

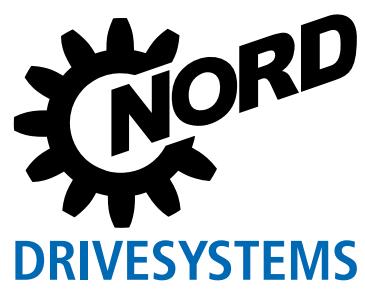
Intelligent Drivesystems, Worldwide Services

# INSTALLATION & OPERATING INSTRUCTIONS



**NORD.COM/DOCS  
DOCUMENT COLLECTION**

Order Number: 202141712-100  
NORD Model SK92772.1ABH-100LP/4 CUS BRE40



## Order and product data

Order Number	202141712-100
Product Name	Right-Angle Helical Bvl Gearbo
NORD Model Type	SK92772.1ABH-100LP/4 CUS BRE40
Mounting Position	M5
Lubricant	VG220-MIN-EP
Lubricant Qty	1.690 Qts

## Contents

### Manuals

U10020-Safety Notes  
U10020 Version: 0.03

U10040-Storage & Commissioning  
U10040 Version: 0.03

U10060-Unit Installation  
U10060 Version: 2.02

U10280-Shaft Fixing Kit  
U10280 Version: 0.04

U10750-Helical & Bevel Reducer lubrication  
U10750 Version: 0.05

U11000-Helical & Bevel Reducer Lubrication Types  
U11000 Version: 0.08

U12205 Lubrication Capacity-92.1-93.1 Series Helical Bevel Foot Mounted  
U12205 Version: 0.07

U14305 Oil Plug & Vent Locations-92.1-93.1 Series Helical Bevel  
U14305 Version: 1314

U15415 92.1/93.1 Parts List  
U15415 Version: 0.02

U19000-Troubleshooting  
U19000 Version: 2409

U30000-Motors- AC INDUCTION, SINGLE & POLYPHASE  
U30000 Version: 0.07

U35000-Motor Brakes -Installation & Maintenance  
U35000 Version: 0.13





DRIVESYSTEMS

# SAFETY NOTES

RETAIN FOR FUTURE USE



U10020 - 1 of 2

## 1. Safety & information symbols

All work including transportation, storage, installation, electrical connection, commissioning, servicing, maintenance and repair must be performed **only by qualified specialists or personnel**. It is recommended that repairs to NORD Products are carried out by the NORD Service Department. Instructions related to operational safety will be emphasized as shown.

Symbol	Meaning
	<b>Danger, Caution or Warning</b> - Severe risk or danger of personal injury or death by working around dangerously high electrical voltage or moving machinery. Proper safety precautions must be taken.
<b>NOTICE</b>	<b>Notice</b> - Care must be taken to avoid the possibility of damaging the drive unit, driven machine, or the environment.
	<b>Important Note</b> - Useful note or tip to help assure trouble-free operation.
	<b>Material Disposal Note</b> - Important note concerning suggested material disposal.

## 2. Safety warnings

<b>DANGER</b>	
<ul style="list-style-type: none"> <li>All work involved in the transport, connection, commissioning and maintenance of any NORD product must be carried out by qualified and responsible technicians. All applicable national, regional, and local work regulations and safety requirements must also be complied with. <b>NORD assumes no liability for personal injury, accidental death, or equipment damage and malfunctions resulting from failure to comply with installation or operating instructions, safety notes, or any work regulations and laws!</b></li> <li>Gear unit installation and maintenance work may only be performed when no power is available to the prime mover or motor. Electric motors, electrical brakes, and variable frequency drives, contain potentially dangerous high-voltage. Prior to installation or maintenance, shut down the power at the circuit breaker or power switch. <b>While working on the drive, make sure the power from the prime mover is isolated or secured on "lock-out" to prevent accidental start-up and to safeguard against injury!</b></li> <li>Surfaces of motors and gear units may become hot during operation or shortly after start-up. In some instances additional protection against accidental contact may be necessary. <b>Use caution to avoid burns or serious injury!</b></li> </ul>	

## 3. Observe published performance range & nameplate data

### NOTICE

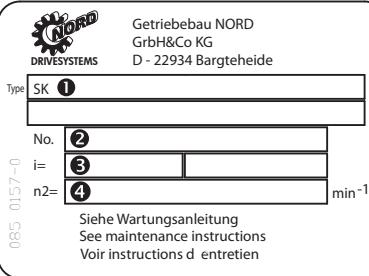
Observe the data on all reducer nameplates and verify published ratings for the NORD item/s in question. Do not operate any NORD equipment outside the published performance range. Failure to comply may result in damage to the drive unit, driven machine, or the environment.

#### U.S. Nameplate



- ① Model/Type
- ② Serial Number
- ③ Gear Ratio
- ④ Service Factor
- ⑤ Torque Rating
- ⑥ Output Speed RPM
- ⑦ Mounting Position

#### European Nameplate



- ① Model/Type
- ② Serial Number
- ③ Gear Ratio
- ④ Speed

## 4. Transportation and handling

Make sure that all eyebolts and lifting lugs are tight and lift only at designed points. Protect the mounting surface from possible damage during transportation.



### WARNING

Do not attach other machinery or loads to the NORD assembly, the supplied lifting bolts are not designed for this purpose and may result in drive damage or personal injury.

If the gearmotor or assembly is equipped with two suspension eye bolts, then both locations should be used for transportation and placement of the unit; in this case the tension force of the slings must not exceed a 45° angle.

In some instances it may be appropriate to use additional lifting straps or slings in order to assure safe transportation of the assembly. Always use sufficiently rated handling equipment and ensure that adequate safety measures are taken to protect personnel from injury during transportation. Once the NORD assembly is properly installed, remove the transportation fixtures.

**NORD Gear Limited**

Toll Free in Canada: 800.668.4378

01.31.17

**NORD Gear Corporation**

Toll Free in the United States: 888.314.6673

[www.nord.com/docs](http://www.nord.com/docs)

## 7. DISPOSAL



### MATERIAL DISPOSAL

Properly dispose of all used gear units and internal parts in accordance with all local regulations. In particular, all lubricants must be properly collected and disposed.

For confirmation of specific materials used in a specific reducer or gearmotor assembly, please consult NORD with the appropriate unit identification or serial number.

Components	Material
Gear wheels, shafts, rolling bearings, parallel keys, snap rings, spacers, shims, etc.	Steel
Gear housing and housing components	Cast iron or Aluminum (depending on type and size)
Worm gears	Bronze alloy
Radial seals, sealing caps, and rubber components	Elastomers with some steel
Coupling components	Plastic or Elastomer with Steel
Housing gaskets and flat oil seals	Asbestos-free sealing or gasket material (various types used)
Gear Oil	Mineral, SHC-Synthetic or PG-Synthetic (can vary)



DRIVESYSTEMS

# STORAGE & COMMISSIONING

RETAIN FOR FUTURE USE



U10040 - 1 of 2

## 1. Storage



### IMPORTANT NOTE

For storage periods longer than 9 months, or for storage in less than desirable conditions, please consult NORD for recommendations.

Storage for up to 9 months is possible, so long as the following conditions are observed:

- Store the gear unit in its actual mounting position in accordance with the specified oil fill-level, in a clean and dry temperature controlled area. Avoid temperature fluctuations within the range of 0°C and 40°C (32°F to 104°F) and avoid relative humidity conditions in excess of 60%.
- Protect all exposed or unpainted shaft and flange surfaces with an anti-corrosion agent or grease.
- Store in a location free from shock and vibration, to avoid false brinelling of bearing elements and raceways.
- Whenever possible, rotate the shafts periodically, by hand if necessary, to help prevent brinelling (bearing damage) and to help keep the shaft seals pliable.
- Avoid direct exposure to the sun or UV light and aggressive or corrosive materials in the environment (ozone, gases, solvents, acids, caustic solutions, salts, radioactivity, etc.

## 2. Commissioning

Prior to gear unit start-up, complete the following:

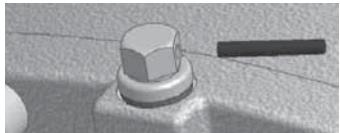
- Please check your gear unit for a vent and if applicable to your product, remove the sealing plug to activate.

### NOTICE

To prevent build-up of excessive pressure, sealed vents must be activated as shown prior to gear unit start up. Excessive pressure may cause damage to internal gearbox components and leakage.



Sealed vent



Activated vent

- Check the lubricant and be sure the gear unit is filled with the proper oil type, to the proper level, as determined by the mounting position.



### IMPORTANT NOTE

Some smaller gear units are supplied as maintenance free/lubricated for life gear units. Oil level may not be checked on some of these units.

- Check the condition of all shaft seals and all assembled flange gasket areas. If any change is detected in the shape, color, hardness or permeability, or if any leaks are detected, the corresponding shaft seals and/or gaskets must be replaced.
- Remove all anti-corrosive metal protectant from otherwise bare metal surfaces. Follow product manufacturers directions and warnings during surface protection removal.
- Check the resistance of all motor and brake windings to verify the integrity of the winding insulation and inspect all terminal box openings and wire connection areas to verify that all components are dry and free of corrosion.

### 3. Long-Term Storage

By taking special precautions, problems such as seal leakage and reducer failure due to the lack of lubrication, improper lubrication quantity, or contamination can be avoided. The following precautions will protect gear reducers during periods of extended storage:

- Store the gear unit in its actual mounting position in accordance with the specified oil fill-level, in a clean and dry temperature controlled area. Avoid temperature fluctuations within the range of 0°C and 40°C (32°F to 104°F) and avoid relative humidity conditions in excess of 60%.
- Fill the reducer full with oil that is compatible with the product normally used or recommended during service.
- Apply grease to all unpainted or unprotected shafts, bores, keyways, flange surfaces, tapped holes, and to the exterior of all oil seals.
- Store in a location free from shock and vibration, to avoid false brinelling of bearing elements and raceways.
- Once every few months rotate the input shaft approximately 10-20 revolutions to redistribute the weight of gears and shafts and to prevent brinelling of the bearings and drying of the seal track.
- Avoid direct exposure to the sun or UV light and aggressive or corrosive materials in the environment (ozone, gases, solvents, acids, caustic solutions, salts, radioactivity, etc.)

### 4. Commissioning After Long-Term Storage

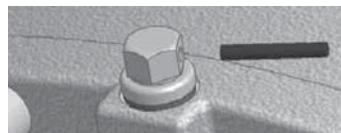
- Please check your gear unit for a vent and if applicable to your product, remove the sealing plug to activate.

#### **NOTICE**

To prevent build-up of excessive pressure, sealed vents must be activated as shown prior to gear unit start up. Excessive pressure may cause damage to internal gearbox components and leakage.



Sealed vent



Activated vent

- Remove all anti-corrosive metal protectant from otherwise bare metal surfaces. Follow product manufacturers directions and warnings during surface protection removal.
- Drain the reducer and refill it with the proper type and amount of lubricant.
- Observe start-up and initial operation to make sure there are no seal or gasket leaks, or unusual sounds, vibration or heat rise during operation.
- Check the resistance of all motor and brake windings to verify the integrity of the winding insulation and inspect all terminal box openings and wire connection areas to verify that all components are dry and free of corrosion.



DRIVESYSTEMS

# UNIT INSTALLATION

RETAIN FOR FUTURE USE



U10060 - 1 of 2

## 1. Installation site

Drives must be properly installed if they are to produce the rated torque. Improper installation may lead to oil leaks, reduced life, or even catastrophic failure. NORD gear drives and motors are intended to be installed at a suitable mounting site under the following conditions:

- Unimpeded airflow to and around the units.
- Accessibility to oil drain, level and breather plugs.
- On brakemotors, allow adequate space for removing the fan guard and replacing and adjusting the brake.
- Mounting surfaces must be flat, torsionally rigid, and damped against vibration.
- Unless special measures are taken, the immediate vicinity around the gear drive or motor should not be exposed to any aggressive or corrosive substances, contaminated air, ozone, gases, solvents, acids, alkalis, salts, radioactivity, etc.

## 2. Mounting position

Reducer mounting position charts illustrate the standard mounting positions for horizontal and vertical mounting. All gear units are assembled with the oil fill-level, oil-drain and vent plugs installed in their proper locations, according to the customer-specified mounting position. For mounting orientations other than shown consult NORD Gear.

### NOTICE

**Improper oil levels may lead to premature component wear and diminished service life.** The gear reducer may not receive proper lubrication if the unit is not mounted in the position for which it is designed. Observe the mounting position designated on the reducer nameplate, or specified in the order acknowledgement. Consult NORD prior to changing mounting position in the field. While it is often possible to simply relocate the oil fill-level and vent locations, and adjust the oil fill amount, in some cases, different mounting positions may lend themselves to different internal construction features.

## 3. Reducer mounting

- The support foundation must be straight, level and flat. Whether the gear unit is foot-mounted or flange-mounted, NORD recommends that the straightness and flatness of the customer-supplied support foundation follow **Table 1**.
- The gear unit must be properly aligned with the driven shaft of the machine in order to prevent additional stress or load forces from being imposed upon the gear unit.
- To facilitate oil drainage it may be desirable to elevate the gear box foundation above the surrounding support structure.
- All bolting surfaces must be clean and free from contamination and corrosion.

**Table 1: Recommended Straightness and Flatness of Customer-Supplied Support Foundation**

Above (in)	To & Including (in)	General Tolerance on Straightness & Flatness ISO 2768-2, Tolerance Class K
0.00	0.39	+/- 0.002 in
0.39	1.18	+/- 0.004 in
1.18	3.9	+/- 0.008 in
3.9	11.8	+/- 0.016 in
11.8	39	+/- 0.024 in
39	118	+/- 0.031 in

Above (mm)	To & Including (mm)	General Tolerance on Straightness & Flatness ISO 2768-2, Tolerance Class K
0	10	+/- 0.05 mm
10	30	+/- 0.1 mm
30	100	+/- 0.2 mm
100	300	+/- 0.4 mm
300	1000	+/- 0.6 mm
1000	3000	+/- 0.8 mm

**Straightness:** Based upon the length of the corresponding line.

**Flatness:** Based upon the longer lateral surface or the diameter of the circular surface.



### IMPORTANT NOTE

The responsibility for the design and construction of the support foundation is with the user. The foundation must be adequate to withstand normal operating loads and possible overloads while maintaining alignment to attached system components under such loads. **Motors and drive components mounted on prefabricated base plates can become misaligned during shipment. Always check alignment after installation.**

## 4. Steel foundation

An engineered structural steel foundation should be designed to provide adequate rigidity and prevent loads from distorting the housing or causing misalignment of internal gears and shafts. When foot-mounting the gear reducer, a base plate or sole plate with suitable thickness (generally equal or greater than the thickness of the drive feet) should be securely bolted to steel supports and extend under the entire gear drive assembly. When flange-mounting the gear unit, the bulk head plate must be engineered to minimize buckling distortions and support the cantilevered weight of the gear unit or gear motor.

### NOTICE

Do not weld on the gear unit or use the gear unit as an earth or ground connection for any welding procedure as this may cause permanent damage to the bearings and gears.

**NORD Gear Limited**

Toll Free in Canada: 800.668.4378

01.31.17

**NORD Gear Corporation**

Toll Free in the United States: 888.314.6673

[www.nord.com/docs](http://www.nord.com/docs)



DRIVESYSTEMS

# UNIT INSTALLATION

RETAIN FOR FUTURE USE

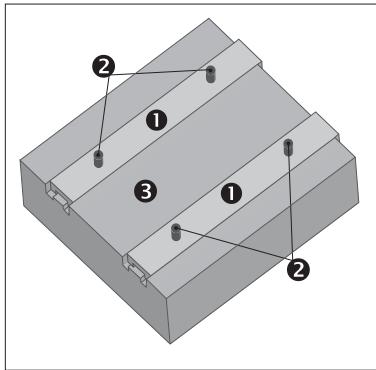


U10060 - 2 of 2

## 5. Concrete foundation

If a concrete foundation is used, allow the concrete to set firmly before bolting down the gear drive. Grout structural steel mounting pads and bolts of sufficient size into the concrete, to adequately distribute the load stress onto the concrete foundation.

**Figure 1: Concrete Foundation**



- ① Grouted Structural Steel Mounting Pads
- ② Mounting Bolts
- ③ Concrete Foundation

## 6. Bolt connections for footed & flange mounted units

NORD footed reducers and flange-mount reducers (with B5 flange) have clearance designed into the mounting holes to allow for some minor adjustments in alignment. Bolt size, strength and quantity should be verified to insure proper torque reaction capacity whatever the mounting arrangement. Tightening torque for gear reducer mounting bolts, and recommended fastener grades, are provided in Table 2.

**Table 2A: Tightening Torque for Inch Reducer Mounting Bolts**

Thread Size (in)	Grade SAE 5 / ASTM A449		Grade SAE 8	
	(lb-ft)	(Nm)	(lb-ft)	(Nm)
1/4-20	7.1	9.6	10.0	13.6
5/16-18	16	21	22	30
3/8-16	28	37	39	53
1/2-13	69	93	98	132
5/8-11	138	188	195	264
3/4-10	247	334	348	472
7/8-9	396	537	558	757
1-8	592	802	833	1,130
1 1/8-7	-	-	1,233	1,672
1 1/4-7	-	-	1,717	2,327
1 3/8-6	-	-	2,267	3,073
1 1/2-6	-	-	2,983	4,045
1 3/4-5	-	-	4,458	6,045

- Calculated tightening torques are based a conventional 60°, clean and dry (un-lubricated) thread, with thread-friction and head-friction equal to 0.15.
- When using inch-fasteners, NORD recommends a minimum Grade SAE 5 (ASTM A-449) for sizes up to 1-8 UNC, and Grade SAE 8 for all larger sizes.

**Table 2B: Tightening Torque for Metric Reducer Mounting Bolts**

Above (mm)	ISO Grade 8.8		ISO Grade 10.9		ISO Grade 12.9	
	(lb-ft)	(Nm)	(lb-ft)	(Nm)	(lb-ft)	(Nm)
M4	2.4	3.2	3.5	4.7	4.1	5.5
M5	4.7	6.4	6.9	9.3	8.1	11
M6	8	11	12	16	14	19
M8	20	27	29	39	34	46
M10	39	53	58	78	67	91
M12	68	92	100	135	110	155
M14	107	145	159	215	180	250
M16	170	230	247	335	290	390
M18	240	325	343	465	400	540
M20	339	460	487	660	570	770
M22	465	630	664	900	770	1,050
M24	583	790	848	1,150	960	1,300
M27	848	1,150	1,217	1,650	1,440	1,950
M30	1,180	1,600	1,660	2,250	1,950	2,650
M36	2,050	2,780	2,884	3,910	3,470	4,710
M42	3,297	4,470	4,639	6,290	5,560	7,540
M48	4,940	6,700	7,010	9,500	8,260	11,200

- Calculated tightening torques are based on a conventional 60°, clean and dry (un-lubricated) thread, with thread-friction and head-friction equal to 0.15.
- When using metric-fasteners, NORD recommends a minimum ISO Grade 8.8 bolt.

## 7. Mounting the prime mover

When the motor is not flange mounted or integrally mounted to the gearbox, it is important to properly secure and align the gear drive with respect to the driven machine before attempting to align the prime mover or motor.

- A. After the main gear drive is properly aligned and bolted in place, align the prime mover with respect to the reducer input shaft.
- B. Use shims under the feet of the prime mover as needed, and secure in place with the proper mounting bolts. Dowel pins may be field-installed to help prevent misalignment and ensure proper realignment if removed for service.

	<b>IMPORTANT NOTE</b>
When using a high speed coupling connection between the prime mover and the reducer, check alignment per the coupling manufacturers recommendations. If the coupling is misaligned, the reducer alignment or shimming is incorrect. Re-align the gear reducer and re-check the high-speed coupling alignment before re-aligning the motor.	

**NORD Gear Limited**

Toll Free in Canada: 800.668.4378

01.31.17

**NORD Gear Corporation**

Toll Free in the United States: 888.314.6673

[www.nord.com/docs](http://www.nord.com/docs)



DRIVESYSTEMS

# SHAFT FIXING KIT

RETAIN FOR FUTURE USE

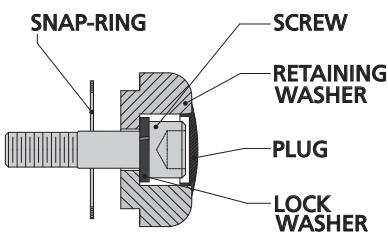


U10280 - 1 of 2

## 1. Shaft fixing kit - basic design

The NORD Fixing Kit provides a method for securing the reducer in an axial direction, after the keyed-hollow shaft reducer is mounted onto the machine shaft. The fixing kit prevents the reducer from shifting or walking out of place during operation. NORD offers a variety of standard fixing kits, based upon bore size, as shown on Page 2 of this manual.

Figure 1 – Fixing kit components



### IMPORTANT NOTE

For installation of the keyed-hollow bore reducer to the machine-shaft, see user manual U10270.

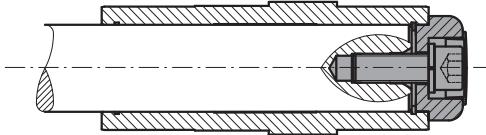
## 2. Assembly types

There are two types of assembly methods commonly used for securing the fixing kit.

Figure 2 – Fixing kit assembly methods

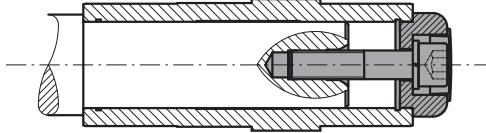
### Type 1

The machine-shaft is located against a fixed snap-ring located inside the bore of the reducer.



### Type 2

The machine shaft is shouldered and is pulled tight against the hollow-shaft; the snap-ring is no longer required.



### NOTICE

The maximum edge break on the solid machine shaft must not exceed the values shown on Page 2 of this manual. Otherwise the load-bearing capacity of the snap-ring will be reduced and may result in failure.

## 3. Assembly

- If using a Type 1 assembly, secure the appropriate snap-ring into the bore of the reducer. With Type 2 assembly, no snap-ring is required.
- Draw the hollow bore gear reducer onto the machine shaft as instructed in U10270. Remember to apply a suitable assembly paste or anti-seize compound to the mating shafts.
- Install the retaining washer over the end of the hollow bore.
- Secure the appropriate cap-screw into the machine shaft and tighten the screw based upon the assembly type, as noted below. Then install the protective plug over the screw hole.

### Type 1 - Screw tightening

Tighten until lightly snug and secure the screw with a thread-locking compound to prevent the screw from backing out.

### NOTICE

Over tightening the retaining screw may cause the snap ring to be pulled out of its seating groove, causing damage to the hollow-bore or snap ring.

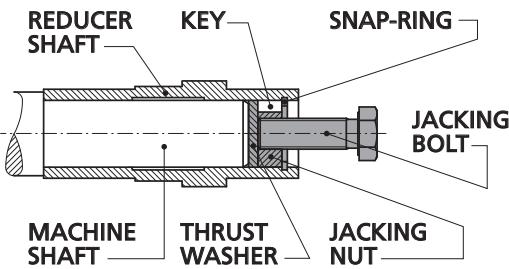
### Type 2 - Screw tightening

Follow the cap screw manufacturer's guidelines and tighten the screw to the proper torque, based upon the bolt grade and material. For reference tightening torque values, also see manual U10060, Table 2.

## 4. Disassembly

When using Type 2 assembly, it is possible to design a simple disassembly tool to allow easier removal of the hollow-bore reducer. The solid shaft is shouldered to rest against the hollow-bore of the reducer. The machine shaft is supported in both of the hollow bore land areas, but the overall length is reduced compared to Type 1 assembly.

Figure 3 – Disassembly Tool



### IMPORTANT NOTE

For suggestions on how to construct a disassembly tool for a particular reducer and bore size, please consult NORD's application engineering department.



DRIVESYSTEMS

# SHAFT FIXING KIT

RETAIN FOR FUTURE USE



U10280 - 2 of 2

## 5. Standard fixing kit size offerings

NORD offers a variety of standard fixing kit sizes as shown by the following tables.

Table 1 - Standard fixing kit size offerings

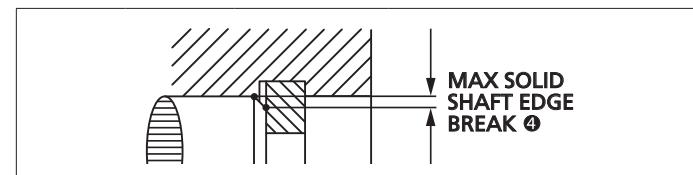
Shaft Bore [in]	Bolt Size	Allowable Thrust Groove ② lb [N]	Ring ③ lb [N]	Max. Edge Break ④ in [mm]
0.500	10-32	730 [3255]	520 [2300]	0.02 [0.5]
0.750	1/4-20	1800 [7905]	560 [2500]	0.04 [1]
1.000	3/8-16	2900 [13020]	1000 [4600]	0.04 [1]
1.188	7/16-14	5100 [22630]	1000 [4700]	0.04 [1]
1.250	7/16-14	5100 [22630]	1000 [4700]	0.04 [1]
1.375	5/8-11	6500 [29140]	1400 [6400]	0.06 [1.5]
1.438	5/8-11	6900 [30690]	1500 [6500]	0.06 [1.5]
1.500	5/8-11	7800 [34875]	1500 [6700]	0.06 [1.5]
1.625	5/8-11	9900 [44020]	1900 [8400]	0.08 [2]
1.688	5/8-11	10500 [46810]	1800 [8200]	0.08 [2]
1.938	5/8-11	11100 [49600]	1900 [8400]	0.08 [2]
2.000	5/8-11	14100 [62775]	2700 [12100]	0.08 [2]
2.063	5/8-11	14100 [62775]	2700 [12100]	0.08 [2]
2.188	5/8-11	16800 [74865]	2900 [13000]	0.08 [2]
2.375	3/4-10	17400 [77190]	2900 [13000]	0.08 [2]
2.438	3/4-10	17400 [77190]	2900 [13000]	0.08 [2]
2.750	3/4-10	19600 [87110]	4700 [21000]	0.10 [2.5]
2.938	3/4-10	20900 [93000]	4700 [21000]	0.10 [2.5]
3.188	3/4-10	27700 [123225]	7000 [31200]	0.12 [3]
3.438	3/4-10	29300 [130200]	7000 [31400]	0.12 [3]
3.625	3/4-10	30900 [137330]	7000 [31400]	0.12 [3]
3.938	7/8-9	32400 [144305]	6900 [30800]	0.12 [3]
4.000	7/8-9	39000 [173600]	16400 [73000]	0.12 [3]
4.063	7/8-9	39000 [173600]	16400 [73000]	0.12 [3]
4.375	7/8-9	41500 [184450]	16200 [72000]	0.12 [3]
4.438	7/8-9	41500 [184450]	16200 [72000]	0.12 [3]
4.750	7/8-9	44200 [196850]	15700 [70000]	0.12 [3]
4.938	7/8-9	48000 [213900]	15500 [69000]	0.12 [3]

Upon request, additional hollow-bore sizes & fixing kit sizes may be offered.

Shaft Bore [mm]	Bolt Size	Allowable Thrust Groove ② N [lb]	Ring ③ N [lb]	Max. Edge Break ④ mm [in]
16	M5	Not applicable ①		
20	M6	8370 [1900]	5600 [1300]	1.0 [0.04]
25	M10	12400 [2800]	7300 [1600]	1.0 [0.04]
30	M10	17515 [3900]	7200 [1600]	1.0 [0.04]
35	M12	29140 [6500]	8700 [1900]	1.5 [0.06]
40	M16	41850 [9400]	10900 [2400]	2.0 [0.08]
45	M16	46810 [10500]	10700 [2400]	2.0 [0.08]
50	M16	62775 [14100]	19000 [4300]	2.0 [0.08]
60	M20	74865 [16800]	29200 [6600]	2.0 [0.08]
70	M20	87110 [19600]	30300 [6800]	2.5 [0.10]
80	M20	115630 [26000]	56000 [12600]	2.5 [0.10]
90	M24	130200 [29300]	56000 [12600]	3.0 [0.12]
100	M24	144305 [32400]	55000 [12400]	3.0 [0.12]
110	M24	181350 [40800]	71000 [16000]	3.0 [0.12]
120	M24	196850 [44300]	70000 [15700]	3.0 [0.12]

Upon request, additional hollow-bore sizes and fixing kit sizes may be offered.

- ① This fixing kit is not supplied with a snap-ring. A Type 2 machine shaft is required.
- ② Thrust load-bearing capacity of the groove is based upon using a hollow-shaft material with a yield-strength of at least 45,000 psi (310 N/mm<sup>2</sup>).
- ③ Thrust load-bearing capacity of the snap-ring is based upon a typical snap-ring material with a yield-strength of at least 30,500 psi (210 N/mm<sup>2</sup>).
- ④ On the solid machine shaft, observe the maximum edge break (radius or chamfer) shown. A larger edge break will result in reduced load-bearing capacity of the snap-ring.





# HELICAL & BEVEL REDUCER LUBRICATION

DRIVESYSTEMS

RETAIN FOR FUTURE USE



U10750 - 1 of 2

## 1. Importance of proper lubrication

Proper gearbox lubrication is essential in order to reduce friction, heat, and component wear. Lubricants reduce heat and wear by inserting a protective "fluid boundary" between mating parts and preventing direct metal to metal contact. Lubricants also help prevent corrosion and oxidation, minimize foam, improve heat transfer, optimize reducer efficiency, absorb shock loads and reduce noise.

Most NORD reducers are shipped from the factory with a pre-determined oil fill level in accordance to the specified reducer size and mounting position.

