anti-skid/anti-corrosion agent for mounting hollow shafts with keyway
- Screw locking agent, e.g. Loctite®
- Measuring equipment, e.g. caliper gauge for measuring rubber buffer pre-stress
- Use fixing screws of strength class 8.8 at least.

6.2.2 Consumables

NOTICE
Lack of lubricant or over-lubrication
Damage and machine/system downtime can result.
▷ Only operate the product in the installation position specified on the rating plate.

The product is delivered ready for operation with lubricant.
The lubricant type and quantity favourable for the intended mounting position are specified on the rating plate, see chapter 3.1.1, p. 16.
For information on lubricant schedules and approved lubricant types, see chapter 11.1, p. 58 and chapter 11.4.2, p. 60.
▶ Any change to the installation position specified on the nameplate is only permitted after consultation with BAUER GEAR MOTOR!

6.2.3 Inspections and preparatory work before installation



CAUTION
Sharp edges on open feather keyways
Cutting injuries may result
▷ Insert the key into the keyway

Work can only be carried out if the following requirements are met:
☑ Product is not damaged or leaking.
☑ The information on the product rating plate matches the requirements with regard to power, speed, voltage, frequency, installation position, and ambient temperature in particular.
☑ Any potential dirt and anti-corrosion agents on flange surfaces, fittings, and output shafts have been removed.

In abrasive, aggressive, or corrosive ambient conditions, only use the product if it is appropriately dimensioned and designed. If in doubt, consult Bauer Gear Motor.

▶ Check the direction of rotation when not coupled. (For information on electrical connection, see chapter 6.9, p. 40 if hazards and/or material damage are expected if the output shaft rotates in the wrong direction).
▶ For products with backstop, check that the working direction (see arrow) corresponds to the required direction of rotation.
▶ When connecting, make sure that the output shaft rotates in the correct direction. In case of doubt, perform a rotary field test.

6.2.4 Requirements for operating the BM gearbox

BM gearbox with mechanically operated clutch
Friction between the shift lever and clutch lever can cause electrostatic charging and consequently a risk of explosion. This can result in serious or fatal injuries.
The clutch is operated in BM gearboxes via a shift lever and a shift lever located outside the gearbox. The mechanical shift clutch located in the gearbox does not pose a fire hazard.
▶ Observe the operating conditions specified in the project planning or delivery documents.
▶ For BM gearboxes, ensure that the coupling meets at least one of the following conditions:
- Location/arrangement of the switch ruler: outside the EX area
- Material of the switching ruler: plastic
- Activation from control-locked travel speeds below 1 m/s.

▶ For plastic switch guides: Assess the potential risk of electrostatic charge before installation. Ensure that no electrostatic charge occurs.

Wheel for electric monorail systems with gearbox BM
The wheel supplied by the manufacturer of the electric overhead conveyor may have a plastic coating.
▶ Ensure that the plastic sheath is made of electrostatically dissipative material.

6.2.5 Drive elements

NOTICE
Material damage due to improper installation of drive elements
This may result in damage to the bearing.
▷ Heat drive elements, such as pinions or couplings, before assembly.

DANGER
Ejection of unsecured keys from the keyway
This can result in serious or even fatal injuries caused by flying debris.
▷ Drive with the customer's drive element fitted or the key suitably secured operate.

6.2.6 Motor with second shaft end

Engines with an optional ZW second motor shaft end are delivered with the key inserted and secured for transportation.

DANGER
Ejection of unsecured keys from the keyway
This can result in serious or even fatal injuries caused by flying debris.
▷ Operate the drive with the customer's drive element fitted or suitably secured key. .

DANGER
Rotating parts.
Serious to fatal injuries are the result.
▷ If no protection is provided on site, install a protective cover in accordance with accident prevention regulations.

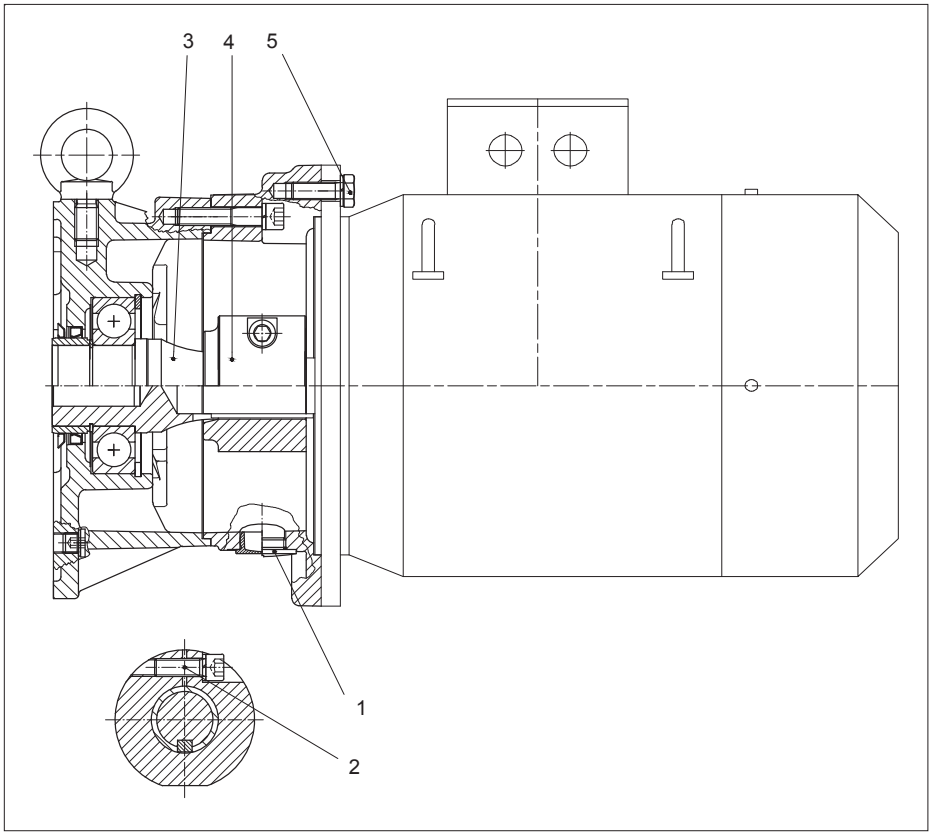
6.3 Mounting standard motors with C-coupling (IEC and NEMA)

Standard motors of IEC frame sizes 56 to 280 (version B5) and NEMA 56C to 405TC using mounting variant "C"

▶ Use the following tightening torques:

IEC motor size	NEMA motor size	Bolt	Tightening torque [Nm]
56	-	M6	10.1
63	-	M6	10.1
71	56	M6	10.1
80	-	M8	24.6
90	145	M8	24.6
112	184	M8	24.6
132	215	M12	84
160	256	M12	84
180	286	M12	84
200	-	M16	206
225	326	M16	206
250	365	M16	206
280	405	M16	206

Tab. 5: Tightening torques for tensioning screws



1. Remove installation seal 1.
2. Align the clamping ring for tensioning bolt 2 with the installation seal bore. Loosen tensioning bolt 2 until clamping ring 4 does not exert any tensioning effect on intermediate shaft 3.
3. Align the motor with regard to the rotor shaft and bore pattern on the connection diagram on the transmission side.
4. For easier assembly, assemble the motor and transmission in a vertical position (motor at the top).
5. Insert the motor shaft freely into the intermediate shaft.
6. Tighten the motor mounting bolts 5.
7. Tighten the tensioning bolt 2.
8. Attach installation seal 1.

6.4 Installation of hollow shaft gearbox with hollow shaft with keyway or spline

This also applies to AsepticDrives or CleanDrives.

▶ Use the following tightening torques:

Screws/nuts with thread	Tightening torque [Nm]
M6	11
M8	25
M10	48
M12	86
M16	210
M20	410
M24	710
M30	1450

Tab. 6: Tightening torques, hollow shaft installation

NOTICE

Unsuitable or improperly used tools

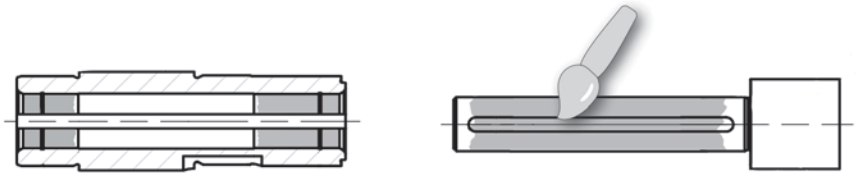
Material damage to drives (bearings, shaft and gearbox housing) and the environment/system may result.

▷ Do not hit transmission elements such as pinions, hubs, couplings, etc. with a hammer.

▷ Pull on transmission elements with a suitable device.

▶ Use an assembly aid to pull the gearbox onto the machine solid shaft with key or spline and secure it axially, see 6.2.1, p. 25.

▶ To facilitate assembly: Apply suitable anti-corrosion protection to shaft and bore.



6.5 Assembly of shaft-mounted gear with hollow shaft with shrink disc connection

NOTICE

Improper handling

Damage to the hollow shaft may occur.

▷ Tighten screws on shrink disc connection only with the solid shaft installed.

DANGER

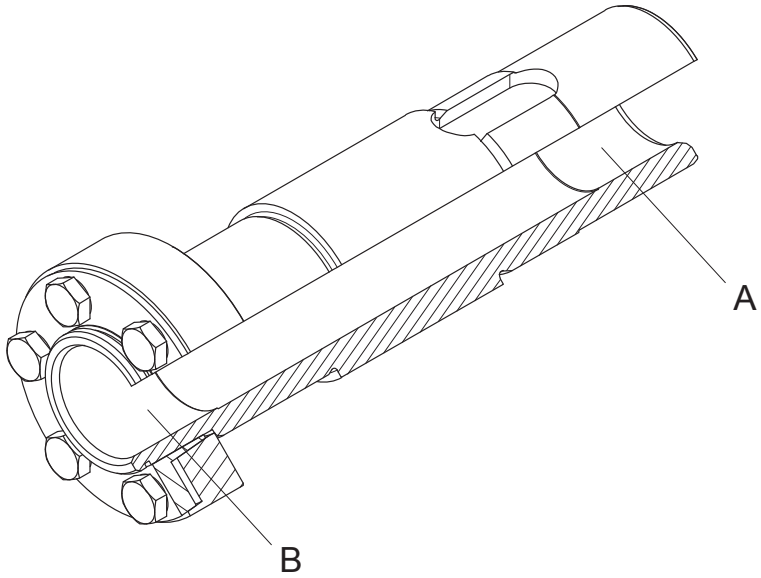
Risk of explosion due to improper handling

Frictional heat during slippage can lead to an explosion risk. Serious or fatal injuries may result.

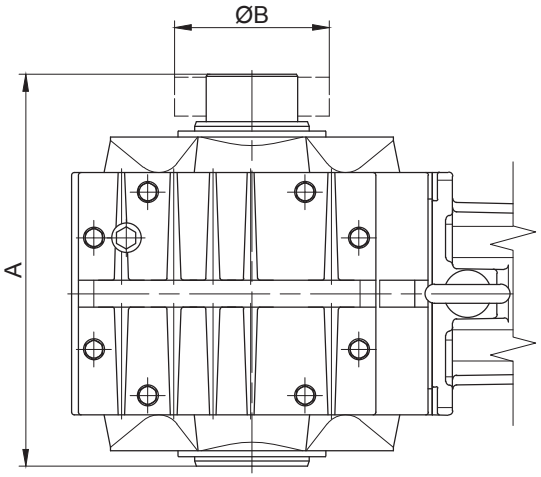
▷ Clean the shafts very carefully.

▷ Tighten the screws on the SSV according to the specifications.

1. Clean solid shaft and hollow shaft bore over the entire length. In particular, assembly personnel must clean areas A and B of oil, grease, and any contaminant that reduce the friction coefficient.
2. Before tightening (tensioning the shrink disc), ensure that the contact surface between the outer surface of the hollow shaft and shrink disc (area B) is free of oil, grease, and any contaminant that reduce the friction coefficient.
   - Remove residue.



3. Slide shrink disc onto the hollow shaft so that the outer clamping flange is flush with the shoulder of the hollow shaft phase. If the shrink disc connection cannot be pushed on, slightly loosen the tensioning screws.



4. The solid shaft must be at least long enough to cover the entire area under the shrink disc connection. Slide the gearbox onto the solid shaft of the machine.
5. Tighten the tensioning screws with several clockwise turns using a torque wrench. Make sure that the gap between the flanges is uniform all around. Required tightening torque: see SSV manual.

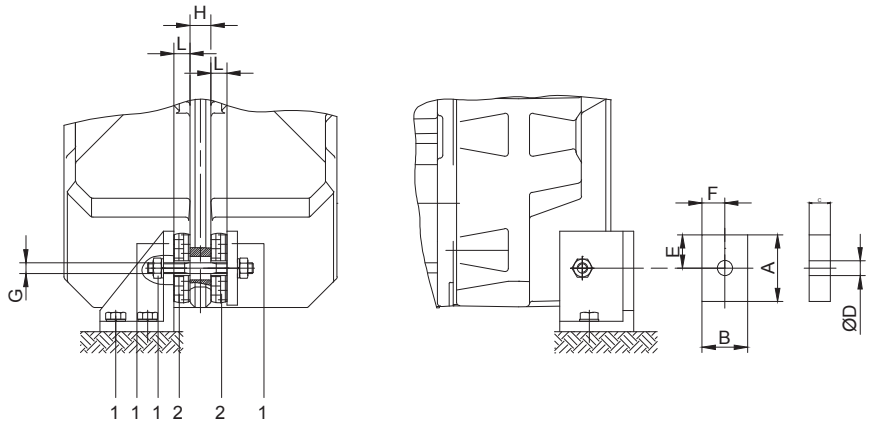
6.6 Installation of torque arm

WARNING
Improper use of rubber buffers
The use of rubber buffers with different pre-stresses allows relative movements that could generate frictional heat. Serious or fatal injuries may result.
▷ Rubber buffers with specified pre-stresses (see Tab. 7, p. 30, Tab. 8, p. 31, Tab. 9, p. 32) must be used.
▷ Avoid metallic contacts by using rubber buffers.
▷ Avoid metallic contacts through correct pre-stressing.
▷ Avoid play and frictional heat by correct pre-stress.

WARNING
Improper installation of torque arm
The dimension "L", see following graphics and tables, determines both the pre-stress force of the torque arm and the tightening torque of the fixing screw "G". Play leads to knocking and gearbox overload. Serious or fatal injuries may result.
▷ Observe the specified preload values (see tables).
▷ Use bolts and nuts with a strength of 8.8 or higher.
▷ Make sure that the position of fixing screw "G" is parallel to the bore.

6.6.1 Rubber buffer for torque arm with shaft-mounted gearboxes

For gear code BF..-0./ (shaft-mounted version): Rubber buffers are included in the delivery. Attachments are not included in scope of supply.



