



NABRICO

DF-1 ND Electric Winch Owner's Manual

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NABRICO

DF-1-ND ELECTRIC MANUAL WINCH

Owner's Manual

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SAFETY INFORMATION

CAUTION

Prior to installing and operating the winch, please read this manual thoroughly and carefully. Keep this manual and all other instructions accessible at all times.

The Occupational Safety and Health Act of 1970 states that it is the employer's responsibility to provide a workplace free of hazard. To this end, all equipment should be installed, operated and maintained in compliance with applicable trade, industrial, federal, state and local regulations. It is the equipment owner's responsibility to obtain copies of these regulations and to determine the suitability of the equipment for the equipment owner's intended use.

Although this manual will help you become familiar with the basic operation of the winch, it is by no means a substitute for proper training by your company in the safe use of winches, barge rigging and other marine equipment. This manual suggests methods of operation, but ultimately, the owners and operators of the equipment are responsible for determining whether a particular method of operation is safe and appropriate for the equipment being operated. Only individuals trained in the proper use of winches, barge rigging and other marine equipment should operate these winches.

The typical operating environment of barge and towboat winches often includes very high forces, and the potential hazards associated with these high forces should not be underestimated. Improper installation or incorrect or unsafe use could result in injury or death to persons or cause equipment failure or damage.

Recommended Information for Safe Operation:

CAUTION

- Check lubrication before use.
- Do not apply tension to the winch unless there are 5 complete wraps of rope on the drum.
- Do not operate the equipment unless you have a firm stance on a non-slippery surface.
- Do not wrap the wire rope around the load. This will damage the wire rope and could cause the load to escape. Rigging connectors are strongly recommended to secure the wire rope to the load.
- Keep fingers, loose clothing and any foreign objects away while operating the equipment.
- Do not divert attention away while operating the equipment. Stay alert to the possibility of accidents and try to prevent them from happening.
- Always remain to the side of the equipment while in operation.
- Never operate the equipment from the front or when bystanders are in front of it.
- Operators and bystanders should stay clear of any load and the wire rope while the equipment is operating.
- Avoid shock loads by starting and stopping the equipment smoothly. Shock loads can over load the equipment which may cause damage.
- Under no circumstances should any equipment be used to move, raise or lower a person(s) or equipment.
- Do not exceed a 15 minute duty cycle for the winch. To do so may result in equipment damage or failure.

| |
|---|
| <h3><u>NOTICE</u></h3> |
| <p>Inspect the equipment carefully at least once a month for loose fasteners, worn gears and pawls, cracked welds and other damaged parts. If any worn, cracked or damaged parts are found, stop use immediately and remove equipment from service until all appropriate repairs are completely made.</p> |

1.1 GENERAL INFORMATION



DF-1 ELECTRIC WINCH **Features & Specifications**

- Salt water package standard on all power winches.
- Stainless or silicon bronze fasteners.
- 3-ply conveyer belt covers (damage and corrosion resistant).
- 3-tooth locking dog with large release and fail-safe disc brake.
- NEMA motor design with helical-bevel gearbox.
- Heaviest winch in its class.
- Hot-dipped galvanized.
- Variable frequency drive option available. Amp draw limits, variable speeds, and motor protection.
- Made as one model adjustable to true right or left hand models for use in pairs.
- Over 100 fewer parts than other electric winches (no chain or sprockets).

| MODEL | DOG HOLDING | BRAKE HOLDING | LINE PULL (LBS) | LINE SPEED 1ST LAYER (FPM) | DRUM CAPACITIES (FT) | | | WEIGHT (LBS) |
|----------|-------------|---------------|-----------------|----------------------------|----------------------|------|-----|--------------|
| | | | | | 5/8" | 3/4" | 1" | |
| DF-I-30 | 30 TONS | 30 TONS | 23,234 | 21 | 228 | 138 | 66 | 1,700 |
| DF-I-40 | 40 TONS | 40 TONS | 30,420 | 23 | 287 | 180 | 100 | 1,800 |
| DF-I-50 | 50 TONS | 50 TONS | 43,264 | 23 | 287 | 180 | 100 | 1,850 |
| DF-I-65 | 65 TONS | 65 TONS | 120,000 | 13 | 572 | 325 | 200 | 3,200 |
| DF-I-100 | 100 TONS | 65 TONS | 98,684 | 10 | 572 | 325 | 200 | 3,500 |



NABRICO

nabrico-marine.com 615.442.1300

1.2 INSTALLATION OF EQUIPMENT

NOTICE

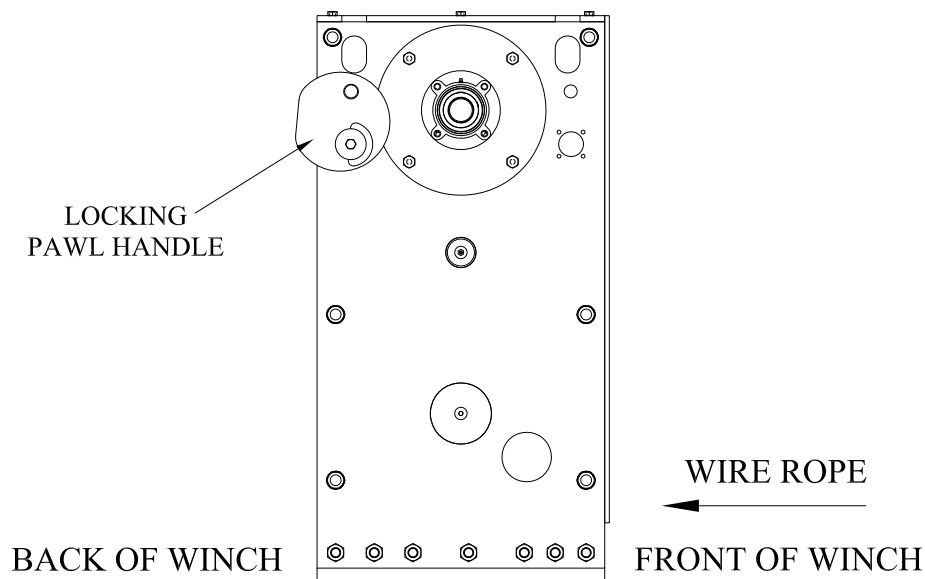
It is the responsibility of the customer, not the winch manufacturer, to properly locate and install the winch with regard to the safety of those operating the machinery.

CAUTION

Install the equipment in an area where there is ample room to operate the unit without the operator becoming entangled in the cable, lines, chains, winch mechanisms or other nearby equipment.

- 1.2.1** All winches must be installed on a flat, rigid and non-slippery surface. Deck and structure must be strong enough to withstand the weight and holding capacity of the winch and ultimate capacity of the wire, and the forces likely to occur during operation. A qualified professional should inspect or design the foundation to insure that it will provide adequate support.
- 1.2.2** Locate the winch in a suitable area free of traffic and obstacles. The winch should also be visible during entire operation. Keep in mind that the winch needs to be accessible for proper lubrication, maintenance and operation.
- 1.2.3** Mounting direction must be in line with the desired direction of cable pull. The front of the winch must face in the direction from which the cable is reeled (see fig. #1). When the unit is powered up the drum should rotate so that it reels cable onto the bottom of the drum from the front of the winch.

FIGURE #1 - MOUNTING POSITION



- 1.2.4 Maintain a fleet angle no greater than 1-1/2 degrees from winch drum to lead sheave (see appendix 1). The proper fleet angle helps to minimize wire rope damage by assisting the wire rope to wind uniformly onto the drum.
- 1.2.5 Using sufficient tack welds, secure the base bars to the deck or doubler plate. This will prevent the winch from becoming misaligned from heat distortion during the application of the seal weld.
- 1.2.6 Next apply a seal weld to the mounting fixture to permanently secure it to the deck. The seal weld will prevent corrosion from occurring between the mounting fixture and mounting surface.
- 1.2.7 Inspect the winch immediately following installation. This inspection will give a good starting record of the winch condition so that future inspections can be compared.

| |
|-----------------------|
| <u>CAUTION</u> |
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| Remember that the weld has to be strong enough to withstand loads equal to or greater than the capacity of the winch and ultimate capacity of the wire. |
|--|

1.3 ELECTRIC POWER CONNECTION

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|----------------|
| CAUTION |
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| |
|--|
| All electrical work must be performed by a licensed electrician. Failure to do so could result in electric shock or poor equipment operation. |
|--|

- 1.3.1 All winches have been factory tested prior to shipment to insure proper operation.
- 1.3.2 All winches have been factory wired to accommodate power supplies as specified by the customer.
- 1.3.3 Make certain that equipment is grounded before electrical power is connected.
- 1.3.4 Refer to Appendix B.1 for typical connection between motor and control box.
- 1.3.5 Ensure that the correct power supply agrees with the motor rating before connecting power to the winch. Do not operate the winch until proper power is supplied to the motor.
- 1.3.6 Before operation of the winch, remove the plastic plug from the gearbox breather.
- 1.3.7 Test connections by operating the winch. The rotation of the drum must agree with the labels of the control device, and the motor must stop when the control is released. The drum must reel the wire rope onto the bottom of the winch drum when the "IN" button is depressed.

1.4 INSTALLATION OF WIRE ROPE

- 1.4.1 To install wire rope, rotate the drum of the winch so that the U-bolt nuts are easily accessed through the round cut out located on the side of the winch (see fig. 2a).
- 1.4.2 Using a standard socket wrench with an extension, loosen the nuts.
- 1.4.3 If installing wire rope on a new winch, remove and discard the u-bolt spacer pipe. If replacing worn out wire rope, remove the wire rope from the U-bolt and dispose of properly.

CAUTION

Remember to always wear the proper protective equipment when handling the wire rope.

- 1.4.4 Rotate the U-bolt so it is at the bottom of the winch and insert the new wire rope end under the winch drum and through the U-bolt from the front of the winch so that approximately 3 to 4 inches extend through the U-bolt.

NOTICE

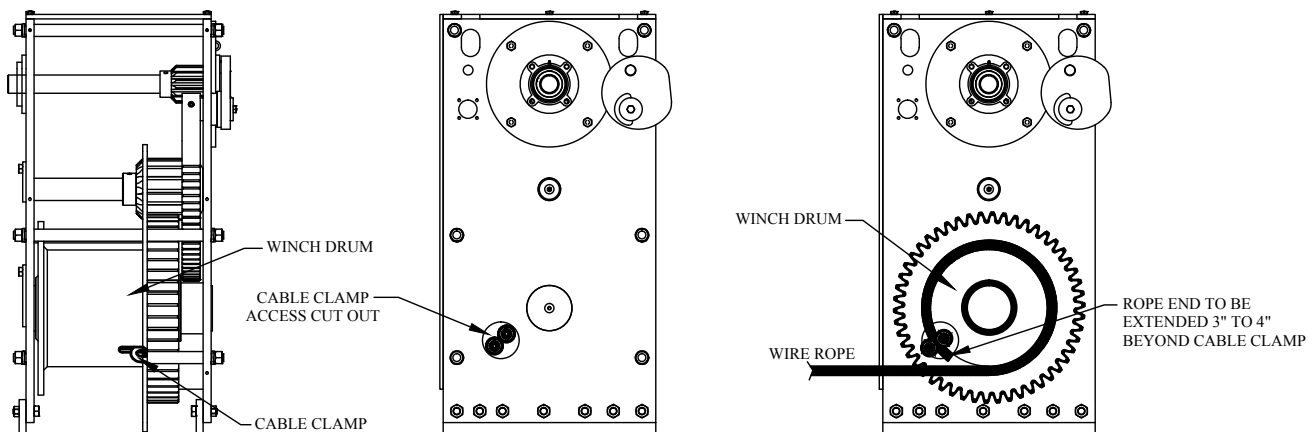
Breaking strength of new wire rope should be a least 3 times greater than the largest load placed on the winch. This minimum value may be greater depending on type of load and the method of moving the load.

- 1.4.5 Ensure that the wire rope remains in the U-bolt and rotate the drum around so the U-bolt aligns with the cable clamp access cut out (see fig. 2b).

CAUTION

The U-bolt nuts must be retightened periodically to insure that the wire rope end is held in place snugly against the drum flange. Over time and usage the rope will “crush” down at the U-bolt creating the possibility that the rope end will escape.

FIGURE #2 - INSTALLING THE WIRE ROPE



A) LOCATING THE CABLE CLAMP

B) INSTALLING THE WIRE ROPE

- 1.4.6 Tighten the U-bolt nuts evenly to secure the wire rope to the winch drum. The U-bolt will act as a vise keeping the wire rope in place as the rest of the rope is reeled onto the winch.
- 1.4.7 Wind the wire rope onto the drum by operating the winch. Maintain tension on the wire rope to insure that the first coil lays snugly against the drum flange and each successive coil is snug against the previous coil. Make sure that the wire rope is being reeled in from the bottom on the winch drum.
- 1.4.8 Continue wrapping the wire rope until there are at least 5 complete wraps on the winch drum. These wraps serve as an anchor and must remain on the drum at all times.

WARNING

In order for the winch to attain its full holding capacity, 5 complete wraps of the wire rope must be on the winch drum at all times. Also, make sure the rope is installed securely to the drum. A poorly secured wire rope could come loose from its anchor and allow the load to escape.

NOTICE

Drum capacity depends on how tightly and evenly the wire rope is wound on the drum. Actual drum capacities are usually 25% to 30% less than values given in performance tables when the wire rope is loosely wound and overlapping. Also, line speed will increase with each additional layer of wire rope that is wound onto the drum.

2.1 OPERATING THE WINCH

2.1.1 Powered Operation

- 2.1.1.1** To reel the wire rope onto the winch drum, depress and hold the “IN” button located on the control box or remote operator station. Make certain that the locking pawl is disengaged by rotating the locking pawl handle to the up position and inserting the T handle locking pin to secure in place (see fig. #3a).
- 2.1.1.2** Observe the wire rope as it winds onto the winch drum. If it becomes loose, uneven or overlapped, stop the operation and rewind before continuing. Continued operation with undesirable wire rope lay can damage the rope and shorten its life.
- 2.1.1.3** To reel the wire rope off the winch drum, depress and hold the “OUT” button located on the control box or remote operator station. Some tension should be kept on the wire rope during unreeling to minimize rope fouling on the drum.

CAUTION

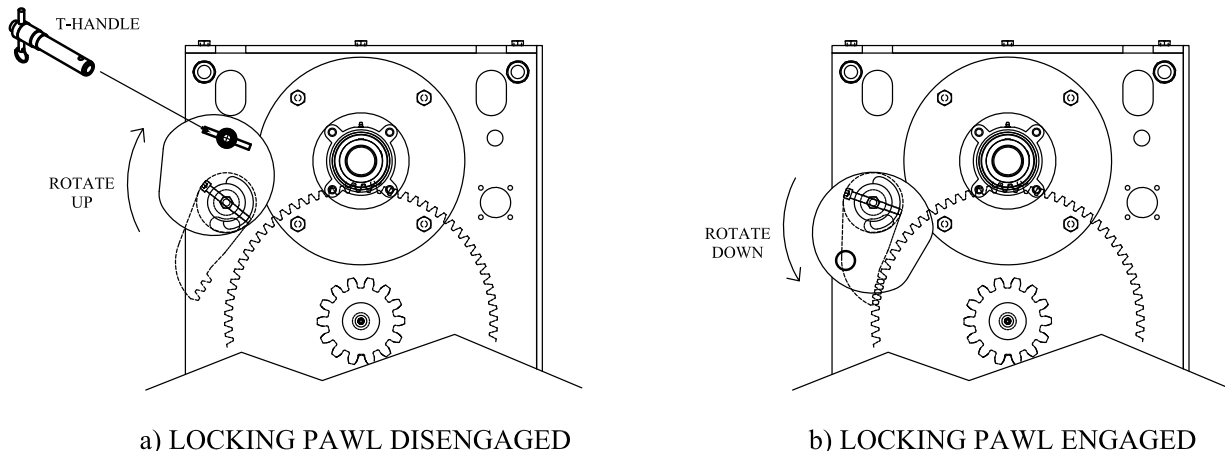
Length of winch operation should not exceed the 15 minute duty cycle rating.

NOTICE

Breaking in the winch occurs during the first 30 to 60 minutes. During break-in, mating surfaces become polished and clearances increase. This is desirable for efficient operation of the bearings and gears.

- 2.1.1.4** To stop the wire rope, release the “IN” or “OUT” button; this will automatically engage the electric brake located on the winch motor. As with any electric brake, there is a slight delay (approx. 0.03 seconds) between the “IN” or “OUT” button release and brake set.
- 2.1.1.5** After the winch is stopped and the brake is set, the locking pawl handle can be rotated down so the locking pawl is free to engage thus dogging the winch down (see fig. #3b).

FIGURE #3 - LOCKING PAWL DISENGAGE/ENGAGE



2.1.2 Emergency Operation

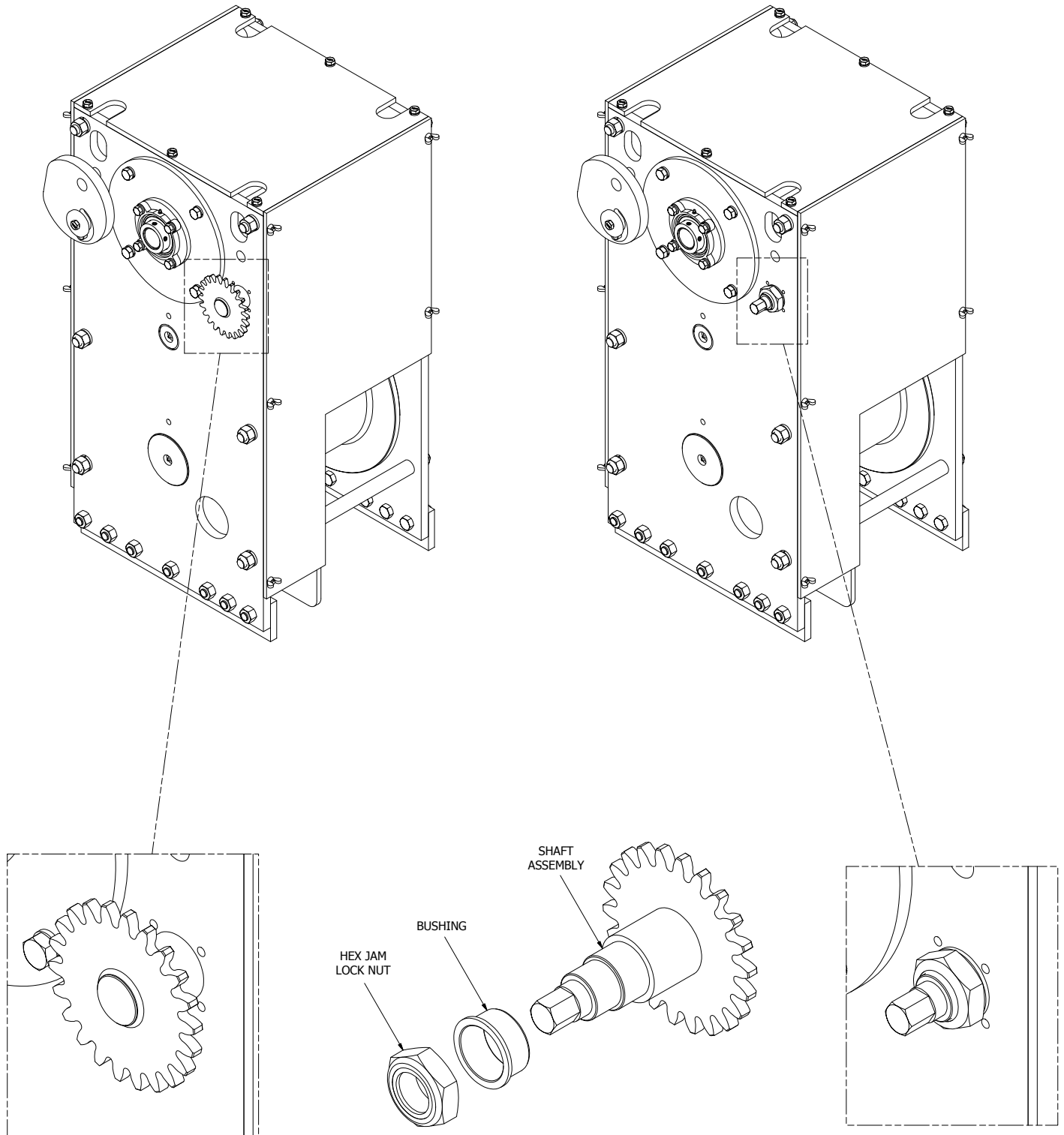
WARNING

Manual operation of an electric winch while under load is extremely dangerous and should only be performed in emergency situations. The extreme high tensions that are common in winch applications should not be underestimated.

To reduce the potential of electric shock, lock out and tag out procedures should be followed before initiating any type of manual operation of the winch

- 2.1.2.1 In case of power failure, disconnect all power sources supplied to the winch.
- 2.1.2.2 Rotate the locking pawl handle down so the locking pawl is free to engage thus dogging the winch down (see fig. 3b).
- 2.1.2.3 Make sure safety precautions have been taken to secure the load and keep unnecessary personnel away from the winch while operating in manual mode.
- 2.1.2.4 Remove the rubber cover from the front of the winch.
- 2.1.2.5 Remove the Hex Jam Lock Nut (see fig. 4) from the Emergency Ratchet Add-on.
 - 2.1.2.5.1 DF-1-30 Emergency Ratchet P/N 101622
 - 2.1.2.5.2 DF-1-40 Emergency Ratchet P/N 101620
 - 2.1.2.5.3 DF-1-65 Emergency Ratchet P/N 101621
- 2.1.2.6 Remove the Shaft Assembly (see fig. 4) from the Stowed Position and reinstall inside the winch with the hex part of the shaft protruding through the winch.
- 2.1.2.7 Replace the Hex Jam Lock Nut on the outside of the winch in the Engaged Position.
- 2.1.2.8 Disengage the motor brake by turning the lever located on the outside of the brake 90 degrees. The locking pawl should now be holding the load applied to the winch.
- 2.1.2.9 While maintaining control of the brake release lever and manual crank, rotate the locking pawl handle up relieving the locking dog engagement (see fig. 3a). The winch should now be ready to be operated manually. It is recommended to have more than one person to operate the winch in manual mode.
- 2.1.2.10 Using a 15/16" ratchet, rotate the Emergency Ratchet Add-on until the tension on the wire rope reaches the desired level.
- 2.1.2.11 Once tensioning has been achieved, the locking pawl should be reengaged dogging the load down.
- 2.1.2.12 After all loads have been removed from the winch, remove the Emergency Ratchet Add-on and store in the Stowed Position.

FIGURE #4 - EMERGENCY OPERATION



STOWED POSITION
SCALE 2" = 1'-0"

ENGAGED POSITION
SCALE 2" = 1'-0"

3.1 EQUIPMENT INSPECTION

NOTICE

An inspection program should be started as soon as any equipment is put into service. A qualified person should be appointed the responsibility of regularly inspecting the equipment. Written records of inspections are recommended by the manufacturer.

3.1.1 Frequent Inspection

- 3.1.1.1** Visually inspect the equipment before each use. Check the equipment for cracks, bending, wear, rust, corrosion and any other damage. If any problems are discovered, stop use immediately and remove the equipment from service until all appropriate repairs are completely performed.
- 3.1.1.2** **ENSURE THAT EQUIPMENT IS PROPERLY LUBRICATED.** Check the gearbox for signs of leakage and make sure it is filled with the proper lubricant.
- 3.1.1.3** Check to ensure that the foundation is in good condition. Make sure that mounting fasteners and other hardware are tightened securely.
- 3.1.1.4** Check electrical wiring and connections for wear, cuts, corrosion and other damage.
- 3.1.1.5** Ensure that the wire rope is installed correctly and anchored securely to the drum. Also, check to make sure the wire rope is in good condition.
- 3.1.1.6** While equipment is running, listen for unusual noises and look for signs of damage. Visually inspect the wire rope to ensure that it winds evenly onto the drum. Make sure the winch responds properly to control device(s) and that the brake operates correctly.

3.1.2 Periodic Inspection

- 3.1.2.1** Periodic inspections should occur whenever equipment is returned to service from storage, every six months in service, more frequently if an inspection discovers any damage or poor operation or in any case where the winch may have been over loaded or operationally abused.
- 3.1.2.2** Visually inspect the equipment checking the finish for wear, flaking or other damage as listed in the frequent inspection plan. Disassembly is recommended in order to properly inspect individual components.
- 3.1.2.3** Check the gearbox oil for dirt, metal particles, water and other signs of contamination by draining a small amount into a clean container.
- 3.1.2.4** Ensure that the gearbox is properly lubricated and replenish if necessary to restore the proper level.
- 3.1.2.5** Check the winch drum by moving it with your hands. Check for excessive movement that may be the result of worn or loose gears, bearings or shafts. Some play is normal while excessive play may be the result of overloading.

- 3.1.2.6 Disconnect power and thoroughly inspect electrical equipment for signs of wear, cuts, corroded connections, moisture, burn marks and other damage.
- 3.1.2.7 Check the power supply at the motor to ensure that it is consistent with the motor rating.

3.1.3 Wire Rope Inspection

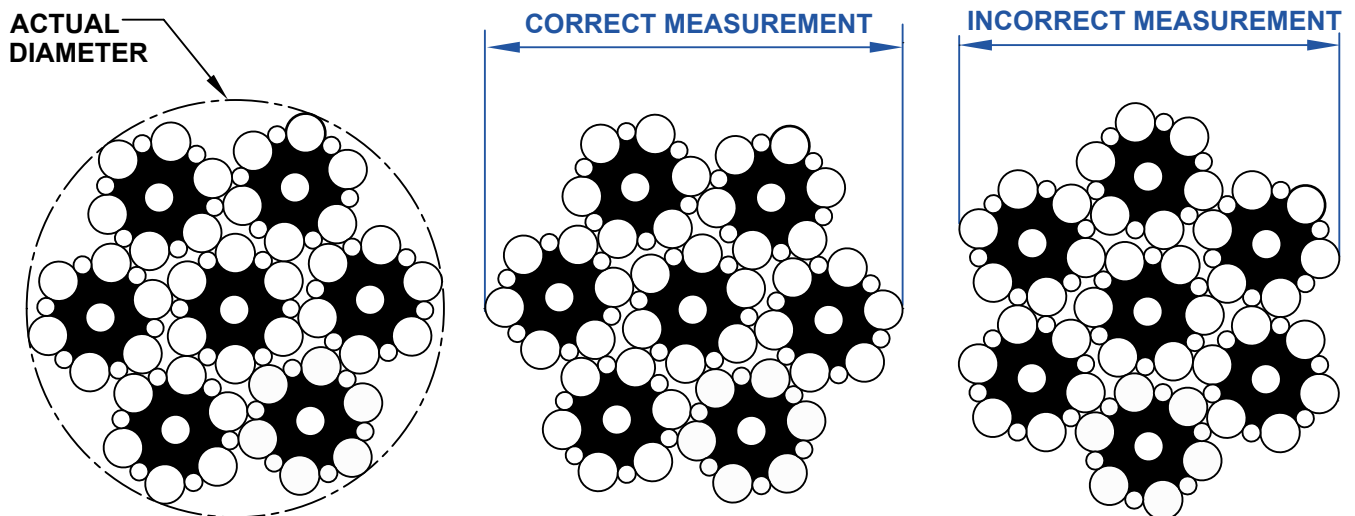
- 3.1.3.1 Wire rope inspection should be conducted according to the manufacturer's recommendations or accepted industry standards.