## 2. Standard oil type

The following tables indicate the standard oil fill type used. Please see user manual U11000 for more specific information and for optional helical and bevel gear lubricants:

### Serviceable Gear Units

Helical In-line	Standard Oil Fill: ISO VG 220, Mineral Oil
Clincher Parallel-Shaft	
Right-Angle Bevel	
NORDBLOC® Series In-line	
NORDBLOC®.1 Series In-line	
Standard Series In-line	



### IMPORTANT NOTE

For shipping purposes, the following large Clincher™ gear units are supplied without oil:

- Clincher™ Sizes SK11282, SK11382, SK11382.1 and SK12382

### Maintenance-free / Lubricated For Life Gear Units

Clincher™ sizes SK0182NB, SK0282NB & SK1382NB	Standard Oil Fill: ISO VG220 SHC/PAO Synthetic Oil
NORDBLOC® Sizes SK172, SK272, SK371F, SK372, SK373, SK320	



### IMPORTANT NOTE

Maintenance-free units are supplied as sealed units with no vent-plug. Consult NORD prior to ordering if interested in ordering any of the above sizes as serviceable gear units.



### IMPORTANT NOTE

Consult the sticker adjacent to the fill plug to determine the type of lubricant installed at the factory. Some units have special lubricants designed to operate in certain environments or intended to extend the service life or service temperature range of the lubricant. If in doubt about which lubricant is needed for a certain application, please contact NORD Gear.

## 3. Lubrication replacement

If the gear unit is filled with mineral oil, the lubricant should be replaced at least after every 10,000 operating hours or after every two years. If the gear unit is filled with synthetic oil, the lubricant should be replaced at least after every 20,000 operating hours or after every four years. Often gear reducers are exposed to extreme ambient conditions, hostile environments, wet conditions, or dirty and dusty operating areas. Especially in these situations, it is important to establish a condition-based oil service interval.

## 4. Oil viscosity

Viscosity, or the oil's resistance to shear under load, is often considered the single most important property of any gear oil.

- Often one will consider making a viscosity correction to the oil to improve the performance when operating the gear unit at low temperature or high temperature.
- In cases of extreme load conditions, gear pairs and antifriction bearings may be more susceptible to sliding or scuffing wear. In these operating conditions, it may also be beneficial to consider an increased lubrication viscosity and/or a lubrication with improved antiwear additive packages.



### IMPORTANT NOTE

The user should consult with their primary lubrication supplier before considering changes in oil type or viscosity.

## 5. Maximum oil sump temperature limit

To prevent reducer overheating, the reducer's maximum oil sump temperature limit must not be exceeded for prolonged periods of operation (up to 3 hours continuous operation depending upon reducer size).

Oil Type	Maximum Oil Temperature Limit	
NORD	AGMA 9005-D94	
Mineral	80-85°C (176-185°F)	95°C (203°F)
Synthetic	105°C (220°F)	107°C (225°F)



### IMPORTANT NOTE

*Use caution when specifying gear reducers for high temperature service.* If there is concern about exceeding the allowable safe operating temperatures, please consult NORD to discuss alternatives.

**NORD Gear Limited**

Toll Free in Canada: 800.668.4378

08.04.17

**NORD Gear Corporation**

Toll Free in the United States: 888.314.6673

[www.nord.com/docs](http://www.nord.com/docs)



# HELICAL & BEVEL REDUCER LUBRICATION

DRIVESYSTEMS

RETAIN FOR FUTURE USE



U10750 - 2 of 2

## 6. The importance of routine oil analysis

Routine oil analysis, sound lubrication practices, and good tracking of oil performance trends will help establish proper lubrication maintenance and change-out intervals. To maximize equipment reliability, NORD Gear generally recommends a condition-based lubrication maintenance program. One may take exceptions to this general recommendation on sealed-for-life or maintenance-free gear units or smaller and less costly gear units. In these instances, the replacement cost of the gear unit is often small compared to the costs associated with this type of oil analysis program.

### NOTICE

NORD suggests replacing the gear oil if oil analysis indicates any of the following. Failure to replace the oil may cause internal damage to gearbox and diminished performance:

- Viscosity has changed by approximately 10% or more.
- Debris particles (silicon, dust, dirt or sand) exceed 25 ppm.
- Iron content exceeds 150-200 ppm.
- Water content is greater than 0.05% (500 ppm).
- The total acid number (TAN) tests indicate a significant level of oxidative break-down of the oil, and a critical reduction in performance; If the TAN number measured changes by more than 5% over the new oil, then an oil change would be recommended.

## 7. Mounting position and oil fill quantity

All NORD Gear reducers are shipped from the factory with a pre-determined oil fill level in accordance to the specified reducer size and mounting position. *For additional information, please see the separate mounting position diagrams and the corresponding oil fill quantity tables for the specified gear unit.*

The gearbox nametag will indicate the mounting position that was provided. *For mounting orientations other than shown in the mounting position charts, please consult NORD Gear.*



### IMPORTANT NOTE

Actual oil volume can vary slightly depending upon the gear case size, mounting and ratio. Prior to commissioning the reducer, check the oil-fill level using the reducer's oil-level plug and drain or add additional oil as needed. The minimum acceptable oil level is 0.15 in (4mm) below the oil level hole.

## 8. Oil plug locations

All gear units are assembled with the oil fill-level, oil-drain and vent plugs installed in their proper locations, according to the specified mounting position. All standard plugs are metric and utilize sealing gaskets between the head of the plug and the reducer housing.

## 9. Drain and fill-level plugs

All reducer drain plugs are metric socket head cap screws. For easier identification, it is NORD's standard practice to provide a hex-head screw for the fill-level plug. For ease of draining the used oil from the gear reducer, use the socket head screw located at the lowest part of the gearbox.



Drain Plug



Fill Level Plug

## 10. Vent plug locations

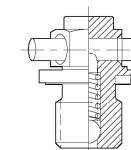
Reducer venting allows for air pressure differences that occur during operation, between the inner space of the reducer and the atmosphere, while ensuring leak-free operation. The AUTOVENT™ is standard for all vented gear units, unless otherwise noted.

**AUTOVENT™** - The AUTOVENT™ helps prevent bearing and gear damage by behaving like a check valve to block the entry of foreign material and prevent lubrication contamination from dust particles, moisture and air-borne process chemicals. The breather opens at approximately 0.3-0.9 psi during operation and closes tightly as the gearbox cools. This option is perfect for humid conditions and wash-down environments, helping to maintain proper oil cleanliness, while reducing foaming and oxidation.

Figure 1 AUTOVENT™ Types



Type 1



Type 2 with transportation plug

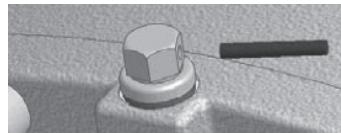
**Open Vent** - An optional open vent can be supplied by NORD. The open vent comes closed upon delivery with a transportation sealing plug (see Warning).

### NOTICE

To prevent build-up of excessive pressure, sealed vents must be activated as shown prior to gear unit start up. Excessive pressure may cause damage to internal components and cause leakage.



Sealed vent



Activated vent

**Filtered Vent** - NORD may offer an optional filtered vent, which allows gases to permeate, but does not allow dust and debris to pass through the vent.

**NORD Gear Limited**

Toll Free in Canada: 800.668.4378

08.04.17

**NORD Gear Corporation**

Toll Free in the United States: 888.314.6673

[www.nord.com/docs](http://www.nord.com/docs)



# HELICAL & BEVEL REDUCER LUBRICATION TYPES

DRIVESYSTEMS

RETAIN FOR FUTURE USE



U11000 - 1 of 2

## Lubrication Tables – Helical and Bevel Gear Units

### Standard Oil Lubricants

ISO Viscosity	Oil Type	Ambient Temperature Range	Manufacturer Brand/Type	Notes
VG220	MIN-EP	0 to 40°C (32 to 104°F)	Mobilgear 600XP220	●①
	PAO-EP	-35 to 60°C (-31 to 140°F)	Mobil SHC Gear 220	●②
	FG	-5 to 40°C (23 to 104°F)	Fuchs FM220	●

### Optional Oil Lubricants

ISO Viscosity	Oil Type	Ambient Temperature Range	Manufacturer Brand/Type	Notes
VG460	PAO-EP	-35 to 80°C (-31 to 176°F)	Mobil SHC Gear 460	-
	FG-PAO	-35 to 80°C (-31 to 176°F)	Mobil SHC Cibus 460	-
VG220	FG-PAO	-35 to 60°C (-31 to 140°F)	Mobil SHC Cibus 220	S
VG150	PAO-EP	-35 to 25°C (-31 to 77°F)	Mobil SHC Gear 150	-

### Grease Options (applied to greased bearings and seal cavities)

NLGI Grade	Grease Thickener	Grease Base Oil	Ambient Temperature Range	Manufacturer Brand/Type	Notes
NLGI 2	Li-Complex	MIN	-30 to 60°C (-22 to 140°F)	Mobil Grease XHP222	●①
	Li-Complex	PAO	-40 to 80°C (-40 to 176°F)	Mobil / Mobilith SHC 220	●②
	Polyurea	FG-PAO	-30 to 80°C (-22 to 176°F)	Mobil SHC Polyrex 222	●

● Stocked Lubricants

① Standard product on serviceable gear units

② Standard product on maintenance free gear units



### IMPORTANT NOTE

- The "Ambient Temperature" is intended to be an operation guideline based upon the typical properties of all the lubricant. The viscosity and other properties of the lubricant change based upon load, speed, ambient conditions, and reducer operating temperatures. The user should consult with their lubrication supplier & NORD gear before considering changes in oil type or viscosity.
- To prevent reducer overheating, observe the maximum operating oil temperature limits:  
Mineral Oil: 80-85 °C (176 – 180 °F).  
Synthetic Oil: 105 °C (225 °F).
- In the following instances, please consult NORD for specific recommendations:
  - ✓ Gear units will operate in high ambient temperature conditions exceeding 40 °C (104 °F).
  - ✓ Gear units will operate in cold ambient temperature conditions approaching 0 °C (32 °F) or lower.
  - ✓ Lower than an ISO VG100 viscosity oil is being considered for a cold-temperature service.
  - ✓ Fluid grease is required for lubricating the gear unit.
- Observe the general lubrication guidelines outlined in user manual U10750.

### Oil Formulation Codes

MIN-EP	- Mineral Oil with EP Additive
PAO-EP	- Synthetic Polyalphaolefin Oil with EP Additive
PAO	- Synthetic Polyalphaolefin Oil
PG	- Synthetic Polyglycol Oil
FG	- Food-Grade Oil
FG-PAO	- Food-Grade, Synthetic Polyalphaolefin Oil
FG-PG	- Food-Grade, Synthetic Polyglycol Oil

### Lubrication Notes

- Avoid using (EP) gear oils in worm gears that contain sulfur-phosphorous chemistries, as these additives can react adversely with bronze worm gears and accelerate wear.
- Food grade lubricants must be in compliance with FDA 212 CFR 178.3570 and qualify as a NSF-H1 lubricant. Please consult with lubrication manufacturer for more information.
- When making a lubrication change, check with the lubrication supplier to assure compatibility and to obtain recommended cleaning or flushing procedures.
- Do not mix different oils with different additive packages or different base oil formulation types. Polyglycol (PG) oils are not miscible with other oil types and should never be mixed with mineral oil or polyalphaolefin (PAO) synthetic oil.

**NORD Gear Limited**

Toll Free in Canada: 800.668.4378

07.11.18

**NORD Gear Corporation**

Toll Free in the United States: 888.314.6673

[www.nord.com/docs](http://www.nord.com/docs)



DRIVESYSTEMS

# HELICAL & BEVEL REDUCER LUBRICATION TYPES

RETAIN FOR FUTURE USE



U11000 - 2 of 2

Oil Cross-reference Chart

ISO Viscosity	Oil Type	Ambient Temperature Range	Mobil	Shell	Castrol	FUCHS	KLÜBER LUBRICATION
VG150	MIN-EP	0 to 25°C (32 to 77°F)	Mobilgear 600XP150	Omala S2 G 150	Alpha SP150	Renolin EP150	Klüberoil GEM 1-150N
	PAO-EP	-30 to 25 °C (-22 to 77 °F)	Mobil SHC Gear 150	Omala S4 GX 150	Alphasyn EP150	Gearmaster SYN150/NA	Klübersynth EG 4-150
	PAO	-30 to 25°C (-22 to 77°F)	Mobil SHC629	Morlina S4 B 150	Alphasyn T150	N/A	Klübersynth GEM 4-150N
	PG	-25 to 25°C (-13 to 77°F)	Mobil Glygoyle 150	Omala S4 WE 150	Alphasyn PG150	Renolin PG150	Klübersynth GH 6-150
	FG	0 to 25°C (32 to 77°F)	Mobil DTE FM 150	N/A	N/A	N/A	N/A
	FG-PAO	-15 to 25°C (5 to 77°F)	Mobil SHC Cibus 150	N/A	N/A	Cassida GL150	Klüberoil 4 UH 1-150N
	FG-PG	-25 to 25°C (-13 to 77°F)	Mobil Glygoyle 150	N/A	N/A	N/A	Klübersynth UH1 6-150
VG220	MIN-EP	0 to 40°C (32 to 104°)	Mobilgear 600XP220	Omala S2 G 220	Alpha SP220	Renolin EP220	Klüberoil GEM 1-220N
	PAO-EP	-30 to 60 °C (-22 to 140 °F)	Mobil SHC Gear 220	Omala S4 GX 220	Alphasyn EP220	Gearmaster SYN220/NA	Klübersynth EG 4-220
	PAO	-30 to 60°C (-22 to 140°F)	Mobil SHC630	Morlina S4 B 220	Alphasyn T220	N/A	Klübersynth GEM 4-220N
	PG	-25 to 60°C (-13 to 140°F)	Mobil Glygoyle 220	Omala S4 WE 220	Alphasyn PG220	Renolin PG220	Klübersynth GH 6-220
	FG	0 to 40°C (32 to 104°F)	Mobil DTE FM 220	N/A	N/A	Fuchs FM220	N/A
	FG-PAO	-25 to 60°C (-13 to 140°F)	Mobil SHC Cibus 220	N/A	N/A	Cassida GL220	Klüberoil 4 UH 1-220N
	FG-PG	-25 to 60°C (-13 to 140°F)	Mobil Glygoyle 220	N/A	N/A	Cassida WG220	Klübersynth UH1 6-220
VG460	MIN-EP	0 to 40°C (32 to 104°F)	Mobilgear 600XP460	Omala S2 G 460	Alpha SP460	Renolin EP460	Klüberoil GEM 1-460N
	PAO-EP	-20 to 80°C (-4 to 176°F)	Mobil SHC Gear 460	Omala S4 GX 460	Alphasyn EP460	Gearmaster SYN460/NA	Klübersynth EG 4-460
	PAO	-20 to 80°C (-4 to 176°F)	Mobil SHC 634	Morlina S4 B 460	Alphasyn T460	N/A	Klübersynth GEM 4-460N
	PG	-20 to 80°C (-4 to 176°F)	Mobil Glygoyle 460	Omala S4 WE 60	Alphasyn PG460	N/A	Klübersynth GH 6-460
	FG	0 to 40°C (32 to 104°F)	Mobil DTE FM460	N/A	N/A	Fuchs FM460	N/A
	FG-PAO	-20 to 80°C (-4 to 176°F)	Mobil SHC Cibus 460	N/A	N/A	Cassida GL460	Klüberoil 4 UH 1-460N
	FG-PG	-20 to 80°C (-4 to 176°F)	Mobil Glygoyle 460	N/A	N/A	Cassida WG460	Klübersynth UH1 6-460

Low-end service temperature limit may vary for a specific lubricant; Please also see the important notes on Page 1.

**NORD Gear Limited**

Toll Free in Canada: 800.668.4378

07.11.18

**NORD Gear Corporation**

Toll Free in the United States: 888.314.6673

[www.nord.com/docs](http://www.nord.com/docs)



DRIVESYSTEMS

# 92.1/93.1 SERIES HELICAL-BEVEL OIL FILL QUANTITIES

RETAIN FOR FUTURE USE



U12205 - 1 of 1

## 92.1/93.1 Helical-bevel mount lubrication

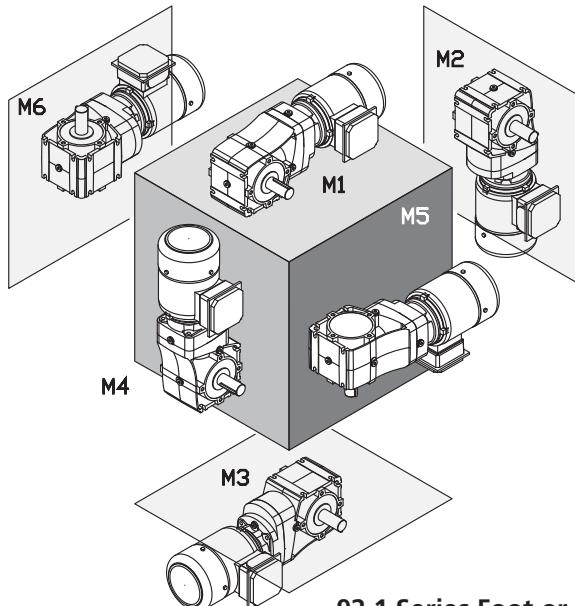
All NORD Gear reducers are shipped from the factory with a pre-determined oil fill level in accordance to the specified reducer size & mounting position. For additional information, please refer to the "Oil Plug & Vent Locations" documentation for your gear unit.



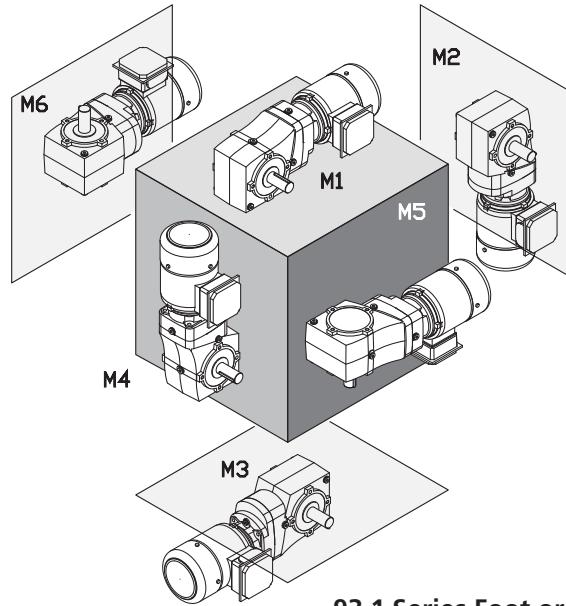
### IMPORTANT NOTE

Actual oil volume can vary slightly depending upon the gear case size, mounting and ratio. Prior to commissioning the reducer, check the oil-fill level using the reducer's oil level plug and drain or add addition oil as needed.

For mounting orientations other than shown please consult NORD Gear. Reducer modifications may be required.



**92.1 Series Foot or Flange Mount**



**93.1 Series Foot or Flange Mount**

### 92.1 Series Oil Fill

	M1		M2		M3		M4		M5		M6	
	Quarts	Liters										
SK 92072.1	0.28	0.26	0.52	0.49	0.44	0.42	0.57	0.54	0.31	0.29	0.33	0.31
SK 92172.1	0.36	0.34	0.65	0.61	0.55	0.52	0.71	0.67	0.44	0.42	0.51	0.48
SK 92372.1	0.45	0.43	0.97	0.92	0.77	0.73	0.88	0.83	0.58	0.55	0.65	0.61
SK 92672.1	0.90	0.85	1.69	1.60	1.27	1.20	1.59	1.50	1.08	1.02	1.08	1.02
SK 92772.1	1.37	1.30	2.80	2.65	1.97	1.86	2.85	2.70	1.69	1.60	1.69	1.60

Oil levels shown apply to all foot & flange mounted units.

### 93.1 Series Oil Fill

	M1		M2		M3		M4		M5		M6	
	Quarts	Liters										
SK 93072.1	0.41	0.39	0.98	0.93	0.83	0.79	1.08	1.02	0.52	0.49	0.66	0.62
SK 93172.1	0.63	0.60	1.24	1.17	0.99	0.94	1.29	1.22	0.69	0.65	0.90	0.85
SK 93372.1	1.06	1.00	2.08	1.97	1.74	1.65	2.26	2.14	1.18	1.12	1.42	1.34
SK 93672.1	1.90	1.80	3.41	3.23	2.86	2.71	4.02	3.80	2.13	2.02	2.59	2.45
SK 93772.1	2.87	2.72	4.89	4.63	3.91	3.70	6.13	5.80	3.10	2.93	3.43	3.25

Oil levels shown apply to all foot & flange mounted units.

**NORD Gear Limited**

Toll Free in Canada: 800.668.4378

**NORD Gear Corporation**

Toll Free in the United States: 888.314.6673



DRIVESYSTEMS

# 92.1/93.1 SERIES HELICAL-BEVEL OIL PLUG & VENT LOCATIONS

RETAIN FOR FUTURE USE

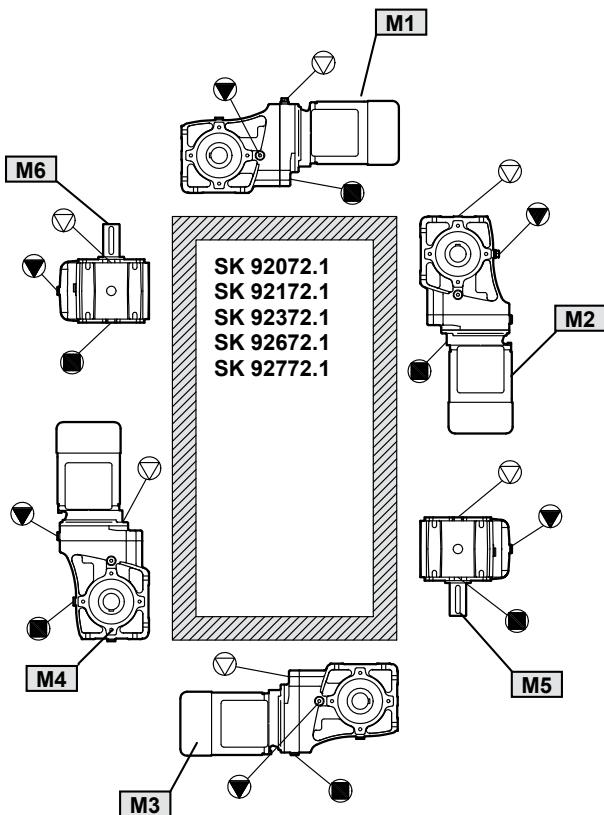


U14305 - 1 of 1

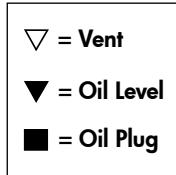
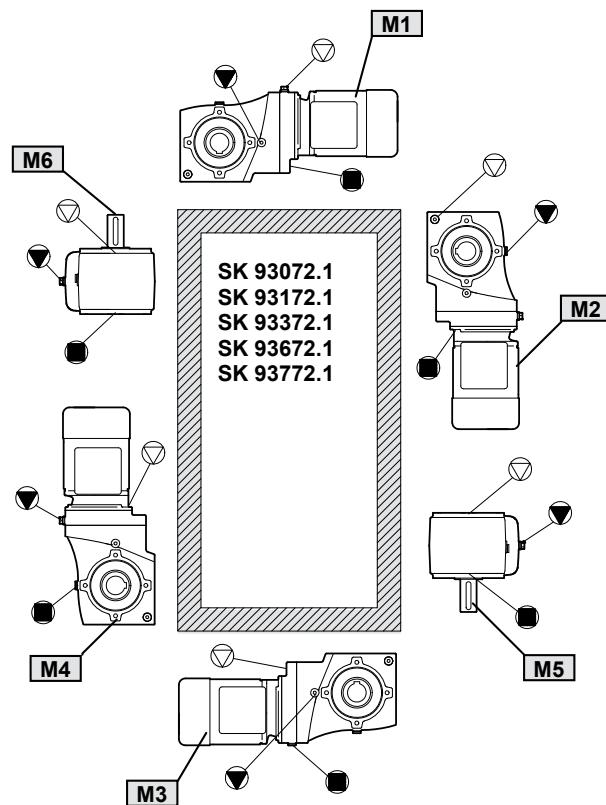
## Oil plug locations

Prior to commissioning the reducer, check the oil-fill level using the reducer's oil-level plug and drain or add additional oil as needed. *For mounting orientations other than shown please consult NORD Gear. New plug locations may be required.*

92.1 Series



93.1 Series

**NORD Gear Limited**

Toll Free in Canada: 800.668.4378

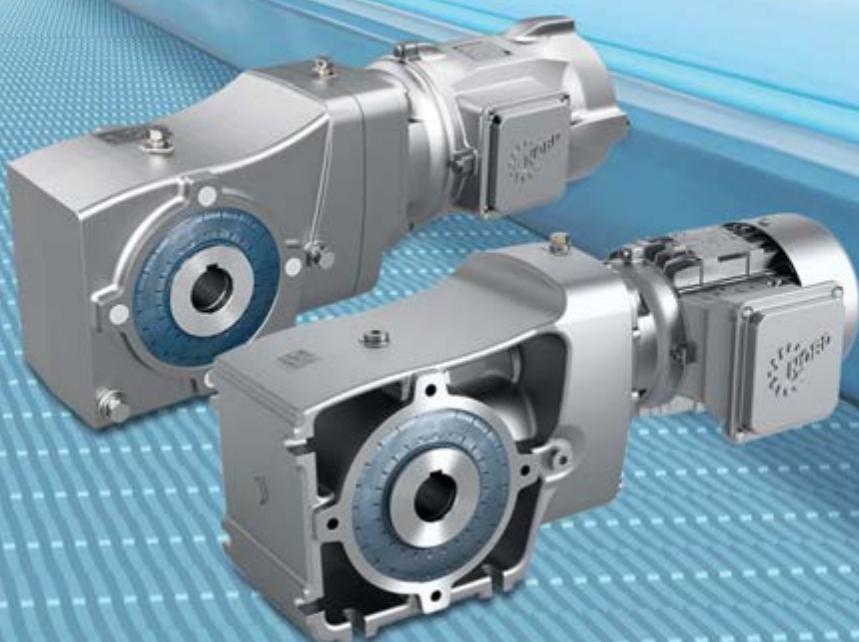
03.24.14

**NORD Gear Corporation**

Toll Free in the United States: 888.314.6673

[www.nord.com/docs](http://www.nord.com/docs)

Intelligent Drivesystems, Worldwide Services



[DE](#) [EN](#) [FR](#)

**PL1014**

**SK 920072.1 - SK 93772.1**

Ersatzteilkatalog 2-stufige Kegelradgetriebe

Spare parts catalogue 2-stage helical bevel gear unit

Catalogue de pièces de rechange Couple coniques à 2 trains

**NORD**  
DRIVESYSTEMS



**Allgemeine Ersatzteile**  
**General parts list**  
**Vues éclatées et nomenclature**



2-stufige Kegelradgetriebe..... 2 - 5  
2-stage helical bevel gear unit  
Couples coniques à 2 trains



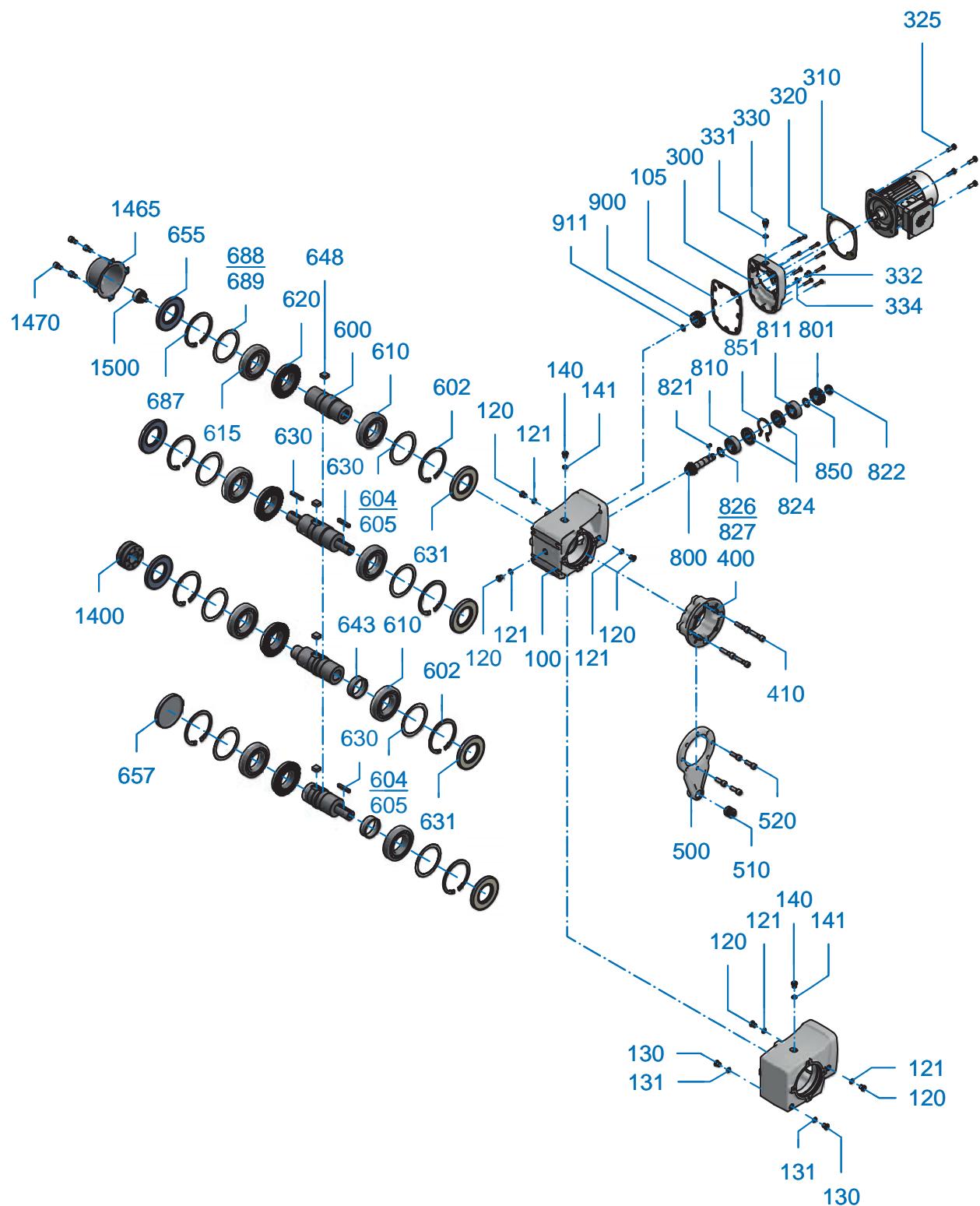
Bestellangaben ..... 6 - 7  
Order details  
Informations de commande

**SK 920072.1 - SK 92772.1  
SK 930072.1 - SK 93772.1**



The logo for NORD DRIVESYSTEMS. It features a stylized black gear icon on the left containing the word "NORD" in a bold, black, sans-serif font. To the right of the gear, the word "DRIVESYSTEMS" is written in a smaller, blue, all-caps, sans-serif font.