1 not included in scope of supply
2 Rubber buffer pre-stressed
G Maximum bolt diameter

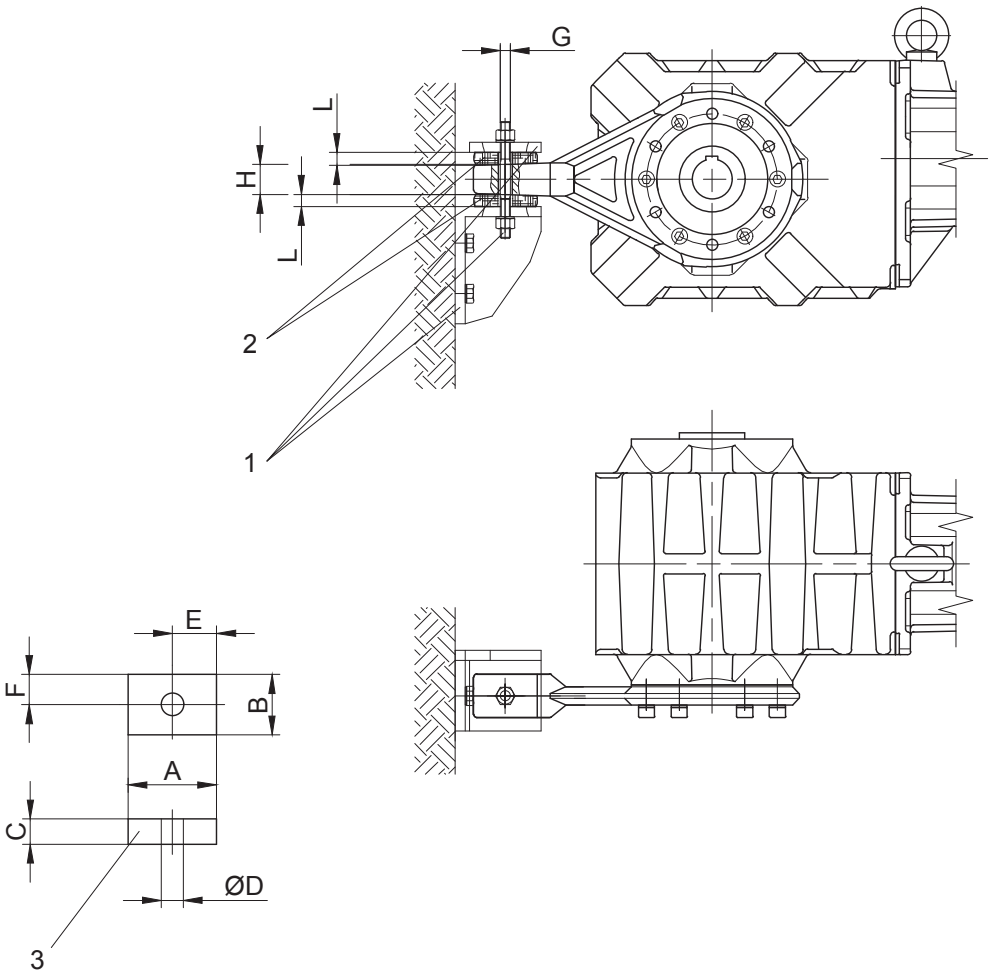
Material:	Natural rubber
Hardness:	50 +/-5 Shore A
Transverse hole dimensions:	See dimension drawing for respective gearbox

Gearbox	Item	A	B	C	D	E	F	G	H	L
BF06	0	30	30	12	12	15	15	M10	10	10
BF10	1	48	32	15	14	24	16	M10	16	13.5
BF20	1	48	32	15	14	24	16	M10	18	13
BF30	2	63	43	20	14	31.5	21.5	M10	18	17
BF40	2	63	43	20	14	31.5	21.5	M10	20	16.5
BF50	3	88	60	25	22	44	30	M18	24	21.5
BF60	3	88	60	25	22	44	30	M18	28	21
BF70	4	123	88	30	26	61.5	44	M20	30	25.5
BF80	5	133	103	35	26	66.5	51.5	M20	40	30
BF90	5	133	103	35	26	66.5	51.5	M20	50	29.5
Dimensions in mm (in.)										

Tab. 7: Rubber buffer, shaft-mounted gearbox, dimensions

6.6.2 Rubber buffer for torque arm with bevel gearboxes

With supplied torque arm for gearbox code BK..-0: Rubber buffers are included with delivery. Attachments are not included in scope of supply.



1 not included in scope of supply
2 Rubber buffer prestressed
3 Rubber buffer
G Maximum bolt diameter

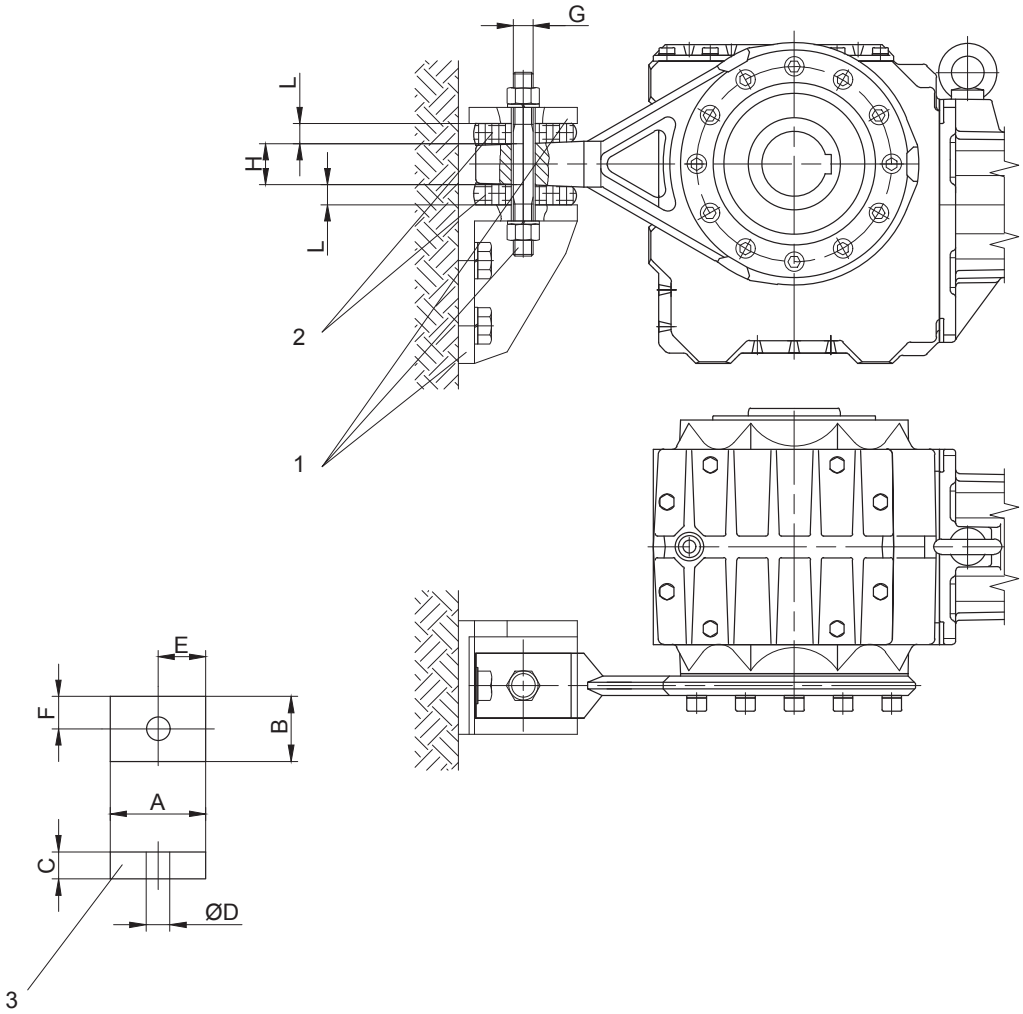
Material:	Natural rubber
Hardness:	50 +/-5 Shore A
Transverse hole dimensions:	See dimension drawing for respective gearbox

Gearbox	Item	A	B	C	D	E	F	G	H	L
BK06	0	30	30	12	12	15	15	M10	10	10
BK08	1	48	32	15	14	24	16	M10	19	13.5
BK10	1	48	32	15	14	24	16	M10	19	13.5
BK17	1	48	32	15	14	24	16	M10	19	13
BK20	1	48	32	15	14	24	16	M10	19	13
BK30	2	63	43	20	14	31.5	21.5	M10	30	17
BK40	2	63	43	20	14	31.5	21.5	M10	30	17
BK50	3	88	60	25	22	44	30	M18	36	21.5
BK60	3	88	60	25	22	44	30	M18	38	21
BK70	4	123	88	30	26	61.5	44	M20	40	25.5
BK80	5	133	103	35	26	66.5	51.5	M20	45	30
BK90	5	133	103	35	26	66.5	51.5	M20	45	29.5
Dimensions in mm (in.)										

Tab. 8: Rubber buffer, bevel gearbox, dimensions

6.6.3 Rubber buffer for torque arm with worm gearboxes

With supplied torque arm for gearbox code BS..-0: Rubber buffers are included with delivery. Attachments are not included in scope of supply.



1 not included in scope of supply
2 Rubber buffer prestressed
3 Rubber buffer – only for BS03-BS40
G Maximum bolt diameter

Material:	Natural rubber
Hardness:	50 +/-5 Shore A
Transverse hole dimensions:	See dimension drawing for respective gearbox

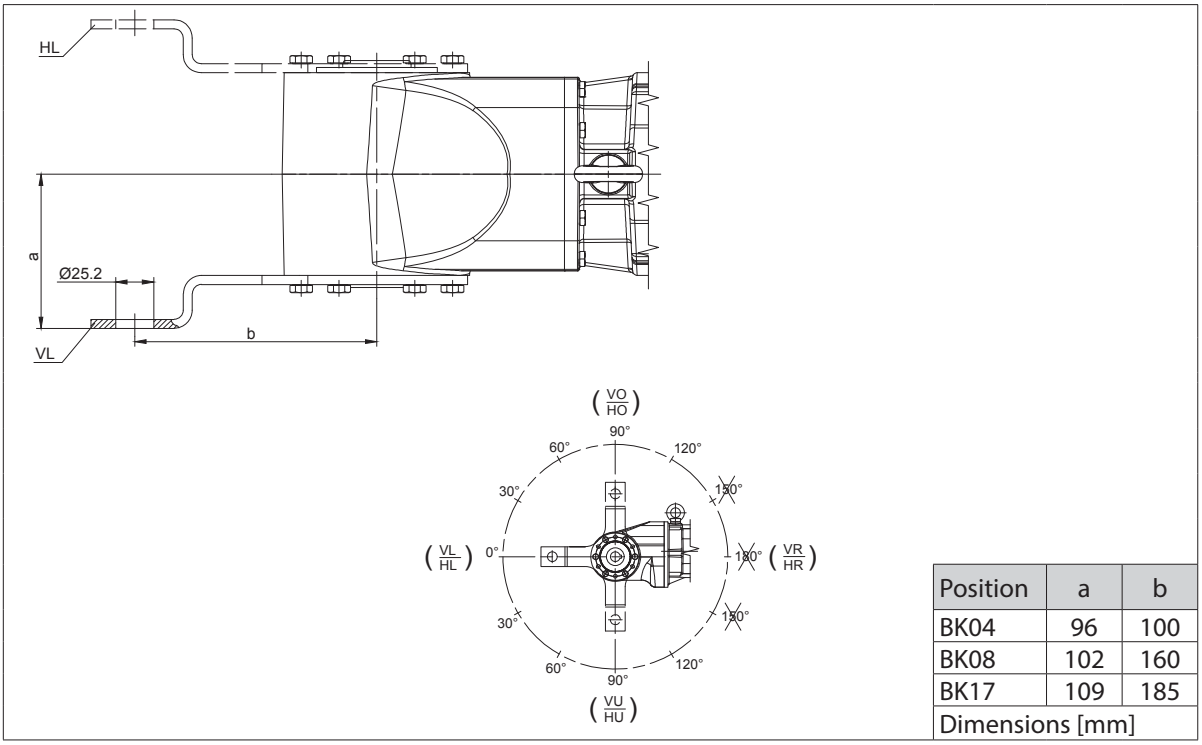
Gearbox	Item	A	B	C	D	E	F	G	H	L
BS02	-	-	-	-	-	-	-	M8	6	-
BS03	0	30	30	12	12	15	15	M8	10	10.5
BS04	0	30	30	12	12	15	15	M8	10	10.5
BS06	0	30	30	12	12	15	15	M10	10	10
BS10	1	48	32	15	14	24	16	M10	19	13
BS20	2	63	43	20	14	31.5	21.5	M10	30	17.5
BS30	2	63	43	20	14	31.5	21.5	M10	30	17
BS40	3	88	60	25	22	44	30	M18	38	22
Dimensions in mm (in.)										

Tab. 9: Rubber buffer, worm gearbox, dimensions

6.6.4 Torque arm for gearboxes BK04, BK08, and BK17

For gearbox code BKH..-0: The torque arm is delivered as a set, consisting of a mounting kit and the torque arm as an accessory with the drive.
The torque arm is not suitable for switching operation.
▶ For switching operation, please contact Bauer Gear Motor GmbH.

▶ Attach mounting kit according to illustration below.



Position	a	b
BK04	96	100
BK08	102	160
BK17	109	185
Dimensions [mm]		

Fig. 2: Torque arm design and position

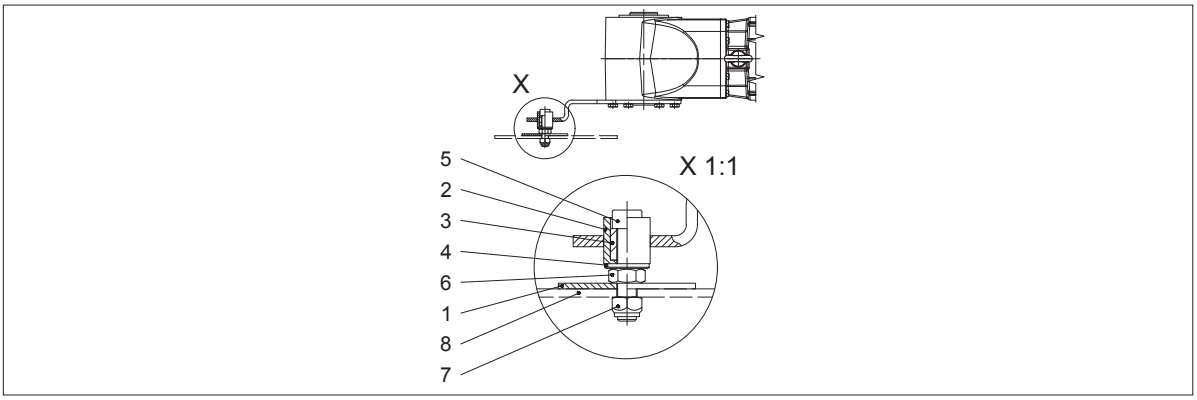


Fig. 3: Mounting kit

Item	Description	Specification
1	Disc	-
2	Bushing	-
3	Sleeve	-
4	Disc	DIN 125-B 13 VA
5	Cylinder screw	DIN EN ISO 4762-M10x50
6	Hex nut	DIN EN ISO 4032-M10
7	Hex nut	DIN 982-M10
8	Customer-side machine housing	-

Tab. 10: Mounting kit

To install the torque arm to the gearbox housing, the mounting kit includes 6 stainless steel screws.
▶ Use the following tightening torques:

Size	Tightening torque [Nm]
M6	8
M8	22
M10	43

Tab. 11: Tightening torques for torque arm installation

6.7 Installation of protective cover

DANGER
Rotating parts
Serious to fatal injuries are the result.
▷ If no protection is provided on site, install a protective cover for the SSV in accordance with accident prevention regulations (UVV) (available as an option).

6.7.1 Protective cover for shrink disc connection

The following covers are provided as contact protection. They do not protect against water or dirt. Special versions for protection rating IP65 are available on request.

Optionally available
Following versions:

