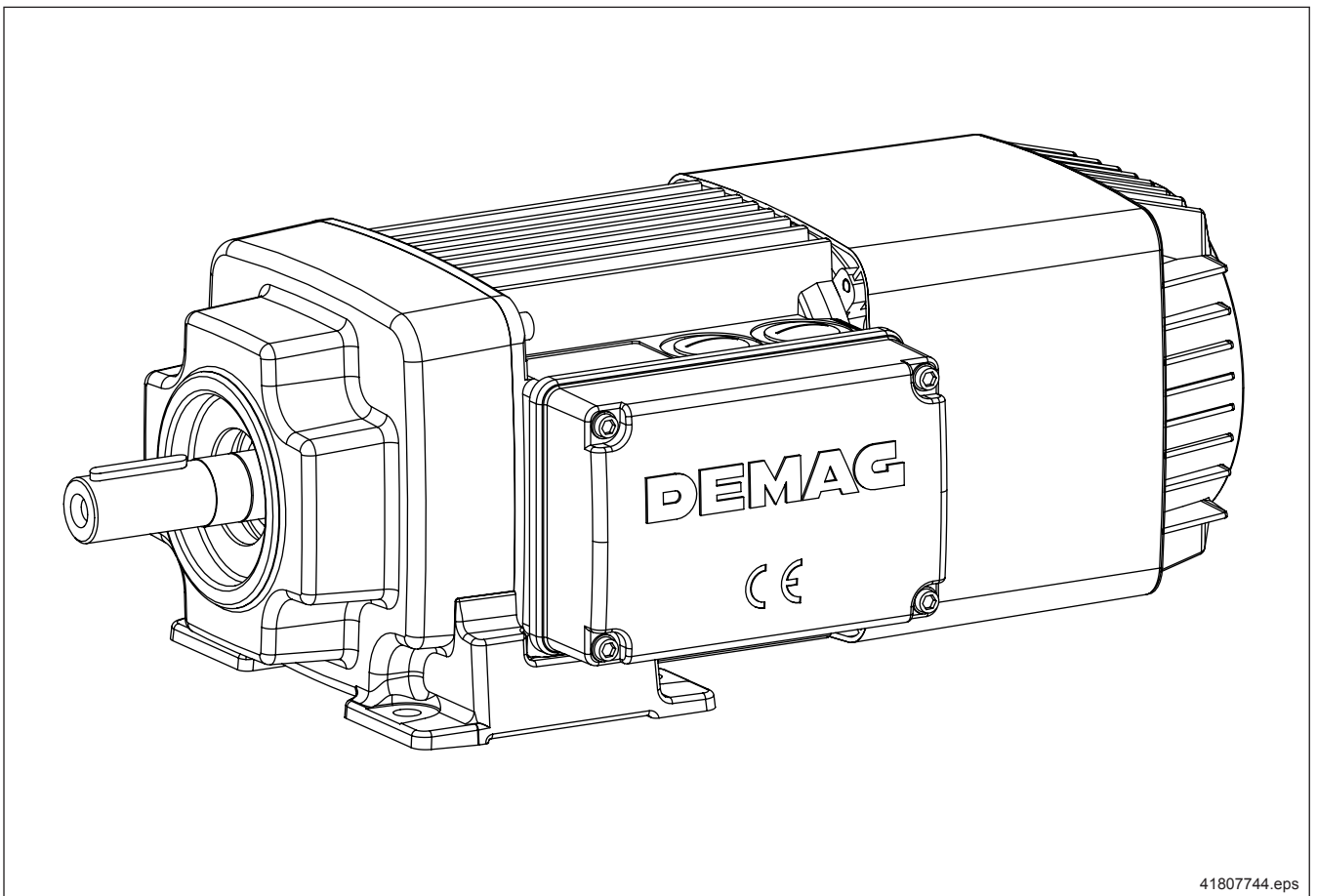




Operating instructions

Z motor range



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Manufacturer**Demag Cranes & Components GmbH****Drives**

P.O. Box 67, D-58286 Wetter

Telephone +49 (0) 2335 92-2922 · Telefax +49 (0) 2335 92-2406

E-mail: drives@demagcranes.com

www.demagcranes.com

Accompanying documents**For geared motors, also refer to the gearbox operating instructions.**

Document	Part no.			
	DE	EN	FR	ES
Drive Designer Online	www.demag-drivenodesigner.com			
Geared motors catalogue DE / EN / FR	203 150 44			–
Geared motors catalogue IT / EN / ES	–	203 250 44	–	203 250 44
Travel unit components catalogue	203 350 44	203 352 44	203 353 44	203 354 44
Geared travel motors – Volume 3 – Quick selection and gearbox limit torque – DE / EN / FR	203 013 44			–
Geared travel motors – Volume 3 – Quick selection and gearbox limit torque – IT / EN / ES	–	203 014 44	–	203 014 44
Helical gearbox operating instructions DGV - DUV - DFV 11-41 gearbox range	214 719 44	214 720 44	214 721 44	214 722 44
DGV - DFV 50-90 helical gearbox range operating instructions	214 150 44	214 151 44	214 152 44	214 153 44
WU - WG - WF angular gearbox range operating instructions	214 057 44	214 058 44	214 059 44	214 060 44
AU - AG - AM - AD offset gearbox range operating instructions	214 205 44	214 206 44	214 207 44	214 208 44
Operating instructions – encoders for Z motor range	214 371 44	214 372 44	214 373 44	214 374 44
Operating instructions – Brake accessories for Z motor range	214 040 44	214 041 44	214 042 44	214 043 44
Operating instructions / Plug connection for KB and Z motor ranges	214 021 44	214 022 44	214 023 44	214 024 44
KBA - KBF motor operating instructions	214 317 44	214 318 44	214 319 44	214 320 44
Z motor spare part lists				
Frame sizes Z63 / 71	222 856 44	222 857 44	222 858 44	222 859 44
Frame sizes Z80 / 90 A	222 864 44	222 865 44	222 866 44	222 867 44
Frame sizes Z90 B / 100	222 876 44	222 877 44	222 878 44	222 879 44
Frame sizes Z112 A / 132	222 884 44	222 885 44	222 886 44	222 887 44
Frame sizes Z160 / 180 A	222 892 44	222 893 44	222 894 44	222 895 44
Frame sizes Z180 B / 200	222 896 44	222 897 44	222 898 44	222 899 44
Frame size Z225	222 900 44	222 901 44	222 902 44	222 903 44

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0 Foreword

☺ You have purchased a Demag product. This equipment was manufactured in accordance with state-of-the-art engineering principles.

These operating instructions are designed to provide the operator with appropriate instructions for safe and correct operation and to facilitate maintenance.

Every individual given the task of transporting, installing, commissioning, operating, maintaining and repairing our Z motors and their additional equipment must have read and understood

- the operating instructions
- the safety regulations
- the safety instructions in the individual chapters and sections.

The operating instructions must be available to the operating personnel at all times in order to prevent operating errors and to ensure smooth and trouble-free operation of our products.

0.1 Copyright

These operating instructions must be treated confidentially. They should only be used by authorized personnel. They may only be entrusted or made available to third parties with the prior written consent of Demag. All documents are protected within the sense of copyright law.

No part of this documentation may be reproduced, utilized or transmitted without specific prior consent. Infringements are an offence resulting in obligatory compensatory damages. All industrial rights reserved.

0.2 After-sales service

For technical information on our products and their systematic application, please refer to one of our after-sales service stations, the relevant representative or to our main office in Wetter.

0.3 Liability for defects

These operating instructions must be read carefully before installing and putting the product into operation.

We assume no liability for damage and malfunctions resulting from failure to comply with the operating instructions.

Any liability claims for defects must be made by quoting the order number immediately on detecting the defect. Any liability claims for defects are void in the event of:

- inappropriate use,
- faulty devices or equipment connected or attached to the product which are not part of our scope of supplies and services,
- use of non-genuine spare parts and accessories,
- refurbishment or modification of the product unless approved in writing by Demag.

Wearing parts are not subject to liability for defects.

0.4 Limitations of liability

All technical information, data and instructions for operation contained in these operating instructions were up-to-date on going to print and are compiled on the basis of our experience and to the best of our knowledge.

We reserve the right to incorporate technical modifications within the scope of further development of the motors which are the subject of these operating instructions. Therefore, no claims can be derived from the information, illustrations and descriptions contained in these operating instructions.

The descriptions and illustrations contained in this documentation do not necessarily correspond to the scope of delivery or any subsequent spare part delivery, either; the drawings and illustrations are not to scale. Only documentation belonging to the actual order is valid.

We assume no liability for damage and malfunctions caused as a result of operating errors, non-compliance with these operating instructions or inappropriate repairs and maintenance. We expressly point out that only genuine Demag spare parts and accessories approved by us may be used.

Accordingly, this also applies to other manufacturers' parts supplied by us. For safety reasons, the fitting and use of spare parts or accessories which have not been approved and unauthorized modification and conversion of the product are not permitted and exempt Demag Cranes & Components from any liability for damages resulting therefrom.

With the exclusion of any further claims, our liability for defects and liability obligations for any defects pertaining to the products supplied or faults in the documentation delivered or any negligence on our part are exclusively based on the stipulations of the original contract. Any further claims, in particular any and all claims for damages, are excluded with the exception of legal claims in accordance with product liability legislation.

0.5 Definitions

Owner

Owners (employer, company) are defined as persons who own the product and who use it appropriately or allow it to be operated by suitable persons.

Operating personnel

Operating personnel are defined as persons assigned by the owner of the product to operate the product.

Specialist personnel

Specialist personnel are defined as persons assigned by the owner to carry out specific tasks, such as installation, setting-up, maintenance and fault elimination.

• Qualified personnel

Qualified personnel are defined as persons, who, owing to their technical training, knowledge and experience as well as knowledge of the relevant standards, are able to assess the tasks given to them and identify and prevent potential hazards.

• Trained person

Trained persons are defined as persons who have been instructed and trained for the tasks assigned to them and on the possible hazards resulting from incorrect handling and who have been informed about the required protective devices, protective measures, relevant regulations, codes of practice, accident prevention regulations and operating conditions and who have proven their qualifications.

• Experienced technician

Experienced technicians are defined as persons, who, owing to their technical training and experience, have sufficient knowledge of the product and are familiar with the relevant national industrial safety regulations, codes of practice, accident prevention regulations, directives and generally accepted engineering standards (e.g. EC Directives, German VDE and BGV regulations) enabling them to judge the safe operating condition of Z.. motors.

1 Safety

1.1 Symbols

These symbols are used to warn against potential safety hazards or causes of damage or provide useful information.



Hazard warning

This symbol appears in the operating instructions next to all instructions relating to safety at work wherever a potential hazard to life and limb exists if the instructions are not complied with.

Follow these instructions at all times and be particularly vigilant and cautious.

Pass on safety instructions to all persons entrusted with working on the motor including the power supply.

In addition to the safety instructions, observe all general safety regulations at all times.



Warning against dangerous electrical voltage

Contact with live parts can result in immediate death. Protective covers (e.g. covers and enclosures) marked with this sign may only be opened by qualified electricians. Before opening, all relevant operating, control, feed or other voltages must be disconnected.



Operating hazard for the installation

This symbol in the operating instructions indicates all warnings which, if not complied with, may result in damage to the motor.

1.2 Intended use

These motors are intended for all travel, lifting and turning motions in industrial applications. Compliance with the permitted operating conditions must be ensured for operation of these drives (e.g. enclosure type, ambient temperature, installation height).

1.3 Prohibited practises, improper use

Under certain conditions, operation of motors in the standard design is prohibited as this could result in malfunctions, equipment failure or hazard to life and limb, e.g. in the case of:

- Acidic, corrosive air as coolant
- Operation outside the permissible temperature range
- Operation outside the normal air pressure range Otherwise, power adjustments are necessary
- Operation under conditions of high humidity or splashwater
- Manipulation of electrical modules.

Safety devices must not be rendered inoperable or modified or used in any way other than that for which they have been designed.

1.4 Safety instructions



The relevant national accident prevention regulations and the general safety conditions must always be observed when our products are operated in order to avoid accidents and damage to machinery. If the safety instructions given in these operating instructions are not observed in any way, personal injury or even death can result.



Warning against dangerous electrical voltage

Motors are connected to a mains power supply. Any contact with live parts can lead to very serious injury or even death.

Putting motors into operation

Do this only

- if you have read the operating instructions and the owner has instructed you in all details
- if the operating instructions are available for reference at the place of operation,
- if you are qualified personnel,
- if you are not under the influence of drugs, alcohol or medication that can adversely affect your ability to react,
- if the general accident prevention, operating and installation regulations (e.g. DIN-VDE 0100/0113) have been observed.

Additional safety instructions

Only carry out maintenance and installation work



- if you are qualified specialist personnel,
- if the motors are at zero voltage,
- if no hazard exists (e.g. crushing hazard, slipping hazard, etc.),
- if the motors are secured against restoration of the power supply,
- if all cables and motor terminals are at zero potential (establish with a voltmeter),
- with insulated tools,
- using genuine spare parts.

2 General

2.1 Models and terminal box position

The available foot and flange-mounted motors correspond to the overview of models. Demag motors are supplied with only one shaft end. The connection dimensions largely correspond to IEC Publication 72-1. The foot motor largely corresponds to DIN 42673, the flange motor corresponds to DIN 42677.

2.2 Motor enclosures

ZN and ZB motors are supplied with IP 54 as standard. For brake sizes B004 - B680, IP 54 dust protection applies for non-magnetic and non-magnetisable particles in this case. All motors are available with IP 55 and IP 65 enclosure, on request, which then also provides protection against magnetic or magnetisable particles.

Brief explanation of enclosures:

IP 54	Protection against harmful dust accumulation, protection against splashwater from all directions.
IP 55	Protection against harmful dust accumulation, protection against hose-water from all directions. Detailed descriptions of these enclosures and test methods can be found in EN 60034 part 5 (DIN VDE 0530, part 5).
IP 65	Complete protection against dust accumulation, protection against hose-water from all directions. Detailed descriptions of these enclosures and test methods can be found in EN 60529.

Outdoor operation

If a motor is operated under arduous conditions outdoors, e.g. unprotected installation in rain and wind or installation at great height, the standard IP 54 enclosure may not be sufficient.

In these cases the motor must be provided with IP 55 enclosure or protected by suitable measures, e.g. wind and rain deflector. For vertically mounted motors with the shaft facing downwards, a canopy is available at an extra price.

2.3 Storage

Motors must be stored as follows:

- in dry places with only minor temperature fluctuations
- in their service position
- protected against dust and moisture
- on a timber support
- free from vibration (no impacts).

Motors must not be stacked on top of each other.

Unless agreed otherwise, liability for defects is granted for the standard preservation in accordance with our terms and conditions of delivery. The period begins on the day the unit is delivered.

Contact Demag in Wetter, Germany, if the motors are to be stored for more than 6 months before they are put into operation.



Important: Motors may otherwise be damaged.

3 Product description

3.1 Motor

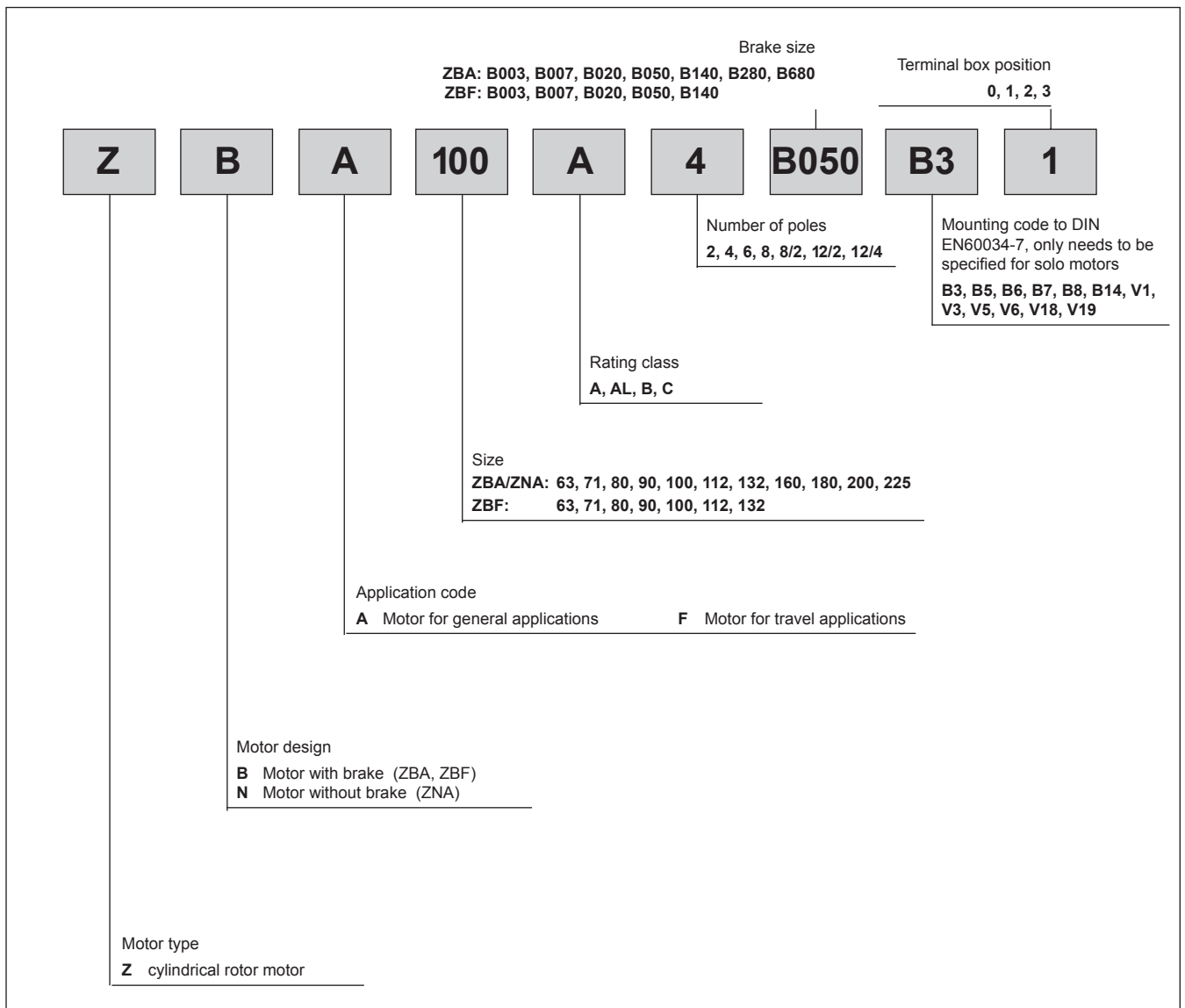
Demag type Z.. cylindrical rotor motors can be supplied with or without brake (ZB. and ZN. motors). The ZBA and ZBN motor range includes sizes Z..63 to Z..225. The output ratings of these 2, 4, 6 and 8-pole motors are graded according to the IEC classification. The motor range includes pole-changing designs and ZBF 63 ... 132 motors with integrated fly wheels for particularly smooth load movement.

The housings of motor frame sizes Z..63 to Z..132 are of a high quality aluminium alloy with an integrated terminal box base. The terminal box cover and fan cover are made of plastic.

Motor frame sizes Z..160 to Z..225 have a grey cast iron housing with a fitted terminal box.

All motors can also be supplied in flange and foot design with IEC shaft dimensions and also fitted to Demag gearboxes.

3.1.1 Motor type designation



3.1.2 Rating plates

Rating plate for Z.. 63 A to Z.. 71 B motors with/without brake

The rating plate is arranged to the left or right of the terminal box on the motor end cap, e.g.

①	Demag Cranes & Components GmbH						Made in Germany	
②	Typ: ZBA 71 B 4 B007	3 ~	IP: 54	Iso: F	EN 60034-1			
③	Mot.Nr.: 71740301		100	%ED	IM B5-1	0,37	kW	
④	10,0 kg	Fl: ---	50 Hz	cosφ	0,60			
⑤	1380	1/min			c/h	---	°C	
⑥	Δ 230	V	2,50		A			
⑦	Y 400	V	1,40		A			
⑧	Bremse: 5,1 Nm	AC 400 V	DC 180 V		V	0,14	A	
	ANR: 85674100		ASN: 00201			EFF.		

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Rating plate for Z.. 80 A to Z.. 132 C motors with/without brake

The rating plate is arranged to the left or right of the terminal box base, e.g.

①	Demag		Made in Germany	
	Cranes & Components GmbH		EN 60034-1	
⑩	Typ: ZBA 80 A 8 B007	3 ~	IP: 54	
⑪	Mot.Nr.: 71739107	Iso.: F	100	%ED
⑫	0,18 kW	cosφ : 0,57	50 Hz	
⑤	670	1/min	----	c/h
⑥	Δ 230	V	1,70	°C
⑦	Y 400	V	0,95	A
⑧	Bremse: 5,1 Nm	AC 400 V	DC 180 V	0,14 A
⑨	IM B5 - 1	16,0 kg	Fl: ---	
⑧	ANR: 85674300	ASN: 00401	EFF.	

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Rating plate for Z.. 160 A to Z.. 225 B motors with/without brake

The rating plate is arranged to the left or right next to the terminal box on the stator, e.g.

①	Demag Cranes & Components GmbH						EN 60034-1	
②	Type: ZBA 160 B4 B280	3 ~	IP 54	Iso.: F	IM B3-1			
③	Mot.Nr: 12345678		100	%ED	15,0	kW		
④	183 kg	Fl: 50 Hz	cosφ: 0,84					
⑤	1440	1/min		c/h	40	°C		
⑥	Δ 230	V	51,00		A			
⑦	Y 400	V	29,0		A			
⑧	Bremse: 185 Nm	AC 400 V	DC 180 V		V	0,45	A	
	ANR: 59021500	ASN: 19301	EFF.					

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- ① — Manufacturer, country of origin, regulation
- ② — Type designation, number of phases, enclosure, temperature class, model
- ③ — Motor number, duty factor, power factor
- ④ — Motor weight, inertia factor, frequency, power factor
- ⑤ — Speed, switching frequency, ambient temperature > 40 °C
- ⑥ — Connection, voltage, current
- ⑦ — Brake: brake torque, supply voltage, coil voltage, coil current
- ⑧ — Order number, entry number
- ⑨ — Model, motor weight, inertia factor
- ⑩ — Type designation, number of phases, enclosure
- ⑪ — Motor number, temperature class, duty factor
- ⑫ — Rating, power factor, frequency

3.2 ZB. motor brake

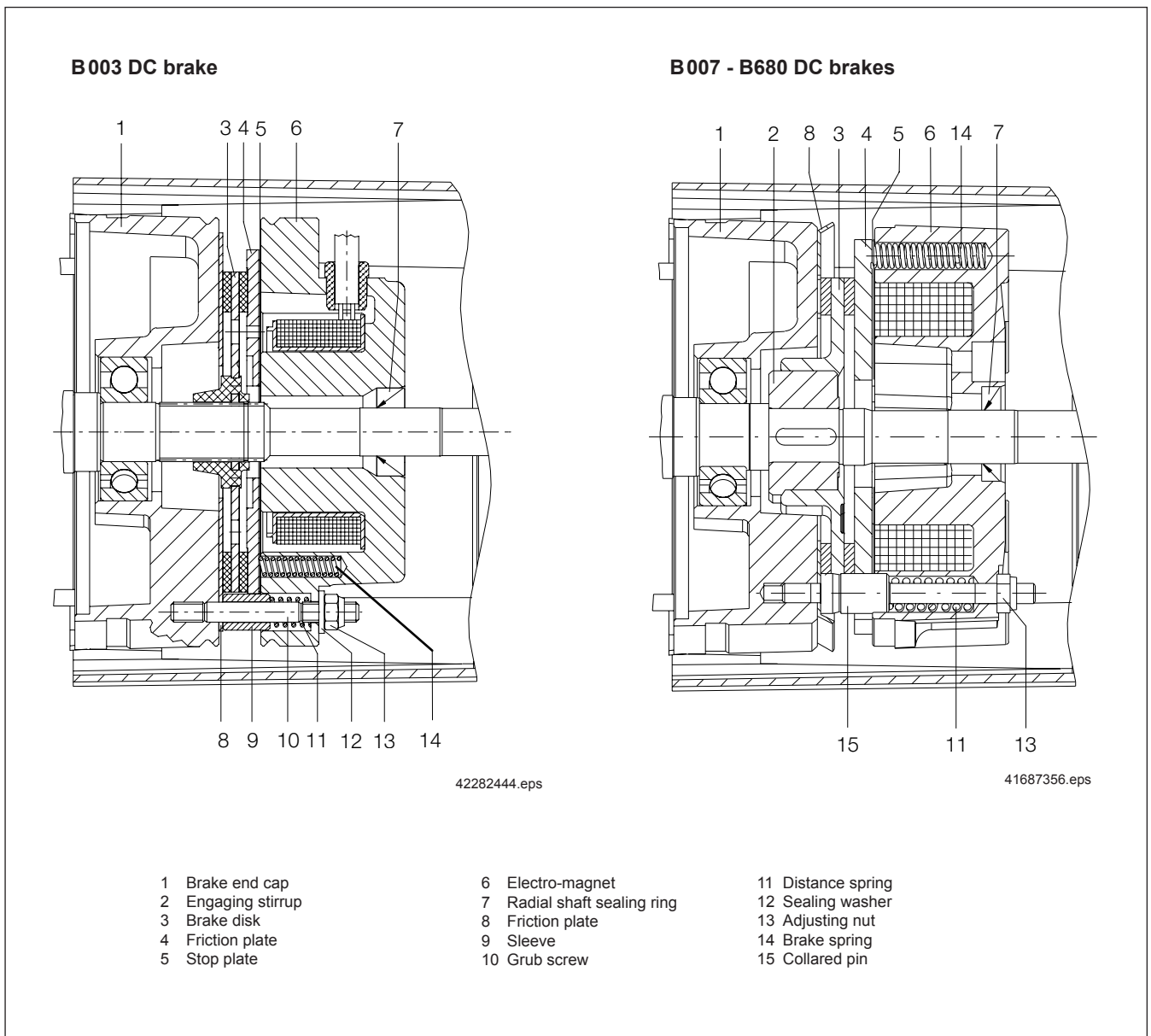
Demag B003 to B680 disk brakes are spring-actuated brakes featuring electromagnetic brake release. The brake fitted under the fan cover can be controlled independently of the motor and causes no axial movement of the rotor shaft or forces on the bearings.

The diagrams show the function elements of the disk brakes, which are spring-actuated with electromagnetic release.

When the voltage supply to the brake coil is interrupted, the brake is applied. This operating principle is also known as a fail-safe brake.

Brakes B003 to B680 can be released by a rectifier integrated in the terminal box of the motor. For brake sizes B003 to B050 also by applying DC voltage direct to the brake coil.

Two brake sizes are available for each motor frame size to cover a large brake torque range for various applications.



4 Installation

4.1 Checking the condition of the motor



Before installing the motor, check whether it has suffered any damage during transportation or while in storage, such as corrosion, leaks, deformation or breakage.

Do not clean motors with compressed air.

4.2 Check the installation location

The standard motor is suitable for operation in normal industrial conditions. If the ambient temperature, atmosphere or humidity are other than indicated on the rating plate, the motor must only be operated with special equipment or features (see rating plate).

Coolant temperature: from -20°C to $+40^{\circ}\text{C}$

Installation height: up to 1,000m above sea level

The site at which the motor is installed must be designed in such a way that

- air may circulate to allow heat to be exchanged and the warm air is not immediately inducted again,
- no residue from operating processes can accumulate on the motor, fall between the drive elements or damage the sealing ring,
- the rating plate is accessible.

4.3 Installing the motor

Before installing the motor, check that it will be operated in the mounting position specified on the rating plate.

4.4 Special instructions for installing the motor



If the motor is operated outdoors in vertical mounting position IM V1 or in an inclined mounting position with the shaft facing downwards, it should be protected by a canopy.

For motors with condensation water openings which can be closed with a threaded plug, the drain holes must be arranged at the lowest point of the motor as otherwise water may enter. If the mounting position of the motor is changed and the drain holes are no longer required, the openings must be permanently sealed.

4.5 Instructions for connecting the motor

- You must be a trained electrician and familiar with the relevant accident prevention regulations and codes of practice.
- The motor and the supply line are disconnected from the supply.
- The frequency and voltage specified on the rating plate must correspond to the line frequency and voltage.

The motor must be connected as described in section 7 “**Motor/brake connection diagrams**”. The connection diagram is glued inside the terminal box lid.

Connecting pin threads in the terminal box	
Motor frame size	Pins
63, 71, 80, 90 A	M4
90 B, 100	M5
112, 132, 160, 180 A	M6
180 B, 200, 225	M8

When the three L1, L2 and L3 phases are connected in sequence to the motor terminals U1, V1, W1, the motor will run in the clockwise direction when viewed from the motor output shaft side corresponding to DIN EN 60034-8.

The same procedure is used for motors with several speeds. To change the direction of rotation of the motor, two of the three phase conductors must be interchanged.



The instructions contained in section 5 “Commissioning” must be followed.

5 Putting into operation

5.1 Requirements

Before the motor is put into service:

- the terminal box must be closed,
- the fan cover must be fitted (as delivered),
- the line voltage and frequency specified on the rating plate must match the given power supply,
- the motor must be checked for correct connection (check direction of rotation),
- heat must be able to dissipate (e.g. air vent slits must be free),
- the drive unit does not constitute a hazard (e.g. no hazards caused by rotating or live parts).
- there are no other hazard sources.

