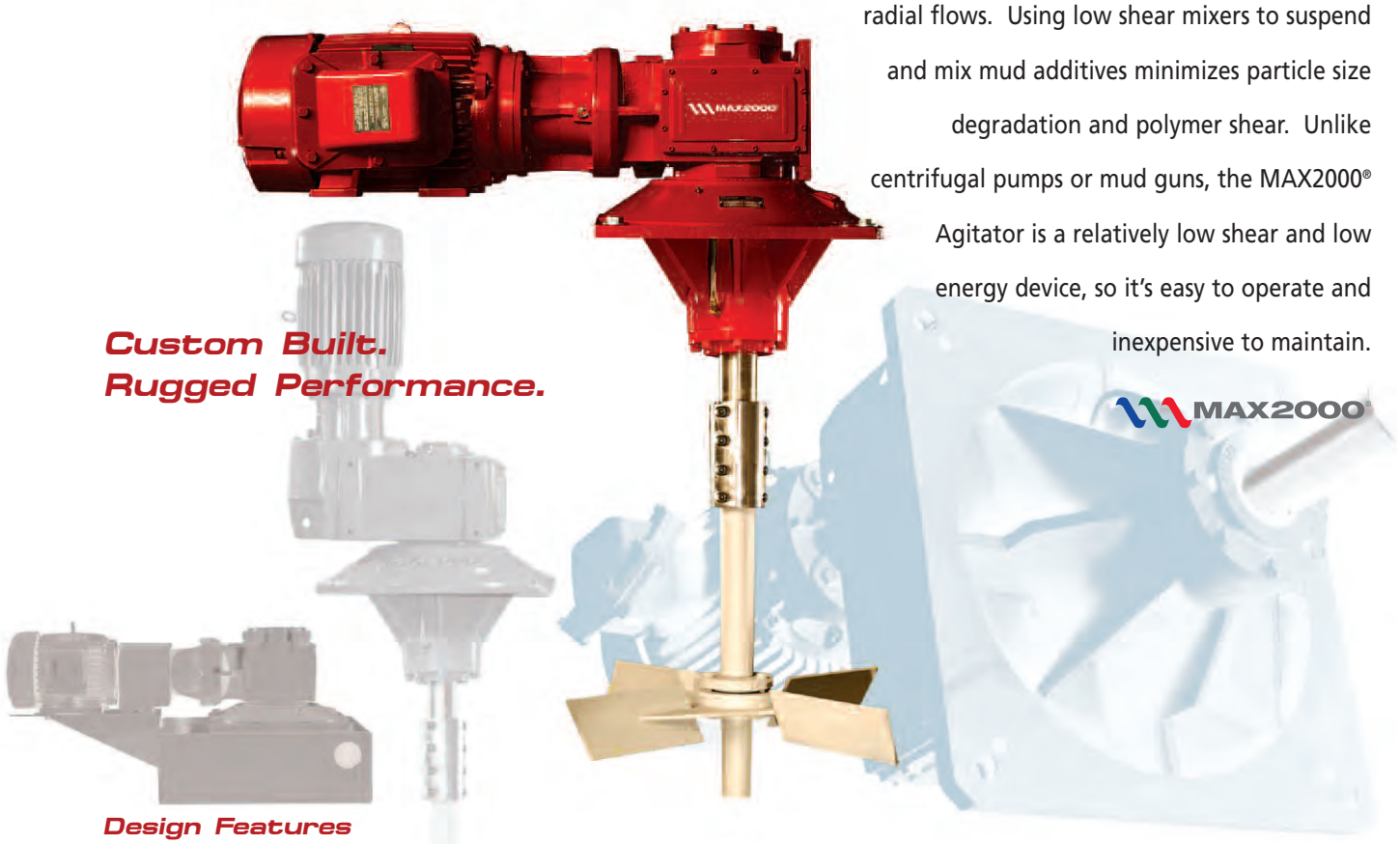
MAX2000® AGITATORS

PSI™

Agitators or "mud mixers" serve an important role in the surface treatment of drilling fluids. The MAX2000® Agitators use an impeller to mix and suspend the solids using both axial and radial flows. Using low shear mixers to suspend and mix mud additives minimizes particle size degradation and polymer shear. Unlike centrifugal pumps or mud guns, the MAX2000® Agitator is a relatively low shear and low energy device, so it's easy to operate and inexpensive to maintain.

MAX2000®



Custom Built.
Rugged Performance.

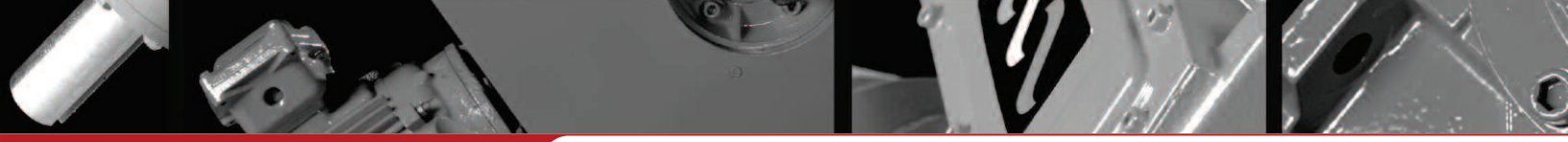
Design Features

- The MAX2000® Agitator features a rugged cast iron gearbox that houses helical bevel gearing. The gear sets are precisely ground to prevent all but the slightest amount of backlash in the gear sets. This feature promotes longer life by eliminating the high impact forces generated when the unit is energized at start-up. Each helical bevel gear stage is 98% efficient. A typical worm gear set is only 85% efficient, since it loses most of its efficiency through the generation of heat.

- Internal gears and bearings are lubricated with mineral oil. When the ambient temperature drops below 23°F or rises above 140°F, a synthetic lubricant should be substituted. A unique feature of the MAX2000® Agitator is the lower bearing, which can be maintained from the top of the tank. This feature eliminates the need for in-tank inspections of the lower bearing, and also provides a barrier of grease that can be expunged out the lower seal. The lower seals are arranged to accommodate the grease pocket and make for a four-tier layer of protection for the gearing. The end result means the lower bearing stays in contact with good, uncontaminated lubricant at all times. All four of these levels must be breached prior to loss of oil in the gearbox.

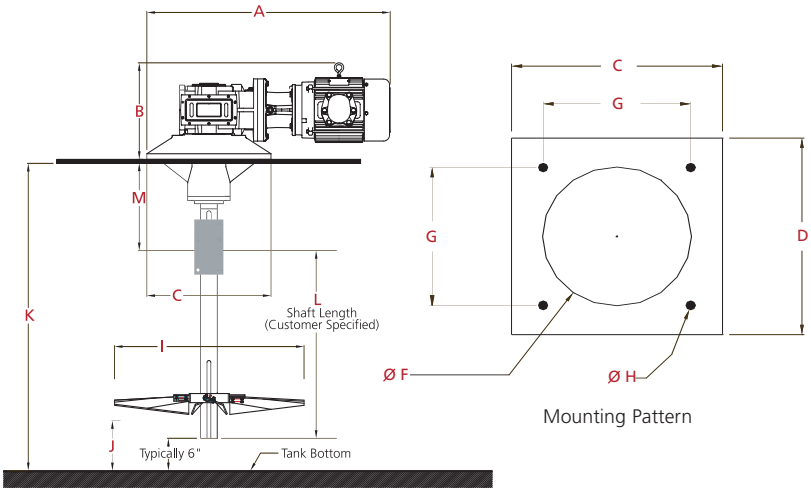
Our shaft to shaft coupling has proven itself to be one of the strongest and most reliable in the industry.

- An external oil sight glass has been provided, so the oil level can be checked at a glance. Vent plugs are supplied and installed in the gearbox housing to maintain a homeostatic internal pressure, which prevents a pressure build-up that could blow out an oil seal.



MAX2000® AGITATORS

Right Angle Agitators... Our Right Angle Agitators are derived from original, industry-standard right angle agitators. Due to the strength of the casting, you can secure a MAX2000® Right Angle Agitator directly to the tank structure without a fabricated base, which allows for a more compact installation.



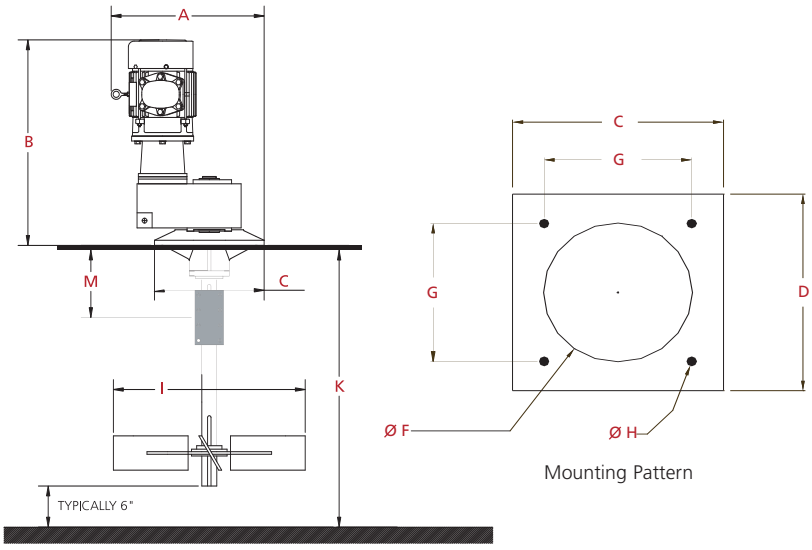
Mounting Pattern

MAX2000 Right Angle Agitator Specifications

MODELS	A	B	C	D	F	G	H	I	J	K	L	M
M2A3-C	32-3/4"	13-9/16"	16"	16"	14"	14"	7/8"	24"			K-M-6	10-1/2"
M2A5-C	34-3/8"	13-9/16"	16"	16"	14"	14"	7/8"	28"			K-M-6	10-1/2"
M2A7-C	38-1/16"	11-11/16"	16"	16"	14"	14"	7/8"	32"	See Note 1	See Note 2	K-M-6	10-1/2"
M2A10-C	38-1/16"	11-11/16"	16"	16"	14"	14"	7/8"	32"			K-M-6	10-1/2"
M2A15-C	48-1/2"	15-11/16"	22"	22"	18-1/2"	19"	1-1/8"	40"			K-M-6	15-1/2"
M2A20-C	49-9/16"	16-15/16"	22"	22"	18-1/2"	19"	1-1/8"	44"			K-M-6	15-1/2"
M2A25-C	52-1/16"	18-1/2"	22"	22"	18-1/2"	19"	1-1/8"	48"			K-M-6	15-1/2"

Note 1–Recommended height for impeller blades is .75 x Impeller Diameter (off bottom of tank)
Note 2–Measured from top of structure supporting agitator to tank bottom

Vertical Agitators... The MAX2000® Vertical Agitators share many of the features of our Right Angle Agitators, but are designed for use when there is a horizontal space limitation. Depending on the size you need, you can save between 12" to 24" in horizontal space.



Mounting Pattern

MAX2000 Vertical Agitator Dimensions

MODELS	A	B	C	D	F	G	H	I	J	K	L	M
M2A3-V	22-5/16"	29"	16"	16"	14"	14"	7/8"	24"			K-M-6	10-1/2"
M2A5-V	22-5/16"	30"	16"	16"	14"	14"	7/8"	28"			K-M-6	10-1/2"
M2A7-V	23-9/16"	32-7/8"	16"	16"	14"	14"	7/8"	32"	See Note 1	See Note 2	K-M-6	10-1/2"
M2A10-V	24-7/8"	36-11/16"	22"	22"	18-1/2"	19"	1-1/8"	36"			K-M-6	10-1/2"
M2A15-V	25-15/16"	43-1/16"	22"	22"	18-1/2"	19"	1-1/8"	40"			K-M-6	15-1/2"
M2A20-V	26-1/2"	41-11/16"	22"	22"	18-1/2"	19"	1-1/8"	44"			K-M-6	15-1/2"
M2A25-V	28-1/16"	43"	22"	22"	18-1/2"	19"	1-1/8"	48"			K-M-6	15-1/2"

Note 1–Recommended height for impeller blades is .75 x Impeller Diameter (off bottom of tank)
Note 2–Measured from top of structure supporting agitator to tank bottom

PSI's Canted Blade Impeller..

For most applications, Canted Blade Impellers are best. Our Canted Blade Impellers produce a combination of both radial and axial shear in the mud. Our Canted Blade Impellers are available in 45° or 60° models. Let PSI choose the impeller size that's best for your application. Carbon and stainless steel models are available.

Impeller Flow Rates

PSI Canted Impeller

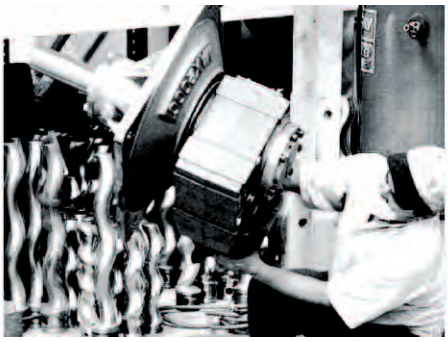
PSI MAXFLOW Impeller

Impeller Diameter	Pump @60RPM	Pump @50RPM	***Required HorsePower***	Impeller Diameter	Pump @60RPM	Pump @50RPM
28	2375	2212	3	42	10584	8468
30	3288	2721	5	45	13018	10415
36	5682	4702	7.5	48	15799	12640
40	7795	6451	10	50	17457	13965
42	9023	7468	15	55	23403	18722
44	10375	8586	20	60	30550	24440
48	13470	11147	25	65	39006	31204

The MAXFLOW Hydrofoil Impeller..

Among all impellers, hydrofoils produce the most efficient mix with the least power consumption. To produce a mix of true axial shear in mud, pick MAXFLOW Hydrofoil Impellers. Let PSI choose what the impeller size that's best for your needs. Carbon and stainless steel models are available.



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MAX2000®
The Exclusive Line of PSI

LOW PROFILE MUD AGITATOR

INSTALLATION, OPERATION & MAINTENANCE MANUAL

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Houston, TX 77086
(281) 893-4774; FAX (281) 893-1027

Safety First!
Cautions and General Safety Rules

This manual contains important information concerning installation, operation, and proper maintenance of the Low Profile Agitator. To prevent injury to personnel or equipment damage, this manual should be read by those responsible for the installation and operation of the Mud Agitators. In addition, the safety precautions below should be followed at all times.

- **Lift the agitator only at lift points** detailed in this manual and use properly rated slings capable of handling the equipment weight.
- The structure on which the agitator is to be installed must be capable of supporting both the static weight and dynamic loads listed in this manual.
- **TURN OFF, LOCK OUT, AND TAG OUT** the electrical power supply to the agitator before working on the agitator.
- Inspect the unit regularly, and replace damaged or worn components only with parts supplied by the original equipment manufacturer.
- The gearbox on the Agitator has a pre-selected gear ratio to maximize the suspension of solids in solution. This gear ratio provides a great increase in torque that is transmitted to the impeller. Any object that might fall into or be placed in the mud tank runs the risk of being caught by and wrapped up by the agitator. *********NO*** **ATTEMPT SHOULD BE MADE TO STOP A ROPE OR HOSE OR ANY OTHER OBJECT ONCE IT HAS BEEN WRAPPED AROUND A MOVING AGITATOR!!!**
- Before entering a mud tank for any reason, the mud agitators should be locked out and tagged out.

Table of Contents

List of Illustrations

SECTION I-INTRODUCTION

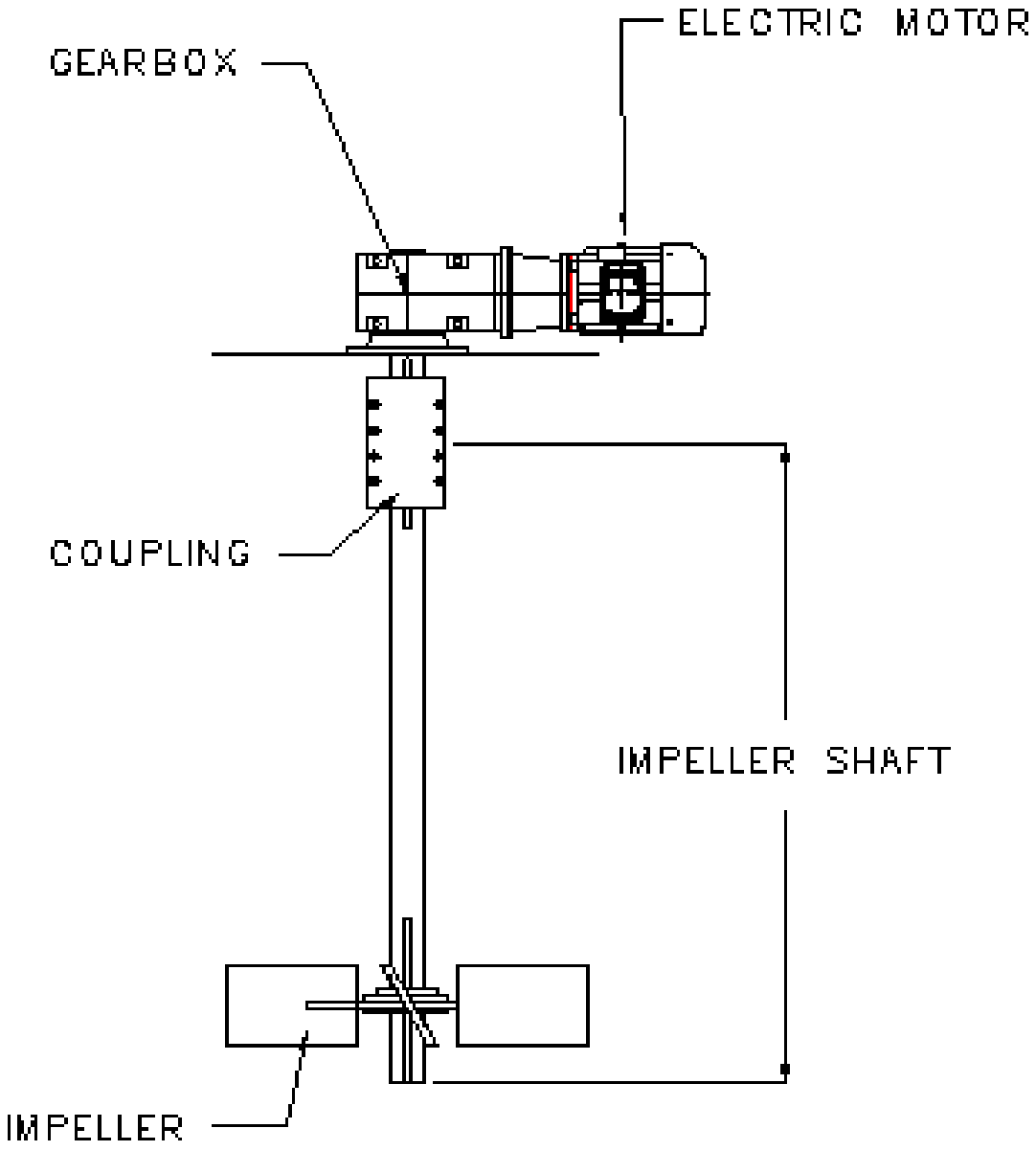


FIGURE 1.1

MAJOR COMPONENTS

SECTION 1- Introduction

A. Role of Mud Agitators

Agitators or "mud mixers" serve an important role in the surface treatment of drilling fluids. Using an impeller mixer that promotes both axial and radial flow, will lower mud costs and improve mud properties.
Unlike centrifugal pumps or sub-guns, impeller mixers are relatively low shear and low energy devices making them easy to maintain and inexpensive to operate. Using low shear mixers to suspend and mix mud additives minimizes particle size degradation and polymer shear.
Properly sized agitators serve three purposes:

1. Impeller mixers ensure that mud additives are homogeneously mixed. This prevents spot over treatment of chemicals, dilution water or weighting agents.
2. Agitators keep the active mud system moving when the mud pumps are disengaged and will prevent the pits from "gelling".
3. When drilling with weighted mud, properly selected agitators will keep the weighting agents in suspension and minimize any tendencies for solids to settle in corners or dead spots.

B. Design Features

The design features of the Agitator that minimize maintenance and maximize reliability include:

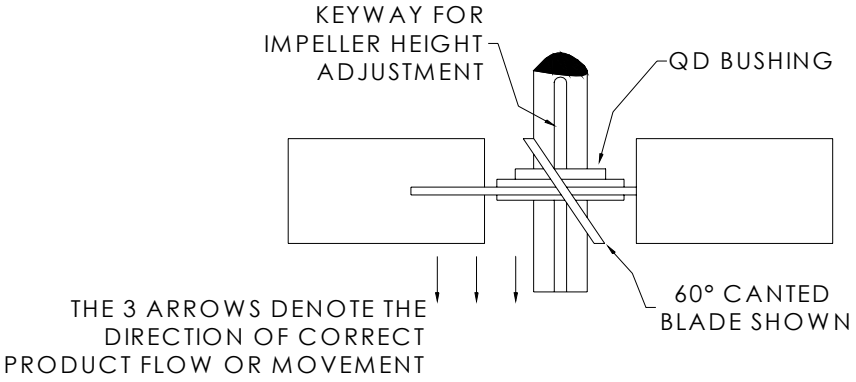
A rugged cast iron gearbox houses a right angle helical bevel gear set that is so precisely machined that there is a minimal amount of backlash in the gear sets. This feature eliminates a "slamming" effect of the gears at start up, promoting longer life.
The internal gears and bearings are lubricated with oil. For ambient temperatures below –23 F^0 or above 140 F^0 a synthetic lubricant should be substituted.
An external oil sight glass can be provided so that the oil level can be checked at a single glance. Vent plugs are supplied, installed in the gearbox housing, to maintain a homeostatic internal pressure, preventing a pressure build up that could blow out an oil seal.

MOTORS

Explosion proof motors are designed to eliminate the potential of a flame path, when flammable vapors or liquids are present. Motors are available with either a foot mount design or a NEMA C-face input. The foot mount or "T" frame motors are mounted using flexible coupling between the motor and gearbox, for ease of alignment. The NEMA C motors bolt to the gearbox housing and no alignment issues are seen. *Do not lift complete agitator by lifting lug on motor*.

IMPELLERS

Optimal suspension and mixing results from the axial and radial flow patterns created by from impellers. Using a 60^{o}, 45^{o}, an axial or a hydrofoil impeller the optimal situation can be created for you application. In addition to the standard welded impeller, the Agitator is offered with a "bolt-on" design blade in carbon steel and the 310 series stainless. On the welded impellers a QD bushing is provided to allow for adjustment of the height of the impeller.



Section 1 – Introduction Cont.

C. Selecting Agitator

To properly select the correct horsepower and impeller diameter needed for a mud tank agitator, the information below is needed.

Tank Geometry

a. Width
b. Length
c. Mud Depth

Maximum Anticipated Mud Density

a. Specify if know
b. Otherwise use 20 pounds per gallon (lb/gal)

Power Available

a. Voltage
b. Amperage Available
c. Frequency

D. Locating Agitators

A canted blade impeller creates a combination of radial and axial flow that provides for uniform suspension and mixing in circular or square areas. A rectangular tank with a length to width ratio of greater than 1.5 should be "divided" into "sizing areas" that are square (or close to square areas) with an agitator located at the center of each. For example, two agitators would be given the responsibility for mixing each of the two 8-foot by 8-foot area of a 16-foot by 8-foot suction tank. All data below is for canted blade impellers.

E. Sizing Agitator

1. Calculate the volume of the mud located with in the "Sizing Area".
   Volume (in gallons)=length X width X max mud depth X 7.5
2. Select an impeller diameter using Figure 1.2 to find an impeller that gives a pumping rate close to the calculated volume V. (Note the frequency of the electric motor will affect pumping rate since 50 Hz motors turn slower than 60 Hz motors.)

3. Calculate the turn over rate. The TOR is the number of seconds required for the impeller to pump the full volume within the sizing area. **Remember that a lower TOR indicates more agitation because the tank turns over in fewer seconds.** TOR should be in the range of 35 to 90 seconds for all "sizing areas". Although, for the suction tank, it should have a TOR closer to 90 (less agitation) to prevent aeration.

TOR= Volume X 60 divided by Pumping Rate

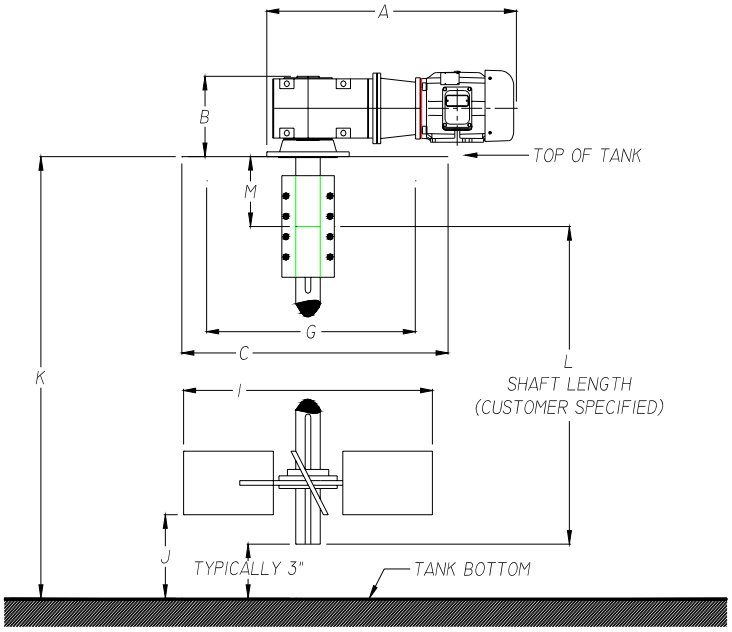
Or

TOR= $\frac{\text{volume X 60}}{\text{Pumping rate}}$

4. If TOR is over 90 select a bigger impeller. If TOR is below 35 select a smaller impeller. Then recalculate the TOR using the new impeller diameter.
5. Using Figure 1.2, look up the horsepower **(Hp20)** required for 20 ppg drilling fluids.
6. Using Figure 1.2, select the minimum gearbox size for this application.
7. Specify the shaft length using the data on page 9 & 10. "Tank depth" is obtained by measuring from the top of the structure (beams, channels, etc.) on which the agitator base will be supported to the bottom of the tank. Shaft length is typically sized to allow 3 inches of clearance from the bottom of the tank to the agitator shaft.