CAUTION

Remember to always wear the proper protective equipment when handling the wire rope.

- 3.1.3.2 Inspect the entire length of wire cable for bent or crushed areas, broken or cut wires, corrosion and other damage. If any defect or damage is found the cable must be replaced.
- 3.1.3.3 Inspect end connections and fittings for corrosion, kinking, crushing or other damage. If any corrosion or damage is found the cable must be replaced.
- 3.1.3.4 Check the wire rope diameter for signs of decreased area (see fig. 5). Diameter decrease may be signs of wear and internal degradation in the wire rope. Generally, wire ropes are manufactured larger than nominal diameter. When placed in service for the first time, diameter can reduce slightly. Minimum diameter specifications can be obtained from the rope manufacturer.

FIGURE #5 - WIRE ROPE DIAMETER



THE WIRE ROPE MUST BE REPLACED IF THE DIAMETER MEASURES LESS THAN THE MINIMUM DIAMETER GIVEN BY THE ROPE MANUFACTURER

EXAMPLE - A $\frac{3}{4}$ " WIRE ROPE HAS A MINIMUM DIAMETER OF $\frac{45}{64}$ " (0.7031")

3.2 EQUIPMENT LUBRICATION

| |
|----------------|
| WARNING |
|----------------|

| |
|--|
| Lubricate the spur gears before each operation, and periodically during operation. Failure to lubricate the gears will cause damage or deformation of gear teeth. |
|--|

- 3.2.1** All grease fittings should be lubricated using NABRICO's suggested lubricants or similar (See Appendix 2).
- 3.2.2** Drive shaft and drum shaft grease fittings should be lubricated at least once a month under normal conditions and at least once a day under adverse conditions. Lubricate while gears are rotating slowly.
- 3.2.3** Drive gear teeth should be coated at least once a month. Application with an aerosol can is recommended for uniform coverage. Graphite or other dry type lubricant should be used instead of gear grease when the winch is subjected to large amounts of foreign material such as coal dust. Always keep gear teeth as free of foreign material as possible.

3.3 CLEANING AND STORAGE

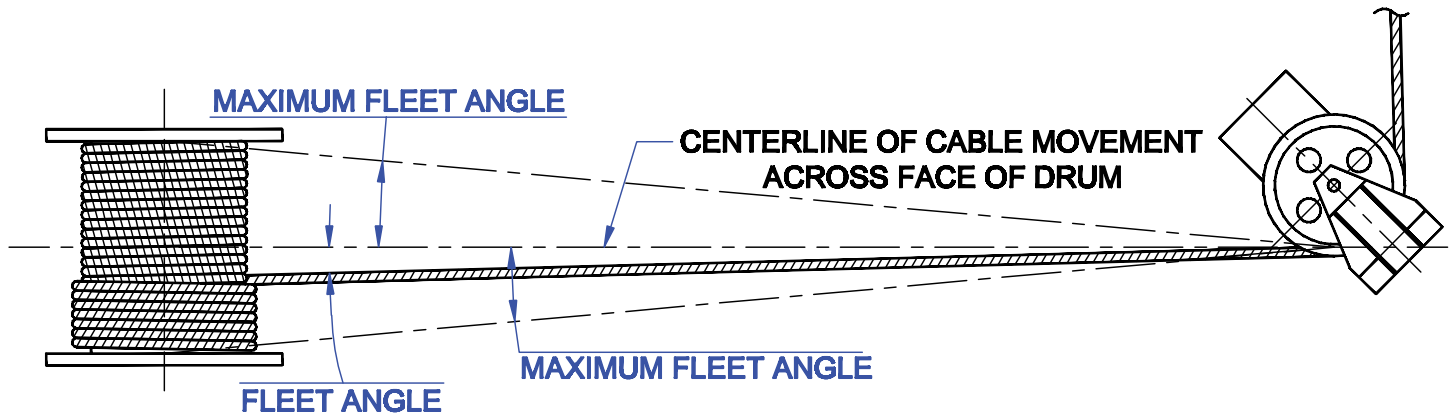
3.3.1 Cleaning the Equipment

- 3.3.1.1** The equipment should be regularly cleaned to remove dirt and to help prevent rust and corrosion.
- 3.3.1.2** When cleaning, be sure to leave a light film of oil on all surfaces to protect them against the elements of nature. Wipe off excessive amounts of oil to avoid the accumulation of dirt.
- 3.3.1.3** Remove all unnecessary objects from the area surrounding the equipment to prevent hazardous situations from occurring.

3.3.2 Storing the Equipment

- 3.3.2.1** Lubricate the equipment as necessary to help prevent rust and corrosion during storage. Add a rust preventive for long term storage.
- 3.3.2.2** Seal the equipment in plastic, if possible, to help prevent rust, corrosion and other damage.
- 3.3.2.3** Store the equipment upright in a cool clean place away from corrosive chemicals and moisture.
- 3.3.2.4** Rotate the drum periodically to keep bearing and gear surfaces from becoming lacquered.

A.1 FLEET ANGLE



Fleet Angle:

In order to insure proper wrapping on the drum and no undue wear of the wire rope, the fleet angle should be kept as small as practical. This is important to consider during the planning of a winch installation. Sheaves and drums should be placed so that the fleet angle will be equal on each side of the centerline of rope travel.

For a smooth drum a maximum fleet angle of 1-1/2 degrees is recommended. When the drum is grooved to suit the wire rope, the fleet angle should not exceed 2 degrees.

Example: Fleet Angle Calculation for 36" Chain Drive Barge Moving Winch

36" Chain Drive Moving Winch

$$a=18''$$

$$b=x \text{ (distance to be determined)}$$

$$A^\circ=1.5^\circ \text{ (minimum for a smooth drum)}$$

$$\tan A = a/b$$

$$\tan 1.5^\circ = 18''/x$$

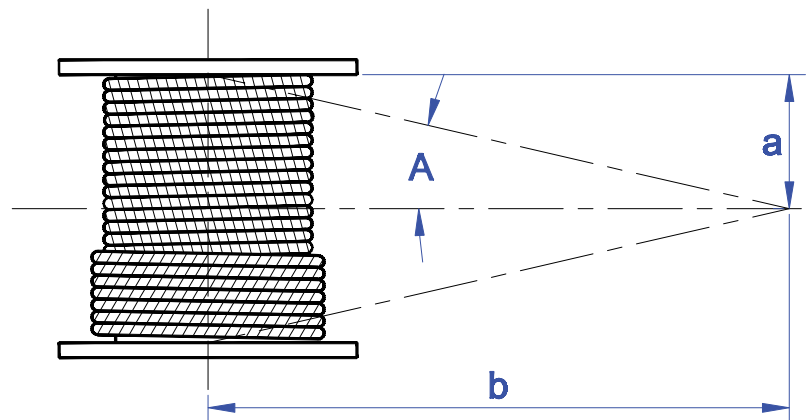
$$.02619 = 18''/x$$

$$x = 18''/.02619$$

$$x \sim 688'' \text{ (rounded up to next whole number)}$$

$$x \sim 688'' / 12 \text{ (convert to feet)}$$

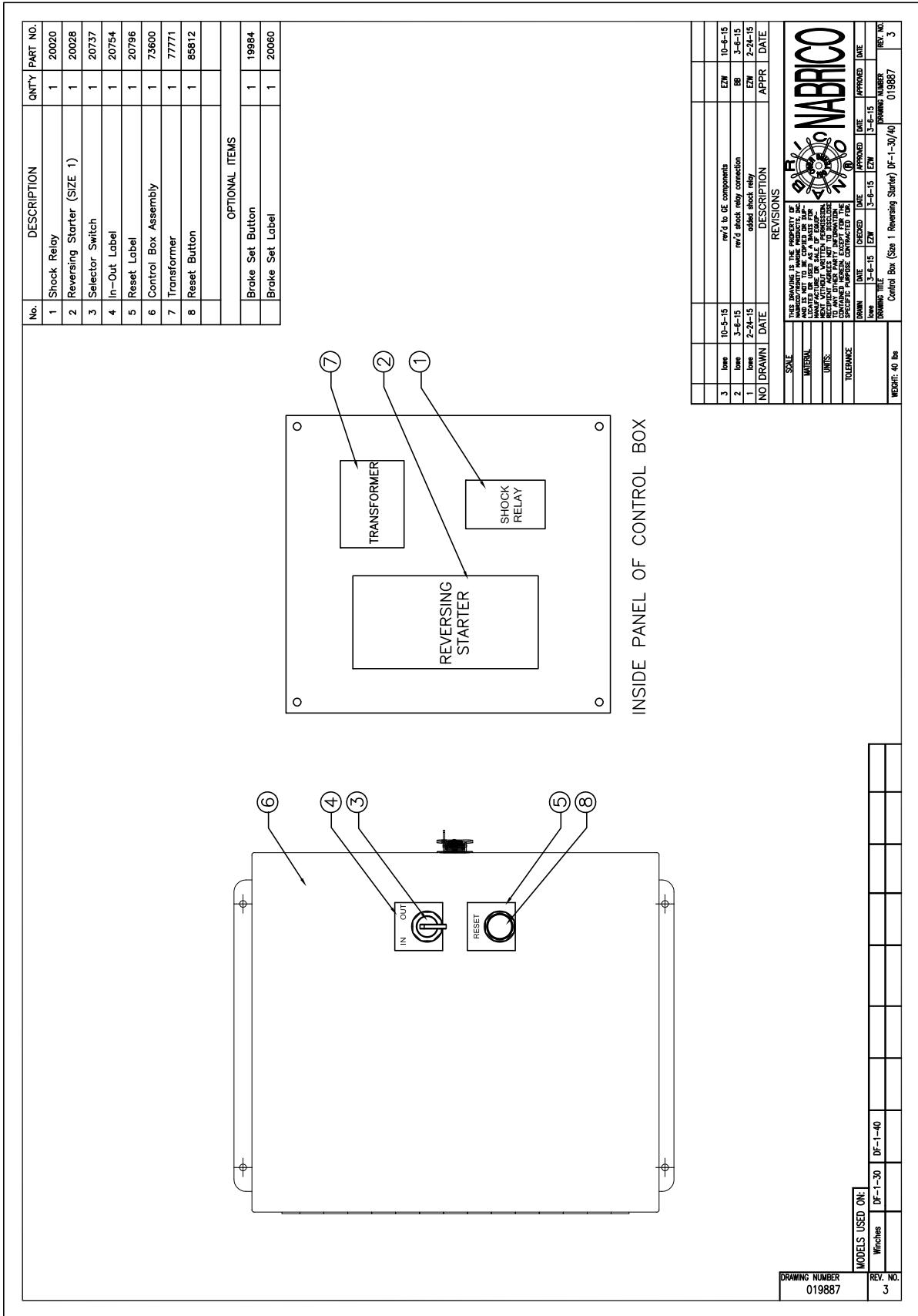
$$x \sim 58'$$

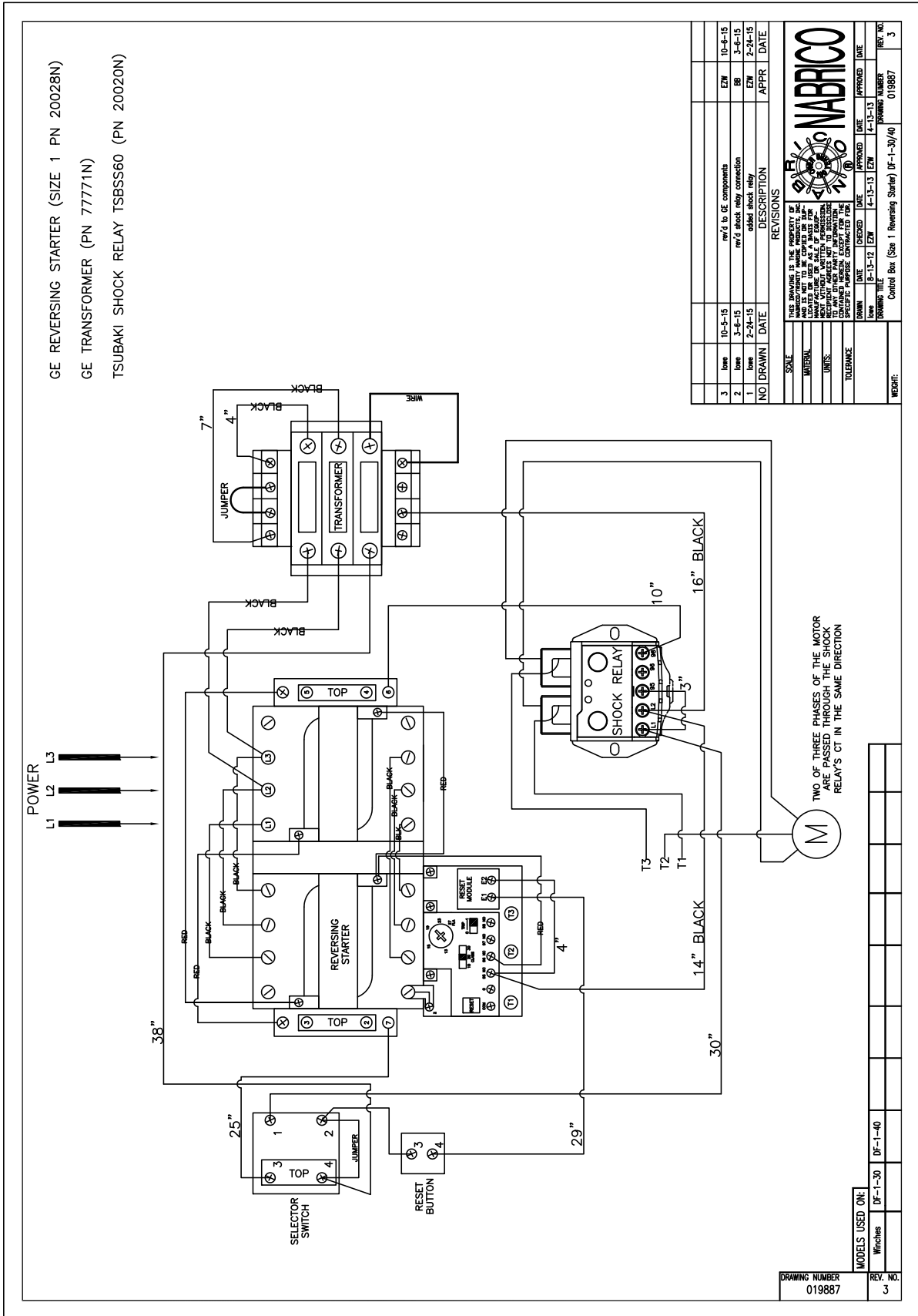


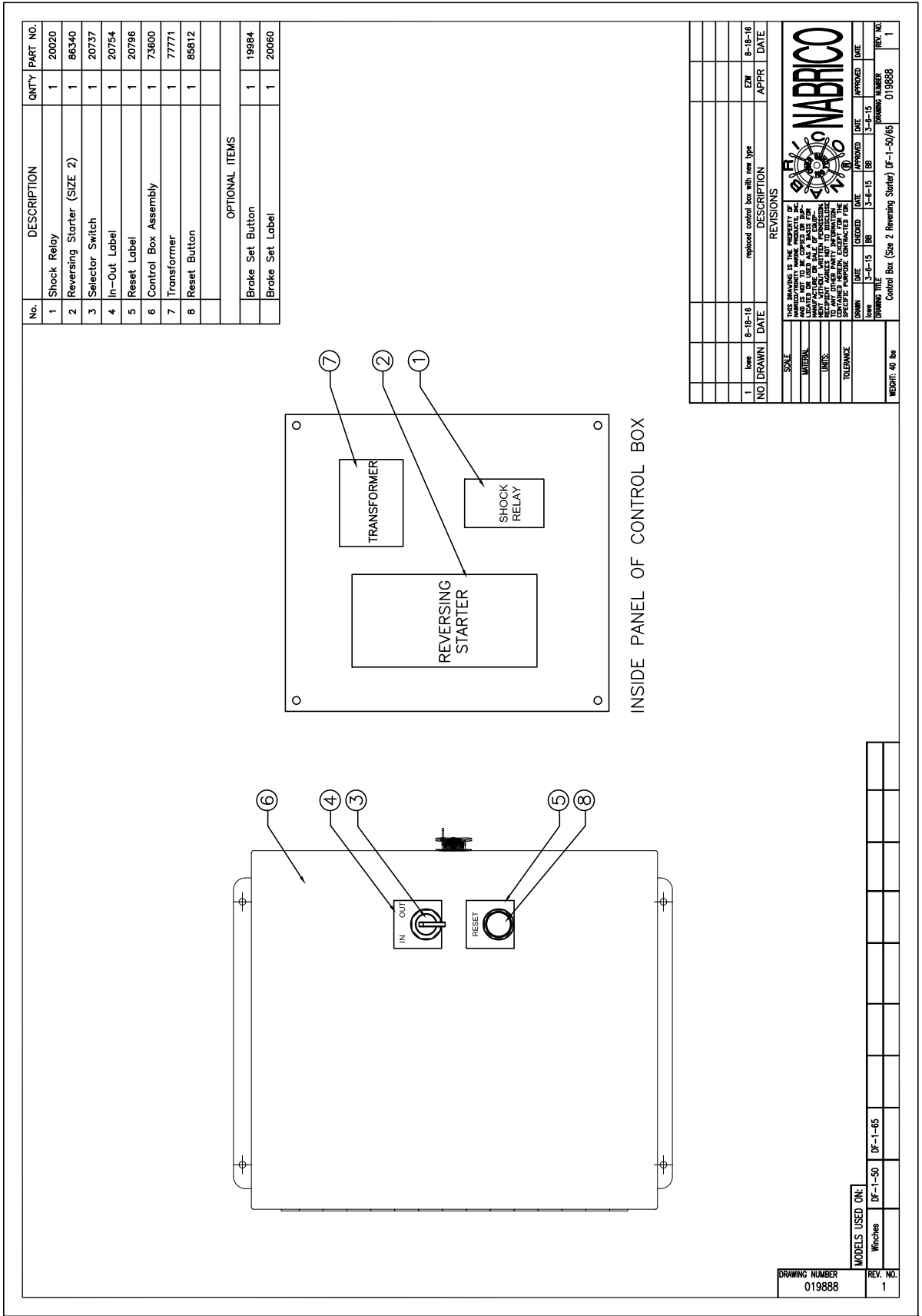
A.2 EQUIPMENT LUBRICATION

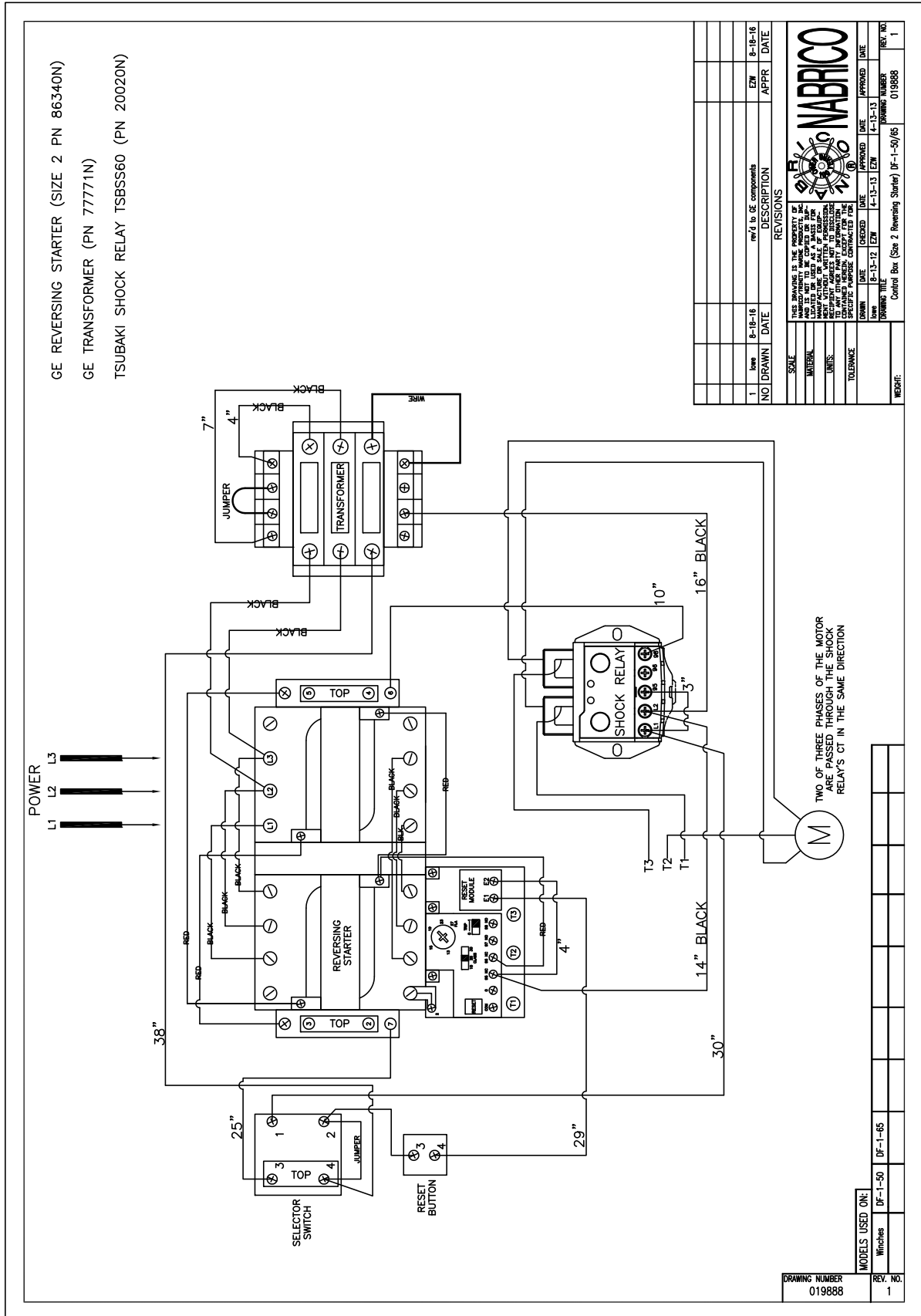
| RECOMMENDED LUBRICANT FOR USE WITH NABRICO DECK MACHINERY | |
|--|------------------------------------|
| HYDRAULIC OIL (OPEN LOOP) | ENVIROLOGIC 3032 |
| SPUR, HELICAL GEARS | ENDURATEX EP220 |
| ALL WORM GEARS | ENDURATEX EP 220 |
| OPEN GEARING (SPRAY CAN) | EUREKA FLUID FILM SPRAY |
| | MOBILTAC E |
| | LUBRIPLATE OPEN GEAR SHEILDING |
| GREASE FITTINGS | PEERLESS LLG #2 |
| PRESERVATIVE TREATMENT | MOBILARMA 524 |
| SUMITOMO, NORD AND SEW GEARBOXES | USE MANUFACTURER'S RECOMMENDATIONS |
| SLEWING BEARINGS / DF-559 WINCH | AQUA SHIELD |
| <p>Note: Lubricant manufacturers shown are not exclusive recommendations. Consult your lubricant source for more detailed information about oil selection.</p> | |

B.1 TYPICAL CONTROL BOX INFORMATION











EHFSA05.0601-4

SHOCK RELAY TSBSA Series INSTRUCTION MANUAL



WARNING

1. Make sure you read this instruction manual thoroughly before installing, wiring, operation and inspecting this SHOCK RELAY.
2. Please make sure that this instruction manual accompanies the SHOCK RELAY to the end user.
3. Product specification are subject to change for improvement without notice.
4. Disconnect power. Always lock out power switch before installing, removing, or servicing unit. Comply with Occupational Safety and Health Standards 1910. 147 "The Control of Hazardous Energy (Lock Out/Tag Out)."
5. Install in proper enclosure in accordance with NEMA 250-1991 "Enclosures for Electrical Equipment (1000Volts Maximum)" and NFPA496 1993 edition "Purged and Pressurized Enclosures for Electrical Equipment, 1993 Edition." When revisions of these standards are published, the updated edition shall apply.
6. Guards must be provided on all power transmission and conveyor applications in accordance with provisions of ASME B15.1-1996 "Safety Standards for Conveyors and Related Equipment, or other applicable standards. When revision of these standards are published, the updated edition shall apply.



CAUTION

- If danger is expected from your application, take the necessary steps to ensure that it operates safely.
- If your Tsubaki Emerson product does not operate normally, take care to ensure that dangerous operating conditions do not occur.
- Wear suitable clothing and protective equipment (safety glasses, gloves, safety shoes, etc.)
- Keep your work place tidy and safe to prevent accidents.

TSUBAKI E&M CO.

2013.12. 1

1. Preface

Thank you for purchasing the Shock Relay TSBSA series.

This instruction manual describes everything from installation to adjustment.

Be sure to read this manual carefully before using your Shock Relay.

When delivering a device containing the Shock Relay, be sure that this instruction manual is included.