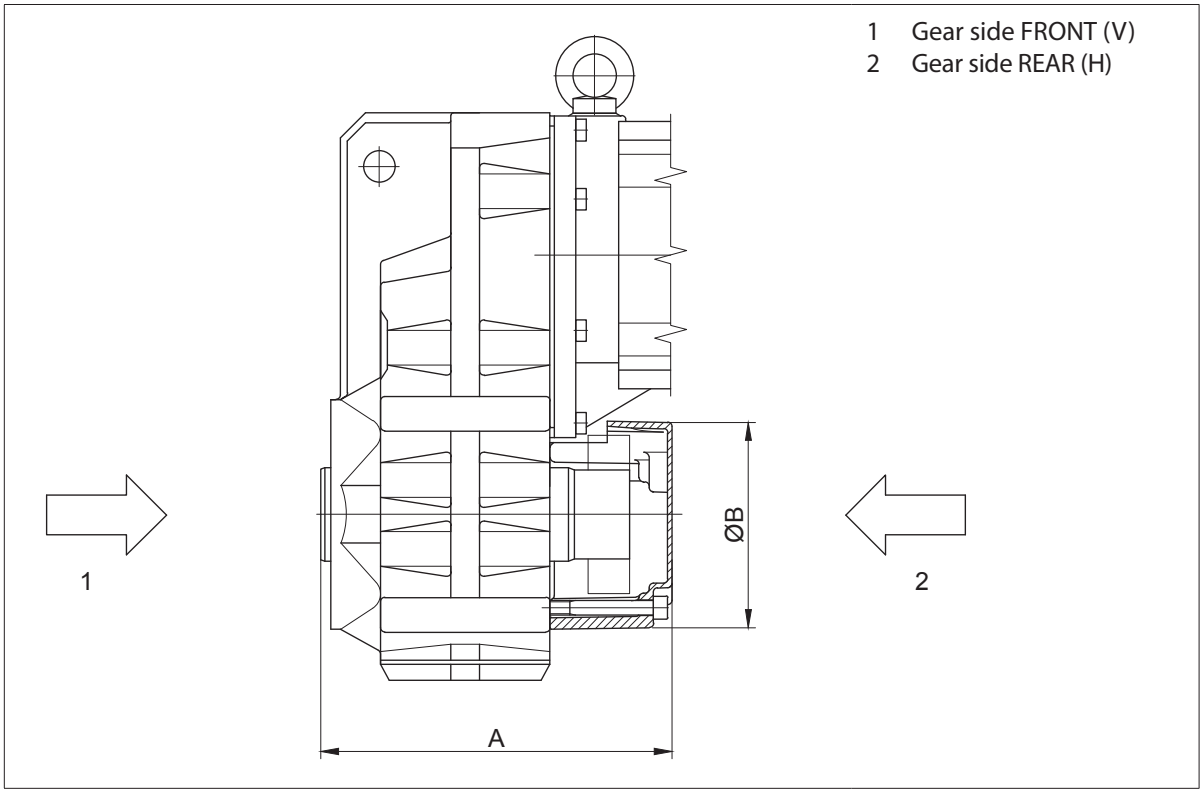


Fig. 4: SSV cover for shaft-mounted gearbox BF10 ... BF90

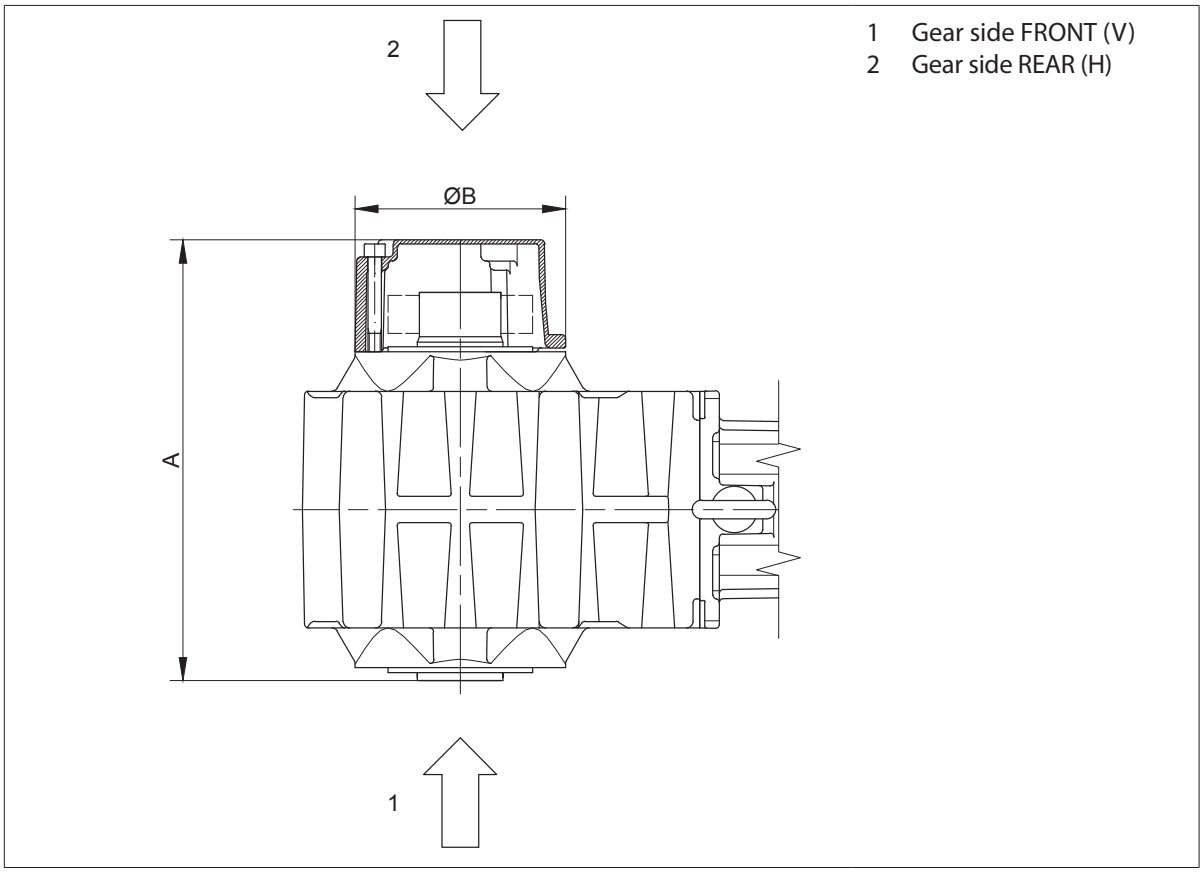


Fig. 5: SSV cover for bevel gearbox BK10 ... BK90

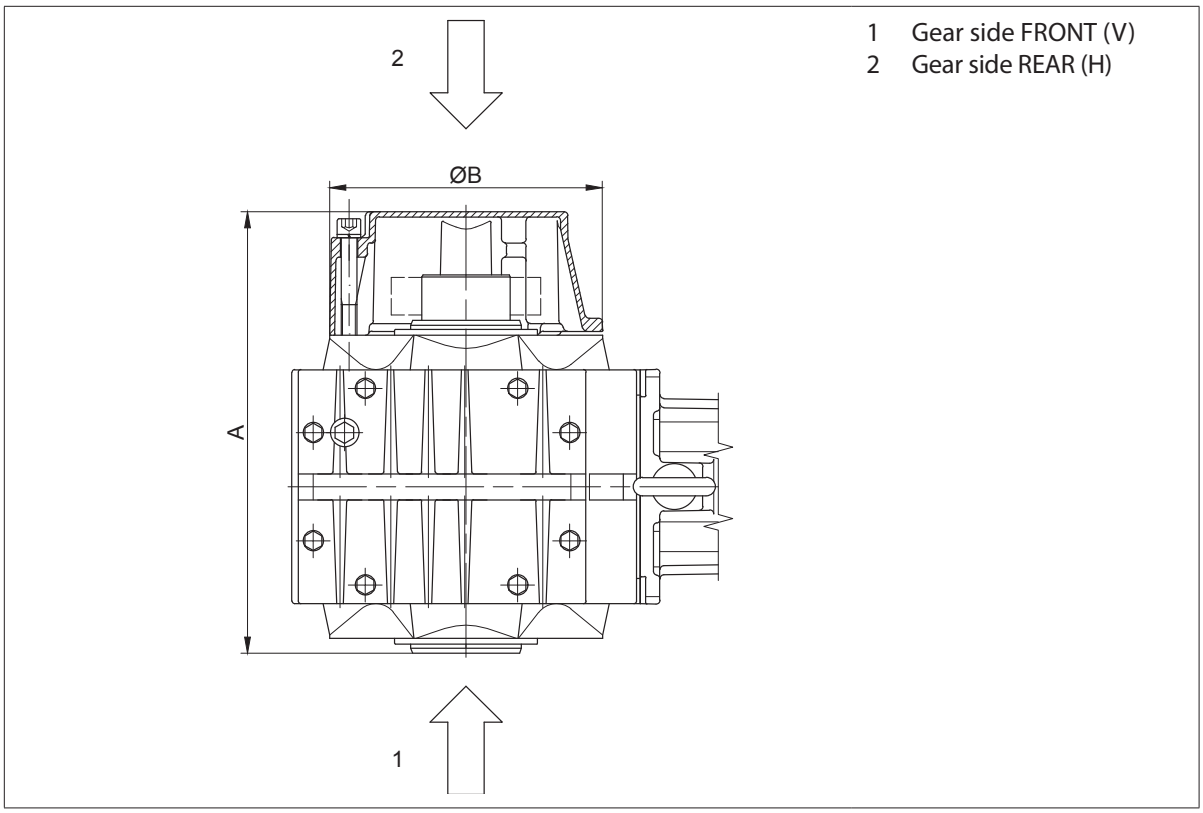


Fig. 6: SSV cover for worm gearbox BS10 ... BS40

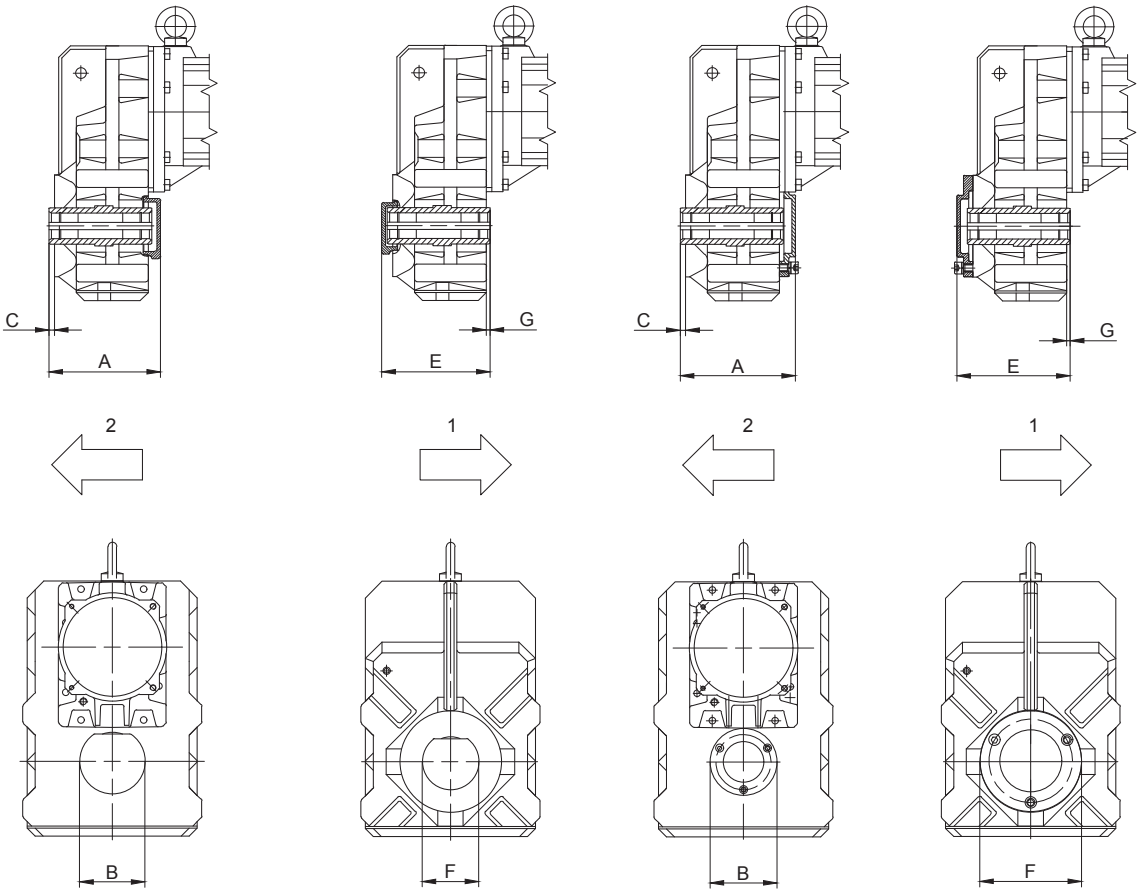
▶ Install covers as contact guard for drives with shrink disc connection.

6.7.2 Protective covers for hollow shafts with keyway or splines

Drives with hollow shafts can be protected against contact and the ingress of occasional splashed water or dirt by installing sealing caps (VK) or sealing covers (VD).

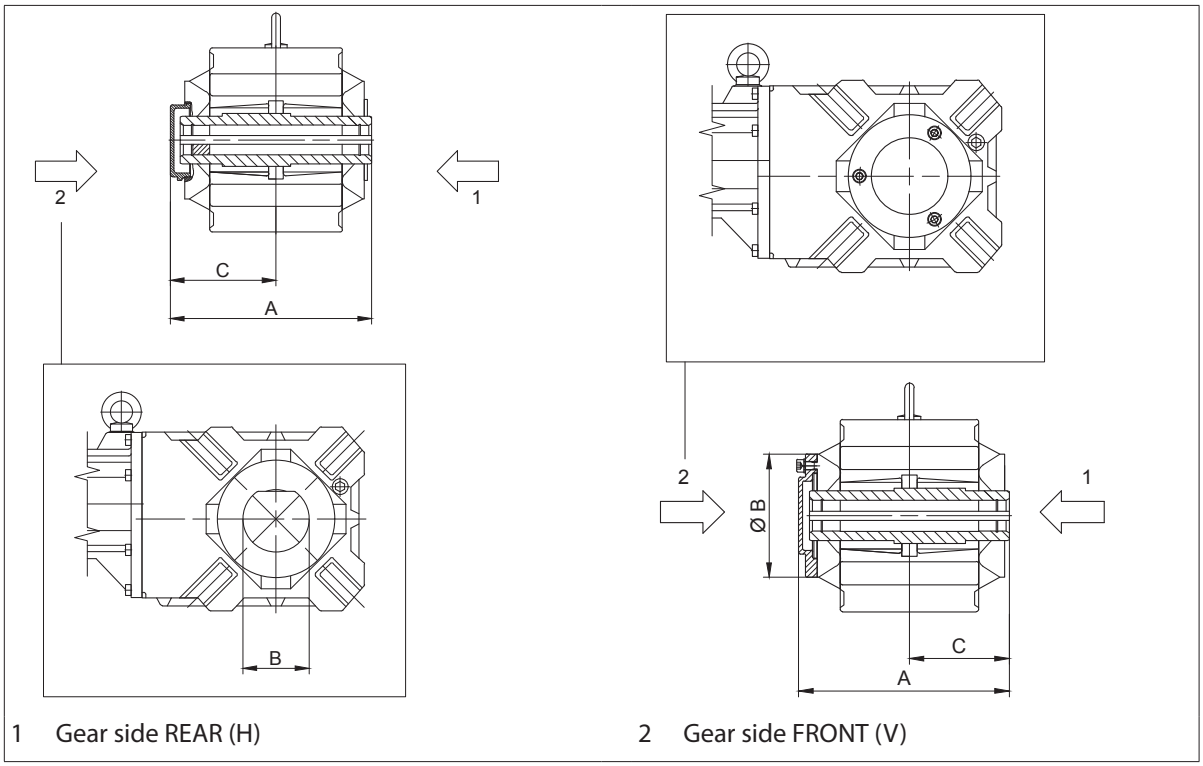
▶ Before mounting the sealing cover, degrease sealing surfaces and seal with a suitable liquid seal.

Optionally available
Following versions:



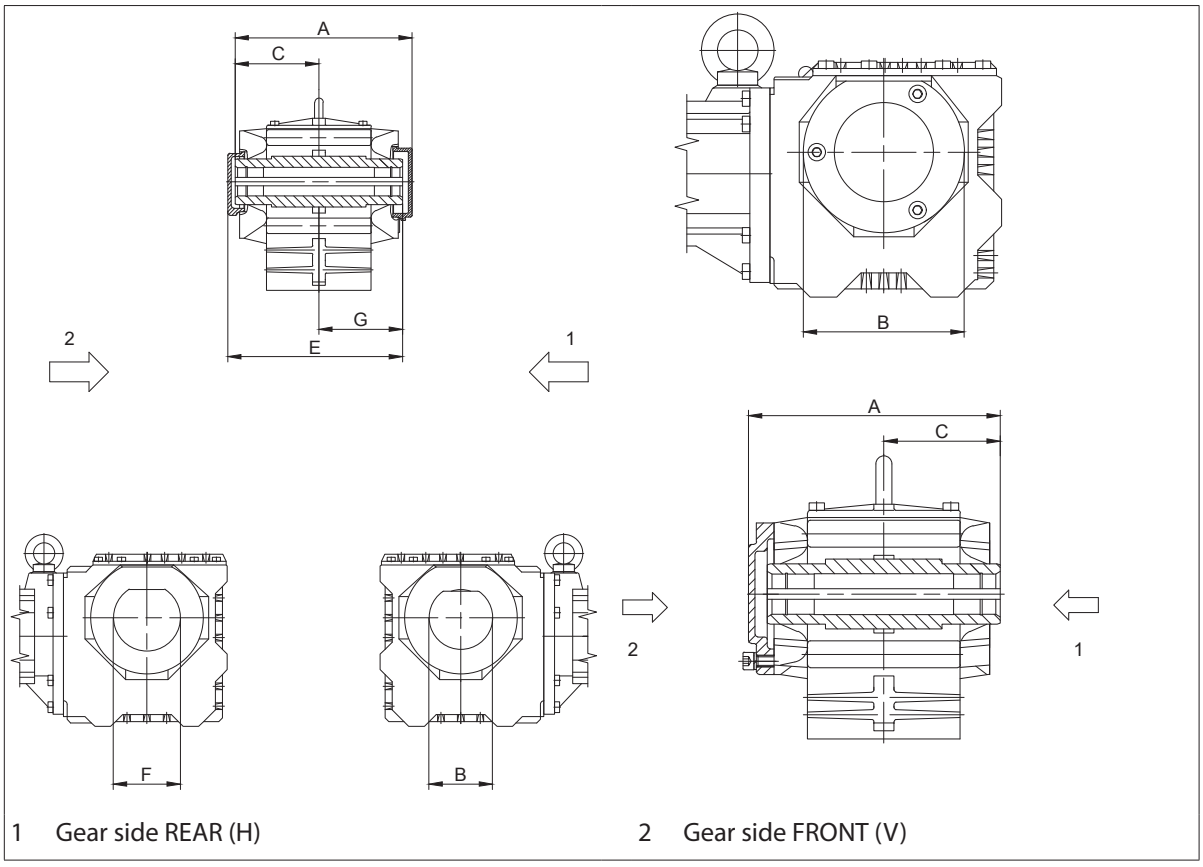
1 Gear side REAR (H) 2 Gear side FRONT (V)

Fig. 7: SSV cover for shaft-mounted gearbox BF10 ... BF90
– sealing caps (left) and sealing covers (right)



1 Gear side REAR (H) 2 Gear side FRONT (V)

Fig. 8: SSV cover for bevel gearbox BK10 ... BK90
– sealing caps (left), sealing cover (right)



1 Gear side REAR (H) 2 Gear side FRONT (V)

Fig. 9: SSV cover for worm gearbox BS10 ... BS40
– sealing caps (left), sealing cover (right)

6.8 Installation of oil expansion tank

The oil expansion tank and the components required for installation are supplied as a three-piece accessory set delivered with the drive.