Impeller diameter in inches	Pumping rate @ 60 Hertz	Pumping rate @ 50 Hertz	Hp 20 (20 ppg mud)	Required Gearbox
20	900	750	1.20	3 Hp
24	2000	1300	1.44	3 Hp
28	2400	1900	1.68	3 Hp
30	3000	2700	2.16	5 Hp
32	4400	3800	2.40	5 Hp
36	5850	5480	4.80	7.5 Hp
40	7200	6000	7.19	10 Hp
42	8100	7000	9.59	15 Hp
44	9900	8100	10.55	20 Hp
48	12500	10200	17.99	25 Hp

Figure 1.2 - Pumping Rate and Gearbox Selection



DIMENSION	MA-3	MA-5	MA-7.5	MA-10	MA-15	MA-20	MA-25
A	30"	31"	33-5/8"	39-1/8"	44-1/8"	46-1/2"	48-1/2"
B	10-3/8"	10-3/8"	10-3/8"	11-5/8"	11-5/8"	14-1/4"	14-1/4"
I (Impeller Typ.)	24"	28"	32"	36"	40"	44"	48"
J (Impeller Height)	Recommended height for canted blades is .75 X Impeller Diameter.						
K (Tank Depth)*	*						
L (Shaft Length)	K-M-3	K-M-3	K-M-3	K-M-3	K-M-3	K-M-3	K-M-3
M	3.25"	3.75"	3.75"	4.75"	4.75"	5.75"	5.75"

*Measure from bottom of agitator support to the bottom of the tank.

Section 2 – Installation

A. Dimensional Data

The weight data for all models of the Agitator is given in Figure 2.1. Since the length of the impeller shafts vary, shaft weight must be added by using the weight per foot data.
Dimensional Data for the PSI Mud Agitator is given on page 10. Again, the customer must specify the "Tank Depth" in order to properly size the agitator shaft. Note that certified drawings, if requested or required, provided with the equipment will take precedence over any information in this manual.
"Tank Depth" is obtained by measuring from the top of the structure (beams, channels, etc.) on which the agitator base will be supported to the bottom of the tank. Shaft length is typically sized to allow 3 inches of clearance from the bottom of the tank to the bottom of the agitator shaft.

B. Lifting the Agitator

Lift the agitator only at secure points, to prevent dropping the unit. *Do not lift unit by motor lifting lug*. Use properly rated slings capable of handling the weight of the equipment. In most cases, the impeller and shaft should be installed after the agitator has been secured to the tank. If the agitator is lifted with the impeller shaft installed, make sure that the shaft coupling has been completely tightened and that the shaft is securely attached before lifting, note that this will alter the balance point of unit. It is always good practice to remove the impeller shaft before removing an existing agitator.

C. Before Installing Agitator

Before installing the agitator, care should be taken to ensure that the structure on which the agitator will be mounted is capable of withstanding both the static load and the dynamic loads that will be transferred to the tank structure.

D. Installing the Agitator

Typically, neither the shaft nor the impeller will be installed before lifting the unit into place. Some conditions, such as, limited headroom above the tank, mandate that the shaft and impeller be installed after the unit has been lifted in place. Anti-seize compound can be applied to all threaded fasteners.
Lift the unit as described above and place in position on the mud tank using mounting plate or output flange.

Using the QD busing and the key that are attached to the impeller, install the key and the QD bushing first. Locate the key so that when the impeller is installed, the distance from the bottom of the canted blades to the tank bottom is roughly ¾ of the impeller diameter. Example, if the impeller diameter is 36", then the distance from the bottom of the tank should be ~27" when installation is complete. Do not install impeller upside down; the product flow or direction should be downward or toward the bottom of the tank. Once the impeller has been installed, the shaft stabilizer can be secured to the tank, if provide or required. Re-check all fasteners and impeller height, before continuing.

A. Electrical Installation

TURN OFF. LOCK OUT AND TAG OUT the electrical power supply to the agitator before working on the agitator or opening the motor starter or junction box on the side of the motor. A qualified electrician should make electrical connections inside the junction box on the side of the motor. Care should be taken to make sure that voltage and frequency of the power supply match the motor nameplate voltage and frequency. Manufacturer provides the electric motor, with a nameplate showing voltage, hertz and electrical design of the motor.

B. Checking Motor Rotation

BEFORE STARTING OR EVEN "BUMPING'" THE MOTOR, MAKE SURE THAT GEARBOX IS FILLED WITH OIL.

The electrical installation is not complete until the motor rotation has been checked. Reversing any two legs on a three-phase power will reverse direction of rotation, if necessary.

C. Checking Oil Level

All Agitators are shipped from the factory filled with the proper type and quantity of gear oil. Nonetheless, gear units must be checked for oil level before startup. Oil level should be checked using the drain plug on the side of the gearbox housing. When mounted level, the oil level should hit the bottom point on the plug. In addition to oil level, check the coupling alignment, between the motor and the gearbox. The alignment has been brought within tolerance prior to shipping; however recheck once installation has occurred to maximize life of the coupling element.

DATA AND CHARTS

MODEL #	IMPELLER SIZE	MOTOR Hp	SHAFT WT. (lbs/ft)	WEIGHT, LESS SHAFT (LBS)	(KG)
LPMA-3	24"	3	12.79	172	78
LPMA-5	28"	5	12.79	247	112
LPMA-7	32"	7.5	12.79	262	119
LPMA-10	36"	10	23.06	326	148
LPMA-15	40"	15	23.06	510	231
LPMA-20	44"	20	31.58	587	266
LPMA-25	48"	25	31.58	646	293

TABLE 2.1- WEIGHT DATA

FIGURE 4.1

TEMPERATURE RANGE (ambient): Fahrenheit	Celsius	AGMA No. -	ISO VG	Example Mobil Product
5 to 77	-15 to +25	-	150	Mobilgear 629
23 to 104	-5 to +40	-	220	Mobilgear 630
Over 104	Over 40	Consult Factory		

Temperature conversions

F=(1.8 X C) + 32 C=0.555(F - 32)

LUBRICANT QUANTITY FOR LP MUD AGITATOR		
MODEL #	CAPACITY GALLONS	CAPACITY LITERS
MA-3	1.06	4
MA-5	1.06	4
MA-7.5	1.06	4
MA-10	1.9	7.2
MA-15	1.9	7.2
MA-20	3.43	13
MA-25	3.43	13

FIGURE 4.2

Section 3 – Operation

A. Starting the Agitator

Prior to proceeding, check the alignment of the motor to gearbox coupling alignment. If couplings are not aligned properly, you may wear out the flexible element before an acceptable length of operating time has passed.
Once installation is complete and proper lubrication levels have been confirmed, pressing the start button on the motor starter can start the unit. *(Note that motor starters are NOT supplied with agitators unless they have been ordered separately.)* As is good practice with all rotating equipment, check for unusual noise or vibration upon start up.

B. Operation

As with centrifugal pumps, agitators will consume more horsepower as mud weight increases. There is no adjustment of the agitator that is required to compensate for changes in drilling conditions. During drilling operations, mud agitators are kept running at all times.
***Aeration of the Suction Tank - Adjusting the height of the impellers in the suction tank is very important to prevent the agitators from introducing air that can cause mud pump problems. If air entrainment starts causing problems with the mud pump, while drilling with acceptable mud volume, impeller height should be lowered at the next opportunity, to minimize aeration. Temporarily increasing mud volume, to prevent aeration, can usually solve the problem.

C. Safety

The gearbox on the Agitator has a speed reduction ratio, which greatly increases the torque output at the impeller. Despite their relatively slow speed, a mud agitator can be extremely dangerous. Any objects that might fall into or be placed in the mud tanks run the risk of being caught by and wrapped up by the agitator. Typical examples of items that pose the threat of being caught by the agitator are: hoses, mud sample buckets, ropes, etc.
******No attempt should be made to stop a rope or hose once it has been wrapped around a moving agitator!!! Doing so can result in a potentially life threatening situation for the person attempting to remove the object from the agitator.***

Section 4 – Maintenance

A. Maintenance

The primary maintenance item for the Agitator is a weekly check of lubrication levels. The correct fill quantities are listed in Figure 4.2, on page 13.

B. Periodic Oil Changes

During the course of normal operation, the oil in the gearbox should be changed every three months. The use of a high quality lubricant, as listed in Figure 4.2 on page 13, will assist in the removal of any particles that might foul out the gearing, and provide trouble free operation of the PSI Mud Agitator.

****It is very important to monitor the ambient temperature around the PSI Mud Agitator. There are two (2) critical points at which an oils lubrication property must be altered. Extended periods of the ambient temperature below 32^{o} F and above 100^{o} F require changing the ISO grade of the oil to accommodate these temperature ranges.*

C. Cautions

The PSI Mud Agitator is a very rugged product, however through the abuse and misuse of any piece of equipment, the operational life of the unit can be greatly diminished. When in a cold environment, 8^{o} F and below, CAST IRON becomes fragile and must be prevented from receiving impacts, as this can crack the housings and cause oil leakage. Whenever possible, check the impeller shaft stabilizer for wear, excessive wearing can cause high angles of shaft deflection, wearing out the lower bearing.

Troubleshooting Guide

Problem	Cause	Action -Solution
Motor Will Not Start	-Power problem	-Check electrical supply
	-Defective motor	-Replace motor
	-Wrong or bad heaters/coil	-check heaters/starter
Motor Quits Running	-Starter tripped out	-Reset starter
	-Burned out heater	-Replace heater
	-Motor burned out	-Replace motor
Tripped Starter	-Bad heaters	-Replace heaters
	-Over amp draw	-check amp draw
	-Agitator undersized	-Replace Agitator
Whining Noise	-Check motor bearings	-Replace motor
Random Noise (Gearbox)	-Contamination in oil	-Drain and replace oil
Rhythmic noise (Gearbox)	-Possible bur on gear set	-See next line…

A bur on a gear set has a tendency to correct itself over time. In the event that the noise is overly obtrusive, remove gearbox and return to factory for evaluation.

Vibration	-Assembly loose	-Tighten all bolts
	-Broken weld (base to tank)	-Re-weld base to tank

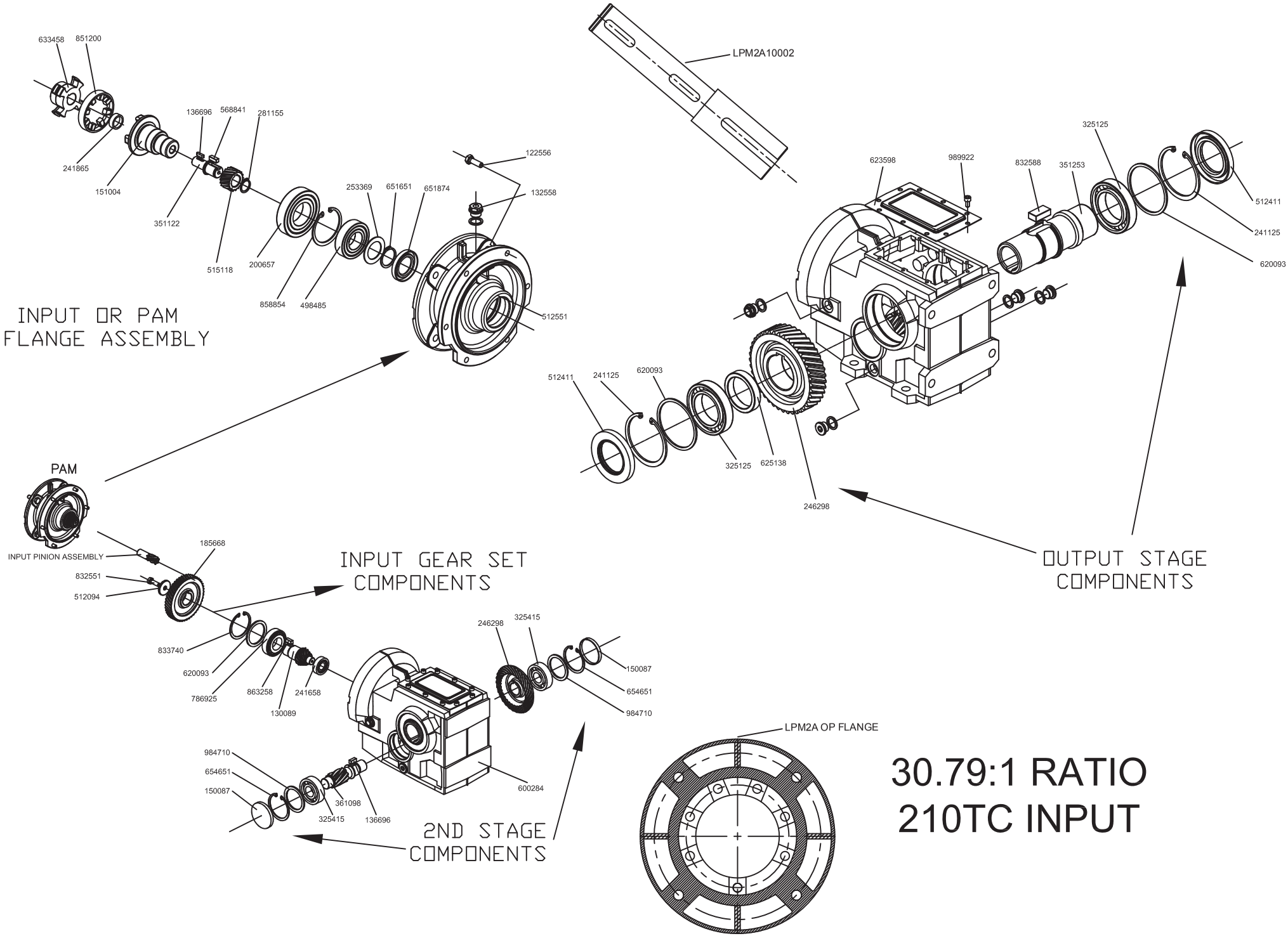
Extended Storage, Non-Use

For extended periods of storage, it is recommended that the input shaft of the gearbox be turned, preferable at high speed, in order for the lubrication to make contact with all seals and bearings. Failure to keep seal "wet" will contribute to them drying out and causing a premature failure, once placed into operation. One to two minutes of running the unit each month should insure continued lubrication contact of these items. After extended periods of storage, it is mandatory to inspect the seals for possible dry rot. Replace if required.

Parts Information

Replacement parts for the PSI Mud Agitators can be ordered from Process Solutions International or any of their agents, worldwide. When ordering, please provide the agitator horsepower, gearbox serial number and description of the part you need. If you desire a detailed parts breakdown with the numbers of replacement parts, contact Process Solutions International using the information listed below.

To order parts or to receive technical support, contact Process Solutions International using the information listed below.


633458
851200
241865
151004
136696
568841
281155
351122
515118
200657
858854
498485
253369
651651
651874
122556
132558
512551
INPUT OR PAM
FLANGE ASSEMBLY
LPM2A10002
623598
989922
832588
351253
325125
512411
241125
620093
246298
512411
241125
620093
325125
625138
OUTPUT STAGE
COMPONENTS
PAM
INPUT PINION ASSEMBLY
185668
832551
512094
INPUT GEAR SET
COMPONENTS
833740
620093
786925
863258
241658
130089
246298
325415
150087
654651
984710
984710
654651
150087
361098
325415
136696
600284
2ND STAGE
COMPONENTS
LPM2A OP FLANGE
30.79:1 RATIO
210TC INPUT

PSI
Process Solutions International™

MAX2000®

MUD AGITATOR

Safety First!

Cautions and General Safety Rules

This manual contains important information concerning installation, operation, and proper maintenance of the MAX2000® Mud Agitator. To prevent injury to personnel or equipment damage, this manual should be read by those responsible for the installation and operation of the Mud Agitators. In addition, the safety precautions below should be followed at all times.

- **Lift the agitator only at lift points** detailed in this manual and use properly rated slings capable of handling the equipment weight.
- The structure on which the agitator is to be installed must be capable of supporting both the static weight and dynamic loads listed in this manual.
- **TURN OFF, LOCK OUT, AND TAG OUT** the electrical power supply to the agitator before working on the agitator.
- Inspect the unit regularly, and replace damaged or worn components only with parts supplied by the original equipment manufacturer.
- The gearbox on the Agitator has a pre-selected gear ratio to maximize the suspension of solids in solution. This gear ratio provides a great increase in torque that is transmitted to the impeller. Any object that might fall into or be placed in the mud tank runs the risk of being caught by and wrapped up by the agitator. *********NO* **ATTEMPT SHOULD BE MADE TO STOP A ROPE OR HOSE OR ANY OTHER OBJECT ONCE IT HAS BEEN WRAPPED AROUND A MOVING AGITATOR!!!**
- Before entering a mud tank for any reason, the mud agitators should be locked out and tagged out.

Table of Contents

List of Illustrations

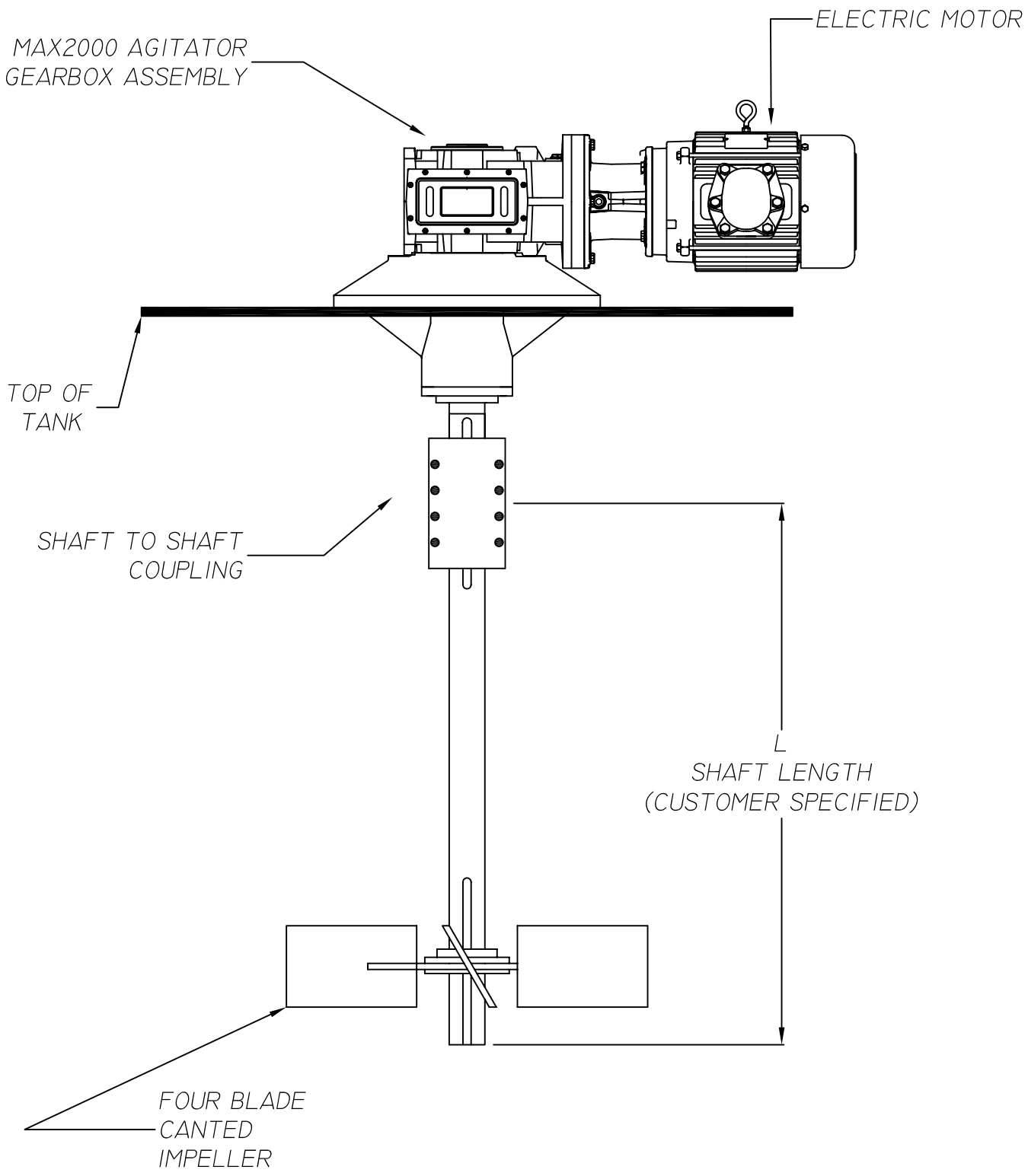


FIGURE I.I

MAJOR COMPONENTS

SECTION 1- Introduction

A. Role of Mud Agitators

Agitators or "mud mixers" serve an important role in the surface treatment of drilling fluids. Using an impeller mixer that promotes both axial and radial flow will lower mud costs and improve mud properties.
Unlike centrifugal pumps or sub-guns, impeller mixers are relatively low shear and low energy devices making them easy to maintain and inexpensive to operate. Using low shear mixers to suspend and mix mud additives minimizes particle size degradation and polymer shear.
Properly sized agitators serve three purposes:

1. Impeller mixers ensure that mud additives are homogeneously mixed. This prevents spot over treatment of chemicals, dilution water or weighting agents.
2. Agitators keep the active mud system moving when the mud pumps are disengaged and will prevent the pits from "gelling".
3. When drilling with weighted mud, properly selected agitators will keep the weighting agents in suspension and minimize any tendencies for solids to settle in corners or dead spots.

B. Design Features

The design features of the Agitator that minimize maintenance and maximize reliability include:

Gear Reducer

A rugged cast iron gearbox houses either a double or triple reduction helical bevel gearing set that is so precisely ground that there is a minimal amount of back lash in the gear sets. This feature eliminates a "slamming" effect of the gears at start up, promoting longer life. Each helical bevel gear set is 98% efficient. Therefore a double reduction box is 96% efficient and a triple reduction box is 94% efficient. A typical worm gear set is only 85% efficient, losing most of it efficiency through the generation of heat.
The internal gears are lubricated with oil. For ambient temperatures below –23 F^0 or above 140 F^0 a synthetic lubricant should be substituted. A unique feature of the MAX2000® Agitator is the greased lower bearing. This lower bearing can be maintained, greased, from the topside of the tank, eliminating the need for in-tank inspections of the lower bearing. This design feature provides a barrier layer of grease that can be expunged out the lower seal. Which allows the lower bearing to be in contact with good, uncontaminated lubricant at all times. The lower seals are arranged to accommodate the grease pocket and makes for a four-tier layer of protection for the gearing. All four of

these levels must be breeched prior to the gearbox losing its oil:

1. Lower seal-drop bearing
2. Grease pocket
3. Upper seal-drop bearing
4. Lower seal in gearbox

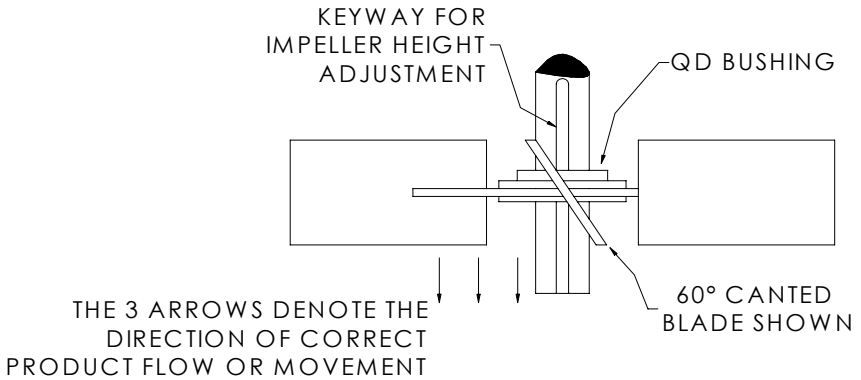
An external oil sight glass has been provided so that the oil level can be checked at a single glance. Vent plugs are supplied, installed in the gearbox housing, to maintain a homeostatic internal pressure, preventing a pressure build up that could blow out an oil seal.

MOTORS

Explosion proof motors are designed to withstand pressure washing and exposure to corrosive fluids without bearing contamination. Motors are available with either a foot mount design or a NEMA C-face input. The foot mount or "T" frame motors are mounted using flexible coupling between the motor and gearbox, for ease of alignment. The NEMA C motors bolt to the gearbox housing and no alignment issues are seen.

IMPELLERS

Optimal suspension and mixing results from the axial and radial flow patterns created by from impellers. Using a 60^{o}, 45^{o}, an axial or a hydrofoil impeller the optimal situation can be created for you application. In addition to the standard welded impeller, the MAX2000® Agitator is offered with a "bolt-on" design blade in carbon steel and the 310 series stainless. On the welded impellers a QD bushing is provided to allow for adjustment of the height of the impeller.



Section 1 – Introduction

C. Selecting Agitator

To properly select the correct horsepower and impeller diameter needed for a mud tank agitator, the information below is needed.

Tank Geometry

a. Width
b. Length
c. Mud Depth

Maximum Anticipated Mud Density

a. Specify if know
b. Otherwise use 20 pounds per gallon (lb/gal)

Power Available

a. Voltage
b. Amperage Available
c. Frequency

D. Locating Agitators

A canted blade impeller creates a combination of radial and axial flow that provides for uniform suspension and mixing in circular or square areas. A rectangular tank with a length to width ratio of greater than 1.5 should be "divided" into "sizing areas" that are square (or close to square areas) with an agitator located at the center of each. For example, two agitators would be given the responsibility for mixing each of the two 8-foot by 8-foot area of a 16-foot by 8-foot suction tank. All data below is for canted blade impellers.

E. Sizing Agitator

1. Calculate the volume of the mud located with in the "Sizing Area".
   Volume (in gallons)=length X width X max mud depth X 7.5

2. Select an impeller diameter using Figure 1.2 to find an impeller that gives a pumping rate close to the calculated volume V. (Note the frequency of the electric motor will affect pumping rate since 50 Hz motors turn slower than 60 Hz motors.)

3. Calculate the turn over rate. The TOR is the number of seconds required for the impeller to pump the full volume within the sizing area. **Remember that a lower TOR indicates more agitation because the tank turns over in fewer seconds.** TOR should be in the range of 35 to 90 seconds for all "sizing areas". Although, for the suction tank, it should have a TOR closer to 90 (less agitation) to prevent aeration.