2. TSBSA and TSB2CT Model identification

• Shock relay

TSB SA 05

| | | | |
|--------------------|-------------------|----------------|------------------|
| | | Current Range: | |
| | Series: SS series | <u>05</u> | <u>0.5 - 5 A</u> |
| | | <u>10</u> | <u>1 - 10A</u> |
| Model: Shock Relay | | <u>30</u> | <u>3 - 30 A</u> |
| | | <u>60</u> | <u>5 - 60 A</u> |

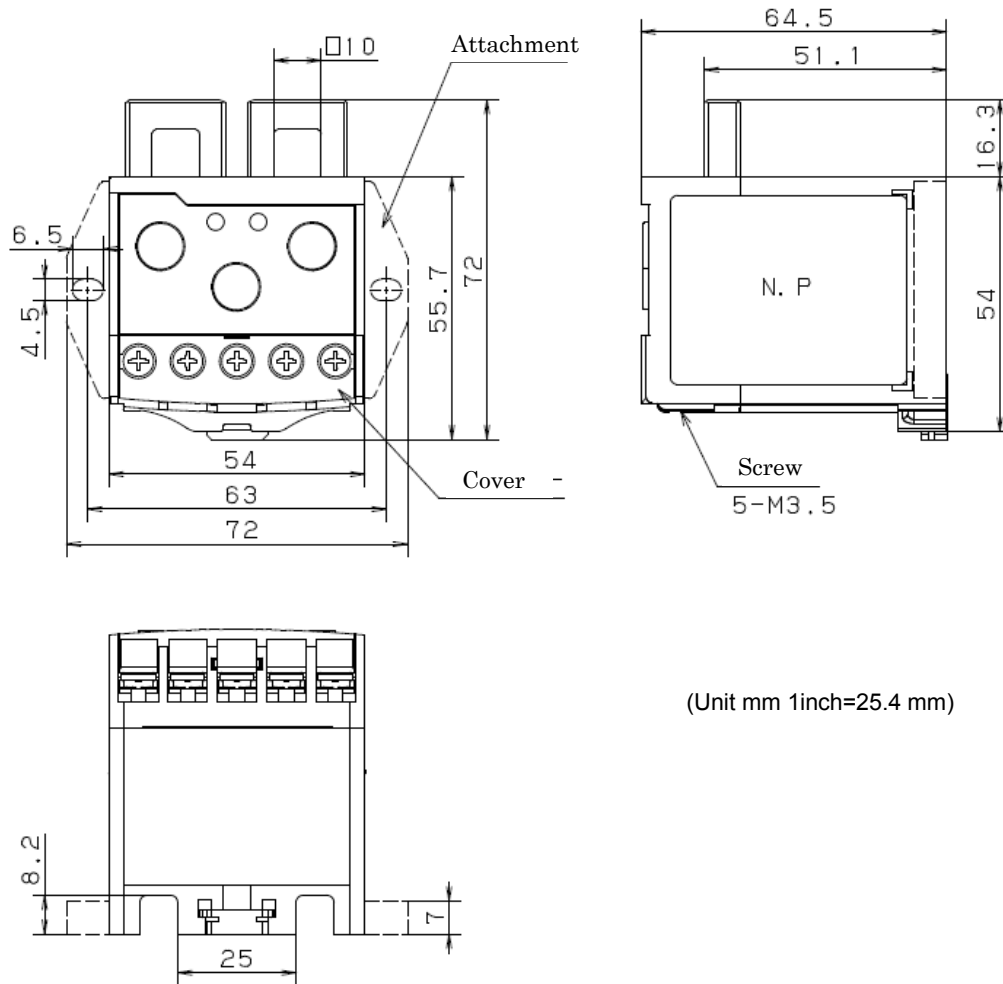
• External 2-phase CT

TSB 2CT 100

| | | | | |
|--------------------|--------------------|------------------------|------------|-------------|
| | | Rated primary current: | <u>100</u> | <u>100A</u> |
| | | | <u>200</u> | <u>200A</u> |
| | Series: 2-phase CT | | <u>300</u> | <u>300A</u> |
| Model: Shock Relay | | | | |

3. Dimensions

• Shock relay



(Unit mm 1inch=25.4 mm)

4. Specifications

| Series | | TSB SA | |
|---|---|----------------------------------|----------------------------|
| Current Setting * ¹ | Type | Range | |
| | 05 | 0.5 - 5A | |
| | 10 | 1 - 10A | |
| | 30 | 3 - 30A | |
| | 60 | 5 - 60A | |
| Time Setting * ¹ | Starting Trip Delay | Start Time | 0.2 - 10s |
| | Trip Time | Shock Time | 0.2 - 5s |
| Accuracy | Current | ±10% (full scale) | |
| Control Power Supply | 100~240VAC, 50/60Hz * ² | | |
| Rated Voltage | 600VAC, 50/60Hz | | |
| Current Sensing | 2 Integral Current Transformer | | |
| Output Relay | Mode | 1-SPDT(1-C) | |
| | Rating | 3A / 250VAC, Resistive | |
| | Minimum applicable load * ³ | DC10V, 10mA | |
| | Status | Normally De-Energized | |
| Expected Output Relay Life | Mechanical | 10,000,000 Operations | |
| | Electrical | 100,000 Operations | |
| Display | Monitor(MON,green), Over Current(OC,red) | | |
| Reset | Auto Reset after 1s | | |
| Ambient Environment | Temperature | Operating | -20 - +60°C (-4 - +158 F) |
| | | Storage | -30 - +70°C (-22 - +176 F) |
| | Humidity | 45 - 85% RH without Condensation | |
| Insulation | Between casing and circuit | Over 10MΩ with 500 VDC Megger | |
| Dielectric Strength | Between casing and circuit | AC 2000V, 5mA, 60Hz, 1min | |
| | Between contacts | AC 1000V, 5mA, 60Hz, 1min | |
| | Between circuits | AC 2000V, 5mA, 60Hz, 1min | |
| Power Consumption | 115VAC | 2.70 VA(0.35W) | |
| | 230VAC | 11.00 VA(1.2W) | |
| Material | Case | Upper:PA6, Bottom:PA66 | |
| | Terminal cover | PA6 | |
| Mounting | 35mm DIN rail or Panel | | |
| Dimension(WxHxD /Including Integral CT Windows) | 54x60x65mm | | |
| Weight | Less than 200g (0.445LBS) without External CT | | |

*1 Current and time setting ranges can be set within the warranty range, but not the upper or lower level of setting volume.

*2 When Shock Relay Is used with Inverter, the output frequency of Inverter should be from 30Hz to 60Hz.

*3 When directly inputting output relay contact into the programmable controller (PLC), be aware that a minute electric current can cause contact failure. As for the input to PLC, it is commended to drive the relay coil for minute current by relay signal of Shock Relay at first, then input this relay contact to PLC.

5. Installation

1. Environmental specifications

Install the Shock Relay in the following environment.

- Temperature: -20 to $+60^{\circ}\text{C}$ not in direct sunlight.
- Humidity: 45~85% relative humidity without condensation and freezing.
- Place: Indoors, no water splash.
- Atmosphere: Free from dust, corrosion gas, and oil mist.
- Height: 2000m or less above sea level.
- Vibration: 5.9m/s^2 and under.

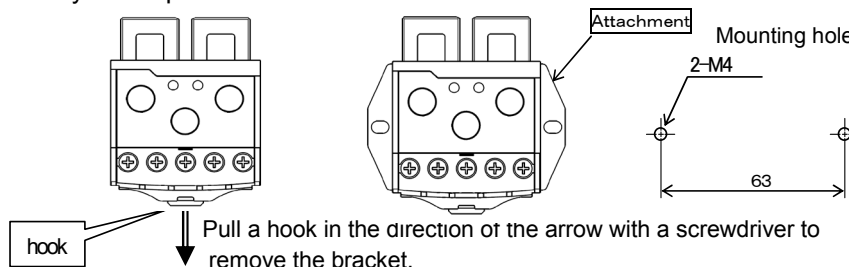
2. Installation to the panel

(1) Installation with DIN rail

While pulling the hook of Shock Relay to the arrow direction, install Shock Relay to 35mm DIN rail. When removal, put the hook to the arrow direction with flathead screwdriver.

(2) Installation with screw

Put the plate for installation at the both side of Shock Relay, and install Shock Relay to the panel



3. Installation to the DIN rail

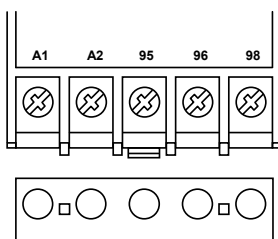
- (1) Pull the hook on the Shock Relay in the direction of the arrow to remove the mounting bracket.
- (2) Install the Shock Relay to the DIN rail.

6. Wiring

- (1) Connect 90–250VAC power source to the terminal A1, A2.
 - Never connect the output of an inverter or a servo driver to terminals A1-A2. Install an insulation transformer between the power line and terminals A1-A2 of the SHOCK RELAY when harmonic noise is included in the power line.
- (2) Check and correct the following items before turning the power on.
 - a. Is there any misconnection?
 - b. Have you forgotten to complete any connections?
 - c. Are there any abnormal conditions such as a short-circuit or ground fault?

| | | |
|--|----------------|---|
| | WARNING | ELECTRICAL SHOCK AND BURN Do not operate without the ground wire connected. |
|--|----------------|---|

7. Terminal Function



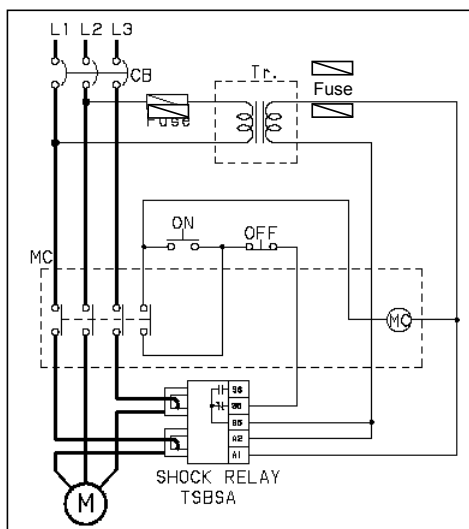
| Terminal | Function | Contents. |
|----------|--------------|---|
| A1 | Power Supply | 100 – 240VAC commercial power supply is wired |
| A2 | | |
| 95 | Output Relay | Common |
| 96 | | Normally close (Tripped: open) |
| 98 | | Normally open (Tripped: close) |

8. Current Transformer

Select the number of wires passing through the CT (Current Transformer) by using the following table for best performance. When two motor leads pass through the CT, the current sensed by the CT is twice the motor current flowing through the motor lead.

| AC 200 ~ 230 Volt Motor | | | | AC 400 ~ 460 Volt Motor | | | |
|-------------------------|---------------------|------------|--------------------------|-------------------------|---------------------|------------|--------------------------|
| Motor Capacity (kW) | Motor Capacity (Hp) | TSBSS TYPE | Wires passing through CT | Motor Capacity (kW) | Motor Capacity (Hp) | TSBSS TYPE | Wires passing through CT |
| 0.1 | 1/8 | TSBSA05 | 4 | — | — | — | — |
| 0.2 | 1/4 | TSBSA05 | 3 | 0.2 | 1/4 | TSBSA05 | 4 |
| 0.4 | 1/2 | TSBSA05 | 2 | 0.4 | 1/2 | TSBSA05 | 3 |
| 0.75 | 1 | TSBSA05 | 1 | 0.75 | 1 | TSBSA05 | 2 |
| 1.5 | 2 | TSBSA10 | 1 | 1.5 | 2 | TSBSA05 | 1 |
| 2.2 | 3 | TSBSA10 | 1 | 2.2 | 3 | TSBSA05 | 1 |
| 3.7 | 5 | TSBSA30 | 1 | 3.7 | 5 | TSBSA10 | 1 |
| 5.5 | 7-1/2 | TSBSA30 | 1 | 5.5 | 7-1/2 | TSBSA30 | 1 |
| 7.5 | 10 | TSBSA60 | 1 | 7.5 | 10 | TSBSA30 | 1 |
| 11 | 15 | TSBSA60 | 1 | 11 | 15 | TSBSA30 | 1 |
| — | — | — | — | 15 | 20 | TSBSA60 | 1 |
| — | — | — | — | 18.5 | 25 | TSBSA60 | 1 |
| — | — | — | — | 22 | 30 | TSBSA60 | 1 |

Basic wiring diagram



M : THREE-PHASE MOTOR

MC : Magnetic contactor

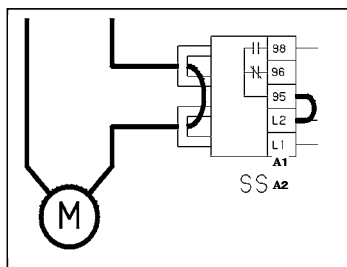
ON : Start switch

OFF : Stop switch

Fuse : Fuse

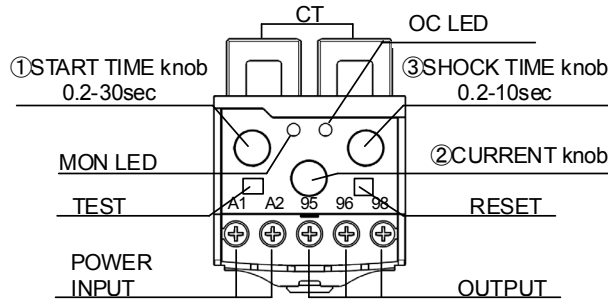
Tr : Transformer

1. A transformer may be required, depending on the voltage of Motor (i.e. over 250VAC)
2. Output relay is normally de-energized. When Shock Relay trips, the contacts change state.
3. Two of three phases of the motor are passed through the Shock Relay's CT in the same direction.
4. A fire might be happened as there is no protection circuit in main circuit.
5. Please select a fuse capacity depending upon capacity of a contactor MC to be connected.



M: SINGLE-PHASE MOTOR

10. construction



Description

Two of three phases of the motor current are monitored by integral current transformers (External current transformers are required for current more than 60 Amps). The internal solid state circuitry compares the monitored motor (or load) currents with the preset current level.

When motor current exceeds the preset trip current level, the "OC" LED illuminates and indicates that an overload has been detected.

The relay will trip after the preset trip time (SHOCK TIME) and the "OC" LED remains illuminated indicating an overload trip has occurred.

When the motor currents decrease, the relay reverts after one second.

If the motor current drops back down below the preset current level before the preset trip time delay has elapsed, Shock Relay will return to normal condition.

MON lamp (green) shows monitor condition.

It is turned on under the normal monitor condition, and the relay turns off the lights while it is outputted.

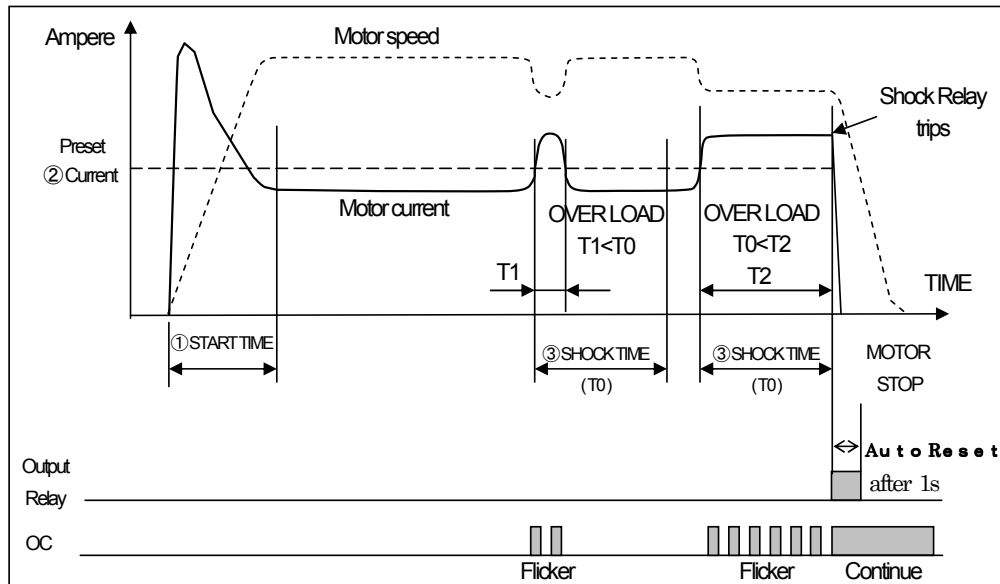
With the visual aid of the "OC" LED flashing when motor current becomes 100% of the preset current actual load current can be determined without aid of an ammeter.

The TEST button provides the means of testing service-worthiness and integrity.

Since the Shock Relay has definite time characteristics, the start trip delay may be adjusted with a minimum setting of 0.2 through a maximum of 10 seconds.

The trip time adjustment range is from 0.2 through 5 seconds. The relay may be used as an electronic shear-pin by setting the SHOCK TIME to minimum.

If the Shock Relay trips, always investigate to determine the cause and correct prior to restarting.



11. Set up

- 1) When installing, set the start delay timer (START TIME knob) to the known motor run-up time or the maximum if the time is not known.
- 2) Set the trip delay timer (SHOCK TIME knob) to the desired trip time.
- 3) Set the load current (CURRENT knob) at the rated full load or the desired value.
- 4) With connections made and control power on, depress the TEST button and hold.
Verify that the red LED illuminates and the internal relay should switch contacts after the sum of start time and shock time.
- 5) Start the equipment and notice the run-up time, then slowly turn the CURRENT knob counter clock-wise until the LED flashes, This indicates 100% of the load current.
Set the CURRENT knob to the desired trip setting. A setting of 110% of the running current is commonly used.
- 6) Reset the START TIME knob to match the normal run-up time.
- 7) Periodic testing by using the TEST button is suggested to ensure the full protection through preventive maintenance.

12. Troubleshooting

| Symptom | Check | Result | Treatment |
|--|---|---|--|
| "MON" lamp isn't turned on. | Check the operation power supply wiring. (between terminals A1 and A2) | Incorrect wiring. | Wire correctly |
| | Measure the voltage of the operation power supply with a tester. (between terminals A1 and A2) | Not between 100~240VAC. Between 100~240VAC. | Set the voltage between 100 ~240VAC. Repair or replace. |
| Just after starting, the relay begins operating. | Check the value of START TIME. | Short | Set a longer. |
| | | Long (It is obvious that relay is operating within the set time). | Repair or replace. |
| The relay output does not operate. | Examine the Current level setting. | The Current level setting is inappropriate. | Set to suitable level. |
| | Examine the SHOCK TIME setting. | Long. | Set a shorter. |

13. Maintenance and testing

During performance of any maintenance or testing, be sure to go the following.

- (1) To prevent a fire hazard, keep the surrounding area clean and create a safe environment.
- (2) When performing tests on the Shock Relay mounting or connections, be sure that the power supply is disconnected, that the instrument is completely stopped, and that "MON" lamp isn't turned on. Also, make sure that the power supply cannot be accidentally reconnected.
- (3) Observe the guidelines listed in the Labor Safety and Health Regulation.

14. Daily check and periodic check

- (1) Confirm that there is no looseness in the installation of the Shock Relay and current transformer. Check the wiring connections every six months.
- (2) Regularly check the function of the output relay, terminal 95-96, terminal 97-98, by pressing the TEST button.
- (3) A typical life time of electrolytic capacitor mounted in the SHOCK RELAY is about 10 years at an average ambient temperature of 30°C, but this lifetime may vary with a different ambient environment and with the operating period when power is supplied. We recommend you to exchange the Shock Relay for a new one before trouble occurs.

15. Point for safe use

- (1) Take measures beforehand to prevent danger when using a TSUBAKI product.
- (2) If our product begins to operate improperly, be sure to take measures to prevent a dangerous situation from arising.

16. Guarantee.

1 Range of guarantee

With regard to any troubles happened to our products, replacement or repair of such troubled parts will be provided for free of charge during the effective period of guarantee, provided that installation and maintenance/management of said products have been performed properly pursuant to the description of this instruction manual and said products have been used under the condition described in the brochures or agreed separately through mutual consultations. The content of guarantee is limited only to the Shock Relay itself delivered to you and the judgment thereof will be made by our selection because such judgment pertaining to the range of guarantee is often complex.

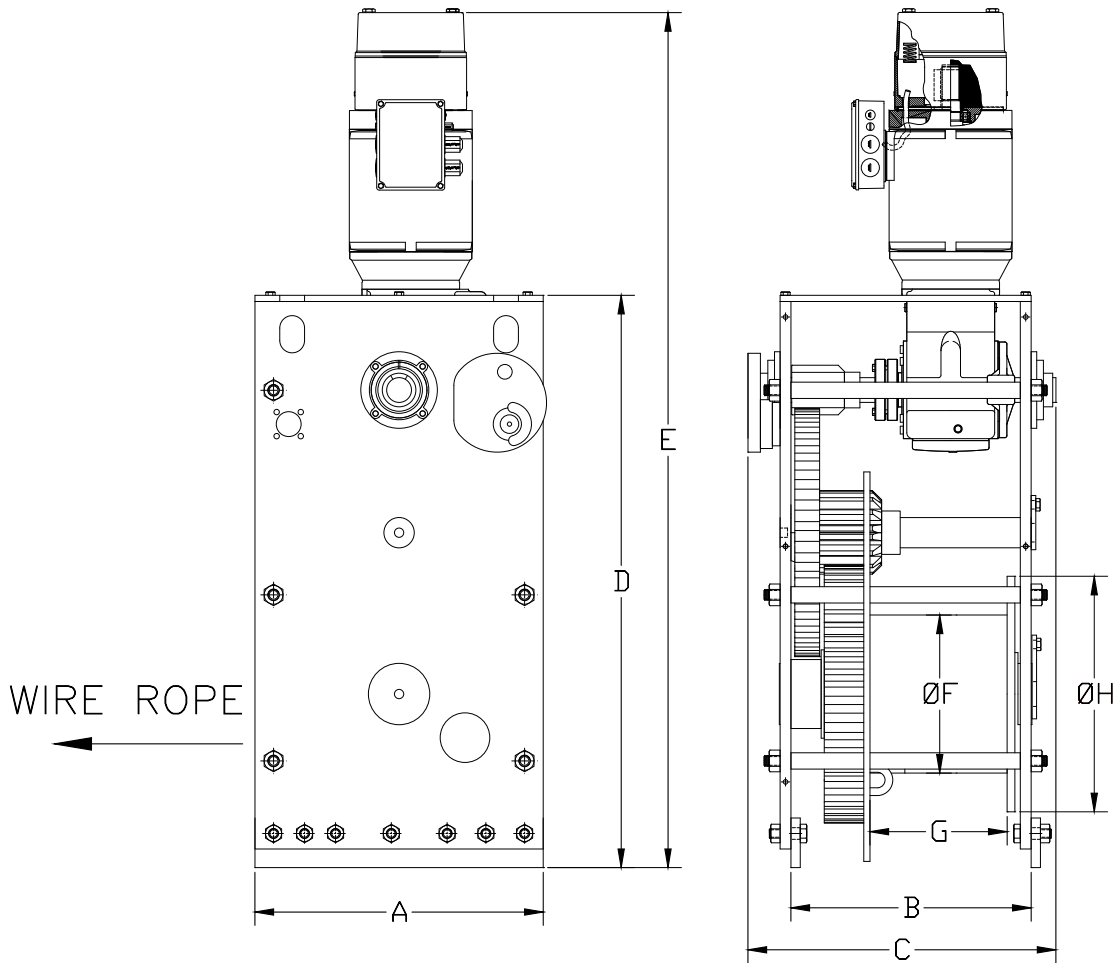
2 Guarantee period

The guarantee period shall be either 18 months after shipment from our factory or 12 months after starting operation, whichever is shorter. Any and all inspection/repair undertaken by us after the above guarantee period has passed will be charged. Should questions arise, please do not hesitate to contact us or the dealer from whom you purchased.

3 Miscellaneous

- (1) Any matters described in this instruction manual are subject to change without notice.
- (2) We have tried our best in preparing the contents of this instruction manual. Should any mistake or oversight be found, we will be more than happy if you would advice us of them.

