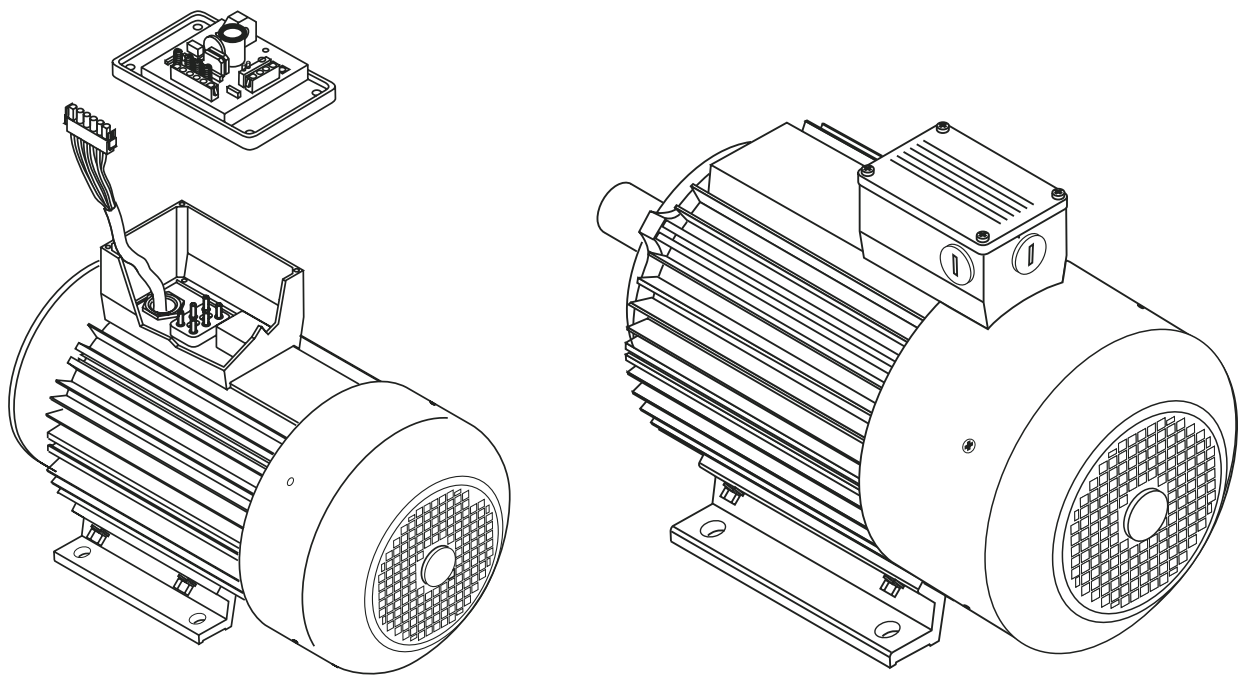


Synchronous generators of series DGG, DWG and WG

Models BG 132 and BG 160











Installation and operating manual

English 05/2013

Legend, safety instructions

This operating manual contains information you must observe for your own personal safety and to prevent material or property damage. The information concerning your own personal safety is emphasised with a warning triangle. Information about material or property damage without personal injury appears without a warning triangle. Depending on the hazard class, the warning information is shown as follows in descending order.

	 Danger Means that death or serious bodily injury will occur if the appropriate precautionary measures are not met.
	 Warning Means that death or serious bodily injury can occur if the appropriate precautionary measures are not met.
	 Caution Means that minor bodily injury can occur if the appropriate precautionary measures are not met.
	Important Means that property damage can occur if the appropriate precautionary measures are not met.
	Note Means that an unexpected event or condition can arise if the appropriate information is not followed.

If more than one hazard class arises, the warning level with the highest level is always the one used. If a warning of injury to personnel in a warning notice with warning triangle appears, an additional warning about material or property damage can be attached to the same warning notice.

Inhalt

	Legend, safety instructions	2
1	Important information and notes	6
1.1	Qualified personnel	6
1.2	Intended use	6
1.3	Validity of the manual	7
1.4	Copyright	8
1.5	General safety instruction	8
1.6	Manufacturer's address	8
1.7	Warranty	8
2	Safety instructions	10
3	References to norms and directives	14
4	Description	15
4.1	Models (BG 132 and BG 160)	15
4.1.1	Features and options of the models	16
4.2	General functions	17
4.3	Generator	17
4.3.1	Function	17
4.3.2	Generator controller	19
4.3.3	Mechanical versions	21
4.4	Variants for the electrical connection	21
4.4.1	Generator with attached terminal box (standard version)	21
4.4.2	Generator with attached corrugated pipe, controller electronics installed externally	23
4.4.3	Generator with attached switch box	23
4.5	Drive types	25
4.5.1	Single-bearing generators (only BG 132)	25
4.5.2	Dual-bearing generators	25
4.5.3	Direct connection via a coupling	25
4.5.4	Drive via hydraulic motor	25
4.5.5	Drive via belt pulley	26
5	Technical data	27
5.1	Generators	27
5.2	Switch box	27
5.3	Generator controller	27
6	Installation of generator	28
6.1	General safety instructions, installation	28
6.2	Requirements on the installation position	30
6.3	General provisions for installation	31
6.4	Permissible installation positions	33
6.4.1	Single-bearing generators	33
6.4.2	Dual-bearing generators (BG 132 an BG 160)	34

Contents

6.5	Holes for condensation water discharge	35
6.6	Installation of single-bearing generators	37
6.6.1	Delivery scope	37
6.6.2	Installation dimensions	38
6.6.3	Minimum clearances and cooling provisions	38
6.6.4	Assembly to engine	40
6.6.5	Additional assembly instructions for shaft attachment with tension bolt	48
6.7	Installation of dual-bearing generators (BG 132)	52
6.7.1	Installation dimensions and assembly	52
6.7.2	Minimum clearances and cooling provisions	53
6.7.3	Assembly instructions for belt drive	55
6.7.4	Assembly instructions for flange mount	57
6.7.5	Assembly instructions for hydraulic drive	61
6.8	Installation of dual-bearing generators (BG 160)	64
6.8.1	Installation dimensions and assembly	65
6.8.2	Minimum clearances and cooling provisions	66
6.8.3	Assembly instructions belt drive	67
6.8.4	Assembly instructions for flange mount	69
6.8.5	Assembly instructions hydraulic drive	71
6.9	Electrical generator connection	73
6.9.1	General	74
6.9.2	Version with terminal box	74
6.9.3	Version without terminal box, cable is routed in the tube	75
7	Operation	76
7.1	General safety instructions, operation	76
7.2	Operating conditions	80
7.3	Electrical safety devices, safety measures and earthing	81
7.3.1	Electrical protection and earth / potential equalization	81
7.3.2	Protection against overcurrent	82
7.4	Connection to an existing distribution network (e.g. company installation)	83
7.5	Working safely with electrical devices	84
7.6	Generator operation	86
7.6.1	Control elements in the optional switch box	86
7.6.2	Electricity distribution and the connection of devices	87
7.6.3	Check insulation monitor	91
8	Maintenance and care	92
8.1	General safety instructions, maintenance and care	93
8.2	Maintenance overview	95
8.3	Visual checks / cleaning work, users	96
8.4	Maintenance work, authorised technicians	97
8.4.1	Check / replace carbon brushes (only for brush generators)	98
8.4.2	Check carbon brush holder	99
8.4.3	Install the carbon brush holder	99
8.4.4	Replacement of the ball bearing	100

9	Repairs	101
10	Disassembly	102
10.1	Safety information	102
10.2	Disassembly	102
10.3	Disassembly of dual-bearing generators (BG 132 and BG 160 models)	103
10.4	Disassembly of single-bearing generators	103
10.4.1	Disassembly of single-bearing brush generators	104
10.4.2	Disassembly of brushless single-bearing generators	108
11	Transport and storage	113
11.1	Generator	113
12	Decommissioning, storage after disassembly of, disposal	114
12.1	Disposal instructions	114
13	Design coding system for generator types	115
13.1	Type code	115
13.2	Examples of descriptions	116
14	Spare parts	117
14.1	Generator	117
14.2	Explosion drawing BG132	118
14.3	Explosion drawing BG160	120
16	Index of figures	122
17	Index	124

1 Important information and notes

1.1 Qualified personnel

The unit or system may be installed and operated in connection with this manual. Installation, commissioning and operation of a unit or system must only be performed by qualified personnel.

Qualified personnel within the meaning of the technical safety information in this manual are persons with the authorisation to put devices, systems and circuits into service, to ground them, and to label them, according to technical safety standards.

1.2 Intended use

- Only use the generator for mains backup operations or for providing current to mobile distribution systems. Only use the generator in accordance with the performance data on the rating plate.
- The system is not designed for feedback mode (e.g. connection of 4-quadrant converters), so this mode is only available to a limited extent after consultation with the manufacturer.
- Secure the generator outputs against overcurrent and short circuit using suitable safety devices, according to the information on the rating plate.
- Do not connect the generator to supply other energy distribution or generator systems (e.g. domestic installations, distribution boards on building sites, other generators, or the mains supply network).
- Only operate the generator at the nominal speed indicated on the rating plate.
- Only use the generator for the uses indicated here and only in accordance with the information in this manual.

All other uses are not as intended and are not allowed.

In the event of improper use or misuse of the current generator or individual components thereof, the Generator. Technik. Systeme. GmbH & Co. KG cannot take any responsibility.

1.3 Validity of the manual

This operating manual applies for synchronous generators with the type designations DGG (three phase AC generators), DWG (AC-DC generators) and WG (AC generators). For reasons of clarity, only three-phase voltage generators are indicated in the operating manual and explicitly named. The specified descriptions apply analogously for WG series AC generators and for generators with special voltages and special frequencies.

1.4 Copyright

Without the express approval of Generator. Technik. Systeme. GmbH & Co. KG, no part of this operating manual may be distributed, published or transmitted, irrespective of the type and the means by which this occurs.

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All rights reserved.

1.5 General safety instruction

Technical changes after going to press are not taken into account.
We reserve the right to make changes.
Version: May 2013

1.6 Manufacturer's address

We are more than happy to provide information, assistance, service and ordering assistance.

Generator. Technik. Systeme. GmbH & Co. KG
Ziegelfeldstraße 62 + 65
73563 Mögglingen (Germany)

Tel +49 (0) 7174 8 98 00-0
Fax +49 (0) 7174 8 98 00-25
www.gts-generator.com
info@gts-generator.com

1.7 Warranty

We provide a warranty on generators of the series described here, according to the latest version of the "General for products and services of the electronic industry" of the ZVEI.

Dear customer,

Generator. Technik. Systeme. GmbH & Co. KG is a technically leading manufacturer of generators from 3,2 to 40 kVA and electronic control units of its own design. GTS generators are highly durable and of the highest quality. They are maintenance-free, long-lasting, precise and robust.

Only high-quality parts that meet the requirements of VDE tests and DIN and European norms are used in the manufacture of the generator.

All information in this operating manual has been composed and verified carefully to the best of our knowledge. Before installation, commissioning and use of the current generator please read the operating manual closely.

Generator. Technik. Systeme. GmbH & Co. KG cannot take any responsibility for any application contrary to the descriptions in this operating manual nor for damage arising from incorrect operation and management, incorrect installation, failing to use the unit as intended, prohibited technical modifications or due to repairs by unauthorised personnel.


If you have questions, please get in touch with
Generator. Technik. Systeme. GmbH & Co. KG.


Best regards


Generator. Technik. Systeme. GmbH & Co. KG







2 Safety instructions






This section contains a compilation of generally valid safety instructions. Please read and heed the safety information before installation, commissioning and operation of the generator carefully. This safety information also appears in the relevant areas of the text in the manual.




	<p>Important</p> <ul style="list-style-type: none"> ▶ Before installing and using the generator, please read the operating manual fully and carefully. ▶ Only use the generator for the uses listed in the sections on "intended use" and only in accordance with the information in the operating manuals.
---	--

	<p>! Danger</p> <p>Danger to life through electric shock</p> <ul style="list-style-type: none"> • During operation, the power generation system generates voltages that are potentially fatal. <ul style="list-style-type: none"> ▶ Never touch the generator, the switch cabinet or the devices attached to the power generation system with wet hands during operation.
--	---

	<p>! Danger</p> <p>Danger to life through electric shock</p> <ul style="list-style-type: none"> • Working on the generator or switch cabinet, visual inspections for maintenance purposes or cleaning work on the power generation system during operation can lead to potentially fatal injuries through electric shock. <ul style="list-style-type: none"> ▶ Switch off the drive unit before performing any inspection or maintenance work on the generator or switch cabinet. Prevent the drive unit from being switched back on by accident (e.g. remove the ignition key and keep somewhere safe).
---	---

	 Danger
	<p>Danger to life through electric shock</p> <ul style="list-style-type: none"> • A grounding of the neutral conductor of the generator (N, neutral conductor) invalidates the protective measure. <ul style="list-style-type: none"> ▶ Never ground the neutral conductor of the generator.
	 Danger
	<p>Danger to life through electric shock</p> <ul style="list-style-type: none"> • Insulation monitors can mutually influence each other. <ul style="list-style-type: none"> ▶ Do not connect any other insulation monitors downstream of the power generation system.
	 Warning
	<p>Risk of injury and destruction of property</p> <ul style="list-style-type: none"> • Inadequately qualified persons are at risk when working on the generator or switch cabinet and may damage the generator. <ul style="list-style-type: none"> ▶ The assembly, connection and commissioning of the power generation system and work on the electrical systems may only be carried out by authorised, qualified and specially trained personnel. ▶ Carry out all connection work according to applicable national regulations (in Germany: these include VDE specifications).

	<div data-bbox="312 282 1374 331" style="background-color: #f4a460; padding: 5px;">⚠ Warning</div> <p>Risk of injury</p> <ul style="list-style-type: none"> When protective coverings are not in use, there is a risk of injury through electric shock, moving parts and hot surfaces. <ul style="list-style-type: none"> ▶ Only operate the generator with the fitted protective coverings proscribed for the drive in the regulations.
	<div data-bbox="312 629 1374 678" style="background-color: #f4a460; padding: 5px;">⚠ Warning</div> <p>Risk of explosion</p> <ul style="list-style-type: none"> A discharge of sparks during operation is possible. <ul style="list-style-type: none"> ▶ Do not operate the generator in environments where there is a risk of explosion.
	<div data-bbox="312 931 1374 981" style="background-color: #f4a460; padding: 5px;">⚠ Warning</div> <p>Risk of accident</p> <ul style="list-style-type: none"> Devices which start up in an uncontrolled fashion can put persons at risk or injury them or cause damage or themselves be damaged. <ul style="list-style-type: none"> ▶ Switch off all devices before you connect them to the power generation system.
	<div data-bbox="312 1321 1374 1370" style="background-color: #f4a460; padding: 5px;">⚠ Warning</div> <p>Danger to life caused by electric shock and risk of damage.</p> <ul style="list-style-type: none"> Jets from a high-pressure cleaner can lead to the destruction of the switch cabinet or electric shock. <ul style="list-style-type: none"> ▶ Never expose the generator or switch cabinet with a protection class lower than IP69k to high-pressure cleaning jets. <div data-bbox="1109 1444 1369 1550">  </div>

	<div data-bbox="387 273 1465 331" data-label="Section-Header"> <p> Caution</p> </div> <div data-bbox="387 331 1465 577" data-label="List-Group"> <p>Burn hazard</p> <ul style="list-style-type: none"> • Parts of the generator can become very hot during and after the operation. <ul style="list-style-type: none"> ▶ Allow the generator or parts of the generator to cool down before you touch them. </div>
	<div data-bbox="387 622 1465 680" data-label="Section-Header"> <p>Important</p> </div> <div data-bbox="387 680 1465 1131" data-label="List-Group"> <ul style="list-style-type: none"> • These generators are not suitable for supplies to fixed distribution networks. • These generators are designed for a certain performance and speed. They can be destroyed by voltage peaks and overloads. <ul style="list-style-type: none"> ▶ Do not use the generator to supply building-site distribution boards or other fixed distribution networks (e.g. domestic installations). ▶ Never connect the generator to the public electricity grid or combine with other power generation systems. ▶ Never combine multiple generators. </div>

3 References to norms and directives

The generator has been manufactured in accordance with the following norms and directives.

- DIN 6280-10, Reciprocating internal combustion engines; generating sets with reciprocating internal combustion engines; small power generating sets; requirements and tests
- DIN EN 60034, Rotating electrical machines
- DIN VDE 0100 (VDE 0100), requirements for the installation of high-voltage systems with nominal voltages of up to 1 000 V
- DIN VDE 0100-430 (VDE 0100, Part 430), installing high-voltage machines with nominal voltages of up to 1 000 V protective measures- protecting cables and lines in the event of an overcurrent
- DIN VDE 0100-551 (VDE 0100, Part 551), electrical installations of buildings - Part 5: selection and installation of electrical equipment- Chapter 55: other equipment-main section 551: low-voltage power supply systems
- DIN VDE 0105-100, operating electrical installations
- DIN VDE 0470-1 (VDE 0470, Part 1), protection class provided by enclosures (IP code)
- BGV A 2, Electrical installations and equipment
- GUV 2.10, Accident prevention requirement "Electrical installations and equipment" with instructions for implementation

4 Description

4.1 Models (BG 132 and BG 160)

Depending on their nominal output and number of poles, the generators are constructed in two different versions: BG 132 model means 132 mm measured from the base up to the shaft center; and 160 mm for model 160.

BG 132 model

- 2-pole generators
(drive speed 3 000 1/min) with nominal lines of 3,2 kVA up to 20 kVA
These generators come in a brushless version or with carbon brushes. Depending on the type of installation, generators of model 132 can be constructed as single-bearing or dual-bearing generators. Single-bearing generators are designed for direct attachment to the drive unit. Here, the bearing of the drive unit then operates as a second bearing.
- 4-pole generators
(drive speed 1 500 1/min) with nominal output of 5 kVA up to 15 kVA
These generators are only constructed as a brushless version. Depending on the type of installation, generators of model 132 can be constructed as single-bearing or dual-bearing generators. Single-bearing generators are designed for direct attachment to the drive unit. Here, the bearing of the drive unit then operates as a second bearing.

Model 160-BG 160

- 2-pole generators (drive speed 3 000 1/min)
from a nominal output of 20 kVA up to 40 kVA
- 4-pole generators (drive speed 1 500 1/min)
from a nominal output of 10 kVA up to 40 kVA

Model 160 generators are only available as a brushless version, and are only constructed as dual-bearing generators

Dual-bearing generators are usually installed near the drive unit. There are a range of options for providing drive power to the generator.

⇒ **Drive types, page 25**

4.1.1 Features and options of the models

Variant / option	BG 132		BG 160
	Single-bearing	Dual-bearing	Dual-bearing
BG132 2-pole to 20 kVA 4-pole to 15 kVA			
BG160 1-pole from 20 kVA 4-pole from 10 kVA			
Generator attached directly onto engine	X	-	-
The type of the seal depends on the drive motor used.	X	-	-
Direct coupling via flange	X	X	X
Driven by belts or hydraulic system	-	X	X
"Brushless" version	X	X	X
"Brush generator" version	2-pole version only		-
Delivery without terminal box, cable guided directly in tube	X	X	X
Terminal box attached, without controller / filter function.	X	X	X
Terminal box attached, controller / filter functions included in part	X	X	X
Terminal box attached, controller / filter functions fully included	X	X	X
"Extended generator controller with automatic idling mode" option	X	X	X
Switch box attached: Model in cast aluminium or sheet metal finish	X (1)	X (1)	X (1)
Operating hour counter in the switch box option	X (1)	X (1)	X (1)
Insulation monitoring option in the switch box option	X (1)	X (1)	X (1)

- = not possible or "no"

x = possible or "yes"

(1) Not available for the complete performance range.

If you have any questions, please get in touch with
Generator.Technik.Systeme GmbH & Co. KG. directly.

4.2 General functions

These generator series are self-excited synchronous inner-pole generators. The generator comprises a functional group consisting of the main machine, exciter machine and, on brushless generators, co-rotating rectifiers. These groups are housed together in one housing. The electronic generator controller can be housed in a terminal box attached to the generator or in an external switch box.

The generators are extremely resistant to unbalanced loads due to constructive measures such as a damping cage and balanced controller.

4.3 Generator

4.3.1 Function

- The generators are electronically controlled, self-excited inner pole generators, in brush and brushless versions.
- The voltage supplied by the generator is regulated by the built-in electronic generator controller so that the output voltage between idle speed and the nominal load meets the requirements of DIN EN 60038. This equates to a quality standard which is comparable with the public electricity grid. The constancy of the output frequency is dependent on the speed constancy of the drive unit. The frequency is synchronous to the drive speed.
- If the generator sustains a temporary overload (below the actuation time of the protective circuit breaker) or if devices are connected to the generator with excessive power draw or excessive start-up power draw, the generator controller will automatically restrict the power output (by reducing the exciter field current) and reduce the output voltage.
- The generators meet the EMC directives DIN EN 13309/DIN EN 55014 and other EMC standards referenced in these norms.
- The generators are cooled by self-ventilation independent of the direction of rotation. The cooling air is drawn through the cooling profiles by the fan wheel on the rear side of the generator and across the housing, towards the front side.

Generator without the “insulation monitor with disconnection” option

With this option, the generator meets the protective measure “protective separation with potential equalization connector” according to VDE 0100, Part 410.

The mains configuration is the IT network with neutral conductor N and protective earth conductor PE.

⇒ Fig. 1, Mains configuration of generator, principle circuit diagram, protective separation, page 18

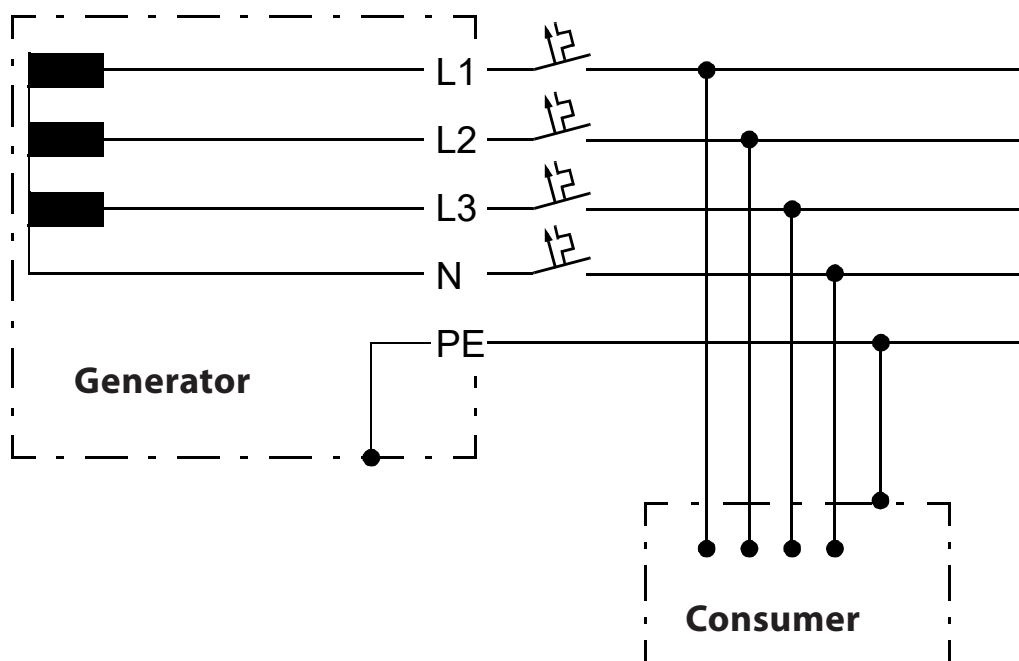


Fig. 1 Mains configuration of generator, principle circuit diagram, protective separation

Generator with “insulation monitor with disconnection” option

With this option, the generator meets the protective measure “protective separation with insulation monitor” according to VDE 0100, Part 410:702.

4.3.2 Generator controller

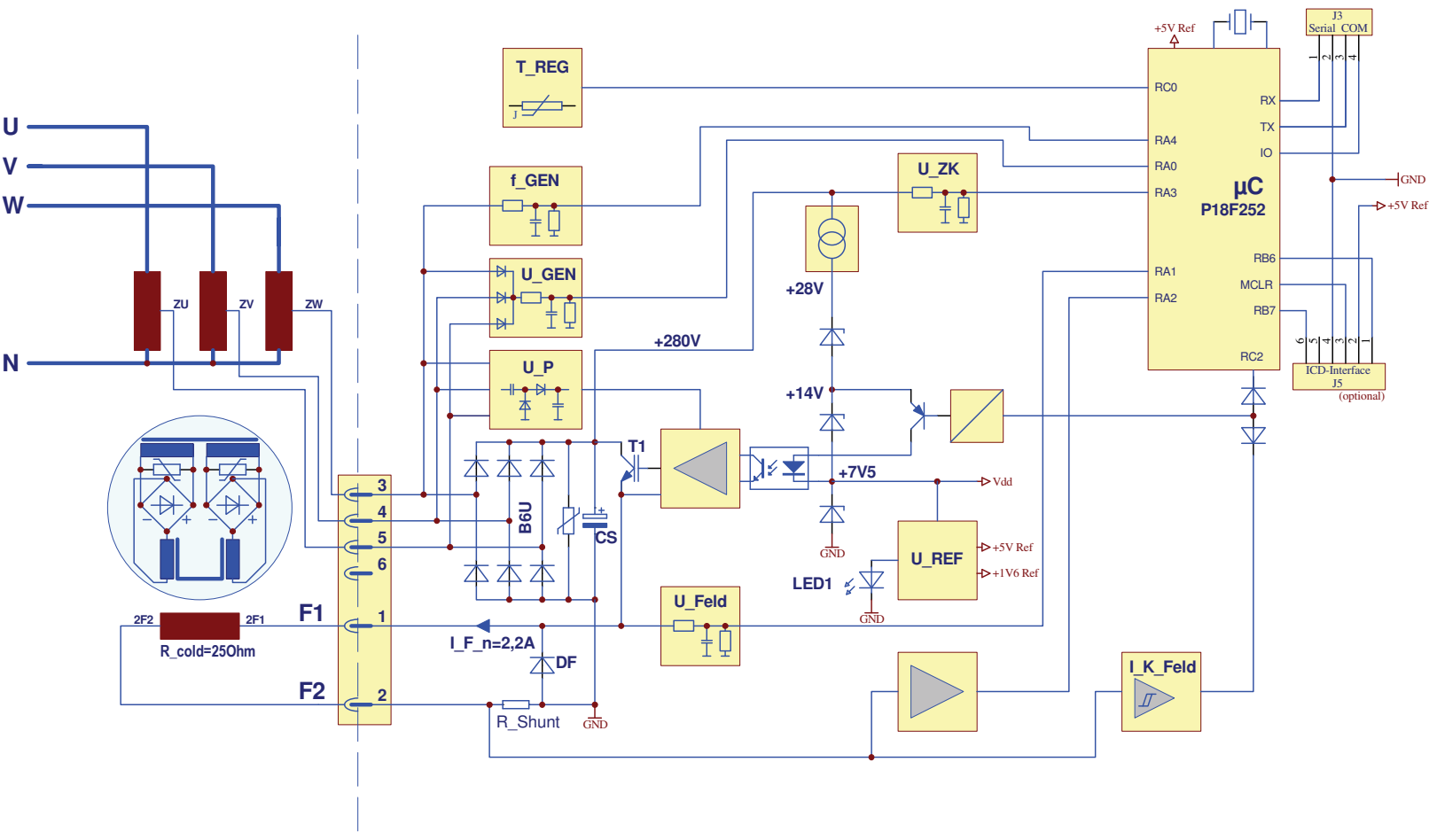


Fig. 2 Block circuit diagram, DWG-brushless generator with generator controller LCAR4BASIC

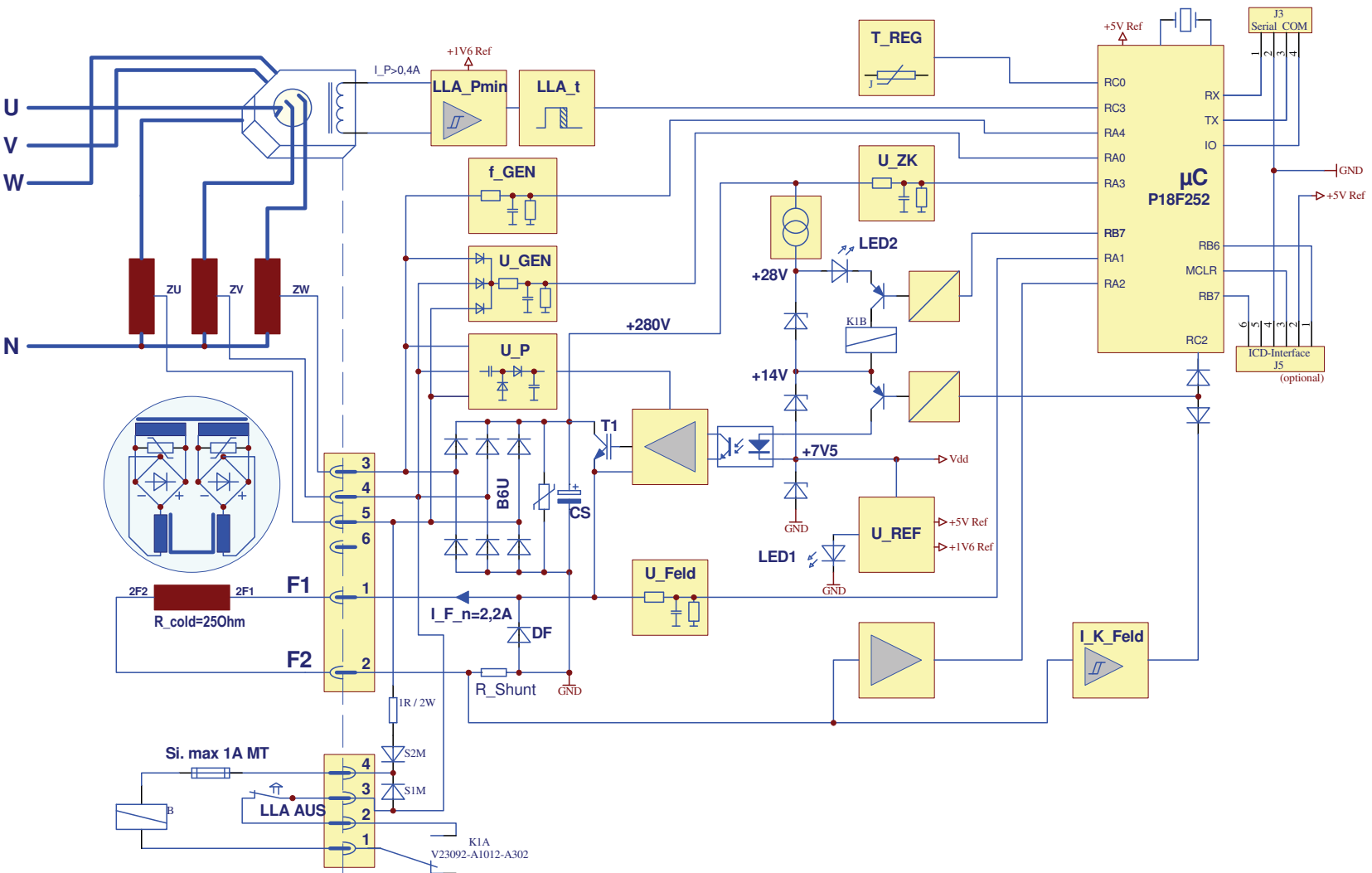


Fig. 3 Block circuit diagram, DWG generator with brushes and generator controller LCAR4STD (with connected electronic idling mechanism)

4.3.3 Mechanical versions

Depending on their nominal output, the generators are constructed in various model sizes.