# **2-stufige Kegelradgetriebe 2-stage Helical-Bevel Gear Unit Couples coniques à 2 trains**



EB 6239000-E1 #1

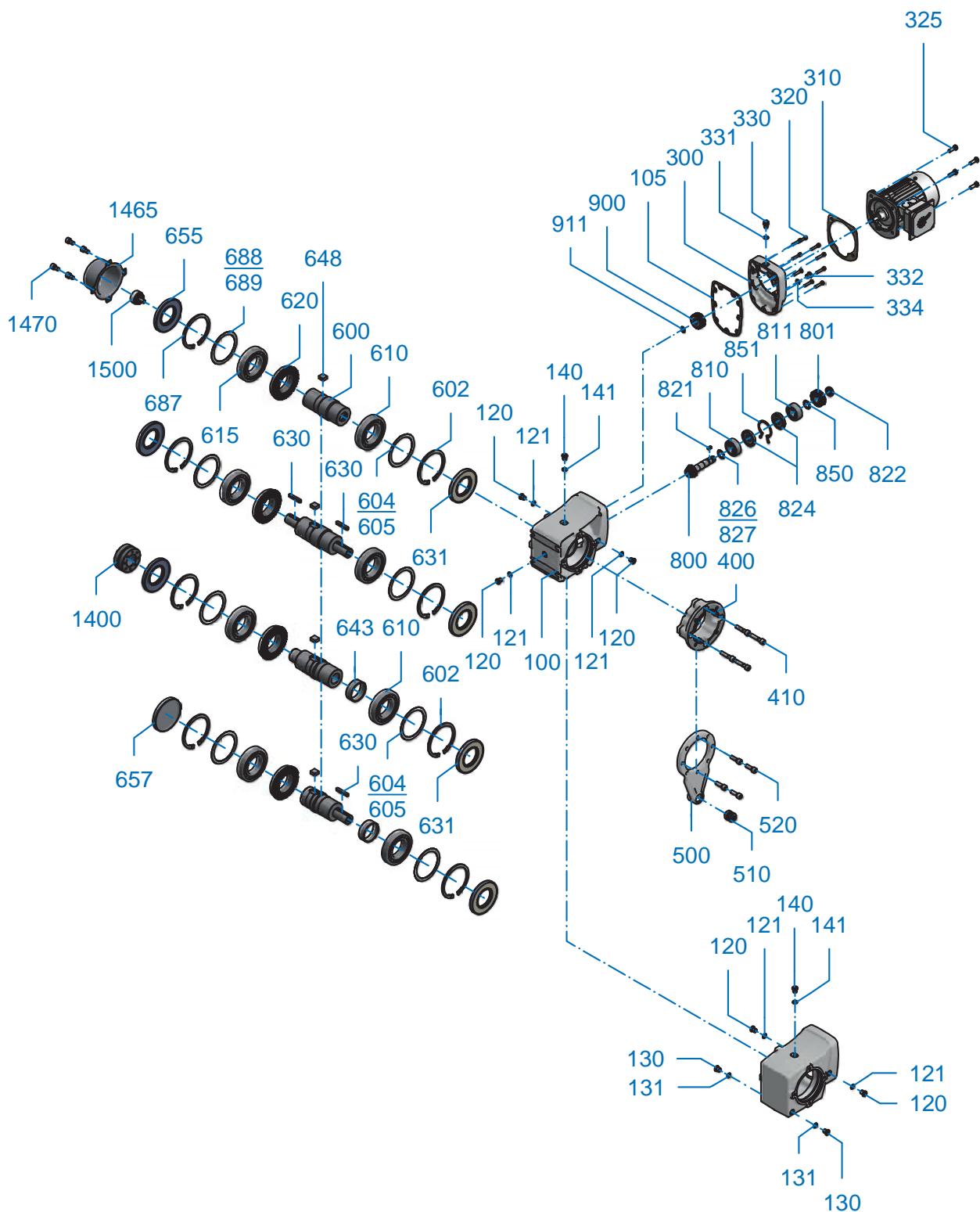


(DE)		(EN)		(FR)	
100	Gehäuse	100	Housing	100	Boîtier
105	Dichtung	105	Seal	105	Bague d'étanchéité
120	Schraube	120	Screw	120	Vis
121	Dichtung	121	Seal	121	Bague d'étanchéité
130	Schraube	130	Screw	130	Vis
131	Dichtung	131	Seal	131	Bague d'étanchéité
140	Schraube	140	Screw	140	Vis
141	Dichtung	141	Seal	141	Bague d'étanchéité
300	Getriebedeckel	300	Gear unit cover	300	Couvercle du réducteur
310	Dichtung	310	Seal	310	Bague d'étanchéité
320	Schraube	320	Screw	320	Vis
325	Schraube	325	Screw	325	Vis
330	Schraube	330	Screw	330	Vis
331	Dichtung	331	Seal	331	Bague d'étanchéité
332	Schraube	332	Screw	332	Vis
334	Dichtung	334	Seal	334	Bague d'étanchéité
400	Flansch	400	Flange	400	Brigde
410	Schraube	410	Screw	410	Vis
500	Drehmomentenstütze	500	Torque arm	500	Bras de réaction
510	Buchse	510	Socket	510	Douille
520	Schraube	520	Screw	520	Vis
600	Abtriebswelle	600	Output shaft	600	Arbre de sortie
610	Wälzlager	610	Roller bearing	610	Palier
615	Wälzlager	615	Roller bearing	615	Palier
620	Abtriebsrad	620	Output gear	620	Roue de sortie
630	Passfeder	630	Key	630	Clavette
631	Wellendichtring	631	Radial shaft seal	631	Bague d'étanchéité de l'arbre
634	Sicherungsring	650	Circlip	650	Circlip
635	Passscheibe	635	Shim	635	Rondelles d'ajustage
636	Passscheibe	636	Shim	636	Rondelles d'ajustage
643	Distanzbuchse	643	Socket	510	Douille
648	Passfeder	648	Key	648	Clavette
650	Sicherungsring	650	Circlip	650	Circlip
652	Passscheibe	652	Shim	652	Rondelle d'ajustage
653	Passscheibe	653	Shim	653	Rondelle d'ajustage
655	Wellendichtring	655	Radial shaft seal	655	Bague d'étanchéité de l'arbre
657	Verschlusskappe	657	Sealing cap	657	Bouchon
↓		↓		↓	



**2-stufige Kegelradgetriebe**  
**2-stage Helical-Bevel Gear Unit**  
**Couples coniques à 2 trains**

EB 6239000-E1 #1





↑	↑	↑
DE	EN	FR
800 Ritzelwelle	800 Pinion shaft	800 Arbre de pignon
801 Antriebsrad	801 Drive gear	801 Roue d'entrée
810 Wälzlager	810 Roller bearing	810 Palier
811 Wälzlager	811 Roller bearing	811 Palier
820 Sicherungsring	820 Circlip	820 Circlip
821 Passfeder	630 Key	630 Clavette
822 Nutmutter	822 Locknut	822 Ecrou à encoches
823 Sicherungsblech	823 Tab washer	823 Rondelle d'arrêt
824 Buchse	824 Socket	824 Douille
826 Passscheibe	826 Shim	826 Rondelle d'ajustage
827 Passscheibe	827 Shim	827 Rondelle d'ajustage
830 Stützscheibe	830 Supporting disc	830 Rondelle d'appui
850 Buchse	850 Socket	850 Douille
851 Sicherungsring	851 Circlip	851 Circlip
900 Antriebsritzeln	900 Driving pinion	900 Pignon d'entrée
910 Passfeder	910 Key	910 Clavette
911 Sicherungsring	911 Circlip	911 Circlip
1400 Baugruppe Schrumpfscheibe	1400 Shrink disc assembly	1400 Module de frette de serrage
1465 Haube	1465 Cover	1465 Capot
1470 Schraube	1470 Screw	1470 Vis
1500 Befestigungselement	1500 Fixing element	1500 Elément de fixation

#### Kontaktdaten / Contact details / Contacts:

Firma / Company / Entreprise:



Straße / Street / Rue:



Stadt / Town / Ville:

PLZ / Postcode/  
Code postal:

Telefon / Telephone / Téléphone:

Fax:

E-mail:

#### Getriebbau NORD

Getriebbau-Nord-Straße 1  
D-22941 Bargteheide

Telefon +49(0) 4532/289-0  
Telefax +49(0) 4532/289-2253  
E-Mail [info@nord.com](mailto:info@nord.com)  
[www.nord.com](http://www.nord.com)

DE

Diese NORD Ersatzteilliste beinhaltet eine standardisierte Darstellung der NORD Getriebe. Um Ihnen das Finden und Nachbestellen von Ersatzteilen zu erleichtern, finden Sie am Ende der Ersatzteilliste ein Bestellformular mit wichtigen Hinweisen zur Bestimmung der richtigen Teile.

Für Rückfragen stehen wir Ihnen gerne zur Verfügung. Ihren lokalen Ansprechpartner finden Sie unter <http://locator.nord.com>.

EN

This NORD spare parts list contains a standardised depiction of NORD gear units. In order to enable you to find and re-order replacement parts more easily, you can find an order form and important information regarding the identification of the correct components at the end of this spare parts list.

We will be glad to help you if you have any queries: You can find your local contact partner under <http://locator.nord.com>.

FR

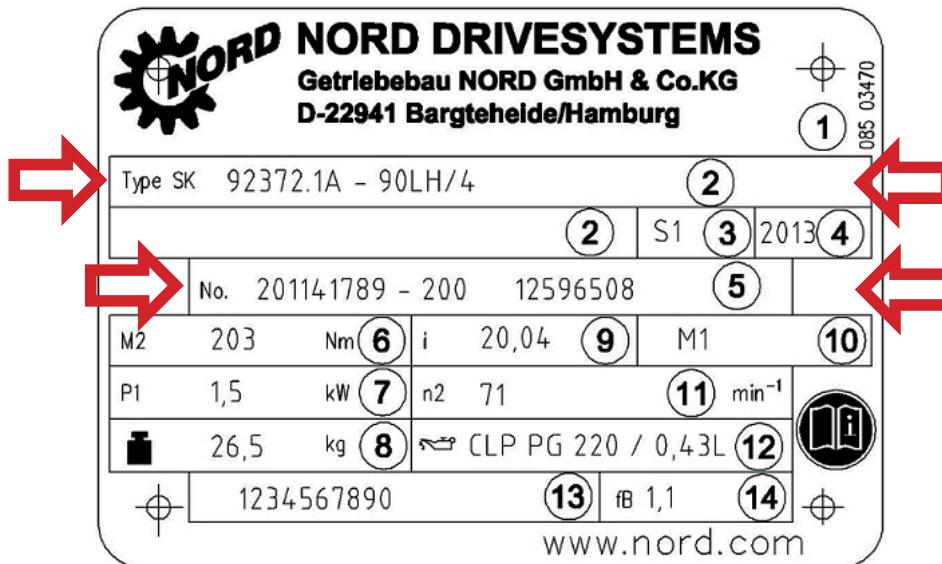
Cette liste de pièces de rechange NORD contient une représentation standard des réducteurs NORD. Pour faciliter la recherche et la commande de pièces de rechange, un formulaire de commande se trouve à la fin de la liste des pièces de rechange et vous donne toutes les informations essentielles pour déterminer les pièces dont vous avez besoin.

En cas de questions, n'hésitez pas à nous contacter. Pour connaître votre interlocuteur local, veuillez consulter le site <http://locator.nord.com>.

### Erläuterung des Typenschildes

### Explanation of the rating plate

### Explication de la plaque signalétique



#### DE

- 1 Matrix – Barcode
- 2 NORD - Getriebetyp
- 3 Herstellungsjahr
- 4 Fabrikationsnummer
- 5 Nenndrehmoment der Getriebeabtriebswelle
- 6 Antriebsleistung
- 7 Gewicht entsprechend Auftragsausführung
- 8 Gesamte Getriebeübersetzung
- 9 Einbaulage
- 10 Nenndrehzahl der Getriebeabtriebswelle
- 11 Schmierstoffart, -viskosität und -menge
- 12 Kundenmaterialnummer
- 13 Betriebsfaktor

#### EN

- 1 Matrix – Barcode
- 2 NORD gear unit type
- 3 Year of manufacture
- 4 Serial number
- 5 Rated torque of gear unit output shaft
- 6 Drive power
- 7 Weight according to ordered version
- 8 Overall gear unit ratio
- 9 Installation orientation
- 10 Rated speed of gear unit output shaft
- 11 Lubricant type, viscosity and quantity
- 12 Customer's part number
- 13 Operating factor

#### FR

- 1 Code matriciel, à barres
- 2 Type de réducteur NORD
- 3 Année de fabrication
- 4 Numéro de série
- 5 Couple nominal de l'arbre de sortie du réducteur
- 6 Puissance d'entraînement
- 7 Poids selon l'exécution du contrat
- 8 Rapport de réduction total
- 9 Position de montage
- 10 Vitesse de rotation nominale de l'arbre de sortie du réducteur
- 11 Type de lubrifiant, viscosité et quantité
- 12 Numéro d'article client
- 13 Facteur de service

### Ersatzteil-Bestellung / Replacement parts order / Commande de pièces de rechange:

Bezeichnung / Designation / Désignation:

Pos.-Nr. / Item No. / N° pos :

Stückzahl / Pieces / Quantité:

Getriebetyp / Gear unit type / Type de réducteur:

Fabrikationsnummer / Serial No. / Numéro de série:





## **NORD DRIVESYSTEMS Group**

**Headquarters and Technology Centre**  
in Bargteheide, close to Hamburg

**Innovative drive solutions**  
for more than 100 branches of industry

**Mechanical products**  
parallel shaft, helical gear, bevel gear and worm gear units

**Electrical products**  
IE2/IE3/IE4 motors

**Electronic products**  
centralised and decentralised frequency inverters,  
motor starters and field distribution systems

**7 state-of-the-art production plants**  
for all drive components

**Subsidiaries in 36 countries on 5 continents**  
provide local stocks, assembly, production,  
technical support and customer service

**More than 3,500 employees throughout the world**  
create customer oriented solutions

**[www.nord.com/locator](http://www.nord.com/locator)**

## **Headquarters:**

**Getriebbau NORD GmbH & Co. KG**  
Getriebbau-Nord-Straße 1  
22941 Bargteheide, Germany  
Fon.: +49 (0) 4532 / 289-0  
Fax: +49 (0) 4532 / 289-2253

**Member of the NORD DRIVESYSTEMS Group**





# TROUBLESHOOTING

RETAIN FOR FUTURE USE



U19000 - 1 of 1

## Troubleshooting

This section identifies some of the most common issues involved with NORD Gear speed reducers, and provides recommendations to assist you in defining and answering your questions as you work with our products. You may also contact our Engineering/Application departments if your questions are not answered in the table below.

Problem With the Reducer		Possible Causes	Suggested Remedy
Runs Hot	Overloading	Load exceeds the capacity of the reducer	Check rated capacity of reducer, replace with unit of sufficient capacity or reduce the load.
	Improper lubrication	Insufficient lubrication	Check lubricant level and adjust up to recommended levels
		Excessive lubrication	Check lubricant level and adjust down to recommended levels.
		Wrong lubrication	Flush out and refill with correct lubricant as recommended
Runs Noisy	Loose foundation bolts	Weak mounting structure	Inspect mounting of reducer. Tighten loose bolts and/or reinforce mounting and structure.
		Loose hold down bolts	Tighten bolts
	Failure of bearings	May be due to lack of lubricant	Replace bearing. Clean and flush reducer and fill with recommended lubricant.
		Overload	Check rated capacity of reducer.
	Insufficient lubricant	Level of lubricant in reducer not properly maintained.	Check lubricant level and adjust to factory recommended level.
Output shaft does not turn	Internal parts are broken or missing	Overloading of reducer can cause damage	Replace broken parts. Check rated capacity of reducer.
		Key missing or sheared off on input shaft.	Replace key.
		Coupling loose or disconnected	Properly align reducer and coupling. Tighten coupling.
Oil Leakage	Worn seals	Caused by dirt or grit entering seal.	Replace seals. Autovent may be clogged. Replace or clean.
	Unit runs hot or leaks	Overfilled reducer	Check lubricant level and adjust to recommended level.
		Vent clogged.	Clean or replace, being sure to prevent any dirt from falling into the reducer.
	Incorrect fill level	Improper mounting position, such as wall or ceiling mount of horizontal reducer.	Check mounting position on the name tag & verify with mounting chart in manual.



DRIVESYSTEMS

# MOTORS - AC INDUCTION, SINGLE & POLYPHASE

RETAIN FOR FUTURE USE



U30000 - 1 of 18

## 1. Overview

This user manual applies to NORD Motor products and it provides general information for motor operation, installation, maintenance, inspection, repair, and trouble shooting, which is relevant to most of the motor products shipped by NORD. Information and instructions provided in this manual, safety and commissioning information and all other manuals applicable to any items supplied by NORD must be observed.

This instruction manual is not intended to include comprehensive details and information related to all possible design variations or accessories options available with NORD motors. If there is any uncertainty about specific procedures, instructions or motor details, then please refer these questions to NORD for additional information or clarification.

Before installing, operating, or performing maintenance on any electrical motor become familiar with the following:

- The detailed operating instructions and wiring diagrams.
- All applicable national, local and system-specific regulations, codes and practices.
- The national / regional regulations governing safety and accident prevention.
- The proper use of any tools, transportation or hoisting equipment, and safety equipment needed to complete the installation.
- To avoid serious injury or possible damage to the equipment or machine, compliance with all safety and information notes is mandatory!



### WARNING

All work involved in the transport, connection, commissioning and maintenance of any NORD product must be carried out by qualified and responsible technicians. All applicable national, regional, and local work regulations and safety requirements must also be complied with. NORD assumes no liability for personal injury, accidental death, or equipment damage and malfunctions resulting from failure to comply with installation or operating instructions, safety notes, or any work regulations and laws!



### DANGER

To avoid electrocution, injury or death, make certain the motor is properly grounded, completely de-energized and brought to a no-voltage condition prior to working on any electrical connections.

## 2. Motor Types

NORD AC electric induction motors described in this manual generally include the following types:

- Single speed or two-speed design.
- Three phase alternating current or single phase design.
- Enclosure types: TEFC, TENV, and TEBC.

## 3. Enclosure Types

### Totally enclosed fan cooled (TEFC).

TEFC motor designs rely on fan that is mounted on the motor's rotor shaft so the cooling capacity can vary based upon the motor's operating speed.

### Totally enclosed, non-ventilated (TENV)

The TENV motor designs rely purely on convection cooling and they have no fan. Often TENV designs are labeled for intermittent or periodic duty or at a lower power rating than is typical for the given motor frame size.

### Totally enclosed, blower cooled (TEBC)

The TEBC design uses separate blower or ventilator fan, with its own low wattage motor and a separate power supply, to provide continuous airflow and cooling. The blower can be used to extend the speed range of the motor and allow extreme slow speed operation without causing a concern for overheating. Blower data is provided in Table 6, page 11.

## 4. Voltage and Frequency Variation

Voltage and frequency variations are based upon the assumption that the nameplate horsepower will not be exceeded and that the motor temperature may increase. Standard allowable deviations are based upon the type of motor labeling.

### NEMA and CSA Labeled Motors

Variations are based upon the nominal utilization voltage, and not the service (supply) voltage as per ANSI C84.1.

Service Voltages	Utilization Voltages
120V, 208V, 240V, 480V, 600V	115V, 200V, 230V, 460V, 575V

- Voltage variation at rated frequency =  $\pm 10\%$ .
- Frequency variations at rated voltage =  $\pm 5\%$ .
- Combined voltage/frequency variation =  $\pm 5\%$ .

### CE Labeled Motors

Per IEC 60038, allowable service voltage variations on in the current system, compared to the previous system, are as indicated.

Previous Service Voltages	Current Service Voltages
220V, 380V, 660V	230V, 400V, 690V +6/-10%
240V, 415V	230V, 400V +10/-6%

- Per EN 60034-1 a  $\pm 5\%$  voltage variation and a  $\pm 2\%$  frequency variation can be tolerated.
- The allowed variations are based upon the voltage (or voltage range) indicated on the motor nameplate.

**NORD Gear Limited**

Toll Free in Canada: 800.668.4378

01.31.17

**NORD Gear Corporation**

Toll Free in the United States: 888.314.6673

[www.nord.com/docs](http://www.nord.com/docs)



DRIVESYSTEMS

# MOTORS - AC INDUCTION, SINGLE & POLYPHASE

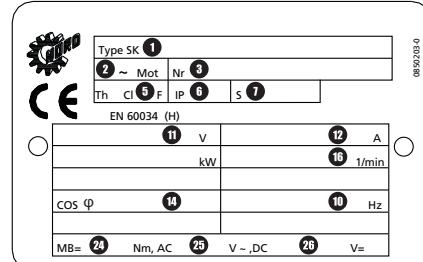
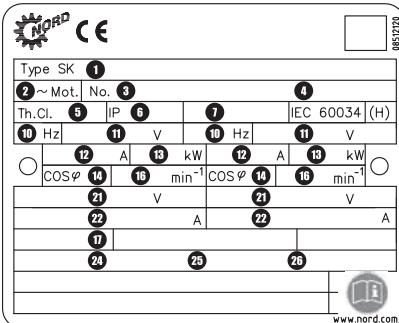
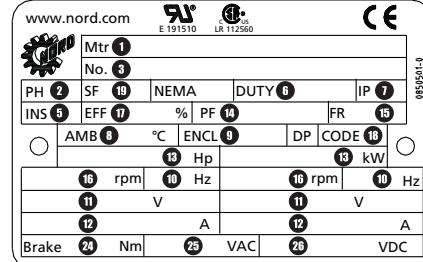
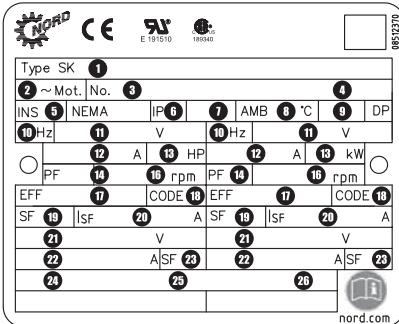
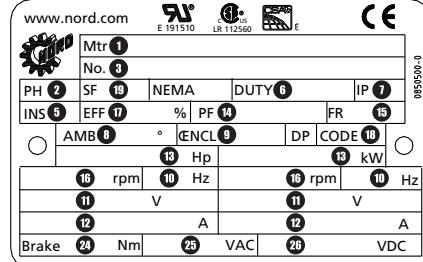
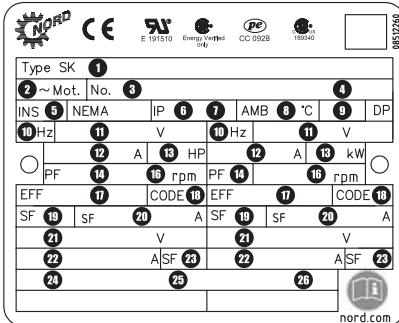
RETAIN FOR FUTURE USE



U30000 - 2 of 18

## 5. Motor Nameplate Information

The motor nameplate and the display of technical information may vary slightly depending upon the global standard/s that the motor conforms to and the efficiency level. Please reference the examples below.



**Table 1. Nameplate Data**

Field	Definition
1	Model / Type
2	Number of Phases
3	Order Number
4	Serial Number
5	Insulation Class
6	IP (Ingress Protection) Enclosure Rating
7	Duty Cycle
8	Ambient Temperature Rating (°C)
9	Enclosure Type
10	Motor Frequency (Hz)
11	Voltage Rating (V)
12	Current Rating (A)
13	Rated Power (HP or kW)

Field	Definition
14	Power Factor
15	Motor Frame Size
16	Full Load Speed (rpm or 1/min <sup>2</sup> )
17	Efficiency
18	NEMA Code Letter
19	Service Factor
20	Current Rating (If Service Factor ≥ 1.15)
21	Operating Voltage Range (A)
22	Current Rating at Operating Voltage Range (A)
23	Service Factor at Operating Voltage Range (A)
24	Brake Rating (Nm)
25	Brake Supply Voltage (VAC)
26	Brake Coil Voltage (VDC)

**NORD Gear Limited**

Toll Free in Canada: 800.668.4378

01.31.17

**NORD Gear Corporation**

Toll Free in the United States: 888.314.6673

[www.nord.com/docs](http://www.nord.com/docs)



DRIVESYSTEMS

# MOTORS - AC INDUCTION, SINGLE & POLYPHASE

RETAIN FOR FUTURE USE



U30000 - 3 of 18

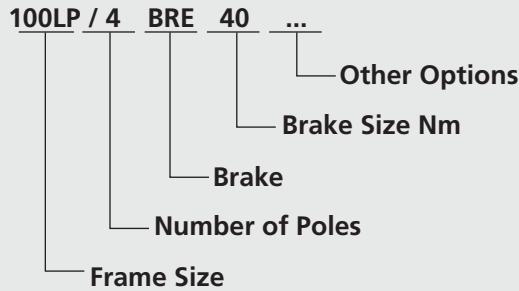
## 6. Motor Options And Nomenclature

NORD offers many options for its motors. The option code will be shown in the motor nomenclature. Below are commonly used options.

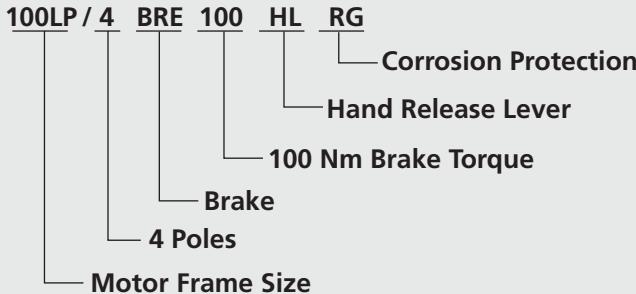
Code	Description
AICM	Additional Internal Insulation Coating Applied
BRE	With Brake
EAR	Single Phase, Start Cap/Run Cap
ECR	Single Phase, Start Cap/Run Cap Increased SF
EHB	Single Phase, Run Capacitor Only
EP	Epoxy Dipped Windings
F	Blower Cooling Fan - 3ph & 1ph
FC	Blower Cooling Fan - 1ph
FHL	Brake – Lockable Manual Release
H	Energy Efficient
HL	Brake – Manual Hand Release
IG	Incremental Encoder
IP66	IP66 Environmental Protection
IR	Brake – Current Sensing Relay
KB	Condensation Holes - Removable Plugs
KD	Condensation Holes - Open
MIK	Brake – Microswitch
MS	Power Plug Connector

Code	Description
OL	TENV Motor – Without Fan / With Cover
OL/H	TENV Motor - Without Fan & Cover
P	Premium Efficient Motors
RD	Canopy Cover
RDD	Double Canopy Cover
RG	Brake – Corrosion Protected
RLS	Backstop
SH	Motor Space Heater
SR	Brake – Dust Protected
TF	Thermistor
TW	Thermostat
VN	10:1 Constant Torque Rated Motor
VR	5:1 Constant Torque Rated Motor
VW	20:1 Constant Torque Rated Motor
VZ-F	1000+:1 Constant Torque Rated Motor
WE	2nd Motor Shaft End
WU	High Slip Rotor
Z	High Inertia Motor Fan

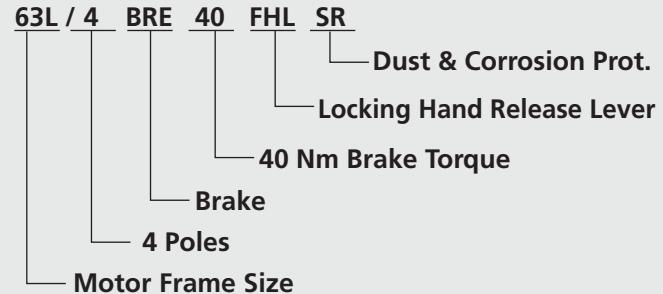
### Motor Nomenclature



### Ordering Examples



100 Frame Motor with 4 poles, Brake, 100 Nm with a hand release lever, corrosion protected brake, and a current sensing relay.



63 Frame motor with 4 poles, a 40 Nm Brake with a locking hand release lever and dust & corrosion protection.



DRIVESYSTEMS

# MOTORS - AC INDUCTION, SINGLE & POLYPHASE

RETAIN FOR FUTURE USE



U30000 - 4 of 18

## 7. Application Conditions

Standard NORD motors are designed to operate in dusty or moist environments and have anti-fungal, thermal class F insulation.

- Enclosure Protection Rating = IP55 (minimum).
- Maximum Installation Height = 3300 ft (1000 m).
- Ambient Temperature = -4 to 104°F (-20 to 40 °C).
- Tropical-proof, Thermal Class F insulation.

