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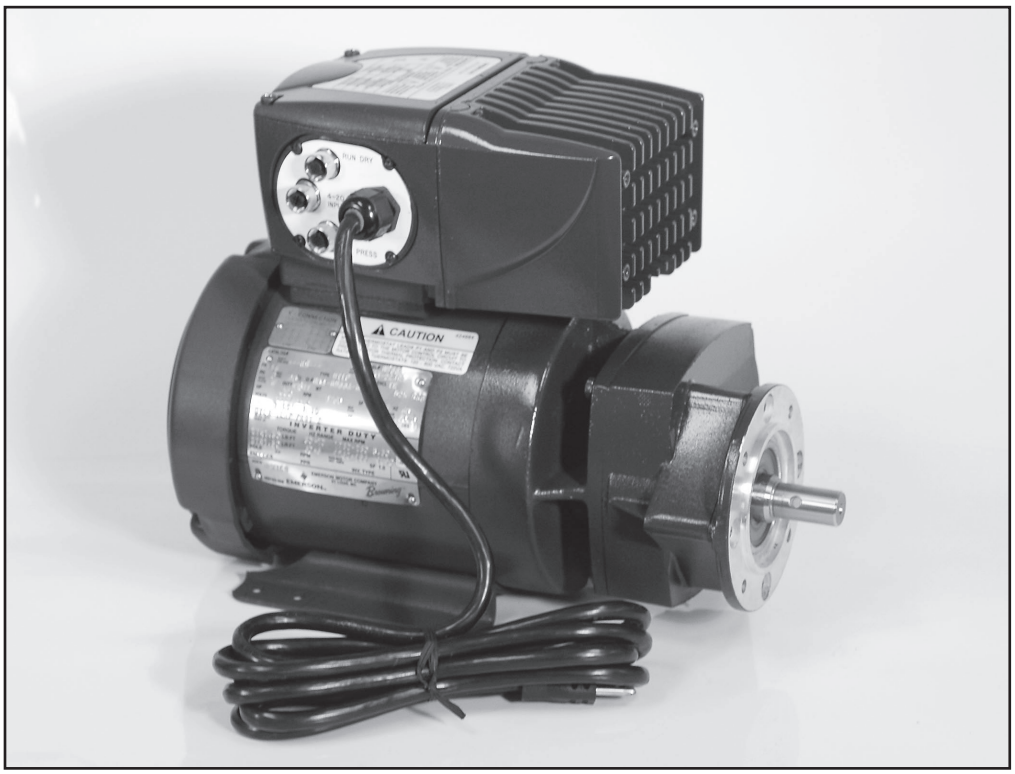
9178
March 2008

Installation and Maintenance Manual For IntelliGear Plus™ Variable Speed MD Gearmotors



c UL us CE

UL Listed
E211799
Ind. Cont EQ. 54 DN

EMERSON™
Industrial Automation

Thank you for choosing an IntelliGear Plus Gearmotor.

General Safety Instructions

⚠ WARNING

- Read and follow all instructions carefully.
- Disconnect and lock-out power before installation and maintenance. Working on or near energized equipment can result in severe injury or death.
- Disconnect power at least 2 minutes prior to servicing to allow capacitors to discharge. Handling wires sooner than this could result in electric shock, severe injury, or death.
- Do not operate equipment without guards in place. Exposed equipment can result in severe injury or death.
- Any eyebolts that have been supplied with the breakmotor or gearmotor are designed for lifting only these components. Lifting additional weight attached to theses components may break the eyebolt and result in personal injury or death, and product damage.

⚠ CAUTION

- All electrical work should be performed by qualified personnel and compliant with local and national electrical codes.
- Periodic inspections should be performed. Failure to perform proper maintenance can result in premature product failure and personal injury.

NOTICE

- IntelliGear Plus contains parts sensitive to static electricity. Care should be taken to discharge static prior to handling these components to avoid damage to them.
- Contact Emerson Power Transmission for recommendations for units running at slow speeds or unusual conditions.

IntelliGear Plus™ Variable Speed MD Gearmotors

Contents

IntelliGear Plus™ Variable Speed MD Gearmotors

General Information

1 - General Information

1.1 - General operating principle

The IntelliGear Plus is a combination of a 3-phase induction motor and an integrated open loop vector variable speed drive. The motor can be combined with many gear types from Emerson Power Transmission's range.