5.2 Check when commissioning

Check that:

- the motor runs correctly (e.g. no speed fluctuations or excessive noise development),
- there is no extreme vibration.

5.3 Geared motors



For geared motors, also refer to the gearbox operating instructions.

6 Maintenance and repair

6.1 Inspection before starting work and during operation

If defects or damage are detected, the motor must not be put into operation or it must be taken out of service. It may only be put back into service when the defect has been eliminated.

Check the motor for:

Check

- External damage
- Unusual running noises
- Dirt accumulation

Action

- Inform person responsible
- Inform person responsible
- Remove dirt accumulation

6.2 Maintenance schedule

Maintenance schedule			
Interval	Component	Maintenance	See section
In accordance with the operating conditions, at least every 3000 hours of operation.	Brake	Check brake of motors fitted with brake.	6.3.1 and 6.3.2
Every 10 000 hours of operation.	Motor	Inspect the motor and clean the cooling air channels.	

6.3 B003 - B680 brakes



The following work may only be carried out by qualified personnel. Observe relevant safety regulations and codes of practise and the instructions contained in section 1.4 “**Safety instructions**”.

- Options:**
- Sealing (covering tape), for brake sizes B003 - B680
 - Reduced noise level (standard for B050 – B680 brakes)
 - Manual brake release unit
 - Micro-switches for brake monitoring
 - Emergency-stop brake lining

See 6.4 “**Options**”.

Notes for B003 brakes:

- Manual brake release unit only available for B007 - B680 brakes.
- Micro-switches are not provided.

Note for B007 - B680 brakes:

The brake spring values refer to the motor design **WITHOUT** a manual brake release unit.

Apart from wear, the brake is virtually maintenance-free.

The organic/mineral brake lining is designed in such a way that worn surface particles are only given off as minimal abrasion. This built-in regeneration of the brake lining surface ensures constant braking characteristics. It is advisable to check air gap s_1 at certain intervals. To ensure the brake releases reliably, air gap s_1 must be adjusted, as required.

Brake size	B003	B007	B020	B050	B140	B280	B680
Motor	ZBA						
Brake air gap s_1 min.	0,3	0,3	0,3	0,3	0,35	0,4	0,4
Brake air gap s_1 max.	1,0	0,65	0,65	0,65	1,3	1,3	1,3
Motor	ZBF						
Brake air gap s_1 min.	0,3	0,3	0,3	0,3	0,35	–	–
Brake air gap s_1 max.	1,2	1,2	1,2	1,2	1,2	–	–

When the brake is released (power applied to brake coil), the brake disk can be freely turned.

It is only possible to give guide values for brake operation until adjustment as they depend on the given operating conditions.

Brake size	B003	B007	B020	B050	B140	B280	B680
Motor	Brake work W_N until readjustment in Ws						
ZBA	$160 \cdot 10^6$	$100 \cdot 10^6$	$120 \cdot 10^6$	$200 \cdot 10^6$	$1000 \cdot 10^6$	$1500 \cdot 10^6$	$2500 \cdot 10^6$
ZBF	$200 \cdot 10^6$	$200 \cdot 10^6$	$300 \cdot 10^6$	$500 \cdot 10^6$	$900 \cdot 10^6$	–	–

When the brake has been adjusted several times, the remaining thickness b_{min} of the brake disk must be checked.

B003 brake

The brake can be adjusted twice. After the second adjustment, check remaining thickness b_{min} of the brake disk at regular intervals. This brake can only be checked visually.

B003-B680 brakes

The brake must be replaced when the remaining thickness is too small or wear differs considerably between the two linings. A wear part set is available for replacement. In addition to the brake disk and the required small parts, the set also includes the assembly instructions.

B007-B680 brakes

The collared pins feature an easily visible marking which clearly indicates the minimum dimension (see section 6.3.1).

Overhaul sets and wearing part sets are available for general overhauls.

ZBA motors

Brake size	Overhaul set							Wearing part set
	ZBA 63 ZBA 71	ZBA 80 ZBA 90 A	ZBA 90 B ZBA 100	ZBA 112 A ZBA 132	ZBA 160 ZBA 180 A	ZBA 180 B ZBA 200	ZBA 225	
B003	260 960 33	–	–	–	–	–	–	260 962 33
B007	260 966 33	260 967 33	–	–	–	–	–	260 970 33
B020	–	260 971 33	260 972 33	–	–	–	–	260 975 33
B050	–	–	260 976 33	260 977 33	–	–	–	260 980 33
B140	–	–	–	260 981 33	260 982 33	–	–	260 984 33
B280	–	–	–	–	260 985 33	260 986 33	–	260 987 33
B680	–	–	–	–	–	260 988 33	260 989 33	260 990 33

ZBF motors

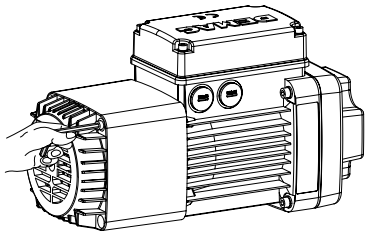
Brake size	Overhaul set						Wearing part set
	ZBF 63/71	ZBF 80	ZBF 90 B	ZBF 100	ZBF 112 A	ZBF 132	
B003	260 960 33	–	–	–	–	–	260 962 33
B007 ¹⁾	260 964 33	–	–	–	–	–	260 965 33
B020	–	260 973 33	260 974 33	–	–	–	260 975 33
B050	–	–	260 978 33	260 978 33	260 979 33	–	260 980 33
B140	–	–	–	–	260 983 33	260 983 33	260 984 33

¹⁾ B007 as an option for ZBF if manual brake release and/or brake monitoring is required.

6.3.1 Removing and fitting the fan cover and fan

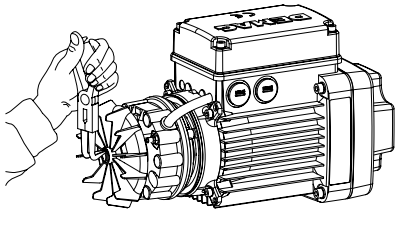
The fan cover and motor fan must be removed in order to check and adjust the brake air gap as well as to replace the brake disk.

Removing the fan cover and fan



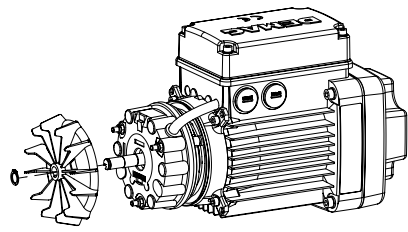
Undo the four retaining screws and remove the fan cover.

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Remove the retaining ring, if required.

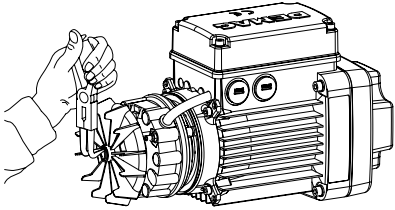
41432144.eps



Remove the fan.

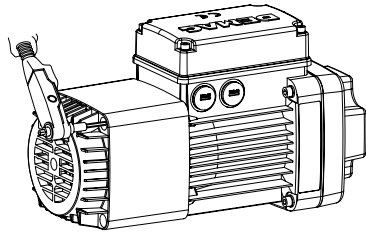
41432244.eps

Fitting the fan cover and fan



Fit the fan and secure it with the retaining ring, if required.

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Fit the fan cover.


Tightening torque

- ZB. 63 - 100 motors = 4 Nm
- ZB. 112-132 motors = 6 Nm
- ZB. 160-225 motors = 10,5 Nm

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After assembly is complete, ensure the retaining ring clicks correctly into the slot in the shaft.





6.3.2 Checking and adjusting the brake air gap s_1

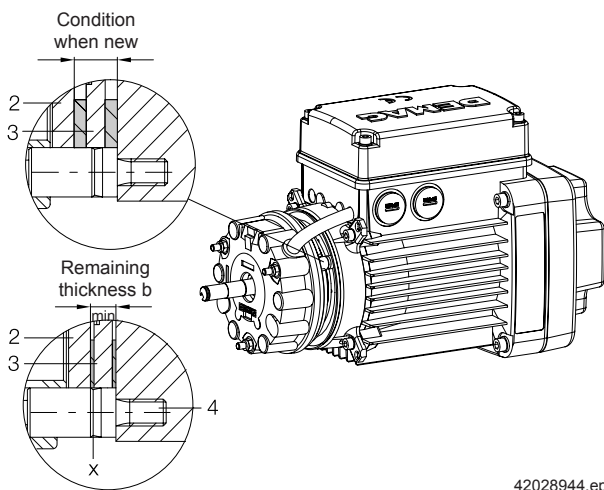


The air gap must be adjusted when the max. permissible value s_1 has been reached, (however, immediately if the brake no longer releases).

If the brake is not adjusted, it will no longer release after further wear. If the motor then operates against the applied brake, the brake and motor may be damaged.

Checking the remaining thickness of the brake disk B003-B680 brakes

Brake size	B003	B007	B020	B050	B140	B280	B680
Remaining thickness b min.	3,5	5	6	7	8,5	10	11

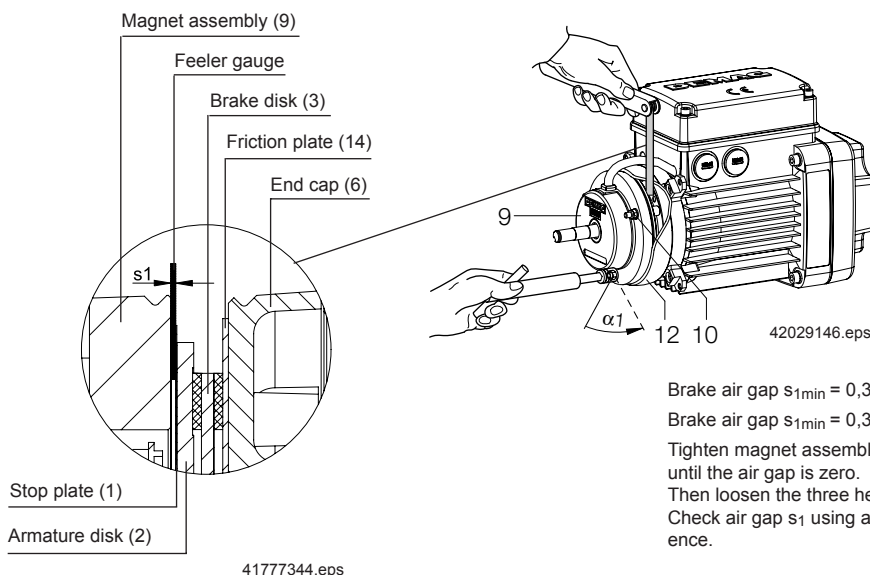


B 007 - B 680

- 1) If armature disk edge (2) has reached the mark (x) on collared pin (4), brake disk (3) must be replaced.
B 003: A check can only be carried out by measuring the remaining thickness.
See section 6.3.2 for replacing the brake disk.
- 2) If the remaining thickness of the brake disk is within the specified tolerances, check brake air gap s_1 (see Checking and adjusting the brake air gap).

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Checking and adjusting the brake air gap B003 brakes



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42029146.eps

Brake air gap $s_{1min} = 0,30 \text{ mm} - s_{1max} = 1,0 \text{ mm}$ (ZBA)

Brake air gap $s_{1min} = 0,30 \text{ mm} - s_{1max} = 1,2 \text{ mm}$ (ZBF)

Tighten magnet assembly (9) with the three hexagon nuts (10) uniformly until the air gap is zero.

Then loosen the three hexagon nuts (10) by angle $\alpha_1 = 120^\circ$.

Check air gap s_1 using a feeler gauge at three points around the circumference.

If the measured result is within the specified range, the motor can be re-assembled. If this is not the case, adjust again as required.

Checking and adjusting the brake air gap

B007-B680 brakes

Brake size	B007	B020	B050	B140	B280	B680
Motor	ZBA					
Brake air gap s_1 min.	0,3	0,3	0,3	0,35	0,4	0,4
Brake air gap s_1 max.	0,65	0,65	0,65	1,3	1,3	1,3
Motor	ZBF					
Brake air gap s_1 min.	0,3	0,3	0,3	0,35	-	-
Brake air gap s_1 max.	1,2	1,2	1,2	1,2	-	-

Tighten magnet assembly (9) with the three hexagon nuts (10) uniformly until the air gap is zero.
Loosen the three hexagon nuts (10) by angle α_1 .

Brake size	B007	B020	B050	B140	B280	B680
Motor	ZBA					
Adjusting angle α_1	120°	120°	90°	80°	70°	60°
Motor	ZBF					
Adjusting angle α_1	120°	120°	90°	80°	-	-

Check air gap s_1 using a feeler gauge at three points around the circumference.
If the measured result is within the specified range, the motor can be re-assembled.

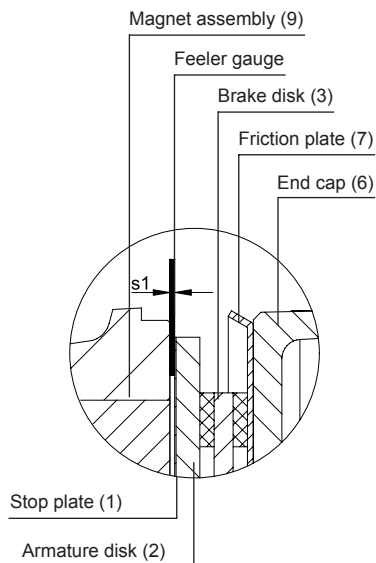


Ensure that the stop plate is not damaged.

If this is not the case, adjust again as required.

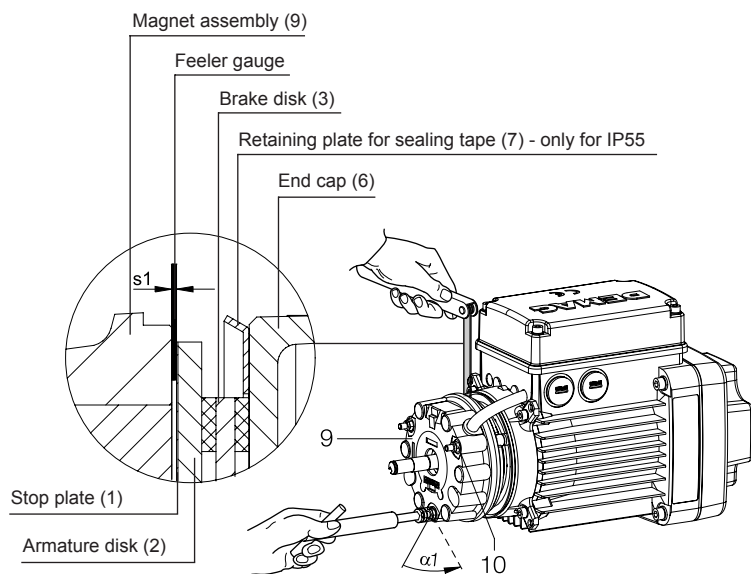
ZBA motor B007-B050 brakes

ZBF 63/71 motor B007 brakes



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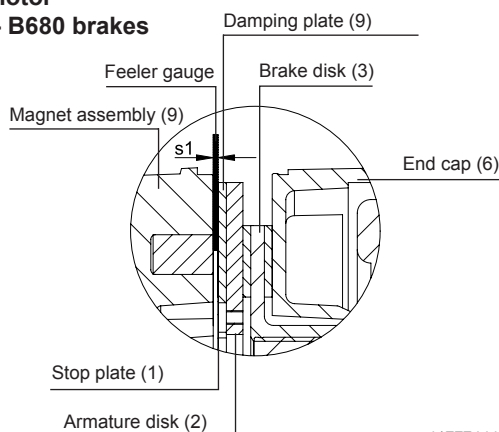
ZBF motor B020-B050 brakes



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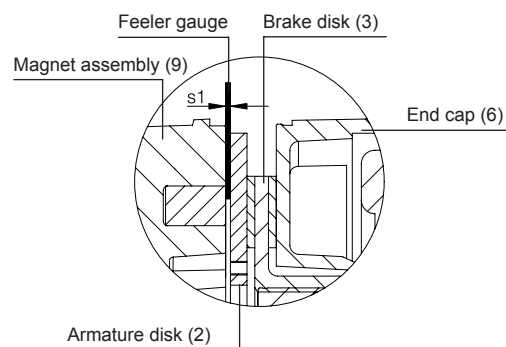
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ZBA motor B140 - B680 brakes



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ZBF motor B140 brakes



41777445.eps

6.3.3 Replacing the brake disk



This work may only be carried out by specialist personnel. Observe relevant safety regulations and codes of practise and the instructions contained in section Safety instructions.

Damaged brakes may only be repaired by a Demag authorised workshop.

Please also refer to the information in section 6.4.

B003 brakes: Disassembly, assembly

Remove terminal box cover (11).
Undo hexagon nut (10) and remove washers (15), magnet assembly (9) and covering tape (12).

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Remove stop plate (1), armature disk (2), distance springs (5) and brake disk (3).

Check grub screws (4), sleeve (13) and braking surfaces for wear

Replace worn or damaged parts.
“Damaged” should be understood to mean any deformation of stop plate (1), however small it may be.

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Mark “I” on friction plate (14)
Mark on end cap (6)

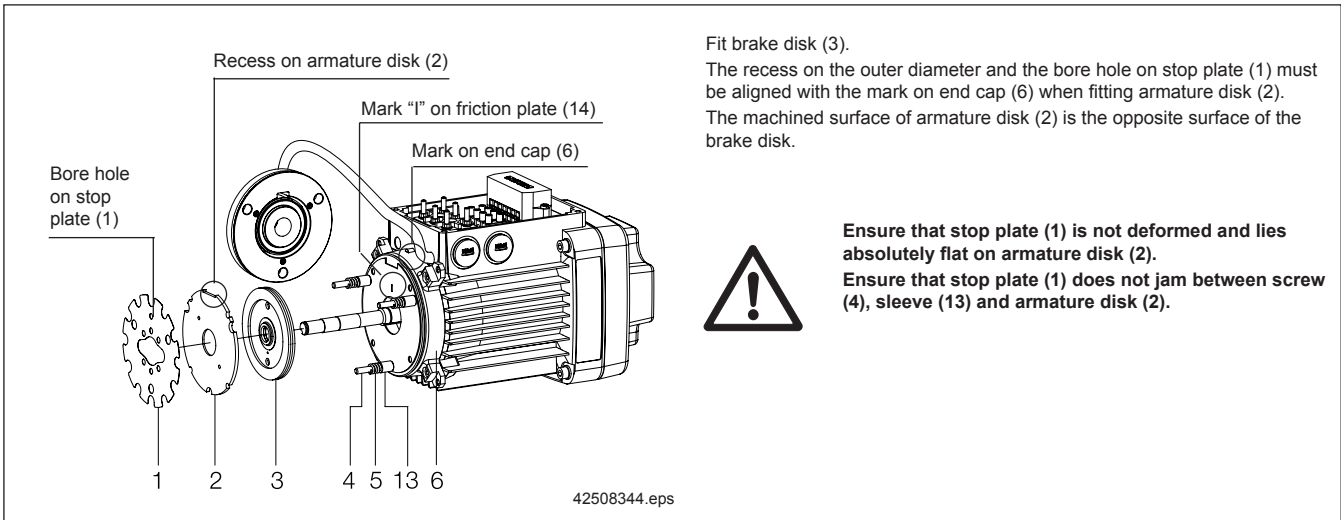
Disassembly, assembly
Grub screws/end cap (6) – if required

Remove end cap (6).
Remove sleeve (13) and friction plate (14).

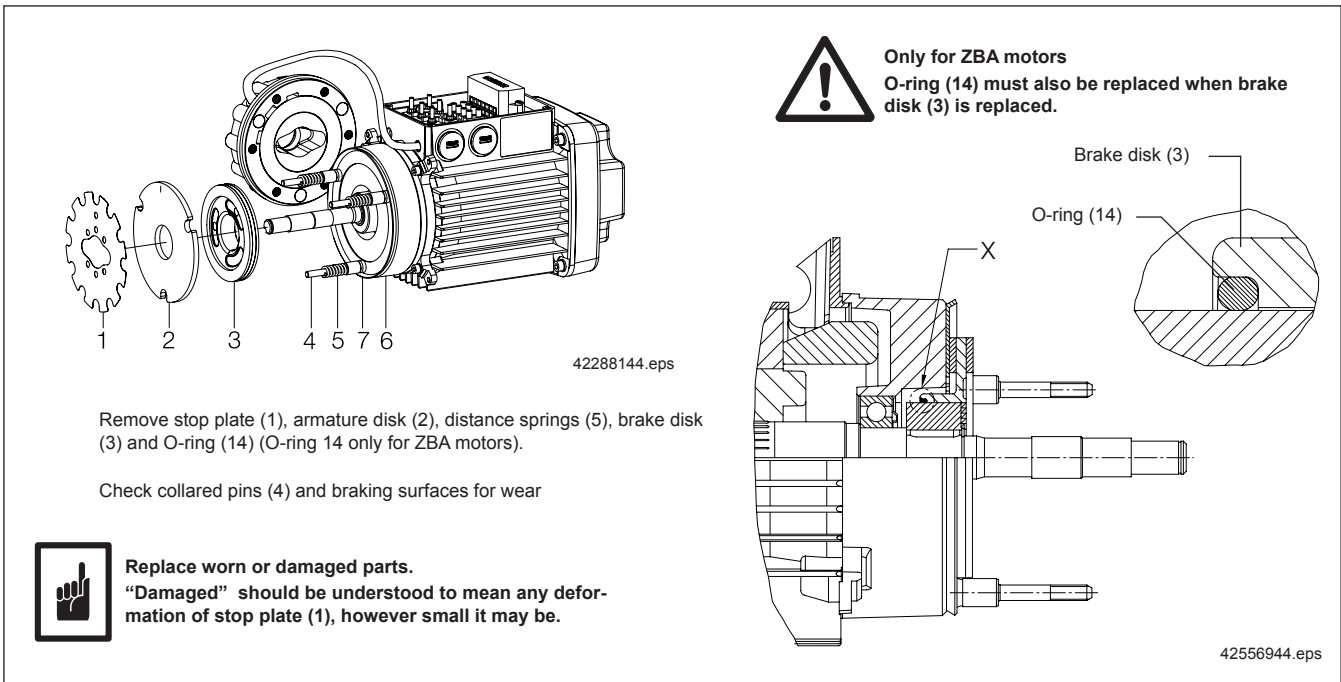
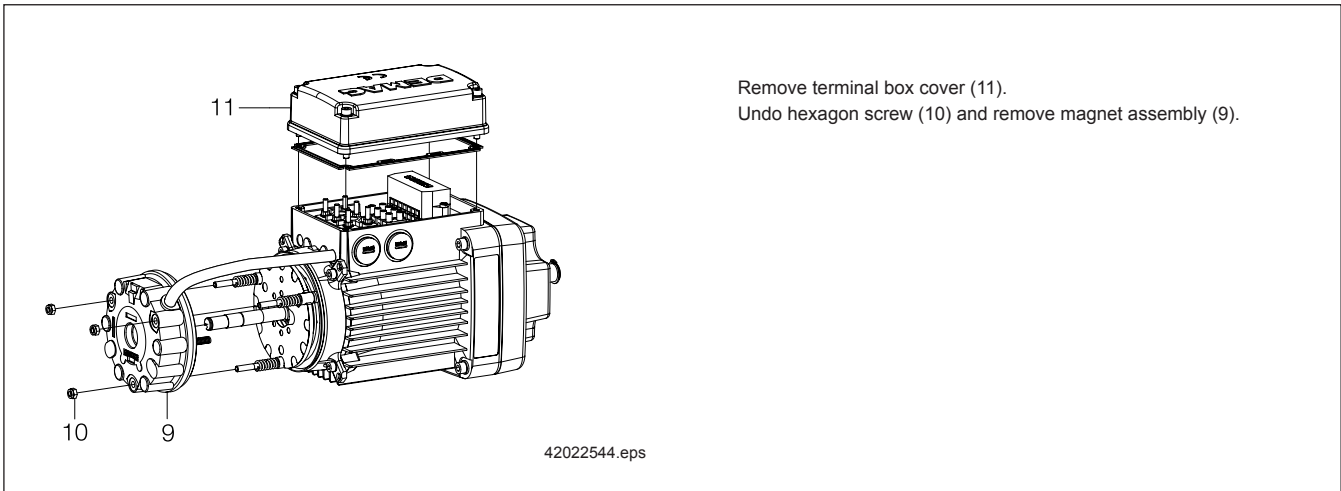
Unscrew the three defective grub screws (4). Fit new grub screws (4).
Friction plate (14) is provided with mark “I”.
End cap (6) is also provided with a mark.
When fitting friction plate (14), ensure that the mark on friction plate (14) is aligned with the mark on end cap (6).
Slide sleeve (13) onto grub screws (4).
Fit new end cap (6).

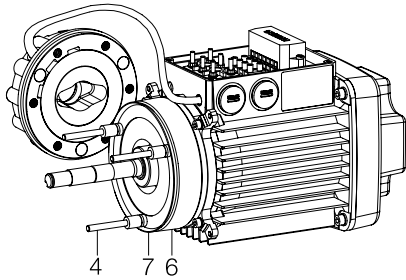
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Tightening torque of the grub screws: 3Nm



B007-B680 brakes Disassembly, assembly





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Disassembly/assembly Collared pins/end cap (6) – if required

Remove end cap (6).
Unscrew the three defective collared pins (4).
Fit new collared pins (4).
Fit new end cap (6).

B007-B050 brakes for ZBF motors



Retaining plate (7) is only fitted on units with IP55 enclosure.
Fit retaining plate (7) with collared pins (4).



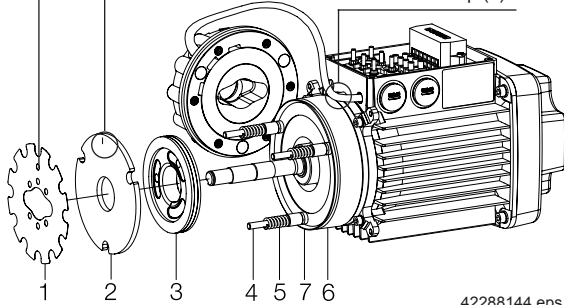
Collared pin tightening torques

Brake size		B007	B020	B050	B140	B280	B680
Tightening torque	Cast-iron end cap	2,3 Nm	4 Nm	9 Nm	30 Nm	70 Nm	140 Nm
	Aluminium end cap	3,8 Nm	-	-	-	-	-

Bore hole on stop plate (1)

Mark "1" on armature disk (2)

Mark on end cap (6)



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Fit brake disk (3).

Mark "1" and the bore hole on stop plate (1) must be aligned with the mark on end cap (6) when fitting armature disk (2).

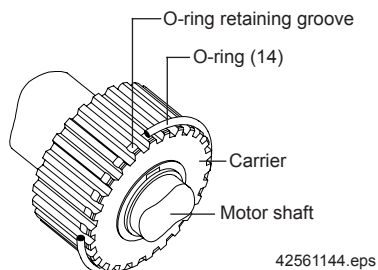
Ensure that stop plate (1) is not deformed and lies absolutely flat on armature disk (2).

Ensure that stop plate (1) does not jam between collared pin (4) and armature disk (2).



Also to be considered when fitting B007 - B680 brakes on ZBA motors:

1) Fit O-ring (14)



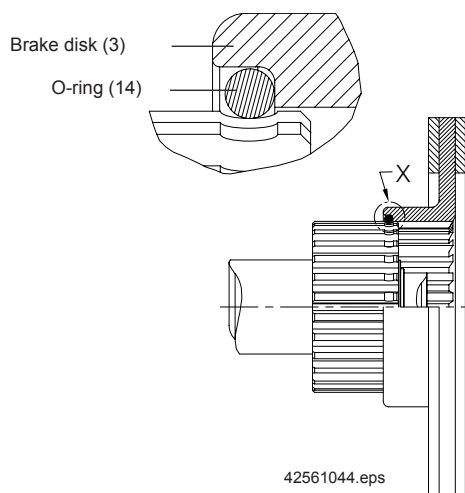
- 1) Fit O-ring (14) onto the carrier.
- 2) Fit brake disk (3).
- 3) Push brake disk (3) into position.

Noticeable resistance has to be overcome to push O-ring (14) out of the retaining groove. This point of resistance clearly indicates that O-ring (14) is correctly fitted in the recess of brake disk (3).

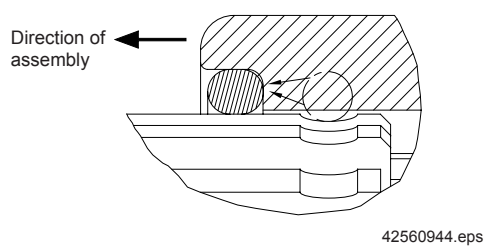
Brake disk (3) may only be moved in the direction of the brake-side end cap (see "Direction of assembly"). If brake disk (3) is pulled back by more than 1,4 mm, O-ring (14) will roll out of the recess in brake disk (3) (repeat the process if the disk is pulled back by more than 1,4 mm).

In this case, the damping effect will then no longer be ensured.