C.1 DIMENSIONAL (SHAFT MOUNTED)

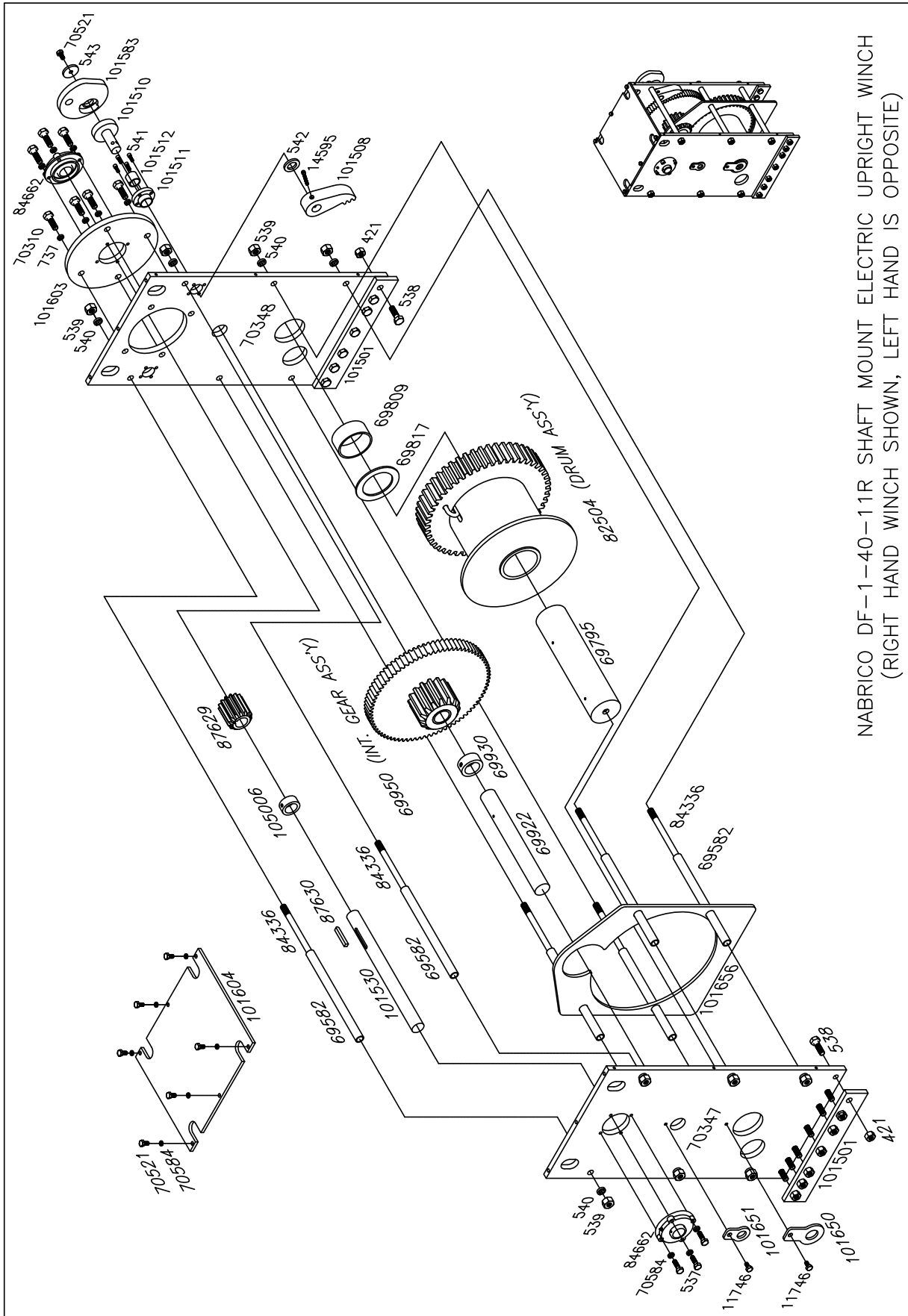


| MODEL | A | B | C | D | E | ØF | G | ØH |
|----------|---------|---------|---------|---------|---------|---------|---------|-----|
| DF-1-30 | 22" | 19-3/8" | 23" | 39" | 57-1/2" | 10-3/4" | 11" | 16" |
| DF-1-40 | 23-1/4" | 20-1/8" | 24" | 46-1/8" | 70" | 12-3/4" | 11-1/4" | 19" |
| DF-1-50 | 23-1/4" | 20-1/8" | 24" | 46-1/8" | 72" | 12-3/4" | 11-1/4" | 19" |
| DF-1-65 | 30" | 23-1/8" | 27" | 55-1/2" | 81" | 14" | 10-5/8" | 24" |
| DF-1-100 | 30" | 22-3/8" | 27-7/8" | 55-5/8" | 80-5/8" | 14" | 10-5/8" | 24" |

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NABRICO

C.2 PARTS BREAKDOWN (SHAFT MOUNTED)



NABRICO DF-1-40-11R SHAFT MOUNT ELECTRIC UPRIGHT WINCH
(RIGHT HAND WINCH SHOWN, LEFT HAND IS OPPOSITE)

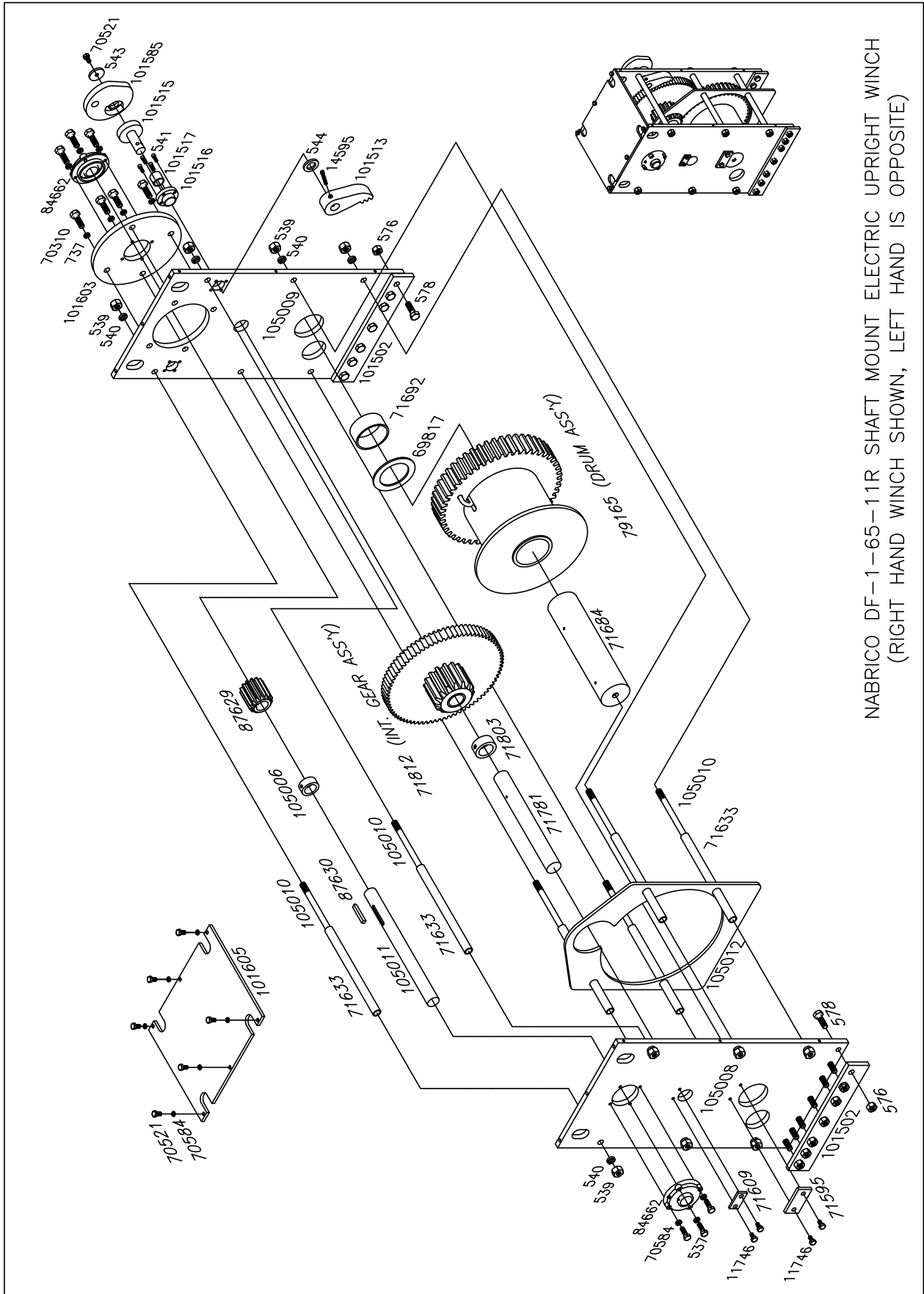
| DF-1-40/50-ND Electric Winch Parts List | | |
|---|-----|---------|
| Winch Parts | | |
| Part Description | Qty | Part #s |
| Pipe Separator | 6 | 69582 |
| Drum Shaft | 1 | 69795 |
| Drum Pipe Spacer | 1 | 69809 |
| Drum Washer | 1 | 69817 |
| Intermediate Shaft | 1 | 69922 |
| Intermediate Shaft Collar | 1 | 69930 |
| Intermediate Gear Assembly (Hardened) | 1 | 69950 |
| Top Plate | 1 | 70346 |
| Side Plate (keeper side) | 1 | 70347 |
| Side Plate (locking pawl side) | 1 | 70348 |
| Drum Assembly (Hardened) | 1 | 82504 |
| Pipe Separator Rod (SS) | 6 | 84336 |
| Drive Pinion | 1 | 87629 |
| Key (drive pinion) 1/2" SQ x 4-1/4" | 1 | 87630 |
| Base Bar | 2 | 101501 |
| Locking Pawl | 1 | 101508 |
| Locking Pawl Post | 1 | 101510 |
| Locking Pawl Sleeve | 1 | 101511 |
| Drive Shaft | 1 | 101530 |
| Locking Pawl Handle (Left Hand Winch) | 1 | 101582 |
| Locking Pawl Handle (Right Hand Winch) | 1 | 101583 |
| Cover Plate (side mount motor cut-out) | 1 | 101603 |
| Keeper Plate (BIG) | 1 | 101650 |
| Keeper Plate (small) | 1 | 101651 |
| Cable Guard Plate | 1 | 101656 |
| Drive Shaft Collar | 1 | 105006 |

| Motor and Components | | |
|--|-----|---------|
| Part Description | Qty | Part #s |
| Brake to Motor Adaptor | 1 | 34450 |
| Nord Gearmotor (shaft mount) 7.5 hp, 17.08 ratio | 1 | 85002 |
| Nord Gearmotor (shaft mount) 10 hp, 27.91 ratio | 1 | 85006 |
| Dings Brake & Gear Combo (75 ft/lbs) | 1 | 397812 |

| DF-1-40/50-ND Electric Winch Parts List | | |
|---|-----|---------|
| Fasteners and Etc. | | |
| Part Description | Qty | Part #s |
| Hex Nut 3/4" (SS) | 14 | 421 |
| Hex Head Bolt 1/2" x 2" (SS) | 8 | 537 |
| Hex Head Bolt 3/4" x 2-1/2" (SS) | 14 | 538 |
| Hex Nut 7/8" (SS) | 12 | 539 |
| Lock Washer 7/8" (SS) | 12 | 540 |
| Socket Head Cap Screw 3/8" x 1" (SS) | 4 | 541 |
| Locking Pawl Washer | 1 | 542 |
| Washer 9/16" ID x 2-1/2" OD (SS) | 1 | 543 |
| Lock Washer 5/8" (SS) | 4 | 737 |
| Hex Head Bolt 5/8" x 1" | 2 | 11746 |
| Socket Head Cap Screw 3/8" x 3" (SS) | 1 | 14595 |
| Hex Head Bolt 5/8" x 1-3/4" (SS) | 4 | 70310 |
| Hex Head Bolt 1/2" x 1" (SS) | 6 | 70521 |
| Lock Washer 1/2" (SS) | 14 | 70584 |

| Bushings and Bearings | | |
|-----------------------------|-----|---------|
| Part Description | Qty | Part #s |
| Intermediate Gear Bushing | 1 | 69973 |
| Drum Gear Bushing | 1 | 82511 |
| Ball Bearing | 2 | 84662 |
| Locking Pawl Sleeve Bushing | 1 | 101512 |

| Miscellaneous Components | | |
|--------------------------------------|-----|---------|
| Part Description | Qty | Part #s |
| Cover Mounting Stud 3/8" x 1-1/2" | 10 | 549 |
| Brass Wing Nut 3/8" | 10 | 550 |
| Protective Rubber Cover | 2 | 80243 |
| U-Bolt with Fasteners (1" Dia. Wire) | 1 | 82570 |
| T-Handle (locking pawl handle) | 1 | 101580 |



NABRICO DF-1-65-11R SHAFT MOUNT ELECTRIC UPRIGHT WINCH
(RIGHT HAND WINCH SHOWN, LEFT HAND IS OPPOSITE)

| DF-1-65-11-ND Electric Winch Parts List | | |
|---|-----|----------|
| Winch Parts | | |
| Part Description | Qty | Part #'s |
| Drum Washer | 1 | 69817 |
| Keeper Plate (BIG) | 2 | 71595 |
| Keeper Plate (small) | 2 | 71609 |
| Pipe Separator | 6 | 71633 |
| Drum Shaft | 1 | 71684 |
| Drum Pipe Spacer | 1 | 71692 |
| Intermediate Shaft | 1 | 71781 |
| Intermediate Shaft Collar | 1 | 71803 |
| Intermediate Gear Assembly | 1 | 71812 |
| Drum Assembly | 1 | 79165 |
| Drive Pinion | 1 | 87629 |
| Key (drive pinion) 1/2" SQ x 4-1/4" | 1 | 87630 |
| Base Bar | 2 | 101502 |
| Locking Pawl | 1 | 101513 |
| Locking Pawl Post | 1 | 101515 |
| Locking Pawl Sleeve | 1 | 101516 |
| Locking Pawl Handle (Left Hand Winch) | 1 | 101584 |
| Locking Pawl Handle (Right Hand Winch) | 1 | 101585 |
| Cover Plate (side mount motor cut-out) | 1 | 101603 |
| Top Plate | 1 | 101605 |
| Drive Shaft Collar | 1 | 105006 |
| Side Plate (keeper side) | 1 | 105008 |
| Side Plate (locking pawl side) | 1 | 105009 |
| Pipe Separator Rod (SS) | 6 | 105010 |
| Drive Shaft Collar | 1 | 105011 |
| Cable Guard Plate | 1 | 105012 |

| Motor and Components | | |
|--|-----|----------|
| Part Description | Qty | Part #'s |
| Nord Gearmotor 10 hp, 230/460V, 60 HZ, 27.91 ratio | 1 | 85006 |
| Nord Gearmotor 10 hp, 220V, 50 HZ, 27.91 ratio | 1 | 85009 |
| Dings Brake & Gear Combo (75 ft/lbs, 60 HZ) | 1 | 397812 |
| Dings Brake & Gear Combo (75 ft/lbs, 50 HZ) | 1 | 397804 |

| DF-1-65-11-ND Electric Winch Parts List | | |
|---|-----|----------|
| Fasteners and Etc. | | |
| Part Description | Qty | Part #'s |
| Hex Head Bolt 1/2" x 2" (SS) | 8 | 537 |
| Hex Nut 7/8" (SS) | 6 | 539 |
| Lock Washer 7/8" (SS) | 6 | 540 |
| Socket Head Cap Screw 3/8" x 1" (SS) | 4 | 541 |
| Locking Pawl Washer | 3 | 544 |
| Washer 9/16" ID x 2-1/2" OD (SS) | 1 | 543 |
| Hex Nut 1" (SS) | 14 | 576 |
| Hex Head Bolt 1" x 3" (SS) | 14 | 578 |
| Lock Washer 5/8" (SS) | 4 | 737 |
| Hex Head Bolt 5/8" x 1" | 8 | 11746 |
| Socket Head Cap Screw 3/8" x 3" (SS) | 1 | 14595 |
| Hex Head Bolt 5/8" x 1-3/4" (SS) | 4 | 70310 |
| Hex Head Bolt 1/2" x 1" (SS) | 7 | 70521 |
| Lock Washer 1/2" (SS) | 14 | 70584 |

| Bushings and Bearings | | |
|-----------------------------|-----|----------|
| Part Description | Qty | Part #'s |
| Drum Gear Bushing | 1 | 71676 |
| Intermediate Gear Bushing | 1 | 71854 |
| Ball Bearing | 2 | 84662 |
| Locking Pawl Sleeve Bushing | 1 | 101517 |

| Miscellaneous Components | | |
|--------------------------------------|-----|----------|
| Part Description | Qty | Part #'s |
| Cover Mounting Stud 3/8" x 1-1/2" | 10 | 549 |
| Brass Wing Nut 3/8" | 10 | 550 |
| U-Bolt with Fasteners (1" Dia. Wire) | 1 | 72001 |
| Protective Rubber Cover | 2 | 80228 |
| T-Handle (locking pawl handle) | 1 | 101580 |

C.3 GEARMOTOR TECHNICAL INFORMATION (SHAFT MOUNTED)



GENERAL INSTRUCTIONS



RETAIN FOR FUTURE USE

U10000 - 1 of 2

1. Importance of the operating instructions

These operating instructions are intended to provide general information and safety guidelines. It is the responsibility of the buyer, machine builder, installer and user of the NORD product to make sure that all the proper safety notes and operating instructions have been reviewed and understood. If the contents of this instruction or any applicable operating instructions are not understood, please consult NORD.

⚠
WARNING
⚠

Electric motors, gearmotors, electrical brakes, variable frequency drives, and gear reducers contain potentially dangerous high-voltage, rotating-components and surfaces that may become hot during operation. All work involved in the transport, connection, commissioning and maintenance of any NORD product must be carried out by qualified and responsible technicians.

2. Inspect incoming freight

Before accepting shipment from the freight company, thoroughly inspect the NORD equipment for any shipping and handling damage. If any goods called for in the bill of lading or express receipt are damaged, or if the quantity is short, do not accept until the freight express agent makes an appropriate notation on your freight bill or express receipt. If any concealed loss or damage is discovered later, notify your freight carrier or express agent at once, and request a formal review of your claim.

Claims for loss or damage in shipment must not be deducted from the NORD invoice, nor should payment of the NORD invoice be withheld awaiting adjustment of such claims, as the carrier guarantees safe delivery. NORD will try to assist in collecting claims for loss or damage during shipment; however, this willingness on our part does not remove the transportation company's responsibility in reimbursing you for collection of claims or replacement of material.

3. Obtaining detailed operating instructions

One can receive the detailed installation and maintenance instructions by entering a serial number (or NORD order number) at the appropriate location on the NORD web site.

- i. Record the serial number from your gearmotor, gear reducer, or motor nameplate, or record the serial number found on your order confirmation.
- ii. Go to www.nord.com/docs to download the appropriate operating instructions.

EXAMPLE: www.nord.com/docs

Unit documentation

Gear unit installation and maintenance instructions can be found by entering the sales order number in the search field below. The sales order number can be found on the gear unit's nameplate (see illustration) or on the order confirmation.

Sales Order Number: 200836833-400
 Model Type: SK9382AZSH-180MH4 TW RD VZ
 Mounting Position: M4

| Type | Name | Pages | Size |
|------|--|-------|-------------|
| 📄 | U10000 - General Instructions | 2 | (51.97 KB) |
| 📄 | U10040 - Storage | 1 | (36.77 KB) |
| 📄 | U10060 - Unit Installation | 2 | (60.94 KB) |
| 📄 | U10270 - Keyed Hollow Shaft | 2 | (70.52 KB) |
| 📄 | U10750 - Helical and Bevel Reducer Lubrication | 2 | (75.96 KB) |
| 📄 | U11000 - Helical and Bevel Lubrication Types | 2 | (58.10 KB) |
| 📄 | U11900 - Lubrication Capacity - Clincher Shaft Mounted | 1 | (894.56 KB) |
| 📄 | U14200 - Oil Plug and Vent Locations - Clincher Parallel Shaft | 1 | (125.83 KB) |
| 📄 | U15200 - Parts List - Clincher Parallel Shaft | 12 | (619.50 KB) |
| 📄 | Complete Manual for 200836833-400 (PDF Format) | 31 | (2.25 MB) |
| 📄 | All Manuals for 200836833-400 (ZIP Format) | | (2.01 MB) |

4. Intended use

NORD is a supplier of electric motors, gearmotors, reducers, electromechanical brakes, mechanical variators, and electrical variable frequency drives that are intended for commercial installations on larger systems and machines.

⚠
WARNING
⚠

NORD does not accept any liability for damage or injury caused by:

- Inappropriate use, operation or adaptation of the drive system.
- Unauthorized removal of housing covers, safety and inspection covers, guarding, etc.
- Unauthorized modifications to the drive system.
- Improper servicing or repair work on the drive system.
- Damage caused during shipment or transportation.
- Disregard of the important Safety Notes or Operating Instructions.



GENERAL INSTRUCTIONS



RETAIN FOR FUTURE USE

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5. Notes concerning warranty and liability

All units are supplied according to the terms described in our standard "Conditions of Sale." The unit limited warranty is also defined in our "Conditions of Sale" and is located in the back of our product catalogs as well as the back of your order invoice.

All NORD Safety Notes and all related NORD Operating instructions shall be considered up-to-date at the time in which they were compiled by the buyer, machine builder, installer or user. NORD reserves the right to incorporate technical modifications and information updates to any safety/operating instructions that are within the scope of providing additional knowledge or clarification, communicating design changes, or product enhancements. Information updates may include any NORD product, or subsequent products purchased and supplied by NORD; No specific claims can be derived from the information or illustrations and descriptions contained in the safety notes or related operating instructions.

6. Checklist for installation and operation

- Verify that the purchased NORD product has been supplied with the expected accessories & options. Check the received goods and packing slip to make sure items are properly received.
- Make sure that you have all of the required Operating Instructions for your NORD electric motor, gearmotor, reducer, electromechanical brake, mechanical variable speed drives, or electrical variable frequency drives.
- Consult NORD if you feel you are missing any documentation or if you have questions.

| | | |
|---|----------------|--|
|  | WARNING |  |
| <p>NORD assumes no liability for personal injury, equipment damage or malfunctions resulting from failure to comply with any installation safety notes. The applicable national, regional, and local work regulations and safety requirements must also be complied with. Failure to comply with any safety notes or regulations may result in serious injury, damage to property, or even death.</p> | | |



SAFETY NOTES



RETAIN FOR FUTURE USE

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1. Safety & information symbols

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

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

2. Safety warnings

GENERAL WARNINGS

- All work involved in the transport, connection, commissioning and maintenance of any NORD product must be carried out by qualified and responsible technicians. All applicable national, regional, and local work regulations and safety requirements must also be complied with. **NORD assumes no liability for personal injury, accidental death, or equipment damage and malfunctions resulting from failure to comply with installation or operating instructions, safety notes, or any work regulations and laws!**
- Gear unit installation and maintenance work may only be performed when no power is available to the prime mover or motor. Electric motors, electrical brakes, and variable frequency drives, contain potentially dangerous high-voltage. Prior to installation or maintenance, shut down the power at the circuit breaker or power switch. **While working on the drive, make sure the power from the prime mover is isolated or secured on "lock-out" to prevent accidental start-up and to safeguard against injury!**
- Surfaces of motors and gear units may become hot during operation or shortly after start-up. In some instances additional protection against accidental contact may be necessary. **Use caution to avoid burns or serious injury!**

3. Observe published performance range & nameplate data

HARMFUL SITUATION

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

U.S. Nameplate

NORD GEAR CORPORATION-USA / WWW.NORD.COM

SK **1**

S/N **2**

RATIO **3** SF **4**

TORQUE **5** LB-IN

SPEED **6** RPM

FOR GEAR LUBRICATION SEE MANUAL **7** MTG POS 120194630

UNICASE™

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

European Nameplate

Getriebebau NORD
GrbH&Co KG
D - 22934 Bargteheide

Type SK **1**

No. **2**

i= **3**

n2= **4** min⁻¹

0-1510 0310

Siehe Wartungsanleitung
See maintenance instructions
Voir instructions d'entretien

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

4. Transportation and handling

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

WARNING

Do not attach other machinery or loads to the NORD assembly, since the supplied lifting bolts are not designed for this purpose.

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

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



HELICAL & BEVEL REDUCER LUBRICATION



RETAIN FOR FUTURE USE

U10750 - 1 of 2

1. Importance of proper lubrication

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

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

2. Standard oil type

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

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

IMPORTANT NOTE

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

- Clincher™ Sizes SK11282, SK11382 and SK12382

| Maintenance-free / Lubricated For Life Gear Units | |
|---|--|
| Clincher™ sizes SK0182NB, SK0282NB & SK1382NB | Standard Oil Fill: ISO VG220 SHC/PAO Synthetic Oil |
| NORDBLOC® Sizes SK172, SK272, SK371F, SK372, SK373, SK320 | |

IMPORTANT NOTE

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

IMPORTANT NOTE

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

3. Lubrication replacement

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

4. Oil viscosity

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

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

IMPORTANT NOTE

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

5. Maximum oil sump temperature limit

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

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

IMPORTANT NOTE

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



HELICAL & BEVEL REDUCER LUBRICATION



RETAIN FOR FUTURE USE

U10750 - 2 of 2

6. The importance of routine oil analysis

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

| | | |
|--|--------------------------|------|
| STOP | HARMFUL SITUATION | STOP |
| <p>NORD suggests replacing the gear oil if oil analysis indicates any of the following:</p> <ul style="list-style-type: none"> • Viscosity has changed by approximately 10% or more. • Debris particles (silicon, dust, dirt or sand) exceed 25 ppm. • Iron content exceeds 150-200 ppm. • Water content is greater than 0.05% (500 ppm). • The total acid number (TAN) tests indicate a significant level of oxidative break-down of the oil, and a critical reduction in performance; If the TAN number measured changes by more than 5% over the new oil, then an oil change would be recommended. | | |

7. Mounting position and oil fill quantity

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

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

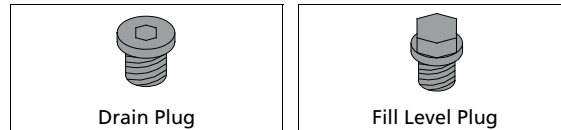
| | | |
|--|--------------------------|------|
| STOP | HARMFUL SITUATION | STOP |
| <p>Actual oil volume can vary slightly depending upon the gear case size, mounting and ratio. Prior to commissioning the reducer, check the oil-fill level using the reducer's oil-level plug and drain or add additional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

8. Oil plug locations

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

9. Drain and fill-level plugs

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

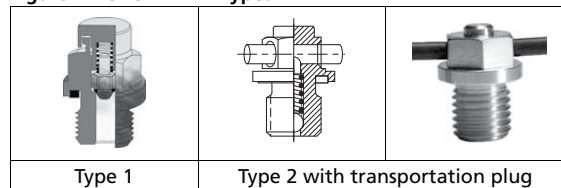


10. Vent plug locations

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

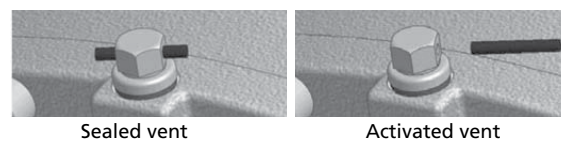
AUTOVENT™ - The AUTOVENT™ helps prevent bearing and gear damage by behaving like a check valve to block the entry of foreign material (water, dust, corrosives, etc.). The breather opens at approximately 2-3 psi during operation and closes tightly as the gearbox cools. This option is perfect for humid conditions and wash-down environments, helping to maintain proper oil cleanliness, and reducing foaming and oxidation. NORD may choose to offer one of two style options as shown in Figure 1. The Type 2 AUTOVENT™ comes closed upon delivery with a transportation sealing plug (see Warning).