In the standard product version, the integrated drive does not require any connection other than the power supply. The options may be used to broaden the application range of the IntelliGear Plus.

IntelliGear Plus motors meet the requirements of the Low Voltage Directive 73/23/EEC, modified by 93/68/EEC. The harmonized standards of the DIN VDE 0160 series in connection with standard VDE 0660, part 500 and EN 60146/VDE 0558 are also applicable.

1.2 - Product name

115V Single Phase Power Supply	
Rating	Power (HP)
310 M 050	0.50

IntelliGear PLUS Controlling Options	
Designation	Description
RP1	4-20 mA follow or local Start/Stop/10 Turn Potentiometer

IntelliGear PLUS Accessories	
Designation	Description
KEYPAD LCD	Parameter setting console w/cable to locally reprogram to customize parameters
VMA30SOFT	CD w/cable and USB to locally reprogram to customize parameters

1.3 - Environmental Characteristics

Characteristics	Level - IntelliGear PLUS	
Degree of protection	TEFC Version	TEFC motor and NEMA 4/12 Controller
Storage temperature	-40 °C to +70 °C	
Transport temperature	-40 °C to +70 °C	
Ambient operating temperature	-20 °C to +40 °C (above 40 °C requires derating 1% per °C	
Altitude	Up to 3000 feet above sea level without derating	
Ambient humidity	95% non-condensing	
Humidity during storage	93%, 40 °C, 4 days	
Vibration	- Exposed product: 0.01 g2 /Hz 1 hr. in accordance with IEC 60068-2-34	
	- Sinusoidal vibration: 2-9 Hz 3.5 ms-2 - 9-200 Hz 10 ms-2 in accordance	
	with IEC 60068-2-6	
Shocks	Packaged product: 15 g, 6 ms, 500 times/direction in all 6 directions in	
	accordance with Standard IEC 600068-2-29	
Immunity	Conforming to EN61000-6-2	
Radiated and conducted emissions	Conforming to EN500081-2 with internal filters	
UL and cUL Standards	Conforming to UL 508 C (E211799)	

1.4 - Radio-frequency interference:

1.4.1 - General

Variable speed drives use high-speed switches (transistors, semi-conductors) which switch high voltages (around 660V for 3-phase drives) at high frequencies (several kHz). This provides better efficiency and a low level of motor noise. As a result, they generate radio-frequency signals which may disturb operation of other equipment or distort measurements taken by sensors:

- due to high frequency leakage currents which escape to ground via the stray capacity of the drive/motor cable and that of the motor via the metal structures which support the motor
- by conduction or feedback of R.F. signals on the power supply cable; conducted emissions
- by direct radiation near to the main supply power cable or the drive/motor cable: radiated emissions

These phenomena are of direct interest to the user. The frequency range concerned (radio-frequency) does not affect the energy distribution company.

1.4.2 - Standards (Emission)

The maximum emission level is set by (EN 50081-2) and (EN 50081-1). IntelliGear Plus conforms to:

- EN 50081-2 as standard
- EN 50081-1 with filter option

1.4.3 - Standards (Immunity)

The maximum immunity level is set by (EN 50082-2) and (EN 50082-1). IntelliGear Plus conforms to:

- EN 50082-2 and EN 50082-1 as standard

1.5 - Description of cables and protection devices (Customer Supplied)

NOTICE: When using a circuit-breaker, it must be a motor circuit-breaker (D curve).

- Comply with the size of protection fuses.
- The cable size may vary according to legislation applicable in the country, which will take precedence over the values given in the table below without exception.

Motor HP Rating	115V Single Phase Power Supply			
	IntelliGear Plus Number	Input Amps	Wire Gauge	Fuse Size
0.50	I 310M 050	5	14AWG	10 A

1.6 - UL conformity

1.6.1 Special mains supply

The drive can be incorporated in an installation with short circuit capacity of 5000 A rms maximum at voltage 264 VAC rms maximum for 230 V (TL) drives or 528 VAC rms maximum for 400 V (T) drives.