2) Fit brake disk (3)



3) Push brake disk (3) into position



6.3.4 Brake spring arrangement and associated brake torques

B003 brakes on ZBA/ZBF motors

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Push distance spring (5) onto grub screws (4).
Place brake springs (8) into magnet assembly (9).
Insert covering tape (12) into the groove of end cap (6).
Push magnet assembly (9) and disks (15) over grub screws (4) and secure with hexagon nut (10).
When fitting magnet assembly (9) ensure that covering tape (12) engages the groove of magnet assembly (9).
Then tighten magnet assembly (9) with the three hexagon nuts (10) uniformly until the air gap is zero. Then loosen the three hexagon nuts (10) by angle $\alpha_1 = 120^\circ$.
Check air gap s_1 using a feeler gauge at three points around the circumference. If the measured result is within the specified range, the motor can be re-assembled.
See section 6.3.1 for checking/adjusting the brake air gap.
Pull the connecting cable of magnet assembly (9) back into the terminal box. Fit terminal box cover (11).

Arrangement of brake springs (8)

Brake torque Nm	Number of brake springs				Ident. no.
	White	Red	Blue	Yellow	
2,5	3	-	-	-	260 010 84
1,9	-	3	-	-	260 011 84
1,4	-	-	3	-	260 027 84
0,9	-	-	-	3	260 013 84

B007-B680 brakes on ZBA motors

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- Push distance spring (5) onto collared pins (4).
- Place brake springs (8) into magnet assembly (9).

See table below for arrangement of brake springs (8).

- Push magnet assembly (9) over collared pins (4) and secure with hexagon nut (10).
- Tighten magnet assembly (9) with the three hexagon nuts (10) uniformly until the air gap is zero.
- Loosen the three hexagon nuts (10) by angle α_1 .
- Check air gap s_1 using a feeler gauge at three points around the circumference. If the measured result is within the specified range, the motor can be re-assembled.

See section 6.3.1 for checking/adjusting the brake air gap.

- Pull the connecting cable of magnet assembly (9) back into the terminal box.
- Fit terminal box cover (11).

Brake size	B007	B020	B050	B140	B280	B680
Adjusting angle α_1	120°	120°	90°	80°	70°	60°
Brake spring	Ident. no.					
White spring	260 110 84	260 210 84	260 310 84	260 410 84	260 510 84	260 610 84
Red spring	260 111 84	260 211 84	260 311 84	260 411 84	260 511 84	260 611 84
Blue spring	260 127 84	260 227 84	260 327 84	260 427 84	-	-

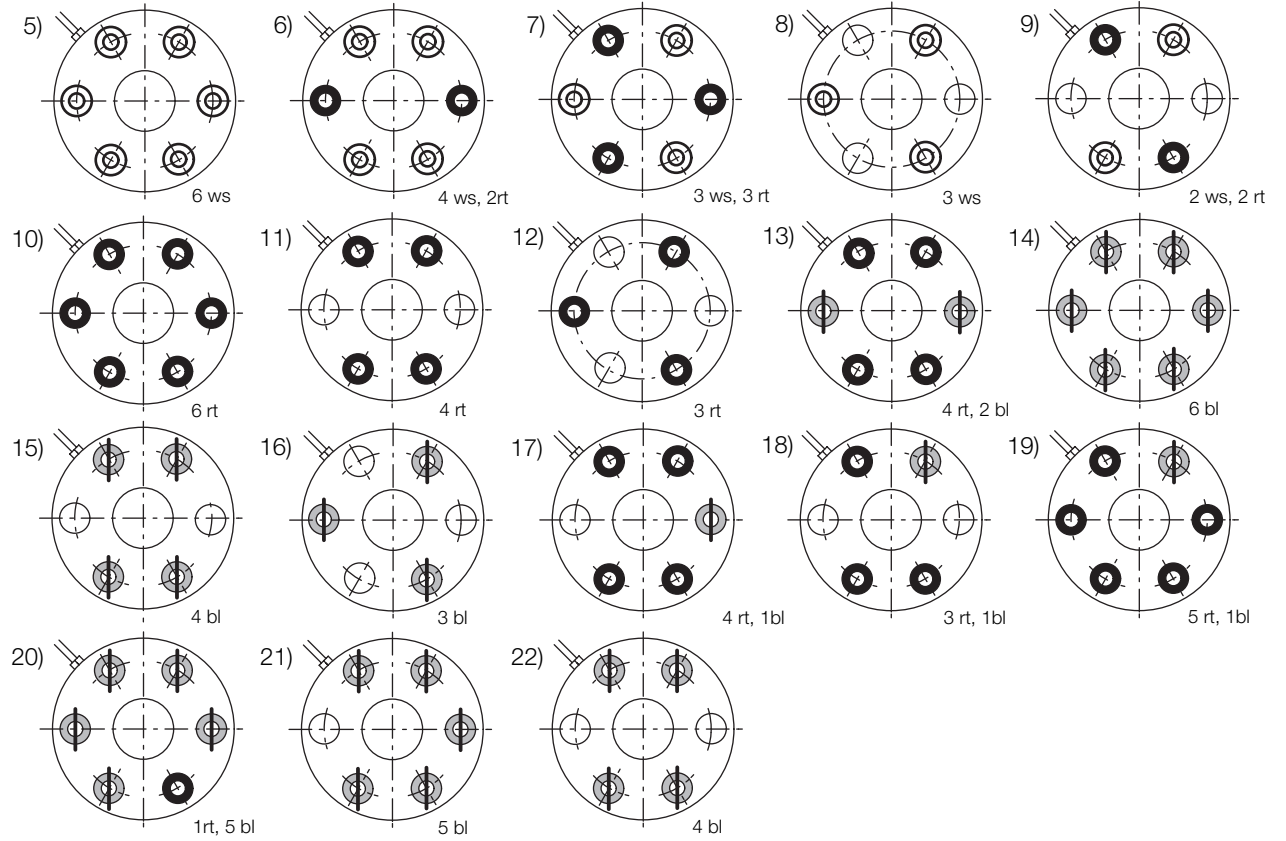
Arrangement of brake springs for ZBA motors not fitted with a manual brake release unit

Brake size			B007	B020	B050	B140	B280	B680	
Quantity of springs			For spring arrangement see item	Brake torque MB in Nm					
White	Red	Blue							
6	0	0	5	7,6	20	50	140	280	680
4	2	0	6	5,9	16	39	105	220	530
3	3	0	7	5,1	13	33	94	185	450
3	0	0	8	3,8	10	25	70	140	340
2	2	0	9	3,4	9	22	62	125	300
0	6	0	10	2,5	6,6	17	47	93	230
0	4	0	11	1,7	4,4	11	31	62	150
0	3	0	12	1,3	3,3	8,3	23	46	115
0	4	2	13	2,3	-	-	-	-	-
0	0	6	14	1,8	-	-	-	-	-
0	0	4	15	1,2	-	-	-	-	-
0	0	3	16	0,9	-	-	-	-	-

Arrangement of brake springs for ZBA motors fitted with a manual brake release unit

Brake size			B007	B020	B050	B140	B280	B680	
Quantity of springs			For spring arrangement see item	Brake torque MB in Nm					
White	Red	Blue							
6	0	0	5	7,6	20	50	140	280	680
4	2	0	6	5,9	16	39	105	220	530
3	3	0	7	5,1	13	33	94	185	450
3	0	0	8	3,8	10	25	70	140	340
2	2	0	9	3,4	9	22	62	125	300
0	6	0	10	2,5	6,6	17	47	93	230
0	4	1	17	1,7	4,4	11	31	62	150
0	3	1	18	1,3	3,3	8,3	23	46	115
0	5	1	19	2,3					
0	1	5	20	1,8					
0	0	5	21	1,2					
0	0	4	22	0,9					

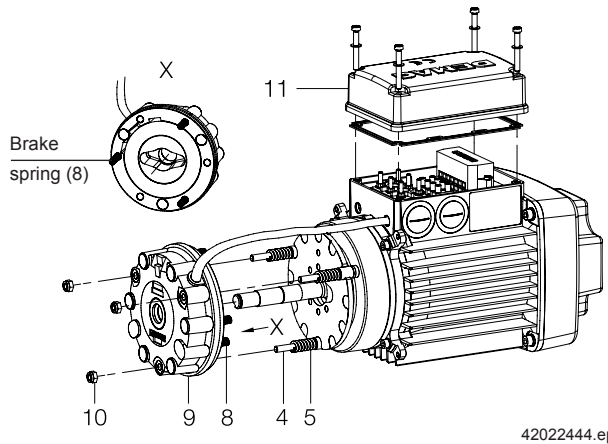
Arrangement of brake springs for ZBA motors



○ = Bore hole empty ⊙ = ws, white spring ● = rt, red spring ⊕ = bl, blue spring

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B007, B020, B050, B140 brakes for ZBF motors



- Push distance spring (5) onto collared pins (4).
- Place brake springs (8) into magnet assembly (9).

See table below for arrangement of brake springs (8).

- Push magnet assembly (9) over collared pins (4) and secure with hexagon nut (10).
- Tighten magnet assembly (9) with the three hexagon nuts (10) uniformly until the air gap is zero.
- Loosen the three hexagon nuts (10) by angle α_1 .
- Check air gap s_1 using a feeler gauge at three points around the circumference.
If the measured result is within the specified range, the motor can be re-assembled.

See section 6.3.1 for checking/adjusting the brake air gap.

- Pull the connecting cable of magnet assembly (9) back into the terminal box.
- Fit terminal box cover (11).

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Brake size	B007	B020	B050	B140
Adjusting angle α_1	120°	120°	90°	80°
Brake spring	Ident. no.			
Red spring	260 111 84	260 211 84	260 311 84	260 411 84
Blue spring	260 127 84	260 227 84	260 327 84	260 427 84

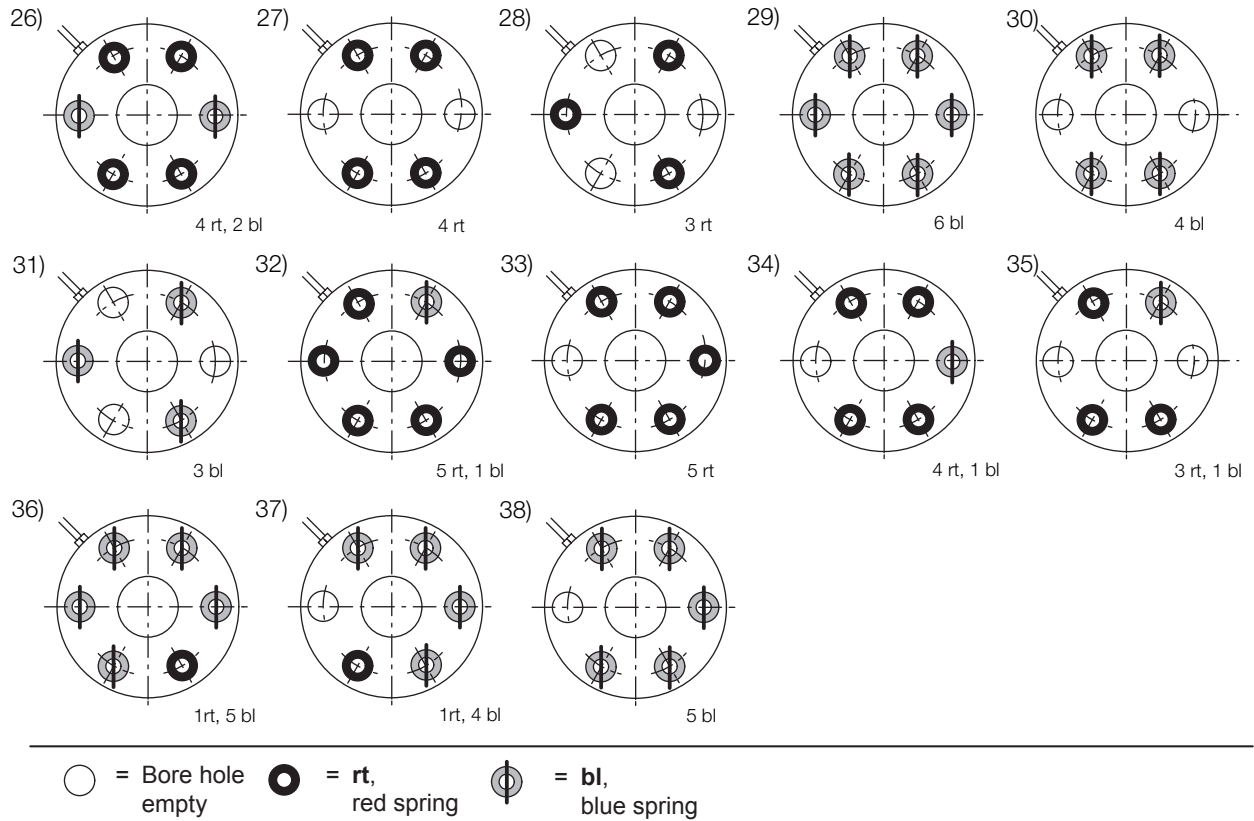
Arrangement of brake springs for ZBF motors not fitted with a manual brake release unit

Brake size			B007	B020	B050	B140
Quantity of springs		For spring arrangement see item	Brake torque M_B in Nm			
Red	Blue					
4	2	26	2,3	5,6	13	37
4	0	27	1,7	4,4	11	31
3	0	28	1,3	3,3	8,3	23
0	6	29	1,8	(3,3)	6,3	18
0	4	30	1,2	2,2	4,2	12
0	3	31	0,9	1,7	3,2	8,8

Arrangement of brake springs for ZBF motors fitted with a manual brake release unit

Brake size			B007	B020	B050	B140
Quantity of springs		For spring arrangement see item	Brake torque M_B in Nm			
Red	Blue					
5	1	32	2,3	5,6	13	–
5	0	33	–	–	–	37
4	1	34	1,7	4,4	11	31
3	1	35	1,3	3,3	8,3	23
1	5	36	1,8	(3,3)	6,3	–
1	4	37	–	–	–	18
0	5	38	1,2	2,2	4,2	12
0	4	30	0,9	1,7	3,2	8,8

Arrangement of brake springs for ZBF motors



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6.3.5 Bolt tightening torques

The bolts on Demag Z... range motors must be tightened with the torques given in the table below. This also applies when high tensile bolts are used.

Bolt tightening torques						
For hexagon socket bolts to DIN 912 and to DIN 6912 for IM B 14 flange mounting						
Bolt size	M 5	M 6	M 8	M 10	M 12	M 16
Tightening torque	6,2 Nm	10,5 Nm	25 Nm	50 Nm	86 Nm	215 Nm
For VERBUS RIPP self-locking bolts for						
<ul style="list-style-type: none"> • IM B 3 foot mounting • IM B 5 flange mounting 						
Bolt size	M 5	M 6	M 8	M 10	M 12	M 16
Tightening torque for cast iron	7,5 Nm	14 Nm	30 Nm	65 Nm	100 Nm	270 Nm
Tightening torque for cast aluminium	9 Nm	18 Nm	45 Nm	75 Nm	–	–

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Tighten the fastening screws of the terminal box cover to a torque of 2,5 - 3 Nm.

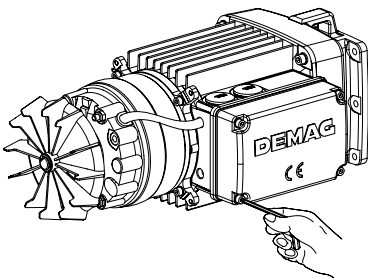
6.4 Options

The following options are possible:

- **Sealing (covering tape) for IP55, brake types B003 - B680**
- **Reduced noise level**
 - Option brake types B 007 - B050
 - Standard for brake types B 140 - B680
- **Manual brake release unit**
Manual brake release is only available for B007 - B680 brakes, **not** for B003 brakes.
- **Micro-switches**
A micro-switch arrangement is only possible for B007 - B680 brakes, **not** for B003 brakes.
- **Emergency-stop brake lining**

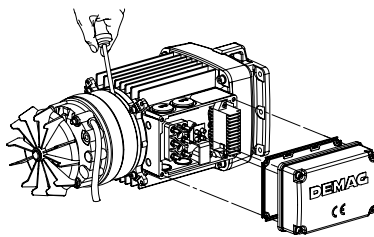
6.4.1 Sealing for B003 - B680 brakes, IP55

Removing the covering tape



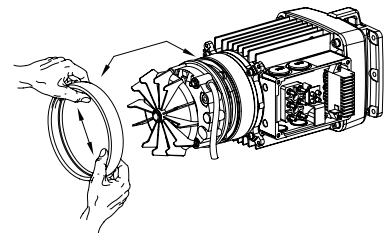
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Undo the screws retaining the terminal box cover.



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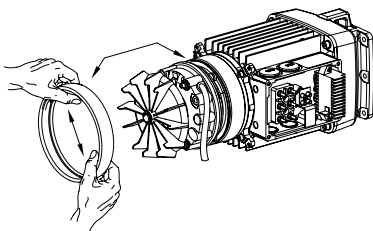
- Remove the terminal box cover.
- Disconnect the brake power supply cable.
- Pull the brake power supply cable out of the terminal box.



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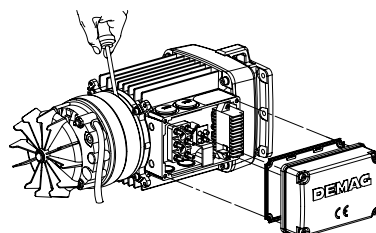
Remove the covering tape, if necessary, use a suitable tool, e.g. a screwdriver.

Fitting the covering tape



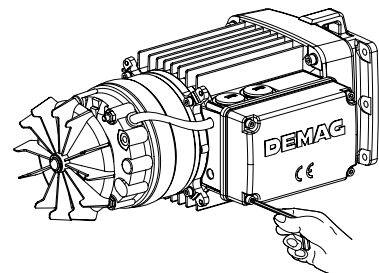
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Replace the covering tape, if necessary, use a suitable tool, e.g. a screwdriver.



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- Insert the brake power supply cable into the terminal box.
- Connect the brake power supply cable.
- Fit the terminal box cover.
- Ensure the seal is correctly seated.



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Close the terminal box cover by tightening 4 screws. Tighten the torques in accordance with the "Bolt tightening torques" table in section 6.3.5.

- 6.4.2 Reduced noise level** See section 6.3.2 for “Replacing the brake disk”
→ **Fitting the brake**
- 6.4.3 Manual brake release unit** For motors fitted with a manual brake release unit, see also the “Additional equipment for brakes, ZBA - ZBF motor range” operating instructions, ident no. **214 041 44**.
- 6.4.4 Micro-switches** For motors fitted with integrated micro-switches, see also the “Additional equipment for brakes, ZBA - ZBF motor range” operating instructions, ident no. **214 041 44**.
- 6.4.5 Emergency-stop brake lining** For special applications, when the permissible friction per switching operation is exceeded, an emergency-stop brake lining can be used for brake sizes B007 – B680 for ZBA motors if the brake is operated only rarely (e.g. emergency stop for inverter operation). For higher thermal loading, increased wear of the lining and counter-surface must be expected.
Brake disks fitted with an emergency-stop brake lining are marked by a red dot and the number 19 impressed in the brake lining carrier.

7 Motor/brake connection diagrams

7.1 Brake control B003 to B680 brakes

Various control modules are available which are fitted in the brake motor terminal box as standard for controlling Demag B003 to B680 disk brakes with DC magnets. All control modules feature varistor protection against overvoltage at the AC input and on the switching contact terminal as standard.

For separate supply from the installation control, and when the control modules are fitted in the switchgear cabinet, an additional varistor must be connected to the brake connection in the terminal box of the brake motor.

Brakes up to size B050 for ZBA motors and B140 for ZBF motors can also be supplied with 24 V DC from the installation power supply.

GF and GP brake rectifiers can be used parallel to the motor winding for pole-changing motors.

GE, GS and GP brake rectifiers can be fed separately with alternating current or connected parallel to the motor winding.

All brake rectifiers are approved for operation up to a max. connection voltage of 500 V AC. AC or DC brake control is possible with GE GP and GS rectifiers depending on the connection of the brake.

The control system is of modular design. SE or VE modules for fast DC interruption of the brake current can be added to brake motors fitted with GE, GS or GP brake rectifiers, also at a later date, without the need for additional cables and switching devices.

GF brake rectifiers feature integrated DC control as standard.

GU control modules are controlled in the DC circuit by means of a 24 V/DC control voltage from the installation or inverter.

DC control should generally be provided for ZBF motors.

If ZB cylindrical rotor brake motors are operated together with inverters, the brake must be provided with a separate power supply and control.

Supply and brake voltage	
U_{line} [AC]	U_{brake} [DC]
230 V	104 V
400 V	180 V



Operation with frequency inverters

If ZB cylindrical rotor brake motors are operated together with inverters, the brake must be provided with a separate power supply and control.

Brake control module overview

Assignments

Excitation modules	Switch-off modules	Brief description	
		Component	Function
Type	Type		
GE	-	Brake rectifier	Normal excitation
GP	-	Brake rectifier	Normal excitation for pole-changing motors
GS	-	Brake rectifier	High-speed excitation
GF	-	Combined module	Normal excitation for pole-changing motors and motor current-dependent high-speed switch-off
GU	-	Brake rectifier	Control possible via 24 V/DC from installation or inverter
-	SE	Current relay	Motor current-dependent high-speed switch-off
-	VE	Voltage relay	Voltage-dependent high-speed switch-off

7.1.1 GE brake rectifiers (normal excitation)

GE brake rectifiers are used for single-speed motors as standard, and for pole-changing motors featuring a separate power supply up to brake size:

- B050 for ZBA motors
- B140 for ZBF motors.

The GE module mainly consists of a half-wave rectifier with an integrated free-wheeling circuit.

Switching between terminal 1 or 2 and the brake coil is not permitted.

The connections to contacts 3 and 4 must not be interchanged for connection of SE or VE modules.



Important: When used with a pole-changing motor, GE modules must be provided with a separate power supply or according to diagram 037 860 84 (see section 7.5).

Note: No additional cables are necessary when SE or VE units are used.

7.1.2 GP brake rectifiers (normal excitation for pole-changing motors)

GP brake rectifiers can be used parallel to the motor winding for pole-changing motors with separate windings. They are used up to brake size B050 for ZBA motors and B 140 for ZBF motors.

For this, it is necessary for both windings to be connected to one phase on the terminal board (e.g. 1U & 2U). The advantage of using a GP brake rectifier compared to a GE module is that no additional cables are required for the power supply.

GP rectifiers mainly consist of two half-wave rectifiers which are connected depending on the winding being used.

Switching between terminal 1 or 2 and the brake coil is not permitted.

The connections to contacts 3 and 4 must not be interchanged for connection of SE modules.



Note: No additional cables are necessary when SE units are used.

7.1.3 GS brake rectifiers (high-speed excitation)

GS brake rectifiers include a reversible rectifier and are used for ZBA motors with brakes as of size B140 as standard. In this case, the module must be supplied via 3 phases at terminals 5, 6 and 7. (Overexcitation factor of 2,5)

They can be used for single-speed motors as well as for pole-changing motors with a separate power supply GS brake rectifiers can be used as an option for brake sizes B003 to B050 (for ZBF to B140). In this case, a 2-phase supply at terminals 5 and 6 is sufficient (overexcitation factor 2). This makes it possible to achieve shorter brake release times and higher motor starting frequencies.

GS modules include a reversible rectifier which overexcites the brake for approx. 0,3 seconds to release it and then supplies it with the appropriate holding voltage from a half-wave rectifier.

Switching between terminal 1 or 2 and the brake coil is not permitted.

The connections to contacts 3 and 4 must not be interchanged for connection of SE modules.



Important: When used with a pole-changing motor, GS modules must be provided with a separate power supply or according to diagrams 037 886 84, 038 001 84 and 038 017 84 (see section 7.5).

Note: No additional cables are necessary when SE or VE units are used.

To ensure the unit switches with over-excitation and, therefore, correct functioning, the following minimum times must be maintained between switch-off and restart.

Switch-off method:	Time
In the DC circuit	100 ms
With GS + VE / SE	250 ms
In the AC circuit	1,5 s

7.1.4 GF brake rectifiers (normal excitation)

The GF combination module combines three functions in one unit and is supplied together with the motor winding.

As standard, the GF brake rectifier is used for ZBF pole-changing motor frame sizes 63 – 100 up to brake size B050. The motor current that flows through the module from terminal 3 to 4 is detected for fast cut-off. When a specific level is not longer attained, the GF module opens the DC circuit of the brake.

GF module function:

- Normal excitation of the brake similar to GP modules;
- Switch-off in the DC circuit by means of integrated motor current detection;
- Protection of the low-speed winding by means of an integrated varistor set.



GF modules must not be used together with an inverter (due to motor current detection) and may only be supplied with voltages between 220 and 500 V AC.

Combinations with GE – VE or GS – VE modules must be used for inverter operation.

7.1.5 GU brake rectifiers (normal excitation)

GU brake rectifiers can be used as an option for brakes with a separate AC power supply up to brake size B050.

They are fitted in the brake motor terminal box as standard, but may also be alternatively used in a switchgear cabinet. The brake coil then has to be protected in the motor terminal box against cut-off voltage peaks by a varistor.

The brake rectifier is controlled direct by means of a 24V/DC switching signal from an installation or a frequency inverter.

The brake is switched on and off in the DC circuit, which enables a short brake application time to be achieved.

It is not necessary to control the brake via the AC supply of the module with the associated additional cabling and wiring requirement.

The brake application times correspond to those for switch-off in the DC circuit via a contact.

7.1.6 SE current relays (motor current-dependent high-speed trip relay)

SE current relays can be combined with GE, GS and GP brake rectifiers. They are used for rapid demagnetization of the brake to achieve fast brake application times without the need for additional wiring for brake switch-off in the DC circuit. SE current relays are connected to one motor current phase. When the motor is switched off, the relay demagnetizes the brake by opening the contact in the DC circuit. SE current relays can be used for rated motor currents up to 50 A.

Important

Operation together with inverters is not permitted. We recommend the use of VE voltage relays for these applications.

SE modules must not be used in the delta jumper for single-speed motors



If the brake is to be released without motor current, it is also recommended that the VE module be used instead of the SE. The grey and white connecting cables of the SE module must be connected to terminals 3 and 4 of the GE, GS or GP modules with the correct assignment.

7.1.7 VE voltage relays (voltage-dependent high-speed trip relay)

VE voltage relays can be combined with GE, GS and GP brake rectifiers. In contrast to SE current relays, VE voltage relays must only be used for brakes with a separate power supply. These modules may preferably be used for inverter-fed motors and for brake release without motor current. They are used for high-speed demagnetization of the brake to achieve fast brake application times without the need for additional wiring for brake switch-off in the DC circuit. VE voltage relays are connected to the brake power supply. The contact in the DC circuit is opened when the brake is switched off.

The red, blue and white connecting cables of the VE module must be connected to terminals 1,3 and 4 of the GE or GS modules with the correct assignment.

GE and VE modules should be used for separate AC brake power supply in combination with ZBF motors.

Brake control module fields of application

GE, GP, GS brake rectifiers, GF, GU combined module

Brake voltage		Brake size							
U AC V	U DC V	B003	B007	B020	B050	B140	B280	B680	
42 - 109	19 - 49	GE [3,0 A] GP [3,0 A]				GE [3,0 A] ¹⁾ GP [3,0 A] ¹⁾			
110 - 500	50 - 225	GE [1,5 A] GP [1,5 A] GS [1,0 A]				GE [1,5 A] ¹⁾ GP [1,5 A] ¹⁾ GS [1,0 A]			
190 - 500	86 - 225						GS [1,0 A]		
260 - 500	117 - 225								GS [1,0 A]
220 - 500	99 - 225	GF [0,8 A] ¹⁾							
220 - 500	99 - 225	GU [0,8 A] ²⁾							

SE and VE switch-off modules

Brake voltage	Brake size						
	B003	B007	B020	B050	B140	B280	B680
U AC in V	42 - 500				54 - 500	190 - 500	260 - 500
U DC in V	19 - 225				24 - 225	86 - 225	117 - 225
Modules	VE 2A voltage relay SE 2 A current relay						

U AC = Brake control module input voltage

U DC = Brake control module output voltage - brake supply voltage

1) Only for use with ZBF motors.

2) Optional for brakes with separate AC power supply.