⇒ Models (BG 132 and BG 160), page 15

4.4 Variants for the electrical connection

⇒ Generator with attached terminal box (standard version), page 21

⇒ Generator with attached corrugated pipe,
controller electronics installed externally, page 23

⇒ Generator with attached switch box, page 23

4.4.1 Generator with attached terminal box (standard version)

The terminal box attached to the generator contains a terminal board for the connection lines as well as the generator controller. A noise filter can also be installed in the terminal box. The noise filter can be housed in an external switch cabinet if required.

⇒ Terminal box, page 22

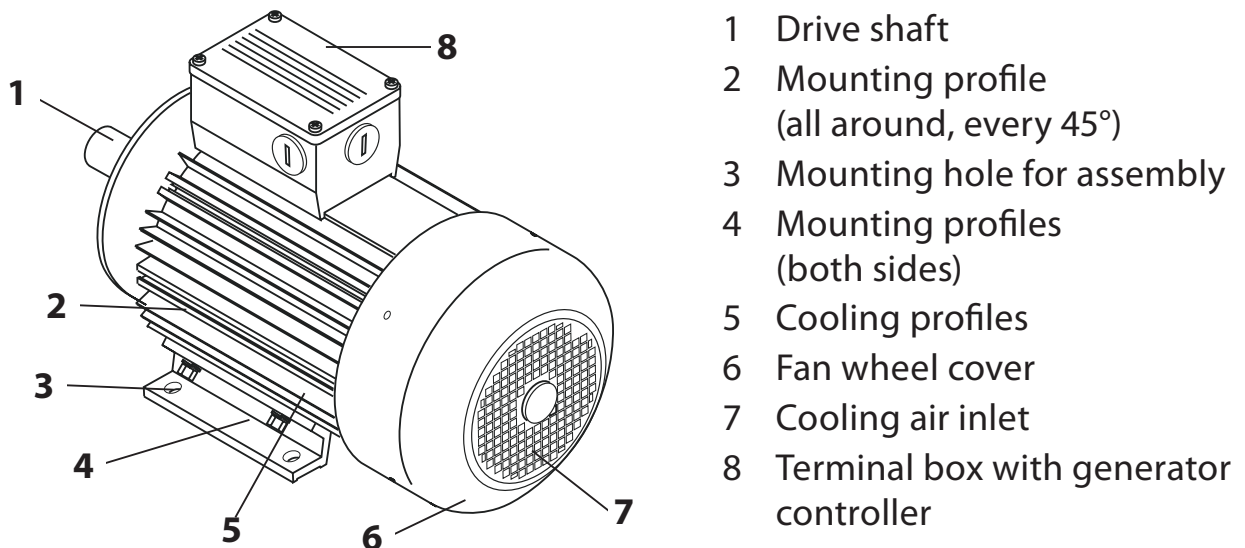


Fig. 4 Dual-bearing generator, model 132, with terminal box

Terminal box

The fully potted generator controller is housed in the cover of the terminal box.

The generator controller can be replaced by an optional extended generator controller with automatic idling mode.

⇒ **Generator controller, page 19**

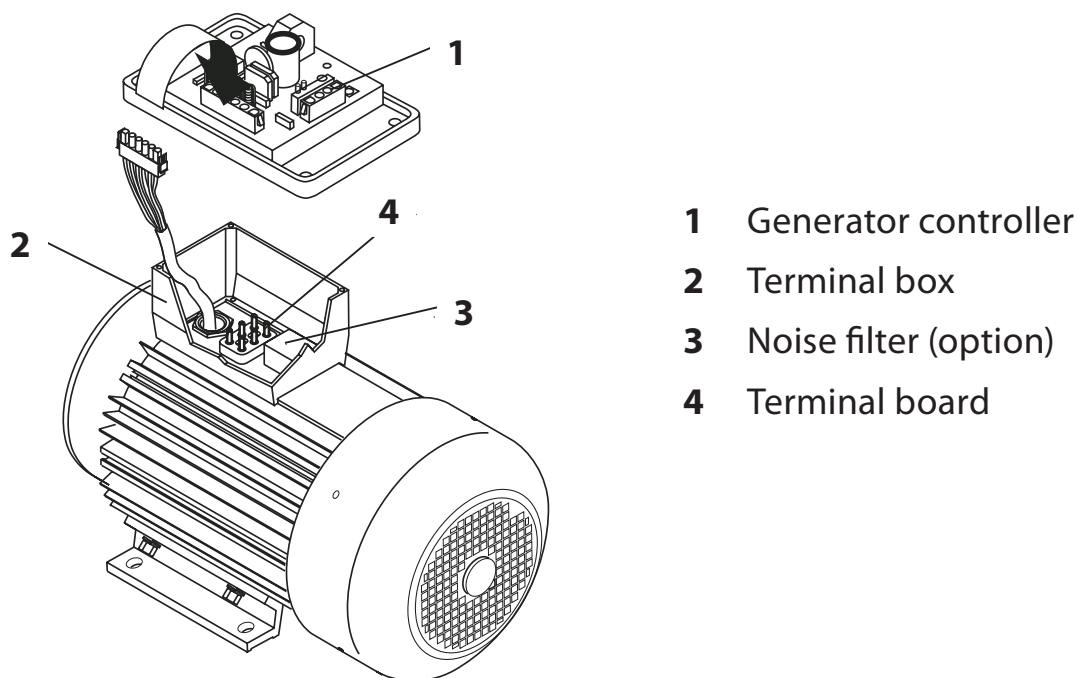
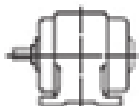


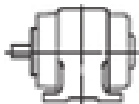
Fig. 5 Terminal box with terminal board, generator controller and noise filter

Foot mount motors

IM B3 (IM 1001)



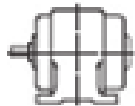
IM B34 (IM 2101)



Attachment flange
Form C DIN 42 948
on power side

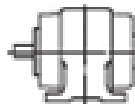
Flange motors

IM B5 (IM 3001)



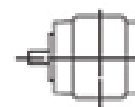
Attachment flange
Form A DIN 42 948
on power side

IM B35 (IM 2001)



Attachment flange
Form A DIN 42 948
on power side

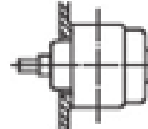
IM B14 (IM 3601)



Attachment flange
Form C DIN 42 948
on power side

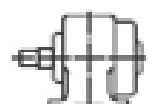
Motors without bearing plate

IM B9 (IM 9101)



without bearing plate
and without roller
bearing on power side

IM B15 (IM 1201)



without bearing plate
and without roller
bearing on power side

4.4.2 Generator with attached corrugated pipe, controller electronics installed externally

All connection lines of the generator, including the lines for the generator controller, are lead out through a corrugated pipe from the generator housing. This variant offers the advantage that the generator can also be used in relatively constrained spaces. In this case, the generator controller, complete power distribution, and the electrical fuse are housed in an external switch cabinet.

4.4.3 Generator with attached switch box

In the standard version, the switch box attached to the generator contains the generator controller, a noise filter, the power sockets for connecting the consumers and an all-pole protective circuit breaker for protecting the installed power sockets against overcurrent and short circuit. An operating hours counter and insulation monitor with shutoff protection can be installed as options.

The generator controller in the switch box can be replaced by an optional extended generator controller with automatic idling mode.

⇒ **Generator controller, page 19**

Insulation monitor with disconnection option

Generators with the “insulation monitor with disconnection” option meet the higher-level protective measure “protective separation with insulation monitor” according to VDE 0100, Part 410.

The insulation monitor monitors the insulation of the lines and units connected to the power sockets.

⇒ **Fig. 6, Switch box with installed options operating hours counter and insulation monitor, page 24**

If an insulation fault is detected at a connected device or in an extension cable, the insulation monitor will de-energize all power sockets immediately and the red signal lamp "INSULATION FAULT" will light up. In this case, the faulty unit will be put out of service and will reset the insulation monitor. An insulation fault exists when the insulation on a 400/230 V generator falls below 23 kOhm. The insulation fault is reset by means of the green RESET button or by switching off the drive.

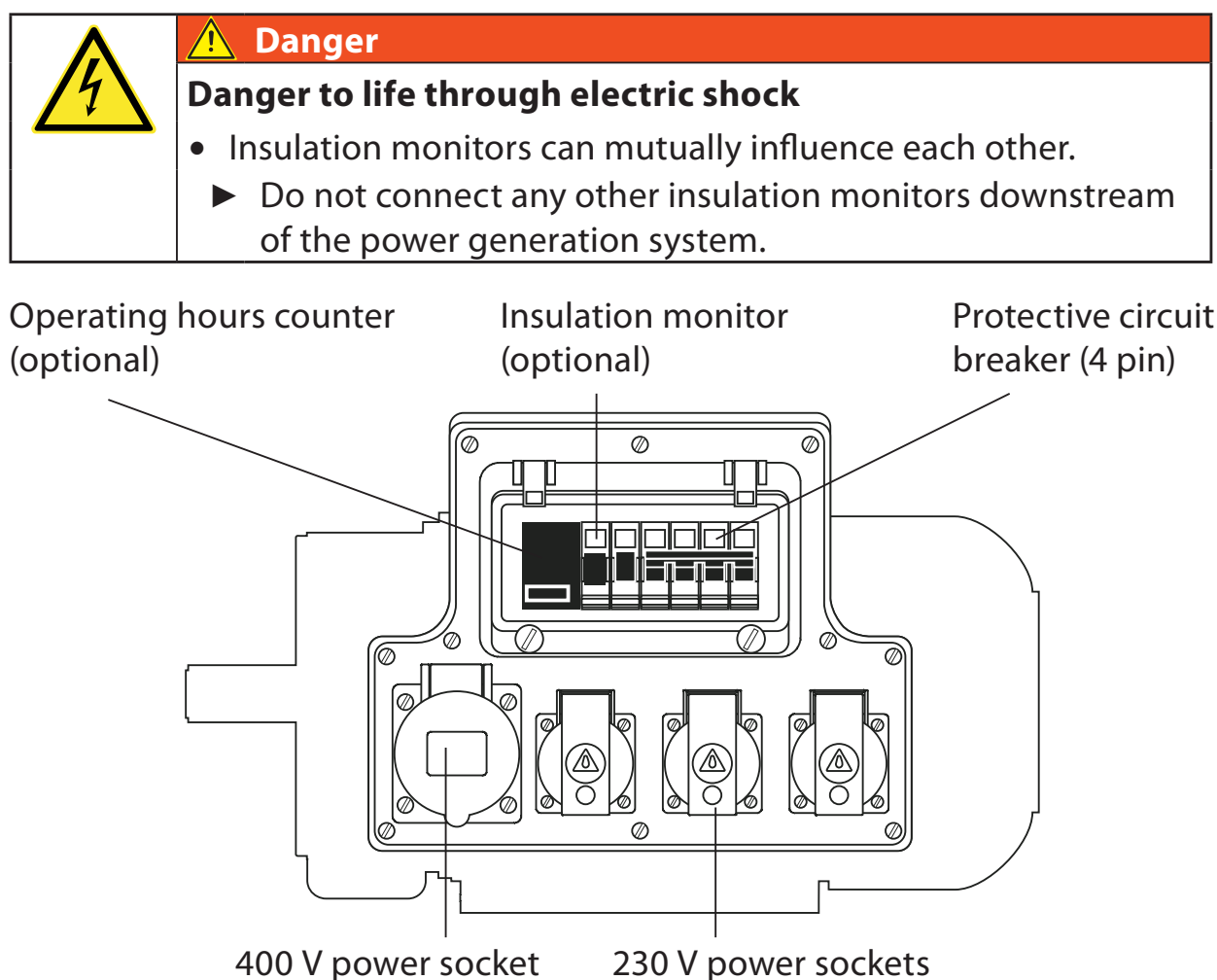


Fig. 6 Switch box with installed options operating hours counter and insulation monitor

4.5 Drive types

4.5.1 Single-bearing generators (only BG 132)

Single-bearing generators are designed exclusively for direct attachment to the drive unit. The shafts of generator and drive unit are directly connected to each other and the bearing of the drive unit serves as a second bearing for the generator.

The generator runs at the same speed as the drive unit. The drive unit must be running at the correct speed to avoid operating the generator at an under or overspeed. Under or overspeed operation can impair the function of the generator or may even damage it.

⇒ **Installation of generator, page 28**

4.5.2 Dual-bearing generators

Dual-bearing generators can be powered in various ways.

Installation and required components depend on the drive type

⇒ **Installation of dual-bearing generators (BG 132), page 52**

⇒ **Installation of dual-bearing generators (BG 160), page 64**

4.5.3 Direct connection via a coupling

The shaft on the generator is joined to the drive shaft of the drive unit via a coupling. The generator runs at the same speed as the drive unit. The drive unit must have a suitable and constantly regulated speed in order to avoid operating the generator at an over or underspeed. Under or overspeed operation can impair the function of the generator or may even damage it.

4.5.4 Drive via hydraulic motor

The generator is driven by a hydraulic motor. The hydraulic motor is fed from a hydraulic system. Do not operate the generator at an under or overspeed. Under or overspeed operation can impair the function of the generator or may even damage it.

4.5.5 Drive via belt pulley

The generator is joined to the drive unit via a belt pulley and a belt. The belt drive is an especially simple and cost-effective means of transmission. It also offers the advantage that, by selecting the transmission ratio, it is possible to optimally adjust the speeds of the drive unit and generator to each other.

5 Technical data

5.1 Generators

Generator technical data

Technical data for your product are available from GTS upon request.

Generator rating plate

⇒ Design coding system for generator types, page 115.

5.2 Switch box

Protection class	IP54 (all covers sealed and locked)
Connections	Power sockets according to the version (CEE, Euro-style earthed, Nema, ...)
Equipment	All-pole shut-down using miniature circuit breaker Controller, filter and interference suppression built in
Optional equipment	Operating hours counter
	Insulation monitor with signal lamp Meets protective measure "protective separation with insulation monitor"
Keep to the maximum permissible lengths of the connected lines.	



5.3 Generator controller



Controller type	LCAR4		
Pin assignment	Pin	Color	Function
	1	red	F1
	2	gray	F2
	3	violet	1/2 U
	4	violet	1/2 V
	5	violet	1/2 W
	6		




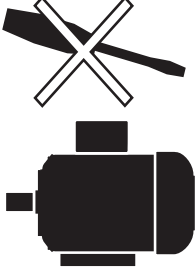




6 Installation of generator


Depending on the model, nominal output, and drive type, there installation may vary. Reference is made to these deviations in the corresponding sections of this manual. Carefully read and follow the safety instructions and all applicable sections of this chapter and the instructions and notes contained therein before installation and commissioning and during operation of the generator.

6.1 General safety instructions, installation

	 Danger
	<p>Danger to life through electric shock</p> <ul style="list-style-type: none">• Insulation monitors can mutually influence each other.<ul style="list-style-type: none">▶ Do not connect any other insulation monitors downstream of the power generation system.

	 Danger
	<p>Danger to life caused by making modifications to the generator</p> <ul style="list-style-type: none">• Any modification, incorrect repair or use of unsuitable third party parts shall cause all warranty claims to lapse and the lapsing of the type approval according to the Equipment Safety Act (GSG) and the certification according to EU-/EEC directives.• The manufacturer cannot assume any liability in such a case.<ul style="list-style-type: none">▶ Never make modifications to the generator or individual components.▶ Only use third party parts expressly approved by the manufacturer for the installation.

 	<div data-bbox="395 284 1465 331"> Danger</div> <div data-bbox="395 342 1465 387">Risk of injury and destruction of property</div> <div data-bbox="395 398 1465 806"><ul style="list-style-type: none">• Opening or disassembling the generator puts the system at risk and compromises the safety of the user.<ul style="list-style-type: none">▶ Never open or dismantle the generator.▶ The generator may only be opened by the manufacturer or an authority authorised by the manufacturer.▶ Only carry out the work described in this manual.</div>
	<div data-bbox="395 853 1465 900"> Danger</div> <div data-bbox="395 911 1465 956">Risk of injury and destruction of property</div> <div data-bbox="395 967 1465 1424"><ul style="list-style-type: none">• Incorrect installation of the generator can lead to malfunctioning, damage or danger.<ul style="list-style-type: none">▶ Before installing the generator, read this operating manual completely and carefully.▶ The assembly / disassembly of generator as well as the maintenance, service and replacement work may only be carried out by authorised and qualified technicians.▶ Only use the generator according to the information in the operating manual and the purposes indicated in the section on "intended use".</div>
	<div data-bbox="395 1471 1465 1518"> Warning</div> <div data-bbox="395 1529 1465 1574">Risk of accident and injury</div> <div data-bbox="395 1585 1465 1774"><ul style="list-style-type: none">• Incorrectly attached lifting equipment can lead to accidents.<ul style="list-style-type: none">▶ Fasten the lifting equipment to the generator exclusively using the ring screws provided.▶ Only use suitable lifting equipment.</div>


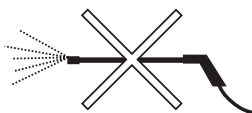
	Warning
	Risk of injury <ul style="list-style-type: none">• When protective coverings are not in use, there is a risk of injury through electric shock, moving parts and hot surfaces.<ul style="list-style-type: none">▶ Only operate the generator with the fitted protective coverings proscribed for the drive in the regulations.


6.2 Requirements on the installation position

Single-bearing generators exclusively for direct attachment to the drive unit. Only attach the generators to drive units that comply with the applicable norms, regulations and directives.

Dual-bearing generators are usually installed near the drive unit.

- Install the generator safely and securely on a 100 % level surface with a load-bearing capacity adequate for the weight class of the generator.
- Mount generators with a belt drive on rails or provide other means for adjusting the belt tension.
- The generator is designed according to IP54 or IP69k (for implementation, see rating plate). It is not explosion-protected. Do not operate in environments where there is a risk of explosion. Observe all additional regulations in this area.

	Warning
	Danger to life caused by electric shock and risk of damage. <ul style="list-style-type: none">• Jets from a high-pressure cleaner can lead to the destruction of the switch cabinet or electric shock.<ul style="list-style-type: none">▶ Never expose the generator or switch cabinet with a protection class lower than IP69k to high-pressure cleaning jets. 


	Important
	<ul style="list-style-type: none">• A cooling air feed above 40 °C can lead to power restrictions; in extreme cases it can cause damage to the generator.<ul style="list-style-type: none">▶ The temperature of the supplied cooling air should not exceed 40 °C.▶ Observe the necessary minimum clearances.

6.3 General provisions for installation

The basic requirement for safe, reliable and fault-free operation, electrical and mechanical safety is a technically and materially correct installation of the generator.

Generally the generators run clockwise. In this case, the output voltage has a “clockwise field of rotation”. Dual-bearing generators can also be operated in anticlockwise rotation; the rotary field of the output voltage then switches to “anticlockwise rotation”.

- The drive system must have sufficient power reserves for the dynamic processes when switching electrical consumers on and off. Its control system must have reliable command over these processes.

	Important
	<ul style="list-style-type: none">• Single-bearing generators are damaged if operated in an anticlockwise direction of rotation.<ul style="list-style-type: none">▶ Never drive single-bearing generators in the anticlockwise direction of rotation.▶ Before commissioning, ensure the direction of rotation is correct.

- Do not change the constructive form and design of the generator.
- Mounting surfaces must be precisely flat. Avoid alignment errors during assembly.
- After assembly, a test finger as per EN 60034, Part 5, or a foreign particle more than 12 mm diameter (e.g. balls) must not be able to touch rotating parts when this would lead to a hazard. In particular, the safety devices of the power transmission system must be sturdily built and securely assembled. Safety devices must only be removable with a tool.
- The cooling air must be supplied and discharged so as to reliably dissipate the arising heat loss. Only non-harmful quantities of dust and water may be drawn in with the cooling air. Avoid short circuits in the airflow.
- Observe the specific installation instructions and guides for the individual generator types.
- Do not operate generators with a second shaft end without a properly assembled working machine or protective covering.
- Install suitable safety devices for protecting circuits (power sockets) against short circuit and overcurrent in an external switch cabinet for generators without a factory-installed switch box that contains electrical safety devices and power sockets. The neutral conductor N must be secured. Coordinate the type and nominal current of the protective circuit breakers with the generator manufacturer GTS.
- For generators without factory-installed switch box that contains electrical safety devices and power sockets, check the generator, the switch cabinet and the complete electrical installation in accordance with DIN VDE 0100, Part 610, by visiting, testing, and measurement before initial commissioning.

⇒ **Drive types, page 25**

⇒ **Installation of single-bearing generators, page 37**

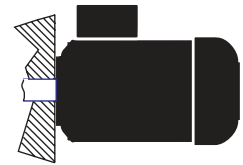
⇒ **Installation of dual-bearing generators (BG 132), page 52**

⇒ **Installation of dual-bearing generators (BG 160), page 64**

⇒ **Electrical generator connection, page 73**

6.4 Permissible installation positions

ok



6.4.1 Single-bearing generators

Single-bearing generators are exclusively for direct attachment to the drive unit. A horizontal installation position is required by the drive motor.

ok



Please indicate the position of the terminal box (or depending on the version, the cable outlet or switch box) when ordering the generator.

ok



The following installation positions are possible:

- Terminal box on top
- Terminal box rotated to the left or right by 45° or 90°

Other installation positions are not permitted.

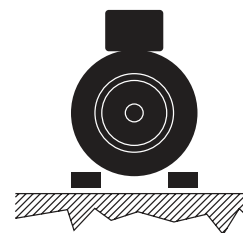
6.4.2 Dual-bearing generators (BG 132 an BG 160)

- > Install the generator on a horizontal surface, standing on the attachment brackets.

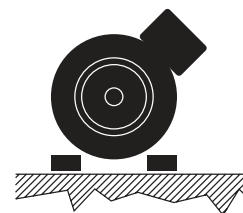
⇒ **adjacent figures**

- In the normal installation position, the terminal box (or depending version, the cable outlet or switch box) is positioned on the top side of the generator.
- The generator can be installed rotated by 45° or 90° to the left or right, as shown in the accompanying image. Remove the attachment bracket and install in the corresponding mounting profiles.

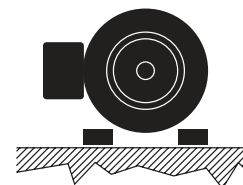
ok



ok



ok

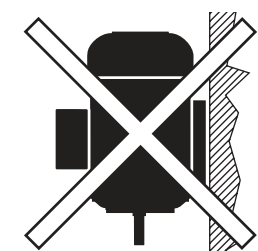


- > Replace the screws with screws of the same grade.

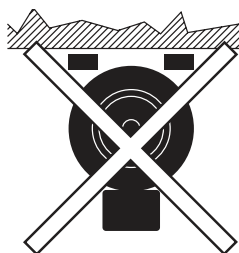
Replacement screws of the same grade are supplied by GTS.

- > The screws must be tightened to the correct torque.
- Torque 25 Nm for grade 8,8
- Torque 35 Nm for grade 10,9

Other installation positions are not permitted.



no




no



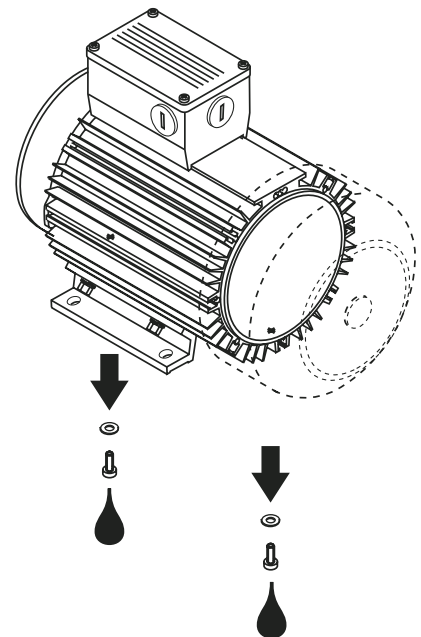
no

6.5 Holes for condensation water discharge


The drain holes for condensation water are not available for all generators; they may be omitted depending on the intended area of application.

	<p>Important</p> <ul style="list-style-type: none">• Under unfavorable circumstances, condensate water may form within the generator.<ul style="list-style-type: none">▶ Multiple holes have been made in the generator housing as a drain for condensation water (front and rear, each has 4 holes, arranged at an angle of 90°).
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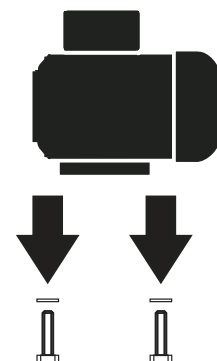
- Do not use the holes on both sides and on the top side. Seal them with M4x8 screws.
- The holes on the bottom side are used to drain off condensation water and must not be sealed with screws.



Max. thread length 8 mm

	<p>Note</p> <ul style="list-style-type: none">• The holes on the rear side are covered by the fan wheel cover.<ul style="list-style-type: none">▶ Remove the cover to gain access to the holes.
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- Check whether the two holes on the underside are open. If necessary, remove the screws from the holes in order to open the condensation water drains.

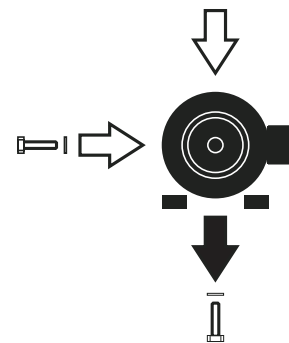
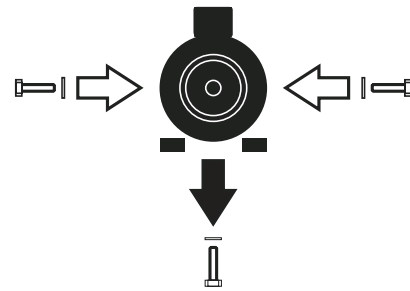


Installation of generator Holes for condensation water discharge

- Check whether the holes on the sides and on the upper side are sealed with screws.

For rotated generator installation

- > Remove the screws on the bottom in order to open the condensate water drain.
- > Seal the open holes on the side with the screws.




6.6 Installation of single-bearing generators

- To install the single-bearing generators, proceed according to the descriptions in this section.
- Before installation, read the chapter on intended use, the general safety information and the safety information in this chapter carefully and follow the instructions and regulations given therein.