TOR= Volume X 60 divided by Pumping Rate

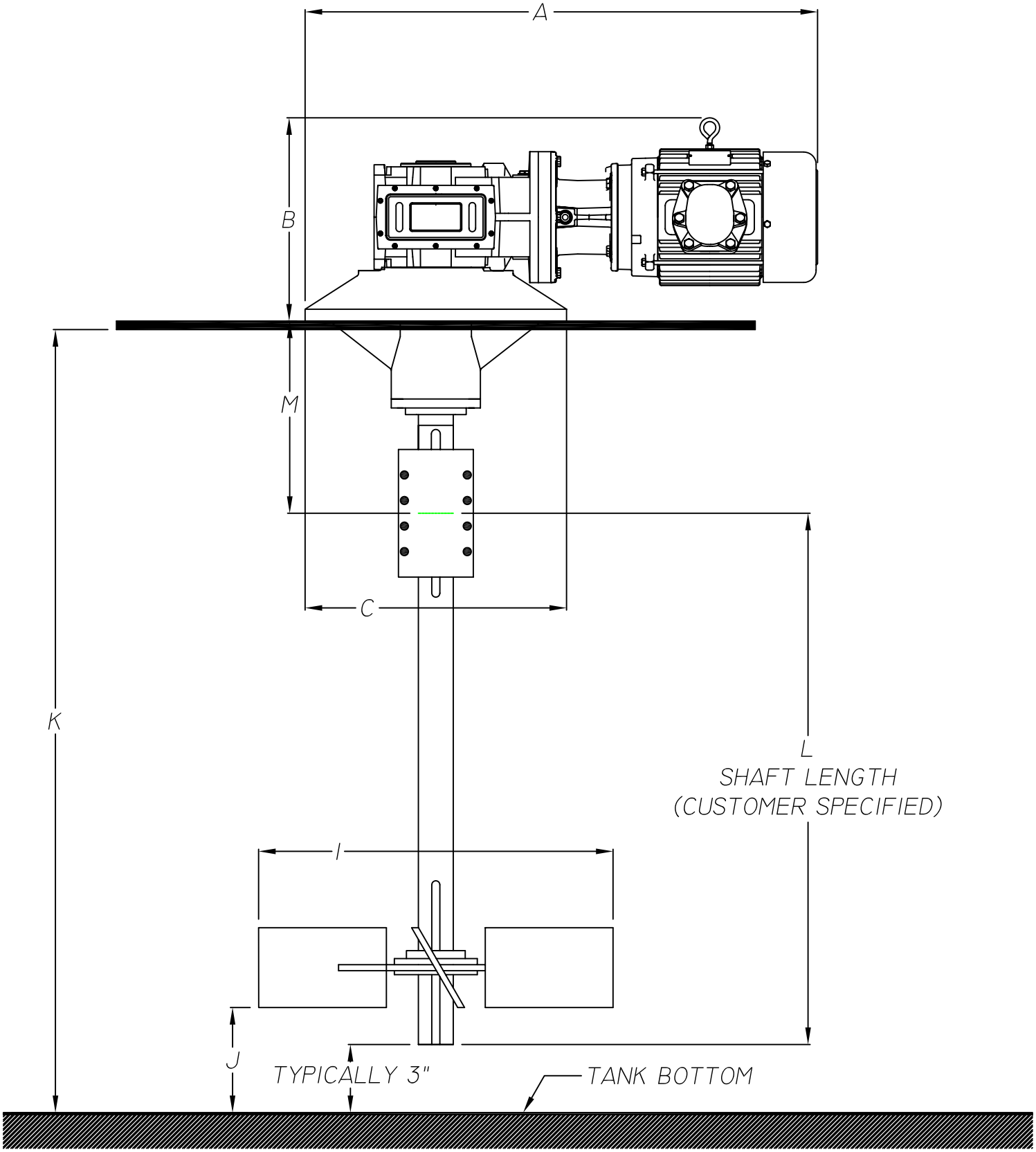
or

$$\textbf{TOR=} \quad \frac{\text{volume X 60}}{\text{Pumping rate}}$$

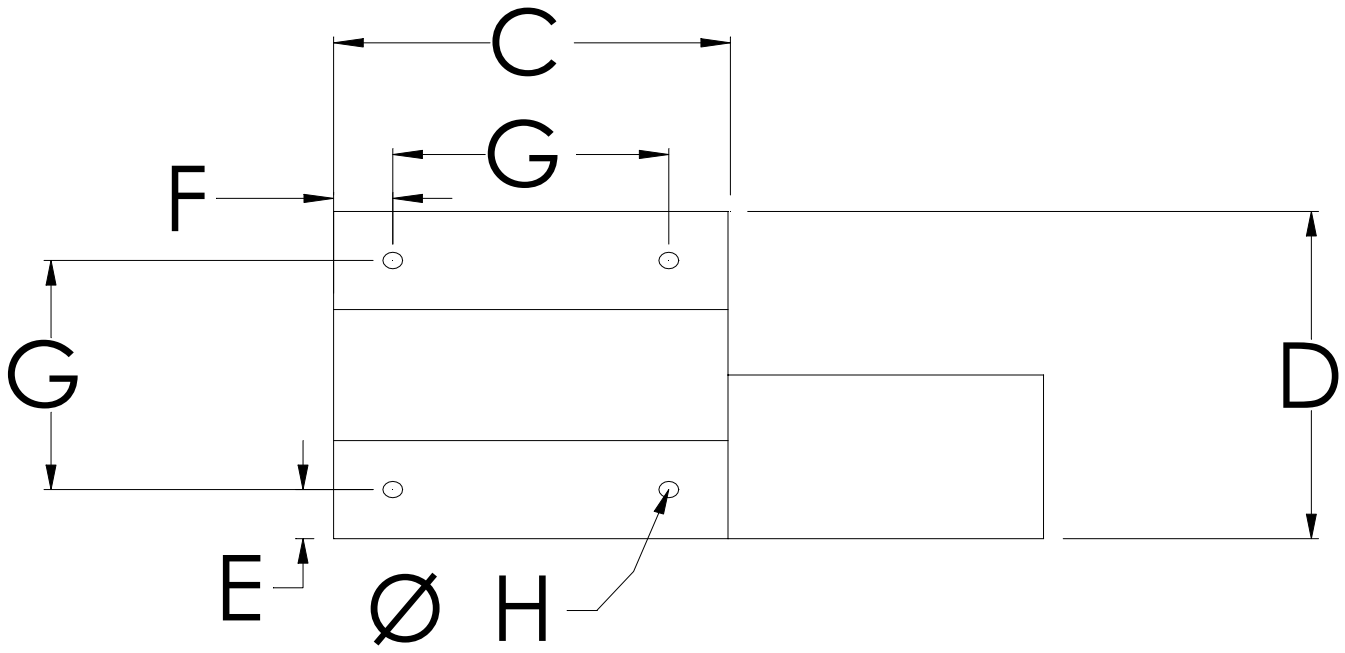
4. If TOR is over 90 select a bigger impeller. If TOR is below 35 select a smaller impeller. Then recalculate the TOR using the new impeller diameter.
5. Using Figure 1.2, look up the horsepower **(Hp20)** required for 20 ppg drilling fluids.
6. Using Figure 1.2, select the minimum gearbox size for this application.
7. Specify the shaft length using the data on page 9 & 10. "Tank depth" is obtained by measuring from the top of the structure (beams, channels, etc.) on which the agitator base will be supported to the bottom of the tank. Shaft length is typically sized to allow 3 inches of clearance from the bottom of the tank to the agitator shaft.

Impeller diameter in inches	Pumping rate @ 60 Hertz	Pumping rate @ 50 Hertz	Hp 20 (20 ppg mud)	Required Gearbox
20	900	750	1.20	3 Hp
24	2000	1300	1.44	3 Hp
28	2400	1900	1.68	3 Hp
30	3000	2600	2.16	5 Hp
32	4400	4000	2.40	5 Hp
36	5850	5400	4.80	7.5 Hp
40	7200	6000	7.19	10 Hp
42	8100	7000	9.59	15 Hp
44	9900	8100	10.55	20 Hp
48	12500	10200	17.99	25 Hp

Figure 1.2 - Pumping Rate and Gearbox Selection


A
B
M
C
K
L
SHAFT LENGTH
(CUSTOMER SPECIFIED)
I
J
TYPICALLY 3"
TANK BOTTOM

Mounting Position



MOUNTING PATTERN

DIMENSION	M2A-3	M2A-5	M2A-7.5	M2A-10	M2A-15	M2A-20	M2A-25
A	28"	40.5"	41.5"	49.625"	55.5"	65.75"	65.75"
B	8.5"	11"	11"	15"	15"	18.5"	18.5"
C	15"	23.75"	24.5"	27"	27"	37.375"	37.375"
D	15"	21.5"	21.5"	26"	26"	36"	36"
E	2.25"	2.5"	2.5"	3.5"	3.5"	3"	3"
F	3.5"	3.25"	3.25"	3.5"	3.5"	3.375"	3.375"
G	9"	16"	16"	19"	19"	30"	30"
H	0.75"	.875"	.875"	1.125"	1.125"	1.31"	1.31"
I (Impeller Diameter, TYP)	24"	28"	32"	36"	40"	44"	48"
J (Impeller Height)	Recommended height for canted blades is .75 X Impeller Diameter.						
K (Tank Depth)*	*						
L (Shaft Length)	K-M-3	K-M-3	K-M-3	K-M-3	K-M-3	K-M-3	K-M-3
M	0.0"	5.5"	5.5"	7.5"	7.5"	7"	7"

*Measure from bottom of agitator support to the bottom of the tank.

Section 2 – Installation

A. Dimensional Data

The weight data for all models of the Agitator is given in Figure 2.1. Since the length of the impeller shafts vary, shaft weight must be added by using the weight per foot data.
Dimensional Data for the MAX2000® Agitator is given on page 10. Again, the customer must specify the "Tank Depth" in order to properly size the agitator shaft. Note that certified drawings, if requested or required, provided with the equipment will take precedence over any information in this manual.
"Tank Depth" is obtained by measuring from the top of the structure (beams, channels, etc.) on which the agitator base will be supported to the bottom of the tank. Shaft length is typically sized to allow 3 inches of clearance from the bottom of the tank to the bottom of the agitator shaft.

B. Lifting the Agitator

Lift the agitator only at the lift points provided. Use properly rated slings capable of handling the weight of the equipment. In most cases, the impeller will be installed after the agitator base has been lifted into the tank but before the base has been securely mounted. If the agitator is lifted with the impeller shaft installed, make sure that the shaft coupling has been completely tightened and that the shaft is securely attached before lifting. It is always good practice to remove the impeller shaft before removing an existing agitator.

C. Before Installing Agitator

Before installing the agitator, care should be taken to ensure that the structure on which the agitator will be mounted is capable of withstanding both the static load and the dynamic loads that will be transferred to the tank structure.

D. Installing the Agitator

Typically, the shaft but not the impeller will be installed before lifting the unit into place. Some conditions, like limited head room above the tank, may require that the shaft be installed after the unit has been lifted in place. Anti-seize compound should be applied to all threaded fasteners.

Lift the unit where indicated and place in position on the mud tank using blocks to provide at least 18 inches of clearance between the bottom of the shaft and tank bottom. Before removing the blocks and fastening the base to the tank structure, the impeller must be

installed. Using the QD busing and the key that are attached to the impeller, install the key and the QD bushing first. Locate the key so that when the impeller is installed, the distance from the bottom of the canted blades to the tank bottom is roughly ¾ of the impeller diameter. Example, if the impeller diameter is 36", then the distance from the bottom of the tank should be 27" when installation is complete. Do not install impeller upside down; the product flow or direction should be downward or toward the bottom of the tank. Once the impeller has been installed, the blocks can be removed and the agitator should be secured to the mud tank using the mounting bolthole pattern shown on the dimensional drawing for the unit. Alternately, the agitator base can be welded directly to the mud tank. Check impeller height and adjust if necessary.

A. Electrical Installation

TURN OFF. LOCK OUT AND TAG OUT the electrical power supply to the agitator before working on the agitator or opening the motor starter or junction box on the side of the motor. A qualified electrician should make electrical connections inside the junction box on the side of the motor. Care should be taken to make sure that voltage and frequency of the power supply match the motor nameplate voltage and frequency.

B. Checking Motor Rotation

BEFORE STARTING OR EVEN "BUMPING'" THE MOTOR, MAKE SURE THAT GEARBOX IS FILLED WITH OIL.

The electrical installation is not complete until the motor rotation has been checked. Reversing any two legs on a three-phase power will reverse direction of rotation if necessary.

C. Checking Oil Level

All Agitators are shipped from the factory filled with the proper type and quantity of gear oil. Nonetheless, gear units must be checked for oil level before startup. Oil level should be checked using the sight glass on the side of the gearbox housing. When mounted level, the oil level should hit the mid point on the sight glass. In addition to oil level, check the lower bearing for grease. A grease gun can be used to pump grease into the zerk and through the grease tube down to the lower bearing. Mobil CM-P is recommended. However, if not available, a moly-fortified grease should be used. Other recommended grease characteristics include: washout resistant, broad temperature range, ISO 320, NLGI Grade II, Lithium based.

DATA AND CHARTS

MODEL #	IMPELLER SIZE	MOTOR Hp	SHAFT WT. (lbs/ft)	WEIGHT LESS SHAFT (LBS)	(KG)
M2A-3	24"	3	5.5	215	98
M2A-5	28"	5	12.8	420	191
M2A-7.5	32"	7.5	12.8	495	225
M2A-10	36"	10	23.0	790	359
M2A-15	40"	15	23.0	940	427
M2A-20	44"	20	31.6	1,250	567
M2A-25	48"	25	41.4	1,400	635

TABLE 2.1- WEIGHT DATA

FIGURE 4.1

TEMPERATURE RANGE (ambient)		AGMA No.	ISO VG	Example
Fahrenheit	Celsius	-		Mobil Product
40 below to 32	40 below to 0	-	220	SHC630
32 to 100	0 to 37.7	5 EP	220	Mobilgear 630
Over 100	Over 37	8 EP	680	Mobilgear 636

Temperature conversions

F=(1.8 X C) + 32 C=0.555(F - 32)

LUBRICANT QUANTITY FOR MAX2000

MODEL #	CAPACITY QUARTS	CAPACITY LITERS
M2A-3	1.37	1.29
M2A-5	4.65	4.4
M2A-7.5	4.65	4.4
M2A-10	10.03	9.5
M2A-15	10.03	9.5
M2A-20	11.52	10.91
M2A-25	11.52	10.91
ABOVE 25 Hp	CONSULT FACTORY	

FIGURE 4.2

Section 3 – Operation

A. Starting the Agitator

Prior to proceeding, check the alignment of the motor to gearbox coupling alignment. If couplings are not aligned properly, you may wear out the flexible element before an acceptable length of operating time has passed.
Once installation is complete and proper lubrication levels have been confirmed, pressing the start button on the motor starter can start the unit. *(Note that motor starters are NOT supplied with agitators unless they have been ordered separately.)* As is good practice with all rotating equipment, check for unusual noise or vibration upon start up.

B. Operation

As with centrifugal pumps, agitators will consume more horsepower as mud weight increases. There is no adjustment of the agitator that is required to compensate for changes in drilling conditions. During drilling operations, mud agitators are kept running at all times.
***Aeration of the Suction Tank - Adjusting the height of the impellers in the suction tank is very important to prevent the agitators from introducing air that can cause mud pump problems. If air entrainment starts causing problems with the mud pump, while drilling with acceptable mud volume, impeller height should be lowered at the next opportunity, to minimize aeration. Temporarily increasing mud volume, to prevent aeration, can usually solve the problem.

C. Safety

The gearbox on the Agitator has a speed reduction ratio, which greatly increases the torque output at the impeller. Despite their relatively slow speed, a mud agitator can be extremely dangerous. Any objects that might fall into or be placed in the mud tanks run the risk of being caught by and wrapped up by the agitator. Typical examples of items that pose the threat of being caught by the agitator are: hoses, mud sample buckets, ropes, etc.

*****No attempt should be made to stop a rope or hose once it has been wrapped around a moving agitator!!! Doing so can result in a potentially life threatening situation for the person attempting to remove the object from the agitator.**

Section 4 – Maintenance

A. Maintenance

The primary maintenance item for the Agitator is a weekly check of lubrication levels. This includes the oil level coating the gearing and the grease in the lower bearing. The oil level can be easily checked through the sight glass on the side of the gearing section. The correct fill quantities are listed in Figure 4.2, on page 13. The design of the grease pocket allows for the "old" grease to be expunged out of the lower seal. You have the ability to add as much grease as you wish, however, the more you add to the lower bearing, an equal amount of grease that is pushed out. It is recommended, in a normal operating range of mud levels, (i.e. below the output shaft of the agitator) during your weekly maintenance check of the agitator, you take the opportunity to put 8-10 pumps of a grease gun into the zerk on the side of the housing.

In the event you find a component of the Agitator Assembly that needs to be repaired, consult the Drawing labeled "Internal Components", page 18, for which items can be replaced in the field. *At no time, should anyone other than a* **FACTORY TRAINED** *individual attempt any repair on the gearing section*. The gears sets are so exactly positioned that without the proper tools and presses, it is emphatically discouraged to attempt any field repair. If any field attempt is made to repair the gearing section of the MAX2000® Gearbox, any warrantee either implied or express is voided, IMMEDIATELY. Please advise any and all personnel to observe this important statement.

B. Periodic Oil Changes

During the course of normal operation, the oil in the gearbox should be changed every three months. The use of a high quality lubricant, as listed in Figure 4.2 on page 13, will assist in the removal of any particles that might foul out the gearing, and provide trouble free operation of the MAX2000® Agitator.

****It is very important to monitor the ambient temperature around the MAX2000® Agitator. There are two (2) critical points at which an oils lubrication property must be altered. Extended periods of the ambient temperature below 32° F and above 100° F require changing the ISO grade of the oil to accommodate these temperature ranges.*

A. Cautions

The MAX2000® Agitator is a very rugged product, however through the abuse and misuse of any piece of equipment, the operational life of the unit can be greatly diminished. When in a cold environment, 8° F and below, CAST IRON becomes fragile and must be prevented from receiving impacts, as this can crack the housings and cause oil leakage. Whenever possible, check the impeller shaft stabilizer for wear, excessive wearing can cause high angles of shaft deflection, wearing out the lower bearing.

Troubleshooting Guide

Problem	Cause	Action -Solution
Motor Will Not Start	-Power problem	-Check electrical supply
	-Defective motor	-Replace motor
	-Wrong or bad heaters/coil	-check heaters/starter
Motor Quits Running	-Starter tripped out	-Reset starter
	-Burned out heater	-Replace heater
	-Motor burned out	-Replace motor
Tripped Starter	-Bad heaters	-Replace heaters
	-Over amp draw	-check amp draw
	-Agitator undersized	-Replace Agitator
Whining Noise	-Check motor bearings	-Replace motor
Random Noise (Gearbox)	-Contamination in oil	-Drain and replace oil
Rhythmic noise (Gearbox)	-Possible bur on gear set	-See next line…

A bur on a gear set has a tendency to correct itself over time. In the event that the noise is overly obtrusive, remove gearbox and return to factory for evaluation.

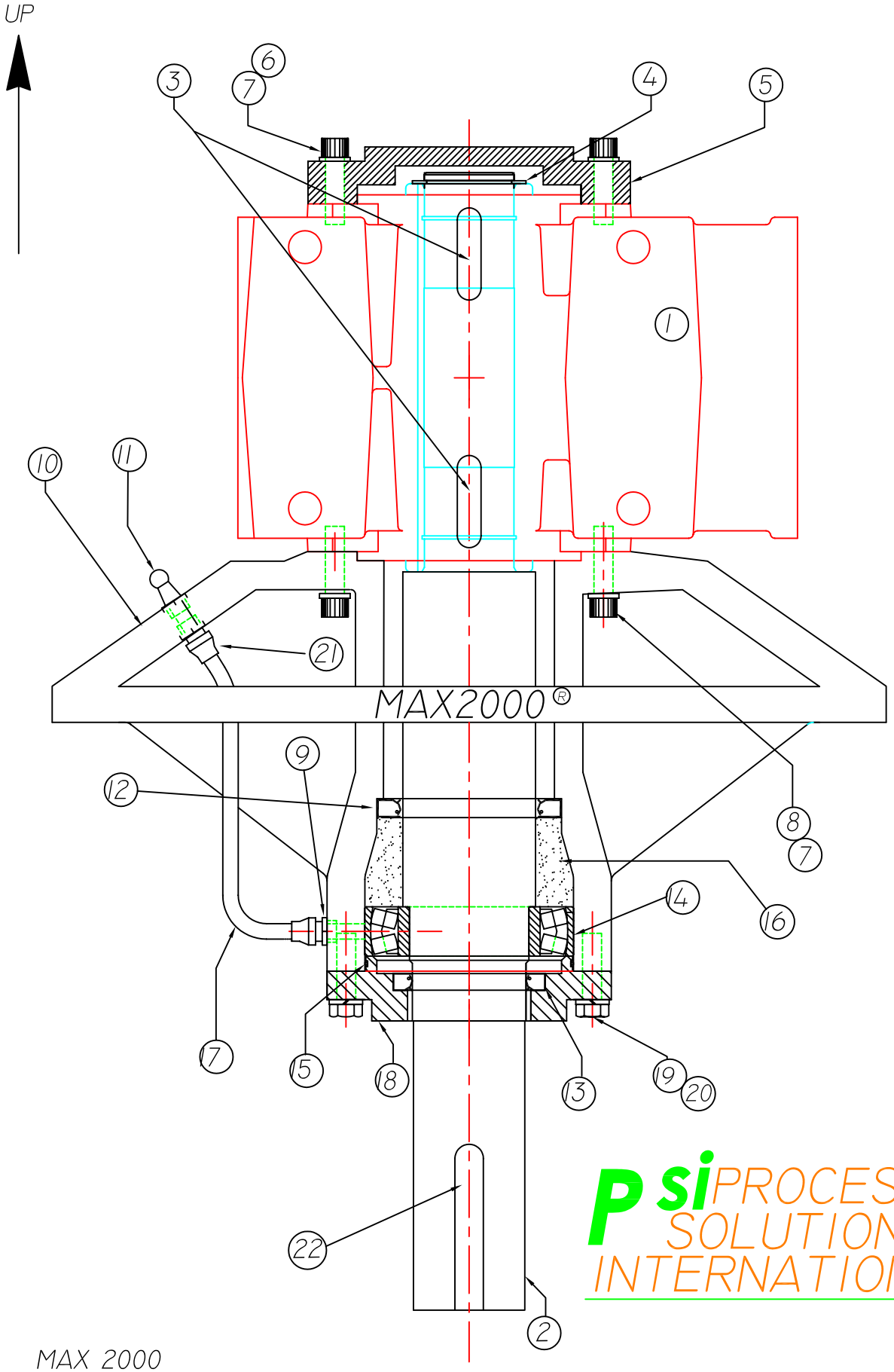
Vibration	-Assembly loose	-Tighten all bolts
	-Broken weld (base to tank)	-Re-weld base to tank

Parts List

Replacement parts for the MAX2000® Agitators can be ordered from Process Solutions International or any of their agents, worldwide. The Drawing labeled "Internal Parts", page 18, gives you a drawing number for the parts you can order. A list of drawing numbers and description for the drawing numbers is located on page 19. When ordering, provide the drawing number and description of the part you need. Please include the horsepower of the Agitator you are repairing. If you desire a parts list with exact catalog numbers of replacement parts, contact Process Solutions International using the information listed below.

To order parts, schedule field service or to receive technical support, contact Process Solutions International using the information listed below.

Process Solutions International
A Division of Kelbro, Inc.
204 W. Powell Lane, Building D
Austin, TX 78753
(512) 873-7670; FAX (512) 873-7664



PSI PROCESS SOLUTIONS INTERNATIONAL

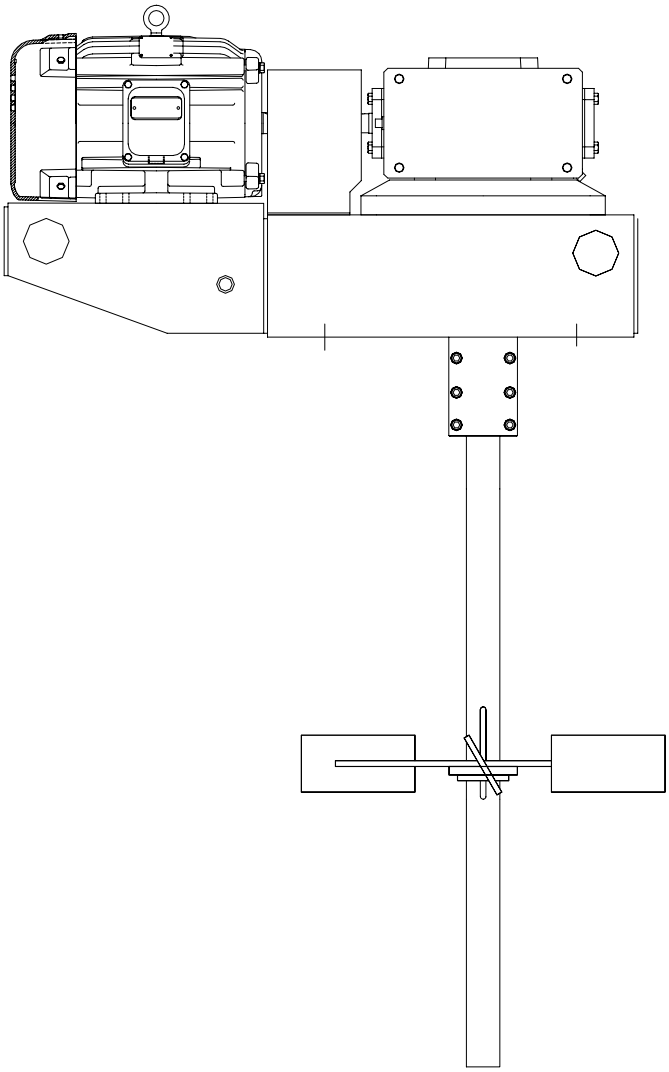
MAX 2000
BILL OF
MATERIALS

Parts Numbers and Descriptions

DRAWING NUMBER	DESCRIPTION
1	Gearbox
2	Output Shaft
3	Internal Keys
4	Retaining Ring
5	Cover
6	Socket Head Cap Screw
7	Lock Washer
8	Socket Head Cap Screw
9	Hose Connector
10	Drop Bearing Housing
11	Grease Zerk
12	Upper Seal, Drop Bearing
13	Lower Seal, Drop Bearing
14	Spherical Roller Bearing
15	O-Ring
16	Grease Envelope
17	Grease Tube
18	End Cap
19	Hex Head Cap Screw
20	Lock Washer
21	Hose Connector
22	External Key

DESERT FOX MUD AGITATOR

INSTALLATION, OPERATION, & MAINTENANCE MANUAL



PROCESS SOLUTIONS INT
Houston, Texas
Toll Free: 1-866-866-4774

Cautions and General Safety Rules

This manual contains important information concerning installation, operation, and proper maintenance of your Process Solutions Mud Agitator. To prevent injury to personnel or equipment damage, this manual should be read by those responsible for the installation and operation of the MAX 2000 Mud Agitators. In addition, the safety precautions below should be followed at all times.