The protection level and maximum ambient temperature are stated on the motor nameplate.



### IMPORTANT NOTE

NORD can provide motors for an expanded range of applications and service conditions including higher protection levels, extreme ambient conditions and, higher altitudes.



### IMPORTANT NOTE

Consult NORD for recommendations if motors are operated under extreme loading conditions, exposed to high inertia loads, or need to operate under unusually high cycling conditions with high starting and stopping frequency.



### DANGER

Special design and assembly considerations are needed if NORD motors are subject to any of the following conditions. Environmental conditions may lead to premature damage and/or failure without the proper protective features. Consult NORD for design considerations:

- Outdoor installation with motor in a vertical position.
- Direct contact with aggressive or corrosive materials (acids, bases, salts, certain gases, etc.).
- Exposure to extreme high or low temperatures, high relative humidity, condensation moisture or very wet environments.
- Subject to extreme material build-up on the unit (dirt, dust, sand, etc.).
- Hazardous Locations (risk of fire or explosion).

## 8. Transportation

During transportation observe the following:

- Make sure that all eyebolts and lifting lugs are tight and firmly against their supporting surface.
- Use all the lifting eyes that are intentionally supplied with the motor.
- Lift only at designed points.
- Protect the mounting surface from possible damage during transportation.
- Always use sufficiently rated handling equipment, lift mechanisms and lifting straps.
- With heavier objects or unbalanced loads, it may be appropriate to use more than one lifting point or an additional strap or sling to assure safe transportation of the assembly. This is especially true of assembled gearmotors and motorized reducers.
- Once the NORD motor or assembly is properly installed, remove the transportation fixtures completely or make certain they are properly re-secured and tightened.



### WARNING

#### Transportation – Use of Lifting Devices

To avoid death, serious injury or equipment damage...

- Hoisting lugs or lifting eyes attached to the motor are designed for the weight of the motor only! Do not attach any additional loads!
- The motor must only be transported and lifted using the lifting eyes, in a position that is appropriate for its type of construction. Otherwise, it could fall over or slip in the lifting tackle.
- During suspended transport, two straps must be able to carry the entire load weight safely.
- When required use additional, suitable means of support for transportation, installation or removal.
- Always secure the support equipment to prevent it from slipping.



DRIVESYSTEMS

# MOTORS - AC INDUCTION, SINGLE & POLYPHASE

RETAIN FOR FUTURE USE



U30000 - 5 of 18

## 9. Storage

If the motor is not in service, store it according to the following conditions:

- Store the motor in a clean, dry, dirt-free, vibration free area.
- Storage temperatures of 10°C (50°F) to 50°C (120°F) must be maintained.
- Relative humidity must not exceed 60%.
- If vibration in the area exceeds 0.002 inch (0.05 mm) at 60 hertz, then vibration isolation pads are suggested to prevent brinelling of the bearings.
- Treat the unprotected shaft end and mating flange surfaces with a corrosion inhibitor that can be cleaned off prior to commissioning.
- Before placing the motor into service, visually inspect the motor exterior for evidence of deterioration during storage. Turn the motor shaft by hand to make sure the shaft turns freely.
- Motor space heaters, when provided, are to be connected and energized whenever there is a possibility that the storage ambient conditions will reach the dew point. Space heaters are optional. Remove motor from the storage container when the heater is energized.
- If the motor needs to be stored for extended periods, or if it is stored in less than favorable conditions, it is recommend that the winding insulation resistance be checked prior to commissioning (page 7).
- Even if stored in favorable conditions, the antifriction motor bearings and motor shaft seals may need to be replaced if the storage period is more than 4 years.

## 10. Safety Considerations

When installing, servicing or replacing electric motors it is important to be working in a "voltage-free" state. Observe the following safety rules.

### Safety Rules

1. Disconnect the system. Disconnect the auxiliary circuits (brakes, space heaters, etc.).
2. Prevent reconnection (follow safe lock-out/tag-out practices).
3. Make sure that the equipment is at zero voltage.
4. Make certain the equipment is properly grounded and short-circuited.
5. Cover or isolate nearby components that are still electrically live.

To energize the system, apply the measures in reverse order.

### Qualified Personnel

All work involved in the transport, connection, commissioning and maintenance of any NORD product must be carried out by qualified and responsible technicians.

For the purpose of this documentation, a qualified personnel is taken to mean a person or people who fulfill the following requirements:

- Through appropriate training and experience, they are able to recognize and avoid risks and potential dangers in their particular field of activity.
- They have been instructed to carry out work on the machine by the appropriate person responsible.
- They are responsible for knowing and complying with all applicable national, regional, and local work regulations and safety requirements.



DRIVESYSTEMS

# MOTORS - AC INDUCTION, SINGLE & POLYPHASE

RETAIN FOR FUTURE USE



U30000 - 6 of 18

## 10. Safety Considerations Ctd.

### General Warnings and Cautions



#### DANGER

To avoid electrocution, injury or death, make certain all electrical devices (motors, brakes, variable frequency drives, etc.) are properly grounded, completely de-energized, and brought to a no-voltage condition prior to working on any electrical connections. Remember that most of these devices carry potentially dangerous energy levels for a period of time after power is removed. Always follow proper lock-out/tag-out procedures.



#### DANGER

Electrical machines contain dangerous voltage levels, electrically live parts, rotating surfaces and hot surfaces. To prevent injury, death or possible equipment damage always observe the following:

- Keep all safety covers and guards in place during operation. Remove and replace covers in compliance with the applicable safety regulations.
- Allow the machine to cool down before starting any work on it.
- Operate the machines properly.
- Perform regular maintenance on the machine.
- Secure and guard free-standing shaft extensions.



#### DANGER

##### Electrically Live Parts

Electrical machines contain electrically live parts. Fatal or severe injuries and substantial material damage can occur if the required covers are removed or if the machines are not handled, operated, or maintained properly.



#### WARNING

##### Rotating Parts

Electrical machines contain dangerous rotating parts. Fatal or severe injuries and substantial material damage can occur if the required covers are removed or if the machines are not handled, operated, or maintained properly.



#### WARNING

##### Hot Surfaces

Electrical machines have hot surfaces. Fatal or severe injuries and substantial material damage can occur if the required covers are removed or if the machines are not handled, operated, or maintained properly. Allow the machine to cool down before starting any work on it.



#### WARNING

##### Maintain Proper Cooling

Operating the motor without the intended cooling fan may cause overheating and result in very hot surfaces, personal injury and material damage. Never commission a motor intended to be fan cooled when it is missing the shaft-driven fan or external blower assembly.



#### DANGER

##### Condensation Drain Holes (Optional)

Inserting objects into the condensation drain holes can damage the winding and can result in death, serious injury and damage to property!

- Before opening sealed drain holes, make sure the motor is in a no-voltage condition. Close the condensation drain holes before re-commissioning.
- Exercise caution around drain holes that are intended to be left open, especially when the motor is energized.



#### IMPORTANT NOTE

Before start-up check the following:

- All electrical connections are secure, well grounded and properly made.
- The motor is rotating in the correct direction (when de-coupled from the driven load).
- There are no temperature-sensitive parts (cables etc.), in contact with motor enclosure.
- Condensation drain holes are always located at the lowest point of the motor.



DRIVESYSTEMS

# MOTORS - AC INDUCTION, SINGLE & POLYPHASE

RETAIN FOR FUTURE USE



U30000 - 7 of 18

## 11. Checking the Insulation

Before putting the motor into operation for the first time, after a lengthy period of storage or standstill (approx. 6 months), the insulation resistance of the winding should be checked.



### WARNING

During or directly after measurement the motor connection terminals carry hazardous voltages. Fatal or severe injuries and substantial material damage can occur if the required covers are removed or if the machines are not handled, operated, or maintained properly.

#### A. Control

The insulation resistance of new, cleaned, or repaired motor windings against the grounded housing and against one another should be  $> 200$  Mega-Ohms.

#### B. Measurement

Using a Mega-Ohm meter apply a DC voltage of 500 VDC to the motor winding for a period of 60 seconds and record the winding insulation resistance compared to ground.

- The 500 VDC test voltage is applicable to low voltage motors up to 1000 VAC.
- When performing this test the temperature of the windings should be  $25^{\circ}\text{C} \pm 15^{\circ}\text{C}$  ( $77^{\circ}\text{F} \pm 27^{\circ}\text{F}$ ).

#### C. Verification

- If the insulation resistance of the winding is less than 50 Mega-Ohms, the cause may be moisture. The windings should be dried and the test should be repeated.
- After any lengthy period of operation the insulation resistance may drop. So long as the measured value does not fall below the critical value of 50 Mega-Ohm, the motor may continue to be operated.
- If the measured value falls below the critical 50 Mega-Ohm level, the cause must be established and the windings or winding sections must be cleaned, dried, repaired, or replaced as needed.

## 12. Bearing Lubrication

NORD motor frame sizes 63 up to and including 225 are normally supplied with internally grease lubricated bearings and require no lubrication during normal operation.

NORD motor frame sizes 250 and larger are supplied with grease fittings for re-greasing the motor bearings.



### IMPORTANT NOTE

Motors with grease fittings are normally supplied with a label indicating the grease type used, the suggested relubrication interval, and the amount of new grease to be applied. General bearing maintenance guidelines are listed in Table 3.

**NORD Gear Limited**

Toll Free in Canada: 800.668.4378

01.31.17

Typical motor bearing grease is an NLGI No. 2 consistency, high grade product with a polyurea base thickener, synthetic or blended mineral/synthetic oil, and stabilizing agents to protect against heat and oxidation.

**Table 3 – Motor Bearing Maintenance Guidelines**

Frame Size	Power	Poles	Re-greasing Interval
63-225	0.16-60 HP (0.12-45 kW)	All	Maintenance Free
250 to 280	75-125 HP (55-75 kW)	2	4000 h
		4 to 8	8000 h
315	150-250 HP (132-200 kW)	2	3000 h
		4 to 8	6000 h



### NOTICE

When re-greasing motor bearings do not mix different greases without verifying the compatibility with a reputable grease lubrication supplier. Mixing incompatible products can lead to bearing failure.

## 13. Mechanical Installation

Integral motors, NEMA C-face motors, and IEC flange mounted motors must be rigidly secured to their mating connection surface using all fastening screws tightened to the proper bolt torque. It is good practice to apply a medium strength thread-locking agent (Loctite® 242) to the mounting screws.

Foot mounted motors must be securely installed to a rigid and level foundation or mounting surface to minimize vibration and maintain alignment between the motor and shaft load. All mounting hole locations must be utilized. Tighten all hold down screws or bolts to the proper bolt torque.

### NOTICE

Failure to provide a proper mounting surface may cause vibration, misalignment and bearing damage.

Accurate alignment and proper balancing of output devices (couplings, belts, pulleys, etc.) is required to assure quiet, low vibration, trouble free operation. When the motor is directly coupled to a gear drive or a driven machine make sure that the motor shaft and driven machine shaft are aligned with one another axially.

### NOTICE

Inaccurate alignment may lead to bearing damage, excessive vibrations and shaft breakage.



### IMPORTANT NOTE

For motor replacement guidelines see section 20 on page 15 and section 21 on page 16.

**NORD Gear Corporation**

Toll Free in the United States: 888.314.6673

[www.nord.com/docs](http://www.nord.com/docs)



DRIVESYSTEMS

# MOTORS - AC INDUCTION, SINGLE & POLYPHASE

RETAIN FOR FUTURE USE



U30000 - 8 of 18

## 14. Electrical Connections



### DANGER

To avoid electrocution, injury or death, make certain all electrical devices (motors, brakes, variable frequency drives, etc.) are properly grounded, completely de-energized, and brought to a no-voltage condition prior to working on any electrical connections. Remember that most of these devices potentially dangerous energy levels for a period of time after power is removed. Always follow proper lock-out/tag-out procedures.



### IMPORTANT NOTE

External motor brakes have their own connection requirements as indicated in the appropriate brake instruction manuals.



### WARNING

If the motor has an integral brake, make certain there is no load connected to the driven equipment before releasing the brake. Otherwise serious injury, death, or damage to the equipment may result.

- The supply voltage and frequency must agree with the motor nameplate data.
- Always feed the connecting leads into the terminal box using appropriate mating cable glands. The mating connection cables and cable glands should be suitable for temperatures  $\geq 194^{\circ}\text{F}$  ( $90^{\circ}\text{C}$ ).
- Provide the ends of the connecting leads and ground lead with cable lugs or curved ring eyelets before connecting them to the terminal board.
- Make certain that the wiring connections and arrangement of the terminal board jumpers conform to the appropriate wiring diagram as provided in the motor terminal box and/or page 9 of this manual.

- Tighten the terminal board screw connections on the main terminal board per the table below.

**Table 4 – Tightening Torque:  
Terminal Board and Grounding Screws**

Thread Size	Nut Size [mm]	Tightening Torque [lb-ft]	[Nm]
M4	7	0.6-0.9	0.8-1.2
M5	8	1.3-1.8	1.8-2.5
M6	10	2.0-3.0	2.7-4
M8	13	4.0-5.9	5.5-8
M10	17	6.6-9.6	9-13
M12	19	11.8-14.8	16-20

- Upon final assembly, the terminal box cover must be sealed so that it is dust-tight and water-tight.

**Table 5 – Tightening Torque:  
Terminal Box Cover Screws**

Thread Size	Tightening Torque	
	[lb-ft]	[Nm]
M4	0.6-0.9	0.8-1.2
M5	0.9-1.3	1.2-1.8
M6	1.1-1.8	1.5-2.5
M8	2.2-3.7	3.0-5.0

## 15. Direction of Rotation

The motor shaft rotation is defined per IEC 600034, Part 8. The motor shaft rotation can be controlled by the way the incoming line power is connected. When connecting the incoming line power in phase order to the terminal block posts, T1 (U1), T2 (V1), and T3 (W1) respectively, the motor shaft rotation will be clockwise when viewing the motor shaft at the drive-end.

NORD Gear Limited

Toll Free in Canada: 800.668.4378

01.31.17

NORD Gear Corporation

Toll Free in the United States: 888.314.6673

www.nord.com/docs



DRIVESYSTEMS

# MOTORS - AC INDUCTION, SINGLE & POLYPHASE

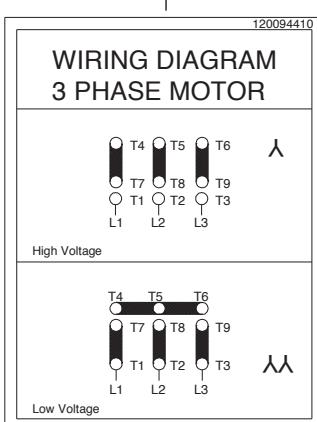
RETAIN FOR FUTURE USE



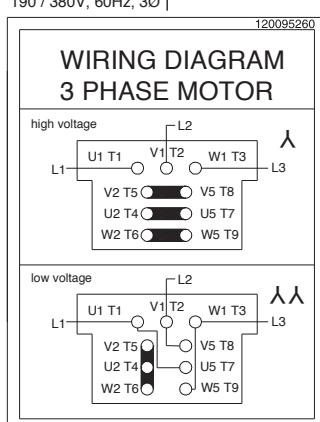
U30000 - 9 of 18

## 15. Wiring Diagrams - Motor & Motor Option Connection Diagrams

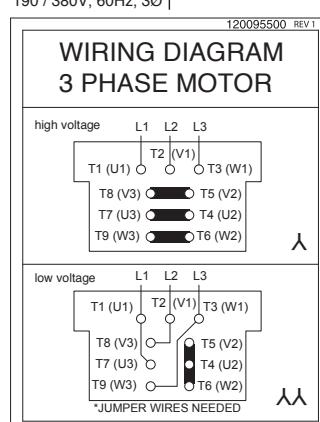
NORD Frames 63-225  
230 / 460V, 60Hz, 3Ø | 200 / 400V, 50Hz, 3Ø



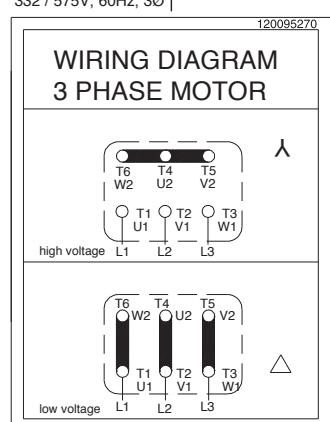
NORD Mfg by Siemens - Frames 200+  
230 / 460V, 60Hz, 3Ø | 200 / 400V, 50Hz, 3Ø  
190 / 380V, 60Hz, 3Ø



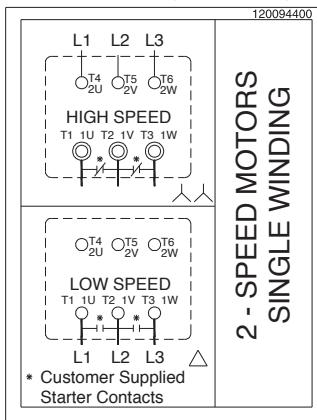
NORD Mfg by Siemens - Frames 200+  
230 / 460V, 60Hz, 3Ø | 200 / 400V, 50Hz, 3Ø  
190 / 380V, 60Hz, 3Ø



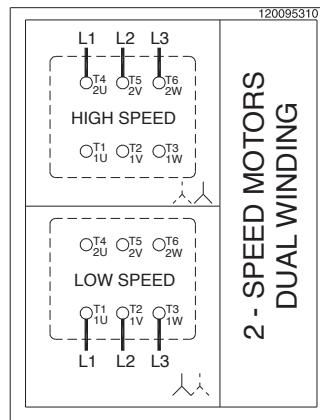
NORD Frames 63-225  
460 / 800V, 60Hz, 3Ø | 230 / 400V, 50Hz, 3Ø  
208 / 360V, 60Hz, 3Ø | 400 / 690V, 50Hz, 3Ø  
332 / 575V, 60Hz, 3Ø



NORD 2 - SPEED MOTORS  
SINGLE WINDING (4-2 & 8-4 POLE)



NORD 2 - SPEED MOTORS  
DUAL WINDING (8-2 POLE)



OPTION "F" 1 PH  
\* CAPACITOR IS SUPPLIED

BLOWER COOLING FAN  
"F" OPTION

OPTION "F" 3 PH  
380-575V  
50 / 60 Hz  
220-332V  
50 / 60 Hz

W2 U2 V2  
U1 V1 W1  
L1 L2 L3

FROM MOTOR  
P1 P2  
WIRE TERMINATION  
TO CONTROL DEVICE

- \* MAX. OPERATING VOLTAGE 2.5V.
- \* SWITCH TEMP. 155°C
- \* RESPONSE TIME < 5 SECONDS

FROM MOTOR  
H1 H2  
WIRE TERMINATION  
TO CONTROL DEVICE

THERMISTOR  
"TF" OPTION

0025960021

W2 U2 V2  
U1 V1 W1  
L1 N

\* CAPACITOR IS SUPPLIED

BLOWER COOLING FAN  
"FC" OPTION

FROM MOTOR  
P1 P2  
WIRE TERMINATION  
TO CONTROL DEVICE

- \* NC (NORMALLY CLOSED)
- \* CONTACTS RATED 1.6A AT 2.50 VAC
- \* 6-500 VAC RANGE
- \* AUTOMATIC RESET AT 30 ± 15°C TEMP. DROP

FROM MOTOR  
H1 H2  
WIRE TERMINATION  
TO CONTROL DEVICE

0025960021

THERMISTATS  
"TW" OPTION

**NORD Gear Limited**

Toll Free in Canada: 800.668.4378

01.31.17

**NORD Gear Corporation**

Toll Free in the United States: 888.314.6673

[www.nord.com/docs](http://www.nord.com/docs)



DRIVESYSTEMS

# MOTORS - AC INDUCTION, SINGLE & POLYPHASE

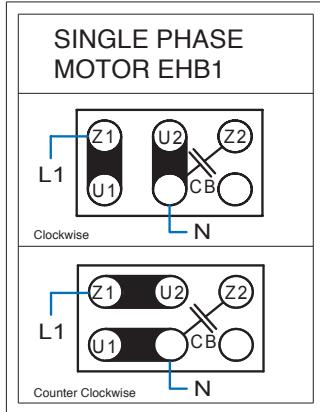
RETAIN FOR FUTURE USE



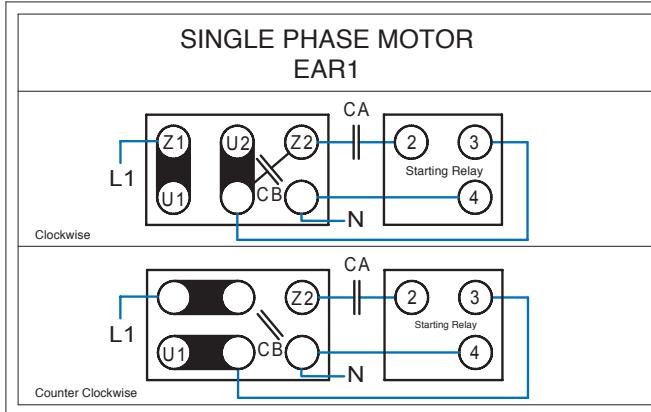
U30000 - 10 of 18

## 15. Wiring Diagrams Ctd. - Single Phase Motor Connection Diagrams

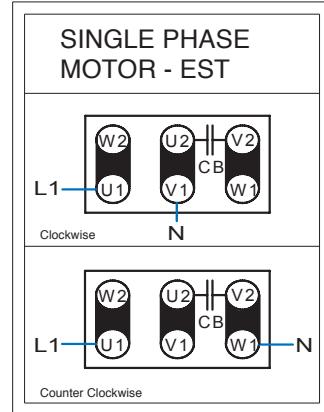
Motor Frame Sizes 63-90  
230V, 50Hz, 1Ø



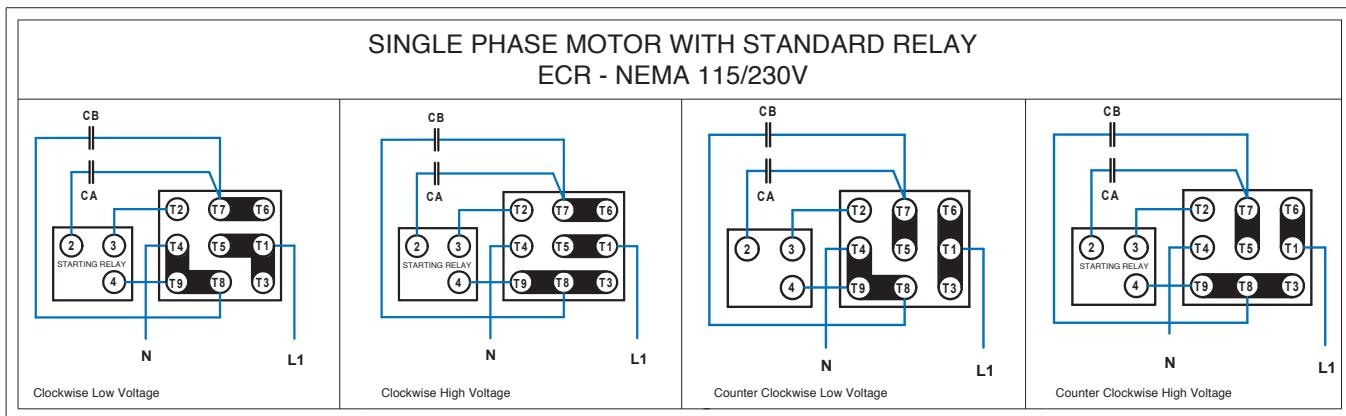
Motor Frame Sizes 63-90  
230V, 50Hz, 1Ø



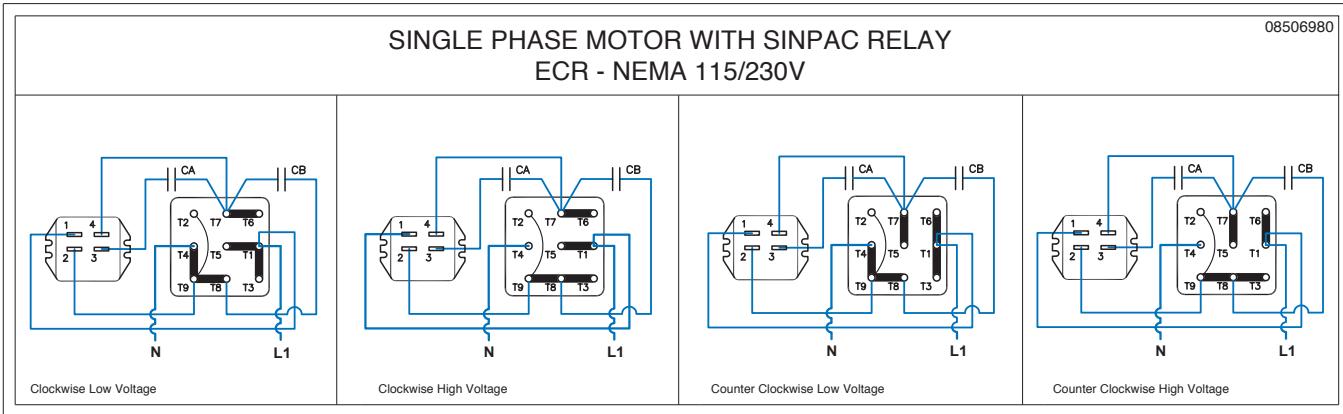
Motor Frame Sizes 63-90  
230V, 50Hz, 1Ø



Motor Frame Sizes 63-90  
115 / 230, 60Hz, 1Ø



Motor Frame Sizes 63-90  
115 / 230, 60Hz, 1Ø





DRIVESYSTEMS

# MOTORS - AC INDUCTION, SINGLE & POLYPHASE

RETAIN FOR FUTURE USE



U30000 - 11 of 18

## 16. Motor Accessories

### Blower Cooling Fan (Option F & FC)

- Connection Diagram Shown on page 10
- Option FC is 1-phase, 115V
- Option F has capability of 1 phase by connecting a supplied capacitor

Table 6 – Option F &amp; FC

#### Option F – 3ph & 1ph 220-575V 50/60Hz

Motor Frame	60Hz Ratings			50Hz Ratings		
	Voltage [V]	Current [A]	Power [W]	Voltage [V]	Current [A]	Power [W]
Single phase connection - $\perp$ ( $\Delta$ Delta)						
63	230 – 277	0.11	38	230 – 277	0.10	27
71	230 – 277	0.12	41	230 – 277	0.10	28
80	230 – 277	0.13	44	230 – 277	0.11	29
90	230 – 277	0.25	88	230 – 277	0.26	72
100	230 – 277	0.28	88	230 – 277	0.26	70
112	230 – 277	0.31	107	230 – 277	0.26	73
132	230 – 277	0.27	89	230 – 277	0.29	82
160 - 225	230 – 277	0.41	140	230 – 277	0.45	128
Three phase low-voltage connection - ( $\Delta$ Delta)						
63	220 – 332	0.08	23	220 – 290	0.10	27
71	220 – 332	0.08	24	220 – 290	0.10	30
80	220 – 332	0.08	25	220 – 290	0.01	29
90	220 – 332	0.21	64	220 – 290	0.28	86
100	220 – 332	0.21	66	220 – 290	0.27	86
112	220 – 332	0.23	70	220 – 290	0.27	85
132	220 – 332	0.25	74	220 – 290	0.32	96
160 - 225	220 – 322	0.49	165	220 – 290	0.52	155
Three phase high-voltage connection - (Y)						
63	380 – 575	0.04	23	380 – 500	0.05	29
71	380 – 575	0.04	25	380 – 500	0.05	30
80	380 – 575	0.04	26	380 – 500	0.05	29
90	380 – 575	0.12	62	380 – 500	0.16	82
100	380 – 575	0.12	66	380 – 500	0.16	83
112	380 – 575	0.13	70	380 – 500	0.16	82
132	380 – 575	0.14	75	380 – 500	0.18	96
160 - 225	380 – 575	0.28	165	380 – 500	0.29	155

#### Option FC – 115V 50/60Hz 1ph

Motor Frame	60Hz Ratings			50Hz Ratings		
	Voltage [V]	Current [A]	Power [W]	Voltage [V]	Current [A]	Power [W]
Single Phase Connection - $\perp$ ( $\Delta$ Delta)						
63	100 – 135	0.23	42	100 – 135	0.30	42
71	100 – 135	0.23	47	100 – 135	0.30	44
80	100 – 135	0.27	57	100 – 135	0.30	43
90	100 – 135	0.46	102	100 – 135	0.57	78
100	100 – 135	0.53	105	100 – 135	0.54	78
112	100 – 135	0.60	115	100 – 135	0.55	80

**NORD Gear Limited**

Toll Free in Canada: 800.668.4378

01.31.17

**NORD Gear Corporation**

Toll Free in the United States: 888.314.6673

[www.nord.com/docs](http://www.nord.com/docs)

## 16. Motor Acc. Ctd. - Motors with Thermal Protection

Effective July 15th, 2016 many newly manufactured NORD motors that require a thermal protection device will use WAGO® Series 221 Series Compact Splicing Connectors. These connectors will be used for splicing the leads of the thermal protection option supplied by NORD to the customer supplied control device.

