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INTRODUCTION

GENERAL INFORMATION:

This manual provides information on the **Ace World Companies** products as well as furnishes service and parts information.

The information contained in this manual at time of publishing is correct to the best knowledge of **Ace World Companies**. While every effort has been made to furnish correct and accurate, as well as sufficient information for maintenance, service and parts, this manual and information contained herein is subject to change without notice. Any questions regarding the information in this manual should be directed to **Ace World Companies, Fort Worth.**

Ace World Companies and any and all associated companies can not be held liable for lack of or unintended omissions or errors in this publication or improper safety precautions and/or user training when performing maintenance or repair on **Ace World Companies** products.

WARRANTY:

This warranty that accompanies the **Ace World Companies** products is listed on the back cover of this manual. This warranty is void if **Ace World Companies** products are used under or with any of the following conditions:

- Loadings exceeding maximum rated loadings listed in **Ace World Companies** product catalogs.
- Accessories or other equipment not designed or approved by **Ace World Companies .**
- Modifications which effect the mechanical and structural integrity of the **Ace World Companies** products.
- Unsafe operation and/or inexperienced maintenance personnel.

NOTE:

There is no substitution for experience. Ace World Companies employs trained and experienced design and maintenance personnel ready to help you 24 hours a day. If you have any questions concerning any information contained herein or with Ace World Companies products in general, please call the number on the front cover of this manual.

GENERAL INFORMATION

INSTALLATION:

There are many different ways to install or mount the bridge girders to the endtrucks. Since each crane builder or user has their own preference **Ace World Companies** does not suggest or offer in this manual information on how to mount the bridge girders to the endtrucks. However, **Ace World Companies** has many experienced engineers in the design of overhead bridge cranes and can offer assistance or ideas on designing the girder/endtruck connection.

SHIPMENT/RECEIVING:

Ace World Companies products are sold F.O.B. factory and freight expenses are the responsibility of the purchaser. **Ace World Companies** products can be shipped by most common carriers. While **Ace World Companies** attempts to package the product sufficiently for transportation, damage during transit may and more often than desired, does occur. The responsibility for filing a damage claim against the freight company lies with the purchaser. If damage does occur, contact **Ace World Companies** immediately so we can ship replacement parts and/or help in the repair determination.

STORAGE:

Ace World Companies products are shipped ready for immediate use. If the need arises, **Ace World Companies** products should be stored indoors in a clean, dry atmosphere. The product should be blocked off the floor, away from moisture and covered loosely with a heavy plastic tarp to prevent dust and dirt from accumulating on the equipment. Any bare metal surfaces such as open gears, shafts, axles, wheel treads etc. should be coated with a rust preventing compound. If storage is for an extended period of time, it is also recommended to periodically rotate the wheels manually to insure grease does not settle in the bearings and oil in the gear reducer coats the gears.

PAINTING:

Ace World Companies products are supplied hand cleaned and prime painted with a universal primer, ready for finish coating by the purchaser. Special surface preparation and paint can be supplied if required by purchaser. When finish painting **Ace World Companies** products it is recommended to follow the paint manufacturers instructions as well as carefully mask wheel treads, bumpers and open motor housings. Remember to remove any masking material prior to putting the product into operation.

MAINTENANCE AND REPAIR

ALL MAINTENANCE AND REPAIR SHOULD BE IN ACCORDANCE WITH ANSI B30 SPECIFICATION

This section provides information on the maintenance and repairs for all of the **Ace World Companies** products. This section deals with lubrication, inspection, disassembly and assembly of the products. It is not intended to provide guidance for all situations but deals with everyday, normal maintenance items.

MAINTENANCE:

The following information provides guidelines for periodic inspections of **Ace World Companies** products. It is suggested each user develop their own periodic maintenance schedules consistent with the intended usage of the **Ace World Companies** product.

Periodic inspection of the endtruck and trolley assemblies is suggested to insure proper operation and lubrication. The frequency of the inspections depends on the operating environment. Inspections should include the following but not be limited to:

1) Check for loose or missing bolts and repair or replace at once.

2) Inspect the wheel flanges and rail for abnormal wear. The wheels are designed to contact the rail head. This is normal. Depending on the operation of the crane and how well the crane was built and squared, the wheels should give years of good service.

3) Inspect the wheels for flat spots or any unusual wear patterns or markings.

4) Inspect the bumper and rail sweeps for cracked bumpers or bent rail sweeps. Fix or replace at once.

5) Inspect the drive pinions on under running and fixed axle trucks for lubrication, wear and alignment with the wheel gear.

6) Inspect the wheel for excessive float. The wheels are designed to give adequate clearance between the wheel flanges and the rail head. CMAA specifications contain guidelines for the amount of float a wheel should have on the rail. Under running endtrucks should have between .125 inch to .25 inch float between the wheel flange and runway beam while top running endtrucks should have minimum .75 inch float up to 1.5 inch float depending on the wheel size and crane span.

MAINTENANCE AND REPAIR

7) Inspect the drive assembly for leaking oil and excessive noise. Inspect the drive mounting torque arm bolts and bushings for proper operation. Inspect the brake torque and brake disc gap. Refer to the applicable drive assembly in the end section of this manual for more information.

If any of the above conditions exist, fix or replace them or contact **Ace World Companies** for guidance.

LUBRICATION:

Lubrication of **Ace World Companies** products is the most important maintenance item. Lubrication should be performed periodically with the frequency dependent upon the operating environment. However, at a minimum it is suggested complete lubrication be accomplished every three months.

The under running endtrucks require lubrication of the exposed drive pinion and wheel gear. If lubrication is required, it is suggested to completely clean the pinions and gears first with a solvent to remove all the old grease. Inspect the gears for wear and replace if required. Regrease with a spray on or brush on inherent open gear lubricant such as "DEM - KOTE" Gear and Wire Rope Lubricant (AGMA Grade 10 as mimimum), which is available from **Ace World Companies** or through your Grainger or similar industrial supply catalog. No greasing of the wheel bearings is required since they are lifetime lubricated and sealed. Refer to the appropriate drive section at the end of this manual for lubrication requirements for the gear reducers and motors.

The top running fixed axle endtrucks require similar lubrication of the exposed drive pinion and wheel gear as the above under running endtrucks. The top of the endtruck has an inspection hole directly above the pinion/gear mesh line. If lubrication is required, it is suggested to completely clean the pinion and wheel gear first with a solvent to remove all the old grease. Inspect the gears for wear and and replace if required. Regrease with a spray on or brush on inherent open gear lubricant such as "DEM - KOTE" Gear and Wire Rope Lubricant, which is available from **Ace World Companies** or through your Grainger or similar industrial supply catalog. No greasing of the wheel bearings is required since they are lifetime lubricated and sealed. Refer to the appropriate drive section at the end of this manual for lubrication requirements for the gear reducers and motors.

MAINTENANCE AND REPAIR

The top running rotating axle endtrucks and top running double girder package trolleys both have similar lubrication requirements. The only lubrication required is periodic greasing of the spherical roller bearings. Each bearing has a grease Zenk on the bearing capsule. The bearings are factory greased but will require periodic greasing. Use a high grade bearing grease such as EP-2 applied with an industrial grease gun to the bearing capsule Zenk fitting. Use manufacturer recommended standard lubricant based on ambient working temperature. Two or three good pumps should normally be enough. Do not pump so much grease into the bearing that it begins to push out around the bearing seal. This will cause failure of the seal and also possibly get grease on the rail head which will cause traction problems for the wheel. Refer to the appropriate drive section at the end of this manual for lubrication requirements for the gear reducers and motors.

BOLTS AND HARDWARE:

Ace World Companies does not include bolts and hardware as spare parts. It is assumed user can locate and apply the proper hardware. However, as a guideline, **Ace World Companies** uses domestic grade 5 hardware as a minimum in all its products. Any hardware provided by user should be grade 5 or better. Below is a sample of identification on the bolt heads and torque values to tighten bolts.

Size	Torque Foot-Lbs. Dry	Lub.
8 mm	17	13
1/2 - 13 UNC	75	58
5/8 - 11 UNC	150	115
3/4 - 10 UNC	270	205

The above torque specifications chart is based on S.A.E. bolt steel classifications. The torque values vary for dry or lubricated threads. The term lubricated includes the application of thread lubricants, lubrizing, cadmium plating and the use of hardened washers. All **Ace World Companies** hardware is installed with split or lock washers.

MAINTENANCE AND REPAIR

REPAIR:

Repair of **Ace World Companies** products is primarily limited to replacement of the worn or damaged parts. These parts include items such as wheel assemblies and drive assemblies.

If structural damage occurs to the frame of the endtruck, most likely the entire endtruck will need to be replaced. This manual does not include information on determining whether this is necessary or on how to remove and replace the existing endtruck frame. Contact **Ace World Companies** for information and guidance on removing the endtruck.

Refer to the appropriate drive section at the end of this manual for guidance on damage and/or repair to the drive assemblies.

TOP RUNNING ROTATING AXLE ENDTRUCKS WHEEL ASSEMBLY REMOVAL

The wheel assemblies can be removed while the crane is on the runway. To accomplish removal of either the drive wheel assembly or an idler wheel assembly, follow the steps below:

1. Move the empty trolley hoist to the opposite end of the bridge.

WARNING!

Disconnect and lock out the power source feeding the crane mainline or other power source. Injury or death to personnel will result if this precaution is not followed.

2. Block the crane from moving on the runway by placing wheel chocks in front of the wheels opposite the side of the crane the wheel assembly is being removed. Do not rely on the drive brake assembly to hold the crane in position.

3. If a drive wheel assembly is being removed, first remove the drive assembly by removing the bolt at the end of the drive axle. Then remove the bolt which secures the drive to the torque arm. Be careful at this point, the drive will rotate freely on the drive axle. If drive assembly is flange mounted, remove the four bolts holding the drive to the bearing capsule. If the drive is an Ace Drive unit, refer to the end section of this manual for instructions on removing the KIBO bushing. With all the mounting bolts removed, carefully slide the drive off the drive axle and support securely on the walkway or other means. If no means is available to support the drive after it is removed from the axle, first disconnect the wires to the drive, remove the mounting bolts and lower drive to the ground.

4. Remove the rail sweep and bumper assembly.

5. Remove the bolts holding the bearing capsules to the truck frame.

6. Using a suitable jack, placed behind the wheel and not in front of the wheel, jack up the endtruck frame enough so the bearing capsule will clear the truck frame as the wheel assembly is rolled out the front of the truck. This may be as much as three inches.

NOTE

These are suggested practices.

TOP RUNNING ROTATING AXLE ENDTRUCKS

WARNING!

The wheel assembly is extremely heavy. Caution must be observed that nothing falls to the ground or other personnel are not under the location where the wheel assembly is being removed.

7. Carefully roll the wheel assembly out of the truck frame. Once the wheel assembly clears the truck frame, attach a suitable sling or other rigging and lower assembly to the ground.

****CAUTION****

BEARING CAPSULES ARE A SLIP FIT AND MAY FALL.

REMOVAL OF CAPSULES MAY BE NEEDED.

Repair of the wheel assemblies is limited to replacement of the components. Inspect the wheel running surface for wear. If bearings need to be replaced, they must be replaced in pairs. The bearings are slip fit into the bearing capsule and light press fit on to the axle. Be careful when removing the bearings to not damage the bearing seal between the bearing and the axle shoulder. While the unit is disassembled, it is a good idea to clean all the components of the old grease and regrease.

Installation of the rotating axle wheel assemblies follows the reverse of the removal outlined above.

WARNING!

Be sure the crane power source is still locked out. Failure to insure this will result in injury or death to personnel.

TOP RUNNING ROTATING AXLE ENDTRUCKS WHEEL ASSEMBLY INSTALLATION

1) Clean all components. Install the axle into the wheel by heating the wheel bore and pressing the axle into the wheel with a large hydraulic press. Press axle into the wheel all the way up to the shoulder of the axle.

2) Install bearing grease seal onto the axle and locate all the way up to the shoulder.

3) Heat the bearing in a bearing heater and install on the axle all the way up to the seal and shoulder. Follow good bearing installation procedures to prevent damage to the bearing that will lead to premature failure.

4) After the bearing has cooled, install the bearing capsules onto the bearings, tapping lightly around the circumference with a wooded mallet. Insure the bearing is fully seated into the capsule.

5) With the truck frame still jacked up, position the assembled wheel assembly on the rail in front of the endtruck frame. Carefully roll the wheel assembly into the truck frame so the bearing capsules are centered on the frame boxes.

WARNING!

The wheel assembly is extremely heavy. Caution must be observed that nothing falls to the ground or other personnel are not under the location where the wheel assembly is being removed.

6) While keeping the bearing capsules centered on the bores, carefully lower the truck frame down onto the capsules. It is critical that the capsules seat properly and completely into the frame bores. Be sure the bolt holes in the capsules line up with the tapped holes in the truck frame before allowing the weight of the crane onto the capsules.

7) Reinstall the bearing capsule bolts and tighten.

8) Reinstall the rail sweep and bumper assembly.

9) If the bearings were not greased prior to assembly with the truck frame, grease the bearings with several good pumps from a grease gun.

TOP RUNNING ROTATING AXLE ENDTRUCKS

10) Reinstall the drive assembly. Check the drive assembly key in the axle. Clean the bore and install the drive on the drive axle. Refer to the end section of this manual for instructions on installing the drive assembly depending on the type drive used.

11) Install all the drive assembly bolts. Reconnect the motor wires if wires were disconnected. Be careful, the drive assembly is heavy and it will rotate freely on the drive axle until the torque arm bolt is attached or the flange bolts are installed.

12) Recheck all bolts for tightness. Remove the wheel chocks.

13) Restore power to the crane and test operation fully before lifting a load or putting crane back into operation.

END TRUCK STYLE IDENTIFICATION

IDENTIFYING YOUR PRODUCTS:

It is important to identify the **Ace World Companies** products to insure you get the correct parts or information you need to service them.

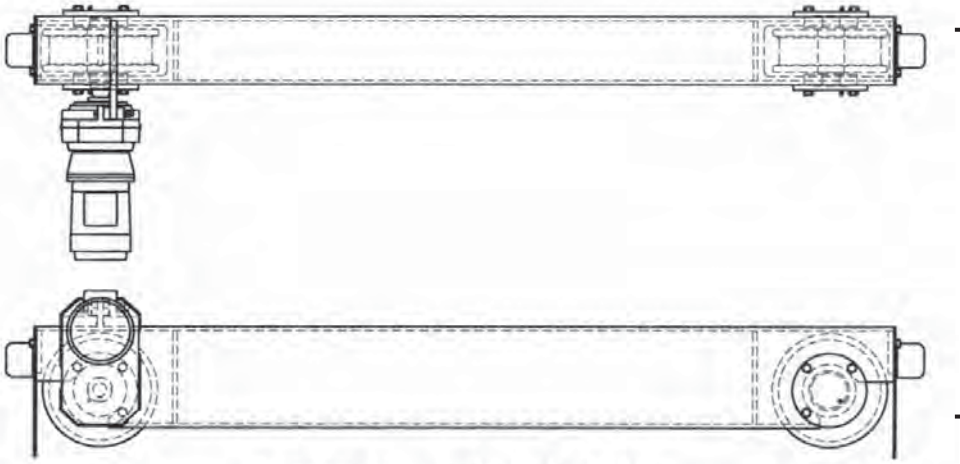
The most important item of identification is the **Ace World Companies** serial number or job number. This number is located on the front of this manual as well as being stamped on the **Ace** name plate located on the equipment as well as being hard stamped into the truck or trolley frame near the drive assembly location.

END TRUCK STYLE IDENTIFICATION

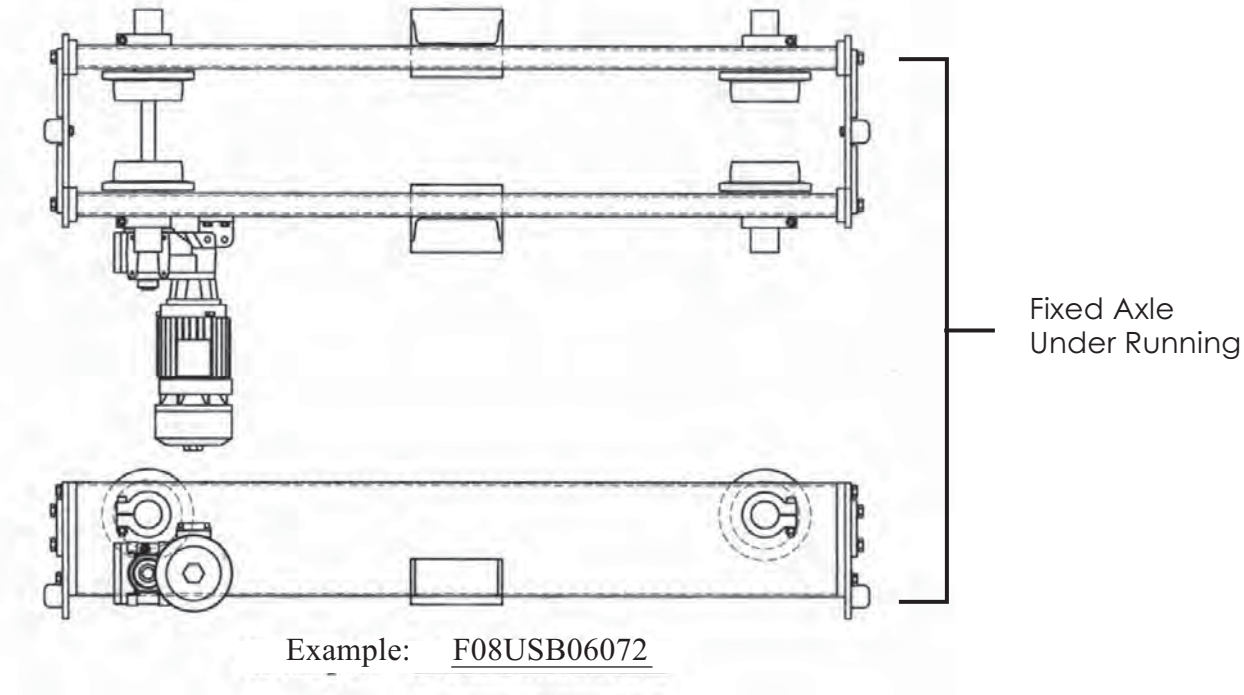
IDENTIFYING YOUR PRODUCTS:

The **Ace World Companies** model number can be used to identify the style of **Ace World Companies** product you have. This number can be found on the engraved tag riveted to the product or on the front cover of this manual.

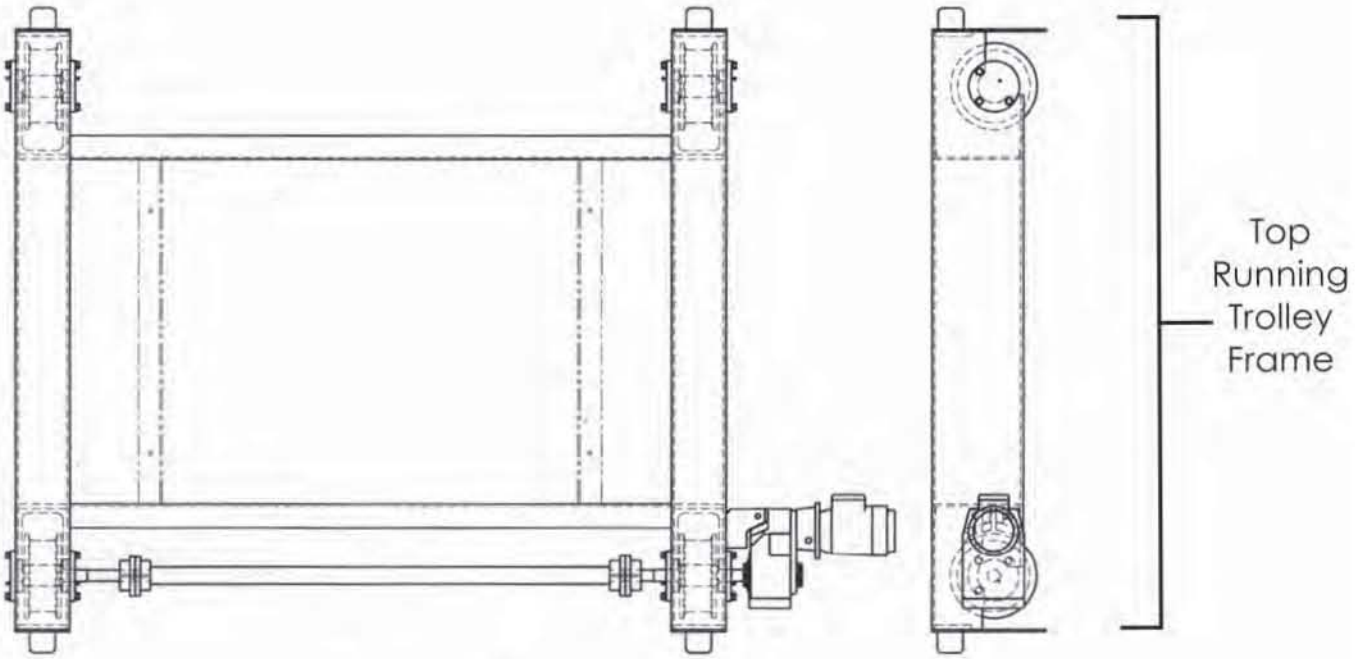
Below are drawings of each style of product and an example model number.



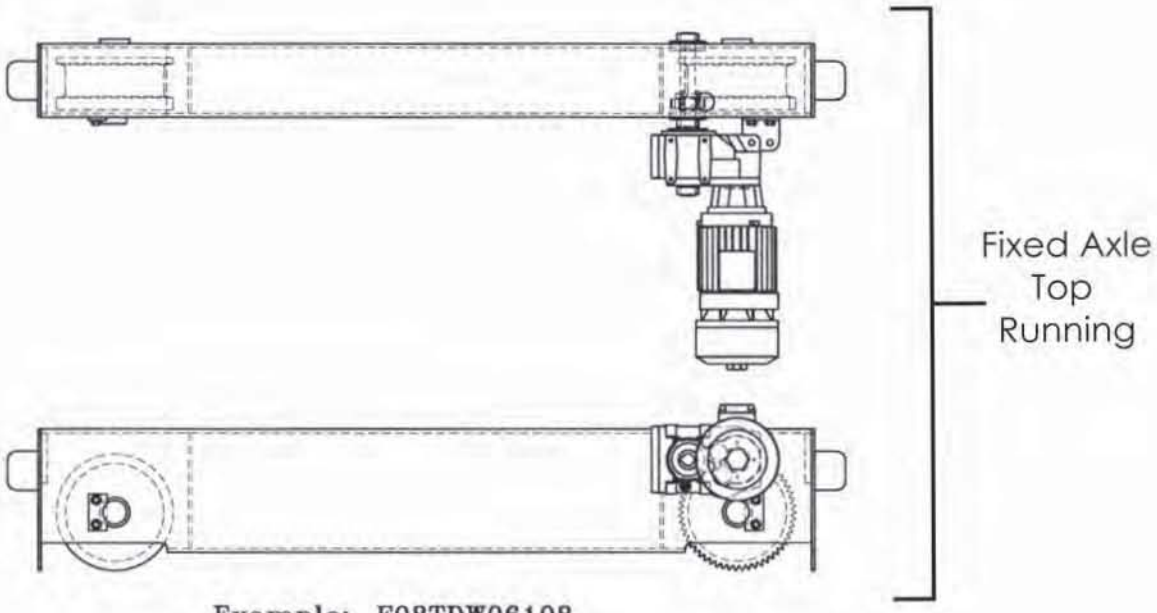
Example: R10TD25090



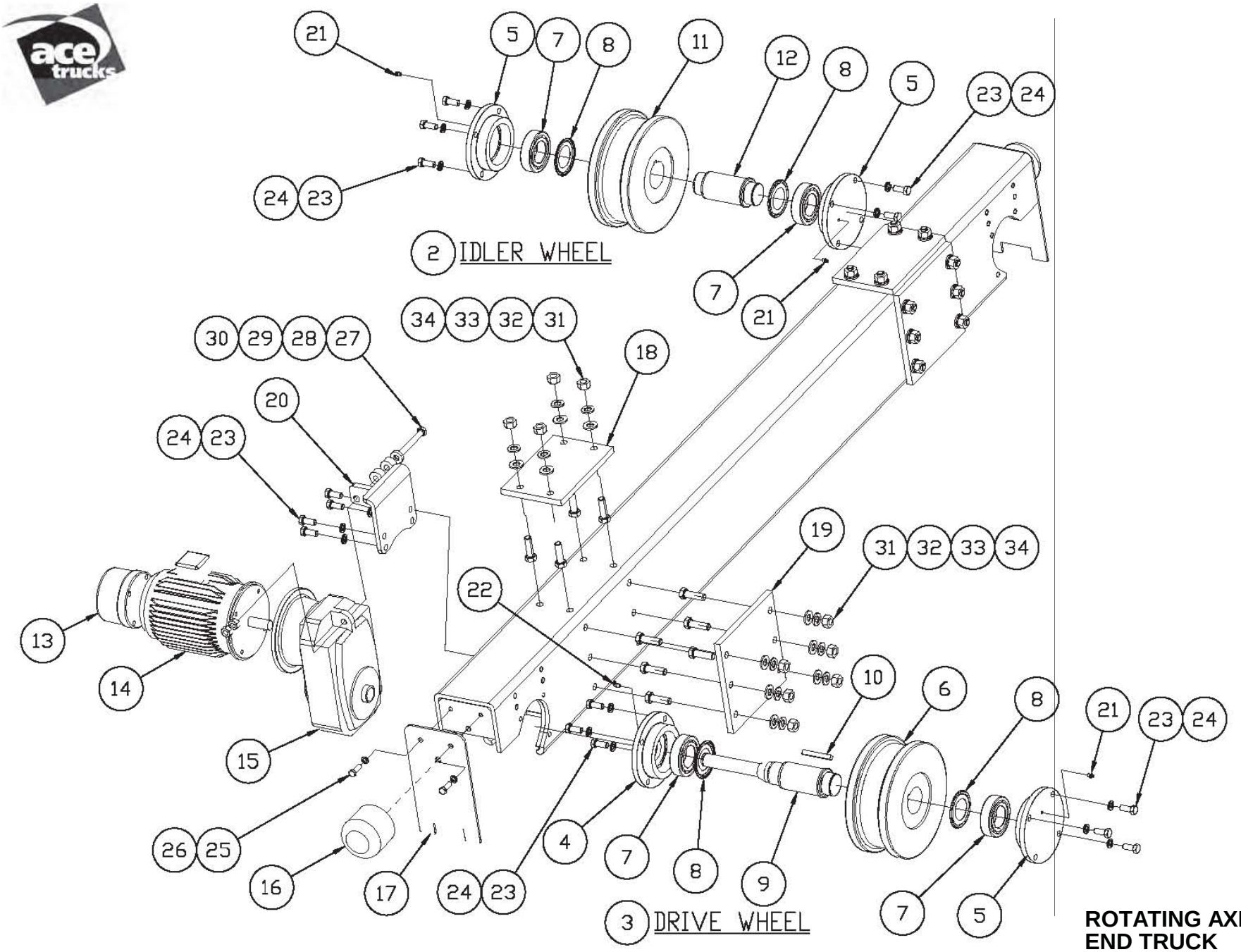
Example: F08USB06072



Example: TRS003S075-1



Example: F08TDW06108



ROTATING AXLE
END TRUCK
TOP RUNNING
6" AND UP

Rotating Axle End Truck
Top Running
6” Wheel & Up
Parts List

1 Frame, Top Running End Truck
2 Idler Wheel Assembly
- **5 Capsule, closed**
- **7 Bearing, roller**
- **8 Seal**
- **11 Idler, wheel**
- **12 Axle, Idler**
- **21 Zert fitting, straight**
- **23 Bolt**
- **24 Nut, heavy hex**

3 Drive Wheel Assembly
- **4 Capsule, open**
- **5 Capsule, closed**
- **6 Drive, wheel**
- **7 Bearing, rollar**
- **8 Seal**
- **9 Axle, Drive**
- **10 Key**
- **21 Zert fitting, straight**
- **22 Zert fitting, 90°**
- **23 Bolt**
- **24 Nut, heavy hex**

13 Brake
14 Motor
15 Gearbox
16 Bumper
17 Rail sweep
- **25 Bolt**
- **26 Nut, heavy hex**

18 Girder plate top
19 Girder plate side
- **30 Bolt (girder plate mounting)**
- **31 Washer, lock (girder plate mounting)**
- **32 Washer, load indicating (girder plate mounting)**
- **33 Nut, heavy hex (girder plate mounting)**

20 Torque arm
- **24 Bolt**
- **25 Washer, lock**
- **26 Bolt (gearbox mount)**
- **27 Washer (gearbox mount)**
- **28 Washer, lock (gearbox mount)**
- **29 Nut, heavy hex (gearbox mount)**

BRAKE MOTOR INFORMATION

Ace motors are three phase totally enclosed motors incorporating an electro-magnetic spring-set disc brake. Motor load is stopped automatically when power is turned off, ensuring a precise stop and quick braking action. Brake activation is obtained without axial sliding of the shaft and is specifically engineered to provide years of worry free performance.

Ace brake motors have been designed to be used with lifting and translating machinery. The integral brake design utilizes an asbestos free brake disc, with a high coefficient of friction. All Ace brake motors have a power-off manual release for convenience and use in the case of power loss.

Ace brake motors incorporate either a NEMA or IEC Design B, totally enclosed motor platform, utilizing a Class H insulation system (inverter rated), providing superior motor protection against voltage spikes induced by variable frequency drives.

Motors are available from stock in both 4 pole (1800 RPM) and 6 pole (1200 RPM) designs, and are available from 3/4 HP thru 10 HP.

All Ace brake motors have Klixon style motor protectors, and can be modified (upon request) to meet specific environmental requirements.

U.L., CSA, ISO Standards and Approvals.

Underwrites Laboratories, Inc.

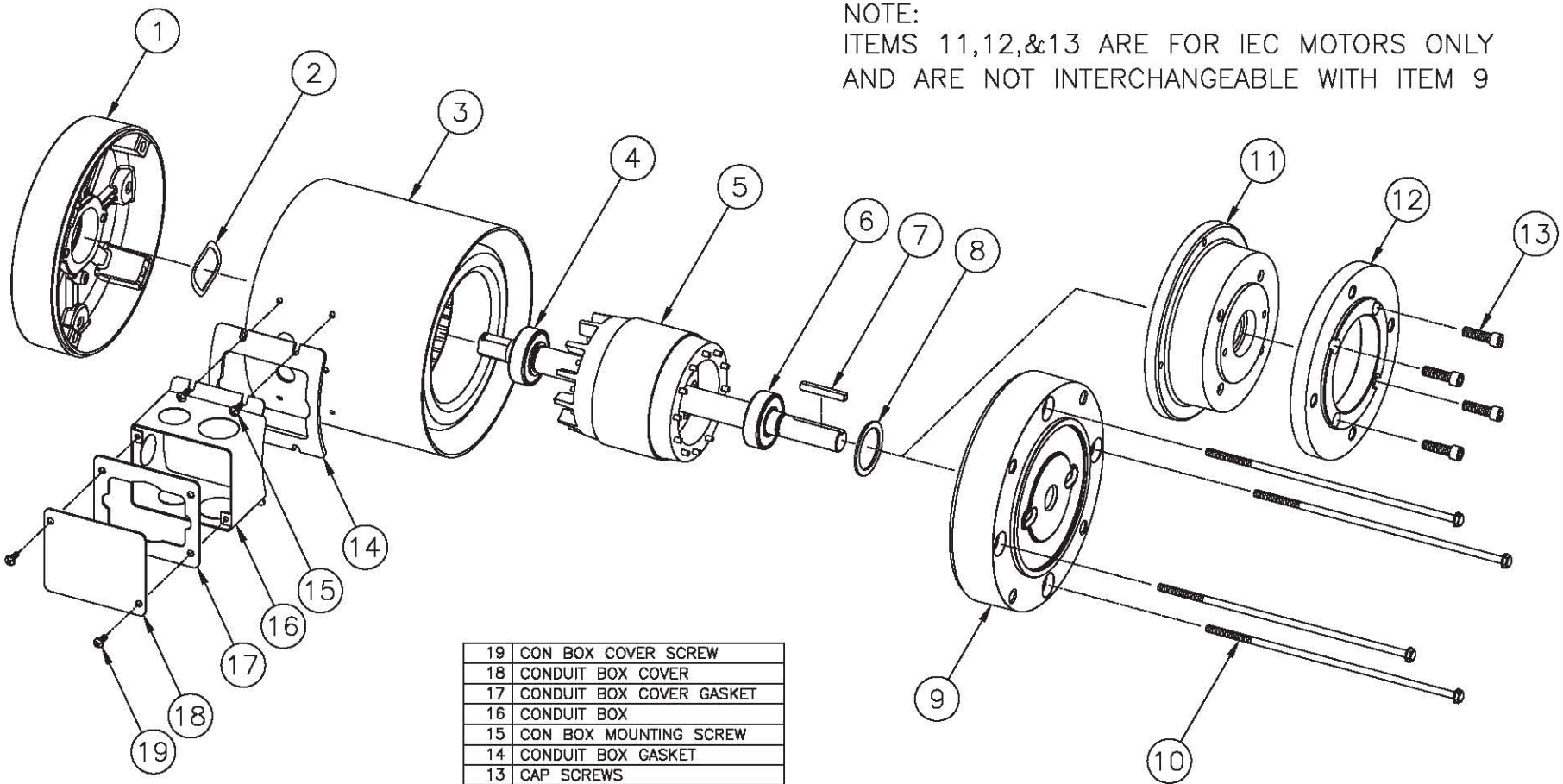
1. U.L recognized Class H insulation system. File #E55555, Guide Number OBJY2.
2. U.L. recognized protector winding combinations. File #E57955. Guide Number XEWWR2.

Canadian Standards Association

1. CSA Report Number L33543, Guide Number 260-0-0.
2. CSA Report Number LR62104.

ISO Quality Certification

Design and Manufacturing Facility, ISO 9001, Certificate Number RvC #93-102. EN29001, BS5750: Part I and ANSI/ASQC Q91-19 ISO9002 Certificate Number RvC #93-090.

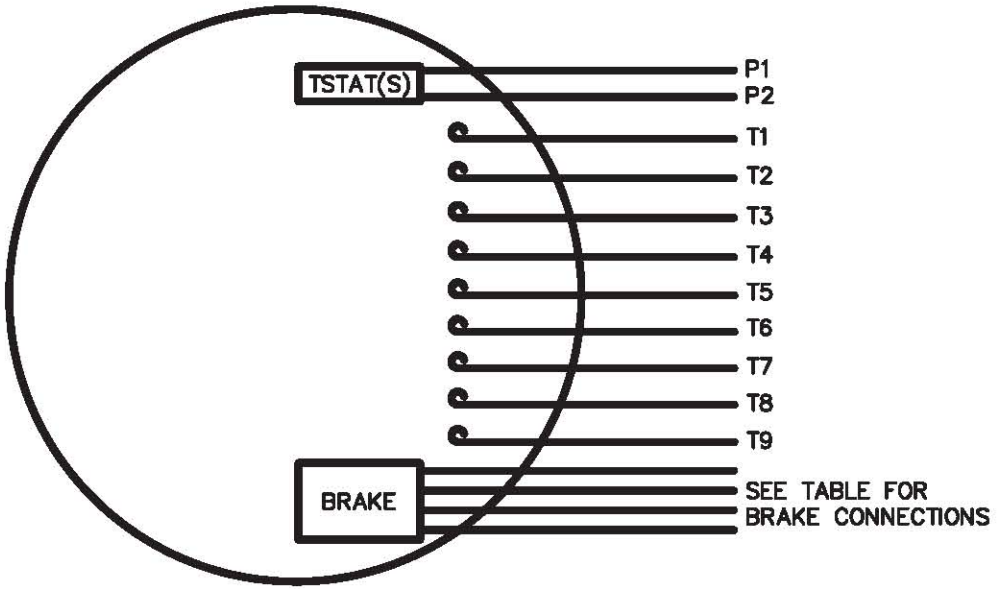


ITEM	DESCRIPTION
19	CON BOX COVER SCREW
18	CONDUIT BOX COVER
17	CONDUIT BOX COVER GASKET
16	CONDUIT BOX
15	CON BOX MOUNTING SCREW
14	CONDUIT BOX GASKET
13	CAP SCREWS
12	IEC FLANGE
11	IEC ENDBELL
10	THRU BOLT
9	ENDBELL
8	SHIM WASHER
7	KEY
6	FRONT BEARING
5	ROTOR SHAFT ASSEMBLY
4	REAR BEARING
3	FRAME STATOR ASSEMBLY
2	LOADING SPRING
1	ENDBELL

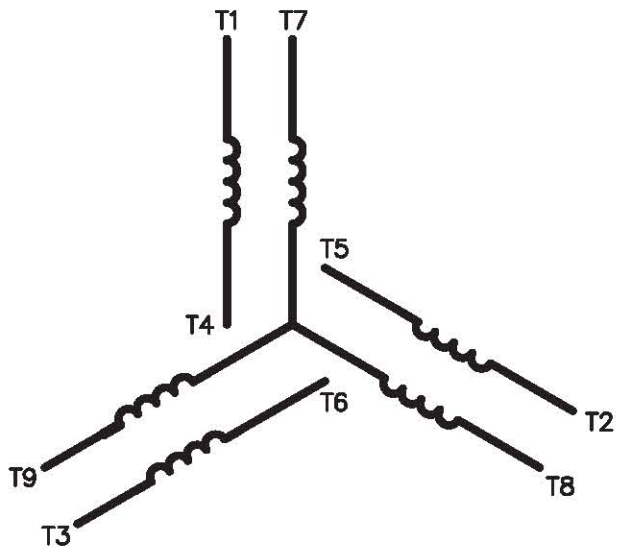
MOTOR EXPLODED VIEW

005010–28

VIEW FROM OUTSIDE OF MOTOR AT SWITCH END.



LINE LEADS



VOLTAGE	L1	L2	L3	JOIN & INSULATE
HIGH	T1	T2	T3	(T4,T7) (T5,T8) (T6,T9)
LOW	T1,T7	T2,T8	T3,T9	T4,T5,T6

	STERNS BRAKE			DINGS BRAKE		
VOLTAGE	L1	L2	JOIN	L1	L2	JOIN
HIGH	1 (RED)	2 (RED)	3 (BLACK) 4 (BLACK)	2 (BLACK)	4 (YELLOW)	1 (YELLOW) 3 (BLACK)
LOW	1 (RED) 3 (BLACK)	2 (RED) 4 (BLACK)	------	2 (BLACK) 3 (BLACK)	1 (YELLOW) 4 (YELLOW)	------

NO.	REVISION	BY	DATE

THIS DRAWING IN DESIGN AND DETAIL IS OUR PROPERTY AND MUST NOT BE USED EXCEPT IN CONNECTION WITH OUR WORK ALL RIGHTS OF DESIGN AND INVENTION ARE RESERVED

TOLERANCES UNLESS OTHERWISE SPECIFIED	
DECIMALS	
.00	± .01
.000	± .005
.0000	± .0005
FRACTIONS	± 1/64
ANGLES	± 1/2°
INCH/MM	

LEESON ELECTRIC CORPORATION

DRAWN RDW 09/14/99	TITLE: EXTERNAL WIRING DIAGRAM 3 PHASE W/O PROTECTOR
CH'K'D.	
APPR.	MAT'L.: DECAL – 004014 DECAL – 080088
SCALE 1=1	
REF. 005010–15	FINISH: CAMFAB INC.
FMF	SIZE: A
	DRAWING NO.: 005010–28

Dings CO. DYNAMICS GROUP

50 Series Enclosed Brake Instructions Ace World Company

Figure 1. 50 Series Brake

IMPORTANT

Read this bulletin carefully before installing or operating this brake. Failure to comply with these instructions cancels all warranties.