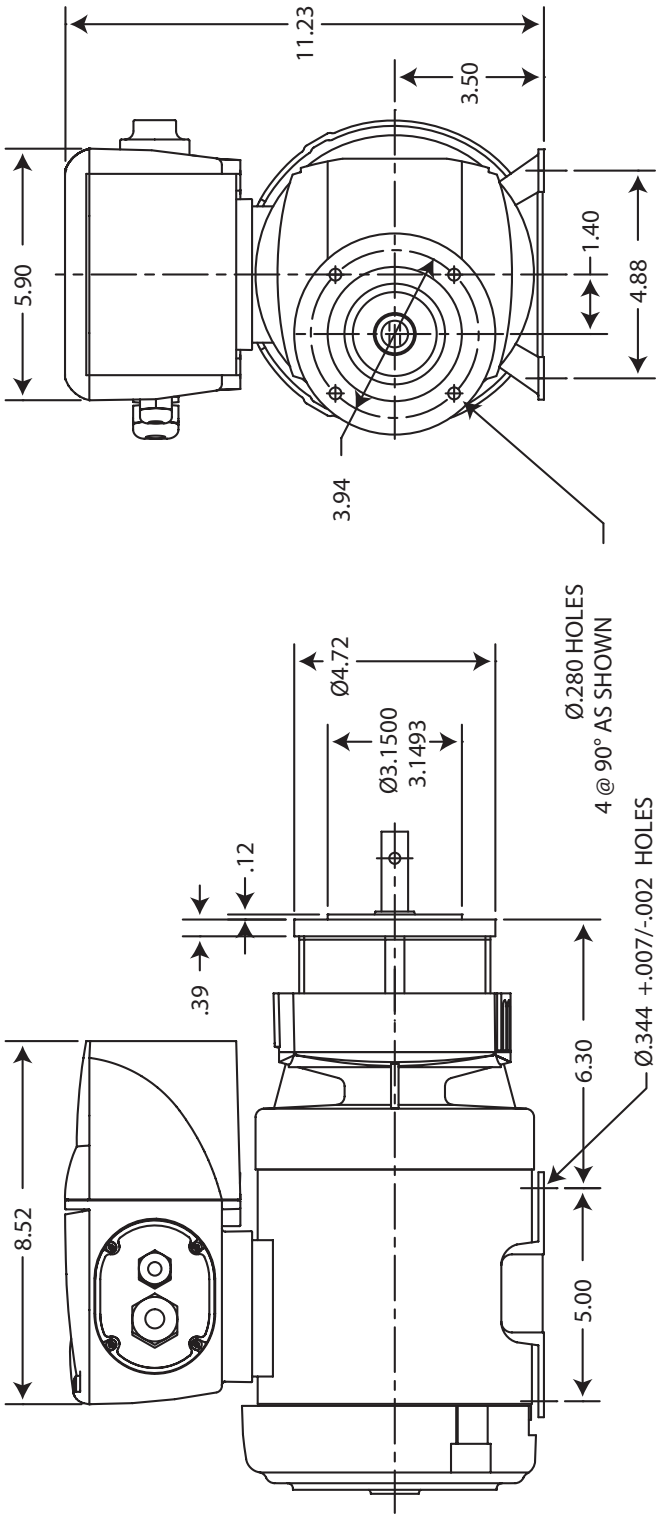
1.6.2 Cables

Only class 1 cooper cables 60/70° C (140/167° F) should be used.

1.6.3 Fuses

UL conformity is adhered to if the fuses are UL-listed, fast-blow fuses (class CC up to 30 A) with a rating as indicated in the above table and if the short-circuit symmetrical current does not exceed 5 kA.

1.8 - Dimensions



CATALOG NUMBER	CCI NUMBER
CBN3001BSCB524.556 CCI096	CCI096-G

2 - Installation

After connection, ensure that the seals are firmly in place, and that the screws and cable glands are watertight to ensure drive protection. Clear any condensation from the drain holes at the bottom of the motor.

2.1 - General

The IntelliGear Plus is usually fitted to the gear and mounted to the machine with flange or foot mounting. The motor fan cools the whole assembly. Make sure that the ventilation air inlet is free of obstruction. The positions of the potentiometer/cable gland supports are specified at the time of ordering. However they may be reversed if necessary.

2.2 - Reversing the operators*

Remove the (2) TX 20 - slot type screws securing the IntelliGear cover and remove the side panels. Swap locations of the side panels and re-secure the lid.

3 - Connections

Connection with copper conductor only.

3.1 - Control Terminal Blocks

- Remove the terminal block from it's fixed holder (unplugged) before making any connections, to avoid putting pressure on the card.

CAUTION: The IntelliGear Plus has a positive logic configuration. Using a drive with a control system which has a different control logic may cause unwanted starting of the motor.