- The WAGO® connector will facilitate assembly of NORD 63-132 frame, 60Hz, CUS approved motors
- An oversized brake terminal box and secondary 2-post wire termination strip will no longer be required.
- NORD will supply (2) Wago® Series 221, 2 conductor splicing connectors for each motor requiring thermal protection (NORD P/N 18251607)

**Table 7 – Motors Receiving the WAGO® Connector**

<b>Motor Supplier</b>	NORD
<b>Frame Size</b>	63 to 132
<b>Type</b>	CUS
<b>Thermal Protection Option</b>	TW, TF, PT100, KTY
<b>Motor Connection</b>	Wye-Wye/Wye (YY/Y)
<b>Voltage – Hz</b>	230/460V – 60 Hz
<b>Brake Motors Affected</b>	No
<b>EKK Small Terminal Box</b>	Not possible (space limited)

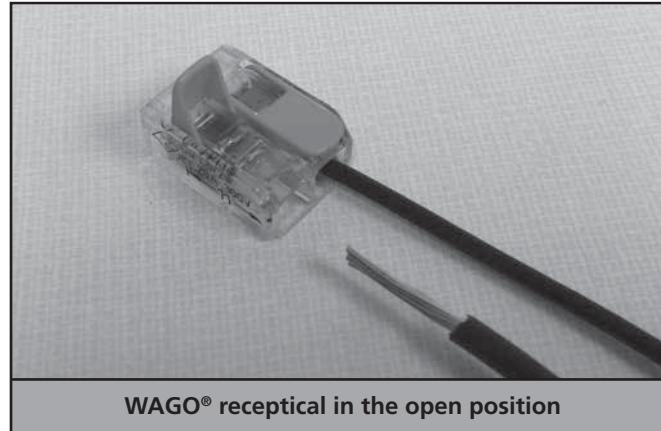
**Table 8 – WAGO® Series 221 Connector Ratings**

<b>Wire Size</b>	12-24 AWG (solid stranded or fine stranded) 0.14 - 4mm <sup>2</sup> (fine stranded) 0.2 - 2mm <sup>2</sup> (solid stranded)
<b>Rated Voltage</b>	600V
<b>Rated Current</b>	20A
<b>Operating Temp.</b>	105°C (221°F)
<b>Global Approvals</b>	cULus, ENC 05, EAC, PSE

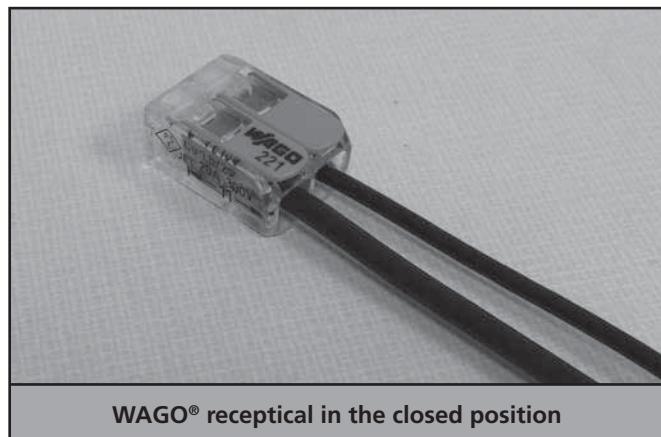
UL Certificate E69654

## Operation of WAGO® Series 221 Connector

1. Strip the wire/s to be connected to 11 mm (0.43 in).
2. Open up the lever of the lever-nut, place the wire in the receptical and close the clamp.
3. Repeat for the additional wires being joined.



WAGO® receptical in the open position



WAGO® receptical in the closed position

The WAGO Connector remains optional for the following NORD motors:

**Brake Motors** - An oversized conduit box is utilized with a secondary 2-post wire termination block for the thermal protection option

**Delta/Wye ( $\Delta/Y$ ) Connected Motors** - These utilize an 8 post terminal box (6 primary posts for the supply power and 2 auxillary posts for thermal protection)

**Motors 160 Frame and Larger** - The terminal box is large enough to allow the use of a secondary 2-post wire termination block for your thermal protection device.



DRIVESYSTEMS

# MOTORS - AC INDUCTION, SINGLE & POLYPHASE

RETAIN FOR FUTURE USE



U30000 - 13 of 18

## Thermostats (TW & 2TW)

Table 9. TW &amp; 2TW options, Thermostats

Standard connection	Series connected, one per phase
Contact	NC (Normally Closed)/ Auto Re-setting
Response Temperature (Option TW)	311 °F (155 °C) Shut-Off Device
Response Temperature (Option 2TW)	311 °F (155 °C) Shut-Off Device + 266°F (130 °C) Alarm Device
Nominal Current	1.6 Amp at 250 V
Resistance	< 50 mΩ
Switch Rebound	< 1ms
Insulation Rating	2000 VAC
Cycles	10,000 max
Lead Identification (inside terminal box)	P1 and P2 or TB1 and TB2 / 2TB1 and 2TB2

Motor thermostats or bi-metallic switches can be wired directly into the control circuit without a separate control module or tripping device. Thermostats operate on a relatively high control voltage so they are less sensitive to voltage interference from the main power supply. Often one can run thermostat leads and motor power leads next to each other when using the appropriate shielded cable. The installer is responsible to wire the thermostats into the motor control circuit. The leads may be labeled as indicated below.

## Thermistors (TF)

Table 10. TF option, Thermistors

Standard Connection	Three devices, series connected, one per phase
Type	Positive temperature coefficient (PTC)
Transition Temperature	150°C±5 °C
Resistance	20... 500Ω (below transition) > 4 kΩ (above transition)
Reed Current	< 1mA
Max Voltage	30V
Lead Identification (inside terminal box)	P1 and P2 or TP1 and TP2

With a separate control module or tripping device (ex. Kirwan INT69) thermistors are used to sense motor overload/ over temperature conditions by converting the critical operating temperature limit into large internal resistance change. Due to their small size, heat sink construction, and high change in resistance value, minor resistance variations caused by relatively long lead runs can be tolerated. This feature also allows for one controller to be used for several temperature sensing locations. Many variable frequency drives come with on-board thermistor inputs. NORD does not supply the thermistor control module.



### IMPORTANT NOTE

- Thermostats and Thermistors will automatically reset.
- All wiring must be completed by qualified personal and adhere to all local codes.

NORD Gear Limited

Toll Free in Canada: 800.668.4378

01.31.17

## 16. Motor Acc. Ctd. - Space Heaters (Option SH)

- Connection Diagram shown on Page 9
- Space Heaters are mounted directly on the motor winding
- The leads are brought into the terminal box and labeled H1 and H2
- They require a separate voltage supply and must not be energized when the motor is energized
- The heaters will keep the winding of the motor approximately 5°C above the surrounding ambient

Table 11. Space Heater Data

Frame Size	Wattage	Voltages	Heater Strips/MTR
63 & 71	18W	110V	1
		230V	
		460V	
80	25W	110V	1
		230V	
		460V	
90 – 112	50W	110V	2
		230V	
		460V	
132-180	100W	110V	2
		230V	
		460V	
200 & 225	120W	110V	2
		230V	
		460V	

## Encoder (Option IG)

- Most standard encoders will be enclosed inside the fan cover
- Incremental, Quadrature, Differential, Marker Channel
- IP66 Protection
- IG1 = 1024PPR, IG2 = 2048PPR, IG4 = 4096PPR
- TTL/RS422, HTL/Push-Pull, Line Driver.
- 5V or 10-30V available.
- Absolute encoders also available.
- Separate encoder wiring instructions are provided by NORD.

NORD Gear Corporation

Toll Free in the United States: 888.314.6673

[www.nord.com/docs](http://www.nord.com/docs)



DRIVESYSTEMS

# MOTORS - AC INDUCTION, SINGLE & POLYPHASE

RETAIN FOR FUTURE USE



U30000 - 14 of 18

## 17. Inspection

Inspect the motor after every 500 operating hours. Please use table 12 below for inspection guidelines.

<b>CAUTION</b>	
If it is necessary to clean the motor exterior, do not use shop air. Shop air can force contaminants into the motor and may cause parts damage or result in blowing debris causing injury.	

Table12. - Motor Inspection Guidelines

Inspect	Check	Action
Motor Exterior	Check the external surfaces for contamination. Accumulation of dirt and fibrous deposits must be removed.	Clean the motor external surfaces using clean, lint-free cloths.  Clean deposits from between cooling fins using a vacuum cleaner and a stiff-bristled nylon brush.
	Check the external surfaces for oil film and greasy deposits.	Clean the oil film and greasy deposits from the motor surface using clean, lint-free cloths.
		If necessary, moisten the cloth with an approved non-flammable, residue-free solvent. Do not pour solvent on the motor.
	Check for evidence of damage or overheating.	If the motor has physical damage, replace the motor.
Motor Mountings	Make sure the mounting hardware is secure.	If the mounting hardware is not secure, check the motor/gearbox alignment, and tighten the mounting hardware.
Motor Electrical Connections	Check that all electrical connections are secure.	If the electrical connections are not secure, tighten them.
	Check the electrical connections for evidence of arcing.	Loose electrical connections can cause arcing, which is evident by discoloration and charring. If you find evidence of arcing, replace the damaged connections.
Insulation Resistance	Using an ohmmeter, check and record the resistance of motor winding insulation.	Compare the current resistance reading to previous readings. If the resistance drops significantly, perform an internal inspection for insulation damage or deterioration.
Motor Brake	On motors that have a brake, use a feeler gauge to check the air gap in between the brake pad and the rotor according to the appropriate user manual.	If the air gap exceeds the maximum allowed for that brake configuration provided in the manual, adjust the air gap or replace the brake pad according to user manual U35000.

**NORD Gear Limited**

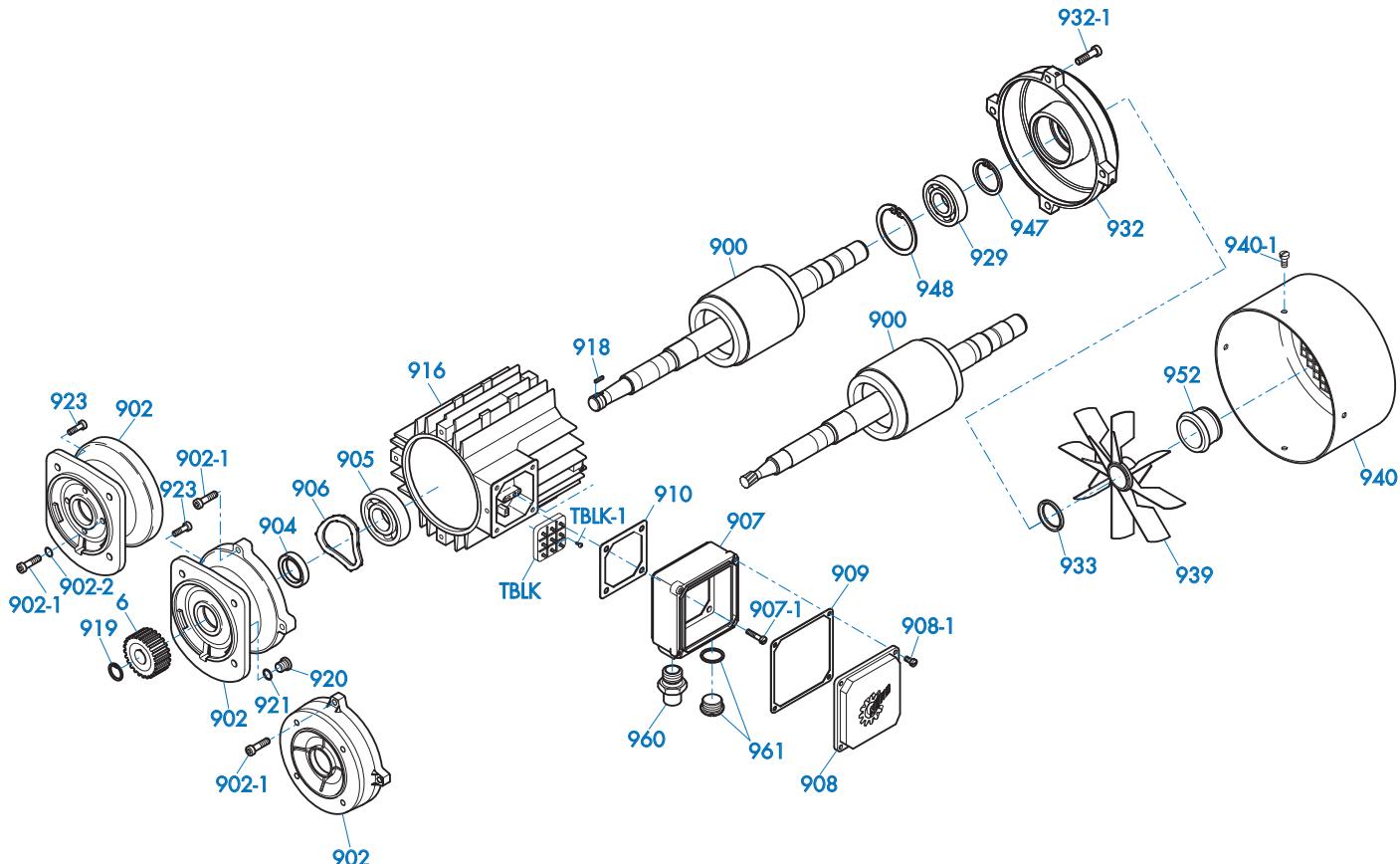
Toll Free in Canada: 800.668.4378

01.31.17

**NORD Gear Corporation**

Toll Free in the United States: 888.314.6673

[www.nord.com/docs](http://www.nord.com/docs)



Part Number	Part Description	Qty per Assembly
6	Input Pinion	1
900	Rotor Assembly	1
902	A-Endbell	1
902-1	Screw	4
902-2	Dubo Seal	4
904	Oil Seal	1
905	Bearing	1
906	Preload Spring	1
907	Terminal Box Frame	1
907-1	Screw	4
908	Terminal Box Cover	1
908-1	Screw	4
909	Gasket - Terminal Box Frame	1
910	Gasket - Terminal Box Cover	1
916	Stator	1
918	Key	1
919	Retaining Ring	1
920	Oil Plug	1

Part Number	Part Description	Qty per Assembly
921	Gasket	1
923	Screw	4
929	Bearing	1
932	B-Endbell	1
932-1	Screw	4
933	Oil Seal	1
939	Fan	1
940	Fan Cover	1
940-1	Screw	4
947	Retaining Ring	1
948	Retaining Ring	1
952	Fan Clip	1
960	NPT Thread Adapter	1
961	Plug (includes O-ring)	1
TBLK	Terminal Block	1
TBLK-1	Screw, Terminal Block Mounting	2
	Jumper Bar (not illustrated)	AR



DRIVESYSTEMS

# MOTORS - AC INDUCTION, SINGLE & POLYPHASE

RETAIN FOR FUTURE USE



U30000 - 16 of 18

## 19. Repair

- Reference the parts list drawing on page 14 for clarification.
- A. Disassemble the motor according to the general exploded view in PARTS INFORMATION. Disassemble only as far as necessary to replace the failed parts.
  - B. Whenever the motor is disassembled, clean all dust and contamination from the motor interior using a vacuum cleaner and a soft-bristled nylon brush.
  - C. The following parts must be replaced if they are removed:
    - Oil seal (904), Oil seal (933)
    - Gasket (909), Gasket (910), Gasket (921)
    - Gasket on plug (961)
    - Self-locking screws (907-1, 908-1, 923, 932-1, 940-1)
    - Dubo Seals (902-2)
  - D. If the following parts are removed, inspect them, and replace them if they are deformed or damaged:
    - Retaining ring (919), Retaining ring (947), Retaining ring (948)
    - Fan clip (952)

## 20. Removing and Replacing Integral Motors

Reference the parts list on Page 14 for clarification.

- A. Disconnect the power to the electric motor. Make certain the motor is properly grounded, de-energized and secured with a lock-out/tag-out device.
- B. Drain the oil from the mating gearbox, or rotate the motor/gearbox assembly so that the motor is up, to prevent oil from spilling from the gearbox when the motor is removed.
- C. Support the motor and prepare it for removal. Steady the motor and support it. For larger motors, use of mechanical lifting or support devices to may be appropriate.
- D. Remove the fastening screws that hold the motor to the reducer input.



### IMPORTANT NOTE

Most integral motor installations have mounting bolts accessible from the motor exterior. If the bolts are not clearly visible, unbolt the input flange from the gearbox. Remove the bolts securing the motor to the reducer input flange, and discard the old DUBO sealing rings that were under the screw heads.

- E. Maintain motor shaft alignment and move the motor directly away from its mounting surface until the motor shaft and mating input gear clear both the internal gear mesh and reducer input.

- F. Remove and discard the old flange gasket.
- G. Clean the gasket faces on the motor and gearbox, making sure no cleaning debris enters the gearbox.
- H. Check the replacement motor to make sure the motor flange, motor shaft, and motor pinion are identical to the motor that was removed.
- I. Place a new gasket between the gearbox and new motor.
- J. Position the motor on the gearbox, making sure the input pinion meshes with the input gear. Rotate the motor as necessary to align the bolt holes and seat the motor flange. Make sure the gasket remains properly aligned and seated
- K. Apply a medium strength thread locking compound to the bolt threads. Install the bolts and tighten them to the appropriate torque.



### IMPORTANT NOTE

If the motor/gearbox installation uses an input flange, first mount the input flange to the motor using the four mounting bolts and NEW DUBO sealing rings under the head of each fastening screw. Make sure the fastening screws are clean and apply new thread sealant if necessary.

- L. Check the gearbox oil level in accordance with the appropriate User Manual/s. If necessary fill or add oil to the gearbox.

### NOTICE

Do not mix oil types. Mixing oil types may lead to component damage and diminished performance. Consult NORD for assistance or reference oil type listed on gearbox tag.

- M. Re-establish the electrical connection to the motor.
- N. Observe the subsequent start-up closely to make certain the equipment is operating properly and there are no seal or gasket leaks.



DRIVESYSTEMS

# MOTORS - AC INDUCTION, SINGLE & POLYPHASE

RETAIN FOR FUTURE USE



U30000 - 17 of 18

## 21. Removing and Replacing NEMA C-Face or IEC Fange-Mounted Motors

For further clarification of these instructions, reference the parts list on Page 14 of this manual.

- A. Disconnect the power to the electric motor. Make certain the motor is properly grounded, de-energized and secured with a lock-out/tag-out device.
- B. Support the motor and prepare it for removal. Steady the motor and support it. For larger motors, use of mechanical lifting or support devices to may be appropriate.
- C. Remove the fastening screws that hold the motor to the C-face or IEC mounting flange.
- D. Maintain motor shaft alignment, and move the motor directly away from its mounting surface until the motor shaft and mating coupling clear the mounting flange surface of the driven equipment.
- E. Measure and record the proper placement of the motor shaft coupling prior to removing it from the old motor.
- F. Make sure the new motor shaft, key and key slot are free of all nicks, burrs, and lubrication or grease.
- G. Install the new shaft key on the new motor. If the shaft key is not captured or if an open-ended key slot is utilized it is good practice to secure the key into the key slot with a medium strength thread locking agent or alternatively one may stake the key in place.
- H. Re-install the coupling on the new motor shaft, making sure the placement of the coupling is in the same location as it was on the old motor (See Step E).
- I. Clean all old gasket material, sealants, contamination, and corrosion from the flange surface on the driven equipment.
- J. If the motor is utilized in a wet or wash down environment apply a sealing gasket or gasket eliminating compound to the mating flange surface, as would seem most appropriate for the application.
- K. Support the new motor and mount it flush against the mating flange surface of the driven equipment.
- L. Apply a medium strength thread locking agent to the bolt threads.
- M. Install the bolts and tighten them to the appropriate torque.
- N. Re-establish the electrical connection to the motor.
- O. Observe the subsequent start-up closely to make certain the equipment is operating properly.

## 22. Testing



### IMPORTANT NOTE

NORD electric motors do not require periodic testing. However, if a motor is removed from its installation, NORD recommends that the motor be checked according to the following static and dynamic testing procedures before it is reinstalled. Finding a condition that will require future repair before the motor is reinstalled decreases the overall maintenance time.

This section provides general test information and functional checks for the types of motors covered by this manual. Read and understand the tests and checks before performing them on your motor.

Record and date all measurements taken.

If the motor fails any of the test procedures provided below, use the troubleshooting guide to determine the motor problem.

#### Static Testing

- A. The motor can only be static tested if it is disconnected from the component it drives and securely mounted on a fixture or mounting plate. These tests are usually conducted when a motor has been removed for any reason other than failure
- B. Turn the motor shaft slowly by hand. Feel and listen for evidence of a failed bearing, which is indicated by a rough feel as the shaft rotates, and by noise.
- C. Check for smooth rotation, with no evidence of binding or catching. If the shaft does not rotate smoothly, or binds or catches, the bearings are worn or failing, lack lubrication, or are contaminated.
- D. Check the motor shaft for side play by applying pressure at right angles to the shaft in several places around the circumference. If the shaft moves perceptibly, the front bearing may be worn.

#### Dynamic Testing

- A. Find the motor voltage and rated load current values as listed on the motor nameplate.
- B. Using a volt-ohmmeter, verify that the motor power supply is in the correct range.
- C. Run the motor with no load. As the motor is operating, listen for unusual motor noise and check for excessive vibration. Vibration and motor noise are indications of bearing contamination, lack of lubrication, damage, or failure.
- D. Use an ammeter to measure the no-load current. Record the no-load current for comparison with previous readings, and for reference during future testing.
- E. If the motor passes the no-load test, operate the motor at rated load and check and record the current.
- F. Check the motor operating temperature at rated load. If the motor operates at a higher than normal temperature, the motor may be damaged, overloaded or failing.

**NORD Gear Limited**

Toll Free in Canada: 800.668.4378

01.31.17

**NORD Gear Corporation**

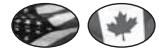
Toll Free in the United States: 888.314.6673

[www.nord.com/docs](http://www.nord.com/docs)



DRIVESYSTEMS

# MOTORS - AC INDUCTION, SINGLE & POLYPHASE



RETAIN FOR FUTURE USE

U30000 - 18 of 18

## 23. Troubleshooting

Fault	Likely Cause	Corrective Action
<b>Motor fails to start.</b>	<ul style="list-style-type: none"> <li>• Motor is mis-wired</li> <li>• Brake is may not be releasing.</li> <li>• Fan guard damaged and contacting fan.</li> <li>• Motor protection device has tripped or does not switch</li> <li>• 1-Ph Capacitor or start switch has failed.</li> </ul>	<ul style="list-style-type: none"> <li>• Verify and correct motor wiring.</li> <li>• Troubleshoot brake per User Manual U35000.</li> <li>• Replace damaged fan guard.</li> <li>• Check motor protection device for correct setting and correct error.</li> <li>• Discharge capacitor and use a volt-ohm meter to check the capacitor for an open circuit - replace if needed. Inspect switch and connections. Replace if contacts look burned or pitted.</li> </ul>
<b>Fuses blow or motor protection faults immediately.</b>	<ul style="list-style-type: none"> <li>• Short circuit in line.</li> <li>• Lines connected incorrectly.</li> <li>• Fuse or circuit breaker tripped.</li> <li>• Motor is overloaded or equipment jammed.</li> <li>• Stator is shorted or went to ground.</li> </ul>	<ul style="list-style-type: none"> <li>• Rectify short circuit.</li> <li>• Check circuit diagram and make corrections.</li> <li>• Replace fuse or circuit breaker.</li> <li>• Make sure load is free. Verify motor amp draw compared to nameplate rating.</li> <li>• A damaged or blown stator will show a burn mark. Stator must be repaired or replaced.</li> </ul>
<b>Motor hums and has high current consumption</b>	<ul style="list-style-type: none"> <li>• Brake may not be releasing.</li> <li>• Rotor may be rubbing stator.</li> <li>• Defective or incorrect stator winding.</li> </ul>	<ul style="list-style-type: none"> <li>• Troubleshoot brake per User Manual U35000.</li> <li>• Send motor to a repair specialist.</li> </ul>
<b>Severe speed loss under load or excessive acceleration time.</b>	<ul style="list-style-type: none"> <li>• Overload.</li> <li>• Excessive voltage drop.</li> <li>• Damaged or failing motor bearings.</li> <li>• Damaged or worn gear unit.</li> <li>• 1-Ph Capacitor or start switch has failed.</li> </ul>	<ul style="list-style-type: none"> <li>• Check load conditions and make certain system is unobstructed. Reduce load or consider a larger motor.</li> <li>• Verify service voltage is within specification. Check if nearby equipment is affecting incoming power. Make sure connection harness and wiring is adequate.</li> <li>• Replace motor bearings.</li> <li>• Replace or repair damaged gear unit.</li> <li>• See instructions under "Motor fails to start".</li> </ul>
<b>Motor runs the incorrect direction.</b>	<ul style="list-style-type: none"> <li>• Incorrect wiring.</li> </ul>	<ul style="list-style-type: none"> <li>• Rewire motor according to system schematic and/or switch two incoming motor phases.</li> </ul>
<b>Motor heats up excessively or thermal overload protection trips</b>	<ul style="list-style-type: none"> <li>• Overload.</li> <li>• Ambient temperature is too high.</li> <li>• Inadequate cooling.</li> <li>• Operation is outside the allowed duty cycle.</li> <li>• Motor protection device may be defective.</li> <li>• Excessive supply voltage.</li> <li>• System short or damaged stator.</li> </ul>	<ul style="list-style-type: none"> <li>• Make sure load is free. Verify motor amp draw compared to nameplate rating. Reduce load or consider a larger motor.</li> <li>• Do not operate above the rated conditions.</li> <li>• Correct cooling air supply. Open and clear cooling air passages. Retrofit with forced ventilator fan if needed.</li> <li>• Adjust operating duty cycle or contact a specialist to select a suitable motor or drive.</li> <li>• Replace motor protection device.</li> <li>• Adapt motor supply voltage.</li> <li>• Check for loose, cut or damaged wires. Check stator winding for defects or burn damage.</li> </ul>
<b>Excessive Noise or Vibration</b>	<ul style="list-style-type: none"> <li>• Motor bearings contaminated or damaged.</li> <li>• Excessive motor shaft end play.</li> <li>• Misaligned or imbalanced load.</li> </ul>	<ul style="list-style-type: none"> <li>• Test motor by itself. If bearings are bad noise may be heard or roughness detected. Replace bearings. Add lubrication if bearings have grease fittings.</li> <li>• Check shaft endplay with motor and system power disconnected. If shaft movement is excessive replace motor shaft bearings.</li> <li>• Check all mating shaft connections for proper alignment and correct all imbalanced load conditions.</li> </ul>
<b>1 Ph Start Capacitor Failures</b>	<ul style="list-style-type: none"> <li>• Motor is not coming up to speed quickly enough.</li> <li>• Motor is being cycled frequently</li> <li>• Start switch is defective or damaged.</li> </ul>	<ul style="list-style-type: none"> <li>• Verify motor size to load conditions. Motor should come up to speed in no more than 2-3 seconds.</li> <li>• Verify duty cycle and consult specialist for recommendations.</li> <li>• Replace start switch.</li> </ul>
<b>1 Ph Run Capacitor Failures</b>	<ul style="list-style-type: none"> <li>• Possible power surge to motor caused by transient voltage or lightening.</li> <li>• Excessive ambient temperature.</li> </ul>	<ul style="list-style-type: none"> <li>• Install proper surge protection.</li> <li>• Verify ambient conditions do not exceed nameplate value.</li> </ul>

**NORD Gear Limited**

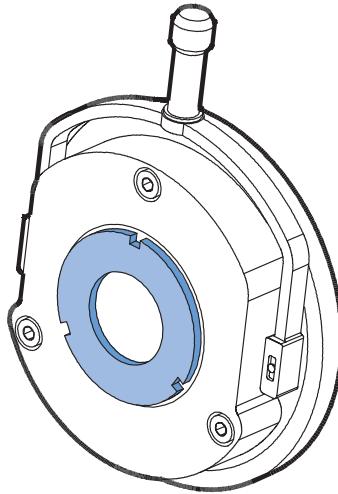
Toll Free in Canada: 800.668.4378

01.31.17

**NORD Gear Corporation**

Toll Free in the United States: 888.314.6673

[www.nord.com/docs](http://www.nord.com/docs)



## General Instructions

This manual describes general operating and maintenance guidelines for a majority of brake products shipped by NORD Gear. This instruction manual is not intended to include a comprehensive listing of all details or procedures required for installation, operation and maintenance.

Brakes covered in this manual are manufactured by PRECIMA. Please feel free to contact NORD with any questions about the supplied brake components.

## Safety Notice

Only qualified personnel should attempt installation, operation and maintenance of NORD brakes. Read this manual in its entirety before operating, commissioning, servicing, or assembling the motor brake. If you have a question about a procedure or are uncertain about any detail, seek clarification and DO NOT PROCEED!



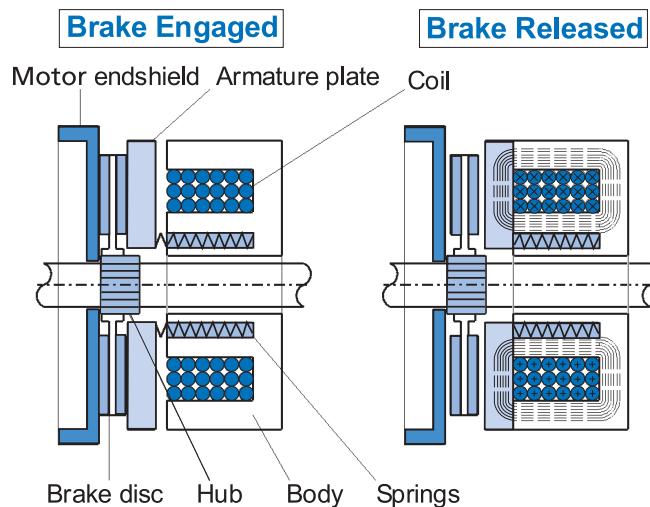
### DANGER

- This equipment contains high electrical voltage. Remove and lockout all power from the electric motor and brake before any work is completed on the brake.
- The user is responsible for conforming to all national and local electrical and safety codes. Wiring practices, proper grounding, disconnects, and over current protection, are of particular importance.
- Make certain the load is supported when servicing the brake. Removing power from the brake or removing the brake from the motor will release the load, which may cause severe injury or death.
- Failure to follow proper procedures and precautions may result in severe bodily injury or death.