Enclosed Housing		Wt. Lbs.		Inertia Rotating Parts
Model	Torque Lb. Ft.	Net	Pkg'd	WK^2 in Lb. $Ft.^2$
4-51003-012	3	6	7	.0023

Table 1. List of Models

WARNING

Brake performance and features must be carefully matched to the requirements of the application.

Consideration must be given to torque requirements, especially where an overhauling condition exists, as well as thermal capacity, ambient temperature, atmospheric explosion hazards, type of enclosure and any other unusual conditions.

Improper selection and installation of a brake and/or lack of maintenance may cause brake failure which could result in damage to property and/or injury to personnel.

If injury to personnel could be caused by brake failure, additional means must be provided to insure safety of personnel.

Do not operate manual release or energize brake coil before installation, in order to preserve prealignment of rotating discs for ease of installation.

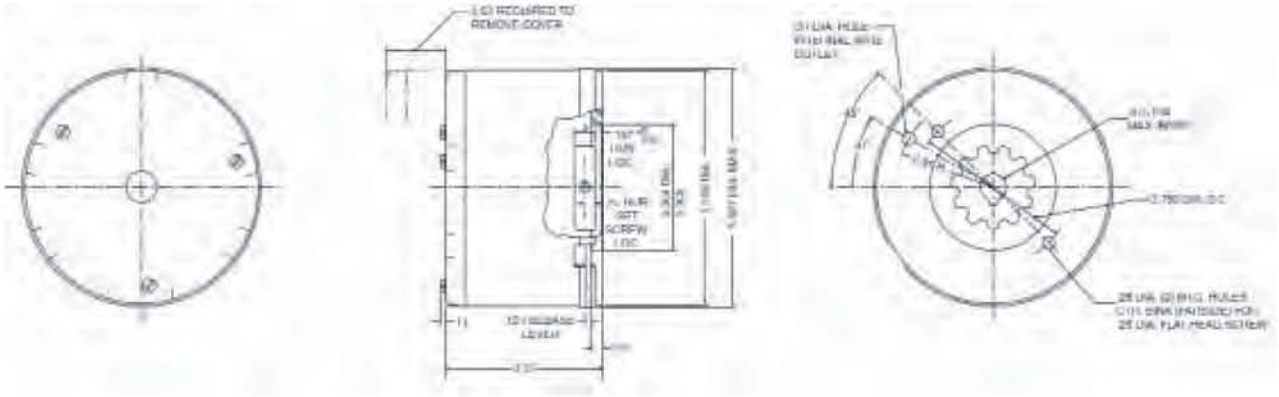


Figure 2. Dimensions of Brake

4740 W. Electric Avenue Milwaukee, WI 53219 414/672-7830 FAX 414/672-5354 www. dingsco.com

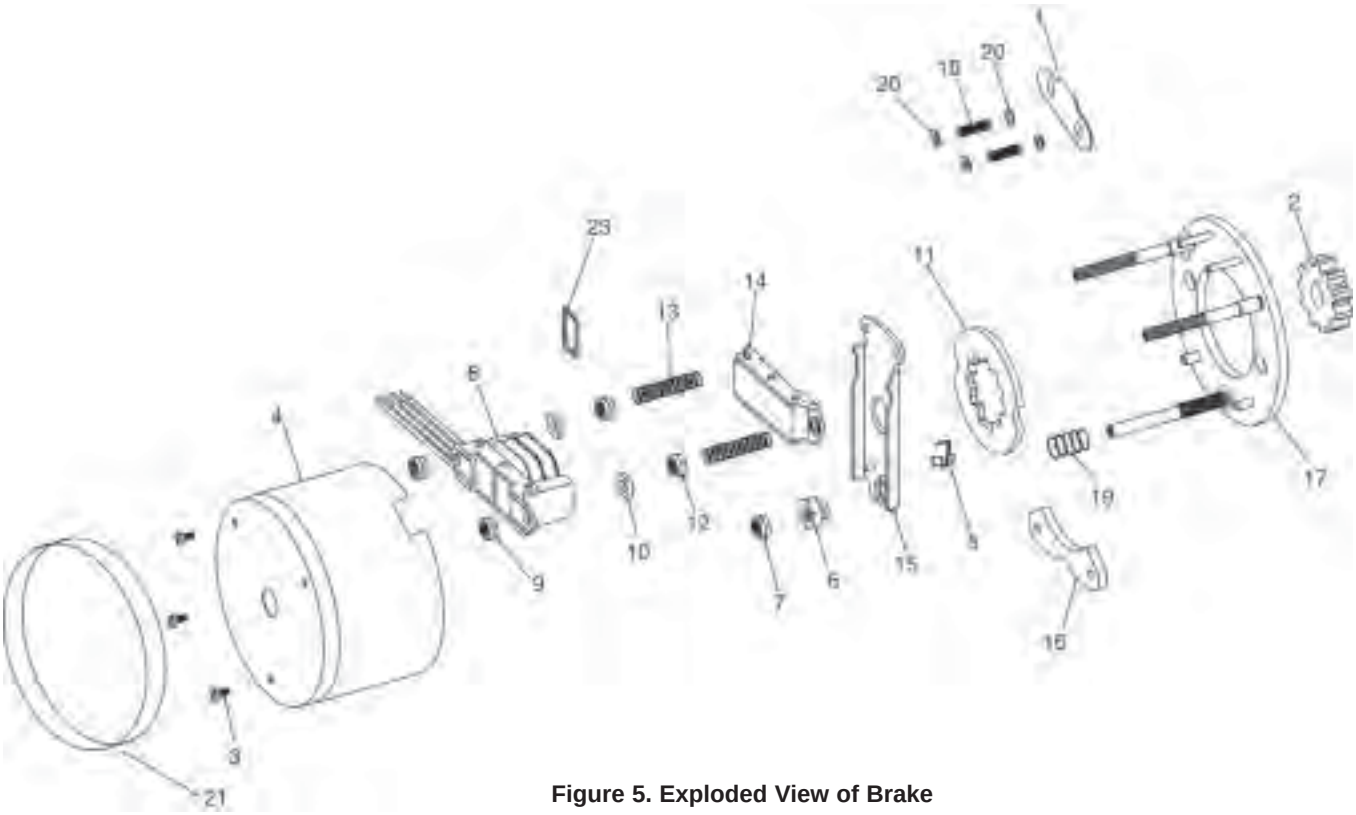


Figure 5. Exploded View of Brake

Table 2. Parts List

ITEM NO.	PIECES REQ'D	NET WT. PER PIECE	DESCRIPTION	PART NO.
1	1	1 oz.	RELEASE LEVER	G050112-001
2	1	4 oz.	SPLINED HUB W/ SET SCREWS (SPECIFY BORE & KEYWAY)	H050038
3	3	1 oz.	MACHINE SCREW, PAN HD. WITH LOCKWASHER	W001006-022
4	1	12 oz.	COVER	K050043-004
5	1	1 oz.	ANTI-BACKLASH SPRING	G050079-001
6	1	1 oz.	PIVOT NUT	G060267-001
7	1	1 oz.	LOCKNUT	W003001-018
8	1	21 oz.	MAGNET ASSEMBLY (INCLUDES ITEM 23) Specify voltage & Hz.	H050035
9	2	1 oz.	LOCKNUT	W003001-015
10	2	1 oz.	RUBBER WASHER	G060310-001
11	1	2 oz.	ROTATING DISC	H050028-002
12	2	1 oz.	NUT, HEX	W003002-002
13	2	1 oz.	TORQUE SPRING - BRONZE	G050077-001
14	1	5 oz.	ARMATURE ASSEMBLY	H050034-002
15	1	8 oz.	PRESSURE ARM ASSEMBLY	H050036-002
16	1	3 oz.	STATIONARY DISC	G050074-001
17	1	24 oz.	BRACKET ASSEMBLY	K050047-001
18	2	1 oz.	RETURN SPRINGS	G050075-001
19	1	1 oz.	COMPRESSION SPRING	G060297-001
20	4	1 oz.	BRASS WASHER	W004003-020
21	1	1 oz.	RUBBER SLEEVE	G050111-001
23	1	1 oz.	SHADING COIL	G060346-001

DESCRIPTION

This brake is direct acting, electromagnetically released and spring set. It uses rotating and stationary disc contact to supply positive braking action. It retains quick release and setting capabilities at all times.

Simplicity of design has reduced maintenance to an absolute minimum. As with any electromechanical equipment, however, periodic inspection and adjustment will assure optimum performance. As the friction disc wears, the magnet gap will increase. The magnet gap should be checked periodically and adjusted when necessary.

INSTALLATION (See Figures 2, 3, 4 & 5)

Before installing, refer to section on Torque Selection.

1. Remove hub (2) from brake and position on motor shaft with key per dimension shown in Figure 2. Stamped part number on hub should face away from motor. Tighten hub set screws to shaft with 6-8 lb. ft. torque.
2. Remove the three cover screws (3) and cover (4) and position brake over hub (2) on shaft. Bolt brake to motor flange with two 1/4" flat head screws. (NOTE: Be sure anti-rattle spring (5) does not rest in hub tooth space containing a set screw.)
3. Connect coil wire leads as indicated in Figure 3. Replace cover, three cover screws and rubber sleeve.

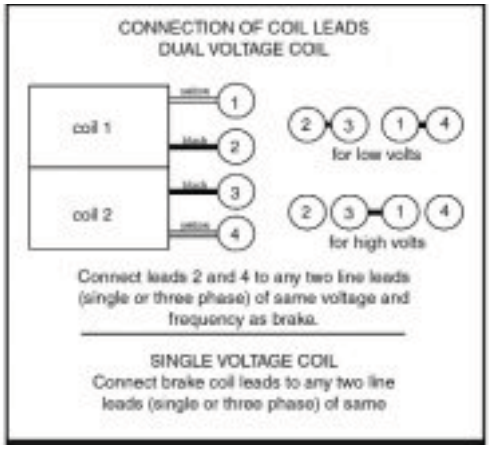


Figure 3. Wiring Diagram

MANUAL RELEASE (See Figure 4)

Manually release the brake by removing the rubber sleeve (21) and using a flat blade screwdriver to push the release lever (1) forward until it has moved approximately 25°. The brake will remain in the released position as long as you hold the lever in this position.

MAINTENANCE AND SERVICE

FRICTION DISC REPLACEMENT (See Figure 4)

When total wear on rotating discs (11) reaches 1/16", replace disc as follows:

1. Remove the rubber sleeve (21), three cover screws (3), cover (4), nuts (9), magnet assembly (8), washers (10), nuts (12), torque springs (13), armature (14), nut (7), nut (6), pressure arm (15) and stationary disc (16).
2. Install new rotating disc (11) making sure anti-rattle spring (5) is installed in position shown and does not rest in a hub tooth space containing a set screw.
3. Reassemble all parts in reverse order.

NOTE: In reassembly, tighten nut (6) so that it just makes contact with pressure arm (15). LOCATE nut (12) 1/2" from end of stud as shown in Figure 4. Tighten nut (9) as described under MAGNET ASSEMBLY REPLACEMENT. Readjust magnet air gap as described under WEAR ADJUSTMENT.

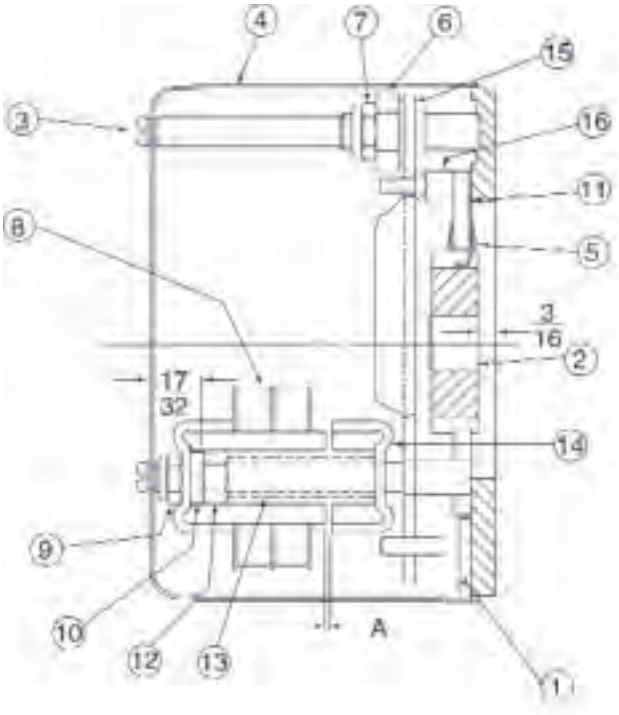


Figure 4. Brake Gap Adjustment

WEAR ADJUSTMENT (See Figure 4).

As friction disc wears, magnet air gap "A" increases. When air gap "A" reaches .150" maximum, adjust to .060"-.070". To adjust: Hold pivot nut (6), loosen lock nut (7), turn pivot nut (6) clockwise until air gap "A" measures .080" at center of magnet. (NOTE: Air gap should decrease slightly to measure .060"-.070". When lock nut (7) is tightened against the pivot nut (6).) Hold pivot nut (6) and tighten lock nut (7) against it. Operate brake several times to see if ;060"-.070" air gap is maintained. If not, re-adjust following same procedure again. Any delay in adjusting air gap will result in a loss of torque and/or coil burn out.

MAGNET ASSEMBLY REPLACEMENT (See Figure 4)

Remove rubber sleeve (21), cover screws (3), cover (4), nuts (9) and magnet assembly (8). Replace magnet assembly. Be sure rubber pads (10) are under magnet bracket. TIghten nuts (9) to remove end play between nut and magnet bracket. TIghten with an additional 1/3 turn (two flats on nut). Check air gap as described under WEAR ADJUSTMENT and replace cover, cover screws and rubber sleeve.

BRAKE DOES NOT RELEASE

Check for failure of power supply to brake.
Check brake visually for broken or damaged parts.
Check for broken leadwire or bad electrical connection.
Check for correct voltage. Voltage must correspond to that listed on brake nameplate. If voltage is more than 10% below figure stamped on nameplate, magnet will not pull in, causing coil to burn out within minutes. If voltage is more than 10% above, coil will overheat and burn out.
Check for burned out coils (coils may be charred or burned).

BRAKE DOES NOT STOP

Check brake visually for broken or damaged parts.
Check disc wear (see WEAR ADJUSTMENT).
Check for broken friction disc.
Check hub. Be certain hub has not shifted position on shaft and rotating disc is fully engaged on hub.

BRAKE CHATTERS OR HUMS

Clean magnet faces if dirty. Insert a clean sheet of paper between the magnet faces and energize brake. Move paper around between faces to dislodge dirt. Finally, remove paper.
Check if shading coil (23) is cracked, broken or out of position.
Check for low voltage. Magnet will not pull in and coil will burn out if voltage is more than 10% below figure stamped on nameplate.

MANUAL RELEASE DOES NOT WORK

Check for broken or damaged parts.
Check return springs (18). Replace if broken.
Check magnet air gap "A" with lever in the normal position. Gap must be .060" at narrowest point. If gap is too small, motor shaft will not turn freely.
Adjust to correct magnet gap as described under WEAR ADJUSTMENT.

SPECIFICATIONS

MOTOR FRAMES	48 Frame
HOUSING	Steel
DUTY	Rated for continuous duty
VOLTAGES	All standard NEMA single phase voltages and frequencies available. Other voltages and frequencies are optional.
MOUNTING	Direct to NEMA "C" motor flanges. Brake is all position mounting.
TORQUE	3 lb. ft.

ORDERING INFORMATION

The following data should be furnished with your order for:

REPLACEMENT PARTS
Brake Model Number
Part Number from Table 2
Part Description from Table 2
(On hub order furnish bore dia. & keyway dimensions)
(On electrical parts specify voltage, phase & frequency)

REPLACEMENT BRAKE
Model Number
Voltage, Phase & Frequency
Hub Bore & Keyway Dimensions

WARRANTY

Seller warrants products manufactured by it and supplied hereunder to be free from defects in materials and workmanship under normal use and proper maintenance for a period of twelve months from date of shipment. If within such period any such products shall be proved to Seller's reasonable satisfaction to be defective, such products shall be repaired or replaced at Seller's option Seller's obligation and Buyer's exclusive remedy hereunder shall be limited to such repair and replacement and shall be conditioned upon Seller's receiving written notice of any alleged defect no later than 10 days after its discovery within the warranty period and, at Seller's option, the return of such products to Seller, f.o.b. its factory, when such return is feasible. Seller reserves the right to satisfy its warranty obligation in full by reimbursing Buyer for all payments it makes hereunder, and Buyer shall thereupon return the products to Seller. Seller shall have the right to remedy such defects. Seller makes no warranty with respect to wear or use items, such as belts, chains, sprockets, discs and coils, all which are sold strictly AS IS.

The foregoing warranties are exclusive and in lieu of all other express and implied warranties (except of title) including but not limited to implied warranties of merchantability, fitness for a particular purpose, performance, or otherwise, and in no event shall the Seller be liable for claims (based upon breach of express or implied warranty, negligence, product liability, or otherwise) for any other damages, whether direct, immediate, incidental, foreseeable, consequential, or special.

Dings Co. DYNAMICS GROUP

Dings CO. DYNAMICS GROUP

60 Series End-Mount Brake Instructions
Standard Housing
Ace World Company

Read carefully before attempting to assemble, install, operate or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage! Retain instructions for future reference.

DESCRIPTION

These magnetic disc brakes mount directly onto NEMA 56C, 143TC, and 145TC frame motors, on the end opposite the drive shaft. The brake is direct acting, electro-magnetically released, and spring set. It uses rotating friction and stationary disc contact to supply positive braking action. It retains quick release and setting capabilities at all times.

WARNING: Do not install or use these brakes in an explosive atmosphere.

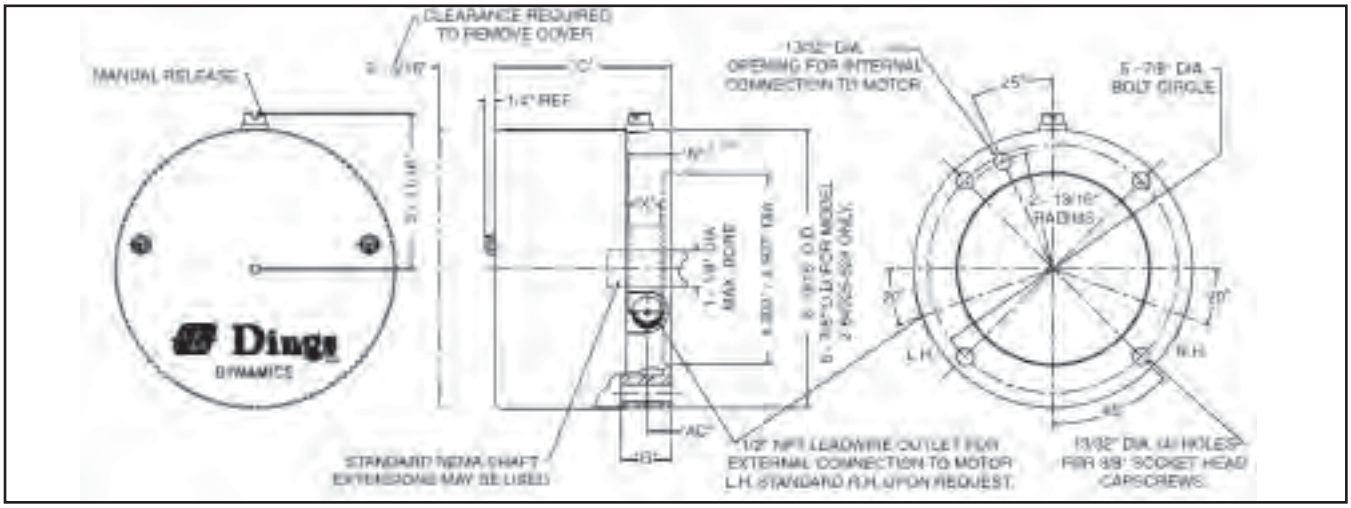


Figure 1

Model Number	Number of Rotating Discs	Torque Lb. Ft.	* Thermal Capacity HPS/MIN.	Inertia of Rotating Parts Lb. Ft.^{2}	Dimensions**				
					X	G	AC	C	N ± 1/32
2-61003-5132	1	3	6	.006	.875	1.19	.585	4.13	1.125
2-62006-5132	2	6	6	.010	.875	1.19	.585	4.13	1.125
2-62010-5132	2	10	6	.010	.875	1.19	.585	4.13	1.125
2-63015-5132	3	15	6	.015	1.187	1.56	.873	4.50	1.437

*Thermal capacity (HPS/MIN.) was determined under the following test conditions: a) Room temperature 72°F. b) Stopping time of one second or less. c) Brake mounted in a horizontal position. d) Equal on and off times. e) 1800 RPM f) Coil energized with 110% of rated voltage.
**NOTE: Model A2-63015-5132 has an adaptor to mount to motor sizes 182TC through 215TC. All dimensions are measured from the face of the adaptor rather than the motor face.

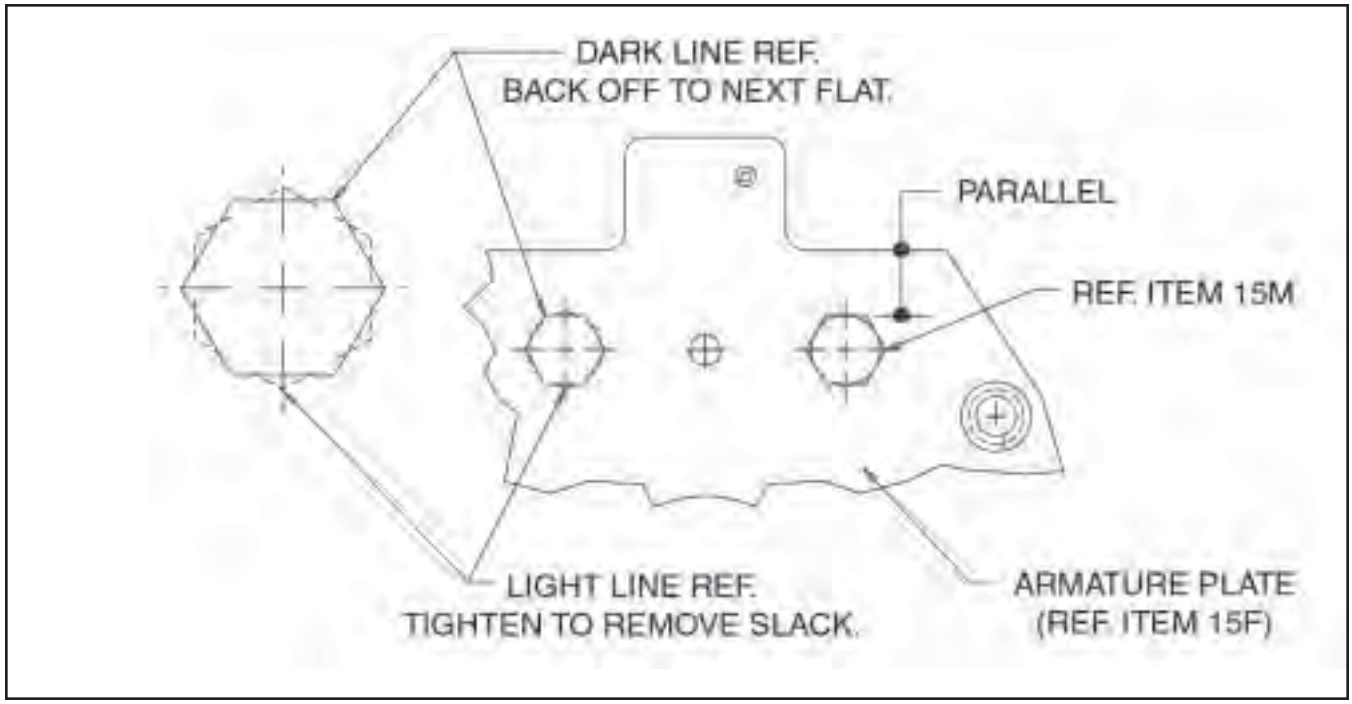


Figure 5

Armature Replacement

CAUTION: Load to be removed or blocked. Brake *will* be inoperative during this procedure.

If you replace the magnet assembly, it may be necessary to replace the armature (15J). If it is badly deformed, it will be difficult to make the magnet quiet.

1. To replace, remove operator assembly (15) from brake. See “Friction Disc Replacement Steps 1-3” on page 5.

   Remove nuts (15T), springs (15S) and carriage bolts (15R). This will allow the armature plate assembly to be removed from magnet bracket.
2. Remove screw (15Q), lockwasher (15P), locking plate (15N), two screws (15M), spacers (15L), and armature (15J). Inspect these parts and shock mount (15K). If worn, replace them also.
3. Put armature in place (ground side up) and install spacers (15L) and screws (15M).

   NOTE: See Fig. 5 Screws (15M) should be tightened to remove slack only. Then back off, counterclockwise on screw so that the next flat on screw is parallel with edge of the armature plate (15F).

   Install locking plate (15N), screw (15Q), and lock-washer (15P). Tighten screw with 30 lb. in. torque.
4. Reassemble to magnet bracket (15C) using items (15R), (15S) and (15T). Reassemble operator assembly to brake bracket. Set magnet air gap “A” and set torque springs (15S) to 1” as shown in Fig. 3.

Pivot Stud Adjustment

CAUTION: Load to be removed or blocked. Brake *will* be inoperative during this procedure.

This adjustment is made at the factory and may be required when replacing the magnet assembly (15A) or the armature (15J).

The purpose is to regulate the height of the armature plate (15F) so that when the magnet (15A) is energized, the armature (15J) is parallel with it. This is required so that the magnet will be quiet.

NOTE: Cover (20) must be removed to make this adjustment.

1. To adjust: Hold nut (19) which is adjacent to washer (18) and loosen the other nut (19) and remove it from the stud.
2. Energize the magnet and turn remaining nut (19) counterclockwise slowly until the magnet becomes noisy. Turn magnet on and off several times until you find the position where the magnet first becomes quiet.

   At this point, turn nut (19) 1/3 turn (two flats) in a clockwise position. Hold nut in this position and turn magnet on and off to make sure the magnet does not become noisy.
3. Holding this nut in place, screw on other nut and tighten it against the nut you are holding. Tighten firmly.
4. Operate the manual release. If the release does not operate properly, see “Manual Release Adjustment” on next page.

Manual Release Adjustment

CAUTION: Load to be removed or blocked. Brake will be inoperative during this procedure.

The manual release (3) may require adjustment after replacing the operator assembly 15), magnet (15A0, or armature (15J). It also may be required if adjustments are made on the pivot stud nuts (19).

The release is working properly if:

a) you turn release knob (3) clockwise to stop and the brake is released;

b) the release knob returns to its normal position automatically when power is applied to the magnet.

NOTE: Cover (20) must be removed to make this adjustment.

1. To adjust: Set air gap “A” as described under “Wear Adjustment” on page 4.
2. If the brake does not release, turn adjusting screw (5) counterclockwise 1/4 turn and try again.
3. If the release knob (3) does not return to its normal position automatically, turn screw (5) clockwise 1/4 turn and try again.

   NOTE: You may have to repeat Steps 2 or 3 to get the release to operate properly.

   It is important that the release knob returns to its normal position automatically when power is applied to the magnet.

Manual Release Assembly

Refer to Fig. 6

1. Place shaft of release knob (3) through hole in bracket (2).
2. Slide return spring (4) over shaft; straight leg of spring should enter shaft first with leg in the position shown.
3. Slip spring (6) over screw (5) and install in tapped hole in release shaft. Screw in until it stops.

   Make sure spring (4) is not caught under spring (6).
4. Engage bent end of spring (4) over spring (6) as shown. Pull it over with a needle-nose pliers or screwdriver.
5. Adjust release. See “Manual Release Adjustment” on the left.

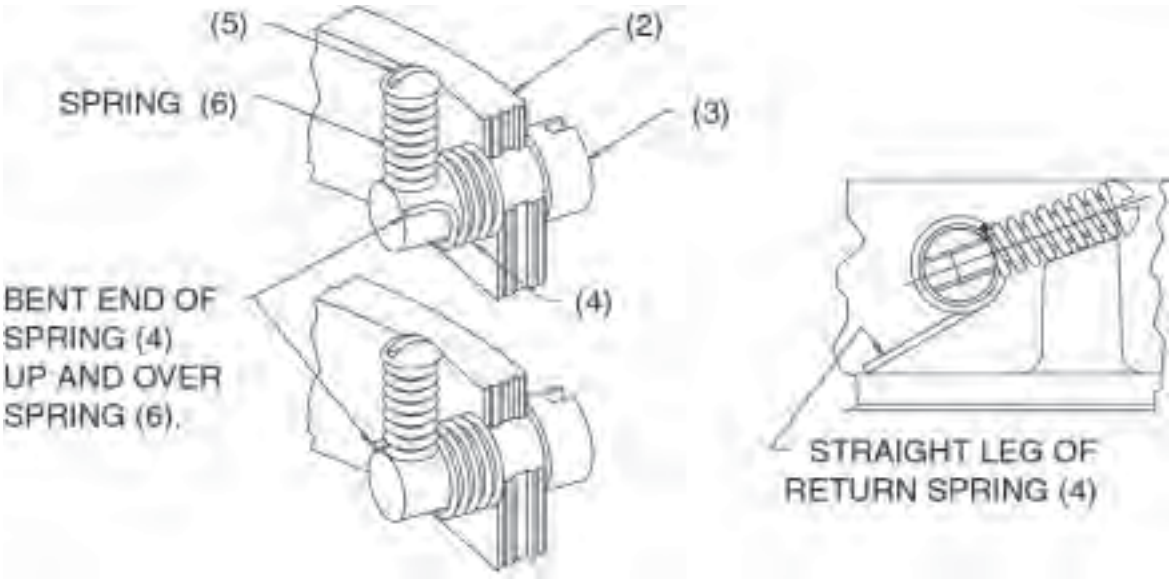


Figure 6

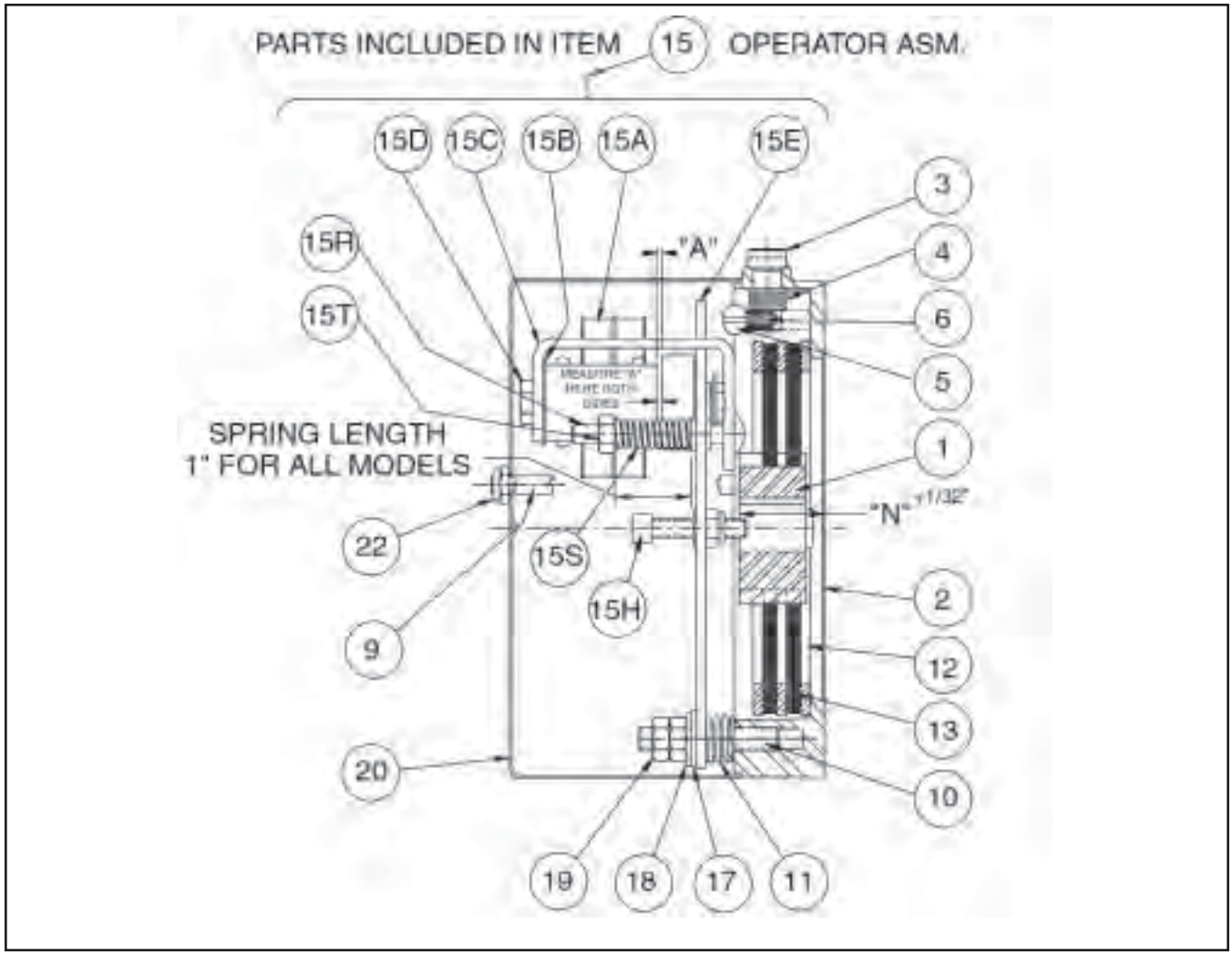


Figure 3

MAINTENANCE

CAUTION: Before attempting to service or remove any components, make certain that the power is disconnected and that the load is completely removed, secured or blocked to prevent injury or property damage.

Wear Adjustment

CAUTION: Load to be removed or blocked. Brake may be inoperative during this procedure.

Before air gap “A” reaches .100”, adjustment is required. Any delay in adjusting the magnet air gap will result in eventual loss of torque. Refer to Fig. 3.

1. To adjust, remove cover locknuts (22) and cover (20) to expose square head wear adjusting screws (15H) and expose magnet air gap “A”.
2. Measure air gap “A” using 3/8” to 1/2” wide feeler gauge. (Measure at center of magnet.)
3. Turn two square head adjusting screws (15H) until air gap “A” measures:

   .045/.050 for 1 disc models
   .050/.055 for 2 disc models
   .060/.065 for 3 disc models
   Air gap should be the same on both sides.

REPLACEMENT PARTS ILLUSTRATION

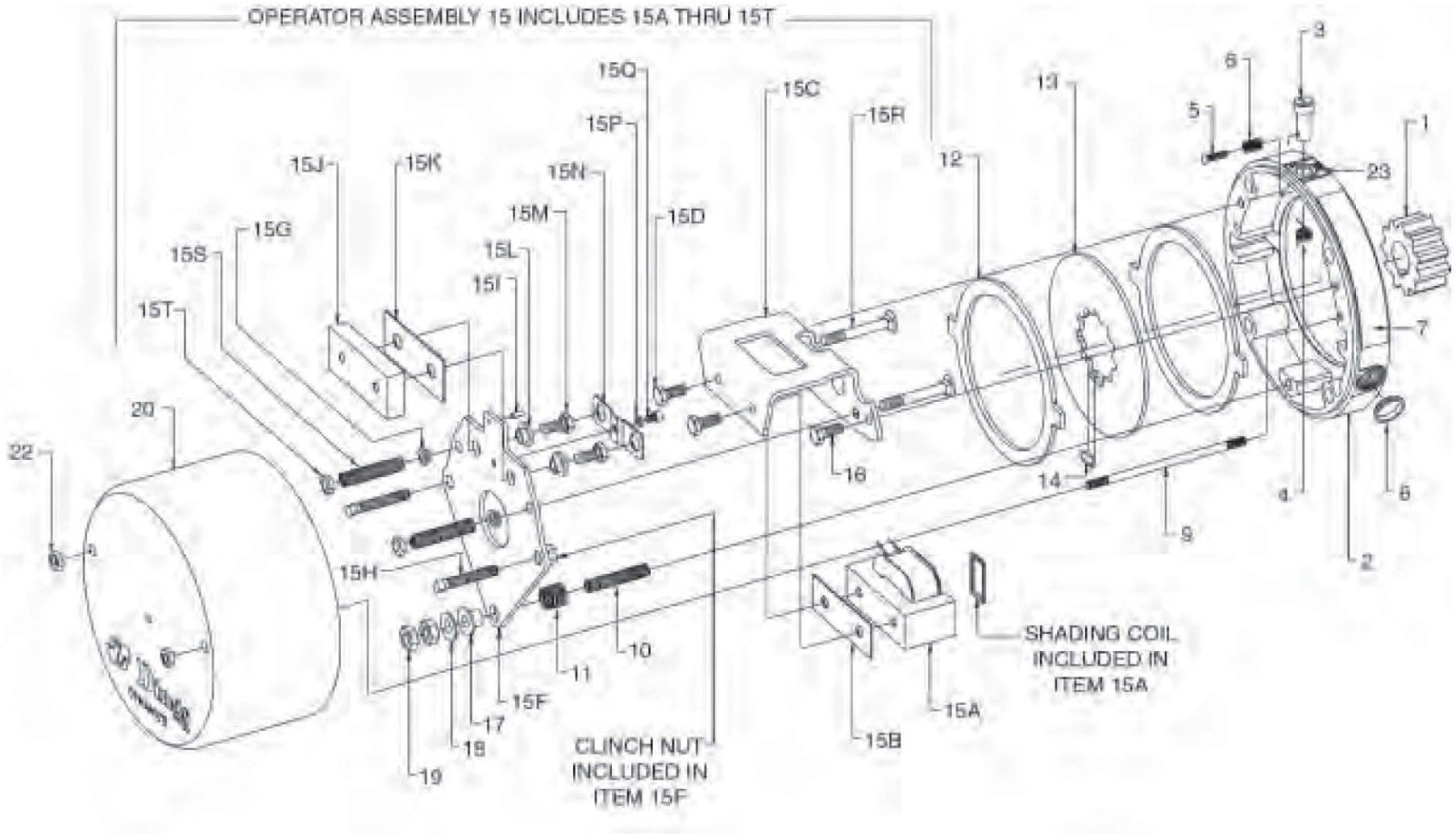


Figure 9

REPLACEMENT PARTS LIST

Item No.	Description	Part Number	Qty.
1	Splined hub	K060107-**	1
2	Bracket 1 & 2 disc models (aluminum)	L060258-001	1
2	Bracket 3 disc model (aluminum)	L060259-001	1
2	Bracket 4 disc model (cast iron)	L060285-001	1
3	Release knob	G060785-001	1
4	Release return spring	G060797-001	1
5	Release adjustment screw	W001002-056C	1
6	Release adjustment lock spring	G060795-001	1
7	Nameplate	K060407-001	1
8	Cap plug	W008003-001	1
9	Cover stud	G060822-001	2
10	Pivot stud	W002005-303A	1
11	Compression spring (all except 20 & 25 lb. ft.)	G060821-001	1
11	Compression spring (20 & 25 lb. ft.)	G060852-001	1
12	Stationary disc	H060147-001	*
13	Splined rotating friction disc	H060157-003	*
14	Stabilizer clip, rotating friction disc (when used)	H060466-001	*
15	Operator assembly: includes “A” through “T” (not shown as an assembly)	K060476-**	1
15A	Magnet assembly	**	1
15B	Magnet shock mount	G060813-001	1
15C	Magnet mounting bracket	H060544-001	1
15D	Hex hd. capscrew 1/4-20 x 1/2 lg.	W001008-001E	2
15E	Armature plate assembly: includes “F” through “Q” (not shown as an assembly)	H060541-**	1

Item No.	Description	Part Number	Qty.
15F	Armature plate	H060545-003	1
15G	Nyliner bushing	W013005-001	2
15H	Wear adjustment screw, sq. hd. 1/4-20 x 1-1/2” lg.	W002003-001	2
15I	Roll pin 5/32” dia. x 3/8” lg.	W005003-098	1
15J	Armature lamination assembly	G060788-001	1
15K	Armature shock mount	G060808-003	1
15L	Armature spacer	G060798-002	2
15M	Hex hd. capscrew 1/4-20 x 5/8” lg. Grade 5	W001007-002E	2
15N	Locking plate	G060812-001	1
15P	Split spring lockwasher #8	W004006-003	1
15Q	Soc. hd. capscrew #8-32 x 1/4” lg.	W001013-201	1
15R	Carriage bolt 1/4-20	G060803-001	2
15S	Torque spring (blue) 1.5 lb. ft.	G060791-001	2
15S	Torque spring (silver) 3 & 6 lb. ft.	G060792-001	2
15S	Torque spring (bronze) 10 & 15 lb. ft.	G060793-001	2
15S	Torque spring (green) 20 & 25 lb. ft.	G060794-001	2
15T	Locknut 1/4-20	W003013-001	2
16	Hex hd. capscrew 1/4-20 x 1/2 lg.	W001008-001E	2
17	Nylon bushing	G060820-001	1
18	Plain brass washer	W004003-024	1
19	Hex nut 5/16-18	W003002-002E	2
20	Cover	L060261-002	1
21	Instruction label (not shown)	K060496-001	1
22	Locknut 1/4-20	W003001-013	2
23	Release label	G060859-001	1

* Number of rotating discs is shown in the brake model number. Example - 2-62006-5132 has two rotating discs. The number of stationary discs is one more than the number of rotating discs.