Brake control module technical data

Module	Part no.	Voltage range V /AC	Max. continuous brake direct current I /A	Remark
GE	260 892 84	110 ... 500	1,5	
	260 890 84	42 ... 500	3	
GP	260 893 84	110 ... 500	1,5	
	260 891 84	42 ... 500	3	
GS	260 894 84	110 ... 500 ³⁾	1	Overexcitaion factor: 2 or 2,5 ¹⁾
GF	260 943 84	220 ... 500	0,8	0,25 ... 16 A for ZBF 63 - 100
GU	260 957 84	220 ... 500	0,8	GU module controlled direct with a 24 V/DC switching signal (I _{switch} : approx. 10,2 mA) from an installation or a frequency inverter
SE	260 864 84	42 ... 500	2	0,25 ... 4 A ²⁾
	260 870 84			0,4 ... 16 A ²⁾
	260 896 84			1,2 ... 50 A ²⁾
VE	260 901 84	42 ... 149	2	
	260 902 84	150 ... 500		

1) 2 leads - Overexcitation factor of 2

3 leads - Overexcitation factor of 2,5 required for ZBA motors from brake size B 140

2) Standard - Rated current of motor is equal to or smaller than the higher value of the SE current relay specified under "control current range" (single-phase motor current)

34 3) Voltage range dependent on the brake size, see "Brake control module fields of application" table

7.2 Brake selection table

Brake	Supply voltage V AC	Assigned standard modules			Standard brake torque		Remark
		ZBA	ZBF		ZBA	ZBF	
		Single speed or pole-changing	Single speed	Pole-changing			
B003	42 - 109	GE [3 A]	GE [3 A] + SE ¹⁾		GF ³⁾	≤ 2,5 Nm	≤ 2,5 Nm
	110 - 500	GE [1,5 A]	GE [1,5 A] + SE ¹⁾				
B007	42 - 109	GE [3 A]	GE [3 A] + SE ¹⁾			≤ 7,6 Nm	≤ 2,3 Nm ⁵⁾
	110 - 500	GE [1,5 A]	GE [1,5 A] + SE ¹⁾				
B020	42 - 109	GE [3 A]	GE [3 A] + SE ¹⁾			≤ 20 Nm	≤ 5,5 Nm
	110 - 500	GE [1,5 A]	GE [1,5 A] + SE ¹⁾				
B050	42 - 109	GE [3 A]	GE [3 A] + SE ¹⁾		≤ 50 Nm	≤ 13 Nm	
	110 - 500	GE [1,5 A]	GE [1,5 A] + SE ¹⁾				
B140	42 - 109	–	GE [3 A] + SE ¹⁾	GP [3 A] + SE ¹⁾	≤ 140 Nm	≤ 37 Nm	
	110 - 500	GS	GE [1,5 A] + SE ¹⁾	GP [1,5 A] + SE ¹⁾			
B280	42 - 189	–	–	–	≤ 280 Nm	–	
	190 - 500	GS	–	–			
B680	42 - 259	–	–	–	≤ 680 Nm	–	
	260 - 500	GS	–	–			

1) SE modules are assigned in accordance with the motor rated current I_N as shown below:

Motor rated current	Module	Part no.
$I_N \leq 4$ A	SE	260 864 84
$I_N \leq 16$ A		260 870 84
$I_N \leq 50$ A		260 896 84

2) Power supply via a separate DC source is possible without any limitation. Voltage range: 19 - 225 V DC

3) GF modules have a limited voltage range: 220 - 500 V AC

4) Power supply via a separate DC source is **not** possible.

Exception: B140 brake with brake torque ≤ 37 Nm voltage range: 19 - 225 V DC

5) For ZBF travel motors fitted with the B003 as standard, the B007 is used for the manual brake release and/or brake monitoring options.

7.2.1 Brake power consumption

400V AC (180V DC) supply voltage, control with brake modules
Temperature range: -20°C to +60°C

Size	Excitation with GE, GF or GP module I / A	Excitation with GS module Overexcitation factor of 2		Excitation with GS module Overexcitation factor of 2,5	
		Release current I / A	Holding current I / A	Release current I / A	Holding current I / A
B003	0,11	0,22	0,11	0,28	0,11
B007	0,13	0,26	0,13	0,33	0,13
B020	0,22	0,44	0,22	0,55	0,22
B050	0,21	0,42	0,21	0,53	0,21
B140 ¹⁾	0,25	0,50	0,25	0,63	0,25
B280	Operation not permitted			1,13	0,45
B680				1,80	0,71

¹⁾ Brake size B140 may only be operated with a GE module or overexcitation factor of 2 up to a brake torque of 37 Nm.

- The release and holding currents are identical with normal excitation.
- Release currents for excitation with a GS module are applied for approx. 300 ms.

Separate brake control with 24V DC, temperature range: -20°C to +60°C

Size	Current consumption I / A
B003	0,98
B007	0,90
B020	1,19
B050	1,75
B140 ¹⁾	1,73

¹⁾ Brake size B140 may only be operated up to a brake torque of 37Nm.

7.2.2 Electrical connection, brake operation times

Depending on the type of connection, the release and braking operation of B003 to B680 DC brakes can generally be characterized by the following values:

ZBA range brake operating times

Size	Release times in ms		Application times in ms		
	t ₁₁	t ₁₂	t ₂₁	t ₂₂	t ₂₃
B003	75	60	175	55	75
B007	120	60	90	30	40
B020	130	90	40	20	30
B050	120	100	90	30	60
B140	---	110	60	30	40
B280	---	140	300	90	130
B680	---	140	300	150	190

ZBF range brake operating times

Size	Release times in ms		Application times in ms		
	t ₁₁	t ₁₂	t ₂₁	t ₂₂	t ₂₃
B003	75	60	175	55	75
B007 ¹⁾	60	35	200	30	40
B020	60	40	300	50	60
B050	80	65	300	60	70
B140	110	90	350	100	100

The brake release and application times given are guide values for the maximum brake torque. In the case of lower brake torques, these values may change, particularly t₂₁ for switch-off in the AC circuit.

t₁₁ = Brake release time with normal excitation (GE, GP, GF, GU) ²⁾

t₁₂ = Brake release time with high-speed excitation (GS) ²⁾

t₂₁ = Brake application time for switch-off in the AC circuit

t₂₂ = Brake application time for switch-off in the DC circuit (contact, GU)

t₂₃ = Brake application time for switch-off in the DC circuit (SE, VE, GF)

Brake release times may be reduced using GS high-speed excitation modules with which a higher voltage is temporarily applied to the brake coil when the brake is turned on and the magnetic field is built up more quickly. Brake sizes B140 to B680 are generally controlled using the GS rectifier on ZBA motors.

Brake application times are highly dependent on the way in which the brake is switched off.

- **Connection in the DC circuit:**

The coil circuit is interrupted when the brake module contact opens at the relevant terminal. The magnetic field rapidly decreases and the brake torque rapidly rises. Demag rectifiers are protected against overvoltage at the switching contact by varistors.

Interruption of the DC circuit between the module and the coil connections is not permitted.

- **Connection in the AC circuit:**

When the brake voltage is switched off, i.e. on the supply side before the rectifier, an inductive coil current continues to flow through the rectifier diodes for a short time. The magnet field decreases more slowly. The braking operation begins more smoothly. **This connection type is not suitable for hoist drives.**

- **Connection in the motor circuit:**

The rectifier is connected direct to the motor terminals. When the motor is switched off, the residual motor voltage results in significantly longer switch-off times compared to switch-off in the AC circuit.

Unless provided with additional switch-off in the DC circuit using a contact or by the SE current relay, this type of connection is not suitable for drives with overhauling loads, e.g. hoists, and may not be used in these applications.

Different excitation times result according to the connection. These times depend on the one hand on the selected brake torque and, more decisively, on the brake connection.

1) For ZBF travel motors fitted with the B003 as standard, the B007 is used for the manual brake release and/or brake monitoring options.

2) Definition: The brake release time is the period which elapses until the full motor acceleration torque is attained.

7.3 Selection criteria

The following criteria must be considered when selecting the connection diagram:

- **Motor type ZBA, ZBF fitted with a brake or ZNA not fitted with a brake.**
- **Motor to be operated with**
 - one line voltage (e.g. 400 V, 50 Hz) or
 - two line voltages (e.g. Δ/Y 230/400 V 50 Hz or YY/Y 240/480 V 60 Hz)
- **Motor designed for one or two speeds**
- **Common or separate power supply to motor and brake**
- **Control module selected:**
 - GE for normal excitation
 - GS for high-speed excitation
 - GP for normal excitation for pole-changing motors
 - GF for pole-changing ZBF motors up to size 100
- **Switch-off:**
 - in the DC circuit for short operating times (e.g. hoist drives, positioning drives)
 - in the AC circuit for medium operating times (e.g. travel drives, conveyor belts)
 - in the motor circuit for stopping the motor in a non-critical time.

Refer to the following flow charts and selection tables.



- Notes:**
- The motor and brake of inverter-fed drives must have **separate** power supplies.
 - **SE modules** must **not** be used with inverter-fed drives.
 - **Connection diagrams**
 - Connection diagram selection (flow chart) for line and inverter-fed drives and related tables → section 7.5.
 - Connection diagrams → Section 7.6
Diagrams shown in rising ident. number order
 - Connection diagram arranged in the motor terminal box.
 - **Condition when supplied for inverter operation:**
If the motor has been ordered for **inverter operation**, GE or GS modules are **NOT** connected to the motor winding.
The brake control module must be provided with a **separate AC power supply**.
 - **Designation of the terminal board**
The terminal designations used in the connection diagrams are printed on the white motor connecting leads. The designations on the terminal board in the motor apply to single-speed motors with 6 connecting leads.

7.4 Z motor standard connection diagrams to EN standards

7.4.1 ZNA standard motors, not fitted with a brake

Speed and winding type	ZNA motor Sizes	Connection diagram
Single speed	63 – 225	020 323 84
Two speeds, separate windings (Y/Y)	63 – 132	020 332 84
Two speeds, separate windings (Y/ Δ)	160 – 225	028 857 84

7.4.2 ZBA standard motors, fitted with a brake

Single-speed motors (Δ/Y)								
ZBA motor Sizes	Brake	Control module	Line voltage					
			$\leq 500V$	Example	Connection diagram	$> 500V$	Example	Connection diagram
63 – 132	B003 – B050	GE	$U_{Br} = U_M$	Line: U_M : 400V U_{Br} :	037 875 84	$U_{Br} = U_M / \sqrt{3}$	Line: 525V U_M : 525V U_{Br} : 300V	037 857 84
132 – 225	B140 – B680	GS three-phase supply			038 006 84		$U_{Br} \leq 500V$ ¹⁾	Line: 525V U_M : 525V U_{Br} : 500V ¹⁾

Double-speed motors, separate windings											
Sizes 63 – 132 (Y/Y)											
Sizes 160 – 225 (Δ/Y)											
ZBA motor Sizes	Brake	Control module	Line voltage								
			$\leq 500V$	Example		Connection diagram	$> 500V$	Example		Connection diagram	
63 – 132	B003 – B050	GE	$U_{Br} = U_M$	Line: U_M : 400V U_{Br} : 400V	400V		037 860 84	$U_{Br} \leq 500V$ ¹⁾	Line: U_M : 525V U_{Br} : 500V ¹⁾	038 425 84	
132	B140	GS three-phase supply			400V		038 001 84			038 427 84	
160 – 225	B140 – B680				400V		038 017 84			038 017 84 ²⁾	

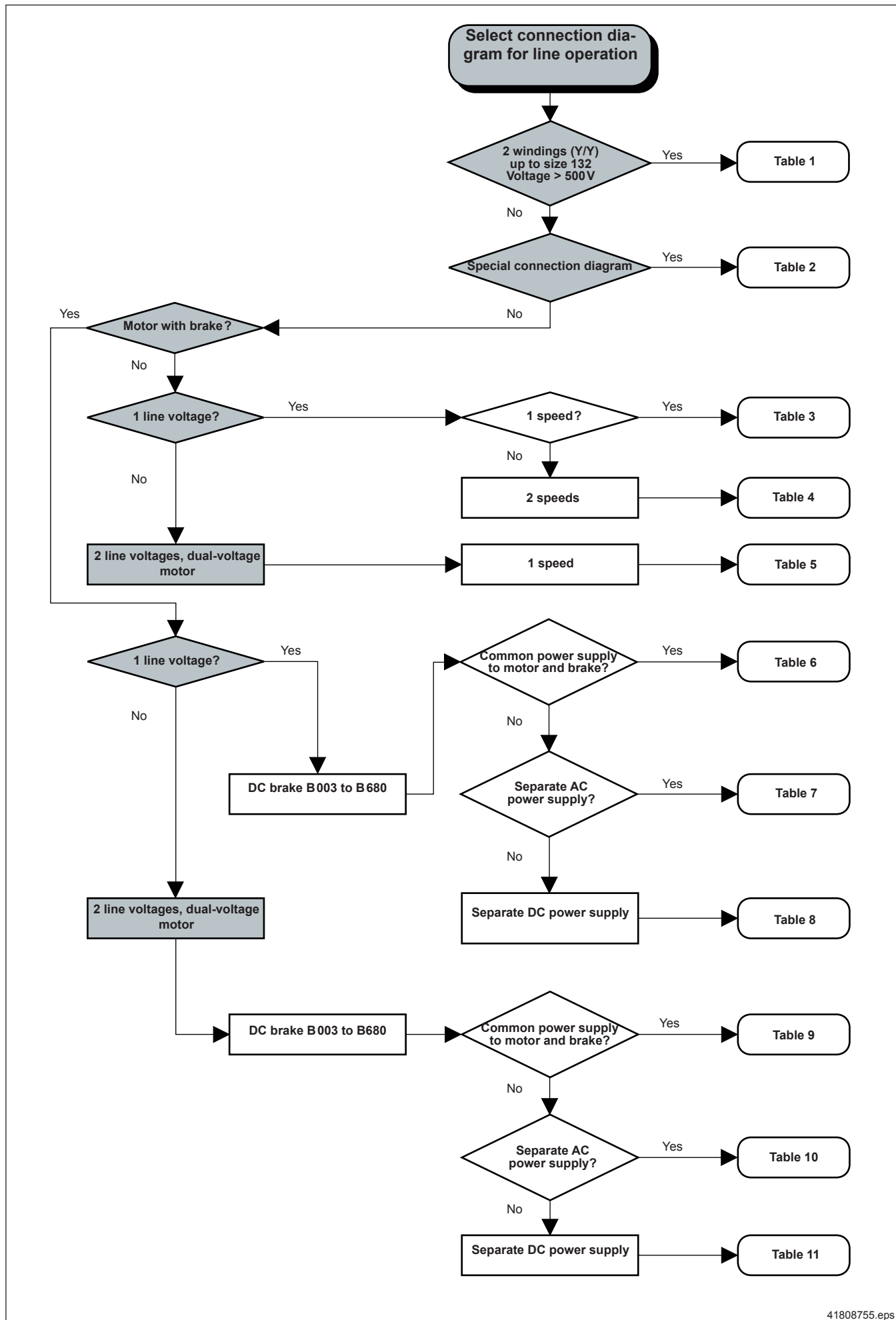
7.4.3 ZBF travel motors

Single-speed motors (Δ/Y)												
ZBF motor Sizes	Brake	Control module	Line voltage									
			$\leq 500V$	Example		Connection diagram	$> 500V$	Example		Connection diagram		
63 – 132	B003 – B140	GE + SE	$U_{Br} = U_M$	Line: U_M : U_{Br} :	400V		038 337 84 037 873 84	$U_{Br} = U_M / \sqrt{3}$	Line: U_M : U_{Br} :	525V 525V 300V		038 858 84

Double-speed motors, separate windings (Y/Y)												
ZBF motor Sizes	Brake	Control module	Line voltage									
			$\leq 500V$	Example		Connection diagram	$> 500V$	Example		Connection diagram		
63 – 100	B003 – B050	GE	$U_{Br} = U_M$	Line: U_M : U_{Br} :	400V		038 337 84	$U_{Br} = U_M / \sqrt{3}$	Line: U_M : U_{Br} :	525V 525V 300V		038 423 84
112 – 132	B140	GP + SE			400V		037 873 84			038 421 84		

7.5 Connection diagram selection

7.5.1 Line operation



Tables 1 – 2 Special connection diagrams

1 Motor with 2 windings (Y/Y) up to size 132, line voltage > 500 V								
Power supply	Switch-off ¹⁾	Brake size		Control modules in terminal box				
		ZBA	ZBF	GP	GF ²⁾	GE	GS	none
Common	ms, ws, gs with contact	≤ B050	≤ B 140	038 420 84	–	–	–	–
		B 140	–	–	–	–	–	–
	gs with SE	≤ B050	≤ B 140	038 421 84	–	–	–	–
		B 140	–	–	–	–	–	–
	internal	≤ B050	≤ B 140	–	038 423 84	–	–	–
		B 140	–	–	–	–	–	–
Separate, AC	ws, gs with contact	≤ B050	≤ B 140	–	–	038 425 84	038 426 84	–
		B 140	–	–	–	–	038 427 84	–
	gs with SE	≤ B050	≤ B 140	–	–	038 429 84	038 431 84	–
		B 140	–	–	–	–	038 433 84	–
	gs with VE	≤ B050	≤ B 140	–	–	038 430 84	038 432 84	–
		B 140	–	–	–	–	038 434 84	–
Separate, DC	gs with contact	≤ B050	≤ B 140	–	–	–	–	038 428 84
–	–	none	none	–	–	–	–	038 435 84

2 Description of special connection diagrams					
Connection diagram	Windings	Voltages	Modules	Switch-off ¹⁾	Special
038 021 84	2 (Y/Y)	1	GE + SE	gs	Only high speed is used
038 186 84	1 (YY/Y)	2	GE	gs, ws, ms	Brake coil for the high voltage
038 187 84	1 (YY/Y)	2	GE + SE	gs	Brake coil for the high voltage
038 338 84	2 (Y/Y)	1	GF	gs	Only high speed is used
038 422 84	2 (Y/Y)	1, > 500 V	GE + SE	gs	Only high speed is used
038 424 84	2 (Y/Y)	1, > 500 V	GF	gs	Only high speed is used, ZBF 63 – 100 motors

1) gs In the DC circuit
 ws In the AC circuit
 ms In the motor circuit
 2) Only for ZBF motors, sizes 63 – 100

Tables 3 – 5 Motors without a brake

3	Motor for one line voltage	Motor type	
		Single speed	
		020 323 84	
4	Motor for one line voltage	Motor type	
		Two speeds (separate windings)	
		Y / Y	Δ / Y
		020 332 84	028 857 84
5	Motor for two line voltages (e.g. Δ/Y 230/400 V 50 Hz or YY/Y 240/480 V 60 Hz)	Motor type	
		Single speed	
		Δ / Y	YY / Y
		020 323 84	020 337 84

Tables 6 – 11 Motors with a brake

6	Common motor and brake power supply (not suitable for inverter operation)			Motor type									
				Single speed			Two speeds (separate windings)						
							Y / Y				Δ / Y		
Switch-off in	Switching element	Brake size for		Control module in the terminal box									
		ZBA	ZBF	GE	GS	GU ³⁾	GP	GF ²⁾	GE	GS	GU ³⁾	GS	GU ³⁾
DC circuit	Contact	≤ B050	≤ B140	037 875 84	037 892 84	410 050 84	037 872 84	–	037 860 84	037 886 84	410 053 84	–	410 051 84
		≥ B140	–	–	038 006 84	–	–	–	–	038 001 84	–	038 017 84	–
	SE ^{1) 2)}	≤ B050	≤ B140	037 882 84	037 894 84	–	037 873 84	–	–	–	–	–	–
		≥ B140	–	–	038 008 84	–	–	–	–	–	–	–	–
	Internal	–	≤ B050	–	–	–	–	038 337 84	–	–	–	–	–
AC circuit	Contact	≤ B050	≤ B140	037 875 84	037 892 84	–	037 872 84	–	037 860 84	037 886 84	–	–	–
		≥ B140	–	–	038 006 84	–	–	–	–	038 001 84	–	038 017 84	–
Motor circuit	–	≤ B050	≤ B140	037 875 44	037 892 84	–	037 872 84	–	–	–	–	–	–
		≥ B140	–	–	038 006 84	–	–	–	–	–	–	–	–

7	Separate AC brake power supply			Motor type									
				Single speed			Two speeds (separate windings)						
							Y / Y				Δ / Y		
Switch-off in	Switching element	Brake size for		Control module in the terminal box									
		ZBA	ZBF	GE	GS	GU ³⁾	GE	GS	GU ³⁾	GS	GU ³⁾		
DC circuit	Contact	≤ B050	≤ B140	037 875 84	037 892 84	410 050 44	037 860 84	037 886 84	410 053 84	–	410 051 84		
		≥ B140	–	–	038 006 84	–	–	038 001 84	–	038 017 84	–		
	SE ^{1) 2)}	≤ B050	≤ B140	037 882 84	037 894 84	–	037 861 84	037 887 84	–	–	–		
		≥ B140	–	–	038 008 84	–	–	038 002 84	–	038 018 84	–		
	VE ¹⁾	≤ B050	≤ B140	037 876 84	037 893 84	–	037 862 84	037 888 84	–	–	–		
		≥ B140	–	–	038 007 84	–	–	038 003 84	–	038 020 84	–		
AC circuit	Contact	≤ B050	≤ B140	037 875 84	037 892 84	–	037 860 84	037 886 84	–	–	–		
		≥ B140	–	–	038 006 84	–	–	038 001 84	–	038 017 84	–		

1) Fitted in the terminal box

2) Not suitable for inverter operation

8 Separate DC brake power supply				Motor type	
				Single speed	Two speeds (separate windings)
Switch-off in	Switching element	Brake size for		No control module in the terminal box ⁴⁾	
		ZBA	ZBF		
DC circuit	Contact	≤ B050	≤ B140	037 897 84	037 898 84

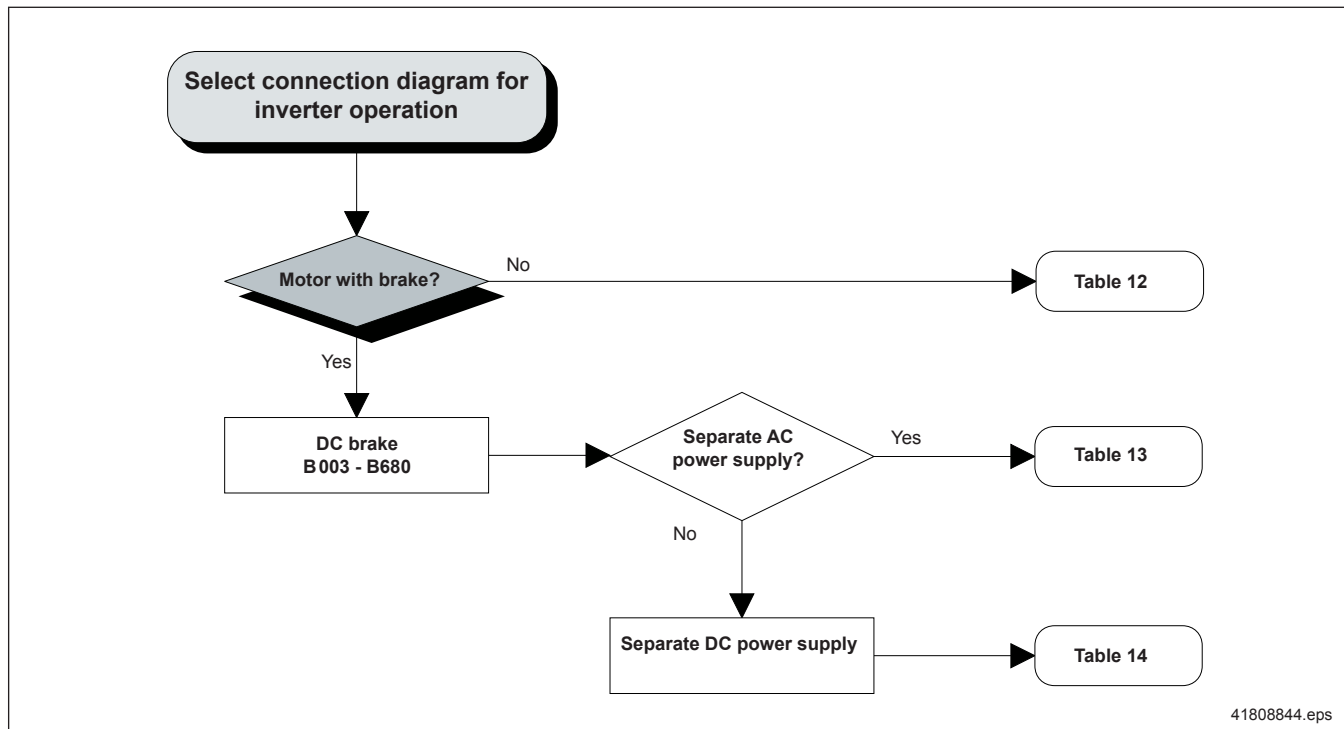
9 Common motor and brake power supply (not suitable for inverter operation)				Motor connection					
				Δ / Y			YY / Y		
Switch-off in	Switching element	Brake size for		Control module in the terminal box					
		ZBA	ZBF	GE	GS	GU ³⁾	GE	GS	GU ³⁾
DC circuit	Contact	≤ B050	≤ B140	037 857 84	037 883 84	410 050 84	037 863 84	037 889 84	410 052 84
		≥ B140	–	–	037 859 84	–	–	038 004 84	–
	SE ^{1) 2)}	≤ B050	≤ B140	037 858 84	037 884 84	–	037 864 84	037 890 84	–
		≥ B140	–	–	037 865 84	–	–	038 005 84	–
AC circuit	Contact	≤ B050	≤ B140	037 857 84	037 883 84	–	037 863 84	037 889 84	–
		≥ B140	–	–	037 859 84	–	–	038 004 84	–
Motor circuit	–	≤ B050	≤ B140	037 857 84	037 883 84	–	037 863 84	037 889 84	–
		≥ B140	–	–	037 859 84	–	–	038 004 84	–

10 Separate AC brake power supply				Motor connection					
				Δ / Y			YY / Y		
Switch-off in	Switching element	Brake size for		Control module in the terminal box					
		ZBA	ZBF	GE	GS	GU ³⁾	GE	GS	GU ³⁾
DC circuit	Contact	≤ B050	≤ B140	037 857 84	037 883 84	410 050 84	037 863 84	037 889 84	410 052 84
		≥ B140	–	–	037 859 84	–	–	038 004 84	–
	SE ^{1) 2)}	≤ B050	≤ B140	037 858 84	037 884 84	–	037 864 84	037 890 84	–
		≥ B140	–	–	037 865 84	–	–	038 005 84	–
	VE ¹⁾	≤ B050	≤ B140	037 876 84	037 893 84	–	037 881 84	037 896 84	–
		≥ B140	–	–	038 007 84	–	–	038 014 84	–
AC circuit	Contact	≤ B050	≤ B140	037 857 84	037 883 84	–	037 863 84	037 889 84	–
		≥ B140	–	–	037 859 84	–	–	038 004 84	–

11 Separate DC brake power supply				Motor connection	
				Δ / Y	YY / Y
Switch-off in	Switching element	Brake size for		No control module in the terminal box ⁴⁾	
		ZBA	ZBF		
DC circuit	Contact	≤ B050	≤ B140	037 897 84	037 899 84

1) Fitted in the terminal box
2) Not for inverter operation
3) Up to B050
4) GU modules can also be used for 24 V DC control voltage and/or 24 V DC brake coil voltage.

7.5.2 Inverter operation



Tables 12 - 14

12	Motor not fitted with a brake		Motor type			
			Single speed Δ / Y		Single speed YY / Y	
			020 323 84		020 337 84	

13	Separate AC brake power supply			Motor type					
				Single speed Δ / Y			Single speed YY / Y		
				Switch-off in	Switching element	Brake size for		Control module in the terminal box	
ZBA	ZBF	GE	GS			GU ³⁾	GE	GS	GU ³⁾
DC circuit	Contact	≤ B050	≤ B140	037 875 84	037 892 84	410 050 84	037 863 84	037 889 84	410 052 84
		≥ B140	–	–	038 006 84	–	–	038 004 84	–
	VE ¹⁾	≤ B050	≤ B140	037 876 84	037 893 84	–	037 881 84	037 896 84	–
		≥ B140	–	–	038 007 84	–	–	038 014 84	–
AC circuit	Contact	≤ B050	≤ B140	037 875 84	037 892 84	–	037 863 84	037 889 84	–
		≥ B140	–	–	038 006 84	–	–	038 004 84	–

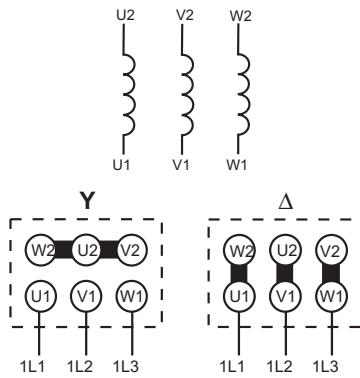
14	Separate DC brake power supply			Motor type					
				Single speed Δ / Y		Single speed YY / Y			
				Switch-off in	Switching element	Brake size for		No control module in the terminal box ²⁾	
ZBA	ZBF								
DC circuit	Contact	≤ B050	≤ B140	037 897 84		037 899 84			

¹⁾ Fitted in the terminal box

²⁾ GU modules can also be used for 24 V DC control voltage and/or 24 V DC brake coil voltage

7.6 Connection diagrams

Motor for one line voltage or dual voltage motor (1:√3)



Y high voltage
 Δ low voltage

For inverter operation, connect motor with Y or Δ connection according to inverter settings.

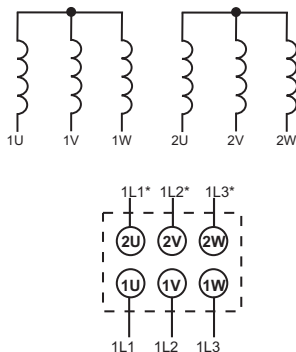
Motor supplied with:

Jumper parts to connect the motor winding with Y or Δ connection enclosed.

020 323 84

02032384.eps

Motor for one line voltage Pole-changing, separate windings



1U, 1V, 1W for low speed
 2U, 2V, 2W for high speed

* = Supply to high speed winding via external switch-over

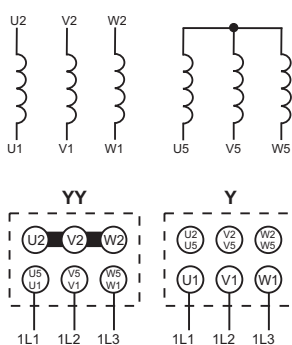
Motor supplied with:

Motor connection ends connected to the terminal board as shown.

020 332 84

02033284.eps

Dual voltage motor (1:2)



YY low voltage
 Y high voltage

For inverter operation, connect motor with YY or Y connection according to inverter settings.