- **Lift the agitator only at lift points** detailed in this manual. Use properly rated slings capable of handling the equipment weight.

- The structure on which the agitator is to be installed must be capable of supporting both the static weight and dynamic loads listed in this manual.

- **TURN OFF. LOCK OUT, and TAG OUT** the electrical power supply to the agitator before working on the agitator.

- Inspect the unit regularly, and replace damaged or worn components only with parts supplied by the original equipment manufacturer.

- The gearbox greatly increases the torque output at the impeller. Any objects that might fall into or be placed in the mud tanks run the risk of being caught by and wrapped up by the agitator. **No attempt should be made to stop a rope or hose or any other object once it has been wrapped around a moving agitator.**

Before entering a mud tank for any reason, the mud agitators should be locked out and tagged out.

Table of Contents

List of Illustrations

Section 1 – Introduction

A. ROLE OF MUD AGITATORS

Agitators or “mud mixers” serve an important role in the surface treatment of drilling fluids. Using an impeller mixer that promotes both axial and radial flow will lower mud costs and improve mud properties.

Unlike centrifugal pumps or sub-guns, impeller mixers are relatively low shear and low energy devices making them easy to maintain and inexpensive to operate. Using low shear mixers to suspend and mix mud additives minimizes particle size degradation and polymer shearing.

Properly sized agitators serve three purposes. One, impeller mixers ensure that mud additives are homogeneously mixed preventing spot over treatment of chemicals or dilution water or weighting agents. Two, agitators keep the active mud system moving when the mud pumps are disengaged and will prevent the pits from “gelling.” Three, when drilling with weighted mud, properly selected agitators will keep the weighting agents in suspension and minimize any tendencies for solids to settle in corners or dead spots.

B. DESIGN FEATURES

The design features of the Desert Fox Agitator that minimize maintenance and maximize reliability include:

- **GEAR REDUCER**

A rugged cast iron gearbox houses a single reduction worm gear that is cut integral to the drive shaft and then hardened and ground. Internal gearing is oil lubricated.

- **MOTORS**

Explosion proof motors are designed to withstand pressure washing and exposure to corrosive fluids without bearing contamination along with allowing safe operation in hazardous environments. Motors are foot mounted for ease of alignment with a flex coupling between motor and gearbox. Unless specified otherwise, motors will be supplied for 460V/60Hz service. All motors are rated at a service factor of 1.15.

- **SHAFT COUPLING**

A rigid shaft coupling is used to attach the impeller shaft to the gearbox output. Unlike the rigid couplings used on other agitators, these couplings can be quickly disassembled with hand tools even after long-term service

- **IMPELLERS**

Optimal suspension and mixing results from the axial and radial flow patterns created by impellers with four (4) 60 degree canted blades. The impeller is fixed to the shaft using a QD bushing allowing adjustment of impeller height.

Section 1 – Introduction

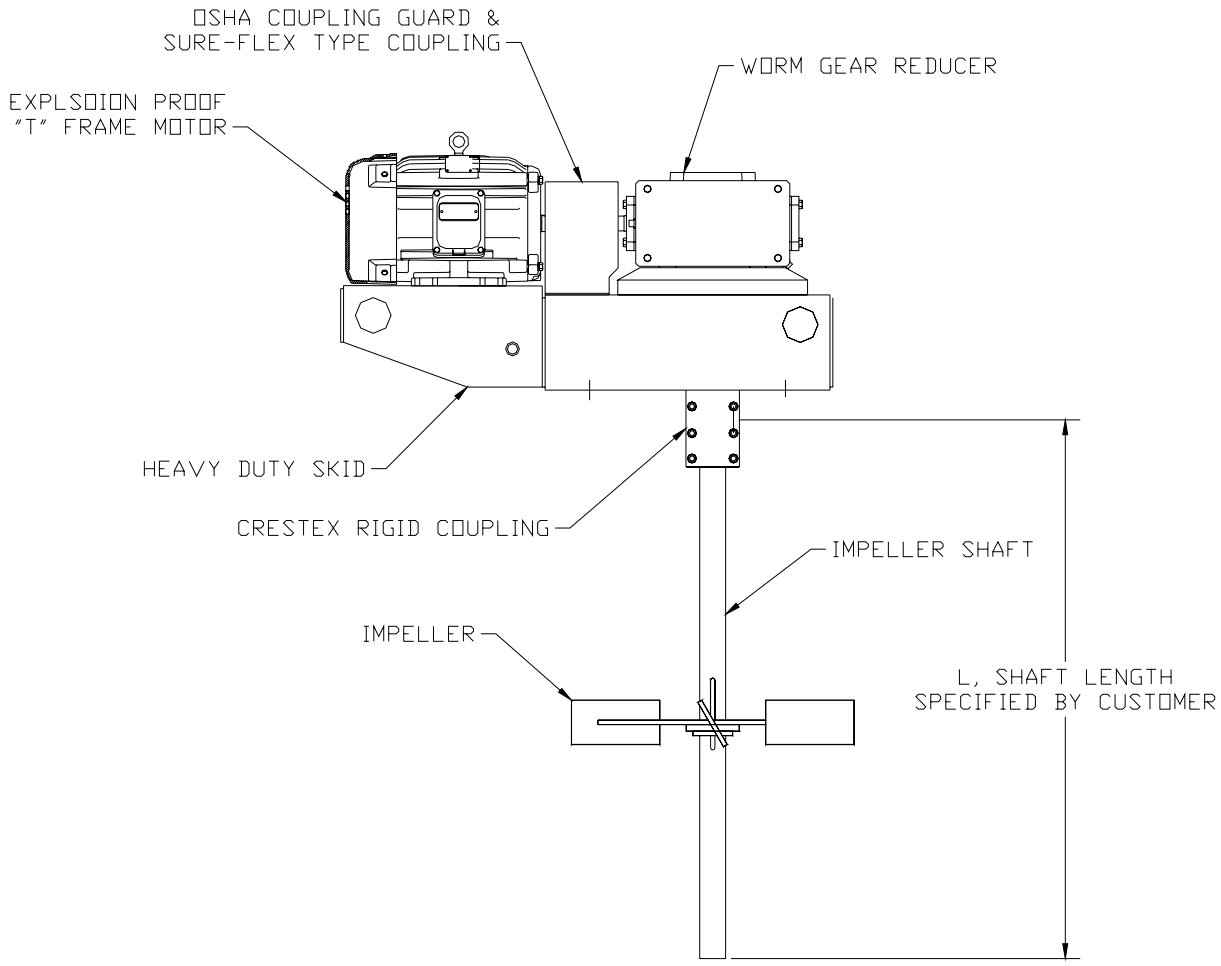


FIGURE 1.1 – MAJOR COMPONENTS

Section 2 – Installation

A. LOCATING AGITATORS

A canted blade impeller creates a combination of radial and axial flow that provides for uniform suspension and mixing in circular or square areas. A rectangular tank with a length to width ratio of greater than 1.5 should be "divided" into "sizing areas" that are square with an agitator located at the center of each All data below is for canted blade impellers

B. LIFTING THE AGITATOR

Lift the agitator only at the lift points provided. Use properly rated slings capable of handling the weight of the equipment.

If the agitator is lifted with the impeller shaft installed, make sure that the shaft coupling has been completely tightened and that the shaft is securely attached before lifting. It is good practice to remove the impeller shaft before removing an existing agitator.

C. CHECKING OIL LEVEL

Check oil level by removing the oil level plug on the side of the gearbox. Make sure that the oil is no more than 1/2" below [12 mm below] the oil level plug. See Section 4 for oil capacity and a list of approved lubricants.

D. BEFORE INSTALLING AGITATOR

Before installing the agitator, care should be taken to ensure that the structure on which the agitator will be mounted is capable of withstanding both the static load and the dynamic loads that will be transferred to the tank structure.

E. DIMENSIONAL DATA

Dimensional Data for all seven models of the Desert Fox Agitator is given in Figure 2.1. Note; that the customer must specify "Tank Depth" in order to properly size the agitator shaft. *Note that certified drawings provided with the equipment will take precedence over any information in this manual.*

"Tank Depth" is obtained by measuring from the top of the structure (beams, channels, etc.) on which the agitator base will be supported to the bottom of the tank. Shaft length is typically sized to allow 6 inches of clearance from the bottom of the tank to the bottom the agitator shaft.

TABLE 2.1 – AGITATOR WEIGHT

Model No.	Impeller Size	Weight (less shaft)
MA3	24" [610 mm]	586 lb [266 kg]
MA5	28" [711 mm]	818 lb [371 kg]
MA 7 ½	32" [813 mm]	953 lb [432 kg]
MA 10	36" [914 mm]	1355 lb [615 kg]
MA 15	40" [1016 mm]	1695 lb [769 kg]
MA 20	44" [1118 mm]	2410 lb [1093 kg]
MA 25	48" [1219 mm]	2470 lb [1120 kg]

Section 2 – Installation

F. INSTALLING THE AGITATOR

Typically, the shaft but not the impeller will be installed before lifting the unit into place. Some conditions, like limited headroom above the tank, may require that the shaft be installed after the unit has been lifted in place. **Anti-seize compound should be applied to all threaded fasteners.**

Lift the unit where indicated and place in position on the mud tank using blocks to provide at least 18 inches of clearance between the bottom of the shaft and tank bottom.

Before removing the blocks and fastening the base to the tank structure, the impeller must be installed. **Install the key and the QD bushing first**. Locate the key so that when the impeller is installed, the distance from the bottom of the canted blades to the tank bottom is roughly 3/4 of the impeller diameter. Example, if the impeller diameter is 36", then the distance from the bottom of the canted blade to the tank bottom should be 27" when installation is complete.

DO NOT INSTALL IMPELLER UPSIDE DOWN; THE QD BUSHING MUST BE ON TOP OF THE IMPELLER.

Once the impeller has been installed, the blocks can be removed and the agitator should be secured to the mud tank using the bolt pattern shown on the dimensional drawing for the unit. Alternately, the agitator base can be welded directly to the mud tank. Check impeller height and adjust if necessary.

G. ELECTRICAL INSTALLATION

TURN OFF. LOCK OUT, and TAG OUT the electrical power supply to the agitator before working on the agitator or opening the motor starter or junction box on the side the motor. A qualified electrician should make electrical connections inside the explosion proof junction box on the side of the motor. Check to make sure that voltage and frequency of the power supply match that on the motor nameplate.

H. MOTOR ROTATION

BEFORE STARTING OR EVEN "BUMPING" THE MOTOR, MAKE SURE THAT GEARBOX IS FILLED WITH OIL.

The proper direction of rotation for all Desert Fox Agitators is **clockwise when viewed from above.** The electrical installation is not complete until the motor rotation has been checked. Reversing any two legs on a three-phase power will reverse direction of rotation if necessary.