- The control circuits in the drive are isolated from the power circuits by single insulation (IEC 664-1).
- The installer must ensure that the external control circuits are isolated against any human contact.
- If the control circuits need to be connected to circuits conforming to SELV safety requirements, additional insulation must be inserted to maintain the SELV classification.

Removable screws in terminal block:

- Tightening torque = 2.62 in. lbs.
- Maximum cross section = 17 AWG

3.2 Power terminal blocks

3.2.1 Terminal block for power supply PB1 (marked L&N)

This terminal block is used to connect the 3 phase power supply when the RFI filter is not used in an IntelliGear Plus. Otherwise, the RFI filter output is screwed onto this connector and the power supply should be attached to the terminals located on top of the filter. (See table below)

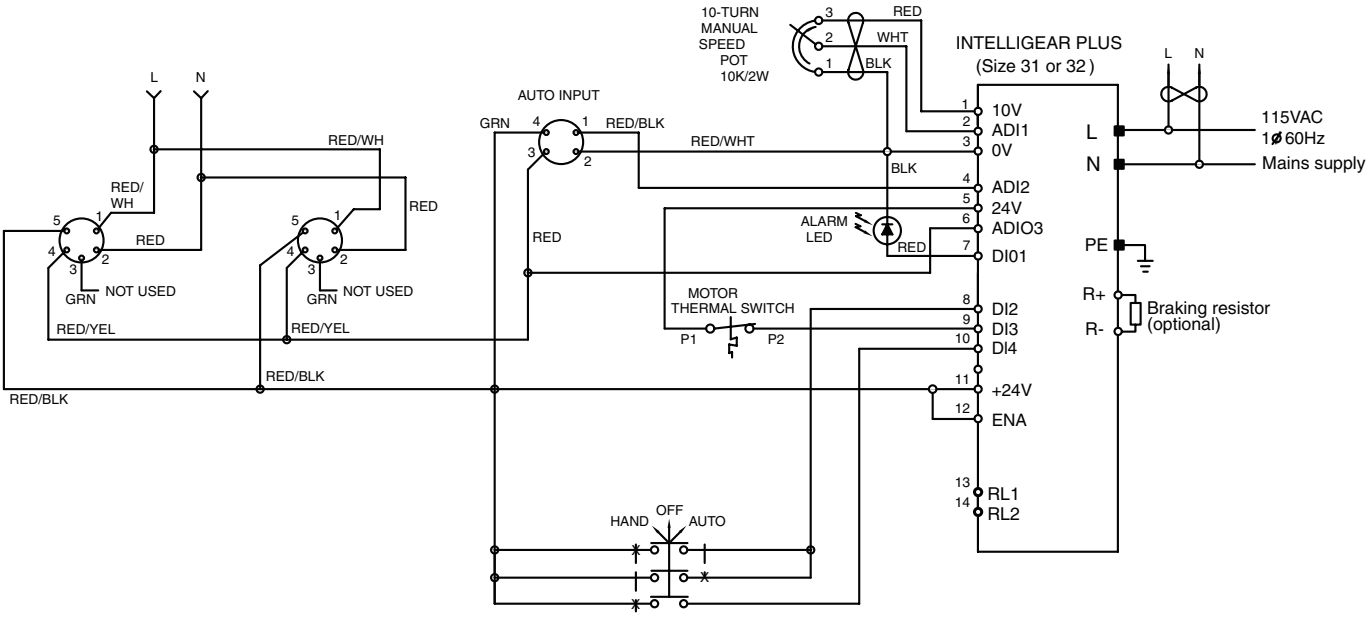
Screw terminal blocks	Frame 310M
Tightening Torque	7.1 in. lbs.
Max. cross-section	AWG 14

4. Commissioning

WARNING! Before switching on the IntelliGear Plus unit, check that the electrical connections are correct, and that any moving parts are mechanically guarded.