☑ Drive correctly positioned for installation according to rating plate
▶ Install oil expansion tank on gearbox in system on site.

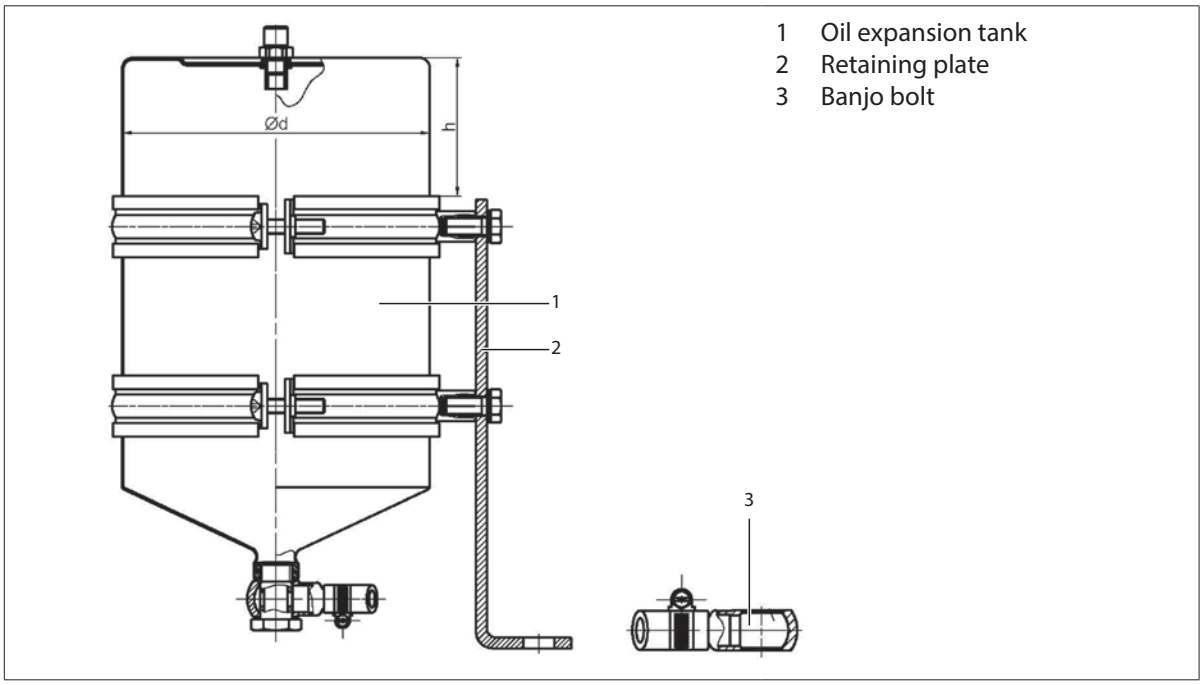


Fig. 10: Accessory set, Part 1: Oil expansion tank unit with retaining plate

Tank diameter d [mm]	Height positioning h [mm]
ca. 100	5
ca. 112	77

Tab. 12: Oil expansion tank height adjustment

6.8.1 Attach oil expansion tank to gearbox housing

The gearbox is delivered with pre-installed threaded bolt, spring washer, and hex nut.

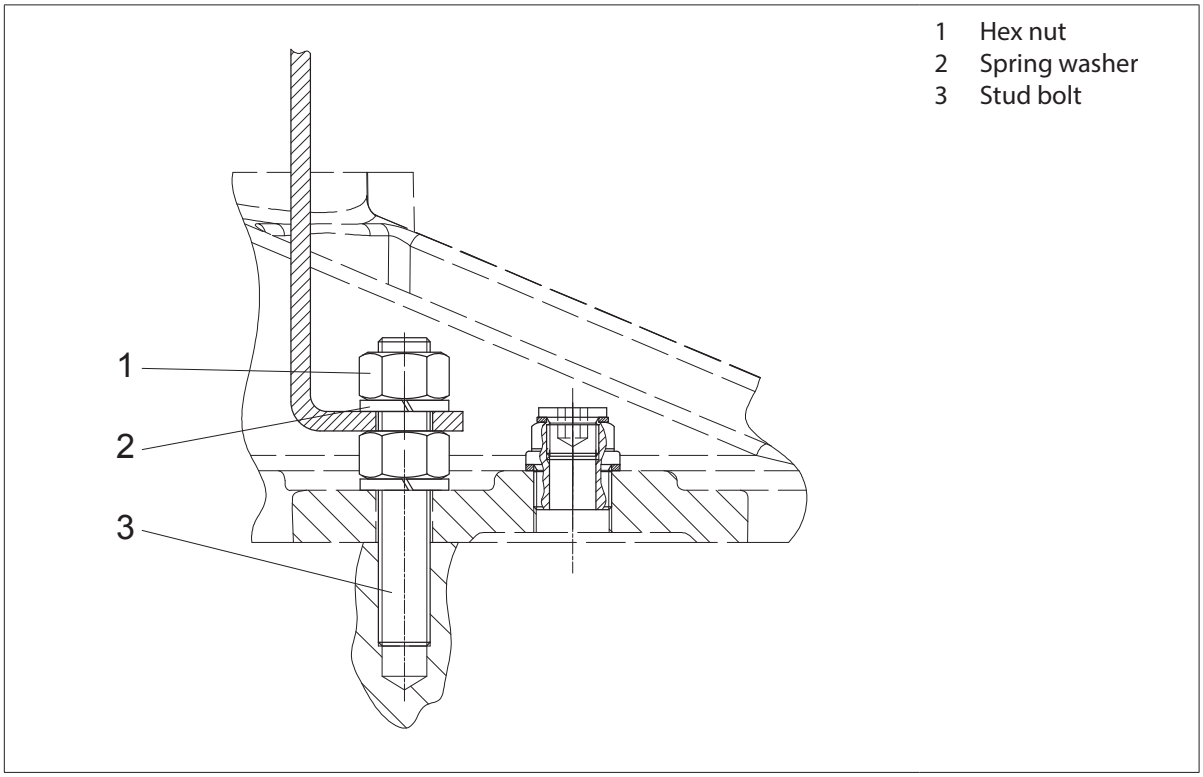


Fig. 11: Accessory set, Part 2: Mounting set with nut and spring washer

▶ Place oil expansion tank (1, Fig. 10, p. 38) with mounted retaining plate (2, Fig. 10, p. 38) on threaded bolt (3) and fasten with spring washers (2) and hex nut (1).

- Tightening torques for hex nut on threaded bolt:
  M12: 86 Nm
  M16: 210 Nm

6.8.2 Avoiding noise

▶ To avoid noise, make sure that the tank unit does not come into contact with the motor housing when mounted.

Aligning the connection hose

▶ If it is necessary to align the connection hose, turn the entire tank in the pipe clamps as follows:

1. Sufficiently loosen the pipe clamps by opening the tensioning screws; see information label on tank (Fig. 12).
2. Align the tank.
   - When doing so, note the correct height position h of the tank, see Fig. 10, p. 38 and Tab. 12, p. 38.
3. Re-tighten tensioning screws of pipe clamps with 5 + 2 Nm.

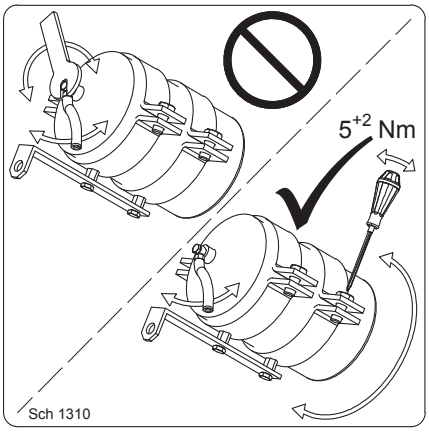


Fig. 12: SCH-1310

6.8.3 Attach connection hose to gearbox housing

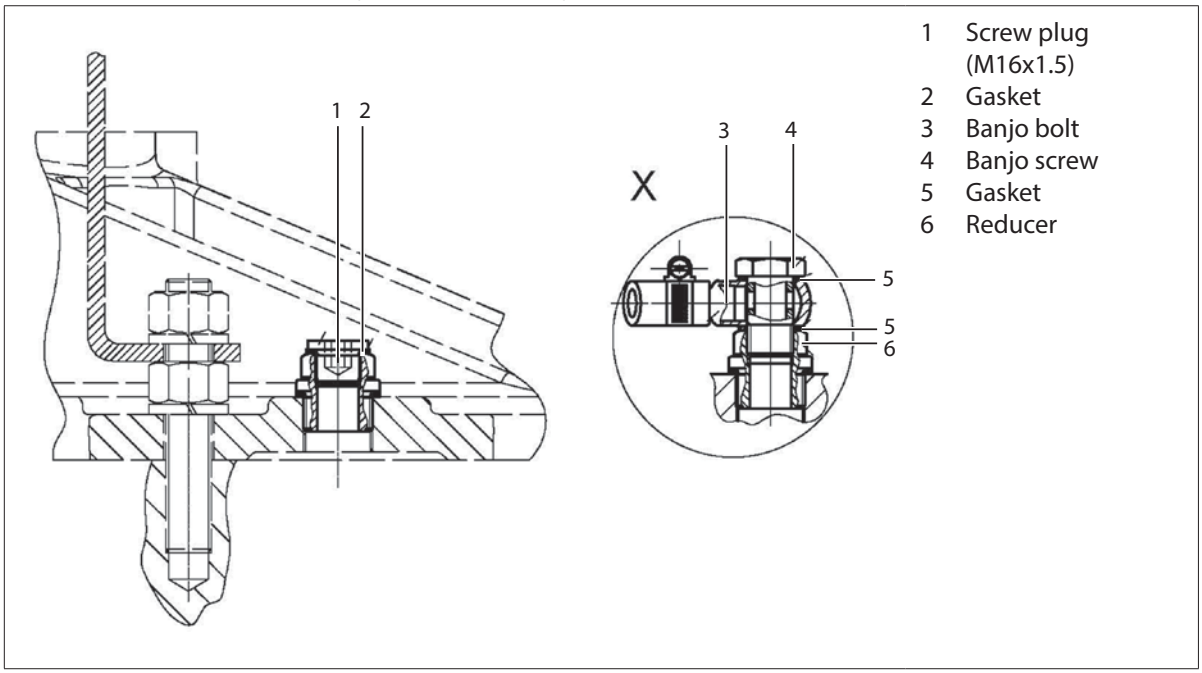


Fig. 13: Accessory set, Part 3: Hollow screw and two gaskets

To ensure that the expansion tank functions correctly, connect the free end of the connection hose to the gearbox using the banjo bolt as follows:

1. Remove the screw plug (1) marked with a red dot and the gasket (2) underneath it.
   - The screw plug and sealing washer are no longer required for operation.
2. Into the open threaded hole of the reducer (6), screw the banjo bolt (3) of the connection hose according to Fig. 13, detail X with new gaskets (5) and new hollow bolt (4), taking into account the arrangement of the components.
   - Tightening torque for banjo screw: 27 Nm

6.9 Electrical installation

The connection diagrams for the respective motor are attached in the terminal box cover of the product.

6.9.1 Required tools and aids

- Chisel or similar
- Hammer
- Screwdriver
- Hexagonal wrench

6.9.2 Prerequisites

WARNING
Improperly performed work
Serious or fatal injuries may result.
▷ Observe and comply with all the requirements described.

Only suitably qualified personnel in accordance with EN 50110-1/-2 (VDE 0105 Part 100) may perform work on this device or system.

- All work with the product must be performed by qualified and trained specialist personnel.
- All work may only be performed by authorised persons under conditions where no explosion hazard is present (after written approval for the work has been issued) with the machine stopped and with power switched off and locked out to prevent re-energising. This also applies to auxiliary circuits (e.g. brake).
- Remove any transport locks before putting the device into service.

Before starting installation

▶ Before performing any work, read and follow the safety instructions described in chapter 2, p. 9.
▶ Comply with the general installation regulations.
  • Carry out the electrical installation in accordance with the relevant regulations (e.g. cable cross-sections, fuses, protective conductor connection).
▶ In addition, observe the following regulations, requirements and safety measures:
  • Plant-specific and local regulations and requirements
  • Safety barriers and warning and safety signs specified on site.
▶ In addition, comply with EN 60079-14.
  • They stipulate overload protection by means of a motor protection switch or equivalent protective device. This includes a thermistor sensor with a trip device (for motors with temperature monitoring).
▶ Only install the product if the mains voltage and frequency match the voltage and frequency data on the rating plate of the motor, or, in the case of inverter duty, the output voltage of the inverter matches the connection voltage of the motor, see chapter 3.1.1, p. 16 and drive rating plate.

Preparing for installation

▶ Observe the assembly instructions specified for the product.
▶ Observe the 5 safety rules in accordance with DIN VDE 0105.
  • Switch off the system.
  • Protect the system from being switched on again.
  • Check that no voltage is present.
  • Cover or fence off nearby live parts.
  • Earth and short out the device.
▶ Use original spare parts for each repair.

Performing installation

▶ Electrical connection of the motor must be made according to the connection diagram enclosed in the terminal box.
▶ If the connection diagram is missing: Do not connect the motor. An approved connection diagram can be requested from Bauer Gear Motor GmbH.
▶ Check the seal of the terminal box for damage after opening. If damaged, replace with original parts (sealing material and adhesive).
▶ Only use the original connecting parts supplied.
▶ For motors other than those using operating mode S1:
  • Monitor motors by means of a device for direct temperature monitoring (see 6.9.17, p. 47) as protection against impermissible heating due to overload.
▶ If unexpected start-up of the system can endanger personnel, do not use motor protection devices with automatic restart.
▶ Connect motor and control, overload protection and earthing according to local installation regulations.

Installation after a long storage period

▶ If product was stored for a long period of time (>9 months / long-term storage): Prepare the product before installation in accordance with the specifications in chapter 5.3.2, p. 23 .

Motor designation

▶ According to ATEX-compliant regulation on the motor, e.g. the following additional marking is applied:
  • Thermistors PTC DIN 44081/82-145
  • Relay function tested Ex II (2) G D
  • tA 28 s/20 °C UN I_A/I_N 5.0

6.9.3 Cable entry with cast-on terminal box (DX.04.. up to DX.11..)

WARNING
Loose, unsecured parts
Eye injury can be the result
▷ Wear safety glasses.

1. Screw on the terminal box cover.
2. Unscrew terminal box cover and remove broken-out parts.
3. Ensure that the cable gland is approved for use in hazardous areas.
4. For third-party motors, follow the instructions in the motor manufacturer's operating manual.
5. Fasten the approved cable gland with the enclosed lock nut and the enclosed sealing ring. When doing so, use the installation torques specified by the cable gland manufacturer.
6. Connect the motor as specified in chapter 6.9.5, p. 42, chapter 6.9.6, p. 44 and chapter 6.9.7, p. 46.
7. Check the seal of the terminal box and replace with original parts if damaged.
8. Tighten the terminal box cover with a tightening torque in accordance with Tab. 13, p. 42 so as to ensure the leak-tightness of the terminal box cover.

Thread size	Tightening torque [Nm]
M4	2.0
M5	2.5
M6	3.0
M8	3.5

Tab. 13: Tightening torques for terminal box cover screw connection

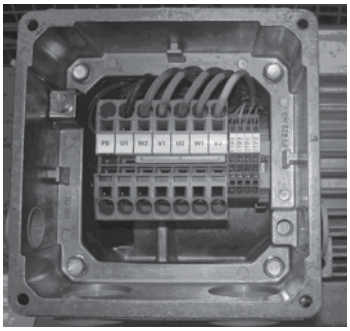
6.9.4 Cable entry with screwed terminal box (DX.06.. up to DX.18..)