Section 2 – Installation

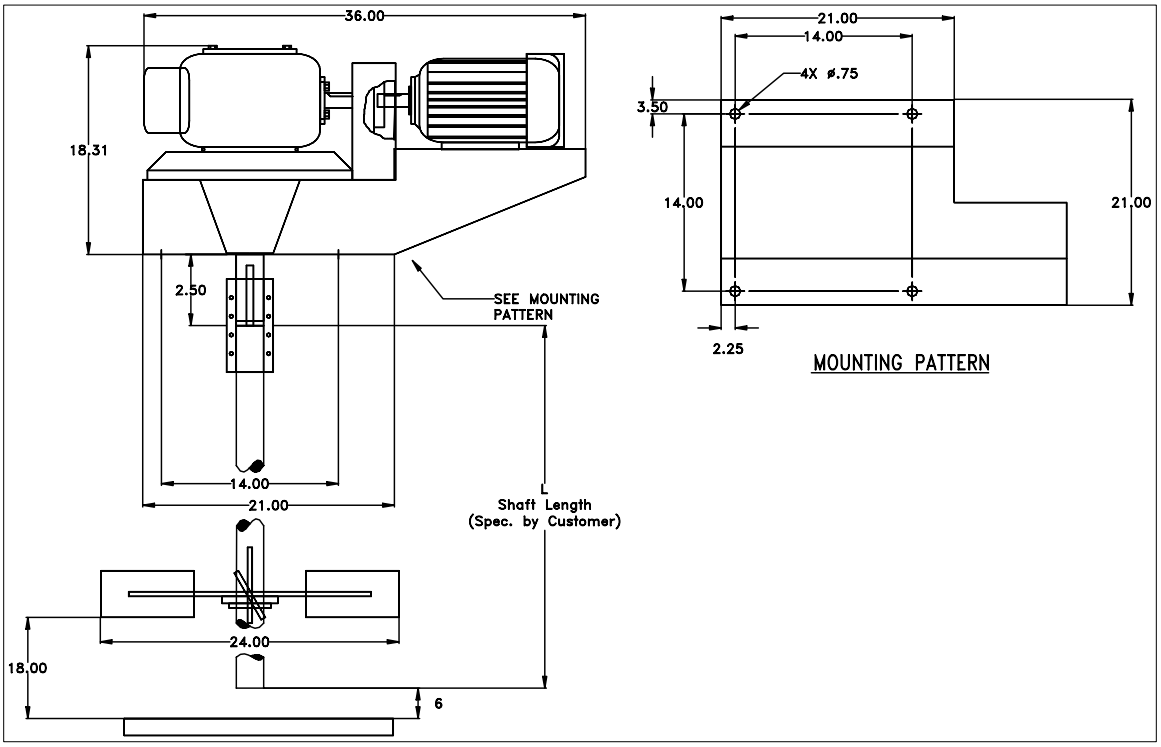


FIGURE2.2: DIMENSIONAL DRAWING MA-3

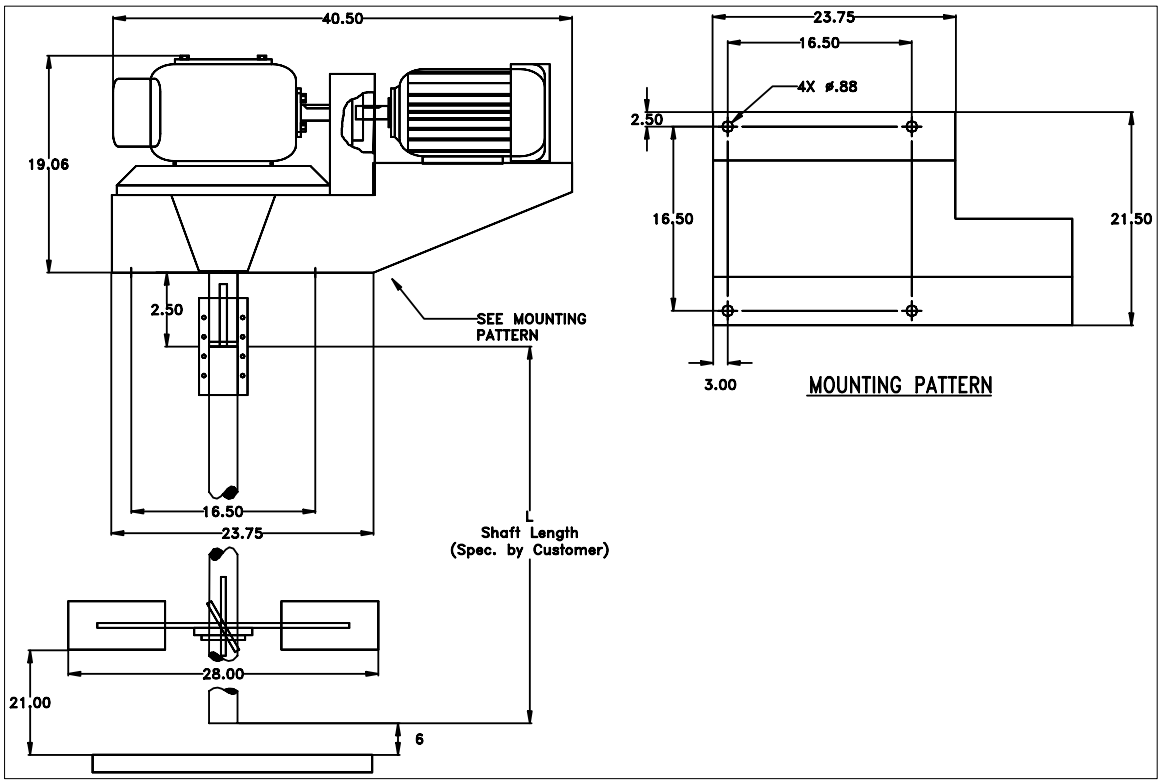


FIGURE 2.3: DIMENSIONAL DRAWING MA-5

Section 2 – Installation

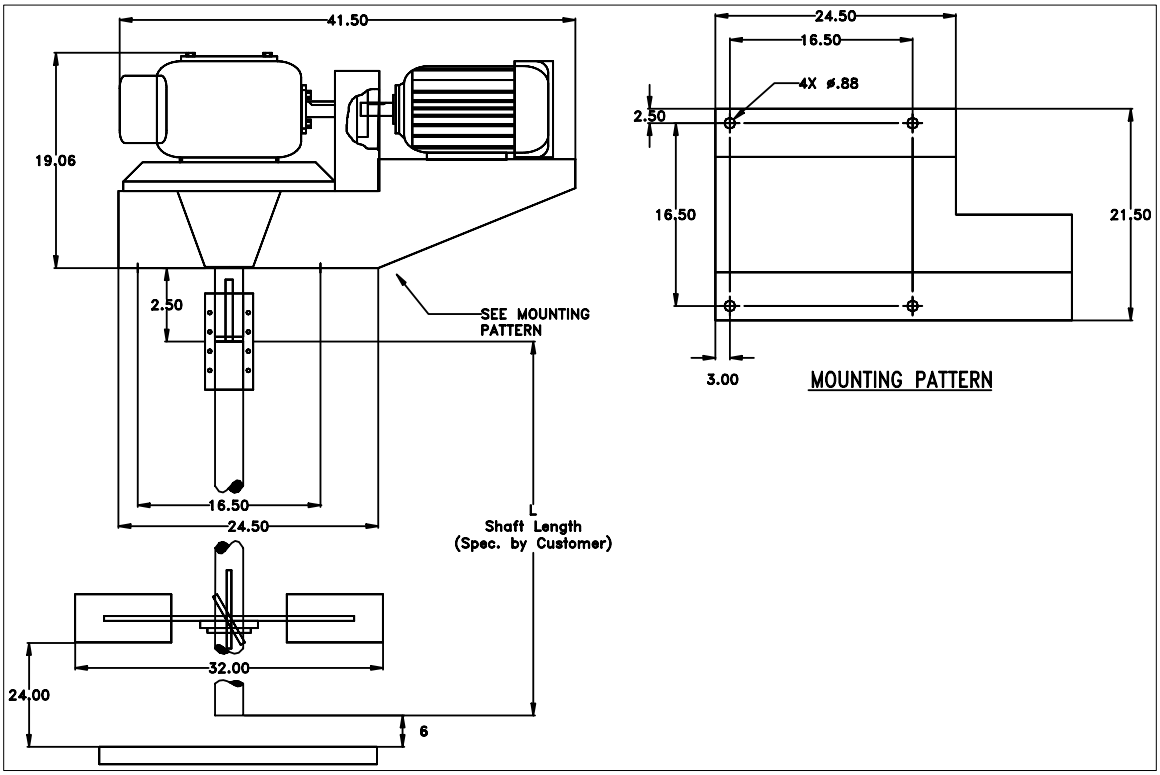


FIGURE 2.4: DIMENSIONAL DRAWING MA-7.5

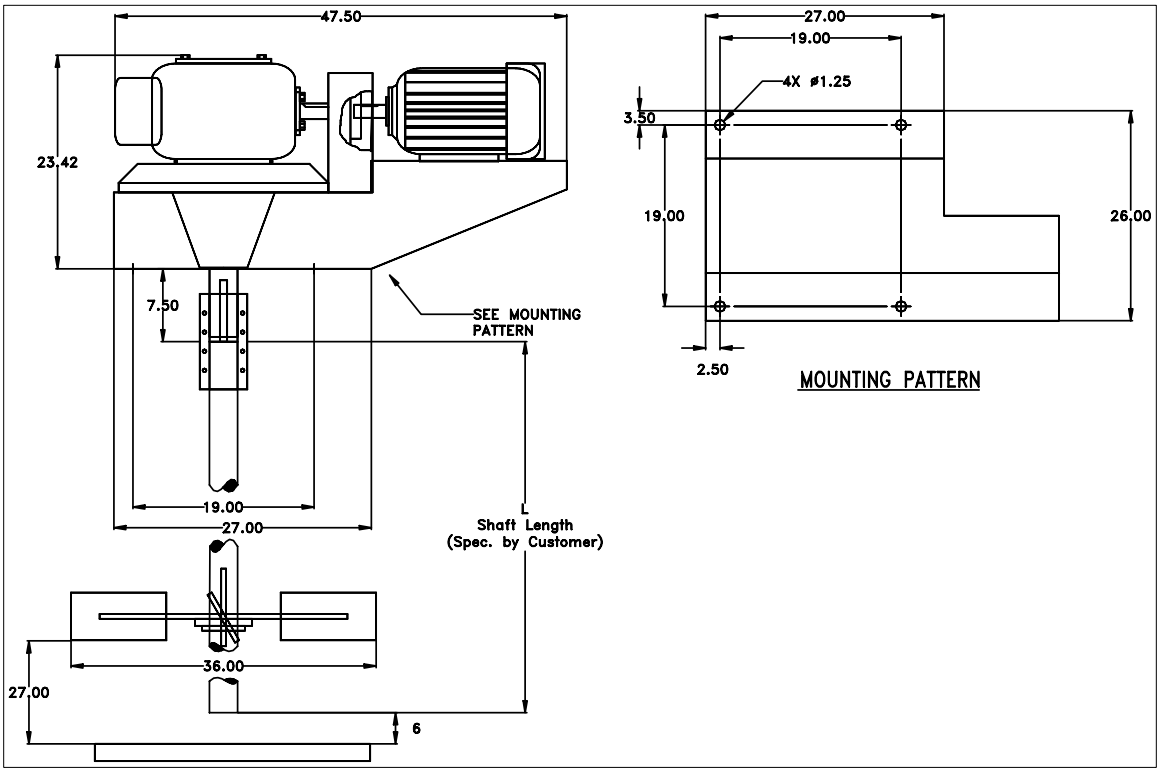


FIGURE 2.5: DIMENSIONAL DRAWING MA-10

Section 2 – Installation

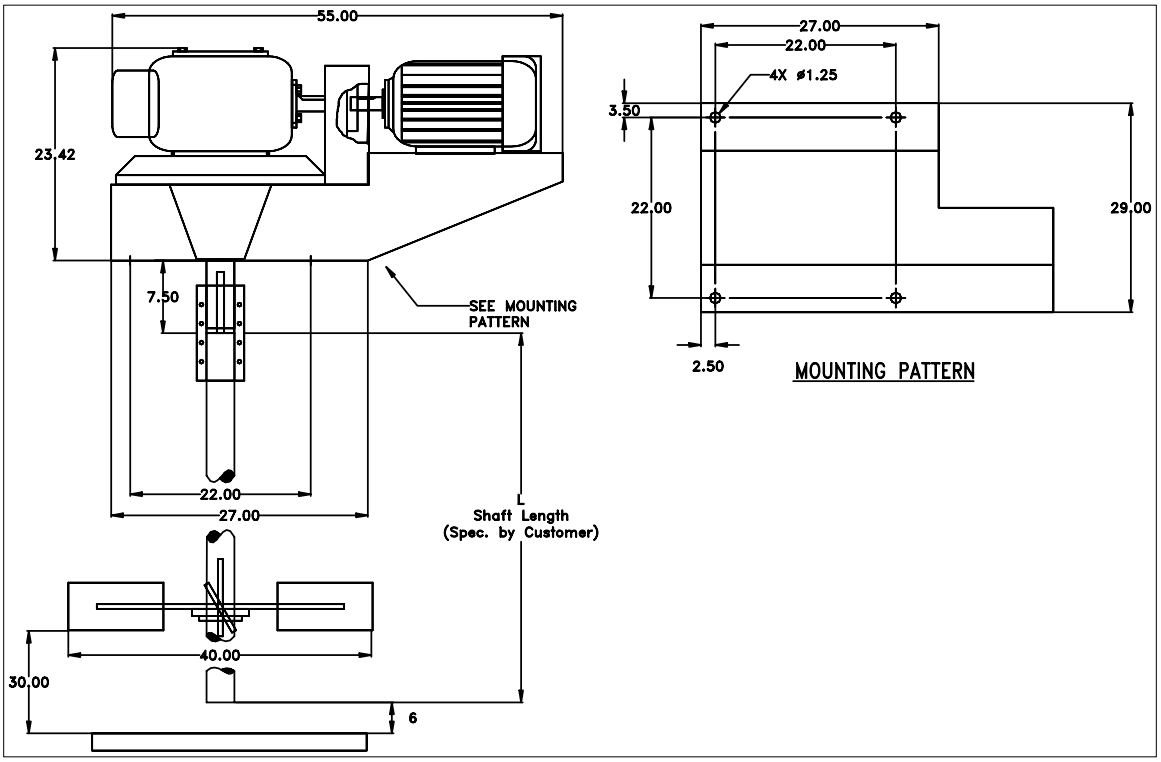


FIGURE 2.6: DIMENSIONAL DRAWING MA-15

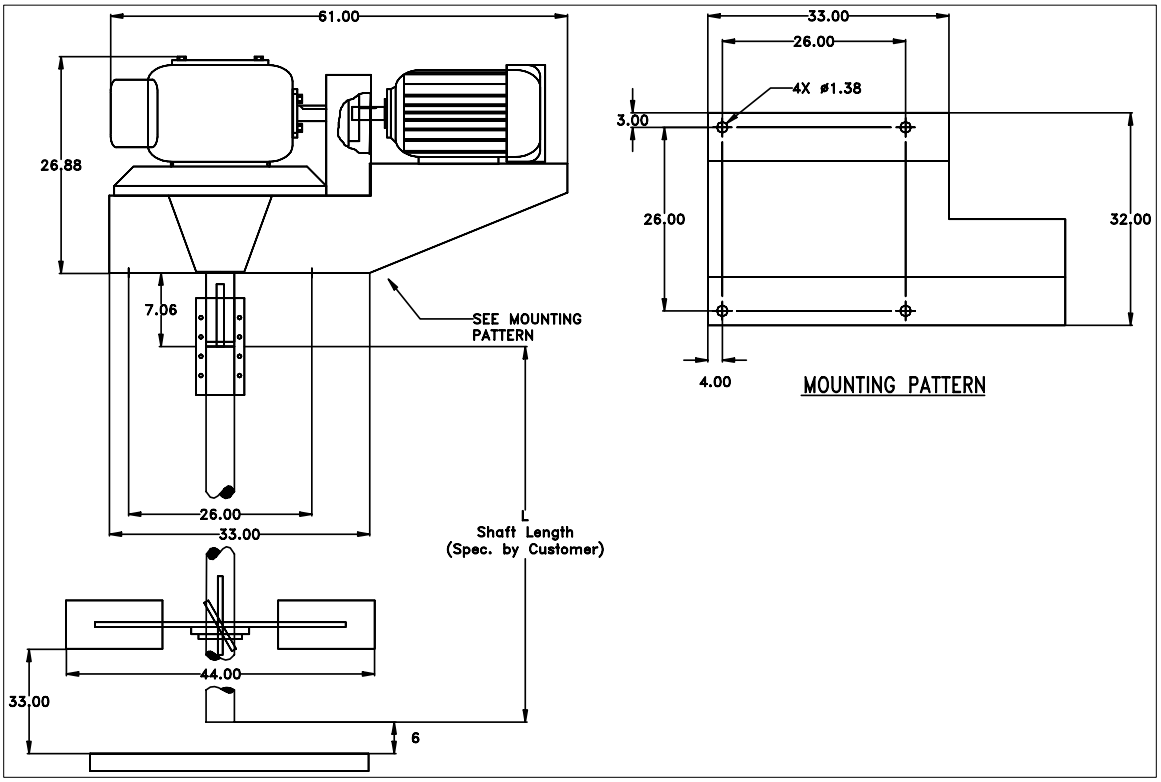


FIGURE 2.7: DIMENSIONAL DRAWING MA-20

Section 2 – Installation

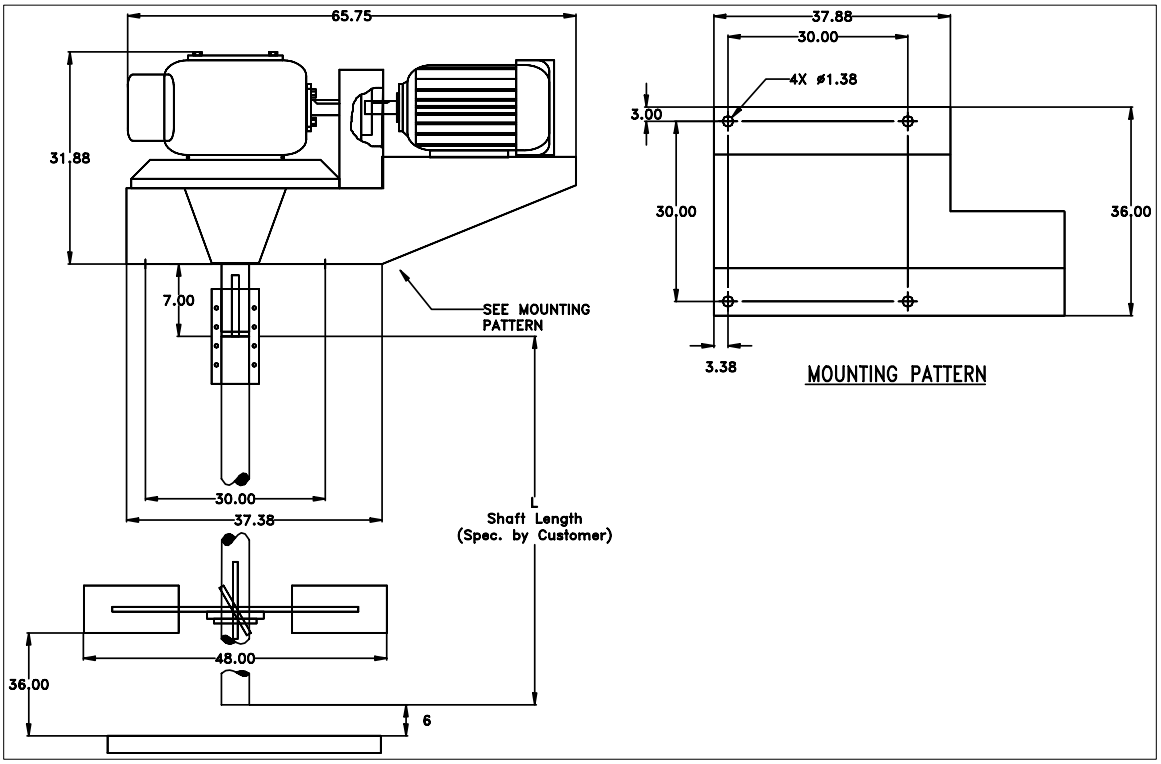


FIGURE 2.8: DIMENSIONAL DRAWING MA-25

Section 3 – Operation

A. STARTING THE AGITATOR

Once installation is complete and proper lubrication levels have been confirmed, the unit can be started by pressing the start button on the motor starter. (Note motor starters are not supplied with agitators unless ordered separately.) As is good practice with all rotating equipment, check for unusual noise or vibration upon start up.

B. OPERATION

Like centrifugal pumps, agitators will consume more horsepower as mud weight increases. No adjustment of the agitator is required to compensate for changes in drilling conditions. During drilling operations, mud agitators are kept running at all times.

C. SAFETY

The gearbox on the Desert Fox Agitator has a 30:1 or 20:1 speed reduction ratio, which greatly increases the torque output at the impeller. Despite their relatively slow speed a mud agitator can be dangerous. Any objects that might fall into or be placed in the mud tanks run the risk of being caught by and wrapped up by the agitator, typical examples include hoses, mud sample buckets, ropes, etc. In the event of a rope or hose being caught by the agitator, the agitator should be shut down immediately.

NO ATTEMPT SHOULD BE MADE TO STOP A ROPE OR HOSE ONCE IT HAS BEEN WRAPPED AROUND A MOVING AGITATOR!

Before entering a mud tank for any reason, the mud agitators should be locked out and tagged out

Section 4 – Maintenance

A. MAINTENANCE

The only regularly scheduled maintenance needed for the Desert Fox Agitator is a weekly check of oil level and oil changes every three months.

B. CHECKING OIL LEVEL

All Desert Fox Agitators have vented fill port on top of the gearbox and a pipe plug located on the side of the gearbox. To check oil level, remove the “oil level” plug on the side of the gearbox and determine the oil level in the gearbox. Oil level should be no more than ½” below [12 mm below] below the oil level plug on the side of the gearbox. Check every week and add oil only as needed by removing both the vented fill plug and the oil level plug. Add oil until it overflows out the side of the gearbox where the oil level plug was removed. Replace plug after filling or checking oil level.

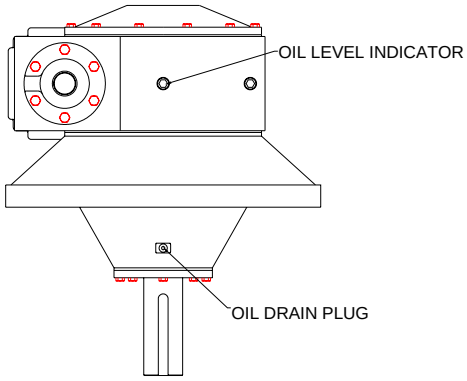


FIGURE 4.1: OIL DRAIN AND FILL INDICATOR

C. OIL CAPACITY

Figure 4.1 below lists oil capacity for all models of the Desert Fox Agitator:

TABLE 4.1 – OIL CAPACITY

Model No.	Quarts	Liters
MA3	6	6
MA5	9	9
MA 7 ½	9	9
MA 10	20	19
MA 15	20	19
MA 20	32	30
MA 25	51	48

D. PERIODIC OIL CHANGES

The precision made gears in the speed reducer require periodic oil changes to remove debris and ensure trouble free operation.

EVERY THREE (3) MONTHS THE OIL SHOULD BE DRAINED FROM THE GEARBOX WHILE WARM AND REPLACED WITH THE PROPER QUANTITY OF AN APPROVED LUBRICANT. SEE CHART BELOW.

Section 4 – Maintenance

E. APPROVED LUBRICANTS

Note some gear lubricants contain E.P. additives that can be corrosive to the bronze in the gear. Avoid lubricants that are compounded with sulfur and/or chlorine. For temperature ranges not shown contact the factory.

TABLE 4.2
RECOMMENDED LUBRICANTS

	ISO VG 460	ISO VG 680
Manufacturer	**Ambient Temperature 15F to 60F [-10C to 15C]**	**Ambient Temperature 50F to 152F [10C to 50C]**
CHEVRON	Cylinder Oil WISO460	Cylinder Oil WISO680
MOBIL	Super Cylinder Oil 600W	Mobil Extra Hecla Cylinder Oil
EXXON	Cylesstic TK-460	Cylesstic TK-680
SHELL	Valvata Oil J460	Valvata Oil J680
TEXACO	Meropa 460	Meropa 680

Section 5 – Troubleshooting

ITEM	PROBLEM	SOLUTION
1	**MOTOR WILL NOT START**	Check the overload relays in the motor starter. Reset the overload relays and attempt to restart. If problem persists, a qualified electrician should "ohm out" the motor to see if there is a short in the windings. Replace motor if necessary.
2	**AERATING THE SUCTION TANK**	Adjusting the height of the impellers in the suction tank is very important to prevent the agitators from introducing air that can cause mud pump problems. If air entrainment starts causing problems with the mud pump while drilling with acceptable mud volume, impeller height should be lowered at the next opportunity to minimize aeration. The problem can usually be solved temporarily, by increasing mud volume to prevent aeration.
3	**RUNNING HOT**	Hot is 200^0F gearbox housing temperature. Worm gearboxes run hot during their initial break in (Approximately 200 hrs). Additional causes of high heat are high impeller loads, worn out gear oil, and bearing failure.
4	**LOUD NOISES**	Loud noises are usually caused by a bearing failure. High frequency noises are indicative of a high speed shaft bearing being failed (motor or gearbox). Low frequency noises are symptomatic of a low speed shaft failure.

Section 6 – Parts Lists

A. ORDERING PARTS

Replacement parts for Desert Fox Mud Agitators can be ordered from Process Solutions International. The following part lists give both a part number and a catalog number, either of which may be used to place orders.

PSI maintains an inventory of stock replacement parts for immediate shipment.

B. FIELD SERVICE

PSI has experienced field service personnel available. Contact psi or its agents should you need a factory-trained representative to visit your location.

Process Solutions
Tomball, Texas
Toll Free: 866-866-4774
Email: psimax2000@msn.com
Website:
http://www.psimax2000.com

C. GETTING HELP

To order parts, schedule field services, or get answers to questions contact:

D. FLEXIBLE COUPLING

The flexible coupling connecting the motor to the gearbox will need periodic replacement. The table below lists the recommended flexible coupling for Desert Fox agitators. Maximum coupling misalignment is 1^0 angular and 0.031" parallel.

TABLE 6.1
MOTOR COUPLING SIZES

Model No.	Flex Coupling Part No.	Description
MA3	18A	6S 1-1/8"x1-1/4"
MA5	18B	6S 1-1/8" x 1-1/4"
MA 7.5	18C	6S 1-1/4" x 1-3/8"
MA 10	18D	6S 1-3/8" x 1-5/8"
MA 15	18E	8S 1-5/8" x 1-7/8"
MA 20	18F	8S 1-7/8" x 1-7/8"
MA 25	18G	9S 1-7/8" x2-1/4"

E. RIGID COUPLING

A rigid coupling is used to connect the gearbox output shaft to the impeller shaft. PSI uses the Crestex style rigid coupling on its agitators to connect the output shaft of the gearbox to the impeller shaft. See figure 6.1 to identify the style rig coupling your mud agitator uses.

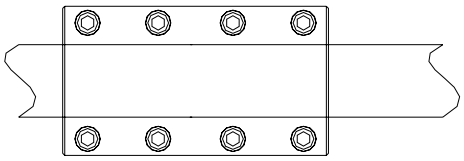


Fig 6.1: Crestex Style Rigid Coupling

TABLE 6.2
CRESTEX SHAFT COUPLING SIZES

Model No.	Rigid Coupling Part No.	Description (Shaft Dia)
MA3	18H	1 11/16
MA5	18I	2 3/16
MA 7 ½	18I	2 3/16
MA 10	18J	2 15/16
MA 15	18J	2 15/16
MA 20	18K	3 7/16
MA 25	18L	3 15/16

Section 6 – Parts Lists

F. OIL SEALS

Seals are used on both the input and output shafts in the gearbox to retain the lubricating oil. The life of the input oil seal is greatly improved by proper alignment of the motor and gearbox. Repeated failure of output seals may be indicative of the need for bottom stabilizer bushing. The table below lists the part numbers for all models of the Desert Fox Agitator. The model can be identified from the tag on the agitator.

TABLE 6.3
OIL SEALS

Model Number	Input Seal Part Number	Output Seal Part Number
MA3	17D	17I
MA5	17E	17J
MA 7 ½	17E	17J
MA 10SD	-	-
MA 10HD	17F	17K
MA 15HD	17F	17K
MA 20	17G	17L
MA 25	17H	17M

G. Bearings

The Desert Fox uses two taper roller bearings on the input shaft ant two taper roller bearings on the output shaft for all models. The 20 and 25 hp models also have a spherical roller bearing on the input shaft. All models have spherical roller bearings in the drop bearing at the

output shaft for high side load capacity. Bearing life is greatly increased through frequent oil changes or greasing the bearings. Input bearing life is also increased greatly through correct drive motor to gearbox shaft alignment. Reference table 6.4 for the bearings for your agitator requires.

H. Recommended Spare Parts

Psi recommends a full set of input/output bearings and seals. A spare electric motor and input coupling should be maintained as well**.**

Table 6.4: Agitator Bearing PN's

Model	Input (cup)	Input (cone)	Input Sph Roller	Output (cup), upper	Output (cone), upper	Output (cup), lower	Output (cone), lower	Drop Brg
MM03	20A	20B	NA	20C	20D	20E	20F	20G
MM05 & MM07	20H	20I	NA	20J	20K	20L	20M	20N
MM10SD	20O	20P	NA	20Q	20R	20S	20T	20U
MM10HD, MM15SD, MM15HD	20V	20W	NA	20X	20Y	20Z	20AA	20AB
MM20	20AC	20AD	20AE	20AF	20AG	20AH	20AI	20AJ
MM25	20AK	20AL	20AM	20AN	20A0	20AP	20AQ	20AR

Section 6 – Parts Lists

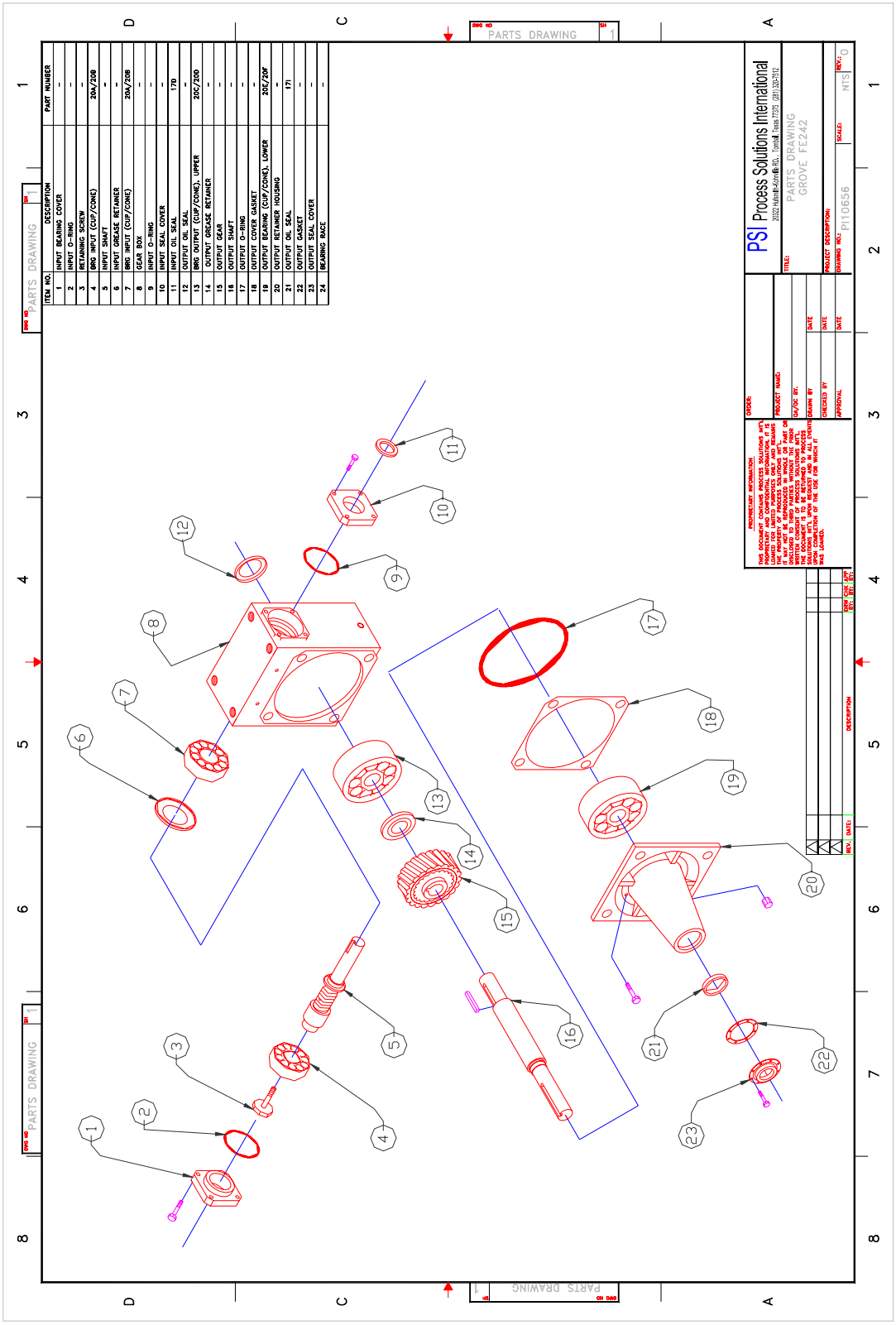
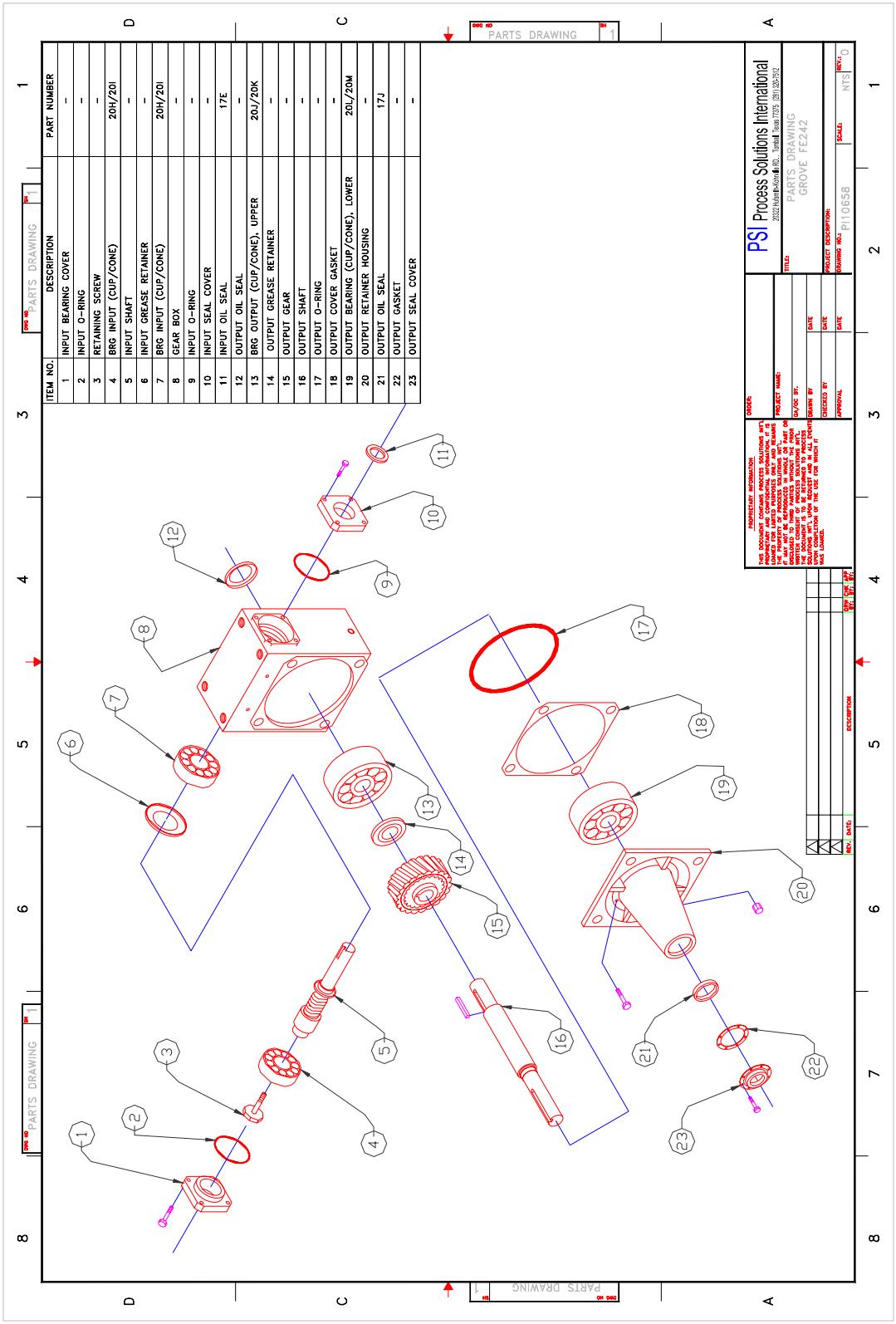


FIG 6.5: DF-MA3

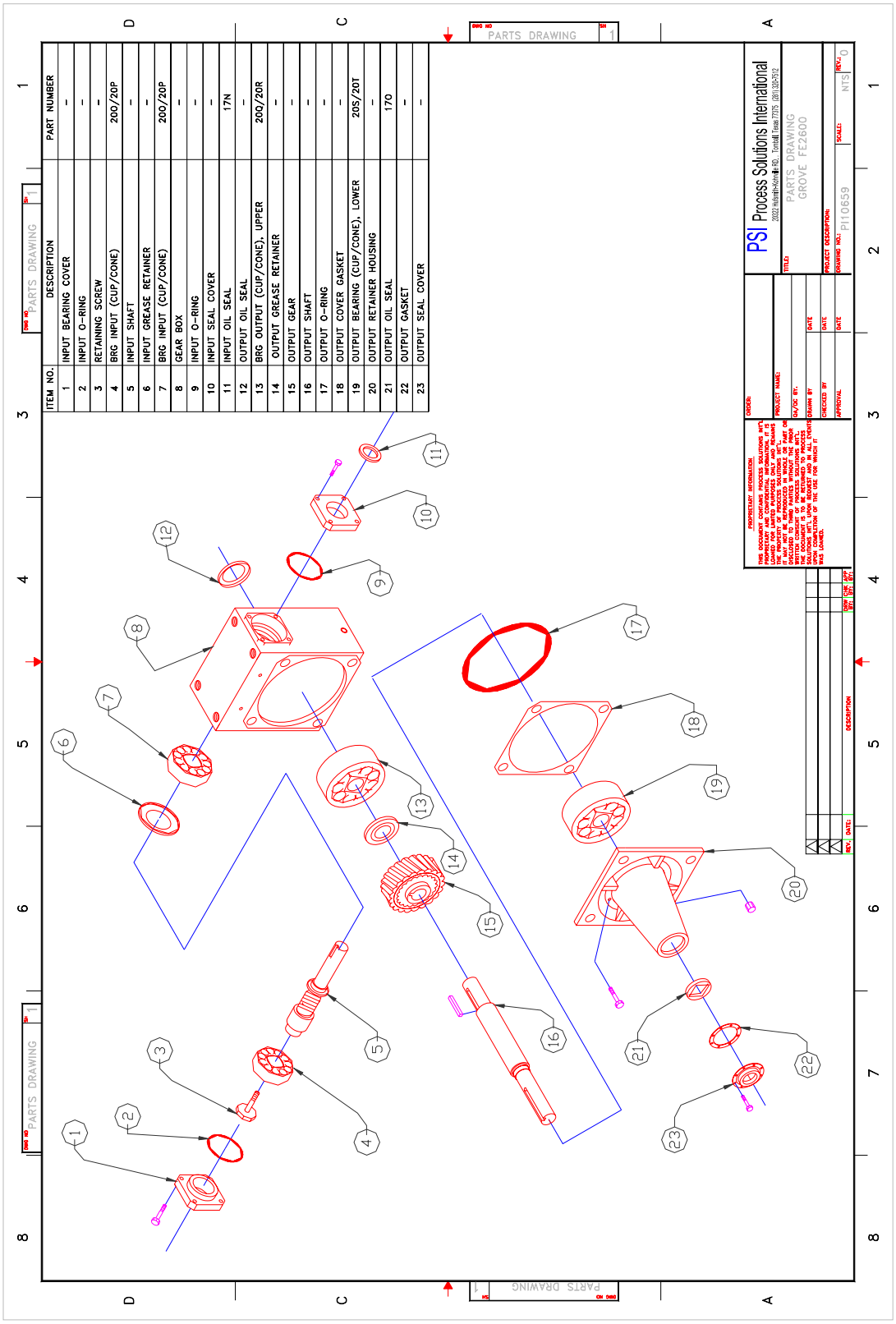
Section 6 – Parts Lists



ITEM NO.	DESCRIPTION	PART NUMBER
1	INPUT BEARING COVER	-
2	INPUT O-RING	-
3	RETAINING SCREW	-
4	BRG INPUT (CUP/CONE)	20H/20I
5	INPUT SHAFT	-
6	INPUT GREASE RETAINER	-
7	BRG INPUT (CUP/CONE)	20H/20I
8	GEAR BOX	-
9	INPUT O-RING	-
10	INPUT SEAL COVER	-
11	INPUT OIL SEAL	17E
12	OUTPUT OIL SEAL	-
13	BRG OUTPUT (CUP/CONE), UPPER	20J/20K
14	OUTPUT GREASE RETAINER	-
15	OUTPUT GEAR	-
16	OUTPUT SHAFT	-
17	OUTPUT O-RING	-
18	OUTPUT COVER GASKET	-
19	OUTPUT BEARING (CUP/CONE), LOWER	20L/20M
20	OUTPUT RETAINER HOUSING	-
21	OUTPUT OIL SEAL	17J
22	OUTPUT GASKET	-
23	OUTPUT SEAL COVER	-