⇒ **Intended use, page 6**

⇒ **Safety instructions, page 10**

⇒ **General safety instructions, installation, page 28**

	<table><tr><th data-bbox="394 754 1460 799">Important</th></tr><tr><td data-bbox="394 799 1460 1075"><ul style="list-style-type: none">• Single-bearing generators are damaged if operated in an anticlockwise direction of rotation.<ul style="list-style-type: none">▶ Never drive single-bearing generators in the anticlockwise direction of rotation.▶ Before commissioning, ensure the direction of rotation is correct.</td></tr></table>	Important	<ul style="list-style-type: none">• Single-bearing generators are damaged if operated in an anticlockwise direction of rotation.<ul style="list-style-type: none">▶ Never drive single-bearing generators in the anticlockwise direction of rotation.▶ Before commissioning, ensure the direction of rotation is correct.
Important			
<ul style="list-style-type: none">• Single-bearing generators are damaged if operated in an anticlockwise direction of rotation.<ul style="list-style-type: none">▶ Never drive single-bearing generators in the anticlockwise direction of rotation.▶ Before commissioning, ensure the direction of rotation is correct.			


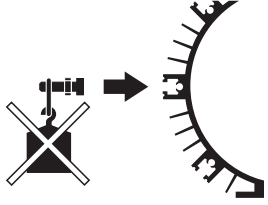
6.6.1 Delivery scope

Depending on the version of the generator and the type of the drive motor, the delivery scope may differ. The type of the seal depends on the drive motor used. Order the matching seals together with the generator.

6.6.2 Installation dimensions

Generator dimension

The generators vary according to the output and model.
If needed, request the drawing for your generator from
Generator.Technik.Systeme GmbH & Co. KG.

	<p>Important</p> <p>► Do not attach any external parts to the assembly of profile on the generator housing.</p> 
---	--

6.6.3 Minimum clearances and cooling provisions

- The generator needs sufficient ventilation for cooling. The cooling air is drawn through the cooling profiles by the fan wheel on the rear side of the generator and across the housing, towards the front side.
- Ensure adequate air feed and exhaust openings.
- Comply with the following minimum clearances and note the regulations for cooling.

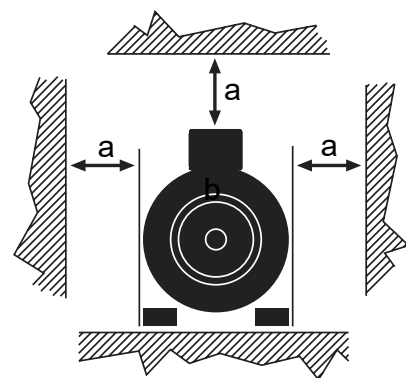
Minimum clearances

When installing, respect the following minimum clearances from fixed parts or walls.

⇒ **adjacent figures**

- On the side and top: $a = 100 \text{ mm}$
- Rear : $b = 170 \text{ mm}$

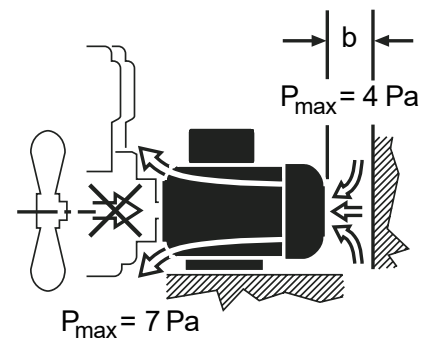
In individual cases, the clearances may vary from these figures. Get in touch with
Generator.Technik.Systeme GmbH & Co. KG.



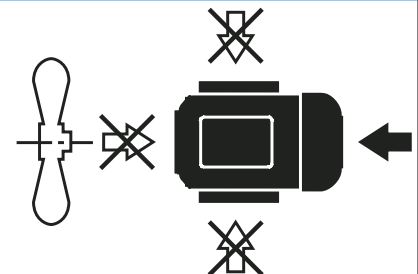
Temperature and pressures of the cooling air

	Important
	<ul style="list-style-type: none"> • A cooling air feed above 40 °C can lead to power restrictions; in extreme cases it can cause damage to the generator. <ul style="list-style-type: none"> ▶ The temperature of the supplied cooling air should not exceed 40 °C.

- A maximum underpressure of $P_{\max} = 4 \text{ Pa}$ is allowed in the suction path of the cooling air, otherwise, a sufficient quantity of cooling air cannot be drawn in.
- In the blow-out area of the cooling air on the front side, a maximum overpressure of $P_{\max} = 7 \text{ Pa}$ may arise as otherwise there will not be sufficient circulation of the cooling air.



	Important
	<ul style="list-style-type: none"> • An impaired cooling air current can lead to restrictions in performance damaging the generator. <ul style="list-style-type: none"> ▶ Do not impair the circulation of the cooling air with other air flows (e.g. from the front or from the side).





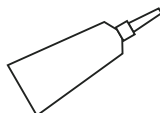
6.6.4 Assembly to engine

During assembly, observe the minimum clearances and specifications for cooling.

- ⇒ Installation of single-bearing generators, page 37
- ⇒ Installation of dual-bearing generators (BG 132), page 52
- ⇒ Installation of dual-bearing generators (BG 160), page 64

6.6.4.1 Generator seal to the drive motor

Use a seal between generator and drive motor during assembly. The type of the seal depends on the drive motor used. The following table lists the specified seals for the various drive motors.

Drive motor	Seal	Assembly instructions
B&S 12,5 HP/14 HP	VE1/877 or VE1/977 	> Press the seal into the shaft opening of the bearing plate.
Honda GX 390 K1 V Yamaha MZ 360 K	VE1/871 	> Secure the seal in the recess provided in the bearing plate with adhesive.
Yanmar L90/L100	Liquid sealant 	> Apply liquid sealing agent into the provided recess in the bearing plate.
Hatz 1D 60C	No sealing required	

6.6.4.2 Assembly of brush generators

Preparatory disassembly and removal of carbon brush holder

⇒ Fig. 7, Preparatory disassembly for assembling single-bearing brush generators, page 41

- > Remove two M8 x 45 screws, wrench size 10 mm, [2].
- > Remove the sleeve [1].
- > Remove both connection lines from the connecting lugs of the carbon brush holder [4].
The connection lines are coded by the size of the connecting lugs thus protecting them against being swapped.
- > Unscrew the mounting screw of the carbon brush holder and remove the carbon brush holder [4].
- > Remove the transportation lock (wooden wedge).
- > Remove the fan wheel cover [3] on the generator.

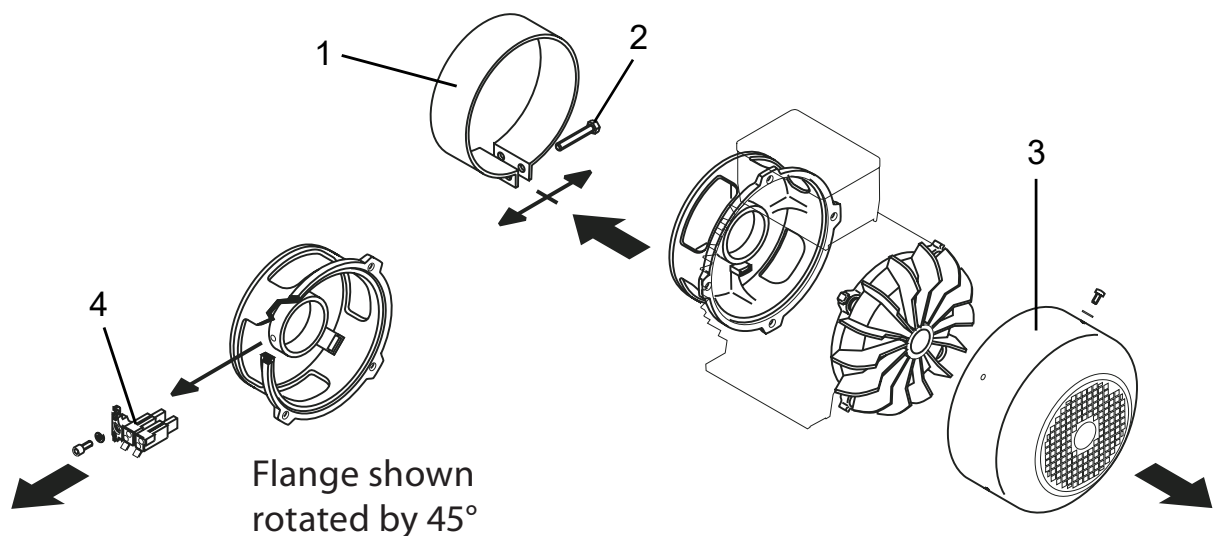


Fig. 7 Preparatory disassembly for assembling single-bearing brush generators

6.6.4.3 Shaft attachment assembly via grub screw

- ⇒ **Fig. 8, Assembly of single-bearing brush generators on the drive motor, page 43**
- ⇒ **Additional assembly instructions for shaft attachment with tension bolt, page 48**
- > Thread the provided grub screw [1] into the shaft of the drive motor as far as the stop with a hexagon socket wrench.
- > Install a appropriate seal on the front bearing plate of the generator.
- ⇒ **Fig. 1, Mains configuration of generator, principle circuit diagram, protective separation, page 18**
- ⇒ **Generator seal to the drive motor, page 40**
- > Align the generator in front of the drive motor so that the generator shaft lies in a line with the shaft of the drive motor.
- > If necessary, install a spacer below the generator as appropriate.
- > Move the generator against the flange of the drive motor. Align the threaded hole of the generator shaft onto the grub screw inserted in the motor shaft.
- > Rotate the fan wheel clockwise in order to thread the generator shaft onto the grub screw in the motor shaft as far as it can go.

Lightly press the generator against the flange of the drive motor. Ensure that the generator shaft is not drawn out of the generator during this procedure.

NOTE

When threading the generator shaft onto the grub screw, align the attachment holes in the bearing plate with the holes in the flange of the drive motor.

The generator shaft must not be tightly fastened onto the grub screw.

Thread the shaft on only as far as the stop.

When a load is applied to the generator, the connection will tighten firmly by itself.

- ⇒ **Additional assembly instructions for shaft attachment with tension bolt, page 48**
- > Secure the bearing plate of the generator with four mounting screws [2] to the flange of the drive motor.

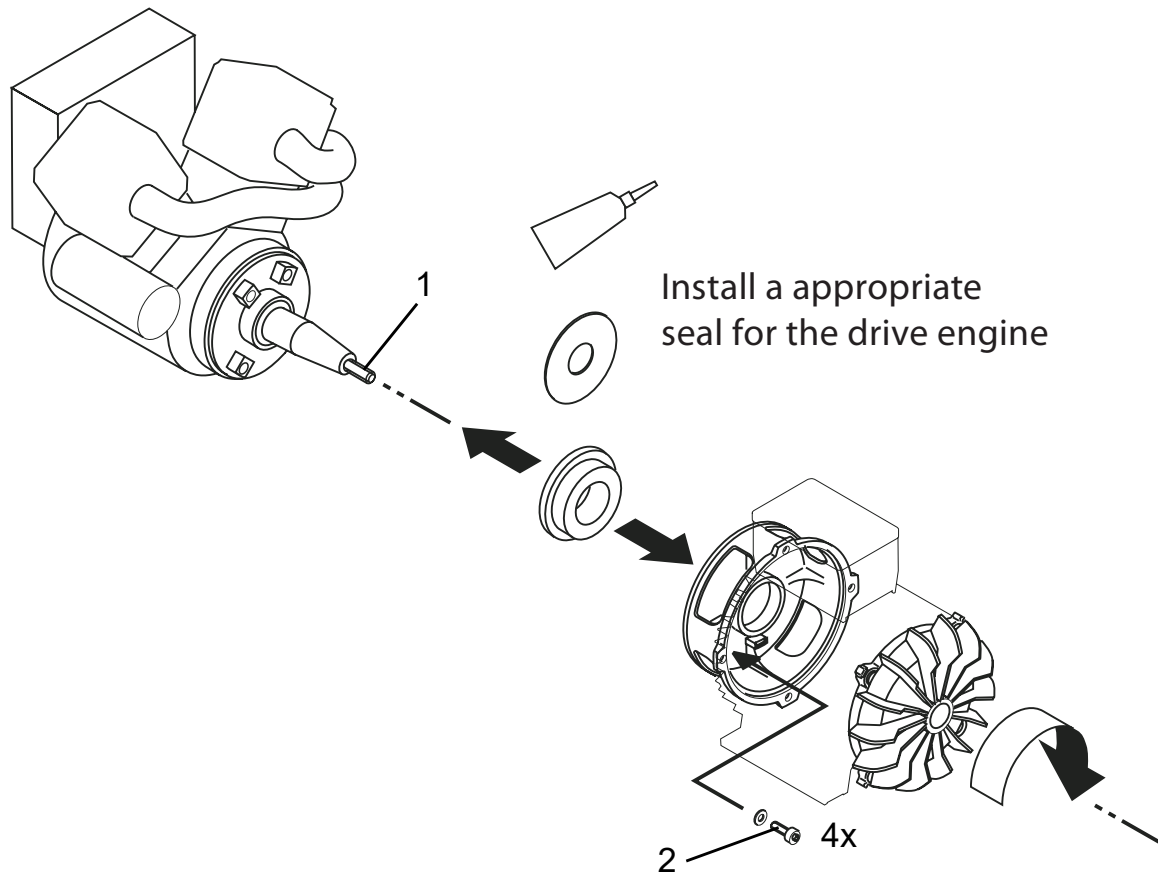


Fig. 8 Assembly of single-bearing brush generators on the drive motor

6.6.4.4 Installation of carbon brush holder

- ⇒ **Fig. 9, Installation of carbon brush holder, page 44**
- > Insert the carbon brush holder [4] into the generator in the correct position.
 - > Push onto the slip rings on the shaft so that the carbon brushes are pressed into the carbon brush holder and the carbon brush holder is resting against its mounting base.
 - > Press the carbon brush holder further and thread in the mounting screw but do not tighten fully yet. Threading in the mounting screw automatically positions the carbon brush holder on the mounting base.
 - > Check the correct position of the carbon brush holder and then tighten the mounting screw.
 - > Insert both connection lines onto the connecting lugs of the carbon brush holder according to the size of the attaching plug.

Installation of generator
Installation of single-bearing generators

- > Place the collar [3] and clamp securely with two screws [2].
- > Attach the fan wheel cover [1] .

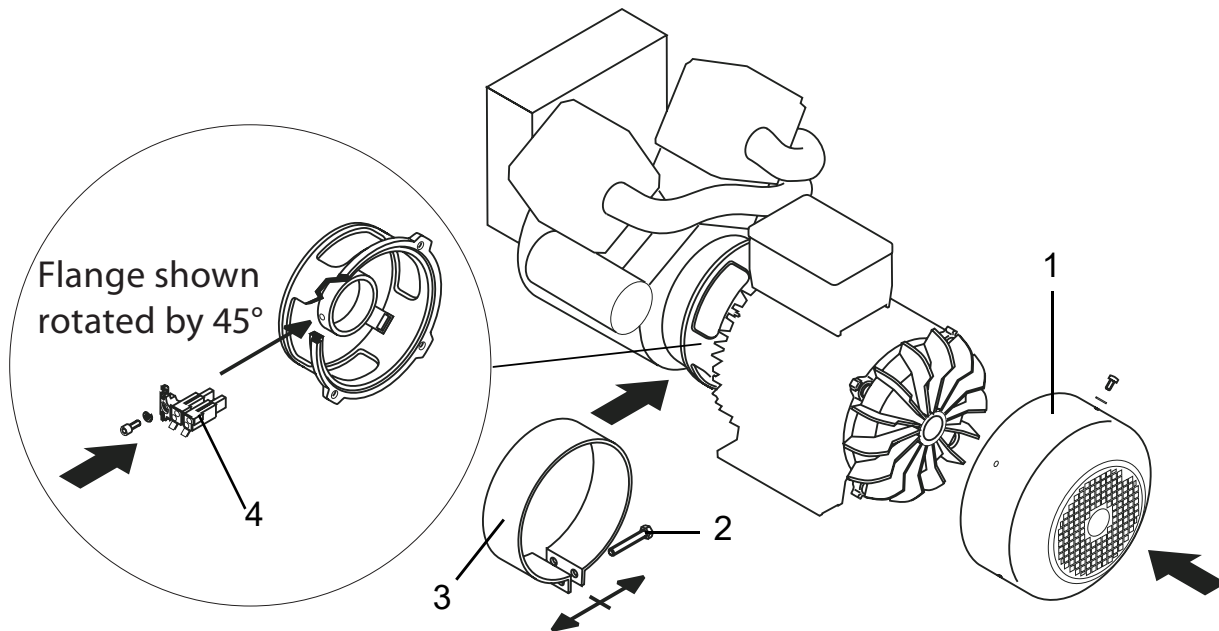


Fig. 9 Installation of carbon brush holder

6.6.4.5 Assembly of brushless generators

Preparatory disassembly

⇒ Fig. 10, Preparatory disassembly for assembling brushless single-bearing brush generators, page 45

- > Remove the fan wheel cover [1] on the generator.
- > On the generator, unscrew the four mounting screws [3] and remove the front bearing plate [2].

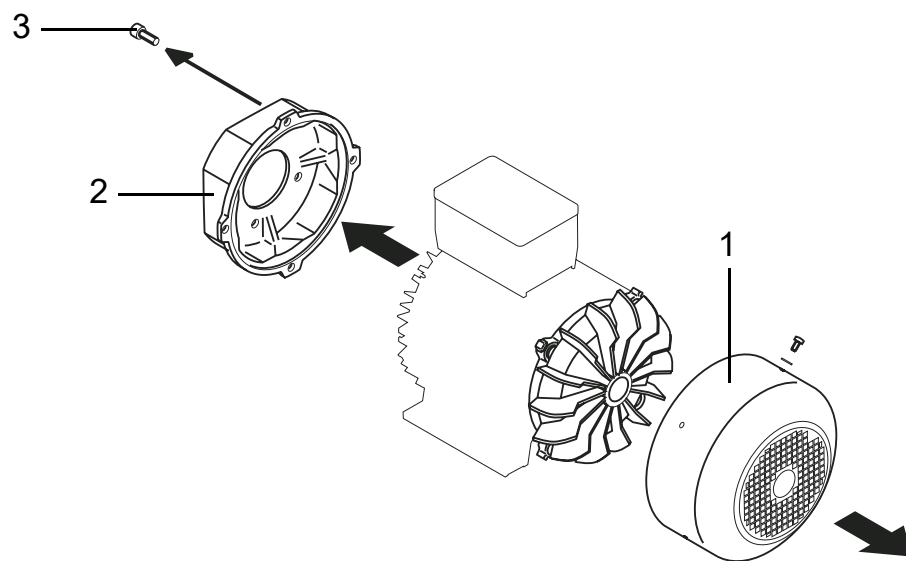


Fig. 10 Preparatory disassembly for assembling brushless single-bearing brush generators

6.6.4.6 Shaft attachment assembly via grub screw

- ⇒ Fig. 11, Assembly of brushless single-bearing generators on the motor (1), page 47
- ⇒ Fig. 12, Assembly of brushless single-bearing generators on the motor (2), page 47
- ⇒ Additional assembly instructions for shaft attachment with tension bolt, page 48
- > Thread the provided grub screw [1] into the shaft of the drive motor as far as the stop with a hexagon socket wrench.
- > Install a appropriate seal on the front bearing plate of the generator.
- ⇒ Fig. 11, Assembly of brushless single-bearing generators on the motor (1), page 47
- ⇒ Generator seal to the drive motor, page 40
- > Remove the front bearing plate [2], place a seal on it, and mount it onto the flange of the drive motor and secure with four screws [3].
- > Align the generator in front of the drive motor so that the generator shaft lies in a line with the shaft of the drive motor.
If necessary, install a spacer below the generator as appropriate.
- > Slide the generator against the drive motor. While doing so, align the threaded hole of the generator shaft onto the grub screw threaded into the engine shaft.
- > Rotate the fan wheel clockwise in order to thread the generator shaft onto the grub screw in the motor shaft as far as it can go.

Lightly press the generator against the bearing plate secured to the drive motor as you do so. Ensure that the generator shaft is not drawn out of the generator during this procedure.

NOTE

When threading the generator shaft onto the grub screw, align the generator to the front bearing plate attached to the drive motor.

The generator shaft must not be tightly fastened onto the grub screw. Thread the shaft on only as far as the stop.

When a load is applied to the generator, the connection will tighten firmly by itself.

- ⇒ Additional assembly instructions for shaft attachment with tension bolt, page 48

- > Secure the bearing plate to the generator with the four mounting screws [2] (Figure 12).
- > Attach the fan wheel cover [1] (Figure 12).

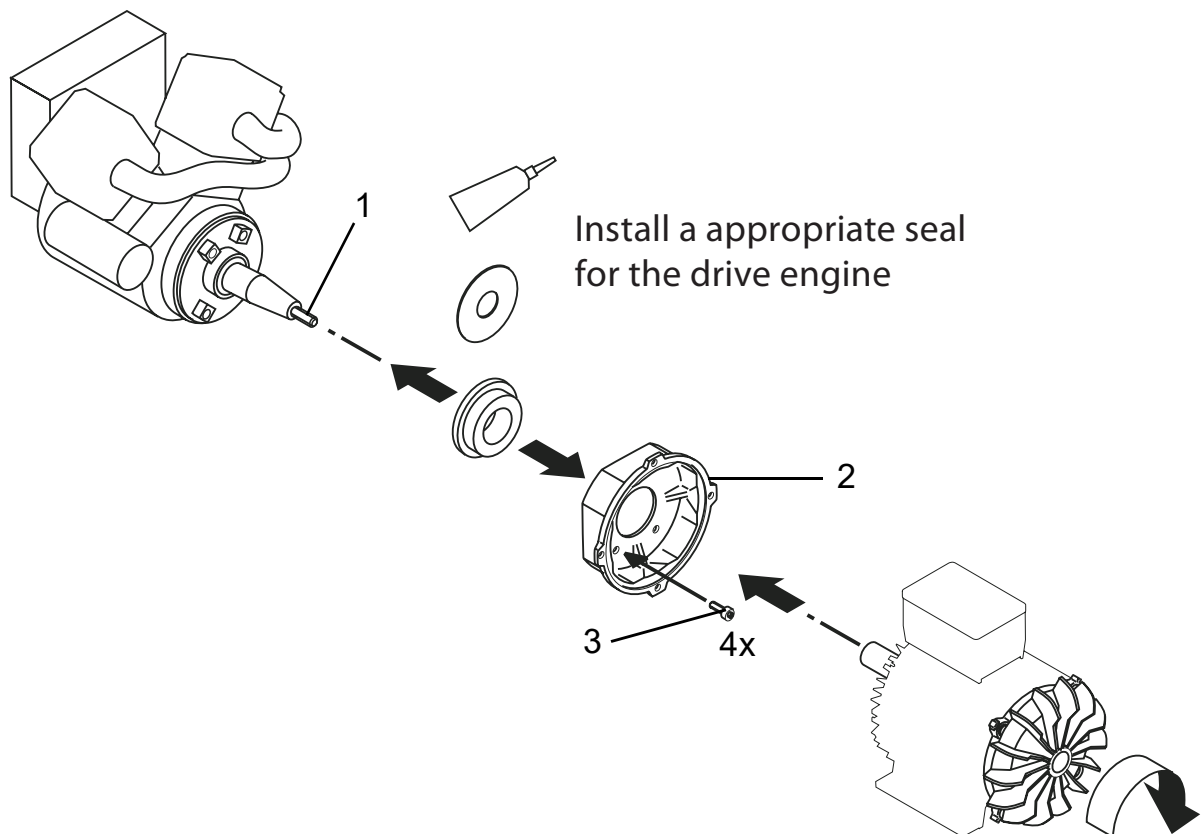


Fig. 11 Assembly of brushless single-bearing generators on the motor (1)

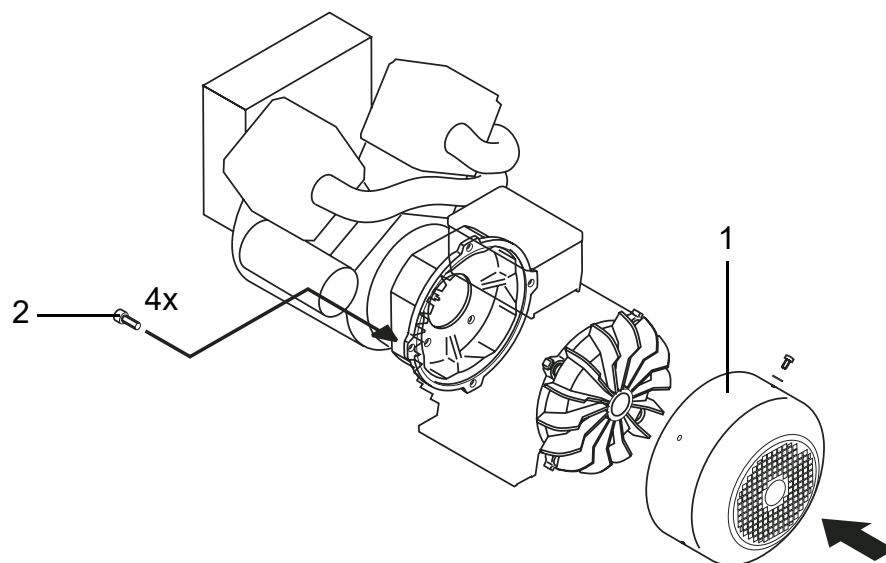


Fig. 12 Assembly of brushless single-bearing generators on the motor (2)

6.6.5 Additional assembly instructions for shaft attachment with tension bolt

A tension bolt can optionally be used for the connection of the shafts. The generator shaft has a hollow bore.

In this case, proceed as follows instead of the relevant assembly of description.

6.6.5.1 Assembly brush generators

⇒ **Fig. 13, Assembly of single-bearing brush generators with tension bolts, page 49**

- > Perform preparatory disassembly.
- > Remove the carbon brush holder (s).

⇒ **Preparatory disassembly and removal of carbon brush holder, page 41**

The steps described here replace the steps in the assembly section, Shaft attachment assembly via grub screw, page 42

- > Install a appropriate seal on the front bearing plate of the generator.
- ⇒ **Generator seal to the drive motor, page 40**
- > Align the generator in front of the drive motor so that the generator shaft lies in a line with the shaft of the drive motor.
If necessary, install a spacer below the generator as appropriate.
- > Move the generator against the flange of the drive motor so that the shafts touch each other.
- > Thread the tension bolt [1] through the generator shaft from behind and screw into the motor shaft.
- > Do not tighten the tension bolt yet.

NOTE

When threading in the tension bolt, align the attachment holes in the bearing plate of the generator to the holes in the flange of the drive motor.

- > Secure the bearing plate of the generator with four mounting screws [2] to the flange of the drive motor.
- > Secure the shaft of the drive motor against twisting and tighten the tension bolt.
- > Install the carbon brush holder.
- ⇒ **Installation of carbon brush holder, page 43**

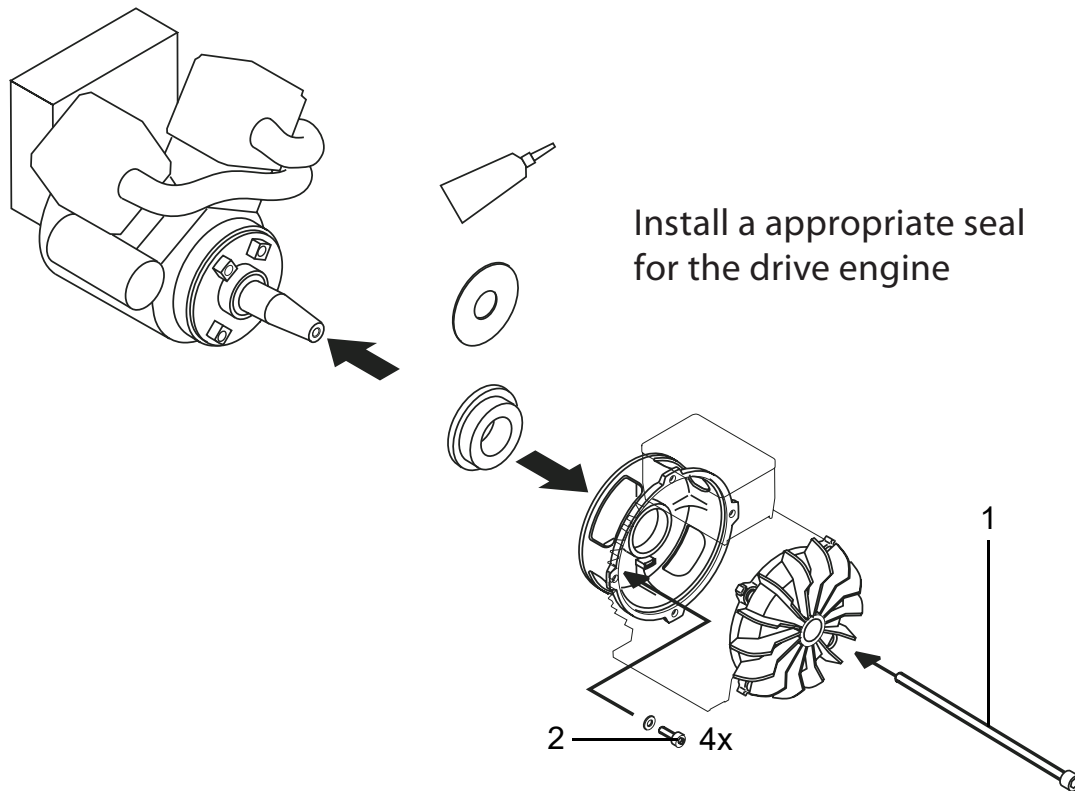


Fig. 13 Assembly of single-bearing brush generators with tension bolts

6.6.5.2 Assembly of brushless generators

- ⇒ Fig. 14, Assembly of brushless single-bearing generators with tension bolts (1), page 50,
- ⇒ Fig. 15, Assembly of brushless single-bearing generators with tension bolts (2), page 51

> Perform preparatory disassembly.