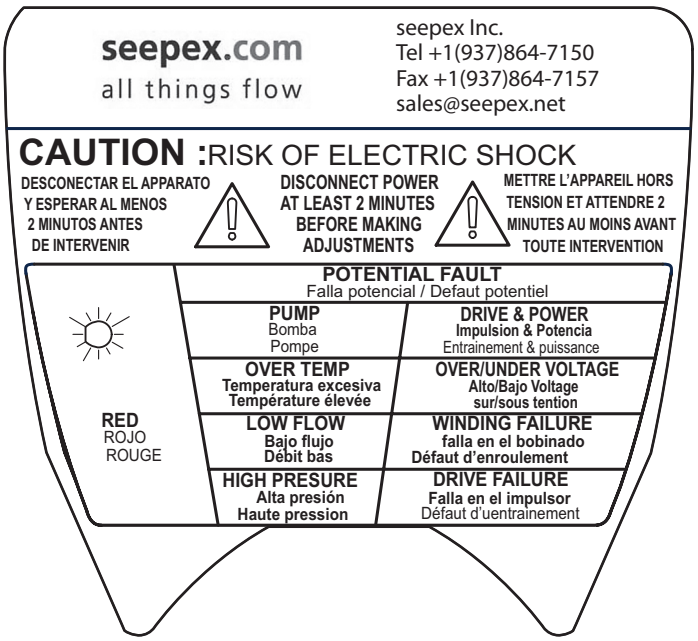
WARNING! For the safety of personnel, the IntelliGear Plus must not be switched on with any protective covering removed.

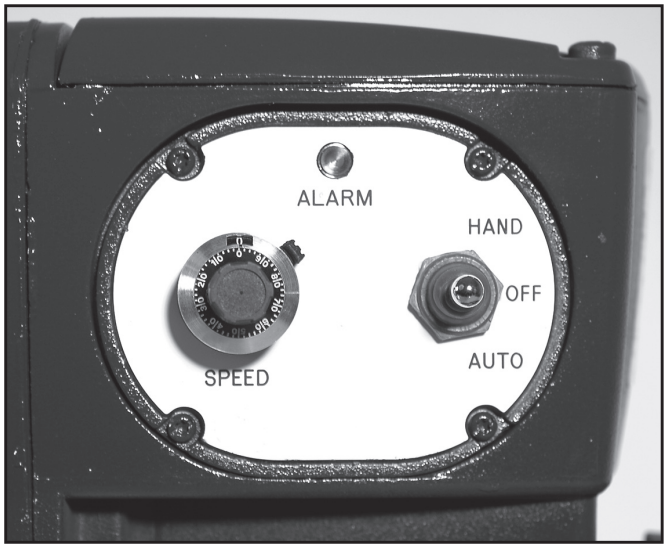
3.3 Wiring diagram based on standard configuration



5. Faults - Diagnostics

Information relating to the status of the IntelliGear Plus is provided by an indicator lamp (see photo bottom right) on the control and by the internal LED in 310M.





6 - Gear Lubrication

Series 3000 CbN gearing is shipped with one of the following synthetic lubricants per the table below and fitted with a magnetic drain. Each reducer is filled according to the mounting position specified when ordered. Refer to the unit name-plate and the chart to the left for the mounting position arrangement for your unit.

In the case of synthetic oil, the lubricant does not require changing, but it is recommended that proper oil level be checked periodically.

Synthetic

No Backstop

Manufacturer	-25° F to 125° F (-30° C to 50° C)
Fuchs®	Sintogear® 125
Mobil®	SHC 629
Shell®	Omala® Fluids HD 150

With Backstop

Manufacturer	-25° F to 125° F (-30° C to 50° C)
Shell	Omala RL 100

Acceptable Mineral Oil Lubricants

Ambient Range of Installation					
-4°F to 14°F (-20°C to 10°C)	14°F to 122°F (-10°C to 50°C)				122°F and Above (50°C +)
	No Backstop			With Backstop	
ISO VG 68	ISO VG 100	ISO VG 150	ISO VG 220	ISO VG 150	ISO VG 320