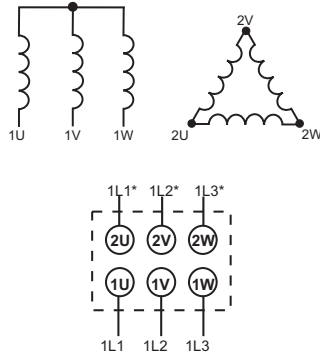
Motor supplied with:

- Motor winding connected with Y connection.
- Jumper parts to connect the motor winding with YY connection enclosed.

020 337 84

02033784.eps

**Motor for one line voltage
Pole-changing, separate winding**



1U, !V, !W for low speed
2U, 2V, 2W for high speed

* = Supply to high-speed winding via external switch-over

Motor supplied with:

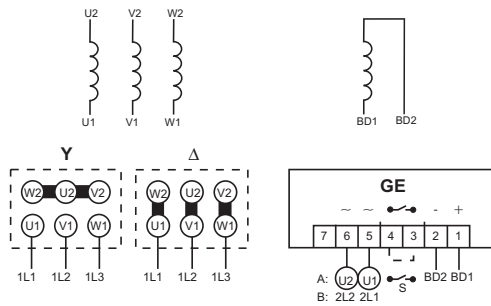
Motor connection ends connected to the terminal board as shown.

028 857 84

02885784.eps

Dual voltage motor (1:√3)

Y high voltage Δ low voltage
Brake coil rated for the low voltage.



A: Common power supply to motor and brake



Not suitable for inverter operation.

B: Separate power supply to brake

For inverter operation, connect motor with Y or Δ connection according to inverter settings.

Switch-off in the DC circuit

- Remove jumper between terminals 3 and 4.
- Connect a contactor between terminals 3 and 4.

Switch-off in the AC circuit

- Jumper between terminals 3 and 4.
- Contactor in the power line behind terminal 5.

Motor current switch-off

Jumper between terminals 3 and 4

→ **not possible for separate power supply to the brake.**

Motor supplied with:

- Jumper parts to connect the motor winding with Y or Δ connection enclosed.
- Brake connected to terminals 1 and 2 of the GE module.
- Jumper between terminals 3 and 4 of the GE module.
- **Line operation:** GE module connected with the motor winding according to variant A.
- **Inverter operation or separate power supply to the brake:**
 - GE module **not** connected to the motor winding.
 - Power supply by the customer according to variant B.

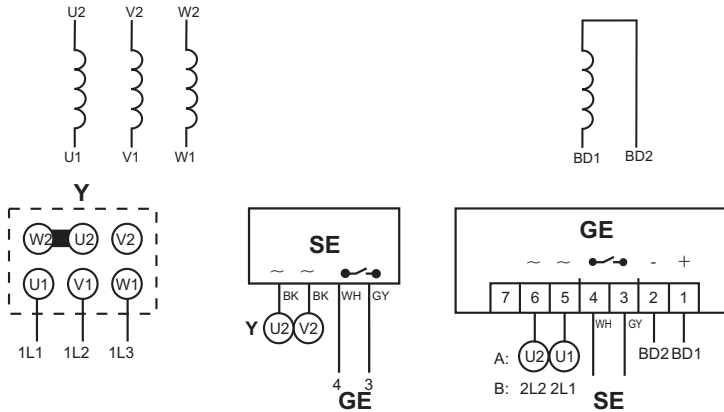
03785784.eps

037 857 84

Motor for one line voltage

- A: Common power supply to motor and brake**
- B: Separate power supply to brake**

Brake coil rated for the phase voltage.



Switch-off in the DC circuit dependent on motor current



Not suitable for inverter operation.

03785884.eps

Motor supplied with:

- Jumper parts to connect the motor winding with Y connection enclosed.
- Brake connected to terminals 1 and 2 of the GE module.
- SE module connected to terminals 3 and 4 of the GE module.
- SE module connected with the motor winding according to variant Y.
- **Line operation:** GE module connected with the motor winding according to variant A.
- **Separate power supply to brake:**
 - GE module **not** connected to the motor winding.
 - Power supply by the customer according to variant B.

037 858 84

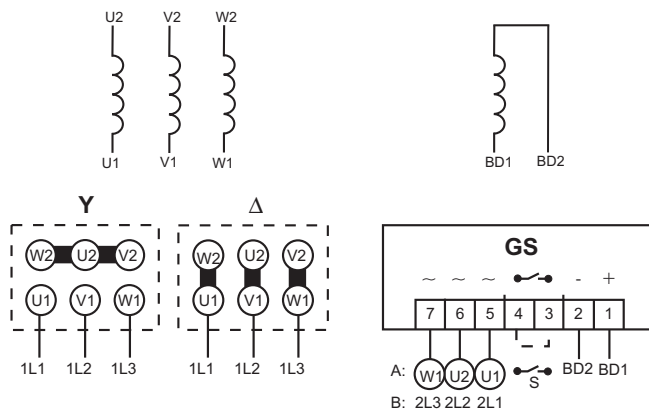
Dual voltage motor (1:√3)

Y high voltage Δ low voltage
Brake coil rated for the low voltage.

A: Common power supply to motor and brake



Not suitable for inverter operation.



B: Separate power supply to brake

For inverter operation, connect motor with Y or Δ connection according to inverter settings.

Switch-off in the DC circuit

- Remove jumper between terminals 3 and 4.
- Connect a contactor between terminals 3 and 4.

Switch-off in the AC circuit

- Jumper between terminals 3 and 4.
- Contactors in the power lines behind terminals 5 and 6.

Motor current switch-off

Jumper between terminals 3 and 4

→ **not possible for separate power supply to the brake.**

Motor supplied with:

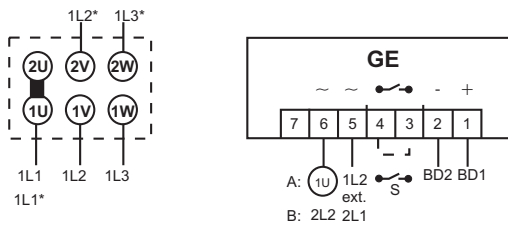
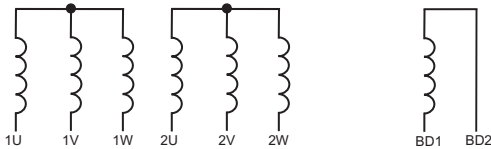
- Jumper parts to connect the motor winding with Y or Δ connection enclosed.
- Brake connected to terminals 1 and 2 of the GS module.
- Jumper between terminals 3 and 4 of the GS module.
- **Line operation:** GS module connected with the motor winding according to variant A.
- **Inverter operation or separate power supply to the brake:**
 - GS module **not** connected to the motor winding.
 - Power supply by the customer according to variant B.

03785984.eps

037 859 84

Motor for one line voltage, pole-changing, separate windings

* = Supply to high-speed winding via external switch-over
 1U, 1V, 1W for low speed
 2U, 2V, 2W for high speed



Motor supplied with:

- Jumper parts to connect the motor winding enclosed.
- Brake connected to terminals 1 and 2 of the GE module.
- Jumper between terminals 3 and 4 of the GE module.
- **Line operation:** GE module connected with the motor winding according to variant A. (1U connected to terminal 6; terminal 5 free).

Important The brake will not function without an external power supply to terminal 5 of the GE module.

- **Separate power supply to brake:**
 - GE module **not** connected to the motor winding.
 - Power supply by the customer according to variant B.

03786084.eps

A: Common power supply to motor and brake



Not suitable for inverter operation.

B: Separate power supply to brake

Switch-off in the DC circuit

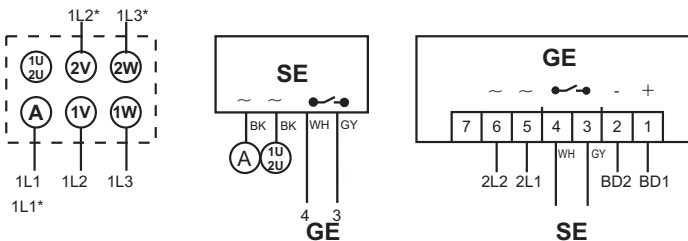
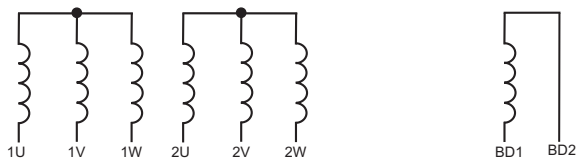
- Remove jumper between terminals 3 and 4.
- Connect a contactor between terminals 3 and 4.

Switch-off in the AC circuit

- Jumper between terminals 3 and 4.
- Contactor in the power line behind terminal 5.

037 860 84

Motor for one line voltage, pole-changing, separate windings Separate power supply to brake



Motor supplied with:

- Motor winding connected as in connection diagram (1U and 2U connected to one terminal)
- Brake connected to terminals 1 and 2 of the GE module.
- SE module connected to terminals 3 and 4 of the GE module.
- SE module connected with the motor winding via intermediate terminal A and terminal 1U 2U

Important The brake will not function without a separate power supply to terminals 5 and 6 of the GE module.

03786144.eps

* = Supply to high speed winding via external switch-over.

1U, 1V, 1W for low speed
 2U, 2V, 2W for high speed

Switch-off in the DC circuit dependent on motor current

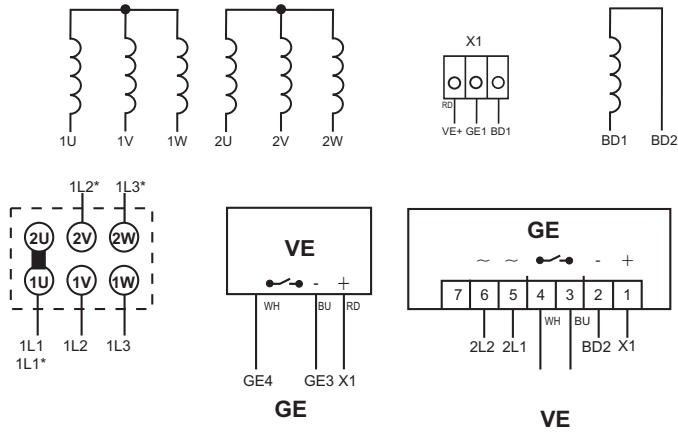


Not suitable for inverter operation.

(A) = Intermediate terminal

037 861 84

Motor for one line voltage, pole-changing, separate windings
Separate power supply to brake



* = Supply to high speed winding via external switch-over.

1U, 1V, 1W for low speed
 2U, 2V, 2W for high speed

Voltage-dependent switch-off in the DC circuit

03786244.eps

Motor supplied with:

- Jumper parts to connect the motor winding enclosed.
- Brake connected to terminals 1 and 2 of the GE module.
- VE module connected to terminals 1, 3 and 4 of the GE module.

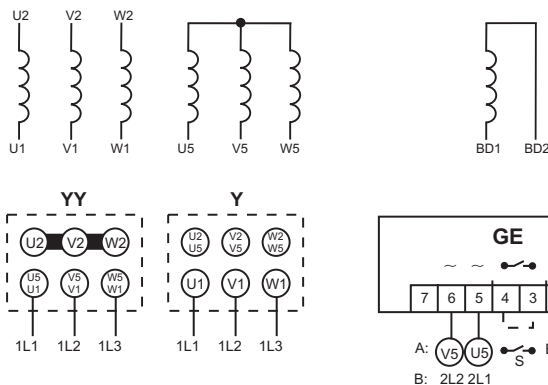
Important: The brake will not function without a separate power supply to terminals 5 and 6 of the GE module.

037 862 84

Dual voltage motor 1:2

YY low voltage

Y high voltage



A: Common power supply to motor and brake

Brake coil rated for the low voltage.



Not suitable for inverter operation.

B: Separate power supply to brake

For inverter operation, connect the motor with YY or Y connection according to inverter settings.

Switch-off in the DC circuit

- Remove jumper between terminals 3 and 4
- Connect a contactor between terminals 3 and 4

Switch-off in the AC circuit

- Jumper between terminals 3 and 4
- Contactor in the power line behind terminal 5

Motor current switch-off

Jumper between terminals 3 and 4

→ **not possible for separate power supply to the brake.**

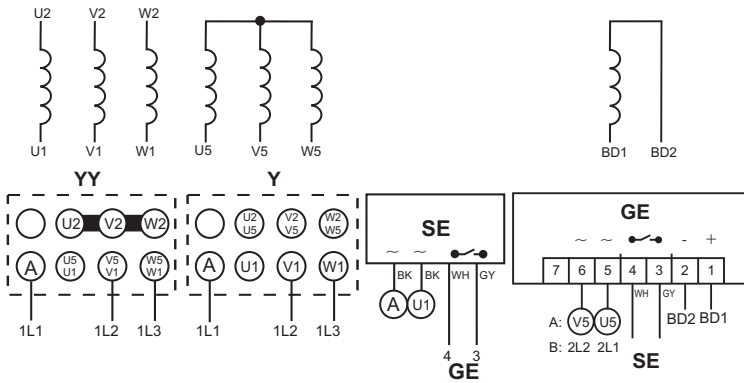
03786344.eps

Motor supplied with:

- Motor winding connected with Y connection.
- Jumper parts to connect the motor winding with YY connection enclosed.
- Brake connected to terminals 1 and 2 of the GE module.
- Jumper between terminals 3 and 4 of the GE module.
- **Line operation:** GE module connected with the motor winding according to variant A.
- **Inverter operation or separate power supply to the brake:**
 - GE module **not** connected to the motor winding.
 - Power supply by the customer according to variant B.

037 863 84

Dual voltage motor 1:2



YY low voltage
Y high voltage

- A: Common power supply to motor and brake**
Brake coil rated for the low voltage
- B: Separate power supply to brake**

Switch-off in the DC circuit dependent on motor current



Not suitable for inverter operation.

A = Intermediate terminal

03786484.eps

Motor supplied with:

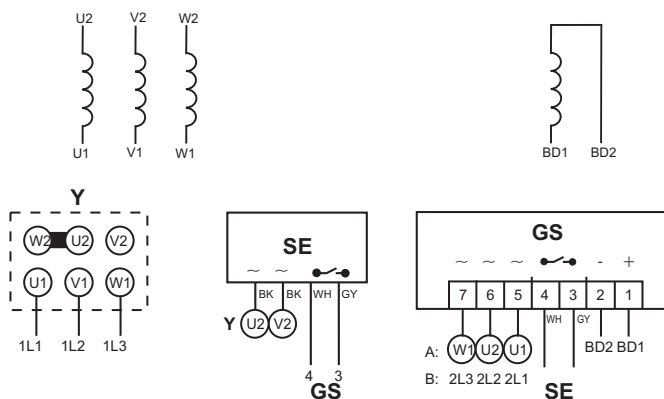
- Motor winding connected with Y connection.
- Jumper parts to connect the motor winding with YY connection enclosed.
- Brake connected to terminals 1 and 2 of the GE module.
- SE module connected to terminals 3 and 4 of the GE module.
- SE module connected with intermediate terminal A and the motor winding via U1.
- **Line operation:** GE module connected with the motor winding according to variant A.
- **Separate power supply to brake:**
 - GE module **not** connected to the motor winding.
 - Power supply by the customer according to variant B.

037 864 84

Motor for one line voltage

- A: Common power supply to motor and brake**
- B: Separate power supply to brake**

Brake coil rated for the phase voltage.



Switch-off in the DC circuit dependent on motor current



Not suitable for inverter operation.

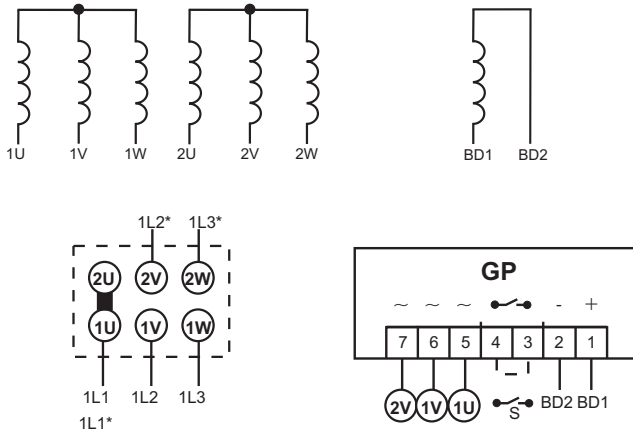
Motor supplied with:

- Jumper parts to connect the motor winding with Y connection enclosed.
- Brake connected to terminals 1 and 2 of the GS module.
- SE module connected to terminals 3 and 4 of the GS module.
- SE module connected with the motor winding according to variant Y.
- **Line operation:** GS module connected with the motor winding according to variant A.
- **Separate power supply to brake:**
 - GS module **not** connected to the motor winding.
 - Power supply by the customer according to variant B.

03786584.eps

037 865 84

Motor for one line voltage, pole-changing, separate windings
Common motor and brake power supply



03787284.eps

* = Supply to high speed winding via external switch-over.

1U, 1V, 1W for low speed
 2U, 2V, 2W for high speed



Not suitable for inverter operation.

Switch-off in the DC circuit

- Remove jumper between terminals 3 and 4
- Connect a contactor between terminals 3 and 4

Switch-off in the AC circuit

- Jumper between terminals 3 and 4
- Contactor in the power line behind terminal 5

Motor current switch-off

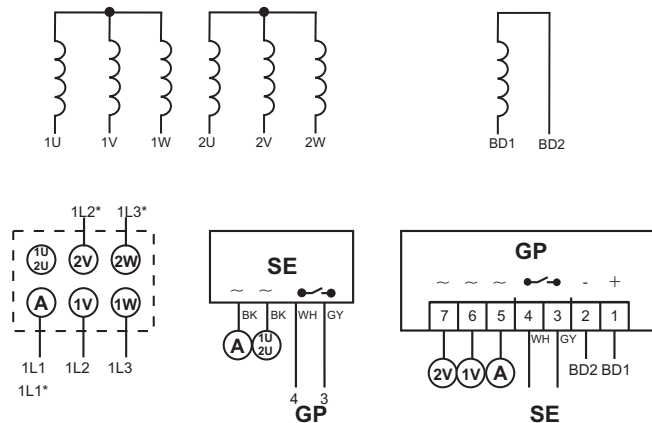
Jumper between terminals 3 and 4

Motor supplied with:

- Jumper parts to connect the motor winding enclosed.
- Brake connected to terminals 1 and 2 of the GP module.
- Jumper between terminals 3 and 4 of the GP module.
- GP module connected with the motor winding as in the connection diagram.

037 872 84

Motor for one line voltage, pole-changing, separate windings
Common motor and brake power supply



03787384.eps

* = Supply to high speed winding via external switch-over.

1U, 1V, 1W for low speed
 2U, 2V, 2W for high speed

Switch-off in the DC circuit dependent on motor current



Not suitable for inverter operation.

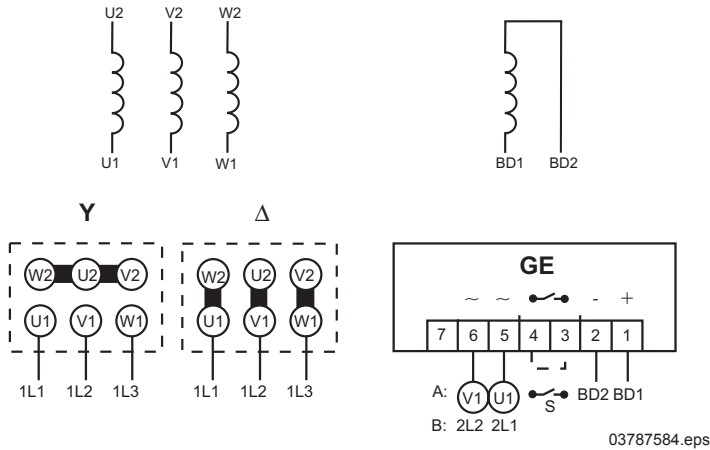
(A) = Intermediate terminal

Motor supplied with:

- Motor winding connected as in connection diagram (1U and 2U connected to one terminal).
- Brake connected to terminals 1 and 2 of the GP module.
- SE module connected to terminals 3 and 4 of the GP module.
- SE module connected with intermediate terminal A and the motor winding via terminal 1U 2U.
- GP module connected with the motor winding and intermediate terminal A as in the connection diagram.

037 873 84

Motor for one line voltage



Motor supplied with:

- Jumper parts to connect the motor winding with Y or Δ connection enclosed.
- Brake connected to terminals 1 and 2 of the GE module.
- Jumper between terminals 3 and 4 of the GE module.
- **Line operation:** GE module connected with the motor winding according to variant A.
- **Inverter operation or separate power supply to the brake:**
 - GE module **not** connected to the motor winding.
 - Power supply by the customer according to variant B.

A: Common power supply to motor and brake



Not suitable for inverter operation.

B: Separate power supply to brake

For inverter operation, connect motor with Y or Δ connection according to inverter settings.

Switch-off in the DC circuit

- Remove jumper between terminals 3 and 4.
- Connect a contactor between terminals 3 and 4.

Switch-off in the AC circuit

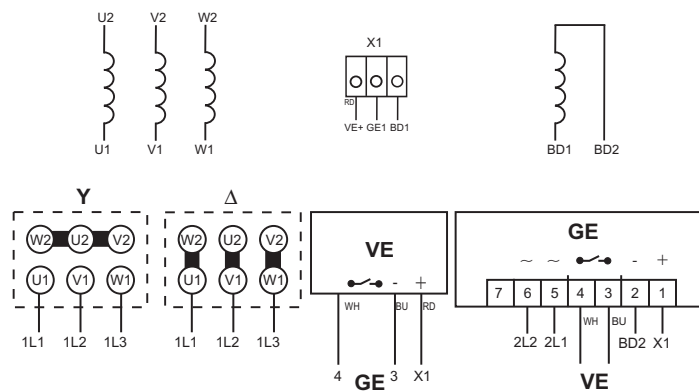
- Jumper between terminals 3 and 4
- Contactor in the power line behind terminal 5.

Motor current switch-off

Jumper between terminals 3 and 4
 → **not possible for separate power supply to the brake.**

037 875 84

Motor for one line voltage or dual voltage motor (1:√3)



Motor supplied with:

- Jumper parts to connect the motor winding with Y or Δ connection enclosed.
- Brake connected to terminals 1 and 2 of the GE module.
- VE module connected to terminals 1, 3 and 4 of the GE module.

Important: The brake will not function without a separate power supply to terminals 5 and 6 of the GE module.

Y high voltage

Δ low voltage

Voltage-dependent switch-off in the DC circuit

Separate power supply to brake

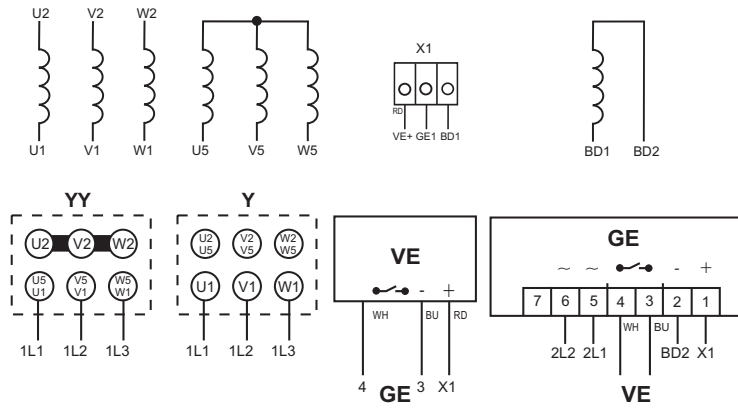
For inverter operation, connect the motor with Y or Δ connection according to inverter settings.

03787644.eps

037 876 84

Dual voltage motor 1:2

YY low voltage
Y high voltage



Voltage-dependent switch-off in the DC circuit

Separate power supply to brake

For inverter operation, connect motor with YY or Y connection according to inverter settings.

03788184.eps

Motor supplied with:

- Motor winding connected with Y connection
- Jumper parts to connect the motor winding with YY connection enclosed.
- Brake connected to terminals 1 and 2 of the GE module.
- VE module connected to terminals 1, 3 and 4 of the GE module.

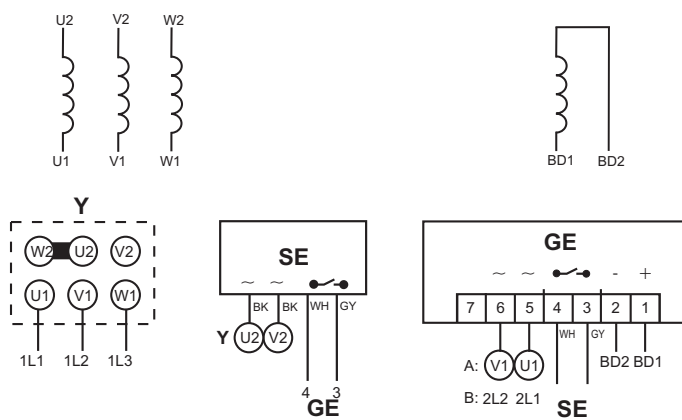
Important: The brake will not function without a separate power supply to terminals 5 and 6 of the GE module.

037 881 84

Motor for one line voltage

- A: Common power supply to motor and brake**
- B: Separate power supply to brake**

Switch-off in the DC circuit dependent on motor current



Not suitable for inverter operation.

03788284.eps

Motor supplied with:

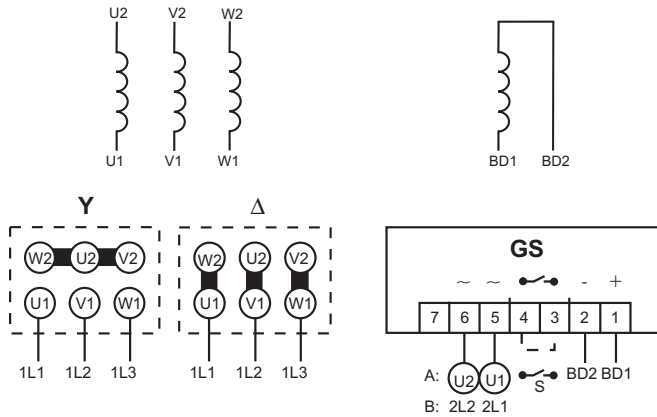
- Jumper parts to connect the motor winding with Y connection enclosed.
- Brake connected to terminals 1 and 2 of the GE module.
- SE module connected to terminals 3 and 4 of the GE module.
- SE module connected with the motor winding according to variant Y.
- **Line operation:** GE module connected with the motor winding according to variant A.
- **Separate power supply to brake:**
 - GE module **not** connected to the motor winding.
 - Power supply by the customer according to variant B.

037 882 84

Dual voltage motor (1:√3)

Y high voltage Δ low voltage

Brake coil rated for the low voltage.



Motor supplied with:

- Jumper parts to connect the motor winding with Y or Δ connection enclosed.
- Brake connected to terminals 1 and 2 of the GS module.
- Jumper between terminals 3 and 4 of the GS module.
- **Line operation:** GS module connected with the motor winding according to variant A.
- **Inverter operation or separate power supply to the brake:**
 - GS module **not** connected to the motor winding.
 - Power supply by the customer according to variant B.

03788384.eps

A: Common power supply to motor and brake



Not suitable for inverter operation.

B: Separate power supply to brake

For inverter operation, connect motor with Y or Δ connection according to inverter settings.

Switch-off in the DC circuit

- Remove jumper between terminals 3 and 4
- Connect a contactor between terminals 3 and 4

Switch-off in the AC circuit

- Jumper between terminals 3 and 4
- Contactor in the power line behind terminal 5

Motor current switch-off

Jumper between terminals 3 and 4

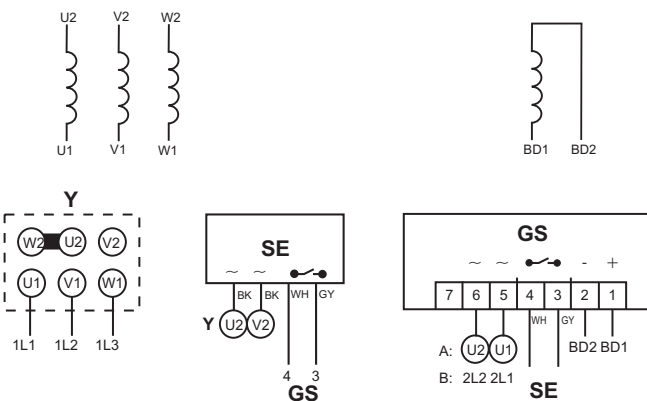
→ **not possible for separate power supply to the brake.**

037 883 84

Motor for one line voltage

A: Common power supply to motor and brake

B: Separate power supply to brake



Motor supplied with:

- Jumper parts to connect the motor winding with Y connection enclosed.
- Brake connected to terminals 1 and 2 of the GS module.
- SE module connected to terminals 3 and 4 of the GS module.
- SE module connected with the motor winding according to variant Y.
- **Line operation:** GS module connected with the motor winding according to variant A.
- **Separate power supply to brake:**
 - GS module **not** connected to the motor winding.
 - Power supply by the customer according to variant B.

03788484.eps

Brake coil rated for the phase voltage.

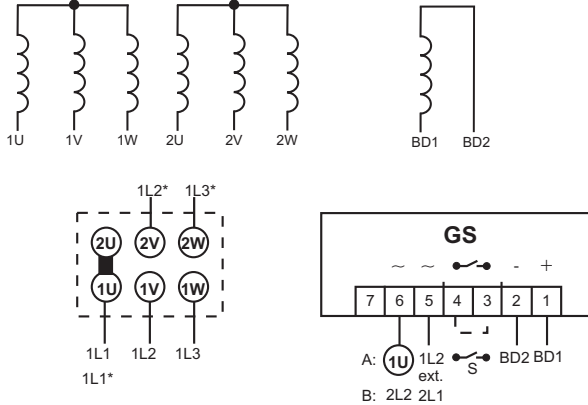
Switch-off in the DC circuit dependent on motor current



Not suitable for inverter operation.