1. Screw on the terminal box cover.
2. Ensure that the cable gland is approved for use in hazardous areas.
3. For third-party motors, follow the instructions in the motor manufacturer's operating manual.
4. Remove the plastic plug and replace it with an approved cable gland.
   - When doing so, use the installation torques specified by the cable gland manufacturer.
5. Connect the motor as specified in chapter 6.9.5, p. 42, chapter 6.9.6, p. 44 and chapter 6.9.7, p. 46.
6. Check the seal of the terminal box and replace with original parts if damaged.
7. Ensure the leak-tightness of the terminal box cover: To do this, firmly tighten the terminal box cover with a tightening torque in accordance with Tab. 13, p. 42.

6.9.5 Electrical connection on terminal block

Make the electrical connection according to the connection diagram. A terminal block with cage spring clamps (CAGE CLAMP®) is installed as standard.
This technology, certified for example under PTB 05 ATEX 1070 U for explosion protection types "e" and "t", together with the jumpers included for delta and wye connections, allows for simple and reliable connection to the main and auxiliary terminals.

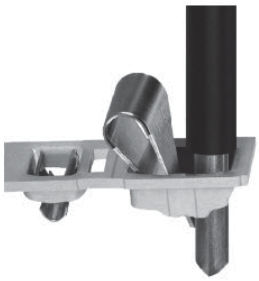
Terminal block with CAGE CLAMP® technology





- 6 terminals for winding
- 1 terminal for PE
- 4 auxiliary terminals in different sizes and colours (e.g. thermistors for warnings and shutdown)
- Star connection W2-U2-V2 fitted
- The lower terminal row is for the mains connection.

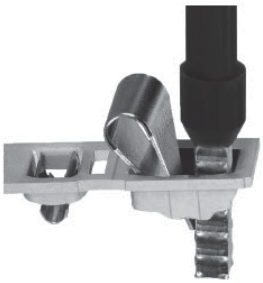
1. For third-party motors, follow the instructions in the motor manufacturer's operating manual.
2. Open clamp with a suitable screwdriver: Insert screwdriver until the stop.
   - Leave screwdriver in place to hold the CAGE CLAMP®.
3. Insert cable: Insert the approx. 10 mm long insulated single-wire, fine-wire, or crimped connection wire. For fine-wire connections, ensure that there are no protruding splices.



Single-wire



Fine-wire



Crimped

4. Pull out screwdriver.
   - Cable is clamped automatically.
5. After completing work: Have any damage to paint coating repaired professionally to ensure corrosion protection.

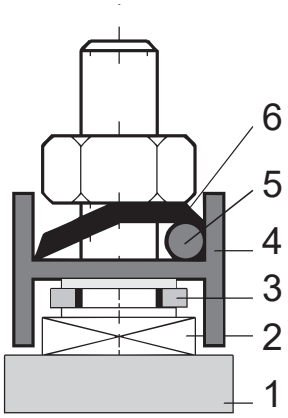
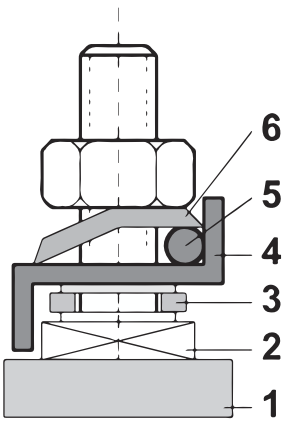
6.9.6 Electrical connection on terminal board

Optionally available

Motor with terminal board with screw bolts installed in terminal box

▶ For third-party motors, follow the instructions in the motor manufacturer's operating manual.

▶ Make connection according to following sketch. Use the tightening torques in accordance with Tab. 15, p. 44.

Especially for ...		
"eb", "tb"	"tc", "ec"	
		1 Plastic base of terminal board 2 Square on brass stud to prevent turning 3 Winding end with ring lug 4 Brass U or Z anti-rotation bracket (bottom) and mains lead retainer bracket (top) 5 Mains cable 6 DIN 46288 connection washer as a pressure piece and lock washer

Tab. 14: Connection of single-wire conductor; version with stud terminal

▶ Use the following tightening torques:

Bolt thread	Rated cross-section [mm²] at		Tightening torque [Nm]
	direct conductor connection	Ring cable lug connection	
M5	2.6 to 6.0	max. 6.0	2.0
M6	4.0 to 10.0	max. 10.0	3.0
M8	4.0 to 16.0	max. 16.0	6.0

Tab. 15: Tightening torques for electrical connection on terminal board

▶ In connection compartments with explosion protection type "increased safety", ensure compliance with the air gaps specified in EN 60079-7 between conductive parts at different voltages.

Working voltage U [V]	Minimum air gap [mm]
201 < U ≤ 250	5
251 < U ≤ 400	6
401 < U ≤ 500	8
501 < U ≤ 630	10
631 < U ≤ 800	142

Tab. 16: Clearances (EN 60079–7, Tab.1, +10%)

▶ Tighten bolts and nuts on live parts to the specified tightening torque.

Thread size	Tightening torque [Nm]
M4	1.2
M5	2.0
M6	3.0
M8	6.0

Tab. 17: Tightening torques for electrically live bolts

▶ Do not route connecting lines over electrically live parts.

Additional terminals for temperature monitoring or standstill heating are located in the main connection compartment or in supplementary connection compartments, depending on the version (see supplied wiring diagram).

▶ Keep the supplied wiring diagram (in the connection compartment) with the drive documents in the plant.

Connect external fan

▶ For third-party motors, follow the instructions in the motor manufacturer's operating manual.

If an external fan is provided, it must always be switched on together with the motor, and with duty type S3 or S4 it should operate continuously with the motor as much as possible.

▶ Connect external fan (see chapter 16.6.1, p. 66)

Ensure protection against contact with electrically live parts

▶ For third-party motors, follow the instructions in the motor manufacturer's operating manual.

1. Close the terminal box again using the seals provided at the factory and in compliance with the IP protection class.
2. Check the seal of the terminal box and replace with original parts if damaged.
3. Replace any plastic sealing plugs intended for transport with ATEX-approved insertion parts of the corresponding category.
4. Ensure that the insertion parts comply with the IP rating of the motor as a minimum.
5. Seal unused insertion holes with approved (e.g. metal) seal plugs with sealing rings at least IP protection class of the motor.
   - If the supplied cable entries have caps, they are only intended to provide protection during transport and are not approved seals. This also applies to outdoor storage of motors. Additional rain protection is necessary in such case.

Motors with cast-on terminal boxes

▶ For third-party motors, follow the instructions in the motor manufacturer's operating manual.

▶ Observe operating instructions for cable and line entries.

▶ Ensure that the diameters of the cables and connectors used correspond to the clamping range marked on the entry.

Cable entries and entry seals that do not meet these requirements are not permitted.

Motors with screwed-on terminal boxes

▶ For third-party motors, follow the instructions in the motor manufacturer's operating manual.

▶ Observe operating instructions for cable and line entries.

▶ Ensure that the diameters of the cables and connectors used correspond to the clamping range marked on the entry.

Cable entries and entry seals that do not meet these requirements are not permitted.

To change the position of the cable and conductor entries, the compartment can be rotated in four steps of 90°.

1. Screw on the terminal box cover.
2. Loosen and remove four screws in the corners at the bottom of the terminal box.
3. Loosen the terminal box from the motor housing and rotate it.
   - To do this, undo the motor connection if necessary and, after aligning the terminal box, reconnect it according to the information in chapter 6.9.5, p. 42, chapter 6.9.6, p. 44 and chapter 6.9.7, p. 46.
4. Check the seal of the terminal box and replace with original parts if damaged.
5. Screw the terminal box to a motor housing and tighten to the tightening torque specified Tab. 18, p. 45 to ensure that the terminal box is leaktight.

Thread size	Tightening torque [Nm]
M4	2.5
M5	5.5
M6	10.0
M8	20.0

Tab. 18: Tightening torques for terminal box screw connection

6. Check the seal of the terminal box on the cover and replace with original part if damaged.
7. Ensure that the cover of the terminal box is leak-tight
   - To do this, tighten the terminal box cover with a tightening torque in accordance with Tab. 13, p. 42.

6.9.7 Protective earthing

▶ Establish standard earth connection via protective conductors in respective motor terminal box. When connecting the earth cable, make sure that the connection conducts well.

6.9.8 Contact protection

If voltage is present, e.g. in testing and commissioning phases with open terminal box:
▶ Make sure that no one is standing in the hazard area.
▶ Attach contact guards, warning signs, barriers, or similar in accordance with safety specifications.

6.9.9 Electrical connection for motor protection devices

WARNING
Automatic restart
After the winding has cooled down, it may restart automatically. This can result in serious or fatal injuries.
▷ Prevent restarting via switching.

▶ Use motor protection switches to protect the winding against overload and against the consequences of operating on only two mains supply lines, e.g. in the event of phase failure.
▶ Set the motor protection switch to the rated current at the respective rated voltage of the motor, see rating plate.

6.9.10 Stator standstill heating

NOTICE
Incorrect connection voltage for auxiliary heating via heater bands
Motor damage and material damage due to drive failure can result.
▷ Note the connection voltage, see rating plate.
▷ Only switch on the heater bands when at a standstill.

6.9.11 Electrical connection for brakes

▶ When making electrical connection for brakes: Follow factory regulations or rules from professional associations for connecting brakes, e.g. phase failure protection or other safety circuits.
▶ For motors with brake for zone 2 or 22: Follow operating instructions of the brake manufacturer.

6.9.12 Electrical connection for external fan

NOTICE
Incorrect connection of external fan
Material damage and financial losses caused by a system malfunction due to motor failure may occur because the external fan cannot cool during downtimes or does not supply enough cooling air at low frequencies (inverter duty).
▷ Make electrical connection for external fan separately (not on motor terminal board) for intermittent, periodic, or frequency inverter duty.

▶ For electrical connection of the external fan: Follow operating instructions of the external fan manufacturer.

6.9.13 Encoder electrical connection

▶ Establish the electrical connection for the encoders in accordance with the manufacturer's operating manual supplied with the product.

6.9.14 Motors with direct wiring

The maximum permissible operating temperature at the cable entry may not exceed 80°C.

▶ Connect the free end of the cable routed to the motor in accordance with the regulations applicable to the connection area.
- With strain relief: If the cable entry used on the motor has a strain relief, the cable can be fitted freely.
- Without strain relief: Fasten the cable in the immediate vicinity so that it is strain-relieving.

6.9.15 Motors with factory-fitted connection cables

▶ Connect the free end of the cable leading out of the motor in accordance with the regulations applicable to the connection area.
- Motors of the DA and SA series: Always secure the cable in the immediate vicinity to relieve tension.

6.9.16 Connection for motors with plug

Plug-and-socket connectors are not allowed to be connected or disconnected under power when used as intended.

▶ Information on connecting motors with plugs: Read motor data sheet.



▷ When connecting, follow manufacturer's documentation for plug.

▶ Protect plug-and-socket connectors of the same or similar type arranged next to each other by mechanical coding to prevent misconnection.

For motor versions with plug connector (device protection level "tc")

▶ Use a locking plate to secure the locking bracket on the lower part of the housing (attachment housing) against accidental disconnection after the line connection.

If the cable bushing housing is not plugged in

▶ Seal the housing with the protective cap provided ex works.

6.9.17 Electrical overload protection

Regardless of the type of explosion protection ("e", "d", or "t"), motors must be protected against overload by one of the two types of overload protection device described below:

Protective device MR

A current-dependent, time-delayed protective device for monitoring all three phases, set no higher than the rated current of the motor, which must trip within 2 hours at 1.2 times the set current level and must not trip within 2 hours at 1.05 times the set current level.

▶ For the "MR" device for all ignition protection types ("e", "d" or "t"), observe the following:
- The protective device must comply with EN 60947 and its operation must be verified by a notified body and marked with (2) G D.
- (2) means its protective function is effective in Category 2 (Zone 1) in accordance with Directive 94/9/EC Article 1 (2) and ATEX guideline 11.2.1. An example is type ZEV current sensors for an electronic motor protection relay from the firm MOELLER.
- Motor protection must also be ensured in the event of the failure of an external wire (two-wire operation), e.g. by use of trip devices with phase dropout technology.
- In the case of motors with pole-changing capability, separate interlocked trip devices must be provided for each motor speed level.
- In the case of Y-Δ start-up, the trip devices must be connected in series with the winding sections and set to the section current level (1/1.73 = 0.58 times the rated motor current). This way the motor is protected if the switch from star to delta (Δ) does not occur.

▶ For motors of ignition protection type "e", also observe the following:
- when the rotor is locked, the protective device must trip within the time tE. The current versus time characteristic present at the premises of the system operator must fulfil this condition for the combination of IA/IN and tE stated on the nameplate, with a permissible deviation of ±20%.
- A practical test with current injection at the time of initial testing and/or repeat testing is only necessary if so indicated by relevant operational experience (EN 60079-17 / VDE 0165-10-1).

- Motors with current-dependent delayed overload protection devices are generally permissible for continuous operation with light and non-frequent start-up procedures that do not cause significant additional heating. Motors that are exposed to frequent or heavy start-up procedures are only permitted if suitable protective devices ensure that the limit temperature is not exceeded. Heavy start-up conditions are present if a ... properly selected current-dependent, time-delayed overload protection device switches off the motor before it reaches its rated speed. This is generally true if the total start-up time is longer than 1.7 tE (EN 60079-14).

The rated power of motors, particularly in combination with gear units with four or more stages, is ample. In such cases the rated current is not a suitable measure of the gear unit loading and cannot be used for overload protection of the gear unit.

- In some cases overloading is fundamentally impossible due to the way power is provided to the driven machine.
- In other cases it is a good idea to protect the gears by means of a mechanical device, such as a slipping clutch or sliding hub, or similar. The decisive factor is the maximum permissible torque limit for continuous operation shown on the nameplate of the gear unit.

Motors with temperature monitoring

Motors for zones 21 and 22 are generally equipped with temperature monitoring (e.g. PTC thermistors, etc.). These must always be connected to an approved trip device marked II(2) GD.
Terminals TP1–TP2 or T1-T2
These motors are equipped with PTC thermistors in accordance with DIN 44082 (triplet version).
▶ Observe the temperature rating and trip time tA marked on the nameplate.
▶ Connect the thermistors to an approved trip device with the marking II(2) GD.
▶ Observe the information on the rating plate when selecting the protective device.
The trip time tA relates to testing with a locked fan. It is the value to be expected at the rated voltage UN with an ambient temperature of 20°C and the specified relative start-up current. It is a measure of the thermal coupling between the sensors and the copper.

- Unless special reasons are present (e.g. a new winding), it is not necessary to test the actual operation of the protective device at the time of initial testing and/or during repeat testing.

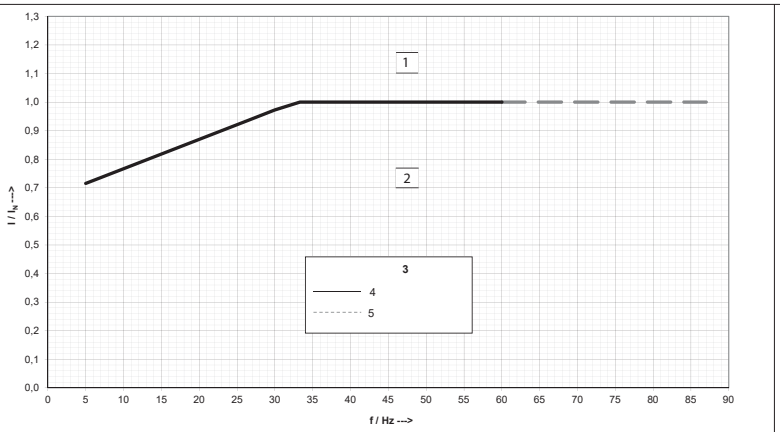
6.9.18 Motors for operation with a frequency converter

For protection against excessive heating due to overload, the motors are monitored by a device for direct temperature monitoring ("Motors with temperature monitoring") in combination with specified settings of the frequency converter.
The device for direct temperature monitoring is type tested and consists of three PTC thermistors compliant with DIN 44082 type M 130 built into the winding, as well as a tripping device functionally tested for this purpose in accordance with Directive 2014/34/EC.
▶ In conjunction with the aforementioned monitor unit, set the following inverter data and observe them during operation:

- Minimum clock frequency: 3 kHz
- Short-term current limit: 1.6 * IN
- Maximum overload time: 60 s
- Permissible operating time below fmin 60 s
- Max. permissible input voltage: 500 V +10%, 50/60 Hz

The maximum overload time and the permissible operating time below fmin are based on an interval of 10 minutes

▶ Select all other setting data according to the requirements of the drive.
The powers, torques and currents as a function of frequency permissible with this duty type are stated on the nameplate or on a supplementary plate. If the supplementary plate is absent, or the permissible power ratings are not stated, the data confirmed by Bauer Gear Motor is applicable.