FIG 6.6: DF-MA5, MA7.5

Section 6 – Parts Lists



ITEM NO.	DESCRIPTION	PART NUMBER
1	INPUT BEARING COVER	–
2	INPUT O-RING	–
3	RETAINING SCREW	–
4	BRG INPUT (CUP/CONE)	200/20P
5	INPUT SHAFT	–
6	INPUT GREASE RETAINER	–
7	BRG INPUT (CUP/CONE)	200/20P
8	GEAR BOX	–
9	INPUT O-RING	–
10	INPUT SEAL COVER	–
11	INPUT OIL SEAL	17N
12	OUTPUT OIL SEAL	–
13	BRG OUTPUT (CUP/CONE), UPPER	200/20R
14	OUTPUT GREASE RETAINER	–
15	OUTPUT GEAR	–
16	OUTPUT SHAFT	–
17	OUTPUT O-RING	–
18	OUTPUT COVER GASKET	–
19	OUTPUT BEARING (CUP/CONE), LOWER	205/20T
20	OUTPUT RETAINER HOUSING	–
21	OUTPUT OIL SEAL	17O
22	OUTPUT GASKET	–
23	OUTPUT SEAL COVER	–

FIG 6.7: DF-MA10SD

Section 6 – Parts Lists

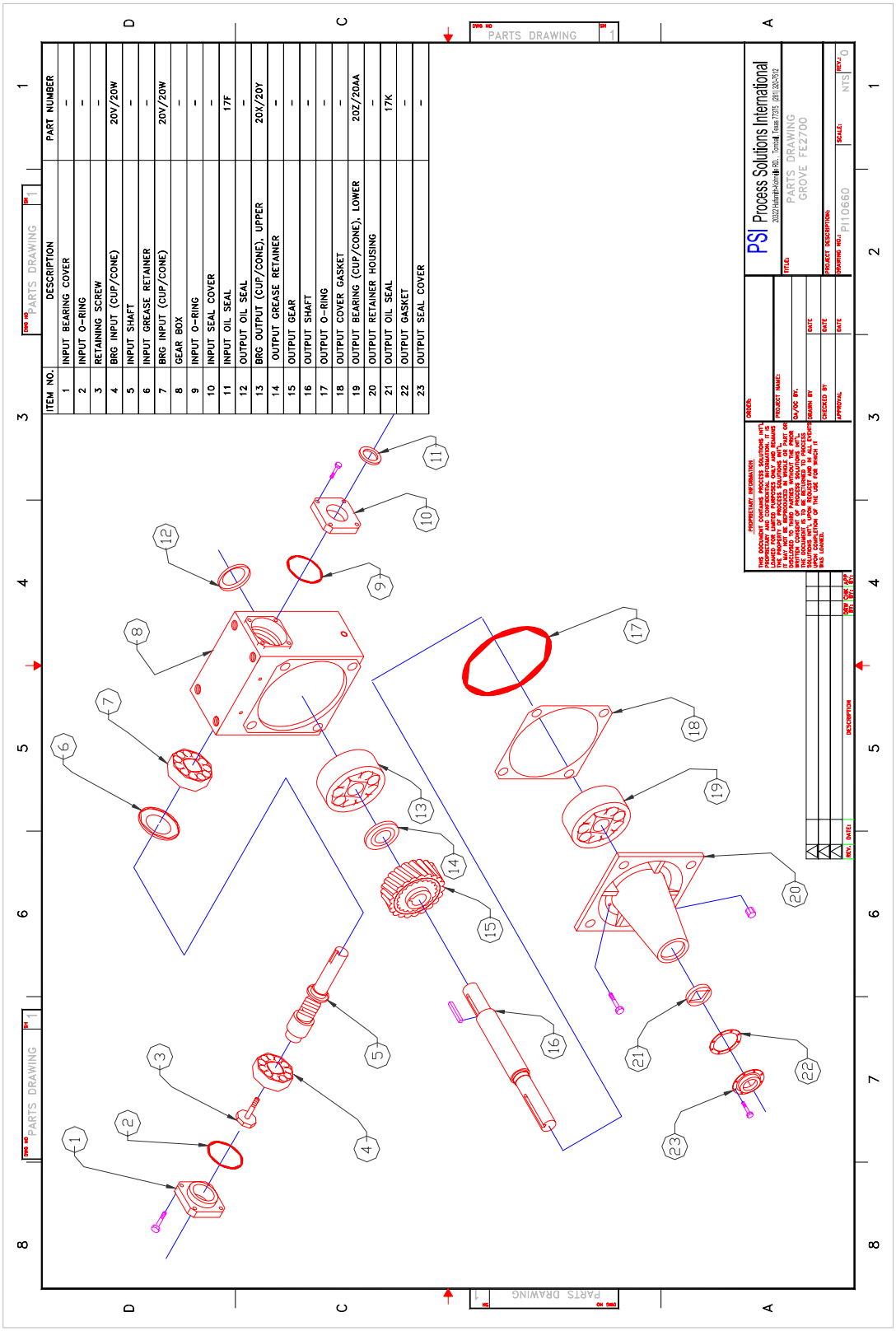


FIG 6.8: DF-MA10HD,MA15

Section 6 – Parts Lists

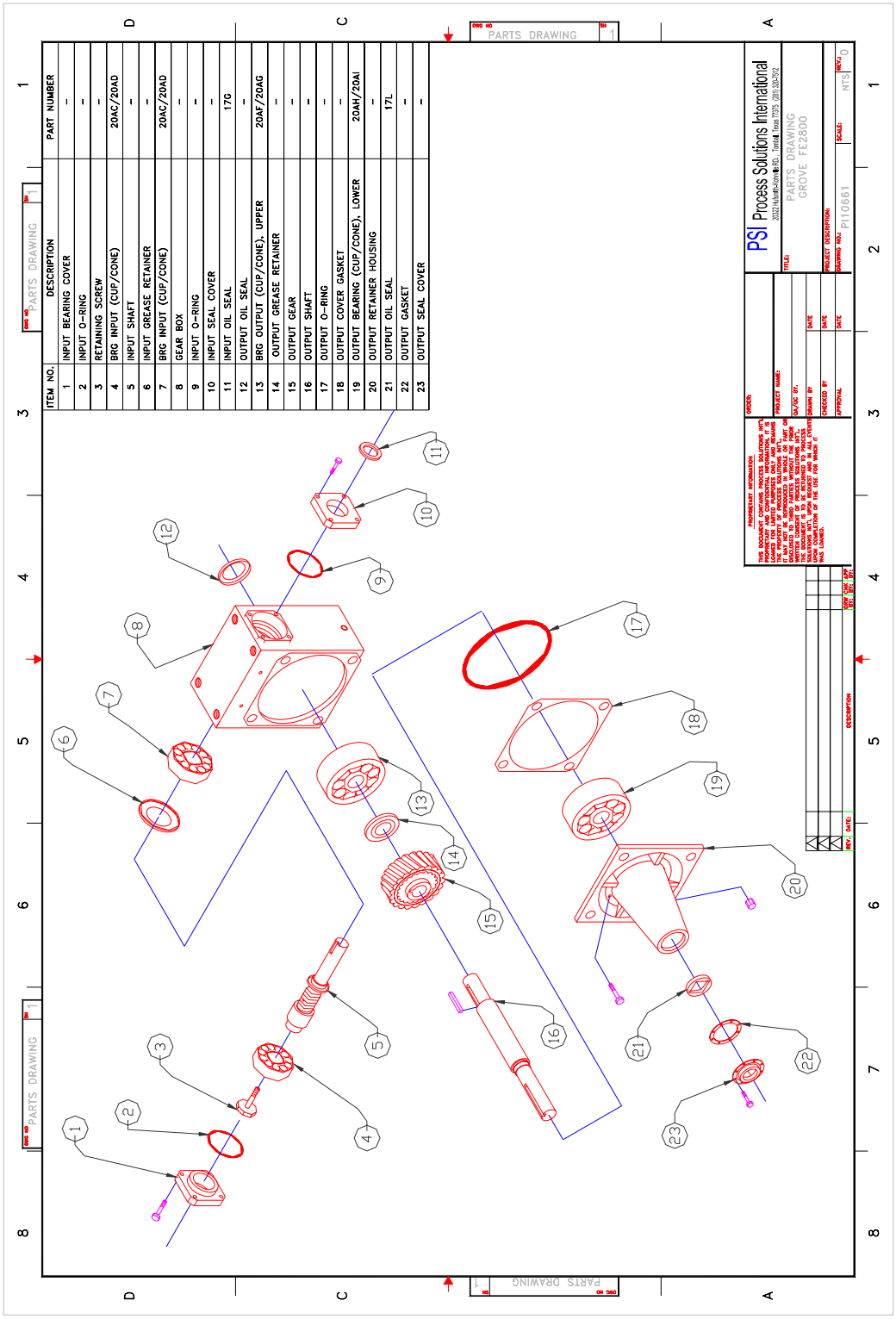
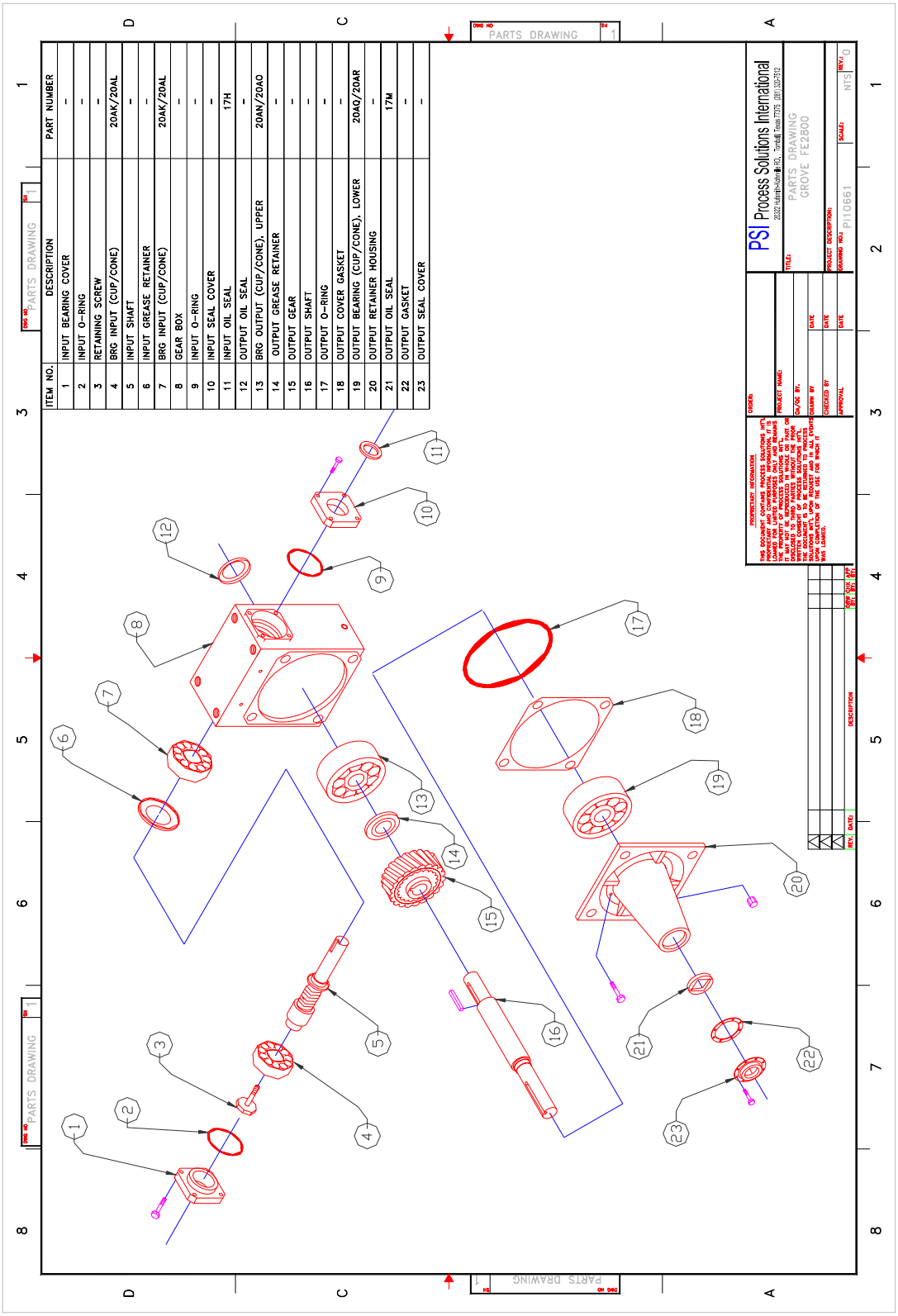


FIG 6.9: DF-MA20

Section 6 – Parts Lists



ITEM NO.	DESCRIPTION	PART NUMBER
1	INPUT BEARING COVER	-
2	INPUT O-RING	-
3	RETAINING SCREW	-
4	BRG INPUT (CUP/CONE)	20AK/20AL
5	INPUT SHAFT	-
6	INPUT GREASE RETAINER	-
7	BRG INPUT (CUP/CONE)	20AK/20AL
8	GEAR BOX	-
9	INPUT O-RING	-
10	INPUT SEAL COVER	-
11	INPUT OIL SEAL	17H
12	OUTPUT OIL SEAL	-
13	BRG OUTPUT (CUP/CONE), UPPER	20AN/20AO
14	OUTPUT GREASE RETAINER	-
15	OUTPUT GEAR	-
16	OUTPUT SHAFT	-
17	OUTPUT O-RING	-
18	OUTPUT COVER GASKET	-
19	OUTPUT BEARING (CUP/CONE), LOWER	20AQ/20AR
20	OUTPUT RETAINER HOUSING	-
21	OUTPUT OIL SEAL	17M
22	OUTPUT GASKET	-
23	OUTPUT SEAL COVER	-

FIG 6.10: DF-MA25HD

PROCESS SOLUTIONS INTERNATIONAL
INSTALLATION, OPERATION, & MAINTENANCE MANUAL

MAX 2000 VERTICAL MUD AGITATORS

Process Solutions International
5119 Hiltonview Rd
Houston, TX 77079
Toll Free: 1-866-866-4PSI
Website: psimax2000.com

DOC. NO. M11452

Safety First
Precautions and General Safety Rules

This manual contains important information concerning installation, operation, and proper maintenance of your Process Solutions Mud Agitator. To prevent injury to personnel or equipment damage, this manual should be read by those responsible for the installation and operation of the MAX 2000 Mud Agitators. In addition, the safety precautions below should be followed at all times.

- **Lift the agitator only at lift points** detailed in this manual. Use properly rated slings capable of handling the equipment weight.

- The structure on which the agitator is to be installed must be capable of supporting both the static weight and dynamic loads listed in this manual.

- **TURN OFF. LOCK OUT, and TAG OUT** the electrical power supply to the agitator before working on the agitator.

- Inspect the unit regularly, and replace damaged or worn components only with parts supplied by the original equipment manufacturer.

- The gearbox greatly increases the torque output at the impeller. Any objects that might fall into or be placed in the mud tanks run the risk of being caught by and wrapped up by the agitator. **No attempt should be made to stop a rope or hose or any other object once it has been wrapped around a moving agitator.**

- Before entering a mud tank for any reason, the mud agitators should be locked out and tagged out.

Table of Contents

Introduction

Introduction

A. ROLE OF MUD AGITATORS

Agitators or “mud mixers” serve an important role in the surface treatment of drilling fluids. A pitched blade impeller mixer generates both axial and radial flow in mud tanks and will lower mud costs and improve mud properties.

Unlike centrifugal pumps or mud-guns, impeller mixers are relatively low shear and low energy devices making them easy to maintain and inexpensive to operate. Using low shear mixers to suspend and mix mud additives minimizes particle size degradation and polymer shearing.

Properly sized agitators serve three purposes. One, impeller mixers ensure that mud additives are homogeneously mixed preventing spot over treatment of chemicals or dilution water or weighting agents. Two, agitators keep the active mud system moving when the mud pumps are disengaged and will prevent the pits from “gelling.” Three, when drilling with weighted mud, properly selected agitators will keep the weighting agents in suspension and minimize any tendencies for solids to settle in corners or dead spots.

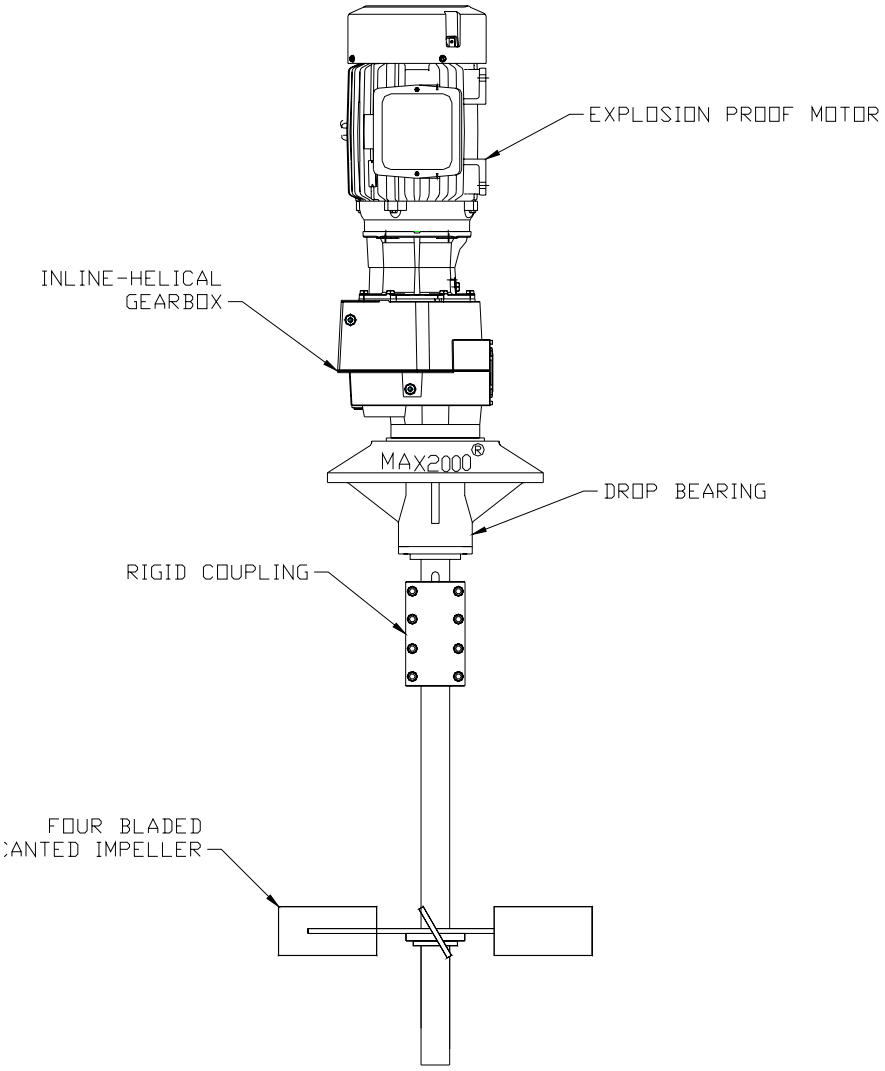


FIGURE 1.1: Major Components

Introduction

B. FEATURES

The design features of the MAX 2000 Agitator that minimize maintenance and maximize reliability include:

- Rugged cast iron gearbox housing.
- High efficiency helical gearing provides low operating temperatures and noise.
- Grease lubricated self aligning spherical roller bearing in the drop bearing.
- Redundant seals at the output shaft.

C. MOTORS

Explosion proof motors are designed to withstand pressure washing and exposure to corrosive fluids without bearing contamination. Motors are available with NEMA C-face input. The NEMA C-face motors bolt directly to the gearbox input adapter flange.

D. SHAFT COUPLING

A rigid coupling is used to attach the impeller shaft to the gearbox output. Unlike the rigid couplings used on other agitators, these couplings can be quickly disassembled with hand tools even after long-term service.

E. IMPELLER

Optimal suspension and mixing results from the axial and radial flow patterns created by impellers. Process Solutions standard canted impeller employs four 60^{o} canted blades. The impeller is fixed to the shaft with a conventional QD bushing allowing for adjustment impeller position relative to the tank bottom. Impellers are normally placed ¾ of the impeller diameter off the tank bottom. For example a 36” impeller will be place 27” off the tank bottom.

PSI also offers a line of high efficiency hydrofoils. This impeller is ideal for deep tanks with large cross section. This impeller usually allows for using a lower horsepower mixer or can eliminate the need for multiple mixers. The Max Flow hydrofoil is an axial flow mixer that does not shear the mud. It creates a homogenous mixer by the bulk fluid velocity the impeller generates.

F. MODEL IDENTIFICATION

Part Number	Description for Models with C-face Motors
M2A-05	Mud agitator assembly with inline helical gearbox and grease lubricated drop bearing support for the output shaft. The gearbox is driven by a vertically oriented NEMA C-face explosion proof motor.
M2A-07	
M2A-10	
M2A-15	
M2A-20	
M2A-25	

Table 1.1 : Model Numbers

Section 2- Installation

A. LOCATING AGITATORS

A canted blade impeller creates a combination of radial and axial flow that provides for uniform suspension and mixing in circular or square areas. A rectangular tank with a length to width ratio of greater than 1.5 should be "divided" into "sizing areas" that are square (or close to square areas) with an agitator located at the center of each. For example, a 16-foot by 8-foot suction tank would typically be handled by two agitators with each agitator sized as if it were responsible for mixing an 8-foot by 8-foot area.

B. DIMENSIONS & WEIGHT

Outline dimensions and the bolt pattern for installing the MAX 2000 Series Agitator are found in the drawings below. The "Tank Depth" must be specified by the customer to properly size the agitator shaft, total assembly weight will vary with shaft length. *Note that certified drawings provided with the equipment will take precedence over any information in this manual.*

"Tank Depth" is obtained by measuring from the top of the structure (beams, channels, etc....) on which the agitator base will be supported to the bottom of the tank. Shaft length is typically sized to allow 6 inches of clearance from the bottom of the tank to the bottom the agitator shaft.

C. LIFTING THE AGITATOR

Lift the agitator by wrapping two sling around the motor input adaptor on the gearbox. Use properly rated slings capable of handling the weight of the equipment.

In most cases, the impeller will be installed after the agitator base has been lifted into the tank but before the base has been securely mounted.

If the agitator is lifted with the impeller shaft installed, make sure that the shaft coupling has been completely tightened and that the shaft is securely attached before lifting. It is good practice to remove the impeller shaft before removing an existing agitator.

Section 2- Installation

D. INSTALLATION

Typically, the shaft but not the impeller will be installed before lifting the unit into place. Some conditions, like limited headroom above the tank, may require that the shaft be installed after the unit has been lifted in place.

ANTI-SEIZE COMPOUND SHOULD BE APPLIED TO ALL THREADED FASTENERS.

Lift the unit as described in section C and place in position on the mud tank using blocks to provide at least 18 inches of clearance between the bottom of the shaft and tank bottom.

BEFORE REMOVING THE BLOCKS AND FASTENING THE BASE TO THE TANK STRUCTURE, THE IMPELLER MUST BE INSTALLED.

Using the QD bushing and the key that is attached to the impeller, **install the key and the QD bushing first**. Locate the key so that when the impeller is installed, the distance from the bottom of the impeller to the tank bottom is roughly 3/4 of the impeller diameter. For example, if the impeller diameter is 36", then the distance from the bottom of the canted blade to the tank bottom should be 27" when installation is complete.

DO NOT INSTALL IMPELLER UPSIDE DOWN; THE QD BUSHING MUST BE ON TOP OF THE IMPELLER.

Once the impeller has been installed, the blocks can be removed and the agitator should be secured to the mud tank using the mounting holes provided on the agitator base. Check impeller height and adjust if necessary.

E. ELECTRICAL

TURN OFF. LOCK OUT, and TAG OUT the electrical power supply to the agitator before working on the agitator or opening the motor starter or the motor junction box. A qualified electrician should make electrical connections inside the explosion proof junction box on the side of the motor. Care should be taken to make sure that voltage and frequency of the power supply match the motor nameplate voltage and frequency.

F. CHECK OIL LEVEL

Check oil level by viewing the sight glass. Oil should be visible to the midpoint of the sight glass, see figure 2.1. See Section 4 for oil capacity and a list of approved lubricants.

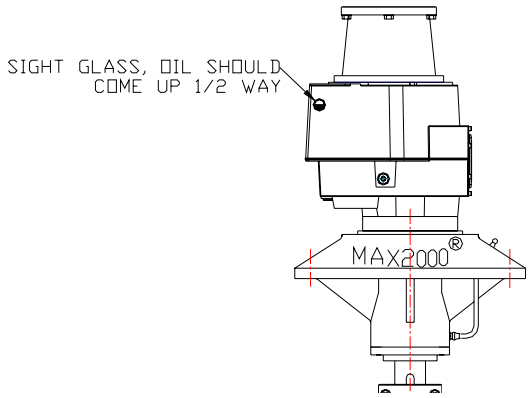


Figure 2.1: Checking Oil Level

G. CHECK MOTOR ROTATION

The proper impeller rotation for all MAX 2000 Agitators is **clockwise when viewed from above.** The electrical installation is not complete until the motor rotation has been checked. Reversing any two legs on three-phase power will reverse direction of rotation.