Motor for one line voltage, pole-changing, separate windings

* = Supply to high-speed winding via external switch-over
 1U, 1V, 1W for low speed
 2U, 2V, 2W for high speed



A: Common power supply to motor and brake



Not suitable for inverter operation.

B: Separate power supply to brake

Switch-off in the DC circuit

- Remove jumper between terminals 3 and 4.
- Connect a contactor between terminals 3 and 4.

Switch-off in the AC circuit

- Jumper between terminals 3 and 4.
- Contactor in the power line behind terminal 5.

03788684.eps

Motor supplied with:

- Jumper parts to connect the motor winding enclosed.
- Brake connected to terminals 1 and 2 of the GS module.
- Jumper between terminals 3 and 4 of the GS module.
- **Line operation:** GS module connected with the motor winding according to variant A (1U connected to terminal 6; terminal 5 free).

Important: The brake will not function without an external power supply to terminal 5 of the GS module.

Separate power supply to brake:

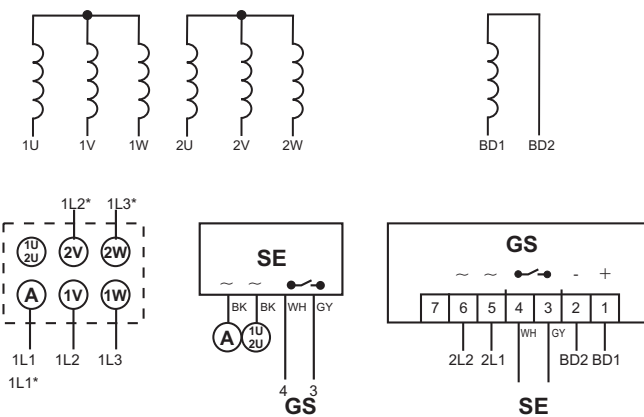
- GS module **not** connected to the motor winding.
- Power supply by the customer according to variant B.

037 886 84

**Motor for one line voltage, pole-changing, separate windings
 Separate power supply to brake**

* = Supply to high-speed winding via external switch-over.

1U, 1V, 1W for low speed
 2U, 2V, 2W for high speed



Switch-off in the DC circuit dependent on motor current



Not suitable for inverter operation.

(A) = Intermediate terminal

03788784.eps

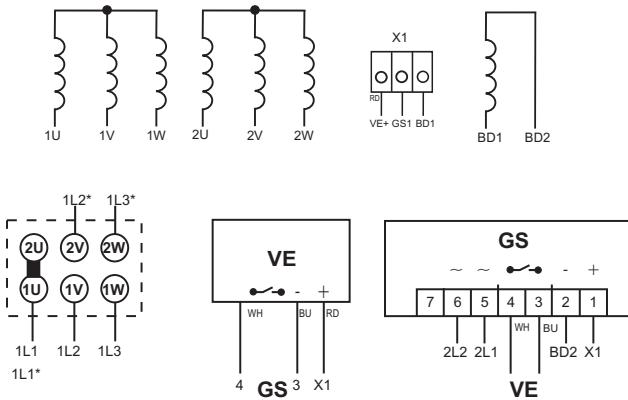
Motor supplied with:

- Motor winding connected as in connection diagram (1U and 2U connected to one terminal).
- Brake connected to terminals 1 and 2 of the GS module.
- SE module connected to terminals 3 and 4 of the GS module.
- SE module connected with the motor winding via intermediate terminal A and terminal 1U 2U.

Important: The brake will not function without a separate power supply to terminals 5 and 6 of the GS module.

037 887 84

Motor for one line voltage, pole-changing, separate windings
Separate power supply to brake



* = Supply to high-speed winding via external switch-over.

1U, 1V, 1W for low speed
 2U, 2V, 2W for high speed

Voltage-dependent switch-off in the DC circuit

03788884.eps

Motor supplied with:

- Jumper parts to connect the motor winding enclosed.
- Brake connected to terminals 1 and 2 of the GS module.
- VE module connected to terminals 1, 3 and 4 of the GS module.

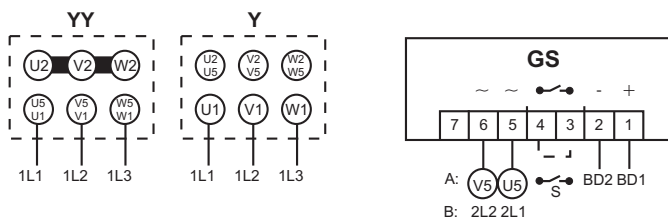
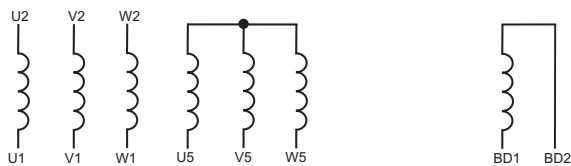
Important: The brake will not function without a separate power supply to terminals 5 and 6 of the GS module.

037 888 84

Dual voltage motor (1:2)

YY low voltage

Y high voltage



A: Common power supply to motor and brake

Brake coil rated for the low voltage.



Not suitable for inverter operation.

B: Separate power supply to brake

For inverter operation, connect the motor with YY or Y connection according to inverter settings

Switch-off in the DC circuit

- Remove jumper between terminals 3 and 4.
- Connect a contactor between terminals 3 and 4.

Switch-off in the AC circuit

- Jumper between terminals 3 and 4
- Contactor in the power line behind terminal 5.

Motor current switch-off

Jumper between terminals 3 and 4

→ **not possible for separate power supply to the brake.**

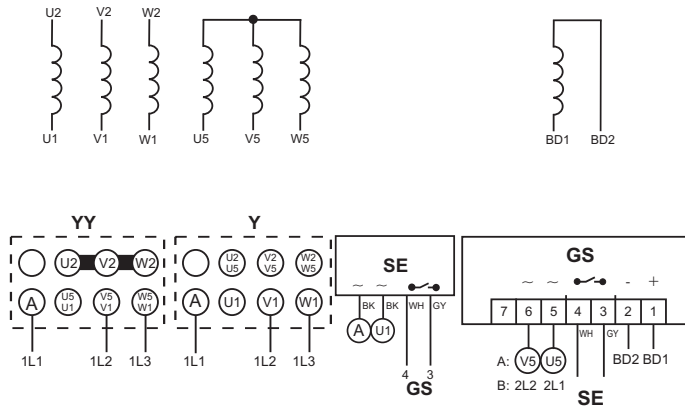
Motor supplied with:

- Motor winding connected with Y connection.
- Jumper parts to connect the motor winding with YY connection enclosed.
- Brake connected to terminals 1 and 2 of the GS module.
- Jumper between terminals 3 and 4 of the GS module.
- **Line operation:** GS module connected with the motor winding according to variant A.
- **Inverter operation or separate power supply to the brake:**
 - GS module **not** connected to the motor winding.
 - Power supply by the customer according to variant B.

03788984.eps

037 889 84

Dual voltage motor (1:2)



YY low voltage
Y high voltage

- A: Common power supply to motor and brake**
Brake coil rated for the low voltage.
- B: Separate power supply to brake**

Switch-off in the DC circuit dependent on motor current



Not suitable for inverter operation.

Motor supplied with:

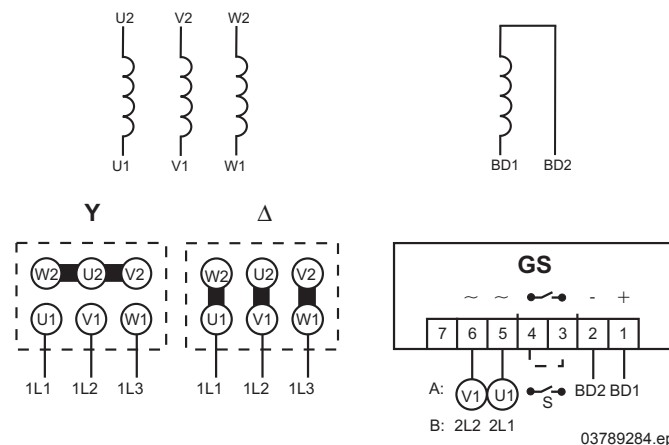
- Motor winding connected with Y connection.
- Jumper parts to connect the motor winding with YY connection enclosed.
- Brake connected to terminals 1 and 2 of the GS module.
- SE module connected to terminals 3 and 4 of the GS module.
- SE module connected with intermediate terminal A and the motor winding via U1.
- **Line operation:** GS module connected with the motor winding according to variant A.
- **Separate power supply to brake:**
 - GS module **not** connected to the motor winding.
 - Power supply by the customer according to variant B.

03789084.eps

A = Intermediate terminal

037 890 84

Motor for one line voltage



A: Common power supply to motor and brake



Not suitable for inverter operation.

B: Separate power supply to brake

For inverter operation, connect motor with Y or Δ connection according to inverter settings

Switch-off in the DC circuit

- Remove jumper between terminals 3 and 4.
- Connect a contactor between terminals 3 and 4.

Switch-off in the AC circuit

- Jumper between terminals 3 and 4
- Contactor in the power line behind terminal 5.

Motor current switch-off

Jumper between terminals 3 and 4

→ **not possible for separate power supply to the brake.**

Motor supplied with:

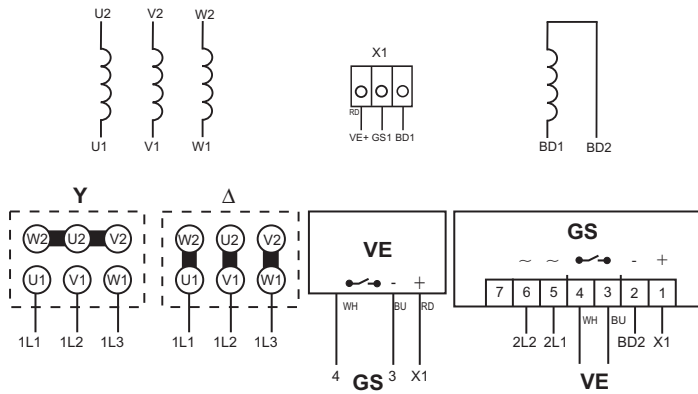
- Jumper parts to connect the motor winding with Y or Δ connection enclosed.
- Brake connected to terminals 1 and 2 of the GS module.
- Jumper between terminals 3 and 4 of the GS module.
- **Line operation:** GS module connected with the motor winding according to variant A.
- **Inverter operation or separate power supply to the brake:**
 - GS module **not** connected to the motor winding.
 - Power supply by the customer according to variant B.

03789284.eps

037 892 84

Motor for one line voltage or dual voltage motor (1:√3)

Y high voltage
 Δ low voltage



Separate power supply to brake

For inverter operation, connect motor with Y or Δ connection according to inverter settings.

Voltage-dependent switch-off in the DC circuit

03789384.eps

Motor supplied with:

- Jumper parts to connect the motor winding with Y or Δ connection enclosed.
- Brake connected to terminals 1 and 2 of the GS module.
- VE module connected to terminals 1, 3 and 4 of the GS module.

Important: The brake will not function without a separate power supply to terminals 5 and 6 of the GS module.

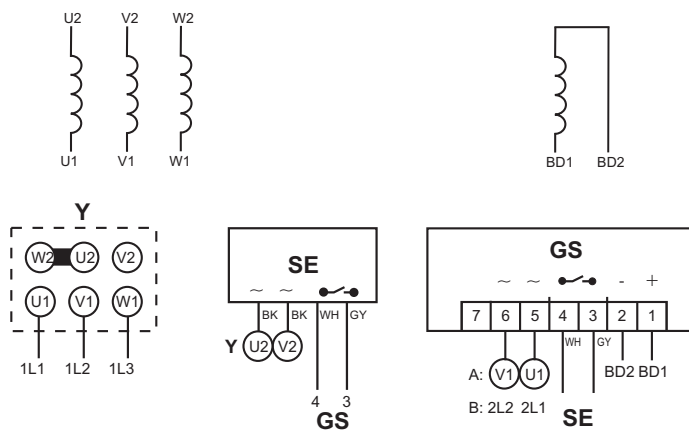
037 893 84

Motor for one line voltage

A: Common power supply to motor and brake

B: Separate power supply to brake

Switch-off in the DC circuit dependent on motor current



Not suitable for inverter operation.

Motor supplied with:

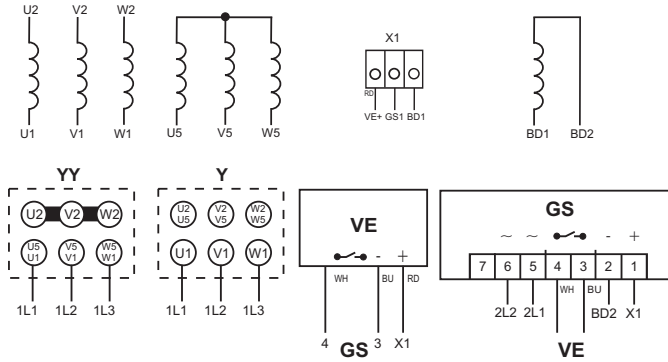
- Jumper parts to connect the motor winding with Y connection enclosed.
- Brake connected to terminals 1 and 2 of the GS module.
- SE module connected to terminals 3 and 4 of the GS module.
- SE module connected with the motor winding according to variant Y.
- **Line operation:** GS module connected with the motor winding according to variant A.
- **Separate power supply to brake:**
 - GS module **not** connected to the motor winding.
 - Power supply by the customer according to variant B.

03789484.eps

037 894 84

Dual voltage motor (1:2)

YY low voltage
Y high voltage



Separate power supply to brake

For inverter operation, connect the motor with YY or Y connection according to inverter settings.

Voltage-dependent switch-off in the DC circuit

03789684.eps

Motor supplied with:

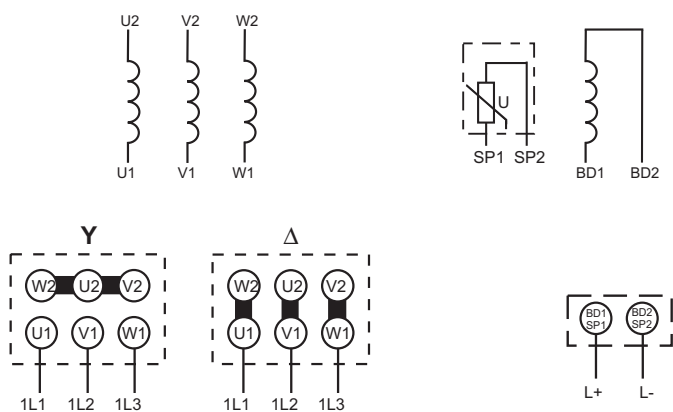
- Motor winding connected with Y connection.
- Jumper parts to connect the motor winding with YY connection enclosed.
- Brake connected to terminals 1 and 2 of the GS module.
- VE module connected to terminals 1, 3 and 4 of the GS module.

Important: The brake will not function without a separate power supply to terminals 5 and 6 of the GS module.

037 896 84

Motor for one line voltage or dual voltage motor (1:√3)

Y high voltage
Δ low voltage



Separate DC supply to brake

For inverter operation, connect motor with Y or Δ connection according to inverter settings.

03789784.eps

Motor supplied with:

- Jumper parts to connect the motor winding with Y or Δ connection enclosed.
- Brake connected to Euro terminals.

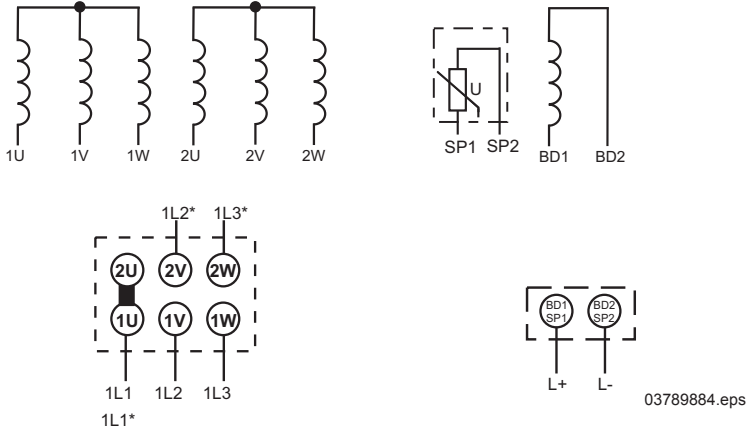
Important: The brake will not function without a separate DC supply to the brake.

037 897 84

**Motor for one line voltage, pole-changing, separate windings
Separate DC supply to brake**

* = Supply to high-speed winding via external switch-over.

1U, 1V, 1W for low speed
2U, 2V, 2W for high speed



Motor supplied with:

- Jumper parts to connect the motor winding enclosed.
- Brake connected to Euro terminals.

Important: The brake will not function without a separate DC supply to the brake.

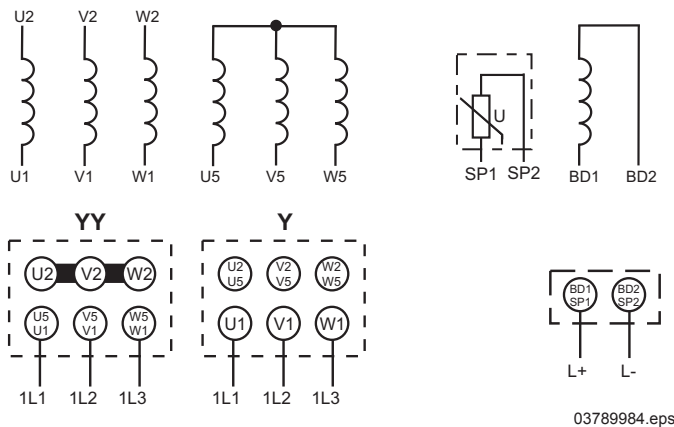
037 898 84

Dual voltage motor (1:2)

YY low voltage
Y high voltage

Separate DC supply to brake

For inverter operation, connect the motor with YY or Y connection according to inverter settings.



Motor supplied with:

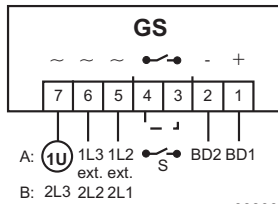
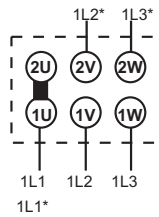
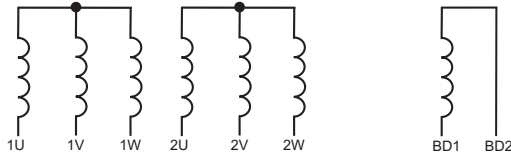
- Motor winding connected with Y connection.
- Jumper parts to connect the motor winding with YY connection enclosed.
- Brake connected to Euro terminals.

Important: The brake will not function without a separate DC supply to the brake.

037 899 84

Motor for one line voltage, pole-changing, separate windings

* = Supply to high-speed winding via external switch-over
 1U, 1V, 1W for low speed
 2U, 2V, 2W for high speed



03800184.eps

Motor supplied with:

- Jumper parts to connect the motor winding enclosed.
- Brake connected to terminals 1 and 2 of the GS module.
- Jumper between terminals 3 and 4 of the GS module.
- **Line operation:** GS module connected with the motor winding according to variant A (1U connected to terminal 7; terminals 5 and 6 free).

Important: The brake will not function without an external power supply to terminals 5 and 6 of the GS module.

- **Separate power supply to brake:**
 - GS module **not** connected to the motor winding.
 - Power supply by the customer according to variant B.

A: Common power supply to motor and brake



Not suitable for inverter operation.

B: Separate power supply to brake

Switch-off in the DC circuit

- Remove jumper between terminals 3 and 4.
- Connect a contactor between terminals 3 and 4.

Switch-off in the AC circuit

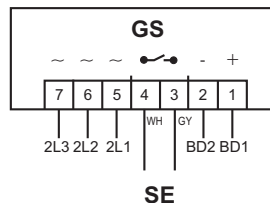
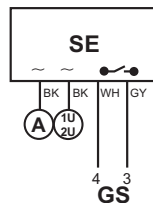
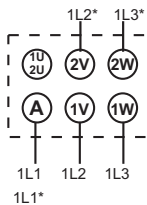
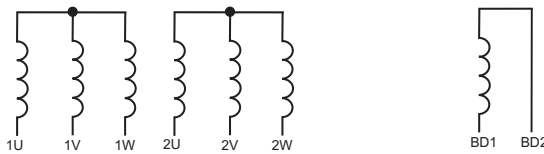
- Jumper between terminals 3 and 4.
- Contactors in the power lines behind terminals 5 and 6.

038 001 84

Motor for one line voltage, pole-changing, separate windings
Separate power supply to brake

* = Supply to high-speed winding via external switch-over.

1U, 1V, 1W for low speed
 2U, 2V, 2W for high speed



03800284.eps

Motor supplied with:

- Motor winding connected as in connection diagram (1U and 2U connected to one terminal).
- Brake connected to terminals 1 and 2 of the GS module.
- SE module connected to terminals 3 and 4 of the GS module.
- SE module connected with the motor winding via intermediate terminal A and terminal 1U 2U.

Important: The brake will not function without a separate power supply to terminals 5, 6 and 7 of the GS module.

Switch-off in the DC circuit dependent on motor current

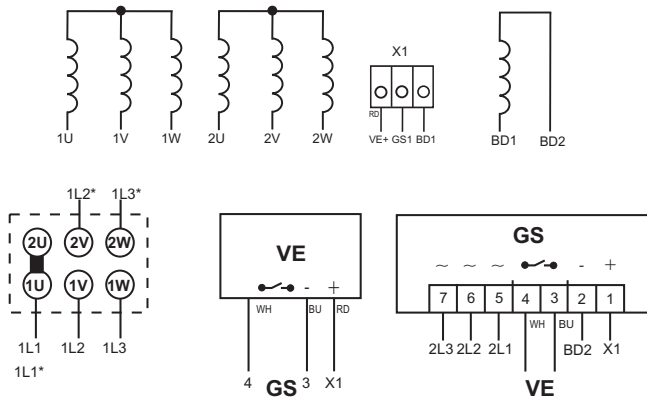


Not suitable for inverter operation.

(A) = Intermediate terminal

038 002 84

**Motor for one line voltage, pole-changing, separate windings
Separate power supply to brake**



* = Supply to high-speed winding via external switch-over.

1U, 1V, 1W for low speed
2U, 2V, 2W for high speed

Voltage-dependent switch-off in the DC circuit

Motor supplied with:

- Jumper parts to connect the motor winding enclosed.
- Brake connected to terminals 1 and 2 of the GS module.
- VE module connected to terminals 1, 3 and 4 of the GS module.

Important: The brake will not function without a separate power supply to terminals 5, 6 and 7 of the GS module.

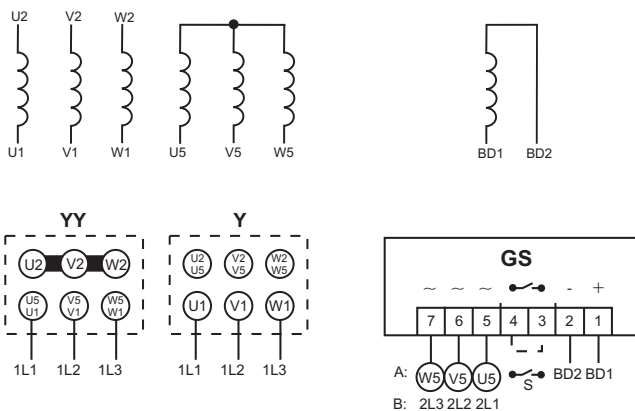
03800384.eps

038 003 84

Dual voltage motor (1:2)

YY low voltage

Y high voltage



A: Common power supply to motor and brake
Brake coil rated for the low voltage.



Not suitable for inverter operation.

B: Separate power supply to brake

For inverter operation, connect the motor with YY or Y connection according to inverter settings

Switch-off in the DC circuit

- Remove jumper between terminals 3 and 4.
- Connect a contactor between terminals 3 and 4.

Switch-off in the AC circuit

- Jumper between terminals 3 and 4.
- Contactors in the power lines behind terminals 5 and 6.

Motor current switch-off

Jumper between terminals 3 and 4

→ **not possible for separate power supply to the brake.**

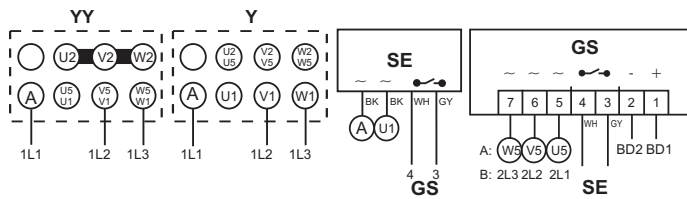
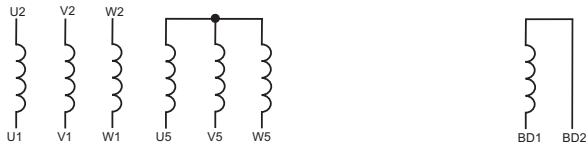
Motor supplied with:

- Motor winding connected with Y connection.
- Jumper parts to connect the motor winding with YY connection enclosed.
- Brake connected to terminals 1 and 2 of the GS module.
- Jumper between terminals 3 and 4 of the GS module.
- **Line operation:** GS module connected with the motor winding according to variant A.
- **Inverter operation or separate power supply to the brake:**
 - GS module **not** connected to the motor winding.
 - Power supply by the customer according to variant B.

03800484.eps

038 004 84

Dual voltage motor (1:2)



Motor supplied with:

- Motor winding connected with Y connection.
- Jumper parts to connect the motor winding with YY connection enclosed.
- Brake connected to terminals 1 and 2 of the GS module.
- SE module connected to terminals 3 and 4 of the GS module.
- SE module connected with intermediate terminal A and the motor winding via U1.
- **Line operation:** GS module connected with the motor winding according to variant A.
- **Separate power supply to brake:**
 - GS module **not** connected to the motor winding.
 - Power supply by the customer according to variant B.

03800584.eps

YY low voltage
Y high voltage

- A: Common power supply to motor and brake**
Brake coil rated for the low voltage.
- B: Separate power supply to brake**

Switch-off in the DC circuit dependent on motor current

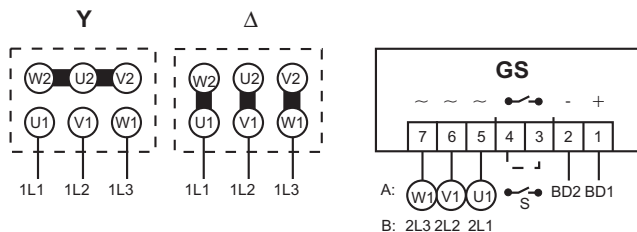


Not suitable for inverter operation.

(A) = Intermediate terminal

038 005 84

Motor for one line voltage



03800684.eps

Motor supplied with:

- Jumper parts to connect the motor winding with Y or Δ connection enclosed.
- Brake connected to terminals 1 and 2 of the GS module.
- Jumper between terminals 3 and 4 of the GS module.
- **Line operation:** GS module connected with the motor winding according to variant A.
- **Inverter operation or separate power supply to the brake:**
 - GS module **not** connected to the motor winding.
 - Power supply by the customer according to variant B.

A: Common power supply to motor and brake



Not suitable for inverter operation.

B: Separate power supply to brake

For inverter operation, connect motor with Y or Δ connection according to inverter settings

Switch-off in the DC circuit

- Remove jumper between terminals 3 and 4.
- Connect a contactor between terminals 3 and 4.

Switch-off in the AC circuit

- Jumper between terminals 3 and 4.
- Contactors in the power lines behind terminals 5 and 6.

Motor current switch-off

Jumper between terminals 3 and 4

→ **not possible for separate power supply to the brake.**

038 006 84

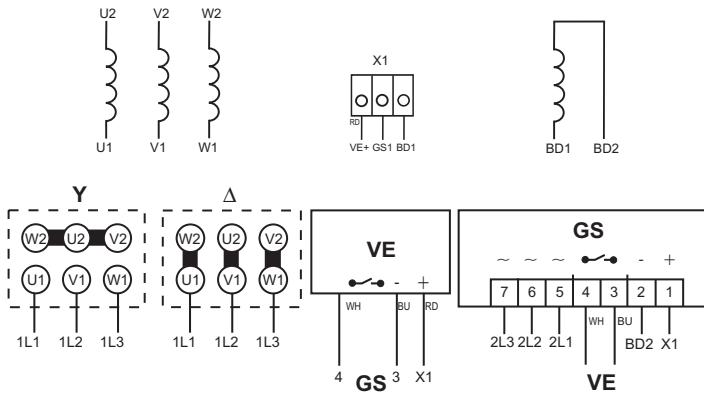
Motor for one line voltage or dual voltage motor (1:√3)

Y high voltage
 Δ low voltage

Separate power supply to brake

For inverter operation, connect motor with Y or Δ connection according to inverter settings.

Voltage-dependent switch-off in the DC circuit



03800784.eps

Motor supplied with:

- Jumper parts to connect the motor winding with Y or Δ connection enclosed.
- Brake connected to terminals 1 and 2 of the GS module.
- VE module connected to terminals 1, 3 and 4 of the GS module.

Important: The brake will not function without a separate power supply to terminals 5, 6 and 7 of the GS module.