> Remove the carbon brush holder (s).

⇒ **Preparatory disassembly, page 45**

The steps described here replace the steps in the assembly section.

Shaft attachment assembly via grub screw, page 42

> Install a appropriate seal on the front bearing plate of the generator.

⇒ **Generator seal to the drive motor, page 40**

> Remove the front bearing plate, place a seal on it, and mount it onto the flange of the drive motor and secure with four screws [2].

Installation of generator

Installation of single-bearing generators

- > Align the generator in front of the drive motor so that the generator shaft lies in a line with the shaft of the drive motor.
If necessary, install a spacer below the generator as appropriate.
- > Move the generator against the drive motor so that the shafts come together.
- > Thread the tension bolt [1] through the generator shaft from behind and screw into the motor shaft.
- > Do not tighten the tension bolt yet.

After screwing in the tension bolt, the shaft of the generator is pressed onto the shaft of the drive motor.

NOTE

When screwing in the tension bolt, align the generator according to the front bearing plate attached to the drive motor.

- > Secure the bearing plate to the generator with the four mounting screws [2] (Figure 15).
- > Secure the shaft of the drive motor against twisting and tighten the tension bolt. Make sure the torque is correct. If the correct torque for the tension bolt is not known, please get in touch with the manufacturer.
- > Attach the fan wheel cover [1] (Figure 15).

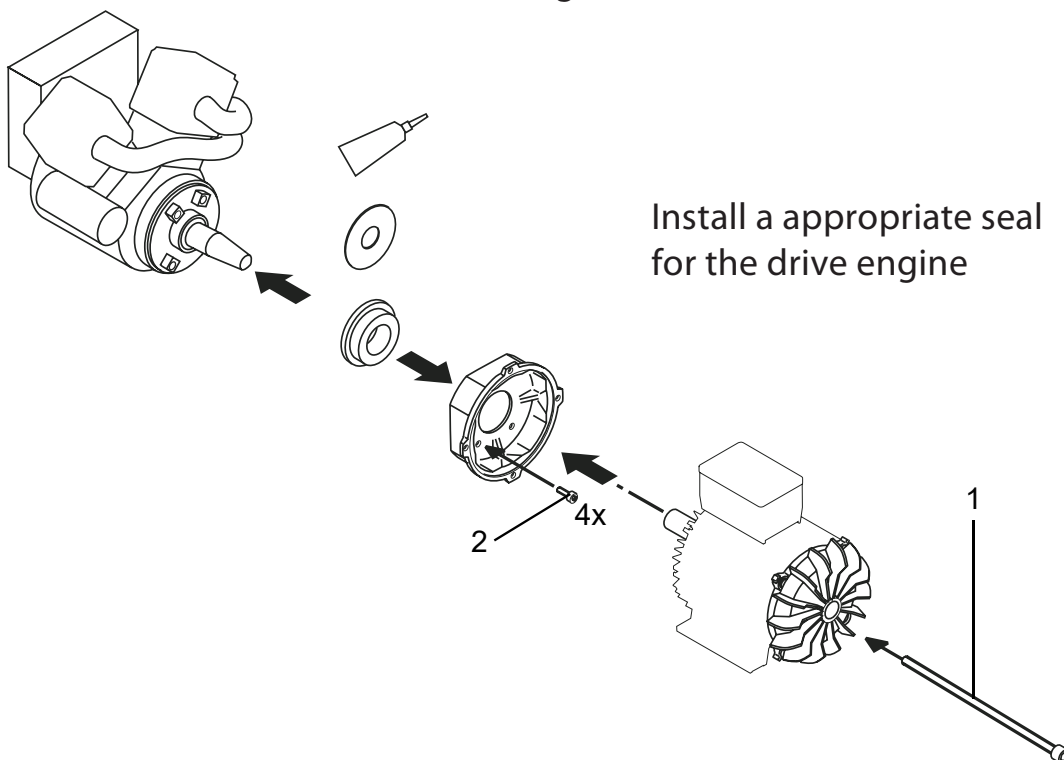


Fig. 14 Assembly of brushless single-bearing generators with tension bolts (1)

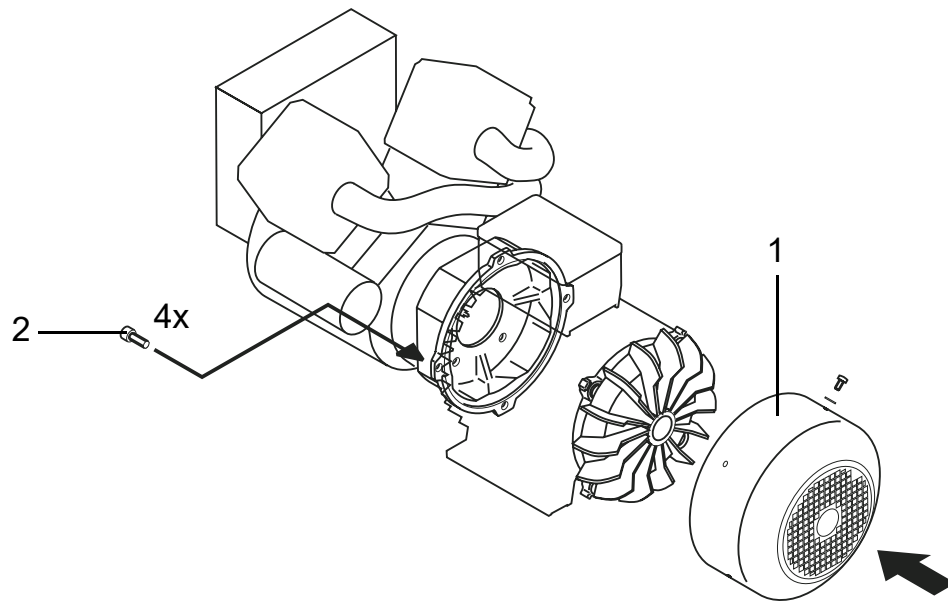


Fig. 15 Assembly of brushless single-bearing generators with tension bolts (2)


6.7 Installation of dual-bearing generators (BG 132)

- To install the dual-bearing generators with BG 132 model, proceed according to the descriptions in this section.
- Before installation, read the chapter on intended use, the general safety information and the safety information in this chapter carefully and follow the instructions and regulations given therein.

⇒ **Intended use, page 6**

⇒ **Safety instructions, page 10**

⇒ **General safety instructions, installation, page 28**

	Warning
	Risk of accident and injury <ul style="list-style-type: none">• Incorrectly attached lifting equipment can lead to accidents.<ul style="list-style-type: none">▶ Secure the lifting equipment to the generator exclusively using the ring screws provided.▶ Only use suitable lifting equipment.

6.7.1 Installation dimensions and assembly

During assembly, observe the minimum clearances and specifications for cooling.

⇒ **Generator seal to the drive motor, page 40**

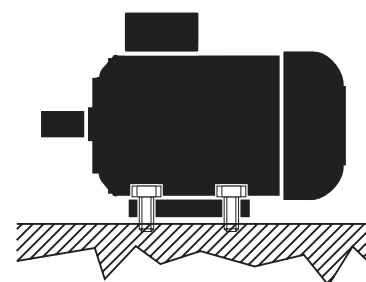
Generator dimension

The generators vary according to the output and model.
If needed, request the drawing for your generator from Generator.Technik.Systeme GmbH & Co. KG.

- > Secure the generator with at least four mounting screws (minimum M8 or comparable, bolt grade min. 8,8).

The attachment must be permanent and resistant to shock and vibrations.

- > Use suitable means to prevent screws from coming undone by themselves, e.g. via a tension ring in accordance with DIN 128.



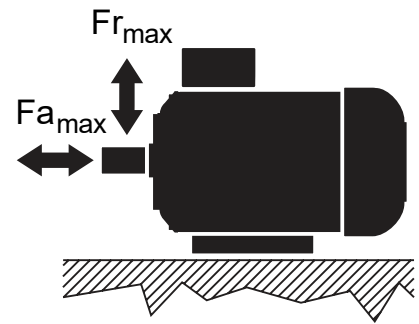
4 Mounting screws

Tightening torque for mounting screws

$M = 25 \text{ Nm}$

Permissible load of the shaft

- Standard bearing plate (shaft \varnothing 28 mm)
 $Fr_{max} = 2\,000\text{ N}$ (measured in 50 mm axial clearance from the point where the shaft exits the bearing plate) $Fa_{max} = 200\text{ N}$
- Reinforced bearing plate (shaft \varnothing 32 mm):
 $Fr_{max} = 3\,000\text{ N}$ (measured in 50 mm axial clearance from the point where the shaft exits the bearing plate) $Fa_{max} = 380\text{ N}$



	<p style="text-align: center;">Important</p> <p>► Do not attach any external parts to the assembly of profile on the generator housing.</p> <div style="text-align: right;"> </div>
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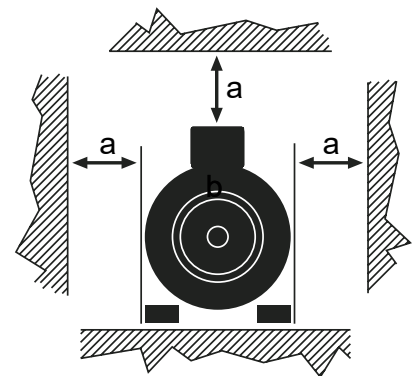
6.7.2 Minimum clearances and cooling provisions

- The generator needs sufficient ventilation for cooling. The cooling air is drawn through the cooling profiles by the fan wheel on the rear side of the generator and across the housing, towards the front side.
- Ensure adequate air feed and exhaust openings.
- During assembly, observe the minimum clearances and specifications for cooling.

Minimum clearances

When installing, respect the following minimum clearances from fixed parts or walls (ø adjacent figures). In individual cases, the clearances may vary from these figures. Get in touch with Generator.Technik.Systeme GmbH & Co. KG.

- On the side and top: $a = 100\text{ mm}$
- Front: $b = 200\text{ mm}$
- Rear : $c = 170\text{ mm}$



Cooling

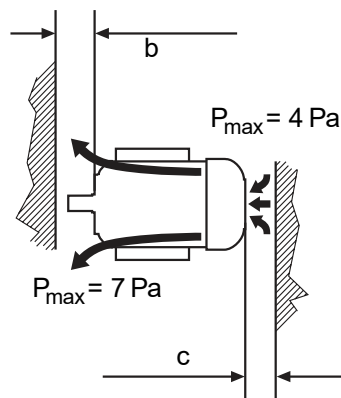
Observe the following instructions
for the cooling of the generator.

Risk of overheating.

The temperature of the supplied cooling air
should not exceed 40 °C.

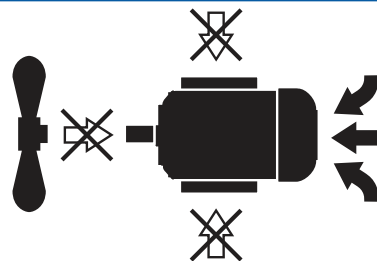
A maximum underpressure of $P_{\max} = 4 \text{ Pa}$ is
allowed in the suction path of the cooling air,
otherwise, a sufficient quantity of cooling air
cannot be drawn in.

In the blow-out area of the cooling air on the
front side, a maximum overpressure of $P_{\max} = 7 \text{ Pa}$
may arise as otherwise there will not be sufficient
circulation of the cooling air.





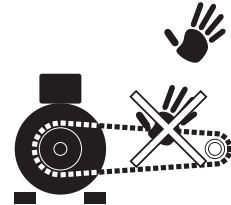
Important


- An impaired cooling air current can
lead to restrictions in performance
damaging the generator.
- Do not impair the circulation of
the cooling air with other air flows
(e.g. from the front or from the side).



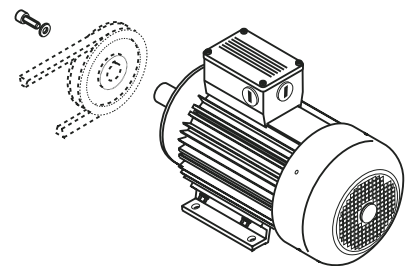
6.7.3 Assembly instructions for belt drive

	 Warning
	<p>Risk of accident</p> <ul style="list-style-type: none"> • Open drive belts and pulleys are a hazard. <ul style="list-style-type: none"> ▶ Never operate the generator without a protective covering. ▶ Never reach into a drive belt while it is running.




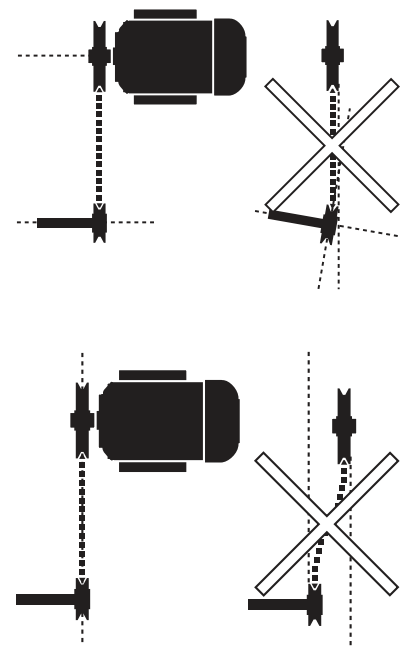
	Important
	<ul style="list-style-type: none"> • Impacts to the shaft can damage the bearings. <ul style="list-style-type: none"> ▶ Do not strike the pulley on the shaft. ▶ Taper bushes are preferred for the attachment.


- > Secure the belt pulley to the shaft with a key.
- > Secure the belt pulley with a screw threaded into the face of the shaft.
- > Prevent this screw from being undone accidentally by placing a suitable locking washer underneath it.

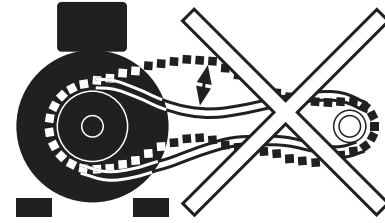


- Threaded hole in the shaft: M10 x 22 mm
- Tightening torque: $M = 50 \text{ Nm}$
- Torque 48 Nm with grade 8,8
- Torque 70 Nm with grade 10,9

	Important
	<ul style="list-style-type: none"> ▶ The axis of the power shaft must run absolutely parallel to the axis of the generator. ▶ The belt pulleys of both axes must lie flush to each other so that the belt runs absolutely straight.



	<p>Important</p> <ul style="list-style-type: none">• Loose belts can spring off and do not reliably transmit the drive power.<ul style="list-style-type: none">▶ The drive belt must not sag loosely.
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When using narrow belt pulleys of type SPA, the clearance between the axes must not exceed 600 mm. For permissible axis clearances for other belts, ask the manufacturer.

Maximum tension force (tension) of drive belt on the shaft

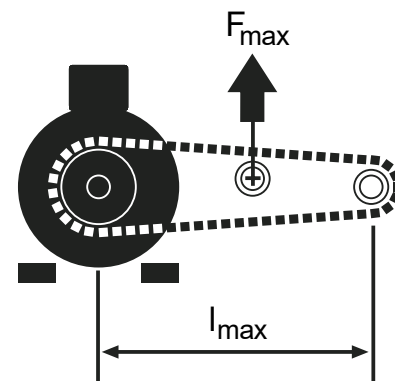
- $F_{\max} = 2\,000\text{ N}$ for standard bearing plate (shaft $\varnothing 28\text{ mm}$)
- $F_{\max} = 3\,000\text{ N}$ for reinforced bearing plate (shaft $\varnothing 32\text{ mm}$)

The maximum tension force indicated is applicable for a max. clearance of 50 mm from the point where the shaft exits the bearing plate. If the belt pulley attachment to the shaft is placed further out, reduce the tension of the belt accordingly in order to balance out the increased leverage effect on the shaft.

Quantity and type of the belts used

Adapt the quantity and type of the belts used to the output of the generator.

Observe the maximum belt tensioning force.



6.7.4 Assembly instructions for flange mount

6.7.4.1 Flange mount BG 132 with standard bearing plate

Preparatory disassembly

- > Remove two M8 x 45 screws, wrench size 10 mm, [2].
- > Remove the sleeve [1].
- > Unscrew and remove four screws M12 x 12 [3], along with the washers.

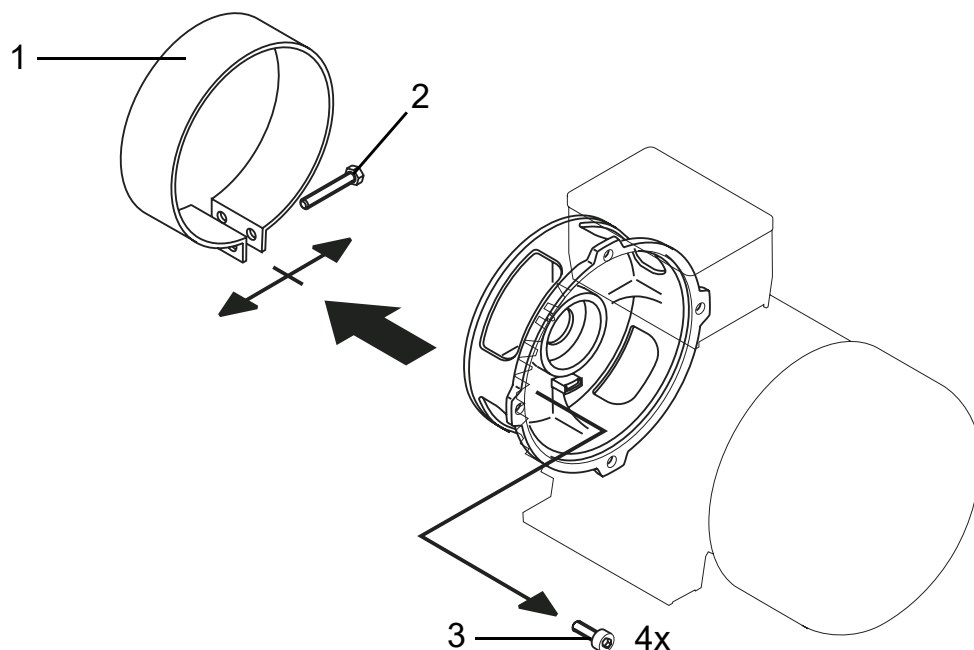


Fig. 16 Preparatory disassembly of for flange mount
(dual-bearing, BG 132 model with standard bearing plate)

Assembly

- > Apply Loctite to the screw thread and place a toothed washer [4b] underneath the screw head.
- > Place toothed washers [2b] underneath the nuts.
- > Place the flange [1] onto the generator and fasten with four screws [4a] and nuts [3a] to a tightening torque of 47 Nm.
- > Place the collar [2] and clamp securely with two screws.
- > Mount the coupling plate [5] on the shaft at the generator and prevent it from twisting on the shaft with a key. Follow the manufacturer's instructions when assembling the coupling plate.
- > Secure the drive side of the coupling [6] to the drive and insert it into the coupling plate. If necessary, while inserting, twist slightly until the gearing locks. Follow the coupling and motor manufacturer's instructions when assembling the coupling plate.
- > Secure the flange [1] to the drive unit. When carrying out the attachment, follow the instructions of the motor manufacturer.

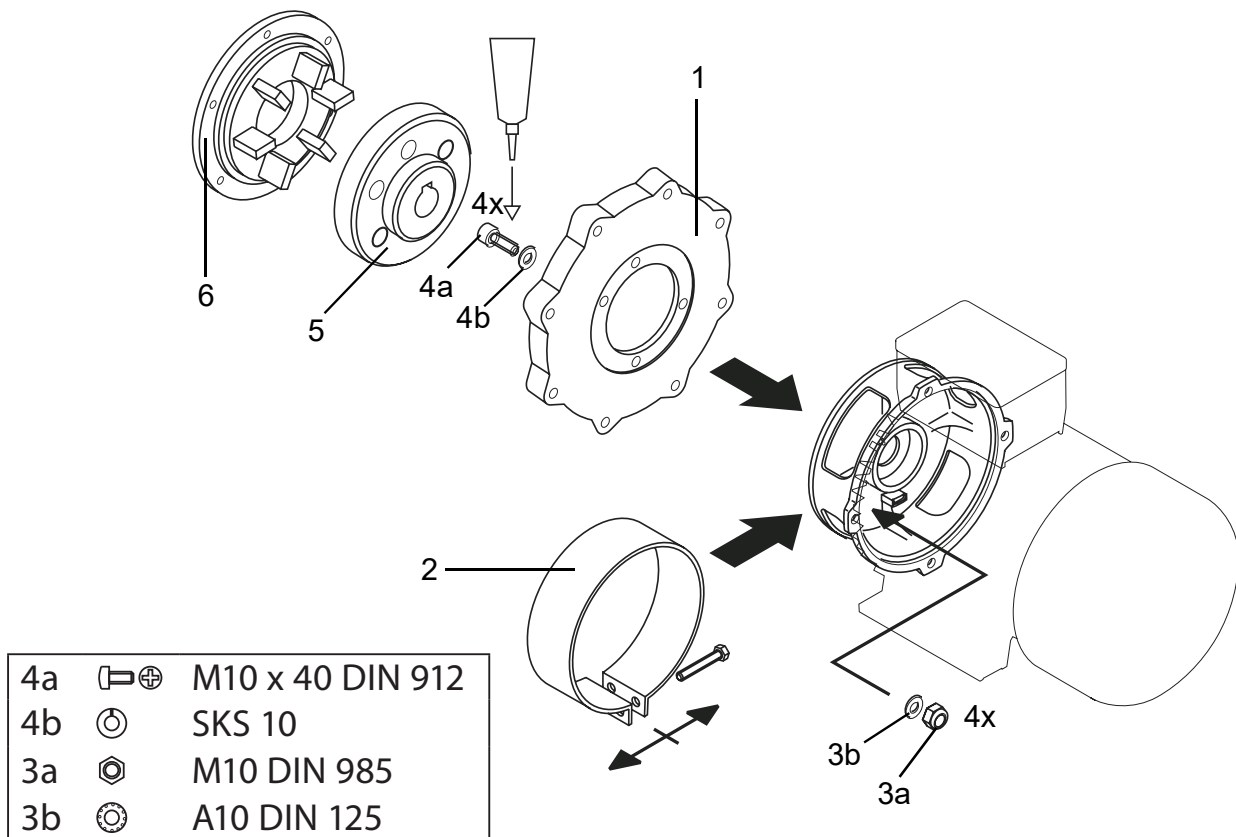
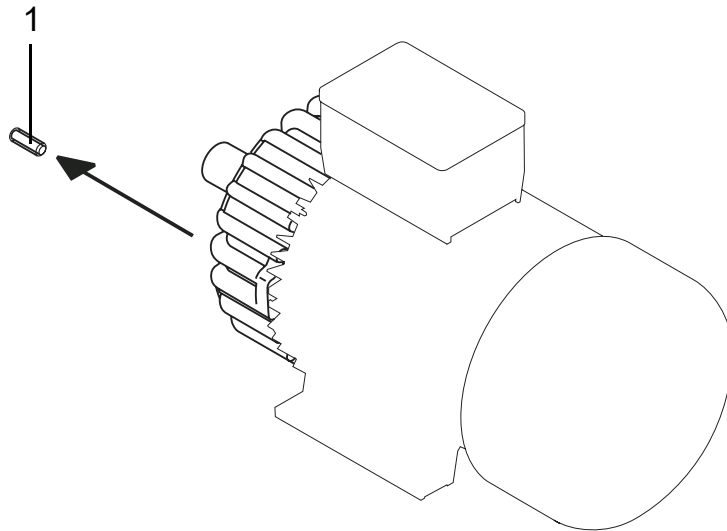


Fig. 17 Assembly of flange mount
(dual-bearing, BG 132 model with standard bearing plate)

6.7.4.2 flange mount BG 132 model with reinforced bearing plate

Preparatory disassembly

> Unscrew the four grub screws M12 x 25 [1].



**Fig. 18 Preparatory disassembly of flange mount
(dual-bearing, BG 132 model with reinforced bearing plate)**

Assembly

⇒ Fig. 19, Assembly of flange mount

(dual-bearing, BG 132 model with reinforced bearing plate), page 60

- > Apply Loctite to the screw thread of the four screws [2a] and place a toothed washer [2b] underneath the screw.
- > Place the flange [1] onto the generator and fasten with four screws [2a] to a tightening torque of 75 Nm.
- > Mount the coupling plate [3] on the shaft at the generator and prevent it from twisting on the shaft with a key.
- > Secure the drive side of the coupling [4] to the drive and insert it into the coupling plate. If necessary, while inserting, twist slightly until the gearing locks.
- > Secure the flange [1] to the drive unit.