**Part number is determined by one or more of the following: model number, voltage, motor shaft diameter and keyway size.

Torque Adjustment

Caution: Load to be removed or blocked. Brake may be inoperative during this procedure.

The magnetic disc brake is factory set for rated static torque. The brake can be adjusted to reduce torque which increases stopping time. Do not attempt to adjust brake for higher torque, as this will cause premature coil burnout. (Refer to Fig. 3)

1. To adjust, remove cover locknuts (22) and cover (20) to expose torque locknuts (15T), which are above torque springs (15S).
2. To increase stopping time and reduce torque, turn two locknuts (15T) counterclockwise, increasing spring length. Each full turn reduces torque 7% to 10% depending upon the model.

Friction Disc Replacement

Caution: Load to be removed or blocked. Brake *will* be inoperative during this procedure.

If brake model number has a prefix VO or VU, see page 8.

When total wear on a rotating friction disc (13) reaches 1/16", replace disc:

1. ***Removing operator assembly***

   Disconnect power.
2. Remove cover locknuts (22) and cover (20).
3. Remove operator assembly (15) by removing screws (16), pivot stud (10), washer (18), bushing (17), and spring (11).
   NOTE: Item (10) has a hex socket in end of stud for removal. Do not loosen nuts (19) on pivot stud (10), or "Pivot Stud Adjustment" (on page 6) to quiet the magnet will have to be made.
4. ***Replacing the friction disc***

   Remove worn rotating discs (13) and stationary discs (12). Replace worn discs and install new discs in the same order. Install stabilizer clip (14), if furnished, on rotating discs prior to installing.
5. ***Re-assembly of operator assembly (15)***

   Refer to Figs. 3 and 9. (Capscrew (16) is shown in Fig. 9 and not Fig. 3)

   Turn two screws (15H) counterclockwise five turns. Place operator assembly onto brake bracket (2) and install two screws (16). Replace compression spring (11), bushing (17), washer (18), and pivot stud (10) which has the two nuts (19) in place. Tighten firmly.
6. Readjust magnet air gap "A" as described under "Wear Adjustment" on page 4.
7. Check manual release operation before completing installation. Adjust per "Manual Release Adjustment" on page 7 if required.
8. ***Completing installation***

   Replace cover (20) and cover locknuts (22). Tighten just enough to hold the cover in place. Reconnect power.

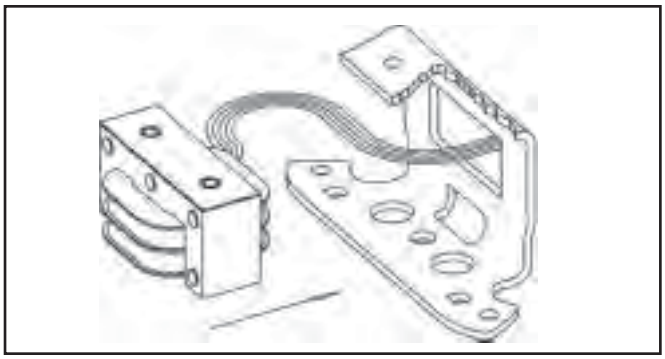


Figure 4

Magnet Assembly Replacement

Caution: Load to be removed or blocked. Brake *will* be inoperative during this procedure.

1. Disconnect power supply.
2. Remove cover locknuts (22) and cover (20).
3. Remove two capscrews (15D), magnet assembly (15A) and shock mount (15B).
4. Replace with new magnet assembly (15A), making sure shock mount (15B) is in place. Feed coil lead wires through hole in back of bracket (15C) as shown in Fig. 4. TIghten mounting screws (15D) with 55-60 lb. in. torque.
5. Place coil lead wires around mounting bracket (15C) to the same side as the wire outlet position. Connect coil lead wires per "Connection of Coil Leads" and Fig. 2.
6. Set air gap "A" as described under "Wear Adjustment" on page 4.
7. Energize coil. Magnet should be quiet; if not, refer to "Pivot Stud Adjustment" on page 6.
8. Check manual release. If it does not operate properly, adjust as outlined under "Manual Release Adjustment" on page 7.
9. Replace cover (20) and cover locknuts (22). Tighten just enough to hold the cover in place. Reconnect power.

TROUBLESHOOTING CHART

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Brake does not release	1. Broken or damaged parts	1. Replace.
	2. Wrong voltage	2. Check for correct voltage. Voltage must correspond to that listed on brake nameplate. If the voltage is more than 10% below the nameplate voltage, the magnet may not pull in.
	3. Burned out coil	3. Replace magnet assembly (15A).
	4. Incorrect wiring connections or broken wires	4. Find the connection or wiring fault. Correct or repair as required.
Brake does not stop properly	1. Broken or damaged parts	1. Replace.
	2. Worn friction disc	2. Replace disc if worn to 1/8” thickness. If disc replacement is not required, adjust air gap. (Refer to “Wear Adjustment” section.)
	3. Hub positioned incorrectly	3. Relocate hub (1) and key, if required. (Refer to “Installation” section.)
	4. Bake is manually released	4. Determine if manual release is in normal position.
Brake chatters or hums	1. Dirty magnet faces	1. To remove dirt, insert a clean sheet of paper between faces and energize brake. Move paper around between faces to dislodge dirt, then remove paper.
	2. Magnet faces are not parallel in closed position	2. See “Pivot Stud Adjustment” section.
	3. Loose or broken shading coil	3. Replace magnet assembly (15A).
	4. Wrong voltage supply	4. Check for low voltage.
Manual release does not work	1. Broken or damaged parts	1. Replace.
	2. Improper setting	2. See “Manual Release Adjustment” section.

VERTICAL MOUNTING

Installation and adjustment of the vertically mounted brake is the same as on the standard model.

Friction Disc Replacement

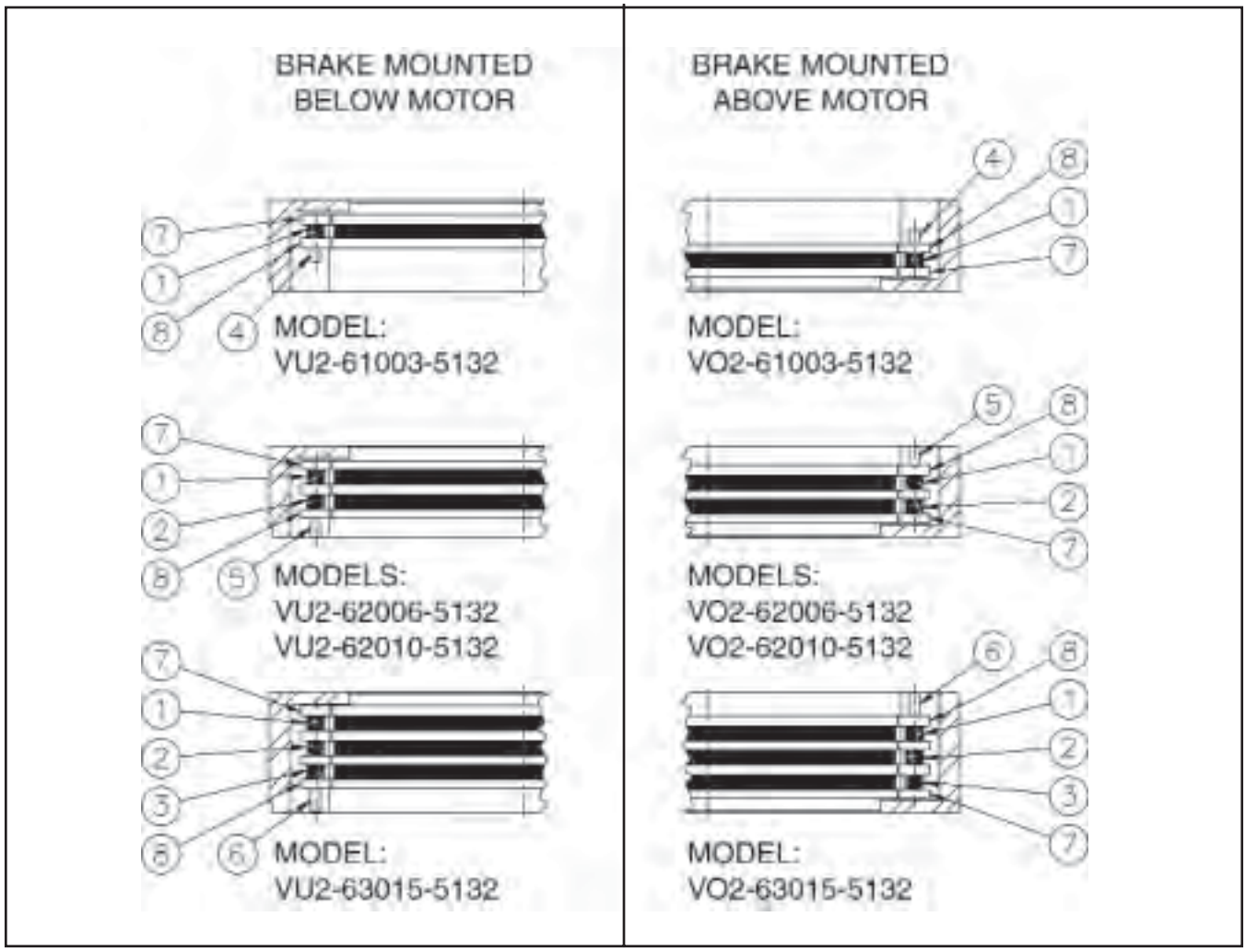
When replacing friction discs, follow procedure outlined on page 5 with this addition:

Care must be taken to insure proper insertion of disc separating springs. Springs are color coded for easy identification, and reference is made to spring color (see Figs. 7 and 8). Since the installation order of the disc springs is dependent on brake mounting position (above or below motor), it is important to consult the correct diagram for spring location.

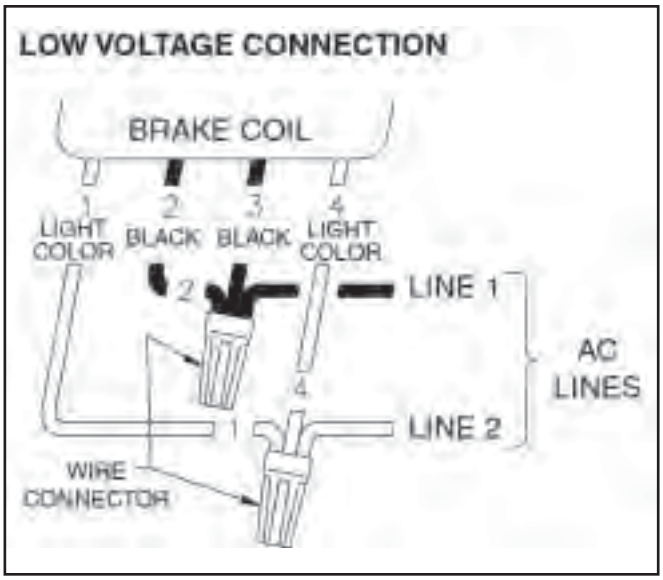
Item No.	Description	Part No.	Qty. of Parts (determined by no. of rotating discs) 1	2	3
1	Spring (silver)	G060350-001	2	2	2
2	Spring (black)	G060350-002	-	2	2
3	Spring (bronze)	G060350-003	-	-	2
4	Roll pin-1/8" x 5/8"	W005003-071	2	-	-
5	Roll pin-1/8" x 1"	W005003-077	-	2	-
6	Roll pin-1/8" x 1 3/8"	W005003-080	-	-	2
7	Stationary disc	H060203-003	1	1	1
8	Stationary disc	H060203-004	1	2	3

Figure 7 Parts for Vertical Mounting

Figure 8



Wiring Diagrams



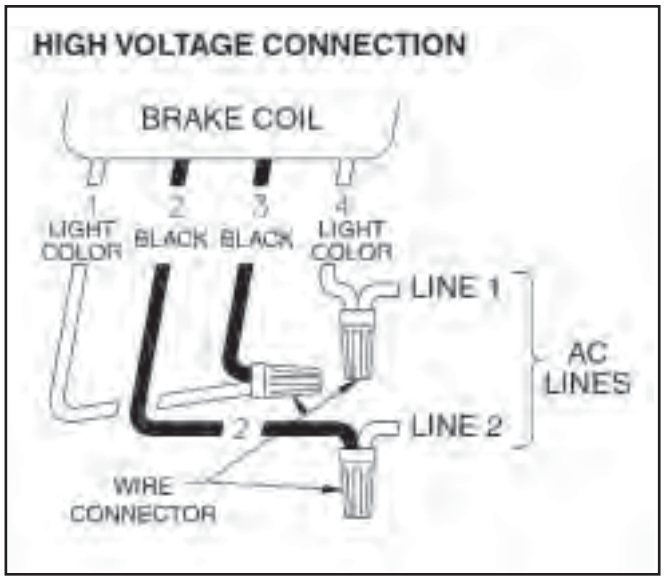


Figure 2

Connection of Coil Leads

After securing the brake to the motor, connect coil leads for proper voltage per wiring diagram (Fig. 2 shows dual voltage coil). Incorrect connection can result in brake failure.

CAUTION: The voltage supplied to the coil must match the voltage that the coils are connected for, or the coils will burn out.

Single voltage coil:
Connect brake coil leads to any two line leads (single or three phase) of same voltage and frequency as brake.

Dual voltage coil:
Connect leads 2 and 4 to any two motor line leads (single or three phase) of same voltage as brake. Connect leads 1 and 3 as shown for voltage desired. Brake must be energized with motor.

OPERATION

These brakes are spring set devices with an electrical (magnet) release. They contain a rotating friction disc which is driven by a hub mounted on the motor shaft. When energized, the magnet compresses the torque springs, removing the force pressing the stationary disc and friction disc together. This permits free rotation of the shaft.

WARNING: Observe proper safety precautions in applications where a brake failure would allow the load to move in such a manner as to injure personnel. KEEP PERSONNEL AWAY FROM LOAD AREAS.

If brake torque rating is higher than motor full-load torque rating, use brake rating rather than motor rating when selecting other drive components.

Take the following precautions when operating the brake:

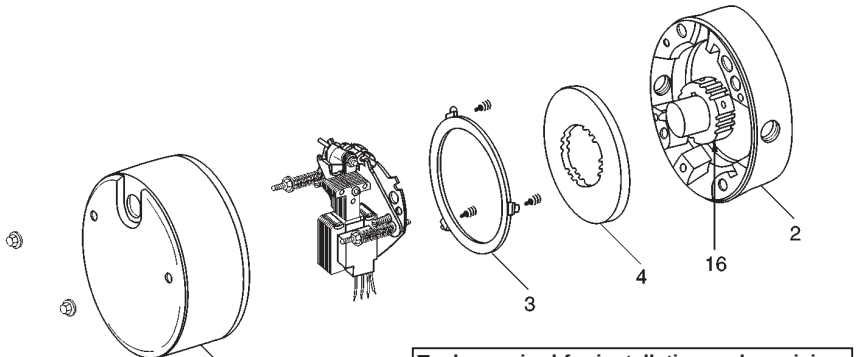
1. Do not operate the brake at higher than normal static torque capacity.
2. For applications with high inertia-type loads or rapid cycling, the thermal capacity of the brake must be considered.
3. High start-stop rates may damage motor. Consult motor manufacturer if high cycling rates are expected.
4. Be sure power supply conforms to electrical rating of brake.

Manual Release

The brake is equipped with a manual release. Turn the release knob (3) clockwise to stop position to release the brake. The brake will remain released until the release knob is turned counterclockwise (approx. 65°) or until the brake coil is energized, automatically resetting the brake.

P/N 8-078-905-10
effective 4/15/99

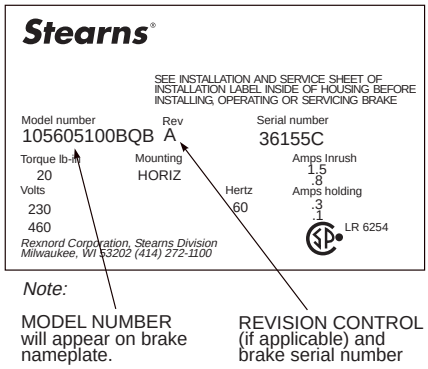
Installation and Service Instructions for 56,000 Series (rev. A) Manual Adjust Brakes



Tools required for installation and servicing:

3/8" hex wrench	5/16" nut driver
5/16" hex wrench	1/4" screwdriver
3/16" hex wrench	8" adjustable wrench

Typical Nameplate



Note:

MODEL NUMBER will appear on brake nameplate.

REVISION CONTROL (if applicable) and brake serial number

Important

Please read these instructions carefully before installing, operating, or servicing your Stearns Brake. Failure to comply with these instructions could cause injury to personnel and/or damage to property if the brake is installed or operated incorrectly. For definition of limited warranty/liability, contact Rexnord Corporation, Stearns Division,
120 North Broadway, Milwaukee, WI 53202, (414) 272-1100.

Caution

1. Installation and servicing must be made in compliance with all local safety codes including Occupational Safety and Health Act (OSHA). All wiring and electrical connections must comply with the National Electric Code (NEC) and local electric codes in effect.
2. Do not install the brake in atmospheres containing explosive gases or dusts.
3. To prevent an electrical hazard, disconnect power source before working on the brake. If power disconnect point is out of sight, lock disconnect in the *off* position and tag to prevent accidental application of power.
4. Make certain power source conforms to the requirements specified on the brake nameplate.
5. Be careful when touching the exterior of an operating brake. Allow sufficient time for brake to cool before disassembly. Surfaces may be hot enough to be painful or cause injury.
6. Do not operate brake with housing removed. All moving parts should be guarded.
7. Installation and servicing should be performed only by qualified personnel familiar with the construction and operation of the brake.
8. For proper performance and operation, only genuine Stearns parts should be used for repairs and replacements.
9. After usage, the brake interior will contain burnt and degraded friction material dust. This dust must be removed before servicing or adjusting the brake.

   DO NOT BLOW OFF DUST using an air hose. It is important to avoid dispersing dust into the air or inhaling it, as this may be dangerous to your health.

   a) Wear a filtered mask or a respirator while removing dust from the inside of a brake.

   b) Use a vacuum cleaner or a soft brush to remove dust from the brake. When brushing, avoid causing the dust to become airborne. Collect the dust in a container, such as a bag, which can be sealed off.

General Description

These series of brakes are spring-set, electrically released. They contain one or more rotating friction discs (4) driven by a hub (16) mounted on the motor or other shaft.

Operating Principle

These series contain one or more friction discs (4) assembled alternately between the endplate (2) friction surface, stationary disc(s) (3) and pressure plate (also called stationary disc) (3). The stationary disc(s) are restrained from rotating by being keyed into the endplate. With the brake released, all disc pack components are free to slide axially and the friction disc(s) to rotate.

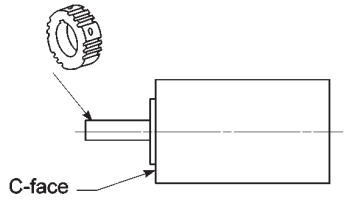
Brake release occurs when the solenoid coil is electrically energized, causing the solenoid plunger to travel a specified distance and through a lever system, overcoming the pressure spring force. This action releases the clamping force on the disc pack, thereby allowing the friction disc(s) and brake hub to rotate.

Brake *sets* and torque is produced when electric current to the solenoid coil is interrupted, thereby collapsing the solenoid magnetic field. The solenoid plunger returns to its original de-energized position allowing the lever arm to move forward by virtue of the compressed torque springs. This action compresses the disc pack components which applies a retarding torque to the brake hub and ultimately restores the brake to a spring-set static condition.

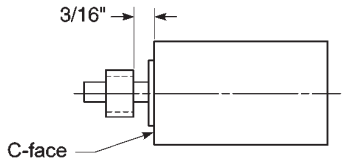
Caution! While the brake is equipped with a manual release to allow manual shaft rotation, the motor should not be run with the manual release engaged, to avoid overheating the friction disc(s).

BRAKE MOUNTING (Manual Adjust)

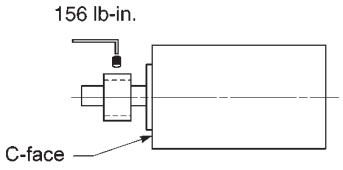
1 Place hub on motor shaft.



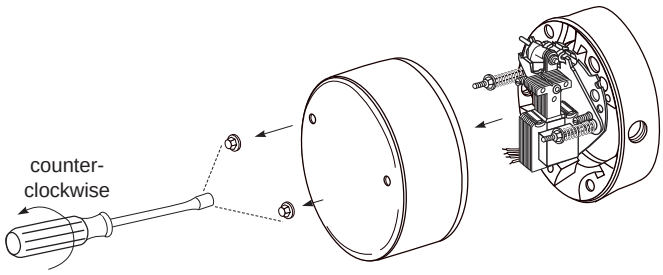
2 Position hub on shaft as shown.



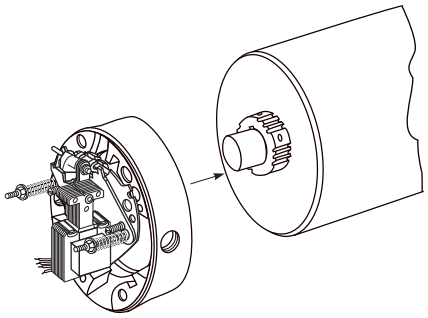
3 Tighten set screws to motor shaft.



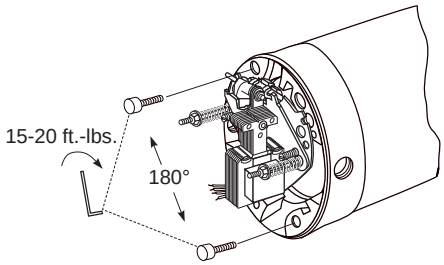
4 Remove brake housing.



5 Slide endplate over hub noting position of stabilizer springs, if used. (Refer to Friction Disc Replacement, view 4 and 4A.)



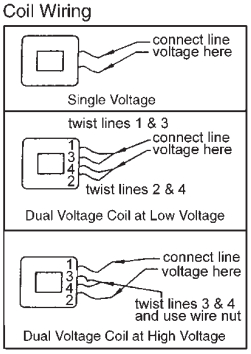
6 Mount brake endplate to motor C-face.



* For vertical assembly of 20 & 25 lb-ft brakes, refer to page 5.

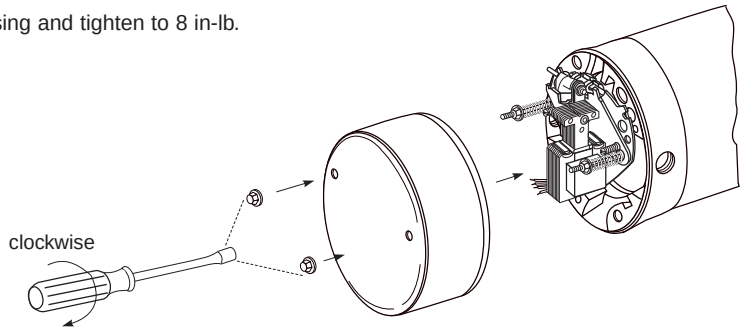
7 Connect coil leadwires to power supply. Refer to nameplate for voltage rating.*
Caution: Keep wiring away from pinch points and moving components.

Coil Wiring



*For DC voltages see sheet 8-078-950-00.

8 Replace brake housing and tighten to 8 in-lb.

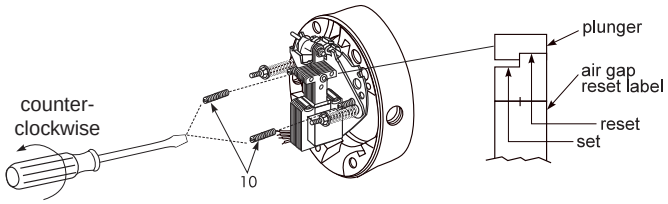


AIR GAP ADJUSTMENT

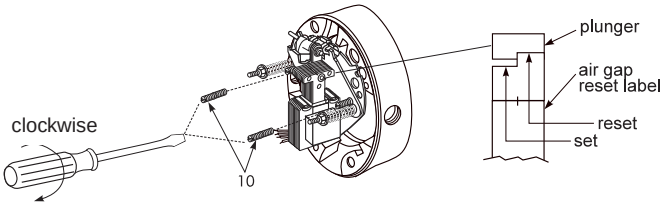
Series 56,000

As friction disc wear the air gap will increase. When plunger gets to the reset position, the air gap must be adjusted.

1 To **increase** air gap, turn adjusting screw (10) counterclockwise.



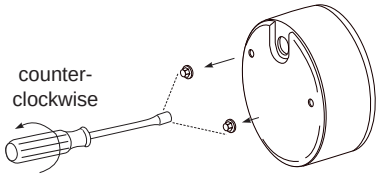
2 To **decrease** air gap, turn adjusting screw (10) clockwise.



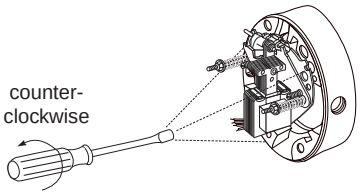
FRICTION DISC REPLACEMENT

Series 56,000

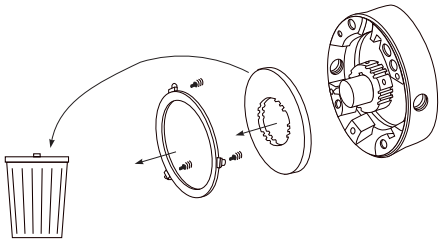
1 Remove brake housing.



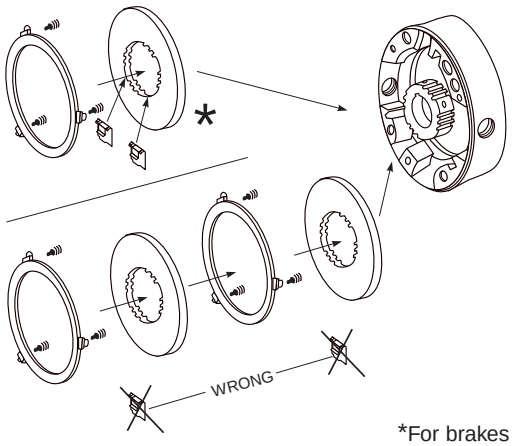
2 Remove support plate screws and lift support from brake.



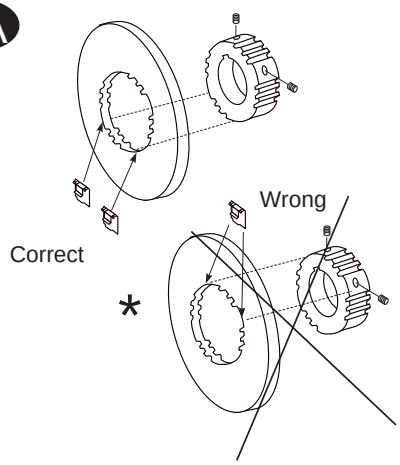
3 Remove and discard old friction disc.



4 Install new friction disc(s) and stationary disc(s) as shown.



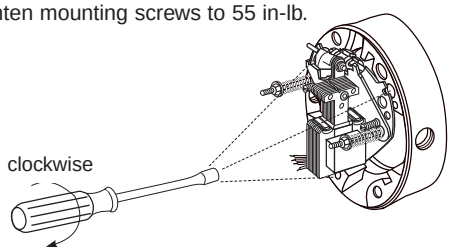
4A



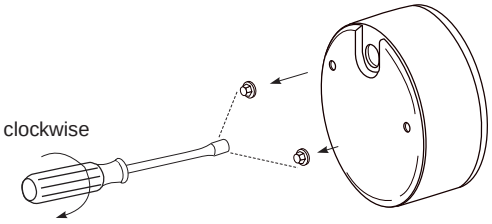
*** Stabilizer springs are for use on single disc units only. Position springs opposite set screw holes.**

*For brakes with vertical springs see page 5.

5 Reposition support plate on endplate and tighten mounting screws to 55 in-lb.



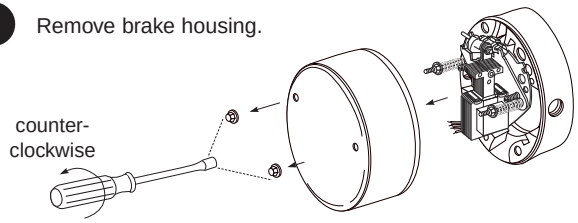
6 Reposition housing and tighten nuts to 8 in-lbs.



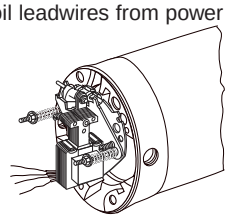
COIL REPLACEMENT

Series 56,000

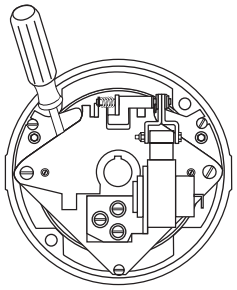
1 Remove brake housing.



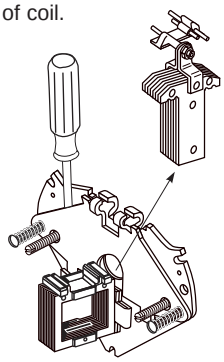
2 Disconnect coil leadwires from power source.



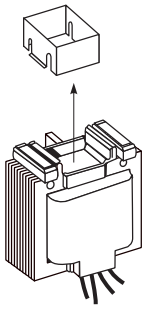
3 Insert screwdriver between support plate and lever arm and pry forward.



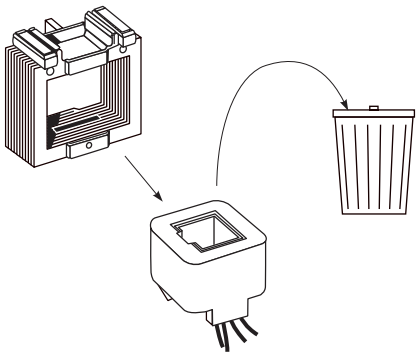
4 Lift plunger/solenoid lever assembly out of coil.



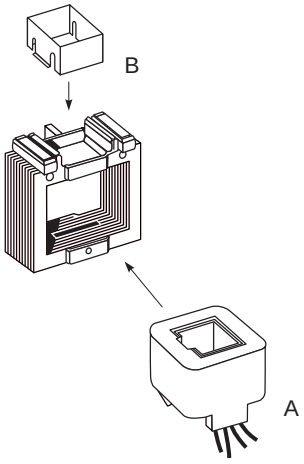
5 Remove plunger guide.



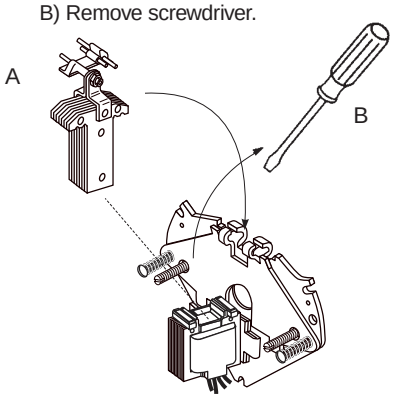
6 Discard coil.



7 A) Insert new coil. (Lead wires in same position as old coil.)
B) Insert plunger guide.

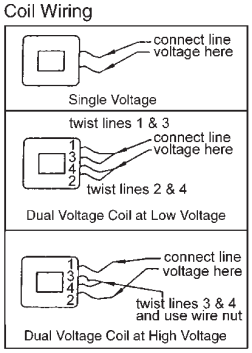


8 A) Reinsert plunger into coil; drop pivot pin into cradle of support plate.
B) Remove screwdriver.

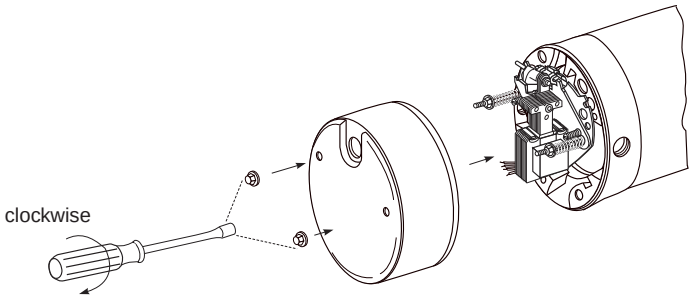


9 Reconnect coil leadwires to power source.

Coil Wiring



10 Reassemble housing. Tighten to 8 in-lbs.



Vertical Brake Assembly

Single disc brakes (1.5, 3 & 6 lb-ft) are universal mount and do not require separator springs. Double disc brakes (10 & 15 lb-ft.) universal mount but require separator springs which are preassembled to the stationary disc. These discs are inserted spring first into the brake. Refer to figure 5A below.

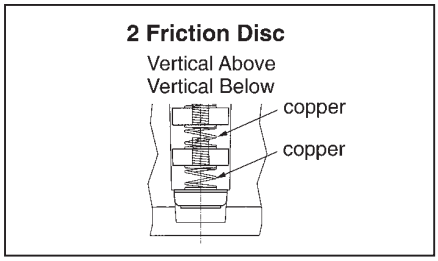


Figure 5A

Installation Procedure for 20 and 25 lb-ft brakes if mounted vertical to motor shaft *(These brakes are factory assembled for horizontal operation.)*

Remove support plate by loosening the three mounting screws.

Remove stationary discs and friction discs.

Using the spring kit provided with this brake, insert three springs of identical color into each stationary disc hole. Springs are inserted from the side opposite the indent mark (see Figure 5B). Stationary disc should be placed on a clean flat surface with a clearance hole to allow the tip of the spring to extend through the bottom side of the support plate. Using the 1/8" pin provided and a hammer, drive the hold until the large coil diameter bottoms out against the disc.

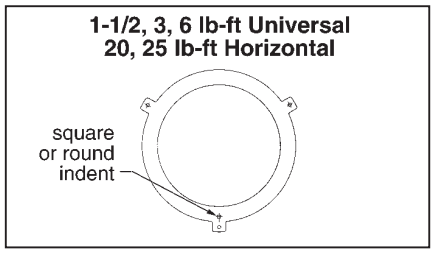


Figure 5B

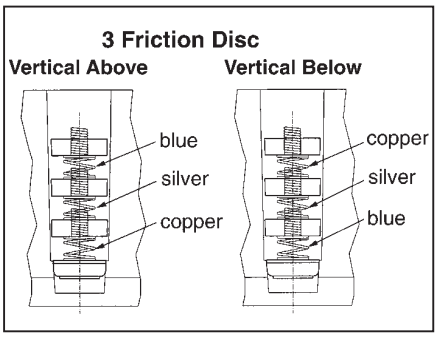


Figure 5C

Reassemble the disc pack with the stationary discs in the proper arrangement shown in Figure 5C.

Mount support plate and torque screws evenly to 55 in-lbs.

Torque Adjustment

Brake is factory set for nominal rated static torque which is maximum torque. Torque may be decreased up to 50% for increased stopping times up to 2 second stop time.

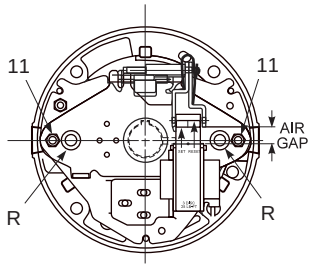


Figure 6

TABLE A

Nominal Static Torque (lb-ft)	Original Spring Height (inches)	Maximum Counter-clockwise Turns	% Torque Reduction per Turn
1-1/2	1-13/16	-	-
3	1-1/2	5-1/2	9%
6	1-1/2		
10	1-9/16		
15	1-9/16		
20	1-9/16		
25	1-1/2		

The torque on the 1-1/2 lb-ft brake may not be reduced.

Turn both adjustment nuts (11), Figure 6, equal amounts counterclockwise to decrease torque. See Table A for torque reduction permissible amounts.