038 007 84

Motor for one line voltage

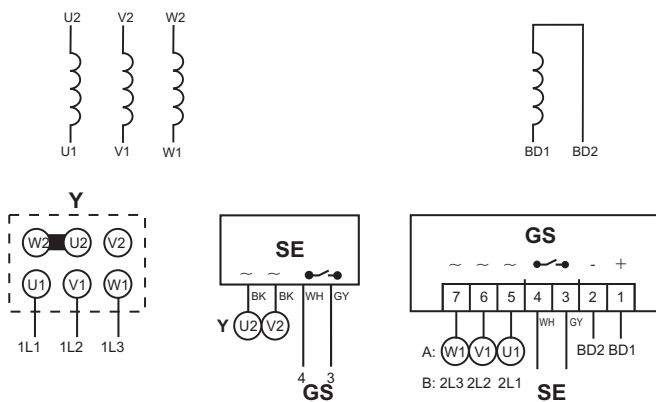
A: Common power supply to motor and brake

B: Separate power supply to brake

Switch-off in the DC circuit dependent on motor current



Not suitable for inverter operation.



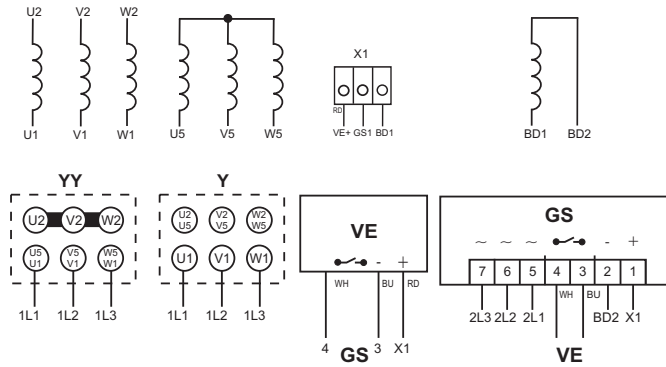
03800884.eps

Motor supplied with:

- Jumper parts to connect the motor winding with Y connection enclosed.
- Brake connected to terminals 1 and 2 of the GS module.
- SE module connected to terminals 3 and 4 of the GS module.
- SE module connected with the motor winding according to variant Y.
- **Line operation:** GS module connected with the motor winding according to variant A.
- **Separate power supply to brake:**
 - GS module **not** connected to the motor winding.
 - Power supply by the customer according to variant B.

038 008 84

Dual voltage motor (1:2)



YY low voltage
Y high voltage

Separate power supply to brake

For inverter operation, connect the motor with YY or Y connection according to inverter settings.

Voltage-dependent switch-off in the DC circuit

03801484.eps

Motor supplied with:

- Motor winding connected with Y connection.
- Jumper parts to connect the motor winding with YY connection enclosed.
- Brake connected to terminals 1 and 2 of the GS module.
- VE module connected to terminals 1, 3 and 4 of the GS module.

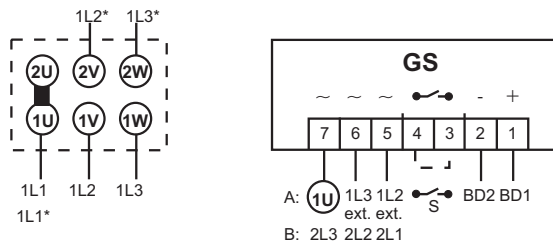
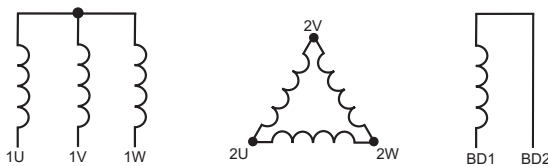
Important: The brake will not function without a separate power supply to terminals 5, 6 and 7 of the GS module.

038 014 84

Motor for one line voltage, pole-changing, separate windings

* = Supply to high-speed winding via external switch-over

1U, 1V, 1W for low speed
2U, 2V, 2W for high speed



A: Common power supply to motor and brake



Not suitable for inverter operation.

B: Separate power supply to brake

Switch-off in the DC circuit

- Remove jumper between terminals 3 and 4.
- Connect a contactor between terminals 3 and 4.

Switch-off in the AC circuit

- Jumper between terminals 3 and 4.
- Contactor in the power line behind terminals 5 and 6.

03801784.eps

Motor supplied with:

- Jumper parts to connect the motor winding enclosed.
- Brake connected to terminals 1 and 2 of the GS module.
- Jumper between terminals 3 and 4 of the GS module.
- **Line operation:** GS module connected with the motor winding according to variant A (1U connected to terminal 7; terminals 5 and 6 free).

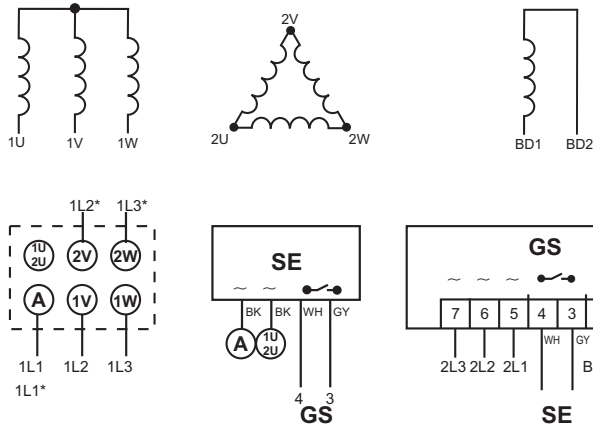
Important: The brake will not function without an external power supply to terminals 5 and 6 of the GS module.

Separate power supply to brake:

- GS module **not** connected to the motor winding.
- Power supply by the customer according to variant B.

038 017 84

**Motor for one line voltage, pole-changing, separate windings
Separate power supply to brake**



* = Supply to high-speed winding via external switch-over.

1U, 1V, 1W for low speed
2U, 2V, 2W for high speed

Switch-off in the DC circuit dependent on motor current



Not suitable for inverter operation.

A = Intermediate terminal

Motor supplied with:

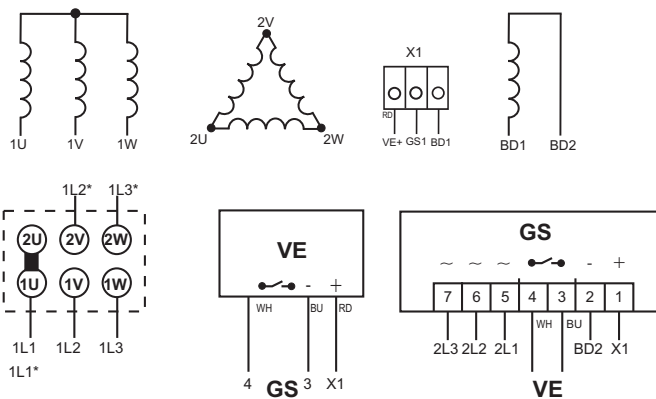
- Motor winding connected as in connection diagram (1U and 2U connected to one terminal).
- Brake connected to terminals 1 and 2 of the GS module.
- SE module connected to terminals 3 and 4 of the GS module.
- SE module connected with the motor winding via intermediate terminal A and terminal 1U 2U.

Important: The brake will not function without a separate power supply to terminals 5, 6 and 7 of the GS module.

03801884.eps

038 018 84

**Motor for one line voltage, pole-changing, separate windings
Separate power supply to brake**



* = Supply to high-speed winding via external switch-over.

1U, 1V, 1W for low speed
2U, 2V, 2W for high speed

Voltage-dependent switch-off in the DC circuit

Motor supplied with:

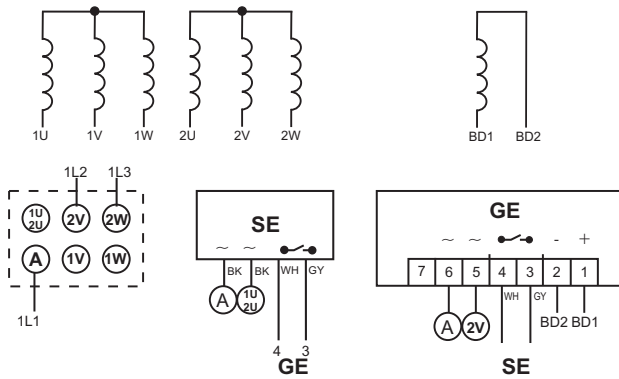
- Jumper parts to connect the motor winding enclosed.
- Brake connected to terminals 1 and 2 of the GS module.
- VE module connected to terminals 1, 3 and 4 of the GS module.

Important: The brake will not function without a separate power supply to terminals 5, 6 and 7 of the GS module.

03802084.eps

038 020 84

Motor for one line voltage, pole-changing, separate windings
Common power supply to motor and brake



03802184.eps

Motor supplied with:

- Motor winding connected as in connection diagram (1U and 2U connected to one terminal).
- Brake connected to terminals 1 and 2 of the GE module.
- SE module connected to terminals 3 and 4 of the GE module.
- SE module connected with the motor winding via intermediate terminal A and terminal 1U 2U.
- GE module connected with the motor winding via intermediate terminal A and terminal 2V.

038 021 84

2U, 2V, 2W for high speed
 Only the high speed winding is used.

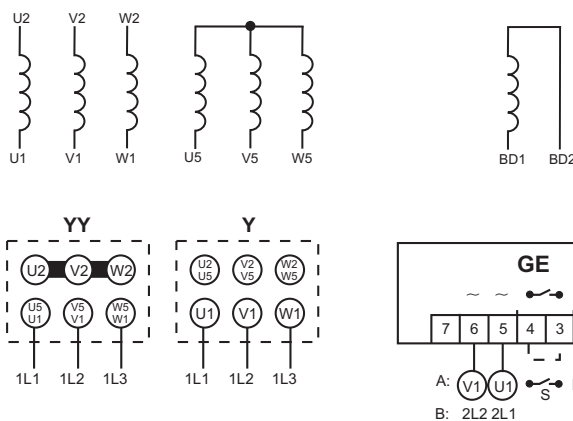
Switch-off in the DC circuit dependent on motor current



Not suitable for inverter operation.

A = Intermediate terminal

Motor for one line voltage or dual voltage motor (1:2)



03818684.eps

Motor supplied with:

- Motor winding connected with Y connection.
- Jumper parts to connect the motor winding with YY connection enclosed.
- Brake connected to terminals 1 and 2 of the GE module.
- Jumper between terminals 3 and 4 of the GE module.
- **Line operation:** GE module connected with the motor winding according to variant A.
- **Inverter operation or separate power supply to the brake:**
 - GE module **not** connected to the motor winding.
 - Power supply by the customer according to variant B.

YY low voltage
 Y high voltage

A: Common power supply to motor and brake.
 Brake coil only rated for the **high** voltage.



Not suitable for inverter operation.

B: Separate power supply to brake.

For inverter operation, connect the motor with YY or Y connection according to inverter settings.

Switch-off in the DC circuit

- Remove jumper between terminals 3 and 4
- Connect a contactor between terminals 3 and 4

Switch-off in the AC circuit

- Jumper between terminals 3 and 4
- Contactor in the power line behind terminal 5

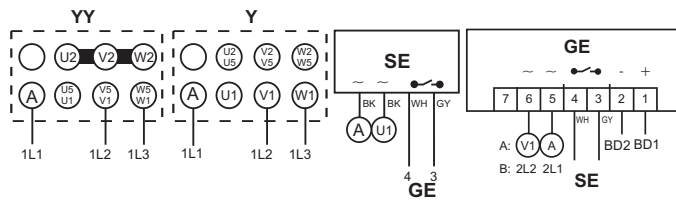
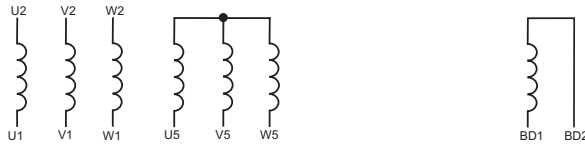
Motor current switch-off

Jumper between terminals 3 and 4

→ **not possible for separate power supply to the brake.**

038 186 84

Motor for one line voltage or dual voltage motor (1:2)



03818784.eps

YY low voltage
Y high voltage

- A:** Common power supply to motor and brake
Brake coil only rated for the high voltage.
- B:** Separate power supply to brake

Switch-off in the DC circuit dependent on motor current



Not suitable for inverter operation.

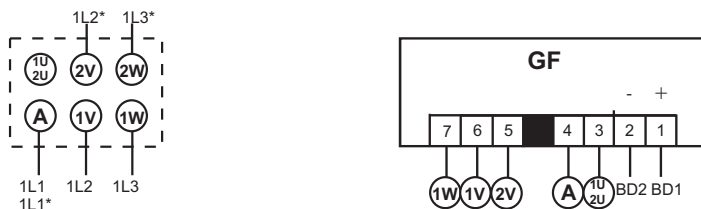
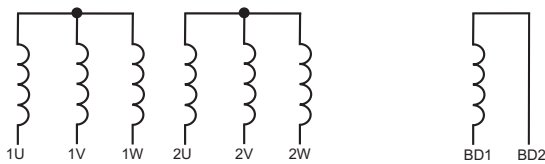
A = Intermediate terminal

Motor supplied with:

- Motor winding connected with Y connection.
- Jumper parts to connect the motor winding with YY connection enclosed.
- Brake connected to terminals 1 and 2 of the GE module.
- SE module connected to terminals 3 and 4 of the GE module.
- SE module connected with intermediate terminal A and the motor winding via U1.
- **Line operation:** GE module connected with the motor winding according to variant A.
- **Separate power supply to brake:**
 - GE module **not** connected to the motor winding.
 - Power supply by the customer according to variant B.

038 187 84

Motor for one line voltage, pole-changing, separate windings



03833784.eps

* = Supply to high speed winding via external switch-over.

1U, 1V, 1W for low speed
2U, 2V, 2W for high speed

Switch-off in the DC circuit dependent on motor current



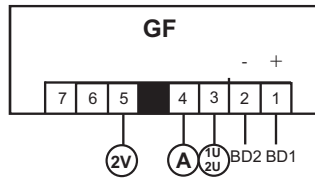
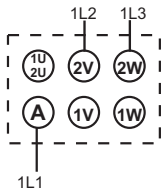
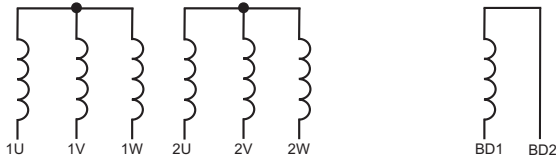
Not suitable for inverter operation.

A = Intermediate terminal

Motor supplied with:

- Motor winding connected as in connection diagram (1U and 2U connected to one terminal)
- Brake connected to terminals 1 and 2 of the GF module.
- GF module connected with the motor winding and intermediate terminal A as in the connection diagram.

Motor for one line voltage, pole-changing, separate windings
Common power supply to motor and brake



03833784.eps

Motor supplied with:

- Motor winding connected as in connection diagram (1U and 2U connected to one terminal)
- Brake connected to terminals 1 and 2 of the GF module.
- GF module connected with the motor winding and intermediate terminal A as in the connection diagram.

2U, 2V, 2W for high speed
 Only the high speed winding is used.

Switch-off in the DC circuit dependent on motor current

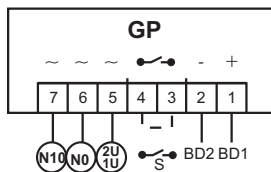
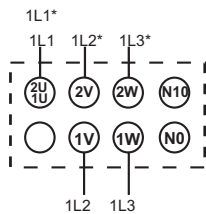
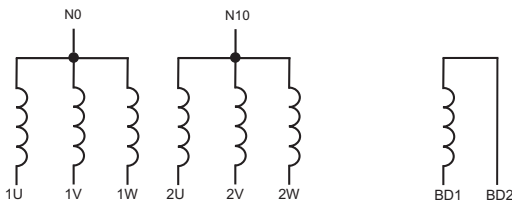


Not suitable for inverter operation.

A = Intermediate terminal

038 338 84

Motor for one line voltage, pole-changing, separate windings



03842084.eps

Motor supplied with:

- Brake connected to terminals 1 and 2 of the GP module.
- Jumper connected to terminals 3 and 4 of the GP module.
- GP module connected with the motor winding as in the connection diagram.

* = Supply to high speed winding via external switch-over.

1U, 1V, 1W for low speed
 2U, 2V, 2W for high speed

Common motor and brake power supply



Not suitable for inverter operation.

Switch-off in the DC circuit

- Remove jumper between terminals 3 and 4.
- Connect a contactor between terminals 3 and 4.

Switch-off in the AC circuit

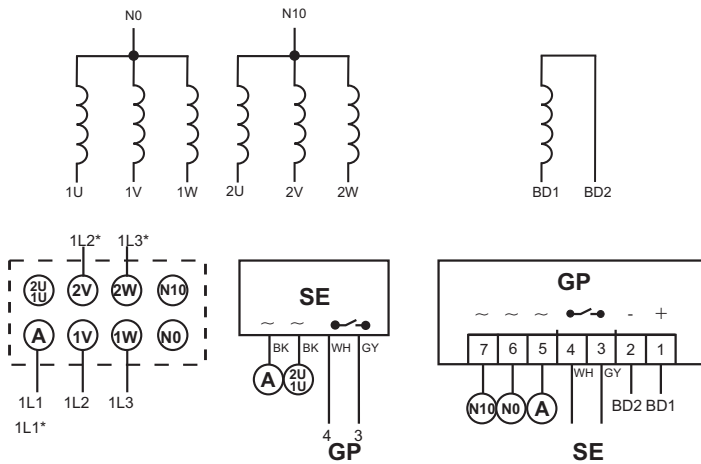
- Jumper between terminals 3 and 4.
- Contactor in the power line behind terminal 5.

Motor current switch-off

Jumper between terminals 3 and 4.

038 420 84

Motor for one line voltage, pole-changing, separate windings
Common motor and brake power supply



03842184.eps

Motor supplied with:

- Motor winding connected as in connection diagram (1U and 2U connected to one terminal).
- Brake connected to terminals 1 and 2 of the GP module.
- SE module connected to terminals 3 and 4 of the GP module.
- SE module connected with the motor winding via intermediate terminal A and terminal 1U 2U.
- GP module connected with the motor winding and intermediate terminal A as in the connection diagram.

* = Supply to high speed winding via external switch-over.

1U, 1V, 1W for low speed
 2U, 2V, 2W for high speed

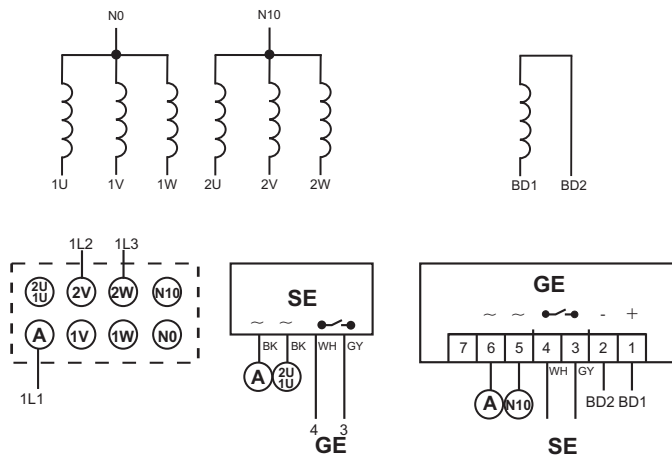
Switch-off in the DC circuit dependent on motor current



Not suitable for inverter operation.

038 421 84

Motor for one line voltage, pole-changing, separate windings
Common power supply to motor and brake



03842284.eps

Motor supplied with:

- Motor winding connected as in connection diagram (1U and 2U connected to one terminal).
- Brake connected to terminals 1 and 2 of the GE module.
- SE module connected to terminals 3 and 4 of the GE module.
- SE module connected with intermediate terminal A and the motor winding via terminal 1U 2U.
- GE module connected with the motor winding via intermediate terminal A and terminal N10.

2U, 2V, 2W for high speed
 Only the high speed winding is used.

Switch-off in the DC circuit dependent on motor current

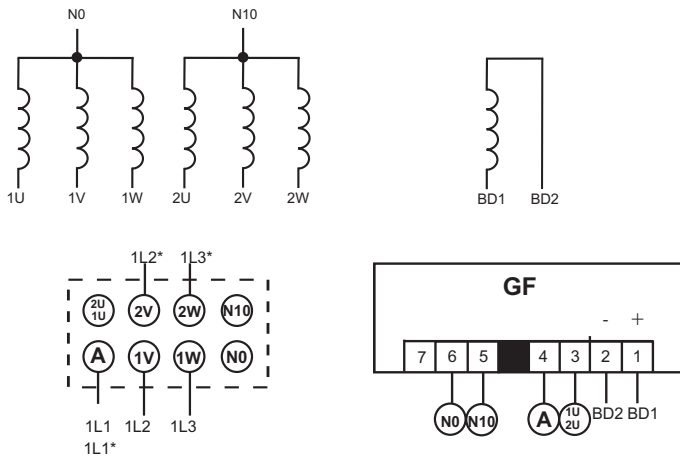


Not suitable for inverter operation.

(A) = Intermediate terminal

038 422 84

Motor for one line voltage, pole-changing, separate windings
Common power supply to motor and brake



* = Supply to high speed winding via external switch-over.

1U, 1V, 1W for low speed
 2U, 2V, 2W for high speed

Switch-off in the DC circuit dependent on motor current



Not suitable for inverter operation.

A = Intermediate terminal

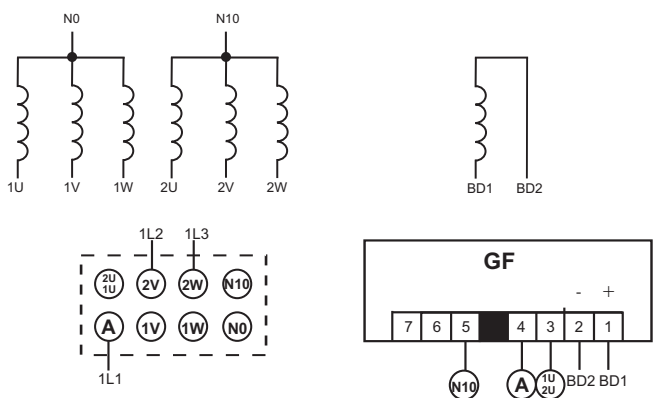
03842384.eps

Motor supplied with:

- Motor winding connected as in connection diagram (1U and 2U connected to one terminal)
- Brake connected to terminals 1 and 2 of the GF module.
- GF module connected with the motor winding and intermediate terminal A as in the connection diagram.

038 423 84

Motor for one line voltage, pole-changing, separate windings
Common power supply to motor and brake



2U, 2V, 2W for high speed
 Only the high speed winding is used.

Switch-off in the DC circuit dependent on motor current



Not suitable for inverter operation.

A = Intermediate terminal

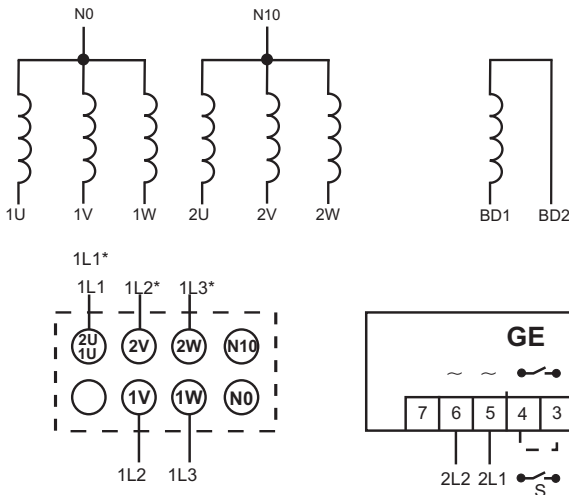
03842484.eps

Motor supplied with:

- Motor winding connected as in connection diagram (1U and 2U connected to one terminal)
- Brake connected to terminals 1 and 2 of the GF module.
- GF module connected with the motor winding and intermediate terminal A as in the connection diagram.

038 424 84

Motor for one line voltage, pole-changing, separate windings
Separate DC power supply to brake, maximum voltage 500V AC



* = Supply to high speed winding via external switch-over.

1U, 1V, 1W for low speed
 2U, 2V, 2W for high speed

Switch-off in the DC circuit

- Remove jumper between terminals 3 and 4
- Connect a contactor between terminals 3 and 4

Switch-off in the AC circuit

- Jumper between terminals 3 and 4
- Contactor in the power line behind terminal 5

Motor supplied with:

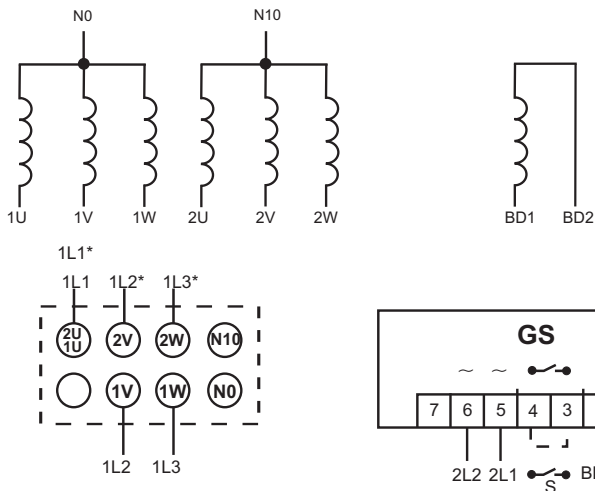
- Motor winding connected as in connection diagram (1U and 2U connected to one terminal)
- Brake connected to terminals 1 and 2 of the GE module.
- Jumper between terminals 3 and 4 of the GE module.

Important: The brake will not function without a separate power supply to terminals 5 and 6 of the GE module.

03842584.eps

038 425 84

Motor for one line voltage, pole-changing, separate windings
Separate DC power supply to brake, maximum voltage 500V AC



* = Supply to high speed winding via external switch-over.

1U, 1V, 1W for low speed
 2U, 2V, 2W for high speed

Switch-off in the DC circuit

- Remove jumper between terminals 3 and 4
- Connect a contactor between terminals 3 and 4

Switch-off in the AC circuit

- Jumper between terminals 3 and 4
- Contactor in the power line behind terminal 5

Motor supplied with:

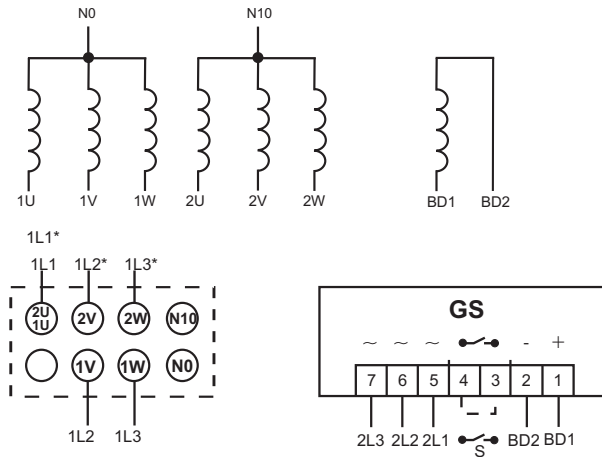
- Motor winding connected as in connection diagram (1U and 2U connected to one terminal)
- Brake connected to terminals 1 and 2 of the GS module.
- Jumper between terminals 3 and 4 of the GS module.

Important: The brake will not function without a separate power supply to terminals 5 and 6 of the GS module.

03842684.eps

038 426 84

**Motor for one line voltage, pole-changing, separate windings
Separate DC power supply to brake, maximum voltage 500V AC**



03842784.eps

* = Supply to high speed winding via external switch-over.

1U, 1V, 1W for low speed
2U, 2V, 2W for high speed

Switch-off in the DC circuit

- Remove jumper between terminals 3 and 4
- Connect a contactor between terminals 3 and 4

Switch-off in the AC circuit

- Jumper between terminals 3 and 4
- Contactor in the power line behind terminal 5

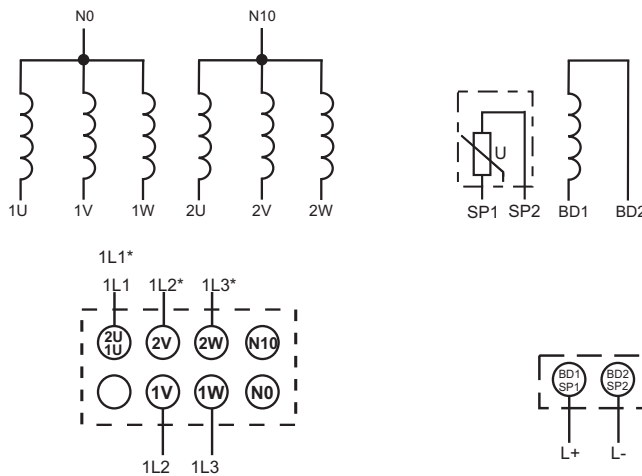
Motor supplied with:

- Motor winding connected as in connection diagram (1U and 2U connected to one terminal)
- Brake connected to terminals 1 and 2 of the GS module.
- Jumper between terminals 3 and 4 of the GS module.

Important: The brake will not function without a separate power supply to terminals 5 and 6 of the GS module.

038 427 84

**Motor for one line voltage, pole-changing, separate windings
Separate DC supply to brake**



03842884.eps

* = Supply to high speed winding via external switch-over.