Frequency converter continuous current limit configuration parameters

1 Operation not permitted in this region
2 Operation permitted in this region
3 Current limit
4 Wye circuit
5 Delta circuit

Fig. 14: Permissible operation with type S.X.08LA4 frequency converter (example)

▶ The pulse voltage at the motor terminals must be limited to the maximum permissible pulse voltage of 1,556 V (2 x √2 x 550 V) by selecting a suitable frequency converter and/or using filters.
- The maximum permissible frequency converter input voltage is 500 V +10%, 50/60 Hz.
- Group operation of the motors is not permissible.
- The motors may only be used with frequency converters that fulfil the requirements mentioned above under "Frequency converter settings".

The rated current of the frequency converter must not exceed twice the rated current of the motor.
The current limiting function of the frequency converter must sense the RMS value of the motor current with a tolerance of ±5% referenced to the rated motor current.
If appropriate, a supplementary plate is affixed to the motor to indicate that a connecting cable or conductors with an extended operating temperature range and a temperature limit of at least 80°C must be used.
Motors with a built-in backstop are not allowed to be operated from a frequency converter.

▶ When operating the frequency converter, check the “electromagnetic compatibility” according to the EMC Directive 2014/30/EU of the drive.

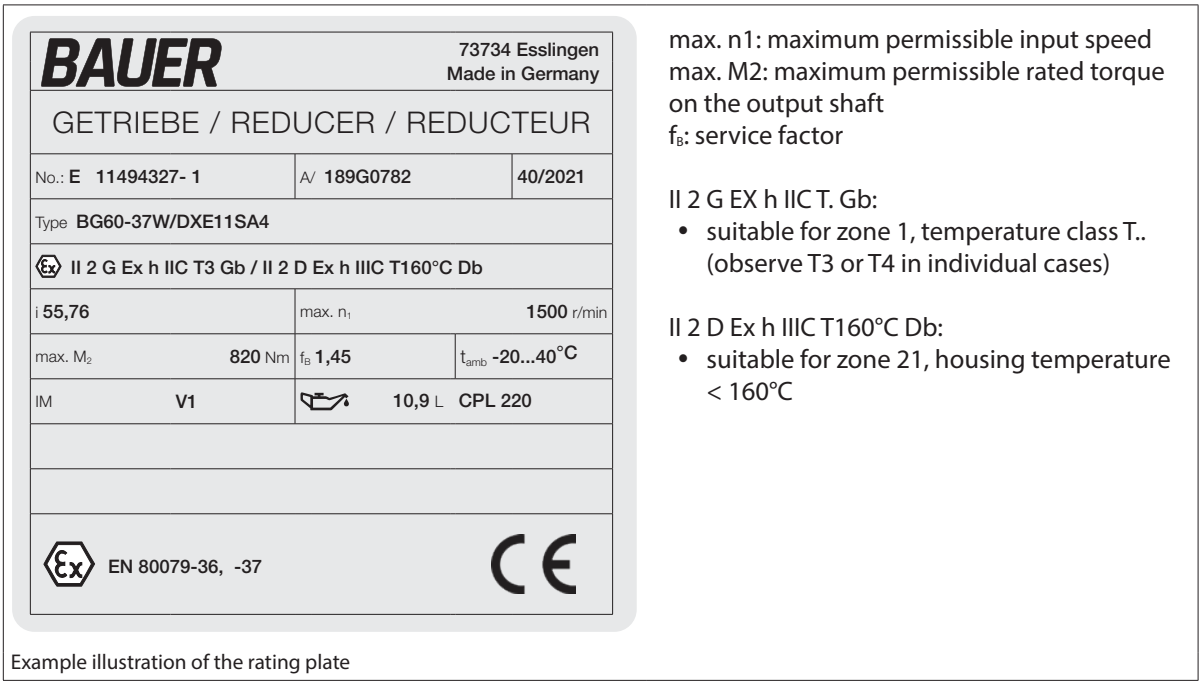
▶ If the frequency converter output is not galvanically isolated from the mains and equipped with current limiting, observe the requirements of EN 50178 / VDE 0160 (electronic equipment for use in power installations) in order to protect the PE conductor against overload.

▶ Observe all information provided by the manufacturer of the inverter.

Note:
No measures for limiting the causes of the peak voltages generated by PWM frequency converters are specified in the standards for explosion-protected electrical machinery. However, from the point of view of the motor manufacturers and to increase operational safety, it is urgently recommended that this additional insulation stress be reduced by measures on the inverter (e.g. moderate switching frequency, avoidance of extremely short rise times for the voltage – i.e. extremely high dU/dt, reduction of filters or chokes at the converter output. Such measures are also recommended in DIN IEC 60034-25/and in DIN IEC/TS 60034-17.

6.9.19 Load rating of gear unit and service factor

A supplementary plate with the following data relevant to explosion protection is affixed to the gear unit.



Example illustration of the rating plate

max. n1: maximum permissible input speed
max. M2: maximum permissible rated torque on the output shaft
f_B: service factor

II 2 G EX h IIC T. Gb:
- suitable for zone 1, temperature class T.. (observe T3 or T4 in individual cases)

II 2 D Ex h IIIC T160°C Db:
- suitable for zone 21, housing temperature < 160°C

Fig. 15: Supplementary plate

Each of the two limits (for n1 and M2) must be complied with independently. The service factor fB defines the general conditions, such as daily operating times, shock class, start/stop frequency, inertia factor, and significant properties of the transmission components. It is specified during the preliminary design phase for the drive in accordance with the specifications in the catalogue (printed or CD version).

DANGER
Risk of explosion
If the service factor fB is exceeded, component overloading may occur and as a result of heat, friction and sparks an ignition source may occur, which can lead to explosions.
Serious to fatal injuries are the result.
▷ Make sure that the duty factor fB is not exceeded to ensure the constructional safety "c" for the ignition protection type.

7 Commissioning

NOTICE
Incorrect installation positions and ambient temperatures
Material damage may result.
▷ Observe the information on approved installation positions and ambient temperatures.

CAUTION
High noise emissions
Hearing damage may occur.
▷ Wear hearing protection.

▶ Observe the values on the rating plate.
▶ Follow instructions in chapters 2, p. 9, 6.2, p. 25 and 6.9, p. 40.
▶ Observe motor speeds, e.g. with inverter duty, for frequency inverter possibly being used.

For existing options, e.g. encoders, follow the operating manual supplied by the manufacturer.

7.1 Checks before commissioning

▶ Before commissioning the product, check the following:
- Integrity
- No leaks
- Fasten the drive and transmission elements with the necessary screws and torques
- Transmission elements such as chains or belts are tensioned according to specification.
- Possible torque arms are placed correctly and rubber buffers are pre-stressed.
- Safety devices and covers are correctly mounted on both the drive and the system/machine.
- All electrical cables are correctly laid and connected.
- Cable glands are tightened and sealed as necessary.
- Motor protection switches are set to the rated current and, if necessary, other motor protection devices are activated.
- Cooling air supply to the motor is unobstructed.
- Any existing brake is set to the projected braking torque.
- Existing brake is working in accordance with requirements and does not lock in place, particularly during lifting operations, and existing manual release lever has been removed.
- The direction of rotation is correct. U, V, W on L1, L2, L3 give a clockwise rotation of the motor when looking at the motor shaft, i.e. on two-stage and four-stage gears, the output shaft also rotates to the right, while on one-stage, three-stage, and five-stage gears, the output shaft rotates to the left. For gearboxes with right-angle output (BK... and BS... gearbox), the defined direction of rotation is related to gear side "V".

7.2 Initial commissioning

☑ Installation position according to rating plate.
▶ For motors with backstop: The permissible motor rotation direction is marked with an arrow on the fan cover. Start the motor in the permissible direction of rotation. Do not start motors with backstop in the blocking direction as this may damage the backstop.

Worm gearboxes (BS...) are so-called sliding gears whose tooth flanks must be smoothed during a run-in phase in order to achieve optimum efficiency. Depending on the load, this is achieved within 50 ... 100 operating hours.

Small amounts of lubricant will occasionally leak out of the output shaft seals during commissioning and within the first hours of operation. This is not a defect, it is a so-called apparent leak. These can be caused by grease "bleeding" between the dust lip and sealing lip of the shaft seal as well as by an incomplete run-in process between sealing lip and shaft.
▷ Wipe off any leaking lubricant with a lint-free cloth.
▷ Check the sealing point again after a few operating hours.

7.3 Commissioning after long-term storage

7.3.1 Gearbox measures

Detailed information and instructions on lubricant recommendations can be found in chapter 11.4.2, p. 60.
For lubricant quantities, see rating plate or customer service manual.

▶ Before commissioning, reduce the lubricant level of the gearbox back to the value specified on the rating plate or in these Operating Instructions.
▶ If the vent screws have been replaced with screw plugs: Re-insert vent screws.
▶ If the storage time exceeds two years or if the ambient temperature frequently deviates from the normal values of -20°C to +40°C for shorter storage times: Change lubricant.
▶ Check shaft seals for damage, inspect shape, colour, hardness, and replace if changed.

7.3.2 Motor measures

WARNING
Electric shock
Serious or fatal injuries may result.
▷ Check the insulation resistance between all winding points and between the winding and housing. Check insulation resistance with commercially available measuring devices.

- Measured value 50 MΩ = optimal, corresponds to new
- Measured value 5 MΩ = drying advisable
- Measured value 1 MΩ = drying required

If it is necessary to dry the motor:
▶ Have the manufacturer or a specialist workshop for electrical machines carry out any work required.
If the work is not carried out by the manufacturer:
▶ Have the work assessed by a recognised qualified person.

8 Normal operation

Normal operation depends on the overall situation after installing the drive in the overall system or machine.

Read and follow documentation for overall system or machine.

9 Malfunctions and troubleshooting

9.1 Motor malfunctions

Malfunction	Possible cause	Remedy
Motor not starting	No voltage connected to motor	▶ Correct connections, eliminate interruptions as necessary.
	Fuse switched off/blown	▶ Switch on or replace fuse.
	Brake not releasing.	▶ Configure drive and connections correctly.
	Motor protection has tripped.	▶ Check motor protection configuration. ▶ Remove blockages.
	No release for inverter duty	▶ Follow operating instructions of the frequency inverter.
Motor not starting or "racking" up.	Motor runs against closed brake.	▶ Adjust brake drive and connections correctly.
	• Voltage drop too large • Cable cross section too small in general or for existing large cable length	▶ Insert cable with correct cross section.
	Motor intended for delta connection, but connected in star	▶ Correct switching.
	If configured for Y-D start-up, starting torque in Y-switching too low (incorrect configuration)	▶ Eliminate tension or other additional mechanical loads in the system. ▶ Check projection, use stronger motor as necessary. ▶ Design different start-up solution.
Motor not reaching its rated speed or speed drops sharply	Motor is overloaded.	▶ Eliminate overload. ▶ Measure load. ▶ Check configuration and initiate further measures as necessary.
	Voltage drop too large, cable cross section too small in general or for existing large cable length	▶ Insert cable with correct cross section.
Fuses fail immediately after switching on	• Connected incorrectly • Short-circuit in supply line	▶ Correct the connection.
	Motor has short-circuited or shorted to earth.	▶ Speak with Bauer Gear Motor in advance, this may fall under warranty. ▶ Have the motor repaired or replaced by a specialist company.
Motor protection trips immediately after switching on	• Connected incorrectly • Short-circuit in supply line	▶ Correct the connection.
	Motor has short-circuited or shorted to earth.	▶ Speak with Bauer Gear Motor in advance, this may fall under warranty. ▶ Have the motor repaired or replaced by a specialist company.

Malfunction	Possible cause	Remedy
Motor becomes too hot. ▶ If necessary, consult with Bauer Gear Motor GmbH • How hot does the motor get? • After what runtime? • Measured where?	Drive is overloaded.	▶ Take a power measurement. ▶ If necessary, select different drive and reconfigure.
	Connection voltage at motor terminals too high or too low (if not otherwise confirmed, ± 5% as standard)	▶ Voltage drop too large. Check connection cable cross section, correct if necessary ▶ If necessary, adjust motor to available mains voltage.
	Cooling insufficient	▶ Ensure unobstructed air supply.
	Motor configured for wrong operating mode (S1 ... S10)	▶ Operate the system according to the operating mode. ▶ If necessary, select different drive and reconfigure.
	Ambient temperature higher than considered during configuration	▶ Consult with Bauer Gear Motor and find a solution together.
	Motor runs on 2 phases only.	▶ Check fuses, connection lines. ▶ Rectify malfunction. ▶ Measure motor winding. ▶ If necessary, repair at specialist workshop.

Tab. 19: Motor malfunctions

9.2 Gearbox malfunctions

Malfunction	Possible cause	Remedy
Gearbox making unusual grinding noises	• Drive installed unfavourably in system (tensioned) • Potentially (also) bearing damage	▶ Correct alignment and mounting of the drive. ▶ If bearings are damaged, repair at specialist workshop.
Gearbox making unusual knocking noises	Damage in gearing	▶ Repair at a specialist workshop.
Oil leaking at output shaft or at housing separation points	• Sealing ring defective/worn • Surface seals defective	▶ Repair at a specialist workshop.
Minimal lubricant leakage at output shaft, usually during commissioning	Apparent leakage	No damage present. ▶ Wipe off excess lubricant and monitor area. If no further leakage occurs, seal point OK
Oil leak at vent valve	• Incorrect installation position • Too much lubricant in gearbox	▶ Correct lubricant quantity according to installation position. See rating plate for the correct lubricant quantities.

Tab. 20: Gearbox malfunctions

10 Overhaul/repair

NOTICE
Property damage
This may result in damage to drives and the surrounding area/system.
▷ Avoid damage to paint coating.
▷ For drives with corrosion class C4, C5, IM2, and aseptic: Have repaired only by Bauer contract partners or at the main plant.

Any work on the products must be performed by qualified specialist personnel.
▶ Follow the troubleshooting instructions in chapter 9, p. 53 .

Repairs
Repairs must be made in compliance with chapters 2, p. 9, 6.2, p. 25, 6.9, p. 40, 7, p. 51, 8, p. 52, and 15, p. 63 by authorised personnel trained on the product.
▶ Use only original spare parts.
- Bauer Gear Motor GmbH assumes no liability or guarantee in the event of non-compliance.

Overhaul
Repair work on explosion-protected electrical machinery may only be performed by the manufacturer or by suitably qualified specialists in a workshop equipped to perform such work.
▶ Only originally spare parts or mechanically identical standard parts (screws and roller bearings) may be used.
The radial shaft seal rings fall within the scope of the approval.
▶ Use only original seals.
▶ Procedures must be carried out according to the manufacturer's instructions.

Work on explosion protection
Tasks related to explosion protection must be performed by the manufacturer or by a shop specialising in electrical machinery. If the tasks are not performed by the manufacturer, they must be assessed and approved by a recognised authorised person.
If the components of an item of electrical equipment that are essential for explosion protection are modified or overhauled, the equipment may only be put back into service after an approved monitoring body or an officially recognised authorised person has found that it conforms to the requirements of BetrSichV and thereby to the relevant technical regulations, and after a certificate to this effect has been issued or the equipment has been marked with a test mark. (Section 14, Industrial Safety Regulation BetrSichV).
▶ In other countries, observe the applicable national regulations.

Painting after repair or overhaul
Repainting of explosion-protected motors can result in thicker paint coats on the machine surface. These can lead to electrostatic discharges, with the risk of explosion in the event of a discharge.
▶ Follow the requirements according to IEC/EN 60079-0: "Equipment – General Requirements", point 7.4, including by:
- Limiting the total paint thickness according to the explosion group to
  - _ IIA or IIB: total coat thickness ≤ 2 mm
  - _ IIC: total coat thickness ≤ 0.2 mm
- Limiting the surface resistance of the paint or resin used to ≤ 1 GΩ for motors in group II or III.

▶ Follow versions of DIN EN 60079–32: “Electrostatic hazards”, in particular Appendix A: "Fundamentals of Static Electricity"; Annex B, "Electrostatic Discharges in Specific Situations"; and Annex C, “Flammability of substances”.

Motors with temperature monitoring
After a rewind (during overhaul)
- The officially recognised competent person is obliged to check the thermal coupling for the setpoint value.
- A deviation of +20% in the response time tA is permissible.
- The maximum voltage that may be applied to the PTC sensors for continuity testing or resistance measurement is 2.5 V DC per sensor (there are normally three connected in series), otherwise there is a risk of permanent damage.