General Maintenance

Warning! Any mechanism or load held in position by the brake should be secured to prevent possible injury to personnel or damage to equipment before any disassembly of the brake is attempted or before the manual release knob is operated on the brake.

Observe all cautions listed at the beginning of this manual before attempting to service brake.

Troubleshooting

A. If brake does not stop properly or overheats, check the following:

1. Are friction discs excessively worn, charred, or broken?
2. Hub may have become loose and shifted on shaft. Recheck set screw torque. Reposition hub if shifted.
3. With brake de-energized and housing (7) removed, check compressed length of pressure springs (11). Compare to Table values (at right) and adjust to minimum height to obtain desired stop times.
4. Is solenoid air gap adjusted correctly? See Page 3 for instructions.
5. Solenoid may not be energizing and releasing the brake. Check voltage at the coil and compare to the coil and/or nameplate voltage rating.
6. Check linkage for binding. Depress solenoid plunger down to frame surface. Movement to be without binding.
7. Brake coil should be energized at same time or prior to energization of motor, and de-energized at same time or after de-energization of motor.
8. Replace friction disc(s) when worn area is one half of original thickness.
9. Check to be sure wear adjust screws are of equal height. Measure from inboard side of support plate with depth micrometer. Turn one screw to obtain equal height.

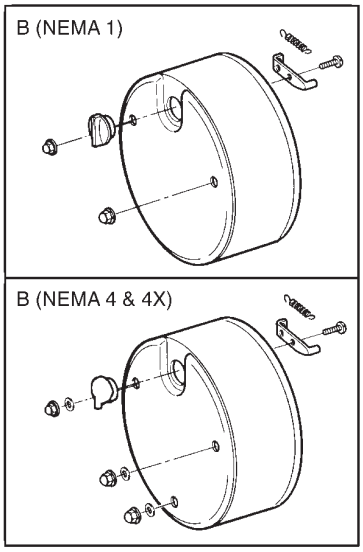
B. If solenoid hums, pulls in slowly, or coil burns out, check the following:

1. Solenoid plunger to frame contact surface may be excessively dented.
2. Are solenoid plunger to frame contact surfaces sticky and dirty.
3. Solenoid mounting screws may have become loose, causing frame to shift and plunger to seat improperly.

Information required when ordering replacement parts:

- Give part number of parts or kits needed, brake model number, and brake serial number. The brake model and serial number may identify special brakes not covered by this parts list
- When ordering hubs, specify shaft diameter (hub bore) and keyway.
- Enclosure is specified as follows:

  NEMA 1 *(formerly referred to as standard)*
  NEMA 4 *(formerly referred to as DTWP dust-tight waterproof)*
  NEMA 4X *(formerly referred to as BISSC washdown)*



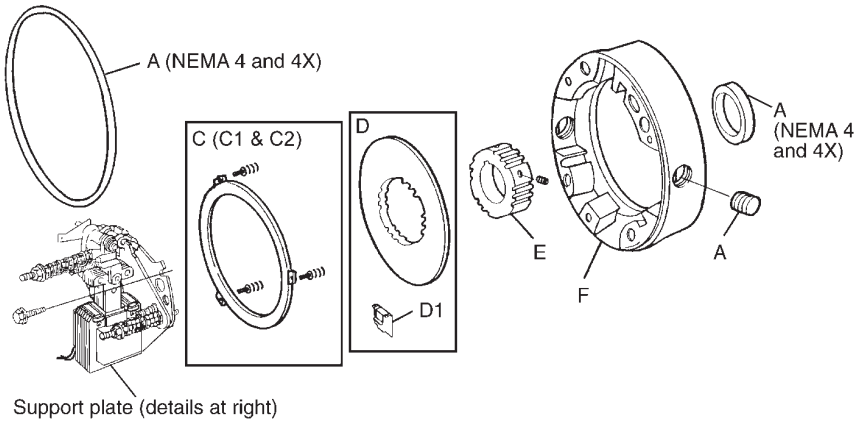


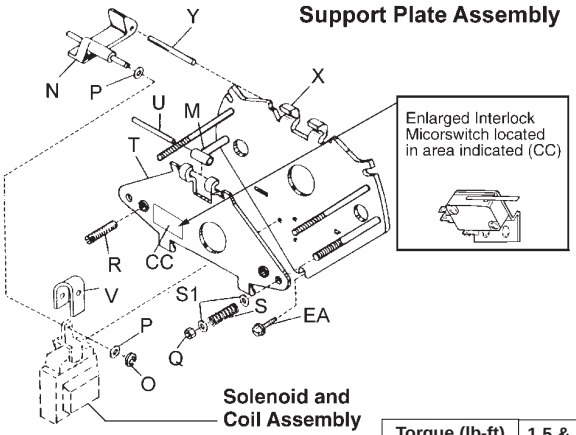
TABLE 1
Components of Standard AC or DC Brake

Item	Description		Part Number↓	Torque (lb-ft)	1.5 and 3			6			10			15			20 and 25		
				NEMA Enclosure	1	4	4X	1	4	4X	1	4	4X	1	4	4X	1	4	4X
				Brake Model Number→	1-056-001-00 & -011-00	1-056-002-00 & -012-00	1-056-004-00 & 014-00	1-056-021-00	1-056-022-00	1-056-024-00	1-056-031-00	1-056-032-00	1-056-034-00	1-056-041-00	1-056-042-00	1-056-044-00	1-056-051-00 & -061-00	1-056-052-00 & -062-00	1-056-054-00 & -064-00
A	Hardware kit - NEMA 1 Hardware kit - NEMA 4 Hardware kit - NEMA 4X		5-66-1001-00 5-66-1002-00 5-66-1003-00		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
A1	Plug/Gasket kit — NEMA 4 ** Close couple — NEMA 4X — NEMA 4 3 disc — NEMA 4X 3 disc		5-66-0532-00 5-66-0533-00 5-66-0534-00 5-66-0535-00			1	1		1	1		1	1		1	1		1	1
B	Housing & release knob kit — NEMA 1 Housing & release knob kit — NEMA 4 Housing & release knob kit — NEMA 4X		5-66-8756-00 5-66-8757-00 5-66-8758-00		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
C C1 C2	Stationary disc kit (1 disc universal 3 disc horizontal) Stationary disc kit (2 disc universal) Stationary disc kit (3 disc universal)		5-66-8354-00 5-66-8355-00 5-66-8356-00		1	1	1	1	1	1	1	1	1	1	1	1	3 1	3 1	3 1
D D1	Friction disc kit Stabilizing spring		5-66-8462-00 8-161-505-00		1 2	1 2	1 2	1 2	1 2	1 2	2 *	2 *	2 *	2 *	2 *	2 *	3 *	3 *	3 *
DP	Disc pack kit — 1 disc Disc pack kit — 2 disc Disc pack kit — 3 disc		5-66-8601-00 5-66-8602-00 5-66-8603-00		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
E	Hub and set screw assembly 1 & 2 disc (NEMA 1)	5/8 bore 7/8 bore 1-1/8 bore	5-16-5150-00-01B 5-16-5150-00-01D 5-16-5150-00-01E		1 1 1			1 1 1			1 1 1			1 1 1					
	Hub and set screw assembly 1 disc (NEMA 4 & 4X)	5/8 bore 7/8 bore 1-1/8 bore	5-16-5151-00-01B 5-16-5151-00-01D 5-16-5151-00-01E			1 1 1	1 1 1		1 1 1	1 1 1									
	Hub and set screw assembly 3 disc (NEMA 1) and 2 & 3 disc (NEMA 4 & 4X)	5/8 bore 7/8 bore 1-1/8 bore	5-16-5153-00-01B 5-16-5153-00-01D 5-16-5153-00-01E									1 1 1	1 1 1		1 1 1	1 1 1	1 1 1	1 1 1	1 1 1
F	Endplate and stationary disc assembly	1 & 2 disc (NEMA 1) 3 disc (NEMA 1) 1 disc (NEMA 4) 2 & 3 disc (NEMA 4) 1 disc (NEMA 4X) 2 & 3 disc (NEMA 4X)	5-02-5031-00 5-02-5032-00 5-02-5033-00 5-02-5034-00 5-02-5037-00 5-02-5038-00		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

*Certain multiple friction disc model numbers require a single stabilizer clip (D1) added to each friction disc. If your brake has these clips, they must be replaced when the friction disc is replaced. This clip is included as part of the friction disc kit 5-66-8462-00.

**Close coupled brakes identified by 8 in the 8th digit. example: 1-056-XXX-8X.

Support Plate Assembly



Solenoid and Coil Assembly

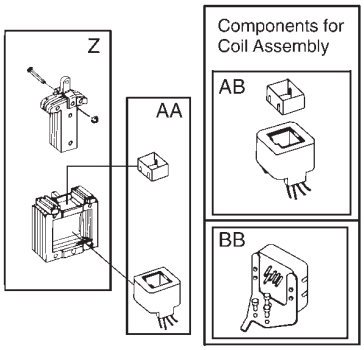


TABLE 2
Components of Support Plate and Coil Assembly

Item	Description		Part Number↓ / Torque (lb-ft) / NEMA Enclosure	1.5 & 3 1	1.5 & 3 4 4X	6 & 10 1	6 & 10 4 4X	15 &20 1	15 &20 4 4X	25 1	25 4 4X
			Support Plate Assy. (Items M through Y and EA)→	5-42-5561-00	5-42-5562-00	5-42-5563-00	5-42-5564-00	5-42-5565-00	5-42-5566-00	5-42-5565-00	5-42-5566-00
M	Bearing		8-006-501-00	1	1	1	1	1	1	1	1
N	Solenoid lever		8-008-504-01	1	1	1	1	1	1	1	1
O	Retaining ring		9-03-0057-00	1	1	1	1	1	1	1	1
P	Spacer		4-45-0168-00	2	2	2	2	2	2	2	2
Q	Torque adjustment nut		9-40-3928-00	2	2	2	2	2	2	2	2
R	Wear adjustment screw		8-100-507-00	2	2	2	2	2	2	2	2
S	Pressure spring		9-70-1215-00	2	2						
	Pressure spring		9-70-1523-00			2	2				
	Pressure spring		9-70-1524-00					2	2	2	2
S1	Spring washer		9-46-0010-00			4	4	4	4	4	4
T	Lever arm and stop nut assy.		5-17-5011-00	1	1	1	1	1	1	1	1
U	Bearing pin		9-29-4826-00	1	1	1	1	1	1	1	1
V	Plunger stop		8-094-503-00	1	1	1	1	1	1	1	1
X	Support plate and spring stud assembly (2 housing studs)		5-26-5019-00	1		1		1		1	
	Support plate and spring stud assembly (3 housing studs)		5-26-5020-00		1		1		1		1
Y	Pivot pin		9-29-4836-00	1	1	1	1	1	1	1	1
EA	Mounting screws		9-25-9013-00	3	3	3	3	3	3	3	3
AC Brakes											
Z	No. 4 solenoid kit		5-66-5042-00	1		1		1		1	
AA	No. 4 coil kit 60 Hz	115-230 Vac	5-66-6407-33	1							
		230/460 Vac	5-66-6409-33	1							
		115 Vac	5-66-6401-33	1							
		230 Vac	5-66-6402-33	1							
		460 Vac	5-66-6404-33	1							
		575 Vac	5-66-6405-33	1							
	No. K4 coil kit 60 Hz	115-230 Vac	5-66-6457-33			1					
		230/460 Vac	5-66-6459-33			1					
		115 Vac	5-66-6451-33			1					
		230 Vac	5-66-6452-33			1					
		460 Vac	5-66-6454-33			1					
		575 Vac	5-66-6455-33			1					
	No. K4 + coil kit 60 Hz	115-230 Vac	5-66-6407-23					1			
		230/460 Vac	5-66-6409-23					1			
		115 Vac	5-66-6401-23					1			
		230 Vac	5-66-6402-23					1			
		460 Vac	5-66-6404-23					1			
		575 Vac	5-66-6405-23					1			
	No. M4 + coil kit 60 Hz	115-230 Vac	5-66-6457-23							1	
		230/460 Vac	5-66-6459-23							1	
		115 Vac	5-66-6451-23							1	
		230 Vac	5-66-6452-23							1	
		460 Vac	5-66-6454-23							1	
		575 Vac	5-66-6455-23							1	
CC	Brake release interlock switch (optional)		5-57-5526-00	1		1		1		1	
DC Brakes											
AB	No. 4 + coil assembly	115 Vdc	5-96-6416-43	1							
		230 Vdc	5-96-6417-43	1							
	No. K4 + coil assembly	115 Vdc	5-96-6416-23			1					
		230 Vdc	5-96-6417-23			1					
	No. M4 + coil assembly	115 Vdc	5-96-6466-23					1			
		230 Vdc	5-96-6467-23					1			
	No. P4 + coil assembly	115 Vdc	5-96-6446-43							1	
		230 Vdc	5-96-6447-43							1	
BB	Electronic DC switch kit	24/28 Vdc	5-57-5712-15								
		115 Vdc	5-57-5716-15								
		230 Vdc	5-57-5717-15								

TABLE 3
Contents of Kits and Assemblies

Item	Kit Description
A	Hardware kit – NEMA 1 (5-66-1001-00) 2 – Housing acorn nuts 2 – Conduit plugs
	Hardware kit – NEMA 4 (5-66-1002-00) Hardware kit – NEMA 4X (5-66-1003-00) 3 – Housing nuts 3 – Housing nut gaskets 1 – Endplate oil seal 2 – Endplate hole plugs 2 – Housing to endplate “U” gasket 2 – Endplate conduit pipe plugs
B	Housing & release knob kit (5-66-875X-00) 1 – Housing and release knob assembly 2 or 3 – Housing nuts 3 – Housing nut gasket (NEMA 4 and 4X)
C	Stationary disc kit (5-66-8355-00) 1 – Stationary disc
C1	Stationary disc kit (5-66-8354-00) 2 – Stationary discs with springs
C2	Stationary disc kit (5-66-8356-00) 3 – Stationary discs with springs
D	Friction disc kit (5-66-8462-00) 1 – Friction disc 2 – Stabilizing springs (for 1-1/2 lb-ft brake use only)
DP	Disc pack kit (5-66-860X-00) 1, 2 or 3 – Friction disc(s) 1, 2 or 3 – Stationary disc(s) 2 – Stabilizing springs (for 1-1/2 lb-ft brake use only) 3, 6 or 9 – Stationary disc separator springs
E	Hub and screw assembly – all types, all bores (5-16-515X-00) 1 – Brake hub 2 – Set screws
Z	No. 4 solenoid kit (5-66-5042-00) 1 – Plunger 1 – Solenoid link 1 – Frame 1 – Solenoid link cap screw 1 – Solenoid link nut 3 – Solenoid mounting screws
AA AB	No. 4 AC coil kit (5-66-64-XX-X3) and DC coil assembly (5-96-64XX-X3) Coil / Top Plunger guide / Wire nut
BB	DC switch kit (5-57-571X-15) 1 – Electronic switch 1 – Mounting bracket 3 – Bracket mounting screws 4 – Switch moutning screws 4 – Nuts 4 – Lock washers 5 – Crimp connectors
CC	Brake release interlock switch (5-57-5526-00) 1 – Microswitch 1 – Mounting bracket 2 – Bracket mounting screws 2 – Switch mounting screws 2 – Lock washers 2 – Nuts 2 – Lead wire assembly

DRIVE ASSEMBLIES

IDENTIFICATION:

Identifying which drive assembly you have is very easy. This manual contains information on **ACE DRIVES**, Benzlers & SEW-EURODRIVES.

The **ACE DRIVE** can be identified by reading the stamped name plate on the motor or the reducer.

There are very few serviceable parts to the drive assembly. If a problem exists, it is usually faster and less expensive to replace an entire motor or gear reducer rather than try to buy parts to repair unit. Contact the factory at the number listed on the front of this manual for more information.

WARNING!

Disconnect and lock out the power source feeding the crane mainline or other power source before attempting any service on the drive assembly.

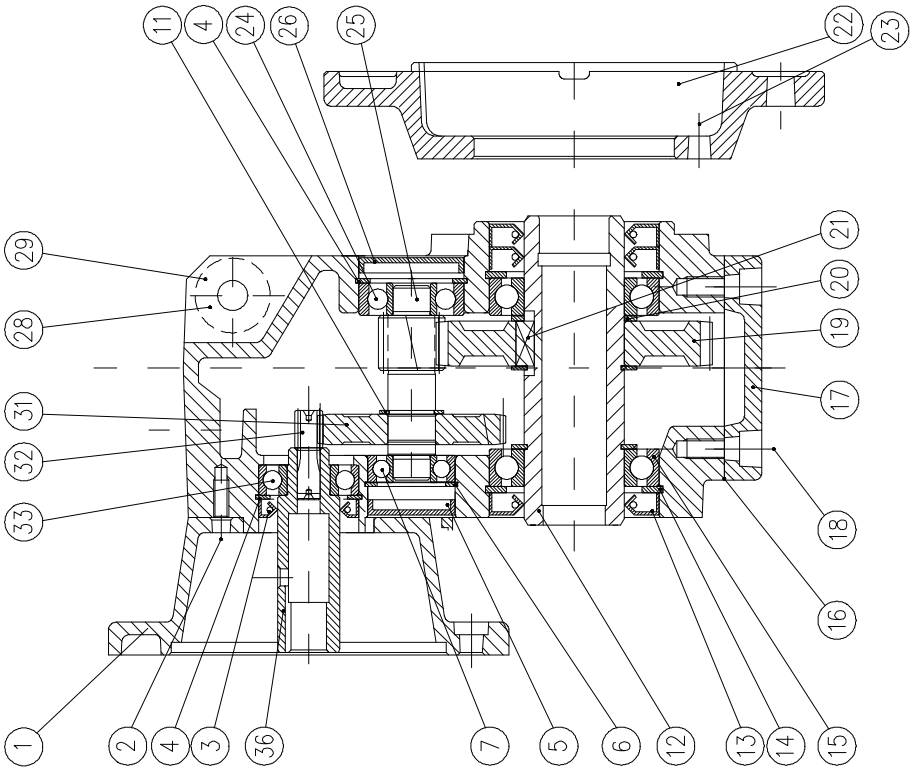
One of the most important items to keep properly adjusted is the drive assembly brake. Proper inspection and maintenance is essential for safe operation of the trolley or crane.

The following information on the drive assemblies is published with the knowledge of the manufacturers and is offered as a guideline only. **Ace World Companies** takes no responsibility as to the content or intent of any information or instruction contained in the following section.

Reservdelslista
Varaosaluettelo , Ersatzeilliste
Liste depiéces de rechange
Lista de piezas de recambio
Catalogo parti de ricambio

BTM02-23

BTM02, 12, 20



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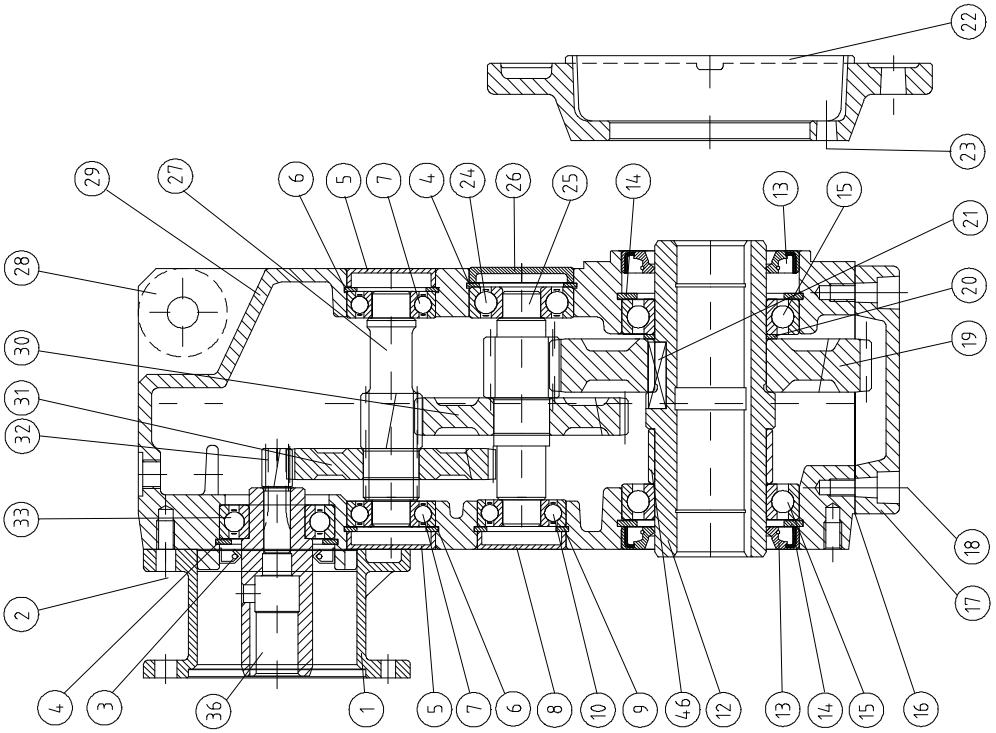


1 Motorfläns Moottorilaippa Motorflange Motorflansch Bride moteur Motor brida Motore flangia	9 Låsring Urarengas Locking ring Sprengring Circlips Anillo de fijacón Anello elastico	17 Lock Kansi Cover Deckel Garde Tapa Coperchio	25 Kuggdrev Vetopyoörä Pinion Ritzel Pignon Piñon Pignone
2 Skruv Ruuvi Screw Schraube Vis Tornillo Vito	10 Kullager Kuulalaakeri Ball bearing Kugellager Roulement à billes Rondamiento de bolas Cuscinetto a sfere	18 Skruv Ruuvi Screw Schraube Vis Tornillo Vito	26 VK Lock VK Kansi VK Cover VK Deckel VK Garde VK Tapa VK Coperchio
3 Tätningsring Tiivisterengas Oil seal ring Dichtungsring Joint Anillo obturador Paragrasso	11 Låsring Urarengas Locking ring Sprengring Circlips Anillo de fijacón Anello elastico	19 Kugghjul Hammaspyörä Gear wheel Zahnrad Roue Rueda dentada Ruota dentata	27 Kuggdrev Vetopyoörä Pinion Ritzel Pignon Piñon Pignone
4 Låsring Urarengas Locking ring Sprengring Circlips Anillo de fijacón Anello elastico	12 Hålaxel Akseliholkki Hollow shaft Getriebehohlwelle Arbre dentée Orificio del eje Albero cavo	20 Distanselement Välirengas Spacer Distanzelement Intercalaire Distanciador Distanziale	28 Gummielement Kytkinkumi Rubber element Gummielement Element de caoutchouc Elemento de caucho Elemento elastico
5 VK Lock VK Kansi VK Cover VK Deckel VK Garde VK Tapa VK Coperchio	13 Tätningsring Tiivisterengas Oil seal ring Dichtungsring Joint Anillo obturador Paragrasso	21 Kil Kiila Key Passfeder Clavette Chaveta Chiavetta	29 Växelhus Vaihderunko Gear case Getribegehäuse Carter Cubierta del engranaje Carcassa riduttore
6 Låsring Urarengas Locking ring Sprengring Circlips Anillo de fijacón Anello elastico	14 Låsring Urarengas Locking ring Sprengring Circlips Anillo de fijacón Anello elastico	22 Sekundär fläns Laipparakenne Output flange Abtriebsflansch Bride côte arbre Brida con eje de salida Flangia uscita	30, 31 Kugghjul Hammaspyörä Gear wheel Zahnrad Roue Rueda dentada Ruota dentata
7 Kullager Kuulalaakeri Ball bearing Kugellager Roulement à billes Rondamiento de bolas Cuscinetto a sfere	15 Kullager Kuulalaakeri Ball bearing Kugellager Roulement à billes Rondamiento de bolas Cuscinetto a sfere	23 Skruv Ruuvi Screw Schraube Vis Tornillo Vito	32 Kuggdrev Vetopyoörä Pinion Ritzel Pignon Piñon Pignone
8 VK Lock VK Kansi VK Cover VK Deckel VK Garde VK Tapa VK Coperchio	16 Packning Tiiviste Packing Packung Joint Empaquetadura Guarnizione	24 Kullager Kuulalaakeri Ball bearing Kugellager Roulement à billes Rondamiento de bolas Cuscinetto a sfere	33 Kullager Kuulalaakeri Ball bearing Kugellager Roulement à billes Rondamiento de bolas Cuscinetto a sfere
			36 Ingående axel Ensiöakseli Input shaft Antriebswelle Arbre d'entrée Eje de entrada Albero d'entrata

Mounting

GENERAL

1. The gear should be placed on a flat and solid foundation.

2. Sprocket, pulley or coupling on shaft can not be mounted with force. This will damage the gear.

3. To avoid increasing load on shafts and bearings, the gear and the driven machine should be carefully aligned, even if an elastic coupling is used.

4. If sprockets are used on the output shaft the preferable direction of pull should be such that the gear housing will be pressed towards the foundation.

5. When situated outdoors or working under adverse conditions as heat, dust or damp, the gear must be provided with sufficient protection, but the cooling air circulation must not be unduly restricted.

HOLLOW SHAFT GEARS

1. The gear is normally mounted on a shaft with tolerance js6. The hollow shaft have tolerance H7. Grease the shaft with Molykote BR2 or equivalent before the gear is mounted. The gear shall not be mounted with force. The gear shall be locked against axial movement. Set screws in hollow shaft can be used for BS88 and 112.

Lubrication

Before delivery BS40-112 are filled with synthetic oil-Mobil SHC 634 and BS35 with synthetic grease-Mobil SHC 007. This type of lubrication is extra suitable for worm gears.

At normal condition the oil/grease never needs to be changed.
Ambient temperature -30°C – +30°C

Maintenance

1. Benzler worm gears are lubricated for life with synthetic oil/grease and are therefore maintainance free.

2. Check that there are no leakages.

3.. The worm gears shall under no circumstances be entirely filled with oil or grease.

Running In

1. The gear should be run under low load conditions during the first 10-30 hours. Then the load should gradually be increased to full load.

2. The length of the running-in period depends on the size of the gear and the actual working conditions.

3. When increasing the load the temperature of the gear can exceed the ambient temperature by 60-70°C. Oil-and gear temperatures of 95-100°C are harmless and have no influence on the function of the gear. When the temperature exceeds 100°C special seal rings must be used.

4. Gears which are not used for a long period should be run for short periods, approximately every third month.

ACE-DRIVES

General

1. The gear motor is lifted by a strap attached to the hole for the torque arm bracket and the motor. Do not lift the geared motor by the motor lifting plug only.
2. The reducer should normally be mounted on a shaft with tolerance js6. The hollow shaft has tolerance H7. Grease shaft with Molykote BR2 or corresponding before mounting the speed reducer.
3. The speed reducer must not be forced onto the shaft. Use a threaded hole in the machine shaft and a threaded bolt and a washer (Fig1).
4. Rubber elements are assembled and pretensioned to correct dimension (LO) according to page 19.
5. At mounting the oil level plug, filling plug and draining plug must be reachable for the oil changing.
6. Gears mounted outdoors or that shall be working under ardous conditions, such as hot, dusty or wet environment, should be equipped with proper protection. Air circulation around the gear shall not be stopped.
7. Air plug shall be placed in the highest situated oil plug. Top simplify oil level check an oil level glass is available against separate order.
   Consult Benzlers for more information.

Dismounting (Fig 2)

1. Remove bolt, washer and locking ring.
2. Remove rubber elements
3. Use Benzlers Dismounting Kit or similar proper details to dismount the gear from machine shaft (see below).

Maintenance

1. Both oil and grease should be replaced after approximatly 20 000 operation hours at an oil temperature of +60°C. If the oil temperature is higher or lower, the intervals between oil replacements will decrease or increase.
2. At cleaning, the gear housing should be flushed with the same sort of oil that is used under working conditions.
3. Check oil level at regular intervals (at stand still). The oil shall reach the correct oil level plug.
   See page 21 depending on mounting position.
4. The geared motor must never be filled entirely with oil or grease irrespective of its mounting position.

   Further information see the Installation and Maintenance instruction.

Fig 1

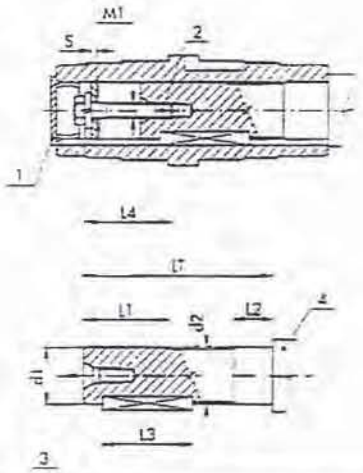
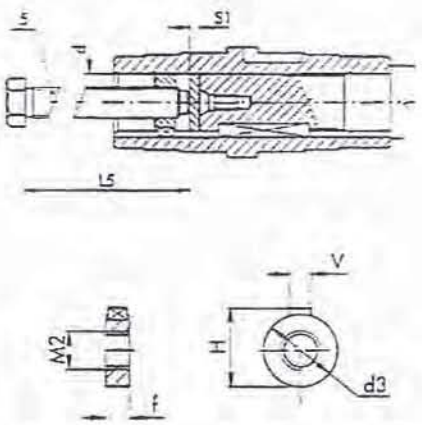


Fig 2



Type	d^{H7}	$d1^{h6}$	d2	d3	f	H	L1	L2	L3[1]	L4	L5	LT	M1	M2	S	S1	V
02, 03	25	25	24.5	24.5	12	28	45	20	63	35	130	91	M8	M12 x 1.24	4	4	8
12, 13	30	30	29.5	29.5	16	33	45	24	90	60	150	99	M10 x M12	M16 x 1.5	4	4	8
	35	35	34.5	34.5	16	38	54	28	90	60	150	99			4	4	10
20, 23	40	40	39.5	39.9	24	43	60	32	110	70	180	126	M16	M24 x 1.5	5	5	12

1) The dim ension L3 is a simple guideline. It can be diffrent according to the customer's requirement.

1 - Cap
2 - Screw TE UNI 5737
3 - Threaded hole UNI 3221
4 - Driven shaft
5 - Screw AM UNI 6050-67

BTM02,12

Lubrication

1. The geared motors are normally delivered with oil according to ordered mounting position. If no mounting position is given the gears are delivered according to mounting position H1 (see below). Different mounting position require different oil volumes.
2. The geared motors are normally delivered with oil type ISO VG 220 EP of mineral type, if nothing else is specified by purchaser.
3. Recommended oil in accordance with viscosity grade ISO VG:

Ambient temperature	Oil type
-20° C - + 10° C	ISO VG 68 EP
+5° C - +30° C	ISO VG 220 EP
-15° C - +40° C	ISO VG 150 Synthetic

For other ambient temperature and / or output speeds please consult Benzlers.

4. For grease lubricated gears, grease in accordance with NLGI 0-00 is recommended with minimum basic viscosity ISO VG 320 at ambient temperature -15° C to +30° C.

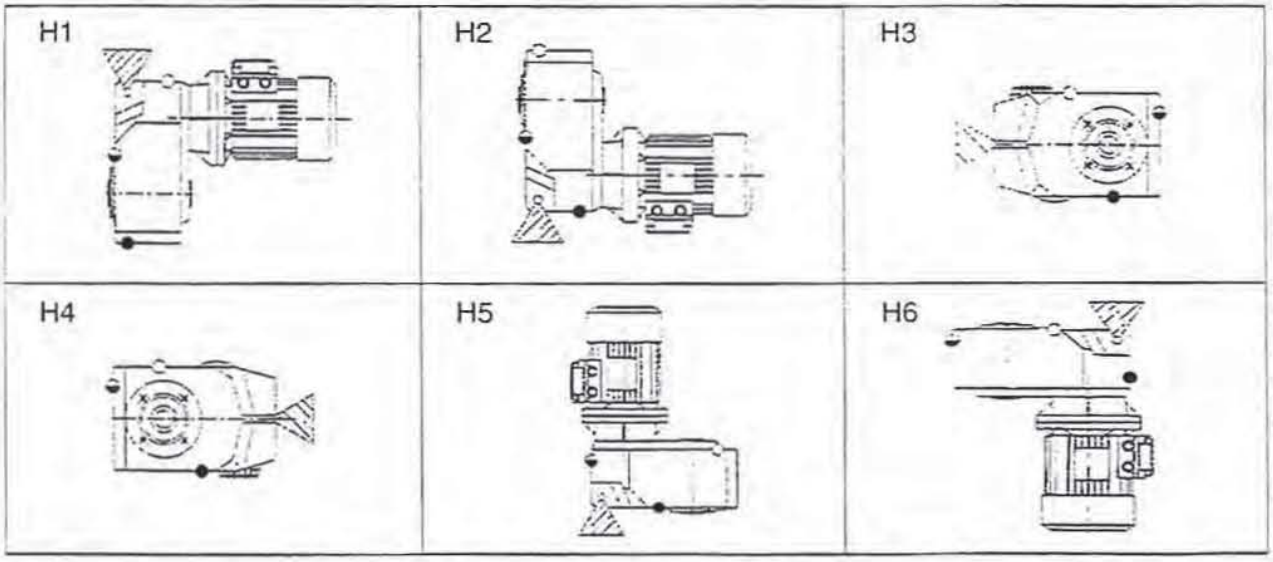
Quantity of oil and oil level plugs

BTM	H1	H2	H3	H4	H5	H6
02	0.75	0.75	1.0	1.0	1.0	1.0
12	1.2	1.2	1.6	1.3	1.8	2.0
20	2.2	2.2	3.4	3.0	4	3.8
03	0.75	0.75	1.0	1.0	1.0	1.0
13	1.2	1.2	1.6	1.3	1.8	2.0
23	2.2	2.2	3.4	3.0	4	3.8

If it is required to mount a gear unit in any other position, Benzlers should first be consulted.

Note!
Lubricants of mineral type shall not be mixed with those of synthetic type.

Check oil level before new oil is filled



Fill and breather plug Oil level plug Drain plug

Mounting

General

1. The geared motor is lifted by a strap attached to the hole for the torque arm bracket and the motor. Do not lift the geared motor by the motor lifting lug only.
2. The reducer should normally be mounted on a shaft with tolerance js6. The hollow shaft has tolerance H7. Grease shaft with Molykote BR2 or corresponding before mounting the speed reducer.
3. The speed reducer must not be forced onto the shaft. Use a threaded hole in the machine shaft and a threaded bolt and a washer(Fig 1).
4. Rubber elements are assembled and pretensioned to correct dimension (LO) .
5. At mounting the oil level plug, filling plug and draining plug must be reachable for the oil changing.
6. Gears mounted outdoors or that shall be working under ardous conditions, such as hot, dusty or wet environment , should be equipped with proper protection. Air circulation around the gear shall not be stopped.
7. Air plug which is supplied on request shall be placed in the highest situated oil plug. To simplify oil level check an oil level glass is available against separate order. Consult Benzlers for more information.

Dismounting (Fig 2)

1. Remove bolt, washer and locking ring.
2. Remove rubber elements
3. Use Benzlers Dismounting Kit or similar proper details to dismount the gear from machine shaft.

Mounting of (KIBO) tapered bushing (Fig 3)

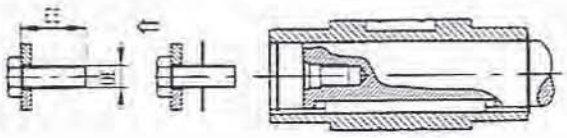
For correct mounting of the speed reducer it is important that both bushings obtain the same pressing force.

1. Mount the inner bushing with the nut in its outer position. The bushing shall be mounted against the shoulder or circlip.
2. Put the key in the keyway.
3. Mount the reducer on the machine shaft and press it against the inner bushing.
4. Mount the outer bushing with the nut in it's inner position. Check so that the bushing is not squeezed but the nut is in contact with the shaft sleeve.
5. Mount the washer with it's bolt. Tighten the bolt with correct torque. The inner bushing is now locked.
6. Loosen the bolt, so the outer bushing is loose. Turn out the nut on the bushing.
7. Tighten the bolt once again with correct torque. The outer bushing is now locked.
8. Screw the nuts against the hollow shaft by hand, mounting is complete.

Dismounting of KIBO®.

1. Loosen the bolts and take away the washer.
2. Pull out the outer bushing with the nut, use a screwdriver. Take out the bushing.
3. Press the reducer from the inner bushing with the nut, dismounting is complete.

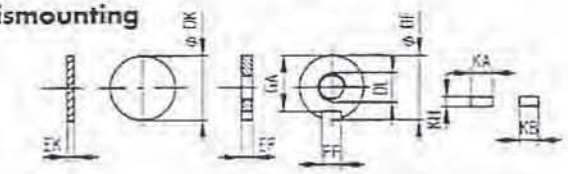
Mounting

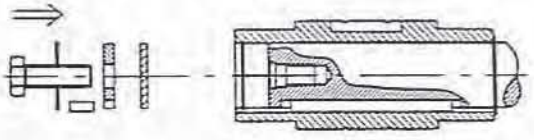


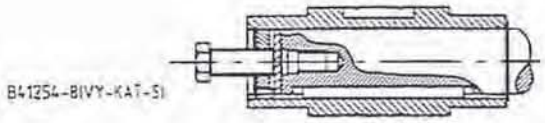
	EE	DE
BTM 22	40	M16
32	50	M16
52	60	M20
72	90	M24

Figure 1

Dismounting

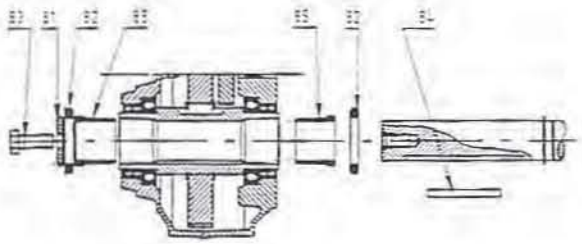






	EK	DK	EF	GA	FF	KA	KH	KB
BTM 22	6	40	10	35	12	20	8	12
32	6	50	12	44,5	14	25	9	14
52	6	60	16	53	18	25	11	18
72	6	70	20	62,5	20	20	12	20

Figure 2



Tightening torque for KIBO ®

Size	Tightening torque
BTM 22	93 Nm
32	108 Nm
52	252 Nm
72	366 Nm

81	Washer
82	Nut
83	Bult
84	Key
85	Tapered bush

Maintenance

Maintenance

1. Both oil and grease should be replaced after approximately 20 000 operation hours at an oil temperature of +60°C. If the oil temperature is higher or lower, the intervals between oil replacements will decrease or increase.
2. At cleaning, the gear housing should be flushed with the same sort of oil that is used under working conditions.
3. Check oil level at regular intervals (At stand still). The oil shall reach the correct oil level plug.
   See page 54 depending on mounting position.
4. The geared motor must never be filled entirely with oil or grease irrespective of its mounting position.
   Further information see the Installation and Maintenance instruction.

Installation

1. The geared motor is lifted by a strap attached to the gear casing and the motor. Do not lift the geared motor by the motor lifting lug only.

2. The geared motor must be mounted on a flat and solid foundation.

3. Sprockets, pulleys, wheels or couplings to be fitted on shafts must not be hammered on, as this may damage the bearings. Coupling halves, etc. must be heated up or an output shaft be pressed into position with screw, washer and nut.