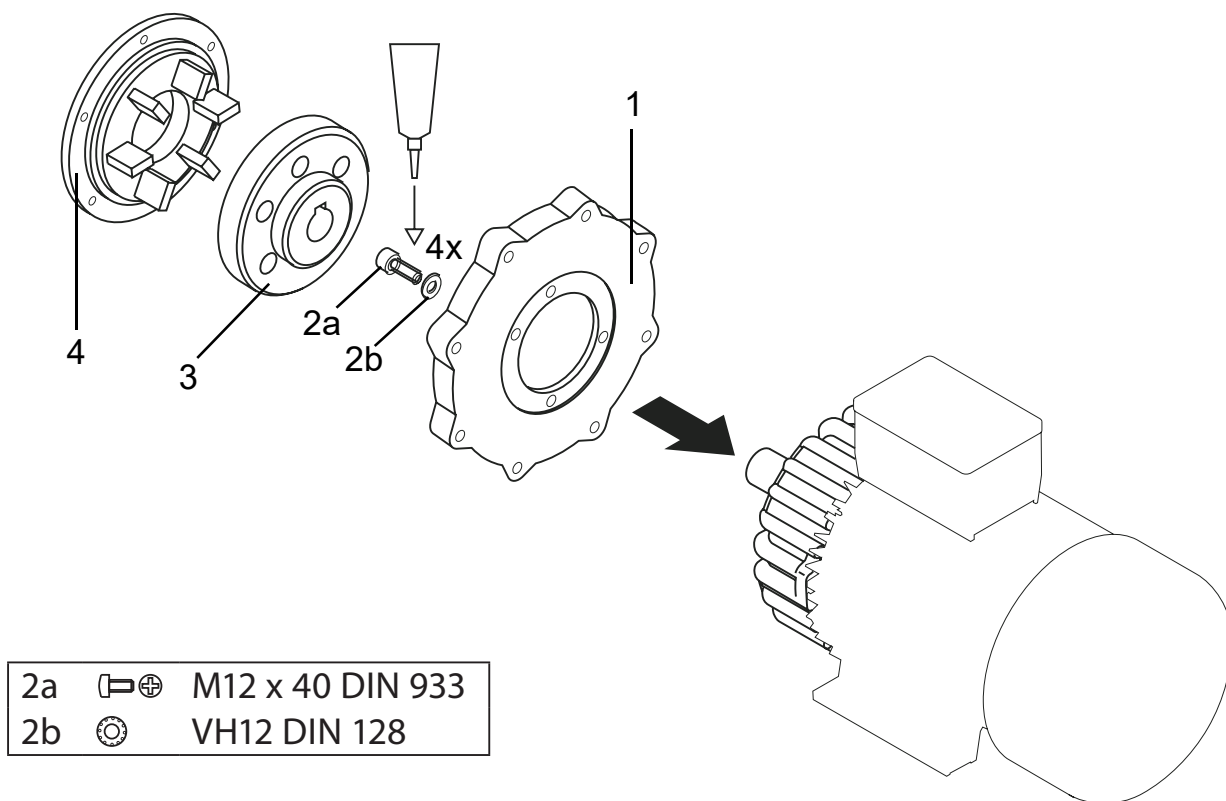


Fig. 19 Assembly of flange mount
(dual-bearing, BG 132 model with reinforced bearing plate)

6.7.5 Assembly instructions for hydraulic drive

6.7.5.1 Hydraulic drive for BG 132 model with standard bearing plate

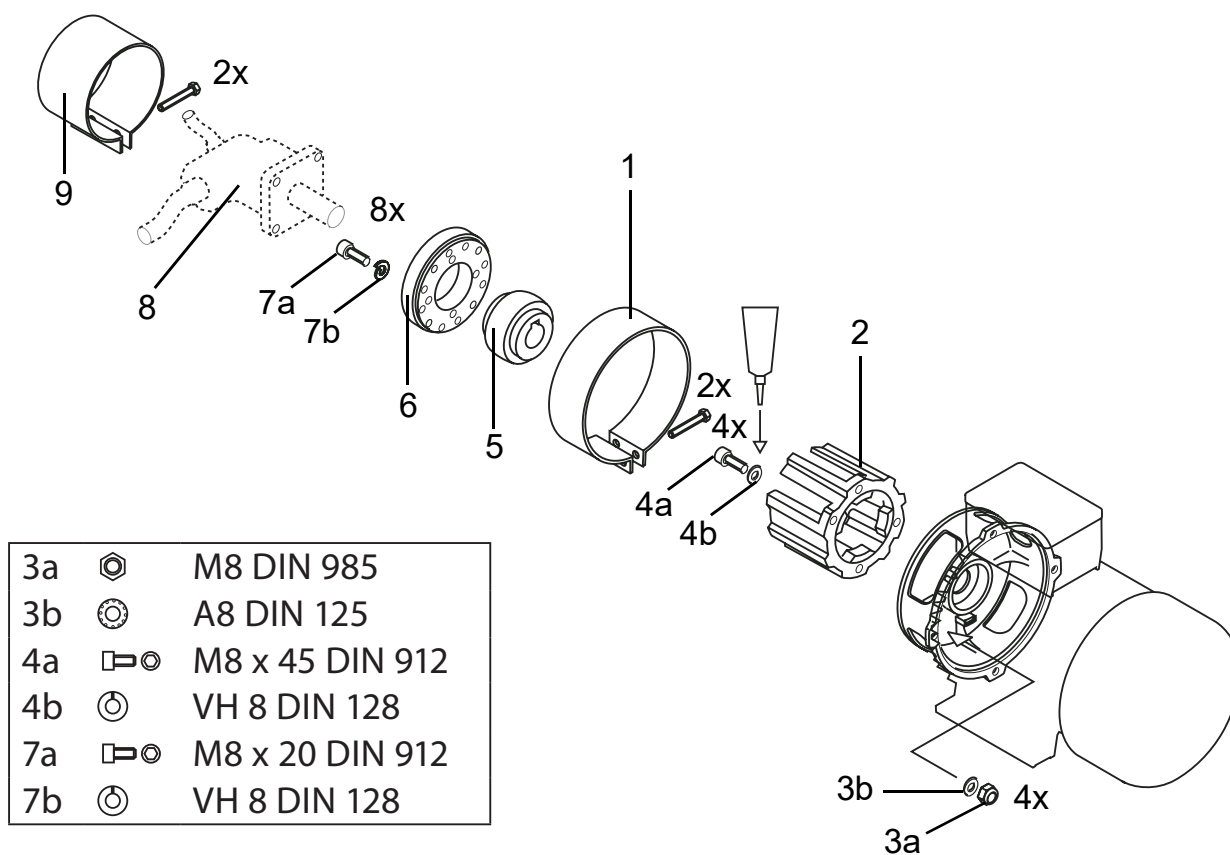
Preparatory disassembly

- > Carry out the preparatory disassembly on the generator.
- ⇒ **Preparatory disassembly, page 57**
- ⇒ **Fig. 16, Preparatory disassembly of for flange mount (dual-bearing, BG 132 model with standard bearing plate), page 57**

Assembly

- ⇒ **Fig. 20, Assembly of flange mount for hydraulic drive (dual-bearing, BG 132 model with standard bearing plate), page 62**
- > Place the flange [2] onto the generator and fasten with four screws [4a] and nuts [3a] to a tightening torque of 47 Nm.
- > Place a toothed washer [4b] underneath the screws and secure with Loctite.
- > Place toothed washers [2b] underneath the nuts.
- > Place the collar [1] and clamp securely with two screws.
- > Mount the first half of the coupling [5] on the shaft at the generator and prevent it from twisting on the shaft using with a key. When carrying out the attachment, follow the instructions of the coupling manufacturer.
- > Mount the washer [6] onto the hydraulic motor [8]. Depending on the hydraulic motor, prepare the necessary screws and tighten them according to the instructions of the manufacturer of the hydromotor.
- > Place the second half of the coupling [5] to the hydraulic motor. When carrying out the attachment, follow the instructions of the coupling manufacturer.
- > Place the hydraulic motor [8] with washer [6] and the second half of the coupling on the generator.
- > Where necessary, turn the coupling slightly to ensure the gearing locks.
- > Place toothed washers [7b] to eight screws [7a] and secure disk [6] to the flange [2]. Tightening torque 24 Nm.
- > Place the collar [9] onto the coupling unit and tighten firmly with two screws.

Installation of generator
Installation of dual-bearing generators (BG 132)



**Fig. 20 Assembly of flange mount for hydraulic drive
(dual-bearing, BG 132 model with standard bearing plate)**

6.7.5.2 BG 132 hydraulic drive with reinforced bearing plate

Preparatory disassembly

- > Carry out the preparatory disassembly on the generator.
- ⇒ **Preparatory disassembly, page 59**
- ⇒ **Fig. 18, Preparatory disassembly of flange mount (dual-bearing, BG 132 model with reinforced bearing plate), page 59**

Assembly

- ⇒ **Fig. 21, Assembly of flange mount hydraulic drive (dual-bearing, BG 132 model with reinforced bearing plate), page 64**
- > Place the flange [1] onto the generator and fasten with four screws [2a] to a tightening torque of 75 Nm. Place a toothed washer [2b] underneath the screws and secure with Loctite. Tightening torque 75 Nm.
- > Mount the first half of the coupling [3] on the shaft at the generator and prevent it from twisting on the shaft using with a key. When carrying out the attachment, follow the instructions of the coupling manufacturer.
- > Die Scheibe [4] an den Hydraulikmotor [6] montieren. Depending on the hydraulic motor, prepare the necessary screws and tighten them according to the instructions of the manufacturer of the hydromotor.
- > Place the second half of the coupling [3] to the hydraulic motor. When carrying out the attachment, follow the instructions of the coupling manufacturer.
- > Place the hydraulic motor [6] with washer [4] and the second half of the coupling on the generator.
- > Where necessary, turn the coupling slightly to ensure the gearing locks.
- > Place toothed washers [5b] to eight screws [5a] and secure disk [4] to the flange [1]. Tightening torque 24 Nm.
- > Place the collar [7] onto the coupling unit and tighten firmly with two screws.

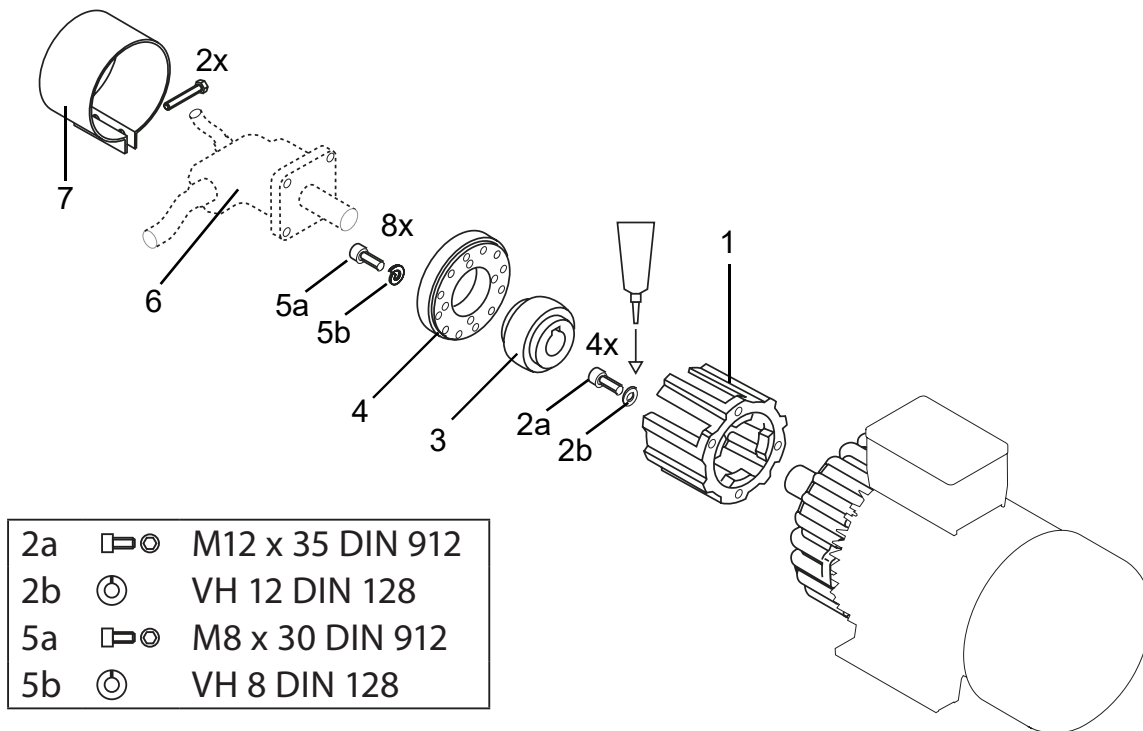


Fig. 21 Assembly of flange mount hydraulic drive
(dual-bearing, BG 132 model with reinforced bearing plate)

6.8 Installation of dual-bearing generators (BG 160)

- To install the dual-bearing generators with BG 160 model, proceed according to the descriptions in this section.
- Before installation, read the chapter on intended use, the general safety information and the safety information in this chapter carefully and follow the instructions and regulations given therein.

⇒ **Intended use, page 6**

⇒ **Safety instructions, page 10**

⇒ **General safety instructions, installation, page 28**

	Warning
	<p>Risk of accident and injury</p> <ul style="list-style-type: none"> • Incorrectly attached lifting equipment can lead to accidents. <ul style="list-style-type: none"> ▶ Secure the lifting equipment to the generator exclusively using the ring screws provided. ▶ Only use suitable lifting equipment.

6.8.1 Installation dimensions and assembly

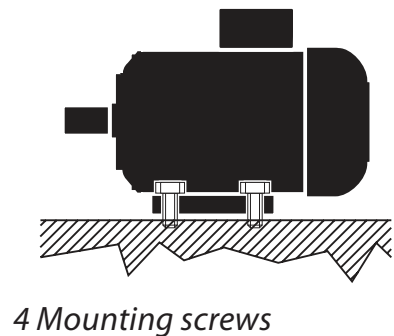
> During assembly, observe the minimum clearances and specifications for cooling.

⇒ **Minimum clearances and cooling provisions, page 66**

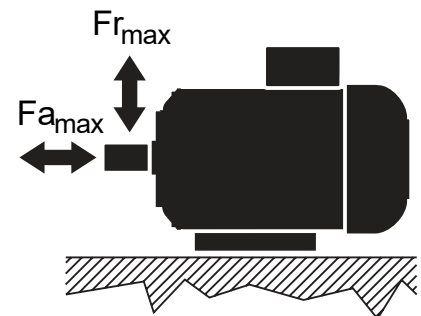
The generators vary according to the output and model.

If needed, request the drawing for your generator from Generator.Technik.Systeme GmbH & Co. KG.

> Secure the generator with at least four mounting screws (minimum M12 or comparable, bolt grade min. 8,8). The attachment must be permanent and resistant to shock and vibrations. Use suitable means to prevent the screws from coming undone by themselves, e.g. via a tension ring according to DIN 128.

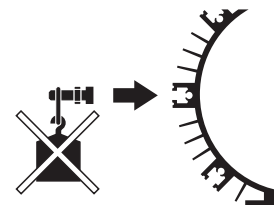


- Tightening torque for mounting screws:
Torque 84 Nm for grade 8,8
- Torque 120 Nm for grade 10,9
- Permissible load of the shaft: $F_{r_{max}} = 5\,000\text{ N}$
(measured in 60 mm axial clearance from the point where the shaft exits the bearing plate)
 $F_{a_{max}} = 500\text{ N}$



Important

- Do not attach any external parts to the assembly of profile on the generator housing.



6.8.2 Minimum clearances and cooling provisions

The generator needs sufficient ventilation for cooling. The cooling air is drawn through the cooling profiles by the fan wheel on the rear side of the generator and across the housing, towards the front side. Ensure adequate air feed and exhaust openings. During assembly, observe the minimum clearances and specifications for cooling.

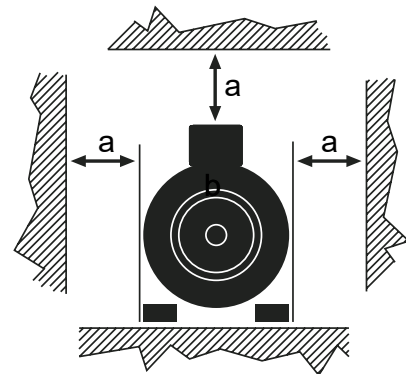
Minimum clearances (BG 160)

When installing, respect the following minimum clearances from fixed parts or walls.

⇒ **adjacent figures**

In individual cases, the clearances may vary from these figures. Get in touch with Generator.Technik.Systeme GmbH & Co. KG.

- Both sides and above: $a = 100 \text{ mm}$
- Front: $b = 300 \text{ mm}$
- Rear : $c = 200 \text{ mm}$



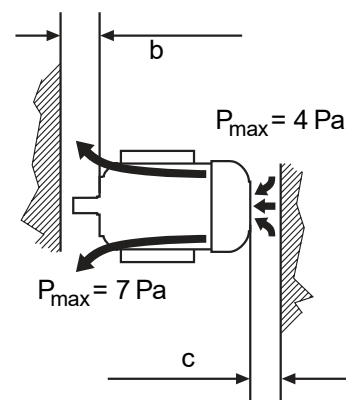
Cooling (BG 160)

During assembly, observe the minimum clearances and specifications for cooling.

Risk of overheating.

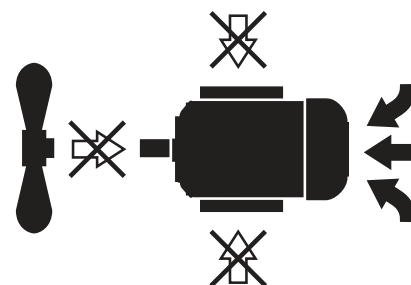
The temperature of the supplied cooling air should not exceed 40°C .

A maximum underpressure of $P_{\text{max}} = 4 \text{ Pa}$ is allowed in the suction path of the cooling air, otherwise, a sufficient quantity of cooling air cannot be drawn in.



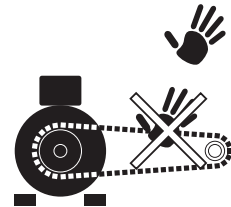
In the blow-out area of the cooling air on the front side, a maximum overpressure of $P_{\text{max}} = 7 \text{ Pa}$ may arise as otherwise there will not be sufficient circulation of the cooling air.

Do not impair the circulation of the cooling air with other air flows (e.g. from the front or from the side).



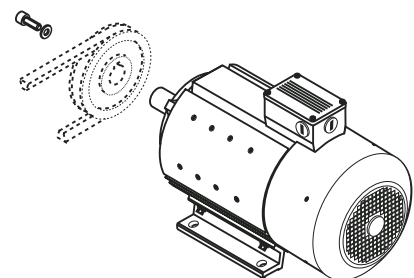
6.8.3 Assembly instructions belt drive

	Warning
	<p>Risk of accident</p> <ul style="list-style-type: none"> • Open drive belts and pulleys are a hazard. <ul style="list-style-type: none"> ▶ Never operate the generator without a protective covering. ▶ Never reach into a drive belt while it is running.



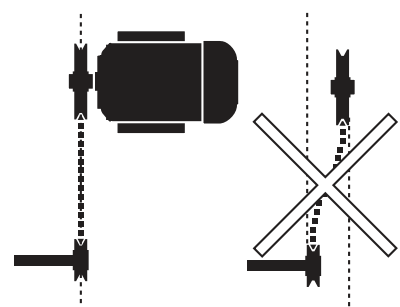
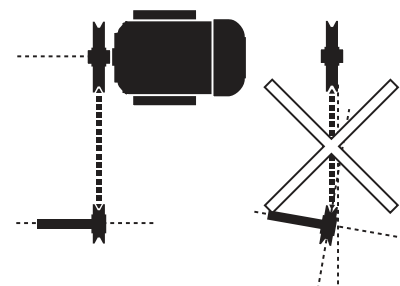
	Important
	<ul style="list-style-type: none"> • The bearings can be damaged by impact on the shaft. <ul style="list-style-type: none"> ▶ Do not strike the pulley on the shaft. ▶ Taper bushes are preferred for the attachment.


- > Secure the belt pulley to the shaft with a key.
- > Secure the belt pulley with a screw threaded into the face of the shaft.
- > Prevent this screw from being undone accidentally by placing a suitable locking washer underneath it.

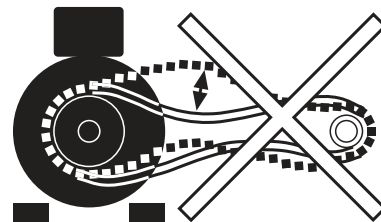


- Threaded hole in the shaft: M16 x 36 mm
- Torque 200 Nm with grade 8,8
- Torque 70 Nm with grade 10,9

	Important
	<ul style="list-style-type: none"> ▶ The axis of the power shaft must run absolutely parallel to the axis of the generator. ▶ The belt pulleys of both axes must lie flush to each other so that the belt runs absolutely straight.



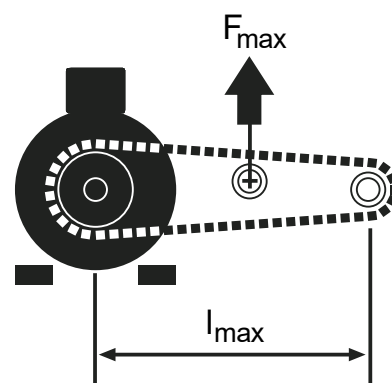
	Important
	<ul style="list-style-type: none">• Loose belts can spring off and do not reliably transmit the drive power.<ul style="list-style-type: none">▶ The drive belt must not sag loosely.



When using narrow belt pulleys of type SPA, the clearance between the axes must not exceed 800 mm. For permissible axis clearances for other belts, ask the manufacturer.

Maximum tension force (tension) of the drive belt on the shaft

$F_{\max} = 5\,000\text{ N}$ at a max. 60 mm axial clearance from the point where the shaft exits the bearing plate. If the belt pulley attachment to the shaft is placed further out, reduce the tension of the belt accordingly in order to balance out the increased leverage effect on the shaft.



Quantity and type of the belts used

- Adapt the quantity and type of the belts used to the output of the generator.
- Observe the maximum belt tensioning force.

6.8.4 Assembly instructions for flange mount

Preparatory disassembly

- > Unscrew the four grub screws M12 x 25 [1].

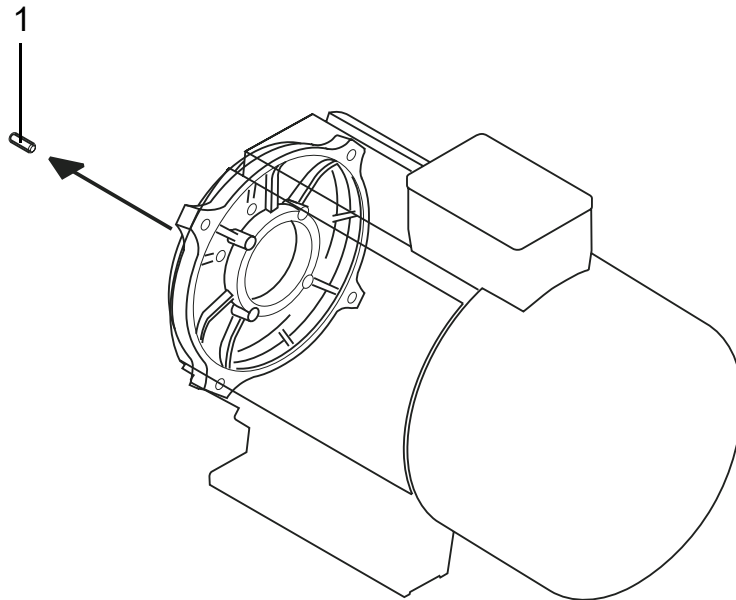


Fig. 22 Preparatory disassembly of flange mount (BG 160 model)

Assembly

⇒ **Fig. 23, Assembly of flange mount (BG 160 model), page 70**

- > Place the flange [1] onto the generator and secure with four screws [2a] to a tightening torque of 75 Nm.
- > Apply Loctite to the screw thread on the four screws [2a] and place a toothed washer [2b] underneath the screw.
- > Mount the coupling plate [3] on the shaft at the generator and prevent it from twisting on the shaft with a key.
- > Secure the drive side of the coupling [4] to the drive and insert it into the coupling plate.
- > If necessary, while inserting the clutch, twist slightly until the gearing locks.
- > Secure the flange [1] to the drive unit.

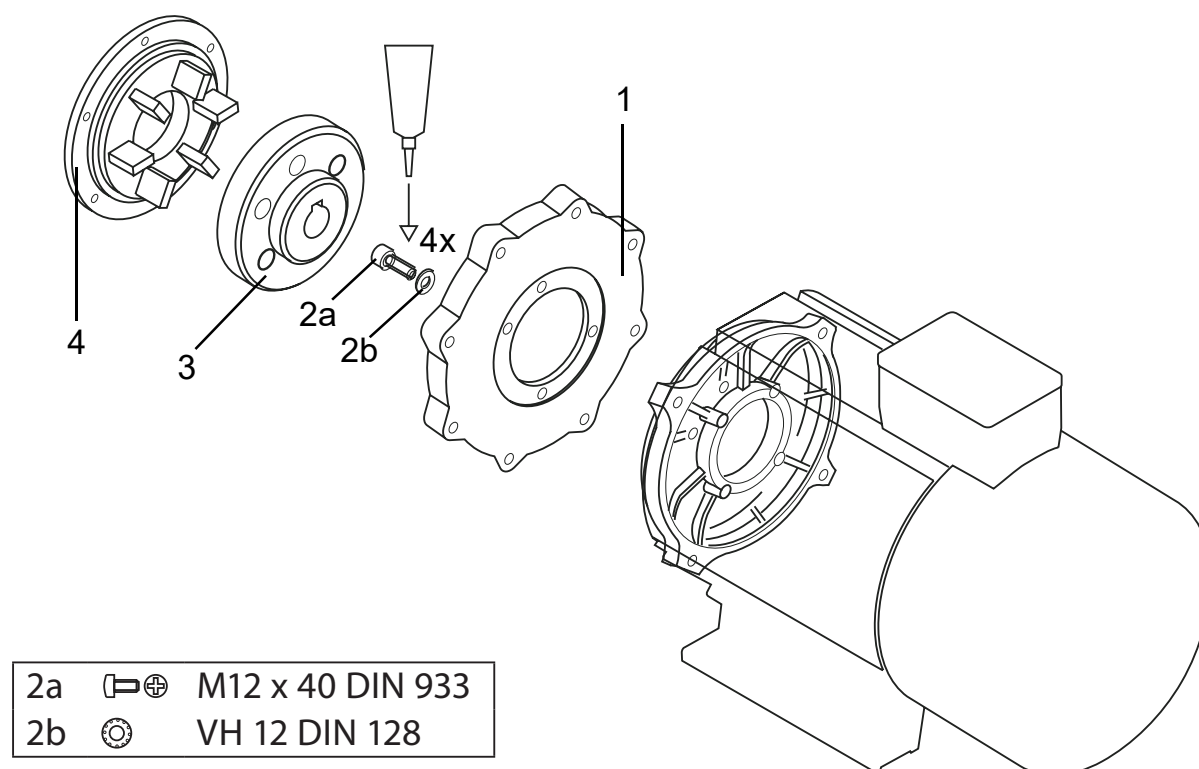


Fig. 23 Assembly of flange mount (BG 160 model)

6.8.5 Assembly instructions hydraulic drive

Preparatory disassembly

- > Carry out the preparatory disassembly on the generator.
- ⇒ **Preparatory disassembly, page 69**
- ⇒ **Fig. 22, Preparatory disassembly of flange mount (BG 160 model), page 69**

Assembly

- ⇒ **Fig. 24, Assembly of flange mount hydraulic drive (BG 160 model), page 72**
- > Place the flange [1] onto the generator and secure with four screws [2a] to a tightening torque of 75 Nm.
- > Place a toothed washer [2b] underneath the screws and secure with Loctite. Tightening torque 75 Nm.
- > Mount the first half of the coupling [3] on the shaft at the generator and prevent it from twisting on the shaft using with a key. When carrying out the attachment, follow the instructions of the coupling manufacturer.
- > Die Scheibe [4] an den Hydraulikmotor [6] montieren. Depending on the hydraulic motor, prepare the necessary screws and tighten them according to the instructions of the manufacturer of the hydromotor.
- > Place the second half of the coupling [3] to the hydraulic motor. When carrying out the attachment, follow the instructions of the coupling manufacturer.
- > Place the hydraulic motor [6] with washer [4] and second half of the coupling to the generator.
Where necessary, turn the coupling slightly to ensure the gearing locks.
- > Place toothed washers [5b] to eight screws [5a] and secure disk [4] to the flange [1]. Tightening torque 24 Nm.
- > Place the collar [7] onto the coupling unit and tighten firmly with two screws.

Installation of generator
Installation of dual-bearing generators (BG 160)

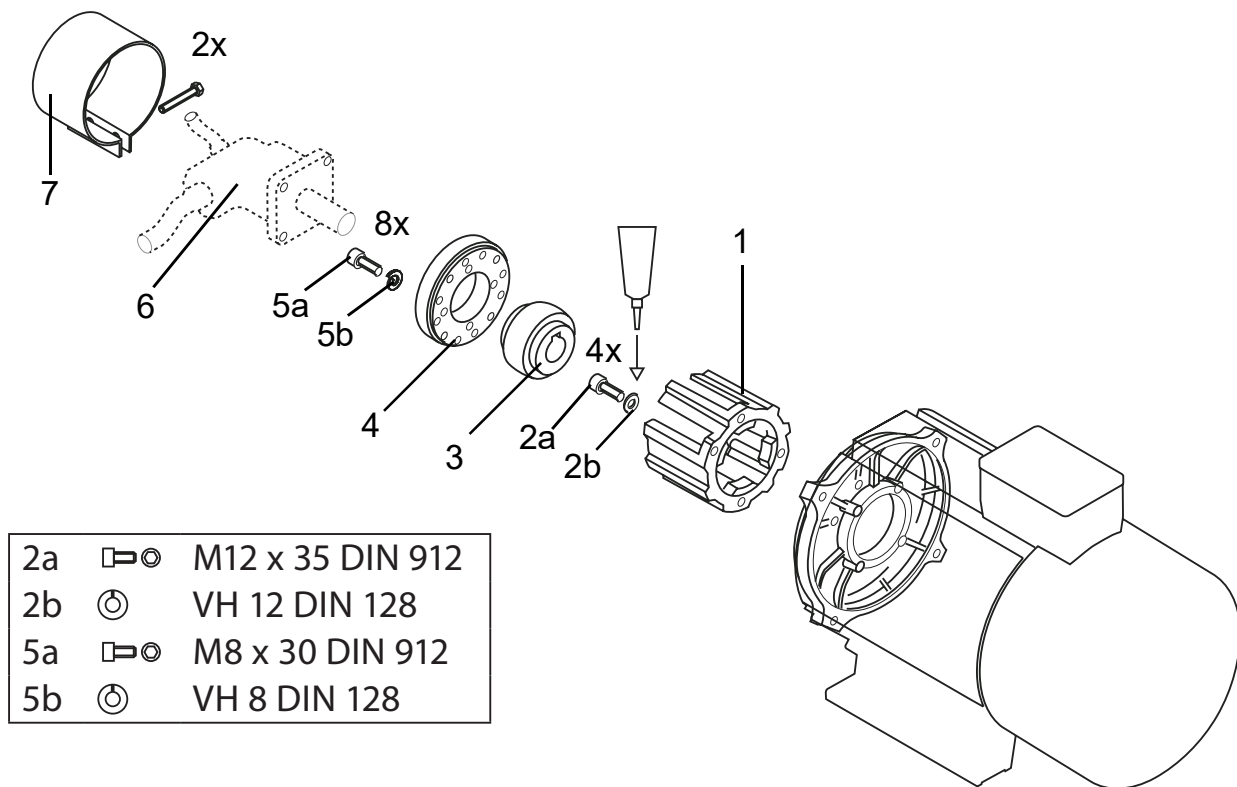




Fig. 24 Assembly of flange mount hydraulic drive (BG 160 model)

6.9 Electrical generator connection

Carefully read the safety instructions before installing, commissioning and operating the generator, and follow the instructions and heed the information.

⇒ **General safety instructions, installation, page 28**

This section is only relevant for generators that are not fitted with a switch box in the factory.