11 Maintenance

WARNING
Inadequate maintenance
Death and serious injuries may result.
▷ Observe maintenance and inspection intervals.

DANGER
Explosion due to incorrect installation position
Death and serious injuries are the result.
▷ For all maintenance work, observe the installation position specified on the type plate (see chapter 3.3.1, p. 19).
▷ Do not change the installation position.

Requirements
▶ The national provisions applicable to the maintenance or overhaul of electrical equipment in explosion hazard areas must be observed.
- For example, in Germany: Industrial Safety Regulation, among others

Practical test
A practical test with current injection as part of periodic inspection is only necessary if so indicated by experience (EN 60079-17 / VDE 0165-10-1).

Regular inspections
▶ The following test points must be included in the test plan for maintaining the target condition of the electrical system at regular intervals of 3000 operating hours, but no longer than 6 months (or at shorter intervals if necessary):

Item	Recommended method
Leak tightness	Visual inspection in the vicinity of the gear housing
Running condition	Listening or comparative vibration measurement
Fixation	Visual inspection or retightening of bolts
SSV shrink-fit flange couplings	Visual inspection or retightening of the clamp screws
Rubber mounts on torque arm	Visual inspection

▶ Continuous supervision of the motors is necessary, depending on the conditions of use.
▶ Check all parts on which the ignition protection type is dependent, e.g. the integrity of the insertion elements and seals.
▶ The motor surface and the air inlet must be kept clean as part of periodic inspections.
▶ Perform a visual inspection:
- Junction box and entry parts are tight.
- Connectors are tight and have not come loose.
- Fan cowls are not deformed.
- There are no excessive and long-lasting dust deposits.

Dust accumulation
The surface temperature of the drive indicated on the power rating plate is only applicable if the dust accumulation does not exceed a thickness of 5 mm.
Excessively thick dust deposits may cause the permissible surface temperature to be exceeded.
▶ Regularly clean motors to remove dust deposits, etc.
▶ Do not operate motors with excessively thick dust deposits.
▶ Particularly when equipment is used in areas at risk of dust explosion classified as zones 21 or 22, excessive and long-term dust deposits must be avoided.

11.1 Maintenance schedule

▶ Observe maintenance activities for components according to supplier documentation.

Assembly	Component	Maintenance interval	Activities
Motor part and attachments	Entire motor	After 3,000 operating hours, every 6 months at the latest:	see chapter 11.2, p. 58
	Encoder	every motor maintenance	See separate operating manual from manufacturer
	Backstop	Every motor maintenance	See separate operating manual from manufacturer
Brakes	see brake manufacturer's operating instructions		
Gearbox	Entire gearbox	After 3,000 operating hours, every 6 months at the latest	see chapter 11.4.1, p. 60
	Only for worm gearboxes	Occasionally, depending on load and operating mode, normally only after running for some time	▶ Replace worm gear.
	Lubricants	After 15,000*) operating hours for mineral gear oil (CLP 220) Every 25,000 operating hours for synthetic gear oil (PGLP220/ PGLP460), after 2 ... 3 years at the latest (does not apply to lifetime lubricated gears).	see chapter 11.4.2, p. 60 For approved lubricant types and quantities depending on installation position, see rating plate or chapter 11.4.3, p. 61.
*) Gearboxes without oil filler and oil drain plugs do not require a lubricant change. They are lifetime lubricated under normal operating conditions.			

Tab. 21: Maintenance schedule

11.2 Motor inspection and maintenance

The motors must be inspected at regular intervals by a qualified specialist.
For geared motors, motor inspection and maintenance is usually performed at the same time as the gearbox.

▶ Pay special attention to the following:
- Possible damage
- Noticeable noises and vibrations
- Correct and proper electrical connection
- Unobstructed cooling air supply
- No impermissible dirt or dust deposits present

Roller bearing
The roller bearings of the motor are permanently lubricated.
▶ Check roller bearings and replace as necessary.
▶ Clean the roller bearings.

Bearings
We do not recommended cleaning and relubricating the bearings due to the risk of contamination.

Further activities

▶ Check sealing ring running surfaces.
- For non-permissible run-in grooves, replace the sleeves or, in the case of motors D..04LA.. - D..06LA.., replace the rotors.

▶ Replace shaft sealing ring. Grease the sealing lips before inserting and, if present, fill 50% of the grease chamber between the dust and sealing lips (see Tab. 22, p. 61).
- Make sure that the new sealing ring does not return to the "old" track.

▶ Also remove dirt and dust deposits near the cooling air supply.

▶ Touch up paint/corrosion protection, replace as necessary.

Terminal box seal

▶ After each opening and before re-closing the terminal box, ensure the following: Check the seal of the terminal box and replace it with an original part if damaged.
- The seal is glued to the housing/cover: Remove seal with a suitable aid without leaving any residue. When doing so, ensure that the metallic housing surface is not mechanically damaged.
- Remove any grease, adhesive, etc. from the contact surface of the gasket.

▶ After removing the protective foil, attach the original part seal of the terminal box with the self-adhesive side covering the contour to the housing/cover and press on briefly.
- Briefly pressing on the seal until an assembly-suitable adhesion is achieved is sufficient. No polymerisation times are to be observed.

11.3 Inspection and maintenance of brakes

WARNING
Non-functional brake
Brakes are components important for safety. Death and serious injury may result.
▷ Any work must be performed by qualified and personnel trained on the product.
▷ Do not expose any friction surfaces and brake discs to oil or grease. Even small quantities reduce the braking torque significantly.

The nearest Bauer service partner can be found at www.bauergears.com.

▶ Perform brake maintenance according to the brake manufacturer's operating instructions.

11.4 Inspection and maintenance of gearboxes

Check the following components during inspection and maintenance:
- Shaft sealing rings (wear parts)
- Roller bearings (wear parts to a lesser extent)

11.4.1 Gearing

If there is unusual running noise caused by bearing damage and/or leaks, have gearing repaired by trained personnel.

▶ Check for bearing damage if noise is heard while running.
▶ Visually inspect the seals on the output and housing for leaks.
▶ Check that rubber buffers for any existing torque arms are installed properly and pre-stressed, see chapter 6.2, p. 25.
  • Regularly monitor the effectiveness of the rubber buffers.
  • The torque arm must under no circumstances be supported directly on metal, as unavoidable relative movements could generate frictional heat.
▶ If rubber buffers are cracked, damaged, or severely compressed: Replace rubber buffer.
▶ Check paint/corrosion protection and touch up as necessary.

Roller bearing
The roller bearings of the gear unit are lubricated by the gear lubricant. The following test interval is sufficient under normal operating conditions, when used as intended and when the operating factor fB is observed:
▶ Check the running condition of the gearbox (roller bearings and gear wheels) as part of the recurring inspections at intervals of 3000 operating hours, at the latest 6 months.
▶ If there are signs of unacceptable wear: Replace the affected components.

Version C:
The clamp connection has no wear or relative movement.
▶ Check the tightness of the clamping screw as part of regular inspection.

11.4.2 Lubricants

WARNING
Incorrect disposal of lubricants
Environmental damage can result. Death and serious injury may result.
▷ Synthetic gear oils based on polyglycol (e.g. PGLP...) must be disposed of separately from mineral oils as hazardous waste.

We also recommend replacing the roller bearings in order to ensure longterm operating reliability.
▶ Allow the lubricant to completely drain into a suitable container and dispose of it properly.
▶ Fill with new lubricant of the same type; see rating plate for quantity.
▶ Replace the shaft sealing ring for gears with pre-stage or for tandem gearboxes. Fill 50% of the chamber between the dust lip and sealing lip with grease (Shell Gadus S2 V100 3 or similar). Make sure that the new sealing ring does not return to the "old" track.

11.4.3 Approved lubricant types for three-phase geared motors

Lubricant manufacturer	Lubricant type					
	Mineral oil	Synthetic oil				USDA H1 oil
	ISO VG 220	ISO VG 68		ISO VG 220	ISO VG 460	ISO VG 220
	Standard oil for gearboxes of series	Low-temperature oil for gearboxes of series		Standard oil for gears of series	Standard oil for gears of series	Food industry oil for gearboxes of series
	BF06-BF90 BG04-BG100 BK60-BK90	BF06-BF90 BG04-BG100	BK06-BK90 BM09-BM40 BS02-BS40	BS02-BS10 BK06-BK10 BM09-BM10 Low-temperature oil for gearboxes of series BS02-BS10 BK06-BK10 BF06-BF90 BG04-BG100 BK60-BK90 BM09-BM10	BS20-BS40 BK17-BK50 BM20-BM40 Low-temperature oil for gearboxes of series BS20-BS40 BK17-BK50 BM20-BM40	BF06-BF90 BG04-BG100 BK06-BK90 BM09-BM40 BS02-BS40
AGIP	BLASIA 220 [13 02 08]	—	—	BLASIA S 220 [13 02 06]	BLASIA S 460 [13 02 06]	—
BECHEM RHUS	STAROIL G 220 [13 02 08]	—	BERUSYNTH EP 68 [13 02 06]	BERUSYNTH EP 220 [13 02 06]	BERUSYNTH EP 460 [13 02 06]	BERUSYNTH EP 220 H1 [13 02 06]
CASTROL	ALPHA EP 220 [13 02 08] ALPHA SP 220 [13 02 08] OPTIGEAR EP 220 [13 02 08] OPTIGEAR 1100/220 [13 02 08]	Alphasyn T68 [13 02 06]	—	ALPHASYN PG 220 [13 02 06] OPTIGEAR 800/220 [13 02 06] OPTIGEAR 1300/220 [13 02 06] ALPHASYN GS 220 [13 02 06]	ALPHASYN PG 460 [13 02 06] OPTIGEAR 800/460 [13 02 06] OPTIGEAR 1300/460 [13 02 06] ALPHASYN GS 460 [13 02 06]	OPTILEB GT 220 (CLP-HC) [13 02 06] OPTILEB GT 1800/220 (CLP-PG) [13 02 08]
CHEVRON	Meropa 220 [13 02 08] GEARTEX EP-A SAE 85W-90 [13 02 06]	—	Meropa Synlu-be WS 68 [13 02 06]	Meropa Synlube WS 220 [13 02 06]	Meropa Synlube WS 460 [13 02 06]	Chevron lubricating oils FM 220 (USA) [13 02 06]
FUCHS	RENOLIN CLP 220 [13 02 08] RENOLIN CLPF 220 SUPER [13 02 08] RENOLIN CLP 220 PLUS [13 02 08]	RENOLIN UNISYN XT 68 [13 02 06]	RENOLIN PG 68 [13 02 06]	RENOLIN PG 220 [13 02 06]	RENOLIN PG 460 [13 02 06]	CASSIDA FLUID GL 220 [13 02 06]
KLÜBER	KLÜBEROIL GEM 1-220 N [13 02 08]	—	KLÜBERSYNTH GH 6-80 [13 02 06]	KLÜBERSYNTH GH 6-220 [13 02 06]	KLÜBERSYNTH GH 6-460 [13 02 06]	KLÜBEROIL 4UH1-220 N [13 02 06] KLÜBERSYNTH UH1 6-220 [13 02 06]
MOBIL	MOBILGEAR 600 XP 220 [13 02 08]	MOBIL SHC 626 [13 02 06]	—	MOBIL SHC Gear 220 [13 02 06] MOBIL SHC 630 [13 02 06]	MOBIL SHC Gear460 [13 02 06] MOBIL SHC 634 [13 02 06]	MOBIL SHC CIBUS 220 [13 02 06]
OEST	Gearol 220 [13 02 06]	—	—	—	—	—
SHELL	OMALA S2 GX220 [13 02 08]	—	—	OMALA S4 WE 220 [13 02 06]	OMALA S4 WE 460 [13 02 06]	—
TOTAL	CARTER EP 220 [13 02 08] CARTER XEP 220 [13 02 06]	—	—	CARTER SY 220 [13 02 06]	CARTER SY 460 [13 02 06]	NEVASTANE SL220 [13 02 06] NEVASTANE EP 220 [13 02 06] NEVASTANE SY 220 [13 02 06]
WINTERSHALL	SRS ERSOLAN 220 [13 02 08]	—	—	—	—	—
	Bearing grease					
—	SHELL S2 V100 3 – High temperature –	KLÜBER PETAMO GHY 133 – or similar –		Standard: SHELL S2 V100 3 High temperature: KLÜBER PETAMO GHY 133 – or similar –		MOBIL Polyrex 222 – or similar –
[....] code from European Waste Catalogue (Decision 2001/118/EC).						

Tab. 22: Approved lubricant types

11.4.4 Lubricant change for drive parts with enclosed installed bearings

The bearings of these drive parts are greased at the factory.

The interval for changing the lubricant is 10,000 operating hours at an input speed of 1,500 rpm. The maximum permissible input speed may be up to 3,600 rpm in specified cases. If the input rpm is doubled, the grease change interval is halved.
In the case of enclosed bearings installed in drive parts, the lubricant change is carried out as part of maintenance/inspection by replacing the bearings of the radial shaft seals. Cleaning and re-greasing the bearings is not recommended due to the risk of impurifying the lubrication.

11.4.5 Lubricant change for drive parts with open, regreasable bearings

Open, regreasable bearings are used as follows:
- with free-running input shaft (-SN) for gearbox sizes 80 and 90, but not for the BF80
- For assembly with standard motors in sizes as from and including IEC200 or NEMA324

an individual lubrication point or nipple is installed for each regreasable bearing.

The maximum speed is 1800 rpm. The grease change interval is 2,500 hours of operation, but a maximum of 6 months. The grease filling in the bearing is to be renewed after every 800 hours of operation by topping up with fresh grease.
The entire grease filling is to be replaced after two grease top-ups at the latest.
- If the grease filling is supplemented, the quantity is approx. 40 g for free shaft end (-SN) and for mounting standard motors.
- When replacing the grease, the fill quantity is approx. 120 g.
- For integral motor attachments, the following quantities apply:
  - Top-up of grease filling: approx. 60 g
  - Replacement of grease filling: approx. 180 g

▶ KLÜBER PETAMO GHY 133 N grease is to be used as lubricant.
▶ Top up and replace grease when the motor shaft rotates to ensure optimum distribution of grease in the bearing.
▶ When replacing grease: Remove the excess used grease from the grease discharge chamber.

The grease type for enclosed and regreasable bearings may vary from the standard for special-purposes lubrication (food-compatible, biodegradable, etc.). Ask the geared motor manufacturer about the correct lubrication for specific special applications.

11.5 Cleaning and maintenance

NOTICE
Improper cleaning of the paint layer
Corrosion protection is impaired. The drive or its surroundings may be damaged.
▷ Only use non-abrasive cleaning tools.

NOTICE
Penetration of liquid into device.
This may result in damage to the drives and the surrounding area/system.
▷ Exposure to water only permitted in accordance with protection class IP (type plate).
▷ Avoid direct impacts to shaft seal (>IP65).

1. Perform cleaning work.
2. At the end of the cleaning cycle, remove any cleaner residue from the drive shaft sealing rings.

12 Decommissioning

Follow the instructions and notes for installation and commissioning in chapters 6.2, p. 25, 6.9, p. 40, 7, p. 51, and 8, p. 52, and proceed in reverse order.

13 Disassembly

Follow the instructions and notes for installation and commissioning in chapters 6.2, p. 25, 6.9, p. 40, 7, p. 51, and 8, p. 52, and proceed in reverse order.

14 Disposal

14.1 Packaging

Improper disposal of packaging materials can cause environmental damage.
The products are packaged in accordance with the necessary or prescribed requirements for the respective mode of transport.

▶ Dispose of non-reusable packaging materials in accordance with local waste or disposal regulations.

14.2 Lubricants

▶ Dispose of synthetic gear oils based on polyglycol (e. g. PGLP, etc.) separately from mineral oils as hazardous waste.

14.3 Gearbox

▶ Dispose of gear and its components, e.g. as scrap steel:
- Housing and housing parts
- Gearwheels
- Shafts
- Roller bearing
- Worm gears (copper alloy)

14.4 Motor

▶ Dispose of motor and its components separately according to material:
- Iron
- Aluminium
- Copper
- Plastic ,
- Electronic components

15 Spare parts and accessories

▶ To maintain Ex-compliance, only use original BAUER spare parts.

Our worldwide service team is always ready to provide advice and support for supplying spare parts. You can find the nearest service partner online at www.bauergears.com/sales-and-service/gear-motor-academy/ under "Sales Locator".

Necessary spare parts can be requested and ordered from Bauer Gear Motor GmbH or one of our service partners.
Our website www.bauergears.com/sales-and-service/gear-motor-academy/ allows you to select the necessary spare parts yourself using the "Spare Part Selector".