## Brake Operation

The standard NORD motor brake is "spring-set". When power is removed and the brake is de-energized (power-off), the brake springs exert a force against the armature plate in turn preventing the brake rotor (or brake disc) from rotating. When the brake coil is energized (power-on), a magnetic field builds and pulls the armature plate across the air gap to the brake casing, which releases the brake rotor and allows the motor shaft to rotate.

**Figure 1: Basic Brake Operation**



NORD brakes are DC voltage brakes and in most instances are supplied with a motor mounted brake rectifier for easy connections to AC power. AC power is taken directly from the power line or from the terminal block of the motor and converted to DC by the supplied rectifier.



### IMPORTANT NOTE

If the motor is connected to a frequency inverter, soft start, or is a two-speed motor, the AC power must be supplied to the brake rectifier separately from the motor power.

## Advantages

- Each NORD motor frame size has a number of brake sizes available, with different torque capacities.
- Brake torque adjustments are possible by changing the brake spring combinations. In addition, brake sizes from 5-40 Nm (3.7-30 lb-ft) are typically supplied with an additional spanner-nut adjustment on the back of the brake.
- NORD brakes provide a high degree of safety because when power is removed the brake will automatically set to hold the load.
- The brake rotor or brake disc is environmentally safe and asbestos-free.
- The connection between the rectifier and the brake coil is completed at the factory and the brake air-gap is factory-set but can be adjusted in the event of wear.



# MOTOR BRAKES INSTALLATION & MAINTENANCE

DRIVESYSTEMS

RETAIN FOR FUTURE USE



U35000 - 2 of 20

## General Selection Considerations

As indicated in the NORD catalog, each NORD motor can be supplied with a number of brake torque sizes.

NORD relies on the equipment builder to specify appropriate brake sizing for their application, while giving consideration to the following:

- For most applications, we advise sizing the brake to 1.5 - 2 times the motor rated torque.
- For vertical applications, it may be advisable to size the brake size up to 3 times the motor rated torque.
- For some applications, it may be necessary to specify a reduced brake torque setting to prevent excessive peak load conditions developed at the reducer output.
- On travel drive applications, excessive brake torque may lead to wheel skid; in addition on crane applications excess hoist-cable swing can result.



### IMPORTANT NOTE

- **Brake torque** - The brake torque is measured with a mean friction radius of the brake pad surface with a circumferential speed of 1m/sec (197 fpm).
- **Brake torque tolerance** - For different applications and operating conditions, brake torque can vary from +40/-20% compared to the rated brake torque.
- **Hoisting (lifting/lowering) applications** - must have the brake wired for fast response (DC-switching)
- **Initial operation & wear-in period** - In new condition, the brake will have a reduced torque of up to 30%. In order to achieve full rated brake torque, a short run-in period is required. The run in time will vary depending on system loads.
- **The brake rotor or brake pad** - must be protected against foreign matter, oil and grease. Contaminants of this type can greatly influence wear and reduce breaking torque.

## Brake Torque Adjustment

Brake torque adjustments are possible by changing the brake spring combinations or by removing springs (Table 1).

In addition, brake sizes from 5-40 Nm (3.7-30 lb-ft) are typically supplied with a threaded adjustment nut or spanner nut to allow for additional fine torque adjustments of the brake. The braking torque can be adjusted by unscrewing the spanner nut a number of turns or "clicks" with a spanner wrench (Table 2).

**Table 1a: Brake Torque Reduction - Spring Removal**

"Brake Size"	7 Springs		5 Springs		3 Springs	
	[Nm]	[lb-ft]	[Nm]	[lb-ft]	[Nm]	[lb-ft]
BRE 5	5	3.7	3.5	2.6	2	1.5
BRE10	10	7.4	7	5.2	4	3.0
BRE20	20	14.8	14	10.3	8	5.9
BRE40	40	29.5	28	20.7	17	12.5
BRE60	60	44.3	43	31.7	26	19.2
BRE100	100	73.8	70	51.6	42	31.0
BRE150	150	111	107	78.9	65	47.9

On brake sizes 5-150 Nm (3.7-111 lb-ft) full brake torque is achieved with all (7) springs. The brake springs are placed in such a manner where there are (3) inner and (4) outer springs. When adjusting the brake torque, start by removing the outer springs at opposite corners to prevent uneven brake wear.

**Table 1b: Brake Torque Reduction - Spring Removal**

"Brake Size"	8 Springs		6 Springs		4 Springs	
	[Nm]	[lb-ft]	[Nm]	[lb-ft]	[Nm]	[lb-ft]
BRE250	250	184	187	138	125	92
BRE400	400	295	300	221	200	148
BRE800	800	590	600	443	400	295
BRE1200	1200	885	900	664	600	443

On brake sizes 250-1200 Nm (184-885 lb-ft) full brake torque is achieved with all (8) springs. The brake springs are placed in such a manner where there are (4) inner and (4) outer springs. When adjusting the brake torque, start by removing the outer springs at opposite corners to prevent uneven brake wear.

**Table 2: Spanner Nut Adjustment**

"Brake Size"	Torque Reduction*		Max. Turns	Minimum Torque*	
	[Nm]	[lb-ft]		[Nm]	[lb-ft]
BRE 5	0.2	0.15	6	0.8	0.59
BRE10	0.2	0.15	12	1.6	1.18
BRE20	0.3	0.22	12	4.4	3.25
BRE40	1	0.74	9	8.0	5.90

\* With the minimum number of springs and maximum number of turns to the spanner nut.

\* Per each turn of the spanner nut

Brake sizes from 5-40 Nm (3.7-30 lb-ft) are typically supplied with a threaded adjustment nut or spanner nut. Additional fine torque adjustment can be made by unscrewing the spanner nut a number of turns or "clicks" with a spanner wrench.



# MOTOR BRAKES INSTALLATION & MAINTENANCE

DRIVESYSTEMS

RETAIN FOR FUTURE USE



U35000 - 3 of 20

## Brake Control Rectifiers

NORD brake control rectifiers convert AC voltage to DC voltage. Rectifiers are used because most applications require AC voltage to power the motor, but DC power is required to power the brake and DC power is not typically available. NORD brake motors typically include the rectifier located inside the terminal box.

## Rectifier Advantages

- Individual power source for each brake.
- Compact size, mounted inside the terminal box.
- Multiple types, voltage options and release/engagement modes available.
- Mountable in a separate control cabinet.
- Integral protection against voltage spikes.

Model	Type	Part No.	Color	Input Voltage $V_{AC} \pm 10\%$	Rated Current	
					$A_{DC}$ (40°C)	$A_{DC}$ (75°C)
GVE20L	Full-wave	19141000	Black	110-275	1.5	1.0
GVE20V	Full-wave	19141030	Black	110-275	1.5	1.0
GHE40L	Half-wave	19141010	Yellow	200-480	2.0	1.0
GHE40V	Half-wave	19141040	Yellow	200-480	2.0	1.0
GHE50L	Half-wave	19141020	Gray	200-575	2.0	1.0
GHE50V	Half-wave	19141050	Gray	200-575	2.0	1.0
GUE40V	Dual-wave	19140300	Black	190-460	0.7	0.5
PMG500	Push-Hybrid	19140200	Black	200-500	4.0	2.8

Rectifier electronics are sealed for moisture-protection; electronics on models ending with the suffix "V" are resin-encapsulated to provide added protection if water should get into the motor terminal box.

## Rectifier Types

### Full-wave rectifier [GVE]:

A rectifier in which both the positive and negative half-cycles of the AC input signal are rectified to produce a uni-directional DC current supply to the load or the brake. The output voltage is 90% of the input voltage ( $V_{DC} = 0.90 \times V_{AC}$ ).

### Half-wave rectifier [GHE]:

A rectifier in which only alternate half-cycles of the AC input signal are rectified to produce a uni-directional DC current supply to the load or the brake. The output voltage is 45% of the input voltage ( $V_{DC} = 0.45 \times V_{AC}$ ).

### Dual Wave Rectifier [GUE]

A rectifier that can be wired as either a full-wave rectifier or a half-wave rectifier depending upon how it is connected to the AC input signal.



### IMPORTANT NOTE

If the motor is connected to a frequency inverter, soft start, or is a two-speed motor, then separate AC power must be supplied to the brake rectifier.

## Rectifier Types [Ctd.]

### PMG 500 Push-Hybrid rectifier [PMG]:

A fast-acting or push-hybrid brake rectifier provides an initial "push" in the form of a timed full-wave brake-release function, which is then followed by a continuous half-wave brake-holding function. There are two ways to apply these rectifiers as follows:

- "Overexcitation" of the brake coil provides faster brake release or improved cycling capacity. The DC voltage of the brake coil is determined based upon using a half-wave rectifier. The output voltage is 45% of the input voltage ( $V_{DC} = 0.45 \times V_{AC}$ ).
- "Reducer-Power Holding" of the brake coil maintains the brake in a released state by using only 25% of the power needed for the initial brake release. This results in very fast brake stopping. The DC voltage of the brake coil is determined based upon using a full-wave rectifier. The output voltage is 90% of the input voltage ( $V_{DC} = 0.90 \times V_{AC}$ ).

NORD offers additional fast-acting rectifiers besides the PMG 500. For additional details please reference User Manual U35100 – Fast Acting Brake Rectifiers.

### NOTICE

In order to prevent rapid wear, the PMG 500 rectifier is required when utilizing the larger 800 Nm (590 lb-ft) and 1200 Nm (885 lb-ft) twin-rotor brakes. The PMG 500 rectifier is wired to "overexcite" the brake during its initial release.

## Brake Switching Options

The rectifiers discussed in this manual can be wired to allow brake switching at either the AC power source (input) or the DC power source (output).

- AC switching allows the brake rectifier to be powered directly from the motor's terminal block with no additional wiring. However, this provides a slower brake stopping time due to the additional time needed to de-energize or collapse the motor's magnetic field.
- DC switching directly interrupts the current flow in the DC circuit of the brake rectifier. This method of brake switching guarantees faster brake stopping or brake engagement times.



### WARNING

When the moving system undergoes a change in height (such as in a lift or incline conveyor application) or if the system tends to speed up or over haul during normal operation, then DC-switching of the brake is required in order to prevent excessive load movement, drift or falling loads during stopping.



# MOTOR BRAKES INSTALLATION & MAINTENANCE



DRIVESYSTEMS

RETAIN FOR FUTURE USE

U35000 - 4 of 20

Figure 2.1: GVE/GHE Dimensions

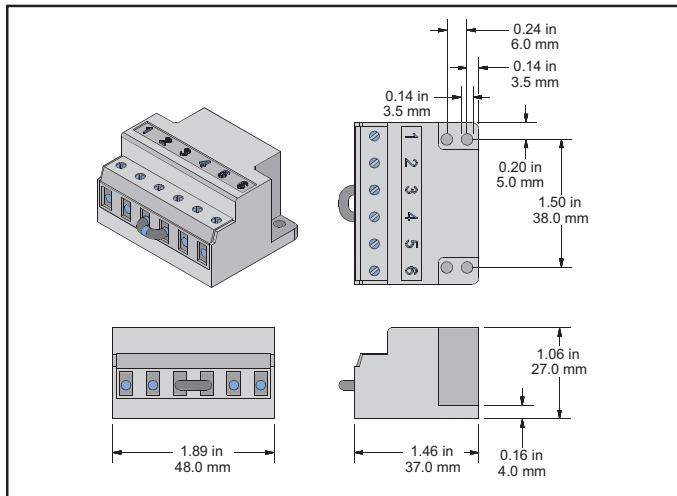
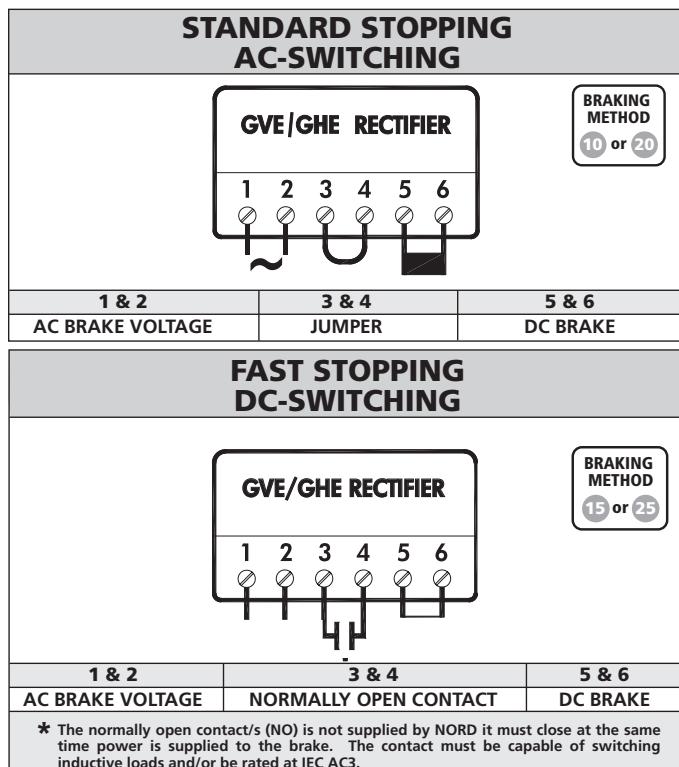


Figure 2.2: GVE/GHE Braking Methods



Braking Method	Break Release (Start)	Brake Engage (Stop)	Power Source
10	Standard	Standard (AC-Switching)	Motor terminals
15	Standard	Fast (DC-switching)	Motor terminals
20	Standard	Standard (AC-Switching)	Separate power
25	Standard	Fast (DC-switching)	Separate power

Figure 3.1: GUE Dimensions

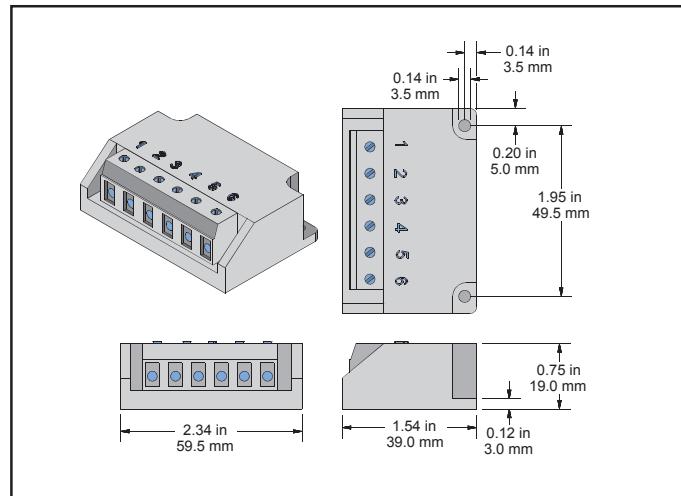
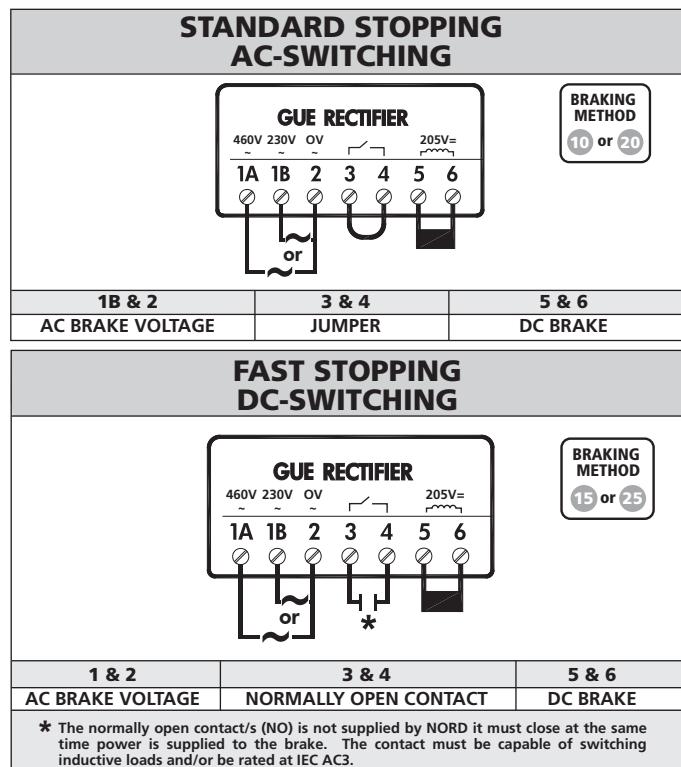


Figure 3.2: GVE/GHE Braking Methods



Braking Method	Break Release (Start)	Brake Engage (Stop)	Power Source
10	Standard	Standard (AC-Switching)	Motor terminals
15	Standard	Fast (DC-switching)	Motor terminals
20	Standard	Standard (AC-Switching)	Separate power
25	Standard	Fast (DC-switching)	Separate power

NORD Gear Limited

Toll Free in Canada: 800.668.4378

08.18.17

NORD Gear Corporation

Toll Free in the United States: 888.314.6673

www.nord.com/docs



# MOTOR BRAKES INSTALLATION & MAINTENANCE

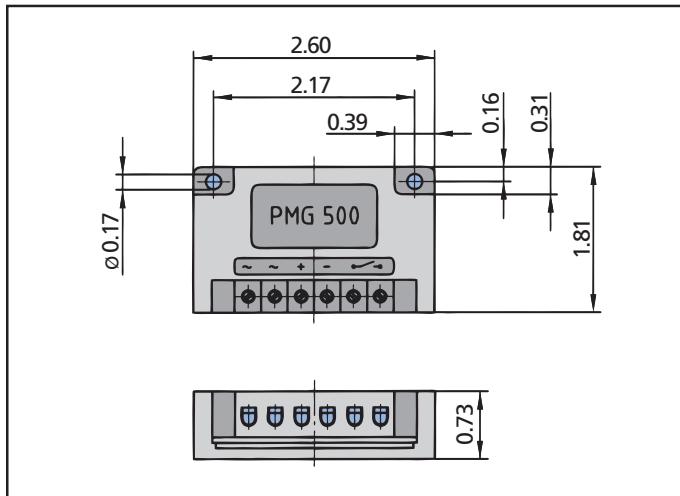


DRIVESYSTEMS

RETAIN FOR FUTURE USE

U35000 - 5 of 20

Figure 4.1: PMG 500 Dimensions

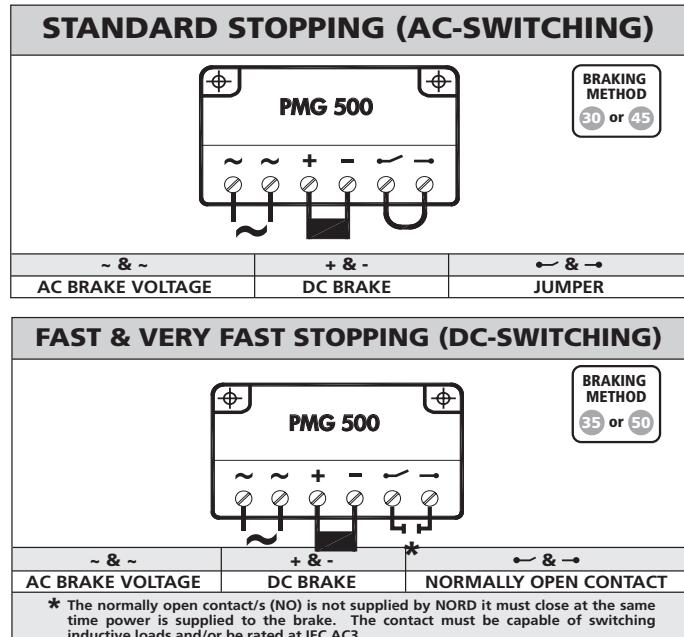
**PMG 500 Push-Hybrid Rectifier**

The PMG 500 rectifier provides an initial "push" in the form of a timed full-wave brake-release function, which is then followed by a continuous half-wave brake-holding function.

- In order to prevent rapid wear, the PMG 500 rectifier is required when utilizing the larger 800 Nm (590 lb-ft) - and 1200 Nm (885 lb-ft) twin-rotor brakes.
- The PMG 500 rectifier is wired to "overexcite" the brake during its initial release. The DC voltage of the brake coil is determined based upon using a half-wave rectifier.

In some applications the PMG rectifier may be used for "Reduced Power Holding" or very fast brake engagement (See user manual U35100 for details).

Figure 4.2: PMG 500 Braking Methods



Braking Method	Break Release (Start)	Brake Engage (Stop)	Power Source
30	Fast (Overexcitation)	Standard (AC Switching)	Motor terminals
35	Fast (Overexcitation)	Fast (DC Switching)	Motor terminals
45	Fast (Overexcitation)	Standard (AC Switching)	Separate power
50	Fast (Overexcitation)	Fast (DC Switching)	Separate power

**IMPORTANT NOTE**

If the motor is connected to an AC drive, soft start, or is a two-speed motor, the AC power must be supplied to the brake rectifier separately from the motor power.



# MOTOR BRAKES

## INSTALLATION & MAINTENANCE



DRIVESYSTEMS

RETAIN FOR FUTURE USE

U35000 - 6 of 20

## BRAKE SIZE: BRE 5

## BRAKE TORQUE: 5 Nm (3.7 lb-ft) max.

NORD Brake P/N	Half-Wave [V <sub>AC</sub> ]	[A <sub>AC</sub> ]	Full-Wave [V <sub>AC</sub> ]	[A <sub>AC</sub> ]	P <sub>c</sub> [W]	V <sub>c</sub> [V <sub>DC</sub> ]	I <sub>c</sub> [A <sub>DC</sub> ]	R <sub>c</sub> [Ω]
19010212	-	-	-	-	22	24	0.92	26.0
19010912	230	0.09	115	0.19	22	105	0.21	500
19011902	400	0.05	200	0.11	22	180	0.12	1475
19011912	460	0.05	230	0.10	22	205	0.11	1900
19012212	500	0.04	250	0.08	21	225	0.09	2450
19012512	575	0.04	-	-	22	250	0.09	2850

## BRAKE SIZE: BRE20

## BRAKE TORQUE: 20 Nm (15 lb-ft) max.

NORD Brake P/N	Half-Wave [V <sub>AC</sub> ]	[A <sub>AC</sub> ]	Full-Wave [V <sub>AC</sub> ]	[A <sub>AC</sub> ]	P <sub>c</sub> [W]	V <sub>c</sub> [V <sub>DC</sub> ]	I <sub>c</sub> [A <sub>DC</sub> ]	R <sub>c</sub> [Ω]
19030222	-	-	-	-	34	24	1.42	16.9
19030922	230	0.18	115	0.35	41	105	0.39	270
19031922	400	0.09	200	0.17	34	180	0.19	950
19031932	460	0.07	230	0.13	30	205	0.15	1391
19032222	500	0.07	250	0.15	36	225	0.16	1391
19032522	575	0.06	-	-	35	250	0.14	1780

## BRAKE SIZE: BRE 60

## BRAKE TORQUE: 60 Nm (44 lb-ft) max.

NORD Brake P/N	Half-Wave [V <sub>AC</sub> ]	[A <sub>AC</sub> ]	Full-Wave [V <sub>AC</sub> ]	[A <sub>AC</sub> ]	P <sub>c</sub> [W]	V <sub>c</sub> [V <sub>DC</sub> ]	I <sub>c</sub> [A <sub>DC</sub> ]	R <sub>c</sub> [Ω]
19050252	-	-	-	-	52	24	2.18	11.0
19050952	230	0.27	115	0.54	63	105	0.60	174
19051902	400	0.13	200	0.27	54	180	0.30	602
19051952	460	0.12	230	0.25	57	205	0.28	740
19052252	500	0.10	250	0.20	50	225	0.22	1004
19052552	575	0.09	-	-	48	250	0.19	1300

## BRAKE SIZE: BRE 150

## BRAKE TORQUE: 150 Nm (110 lb-ft) max.

NORD Brake P/N	Half-Wave [V <sub>AC</sub> ]	[A <sub>AC</sub> ]	Full-Wave [V <sub>AC</sub> ]	[A <sub>AC</sub> ]	P <sub>c</sub> [W]	V <sub>c</sub> [V <sub>DC</sub> ]	I <sub>c</sub> [A <sub>DC</sub> ]	R <sub>c</sub> [Ω]
19070252	-	-	-	-	77	24	3.20	7.5
19070952	230	0.39	115	0.79	92	105	0.88	120
19071902	400	0.18	200	0.36	73	180	0.40	445
19071952	460	0.15	230	0.31	70	205	0.34	600
19072252	500	0.15	250	0.30	76	225	0.34	670
19072552	575	0.14	-	-	76	250	0.30	825

## BRAKE SIZE: BRE 400

## BRAKE TORQUE: 400 Nm (295 lb-ft) max.

NORD Brake P/N	Half-Wave [V <sub>AC</sub> ]	[A <sub>AC</sub> ]	Full-Wave [V <sub>AC</sub> ]	[A <sub>AC</sub> ]	P <sub>c</sub> [W]	V <sub>c</sub> [V <sub>DC</sub> ]	I <sub>c</sub> [A <sub>DC</sub> ]	R <sub>c</sub> [Ω]
19092252	-	-	-	-	144	24	6.00	4.0
19092952	230	0.62	115	1.24	145	105	1.38	76
19093902	400	0.35	200	0.70	141	180	0.78	230
19093952	460	0.31	230	0.62	140	205	0.68	300
19093962	500	0.29	250	0.57	143	225	0.63	355
19093972	575	0.26	-	-	142	250	0.57	440

## BRAKE SIZE: BRE 1200 BRAKE TORQUE: 1200 Nm (885 lb-ft) max. ②

NORD Brake P/N	Half-Wave [V <sub>AC</sub> ]	[A <sub>AC</sub> ]	Full-Wave [V <sub>AC</sub> ]	[A <sub>AC</sub> ]	P <sub>c</sub> [W]	V <sub>c</sub> [V <sub>DC</sub> ]	I <sub>c</sub> [A <sub>DC</sub> ]	R <sub>c</sub> [Ω]
19099802	230	0.62	-	-	145	105	1.38	76
19099902	400	0.27	-	-	108	180	0.60	300
19099902	460	0.31	-	-	140	205	0.68	300

Half-Wave [V<sub>AC</sub>] = AC supply voltage with half-wave rectifierHalf-Wave [A<sub>AC</sub>] = AC supply current to half-wave rectifierFull-Wave [V<sub>AC</sub>] = DC supply voltage with full-wave rectifierFull-Wave [A<sub>AC</sub>] = AC supply current to full-wave rectifier

① When used as a stopping brake, evaluation of brake work is essential.

② Designed as a holding brake or emergency stop brake only.

**NORD Gear Limited**

Toll Free in Canada: 800.668.4378

08.18.17

## BRAKE SIZE: BRE 10

## BRAKE TORQUE: 10 Nm (7.4 lb-ft) max.

NORD Brake P/N	Half-Wave [V <sub>AC</sub> ]	[A <sub>AC</sub> ]	Full-Wave [V <sub>AC</sub> ]	[A <sub>AC</sub> ]	P <sub>c</sub> [W]	V <sub>c</sub> [V <sub>DC</sub> ]	I <sub>c</sub> [A <sub>DC</sub> ]	R <sub>c</sub> [Ω]
19020222	-	-	-	-	28	24	1.17	20.6
19020922	230	0.14	115	0.28	33	105	0.32	332
19021902	400	0.07	200	0.15	29	180	0.16	1100
19021922	460	0.06	230	0.11	26	205	0.13	1620
19022222	500	0.06	250	0.12	30	225	0.13	1700
19022522	575	0.05	-	-	27	250	0.11	2323

## BRAKE SIZE: BRE40

## BRAKE TORQUE: 40 Nm (30 lb-ft) max.

NORD Brake P/N	Half-Wave [V <sub>AC</sub> ]	[A <sub>AC</sub> ]	Full-Wave [V <sub>AC</sub> ]	[A <sub>AC</sub> ]	P <sub>c</sub> [W]	V <sub>c</sub> [V <sub>DC</sub> ]	I <sub>c</sub> [A <sub>DC</sub> ]	R <sub>c</sub> [Ω]
19040232	-	-	-	-	41	24	1.69	14.2
19040932	230	0.21	115	0.42	49	105	0.46	226
19041902	400	0.11	200	0.22	45	180	0.25	723
19041922	460	0.11	230	0.22	50	205	0.24	840
19042232	500	0.09	250	0.18	44	225	0.20	1150
19042532	575	0.08	-	-	44	250	0.18	1425

## BRAKE SIZE: BRE 250

## BRAKE TORQUE: 250 Nm (185 lb-ft) max.

NORD Brake P/N	Half-Wave [V <sub>AC</sub> ]	[A <sub>AC</sub> ]	Full-Wave [V <sub>AC</sub> ]	[A <sub>AC</sub> ]	P <sub>c</sub> [W]	V <sub>c</sub> [V <sub>DC</sub> ]	I <sub>c</sub> [A <sub>DC</sub> ]	R <sub>c</sub> [Ω]
19080252	-	-	-	-	99	24	4.14	5.8
19080952	230	0.51	115	1.03	120	105	1.14	92
19081902	400	0.27	200	0.54	108	180	0.60	300
19081952	460	0.24	230	0.49	111	205	0.54	380
19082252	500	0.20	250	0.40	100	225	0.44	507
19081962	575	0.17	-	-	95	250	0.38	655

**NOTICE**

The PMG500 rectifier is required when utilizing the larger 800 Nm (590 lb-ft) and 1200 Nm (885 lb-ft) twin-rotor brakes. In order to prevent rapid wear, NORD recommends using the PMG500 rectifier to "overexcite" the brake during its release. The brake coil should be sized utilizing the PMG rectifier like a half-wave rectifier.

Pc [W] = Power to brake coil

Vc [V<sub>DC</sub>] = DC brake coil voltage (range -30% to +10%)Ic [A<sub>DC</sub>] = DC current top brake coilRc [V] = Brake coil resistance ( $\pm 5\%$ )

Brake coil data based upon ambient conditions of 20°C (68°F).