Section 2- Installation

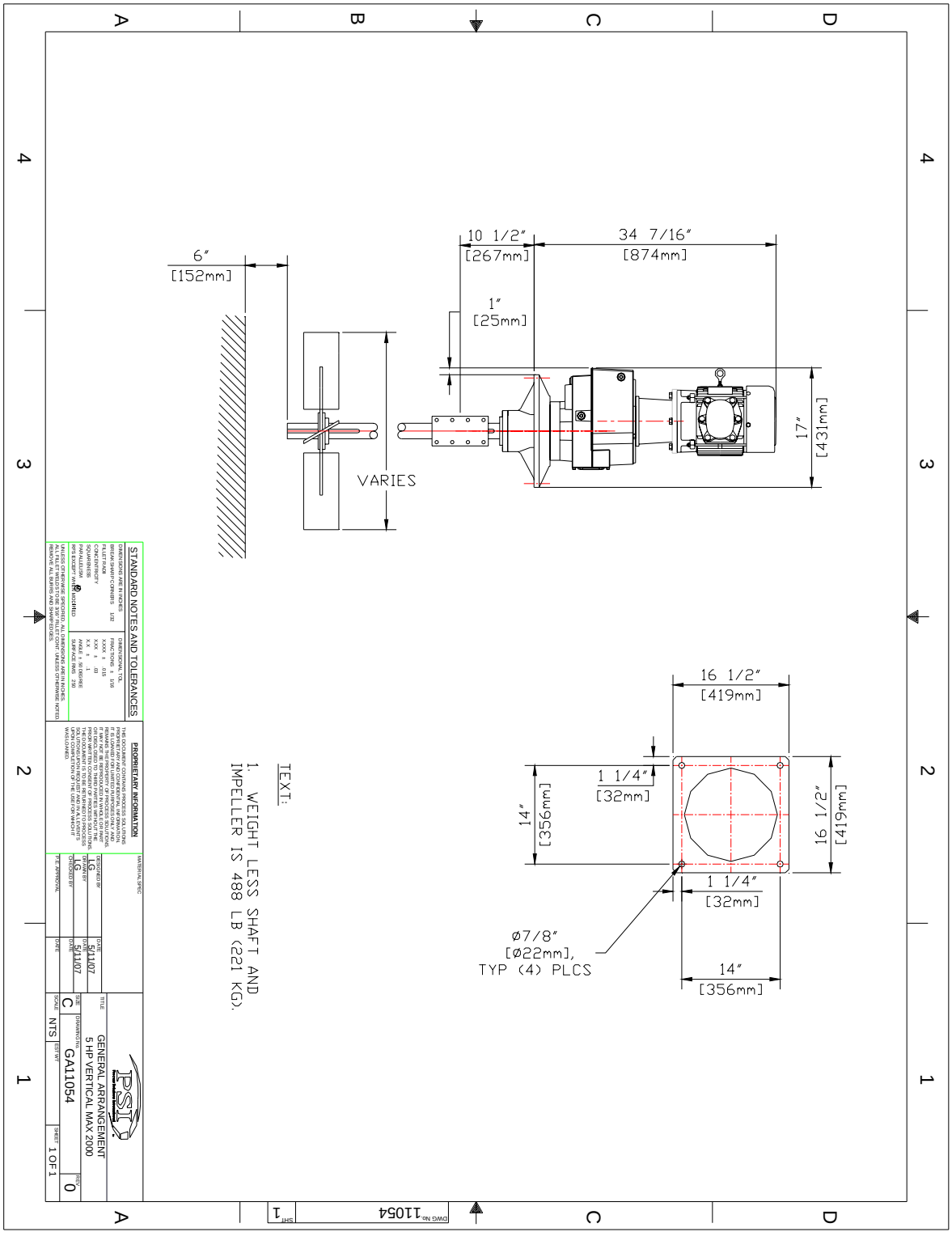


FIGURE 2.2: DIMENSIONAL DRAWING MAX-MA05V

Section 2- Installation

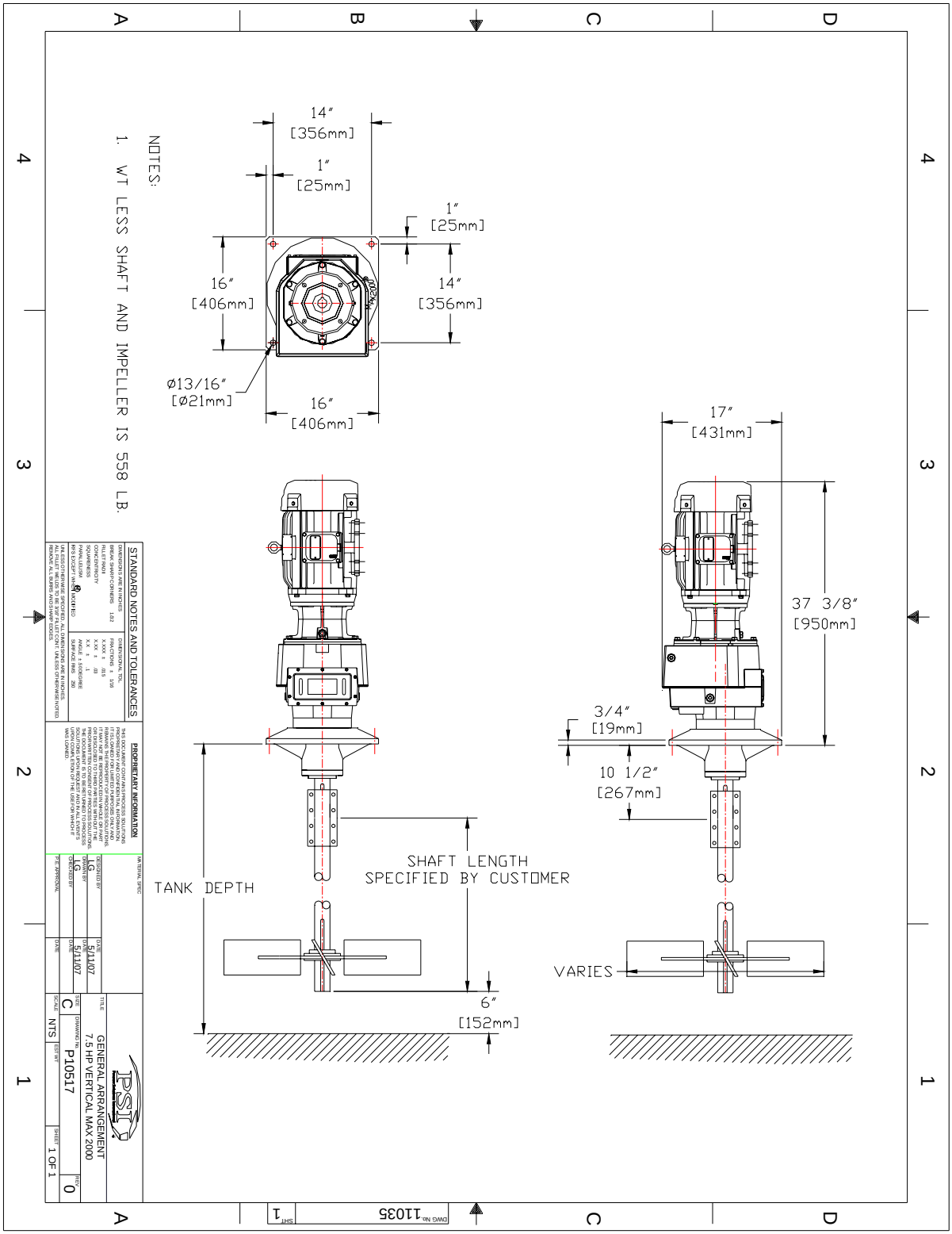


FIGURE 2.3: DIMENSIONAL DRAWING MAX-MA07V

Section 2- Installation

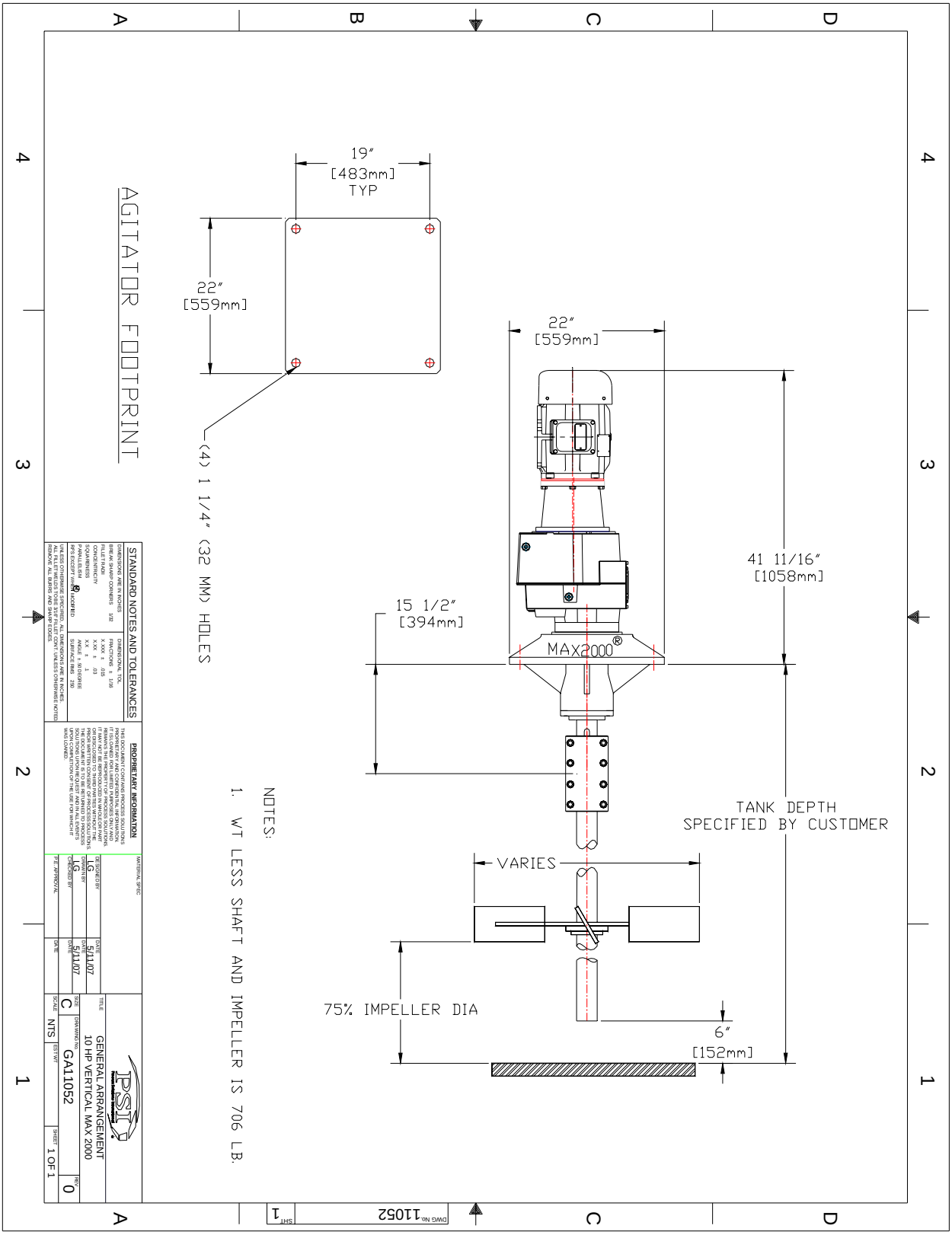


FIGURE 2.4: DIMENSIONAL DRAWING MAX-MA10V

Section 2- Installation

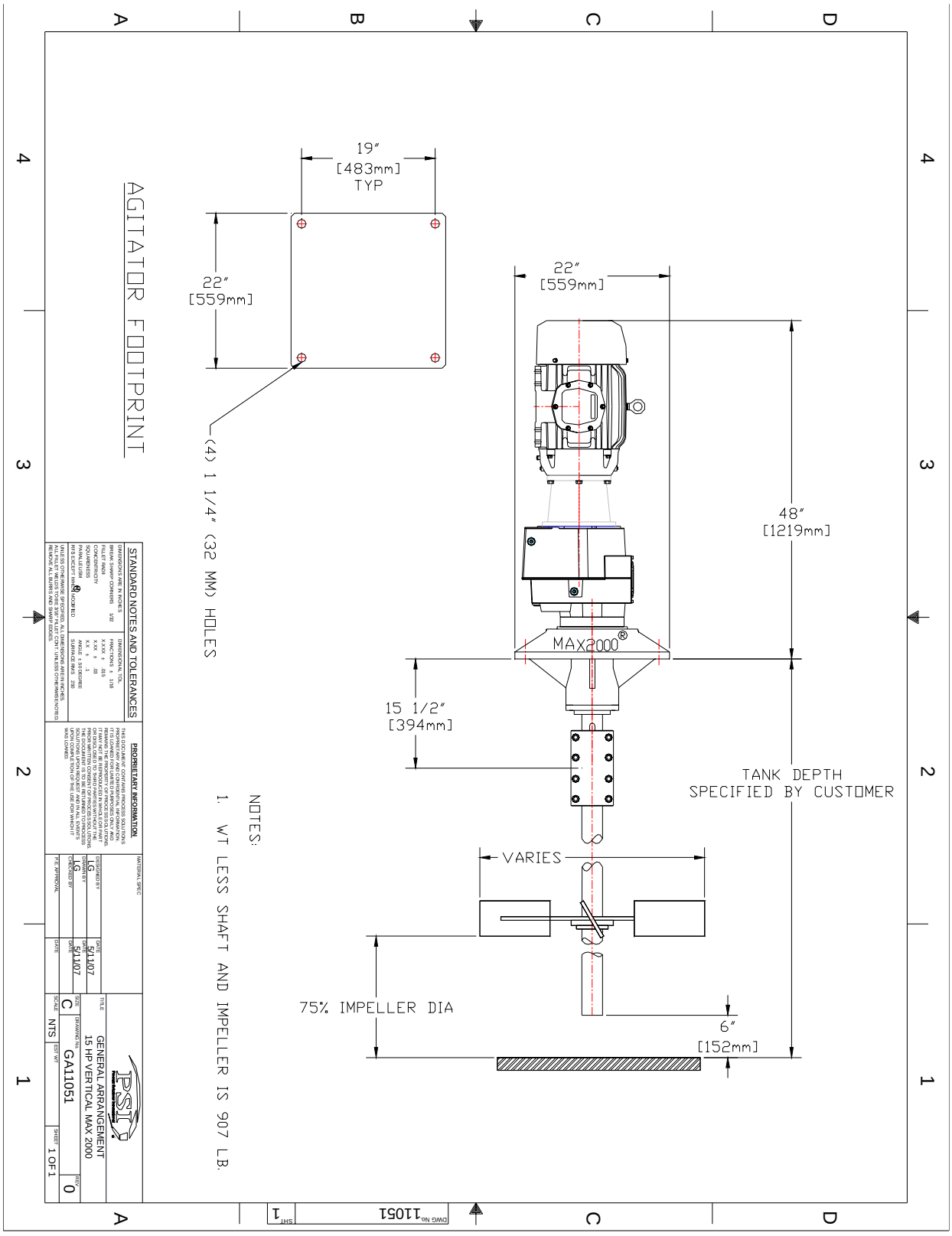


FIGURE 2.5: DIMENSIONAL DRAWING MAX-MA15V

Section 2- Installation

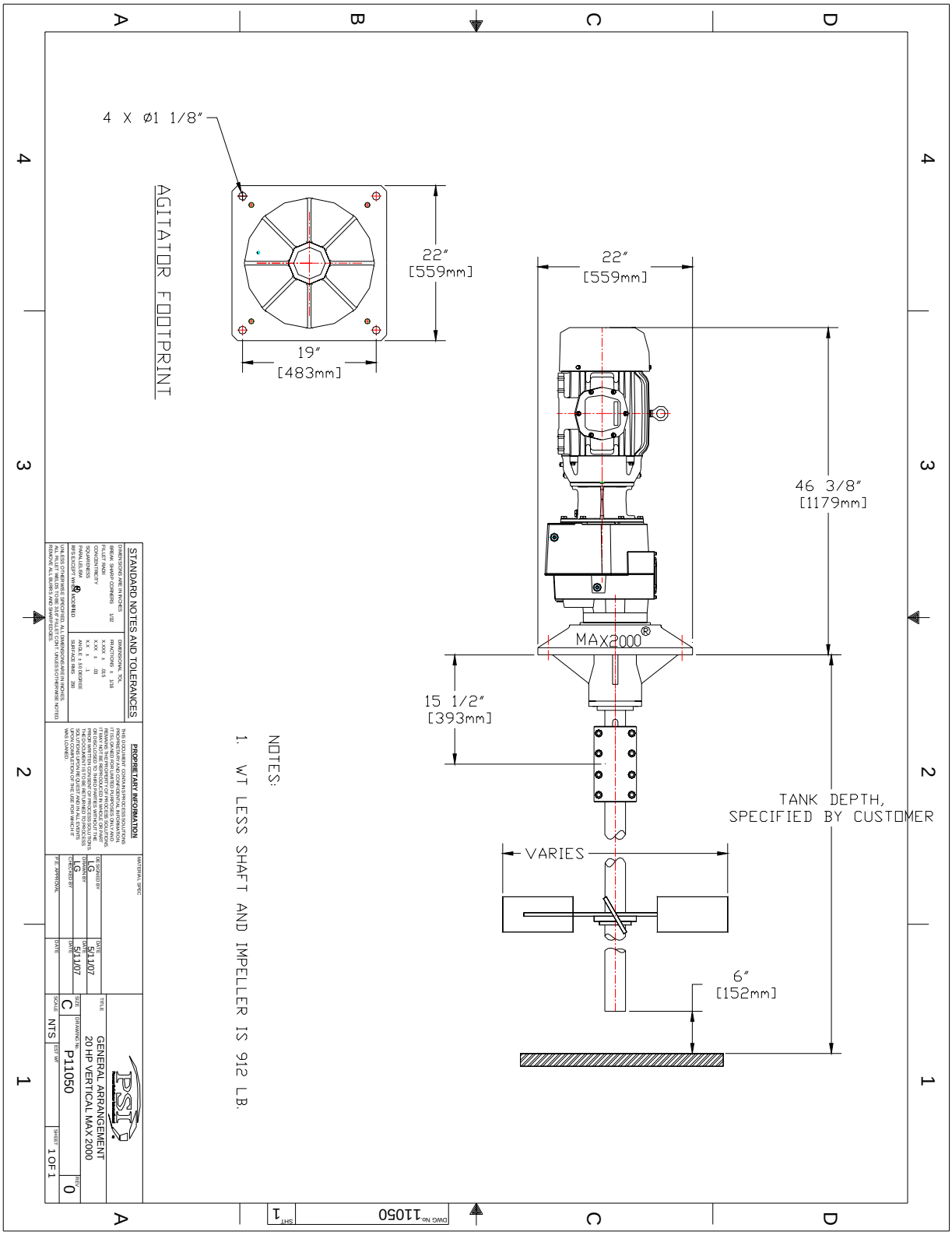


FIGURE 2.6: DIMENSIONAL DRAWING MAX-MA20V

Section 2- Installation

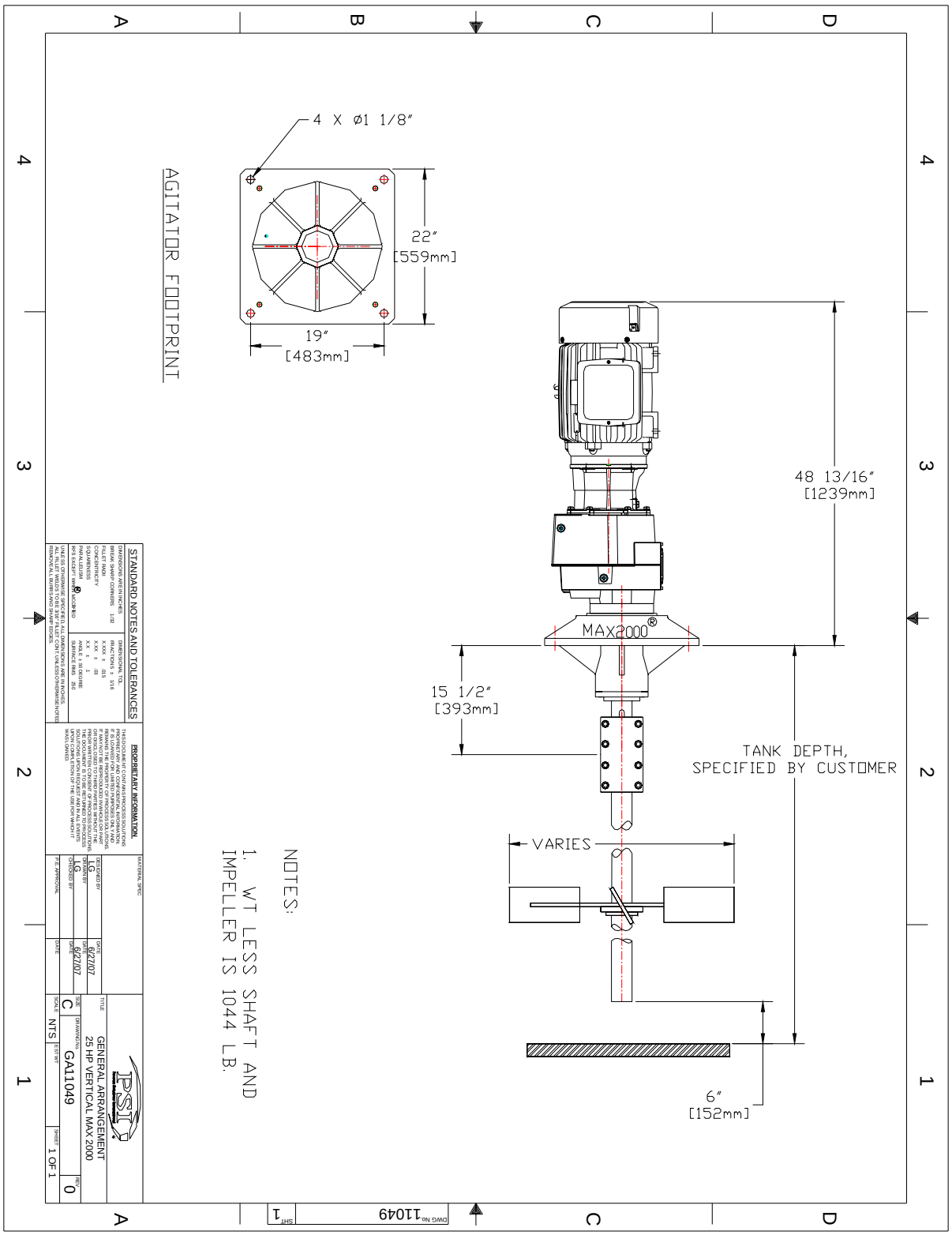


FIGURE 2.7: DIMENSIONAL DRAWING MAX-MA25V

Section 2- Installation

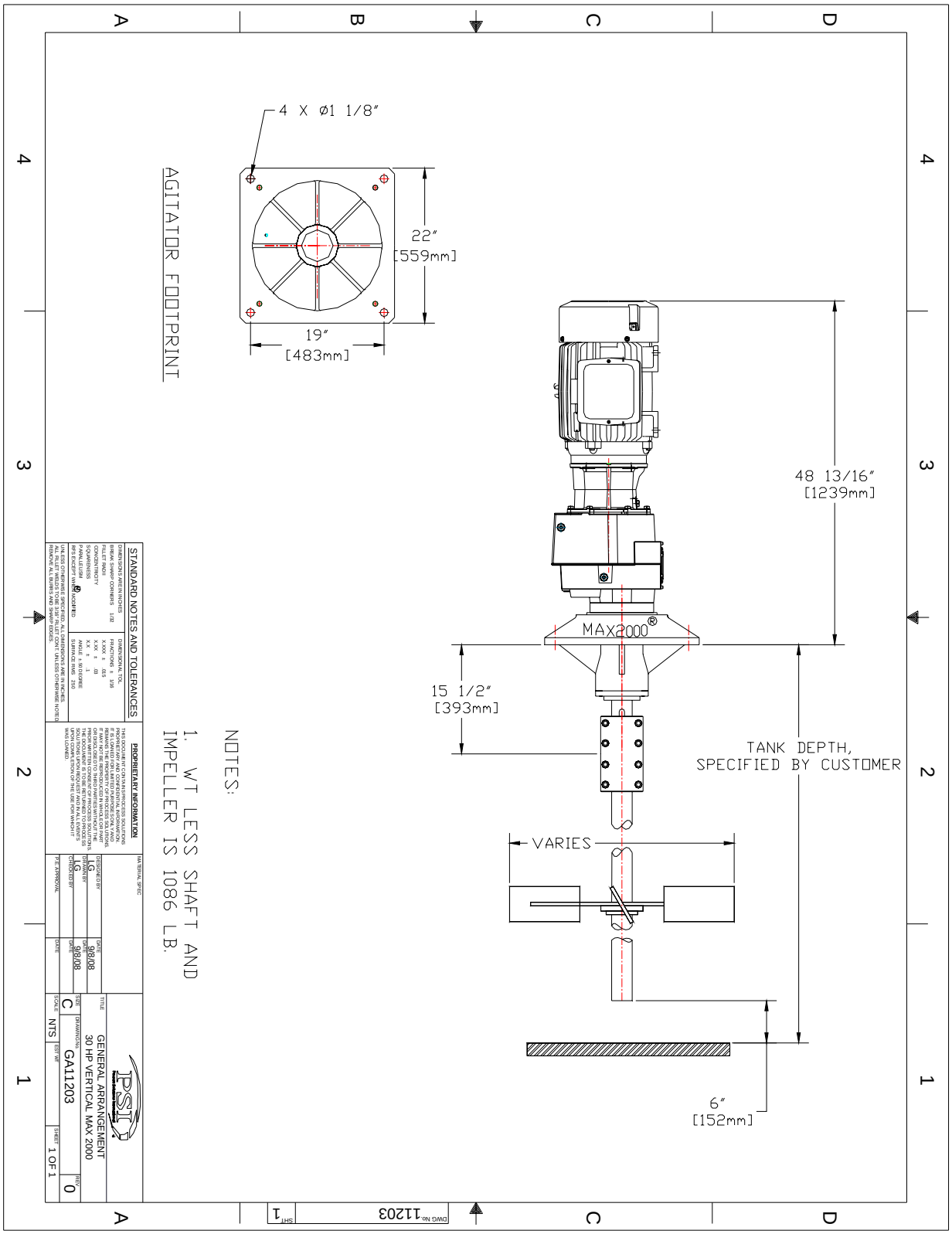


FIGURE 2.8: DIMENSIONAL DRAWING MAX-MA30V

Section 3- Operation

STARTING THE AGITATOR

Once installation is complete and proper lubrication levels have been confirmed, the unit can be started by pressing the start button on the motor starter. (Note motor starters are not supplied with agitators unless ordered separately.) As is good practice with all rotating equipment, check for unusual noise or vibration upon start up.