	<div data-bbox="387 654 1460 712"> Danger</div> <div data-bbox="387 712 1460 770">Risk of injury and destruction of property</div> <ul data-bbox="387 770 1460 1232" style="list-style-type: none">• Incorrect installation of the generator can lead to malfunctioning, damage or danger.<ul data-bbox="419 869 1460 1232" style="list-style-type: none">▶ Before installing the generator, read this operating manual completely and carefully.▶ The assembly / disassembly of generator as well as the maintenance, service and replacement work may only be carried out by authorised and qualified technicians.▶ Only use the generator according to the information in the operating manual and the purposes indicated in the section on "intended use".
---	---

Only authorized persons may carry out connection and assembly of work on electrical installations, according to applicable national requirements (in Germany: these include VDE specifications).

If the neutral conductor N is earthed despite this, the work may be carried out by a qualified electrician. A fault current (FI) protective switch must be downstream of the generator output. Carry out suitable measurements to verify the effectiveness of the electrical safety measures.

6.9.1 General

On generators without a factory-installed switch box, install suitable safety devices in a separate switch cabinet in order to protect the circuits (power sockets) connected to the generator:

- Short circuit tripping characteristics: "B" characteristic
- Protection against overcurrent: as per nominal current
- The neutral conductor N must be secured.

6.9.2 Version with terminal box

Follow the connection instructions below when connecting generators with an attached terminal box:

- When opening the terminal box, make sure that the connection wires of the generator controller built into the cover are not torn off or damaged.
- After opening the terminal box, remove the plug connector to the generator controller in the terminal box cover. The plug connector is mechanically coded and cannot be reversed inadvertently. Do not assemble the plug connector until immediately before closing the cover.
- Only use suitable waterproof screw fittings, protection class IP54 or higher, to introduce cables into the terminal box.
- Install the connecting wires in the terminal box with the utmost care.
- When closing the cover, make sure no connecting wires get jammed or crushed, and that the generator controller is not damaged.

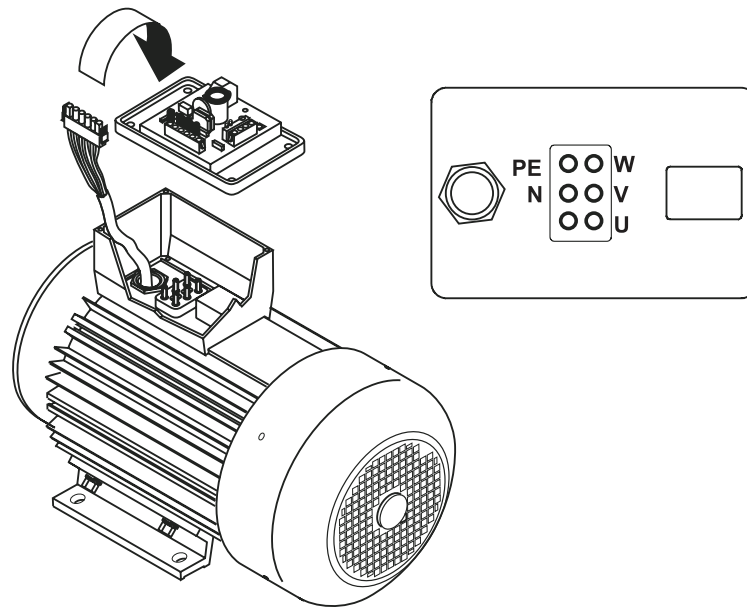


Fig. 25 Terminal boxes, connection assignment on terminal board

6.9.3 Version without terminal box, cable is routed in the tube

Optionally, the generator can also be delivered without an attached terminal box. In this case, the connection lines are lead out of the generator through a tube.

This variant is set up specific to the customer. Therefore, the cable connections must be discussed with the generator manufacturer.



7 Operation



This chapter describes the operation and control of the generator. Depending on the generator equipment, deviations can arise. Reference is made to these deviations in the corresponding sections of this manual. Before use, read the chapter on intended use, the general safety information and the safety information in this chapter carefully and follow the instructions and regulations given therein.





⇒ **Intended use, page 6**

⇒ **Safety instructions, page 10**

7.1 General safety instructions, operation

	<div data-bbox="316 824 1361 869"> Danger</div> <div data-bbox="316 880 1361 925">Danger to life through electric shock</div> <ul data-bbox="316 936 1361 1149" style="list-style-type: none">• During operation, the power generation system generates voltages that are potentially fatal.<ul data-bbox="339 1025 1361 1149" style="list-style-type: none">▶ Never touch the generator, the switch cabinet or the devices attached to the power generation system with wet hands during operation.
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	<div data-bbox="395 282 1461 331"> Danger</div> <div data-bbox="395 331 1461 577">Risk of injury<ul style="list-style-type: none">• When protective coverings are not in use, there is a risk of injury through electric shock, moving parts and hot surfaces.<ul style="list-style-type: none">▶ Only operate the generator with the fitted protective coverings proscribed for the drive in the regulations.</div>
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	<div data-bbox="311 277 1364 331" style="background-color: #f4a460; padding: 5px;">⚠ Warning</div> <p>Danger to life caused by electric shock and risk of damage.</p> <ul style="list-style-type: none"> • Jets from a high-pressure cleaner can lead to the destruction of the switch cabinet or electric shock. ▶ Never expose the generator or switch cabinet with a protection class lower than IP69k to high-pressure cleaning jets. 
	<div data-bbox="311 712 1364 766" style="background-color: #f4a460; padding: 5px;">⚠ Warning</div> <p>Risk of injury and destruction of property</p> <ul style="list-style-type: none"> • Inadequately qualified persons are at risk when working on the generator or switch cabinet and may damage the generator. ▶ Assembly, connection and commissioning of the generator, as well as work on electrical installations, may only be carried out by authorised, qualified and trained personnel. ▶ Carry out all connection work according to applicable national regulations (in Germany: these include VDE specifications).
	<div data-bbox="311 1285 1364 1339" style="background-color: #ffff00; padding: 5px;">⚠ Caution</div> <p>Burn hazard</p> <ul style="list-style-type: none"> • Parts of the generator can become very hot during and after the operation. ▶ Allow the generator or parts of the generator to cool down before you touch them.



Important

- These generators are not suitable for supplies to fixed distribution networks.
- These generators are designed for a certain performance and speed. They can be destroyed by voltage peaks and overloads.
 - ▶ Do not use the generator to supply building-site distribution boards or other fixed distribution networks (e.g. domestic installations).
 - ▶ Never connect the generator to the public electricity grid or combine with other power generation systems.
 - ▶ Never combine multiple generators.

7.2 Operating conditions

The generator may only be used if the following operating conditions are met.

- Only connect devices which have voltage and frequency data on their rating plate matching that for the power generation system. The total power draw of all connected units must not exceed the output indicated for the current power generation system. Only connect as many units as the generator output can supply sufficiently. Do not overload the generator.
- A cooling air feed above 40 °C can lead to power restrictions; in extreme cases it can cause damage to the generator. The temperature of the supplied cooling air should not exceed 40 °C. Observe the necessary minimum clearances. The generator must have an unobstructed flow of cooling air and an unhindered cooling air discharge.
If the generator is not sufficiently cooled, or in conditions which deviate from the permissible operating conditions, the output voltage of the generator will be reduced automatically. To prevent damage to connected devices, in this case it will be necessary to reduce the output connected to the generator.

7.3 Electrical safety devices, safety measures and earthing



7.3.1 Electrical protection and earth / potential equalization

Generators without the “insulation monitor with disconnection” option meet the protective measure “protective separation with potential equalization connector” according to VDE 0100, Part 728.

Generators with the “insulation monitor with disconnection” option meet the higher-level protective measure “protective separation with insulation monitor” according to VDE 0100, Part 728.

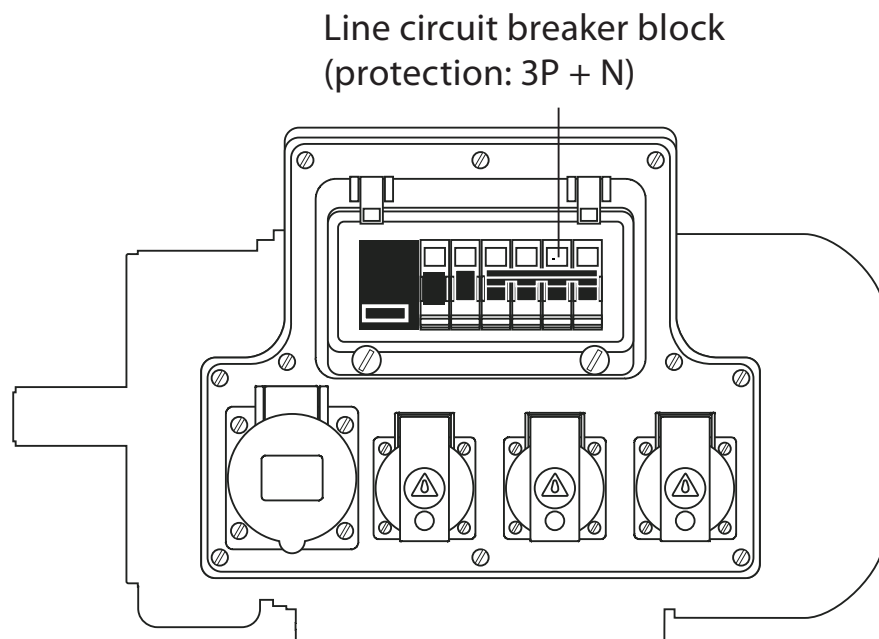
There is no need to earth the generator in order for the electrical safety measures mentioned above to work properly (e.g. through an earthing rod). However, if this is still required or if it should become required in special cases, a pre-defined earthing of the generator housing must be done, or the generator housing must be added to a potential equalization with other units.

Only use the earthing points exclusively provided for this purpose and marked with the earth symbol .

	 Danger
	<p>Danger to life through electric shock</p> <ul style="list-style-type: none"> • A grounding of the neutral conductor of the generator (N, neutral conductor) invalidates the protective measure. <ul style="list-style-type: none"> ▶ Never ground the neutral conductor of the generator. ▶ If the neutral conductor N still needs to be earthed, this work may only be carried out by a qualified electrician. <p>A fault current (FI) protective switch must be downstream of the generator output. Carry out suitable measurements to verify the effectiveness of the electrical safety measures.</p>

7.3.2 Protection against overcurrent

On generators with factory-installed switch box, the power sockets are to be protected against overcurrent and short circuits at the attached switch box using line circuit breakers.





**Fig. 26 Miniature circuit breakers in the switch box
(only for generators 8kVA and 13 kVA)**

Generators without factory-installed switch boxes

To protect the circuits (power sockets) connected to the generator, install suitable safety devices in a separate switch cabinet.

- Short circuit tripping characteristics: "B" characteristic
- Protection against overcurrent: as per nominal current
- The neutral conductor N must be secured.

7.4 Connection to an existing distribution network (e.g. company installation)

	 Danger
	Danger to life through electric shock <ul style="list-style-type: none">• In an energy recovery system, there is a risk to life through an electric shock for any persons who may be working on the public power network while it is shut down.• The generator can be damaged in mains parallel mode with the public power network, may catch fire or may cause fires in the electrical lines of the installation.<ul style="list-style-type: none">▶ An energy recovery system into the public power network or parallel operation with the mains is not permitted.▶ Make sure that the installation is completely and reliably disconnected from the public power network of the power utility company.




The connection of generators to an existing distribution (e.g. company installation) may be performed by a qualified electrician and only with the approval of the energy utility company. All relevant DIN and VDE provisions, in particular, DIN VDE 0100, Part 728.6, as well as any potential additional technical connection conditions of the power utility company must be observed.

Considerable changes may also be needed to the generator, which may only be performed by a qualified electrician with the agreement of the manufacturer of the power generation system.



7.5 Working safely with electrical devices

Follow the following operating instructions to work safely with electrical devices.

⇒ **General safety instructions, operation, page 76**


 	<div data-bbox="312 528 1361 577"> Danger</div> <div data-bbox="312 584 1361 633">Risk of accident and injury</div> <ul data-bbox="312 640 1361 947" style="list-style-type: none">• There are risks associated with working with power generation systems and electrical equipment.<ul data-bbox="336 734 1361 947" style="list-style-type: none">▶ Only qualified, specially trained personnel are allowed to carry out work on electrical systems.▶ Before any work on electrical equipment, please read the safety instructions and follow them.▶ Read the following operating instructions and follow them.
--	---

- Devices which caused a shutdown by the insulation monitor and the “INSULATION FAULT” error indication, must not be operated from other power generation systems that have no insulation monitoring or from the public electricity grid. Immediately put devices with insulation faults out of service and replace them or have them repaired by the device manufacturer or an authorised electrician company.
- Do not connect devices unless they are in a fully-functional and safe condition. The units and plug connectors must be clean and dry.

	<div data-bbox="312 1413 1361 1462"> Warning</div> <div data-bbox="312 1469 1361 1518">Risk of accident</div> <ul data-bbox="312 1525 1361 1740" style="list-style-type: none">• Devices which start up in an uncontrolled fashion can put persons at risk or injury them or cause damage or themselves be damaged.<ul data-bbox="336 1664 1361 1740" style="list-style-type: none">▶ Switch off all devices before you connect them to the power generation system.
---	---

- Depending on the range of use and application, when working with power generation systems, follow the instructions, requirements, provisions or recommendations from Employer's Liability Insurance Associations and trade associations. In particular, the German Equipment Safety Act (GSG) must be followed, as must relevant accident prevention requirements and the mining ordinances of the states. When using current power generation systems outside the jurisdiction of the laws of the Federal Republic of Germany, check the suitability of the generator taking into account the relevant national provisions.

If you have any questions, please get in touch with the system manufacturer directly.



- Only operate the power generation system under permissible operating conditions.
- Many portable electrical tools meet protection class II (protective insulation, labeling ). Use such devices wherever possible. If devices of protection class I (i.e. with metal housing parts without protective insulation) are used, these must be fitted with a connection cable and a plug with PE connector. With such devices, the protective earth must be checked every work day to ensure the correct function.

⇒ **Check insulation monitor, page 91**

- When working in “conductive areas with restricted room for movement”, that is within the scope of validity of DIN VDE 0100 Part 706 (e.g. in metal boilers), only connect a single item of equipment to the generator for providing current to “handheld electronic tools and mobile measuring equipment”. Alternatively, additionally for each unit, a separate isolating transformer must be used or an isolating transformer with multiple isolated secondary windings. As a general rule, handheld lights must only be operated via an isolating transformer with safety extra low voltage (SELV) in conductive areas with limited room for movement.
- Carefully select, install, and maintain the lines for the distribution (e.g. extension lines and device connection lines). Regularly inspect the electrical lines. Replace faulty lines and cables. Observe the technical data when connecting extension lines.

⇒ **Technical data, page 27**

7.6 Generator operation

 	⚠ Danger
	Risk of accident and injury <ul style="list-style-type: none">• There are risks associated with working with power generation systems and electrical equipment.<ul style="list-style-type: none">► Before putting the generator into operation: read through all sections of this chapter carefully, in particular, the safety information in the chapter on “General safety information”. <p>⇒ General safety instructions, operation, page 76</p>

Check the correct function of the insulation monitor every day before starting work. Only put the generator into service when the check has showed that the insulation monitor was in correct working order.

7.6.1 Control elements in the optional switch box

The attached switch box of the generator and insulation monitor and Operating hours counter are optional.

Insulation monitor with switches and signal lamps (optional)

Line circuit breaker block (protection: 3P + N)

Operating hours counter (optional)

400 V power socket

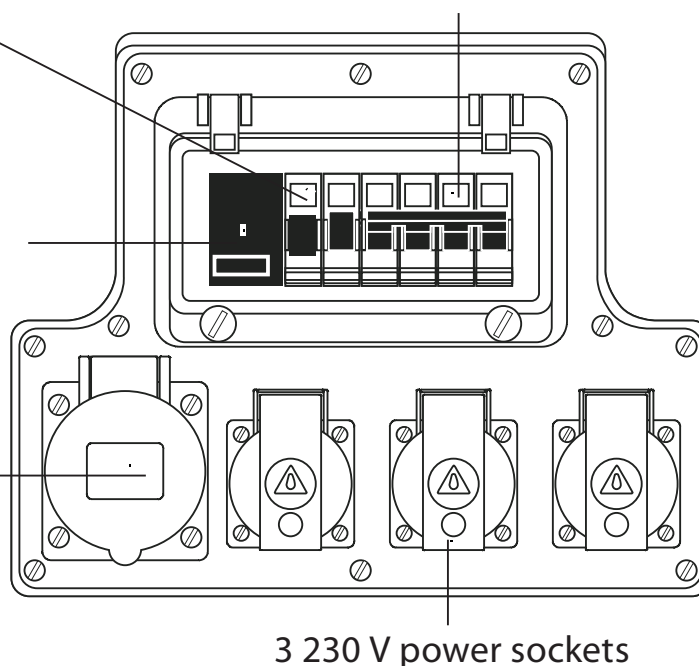







Fig. 27 Operating and control elements in the switch box (optional)


7.6.2 Electricity distribution and the connection of devices

	<div data-bbox="395 349 1460 394"> Danger</div> <div data-bbox="395 394 1460 595">Danger to life through electric shock<ul style="list-style-type: none">• Insulation monitors can mutually influence each other.<ul style="list-style-type: none">▶ Do not connect any other insulation monitors downstream of the power generation system.</div>
---	---


	Important
	<p>Risk of destruction</p> <ul style="list-style-type: none">• The total power draw of all connected units must not exceed the output indicated for the current power generation system.<ul style="list-style-type: none">▶ Only connect as many units as the generator output can supply sufficiently.▶ Do not overload the generator.


	Important
	<p>Risk of destruction</p> <ul style="list-style-type: none">• Devices with deviating voltage and frequency may be damaged upon connection.<ul style="list-style-type: none">▶ Only connect devices which have voltage and frequency data on their rating plate matching that for the power generation system.

	Important
	<ul style="list-style-type: none">• The power generation system is not suitable for supplying fixed distribution networks.<ul style="list-style-type: none">▶ Do not use the power generation system to supply building-site distribution boards or other fixed distribution networks (e.g. domestic installations).

	Important
	<ul style="list-style-type: none">▶ After disconnecting the consumers from the switch cabinet, the hinged covers of the sockets must be closed correctly.

Generator with attached switch box


	Important
	<p>Risk of destruction</p> <ul style="list-style-type: none">• When using several devices on the AC power sockets at the same time (especially on devices with different power consumption ratings), temporary over and undervoltages may arise due to a switch-on delay in the neutral conductor.<ul style="list-style-type: none">▶ Do not use the line circuit breakers in the switch cabinet for switching the connected equipment on or off.

	Important
	<ul style="list-style-type: none">▶ The cover on the switch box and the hinged covers on unused power sockets must always be closed correctly to ensure protection class IP54 (tighten the lock screws by hand).

NOTE

Fault current (RCD) protective circuit breakers are in principal not fully-functional in unearthed networks (protective isolation as made available by the generator) since the earthing is missing. A downstream protection measure by means of a fault current protective circuit breaker is not necessary as a result of the “protective isolation” safety measure provided by the generator.

Put the generator into service and connect the consumers

	Note
	<p>The sum of all connected extension cables must not exceed the following lengths:</p> <ul style="list-style-type: none">• max. 250 m given a conductor cross section of 2,5 mm²• max. 100 m given a conductor cross section of 1,5 mm²



Note


- Equipment powered by electric motors may need start-up currents which can be many factors higher than the indicated operating currents.
 - ▶ In case of doubt, please get in touch with the manufacturer.

- > Every work day carry out a check on the insulation monitor to ensure it is suitable for work. (where available)
 - ⇒ **Check insulation monitor, page 91(when available)**
- > No devices are allowed to be connected to the power generation system.
- > Switch off all devices to be connected (device switch to position "OFF" or "0". Risk of accident caused by devices started up in an uncontrolled fashion!
- > Start the drive unit.
- > Wait until the drive unit has reached its nominal speed.
- > Switch on the protective circuit breaker depending on the model in the attached switch box or in the switch box (position "ON" or "1").
 - ⇒ **Switch box Fig. 6, Switch box with installed options operating hours counter and insulation monitor, page 24**
 - ⇒ **Switch cabinet Fig. 5, Terminal box with terminal board, generator controller and noise filter, page 22**
- > Switch on the main switch on the switch cabinet. (Position "ON" or "1").
- > When wanting to connect devices of protection class I (devices with protective earth and non protective insulated metal housing parts), carry out the protective earth check for these devices every work day.
- > Connect the devices up and switch them on in sequence. Switch on the powerful units with high current consumption or high starting current first then the less powerful units.

Switch off the connected devices

- > Switch off the units in sequence. (where possible, first switch off the units with the lower performance followed by the more powerful units).
- > Disconnect the power-supply plug of the units.
- > Close all hinged covers correctly.


7.6.3 Check insulation monitor

	Warning
	Risk of injury and destruction of property <ul style="list-style-type: none">• The insulation monitor must trip.<ul style="list-style-type: none">▶ Every work day, check generators with the option “insulation monitor with disconnection” to ensure that the insulation monitor is working correctly.▶ Only put the generator into service when the check showed that the insulation monitor was in correct working order.

Check the insulation monitor as follows

⇒ Fig. 27, Operating and control elements in the switch box (optional), page 86

- > Remove all devices and cables connected to the generator.
- > Start the drive unit. Only perform the check when the generator is running.
- > Open the cover to the switch box.
- > Switch on the switch of the insulation monitor (position “ON” or “I”).
- > Press the red check button. The check button also acts as a signal lamp at the same time.
The insulation monitor should trip.
- > Check whether the insulation monitor has tripped and the red signal lamp “INSULATION FAULT” lights up.

	Important
	<ul style="list-style-type: none">• The insulation monitor must trip.<ul style="list-style-type: none">▶ If the insulation monitor does not trip, refrain from using the power generation system any longer.▶ In this case, flag the power generation system as faulty and have it repaired. <p>⇒ Repairs, page 101</p>

Resetting the insulation monitor


- > Stop the drive unit.
 - > (Switch back on the switch of the insulation monitor (position “ON” or “I”).
 - > Correctly close the cover of the switch box (tighten lock screws by hand).
- After a successful check, the generator is ready for use.*




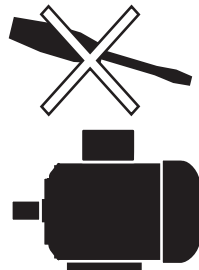
8 Maintenance and care

All generator components are in principle maintenance-free. However, carry out the maintenance work listed in the maintenance summary regularly and in a timely fashion in order to ensure a reliable operation of the generator.

⇒ **General safety instructions, maintenance and care, page 93**

⇒ **Check / replace carbon brushes (only for brush generators), page 98**

	<div data-bbox="375 627 566 672">Important</div> <ul style="list-style-type: none">• In addition to the work given here, checks on the drive system may be necessary as set out in the requirements and regulations of the drive / system manufacturer. This also includes installed protective coverings.<ul style="list-style-type: none">▶ Observe the maintenance instructions of the drive or system manufacturer.
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 	<div data-bbox="311 996 518 1041"> Danger</div> <div data-bbox="311 1052 1037 1097">Risk of injury and destruction of property</div> <ul style="list-style-type: none">• Opening or disassembling the generator puts the system at risk and compromises the safety of the user.<ul style="list-style-type: none">▶ Never open or dismantle the generator.▶ The generator may only be opened by the manufacturer or an authority authorised by the manufacturer.▶ Only carry out the work described in this manual. <div data-bbox="1149 1120 1348 1388"></div>
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Immediately rectify any damage and defects to the generator, regardless of the maintenance intervals.

Do not put the generator back into service until the defects have been rectified.

> Only qualified, specially trained personnel are allowed to carry out work on electrical installations.

8.1 General safety instructions, maintenance and care

	<div data-bbox="395 347 1460 398" style="background-color: #ff8c00; padding: 5px;"> Danger</div> <p>Danger to life through electric shock</p> <ul style="list-style-type: none"> • During operation, the power generation system generates voltages that are potentially fatal. <ul style="list-style-type: none"> ▶ Work on the electrical systems and equipment must only be carried out after the system has been switched off and is de-energized. ▶ Switch off the drive unit before performing any inspection or maintenance work on the generator or switch cabinet. Prevent the drive unit from being switched back on by accident (e.g. remove the ignition key and keep somewhere safe).
	<div data-bbox="395 965 1460 1016" style="background-color: #ff8c00; padding: 5px;"> Warning</div> <p>Risk of injury and destruction of property</p> <ul style="list-style-type: none"> • Inadequately qualified persons are at risk when working on the generator or switch cabinet and may damage the generator. <ul style="list-style-type: none"> ▶ Assembly, connection and commissioning of the generator, as well as work on electrical installations, may only be carried out by authorised, qualified and trained personnel. ▶ Carry out all connection work according to applicable national regulations (in Germany: these include VDE specifications).
	<div data-bbox="395 1538 1460 1590" style="background-color: #ff8c00; padding: 5px;"> Warning</div> <p>Danger to life caused by electric shock and risk of damage.</p> <ul style="list-style-type: none"> • Jets from a high-pressure cleaner can lead to the destruction of the switch cabinet or electric shock. <div data-bbox="1193 1659 1460 1771" style="float: right;">  </div> <ul style="list-style-type: none"> ▶ Never expose the generator or switch cabinet with a protection class lower than IP69k to high-pressure cleaning jets.

	<div data-bbox="309 277 1370 331"> Warning</div> <div data-bbox="309 331 1370 385">Risk of injury and destruction of property</div> <div data-bbox="309 385 1370 580"><ul style="list-style-type: none">• The use of unauthorized third party parts can lead to malfunctions, damage or danger.<ul style="list-style-type: none">▶ Only use third party parts expressly approved by the manufacturer for the installation.</div>
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8.2 Maintenance overview



Interval	Maintenance work	Executed by
Every work day	Insulation monitor > Check where available. ⇒ Check insulation monitor, page 91	User
Monthly	Generator > Visual inspection for contamination or damage. Clean where necessary. > Check the information and rating plates, where necessary clean or replace them. > Check the cooling air openings for contaminants and blockages, clean where necessary. ⇒ Visual checks / cleaning work, users, page 96	User
	Switch box (if installed) > Visual check for contamination or damage. Clean where necessary. > Check the cover and power socket cover to ensure they are sealed tight. ⇒ Visual checks / cleaning work, users, page 96	User
every 1 000 operating hours	For brush generators > Check carbon brushes. ⇒ Check / replace carbon brushes (only for brush generators), page 98	qualified electrician
every 5 000 operating hours	> Check ball bearing using a "sound check". > Replace if necessary (rough running noises of the bearing).	qualified electrician
every 2 0000 operating hours	> Replace the ball bearings. The standard maintenance interval for replacement of the ball bearing is 2 0000 hours. > Replace the ball bearing earlier (check every 5 000 hours) where necessary. ⇒ Check / replace carbon brushes (only for brush generators), page 98	Manufacturer

8.3 Visual checks / cleaning work, users

Read and follow the chapter on safety information, maintenance and upkeep as well as the safety information indicated here.

⇒ **General safety instructions, maintenance and care, page 93**

	<div data-bbox="312 524 1361 577"> Danger</div> <div data-bbox="312 586 1361 631">Danger to life through electric shock</div> <ul data-bbox="312 640 1361 1037" style="list-style-type: none">• Working on the generator or switch cabinet, visual inspections for maintenance purposes or cleaning work on the power generation system during operation can lead to potentially fatal injuries through electric shock.<ul data-bbox="338 824 1329 1037" style="list-style-type: none">▶ Switch off the drive unit before performing any inspection or maintenance work on the generator or switch cabinet. Prevent the drive unit from being switched back on by accident (e.g. remove the ignition key and keep somewhere safe).
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	<div data-bbox="312 1097 1361 1151"> Caution</div> <div data-bbox="312 1160 1361 1205">Burn hazard</div> <ul data-bbox="312 1214 1361 1382" style="list-style-type: none">• Parts of the generator can become very hot during and after the operation.<ul data-bbox="338 1308 1329 1382" style="list-style-type: none">▶ Allow the generator or parts of the generator to cool down before you touch them.
---	---



Monthly work, operators

- > Inspect the generator enclosure for outwardly visible damage and excess contamination. This can impair the cooling.
- > Where necessary, clean the generator with a damp cloth.
- > Check whether the sign attached to the generator for the safety and warning information and the rating plate is easy to read.
- > Where necessary, clean the signs or replace them.
- > Inspect the cooling air openings on the reverse side of the generator for dirt which could impede the flow of cooling air. If necessary, clean with a damp cloth. Where necessary, clean with a damp cloth.

Generator with attached switch box

- > Check the housing of the switch box and the integrated power sockets for outwardly visible damage and contamination.
- > Where necessary, clean the switch box with a damp cloth.
- > Check whether the transparent cover of the switch box and the hinged covers of the power sockets are not damaged and close correctly.

8.4 Maintenance work, authorised technicians

	<div data-bbox="395 1167 1460 1216"> Warning</div> <div data-bbox="395 1216 1460 1550">Risk of injury and destruction of property<ul style="list-style-type: none">• Inadequately qualified persons are at risk when working on the generator or switch cabinet and may damage the generator.<ul style="list-style-type: none">▶ The assembly / disassembly of generator as well as the maintenance, service and replacement work may only be carried out by authorised and qualified technicians.</div>
---	---

Read and follow the chapter on safety information as well as the safety information indicated here.