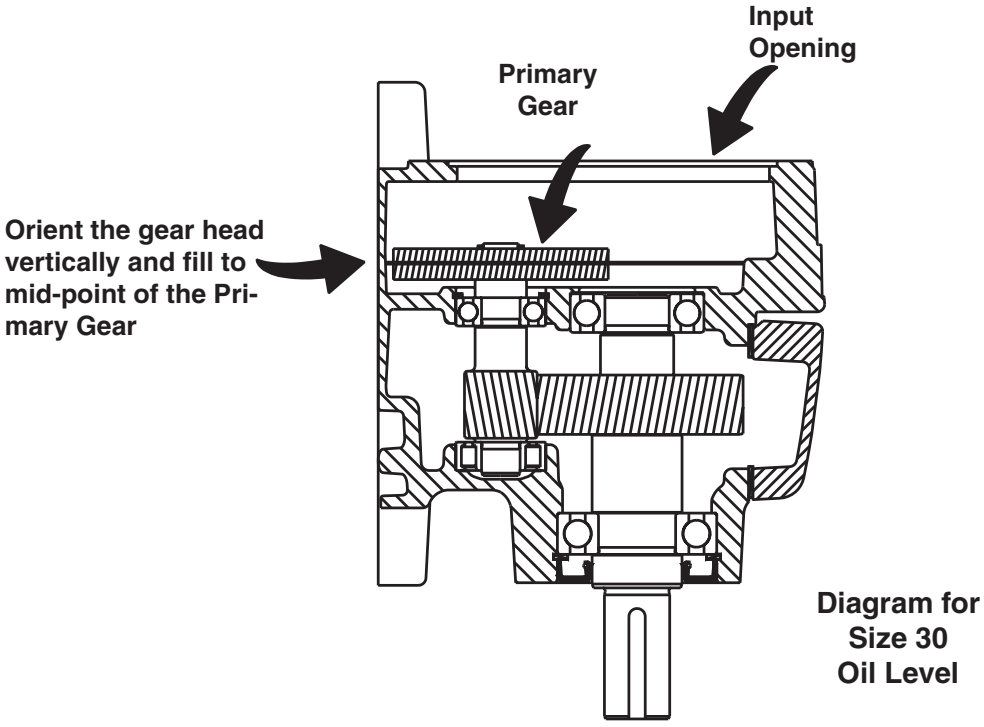
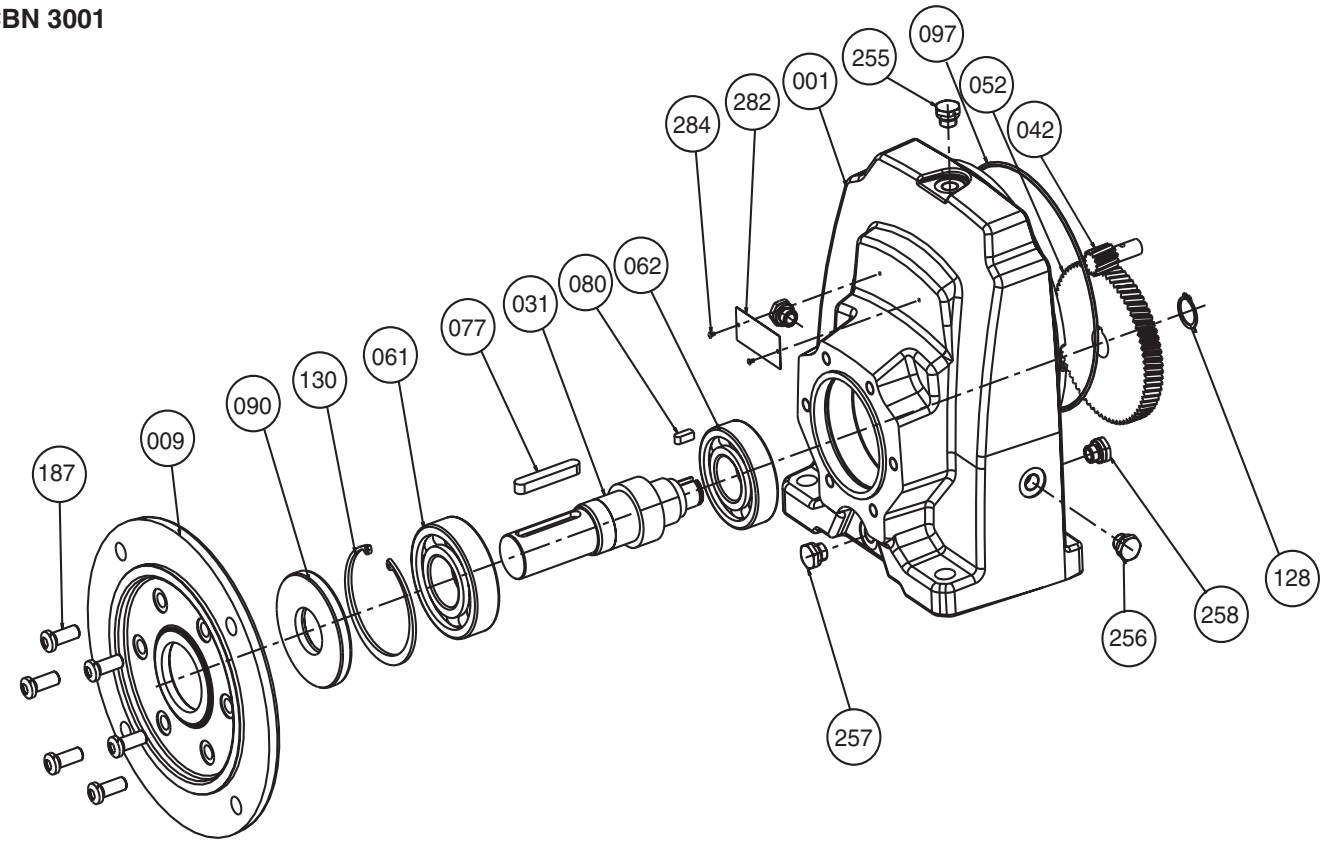