4. To avoid increasing load on shafts and bearings align the geared motor and driven machine carefully even when using a flexible coupling.

Maintenance

1. Both oil and grease should be replaced after approximately 20,000 operations hours at an oil temperature of +60°C. If the oil temperature is higher or lower, the intervals between oil replacements will decrease or increase accordingly.

2. At cleaning, the gear housing should be flushed with the same sort of oil that is used under working conditions.

3. Check oil level at regular intervals. The oil should reach the correct oil level plug.

4. The geared motor must never be filled entirely with oil or grease irrespective of its mounting position.

Tightening torque for bolts and nuts (Nm)

Size	M6	M8	M10	M12	M16	
Bolt		10.1	24.5	48.0	83.0	205.0
Nut		14.3	16.6	49.5		

*Quality 8.8

For further information use Benzler maintenance instruction or contact Benzler office.

For motorservice use instruction made by motor manufacturer.

Lubrication

1. BG 12 gears are delivered filled with a synthetic oil Mobil SHC 634. For normal conditions the supplied lubricant is for life.

   Ambient temperature -30°C to +30°C.

   All geared motors are normally delivered with oil according to mounting position specified by purchaser. If no mounting position is specified, geared motors will be supplied filled with oil for B3 mounting.

   Note that different mounting positions require different oil quantities.

2. The geared motors are normally delivered with oil type ISO VG 220, if nothing else is specified by purchaser.

3. The geared motors are provided with labels which indicate the mounting position and the grade of oil used.

4. The inner bearings are oil lubricated. The coupling shaft bearing and the outer bearing of the slow speed shaft are always lubricated with ball bearing grease.

Recommended oil in accordance with viscosity grade ISO VG:

Ambient temperature/type of oil

-20° C - +10° C	-ISO VG 68 EP
+ 5° C - +30° C	-ISO VG 220 EP
-15° C - +40° C Synthetic:	-ISO VG 150 SYNTHETIC

For grease lubricated gear units:

-15° C - +30° C

Grease in accordance with NLGI 0-00, minimum ISO VG 320

N.B. Mineral oils must not be mixed with synthetic oil. Different grades of grease are, as a rule, not mixable.

Motors and Brakemotors
Type BM (G) Brakes

OPERATING INSTRUCTIONS

09 793 67 US

General
Every SEW-Eurodrive motor is thoroughly tested, checked, and properly packed prior to shipment. However, please check immediately upon arrival for shortage of parts or transit damage. Note the damage or shortage on the freight bill of lading and file a claim with the carrier. Also, notify SEW-Eurodrive of the shortage or damage.

Installation
For motors mounted integrally to a gear unit, please refer to the Operating Instructions for Gearmotors and Gear Reducers for proper installation of the drive. The drive installation site should be selected to ensure:

Ambient temperatures below 40°C (104°F).

Unimpeded flow of air to the motor and variable speed units.

Accessibility to gear unit, oil plugs.

Adequate space for the removal of the brakemotor fanguard for brake adjustment and maintenance.

The drive unit should be mounted on a flat, vibration damping, and torsionally rigid structure. The flatness tolerance of the supporting surface should not exceed:

For motor size 180 and smaller — 0.004 inch
For motor size above 180 — 0.008 inch

Do not hammer on the shafts to install couplings, sheaves, etc. Hammering can cause brinelling of the bearings and a reduction in bearing life. We recommend heating the components to approximately 175°F and sliding them on. This will reduce possible damage to the bearings. In addition, there is a metric tapped hole in the center of the motor shaft that can be utilized with a tool to press on or remove the coupling, sheaves, etc.

The motor shaft diameters are metric and have tolerances as listed in the SEW-Eurodrive catalogs. Shaft couplings should be properly aligned to prevent vibration, coupling wear and premature failure of the shaft bearings.

Maximum Parallel Offset — 0.003 inch
Maximum Angular Offset — 0.030°

To prevent the output shaft and bearings from being subjected to excessive loads, the maximum overhung loads, as shown in SEW-Eurodrive catalogs, should not be exceeded. Please consult our engineering department if the load may exceed the recommended figure given or where there are combined radial and axial loads. In such cases, the exact operating conditions must be stated including speed, direction of rotation, position, magnitude and direction of the external radial and axial loads being applied.

Long Term Storage
If the motor must be stored for a long period of time without operating, the motor must be stored in a dry, protected area, and in the mounting position indicated on the unit nameplate.In order to ensure that the motor has not been damaged by moisture after a prolonged storage, the insulation resistance should be checked. An insulation tester with a measurement voltage of at least 500V (e.g. magneto generator) should be used for this purpose. The insulation resistance is sufficient if it has an ohmic value of at least 1000 x V_N (e.g. at V_N = 230VAC: R_{insul} 230000 ohms = 0.23M ohms). If the measured value is smaller, the motor should be dried before use (for example, with hot air up to a maximum of 90°C or by resistance heating with an auxiliary AC voltage of 10% of V_N via an isolating transformer). Care should be taken to ensure that the motor is heated with not more than 20% of its rated current and that the rise in temperature is not more than 90°C. The drying procedure can be stopped when the insulation resistance has reached 500000 = 0.5M ohms.

Severe Duty Units
Severe Duty Units are indicated with the letters "-KS" at the end of the motor type on the motor nameplate. Severe Duty units include drain holes in the motor end bells and conduit box at the lowest points allowing condensation to drain out of the motor.

CAUTION!
The drain holes are installed for the mounting position listed on the gear box nameplate. Installing a unit in a mounting position other than what is shown on the nameplate will reposition the condensation drain holes. As a result, the drain holes may not be located at the lowest point and may not allow water to drain. This can cause premature drive failure.

Electrical Connection
The motor must be installed and connected by a qualified electrician who is knowledgeable with the NEC article 430 and local regulations. He must make sure that the voltage and frequency of the electrical supply correspond with the data stamped on the motor nameplate before connecting the motor in accordance with the wiring diagram, which can be found in the terminal box. For brake connections, see the following pages.

At installation the electrician must make sure that the terminal block jumpers are positioned correctly and that all electrical connections including the ground connection are secure. In order to effectively protect the motor from overloads, appropriate motor protection must be provided. Fuses do not always provide adequate motor protection. For motors which are required to operate with a very high start-stop frequency, the overload heater type motor protection is insufficient. It is advisable in such applications to provide the motor with temperature sensors (thermistors) in the windings. Monitor the thermistors by means of an external trip device. In this way, the motor will be fully protected against practically all possible overloads.

When using motors outdoors or in washdown applications the cable entries into the terminal box must be directed downward to prevent water from entering the conduit box. The unused cable entries must be closed off properly.

Lubrication and Maintenance
WARNING! Always ensure equipment is secure and electrical power is off before removing or performing maintenance on the drive assembly. The motor bearings are sealed and the grease content is adequate for the life of the bearing.

SEW EURODRIVE

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MIDWEST ASSEMBLY CENTER
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EAST COAST ASSEMBLY CENTER
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ISO 9002

Mounting Positions and Important Order Information

General information on mounting positions

Mounting position designation

SEW differentiates between six mounting positions M1 – M6 for geared motors. The following figure shows the spatial arrangement of the gear units in mounting positions M1 – M6.

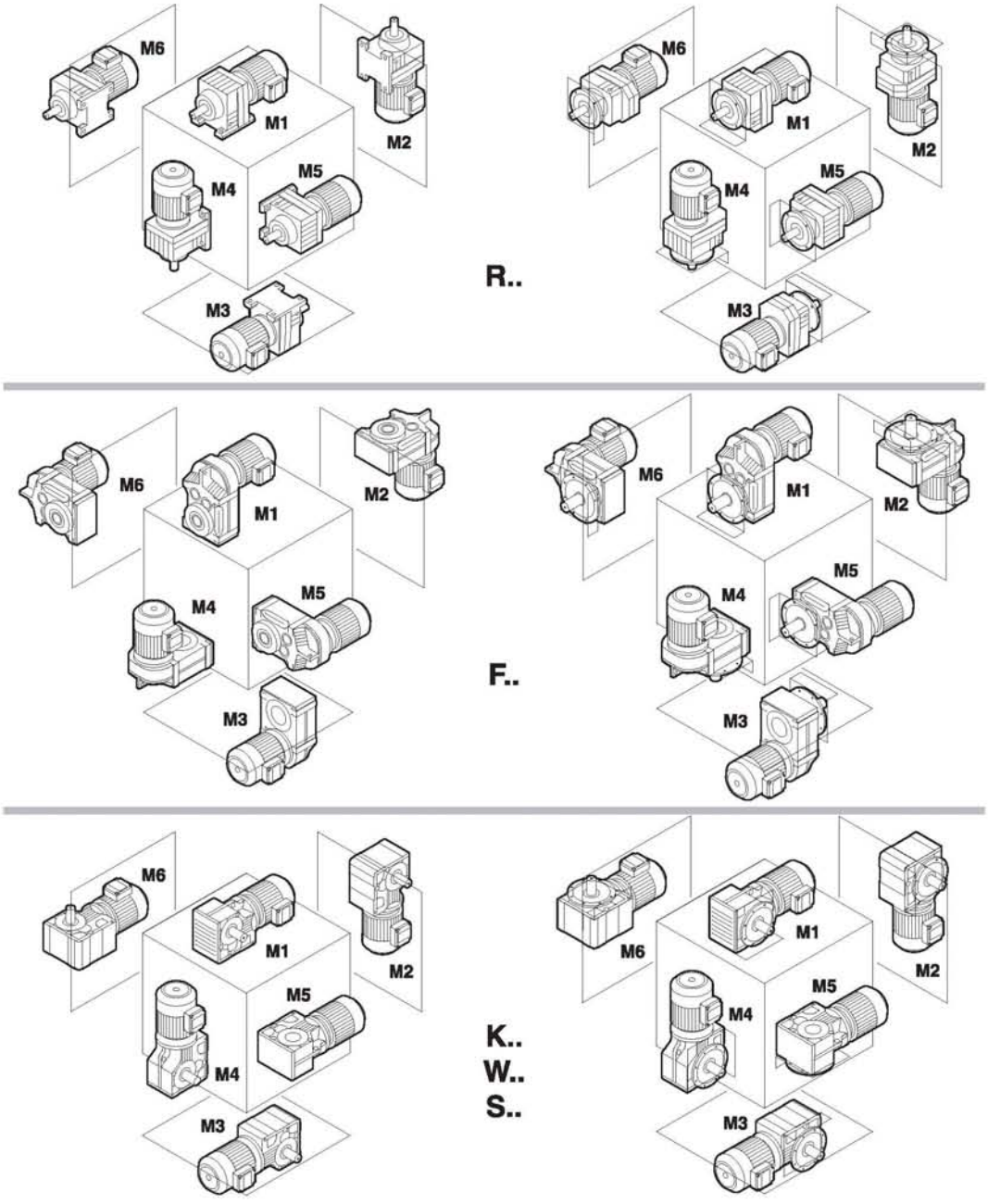


Fig. 8: Depiction of mounting positions M1 – M6

USCS 0102

Gearmotors and Gear Reducers

OPERATING INSTRUCTIONS

01 805 52 US

GENERAL
These operationg instructions are intended to help you install and operate the drive. For trouble free service, proper installation and operation are essential. Additionally, these instructions contain important recommendations on maintenance.

Before shipment, every SEW-Eurodrive gear unit is tested, checked and properly packed. However, please inspect the drive immediately upon arrival for shortage or transit damage. Note the damage or shortage on the freight bill of lading and file a claim with the carrier. Also, notify SEW-Eurodrive of the shortage or damage.

LUBRICANTS
All gearmotors and gear reducers are supplied with the correct grade and quantity of lubricating oil for the specified mounting position. Exceptions include reducers shipped without input assemblies. The recommended lubricants are found on page 2.

LONG TERM STORAGE
If the drive is not installed immediately, it should be stored in a dry, protected area. If the drive is to be stored for an extended period of time and was not ordered from SEW for long term storage, contact your nearest SEW assembly plant for information on Long Term Storage or request **Document #2115**.

Drives which are used for standby service should be stored as a sealed gearcase.

INSTALLATION OF COMPONENTS ON DRIVE SHAFTS
Do not hammer on the shafts. Hammering can cause brinelling of the reducer's bearings shortening the bearing life. We recommend heating the components to approximately 175°F (when possible) and sliding them on the shaft. This will reduce possible damage to the reducer's bearings. **Document #2116**.

For both standard and metric SEW shaft tolerances, refer to the SEW Catalog or request **Document #2154.**

Shaft couplings should be properly aligned to prevent vibration, coupling wear, and premature failure of the shaft bearings.

To prevent the output shaft and bearings from being subjected to excessive loads, the maximum overhung load, as shown in SEW-Eurodrive catalogs, should not be exceeded. Please consult our engineering department if the load may exceed the recommended figure given or where there are combined radial and axial loads. In such cases, the exact operating conditions must be stated including speed, direction of rotation, position, magnitude and direction of the external radial and axial loads being applied.

SHAFT MOUNTED REDUCERS
SEW-Eurodrive supplies the recommended hollowshaft mounting paste with every hollowshaft reducer. The mounting paste is to be applied on the keyed output shaft. The mounting paste is to aid in the prevention of rusting and fretting corrosion between the reducer hollowshaft and the shaft of the driven machine. The mounting paste will aid in shaft removal when necessary.

Warning! Always ensure exposed, rotating parts are properly covered to ensure safety.

For additional information on shaft mounted reducers, drive shaft configuration and tolerances, refer to the SEW-Eurodrive Catalog or request **Documents #2201 and #2202**.

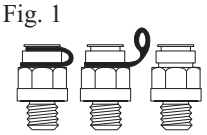
INSTALLATION AND OPERATION
The drive installation site should be selected to ensure:

- Ambient temperatures below 40°C (104°F).
- Unimpeded flow of air to the motor and variable speed units.
- Accessibility to the drain, level and breather plugs.
- Adequate space for the removal of brakemotor fanguard for brake adjustment and maintenance.

The drive unit should be mounted on a flat, vibration damping, and torsionally rigid structure. Careful alignment is critical. Mounting to an uneven surface will cause housing distortion. The flatness tolerance of the supporting surface should not exceed:

- For gear units size 80 and smaller — 0.004 inch.
- For gear units above size 80 — 0.008 inch.

Fig. 1



For transportation, the units are supplied with the breather plug already mounted. After the unit is installed, the black rubber seal located on the breather MUST BE REMOVED (Fig. 1). In addition, the oil level should be checked. Remove the plated (non-painted) oil level plug. The oil level is correct when the surface of the oil is level with the lowest point of that tapped hole, the exception is S37. Units W20 and W30 are sealed in any position.

After installation, the actual mounting position should be confirmed against the mounting postion shown on the gear reducer nameplate. Adequate lubrication is only guaranteed if the unit is mounted in the specific nameplated mounting position.

Refer to the SEW Catalog or request **Document #2111, #2112, #2113, or #2114 (R, F, K, orS, respectively)** if a specific mounting position diagram is needed.

MAINTENANCE
Warning! Always ensure equipment is secure and electrical power is off before removing or performing maintenance on the drive assembly. Oil levels and oil quality should be checked at regular intervals, determined by usage and the environment. Grease and oil should be changed per the recommendations on page 2. Check coupling alignment, chain or belt tension, and mounting bolt torque periodically. Keep the drive relatively free of dust and dirt.

For additional information, call the SEW FAXline, 1-800-601-6195, and request document number shown.

SEW EURODRIVE

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ISO 9002

WARNING:
Brake performance and features must be carefully matched to the requirements of the application.

Consideration must be given to torque requirements, especially where an overhauling condition exists, as well as thermal capacity, ambient temperature, atmospheric explosion hazards, type of enclosure and any other unusual conditions.

Improper selection and installation of a brake and/or lack of maintenance may cause brake failure which could result in damage to property and/or injury to personnel.

If injury to personnel could be caused by brake failure, additional means must be provided to insure safety of personnel.

UNPACKING

When unpacking the brake, inspect it carefully for damage that may have occurred during transit.

GENERAL SAFETY INFORMATION

NOTE: These brakes are not intended for accurate positioning applications. They are designed for applications that require rapid stopping and holding power, such as on conveyors, door openers, etc.

1. For applications with high inertia-type loads or rapid cycling, the thermal capacity of the brake must be considered.
2. Observe all local electrical and safety codes, as well as the National Electrical Code (NEC) and the Occupational Safety and Health Act (OSHA).
3. Brake motors and brake gearmotors must be securely and adequately grounded. This can be accomplished by wiring with a grounded metal-clad raceway system, by using a separate ground wire connected to the bare metal of the motor frame, or other suitable means. Refer to NEC Article 250 (Grounding) for additional information. All wiring should be done by a qualified electrician.
4. Always disconnect power before working on or near a brake motor, a brake gearmotor, or its connected load. If the power disconnect point is out of sight, lock it in the open position and tag it to prevent unexpected application of power.
5. When working on the brake, be sure the load is completely removed, secured or blocked to prevent injury or property damage.
6. Provide guarding for all moving parts.
7. Be careful when touching the exterior of an operating motor, gearmotor or brake. It may be hot enough to cause injury or to be painful. This condition is normal for modern motors, which operate at higher temperatures when running at rated load and voltage.
8. Protect all electrical lead wires and power cables against contact with sharp objects or moving parts.
9. Do not kink electrical lead wires and power cables, and never allow them to touch oil, grease, hot surfaces, or chemicals.

INSTALLATION

CAUTION: To preserve pre-alignment of rotating discs for ease of installation, do not operate manual release or energize brake coil before installation.

NOTE: The brakes are designed for horizontal mounting. Modification is required for vertical mounting. Brakes that are modified will have a prefix on the model number of VO (Vertical Over) or VU (Vertical Under).

Numbers in parentheses refer to parts illustrated in Figs. 3, 5, 6 and 9.

Mounting Hub on Motor Shaft

1. Remove hub (1) from brake and position it on motor shaft with key as shown in Fig. 1. Stamped part number on hub should face away from motor. Tighten hub setscrews with 8 to 10 lb. ft. torque.

Placing Brake on Motor Shaft

1. Remove two cover locknuts (22) and cover (20). Position brake over hub on shaft, aligning hub splines with rotating disc splines.
2. Bolt brake to motor flange with four 3/8 - 16 socket head capscrews.
   NOTE: Dimension “G” (Fig. 1) is the length of the mounting hole through brake bracket.
3. Place coil lead wires around mounting bracket (15C) to the same side as the desired wire outlet position. Connect lead wires per “Connection of Coil Leads” and Fig. 2.
4. Replace cover (20) and cover locknuts (22). Tighten just enough to hold the cover in place.

LUBRICANTS

LUBRICATION SCHEDULE FOR SEW-EURODRIVE GEAR UNITS									
Gear Reducer Type[1)]	**Lubrication Type**	**Ambient air temperature range °F**	**ISO Viscosity Grade**	**Mobil Oil Co.**	**CHEVRON Oil Co.**	**Shell Oil Co.**	**Texaco Oil Co.**	**BP Oil Co.**	**Kluber Oil Co.**
R F K	**Oil**	+14 to +104	VG220	Mobilgear 630	Chevron Non-Leaded Gear Compound 220	Shell Omala Oil 220	Meropa 220	BP Energol GP-XP 220	Kluberoil GEM 1-220
		-4 to +77	VG150 VG100	Mobilgear 629	Chevron Non-Leaded Gear Compound 150	Shell Omala Oil 100	Meropa 150	BP Energol GP-XP 100	Kluberoil GEM 1-150
S	**Oil**	+32 to +104	VG680	Mobilgear 636	Chevron Non-Leaded Gear Compound 680	Shell Omala Oil 680	Meropa 680	BP Energol GP-XP 680	Kluberoil GEM 1-680
		+5 to +77	VG220	Mobilgear 630	Chevron Non-Leaded Gear Compound 220	Shell Omala Oil 220	Meropa 220	BP Energol GP-XP 220	Kluberoil GEM 1-220
General	**Synth. Oil**	+176 to -40	Consult Factory For Use of Synthetic Oils						
	Synth. Grease	+176 to -40	Consult Factory For Use of Grease Filled Reducers						
Ball & Roller Bearings	**Grease** Used for normal application Temp. Range: -22°F to 140°F			**Mobilux EP2**	**Chevron Dura-Lith EP2**	**Shell Alvania Grease R3**	**Multifak EP2**	**BP Energrease LS3**	**CENTOPLEX 2EP**

[1)] Applies to all reducers with or without motor and input shaft.

Oil levels and oil quality should be checked at frequent intervals, depending on usage. Oil changes are required at intervals of 10,000 operating hours or every two years, whichever comes first. If a synthetic oil lubricant is used, then this period can be extended to 20,000 operating hours or every four years, whichever comes first. In applications where hostile operating conditions exist, such as high humidity, corrosive environment, or large temperature changes, the lubricant should be changed at more frequent intervals.

The gear units W20 and W30 are supplied with a synthetic oil which is good for the life of the reducer, independent of the mounting position.

Grease packed bearings should be cleaned and regreased every 10,000 hours or 20,000 hours for synthetic grease. Input (high speed) bearings should not be overgreased. They should be filled with grease not to exceed 1/3 of the bearing's free volume. For output bearings and bearings with replaceable grease shields, fill to 2/3 of their free volume.

ATTENTION

When the recommended lubricant is not avilable, it is permissible to use a lubricant having equivalent characteristics but we do not recommend that lubricants of different brands be mixed. Under no circumstances should synthetic lubricants be mixed with one another or with one having a mineral base.

LUBRICANTS

The approximate lubricant in US **gallons and liters** per mounting position is as follows:

	Mounting Position											
	M1		M2		M3		M4		M5		M6	
Gear Unit	Gallons	Liters	Gallons	Liters	Gallons	Liters	Gallons	Liters	Gallons	Liters	Gallons	Liters
F27	0.16	0.6	0.21	0.8	0.18	0.7	0.18	0.7	0.16	0.6	0.16	0.6
F37	0.26	1	0.32	1.2	0.18	0.7	0.32	1.2	0.26	1	0.29	1.1
F47	0.40	1.5	0.48	1.8	0.29	1.1	0.50	1.9	0.40	1.5	0.45	1.7
F57	0.69	2.6	0.98	3.7	0.55	2.1	0.92	3.5	0.74	2.8	0.77	2.9
F67	0.71	2.7	1.00	3.8	0.50	1.9	1.00	3.8	0.77	2.9	0.85	3.2
F77	1.32	5	1.93	7.3	1.14	4.3	2.11	8	1.59	6	1.66	6.3
F87	2.64	10	3.43	13	2.03	7.7	3.65	13.8	2.85	10.8	2.91	11
F97	4.89	18.5	5.94	22.5	3.33	12.6	6.66	25.2	4.89	18.5	5.28	20
F107	6.47	24.5	8.45	32	5.15	19.5	9.91	37.5	7.13	27	7.13	27
F127	10.70	40.5	14.53	55	8.98	34	16.12	61	12.29	46.5	12.42	47
F157	18.23	69	27.48	104	16.64	63	27.74	105	22.72	86	20.61	78
FF27	0.16	0.6	0.21	0.8	0.18	0.7	0.18	0.7	0.16	0.6	0.16	0.6
FF37	0.26	1	0.32	1.2	0.18	0.7	0.34	1.3	0.26	1	0.29	1.1
FF47	0.42	1.6	0.50	1.9	0.29	1.1	0.50	1.9	0.40	1.5	0.45	1.7
FF57	0.74	2.8	1.00	3.8	0.55	2.1	0.98	3.7	0.77	2.9	0.79	3
FF67	0.71	2.7	1.00	3.8	0.50	1.9	1.00	3.8	0.77	2.9	0.85	3.2
FF77	1.35	5.1	1.93	7.3	1.14	4.3	2.14	8.1	1.59	6	1.66	6.3
FF87	2.72	10.3	3.49	13.2	2.06	7.8	3.73	14.1	2.91	11	2.96	11.2
FF97	5.02	19	5.94	22.5	3.33	12.6	6.74	25.5	4.99	18.9	5.42	20.5
FF107	6.74	25.5	8.45	32	5.15	19.5	10.17	38.5	7.27	27.5	7.40	28
FF127	10.96	41.5	14.80	56	8.98	34	16.64	63	12.29	46.5	12.95	49
FF157	19.02	72	27.74	105	16.91	64	28.01	106	22.99	87	20.87	79
FA/FH/FV27 FAF/FHF/FVF27 FAZ/FHZ/FVZ27	0.16	0.6	0.21	0.8	0.18	0.7	0.18	0.7	0.16	0.6	0.16	0.6
FA/FH/FV37 FAF/FHF/FVF37 FAZ/FHZ/FVZ37	0.26	1	0.32	1.2	0.18	0.7	0.32	1.2	0.26	1	0.29	1.1
FA/FH/FV47 FAF/FHF/FVF47 FAZ/FHZ/FVZ47	0.40	1.5	0.48	1.8	0.29	1.1	0.50	1.9	0.40	1.5	0.45	1.7
FA/FH/FV57 FAF/FHF/FVF57 FAZ/FHZ/FVZ57	0.71	2.7	1.00	3.8	0.55	2.1	0.95	3.6	0.77	2.9	0.79	3
FA/FH/FV67 FAF/FHF/FVF67 FAZ/FHZ/FVZ67	0.71	2.7	1.00	3.8	0.50	1.9	1.00	3.8	0.77	2.9	0.85	3.2
FA/FH/FV77 FAF/FHF/FVF77 FAZ/FHZ/FVZ77	1.32	5	1.93	7.3	1.14	4.3	2.11	8	1.59	6	1.66	6.3
FA/FH/FV87 FAF/FHF/FVF87 FAZ/FHZ/FVZ87	2.64	10	3.43	13	2.03	7.7	3.65	13.8	2.85	10.8	2.91	11
FA/FH/FV97 FAF/FHF/FVF97 FAZ/FHZ/FVZ97	4.89	18.5	5.94	22.5	3.33	12.6	6.61	25	4.89	18.5	5.28	20
FA/FH/FV107 FAF/FHF/FVF107 FAZ/FHZ/FVZ107	6.47	24.5	8.45	32	5.15	19.5	9.91	37.5	7.13	27	7.13	27
FA/FH/FV127 FAF/FHF/FVF127 FAZ/FHZ/FVZ127	10.30	39	14.53	55	8.98	34	16.12	61	11.89	45	12.29	46.5
FA/FH/FV157 FAF/FHF/FVF157 FAZ/FHZ/FVZ157	17.97	68	27.21	103	16.38	62	27.48	104	22.46	85	20.34	77

For additional information on F-Series mounting positions, refer to the SEW Catalog or call the SEW FAXline, 1-800-601-6195, and request Document #2112.

Re-adjusting the Brake Air Gap

A properly adjusted brake air gap is critical for correct operation. The following table indicates the required air gap measurement.

Motor Size	Brake Size	Air Gap
DT71 - DT100	BM(G)05 - BM(G)4	0.010"-0.024" (0.25-0.6 mm)
DV112 - DV225	BM(G)8 - BM31	0.012"-0.047" (0.3-1.2 mm)
DV180-DV225	BM32-BM62 Double Disc	0.016"-0.047" (0.4-1.2 mm)

Prolonged use of the brake will wear the brake disc lining. This wear increases the air gap. When the air gap approaches its maximum value, the brake must be re-adjusted. To re-adjust the brake, follow the procedure below.

1. Remove the fan cover (14), fan snapring, fan (17), rubber seal (2), and any accessories at the fan end.
2. Insert a feeler gauge between the brake coil body (21) and the stationary disc (22), tighten the adjusting nuts (19) until the minimum value for the air gap is reached equally around the brake. With motor size 160L and up (brakes BM30 to BM62) first screw the threaded bushings (24) into the endshield. After setting the air gap, lock the bushings (24) against the coil body.
3. Ensure a play of 0.06" to 0.08" (1.5 to 2 mm) in the releasing arm. See "THE HAND RELEASE MECHANISM."

Replacement of the Brake Disc (26)

Extended operation of the brake may wear the brake disc (26) beyond acceptable limits. The thickness of the brake disc can be measured to determine if this has occurred.

Motor Size	Brake Size	Min. Disc (26) Thickness
DT71 - DT100	BM05 - BM4	0.354" (9mm)
DV112 - DV225	BM8 - BM62	0.394" (10mm)

If the brake disc (26) is worn below the measurement given, it must be replaced. If the thickness is greater than the specification above, the brake disc is still usable and the brake can be re-adjusted.

The Hand Release Mechanism

Most of our brakes are supplied with a hand-operated release lever. This allows opening of the brake without applying power, allowing for adjustments on the driven machinery.

There are two brake release mechanisms available:

The "BMHR" (4) type requires a lever to be inserted into the release arm. To open the brake, pull the lever away from the motor. It will re-engage automatically, once the lever is released. The lever, when not used, is attached to the motor's cooling fins with clamps.

The screw-type "BMHF" (5) arrangement requires a hexagon key which, when turned clockwise, opens the brake.

Since the stationary disc (22) will move away from the coil body during the brake's operation, it is vital that there is free play (floating clearance) on the release arm of 0.060"-0.080" (1.5-2.0 mm). The springs (11) should be placed between the arm (7) and the nuts (12) to eliminate noise.

The brake release mechanism is not used to change the brake's torque setting. There must always be clearance on the lever.

Troubleshooting

Fault: Motor does not run

1. Check the motor and brake wiring for damage and proper connection.
2. At the motor, measure the line voltage, line current and motor resistance of all three phases.
3. If all three phases read a similar current value the following conditions may exist:

   The motor may be blocked by either an excessive external load, or problems in the reducer or the brake. In both cases, the motor should draw locked rotor (in-rush) current. Consult SEW-Eurodrive catalogs for these values. Release the brake mechanically, reset the air gap if needed, or disconnect the load from the output shaft.

   If the brake is at fault electrically see #4 below.

   If the current differs significantly from the rated locked rotor current, the motor is either an incorrect voltage, or it is jumpered for the wrong voltage.
4. If the brake can be released mechanically, but does not respond to voltage, check the brake for electrical problems.

   Make sure the wiring is according to the instructions. Pay special attention to the brake voltage.

   Energize the brake circuit and measure the AC voltage on the rectifier terminals 2 and 3 (BG/BGE rectifiers). The measured voltage should correspond to the nameplate inscription: "Brake V."

   Measure the DC voltage across terminals 3 and 5 of the brake rectifier which should be about 35% to 45% of the previously measured AC voltage.

   If there is no fault found to this point, measure the resistance of the brake coils. Disconnect the coil from the rectifier for this measurement. See the table on Page 2 for the brake coil resistance values.

   Measure the resistance of each brake coil lead to the brake coil body. This test should show an open circuit. If a short is found, the brake coil is damaged.

If the results of all these checks (electrical connection, mechanical checks and adjustments, and electrical tests) indicate that the brake should work, then the most likely cause of the brake's failure to release is a damaged brake rectifier.

Fault: Brake stopping time is too slow

If the brake has been operating well for some time and a gradual increase in stopping time has occurred, the release arm may have come in contact with the coil body. Verify that the brake release arm end play is correct, and check for excessive brake disc wear, (see previous instructions).

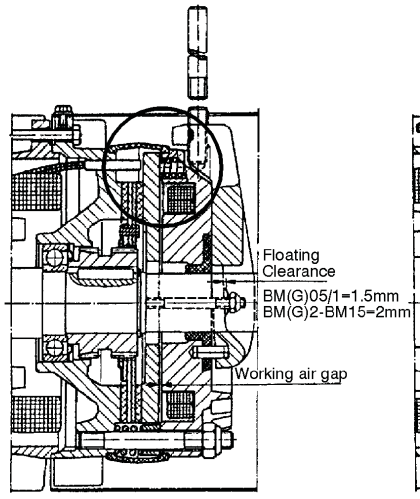
If the brake has been in operation for some time, and the stopping has become erratic, dust accumulation around the stationary disc guides may be the cause. Remove the brake's rubber sealing collar and clean with an air hose.

If the application is new, check the brake's wiring and air gap. If the brake is not wired for fast response, then changing the brake wiring to fast response will decrease the stopping time. Vertical motion and indexing applications may also require the fast response connection. Increasing the brake's torque may remedy the situation, but will also increase stress on the transmission.

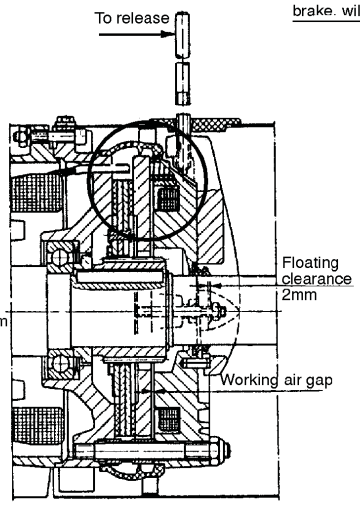
On applications requiring excessive brake work, the lining's surface may become glazed due to extreme heat. The application of a BGE rectifier will improve this situation dramatically. BGE rectifiers are standard equipment on motors size DV 112 - DV225, but optional on the smaller sizes DT71-DT100. Contact SEW-Eurodrive for more information.

BM(G) Brake Cross Section and Exploded Views

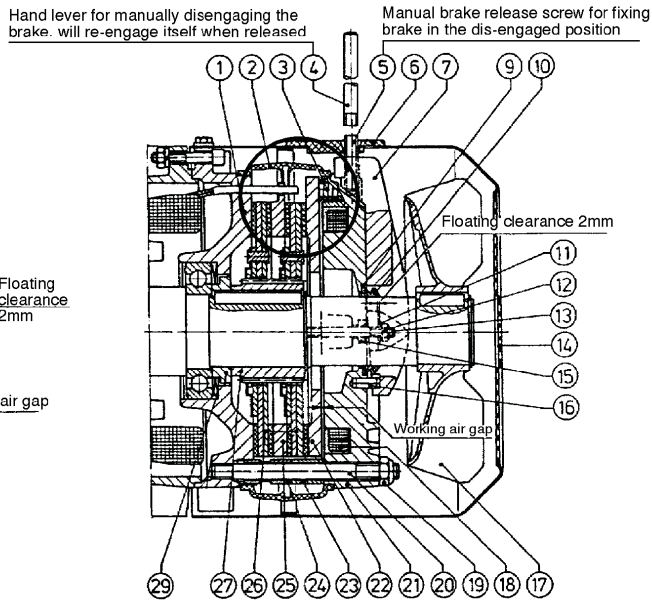
BM(G) 05 - BM 15

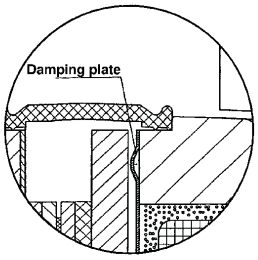


BM 30/31



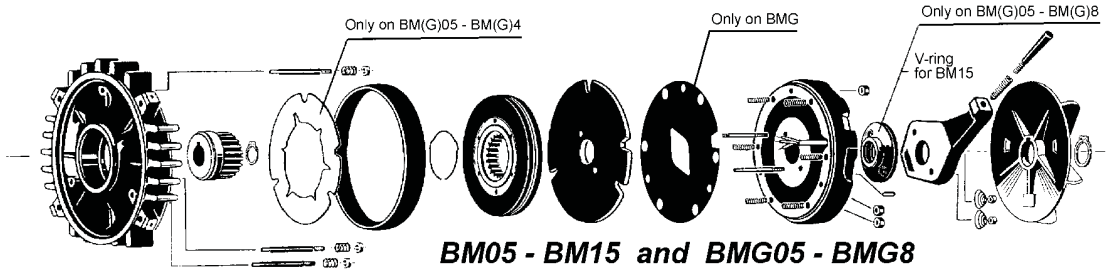
BM 32/62





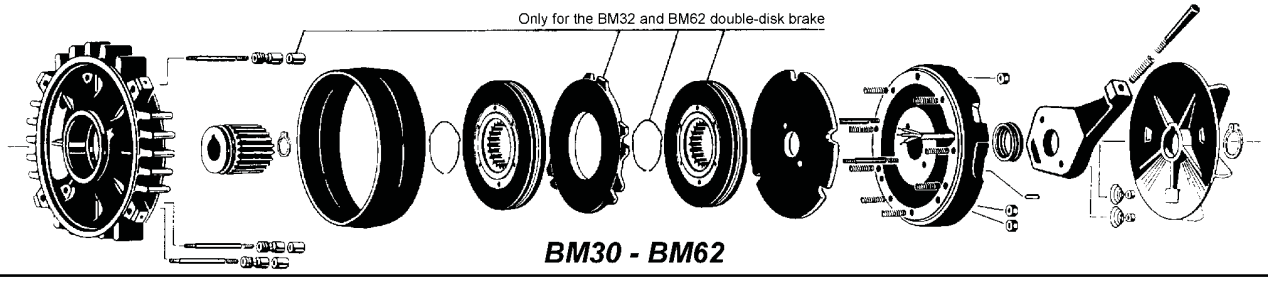
(1) Brake end shield
(2) Rubber sealing collar
(3) Braking springs
(4) Hand release lever
(5) Releasing screw
(6) Closing plate
(7) Release arm
(9) Sealing ring
(10) V-ring
(11) Conical spring
(12) Release
(13) Stud
(14) Fanguard
(15) Grommet
(16) Dowel pin
(17) Fan
(18) N/A
(19) Brake adjustment nut
(20) Retaining stud
(21) Brake coil body
(22) Stationary disc
(23) Pressure ring
(24) Setting sleeve
(25) Dual brake pad stationary disc
(26) Brake disc complete
(27) Carrier
(29) Cup Spring

Exploded view of the BM and BMG single-disk brake (motor sizes 71-160M)



BM05 - BM15 and BMG05 - BMG8

Exploded view of the BM single-disk and double-disk brake (motor sizes 160L-225)



BM30 - BM62

Troubleshooting Chart

PROBLEM	CAUSE	REMEDY
Motor Overheats (Check temperature with instrumentation)	Motor not connected for proper supply voltage	Check connection diagram on conduit box cover and correct the wiring.
	Supply voltage varies outside the allowable tolerance causing an undervoltage or overvoltage condition.	Assure correct supply voltage.
	Insufficient cooling air volume due to: a. Low frequency operation on variable frequency drive. b. Obstructed air flow.	Increase air flow: a. Continuous running auxiliary fan. b. Ensure unobstructed air flow.
	Ambient temperature is too high.	Ensure cool air gets to the motor. Ducting may be required.
	Overload at rated voltage. Unit will draw current in excess of nameplate rating and run below rated speed.	Select a larger unit.
	Motor's allowable duty cycle is exceeded (too many starts per hour required).	The problem may or may not be solved with a larger motor. Contact SEW-Eurodrive.
	Single phasing due to break or loose connection in supply line or blown fuse.	Repair supply lines. Replace fuses.
Motor does not run.	Blown fuse.	Determine and correct cause of failure and replace fuse.
	Motor protection device activated.	Reset protective device. Identify and correct cause for device activation.
	Motor protection device faulty or will not reset.	Check protection device for faults.
Motor will not start or starts sluggishly.	Motor not connnected for proper voltage.	Check connection diagram in conduit box cover and correct the wiring.
	Large voltage and/or frequency fluctuation at starting.	Ensure stable power supply.
For reduced voltage starting, motor will not start in Star Connection but will start in Delta connection.	Insufficient torque in Star Connection.	Start motor directly in Delta Connection if possible. Otherwise use a larger motor.
	Faulty contact in Star/Delta starter.	Correct fault condition.
Motor hums and draws high current.	Faulty or defective winding.	Have motor repaired by qualified service shop.
	Rotor dragging.	
Fuses blow or motor overcurrent protection trips immediately.	Short circuit in power supply conductors or in the motor.	Correct the fault condition.
	Motor has ground fault or winding to winding short circuit.	Have motor repaired by qualified service shop.
	Motor improperly connected.	Check connection diagram in conduit box cover and correct the wiring.
Motor runs in wrong direction.	Motor supply leads misconnected.	Switch two supply leads.