⇒ **Safety instructions, page 10**

8.4.1 Check / replace carbon brushes (only for brush generators)

For brush type generators, the carbon brushes must be removed and inspected every 1 000 operating hours by qualified technicians, as described below. If the carbon brushes are run down by more than a half, replace the entire carbon brush holder. The carbon brushes cannot be replaced individually.

Remove the carbon brush holder (s)

- > Remove the two M8 x 45 screws, wrench size 10 mm, [2].
- > Remove the sleeve [1].
- > Remove both connection lines from the connecting lugs of the carbon brush holder [3]. The connection lines are coded by the size of the connecting lugs thus protecting them against being swapped.
- ⇒ **Fig. 29, Check and replace carbon brushes as needed, page 99**
- > Unscrew the mounting screw of the carbon brush holder and remove the carbon brush holder [3].

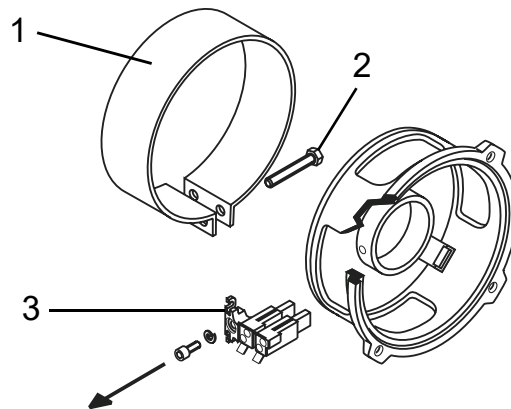


Fig. 28 Removal of carbon brush holder

8.4.2 Check carbon brush holder

Replace the carbon brush holder when the carbon brushes have run down by more than a half, i.e. when they extend less than 6 mm from the carbon brush holder.

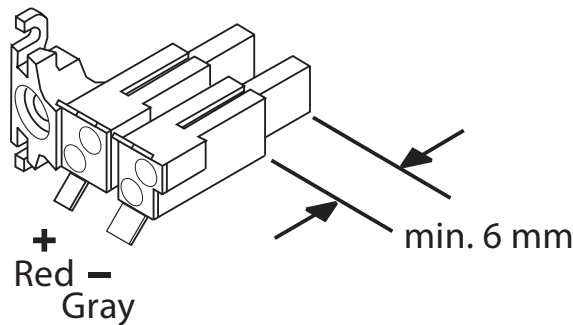


Fig. 29 Check and replace carbon brushes as needed

8.4.3 Install the carbon brush holder

⇒ Fig. 30, Installation of carbon brush holder, page 100

- > Insert the carbon brush holder [3] into the correct position in the generator and push it onto the slip rings on the shaft so that the carbon brushes are pressed into the carbon brush holder and the carbon brush holder is resting against its mounting base.
 - > Press the carbon brush holder further and thread in the mounting screw but do not tighten fully yet. Threading in the mounting screw automatically positions the carbon brush holder on the mounting base.
 - > Check the correct position of the carbon brush holder and then tighten the mounting screw.
 - > Insert both connection lines onto the connecting lugs of the carbon brush holder according to the size of the attaching plug.
- ⇒ Figure Removal of carbon brush holder, Seite 98
- > Place the collar [1] and clamp securely with two screws [2].

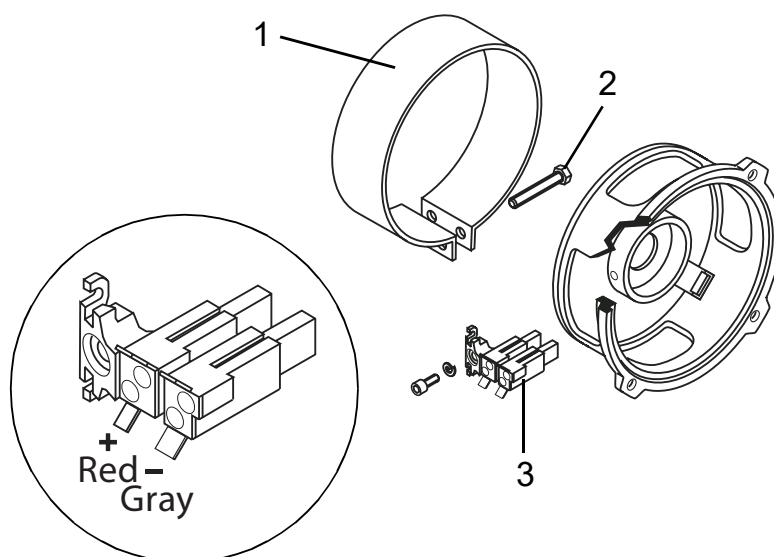


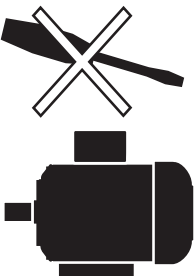


Fig. 30 Installation of carbon brush holder





8.4.4 Replacement of the ball bearing

Replace the ball bearings of the generator at least every 20000 operating hours. If rough running noises are detected during the regular check on the ball bearings specified for every 5000 operating hours, replace the ball bearing earlier.

 	<div style="background-color: #ff4500; color: white; padding: 5px;">! Danger</div> <p>Risk of injury and destruction of property</p> <ul style="list-style-type: none"> • Opening or disassembling the generator puts the system at risk and compromises the safety of the user. <ul style="list-style-type: none"> ▶ Never open or dismantle the generator. ▶ The generator may only be opened by the manufacturer or an authority authorised by the manufacturer. ▶ Only carry out the work described in this manual. <div style="text-align: right;">  </div>
--	--







9 Repairs

Only the work described in Chapter 6 is allowed during maintenance.
Additional work may be carried out by the manufacturer only.

 	 Danger
	<p>Risk of injury and destruction of property</p> <ul style="list-style-type: none">• Opening or disassembling the generator puts the system at risk and compromises the safety of the user.▶ Never open or dismantle the generator.▶ The generator may only be opened by the manufacturer or an authority authorised by the manufacturer.▶ Only carry out the work described in this manual. 

10 Disassembly

10.1 Safety information

	<div> Danger</div> <div>Danger to life through electric shock<ul style="list-style-type: none">Working on the generator or switch cabinet during operation can lead to potentially fatal injuries caused by electric shock.<ul style="list-style-type: none">Switch off the drive unit before performing any inspection or maintenance work on the generator or switch cabinet. Prevent the drive unit from being switched back on by accident (e.g. remove the ignition key and keep somewhere safe).</div>
	<div> Warning</div> <div>Risk of injury and destruction of property<ul style="list-style-type: none">Inadequately qualified persons are at risk when working on the generator or switch cabinet and may damage the generator.<ul style="list-style-type: none">The assembly / disassembly of generator as well as the maintenance, service and replacement work may only be carried out by authorised and qualified technicians.</div>
	<div> Caution</div> <div>Burn hazard<ul style="list-style-type: none">Parts of the generator can become very hot during and after the operation.<ul style="list-style-type: none">Allow the generator or parts of the generator to cool down before you touch them.</div>

10.2 Disassembly

The disassembly of generator must be carried out according to the descriptions for the installation.

⇒ **Installation of generator, page 28**

10.3 Disassembly of dual-bearing generators (BG 132 and BG 160 models)

The disassembly of dual-bearing generator must be carried out according to the descriptions in the Installation chapter.

⇒ **Installation of generator, page 28**

10.4 Disassembly of single-bearing generators

NOTE

The following special tools are necessary for the disassembly of single-bearing generators:

- Special tool provided by the motor manufacturer for locking the motor shaft.
- For shaft attachment via grub screw: special hexagon nut for turning the generator shaft with a screw spanner as well as special saw ring pliers for removing and attaching the saw ring for securing the fan wheel on the shaft.
- For shaft attachment via pull rod: rod and set screw.

Additionally for brush generators:

- Insert the special wooden wedge for the transportation lock of the rotor.

10.4.1 Disassembly of single-bearing brush generators

Preparatory work and removal of carbon brush holder

- > Disconnect electrical connection lines of the generator.
- ⇒ **Installation of generator, page 28**
- > Remove the two M8 x 45 screws, wrench size 10 mm, [2].
- > Remove the sleeve [1].
- > Remove both connection lines from the connecting lugs of the carbon brush holder [5].
The connection lines are coded by the size of the connecting lugs thus protecting them against being swapped.
- > Unscrew the mounting screw of the carbon brush holder and remove the carbon brush holder [5].

Continue with the disassembly with the following descriptions

- For shaft attachment via grub screw
- ⇒ **Disassembly of shaft attachment via the grub screw, page 105.**
- #- For shaft attachment via tension bolt
- ⇒ **Disassembly of shaft attachment via tension bolt, page 107.**

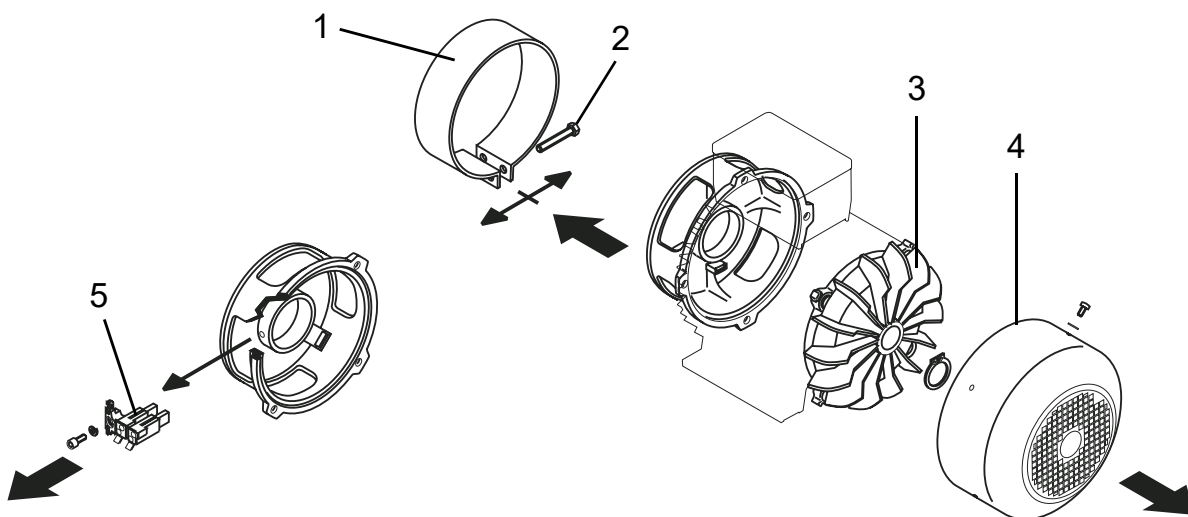


Fig. 31 Preparatory work, disassembly of single-bearing brush generators

Disassembly of shaft attachment via the grub screw

- ⇒ Fig. 32, Disassembly of single-bearing brush generators (1), page 105
- ⇒ Fig. 33, Disassembly of single-bearing brush generators (2), page 106
- > Remove the fan wheel cover [4] and fan wheel [3] from the generator.
The fan wheel is secured with a key (against twisting) and a saw ring on the shaft.
- > Instead of the ventilation wheel, place the special hexagon nuts [2] onto the generator shaft.
- > Use the key [1] to secure against twisting.
- > Restrain the motor shaft with the special tool from the motor manufacturer.
- > Apply a screw spanner to the special hexagon nut and undo the grub screw joint between motor and generator shaft.
- > If necessary, support the generator and unscrew the four mounting screws [3] of the bearing plate on the flange of the drive motor.
- > Turn down the generator shaft from the grub screw which is screwed into the motor shaft, remove the generator.
- > Unscrew the grub screw [4] from the shaft of the drive motor with a hexagon socket wrench.

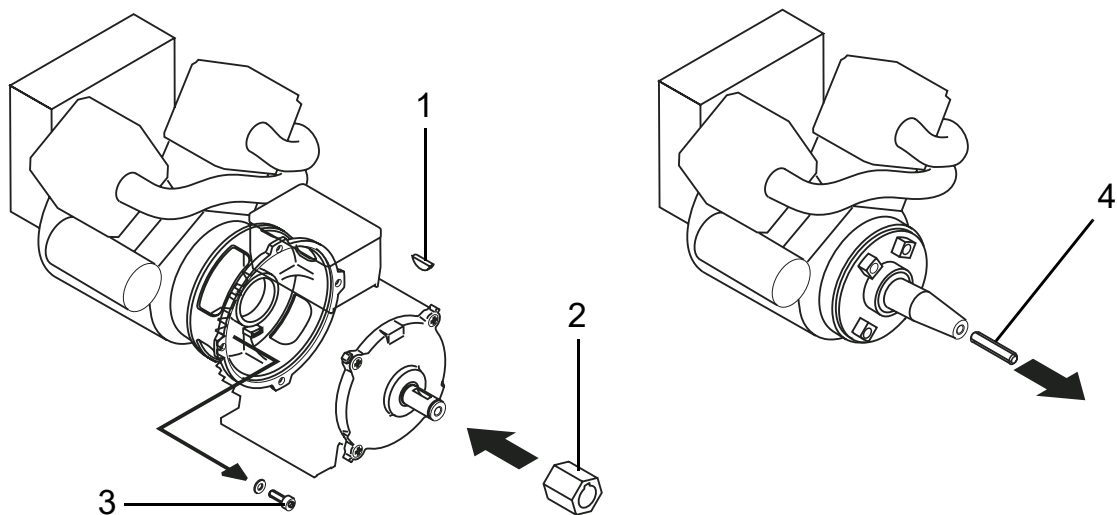


Fig. 32 Disassembly of single-bearing brush generators (1)

Disassembly

Disassembly of single-bearing generators

- > Remove the special hexagon nut [1] from the generator shaft.
- > Assemble the carbon brush holders [4] again in the generator and connect the lines.
- > Insert the special wooden wedge for the transportation lock of the rotor.
- > Place the collar [6] and clamp securely with two screws [5].
- > Attach the fan wheel [2] and secure with the key (against twisting) and the saw ring on the generator shaft.
- > Attach the fan wheel cover [3] .

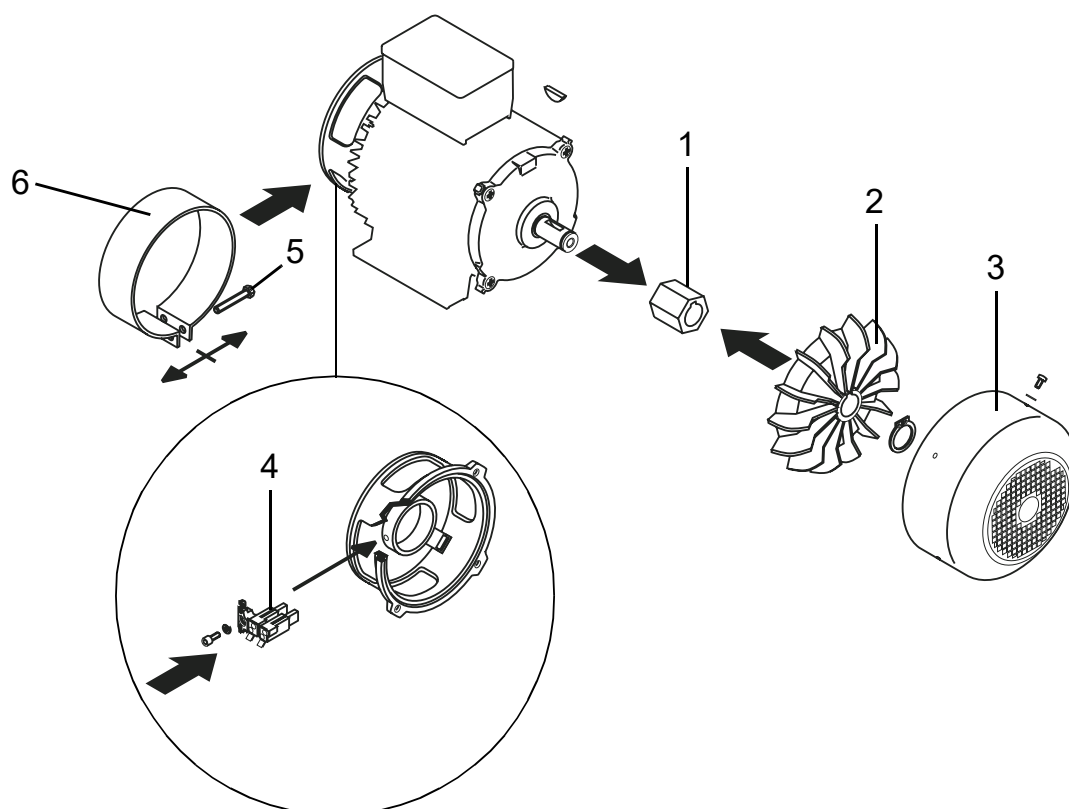


Fig. 33 Disassembly of single-bearing brush generators (2)

Disassembly of shaft attachment via tension bolt

⇒ **Fig. 34, Disassembly of single-bearing brush generators with tension bolt, page 107**

- > Remove the covering lid [2] from the fan wheel cover.
- > Restrain the motor shaft with the special tool from the motor manufacturer.
- > Undo the tension bolt [1] and remove from the generator shaft.
- > If necessary, support the generator and unscrew the four mounting screws [3] of the bearing plate on the flange of the drive motor.
- > Instead of the tension bolt, thread the rod [4] into the generator shaft and insert the set screw [5] into the generator shaft.
Screwing in the set screw undoes the generator shaft from the motor shaft.
- > Remove the generator from the drive motor.
- > Remove the rod and set screw from the generator shaft.
- > Place cover lid onto the fan wheel cover.
- > Re-assemble the carbon brush holder [4] in the generator and fit the connection lines.
- > Insert the special wooden wedge for the transportation lock of the rotor.
- > Place the collar [6] (Figure 33) and clamp securely with two screws [5] (Figure 33).

⇒ **Fig. 33, Disassembly of single-bearing brush generators (2), page 106**

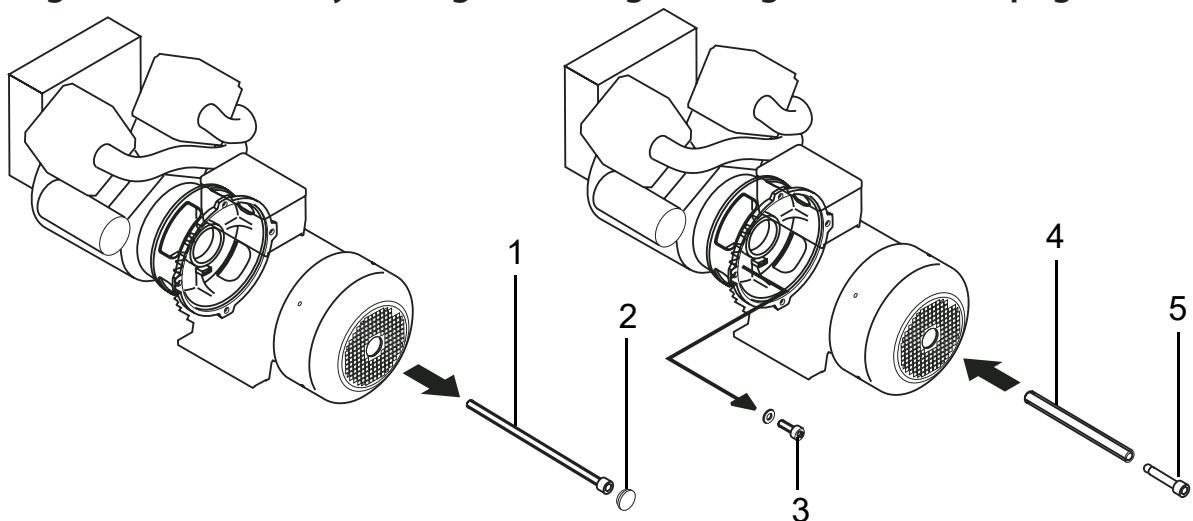


Fig. 34 Disassembly of single-bearing brush generators with tension bolt

10.4.2 Disassembly of brushless single-bearing generators

Preparatory work

- > Disconnect electrical connection lines of the generator.
- ⇒ **Electrical generator connection, page 73**
- > Continue with the disassembly with the following descriptions:
- > For shaft attachment via grub screw, continue with the next section.
- > For shaft attachment via tension bolts.
- ⇒ **Disassembly of shaft attachment via tension bolt, page 111**

Disassembly of shaft attachment via the grub screw

- ⇒ **Fig. 35, Disassembly of brushless single-bearing generators (1), page 109,**
 - ⇒ **Fig. 36, Disassembly of brushless single-bearing generators (2), page 110,**
 - ⇒ **Fig. 37, Disassembly of brushless single-bearing generators (3), page 110**
 - > Remove the fan wheel cover [3] (Figure 35) and fan wheel [2] from the generator.
- The fan wheel is secured with a key (against twisting) and a saw ring on the shaft.*
- > If necessary, support the generator and undo the front bearing plate from the generator.
 - > Unscrew the four mounting screws [4] of the front bearing plate from the generator.
 - > Instead of the ventilation wheel, place the special hexagon nuts [2] onto the generator shaft.
 - > Use the key [1] to secure against twisting.
 - > Restrain the motor shaft with the special tool from the motor manufacturer.
 - > Apply the screw spanner to the special hexagon nut and undo the grub screw joint between motor and generator shaft.
 - > Turn down the generator shaft from the grub screw which is screwed into the motor shaft, remove the generator.

- > Remove the generator front bearing plate that is still attached to drive motor.
To do so, unscrew the four screws [3] (Figure 36) and remove the bearing plate [4].
- > Attach the front bearing plate [4] to the generator.
- > Unscrew the grub screw [1] (Figure 37) from the shaft of the drive motor with a hexagon socket wrench.
- > Remove the special hexagon nut [2].
- > Attach the fan wheel [3] and the cover [4] again.
- > Secure the fan wheel with a key (against twisting) and a saw ring on the shaft.

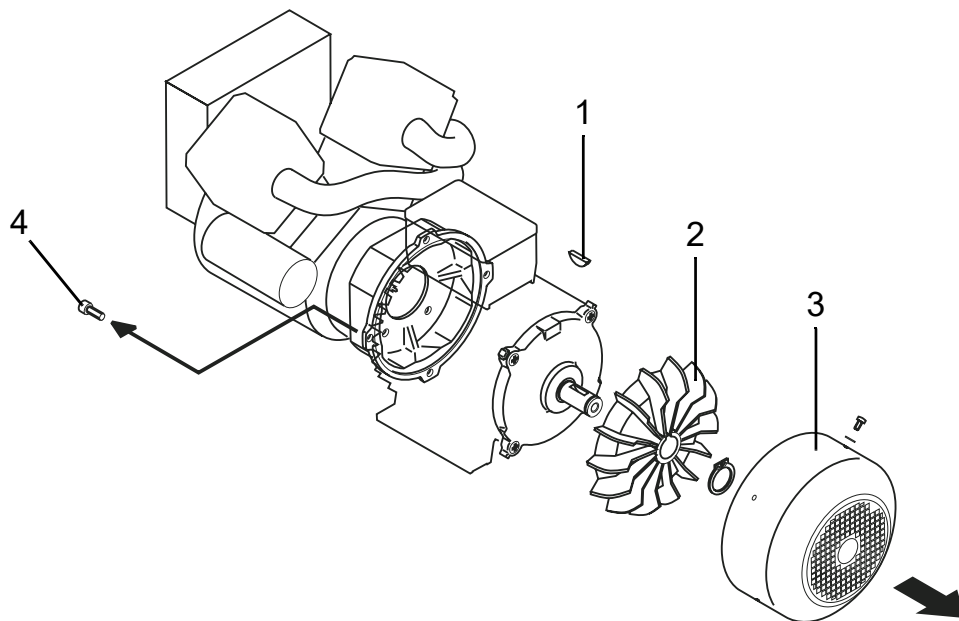


Fig. 35 Disassembly of brushless single-bearing generators (1)

Disassembly
Disassembly of single-bearing generators

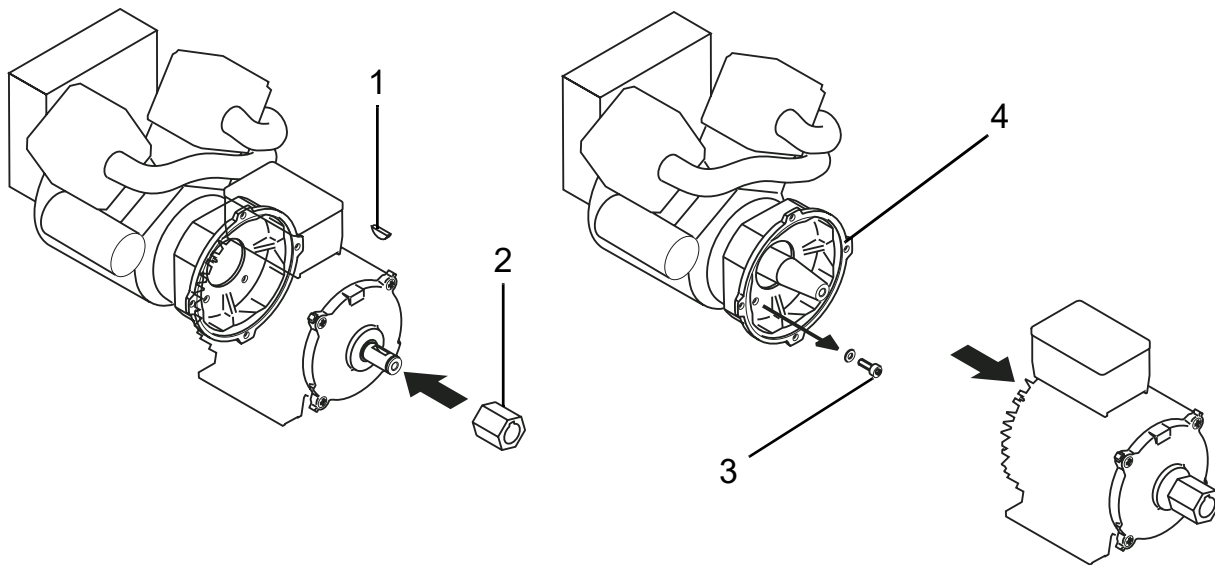


Fig. 36 Disassembly of brushless single-bearing generators (2)

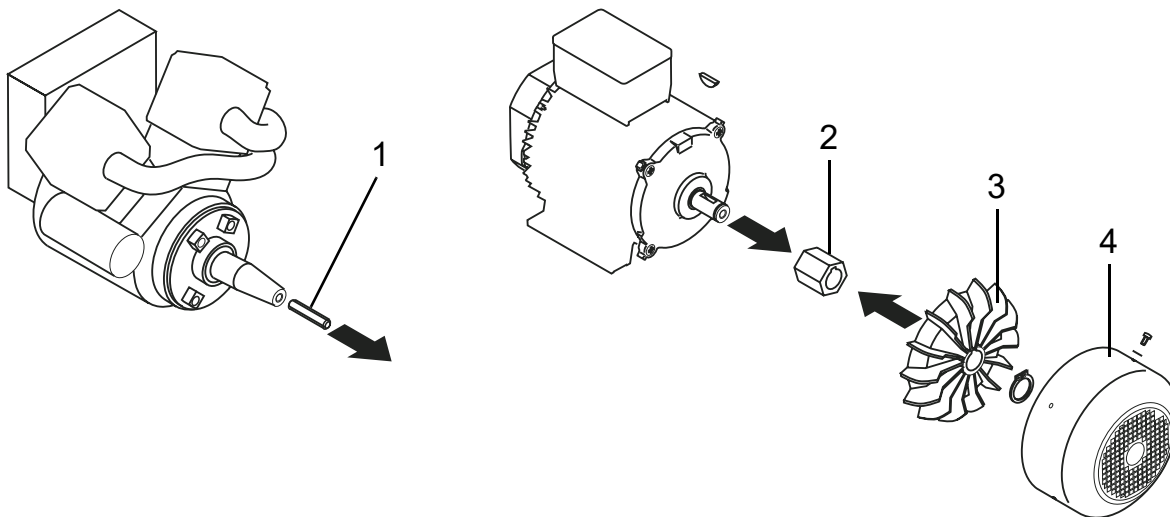


Fig. 37 Disassembly of brushless single-bearing generators (3)

Disassembly of shaft attachment via tension bolt

- ⇒ Fig. 38, Disassembly of brushless single-bearing generators with tension bolts (1), page 111,
- ⇒ Fig. 39, Disassembly of brushless single-bearing generators with tension bolts (2), page 112
- > Remove the covering lid [2] (Figure 38) from the fan wheel cover.
- > Undo the front bearing plate from the generator.
Unscrew the four mounting screws [5] of the front bearing plate from the generator.
- > Restrain the motor shaft with the special tool from the motor manufacturer.
- > Undo the tension bolt [1] and remove from the generator shaft.
- > Instead of the tension bolt, thread the rod [3] into the generator shaft and insert the set screw [4] into the generator shaft.

Thread in the set screw undoes the generator shaft from the motor shaft.