16 Technical data

16.1 General data and conditions of use

See the rating plate/type plate for the most important technical data on operating the gears, motors, and geared motors.
These technical data and other contractually agreed data and properties form the basis and limit of the intended use.
Unless explicitly stated or agreed, the products can be operated without restriction and without taking special measures under the following environmental conditions:

Parameter	Value
Ambient temperature range	-20°C - +40°C
Installation altitude	1000 m above sea level

Tab. 23: Permissible ambient conditions

The power and torque data given on the rating plate is fully available at the output shaft
.
Gearbox efficiencies are taken into account here.
Specific technical data can be requested from Bauer Gear Motor by specifying the serial and/or article number.

16.2 Substructure and system-related vibrations

Gearbox series	Gear size	Max. permissible error (mm)
BG	<06	0.2
	10 … 30	0.4
	40 … 60	0.5
	70 … 80	0.7
	90 …100	0.8
BF	10 … 30	0.2
	40 … 50	0.4
	60 … 70	0.5
	80 … 90	0.7
BK	06 … 30	0.2
	40 … 50	0.4
	60 … 80	0.5
	90	0.7
BS	<06	0.2
	10 … 30	0.4
	40	0.5

Tab. 24: Foot design: permissible flatness error

Gearbox series	Bolt circle Ø (mm), A-flange	Bolt circle Ø (mm), C-flange	Max. permissible error (mm)
BG, BF, BK, BS	<165	<165	0.2
	>165 … 265	>165 … 265	0.4
	>265 … 350	>265	0.5
	>350 … 500	-	0.7
	>500	-	0.8

Tab. 25: Flange design: permissible flatness error)

16.3 Tightening torque

Bolts/nuts	Tightening torque, strength class 8.8 [Nm]
M5	6.5
M6	11.3
M8	27.3
M10	54
M12	93
M16	230
M20	464
M24	798
M30	1597

Tab. 26: Tightening torques for VDI 2230 screws, quality grade 8.8

16.4 Gearbox

16.4.1 General

Numerous influencing factors are decisive for the overall load on a gearbox.
The most important include:

- Average torque (rated torque) in Nm
- Daily operating time in hours (h)
- Strength of torque peaks (load classification)
- Frequency of torque peaks (switching operation)

These influences can be described in a simplified and practical manner by operating factors.
A distinction is made between operating factor 1 for load classification and operating time and operating factor 2 for load classification and switching frequency.

16.4.2 Torque ranges

Bauer gearboxes and geared motors are provided in different gear sizes:

Type of gearbox	Series	Number of sizes	Torque range
Helical gear	BG	13	20 Nm to 16,800 Nm
Shaft-mounted gear	BF	10	90 Nm to 16,800 Nm
Bevel	BK	10	80 Nm to 16,800 Nm
Worm gear	BS	8	25 Nm to 1,000 Nm

Tab. 27: Torque ranges for Bauer gearboxes and geared motors

16.5 Motors

16.5.1 General

The power specified on the rating plate is fully available at the output shaft.
This applies to continuous operation (S1-100%) – unless otherwise specified – at a maximum ambient temperature of 40°C and up to an installation altitude of 1000 m above sea level, unless otherwise indicated.
Unless otherwise specified, a tolerance of +/- 5% applies to the rated voltage in accordance with IEC 60034-1.

16.5.2 Permanent magnet synchronous motors (PMSMs)

Parameter	Value
Parameter for optimal frequency inverter duty	See rating plate
Limit torques	See rating plate
Limit currents	See rating plate
Limit speed	See rating plate

Tab. 28: PMSM parameters

16.6 Motor attachments and accessories

16.6.1 External fan



▷ Observe the operating instructions and data sheet from the manufacturer of the external fan.

16.6.2 Brakes with Ex approval



▷ Observe the operating instructions and data sheet of the brake manufacturer.

16.6.3 Sensor system for zone 2/22



▷ Observe the operating instructions and data sheet of the transmitter manufacturer.

16.7 Brake maintenance

▶ Perform brake maintenance as specified in the brake manufacturer's operating instructions.

17 Declarations of Conformity

EU Declaration of Conformity

BAUER GEAR MOTOR
A REGAL REXNORD BRAND

according to ATEX Directive 2014/34/EU
for special gears for use in potentially explosive atmospheres
Category 2G, 2D, 3G or 3D

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B 000.1200-01 Version: 10/2024

Bauer Gear Motor GmbH
Eberhard-Bauer-Str. 37, 73734 Esslingen (Germany)

hereby declares on its sole responsibility conformity of the following products:

gear series **helical gear drives BG..**
flat gears BF..
bevel gears BK..
worm gears BS..
electric monorail gears BM...

where applicable with additional component series C-

Category: 2G, 2D, 3G or 3D

Marking:
- **II 2 G Ex h IIC T1…T4 Gb**
- **II 2 D Ex h IIIC T160°C…120°C Db**
- **II 3 G Ex h IIC T1…T4 Gc**
- **II 3 D Ex h IIIC T160°C…120°C Dc**
- **II 2 G Ex h IIB T1…T4 Gb**
- **II 3 G Ex h IIB T1…T4 Gc**

with the requirements of the European Directive

DIRECTIVE 2014/34/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014.
Published on 29 March 2014 in the Official Journal of the EU No. L 96/309.

The object of declaration as described above is in conformity with the pertinent harmonisation legislation of the Union, demonstrated by compliance with the following harmonised standards:

EN 1127-1:2019
EN 80079-36:2016
EN 80079-37:2016
EN 60529:1991 / A1:2000 / A2:2013

In accordance with 2014/34/EU, Annex VIII, Bauer Gear Motor GmbH has deposited the necessary documents with the notified body: PTB (Physikalisch-Technische Bundesanstalt), EU Identification Number: 0102
Document Registration Number: PTB Reg. No. 03 ATEX D005

Esslingen 1 October 2024

Bauer Gear Motor GmbH

M. Edel
(Managing Director)

P. Cagan
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This declaration does not constitute a guarantee of features or performance with regard to product liability.
The technical documentation is produced and administered by Bauer Gear Motor GmbH.

CERT-EG2-KonfErkl_ATEX_ck_B000_1200_01-EN-A4

EU Declaration of Conformity

BAUER GEAR MOTOR
A REGAL REXNORD BRAND

according to ATEX Directive 2014/34/EU
for three-phase motors with the type of protection "e" for Zone 2 or "t" for Zone 22

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B 320.1100-14 Version: 10/2024

Bauer Gear Motor GmbH
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hereby declares on its sole responsibility conformity of the following products:

three-phase motor series …/D.X..04…,D.X..05…, .../D.X..06..., .../D.X..07..., .../D.X..08..., .../D.X..09..., .../D.X..11..., .../D.X..13..., .../D.X..16... und .../D.X..18...

where necessary, in conjunction with

Speed sensor -G

Brake -BR

the gear series:
helical gear drives BG.., flat gears BF.., bevel gears BK.., worm gears BS.., e lectric monorail gears BM...

Category: 3G, 3D or 3GD

Marking:
II 3G Ex ec IIC T1…T3 Gc
II 3G Ex ec IIB T1…T3 Gc
II 3D Ex tc IIIC T160°C…120°C Dc
II 3D Ex tc IIIB T160°C…120°C Dc

with the requirements of the European Directive

DIRECTIVE 2014/34/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014.
Published on 29 March 2014 in the Official Journal of the EU No. L 96/309.

The object of declaration as described above is in conformity with the pertinent harmonisation legislation of the Union, demonstrated by compliance with the following harmonised standards:

EN IEC 60079-0:2018 + AC:2020	General requirements
EN IEC 60079-7:2015 + A1:2018	Equipment protection by type of protection "e"
EN 60079-31:2014	Equipment dust ignition protection by enclosure "t"
EN 60034-1:2010 + Cor.:2010	Rotating electrical machines - Part 1: Rating and performance

Esslingen 1 October 2024

Bauer Gear Motor GmbH

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CERT-EG1-KonfErkl_ATEX_e_t_B320_1100_14-EN-A4

EU Declaration of Conformity

BAUER GEAR MOTOR
A REGAL REXNORD BRAND

according to ATEX Directive 2014/34/EU
for three-phase motors with the type of protection "e"
for Zone 1 or "t" for Zone 21

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B 320.1200-15 Version: 10/2024

Bauer Gear Motor GmbH
Eberhard-Bauer-Str. 37, 73734 Esslingen (Germany)

hereby declares on its sole responsibility conformity of the following products:

three-phase motor series .../D.X..06..., .../D.X..08..., .../D.X..09..., .../D.X..11..., .../D.X..13..., .../D.X..16... und .../D.X..18...
Type examination certificates to:
PTB 23 ATEX 3003; PTB 23 ATEX 3004; PTB 23 ATEX 3005; PTB 23 ATEX 3006; PTB 23 ATEX 3007; PTB 23 ATEX 3008; PTB 23 ATEX 3009; PTB 23 ATEX 3010 X;
Notified Body No. 0102 PTB-Braunschweig

where necessary, in conjunction with the gear

series:
helical gear drives BG.., flat gears BF.., bevel gears BK.., worm gears BS.., electric monorail gears BM..

Category: **2G, 2D or 2GD**

Marking:
II 2 G Ex eb IIC T1…T4 Gb
II 2 G Ex eb IIB T1…T4 Gb
II 2 D Ex tb IIIC T160°C…120°C Db
II 2 D Ex tb IIIB T160°C…120°C Db

with the requirements of the European Directive

DIRECTIVE 2014/34/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014.
Published on 29 March 2014 in the Official Journal of the EU No. L 96/309.

QA system in accordance with RL 2014/34/EU Appendix IV certified by TÜV Rheinland Industrie Service GmbH
Notified under No. 0035

The object of declaration as described above is in conformity with the pertinent harmonisation legislation of the Union, demonstrated by compliance with the following harmonised standards:

EN IEC 60079-0:2018 + AC:2020	General requirements
EN IEC 60079-7:2015 + A1:2018	Equipment protection by type of protection "e"
EN 60079-31:2014	Equipment dust ignition protection by enclosure "t"
EN 60034-1:2010 + Cor.:2010	Rotating electrical machines - Part 1: Rating and performance

Esslingen 1 October 2024

Bauer Gear Motor GmbH

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The technical documentation is produced and administered by Bauer Gear Motor GmbH.

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EU Declaration of Conformity

BAUER GEAR MOTOR™
A REGAL REXNORD BRAND

according to ATEX Directive 2014/34/EU
Permanent magnet three-phase synchronous motors
with the type of protection type „e" for Zone 2 or „t" for Zone 22

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B 320.1100-18 Version: 10/2024

Bauer Gear Motor GmbH
Eberhard-Bauer-Str. 37, 73734 Esslingen (Germany)

hereby declares on its sole responsibility conformity of the following products:

Permanent magnet three-phase synchronous motor series
.../S.X..06..., .../S.X..08..., .../S.X..09..., .../S.X..11..., .../S.X..13..., .../S.X..16... and .../S.X..18...

where necessary, in conjunction with

Speed sensor -G

Brake -BR

the gear series:
helical gear drives BG.., flat gears BF.., bevel gears BK.., worm gears BS.., electric monorail gears BM..

Category: **3G, 3D or 3GD**

Marking:
II 3 G Ex ec IIC T1…T3 Gc
II 3 G Ex ec IIB T1…T3 Gc
II 3 D Ex tc IIIC T160°C…120°C Dc
II 3 D Ex tc IIIB T160°C…120°C Dc

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EN IEC 60079-0:2018 + AC:2020	General requirements
EN IEC 60079-7:2015 + A1:2018	Equipment protection by type of protection „e"
EN 60079-31:2014	Equipment dust ignition protection by enclosure „t"
EN 60034-1:2010 + Cor.:2010	Rotating electrical machines - Part 1: Rating and performance

Esslingen 1 October 2024

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EU Declaration of Conformity

BAUER GEAR MOTOR
A REGAL REXNORD BRAND

according to ATEX Directive 2014/34/EU
for permanent magnet three-phase synchronous motors
with the type of protection „e" for Zone 1 or „t" for Zone 21

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Bauer Gear Motor GmbH
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hereby declares on its sole responsibility conformity of the following products:

Permanent magnet three-phase synchronous motor series
.../S.X..06..., .../S.X..08..., .../S.X..09..., .../S.X..11..., .../S.X..13..., .../S.X..16... and .../S.X..18...
Type examination certificates:
PTB 13 ATEX 3014 X; PTB 13 ATEX 3015 X; PTB 13 ATEX 3016 X; PTB 13 ATEX 3017 X;
PTB 13 ATEX 3018 X; PTB 13 ATEX 3019 X; PTB 13 ATEX 3020 X;
Notified Body No. 0102 PTB-Braunschweig

where necessary, in conjunction with

the gear series:
helical gear drives BG.., flat gears BF.., bevel gears BK.., worm gears BS.., electric monorail gears BM..

Category: **2G, 2D or 2GD**

Marking:
II 2 G Ex eb IIC T1…T4 Gb
II 2 G Ex eb IIB T1…T4 Gb
II 2 D Ex tb IIIC T 160°C…120°C Db
II 2 D Ex tb IIIB T 160°C…120°C Db

with the requirements of the European Directive

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Notified under No. 0035

The object of declaration as described above is in conformity with the pertinent harmonisation legislation of the Union, demonstrated by compliance with the following harmonised standards:

EN IEC 60079-0:2018 + AC:2020	General requirements
EN IEC 60079-7:2015 + A1:2018	Equipment protection by type of protection „e"
EN 60079-31:2014	Equipment dust ignition protection by enclosure „t"
EN 60034-1:2010 + Cor.:2010	Rotating electrical machines - Part 1: Rating and performance

Esslingen 1 October 2024

Bauer Gear Motor GmbH

M. Edel
(Managing Director)

P. Cagan
(Quality Director)

This declaration does not constitute a guarantee of features or performance with regard to product liability.
The technical documentation is produced and administered by Bauer Gear Motor GmbH.

CERT-EG1-KonfErkl_ATEX_PMSM_e_t_B320_1200_16-EN-A4

18 Authorised service dealers

Along with the central service department in the Esslingen plant, the following contract partners with officially recognised personnel are available. These partners are trained to service explosion-protected BAUER geared motors, and are equipped with the necessary special tools.

DE	**73734**	BAUER GEAR MOTOR A REGAL REXNORD BRAND	**Bauer Gear Motor GmbH** Eberhard-Bauer-Straße 37 Esslingen / Germany	info.bgm@regalrexnord.com www.bauergears.com
DE	**22111**	**Bauer Gear Motor** **Authorised Partner**	**Steinlen Elektromaschinenbau GmbH** Am Schiffbeker Berg 18 Hamburg / Germany	info@steinlen.de www.steinlen.de
DE	**30938**	**Bauer Gear Motor** **Gear Centre**	**Steinlen Elektromaschinenbau GmbH** Ehlbeek 21 Burgwedel / Germany	info@steinlen.de www.steinlen.de
DE	**44147**	**Bauer Gear Motor** **Authorised Partner** Sales & Service	**BOSS-Steinlen Elektromaschinen und Pumpentechnik GmbH** Planetenfeldstr. 106 44379 Dortmund / Germany	info@boss-gruppe.de www.boss-gruppe.de
DE	**50266**	**Bauer Gear Motor** **Authorised Partner** Service	**Velden GmbH** Frechener-Str. 12 50226 Frechen / Germany	Info@velden-gmbh.de www.velden-gmbh.de
DE	**67065**	**Bauer Gear Motor** **Gear Centre**	**Klebs + Hartmann GmbH & Co. KG** August-Heller-Straße 3 Ludwigshafen / Germany	e-technik@klebs-hartmann.de www.klebs-hartmann.de
DE	**93354**	**Bauer Gear Motor** **Authorised Partner** Sales & Service	**EMS-Elektromotoren GmbH** Gewerbegebiet Egelsee 15 Siegenburg / Germany	web@ems-elektromotoren.de www.ems-elektromotoren.de
BE	**9000**	**Bauer Gear Motor** **Gear Centre**	n.v. EMR s.a. Kruisstraat 61C 9930 Lievegem 9930 Lievegem / Belgium	emr@nvemr.be www.nvemr.be

19 Wiring Diagram

Duplicate of the circuit diagram
with the relevant data
in the test field!

20 Ratings

After successful unit testing, the drive is assigned a nameplate having the following marking:

Motor	Gearbox
Apply duplicate of the rating plate with the relevant data in the test field!	Apply duplicate of the rating plate with the relevant data in the test field!

BAUER GEAR MOTOR™

Regal Rexnord

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To view our Standard Terms and Conditions of Sale, please visit https://www.regalrexnord.com/Terms-and-Conditions-of-Sale.

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