Note: If, after proceeding through the Troubleshooting Chart, the motor is found to be defective, contact your nearest SEW-Eurodrive Assembly Center for warranty assistance or replacement parts.

AM Adapter NEMA Size 56-365
and IEC Size 63-280

OPERATING INSTRUCTIONS
23 755 01 US

GENERAL

This operating instruction pertains to the mounting of NEMA "TC" and IEC type motors to the AM adapter. The AM adapter is used to mount NEMA type "TC" or IEC flanged motors to SEW-Eurodrive gear reducers. The AM adapter has been designed to allow easy mounting of the motor to the adapter. The AM size corresponds to the compatible NEMA and IEC motor frame designations. If you have any questions concerning this instruction, contact the nearest SEW-Eurodrive Assembly Center.

This operating instruction should be used together with the general operating instruction "Gearmotors and Gear Reducers".

INSTALLATION

With every adapter, SEW-Eurodrive supplies the motor coupling half, a key, a flexible coupling spider and mounting paste. Coat the motor shaft with the mounting paste supplied by SEW (a food grade version, USDA H1, is available upon request). The use of the paste will aid in the mounting of the motor coupling half as well as allow for easier removal of the motor coupling at a later date.

NOTE: The motor coupling must be mounted with the supplied parts. Failure to use the supplied parts could void the SEW-Eurodrive Warranty.

The mounting instructions for the motor coupling half are as follows. Refer to the diagram(s) to the right.

Remove any dirt or adhesive residue from the motor shaft. Apply the SEW supplied mounting paste to the motor shaft.

The SEW supplied key is to be placed in the motor keyway and should be located under the motor coupling.

NOTE: The key is not to extend beyond the coupling bore on the EITHER side.

NEMA Adapter Sizes AM56-AM365

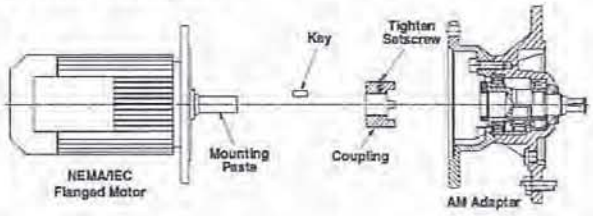
- The motor coupling is to be mounted on the motor shaft and is to be located accordingly (see chart).

IEC Adapter Sizes AM63-AM280

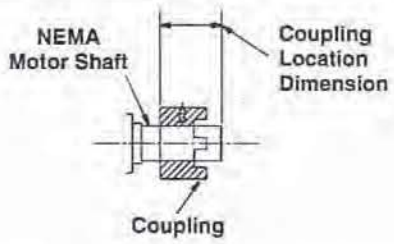
- The motor coupling is to be mounted on the motor shaft and is to be located against the shoulder.

Tighten the setscrew located on the motor coupling.

Place the flexible motor spider between the jaws of the motor coupling. Align the motor coupling so that the jaws on the reducer coupling mesh with the motor coupling. The motor shaft will extend into the bore of the reducer coupling. Secure the flanged motor to the AM adapter with the required hardware specified by the motor manufacturer.



NEMA Adapter Coupling Location



SEW Adapter Size	NEMA Motor Frame	*Coupling Location Dimension (in.)
AM56	56C	1.23
AM143/145	143/145TC	1.68
AM182/184	182/184TC	2.10
AM213/215	213/215TC	2.76
AM254/256	254/256TC	3.65
AM284/286	284/286TC	4.00
AM324/326	324/326TC	3.88
AM364/365	364/365TC	4.51

*Coupling Location Dimension Tolerance is -0.0 / +0.03125

NOTE: For mounting a motor other than a type "TC" NEMA motor to the NEMA AM adapter, please see operation instruction #23 756 00 US.

SEW EURODRIVE

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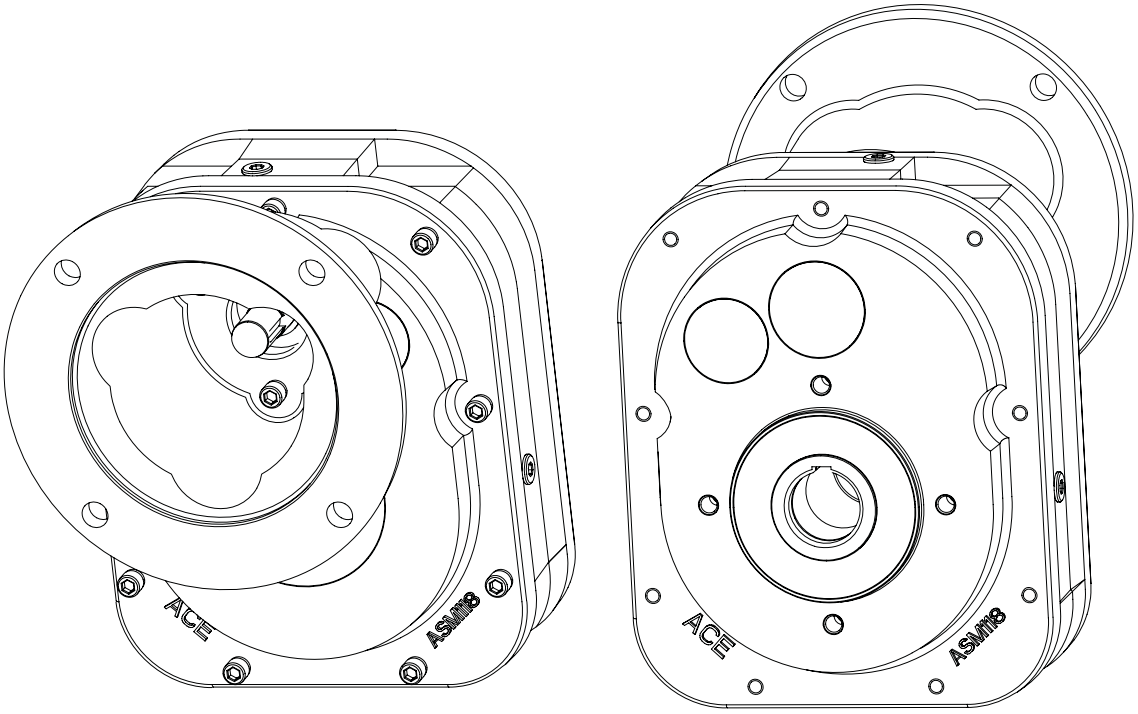
ASM118 Installation and Maintenance Manual



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Introduction

Designed exclusively for the crane and hoist industry, the ASM118 encompasses features required to excel in such a demanding application:

- Tough, rugged, steel cast housing.
- Heat treated, alloy steel gearing.
- Large, oversized bearings.
- Standard NEMA motor adaptors.

To operate trouble-free, the ASM118 relies on rugged design and construction as well as proper installation and maintenance. The following provides important installation and maintenance information for the ASM118 that will help achieve trouble-free service.

Installation and Initial Run-in

Careful attention must be given to the pre-installation checks, installation, and initial run-in of the ASM118.

Pre-Installation Checks

Prior to installation of the ASM118, verify that the nameplate information listed on the unit matches the application requirements. Verify the power rating of the unit, the ratio, the mounting position, and the hollow bore size, comparing these items to the application requirements. If a discrepancy exists, contact the factory prior to installation and operation. Record the nameplate information on page 6 of this manual for future reference.

Visually check the reducer for damage that may have occurred during shipping. Do not install or operate any unit that has been damaged during shipping.

The ASM118 is factory filled with lubricant prior to shipment. Unless otherwise specified, the unit is filled with Mobilgear 630 at the level corresponding to an M1 mounting position. Check the oil level of the unit to insure that it contains the proper amount of lubricant for the actual installed mounting position. If the oil level is low, then add lubricant as specified in figure 1 and table 4.

Installation

When lifting the ASM118, do not lift by the motor or motor flange. It is best to place a strap around the reducer and lift the unit by the housing. To avoid injury, do not lift heavy objects by hand.

⚠ WARNING

Do not lift heavy objects by hand.

Mounting Surfaces

Insure the mounting surfaces for the ASM118 conform to the following:

Hollow Shaft Mounted

- The mounting shaft must be a slip-fit in the bore of the ASM118 hollow shaft and should conform to the size recommendations found in the ASM Product Catalog.
- The mounting shaft must be free of nicks, burs, and debris that could cause damage to the reducer hollow bore.
- Lightly coat the mounting shaft with anti-seize prior to installation.

Flange Mounted

- The mounting surface must be flat and perpendicular to the ASM118 hollow bore.
- If piloted, the pilot bore must be a slip fit and should conform to the size recommendations found in the ASM Product Catalog.
- The mounting surface should be free of nicks, burs, and debris that could cause damage to the reducer or result in misalignment.
- The mounting surface must be sufficiently rigid to avoid excessive deflections during operation.

Hammering

Do not hammer the ASM118 or components mounted to the ASM118. Hammering can damage internal components or deform the housing.

⚠ CAUTION

Do not hammer ASM118 or components onto ASM118.

Tightening Torques

Follow the recommended tightening torques for mounting the unit per table 1.

	Tightening Torque at Bolt Head, in-lbf	
Bolt Size	**Grade 5**	**Grade 8**
1/4-20 UNC	100	145
5/16-18 UNC	210	300
3/8-16 UNC	370	525
7/16-14 UNC	595	840
1/2-13 UNC	905	1,280
9/16-12 UNC	1,300	1,840
5/8-11 UNC	1,800	2,540
3/4-10 UNC	3,200	4,510

Table 1 – Bolt Tightening Torques

Welding

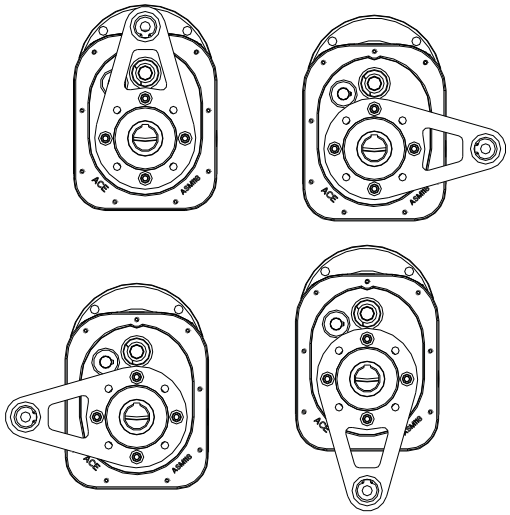
Do not weld the ASM118. Welding can cause internal distortions that are detrimental to the unit. Do not use the reducer as a ground during welding.

Overhung Loads

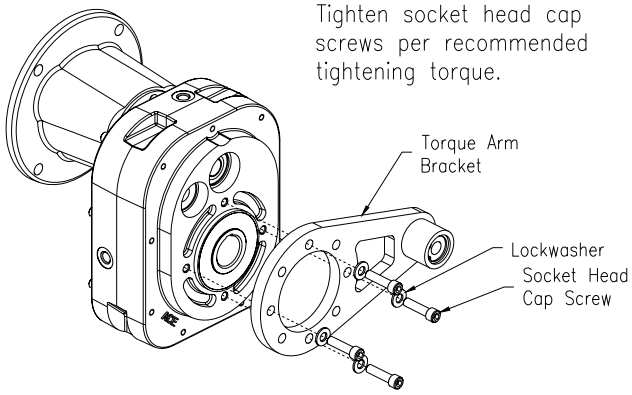
If the ASM118 is to be used with a sheave, pulley, or sprocket then insure that it is mounted as close to the housing as possible. Also, verify that the overhung load capacity of the reducer is sufficient for the application and installation.

Torque Arm

When a torque arm is required, insure that the torque arm does not over-constrain the ASM118. The factory provided torque arm adaptor may be installed in any orientation shown.



Install the torque arm bracket to the housing as shown.



Breather

The ASM118 is completely sealed and does not require a breather under normal operation conditions. If the ambient temperature exceeds 120° F, then a breather is required.

Elevated Temperatures

When the ASM118 is exposed to direct sunlight, high humidity, or installed in an enclosure that prevents air circulation, the unit may be subjected to elevated operating temperatures. If so, insure that the unit is

configured for operation at elevated temperatures.

⚠ WARNING

Install protective guards as required per applicable OSHA standards.

Run-in

It is advisable to subject the ASM118 to a partial load run-in period prior to operating the unit at full load. Operate the ASM118 at no more than 50% full load for 4 hours. After run-in, recheck the installation for proper alignment, tighten any loose bolts, and visually inspect the unit.

During normal operation, the ASM118 can reach temperatures that can cause injury. Do not touch these surfaces when the unit is hot.

⚠ WARNING

Do not touch hot surfaces.

Maintenance

Long, trouble-free operation of the ASM118 relies heavily on regular and thorough maintenance. Items to be addressed include lubrication types, lubricant levels, maintenance schedules, and seasonal temperature affects.

Refer to the lubricant manufacturer's product safety data sheets for proper handling and storage of lubricants. Failure to do so could result in personal, property, and environmental damage.

⚠ WARNING

Handle and store lubricants according to manufacturer's recommendations.

Lubrication Types

The ASM118 is factory filled with Mobilgear 630. Optional synthetic lubricants are available for extreme temperature applications. Completely drain and refill the unit if using a different brand or viscosity lubricant other than the factory standard. Table 2 identifies lubricant viscosity requirements and table 3 identifies alternative manufacturer's products.

The lubricants in table 3 are not recommended for food and drug applications where a potential for incidental contact between the ASM118 lubricant and the product exists.

The ASM118 standard seals are not guaranteed to be compatible with all synthetic lubricants listed in table 3. If synthetic based lubricants are required for the application, use fluorocarbon seals or consult the seal manufacturer for compatibility with synthetic based lubricants.

⚠ CAUTION

Dispose of used lubricants according to federal, state, and local rules and regulations.

Lubricant Levels

Maintaining the proper oil level insures that all components of the ASM118 receive adequate lubrication for long, trouble-free operation. Figure 1 and table 4 provide the ASM118 lubrication levels and volumes for various mounting positions.

If it is discovered that the oil level is higher than recommended, have the lubricant analyzed for water content. The water content should not exceed 0.05%. If the water content exceeds allowable levels then:

- Determine how water is entering the unit and remedy the condition.
- Drain the unit and inspect for damage, repair if needed.

- ❑ Flush and re-fill the unit with the proper lubricant.

Do not overfill the ASM118. Exceeding the recommended oil level could result in leakage, seal failure, hard-starts, and over-heating.

Maintenance Schedules

The severity of the operating environment plays a large role in determining maintenance intervals of the ASM118. The following general maintenance schedule provides a minimum guideline if an existing, application-based maintenance schedule does not exist.

During normal operation, the ASM118 can reach temperatures that can cause injury. Do not touch these surfaces when the unit is hot.

⚠ WARNING

Do not touch hot surfaces.

After the First Week

After the ASM118 has operated for one week:

- ❑ Check the installation for alignment and rigidity.
- ❑ Re-tighten any loose bolts to the proper tightening torque.
- ❑ Check the oil level.
- ❑ Visually check the ASM118.
- ❑ Correct any problems discovered.

After the First Month

After the first month of operating the ASM118:

- ❑ Drain and flush the unit with new oil of similar type and viscosity of the existing lubricant.
- ❑ Re-fill the ASM118 with the proper lubricant type and viscosity to the correct level.
- ❑ Visually inspect the ASM118.
- ❑ Correct any problems discovered.

⚠ CAUTION

Dispose of used lubricants according to federal, state, and local rules and regulations.

Each Month of Operation

After each month of operating the ASM118:

- ❑ Check the oil level.
- ❑ Visually inspect the unit.
- ❑ Correct any problems discovered.

Periodic Lubricant Change

Over time and use, the lubricant will degrade and its load carrying capacity will diminish. Periodic lubricant changes must be performed to flush the ASM118 of contaminants and maintain the correct lubricant viscosity.

The preferred method of determining lubricant change intervals is through periodic laboratory analysis. Your lubricant supplier can recommend a testing facility for lubricant analysis. If lubricant analysis is not performed, then change the lubricant per the following schedules:

- ❑ Petroleum based lubricants should be changed every 2,500 hours of use or every six (6) months, whichever occurs first.
- ❑ Synthetic based lubricants should be changed every 10,000 hours of use or every two (2) years, whichever comes first.

During normal operation, the ASM118 can reach temperatures that can cause injury. Do not touch these surfaces when the unit is hot.

⚠ WARNING

Do not touch hot surfaces.

Seasonal Temperature Affects

Certain applications may experience seasonal temperature variations that require different lubricant viscosities at different times of the year. It is important to insure that the correct lubricant viscosity is used throughout the year. A lubricant with too heavy a viscosity may produce high starting loads and inadequate lubrication of high-speed bearings and gears. A lubricant with too light a viscosity may not provide adequate load capacity, resulting in unit overheating and pre-mature bearing and gear failures. Refer to tables 2 and 3 for recommended lubricant viscosities and products.

Nameplate Information

The following figure provides a convenient place to record the nameplate information from your AMS118. This information is important when identifying spare parts or requesting technical assistance.

Additional Information and Notes:

Fort Worth, TX USA

UNIT TYPE: _____ HP @ 1750

SERIAL NUM: _____ RATIO

LUBE: _____

Lubrication Tables and Figures

	Recommended ISO Viscosity Grade	
Ambient Temperature (°F)	**Petroleum Based Lubricants**	**Synthetic Based Lubricants**
-40 to 15	*Not Recommended*	150
15 to 50	150	220
50 to 95	220	220
95 to 120	*Not Recommended*	320

Table 2 – Recommended ISO Viscosity Grades

		Lubricant Product Name	
Manufacturer	**ISO Viscosity Grade**	**Petroleum Based**	**Synthetic Based**
Mobil	150	Mobilgear 629 (1)	Mobilgear SHC 150 (1)
	220	Mobilgear 630 (1) (2)	Mobilgear SHC 220 (1) (3)
	320	*Not Recommended*	Mobilgear SHC 320
Texaco	150	Meropa 150	Pinnacle EP 150 (1)
	220	Meropa 220	Pinnacle EP 220 (1)
	320	*Not Recommended*	Pinnacle EP 320
Shell	150	Omala 150	Omala RL 150
	220	Omala 220	Omala RL 220
	320	Not Recommended	Omala RL 320

(1) Denotes Extreme Pressure Lubricant. EP Lubricants are preferred over non-EP lubricants.
(2) Denotes ASM118 Standard Factory Petroleum Based Lubricant
(3) Denotes ASM118 Standard Optional Factory Synthetic Based Lubricant

Table 3 – Recommended Lubricants

Mounting Position	**Lubricant Volume, ounces**
M1 (1)	14
M2	32
M3	33
M4	32
M5	22
M6	22

(1) Denotes Factory Filled Lubricant Volume for Unspecified Mounting Positions

Table 4 – Lubricant Volumes at Various Mounting Positions

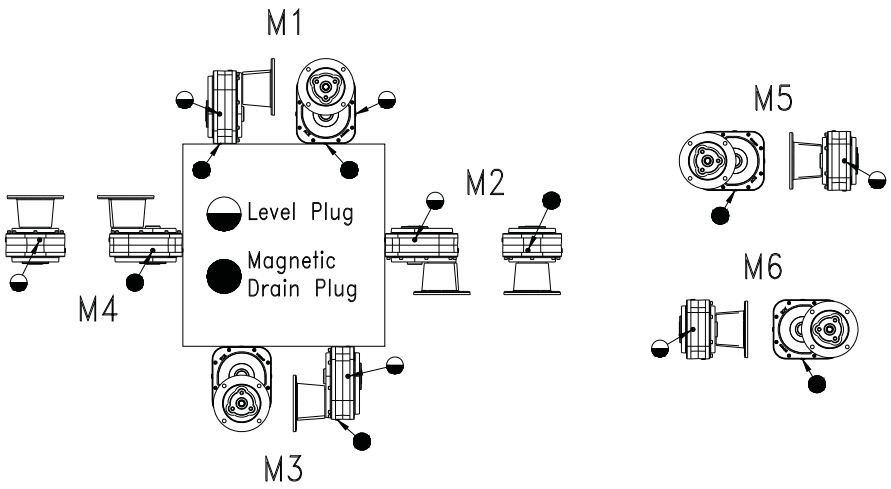


Figure 1 – Lubricant Level and Drain Locations at Various Mounting Positions

Long Term Storage

If a unit is inactive or stored for long periods, then the unit must be prepared for long-term storage:

- Drain the lubricant and coat the inside with rust preventative oil that is soluble in lubricating oil. Completely seal the unit from the environment by removing any vented plugs or breathers and replacing them with the factory recommended drain plugs.
- Grease all seals with mineral based NLGI #2 grease.
- Apply a thin coat of rust preventative to the exposed metal surfaces of the housing and shafting.
- Every month, rotate all shafts at least one complete revolution to insure that the rust preventative coating covers all components.
- Inspect stored units every six months and re-apply rust preventative and grease as required.
- It is recommended to store the ASM118 indoors.

Before returning the unit into operation:

- Flush the unit with new lubricant and fill to the proper level. Refer to tables 2 through 4 and figure 1.
- Wipe excessive grease and rust-preventative from the housing and shafting.
- Visually inspect the unit and check all bolts for proper tightening torque.
- Check for gear or bearing damage by rotating all the ASM118 shafting a minimum of one revolution.

Repair, Assembly, and Disassembly

Refer to the ASM118 Parts and Repair Manual for information regarding the repair, assembly, and disassembly of the ASM118.

Factory Information

The ASM118 is proudly manufactured and assembled in the USA by ACE World Companies, Inc.

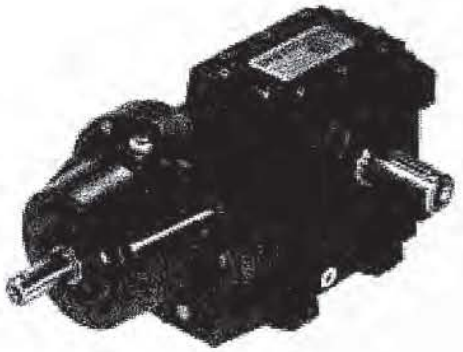
ACE World Companies, Inc.
10200 Jacksboro Hwy
Fort Worth, TX 76135
Tel: 817-237-7700
Fax: 817-237-2777
www.aceworldcompanies.com

Here are additional products and services provided by ACE World Companies to help meet all your material handling needs:

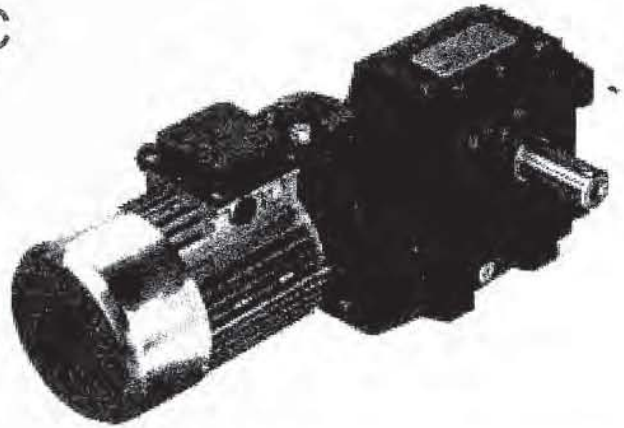
- A complete line of built-up hoists up to 700 ton and 750 hp.
- Crane design and manufacturing.
- Rebuild and re-design of hoist and special application reducers.
- Custom gear reducer design and manufacturing capabilities.
- Complete electrical packages, including variable frequency control drives.
- Replacement top-running and under-hung trolley/hoists.
- Standard and custom designed end-trucks.
- Special machinery projects.

10200 JACKSBORO HWY.,FORT WORTH,TEXAS 76135
PH: (817) 237-7700 FAX: (817) 237-2777
WEBSITE: WWW.ACEWORLDCOMPANIES.COM

REGISTERED ISO 9001 COMPANY



B - IB - C



Warehouse storage

When moving the unit, care should be taken to protect external parts from breakage or damage due to accidental knocks or falls.
If the unit is to be stored in a hostile atmosphere or for a long period of time (2/4 months), it is important to apply protective and waterproofing products to avoid deterioration of shafts and rubber parts.
Before starting up the unit, carry out the following checks:
Check the data shown on the name plate of the reduction unit and/or the electric motor;
Check for any leaks of lubricant
If possible, remove any traces of dirt from the shaft and from the areas around the oil seal.
If the oil seal is not immersed in the lubricant inside the assembly during particularly long storage periods (4/6 months) it is recommended that it should be replaced as the rubber might stick to the shaft or even have lost the elasticity it needs to work.

Installation

Particular care must be taken when installing drives, as this is often the source of damage and down time. Careful choice of the type of drive and mounting position can often avoid the need for protection of sensitive areas, particularly underneath the unit from oil leaks, however limited they may be.

- The machine must be firmly fastened in place in order to prevent any vibrations.
- Whenever possible, protect the reduction unit from direct sunlight and bad weather, especially when it is mounted on its vertical axis.
- Make sure the air intake on the fan side is unobstructed in order to ensure that the motor is correctly cooled.
- In the case of temperatures of < -5 °C or > +40 °C, contact Technical Assistance.
- If the motor is to be started very often under load, the use of a heat probe inserted into the motor is recommended.
- The various machine members (pulleys, gear wheels, couplings, etc.) must be mounted on the shafts using special threaded holes or other systems that ensure correct operation without risk of causing damage to the bearings or the external parts of the assemblies (fig.1).
- Lubricate the surfaces that come into contact in order to prevent oxidation or seizure.

Installation

Example of a pulley mounted correctly on the slow shaft of a reduction unit

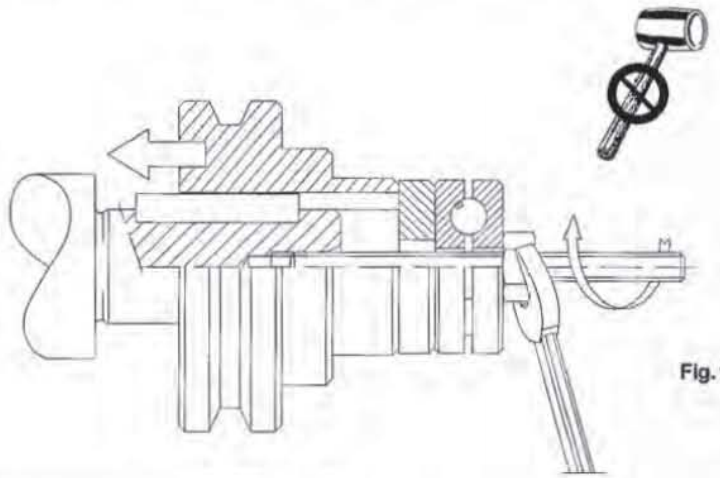


Fig. 1

Correct and incorrect examples of pulleys mounted on the main shaft of a reduction unit.

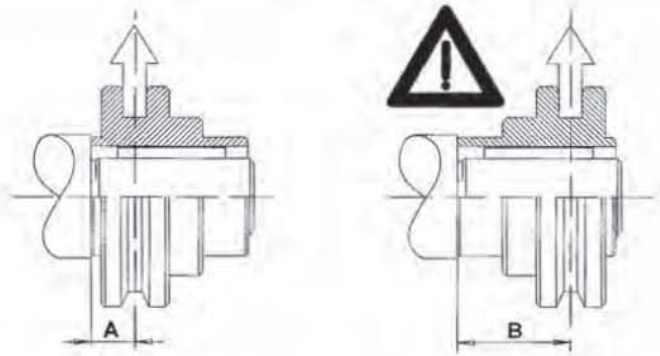
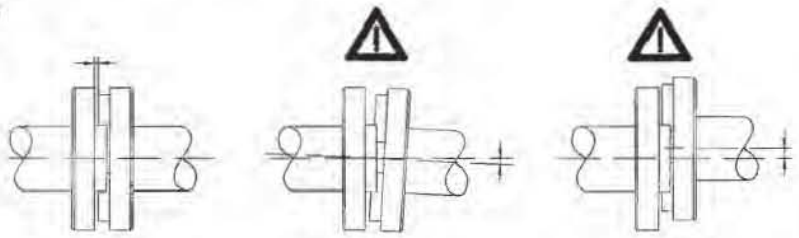


Fig. 2

Installation

Correct and incorrect examples of coupling connections.

Fig. 3



The pulley must be mounted on the main shaft as close as possible to the shoulder so that is does not cause excessive radial load on the bearings (fig. 2).Great care must be taken when connecting the couplings to ensure that they are well aligned, so as not to cause excessive radial load on the bearings (fig.3).When it is applied, paint must never be used on rubber parts: oil seal, etc. It must never be applied to any breather holes in plugs if they are mounted on the unit.In the case of assemblies with oil plugs, remove the closed cap used for transport and fit it with the breather plug that is supplied with the reduction unit.When the assembly is supplied without a motor, the following precautions must be followed in order to ensure that connections are properly made

Mounting the motor on the pam B5 flange

Check that the tolerance of the motor shaft and the motor flange comply with at least one 'normal' class of quality. Carefully clean off any trace of dirt or paint from the shaft, the centering diameter and the face of the flange. Carry out mounting operations making sure not to use force. If this is not possible, check the tolerance of the motor key and ensure that it is correctly fitted. Apply assembly grease to the shaft in order to prevent oxidation or seizure caused by contact.

Good quality motors should be used in order to ensure that the unit works correctly, without vibrations or noise.

Before mounting the unit on the machine, check that the principal shaft of the reduction unit rotates in the right direction.

Use the oil window, if present, to check that the lubricant reaches the correct level required for the mounting position used.

Starting up

The unit should be started up gradually: do not immediately apply the maximum load the machine is able to take ; look for and correct any malfunction that may be caused by incorrect mounting.

Running-in is not essential for the reduction unit to run properly since modern construction techniques for the gears and castings, the extreme cleanliness of the internal parts, and the excellent qualities of the lubricants used, ensure that the internal parts receive a high degree of protection even during the first moments.

Servicing

The high degree of finish of the internal parts ensures that the unit will work correctly with only a minimum amount of servicing

Generally speaking, the following rules should be followed: periodically check that the exterior of the assembly is clean, especially in the cooling areas; periodically check to see if there are any leaks, especially in the areas around the oil seals.

Assemblies that are lubricated for life and thus do not have any oil plugs do not require any special maintenance except as stated above.

For other assemblies, low maintenance is required with an oil change at 8/10,000 hours of use. The change of oil naturally depends on the type of environment and use to which the unit is put.

Apart from the normal maintenance rules given above, make sure the breather hole in the plug is clean and, using the oil window, periodically check that there is sufficient lubricant.

Should it be necessary to top up with lubricant, use the same type that is already in the reducer or one that is compatible with it.

In case of doubtful incompatibility between lubricants, we recommend you empty out the oil from the gearbox completely and, before refilling with new oil, wash out the unit to remove any residue.

When changing the oil, follow the previous instructions.

Troubleshooting

If any problems should arise when starting the unit or during its first few hours of operation, contact the after sales service unit of Motovario.

The table shows a series of problems with a description of possible remedies.

It should be kept in mind however that the information given is for reference only, as all the drives manufactured by Motovario are thoroughly tested and checked before they leave the factory.

Please note that tampering with the assembly without prior authorization from Motovario immediately invalidates the warranty and often makes it impossible to ascertain the causes of a defect or malfunction.

Troubleshooting

PROBLEMS	CAUSES	ACTION (1)	ACTION (2)
The motor does not start.	Problems with power supply. Defective motor. Wrong size of motor.	Check power supply.	Replace electric motor.
Current absorbed by the motor is greater than shown on the data plate.	Wrong size of motor.	Check the application.	Replace the electric motor and, if necessary, the reduction unit.
Temperature of the motor housing is very high.	Defective motor. Wrong size of motor. Incorrect mounting of motor	Check the application.	Replace the electric motor and, if necessary, the reduction unit.
Temperature of the reduction unit housing is very high.	Wrong size of reduction unit. Mounting position does not comply with the order. Incorrect mounting of motor	Check the application.	Correct the working conditions: mounting position and/or lubricant level.
Incorrect rotation speed of the main reducer unit shaft.	Incorrect reduction ratio. Incorrect polarity of motor.	Check reduction ratio. Check polarity of motor.	Replace reduction unit and/or electric motor.
Oil leak from oil seal.	Defective oil seal. Oil seal damaged during shipment. Defective motor shaft.	Replace the oil seal. Repair motor shaft (if possible).	Replace the part or return the assembly to Motovario.
Oil leak from joint.	Flat gasket or O-ring damaged.	Replace damaged gasket or O-ring.	Return the assembly to Motovario.
The main shaft rotates the wrong way.	Incorrect connection of the electric motor.	Swap two phases of the motor supply.	
Intermittent noise from the gears.	Dents in the gear wheels.	No practical problem if the noise has no effect on the application.	Return the assembly to Motovario if there is significant noise when laaded.

Troubleshooting

PROBLEMS	CAUSES	ACTION (1)	ACTION (2)
No intermittent noise from the gears.	Dirty inside the gearbox.	No practical problem if the noise has no effect on the application.	Return the assembly to Motovario if there is significant noise when laaded.
Noise (whine) from the drive assembly.	Bearings incorrectly adjusted. Gears with mesh errors. Insufficient lubricant.	Check correct quantity of lubricant.	Return the assembly to Motovario.
Electric motor vibrates.	Measurement of the assembly coupling.	Check geometric tolerance of flange on electric motor. Check tolerance and geometry of key on motor shaft.	Replace electric motor.

Critical applications

The performance given in the catalogue correspond to mounting position B3 or similar, ie. when the first stage is not entirely immersed in oil. For other mounting positions and/or particular input speeds, refer to the tables that highlight different critical situations for each size of reduction unit.
It is also necessary to take due consideration of and carefully assess the following applications by calling our Technical Service:

- As a speed increasing.
- Use in services that could be hazardous for people if the reduction unit fails.
- Applications with especially high inertia.
- Use as a lifting winch.
- Applications with high dynamic strain on the case of the reductionunit.
- In places with T° under -5°C or over 40°C.
- Use in chemically aggressive environments.
- Use in a salty environment.
- Monting positions not envisaged in the catalogue.
- Use in radioactive environments.
- Use in environments pressures other than atmospheric pressure.

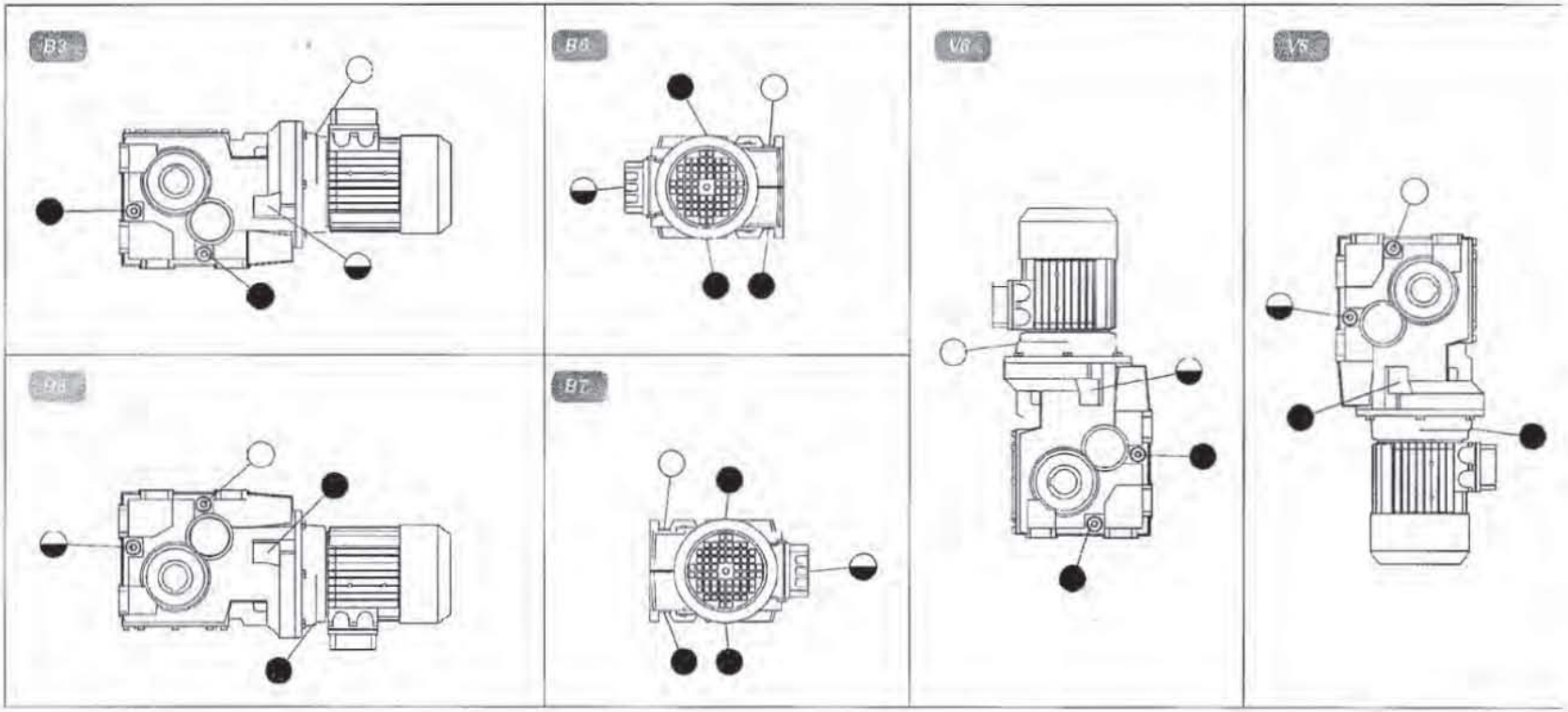
Avoid applications where even partial immersion of the reduction unit is required.

The maximum torque (*) that the gear reducer can support must not exceed two times the nominal torque (f.s.=1) stated in the performance tables. (*) intended for momentary overloads due to starting at full load, braking, shocks or other causes, particularly those that are dynamic.