Figure 1 AUTOVENT™ Types



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

| | | |
|--|----------------|---|
| ⚠ | WARNING | ⚠ |
| <p>To prevent build-up of excessive pressure, sealed vents must be activated as shown prior to gear unit start up.</p> | | |



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



HELICAL & BEVEL REDUCER LUBRICATION TYPES



DRIVESYSTEMS

RETAIN FOR FUTURE USE

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Lubrication Tables – Helical and Bevel Gear Units

Standard Oil Lubricants

| ISO Viscosity | Oil Type | Ambient Temperature Range | Manufacturer Brand/Type | Notes |
|---------------|----------|----------------------------|-------------------------|-------|
| VG220 | MIN-EP | 0 to 40°C (32 to 104°F) | Mobilgear 600XP220 | ◆● |
| | PAO | -35 to 60°C (-31 to 140°F) | Mobil SHC630 | ◆② |
| | FG | -5 to 40°C (23 to 104°F) | Fuchs FM220 | ◆ |

Optional Oil Lubricants

| ISO Viscosity | Oil Type | Ambient Temperature Range | Manufacturer Brand/Type | Notes |
|---------------|----------|----------------------------|-------------------------|-------|
| VG460 | PAO | -35 to 80°C (-31 to 176°F) | Mobil SHC 634 | - |
| | FG-PAO | -35 to 80°C (-31 to 176°F) | Mobil SHC Cibus 460 | - |
| VG220 | FG-PAO | -35 to 60°C (-31 to 140°F) | Mobil SHC Cibus 220 | - |
| VG150 | PAO | -35 to 25°C (-31 to 77°F) | Mobil SHC629 | - |

Grease Options (applied to greased bearings and seal cavities)

| NLGI Grade | Grease Type/Thickener | Ambient Temperature Range | Manufacturer Brand/Type | Notes |
|------------|-----------------------|----------------------------|-------------------------|-------|
| NLGI 2 | Standard (Li-Complex) | -30 to 60°C (-22 to 140°F) | Mobil Grease XHP222 | ◆● |
| | High Temp (Polyurea) | -40 to 80°C (-40 to 176°F) | Mobil / Polyrex EP 2 | ◆② |
| | Food-Grade (Polyurea) | -30 to 40°C (-22 to 104°F) | Mobil SHC Polyrex 222 | ◆ |

◆ Stocked Lubricants

● Standard product on serviceable gear units

② Standard product on maintenance free gear units

i
IMPORTANT NOTES
i

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

Oil Formulation Codes

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

Lubrication Notes

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

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DRIVESYSTEMS

HELICAL & BEVEL REDUCER LUBRICATION TYPES

RETAIN FOR FUTURE USE



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Oil Cross-reference Chart

| ISO Viscosity | Oil Type | Ambient Temperature Range | Mobil | Shell | Castrol | FUCHS | KLÜBER LUBRICATION |
|---------------|----------|------------------------------|---------------------|--------------|----------------|----------------------|------------------------|
| VG150 | MIN-EP | 0 to 25°C (32 to 77°F) | Mobilgear 600XP150 | Omala 150 | Alpha SP150 | Renolin EP150 | Klüberoil GEM 1-150N |
| | PAO-EP | -30 to 25 °C (-22 to 77 °F) | Mobilgear SHC150 | Omala HD 150 | Alphasyn EP150 | Gearmaster SYN150/NA | Klübersynth EG 4-150 |
| | PAO | -30 to 25°C (-22 to 77°F) | Mobil SHC629 | Omala RL 150 | Alphasyn T150 | N/A | Klübersynth GEM 4-150N |
| | PG | -25 to 25°C (-13 to 77°F) | Mobil Glygoyle 150 | Tivela S150 | Alphasyn PG150 | Renolin PG150 | Klübersynth GH 6-150 |
| | FG | 0 to 25°C (32 to 77°F) | Mobil DTE FM 150 | N/A | N/A | N/A | N/A |
| | FG-PAO | -15 to 25°C (5 to 77°F) | Mobil SHC Cibus 150 | N/A | N/A | Cassida GL150 | Klüberoil 4 UH 1-150N |
| | FG-PG | -25 to 25°C (-13 to 77°F) | Mobil Glygoyle 150 | N/A | N/A | N/A | Klübersynth UH1 6-150 |
| VG220 | MIN-EP | 0 to 40°C (32 to 104°) | Mobilgear 600XP220 | Omala 220 | Alpha SP220 | Renolin EP220 | Klüberoil GEM 1-220N |
| | PAO-EP | -30 to 60 °C (-22 to 140 °F) | Mobilgear SHC220 | Omala HD220 | Alphasyn EP220 | Gearmaster SYN220/NA | Klübersynth EG 4-220 |
| | PAO | -30 to 60°C (-22 to 140°F) | Mobil SHC630 | Omala RL220 | Alphasyn T220 | N/A | Klübersynth GEM 4-220N |
| | PG | -25 to 60°C (-13 to 140°F) | Mobil Glygoyle 220 | Tivela S220 | Alphasyn PG220 | Renolin PG220 | Klübersynth GH 6-220 |
| | FG | 0 to 40°C (32 to 104°F) | Mobil DTE FM 220 | N/A | N/A | Fuchs FM220 | N/A |
| | FG-PAO | -25 to 60°C (-13 to 140°F) | Mobil SHC Cibus 220 | N/A | N/A | Cassida GL220 | Klüberoil 4 UH 1-220N |
| | FG-PG | -25 to 60°C (-13 to 140°F) | Mobil Glygoyle 220 | N/A | N/A | Cassida WG220 | Klübersynth UH1 6-220 |
| VG460 | MIN-EP | 0 to 40°C (32 to 104°F) | Mobilgear 600XP460 | Omala 460 | Alpha SP460 | Renolin EP460 | Klüberoil GEM 1-460N |
| | PAO-EP | -20 to 80°C (-4 to 176°F) | Mobilgear SHC460 | Omala HD460 | Alphasyn EP460 | Gearmaster SYN460/NA | Klübersynth EG 4-460 |
| | PAO | -20 to 80°C (-4 to 176°F) | Mobil SHC 634 | Omala RL460 | Alphasyn T460 | N/A | Klübersynth GEM 4-460N |
| | PG | -20 to 80°C (-4 to 176°F) | Mobil Glygoyle 460 | Tivela S460 | Alphasyn PG460 | N/A | Klübersynth GH 6-460 |
| | FG | 0 to 40°C (32 to 104°F) | Mobil DTE FM460 | N/A | N/A | Fuchs FM460 | N/A |
| | FG-PAO | -20 to 80°C (-4 to 176°F) | Mobil SHC Cibus 460 | N/A | N/A | Cassida GL460 | Klüberoil 4 UH 1-460N |
| | FG-PG | -20 to 80°C (-4 to 176°F) | Mobil Glygoyle 460 | N/A | N/A | Cassida WG460 | Klübersynth UH1 6-460 |

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

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90.1 HELICAL-BEVEL FLANGED OIL FILL QUANTITIES



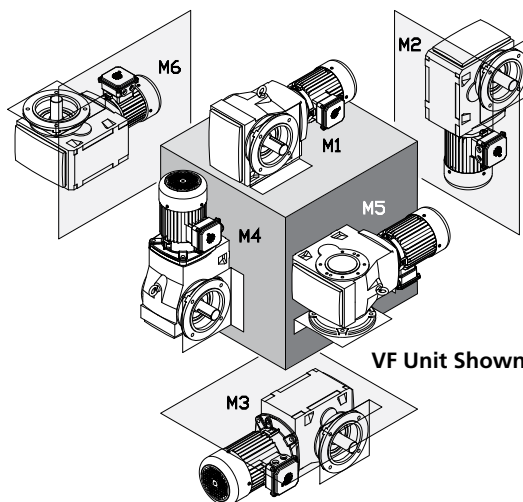
DRIVESYSTEMS

RETAIN FOR FUTURE USE

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90.1 Helical-bevel flanged lubrication

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



HARMFUL SITUATION

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

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

| Type | M1 | | M2 | | M3 | | M4 | | M5 | | M6 | |
|-----------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | Quarts | Liters | Quarts | Liters | Quarts | Liters | Quarts | Liters | Quarts | Liters | Quarts | Liters |
| SK 9012.1 | 1.06 | 1.00 | 2.01 | 1.90 | 2.01 | 1.90 | 2.32 | 2.20 | 1.27 | 1.20 | 1.80 | 1.70 |
| SK 9013.1 | 1.53 | 1.45 | 2.43 | 2.30 | 2.22 | 2.10 | 2.96 | 2.80 | 1.11 | 1.05 | 1.90 | 1.80 |
| SK 9016.1 | 1.06 | 1.00 | 2.01 | 1.90 | 2.01 | 1.90 | 2.32 | 2.20 | 1.27 | 1.20 | 1.80 | 1.70 |
| SK 9017.1 | 1.53 | 1.45 | 2.43 | 2.30 | 2.22 | 2.10 | 2.96 | 2.80 | 1.11 | 1.05 | 1.90 | 1.80 |
| SK 9022.1 | 1.69 | 1.60 | 3.70 | 3.50 | 3.70 | 3.50 | 4.44 | 4.20 | 2.43 | 2.30 | 2.96 | 2.80 |
| SK 9023.1 | 2.43 | 2.30 | 3.70 | 3.50 | 4.02 | 3.80 | 5.60 | 5.30 | 2.32 | 2.20 | 3.59 | 3.40 |
| SK 9032.1 | 2.22 | 2.10 | 5.07 | 4.80 | 6.76 | 6.40 | 7.50 | 7.10 | 3.49 | 3.30 | 5.39 | 5.10 |
| SK 9033.1 | 3.91 | 3.70 | 6.02 | 5.70 | 7.08 | 6.70 | 9.09 | 8.60 | 3.80 | 3.60 | 5.60 | 5.30 |
| SK 9042.1 | 4.76 | 4.50 | 10.6 | 10.0 | 10.6 | 10.0 | 12.2 | 11.5 | 6.87 | 6.50 | 8.66 | 8.20 |
| SK 9043.1 | 6.87 | 6.50 | 11.1 | 10.5 | 12.6 | 11.9 | 15.5 | 14.7 | 7.08 | 6.70 | 9.83 | 9.30 |
| SK 9052.1 | 7.93 | 7.50 | 17.4 | 16.5 | 21.1 | 20.0 | 24.8 | 23.5 | 12.2 | 11.5 | 19.0 | 18.0 |
| SK 9053.1 | 13.7 | 13.0 | 19.0 | 18.0 | 22.7 | 21.5 | 28.0 | 26.5 | 13.7 | 13.0 | 18.0 | 17.0 |
| SK 9062.1 | 12.7 | 12.0 | 29.1 | 27.5 | 34.9 | 33.0 | 40.7 | 38.5 | 20.1 | 19.0 | 27.5 | 26.0 |
| SK 9072.1 | 12.7 | 12.0 | 29.1 | 27.5 | 34.9 | 33.0 | 40.7 | 38.5 | 20.1 | 19.0 | 27.5 | 26.0 |
| SK 9082.1 | 22.2 | 21.0 | 57.0 | 54.0 | 70.0 | 66.0 | 85.0 | 80.0 | 40.2 | 38.0 | 55.0 | 52.0 |
| SK 9086.1 | 38.0 | 36.0 | 82.0 | 78.0 | 96.0 | 91.0 | 113 | 107 | 56.0 | 53.0 | 80.0 | 76.0 |
| SK 9092.1 | 42.3 | 40.0 | 137 | 130 | 163 | 154 | 185 | 175 | 87.0 | 82.0 | 96.0 | 91.0 |
| SK 9096.1 | 85.0 | 80.0 | 198 | 187 | 204 | 193 | 272 | 257 | 119 | 113 | 165 | 156 |

Oil Levels shown apply to base models and gear units ending in AZ, AF, VZ, & VF.

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90.1 HELICAL-BEVEL OIL PLUG & VENT LOCATIONS



DRIVESYSTEMS

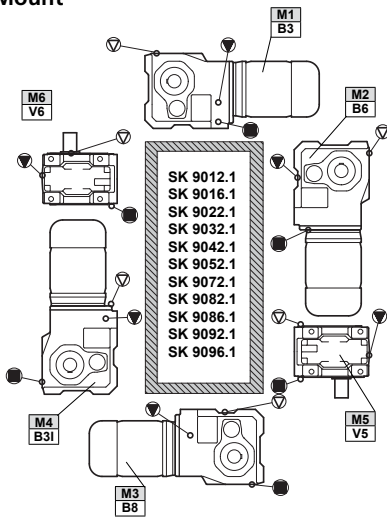
RETAIN FOR FUTURE USE

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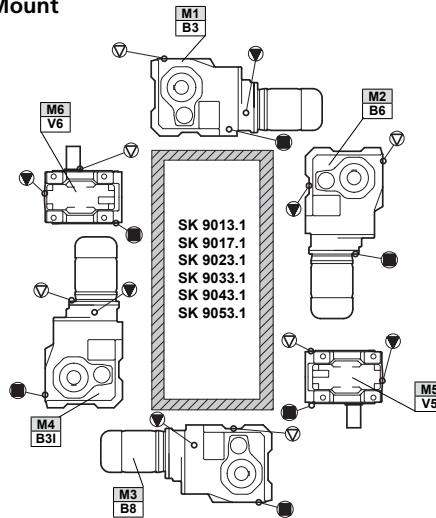
Oil plug connections

Prior to commissioning the reducer, check the oil-fill level using the reducer's oil-level plug and drain or add additional oil as needed. The minimum acceptable oil level is 0.15 in (4mm) below the oil level hole. *For mounting orientations other than shown please consult NORD Gear. New plug locations may be required.*

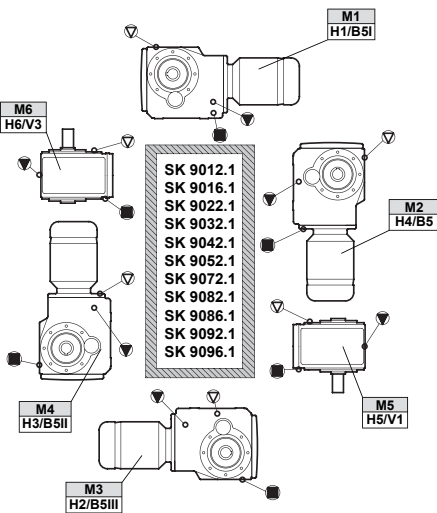
Foot Mount



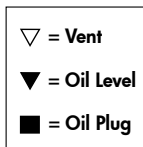
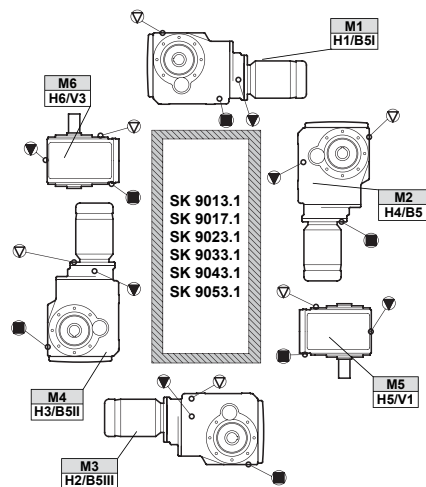
Foot Mount



Shaft/Flange Mount



Shaft/Flange Mount



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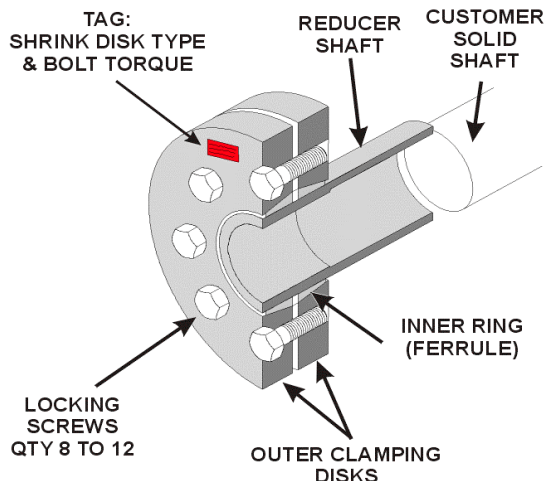
Hollow Shrink Disc Shaft Installation and Maintenance Instructions

BIM 1001

USA

CDN

Retain These Safety Instructions For Future Use



Installation Instructions:

1. Mating shaft tolerances are normally tighter for shrink discs due to the gripping forces needed. Customer shaft diameter has to be machined according to ISO h6 or f6 tolerances (f6 easier to machine but lower gripping forces as shown in catalog). Refer to Table 1 for h6 and f6 tolerances for customer shafts.
2. Remove transportation spacers (if provided) located between outer collars. Do not take the unit apart.
3. Lightly tighten locking screws until most play between outer collars and the conical inner ring (ferrule) is eliminated. You must be able to easily turn the ferrule with your fingers.
4. Lightly lubricate the bore of the ferrule, with grease, for easier mounting onto outside diameter of the reducer hollow shaft.
5. Slide the shrink-disc onto hollow shaft.
6. Wipe the reducer bore and the mating solid shaft clean of any lubricants and dirt. Only use solvent if the parts feel oily to the touch after wiping with a clean rag.
7. Slide the reducer onto the solid shaft until it is about half way through.
8. Lubricate the remaining portion of the solid shaft with a #2 grease, where it will be inserted into the hollow shaft.
9. Tighten the locking screws in a circular pattern. Refer to Table 2 for tightening torques. Initially, tighten locking screws finger tight to position outer collars. Then tighten 1/4

to 1/2 turn at a time until specified tightening torque (per table) is reached.

10. Continue tightening each bolt at rated torque until no further rotation is seen. This assures the shrink disc is fully seated.



Warning:

The surface area between the hollow shaft and the solid shaft must be free of lubricant or the connection may slip in service.



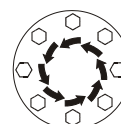
Warning:

Always tighten in a circular pattern. Never tighten bolts in a star pattern or connection may slip in service.

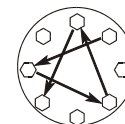
BOLT TIGHTENING PATTERN



CLOCKWISE CIRCULAR PATTERN
RIGHT



COUNTER CLOCKWISE CIRCULAR PATTERN
RIGHT



STAR PATTERN
WRONG

Customer shaft diameter tolerance with Shrink Disc fit h6
Metric (mm)

- ≤ Ø 18 = +0.000/-0.011
- > Ø 18 ≤ Ø 30 = +0.000/-0.013
- > Ø 30 ≤ Ø 50 = +0.000/-0.016
- > Ø 50 ≤ Ø 80 = +0.000/-0.019
- > Ø 80 ≤ Ø 120 = +0.000/-0.022
- > Ø 120 ≤ Ø 180 = +0.000/-0.025

Inch

- ≤ Ø 0.750 = +0.0000/-0.0004
- > Ø 0.750 ≤ Ø 1.125 = +0.0000/-0.0005
- > Ø 1.125 ≤ Ø 2.000 = +0.0000/-0.0006
- > Ø 2.000 ≤ Ø 3.000 = +0.0000/-0.0007
- > Ø 3.000 ≤ Ø 4.750 = +0.0000/-0.0008
- > Ø 4.750 ≤ Ø 7.000 = +0.0000/-0.0010

Shaft finish to be 125 micro inches or smoother.

Customer shaft diameter tolerance with Shrink Disc fit f6 (looser fit)
Metric (mm)

- ≤ Ø 18 = -0.016/-0.024
- > Ø 18 ≤ Ø 30 = -0.020/-0.029
- > Ø 30 ≤ Ø 50 = -0.025/-0.036
- > Ø 50 ≤ Ø 80 = -0.030/-0.043
- > Ø 80 ≤ Ø 120 = -0.036/-0.051
- > Ø 120 ≤ Ø 180 = -0.043/-0.061

Inch

- ≤ Ø 0.750 = -0.0006/-0.0011
- > Ø 0.750 ≤ Ø 1.125 = -0.0008/-0.0013
- > Ø 1.125 ≤ Ø 2.000 = -0.0010/-0.0016
- > Ø 2.000 ≤ Ø 3.000 = -0.0012/-0.0019
- > Ø 3.000 ≤ Ø 4.750 = -0.0014/-0.0023
- > Ø 4.750 ≤ Ø 7.000 = -0.0017/-0.0027

Shaft finish to be 125 micro inches or smoother

Tightening Torques for Locking Screws

| Shrink Disk Type | Bore Size Inches (mm) | Locking Screws (Bolts) | | |
|------------------|----------------------------|------------------------|---------|--------------------|
| | | Qty | Size | Torque in-lbs (Nm) |
| SNxx/35V | 0.9375 - 1.000 (24 - 26) | 8 | M5X25 | 60 (7) |
| SNxx/40V | 1.125 - 1.250 (28 - 32) | 8 | M6X35 | 110 (12) |
| SNxx/46V | 1.3125 - 1.4375 (34 - 36) | 10 | M6X35 | 110 (12) |
| SNxx/55V | 1.5625 - 1.75 (40 - 45) | 8 | M8X40 | 270 (30) |
| SNxx/62V | 1.875 - 2.0625 (48 - 52) | 10 | M8X40 | 270 (30) |
| SNxx/76V | 2.1875 - 2.5625 (55 - 65) | 10 | M10X50 | 520 (59) |
| SNxx/90V | 2.5625 - 2.9375 (65 - 75) | 10 | M12X70 | 885 (100) |
| SNxx/108V | 2.9375 - 3.375 (75 - 85) | 12 | M12X70 | 885 (100) |
| SNxx/128V | 3.750 - 4.125 (95 - 105) | 8 | M16X70 | 2,210 (250) |
| SNxx/138V | 4.125 - 4.500 (105 - 115) | 8 | M16X70 | 2,210 (250) |
| SNxx/158V | 4.500 - 5.125 (115 - 130) | 12 | M16X80 | 2,210 (250) |
| SNxx/185V | 5.3125 - 5.875 (135 - 150) | 12 | M16X80 | 2,210 (250) |
| SNxx/210V | 6.250 (160) | 12 | M16X80 | 4,340 (490) |
| SNxx/230V | 6.3125 - 7.500 (160 - 190) | 12 | M20X100 | 4,340 (490) |

Maintenance

Shrink disks are maintenance free.

Removal

- Loosen locking screws in circular pattern as they were tightened, by approximately 1/4 to 1/2 turn at a time until finger tight. Do not remove locking screws completely.
- Loosen the outer collars from the tapered inner ring. This may require tapping the bolts with a soft faced hammer or prying lightly between the outer collars.
- Remove hollow-shaft reducer from solid shaft.

Preparation for Re-Use:

- Disassemble and thoroughly clean all parts. Wire brush to remove any excessive rust or dirt.
- Lubricate the taper of the outer collars and of the inner ring with Molycote G-Rapid plus (product of Dow Corning) or equivalent.
- Grease screw threads and head contact area with multipurpose grease.

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Fax 905-796-8130



RIGHT-ANGLE SHAFT-MOUNT WITH TORQUE ARM (D)



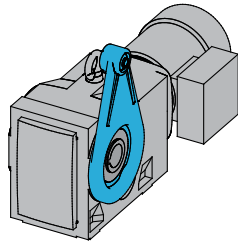
RETAIN FOR FUTURE USE

U10600 - 1 of 2

1. Torque arm (D)

The preferred method of installing a shaft-mounted reducer is to support the weight of the gear unit or gearmotor assembly from the driven solid machine shaft. A torque arm is required in order to restrain the gearbox, react the load torque, and keep the gear unit from spinning around the shaft.

The Torque-Arm (D) bracket is mounted to either side of the right-angle gear unit using mounting screws that thread into the B14 flange-face of the reducer. The anchor hole of the torque-arm bracket is supplied with a resilient rubber bushing.



IMPORTANT NOTE

The side of the reducer that the torque arm is mounted on, and the angular position can be specified at time of order. Consult the appropriate NORD catalog for specific Torque Arm (D) mounting options and ordering guidelines.

2. Purpose of the built-in resilient rubber bushing

The resilient rubber bushing installed into the anchor hole end of the torque-arm helps isolate and absorb all the load forces present in the system and increase the reducer's service life by reducing cumulative torsional shock loads.

- The primary load force acts in the direction of driven shaft rotation, reacts the load torque of the reducer, and prevents the gearbox from spinning on the shaft.
- Additional forces present themselves in the direction opposite of the shaft rotation, due to the typical slight out-of-round condition present in the machine shaft. This condition is the reason most shaft mounted-reducers have a slight shaft-wobble, which is normal.

HARMFUL SITUATION

Always make sure that the Torque Arm (D) has the resilient rubber bushing installed into the anchor hole end of the torque arm. Failure to do so will not properly cushion the reducer and can result in excessive binding, bearing stress, and damage to the reducer.

3. Machine support

The user must supply a suitably strong and rigid mating machine support that provides load bearing capacity on both sides of the torque-arm bracket.

WARNING

It is the responsibility of the machine builder to design a support bracket of adequate strength and rigidity, and supply an appropriate tightening bolt assembly. Failure to do so may result in injury caused from a damaged or broken torque-reaction assembly.

4. Installation of a right-angle reducer with torque arm

A. Make sure the Torque-Arm (D) is mounted in the correct position on the reducer. Assembled screw heads should always sit flush with the torque arm.

- To reposition the torque-arm, remove the mounting screws, relocate the torque-arm, and reassemble the mounting screws as noted above.
- If the torque-arm was shipped loose, position the torque-arm in the correct location on the gear unit, and secure the torque-arm as noted above.

IMPORTANT NOTES

- Torque arm mounting screws should be secured with a thread locking product (ex. Loctite® 242 or Loxeal® 54-03) and tightened per the table on page 2.
- Assembled screw heads should always sit flush with the torque arm.
- The support bracket should provide support on both sides of the torque arm or be in the form of a U-shape.
- Do not force the torque-arm. The torque arm must remain at a right angle to the gear unit.
- If mounting holes do not align properly the machine support may need to be moved.

B. Install the right-angle hollow bore reducer onto the machine shaft. Then line up the hole in the reducer's torque-arm with the hole in the machine's support bracket, and temporarily hold the reducer in place.

C. Apply a thread locking compound such as Loctite® 242 or Loxeal® 54-03 to the end of the anchor bolt that is used to secure the torque arm in place.

D. Place the anchor bolt through the support bracket and the reducer torque-arm. Attach the mating nut to the bolt and tighten the assembly until snug. At least one bolt diameter should protrude from the nut after assembly.

WARNING

Do not force misalignment of the torque-arm. The torque arm must remain at a right angle to the gear unit or excessive load may be placed on the reducer shaft and bearings.