1U, 1V, 1W for low speed
2U, 2V, 2W for high speed

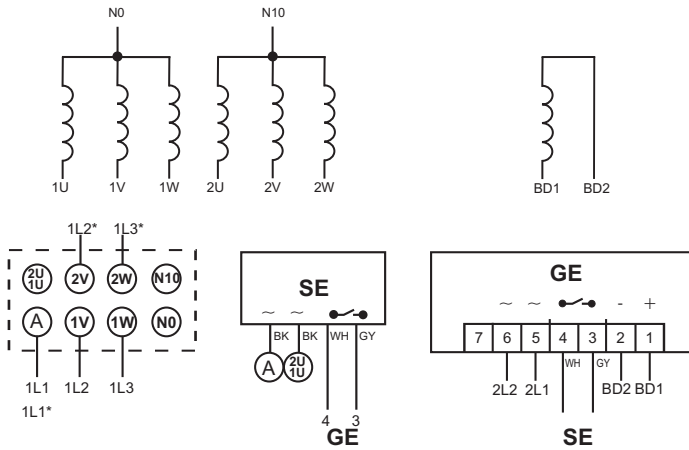
Motor supplied with:

- Motor winding connected as in connection diagram (1U and 2U connected to one terminal)
- Brake connected to Euro terminals.

Important: The brake will not function without a separate DC supply to the brake.

038 428 84

Motor for one line voltage, pole-changing, separate windings
Separate DC power supply to brake, maximum voltage 500V AC



03842984.eps

Motor supplied with:

- Motor winding connected as in connection diagram (1U and 2U connected to one terminal).
- Brake connected to terminals 1 and 2 of the GE module.
- SE module connected to terminals 3 and 4 of the GE module.
- SE module connected with the motor winding via intermediate terminal A and terminal 1U 2U.

Important: The brake will not function without a separate power supply to terminals 5 and 6 of the GE module.

038 429 84

* = Supply to high speed winding via external switch-over.

1U, 1V, 1W for low speed
 2U, 2V, 2W for high speed

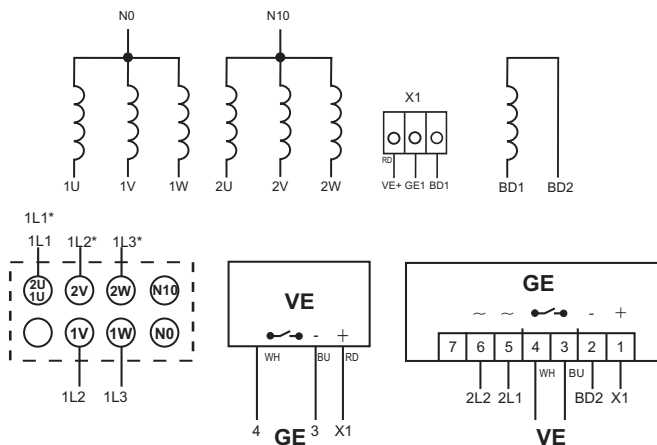
Switch-off in the DC circuit dependent on motor current



Not suitable for inverter operation.

A = Intermediate terminal

Motor for one line voltage, pole-changing, separate windings
Separate DC power supply to brake, maximum voltage 500V AC



03843084.eps

Motor supplied with:

- Motor winding connected as in connection diagram (1U and 2U connected to one terminal).
- Brake connected to terminals 1 and 2 of the GE module.
- VE module connected to terminals 1, 3 and 4 of the GE module.

Important: The brake will not function without a separate power supply to terminals 5 and 6 of the GE module.

* = Supply to high speed winding via external switch-over.

1U, 1V, 1W for low speed
 2U, 2V, 2W for high speed

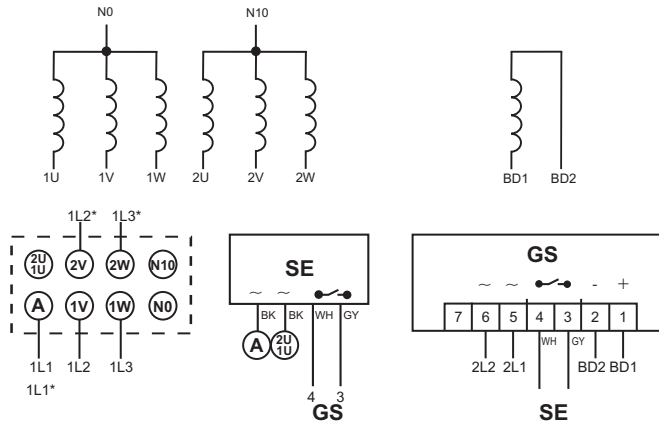
Voltage-dependent switch-off in the DC circuit

038 430 84

Motor for one line voltage, pole-changing, separate windings
Separate DC power supply to brake, maximum voltage 500V AC

* = Supply to high speed winding via external switch-over.

1U, 1V, 1W for low speed
 2U, 2V, 2W for high speed



Switch-off in the DC circuit dependent on motor current



Not suitable for inverter operation.

(A) = Intermediate terminal

03843184.eps

Motor supplied with:

- Motor winding connected as in connection diagram (1U and 2U connected to one terminal).
- Brake connected to terminals 1 and 2 of the GS module.
- SE module connected to terminals 3 and 4 of the GS module.
- SE module connected with the motor winding via intermediate terminal A and terminal 1U 2U.

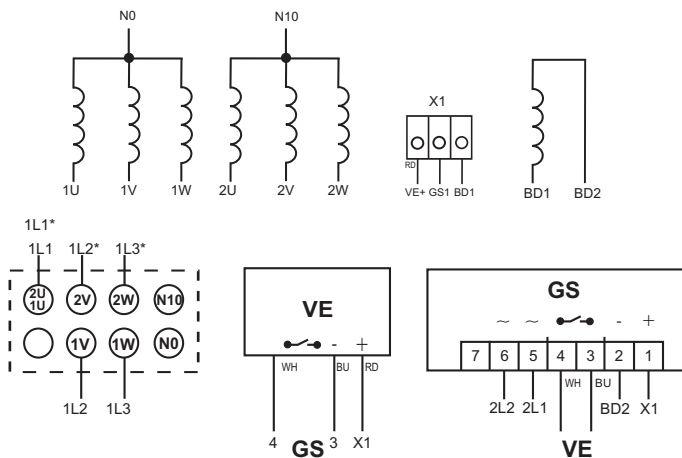
Important: The brake will not function without a separate power supply to terminals 5 and 6 of the GS module.

038 431 84

Motor for one line voltage, pole-changing, separate windings
Separate DC power supply to brake, maximum voltage 500V AC

* = Supply to high speed winding via external switch-over.

1U, 1V, 1W for low speed
 2U, 2V, 2W for high speed



Voltage-dependent switch-off in the DC circuit

03843284.eps

Motor supplied with:

- Motor winding connected as in connection diagram (1U and 2U connected to one terminal).
- Brake connected to terminals 1 and 2 of the GS module.
- VE module connected to terminals 1, 3 and 4 of the GS module.

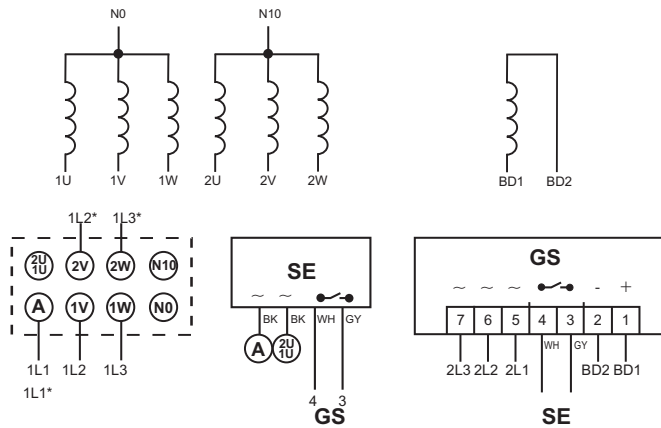
Important: The brake will not function without a separate power supply to terminals 5 and 6 of the GS module.

038 432 84

Motor for one line voltage, pole-changing, separate windings
Separate DC power supply to brake, maximum voltage 500 V AC

* = Supply to high speed winding via external switch-over.

1U, 1V, 1W for low speed
 2U, 2V, 2W for high speed



03843384.eps

Motor supplied with:

- Motor winding connected as in connection diagram (1U and 2U connected to one terminal).
- Brake connected to terminals 1 and 2 of the GS module.
- SE module connected to terminals 3 and 4 of the GS module.
- SE module connected with the motor winding via intermediate terminal A and terminal 1U 2U.

Important: The brake will not function without a separate power supply to terminals 5, 6 and 7 of the GS module.

Switch-off in the DC circuit dependent on motor current



Not suitable for inverter operation.

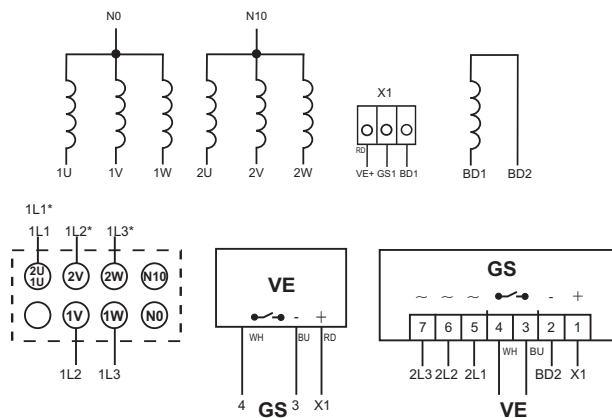
A = Intermediate terminal

038 433 84

Motor for one line voltage, pole-changing, separate windings
Separate DC power supply to brake, maximum voltage 500 V AC

* = Supply to high speed winding via external switch-over.

1U, 1V, 1W for low speed
 2U, 2V, 2W for high speed



03843484.eps

Motor supplied with:

- Motor winding connected as in connection diagram (1U and 2U connected to one terminal).
- Brake connected to terminals 1 and 2 of the GS module.
- VE module connected to terminals 1, 3 and 4 of the GS module.

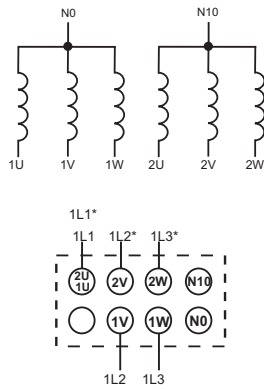
Important: The brake will not function without a separate power supply to terminals 5, 6 and 7 of the GS module.

Voltage-dependent switch-off in the DC circuit

Motor for one line voltage, pole-changing, separate windings

* = Supply to high speed winding via external switch-over.

1U, 1V, 1W for low speed
2U, 2V, 2W for high speed



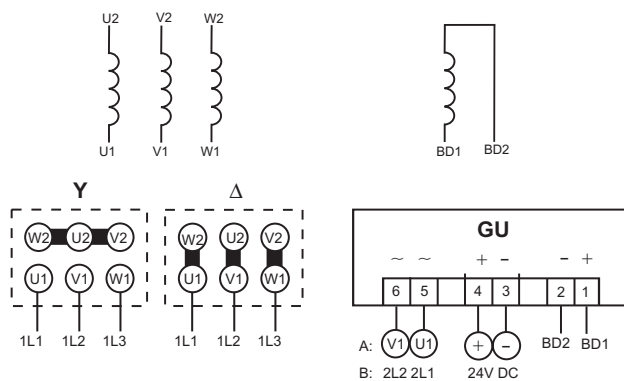
03843584.eps

Motor supplied with:

Motor winding connected as in connection diagram (1U and 2U connected to one terminal)

038 435 84

Motor for one line voltage



41005084.eps

Motor supplied with:

- Jumper parts to connect the motor winding with Y or Δ connection enclosed.
- Brake connected to terminals 1 and 2 of the GU module.
- Terminals 3 and 4 of the GU module free (connect 24V DC).
- **Line operation:** GU module connected with the motor winding according to variant A.
- **Inverter operation or separate power supply to the brake:**
 - GU module **not** connected to the motor winding.
 - Power supply by the customer according to variant B.

A: Common power supply to motor and brake



Not suitable for inverter operation.

B: Separate power supply to brake

For inverter operation, connect motor with Y or Δ connection according to inverter settings.

Switch-off in the DC circuit

- Switched 24V DC power supply to control the internal GU switching relay connected between terminals 3 and 4.

Switch-off in the AC circuit

- Permanent 24V DC power supply connected to terminals 3 and 4 (not switched).
- Contactor in the power line behind terminal 5.

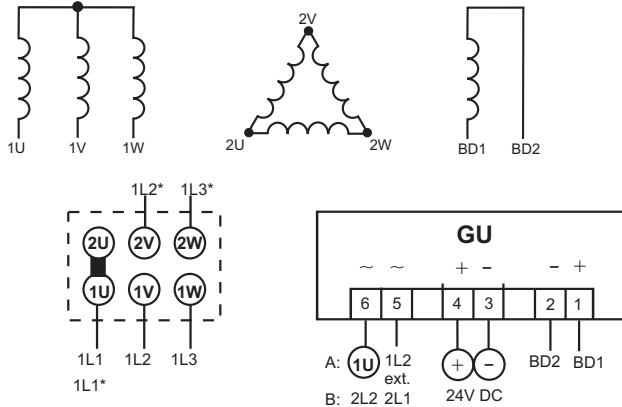
Motor current switch-off

- Permanent 24V DC power supply connected to terminals 3 and 4 (not switched).
- **not possible for separate power supply to the brake.**

410 050 84

Motor for one line voltage, pole-changing, separate windings

* = Supply to high-speed winding via external switch-over
 1U, 1V, 1W for low speed
 2U, 2V, 2W for high speed



Motor supplied with:

- Jumper parts to connect the motor winding enclosed.
- Brake connected to terminals 1 and 2 of the GU module.
- Terminals 3 and 4 of the GU module free (connect 24V DC).
- **Line operation:** GU module connected with the motor winding according to variant A (1U connected to terminal 6; terminal 5 free).

Important: The brake will not function without an external power supply to terminal 5 of the GU module.

Separate power supply to brake:

- GU module **not** connected to the motor winding.
- Power supply by the customer according to variant B.

41005184.eps

410 051 84

A: Common power supply to motor and brake



Not suitable for inverter operation.

B: Separate power supply to brake

Switch-off in the DC circuit

- Switched 24V DC power supply to control the internal GU switching relay connected between terminals 3 and 4.

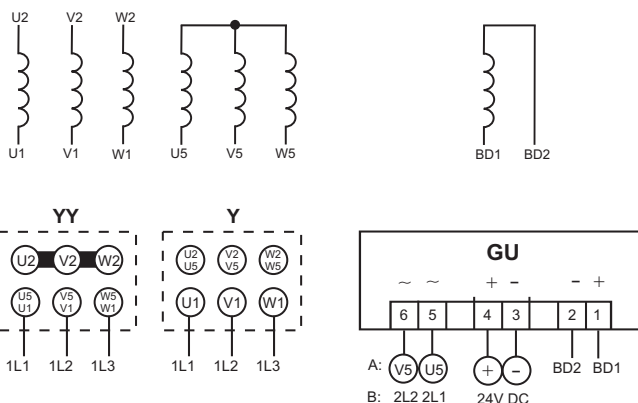
Switch-off in the AC circuit

- Permanent 24V DC power supply connected to terminals 3 and 4 (not switched).
- Contactor in the power line behind terminal 5.

Dual voltage motor 1:2

YY low voltage

Y high voltage



Motor supplied with:

- Motor winding connected with Y connection.
- Jumper parts to connect the motor winding with YY connection enclosed.
- Brake connected to terminals 1 and 2 of the GU module.
- Terminals 3 and 4 of the GU module free (connect 24V DC).
- **Line operation:** GU module connected with the motor winding according to variant A.
- **Inverter operation or separate power supply to the brake:**
 - GU module **not** connected to the motor winding.
 - Power supply by the customer according to variant B.

41005284.eps

410 052 84

A: Common power supply to motor and brake

Brake coil rated for the low voltage.



Not suitable for inverter operation.

B: Separate power supply to brake

For inverter operation, connect the motor with YY or Y connection according to inverter settings.

Switch-off in the DC circuit

- Switched 24V DC power supply to control the internal GU switching relay connected between terminals 3 and 4

Switch-off in the AC circuit

- Permanent 24V DC power supply connected to terminals 3 and 4 (not switched).
- Contactor in the power line behind terminal 5

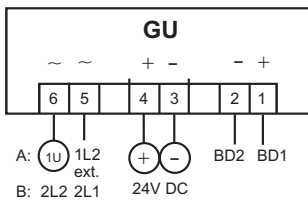
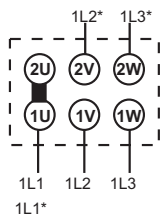
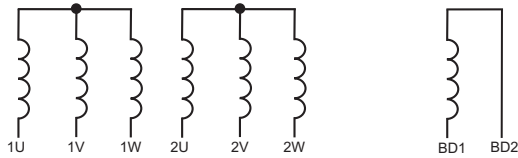
Motor current switch-off

Permanent 24V DC power supply connected to terminals 3 and 4 (not switched).

→ **not possible for separate power supply to the brake.**

Motor for one line voltage, pole-changing, separate windings

* = Supply to high-speed winding via external switch-over
 1U, 1V, 1W for low speed
 2U, 2V, 2W for high speed



Motor supplied with:

- Jumper parts to connect the motor winding enclosed.
- Brake connected to terminals 1 and 2 of the GU module.
- Terminals 3 and 4 of the GU module free (connect 24V DC).
- **Line operation:** GU module connected with the motor winding according to variant A. (1U connected to terminal 6; terminal 5 free).

Important The brake will not function without an external power supply to terminal 5 of the GU module.

Separate power supply to brake:

- GU module **not** connected to the motor winding.
- Power supply by the customer according to variant B.

A: Common power supply to motor and brake



Not suitable for inverter operation.

B: Separate power supply to brake

Switch-off in the DC circuit

- Switched 24V DC power supply to control the internal GU switching relay connected between terminals 3 and 4.

Switch-off in the AC circuit

- Permanent 24V DC power supply connected to terminals 3 and 4 (not switched).
- Contactor in the power line behind terminal 5.

41005384.eps

410 053 84

7.7 Connecting temperature and brake monitoring devices



Depending on the motor features, the connections for temperature monitoring and/or brake monitoring are brought out on Euro terminals in the terminal box.

The following connection designations are used:

- **PTC thermistor**

- Switch-off: **1TP1 - 1TP2 and 2TP1 - 2TP2**
- Warning: **TP11 - TP12**

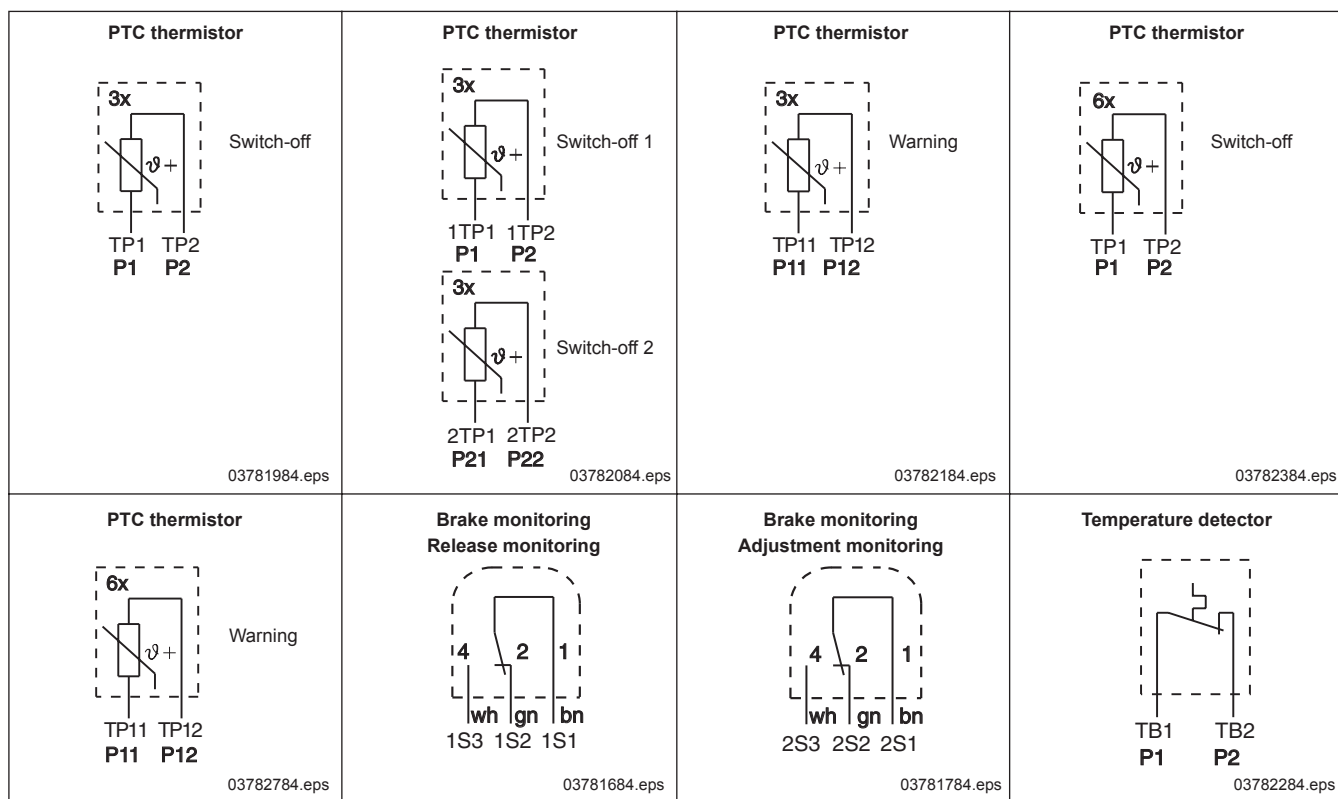
Important: PTC thermistors to DIN 44081 are suitable for tripping devices with 2,5 V DC output voltage and 4 k Ω tripping resistance. PTC thermistors may only be continuity tested with max. 2,5 V DC. Do not use a buzzer (voltage peaks) or similar devices. The resistance of **one** PTC thermistor is 20 ... 250 Ω at temperatures of -20°C to $\vartheta_{\text{TNF}} - 20\text{K}$. (TNF = rated operating temperature).

- **Temperature detector (bimetallic switch):** **TB1 - TB2**

- **Brake monitoring**

- Release monitoring: **1S3 - 1S2 - 1S1**
 Contact 2 (1S2 - 1S1) closed:
 Brake not released, brake in applied position
 Contact 4 (1S3 - 1S1) closed:
 Brake released
- Adjustment monitoring: **2S3 - 2S2- 2S1**
 Contact 2 (2S2- 2S1) closed:
 Brake must be adjusted
 Contact 4 (2S3 - 2S1) closed:
 Normal operating condition

The diagrams below show the most important single connections. When several monitoring devices are used (such as PTC thermistors for the motor and release monitoring for the brake), the individual circuits are combined in one connection diagram which can be found inside the motor terminal box.



8 Technical data

Function conditions for standard design

Conditions	Z range		
Transport temperature	-20 ... +40 °C		
Storage temperature	0 ... +40 °C		
Storage conditions	dry, indoors		
Ambient operating temperature	-20 ... +40 °C		
Ambient conditions	acid-free		
Coolant	Air		
Coolant temperature	max. +40 °C		
Temperature rise limit of winding	105K		
Site altitude	max. 1000m above sea level		
Air circuit	Ensure by working clearance, unrestricted air intake		
Type of enclosure	IP 54		
Mounting arrangement	Low vibration		
Working clearance at fan end	150 mm at rear		
Line voltage	400V/50Hz	480V/60Hz	500V/50Hz
Voltage tolerance	± 10% of the line voltage for short periods according to IEC 38		

Maximum speeds in rpm

Motor frame size	with operational braking (line operation)	Motor frame size	with occasional emergency stops (inverter operation)
ZBF 63 – 132	3600	–	–
ZNA 63 – 100	5000	ZNA 63 – 100	5000
ZNA 112 – 132	4000	ZNA 112 – 132	4000
ZNA 160 – 180 A	3600	ZNA 160 – 180 A	3600
ZNA 180 B – 225	3000	ZNA 180 B – 225	3000
ZBA 63 – 132	3600	ZBA 63 – 100	5000
ZBA 160 – 180 A, with B 140 brake		ZBA 112 – 132	4000
ZBA 160 – 180 A, with B 280 brake	2000	ZBA 160 – 180 A	3600
ZBA 180 B – 225		ZBA 180 B – 225	3000

9 Troubleshooting

Item	Problem	Possible cause	Solution
1	Motor does not start.	Fuse has tripped.	Replace fuse.
		Power supply line interrupted.	Check connections.
		Motor protection has tripped.	Check motor protection for correct seating.
		Control defective.	Check motor connection.
		Brake does not release.	See item 10 “Brake does not release”
2	Motor does not start or starts slowly.	Motor for delta connection is connected in star.	Correct motor connection.
		Extreme voltage or frequency deviation from setpoint value.	Improve quality of power supply; check power supply line cross-section.
3	Motor will not start in star connection, only starts in delta connection.	Insufficient torque in star connection.	If the delta starting torque is not too high, start up direct in star connection; otherwise use larger motor or special design (contact manufacturer).
		Contact fault in star-delta starter.	Eliminate fault.
4	Motor runs in wrong direction.	Motor incorrectly connected.	Swap two supply leads.
5	Motor hums and has high power consumption.	Winding defective.	Motor must be sent to specialist workshop for repair.
6	Fuses trip or motor protection trips immediately.	Short-circuit in the supply line.	Eliminate short-circuit.
		Short-circuit in the motor.	Motor must be sent to specialist workshop for repair.
		Power supply leads incorrectly connected.	Correct motor connection.
		Short-circuit to earth in the motor.	Motor must be sent to specialist workshop for repair.
7	Extreme loss of speed under load.	Overload.	Measure power, use larger motor or reduce load, if necessary.
		Voltage drop.	Use larger power supply line cross-section.
8	Excessive motor temperature rise (measure temperature).	Overload.	Measure power, use larger motor or reduce load, if necessary.
		Insufficient cooling.	Improve cooling air circulation or clear air circulation channels; fit separate fan, if necessary.
		Separate fan not running.	Check connection, correct, if necessary.
		Ambient temperature too high	Reduce power; use larger motor, if necessary.
		Delta connection instead of star connection as specified.	Correct motor connection.
		Temporary two-phase operation.	Intermittent electrical contact in the power supply line.
		Fuse has tripped.	Replace fuse.
		Mains voltage differs from the rated motor voltage by more than 10%. Higher voltages are particularly unfavourable for low-speed motors as their no-load current is close to the rated current even at normal voltage.	Match motor to power supply voltage.
Duty type (S1 - S10, EN 60034-1) exceeded, e.g. starting frequency is too high.	Adapt operating conditions to corresponding motor duty type.		
9	Excessive noise.	Friction bearing distorted, dirty or damaged.	Re-align motor, inspect friction bearings, replace if necessary.
		Rotating parts vibrating.	Correct any imbalance.
		Foreign bodies in cooling air circuit.	Clean cooling air paths.
10	Brake does not release.	Incorrect voltage applied to brake control unit	Apply correct voltage (see rating plate).
		Brake control unit failure.	Replace brake control unit, check brake coil (resistance), check switchgear components.
		Maximum permissible air gap exceeded because the brake lining is worn out.	Adjust the brake (replace the complete brake lining carrier if the lining is worn out).
		Voltage drop in the power supply line > 10 %.	Ensure correct supply voltage is applied.
		Brake coil short-circuit with the winding or housing.	Replace complete brake with control unit (specialist workshop), check switchgear components.
11	Motor does not brake.	Brake lining worn out.	Replace the complete brake lining carrier.
		Manual brake release device incorrectly adjusted.	Set adjusting nuts to correct setting.
		Manual brake release device locked.	Release lock, remove lever.
		Incorrect brake torque.	Change brake torque.

Hereby we,



Demag Cranes & Components GmbH
Drives,

declare that the product

Demag AC motor

of the

Z, M

type of serial design, with or without the relevant gearbox, has been declared in conformity with the provisions of the following relevant regulations:

EC EMC directive	89/336/EEC
amended by	92/31/EEC and 93/68/EEC
EC Low voltage Directive	73/23/EEC
amended by	93/68/EEC

Applied harmonised standards:

#

EN ISO 12100	Safety of Machinery
EN 61000-6-2	Electromagnetic Compatibility, Resistance to Interference in Industrial Environments
EN 61000-6-4	Electromagnetic Compatibility, Interference Emission in Industrial Environments
EN 60034-1	Rating and Performance
EN 60034-5	Types of Enclosures for Rotating Electrical Machines
EN 60034-7	Types of Construction and Mounting Arrangements (IM Code)
EN 60034-8	Terminal Markings and Direction of Rotation
EN 60034-9	Noise Limits
EN 60034-14	Mechanical Vibration; Measurements, Evaluation and Limits of Vibration Severity
EN 60034-18-1	Functional Evaluation of Isolating Systems
EN 60529	Types of Enclosure (IP Code)

Wetter, 1 December 2005

Place and date of issue

#

ppa. Schulte
Engineering (Drives)

ppa. Hoffmann
Handling Technology BU

The current addresses of the sales offices in Germany and the subsidiaries and agencies worldwide can be found on the Demag Cranes & Components homepage at www.demagcranes.com ► Contact and Demag worldwide

**Demag Cranes & Components GmbH
Drives
P.O. Box 67, D-58286 Wetter
Telephone +49(0)2335 92-5550 · Telefax +49(0)2335 92-2406
E-mail drives@demagcranes.com
www.demagcranes.com**