B	080	100	125	140	150
2000 < n1 < 3000	-	-	B	B	B
V5 - V6	B	B	B	B	B
n1 > 3000	B	B	B	A	A
...L : B6 - B7	B	B	B	B	B

A - Application not recommended
B - Check the application and/or call our technical service

Mounting position 080÷150



- Oil fill / breather plug
- Oil level plug
- Oil drain plug

Lubrication (B-IB-CB)

In cases of ambient temperatures not envisaged in the table, call our Technical Service.
In the case of temperatures under -30°C or over 60°C it is necessary to use oil seals with special properties.
For operating ranges with temperatures under 0°C it is necessary to consider the following:

1- The motors need to be suitable for operation at the envisaged ambient temperature.
2- The power of the electric motor needs to be adequate for exceeding the higher starting torques required.
3- In the case of reduction units with a cast-iron case, pay attention to impact loads since cast iron may have problems of ragility at temperatures under -15°C.
4- During the early stages of service, problems of lubrication may arise due to the high level of viscosity taken on by the oil and so it is wise to have a few minutes of rotation under no load.

The oil needs to be changed after approximately 10,000 hours. This period depends on the type of service and the environment where the reduction unit works.
For units supplied without oil plugs, lubrication is permanent and so they need no servicing.

- I riduttori di media/grossa taglia vengono for niti privi di olio e completi dei tappi necessari a garantire tutte le posizoni di piazzamento.I sudetti riduttori vengono contraddistinti dal l'applicazione della relativa targhetta.

(I)	Attenzione: riduttore privo di lubrificante,riempire a livello prima dell'avviamento.
(GB)	Attention: gearbox unit without lubricant,fill it up to the level before starting.
(D)	Achtung : Getriebe ohne Schmierstoff, bitte vor Inbetriebnahme füllen.
(F)	Attention : groupe sans lubrifiant, remplir au niveau avant le démarrage.
(E)	Atención: grupo sin lubricante, llenar hasta el nivel antes de la puesta en marcha.

Olio minerale / Mineral oil / Mineralöl / Huile minérale / Aceite mineral.	T°C ISO VG...	(-5) ÷ (+40) ISO VG220	(-15) ÷ (+25) ISO VG150

	080	100	125	140	150
B	●	●	●	●	●

● - non lubrificato

Lubrication (B-IB-CB)

T°C ISO VG...	(-5) ÷ (+40) ISO VG220	(-15) ÷ (+25) ISO VG150
AGIP	BLASIA 220	BLASIA 150
SHELL	OMALA OIL220	OMALA OIL150
ESSO	SPARTAN EP220	SPARTAN EP150
MOBIL	MOBILGEAR 630	MOBILGEAR 629
CASTROL	ALPHA MAX 220	ALPHA MAX 150
BP	ENERGOL GR-XP220	ENERGOL GR-XP150

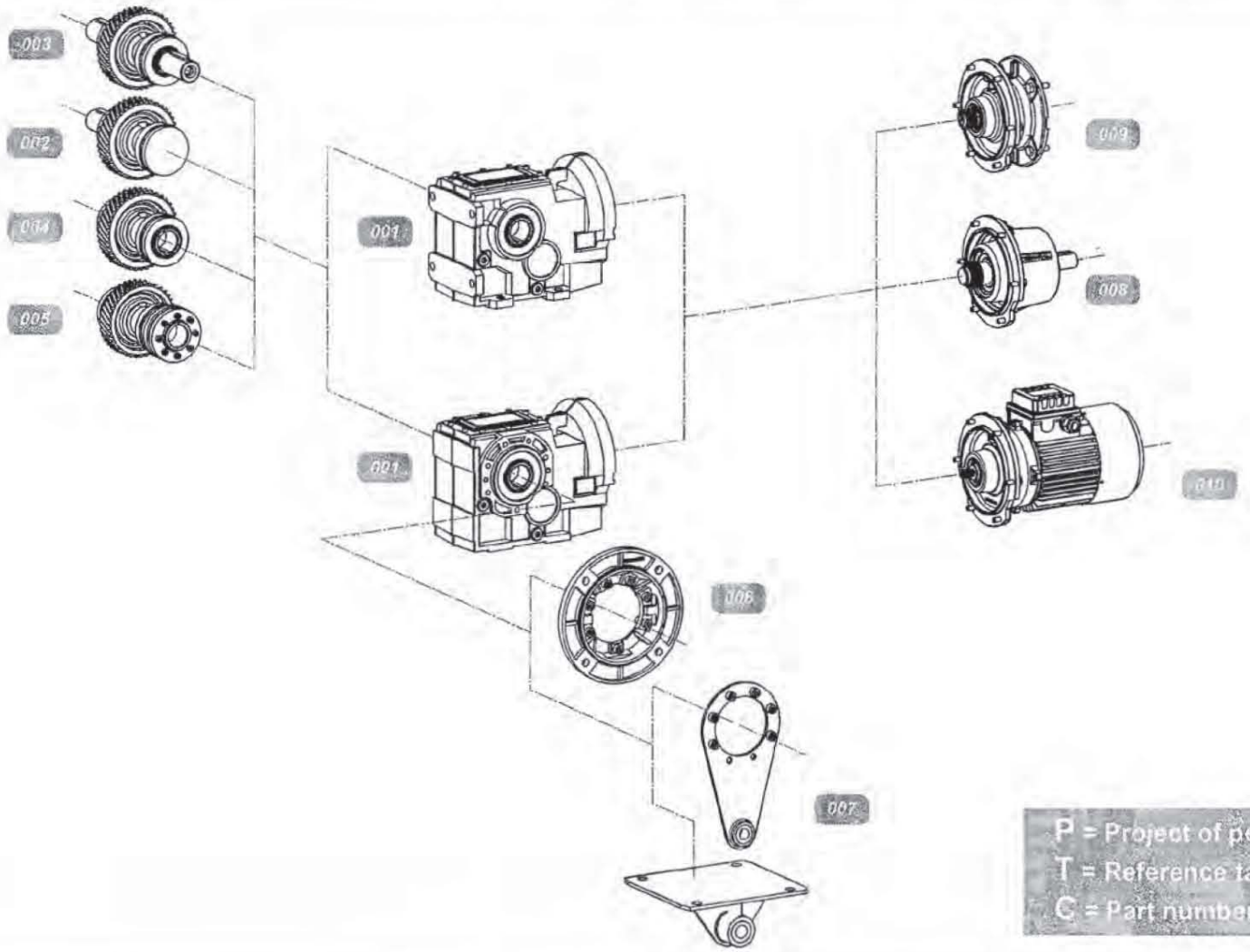
Mineral oil

B	A42	A52	A53	A72	A73
B3	0,3	0,45	0,45 + (0,13)	1	1 + (0,13)
B8					
B6-B7					
V5					
V6					

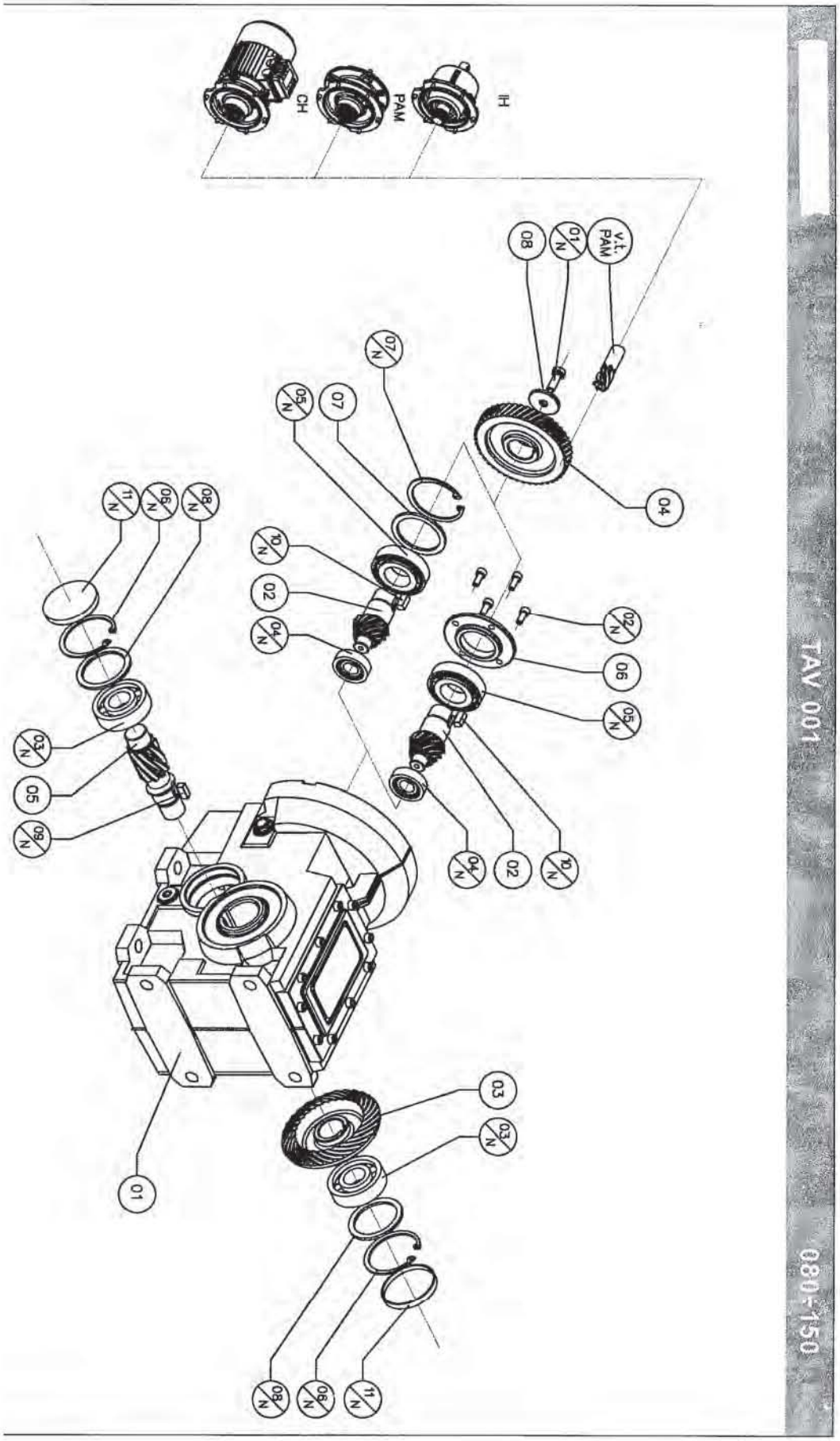
CB	A42	A52	A53	A72	A73
B3	0,2	0,3	0,3 + (0,13)	0,8	0,8 + (0,13)
B8					
B6-B7					
V5					
V6					

B - CB	083	103	123	143	153
B3	2,4	3,7	6,5	12	20
B8	3	4,6	8,2	15	25
B6-B7	2,6	4	7,2	13	22
V5	3,9	6,8	10,4	19	32
V6	2,8	4,2	6,8	12	20

- Quantity of oil in litres



P = Project of pertinence
T = Reference table
C = Part number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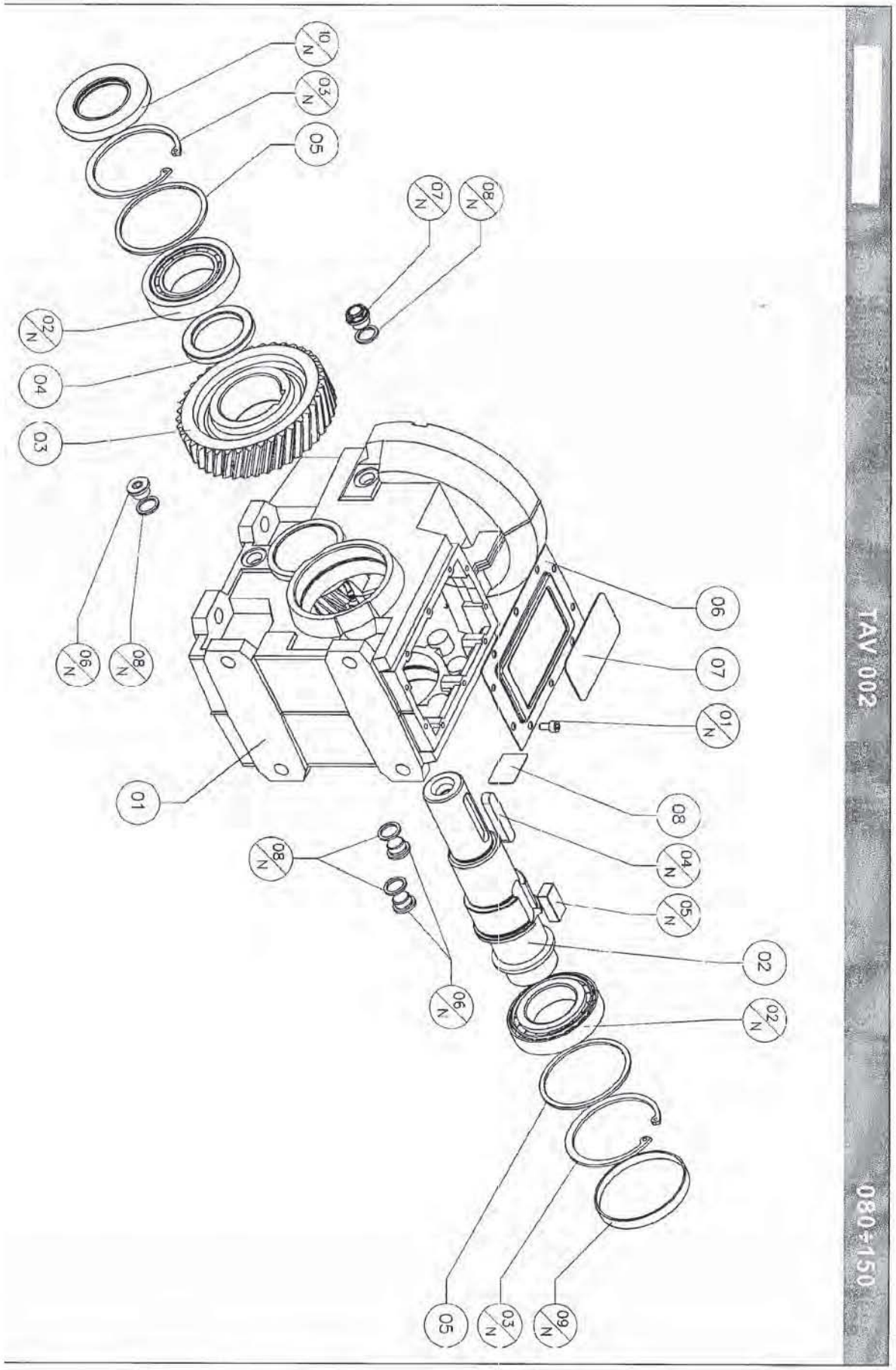
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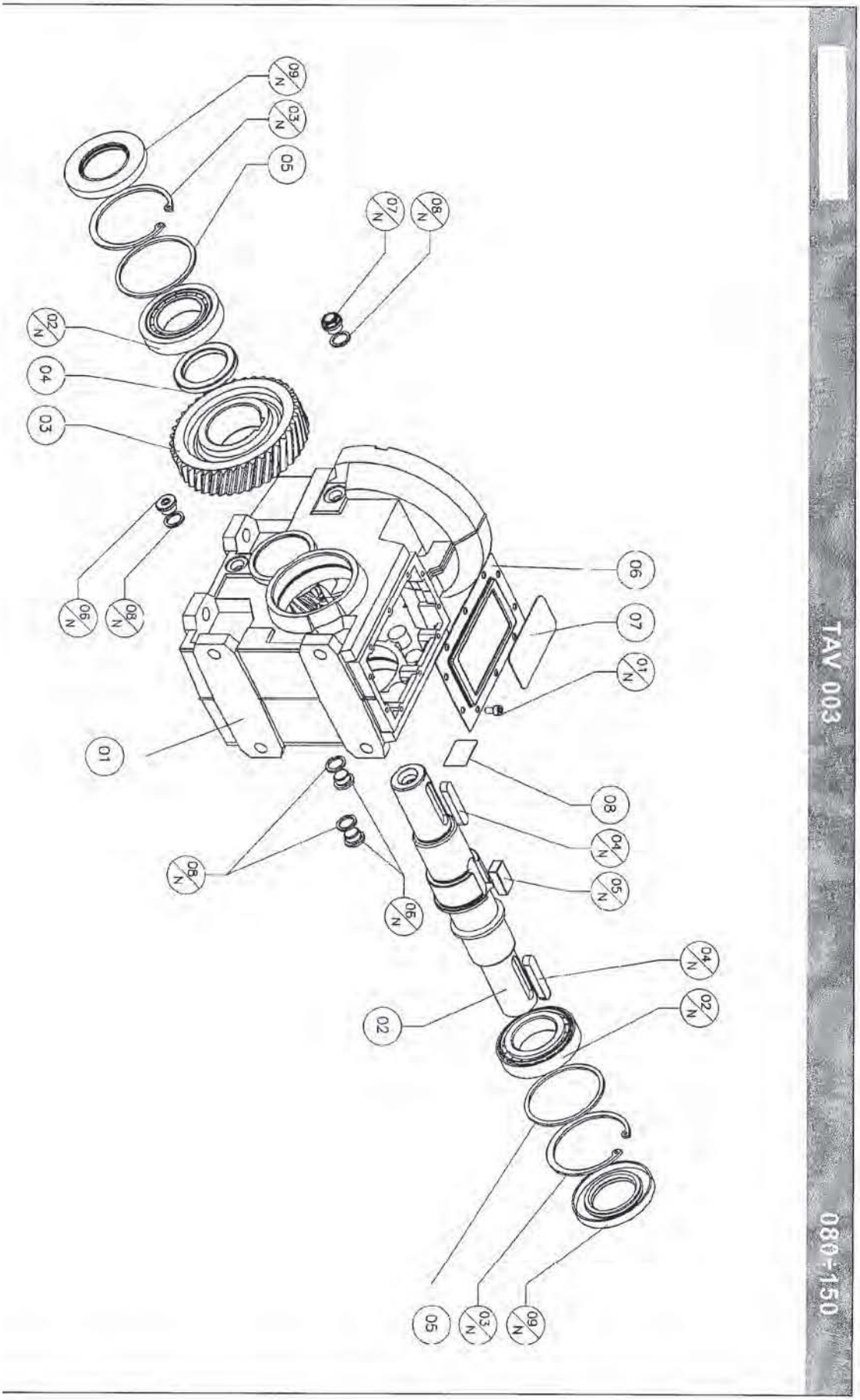
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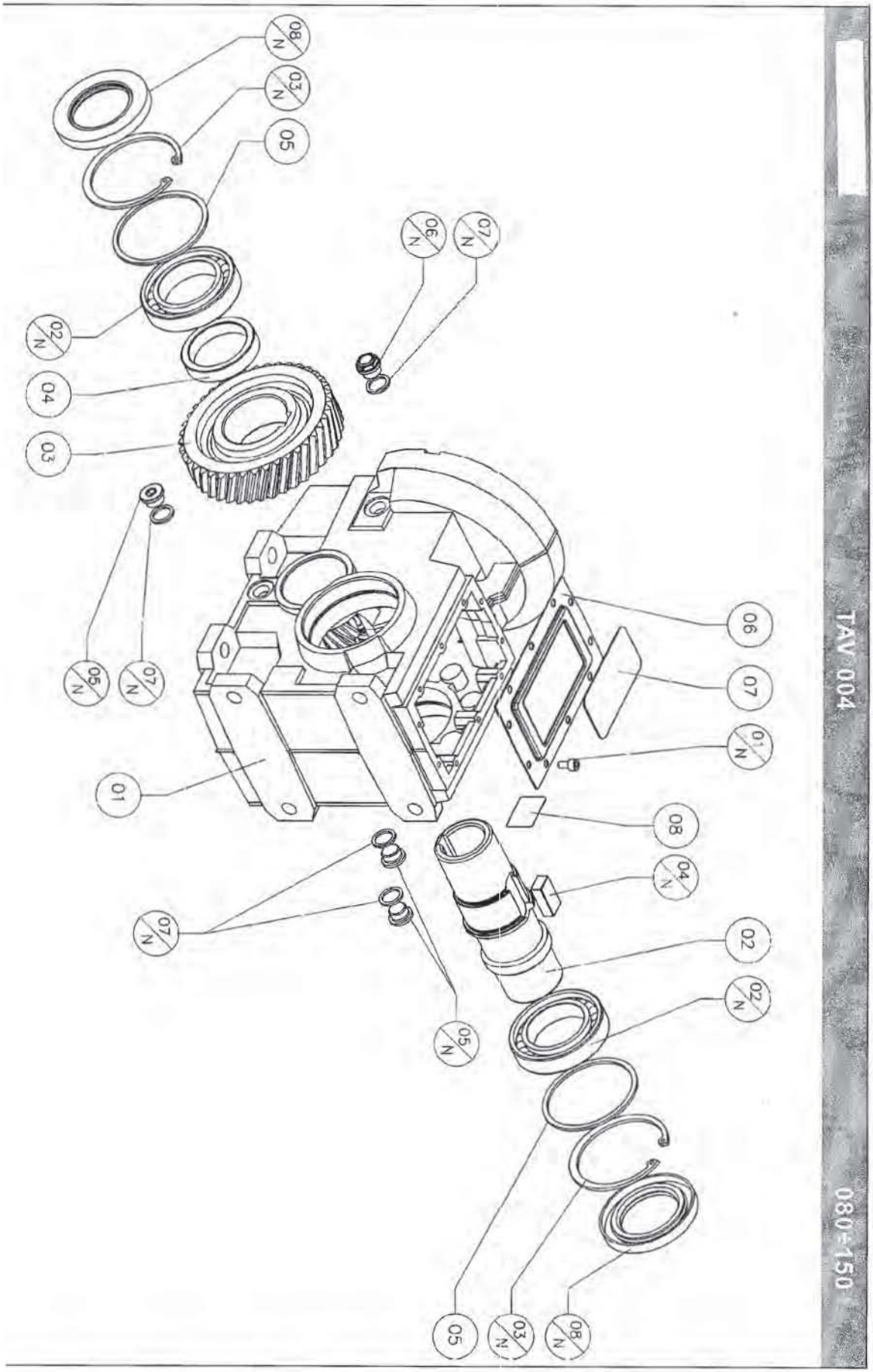
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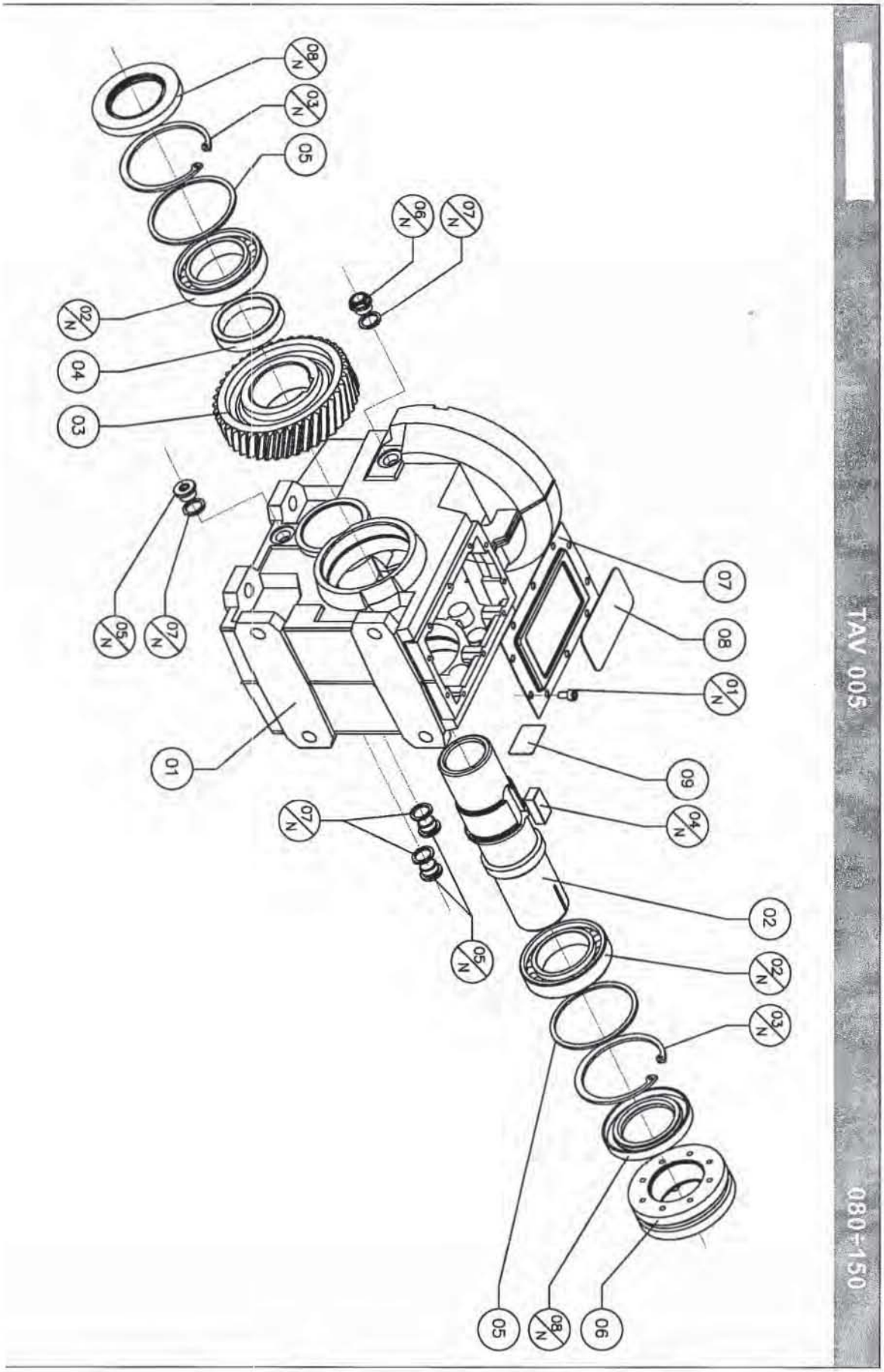
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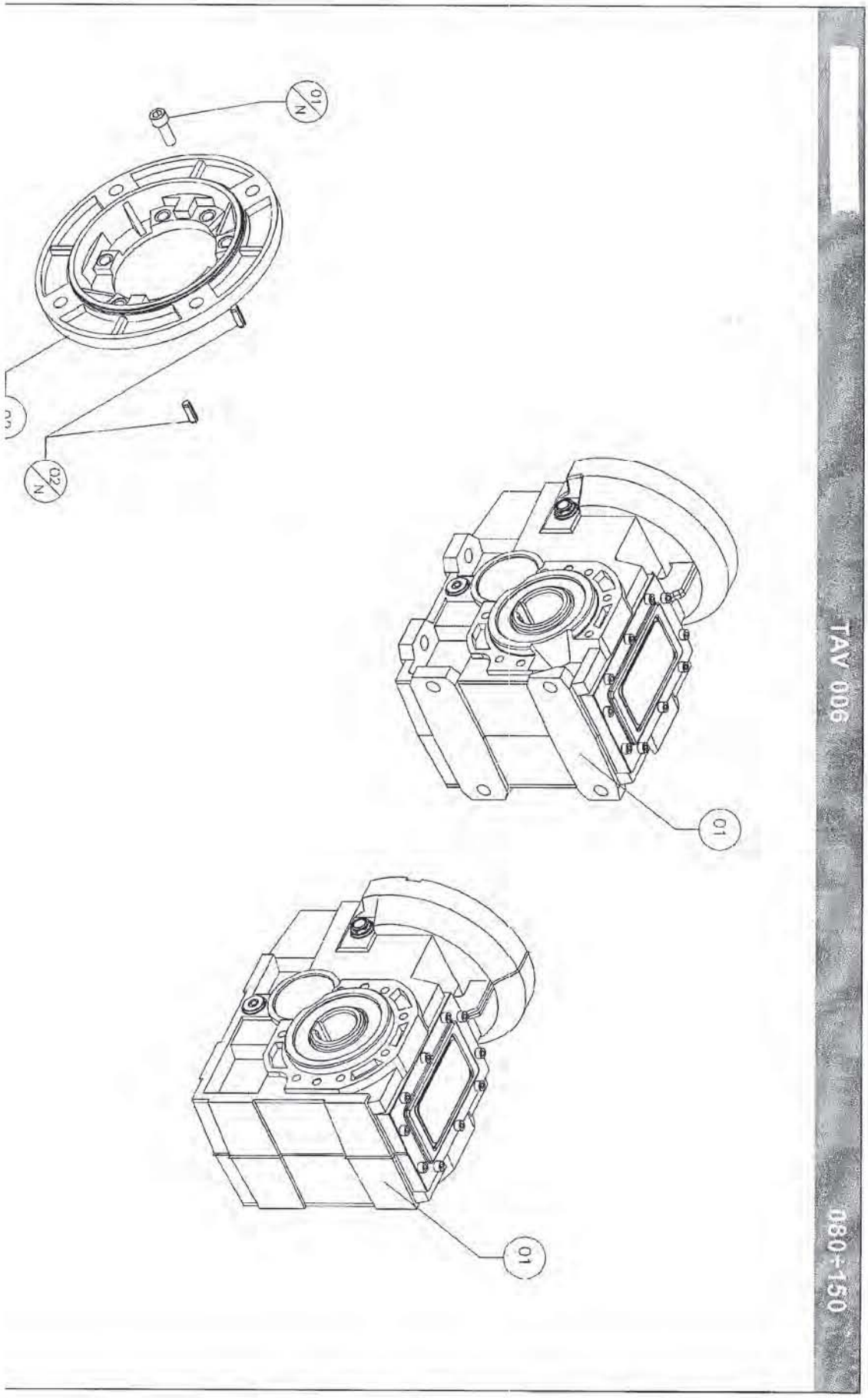
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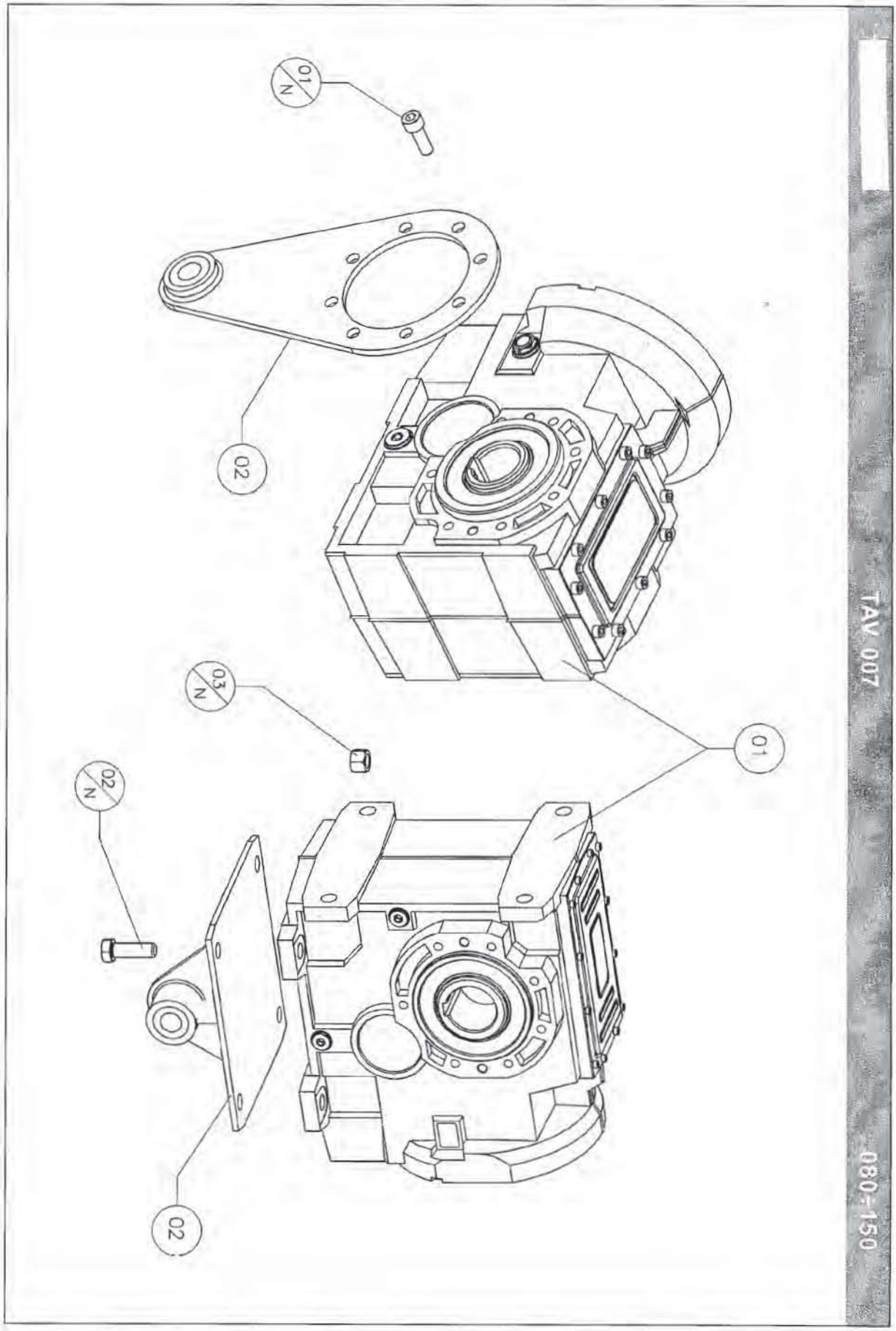
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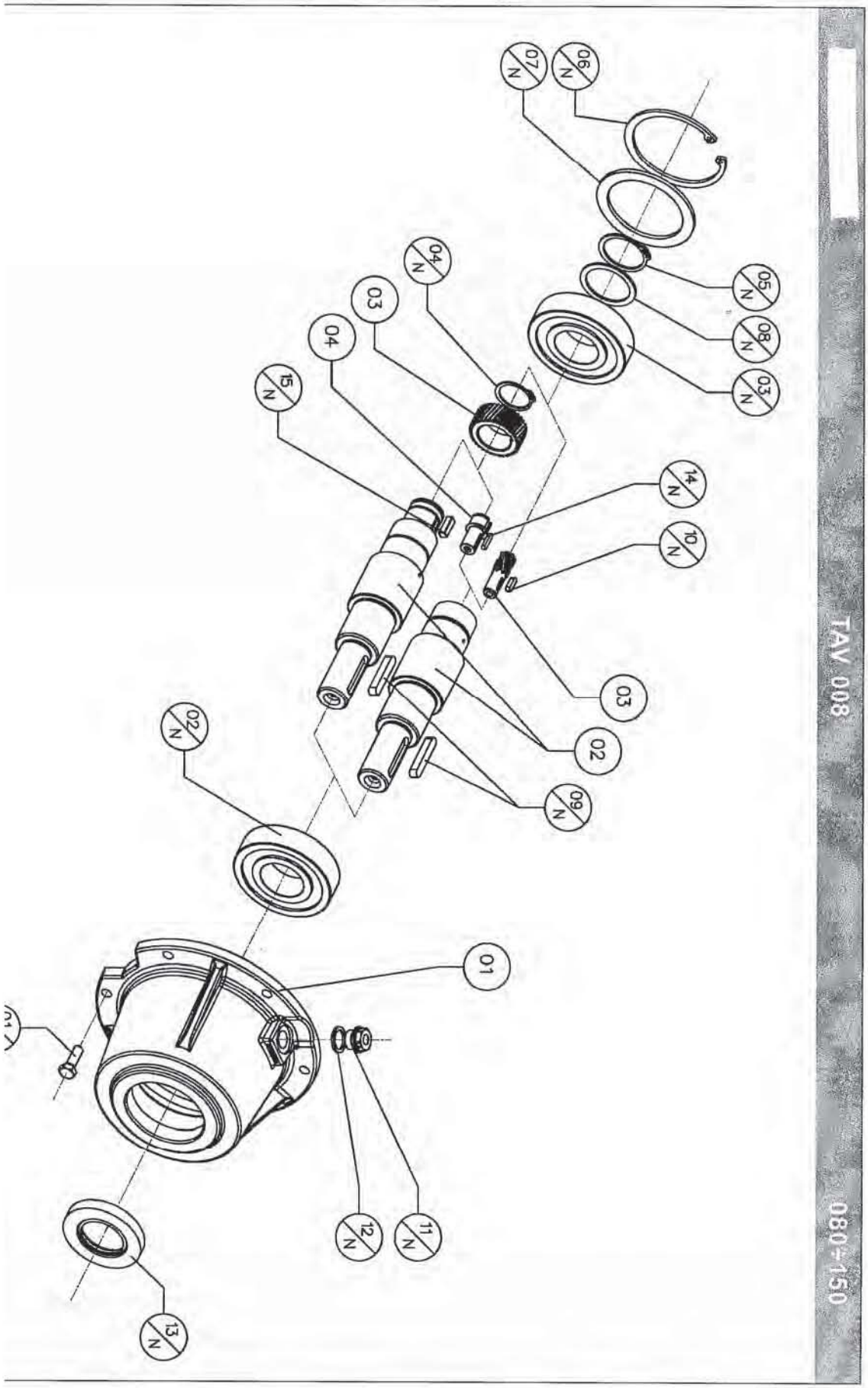
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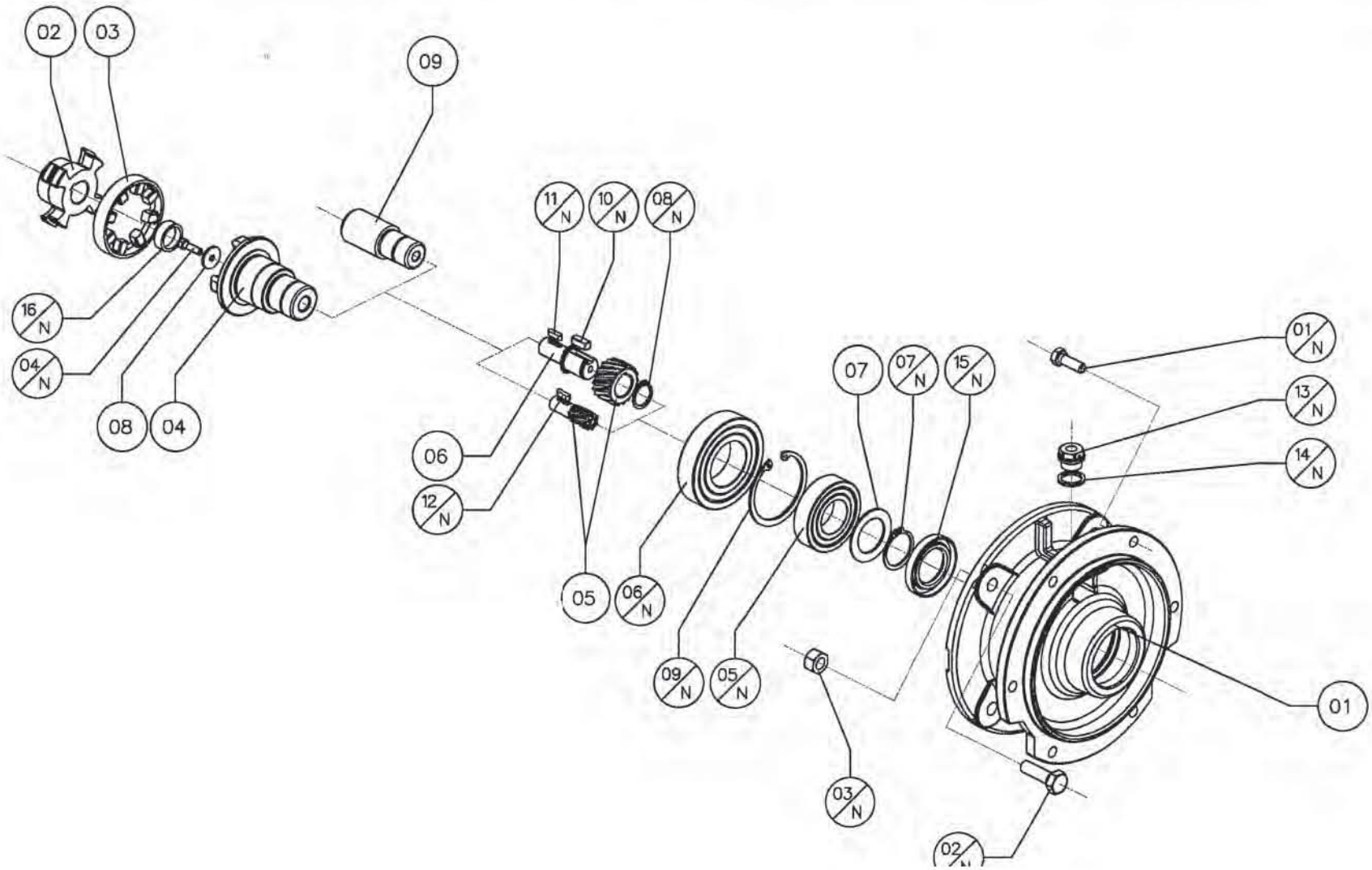
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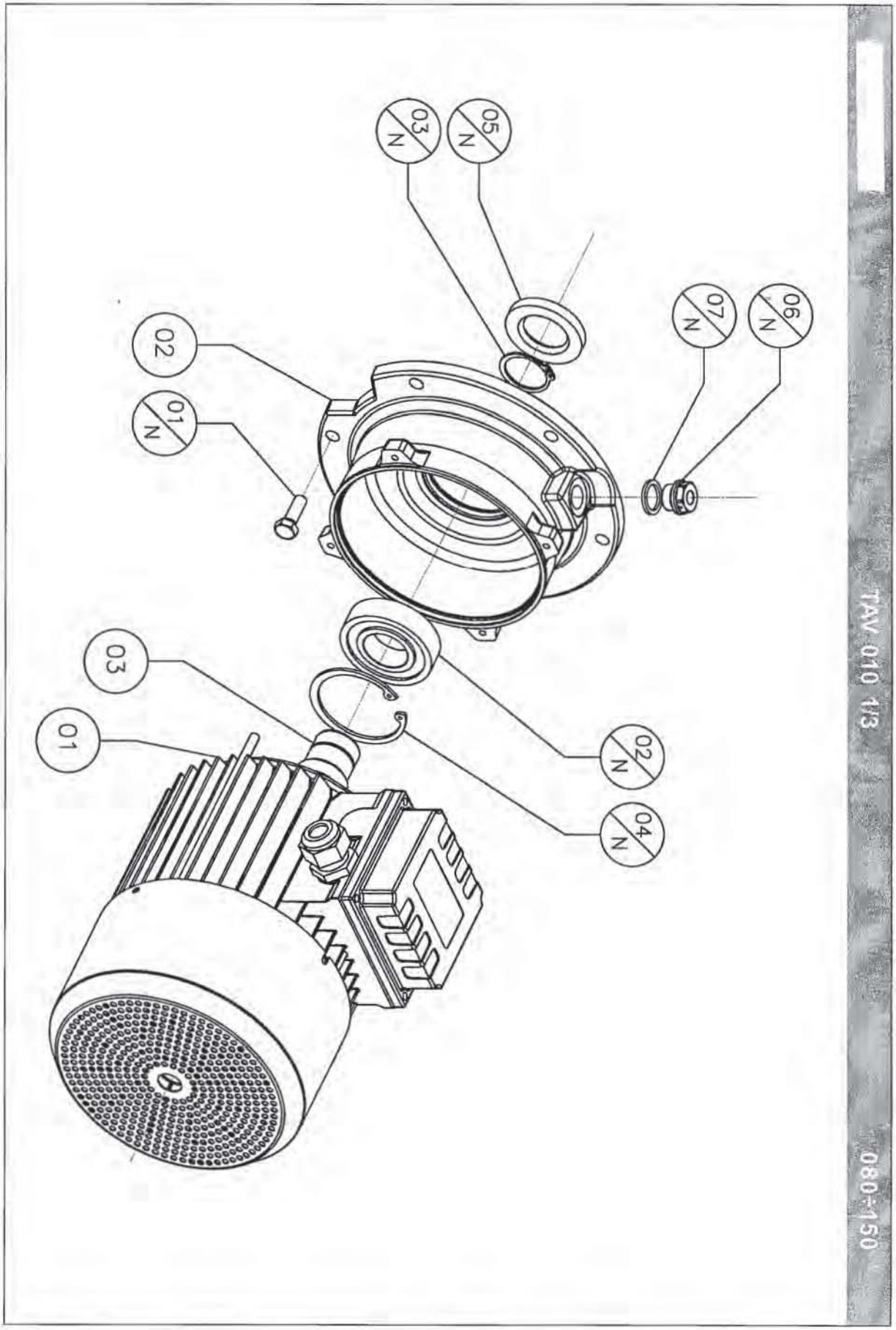
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PH: (817) 237-7700 FAX: (817) 237-2777
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REGISTERED ISO 9001 COMPANY