E. Properly secure the gear unit assembly to the driven shaft in an axial direction.

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TROUBLESHOOTING



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Troubleshooting

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

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

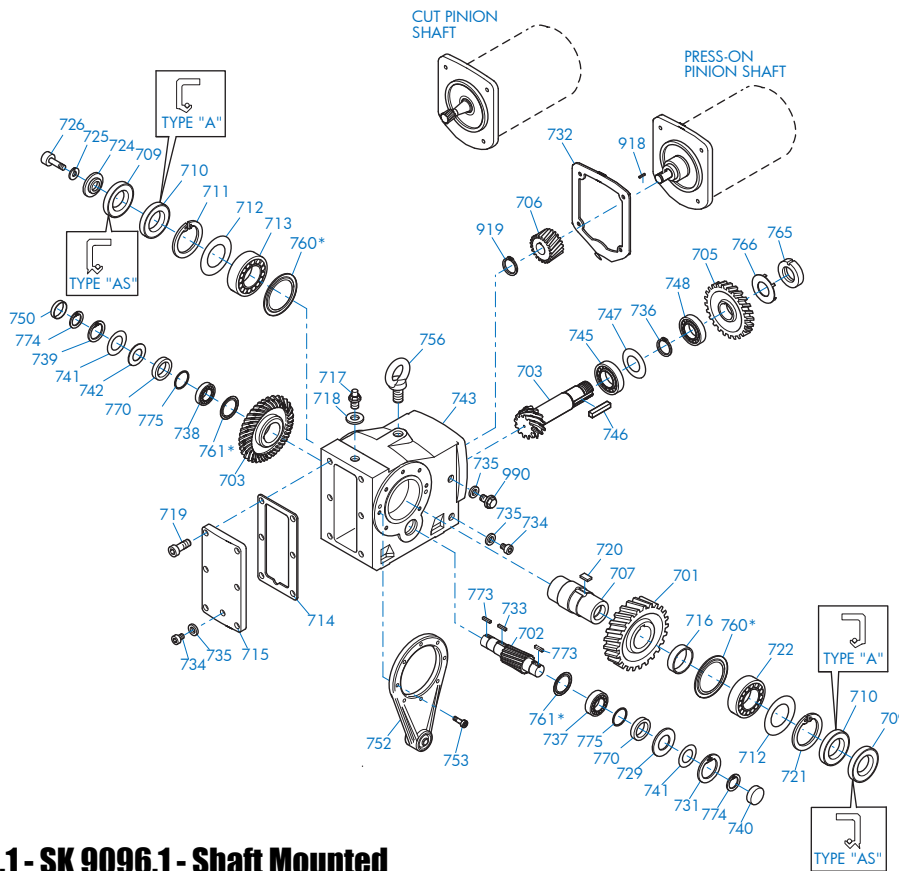


90.1 HELICAL-BEVEL PARTS LIST DRAWINGS



RETAIN FOR FUTURE USE

U15300 - 5 of 10



SK 9012.1 - SK 9096.1 - Shaft Mounted

| | | |
|---------------------------|---------------------------|--------------------------------|
| 701 Gear | 724 Retaining Washer | 748 Anti-Friction Bearing |
| 702 Pinion Shaft | 725 Lock Washer | 750 Bore Plug |
| 703 Bevel Gearset | 726 Bolt | 752 Torque Arm |
| 705 Gear | 729 Thrust Washer | 753 Bolt |
| 706 Pinion | 731 Snap Ring | 756 Flanged Eye Bolt |
| 707 Output Shaft | 732 Gasket | 760 Nilos Ring* |
| 709 Oil Seal | 733 Key | 761 Nilos Ring* |
| 710 Oil Seal | 734 Oil plug | 765 Slotted Round Nut |
| 711 Snap Ring | 735 Gasket | 766 Tab Lock Washer |
| 712 Shim | 736 Snap Ring | 770 Backstop (If Equipped) |
| 713 Anti-Friction Bearing | 737 Anti-Friction Bearing | 773 Key (w/Backstop) |
| 714 Gasket | 738 Anti-Friction Bearing | 774 Snap Ring (w/Backstop) |
| 715 Inspection Cover | 739 Snap Ring | 775 Thrust Washer (w/Backstop) |
| 716 Spacer | 740 Bore Plug | 918 Key |
| 717 Vent Plug | 741 Shim | 919 Snap Ring |
| 718 Gasket | 742 Thrust Washer | 990 Oil Level Plug |
| 719 Bolt | 743 Gearcase | |
| 720 Key | 745 Anti-Friction Bearing | |
| 721 Snap Ring | 746 Key | |
| 722 Anti-Friction Bearing | 747 Shim | |
| | | |
| | | |

* Conditionally used part

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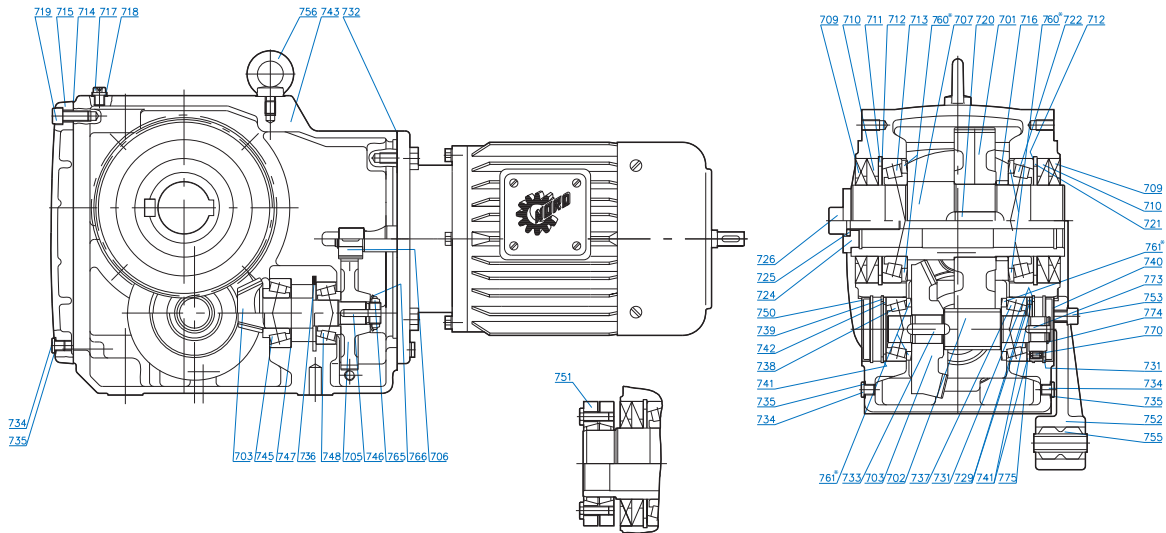


90.1 HELICAL-BEVEL PARTS LIST DRAWINGS



RETAIN FOR FUTURE USE

U15300 - 6 of 10



SK 9012.1 - SK 9096.1 - Shaft Mounted

| | | |
|---------------------------|---------------------------|---------------------------|
| 701 Gear | 722 Anti-Friction Bearing | 746 Key |
| 702 Pinion Shaft | 724 Washer | 747 Shim |
| 703 Bevel Gearset | 725 Lock Washer | 748 Anti-Friction Bearing |
| 705 Gear | 726 Bolt | 750 Bore Plug |
| 706 Pinion | 729 Thrust Washer | 751 Shrink Disc |
| 707 Output Shaft | 731 Snap Ring | 752 Torque Arm |
| 709 Oil Seal | 732 Gasket | 753 Bolt |
| 710 Oil Seal | 733 Key | 755 Rubber Buffer |
| 711 Snap Ring | 734 Oil plug | 756 Flanged Eye Bolt |
| 712 Shim | 735 Gasket | 760 Nilos Ring* |
| 713 Anti-Friction Bearing | 736 Snap Ring | 761 Nilos Ring* |
| 714 Gasket | 737 Anti-Friction Bearing | 765 Slotted Round Nut |
| 715 Inspection Cover | 738 Anti-Friction Bearing | 766 Tab Lock Washer |
| 716 Spacer | 739 Snap Ring | 770 Backstop* |
| 717 Vent Plug | 740 Bore Plug | 773 Key (w/Backstop) |
| 718 Seal | 741 Shim | 774 Snap Ring |
| 719 Bolt | 742 Thrust Washer | (w/Backstop) |
| 720 Key | 743 Gearcase | 775 Thrust Washer |
| 721 Snap Ring | 745 Anti-Friction Bearing | (w/Backstop) |

* Conditionally used part

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MOTORS - AC INDUCTION, SINGLE & POLYPHASE

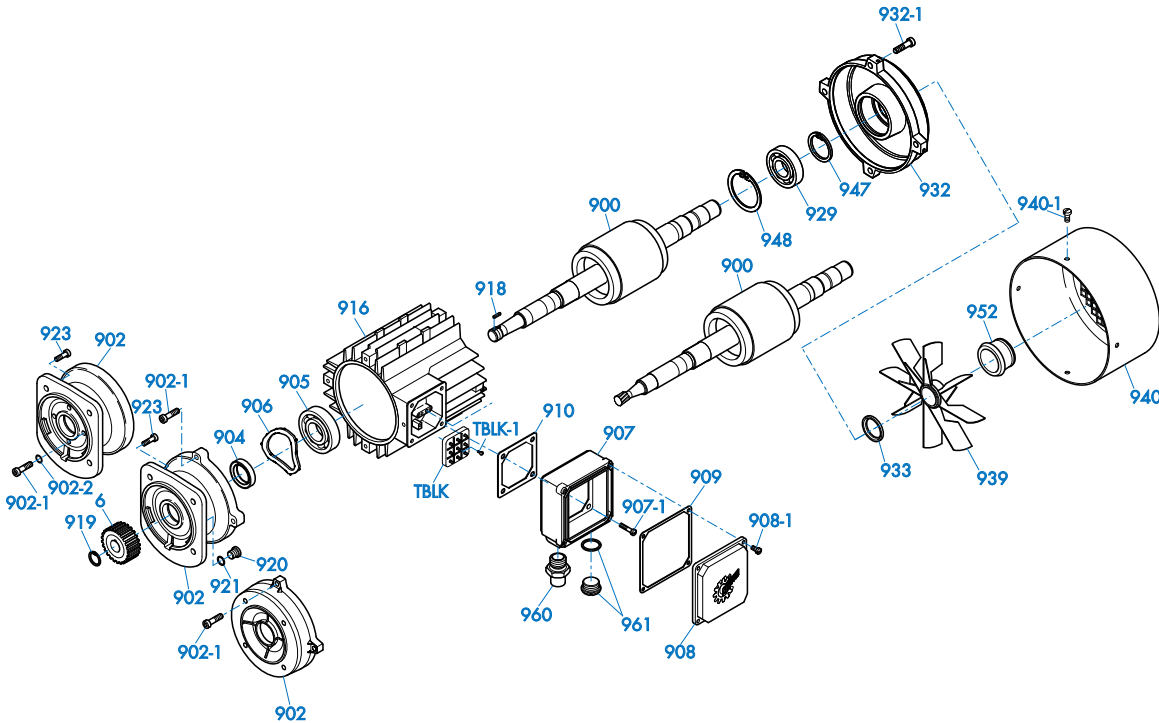


RETAIN FOR FUTURE USE

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18. Parts List

If you are ordering a part, provide the model and order number (table 1, page 2) of your motor. This will determine the specific part number you need.



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

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

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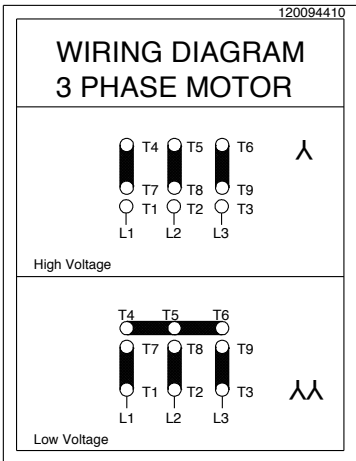


RETAIN FOR FUTURE USE

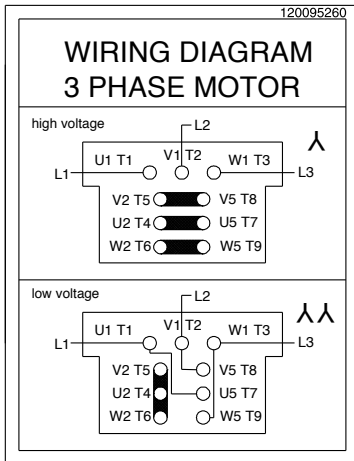
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15. Wiring Diagrams

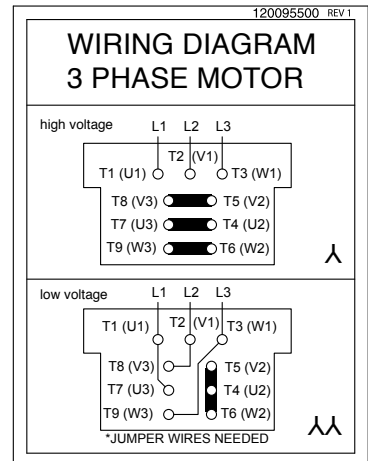
NORD Frames 63-225
230 / 460V, 60Hz, 3Ø | 200 / 400V, 50Hz, 3Ø



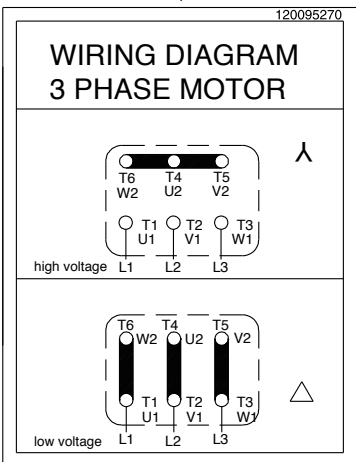
NORD mfg by Siemens - Frames 200 +
230 / 460V, 60Hz, 3Ø | 200 / 400V, 50Hz, 3Ø
190 / 380V, 60Hz, 3Ø



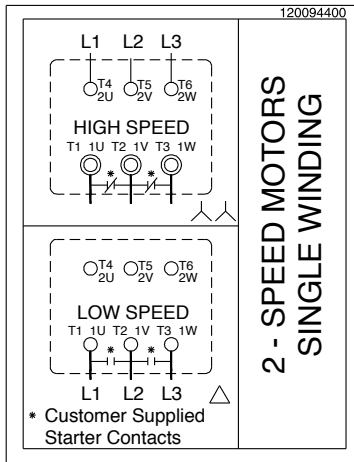
NORD mfg by Siemens - Frames 200 +
230 / 460V, 60Hz, 3Ø | 200 / 400V, 50Hz, 3Ø
190 / 380V, 60Hz, 3Ø



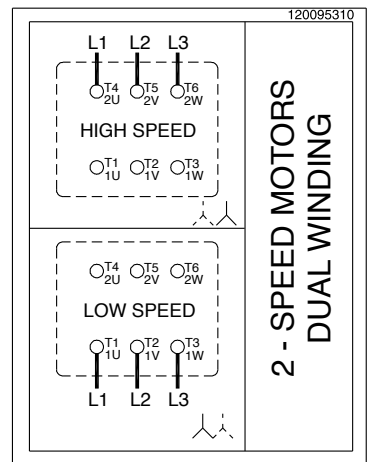
NORD Frames 63 - 225
460 / 800V, 60Hz, 3Ø | 230 / 400V, 50Hz, 3Ø
208 / 360V, 60Hz, 3Ø | 400 / 690V, 50Hz, 3Ø
332 / 575V, 60Hz, 3Ø



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



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





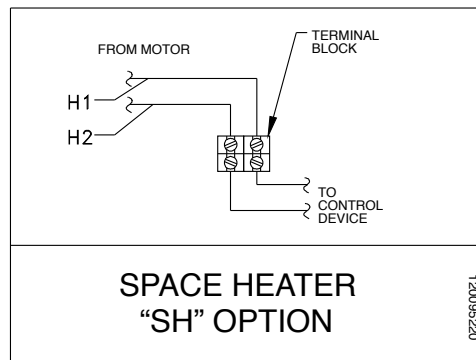
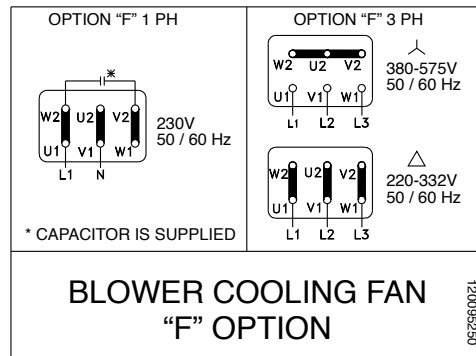
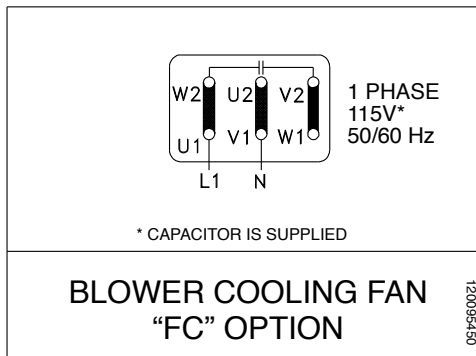
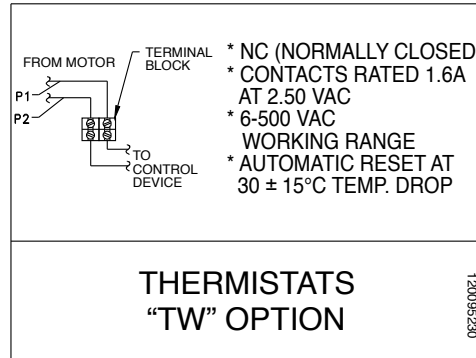
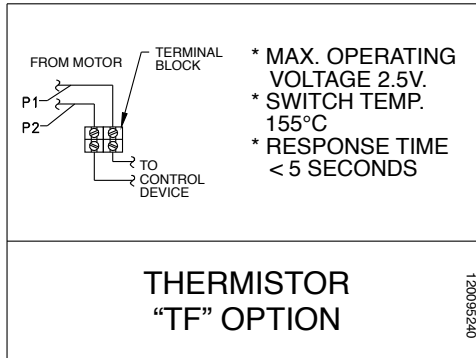
MOTORS - AC INDUCTION, SINGLE & POLYPHASE



RETAIN FOR FUTURE USE

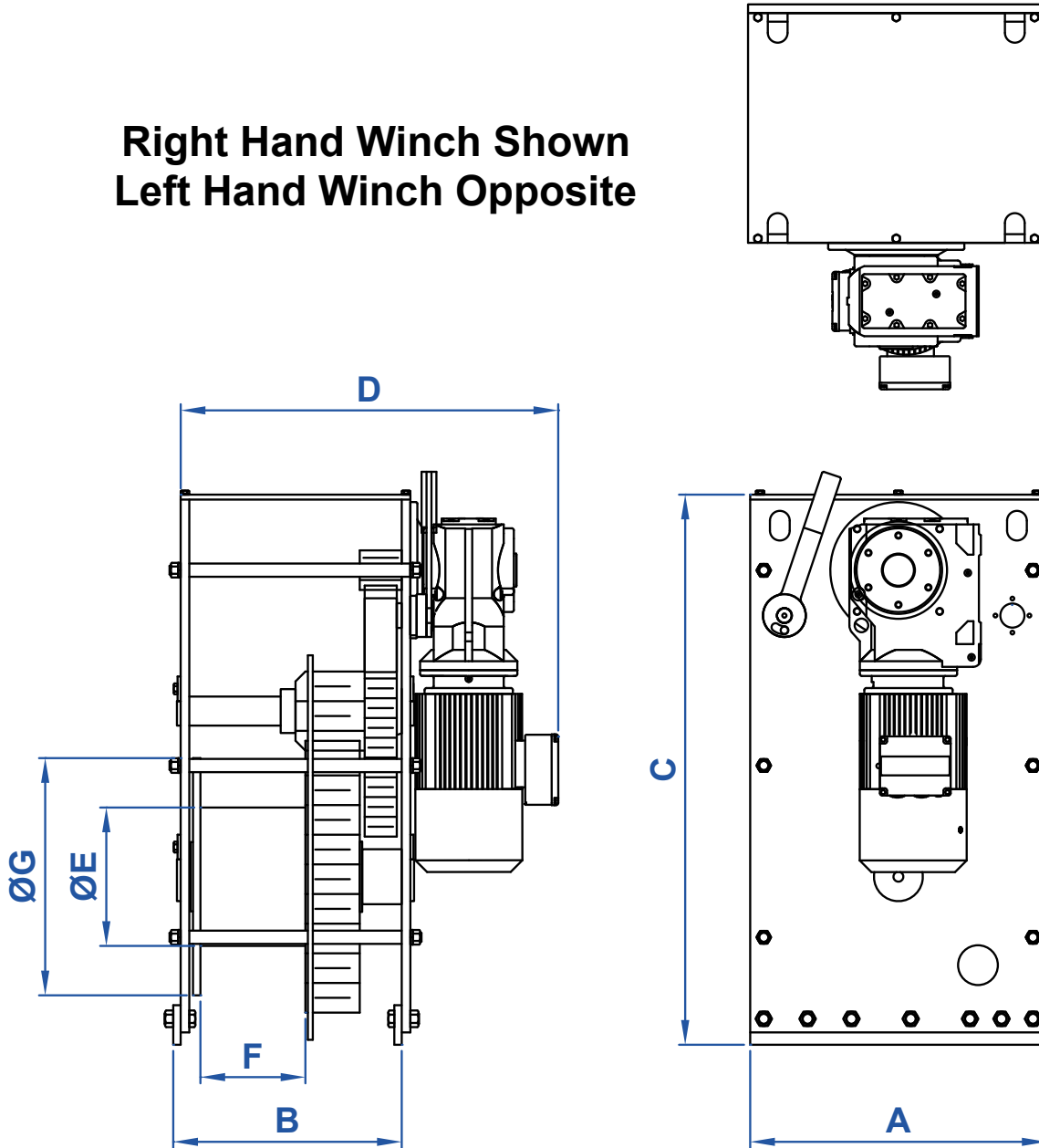
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15. Wiring Diagrams Ctd.



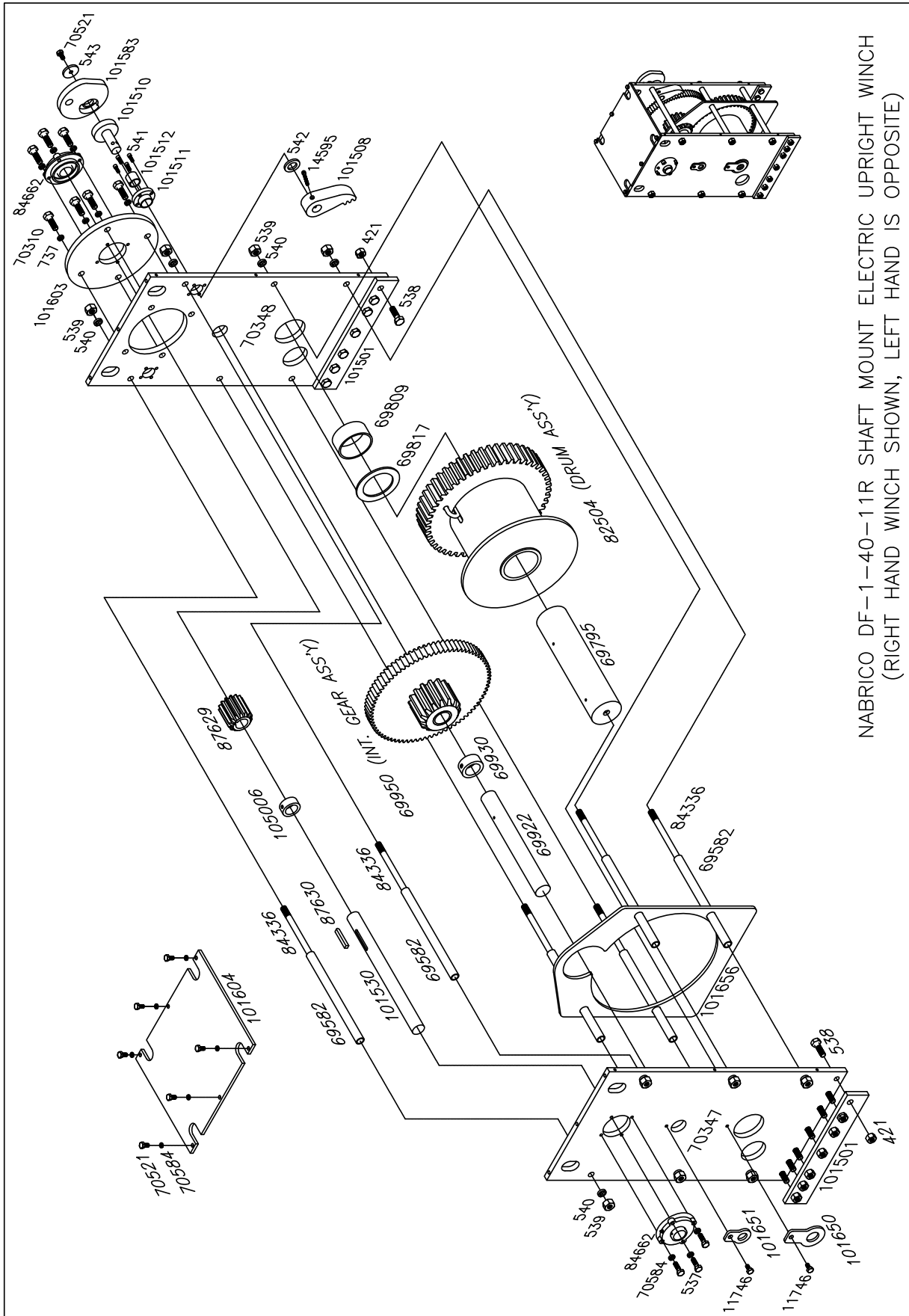
D.1 DIMENSIONAL (FLANGE MOUNTED)

**Right Hand Winch Shown
Left Hand Winch Opposite**



| Model | Part Number | Length "A" | Width "B" | Height "C" | Overall Length "D" | Drum Dia. "E" | Drum Width "F" | Flange Dia. "G" | Weight |
|---------|----------------|------------|----------------------------------|----------------------------------|-----------------------------------|---------------|----------------------------------|-----------------|-----------|
| DF-1-40 | 83396 83397 | 30" | 23 ¹ / ₈ " | 55 ¹ / ₂ " | 38 ³ / ₁₆ " | 14" | 10 ⁵ / ₈ " | 24" | 1,850 lbs |

D.2 PARTS BREAKDOWN (FLANGE MOUNTED)