- > Remove the generator from the drive motor.
- > Remove the rod [3] and set screw [4] from the generator shaft.
- > Place the cover lid [2] onto the fan wheel cover.
- > Remove the generator front bearing plate [1] (Figure 39) that is attached to the drive motor.
- > Remove the four screws [2] and remove the bearing plate.
- > Attach the front bearing plate to the generator.

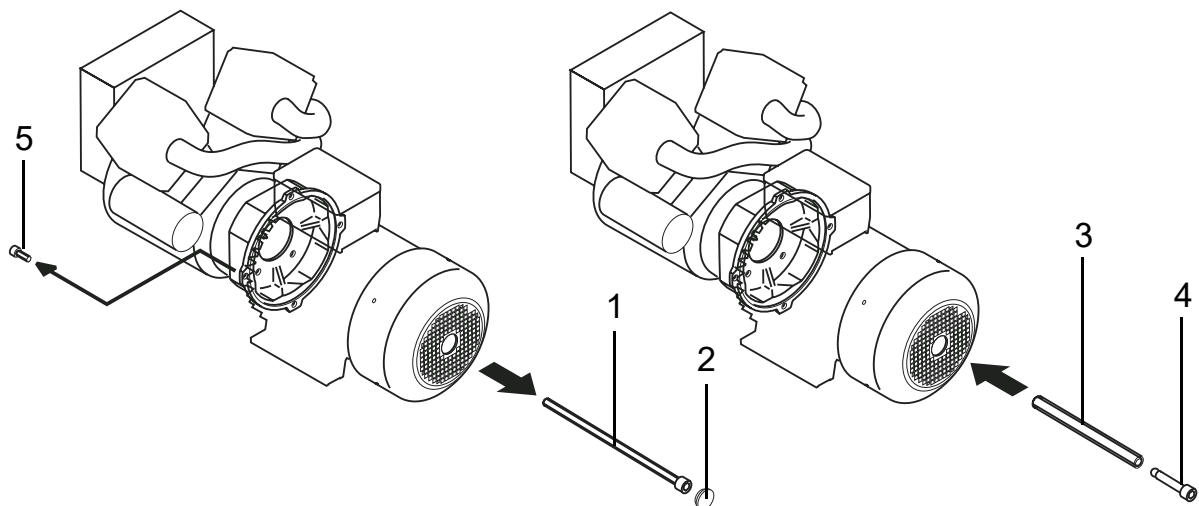


Fig. 38 Disassembly of brushless single-bearing generators with tension bolts (1)

Disassembly
Disassembly of single-bearing generators

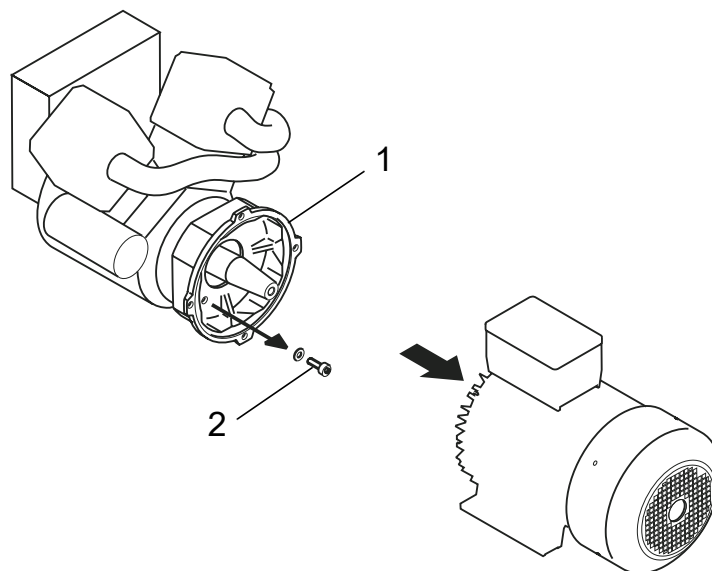



Fig. 39 Disassembly of brushless single-bearing generators with tension bolts (2)

11 Transport and storage

	<p>Note</p> <ul style="list-style-type: none"> ▶ Transport and store the generators and the switch cabinets in a dry space and protect against water. ▶ Only transport or store the generator in the as-delivered condition with packaging and safety devices attached.
---	--

11.1 Generator

Generators in the factory are bolted down for transport on a pallet and are packaged to protect them from damage and moisture ingress.

If ring screws are not attached to the generator in the factory, they must be subsequently attached in order to lift the generator.

	BG 132 generators	BG 160 generators
Weight (mass):	approx. 40-80 kg	approx. 140-180 kg
Permissible temperatures:		
Transport	-25 °C to +60 °C	
Bearing	-20 °C to +50 °C	
Permissible relative humidity:		
Transport	95%, non-condensing	
Bearing	95%, non-condensing	

12 Decommissioning, storage after disassembly of, disposal

Carry out removal and decommissioning of generators according to the descriptions in the Disassembly of chapter.

⇒ **Disassembly, page 102**

After removal, package and store generators that are still functional in accordance with descriptions.

⇒ **Transport and storage, page 113**

Label generators that are no longer operable as such and dispose of them or send to a recycling center according to the applicable legal requirements. More information is available from the relevant environmental authorities or manufacturers.

12.1 Disposal instructions

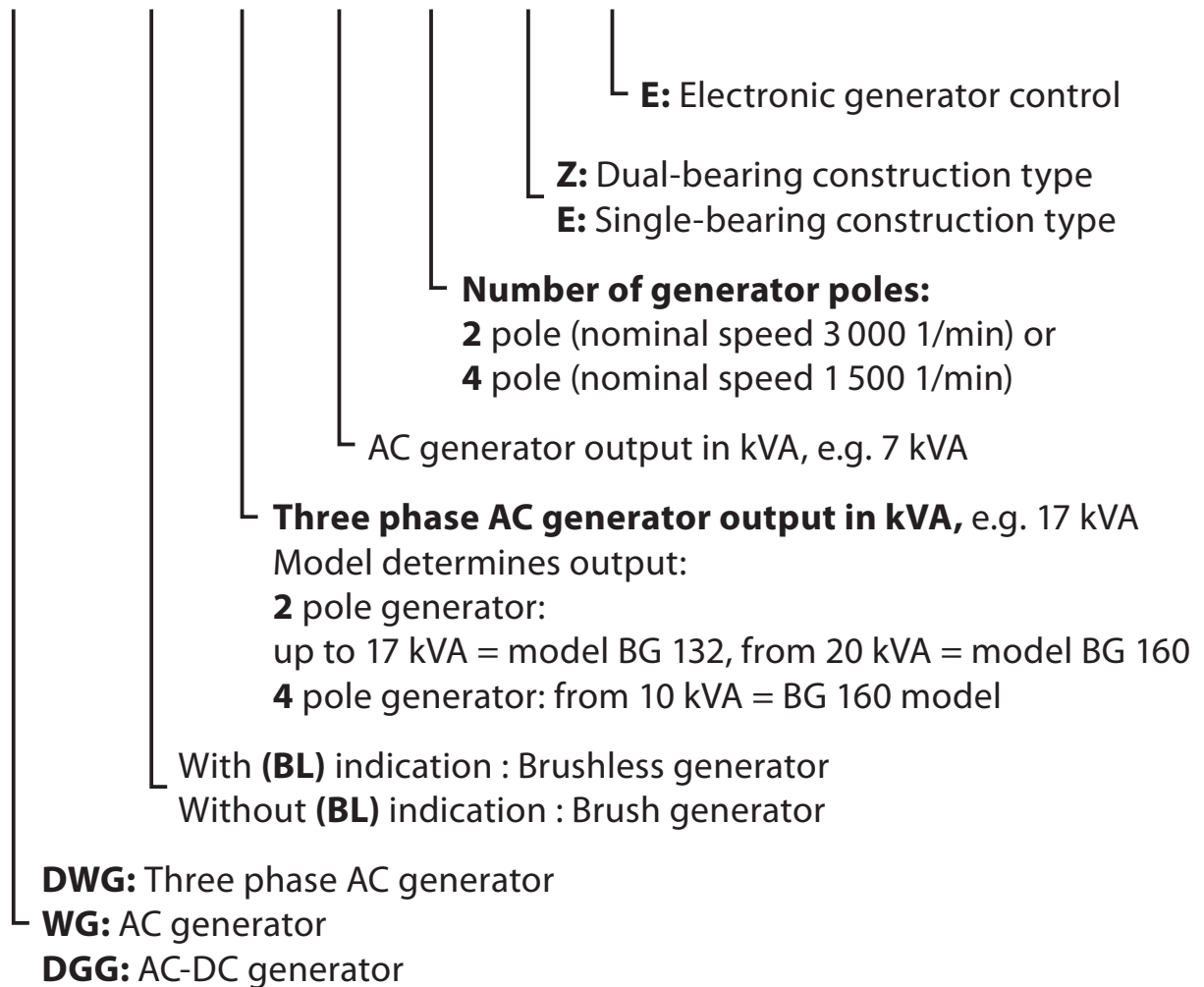
Generator housing	Aluminium
Fan wheel cover	Iron / steel
Fan wheel	Polyamide
Rotor / shaft	Iron / steel
Windings	Copper, impregnated with modified Esther imides (THEIC)
Electronic parts	Dispose as electric scrap

13 Design coding system for generator types

This chapter contains information about the design coding system for the individual generator types as well as examples for generator descriptions.

13.1 Type code

DWG (BL) 17/ 7,0 -2 Z E



13.2 Examples of descriptions

Type designation	Features or properties
DWG 8,0/5,0-2EE	Three phase AC generator, brush machine, 8 kVA three-phase AC voltage output, 5 kVA AC generator output, 2-pole machine, construction type single-bearing, electronically regulated, model BG 132 (as 2-pole < 17 kVA)
DWG (BL) 10/6-4ZE	Three phase AC generator, brushless, 10 kVA three-phase AC voltage output, 6 kVA AC generator output, 4-pole machine, construction type single-bearing, electronically regulated, model BG 160 (as 4-pole from 10 kVA)

14 Spare parts

Companies authorised for repair and replacement work, must refer directly to the manufacturer for the service manual.

14.1 Generator

Obtain the generator ID and serial number from the rating plate.

Item designation	Item code
Housing / stator	1010
Footer	1030
Pole wheel	2010
Ball bearing B side	2110
Ball bearing A side	2111
B bearing plate	3010
A bearing plate	4010
Blades	5110
Cover	5130
Controller LCAR4	5400
Terminal box	5150
Terminal board	1020

- > When ordering spare parts, always specify the Generator ID, serial number, item designation and item code.

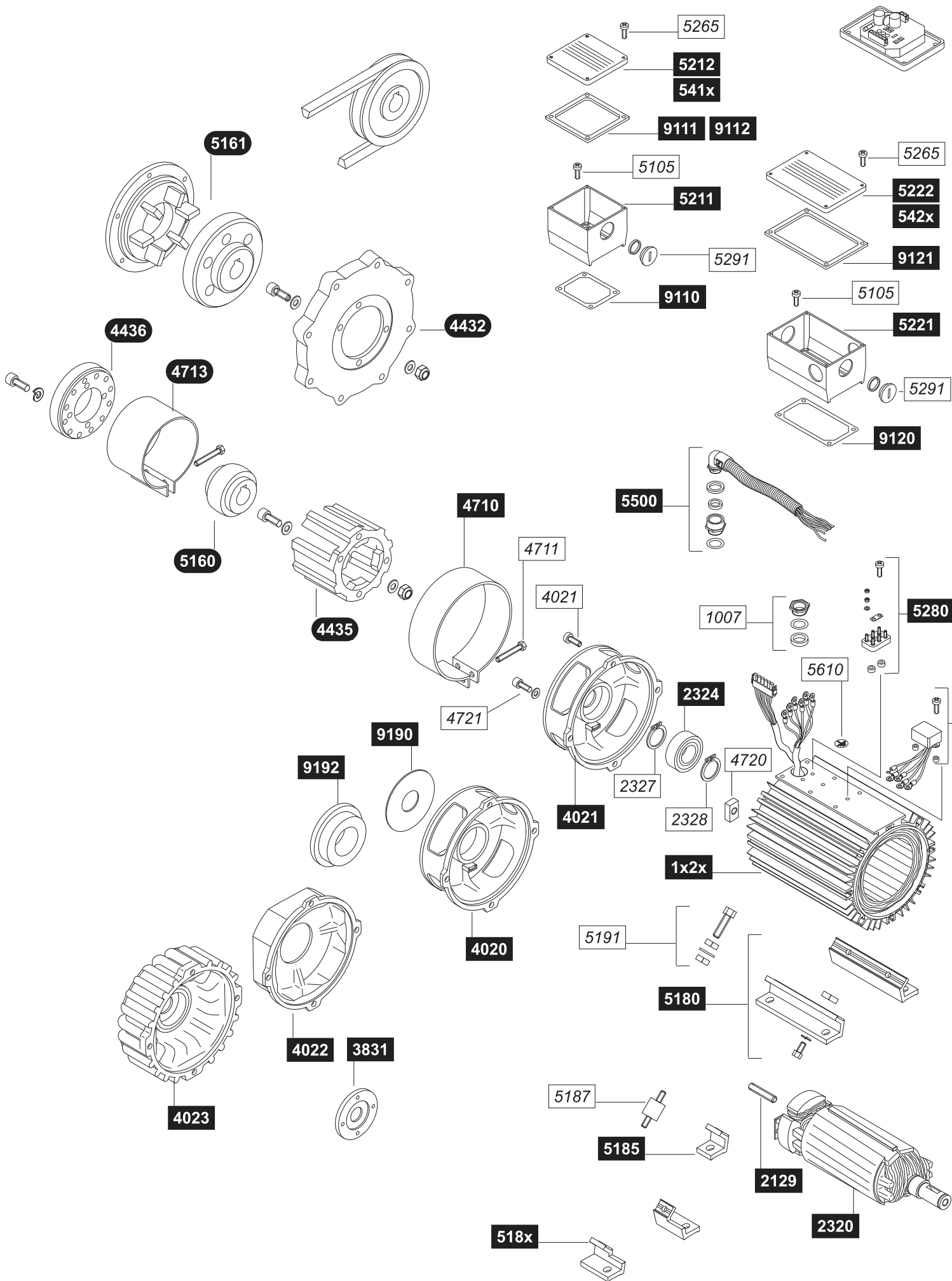
Order example: blades for DWG (BL) 13/7-2 ZE:

Generator ID 7640, serial number 654321, blades 5110

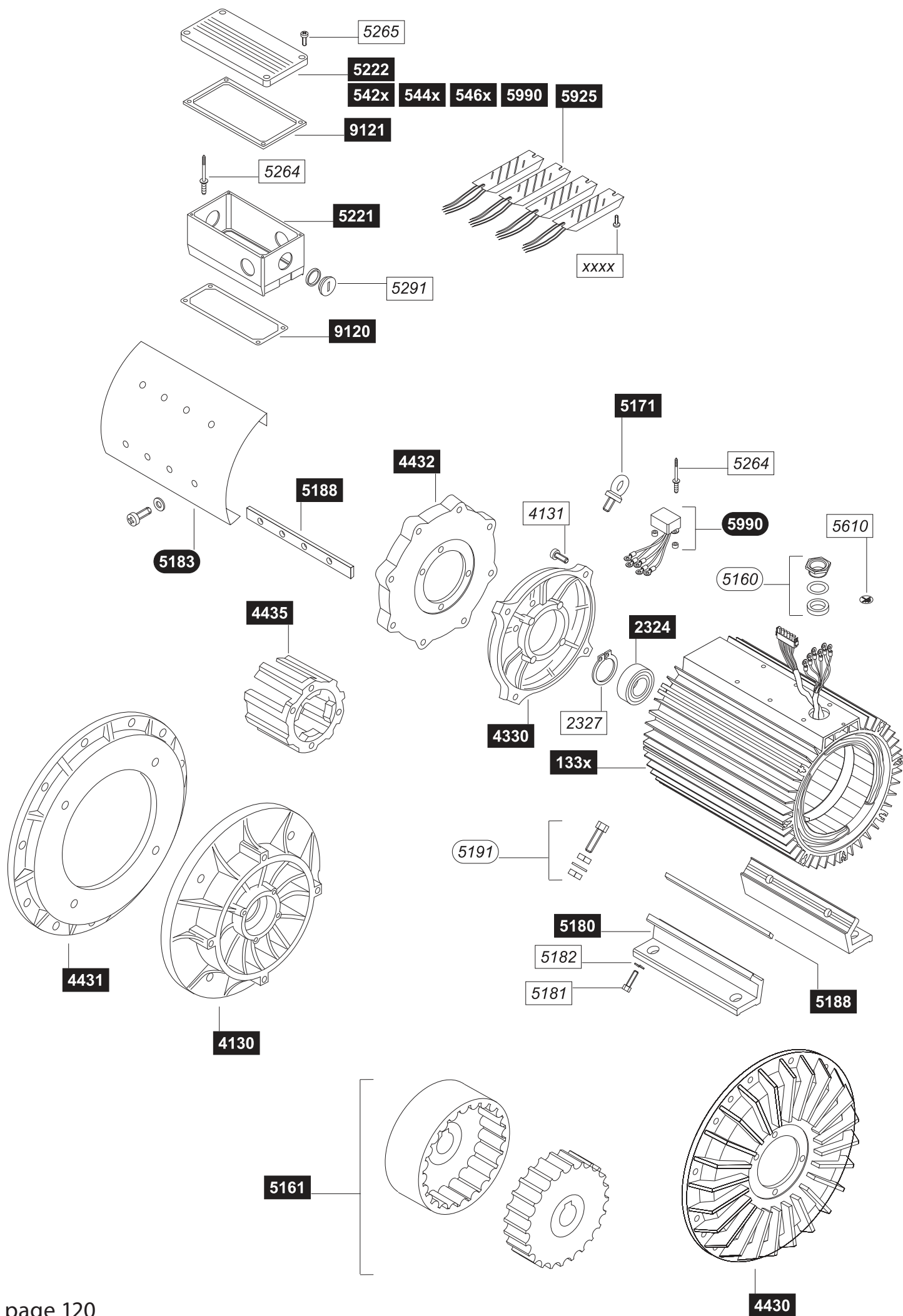
⇒ Explosion drawing BG132, page 118

⇒ Explosion drawing BG160, page 120

You can find additional information and assistance for technical problems in our service portal online.

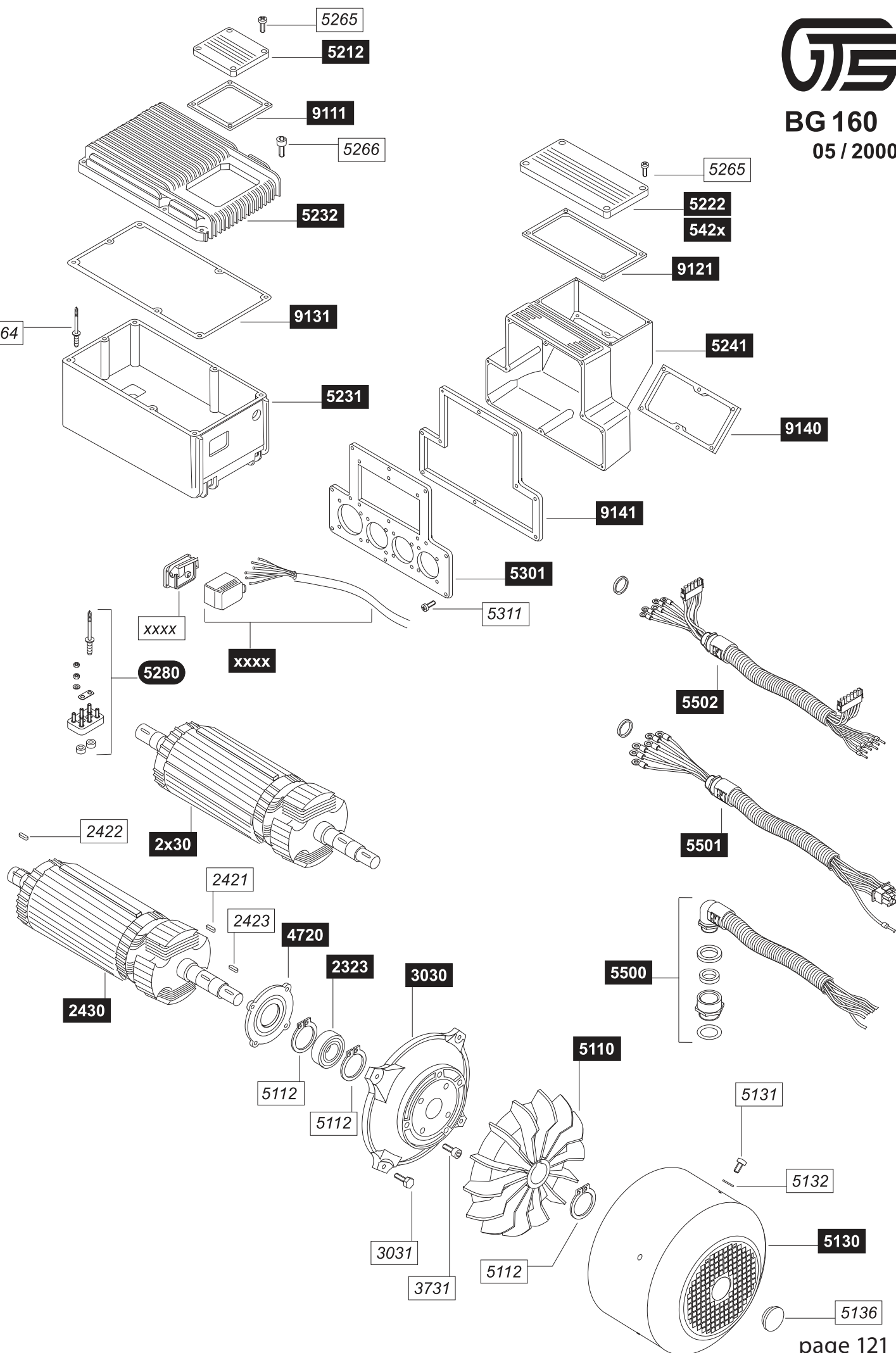








BG 160
05 / 2000



15 Index of figures

Fig. 1	Mains configuration of generator, principle circuit diagram, protective separation.....	18
Fig. 2	Block circuit diagram, DWG-brushless generator with generator controller LCAR4BASIC	19
Fig. 3	Block circuit diagram, DWG generator with brushes and generator controller LCAR4STD (with connected electronic idling mechanism).....	20
Fig. 4	Dual-bearing generator, model 132, with terminal box.....	21
Fig. 5	Terminal box with terminal board, generator controller and noise filter	22
Fig. 6	Switch box with installed options operating hours counter and insulation monitor	24
Fig. 7	Preparatory disassembly for assembling single-bearing brush generators	41
Fig. 8	Assembly of single-bearing brush generators on the drive motor	43
Fig. 9	Installation of carbon brush holder	44
Fig. 10	Preparatory disassembly for assembling brushless single-bearing brush generators.....	45
Fig. 11	Assembly of brushless single-bearing generators on the motor (1)	47
Fig. 12	Assembly of brushless single-bearing generators on the motor (2)	47
Fig. 13	Assembly of single-bearing brush generators with tension bolts.....	49
Fig. 14	Assembly of brushless single-bearing generators with tension bolts (1)	50
Fig. 15	Assembly of brushless single-bearing generators with tension bolts (2)	51
Fig. 16	Preparatory disassembly of for flange mount (dual-bearing, BG 132 model with standard bearing plate)	57
Fig. 17	Assembly of flange mount (dual-bearing, BG 132 model with standard bearing plate)	58
Fig. 18	Preparatory disassembly of flange mount (dual-bearing, BG 132 model with reinforced bearing plate)	59
Fig. 19	Assembly of flange mount (dual-bearing, BG 132 model with reinforced bearing plate)	60
Fig. 20	Assembly of flange mount for hydraulic drive (dual-bearing, BG 132 model with standard bearing plate)	62
Fig. 21	Assembly of flange mount hydraulic drive (dual-bearing, BG 132 model with reinforced bearing plate)	64
Fig. 22	Preparatory disassembly of flange mount (BG 160 model)	69
Fig. 23	Assembly of flange mount (BG 160 model)	70
Fig. 24	Assembly of flange mount hydraulic drive (BG 160 model).....	72
Fig. 25	Terminal boxes, connection assignment on terminal board	75
Fig. 26	Miniature circuit breakers in the switch box (only for generators 8kVA and 13 kVA)	82
Fig. 27	Operating and control elements in the switch box (optional)	86
Fig. 28	Removal of carbon brush holder	98
Fig. 29	Check and replace carbon brushes as needed	99
Fig. 30	Installation of carbon brush holder	100
Fig. 31	Preparatory work, disassembly of single-bearing brush generators	104
Fig. 32	Disassembly of single-bearing brush generators (1).....	105
Fig. 33	Disassembly of single-bearing brush generators (2).....	106
Fig. 34	Disassembly of single-bearing brush generators with tension bolt	107
Fig. 35	Disassembly of brushless single-bearing generators (1).....	109
Fig. 36	Disassembly of brushless single-bearing generators (2).....	110
Fig. 37	Disassembly of brushless single-bearing generators (3).....	110
Fig. 38	Disassembly of brushless single-bearing generators with tension bolts (1)	111
Fig. 39	Disassembly of brushless single-bearing generators with tension bolts (2).....	112

17 Index

A

Assembly of brush generators.....	41
Assembly of brushless generators.....	45
Assembly of flange mount.....	60, 70, 72
Assembly to engine.....	40

B

Ball bearing.....	117
Bearing plate.....	117
Belt drive, assembly.....	55, 67
Belt pulley.....	26
BG 132.....	15
BG 160.....	15

C

Carbon brushes.....	98
Carbon brush holder.....	98
Cardan shaft.....	25
Check insulation monitor.....	91
Circuit breakers.....	24, 82
Condensate water drain.....	35
Connecting equipment.....	87
Connections.....	27
Contents.....	3
Control elements.....	86
Controller.....	117
Cooling air.....	39
Cooling air supply.....	39
Cooling instructions.....	38, 53, 66
Cooling profiles.....	21
Copyright.....	8
Current distribution.....	87
CW rotational field.....	31

D

Decommissioning.....	114
Designation system.....	115
Disassembly.....	114
Disassembly for flange mount.....	57
Disassembly of power generation system	102

Display elements.....	86
Disposal.....	114
Disposal instructions.....	114
Domestic installations.....	83
Drive types.....	25
Dual-bearing generators.....	30, 34

E

Earthing.....	81
Electrical connection.....	73
Electrical protection.....	81
EN 60034.....	32
Equipotential bonding.....	81

F

Flange mount.....	57, 59, 69
Footer.....	117
Function.....	17
Function, generator.....	17

G

General instructions, installation for generator.....	31
Generator controller.....	19, 22, 27
Generator operation.....	86
Generator seal.....	40
Generators without a switch box.....	32, 82

H

Hazard class.....	2
Housing.....	117
Hydraulic drive.....	61
Hydraulic drive, assembly.....	71
Hydraulic motor.....	25

I

Important information and notes.....	6
Installation dimensions.....	38
Installation dimensions and assembly.....	52
Installation of carbon brush holder.....	44
Installation of dual-bearing generators.....	64
Installation of generator.....	28
Installation of single-bearing generators...	37

Installation positions.....	33, 34
Instructions on the installation position for generator.....	30
Insulation monitor.....	24, 86
Insulation monitor with disconnect.....	18
Intended use.....	6

L

Loads on the shaft.....	53
-------------------------	----

M

Mains configuration	18
Maintenance and care.....	92
Maintenance overview	95
Maintenance work.....	97
Manufacturer's address.....	8
Maximum tension force.....	68
Minimum clearances.....	38, 53, 66
Models.....	15
Mounting profile.....	21

N

Noise filter.....	22
Norms and directives.....	14

O

Operating hours counter	24, 86
Operation.....	76

P

Pole wheel.....	117
Protection against overcurrent.....	82
Protection class.....	27
Protective covering.....	32
Protective isolation	18

Q

Qualified personnel.....	6
--------------------------	---

R

Reinforced bearing plate	59, 63
Repairs.....	101
Replace ball bearing	100

Rotated generator installation.....	36
-------------------------------------	----

S

Safety devices.....	32, 81
Safety information, installation	10, 28
Safety information legend.....	2
Safety information, operation.....	76
Safety measures.....	81
Seal.....	40
Serial number(s).....	117
Shaft attachment with tension bolts.....	48
Single-bearing generators.....	30, 33
Spare parts.....	117
Standard bearing plate.....	57, 61
Stator.....	117
Storage.....	113, 114
Switch box.....	23, 27

T

Technical data.....	27
Temperature.....	39
Tension force, drive belts on shaft.....	56, 68
Terminal board	117
Terminal box.....	22, 117
Tightening torque.....	52
Transport.....	113
Type code.....	115
Type designation.....	116

V

Validity of the manual	7
Variants, electrical connection	21
Version without terminal box.....	75
Version with terminal box.....	74

W

Warranty.....	8
Working with electrical equipment.....	84