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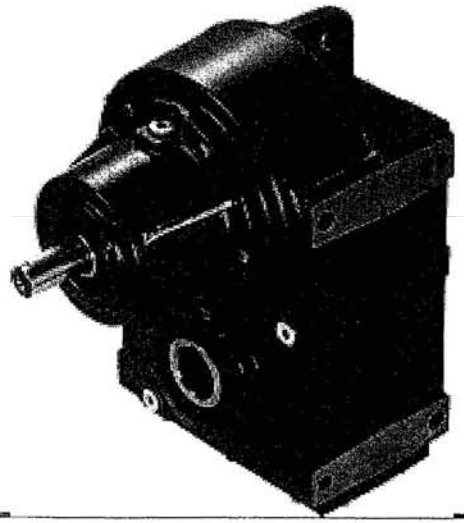
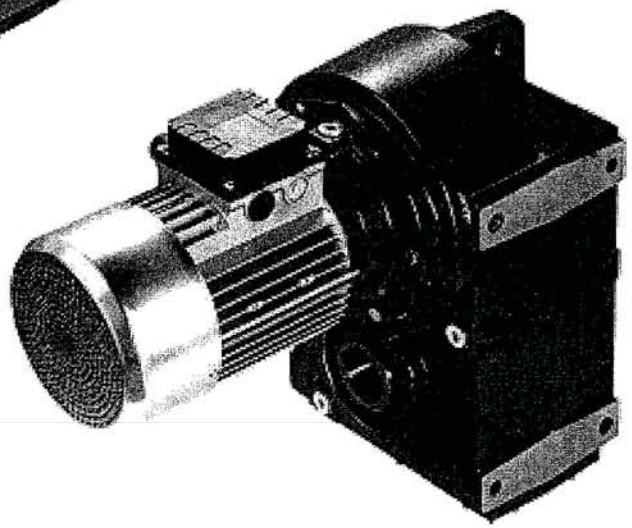




Warehouse storage

When moving the unit, care should be taken to protect external parts from breakage or damage due to accidental knocks or falls.
If the unit is to be stored in a hostile atmosphere or for a long period of time (2/4 months), it is important to apply protective and waterproofing products to avoid deterioration of shafts and rubber parts.
Before starting up the unit, carry out the following checks:
Check the data shown on the name plate of the reduction unit and/or the electric motor;
Check for any leaks of lubricant
If possible, remove any traces of dirt from the shaft and from the areas around the oil seal.
If the oil seal is not immersed in the lubricant inside the assembly during particularly long storage periods (4/6 months) it is recommended that it should be replaced as the rubber might stick to the shaft or even have lost the elasticity it needs to work.

Installation

Particular care must be taken when installing drives, as this is often the source of damage and down time. Careful choice of the type of drive and mounting position can often avoid the need for protection of sensitive areas, particularly underneath the unit from oil leaks, however limited they may be.

- The machine must be firmly fastened in place in order to prevent any vibrations.
- Whenever possible, protect the reduction unit from direct sunlight and bad weather, especially when it is mounted on its vertical axis.
- Make sure the air intake on the fan side is unobstructed in order to ensure that the motor is correctly cooled.
- In the case of temperatures of < -5 °C or > +40 °C, contact Technical Assistance.
- If the motor is to be started very often under load, the use of a heat probe inserted into the motor is recommended.
- The various machine members (pulleys, gear wheels, couplings, etc.) must be mounted on the shafts using special threaded holes or other systems that ensure correct operation without risk of causing damage to the bearings or the external parts of the assemblies (fig.1).
- Lubricate the surfaces that come into contact in order to prevent oxidation or seizure.

Installation

Example of a pulley mounted correctly on the slow shaft of a reduction unit

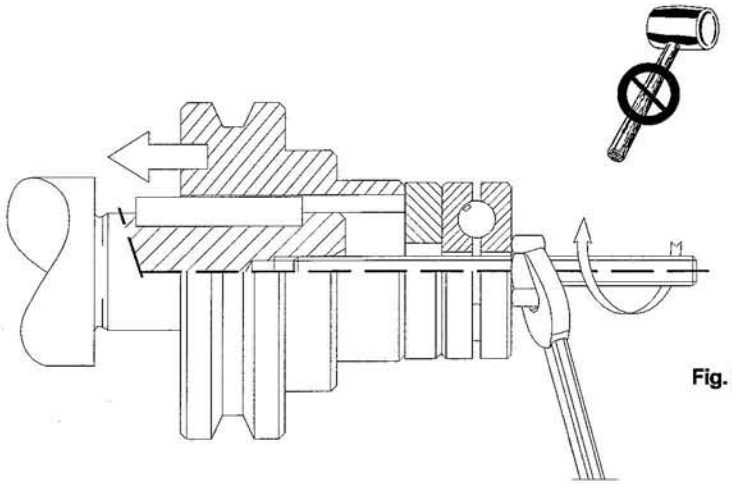


Fig. 1

Correct and incorrect examples of pulleys mounted on the main shaft of a reduction unit.

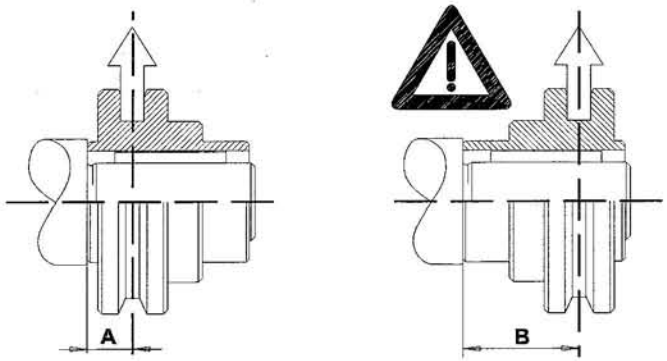
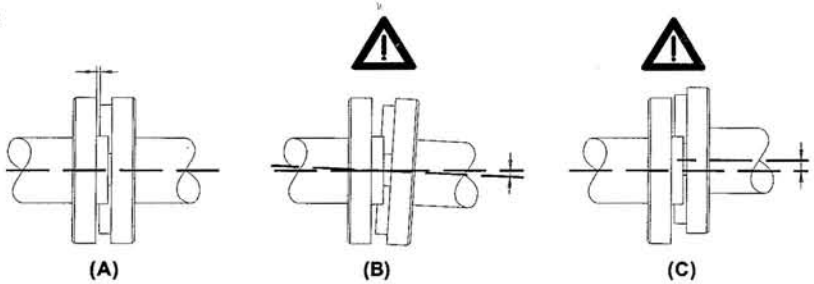


Fig. 2

Installation

Correct and incorrect examples of coupling connections.

Fig. 3



The pulley must be mounted on the main shaft as close as possible to the shoulder so that is does not cause excessive radial load on the bearings (fig. 2).Great care must be taken when connecting the couplings to ensure that they are well aligned, so as not to cause excessive radial load on the bearings (fig.3).When it is applied, paint must never be used on rubber parts: oil seal, etc. It must never be applied to any breather holes in plugs if they are mounted on the unit.In the case of assemblies with oil plugs, remove the closed cap used for transport and fit it with the breather plug that is supplied with the reduction unit.When the assembly is supplied without a motor, the following precautions must be followed in order to ensure that connections are properly made

Mounting the motor on the pam B5 flange

Check that the tolerance of the motor shaft and the motor flange comply with at least one 'normal' class of quality. Carefully clean off any trace of dirt or paint from the shaft, the centering diameter and the face of the flange. Carry out mounting operations making sure not to use force. If this is not possible, check the tolerance of the motor key and ensure that it is correctly fitted. Apply assembly grease to the shaft in order to prevent oxidation or seizure caused by contact.

Good quality motors should be used in order to ensure that the unit works correctly, without vibrations or noise.

Before mounting the unit on the machine, check that the principal shaft of the reduction unit rotates in the right direction.

Use the oil window, if present, to check that the lubricant reaches the correct level required for the mounting position used.

Starting up

The unit should be started up gradually: do not immediately apply the maximum load the machine is able to take ; look for and correct any malfunction that may be caused by incorrect mounting.

Running-in is not essential for the reduction unit to run properly since modern construction techniques for the gears and castings, the extreme cleanliness of the internal parts, and the excellent qualities of the lubricants used, ensure that the internal parts receive a high degree of protection even during the first moments.

Servicing

The high degree of finish of the internal parts ensures that the unit will work correctly with only a minimum amount of servicing

Generally speaking, the following rules should be followed: periodically check that the exterior of the assembly is clean, especially in the cooling areas; periodically check to see if there are any leaks, especially in the areas around the oil seals.

Assemblies that are lubricated for life and thus do not have any oil plugs do not require any special maintenance except as stated above.

For other assemblies, low maintenance is required with an oil change at 8/10,000 hours of use. The change of oil naturally depends on the type of environment and use to which the unit is put.

Apart from the normal maintenance rules given above, make sure the breather hole in the plug is clean and, using the oil window, periodically check that there is sufficient lubricant.

Should it be necessary to top up with lubricant, use the same type that is already in the reducer or one that is compatible with it.

In case of doubtful incompatibility between lubricants, we recommend you empty out the oil from the gearbox completely and, before refilling with new oil, wash out the unit to remove any residue.

When changing the oil, follow the previous instructions.

Troubleshooting

If any problems should arise when starting the unit or during its first few hours of operation, contact the after sales service unit of Motovario.

The table shows a series of problems with a description of possible remedies.

It should be kept in mind however that the information given is for reference only, as all the drives manufactured by Motovario are thoroughly tested and checked before they leave the factory.

Please note that tampering with the assembly without prior authorization from Motovario immediately invalidates the warranty and often makes it impossible to ascertain the causes of a defect or malfunction.

Troubleshooting

PROBLEMS	CAUSES	ACTION (1)	ACTION (2)
The motor does not start.	Problems with power supply. Defective motor. Wrong size of motor.	Check power supply.	Replace electric motor.
Current absorbed by the motor is greater than shown on the data plate.	Wrong size of motor.	Check the application.	Replace the electric motor and, if necessary, the reduction unit.
Temperature of the motor housing is very high.	Defective motor. Wrong size of motor. Incorrect mounting of motor	Check the application.	Replace the electric motor and, if necessary, the reduction unit.
Temperature of the reduction unit housing is very high.	Wrong size of reduction unit. Mounting position does not comply with the order. Incorrect mounting of motor	Check the application.	Correct the working conditions: mounting position and/or lubricant level.
Incorrect rotation speed of the main reducer unit shaft.	Incorrect reduction ratio. Incorrect polarity of motor.	Check reduction ratio. Check polarity of motor.	Replace reduction unit and/or electric motor.
Oil leak from oil seal.	Defective oil seal. Oil seal damaged during shipment. Defective motor shaft.	Replace the oil seal. Repair motor shaft (if possible).	Replace the part or return the assembly to Motovario.
Oil leak from joint.	Flat gasket or O-ring damaged.	Replace damaged gasket or O-ring.	Return the assembly to Motovario.
The main shaft rotates the wrong way.	Incorrect connection of the electric motor.	Swap two phases of the motor supply.	
Intermittent noise from the gears.	Dents in the gear wheels.	No practical problem if the noise has no effect on the application.	Return the assembly to Motovario if there is significant noise when laaded.

Troubleshooting

PROBLEMS	CAUSES	ACTION (1)	ACTION (2)
No intermittent noise from the gears.	Dirty inside the gearbox.	No practical problem if the noise has no effect on the application.	Return the assembly to Motovario if there is significant noise when laaded.
Noise (whine) from the drive assembly.	Bearings incorrectly adjusted. Gears with mesh errors. Insufficient lubricant.	Check correct quantity of lubricant.	Return the assembly to Motovario.
Electric motor vibrates.	Measurement of the assembly coupling.	Check geometric tolerance of flange on electric motor. Check tolerance and geometry of key on motor shaft.	Replace electric motor.

Critical applications

The performance given in the catalogue correspond to mounting position B3 or similar, ie. when the first stage is not entirely immersed in oil. For other mounting positions and/or particular input speeds, refer to the tables that highlight different critical situations for each size of reduction unit.
It is also necessary to take due consideration of and carefully assess the following applications by calling our Technical Service:

- As a speed increasing.
- Use in services that could be hazardous for people if the reduction unit fails.
- Applications with especially high inertia.
- Use as a lifting winch.
- Applications with high dynamic strain on the case of the reductionunit.
- In places with T° under -5°C or over 40°C.
- Use in chemically aggressive environments.
- Use in a salty environment.
- Monting positions not envisaged in the catalogue.
- Use in radioactive environments.
- Use in environments pressures other than atmospheric pressure.

Avoid applications where even partial immersion of the reduction unit is required.

The maximum torque (*) that the gear reducer can support must not exceed two times the nominal torque (f.s.=1) stated in the performance tables. (*) intended for momentary overloads due to starting at full load, braking, shocks or other causes, particularly those that are dynamic.

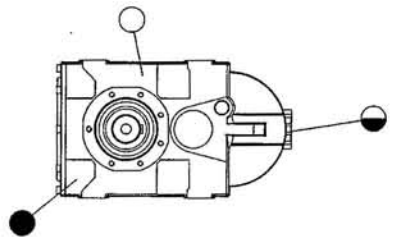
S	050	060	080	100	125
2000 < n1 < 3000	-	-	-	-	B
V5 - V6	B	B	B	B	B
n1 > 3000	B	B	B	B	B
...L : B6 - B7	-	B	B	B	B

A - Application not recommended
B - Check the application and/or call our technical service

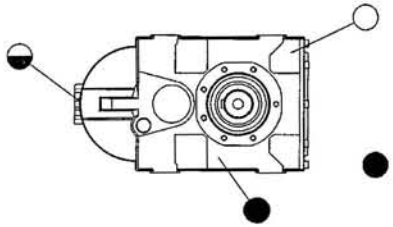
Mounting position

050÷125

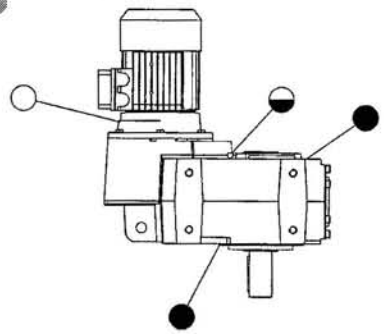
B3



B8



V5



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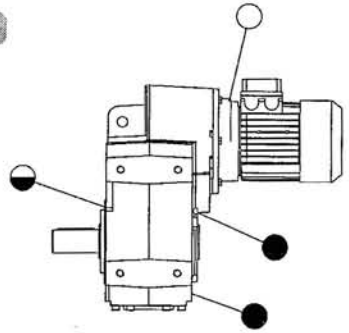

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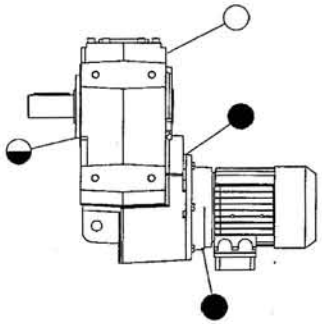
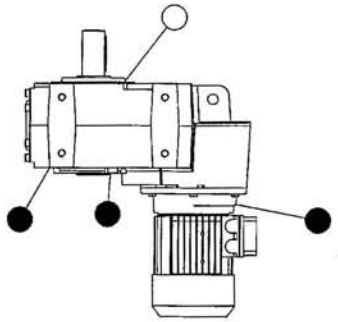


V6



○ Oil fill / breather plug

◒ Oil level plug

● Oil drain plug

Lubrication (S-IS-CS)

In cases of ambient temperatures not envisaged in the table, call our Technical Service.
In the case of temperatures under -30°C or over 60°C it is necessary to use oil seals with special properties.
For operating ranges with temperatures under 0°C it is necessary to consider the following:

1- The motors need to be suitable for operation at the envisaged ambient temperature.
2- The power of the electric motor needs to be adequate for exceeding the higher starting torques required.
3- In the case of reduction units with a cast-iron case, pay attention to impact loads since cast iron may have problems of ragility at temperatures under -15°C.
4- During the early stages of service, problems of lubrication may arise due to the high level of viscosity taken on by the oil and so it is wise to have a few minutes of rotation under no load.

The oil needs to be changed after approximately 10,000 hours. This period depends on the type of service and the environment where the reduction unit works.
For units supplied without oil plugs, lubrication is permanent and so they need no servicing.

- I riduttori di media/grossa taglia vengono for niti privi di olio e completi dei tappi necessari a garantire tutte le posizoni di piazzamento.I sudetti riduttori vengono contraddistinti dal l'applicazione della relativa targhetta.

(I)	Attenzione: riduttore privo di lubrificante,riempire a livello prima dell'avviamento.
(GB)	Attention: gearbox unit without lubricant,fill it up to the level before starting.
(D)	Achtung : Getriebe ohne Schmierstoff, bitte vor Inbetriebnahme füllen.
(F)	Attention : groupe sans lubrifiant, remplir au niveau avant le démarrage.
(E)	Atención: grupo sin lubricante, llenar hasta el nivel antes de la puesta en marcha.

Olio minerale Mineral oil Mineralöl Huile minérale Aceite mineral.	T°C ISO VG...	(-5) ÷ (+40) ISO VG220	(-15) ÷ (+25) ISO VG150

- Motovario dispone la lubrificazione dei gruppi come indicato in tabella.

-	●	
- non esiste	- non lubrificato	- lubrificato

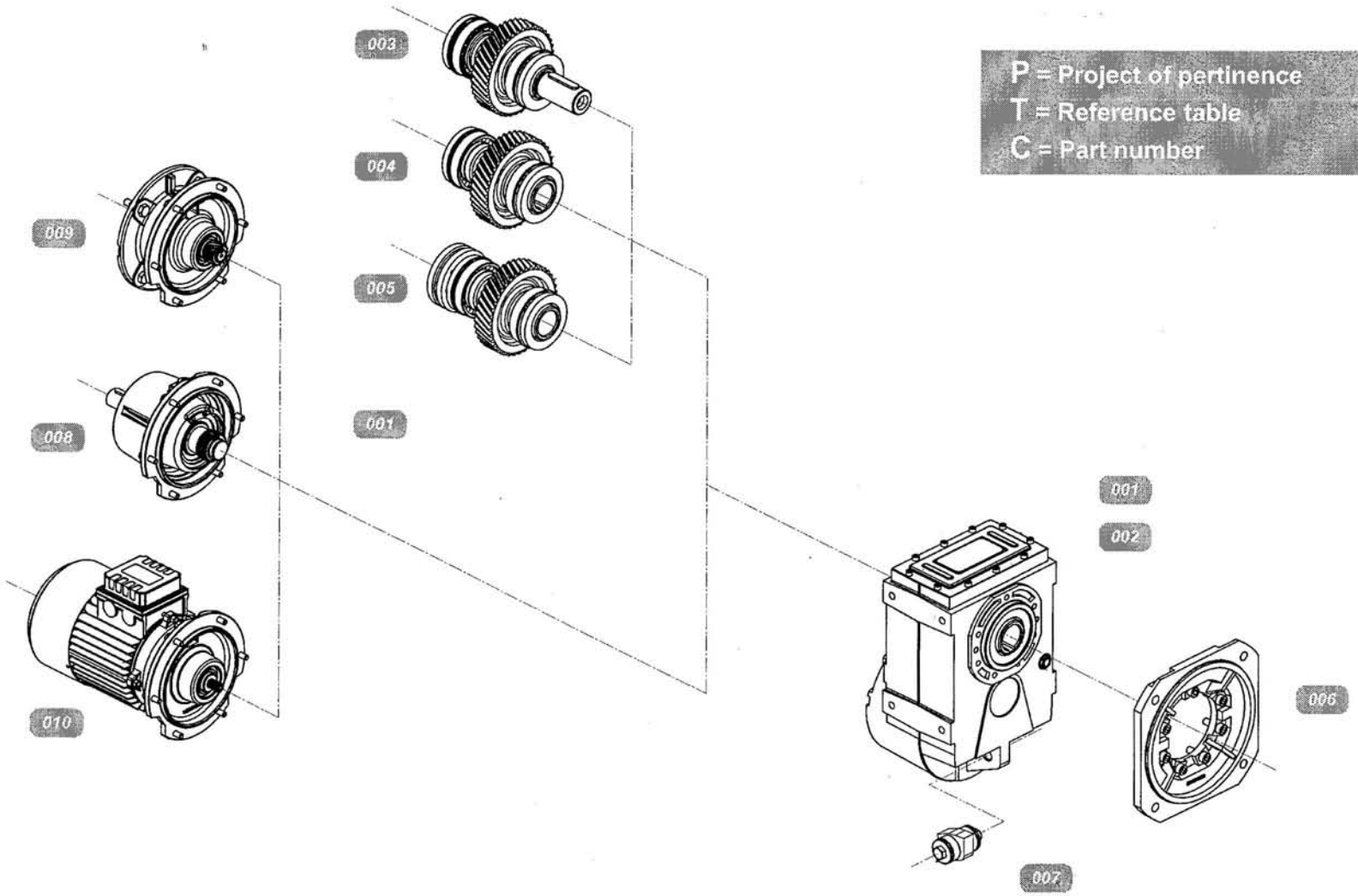
Lubrificazione (S-IS-CS)

T°C ISO VG...	(-5) ÷ (+40) ISO VG220	(-15) ÷ (+25) ISO VG150
AGIP	BLASIA 220	BLASIA 150
SHELL	OMALA OIL220	OMALA OIL150
ESSO	SPARTAN EP220	SPARTAN EP150
MOBIL	MOBILGEAR 630	MOBILGEAR 629
CASTROL	ALPHA MAX 220	ALPHA MAX 150
BP	ENERGOL GR-XP220	ENERGOL GR-XP150

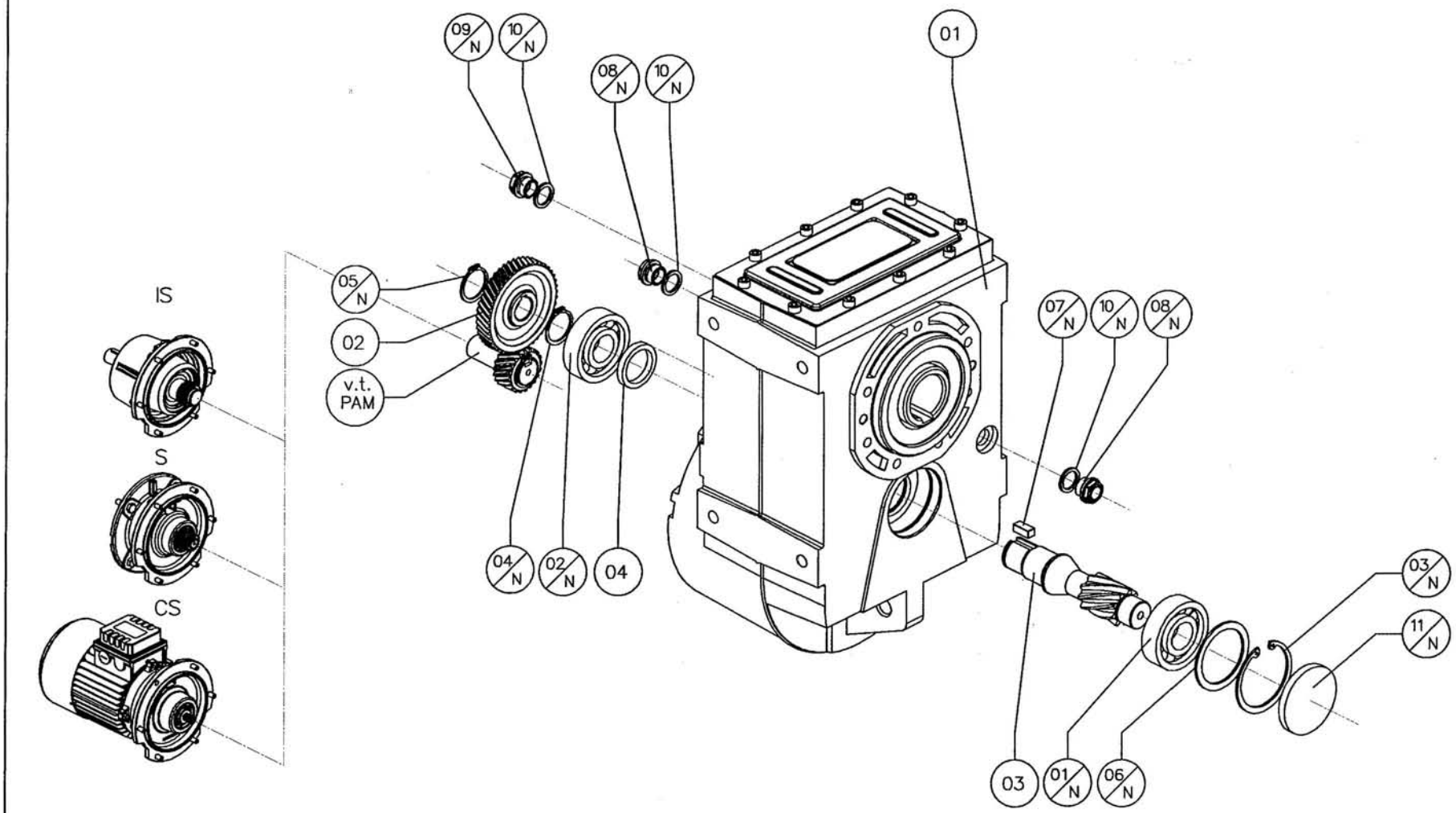
Mineral oil

S - CS	052	053	062	063	082	083	102	103	122	123
B3	1,8	1,8	2,2	2,2	3,2	3,2	4,9	4,9	11	11
B8	1,8	1,8	2,2	2,2	3,2	3,2	4,9	4,9	11	11
B6-B7	1,8	1,8	2,2	2,2	3,7	3,7	5,5	5,5	12	12
V5	2,2	2,2	2,8	2,8	4,5	4,5	6,4	6,4	13,5	13,5
V6	1,8	1,8	2,2	2,2	3,7	3,7	5,5	5,5	12	12

- Quantity of oil in litres



P = Project of pertinence
T = Reference table
C = Part number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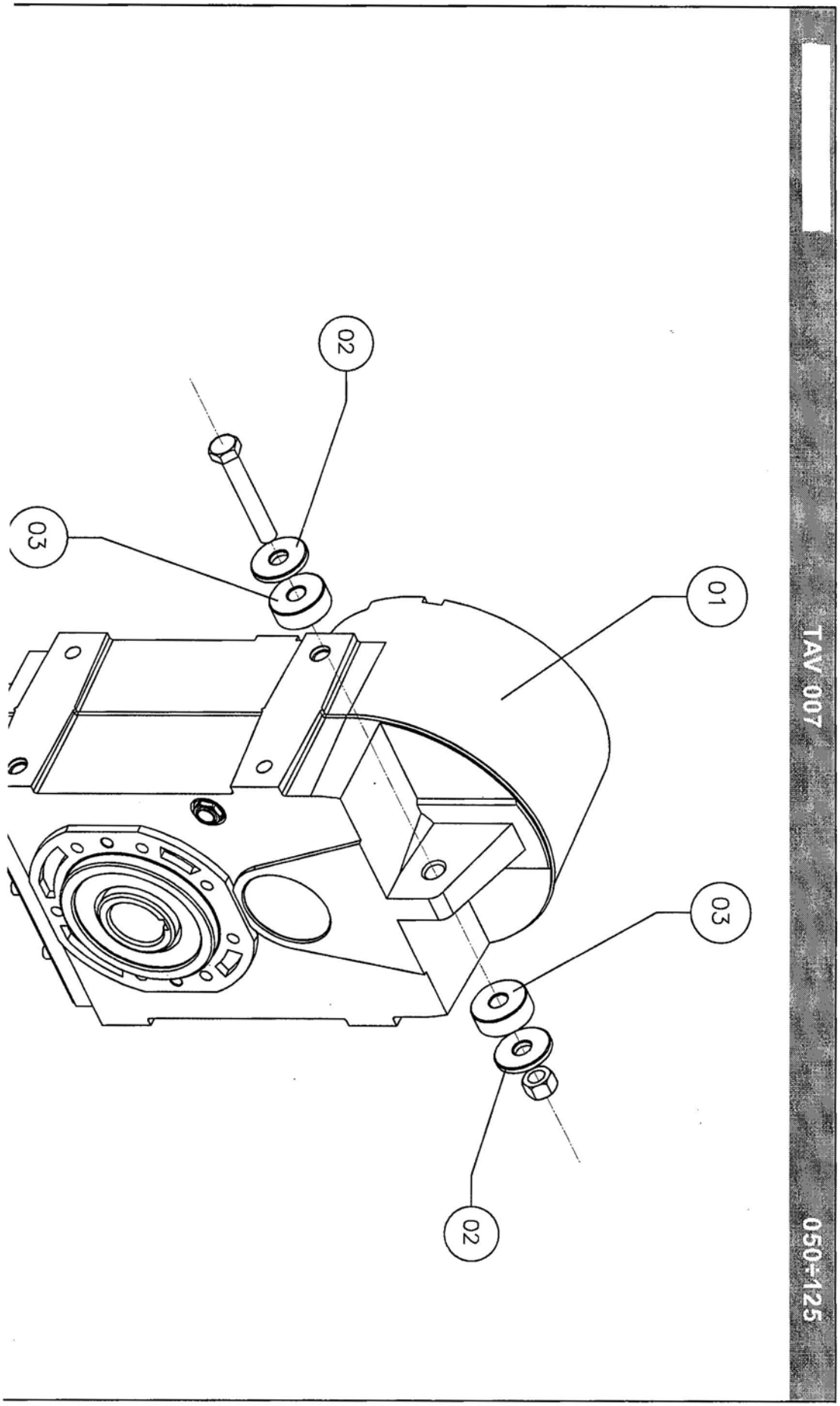
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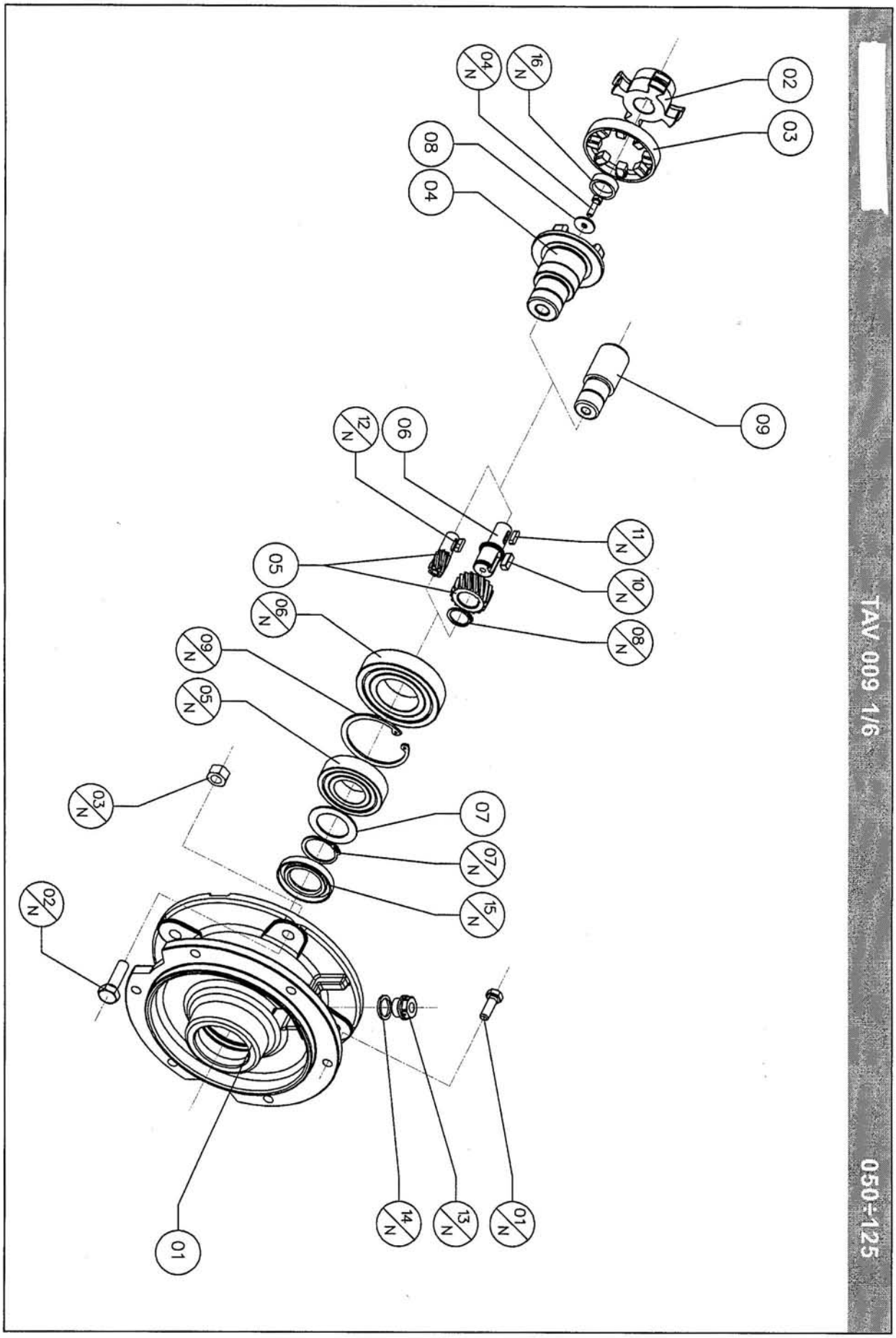
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