NABRICO DF-1-40-11R SHAFT MOUNT ELECTRIC UPRIGHT WINCH
(RIGHT HAND WINCH SHOWN, LEFT HAND IS OPPOSITE)

| DF-1-40-ND Electric Winch Parts List | | |
|---|------------|-----------------|
| Winch Parts | | |
| Part Description | Qty | Part #'s |
| Cover Plate (shaft mount bearing cut-out) | 1 | 396 |
| Pipe Separator | 6 | 69582 |
| Drum Shaft | 1 | 69795 |
| Drum Pipe Spacer | 1 | 69809 |
| Drum Washer | 1 | 69817 |
| Intermediate Shaft | 1 | 69922 |
| Intermediate Shaft Collar | 1 | 69930 |
| Intermediate Gear Assembly (Hardened) | 1 | 69950 |
| Side Plate (keeper side) | 1 | 70347 |
| Side Plate (locking pawl side) | 1 | 70348 |
| Drum Assembly (Hardened) | 1 | 82504 |
| Pipe Separator Rod (SS) | 6 | 84336 |
| Drive Pinion | 1 | 87629 |
| Key (drive pinion) 1/2" SQ x 4-1/4" | 1 | 87630 |
| Locking Dog Handle (15" Length) | 1 | 93732 |
| Base Bar | 2 | 101501 |
| Locking Pawl | 1 | 101508 |
| Locking Pawl Post | 1 | 101510 |
| Locking Pawl Sleeve | 1 | 101511 |
| Top Plate | 1 | 101604 |
| Keeper Plate (BIG) | 1 | 101650 |
| Keeper Plate (small) | 1 | 101651 |
| Cable Guard Plate | 1 | 101656 |

| Motor and Components | | |
|---|------------|-----------------|
| Part Description | Qty | Part #'s |
| Lock Washer 5/8" (SS) | 4 | 737 |
| Brake to Motor Adaptor | 1 | 34450 |
| Hex Head Bolt 5/8" x 2" (SS) | 4 | 70311 |
| Nord Gearmotor (RH Winch) 7.5 hp, 20.32 ratio | 1 | 85001 |
| Nord Gearmotor (LH Winch) 7.5 hp, 20.32 ratio | 1 | 85003 |
| Dings Brake & Gear Combo (75 ft/lbs) | 1 | 397802 |

| DF-1-40-ND Electric Winch Parts List | | |
|---|------------|-----------------|
| Fasteners and Etc. | | |
| Part Description | Qty | Part #'s |
| Hex Head Bolt 3/4-10 NC x 1-1/2" (SS) | 1 | 282 |
| Washer 13/16" ID x 2-3/4" OD x 1/8" thk | 1 | 397 |
| Hex Nut 3/4" (SS) | 14 | 421 |
| Hex Head Bolt 1/2" x 2" (SS) | 4 | 537 |
| Hex Head Bolt 3/4" x 2-1/2" (SS) | 14 | 538 |
| Hex Nut 7/8" (SS) | 12 | 539 |
| Lock Washer 7/8" (SS) | 12 | 540 |
| Socket Head Cap Screw 3/8" x 1" (SS) | 4 | 541 |
| Locking Pawl Washer | 1 | 542 |
| Washer 9/16" ID x 2-1/2" OD (SS) | 1 | 543 |
| Lock Washer 3/4" (SS) | 1 | 729 |
| Hex Head Bolt 5/8" x1" | 2 | 11746 |
| Socket Head Cap Screw 3/8" x 3" (SS) | 1 | 14595 |
| Hex Head Bolt 1/2" x 1" (SS) | 6 | 70521 |
| Lock Washer 1/2" (SS) | 9 | 70584 |
| | | |
| | | |
| | | |

| Bushings and Bearings | | |
|------------------------------|------------|-----------------|
| Part Description | Qty | Part #'s |
| Intermediate Gear Bushing | 1 | 69973 |
| Drum Gear Bushing | 1 | 82511 |
| Locking Pawl Sleeve Bushing | 1 | 101512 |

| Miscellaneous Components | | |
|--------------------------------------|------------|-----------------|
| Part Description | Qty | Part #'s |
| Cover Mounting Stud 3/8" x 1-1/2" | 10 | 549 |
| Brass Wing Nut 3/8" | 10 | 550 |
| Protective Rubber Cover | 2 | 80243 |
| U-Bolt with Fasteners (1" Dia. Wire) | 1 | 82570 |
| T-Handle (locking pawl handle) | 1 | 101580 |
| | | |

D.3 GEARMOTOR TECHNICAL INFORMATION (FLANGE MOUNTED)



REDUCER MOUNTING FOOTED & FLANGE MOUNT GEAR UNITS

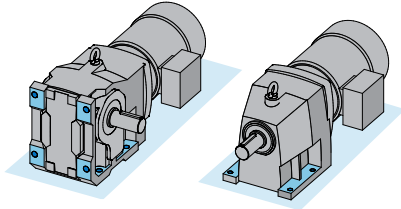


RETAIN FOR FUTURE USE

U10500 - 1 of 2

1. Foot-mounted reducers

When installing the foot-mounted gear unit, observe the flatness specifications and bolt tightening torque guidelines provided in U10060 and make sure the mating mounting surface and reducer feet are clean and free of debris. Use of shims under the feet of the gear unit may be required in order to align the output shaft to the driven equipment. Make sure that all feet are supported so that the housing will not distort when it is bolted down. Improper shimming will cause mis-alignment and may reduce the life of the gear unit or cause component failure. Dowel pins may be field-installed to help prevent misalignment and ensure proper realignment if removed for service.



i
IMPORTANT NOTE
i

Gear units may be subjected to radial loads or side pull, caused by external chain drives or belt drives. In these instances it is recommended that the mounting base be designed with a slide-plate adjustment to accommodate extra slack in the chain or the belt after the feet are loosened. When using an external chain or belt drive, make sure the reducer is sized so that the shaft and bearings have adequate capacity.

2. Flange-mounted reducers (with B5 flange)

When using the B5 flange to mount the gear unit, the bulk head plate must be engineered to minimize buckling distortions and support the cantilevered weight of the gear reducer or gearmotor. On the B5 mounting flange NORD provides a pilot register or and the flange pilot tolerance as listed per Table 1. When the mating hole is designed with the proper fit, the flange pilot tenon provides a means of accurately positioning the reducer while the hold-down bolts are properly secured; once the reducer is secured, the tenon helps prevent movement of the reducer and it helps locate the center of the reducer output shaft.

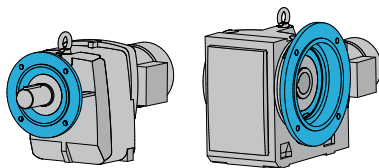


Table : Flange Pilot Tolerance

| Above ø (in) | To & Including ø (in) | Tolerance (in) | ISO 286-2 Fit Class |
|-----------------|--------------------------|-------------------|------------------------|
| 1.969 | 3.150 | +0.0005 / -0.0003 | j6 |
| 3.150 | 4.724 | +0.0005 / -0.0004 | j6 |
| 4.724 | 7.087 | +0.0006 / -0.0004 | j6 |
| 7.087 | 9.055 | +0.0006 / -0.0005 | j6 |
| 9.055 | 9.843 | +0.0000 / -0.0011 | h6 |
| 9.843 | 12.402 | +0.0000 / -0.0013 | h6 |
| 12.402 | 15.748 | +0.0000 / -0.0014 | h6 |
| 15.748 | 19.685 | +0.0000 / -0.0016 | h6 |
| 19.685 | 21.654 | +0.0000 / -0.0017 | h6 |

| Above ø (mm) | To & Including ø (mm) | Tolerance (mm) | ISO 286-2 Fit Class |
|-----------------|--------------------------|-------------------|------------------------|
| 50 | 80 | +0.012 / -0.007 | j6 |
| 80 | 120 | +0.013 / -0.009 | j6 |
| 120 | 180 | +0.014 / -0.011 | j6 |
| 180 | 230 | +0.000 / -0.013 | j6 |
| 230 | 250 | +0.000 / -0.029 | h6 |
| 250 | 315 | +0.000 / -0.032 | h6 |
| 315 | 400 | +0.000 / -0.036 | h6 |
| 400 | 500 | +0.000 / -0.040 | h6 |
| 500 | 550 | +0.000 / -0.044 | h6 |

When installing the flange mounted gear unit, observe the flatness specifications and bolt tightening torque guidelines provided in U10060. Make sure the mating mounting surface and reducer flange are clean and free of debris. Use a straight edge or parallel bar to check for high spots on the mating mounting surface and remove any raised material around the mounting holes.

Set the gear unit into place and tighten the bolts until they are snug. Before final bolt-tightening check for any material gaps between the mating surfaces and if shimming is required, use "U" shaped shims at least 2 times the width of the bolt. Avoid over shimming a very irregular surface as this will make it very difficult to achieve proper alignment.

i
IMPORTANT NOTE
i

For heavy shock applications, it is advisable to field-install dowel pins through the mounting flange connection (in addition to the mounting bolts). This will help control flange movement or flange rotation and relieve the mounting bolts from this additional stress.



REDUCER MOUNTING FOOTED & FLANGE MOUNT GEAR UNITS

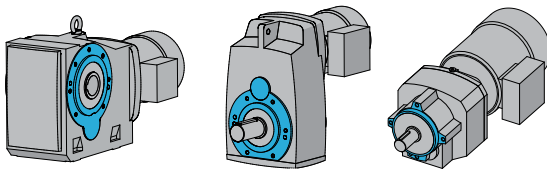


RETAIN FOR FUTURE USE

U10500 - 2 of 2

3. Flange-mounted reducers (with B14 flange)

When using the B14 flange to mount the gear unit, the bulk head plate must be engineered to minimize buckling distortions and support the cantilevered weight of the gear reducer or gearmotor. When properly installed, the output flange of the reducer housing is designed to enable the permissible torques and radial forces to be reliably transmitted by the bolt connections.

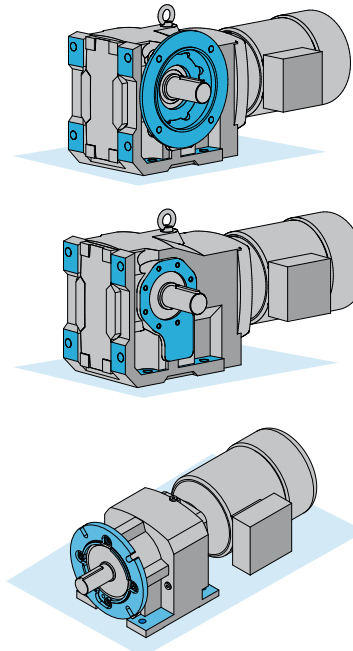


| | | |
|--|-----------------------|----------|
| i | IMPORTANT NOTE | i |
| <p>When using the B14 flange-face for mounting, if dowel pin holes are provided in addition to the threaded holes, then it is advisable to also use the proper dowel pins, to help control flange movement or flange rotation and relieve the mounting bolts from this additional stress. This is especially important for heavy shock applications.</p> | | |

4. Foot & flange reducer housings

Some gear reducer housings are available with a foot and an output flange. Units with a foot and a B5 Flange are designated with the suffix XF after the primary model number and units with a B14 face-flange are designated with the suffix XZ after the primary model number. When a gear unit is provided with both a foot and a flange, the foot is considered the primary mounting surface. The flange is generally considered to be the secondary mounting option and it is intended that this surface be used for auxiliary add on elements that place minimal load stress on the reducer housing.

| | | |
|---|--------------------------|-------------|
| STOP | HARMFUL SITUATION | STOP |
| <p>To prevent overstress on the main gear unit housing, never tighten the reducer mounting feet and the mounting flange against one-another. Auxiliary add-on elements that are mounted to the reducer flange, must not transmit excessive force, torque or vibration to the main gear housing.</p> | | |



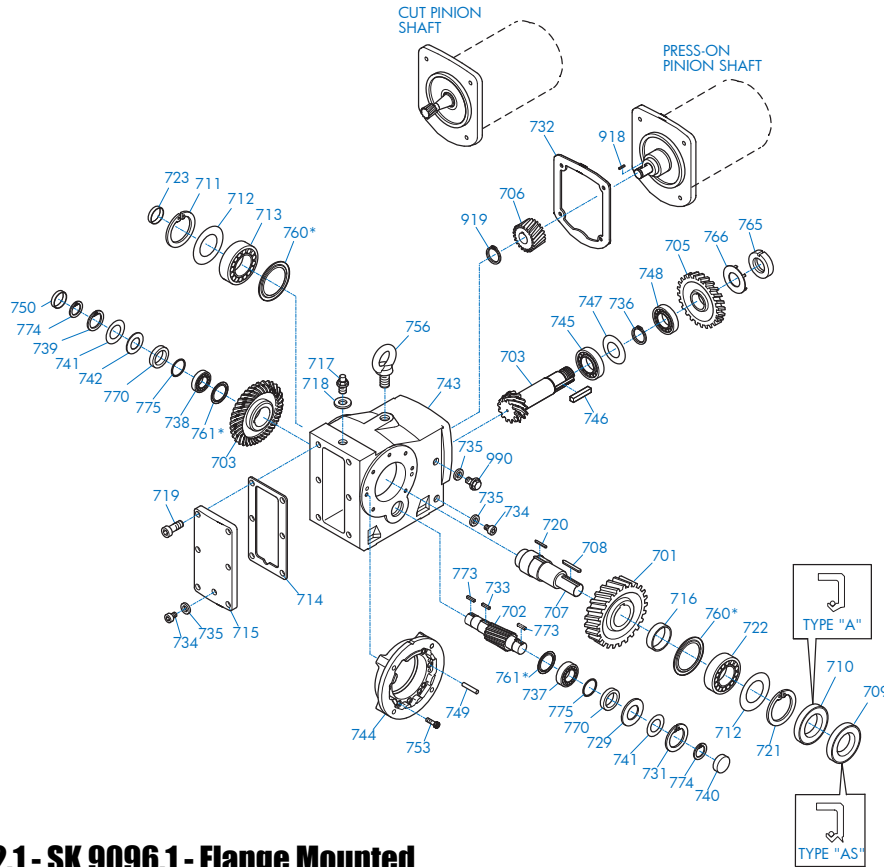


90.1 HELICAL-BEVEL PARTS LIST DRAWINGS

RETAIN FOR FUTURE USE



U15300 - 3 of 10



SK 9012.1 - SK 9096.1 - Flange Mounted

| | | |
|---------------------------|---------------------------|----------------------------|
| 701 Output Gear | 722 Anti-Friction Bearing | 748 Anti-Friction Bearing |
| 702 Pinion Shaft | 723 Bore Plug | 749 Dowel Pin |
| 703 Bevel Gearset | 729 Thrust Washer | 750 Bore Plug |
| 705 Gear | 731 Snap Ring | 753 Bolt |
| 706 Pinion | 732 Gasket | 756 Flanged Eye Bolt |
| 707 Output Shaft | 733 Key | 760 Nilos Ring* |
| 708 Key | 734 Oil plug | 761 Nilos Ring* |
| 709 Oil Seal | 735 Gasket | 765 Slotted Round Nut |
| 710 Oil Seal | 736 Snap Ring | 766 Tab Lock Washer |
| 711 Snap Ring | 737 Anti-Friction Bearing | 770 Backstop (If Equipped) |
| 712 Shim | 738 Anti-Friction Bearing | 773 Key (w/Backstop) |
| 713 Anti-Friction Bearing | 739 Snap Ring | 774 Snap Ring |
| 714 Gasket | 740 Bore Plug | (w/Backstop) |
| 715 Inspection Cover | 741 Shim | 775 Thrust Washer |
| 716 Spacer | 742 Thrust Washer | (w/Backstop) |
| 717 Vent Plug | 743 Gearcase | 918 Key |
| 718 Gasket | 744 Flange | 919 Snap Ring |
| 719 Bolt | 745 Anti-Friction Bearing | 990 Oil Level Plug |
| 720 Key | 746 Key | |
| 721 Snap Ring | 747 Shim | |

* Conditionally used part

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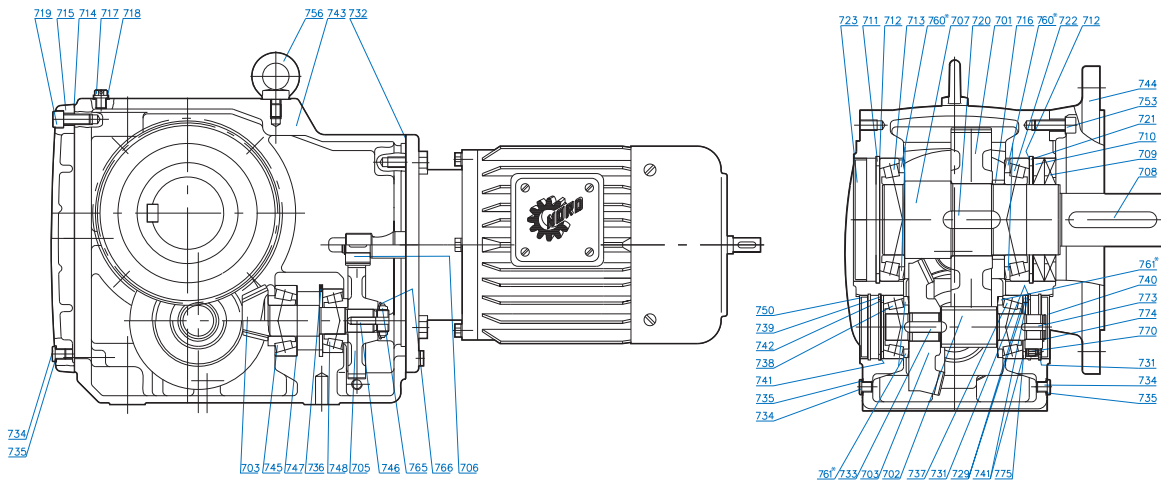


90.1 HELICAL-BEVEL PARTS LIST DRAWINGS



RETAIN FOR FUTURE USE

U15300 - 4 of 10



SK 9012.1 - SK 9096.1 - Flange Mounted

| | | |
|---------------------------|---------------------------|---------------------------|
| 701 Output Gear | 720 Key | 744 Flange |
| 702 Pinion Shaft | 721 Snap Ring | 745 Anti-Friction Bearing |
| 703 Bevel Gearset | 722 Anti-Friction Bearing | 746 Key |
| 705 Gear | 723 Bore Plug | 747 Shim |
| 706 Pinion | 729 Thrust Washer | 748 Anti-Friction Bearing |
| 707 Output Shaft | 731 Snap Ring | 750 Bore Plug |
| 708 Key | 732 Gasket | 753 Bolt |
| 709 Oil Seal | 733 Key | 756 Flanged Eye Bolt |
| 710 Oil Seal | 734 Oil plug | 760 Nilos Ring* |
| 711 Snap Ring | 735 Gasket | 761 Nilos Ring* |
| 712 Shim | 736 Snap Ring | 765 Slotted Round Nut |
| 713 Anti-Friction Bearing | 737 Anti-Friction Bearing | 766 Tab Lock Washer |
| 714 Gasket | 738 Anti-Friction Bearing | 770 Backstop* |
| 715 Inspection Cover | 739 Snap Ring | 773 Key (w/Backstop) |
| 716 Spacer | 740 Bore Plug | 774 Snap Ring |
| 717 Vent Plug | 741 Shim | (w/Backstop) |
| 718 Gasket | 742 Thrust Washer | 775 Thrust Washer |
| 719 Bolt | 743 Gearcase | (w/Backstop) |

* Conditionally used part

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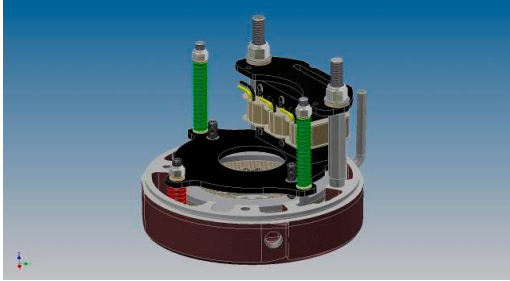
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E.1 DINGS ELECTRIC BRAKE TECHNICAL INFORMATION



A Venturedyne, Ltd. Company



Bulletin No. BK4773-3 (02/2016)

70 Series 8700 End-Mount 3 Phase Brake Instructions IP56 (NEMA 4) Housing

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 NEMA182C, 213TC, and 256TC 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.

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. Do not activate the manual release without the hub inserted in the discs as doing so may result in loss of disc spline alignment.

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) & the Occupational Safety and Health Act (OSHA).
3. Brake motors & brake gearmotors must be securely & 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 & voltage.
8. Protect all electrical lead wires & power cables against contact with sharp objects or moving parts.
9. Do not kink electrical lead wires & power cables, and never allow them to touch oil, grease, hot surfaces, or chemicals.

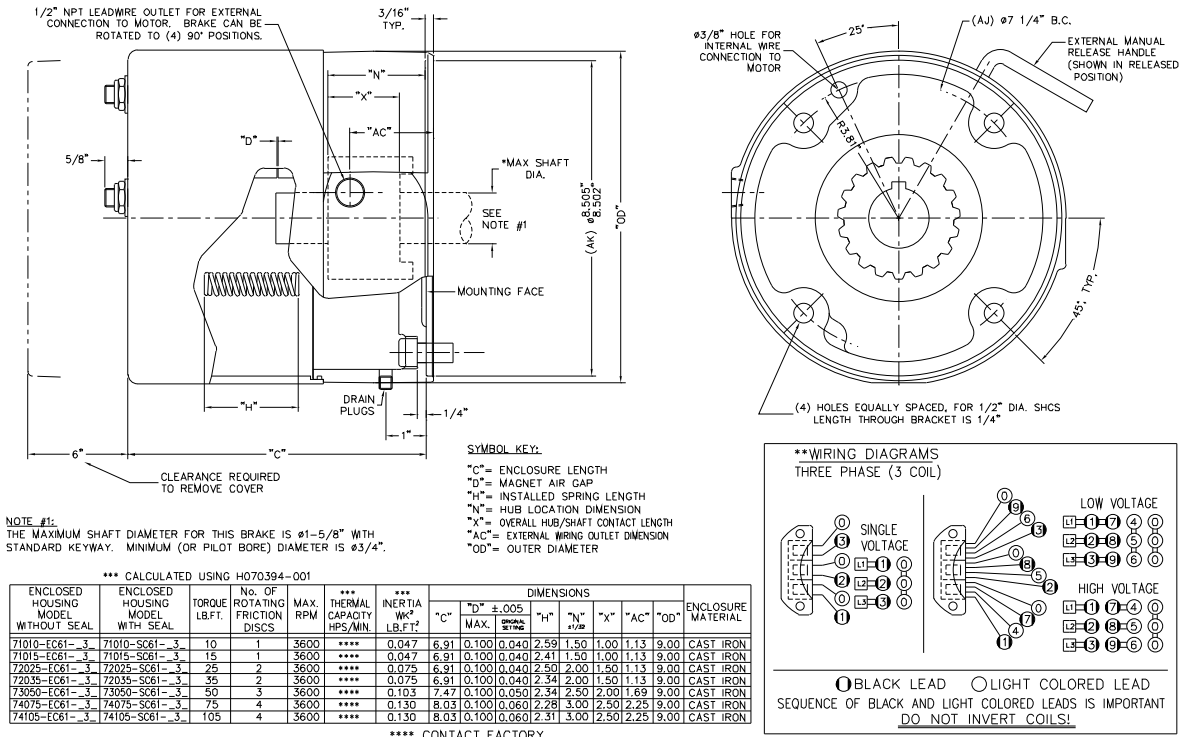


Figure.1 Brake Outline

RECOMMENDED TOOLS AND HARDWARE

NOTE: The following tools and hardware are required for installing the brake onto a motor or mounting bracket. Use proper torque when required to ensure fasteners do not loosen during operation.

- 3/4 INCH HEX WRENCH OR RATCHET/SOCKET
- 5/32 HEX BIT SOCKET (OR KEY)
- TORQUE WRENCH
- QUANTITY (4), 1/2 diameter SHCS, MINIMUM 1" LONG (see installation note #5 below)
- 3/8 BALL END HEX BIT SOCKET (KEY OR T-HANDLE)

INSTALLATION

(See Figures 1, & 2, Table 1)

1. Remove hub (99) from brake and position on motor shaft with key according to dimension "N" per figure 1. Stamped part number on hub should face away from motor. Tighten hub set screws with 13 lb.ft. torque.
2. Remove temporary cover nut and cover (67). Set cover aside. Discard temporary nut.
3. If brake is supplied with a mounting face gasket (91), place gasket onto the brake mounting face.
4. Place brake on motor, guiding discs on hub. Use caution not to pinch gasket. For horizontal mounted brakes, the drain plug should be pointed down.
5. Bolt brake to motor "C" face with four socket head cap screws. See Figure 1 to help in determining proper bolt length. Final bolt thread pitch, length and mounting torque is dependent on the material and depth of the threaded holes in the mounting face.
6. Connect coil leads per appropriate wiring diagram in Figure 1 and replace cover (67).
7. Use provided sealing washers (70) and nylon locking nuts (71) to secure cover (67).