Diagram for Size 30 Oil Level

Fuchs is a registered trademark of Fuchs Petrolub; Shell is a registered trademark of Shell Petroleum Incorporated. Omala is a registered trademark of Shell Trademark Management.

7.0 - Gear Parts List
CBN 3001



Rep	Description	Quantity
001	Housing	1
009	Output flang ring	1
031	Output shaft	1
042	Pinion	1
052	Gear	1
061	Bearing front	1
062	Bearing back	1
077	Output shaft key	1
080	Gear Key	1

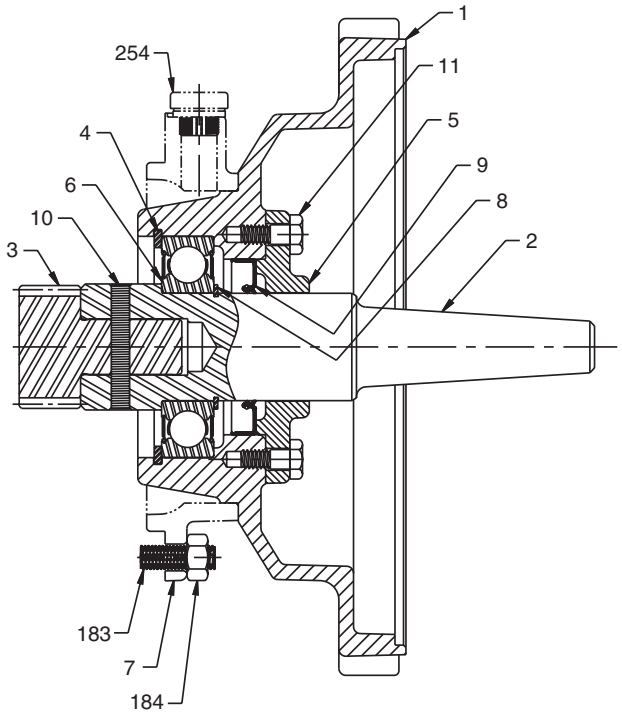
Rep	Description	Quantity
090	Oil seal	1
097	Input o-ring	1
127	Gearing snap ring*	1
130	Gearing snap ring	1
175	Input bracket screw	4
185	Washer for gear*	1
186	Screw washer*	1
187	Bolt	4
282	Nameplate	1

* Not illustrated on diagram

Typical Maintenance Items - Bearings and Seals

Gear Frame	Item Description By Location		
	Bearings		Seal (mm)
	61	62	90
30	6205 ZZ	6005	25 x 52 x 7 DL nitrile

CbN 30 (Quantity Per Unit)



Rep	Description	Quantity
1	Motor adapter	1
2	Input shaft	1
3	Pinion	1
4	Internal snap ring	1
6	Bearing	1
8	External snap ring	1
9	Seal	1
10	Pinion pin	1
183	Stud	4
184	Nut	4

Gear Frame	Bearing	Seal (mm)
	6	9
30	6005 2RS	47 x 25 x 7

Part #	Description	Qty.
1	Fan Cover	1
2	Self Tapping Screw	3
3	Hex Nut	1
5	Retaining Snap Ring	1
6	Fan	1
7	Bracket	1
8	Screw	4
9	Bushing	4
10	Plastic Plug	4
11	Ball Bearing	1
12	Rotor Assembly (includes items 13 & 14)	1
13	Shaft	1
14	Rotor Core	1
15	Wound Stator Assembly	1
16	Gasket	1
17	Outlet Box Base	1
18	Self Tapping Screw	2
19	Outlet Box Cover	1
20	Self Tapping Screw	2

FRAME 56