**NORD Gear Corporation**

Toll Free in the United States: 888.314.6673

[www.nord.com/docs](http://www.nord.com/docs)



# MOTOR BRAKES INSTALLATION & MAINTENANCE

DRIVESYSTEMS

RETAIN FOR FUTURE USE



U35000 - 7 of 20

## General Maintenance

### Brake Air Gap

In order to obtain optimal brake performance and maximum brake life, it is necessary to periodically check and reset the brake air gap. As the brake rotor wears and decreases in thickness, the air gap will increase. If the air gap is too large, the brake coil may not have enough magnetic force to pull the metal armature disc across the gap and the brake will drag.



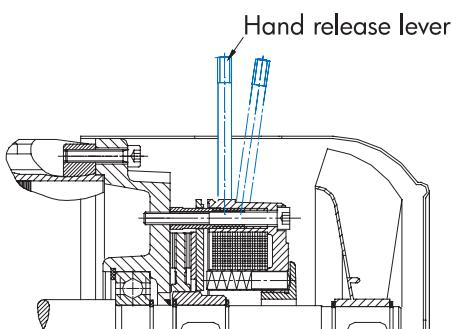
### IMPORTANT NOTE

When a complete brake motor is supplied by NORD, the air gap is already set at the factory. If the brake is ordered as a part, the air gap must be set in the field. All brake air gap adjustments must be made with the brake assembled onto the motor and power off (brake engaged).

### Hand Release Lever (HL)

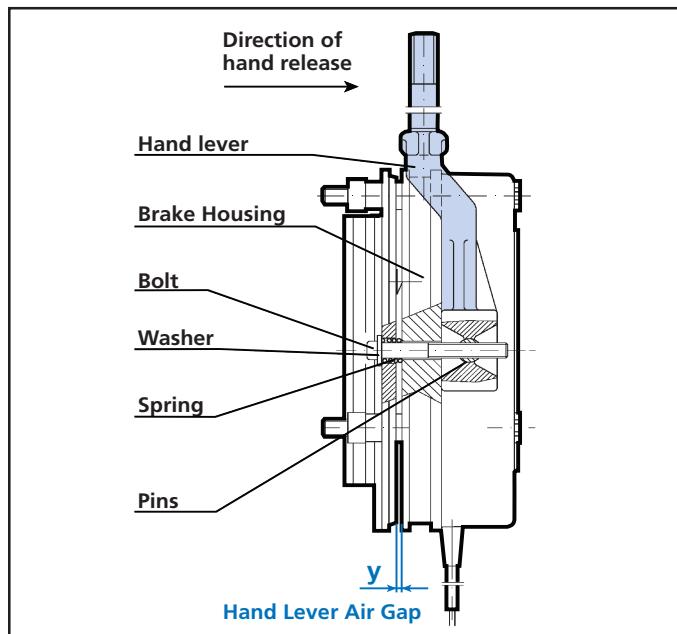
It is common to supply the NORD brake with a hand release lever assembly. The hand release lever allows the brake to be manually released without requiring that the brake be energized with voltage. The lever has a spring return that allows the brake to be hand released and returned automatically to its set position. The handle of the hand release lever can be unscrewed for easy removal.

Figure 5



## Brake Hand-Lever Installation and Adjustment

Figure 6



1. Place the hand-lever over the brake housing (as shown) and align the pins.
2. Screw the bolts with washer and spring into the pins.
3. Using a feeler gage, adjust the hand-lever air gap per Table 5.

Table 5: Hand-Lever Air Gap Setting

Brake Size	Dimension "y" ① [mm]	Dimension "y" ① [in]	Brake Size	Dimension "y" ① [mm]	Dimension "y" ① [in]
BRE 5	1	0.040	BRE 100	1.2	0.047
BRE 10	1	0.040	BRE 150	1.2	0.047
BRE 20	1	0.040	BRE 250	1.5	0.059
BRE 40	1	0.040	BRE 400	1.5	0.059
BRE 60	1	0.040	BRE 800	1.5	0.059
			BRE 1200	1.5	0.059

① Tolerance: + 0.008 in [+ 0.2 mm]



### IMPORTANT NOTE

When a brake motor with hand-lever is supplied by NORD, both the hand lever air gap and brake air gap are set at the factory. When ordered as parts, proper hand-lever and air gap adjustments must be made in the field. Hand-lever adjustments must always be made prior to assembling the brake to the motor. All brake air gap adjustments must be made with the brake assembled to the motor and the power off (brake engaged).



### IMPORTANT NOTE

When setting the hand-lever gap or dimension "y" the magnetic brake coil housing and the anchor plate must be kept uniform all around.



### IMPORTANT NOTE

- To assure proper assembly and proper functioning of the brake, the hand-lever must be assembled to the brake, and the hand-lever air gap must be adjusted, before the brake is assembled to the motor.
- Once adjusted properly, the hand-lever air gap setting should not be altered, even when readjusting the air gap setting.



# MOTOR BRAKES INSTALLATION & MAINTENANCE



DRIVESYSTEMS

RETAIN FOR FUTURE USE

U35000 - 8 of 20

## Setting the Brake Air Gap

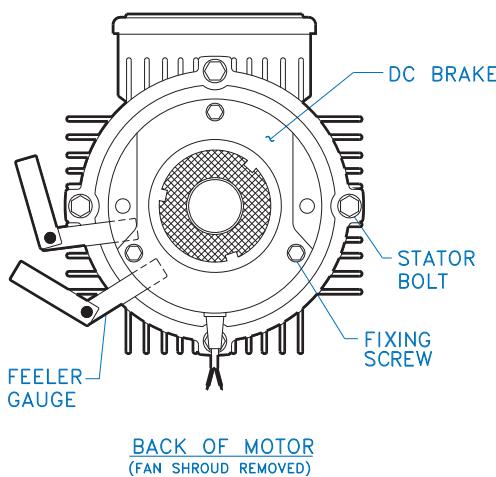
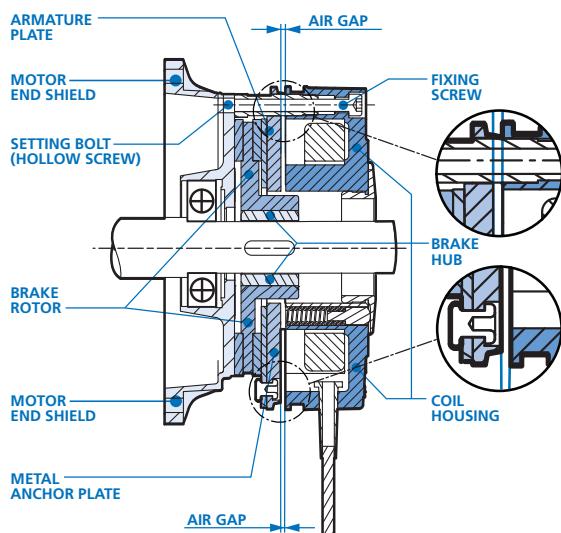
NORD spring-loaded brakes are virtually maintenance free. However, the air-gap of the brake rotor or brake disc must be periodically checked and adjusted. If necessary, the worn brake rotor must be replaced. Table 6 serves as guide to check and set the brake air gap as needed.

### IMPORTANT NOTE

When a complete brake motor is supplied by NORD, the air gap is already set at the factory. If the brake is ordered as a part, the air gap must be set in the field. All brake air gap adjustments must be made with the brake assembled to the motor and the power off (brake engaged).

The brake air gap is checked by placing a feeler gage between metal anchor plate and the brake coil housing as shown in Figure 6. This procedure is identical even for the larger BRE800 and BRE1200 twin rotor brakes.

**Figure 7 – Setting the Brake Air Gap**



### Procedure

- Loosen the fixing screws that attach the brake to the motor's end-shield by approximately half a turn. The brake assembly may be further loosened by turning the setting bolts or hollow screws counter-clockwise into the brake coil housing.
- The desired nominal air-gap for each brake size is displayed in Table 6. In the course of making adjustments, the air gap measurement must be checked in several places using a feeler gauge. The feeler gauge should be positioned between the armature plate and the brake coil housing as indicated in Figure 7.
- Decreasing or Increasing the air gap can be accomplished per the following instructions:

**Decreasing the Air Gap** – To decrease the air gap, turn the setting bolts or hollow screws counter-clockwise while securing the fixing screws; alternatively, turn the fixing screws clockwise while securing the setting bolts or hollow-screws.

**Increasing the Air Gap** – To increase the air gap, turn the setting bolts or hollow screws clockwise while securing the fixing screws; alternatively, turn the fixing screws counter-clockwise, while securing the setting bolts or hollow screws.

- Re-tighten the fixing screws to the proper torque as indicated in Table 6.
- Re-check the air gap in several places and repeat Steps 1-5 as needed until the air gap spacing is uniform and consistent all the way around the brake.

**Table 6: Brake Air Gap Settings**

Brake Size	Fixing Screw Tightening Torque [lb-ft]	Fixing Screw Tightening Torque [Nm]	Nominal Air Gap Setting ① [in]	Nominal Air Gap Setting ① [mm]	Maximum Air Gap ② [in]	Maximum Air Gap ② [mm]
BRE 5	2.2	3	0.008	0.2	0.024	0.6
BRE10	4.4	6	0.008	0.2	0.028	0.7
BRE20	7.4	10	0.012	0.3	0.031	0.8
BRE40	7.4	10	0.012	0.3	0.035	0.9
BRE60	18	25	0.012	0.3	0.039	1.0
BRE100 ③	18	25	0.016	0.4	0.043	1.1
BRE150 ③	18	25	0.016	0.4	0.043	1.1
BRE250	37	50	0.020	0.5	0.047	1.2
BRE400	37	50	0.020	0.5	0.047	1.2
BRE800	37	50	0.028	0.7	0.047	1.2
BRE1200	37	50	0.028	0.7	0.047	1.2

① Tolerance: + 0.004 in [+ 0.1 mm]

② Brake air gap must be re-adjusted before the stated value.

③ When using the stainless steel friction plate (RG) increase the nominal air gap to 0.2 mm (0.008 in.).

**NORD Gear Limited**

Toll Free in Canada: 800.668.4378

08.18.17

**NORD Gear Corporation**

Toll Free in the United States: 888.314.6673

[www.nord.com/docs](http://www.nord.com/docs)



# MOTOR BRAKES INSTALLATION & MAINTENANCE

DRIVESYSTEMS

RETAIN FOR FUTURE USE



U35000 - 9 of 20

## Brake Rotor (Brake Disc) Wear Assessment

Periodically the brake rotor or brake disc must also be checked for wear. If the brake rotors wear approaches the minimum allowed thickness, then the part should be replaced. Use Table 7 to determine whether or not the brake rotor requires replacement.

**Table 7: Brake Rotor Thickness**

Brake Size	Nominal Brake Rotor Thickness ①		Minimum Brake Rotor Thickness ②	
	[in]	[mm]	[in]	[mm]
BRE 5	0.295	7.5	0.177	4.5
BRE10	0.335	8.5	0.217	5.5
BRE20	0.406	10.3	0.295	7.5
BRE40	0.492	12.5	0.374	9.5
BRE60	0.571	14.5	0.453	11.5
BRE100	0.630	16	0.492	12.5
BRE150	0.709	18	0.571	14.5
BRE250	0.787	20	0.650	16.5
BRE400	0.787	20	0.650	16.5
BRE800	0.787	20	0.650	16.5
BRE1200	0.866	22	0.689	17.5

① As new condition.

② Worn condition - brake rotor replacement is required!

## Brake Pad Replacement (reference to parts list on page 8)

When the brake pad is worn the pad should be replaced to maintain proper brake operation and ensure safety.

### Required Tools

- Phillips head screw drivers (fan shroud removal)
- External snap ring pliers (fan and brake hub removal).
- Large flat head screw driver or small pry bar (fan removal)
- Metric T-handle wrenches and open-end wrenches.

### Procedure

1. Remove the fixing screws (946) securing the fan cover (940) to the motor end-shield (932). If the brake has a hand release (937), the lever arm should be removed by unscrewing it.
2. Remove the fan cover (940) and note the position of the hand release slot if applicable.
3. Remove the snap ring holding the cooling fan (939) and carefully remove the cooling fan (939), key and second snap ring (997).
4. If the brake is equipped with a dust boot (992), remove it.
5. Remove the socket head cap screws holding the brake coil (936) to the motor end-shield (932).
6. Remove the brake coil (936), noting the hand release (937) and power cable locations.
7. Slide the brake rotor (993) off the brake hub (938) which is secured to the motor shaft.
8. Clean the brake, install the new brake rotor pad and reassemble the brake in reverse order of the steps outlined.

### NORD Gear Limited

Toll Free in Canada: 800.668.4378

08.18.17

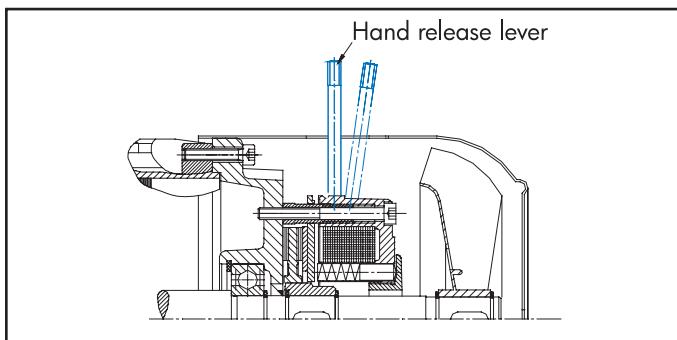
## Optional Brake Accessories

NORD can supply a variety of brake options and accessories, of which some of the most common are noted below.

### Hand Release Lever (HL)

The hand release lever allows the brake to be manually released without requiring that the brake be energized with voltage. The lever has a spring return that allows the brake to be hand released and returned automatically to its set position. The handle of the hand release lever can be unscrewed for easy removal.

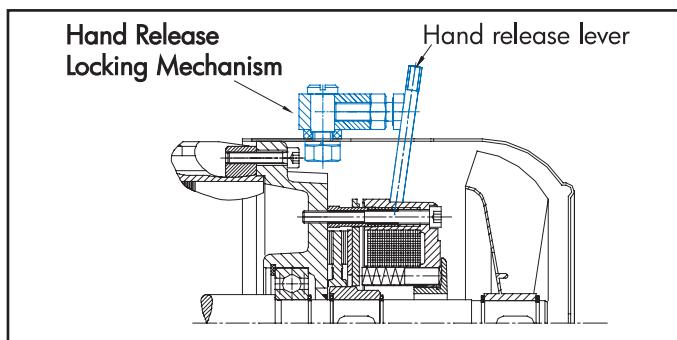
**Figure 8**



### Locking Hand Release Lever (FHL)

This option allows the brake to be manually released and locked off without requiring voltage to the brake. The lock mechanism prevents the spring from returning the brake to a closed state without manual action by the user. The hand release lever can be unscrewed for easy removal.

**Figure 9**



### Corrosion Protected Brake (RG)

The brake is fitted with a stainless steel brake plate to provide additional corrosion protection in severe and wet environments.

### Dust & Corrosion Protected Brake (SR)

A rubber-sealing boot is installed on the brake to provide additional protection in dusty environments. This feature includes the stainless steel brake plate (RG).

### IP66 Brake (IP66)

NORD can also provide an IP66 brake option designed for a bigger degree of protection against severe environments.

**NORD Gear Corporation**

Toll Free in the United States: 888.314.6673

[www.nord.com/docs](http://www.nord.com/docs)



# MOTOR BRAKES INSTALLATION & MAINTENANCE

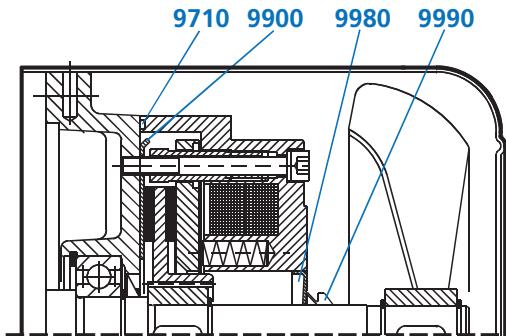
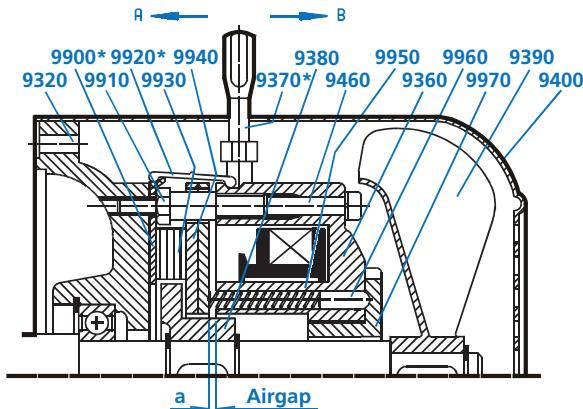


DRIVESYSTEMS

RETAIN FOR FUTURE USE

U35000 - 10 of 20

## Parts List - Precima Brakes



Normal Design, Enclosure IP55 with following options:

RG – Stainless Steel Disc (Item 9900)  
SR – Dust Boot-includes Option RG (Item 9920)  
HL – Hand Release (Item 9370)

9320 Non-drive end shield	9710 O-ring - optional	9960 Pressure plate adjustment**
9360 Brake coil	9900 Friction plate - optional	9970 Adjustable ring **
9370 Manual brake lever – optional	9910 Setting bolt	9980 Bushing/seal - optional
9380 Brake hub	9920 Dust protection ring	9990 V-ring - optional
9390 Fan	9930 Brake rotor	
9400 Fan cover	9940 Armature plate	
9460 Fixing screw	9950 Spring	

\*\* Only for brakes that are 5 Nm to 40 Nm

Table 8: Spare Parts

Brake Size	NORD Motor Frame	Brake Rotor [Item 9930]	Brake Hub [Item 9380]	Brake Hub Bore / (Style)	Hand Release (HL) [Item 9370]	Stainless Disc (RG) [Item 9900]	Dust Boot (SR) [Item 9920]
BRE5	63/71/80	19120042	19100112	15 mm (hex)	19150042	19130042	19110042
BRE10	63/71	19120082	19100212	15 mm (hex)	19150082	19130082	19110082
BRE10	80/90	19120082	19100222	20 mm (hex)	19150082	19130082	19110082
BRE20	80/90/112	19120162	19100322	20 mm (hex)	19150162	19130162	19110162
BRE20	100	19120162	19100332	25 mm (hex)	19150162	19130162	19110162
BRE40	90/100	19120322	19100452	25 mm (spline)	19150322	19130322	19110402
BRE40	112	19120402	19100442	30 mm (hex)	19150322	19130322	19110402
BRE60	100	19120602	19100532	25 mm (spline)	19150602	19130602	19110602
BRE60	112	19120602	19100542	30 mm (spline)	19150602	19130602	19110602
BRE60	132	19120602	19100552	35 mm (spline)	19150602	19130602	19110602
BRE100	132/160	19120802	19100652	35 mm (spline)	19150802	19130802	19110802
BRE150	132	19121502	19100752	35 mm (spline)	19151502	19131502	19111502
BRE150	160/180	19121502	19100772	45 mm (spline)	19151502	19131502	19111502
BRE250	160/180	19122402	19100872	45 mm (spline)	19152402	19132500	19112502
BRE250	200	19122402	19100882	50 mm (spline)	19152402	19132500	19112502
BRE400	200/225	19124002	19100912	60 mm (spline)	19154003	10114020	19114002



## IMPORTANT NOTES

- For brake coil part numbers, listed by brake size and coil voltage, please see page 4.
- The large BRE 800 and BRE 1200 twin rotor brakes are supplied to NORD pre-assembled and complete. For parts list details and spare parts information please contact NORD.

**NORD Gear Limited**

Toll Free in Canada: 800.668.4378

08.18.17

**NORD Gear Corporation**

Toll Free in the United States: 888.314.6673

[www.nord.com/docs](http://www.nord.com/docs)



# MOTOR BRAKES INSTALLATION & MAINTENANCE

DRIVESYSTEMS

RETAIN FOR FUTURE USE



U35000 - 11 of 20

## Brake Times & Electrical Selection

Brake timing performance is critical in selecting the optimal brake system. NORD brakes can provide exceptional performance in terms of the release (start) times and engagement (stop) times. Use the following guidelines in order to select the correct brake control components and connections.

- 1) Determine if the brake needs to be wired directly from the motor terminal block or powered by a separate power source.
- If you are using a frequency inverter, soft-start or a two speed motor you will need to supply the rectifier from a separate power source.
- If the motor is powered direct across-the-line the rectifier power can be supplied from the motor's terminal block.
- 2) What type of performance do I need?
  - Is the standard brake performance OK?
  - Is a higher performance required for fast brake release or very fast brake stopping?
- 3) Determine the brake supply voltage and check the rectifier compatibility using the table on page 10?

## Selection Suggestions

### When Fast Stopping is Recommended

Any applications that require quick stops and positive action at stand-still

### Recommended Applications

- conveyors and inclined conveyors
- hoists and lifts
- bulk material handling equipment (bucket elevators, idler conveyor's).



### WARNING

- Hoisting (lifting/lowering) applications - must have the brake wired for fast response.

### When Fast-Release is Recommended (Overexcitation)

Fast Release is recommended in any application that is very high-cycling with frequent starts and stops. These applications require the brake to release very-quickly in order to avoid excessive heat build-up in the AC motor and brake coil.

### Recommended Applications

- Index conveyors
- Diverters
- Storage and retrieval crane systems

Power Source	Brake Release (start)	Brake engagement (stop)	Braking Method *	Rectifier
Motor Terminal Block	Standard	Standard (AC switching)	10	GVE/GHE/GUE
	Standard	Fast (DC switching)	15	GVE/GHE/GUE
	● Fast (Overexcitation)	Standard (AC switching)	30	PMG 500
	● Fast (Overexcitation)	Fast (DC switching)	35	PMG 500
Separate Power Source	Standard	Standard (AC switching)	20	GVE/GHE/GUE
	Standard	Fast (DC switching)	25	GVE/GHE/GUE
	● Fast (Overexcitation)	Standard (AC switching)	45	PMG 500
	● Fast (Overexcitation)	Fast (DC switching)	50	PMG 500

\* Braking methods referenced in connection diagrams on pages 11-15.

● Please see important note below:

### NOTICE

The PMG500 rectifier is required when utilizing the larger 800 Nm (590 lb-ft) - and 1200 Nm (885 lb-ft) twin-rotor brakes. In order to prevent rapid wear, NORD recommends using the PMG500 rectifier to "overexcite" the brake during its release. The brake coil should be sized utilizing the PMG rectifier like a half-wave rectifier.

**NORD Gear Limited**

Toll Free in Canada: 800.668.4378

08.18.17

**NORD Gear Corporation**

Toll Free in the United States: 888.314.6673

[www.nord.com/docs](http://www.nord.com/docs)



# MOTOR BRAKES

## INSTALLATION & MAINTENANCE



DRIVESYSTEMS

RETAIN FOR FUTURE USE

U35000 - 12 of 20

The table below determines the rectifier and DC brake voltage required, based on the AC supply voltage & braking method.

Rectifier Supply Voltage (VAC)	Brake Coil Voltage (VDC)	Braking Method	Rectifier Type	Rectifier P/N	BRE 5	BRE 10	BRE 20	BRE 40	BRE 60	BRE 100	BRE 150	BRE 250	BRE 400	BRE 800	BRE 1200
115	105	20	GVE20L	19141000	X	X	X	X	X	X	X				
	105	25	GVE20L	19141000	X	X	X	X	X	X	X				
208	180	10	GVE20L	19141000	X	X	X	X	X	X	X	X	X	X	X
	180	15	GVE20L	19141000	X	X	X	X	X	X	X	X	X	X	X
	180	20	GVE20L	19141000	X	X	X	X	X	X	X	X	X	X	X
	180	25	GVE20L	19141000	X	X	X	X	X	X	X	X	X	X	X
	105	30	PMG500	19140200											X X
	105	35	PMG500	19140200											X X
	105	45	PMG500	19140200											X X
230 or 208-230	105	50	PMG500	19140200											X X
	105	10	GHE40L	19141010	X	X	X	X	X	X	X				
	205	10	GVE20L	19141000	X	X	X	X	X	X	X	X	X	X	X
	205	10	GUE40V	19140300	X	X	X	X	X	X	X	X	X	X	X
	105	15	GHE40L	19141010	X	X	X	X	X	X	X	X	X	X	X
	205	15	GVE20L	19141000	X	X	X	X	X	X	X	X	X	X	X
	205	15	GUE40V	19140300	X	X	X	X	X	X	X	X	X	X	X
	105	20	GHE40L	19141010	X	X	X	X	X	X	X	X	X	X	X
	205	20	GUE40V	19140300	X	X	X	X	X	X	X	X	X	X	X
	205	20	GVE20L	19141000	X	X	X	X	X	X	X	X	X	X	X
	205	20	GVE20L	19141000	X	X	X	X	X	X	X	X	X	X	X
	105	25	GHE40L	19141010	X	X	X	X	X	X	X	X	X	X	X
	205	25	GUE40V	19140300	X	X	X	X	X	X	X	X	X	X	X
	205	25	GVE20L	19141000	X	X	X	X	X	X	X	X	X	X	X
	105	30	PMG500	19140200											X X
332	105	35	PMG500	19140200											X X
	180	35	PMG500	19140200											X X
400	180	10	GHE40L	19141010	X	X	X	X	X	X	X	X	X	X	X
	180	10	GUE40V	19140300	X	X	X	X	X	X	X	X	X	X	X
	180	15	GHE40L	19141010	X	X	X	X	X	X	X	X	X	X	X
	180	15	GUE40V	19140300	X	X	X	X	X	X	X	X	X	X	X
	180	20	GHE40L	19141010	X	X	X	X	X	X	X	X	X	X	X
	180	20	GUE40V	19140300	X	X	X	X	X	X	X	X	X	X	X
	180	25	GHE40L	19141010	X	X	X	X	X	X	X	X	X	X	X
	180	25	GUE40V	19140300	X	X	X	X	X	X	X	X	X	X	X
	180	30	PMG500	19140200											X X
	180	35	PMG500	19140200											X X
	180	45	PMG500	19140200											X X
	180	50	PMG500	19140200											X X
460	205	10	GHE40L	19141010	X	X	X	X	X	X	X	X	X	X	X
	205	10	GUE40V	19140300	X	X	X	X	X	X	X	X	X	X	X
	205	15	GHE40L	19141010	X	X	X	X	X	X	X	X	X	X	X
	205	15	GUE40V	19140300	X	X	X	X	X	X	X	X	X	X	X
	205	20	GHE40L	19141010	X	X	X	X	X	X	X	X	X	X	X
	205	20	GUE40V	19140300	X	X	X	X	X	X	X	X	X	X	X
	205	25	GHE40L	19141010	X	X	X	X	X	X	X	X	X	X	X
	205	25	GUE40V	19140300	X	X	X	X	X	X	X	X	X	X	X
	205	30	PMG500	19140200											X X
	205	35	PMG500	19140200											X X
575	205	45	PMG500	19140200											X X
	205	50	PMG500	19140200											X X
	250	10	GHE50L	19141020	X	X	X	X	X	X	X	X	X	X	X
	250	15	GHE50L	19141020	X	X	X	X	X	X	X	X	X	X	X
	250	20	GHE50L	19141020	X	X	X	X	X	X	X	X	X	X	X
	250	25	GHE50L	19141020	X	X	X	X	X	X	X	X	X	X	X



Specify Rectifier Model Type

And DC Brake Voltage

**NORD Gear Limited**

Toll Free in Canada: 800.668.4378

**NORD Gear Corporation**

Toll Free in the United States: 888.314.6673



# **MOTOR BRAKES INSTALLATION & MAINTENANCE**



# DRIVESYSTEMS

**RETAIN FOR FUTURE USE**

- U35000 - 13 of 20

## Typical Connection Diagrams

<b>BR101A</b>	POWERED FROM MOTOR TERMINAL BLOCK STANDARD RELEASE NORMAL STOPPING (AC-SWITCHING)	<b>10</b>	<b>BR101B</b>	POWERED FROM MOTOR TERMINAL BLOCK STANDARD RELEASE NORMAL STOPPING (AC-SWITCHING)	<b>10</b>	<b>BR101C</b>	POWERED FROM MOTOR TERMINAL BLOCK STANDARD RELEASE NORMAL STOPPING (AC-SWITCHING)	<b>10</b>	<b>BR601A</b>	POWERED FROM MOTOR TERMINAL BLOCK STANDARD RELEASE NORMAL STOPPING (AC-SWITCHING)	<b>10</b>			
<b>MOTOR</b>	<b>RECTIFIER</b>	<b>V<sub>motor</sub></b>	<b>V<sub>B-AC</sub></b>	<b>V<sub>B-DC</sub></b>	<b>MOTOR</b>	<b>RECTIFIER</b>	<b>V<sub>motor</sub></b>	<b>V<sub>B-AC</sub></b>	<b>V<sub>B-DC</sub></b>	<b>MOTOR</b>	<b>RECTIFIER</b>	<b>V<sub>motor</sub></b>	<b>V<sub>B-AC</sub></b>	<b>V<sub>B-DC</sub></b>
208-230V/460V 230V/460V 230V/460V	GVE20 GVE20 GHE40	208 VAC 230 VAC 230 VAC	230 VAC 230 VAC 230 VAC	205 VDC 205 VDC 105 VDC	230V/460V 230V/460V	GVE20 GHE40	460 VAC 460 VAC	230 VAC 230 VAC	205 VDC	230V/460V	GHE40	460 VAC	460 VAC	205 VDC
<b>BR601B</b>	POWERED FROM MOTOR TERMINAL BLOCK STANDARD RELEASE NORMAL STOPPING (AC-SWITCHING)	<b>10</b>	<b>BR601C</b>	POWERED FROM MOTOR TERMINAL BLOCK STANDARD RELEASE NORMAL STOPPING (AC-SWITCHING)	<b>10</b>	<b>BR603A</b>	POWERED FROM MOTOR TERMINAL BLOCK STANDARD RELEASE FAST STOPPING (DC-SWITCHING)	<b>15</b>	<b>BR603B</b>	POWERED FROM MOTOR TERMINAL BLOCK STANDARD RELEASE FAST STOPPING (DC-SWITCHING)	<b>15</b>			
<b>MOTOR</b>	<b>RECTIFIER</b>	<b>V<sub>motor</sub></b>	<b>V<sub>B-AC</sub></b>	<b>V<sub>B-DC</sub></b>	<b>MOTOR</b>	<b>RECTIFIER</b>	<b>V<sub>motor</sub></b>	<b>V<sub>B-AC</sub></b>	<b>V<sub>B-DC</sub></b>	<b>MOTOR</b>	<b>RECTIFIER</b>	<b>V<sub>motor</sub></b>	<b>V<sub>B-AC</sub></b>	<b>V<sub>B-DC</sub></b>
208Δ/400V 230Δ/400V 332Δ/575V	GVE20 GHE40 GHE50	400 VAC 400 VAC 575 VAC	230 VAC 230 VAC 575 VAC	205 VDC 250 VDC	230V/400V 230V/400V 400Δ/690V	GVE20 GHE40	208 VAC 400 VAC 460 VAC	230 VAC 400 VAC 460 VAC	180 VDC 180 VDC 205 VDC	208Δ/360V 230Δ/400V 400Δ/690V	GVE20 GHE40	208 VAC 400 VAC 460 VAC	230 VAC 230 VAC 460 VAC	180 VDC 180 VDC 205 VDC
<b>BR603C</b>	POWERED FROM MOTOR TERMINAL BLOCK STANDARD RELEASE FAST STOPPING (DC-SWITCHING)	<b>15</b>	<b>BR103A</b>	POWERED FROM MOTOR TERMINAL BLOCK STANDARD RELEASE FAST STOPPING (DC-SWITCHING)	<b>15</b>	<b>BR103B</b>	POWERED FROM MOTOR TERMINAL BLOCK STANDARD RELEASE FAST STOPPING (DC-SWITCHING)	<b>15</b>	<b>BR103C</b>	POWERED FROM MOTOR TERMINAL BLOCK STANDARD RELEASE FAST STOPPING (DC-SWITCHING)	<b>15</b>			
<b>MOTOR</b>	<b>RECTIFIER</b>	<b>V<sub>motor</sub></b>	<b>V<sub>B-AC</sub></b>	<b>V<sub>B-DC</sub></b>	<b>MOTOR</b>	<b>RECTIFIER</b>	<b>V<sub>motor</sub></b>	<b>V<sub>B-AC</sub></b>	<b>V<sub>B-DC</sub></b>	<b>MOTOR</b>	<b>RECTIFIER</b>	<b>V<sub>motor</sub></b>	<b>V<sub>B-AC</sub></b>	<b>V<sub>B-DC</sub></b>
230A/400V 332Δ/575V	GHE40 GHE50	400 VAC 575 VAC	400 VAC 575 VAC	180 VDC	208-230V/460V 230V/460V 230V/460V	GVE20 GVE20 GHE40	208 VAC 230 VAC 230 VAC	230 VAC 230 VAC 230 VAC	205 VDC	230V/460V	GVE20	460 VAC	460 VAC	205 VDC

- \* The normally open contact/s (NO) is not supplied by NORD. It must close at the same time power is supplied to the brake. The contact must be capable of switching inductive loads and/or be rated IEC AC3.