A Venturedyne, Ltd. Company

REPLACEMENT PARTS LIST

(See Figure 2)

| ITEM NO. | DESCRIPTION | MODEL | | | | | | | | | | | | | | PART NO. | | |
|----------|--|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|----------|---|-------------|
| | | 71010-EC61 | 71015-EC61 | 72025-EC61 | 72035-EC61 | 73050-EC61 | 74075-EC61 | 74105-EC61 | 71010-SC61 | 71015-SC61 | 72025-SC61 | 72035-SC61 | 73050-SC61 | 74075-SC61 | 74105-SC61 | | | |
| 1 | Bracket assembly, 1&2 disc | 1 | 1 | 1 | 1 | | | | | | | | | | | | | K070579-XXX |
| 1 | Bracket assembly, 1&2 disc with hub seal | | | | | | | | 1 | 1 | 1 | 1 | | | | | | K070579-XXX |
| 1 | Bracket assembly, 3 disc | | | | | | 1 | | | | | | | | | | | K070580-XXX |
| 1 | Bracket assembly, 3 disc with hub seal | | | | | | | | | | | | 1 | | | | | K070580-XXX |
| 1 | Bracket assembly, 4 disc | | | | | | | 1 | 1 | | | | | | | | | K070581-XXX |
| 1 | Bracket assembly, 4 disc with hub seal | | | | | | | | | | | | | | 1 | 1 | | K070581-XXX |
| 7 | Handle, manual release | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | H070422-002 |
| 11 | Spring, return manual release | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | G070846-001 |
| 12 | Cam, manual release | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | H070393-001 |
| 13 | Screw, retaining, cam | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | W001045-043 |
| 17 | Post, pivot | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | W002005-168 |
| 19 | Stud post, magnet assembly/cover | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | H070395-001 |
| 25 | Disc, rotating friction | 1 | 1 | 2 | 2 | 3 | 4 | 4 | 1 | 1 | 2 | 2 | 3 | 4 | 4 | | | H070394-001 |
| 26 | Disc, stationary | 1 | 1 | 2 | 2 | 3 | 4 | 4 | 1 | 1 | 2 | 2 | 3 | 4 | 4 | | | K070560-001 |
| 27 | Spring, pivot | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | G070847-001 |
| 28 | Bolt, torque spring | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | W001007-069 |
| 32 | Pressure plate assembly, three phase | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | H070423-001 |
| 37 | Bushing, flanged | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | W013007-061 |
| 42 | Spring, torque, silver | | | | | | | 2 | | | | | | | | 2 | | G070848-001 |
| 42 | Spring, torque, gold | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | G070849-001 |
| 43 | Washer, flat | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | W004002-008 |
| 44 | Nut, adjustment | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | W003013-005 |
| 46 | Washer, magnet assembly base | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | W004004-018 |
| 50A | Magnet Assembly, three phase | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | H070402-XXX |
| 50 | Magnet frame, three phase | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | K070567-001 |
| 51 | Coil, magnet, three phase | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | H020003-XXX |
| 54 | Clamp, cable | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | W021008-005 |
| 55 | Screw, cable clamp | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | W001038-143 |
| 59 | Washer, shock absorber | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | G070850-001 |
| 60 | Washer, capture | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | W004004-017 |
| 61 | Nut, nylock magnet assembly | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | W003001-20 |
| 65 | O-ring, bracket/cover | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | W006001-036 |
| 67 | Cover, cast iron | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | K070554-001 |
| 70 | Sealing washer | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | W011002-010 |
| 71 | Nut, cover | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | W003001-020 |
| 84 | Nameplate, metal | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | K070574-001 |
| 85 | Drive screw | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | W001012-048 |
| 86 | Release label | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | G070852-001 |
| 87 | Capplug, 1/2 NPT | | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | W008003-001 |
| 87 | Pipe plug, 1/2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | | | | W010002-004 |
| 88 | Pipe plug, 1/8 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | W010002-004 |
| 91 | Bracket gasket | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | | | | | | | | | K070250-005 |
| 99 | Hub assembly 1 disc | 1 | 1 | | | | | | | | | | | | | | | H080030-XXX |
| 99 | Hub assembly 2 disc | | | 1 | 1 | | | | | | | | | | | | | H080031-XXX |
| 99 | Hub assembly 3 disc | | | | | 1 | | | | | | | | | | | | H080032-XXX |
| 99 | Hub assembly 4 disc | | | | | | 1 | 1 | | | | | | | | | | H080033-XXX |
| 99 | Hub assembly 1 disc w/seal | | | | | | | | 1 | 1 | | | | | | | | H070408-XXX |
| 99 | Hub assembly 2 disc w/seal | | | | | | | | | 1 | 1 | | | | | | | H070411-XXX |
| 99 | Hub assembly 3 disc w/seal | | | | | | | | | | | 1 | | | | | | H070416-XXX |
| 99 | Hub assembly 4 disc w/seal | | | | | | | | | | | | | 1 | 1 | | | H070419-XXX |

XXX-Figure per model number

Table 1 - Parts List



EXPLODED VIEW
(See Table 1)

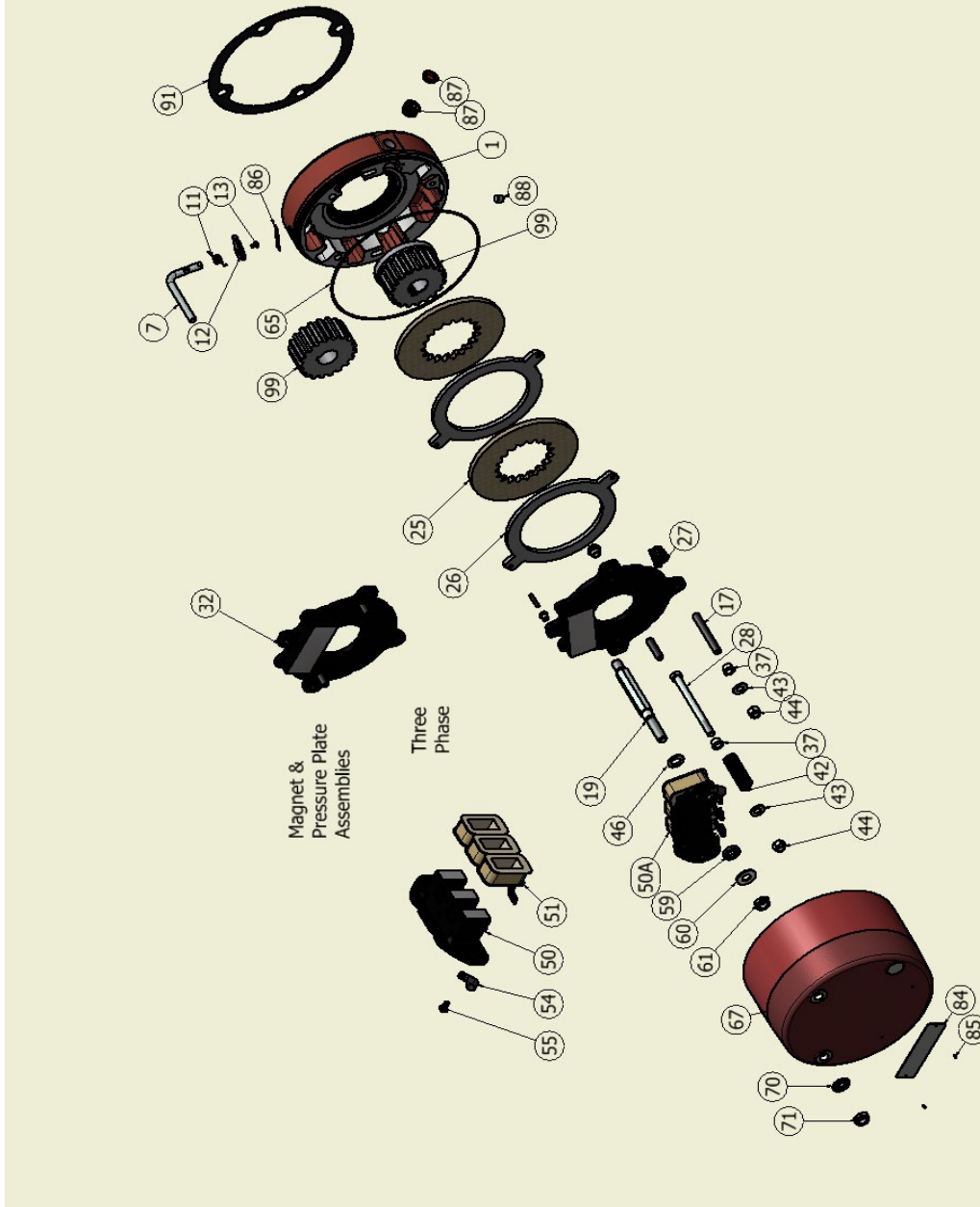


Figure 2 - Exploded View of Brake

F.1 DINGS BRAKE (PREVIOUS VERSION)

Bulletin No. BK4704 (5/15)



70 Series 2 Post
Nema 4 Enclosure
Brake Instructions

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



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.

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.

SPECIFICATIONS

MOTOR FRAMES - 182TC, 184TC, 213TC, 215TC, 254TC, 256TC.

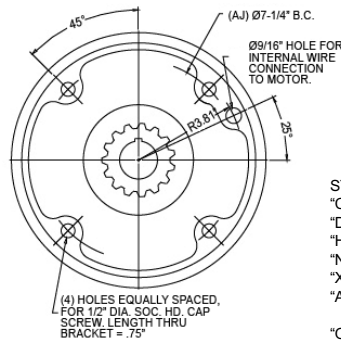
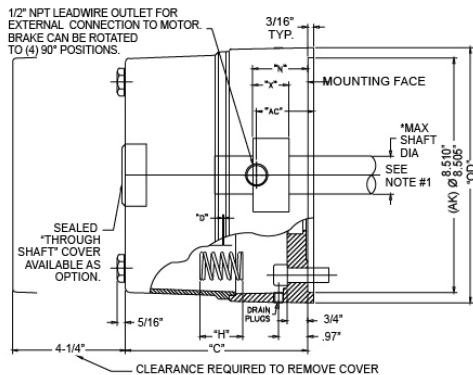
ENCLOSURE MATERIAL - Cast iron.

DUTY - Rated for continuous duty.

VOLTAGES - All standard NEMA voltages and frequencies available. Other voltages and frequencies are optional.

MOUNTING - Direct to NEMA "C" motor flanges. Adaptors for larger or smaller frames, foot mounting and vertical mounting are available.

SHAFTS - NEMA standard length motor shafts and thru shafts may be used on all models (cover modification required for thru shafts).



SYMBOL KEY:
 "C" = ENCLOSURE LENGTH
 "D" = MAGNET AIR GAP
 "H" = INSTALLED SPRING LENGTH
 "N" = HUB LOCATION DIMENSION
 "X" = OVERALL HUB LENGTH
 "AC" = EXTERNAL WIRING OUTLET DIMENSION
 "OD" = OUTER DIAMETER

Figure 1. Dimensions

| MODEL | Torque Lb-Ft | No. of rotating friction discs | Max. RPM | Thermal Capacity HPS/MIN | Inertia Wk ² Lb-ft ² | DIMENSIONS | | | | | | | |
|-----------|-----------------|--------------------------------------|-------------|--------------------------------|--|------------|------------|------------------|------|---------------|------|------|------|
| | | | | | | "C" | "D" ± .005 | | "H" | "N" ± 1/32 | "X" | "AC" | "OD" |
| | | | | | | | Max. | Original Setting | | | | | |
| R71010-37 | 10 | 1 | 3600 | 10 | .028 | 5.75 | .060 | .035 | 1.31 | 1.50 | 1.31 | 1.43 | 9.00 |
| R71015-37 | 15 | 1 | 3600 | 10 | .028 | 5.75 | .060 | .035 | 1.31 | 1.50 | 1.31 | 1.43 | 9.00 |
| R72025-37 | 25 | 2 | 3600 | 11 | .051 | 6.37 | .060 | .035 | 1.31 | 2.00 | 1.81 | 2.05 | 9.00 |
| R72035-37 | 35 | 2 | 3600 | 11 | .051 | 6.37 | .065 | .040 | 1.22 | 2.00 | 1.81 | 2.05 | 9.00 |
| R73050-37 | 50 | 3 | 3600 | 12 | .075 | 7.00 | .065 | .040 | 1.25 | 2.50 | 2.31 | 2.68 | 9.25 |
| R74075-37 | 75 | 4 | 3600 | 13 | .099 | 7.62 | .065 | .040 | 1.22 | 3.00 | 2.81 | 3.31 | 9.25 |

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INSTALLATION

(See Figures 1 & 3)

STEP 1

Remove hub (22) from brake and position on motor shaft with key according to dimension "N". Stamped part number on hub should face away from motor. Tighten hub set screws to 12 lb-ft torque.

| MODEL | Torque Lb-Ft | "N" ± 1/32 |
|-----------|--------------|------------|
| R71010-37 | 10 | 1.50 |
| R71015-37 | 15 | 1.50 |
| R72025-37 | 25 | 2.00 |
| R72035-37 | 35 | 2.00 |
| R73050-37 | 50 | 2.50 |
| R74075-37 | 75 | 3.00 |

STEP 2

Remove cover screws (24), gasket (34), and cover (23), plus o-ring (26).

STEP 3

Install mounting face gasket (38) and place brake on motor, guiding discs on hub (22).

STEP 4

Bolt brake to motor "C" face with four 1/2 inch socket head cap screws. See Figure 1 for screw length thru bracket.

STEP 5

Connect coil leads per appropriate wiring diagram in Figure 2 and replace cover.

MANUAL RELEASE

(See Figure 3)

To operate release, rotate two rods (9) clockwise until stop screw (14) hits pin. Brake will remain in released position until rods are manually returned to original position, or until electrical power is restored which automatically returns the release rods to the set position.

TORQUE ADJUSTMENT

(See Figures 1 & 3)

Brake is factory set for rated torque per spring length "H". To increase stopping time and lower torque, turn two locknuts (8) counterclockwise, increasing dimension "H". All two springs must be set to the same length. Do not decrease spring length "H" as this may cause coil to burn out.

WEAR ADJUSTMENT

(See Figures 1 & 3)

Magnet gap "D" increases as friction discs wear. When gap approaches "D" max., adjust gap to "D" min. dimension by turning nuts (21 and 20). Magnet gap can vary from nominal ± .005" between corners. After setting gap, readjust torque spring length "H".

CAUTION: MAGNET GAP MUST NOT EXCEED "D" MAXIMUM.

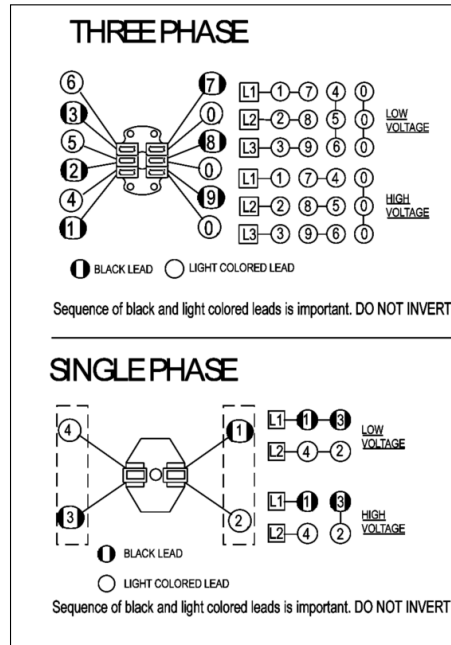


Figure 2. Wiring Diagram

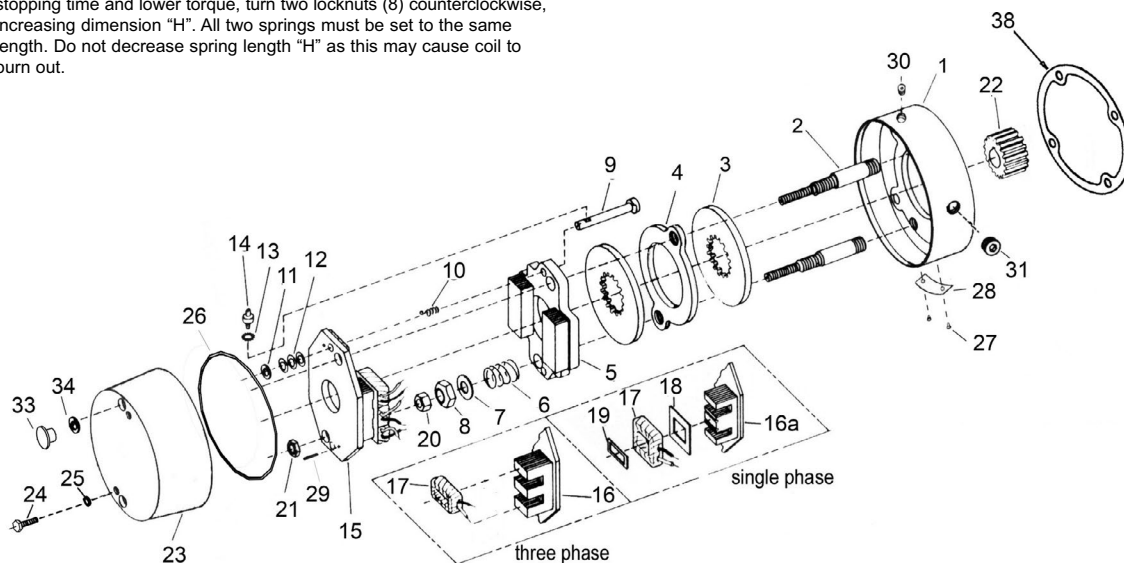


Figure 3. Exploded View of Brake

Table 1. Parts List

| ITEM NO. | DESCRIPTION | MODEL | | | | | | PART NO. |
|----------|---|-------------|-----------|-----------|-----------|-----------|-----------|--------------|
| | | R71010-37 | R71015-37 | R72025-37 | R72035-37 | R73050-37 | R74075-37 | |
| 1 | Bracket – 1 Disc | 1 | 1 | | | | | L070083-001 |
| 1 | Bracket – 2 Disc | | | 1 | 1 | | | L070083-002 |
| 1 | Bracket – 3 Disc | | | | | 1 | | L070083-003 |
| 1 | Bracket – 4 Disc | | | | | | 1 | L070083-004 |
| 2 | Stud – 1 Disc | 2 | 2 | | | | | G070213-001 |
| 2 | Stud – 2 Disc | | | 2 | 2 | | | G070213-002 |
| 2 | Stud – 3 Disc | | | | | 2 | | G070213-003 |
| 2 | Stud – 4 Disc | | | | | | 2 | G070213-004 |
| 3 | Rotating Friction Disc | 1 | 1 | 2 | 2 | 3 | 4 | H070103-008 |
| 3 | Heavy Duty Rotating Friction Disc (OPTION) | 1 | 1 | 2 | 2 | 3 | 4 | H070339-001 |
| 4 | Stationary Disc | | | 1 | 1 | 2 | 3 | K070485-001 |
| 5 | Pressure Plate Assembly | 1 | 1 | 1 | 1 | 1 | 1 | K070045-001 |
| 5a | Roll Pin | 2 | 2 | 2 | 2 | 2 | 2 | W005003-101 |
| 6 | Torque Spring (Blue) for 10 lb-ft brake | 2 | | | | | | G070011-001 |
| 6 | Torque Spring (Silver) for 15, 35, 50, & 75 lb-ft brake | | 2 | | 2 | 2 | 2 | G070012-001 |
| 6 | Torque Spring (Red) for 25 lb-ft brake | | | 2 | | | | G070019-001 |
| 7 | Torque Spring Washer | 2 | 2 | 2 | 2 | 2 | 2 | W004003-001 |
| 8 | Torque Adjust Nut | 2 | 2 | 2 | 2 | 2 | 2 | W003001-022 |
| 9 | Manual Release Rod | 2 | 2 | 2 | 2 | 2 | 2 | G070001-002 |
| 10 | Manual Release Spring | 2 | 2 | 2 | 2 | 2 | 2 | G060010-001 |
| 11 | Manual Release Washer | 2 | 2 | 2 | 2 | 2 | 2 | W004004-003C |
| 12 | Manual Release Shim | As Required | | | | | | W004004-004C |
| 13 | Manual Release Lockwasher | 2 | 2 | 2 | 2 | 2 | 2 | W004007-007 |
| 14 | Manual Release Stop Screw | 2 | 2 | 2 | 2 | 2 | 2 | G060029-001 |
| 15 | Magnet Assembly with coils, 3 phase | 1 | 1 | 1 | 1 | 1 | 1 | K070097* |
| 15 | Magnet Assembly with coils, single phase | 1 | 1 | 1 | 1 | 1 | 1 | K070335* |
| 16 | Magnet Plate w/o Coils, 3 phase | 1 | 1 | 1 | 1 | 1 | 1 | K070024-001 |
| 16a | Magnet Plate w/o Coils, single phase | 1 | 1 | 1 | 1 | 1 | 1 | K070027-001 |
| 17 | Coil, single phase | 2 | 2 | 2 | 2 | 2 | 2 | H070013* |
| 17a | Coil, 3 phase | 6 | 6 | 6 | 6 | 6 | 6 | H020003* |
| 18 | Insulating Washer, single phase | 1 | 1 | 1 | 1 | 1 | 1 | G070029-001 |
| 19 | Shading Coil, single phase only | 1 | 1 | 1 | 1 | 1 | 1 | G070032-001 |
| 20 | Gap Adjust Nut | 2 | 2 | 2 | 2 | 2 | 2 | W003003-023 |
| 21 | Gap Adjust Nut | 2 | 2 | 2 | 2 | 2 | 2 | W003001-020 |
| 22 | Hub 1 Disc | 1 | 1 | | | | | H070055** |
| 22 | Hub 2 Disc | | | 1 | 1 | | | H070056** |
| 22 | Hub 3 Disc | | | | | 1 | | H070057** |
| 22 | Hub 4 Disc | | | | | | 1 | H070058** |
| 23 | Cover | 1 | 1 | 1 | 1 | 1 | 1 | K070104-001 |
| 24 | Cover Screw, Hex Head 1/4-20 | 2 | 2 | 2 | 2 | 2 | 2 | W001007-005 |
| 25 | 5/16 Washer Gasket | 2 | 2 | 2 | 2 | 2 | 2 | W011002-005 |
| 26 | O-ring | 1 | 1 | 1 | 1 | 1 | 1 | W006001-010 |
| 27 | Drive Screw | 2 | 2 | 2 | 2 | 2 | 2 | W001012-048 |
| 28 | Nameplate | 1 | 1 | 1 | 1 | 1 | 1 | K060473-001 |
| 29 | Roll Pin 5/32 x 1/25" Long | 2 | 2 | 2 | 2 | 2 | 2 | W005003-109 |
| 30 | Pipe Plug, Soc. Hex Head, 1/8 NPT | 2 | 2 | 2 | 2 | 2 | 2 | W010002-001 |
| 31 | 1/2 Sq. Hd. Pipe Plug | 1 | 1 | 1 | 1 | 1 | 1 | W010002-004 |
| 33 | Manual Release Cap | 2 | 2 | 2 | 2 | 2 | 2 | G060170-002 |
| 34 | Washer Gasket | 2 | 2 | 2 | 2 | 2 | 2 | G070381-001 |
| 38 | Gasket, Mounting Face | 1 | 1 | 1 | 1 | 1 | 1 | K070250-005 |

*Specify coil voltage

**Specify hub bore diameter

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FRICION DISC REPLACEMENT

(See Figures 1 & 3, Table 1)

*When the rotating friction disc (3) wears down to a thickness of 7/32", replace disc.

1. Remove cover screws (24) and cover (23).
2. Unhook loop of torsion springs (10) from pins at rear of magnet plate (15). Remove release stop screws (14), washers (11) and shims (12).
3. Remove adjusting lock nuts (21), magnet assembly (15), adjusting nuts (20), torque nuts (8), washers (7), torque spring (6) and pressure plate (5).
4. Remove friction disc (3) and stationary disc (4). Replace worn friction discs.
5. Reassemble all parts in reverse order. Set spring length "H" and magnet gap "D". Assemble manual release. See following paragraph.

MANUAL RELEASE ASSEMBLY

(See Figure 3)

When assembling a standard manual release mechanism (Figure 3), add only enough shim washers (12) to obtain proper release action. Too many shim washers will prevent automatic reset when electrical power is applied. Too few washers will prevent the motor shaft from turning freely. Replace stop screws (14). Wind each torsion spring (10) approximately 1/4 turn and hook spring loop over pin.

TROUBLE SHOOTING

A. IF BRAKE DOES NOT RELEASE:

1. Check brake visually for broken or damaged parts.
2. Check for broken leadwire or bad electrical connection.
3. Check for correct voltage. Line voltage must correspond to the voltage for which the brake coils are connected. If the line voltage is more than 10% below the voltage for which the brake coils are connected, the magnet will not pull in, causing the coils to burn out within minutes. If the line voltage is more than 10% above the voltage for which the brake coils are connected, the coils will overheat and burn out.
4. Check for burned-out coils (coils may be charred or burned).
5. Check for excessive magnet gap. (See WEAR ADJUSTMENT.)
6. Check for failure or power supply to brake.

B. IF BRAKE DOES NOT STOP:

1. Check brake visually for broken or damaged parts.
2. Make certain hub has not shifted position on the motor shaft and that all rotating discs are fully engaged on the hub.
3. Check that the manual release is in the normal position.
4. Check disc wear. (See WEAR ADJUSTMENT.)

ORDERING INFORMATION

The following data should be furnished with your order for:

REPLACEMENT PARTS

Brake Model Number
Part Number from Tables
Part Description from Tables

(On hub order furnish bore dia. & keyway dimensions. On electrical parts specify voltage, phase & frequency.)

MAGNET COIL REPLACEMENT

(See Figures 3 & 4)

Remove magnet assembly as outlined under FRICTION DISC REPLACEMENT.

Coils (17) are held in place with epoxy cement. Force coil off magnet mounting plate and remove excess epoxy from all surfaces.

Replacement coils should be held in place with new epoxy cement. The epoxy cement should be heat resistant and shock resistant. Place an insulating washer (18) below the coils (single phase only). Order insulating washers when ordering coils. An insulating washer can be cut to suit when replacing only one coil on a multiple coil assembly.

When installing coils, it is very important to follow EXACTLY the sequence of black and light colored leads as shown in wiring diagram (Figure 2). The brake will not operate properly unless coils are all in the correct position.

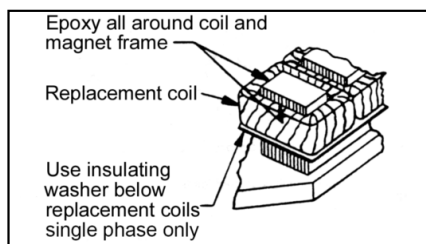


Figure 4. Fastening of Replacement Magnet Coils

C. IF BRAKE CHATTERS OR HUMS:

1. See that magnet faces are clean. To remove dirt, insert a clean sheet of paper between magnet faces and energize brake. Move paper around between faces to dislodge dirt, then remove paper.
2. Check for low voltage. Magnet will not pull in, and coils will burn out if line voltage is beyond 10% below the voltage the brake coils are connected for.
3. See that magnet faces are parallel within tolerance. Readjust magnet gap to "D" min. (See WEAR ADJUSTMENT.)
4. Check if shading coil (19) is cracked, broken or out of position (single phase only).

D. IF MANUAL RELEASE DOES NOT WORK:

1. Check for broken or damaged parts.
2. Check return spring (10). Brake will not reset automatically if this spring is broken.
3. Check quantity of shim washers (12) under release stop screws. (See MANUAL RELEASE ASSEMBLY.)

REPLACEMENT BRAKE

Model Number
Voltage, Phase & Frequency
Hub Bore & Keyway Dimensions
Mounting - Horizontal or Vertical. (If vertical, specify whether above or below motor. If brake includes foot mounting bracket or adaptor, specify.)



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Dimensions. All dimensions shown in this catalog are in feet and inches. Weights are in English pounds. Capacities are in short tons of 2,000 pounds. Please note that dimensions and weights are nominal and are subject to standard variations. Maximum test pressure on hatches, doors, and enclosures is 2 PSI unless advised in writing by NABRICO of a higher allowance. Product details and specifications are subject to change without notice.

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ROLLER BUTTON

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OCEAN DOMES

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STAINLESS STEEL

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8" SIZE
10" SIZE