## = Braking Method

**NORD Gear Limited**

Toll Free in Canada: 800.668.4378

**NORD Gear Corporation**

Toll Free in the United States: 888.314.6673



# MOTOR BRAKES INSTALLATION & MAINTENANCE

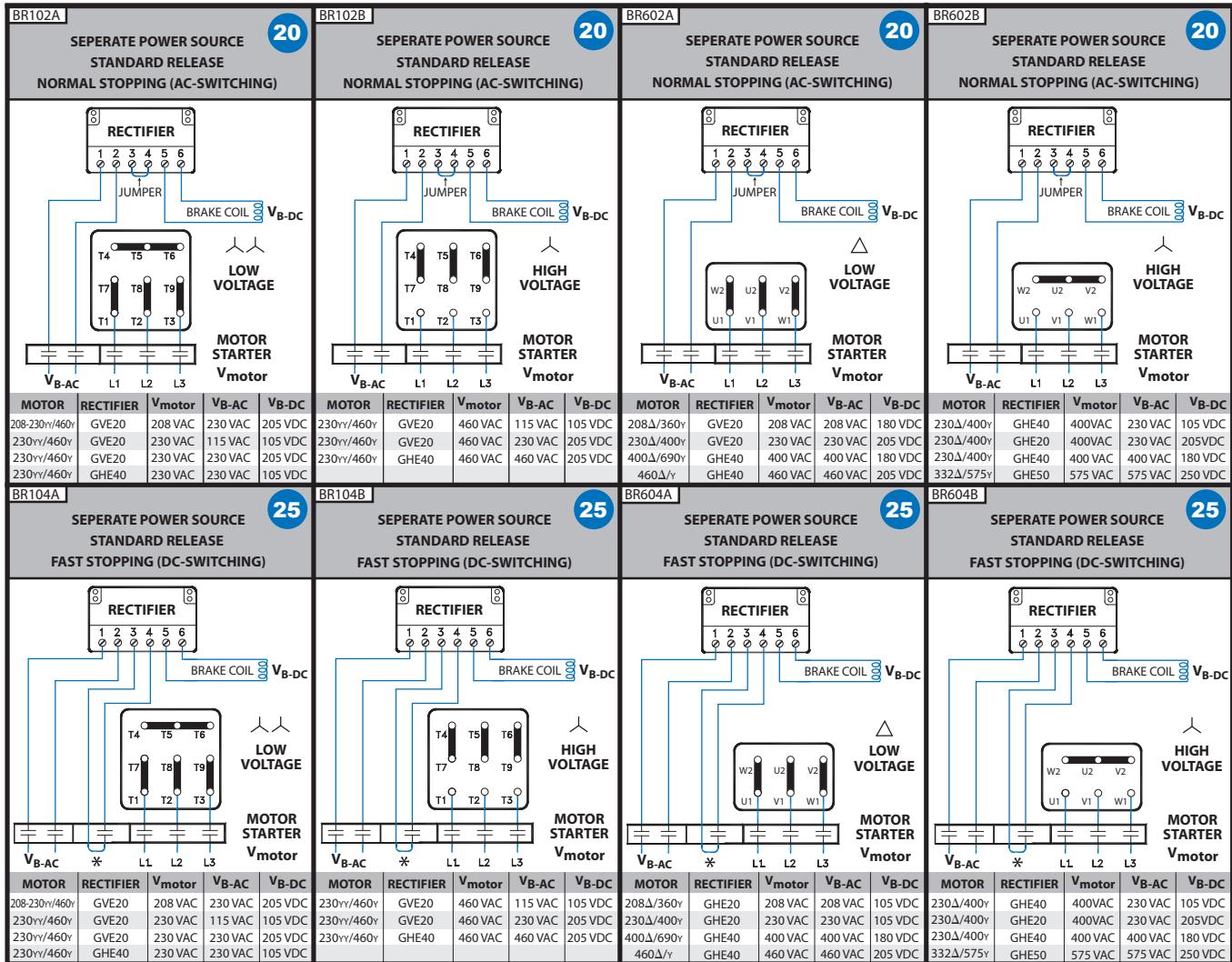


DRIVESYSTEMS

RETAIN FOR FUTURE USE

U35000 - 14 of 20

## Typical Connection Diagrams



\* The normally open contact/s (NO) is not supplied by NORD. It must close at the same time power is supplied to the brake. The contact must be capable of switching inductive loads and/or be rated IEC AC3.

= Braking Method



# MOTOR BRAKES INSTALLATION & MAINTENANCE

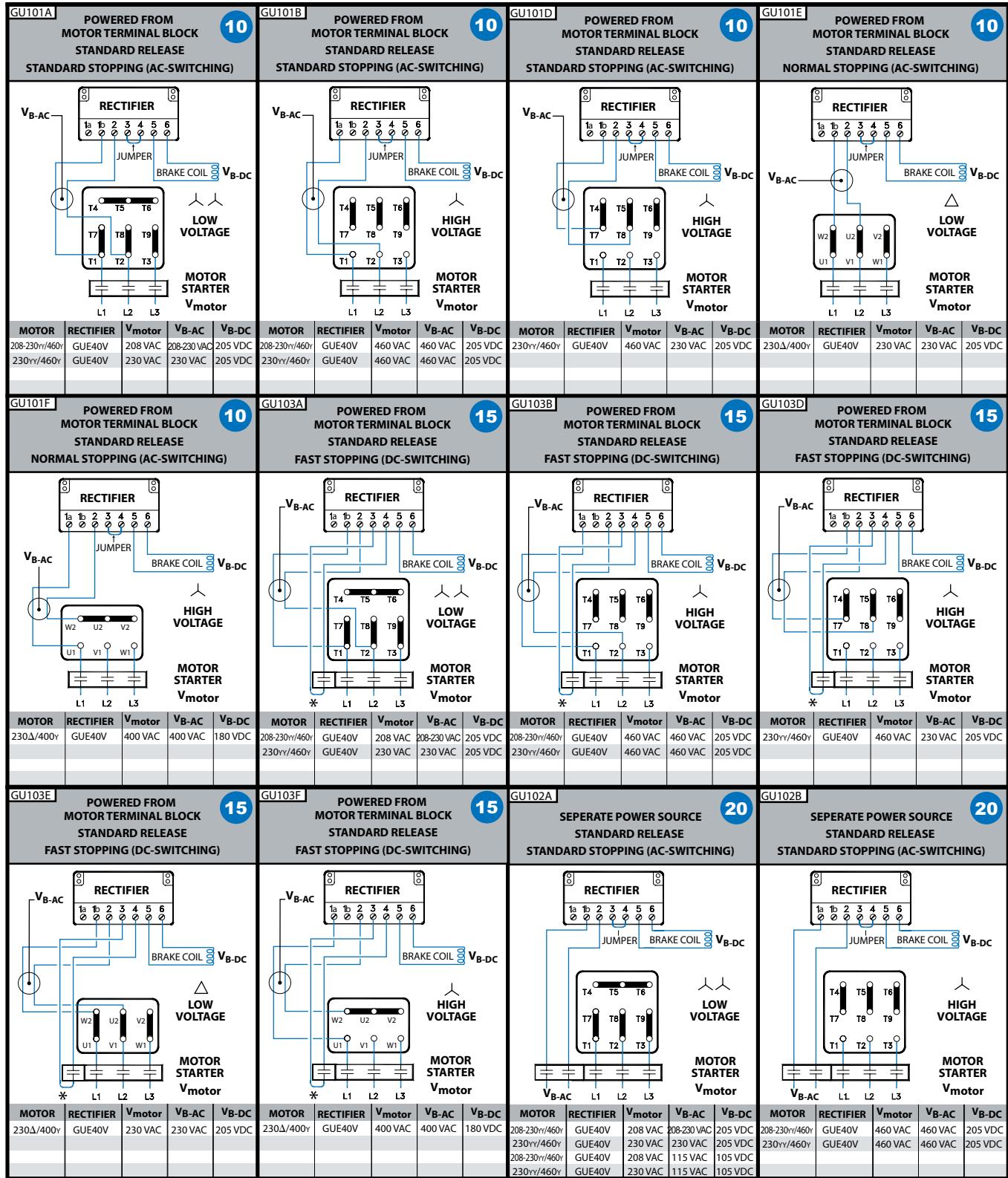


DRIVESYSTEMS

RETAIN FOR FUTURE USE

U35000 - 15 of 20

## Typical Connection Diagrams



\* The normally open contact/s (NO) is not supplied by NORD. It must close at the same time power is supplied to the brake. The contact must be capable of switching inductive loads and/or be rated IEC AC3.

= Braking Method

NORD Gear Limited

Toll Free in Canada: 800.668.4378

08.18.17

NORD Gear Corporation

Toll Free in the United States: 888.314.6673

www.nord.com/docs



# MOTOR BRAKES INSTALLATION & MAINTENANCE

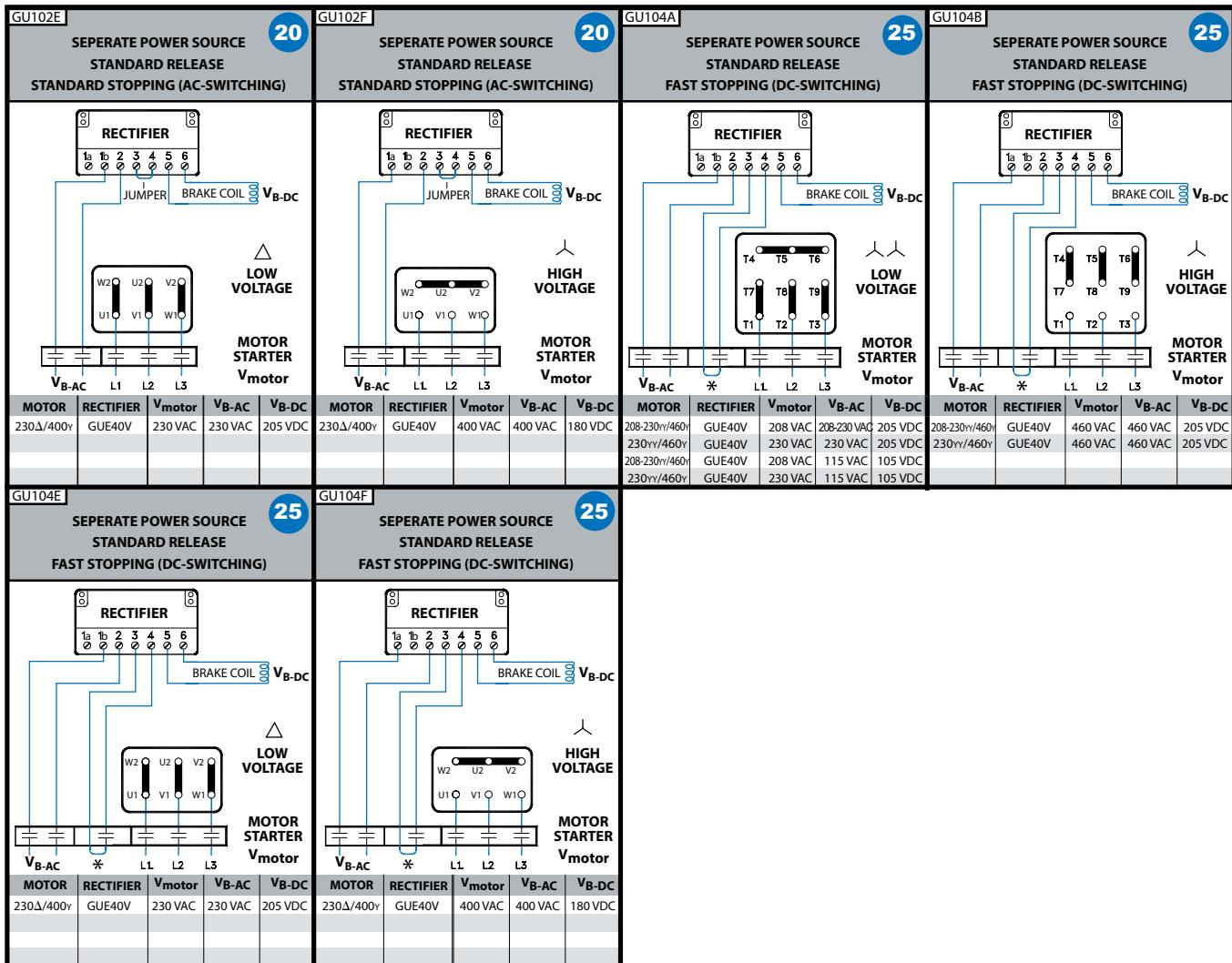


DRIVESYSTEMS

RETAIN FOR FUTURE USE

U35000 - 16 of 20

## Typical Connection Diagrams



\* The normally open contact/s (NO) is not supplied by NORD. It must close at the same time power is supplied to the brake. The contact must be capable of switching inductive loads and/or be rated IEC AC3.

= Braking Method

NORD Gear Limited

Toll Free in Canada: 800.668.4378

08.18.17

NORD Gear Corporation

Toll Free in the United States: 888.314.6673

www.nord.com/docs



# MOTOR BRAKES INSTALLATION & MAINTENANCE

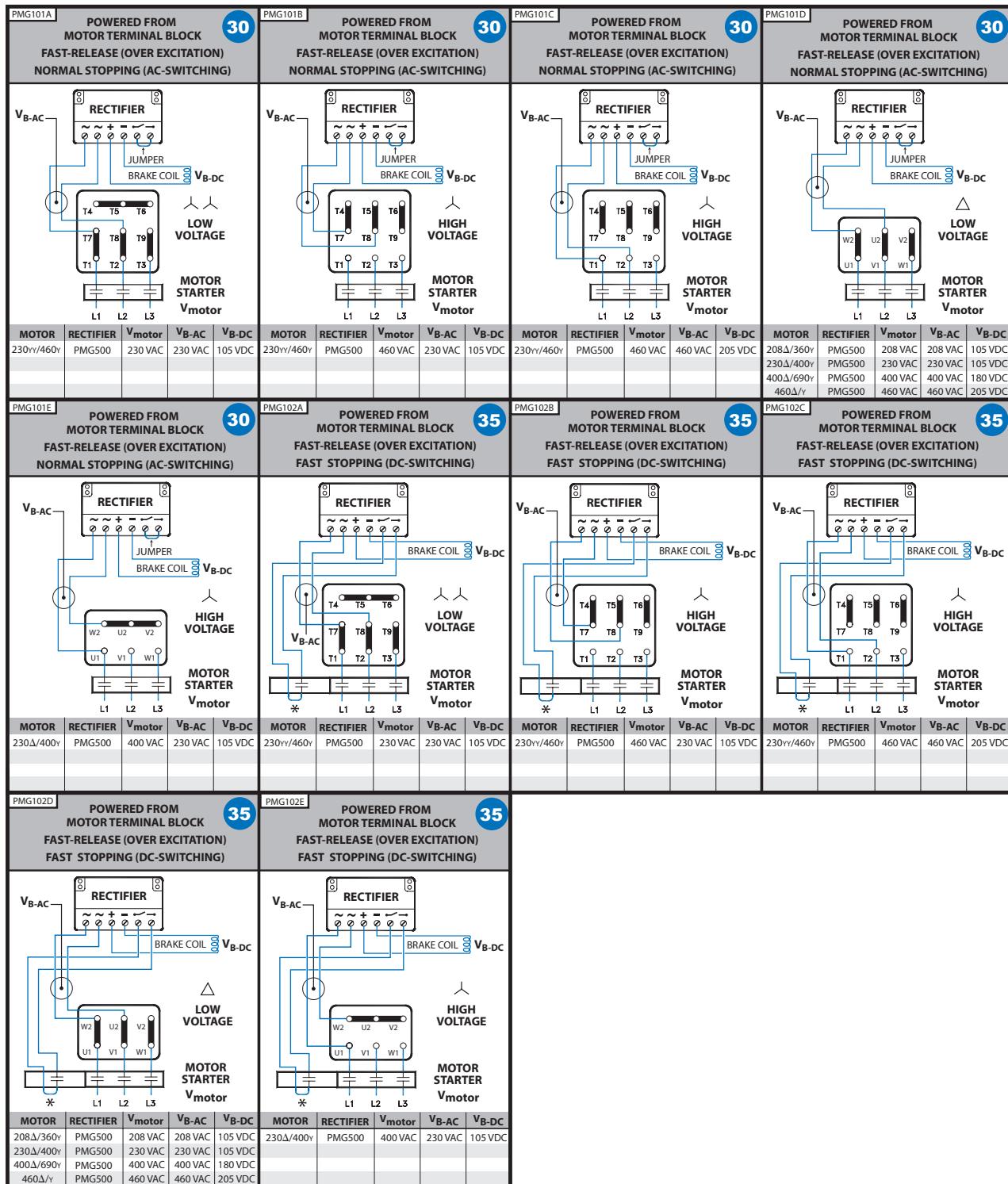


DRIVESYSTEMS

RETAIN FOR FUTURE USE

U35000 - 17 of 20

## Typical Connection Diagrams



\* The normally open contact/s (NO) is not supplied by NORD. It must close at the same time power is supplied to the brake. The contact must be capable of switching inductive loads and/or be rated IEC AC3.



= Braking Method



# MOTOR BRAKES INSTALLATION & MAINTENANCE

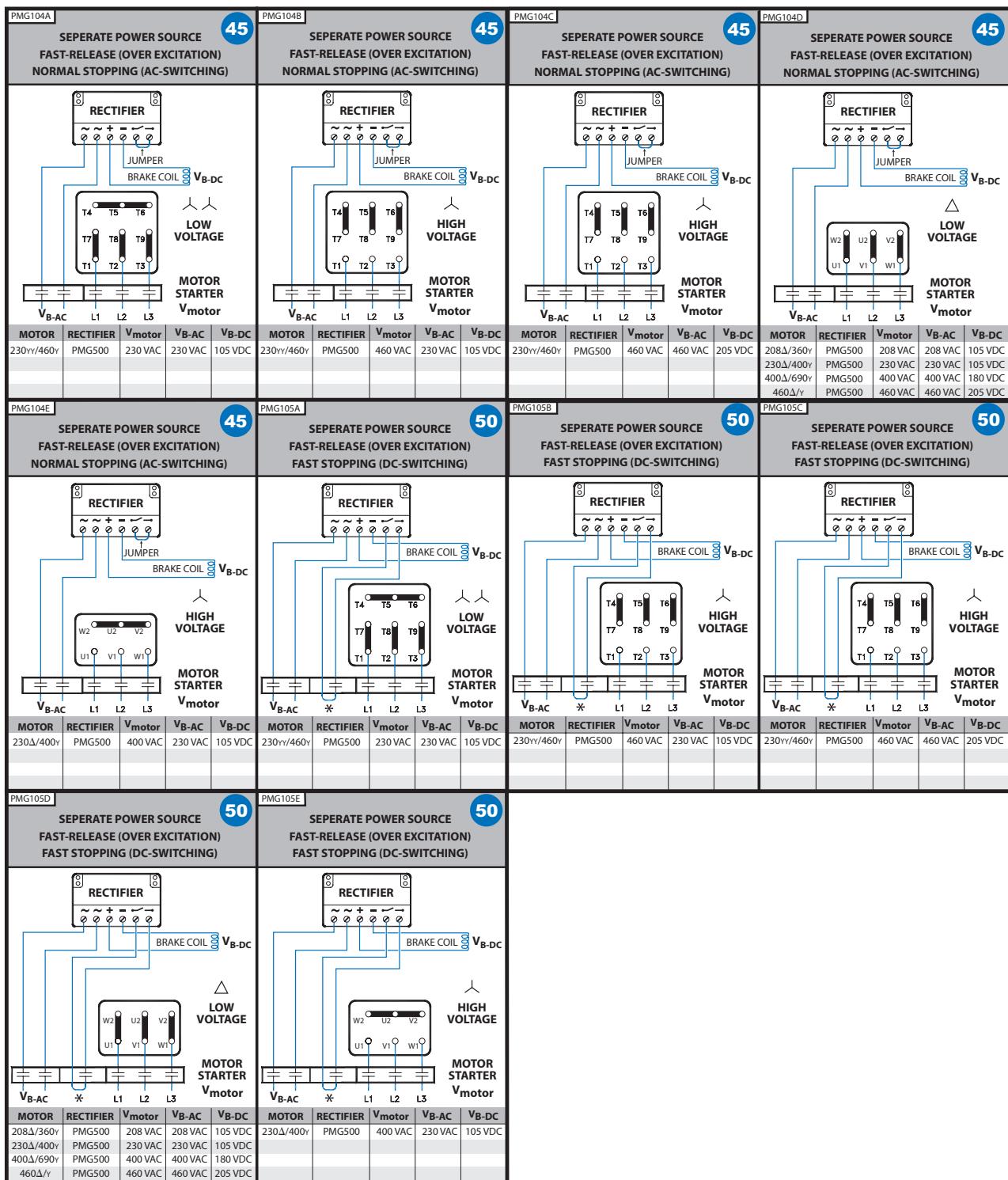


DRIVESYSTEMS

RETAIN FOR FUTURE USE

U35000 - 18 of 20

## Typical Connection Diagrams



\* The normally open contact/s (NO) is not supplied by NORD. It must close at the same time power is supplied to the brake. The contact must be capable of switching inductive loads and/or be rated IEC AC3.



= Braking Method



# MOTOR BRAKES INSTALLATION & MAINTENANCE

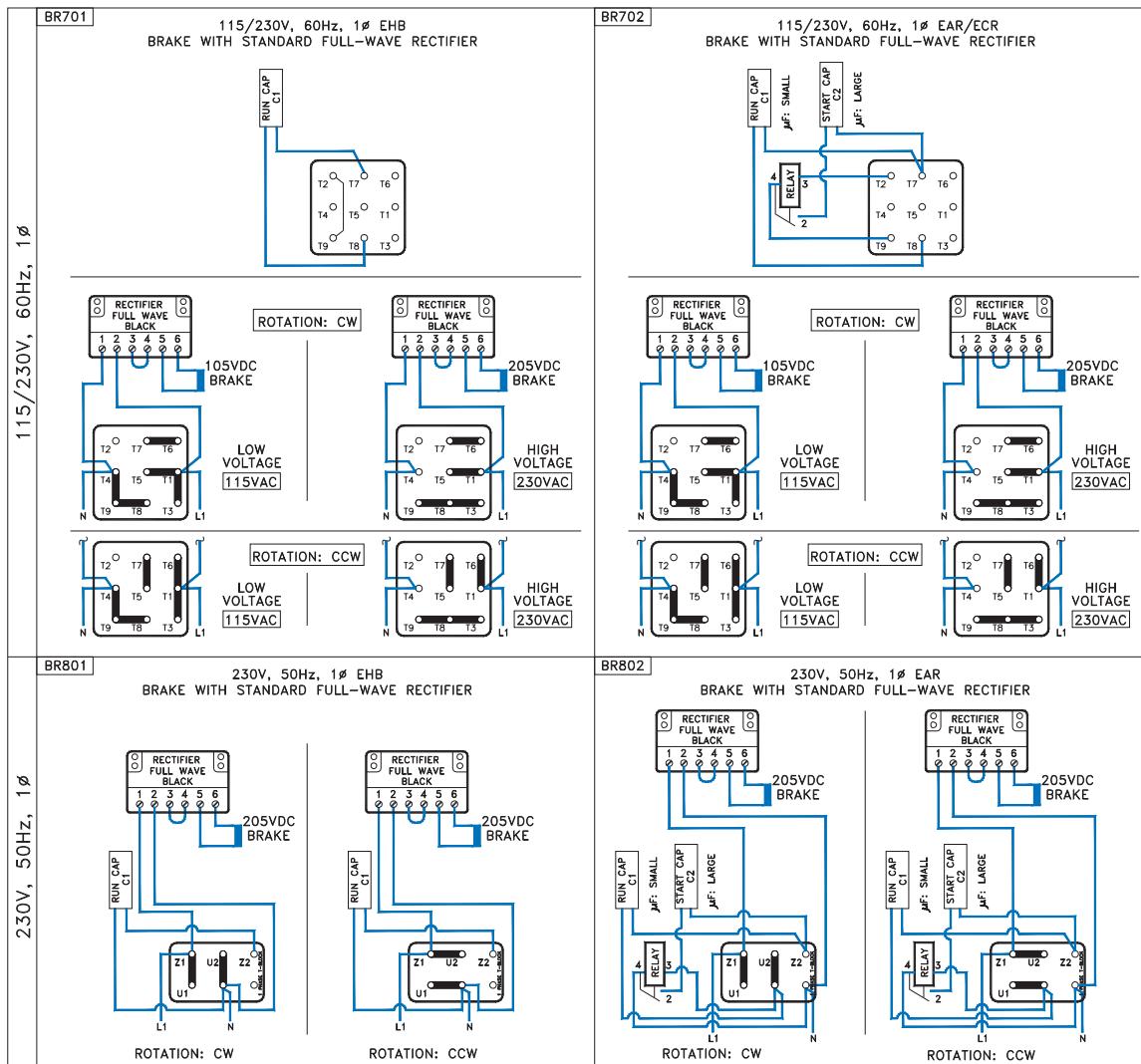


DRIVESYSTEMS

RETAIN FOR FUTURE USE

U35000 - 19 of 20

## Typical Connection Diagrams - Single Phase Motors





DRIVESYSTEMS

# MOTOR BRAKES INSTALLATION & MAINTENANCE



RETAIN FOR FUTURE USE

U35000 - 20 of 20

## Troubleshooting Information

Troubleshooting	Cause	Remedy
Brake doesn't release	Air gap too large	Check air gap and adjust
	Brake not receiving electrical power	Check electrical connection
	Failed rectifier	Replace rectifier
	Brake is getting too warm	Use fast response (FR) rectifier
	Voltage to brake coil too small	Check connection voltage of brake coil
	Rectifier supply voltage from inverter	Rectifier voltage must be from separate source. (Inverter output voltage varies)
Brake release is delayed	Air gap too large	Check air gap and adjust
	Voltage to brake coil too small	Check connection voltage of brake coil
Brake does not engage	Voltage to coil too large	Check connection voltages of brake windings
	Hand release is adjusted incorrectly	Adjust to correct air gap
	Anchor plate mechanically blocked	Remove mechanical blockage
Brake engagement is delayed	Voltage to coil too large	Check connection voltage of brake windings
	Brake is switched to AC side	Use DC switching