A. OPERATION

Like centrifugal pumps, agitators will consume more horsepower as mud weight increases. No adjustment of the agitator is required to compensate for changes in drilling conditions. During drilling operations, mud agitators are kept running at all times.

B. SAFETY

The gearbox on the MAX 2000 Vertical Agitator has a nominal 30:1 speed reduction ratio, which greatly increases the torque at the output shaft. Despite their relatively slow speed, a mud agitator can be dangerous. Any objects that might fall into or be placed in the mud tanks run the risk of being caught by and wrapped up by the agitator impeller, typical examples include hoses, mud sample buckets, and ropes. In the event of a rope or hose being caught by the agitator, the agitator should be shut down immediately.

NO ATTEMPT SHOULD BE MADE TO STOP A ROPE OR HOSE ONCE IT HAS BEEN WRAPPED AROUND A MOVING AGITATOR.

Before entering a mud tank for any reason, the mud agitators should be locked out and tagged out and pits must be vented as required.

Section 4- Maintenance

The only regularly scheduled maintenance needed for the MAX 2000 Vertical Agitator is a weekly check of oil level and oil changes every three months and weekly greasing of the drop bearing.

A. CHECKING OIL LEVEL

All MAX 2000 Agitators have vented fill port on top of the gearbox and a pipe plug located on the bottom of the gearbox. To check oil level, remove the "oil level" plug on the side of the gearbox and use a small allen key to determine the oil level in the gearbox. Oil level should be no more than ½" below [12 mm below] below the oil level plug on the side of the gearbox. Check every week and add oil only as needed by removing both the vented fill plug and the oil level plug. Add oil until it flows out the side of the gearbox where the oil level plug was removed. Replace plug after filling or checking oil level. See figure 4.1.

B. OIL CAPACITY

Table 4.1 below lists oil capacity for all models of the MAX 2000 Agitator:

TABLE 4-1 – OIL CAPACITY

Model No.	Capacity Quarts	Capacity Liters
MAX-MA05V	10	9.4
MAX-MA07V	10	9.4
MAX-MA10V	10	9.4
MAX-MA15V	18	17
MAX-MA20V	18	17
MAX-MA25V	18	17
MAX-MA39V	18	17

C. PERIODIC OIL CHANGES

The precision made gears in the speed reducer require periodic oil changes to remove debris and ensure trouble free operation. When changing from mineral oil to synthetic oil or vice versa the gearbox should be flushed once with the new oil. Extreme pressure (EP) lubricants should only be used.

EVERY THREE (3) MONTHS THE OIL SHOULD BE DRAINED FROM THE GEARBOX WHILE WARM AND REPLACED WITH THE PROPER QUANTITY OF AN APPROVED LUBRICANT. SEE CHART BELOW.

D. APPROVED LUBRICANTS

For temperature ranges not shown contact the Process Solutions International. Other gear oils may be used. Extreme pressure (EP) lubricants should only be used. See figure 4.1 for location of drain plug and fill plug. Check the level once a month and top off as required

TABLE 4-2 RECOMMENDED LUBRICANTS

Mfg	Ambient Temperature 23F to 104F [-5C to 40C] ISO 460 Mineral Oil	Ambient Temperature 5F to 25F [-15C to 25C] ISO 320 Synthetic
Mobil [or equal]	Mobil Gear 630	Mobil SHC630 [Synthetic]
Chevron [or equal]	Gear Compound 220	Tegra Synthetic 150 [Synthetic]

Section 4- Maintenance

E. DROP BEARING LUBRICATION

Using a hand operated grease gun, pump three shots of NLGI number 2 multi-purpose lithium or lithium complex grease into the grease fitting located on the cast iron drop bearing housing. See Figure 4.2.

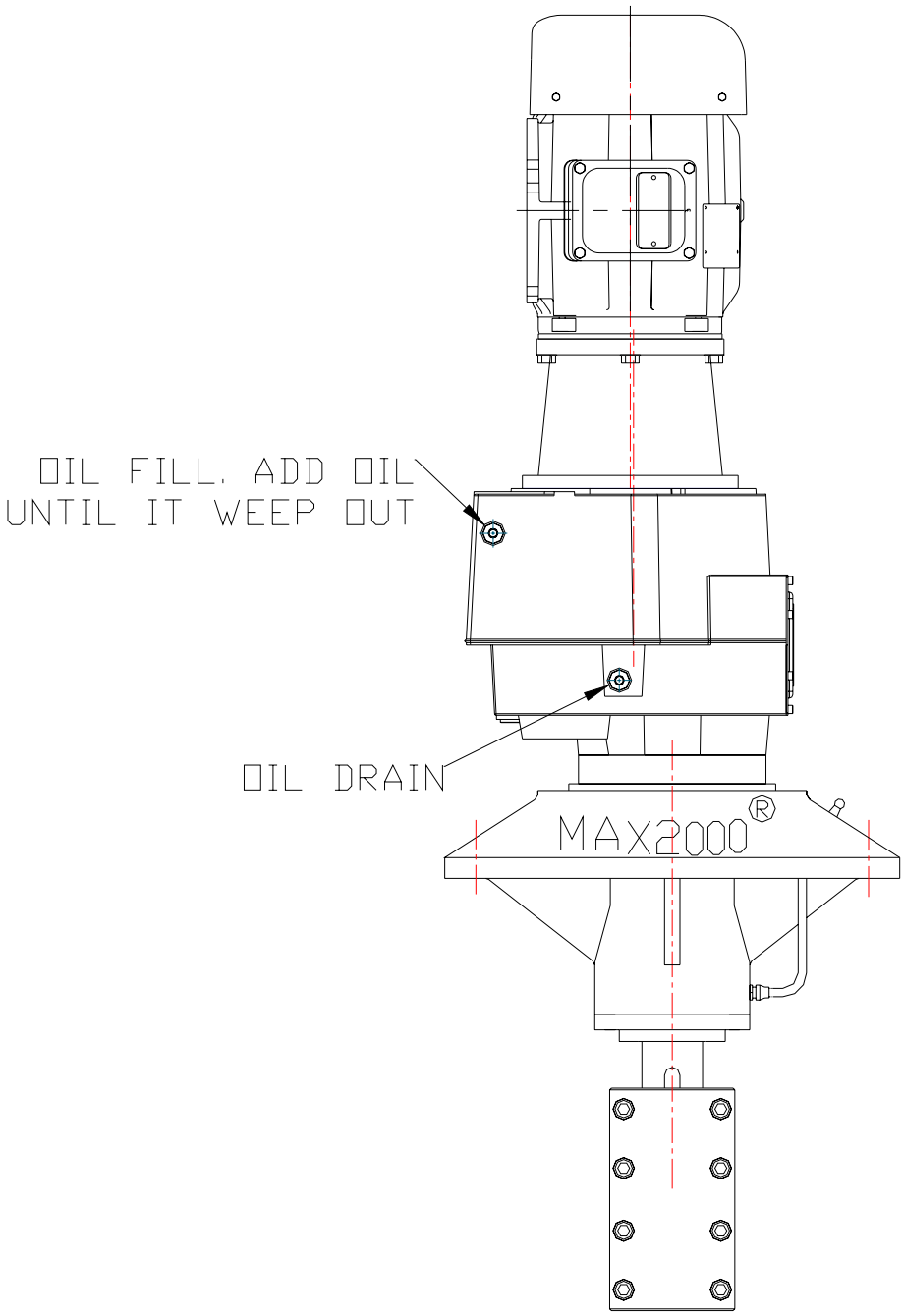


FIGURE 4.1: Changing the Oil

Section 4- Maintenance

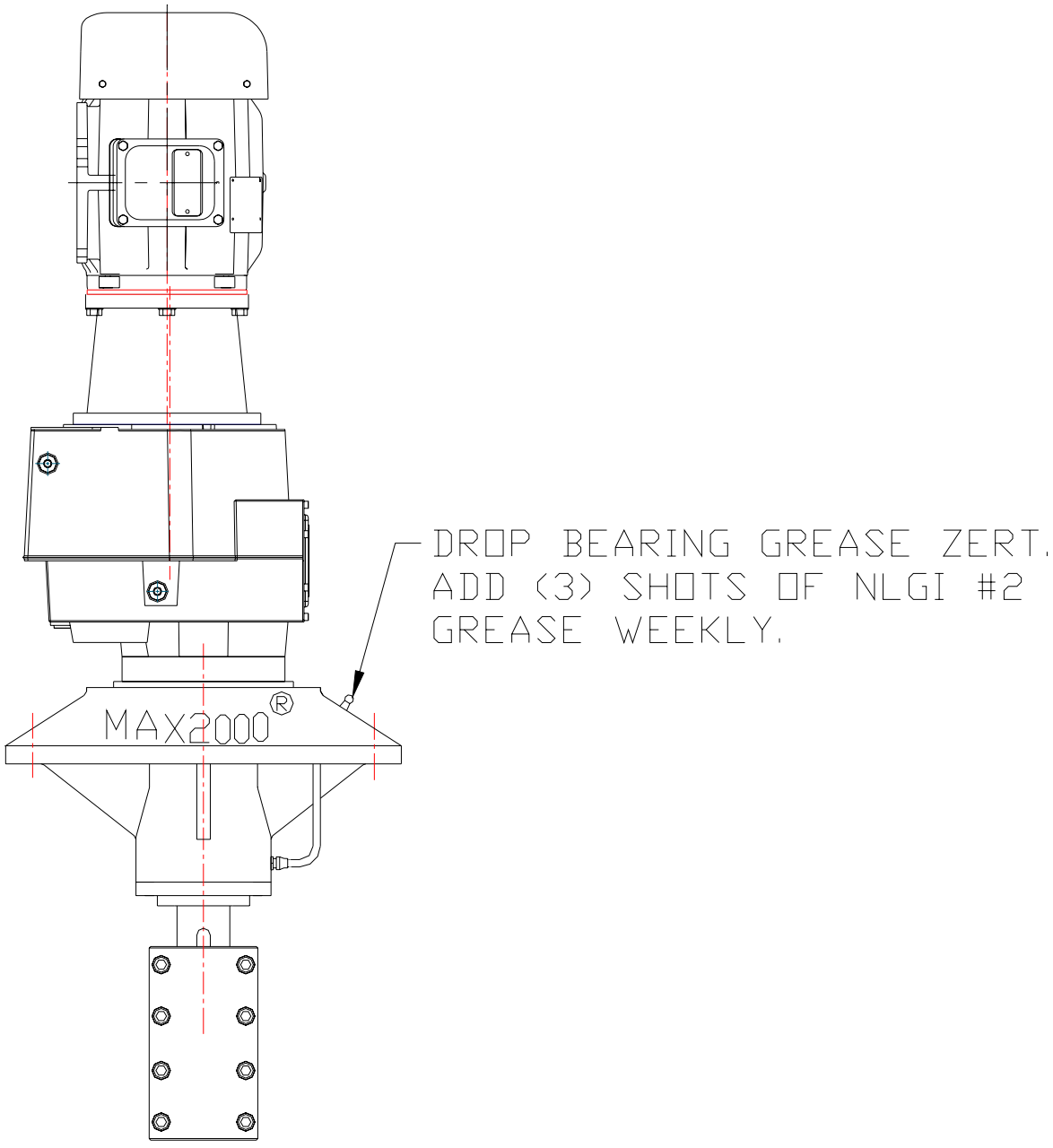


FIGURE 4.2: Lubricating the Drop Bearing

Section 5- Troubleshooting

ITEM	PROBLEM	SOLUTION
1	MOTOR WILL NOT START	Check the overload relays in the motor starter. Reset the overload relays and attempt to restart. If problem persists, a qualified electrician should "ohm out" the motor to see if there is a short in the windings. Replace motor if necessary.
2	AERATING THE SUCTION TANK CAUSES CAVITATION IN TRIPLEX MUD PUMPS	Adjusting the height of the impellers in the suction tank is very important to prevent the agitators from introducing air that can cause mud pump problems. If air entrainment starts causing problems with the mud pump while drilling with acceptable mud volume, impeller height should be lowered at the next opportunity to minimize aeration. The problem can usually be solved temporarily, by increasing mud volume to prevent aeration.

Section 6 Parts List

A. ORDERING PARTS

Replacement parts for MAX 2000 Mud Agitators can be ordered from process Solutions or its agents. The following part lists give both a part number and a catalog number, either of which may be used to place orders.

Process Solutions maintains an inventory of stock replacement parts for immediate shipment.

B. Crestex Rigid Coupling Parts:

Below are the parts for the CresTex rigid coupling for connecting the gearbox to the impeller drive shaft. See figure 6.1 for part Identification

Agit Pwr (hp)	Complete Coupling	Collet	Bolts
5	20316CTX	20316CTX-CO	SHCS, ½-13 x 1 ½ lg, grade 5, zinc plated.
7.5	20316CYX	20316CTX-CO	
10	21516CTX	21516CTX-CO	
15	21516CTX	21516CTX-CO	
20	21516CTX	21516CTX-CO	
25	21516CTX	21516CTX-CO	
25	21516CTX	21516CTX-CO	

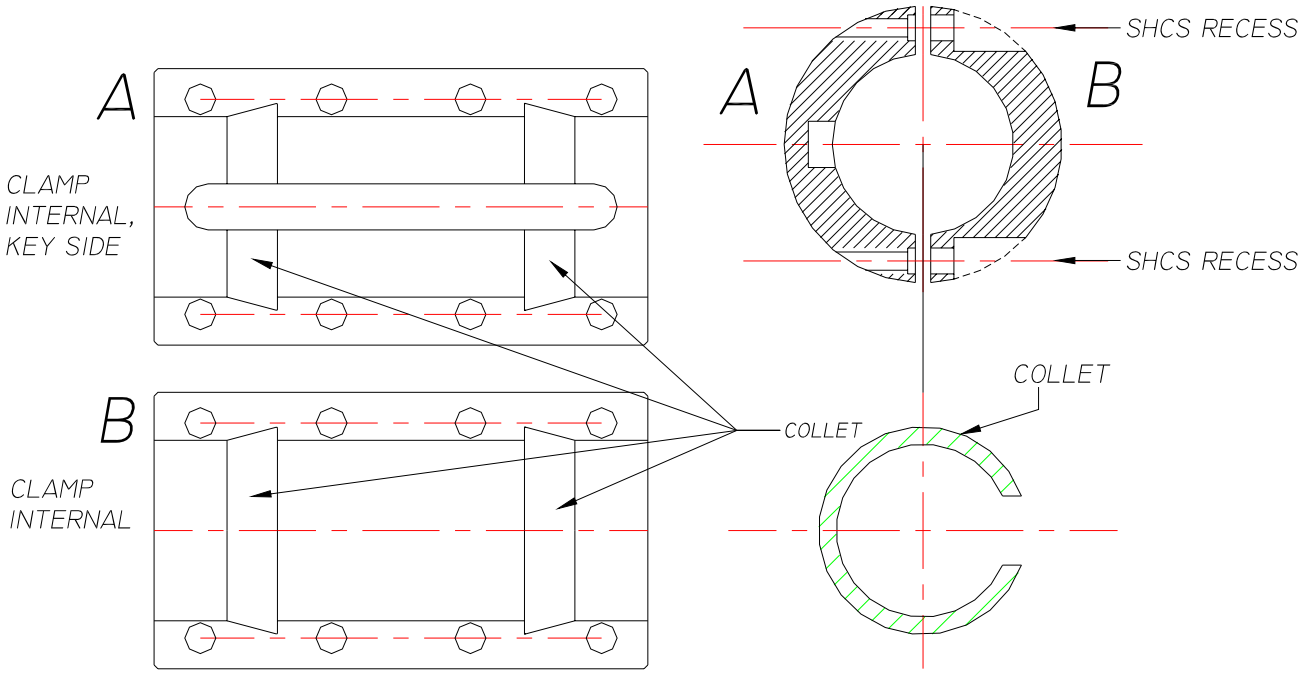


Figure 6.1: Crestex Clamp

Section 6 Parts List

C. GEARBOX PARTS

See figure 6.2 for the gearbox parts drawing and reference the following parts list for the correct part number.

Agitator hp	Table
5	6.2
7.5	6.3
10	6.4
15	6.5
20	6.5
25	6.6
30	6.6

Table 6.1: Agitator BOM Pages

D. GETTING HELP

To order parts, schedule field services, or get answers to questions contact:

Process Solutions International
Houston, Texas
Toll Free: 866-866-4PSI
Email: psimax2000@msn.com
Website:
http://www.psimax2000.com

Section 6 Parts List

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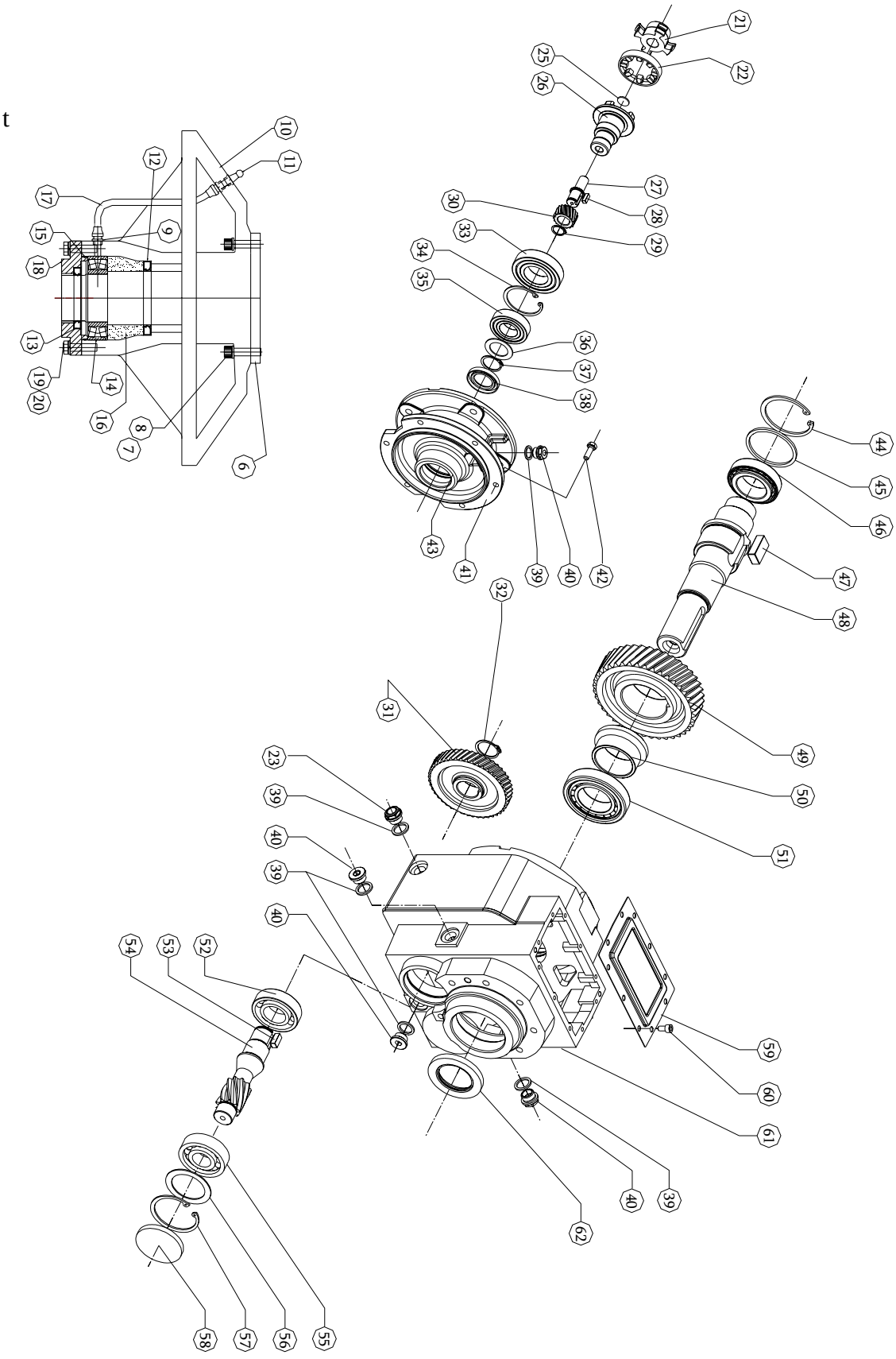


Figure 6.2: Gearbox Parts Drawing

Section 6 Parts List

Table 6.2: 5 hp Agitator Parts List

Item	Qty	Description	Part Number
6	1	SPACER	M2100S
7	7	SHCS, M14 X 90	M2A1007
8	7	L'WASHER, M14	M2A1008
9	1	GREASE FITTING	M2A05009
10	1	DROP BEARING CASTING	M2A10010-V
11	1	GREASE ZERK	M2A05011
12	1	LIP SEAL	M2A05012
13	1	LIP SEAL	M2A05013
14	1	BEARING, SPHERICAL ROLLER	M2A05014
15	1	ORING	M2A05015
16	-	Grease	-
17	1	GREASE LINE	M2A10017
18	1	DROP BEARING END CAP	M2A10018
19	8	HHCS, 1/2-13 X 1 1/2 LG	M2A10019
20	8	L'WASHER, 1/2	M2A10020
21	1	COUPLING, MOTOR SIDE 180 FRAME	412794
22	1	COUPLING SPIDER 180 FRAME	351225
23	1	SIGHT GLASS	122547
24	-	-	-
25	1	INPUT SHAFT PLUG	132558
26	1	-	-
27	1	-	-
28	1	-	-
29	1	-	-
30	1	PINION GEAR & SHAFT ARE INTEGRAL	541258
31	1	INPUT GEAR	516474
32	1	SNAP RING	365258
33	1	INPUT BEARING, BALL	200654
34	1	INPUT SNAP RING	858854
35	1	INPUT BEARING, BALL	200655
36	1	SPACER/SHIM	984710
37	1	SNAP RING	654651
38	1	SEAL, INPUT	505447
39	1	GASKET	465120
40	1	PLUG	210241
41	1	HIGH TEMP SILICON	-
42	6	INPUT HOUSING BOLT	122556
43	1	INPUT CASING	892405
44	1	SNAP RING	858854
45	1	SPACER/SHIM	234187
46	1	BEARING, TAPER ROLLER	512225
47	1	OUTPUT SHAFT KEY	832588
48	1	OUTPUT SHAFT	M2A20002-V
49	1	OUTPUT GEAR	509289
50	1	SPACER RING	144887
51	1	BEARING, TAPER ROLLER	495248
52	1	BEARING, TAPER ROLLER	786925
53	1	KEY	125825
54	1	SPIRAL BEVEL SHAFT	351958
55	1	BEARING	984658
56	1	SPACER/SHIM	984710
57	1	SNAP RING	654651
58	1	CLOSED GREASE PLUG	465120
59	1	INSPECTION COVER	623598
60	10	COVER SCREW	989922
61	1	GEARBOX HOUSING	520505
62	1	OUTPUT SEAL	284555

Section 6 Parts List

Table 6.3: 7.5 hp Agitator Parts List

Item	Qty	Description	Part Number
6	1	SPACER	M2100S
7	7	SHCS, M14 X 90	M2A1007
8	7	L'WASHER, M14	M2A1008
9	1	GREASE FITTING	M2A05009
10	1	DROP BEARING CASTING	M2A10010-V
11	1	GREASE ZERK	M2A05011
12	1	LIP SEAL	M2A05012
13	1	LIP SEAL	M2A05013
14	1	BEARING, SPHERICAL ROLLER	M2A05014
15	1	ORING	M2A05015
16	-	Grease	-
17	1	GREASE LINE	M2A10017
18	1	DROP BEARING END CAP	M2A10018
19	8	HHCS, 1/2-13 X 1 1/2 LG	M2A10019
20	8	L'WASHER, 1/2	M2A10020
21	1	COUPLING, MOTOR SIDE 210 FRAME	633448
22	1	COUPLING SPIDER 210 FRAME	851200
23	1	SIGHT GLASS	122547
24	-	-	
25	1	INPUT SHAFT PLUG	241865
26	1	-	-
27	1	-	-
28	1	-	-
29	1	-	-
30	1	PINION GEAR & SHAFT ARE INTEGRAL	812554
31	1	INPUT GEAR	205450
32	1	SNAP RING	365258
33	1	INPUT BEARING, BALL	200657
34	1	INPUT SNAP RING	858854
35	1	INPUT BEARING, BALL	498485
36	1	SPACER/SHIM	153369
37	1	SNAP RING	651651
38	1	SEAL, INPUT	651874
39	1	GASKET	754951
40	1	PLUG	210241
41	1	HIGH TEMP SILICON	-
42	6	INPUT HOUSING BOLT	122556
43	1	INPUT CASING	521551
44	1	SNAP RING	858854
45	1	SPACER/SHIM	234187
46	1	BEARING, TAPER ROLLER	512245
47	1	OUTPUT SHAFT KEY	832588
48	1	OUTPUT SHAFT	M2A20002-V
49	1	OUTPUT GEAR	509289
50	1	SPACER RING	144887
51	1	BEARING, TAPER ROLLER	495248
52	1	BEARING, TAPER ROLLER	786925
53	1	KEY	125825
54	1	SPIRAL BEVEL SHAFT	351958
55	1	BEARING	984658
56	1	SPACER/SHIM	984710
57	1	SNAP RING	654651
58	1	CLOSED GREASE PLUG	465120
59	1	INSPECTION COVER	623598
60	10	COVER SCREW	989922
61	1	GEARBOX HOUSING	520505
62	1	OUTPUT SEAL	284555

Section 6 Parts List

Table 6.4 10 hp Agitator Parts List

Item	Qty	Description	Part Number
6	1	SPACER	M2100S
7	7	SHCS, M14 X 90	M2A1007
8	7	L'WASHER, M14	M2A1008
9	1	GREASE FITTING	M2A05009
10	1	DROP BEARING CASTING	M2A10010-V
11	1	GREASE ZERK	M2A05011
12	1	LIP SEAL	M2A10012
13	1	LIP SEAL	M2A10013
14	1	BEARING, SPHERICAL ROLLER	M2A10014
15	1	ORING	M2A10015
16	-	Grease	-
17	1	GREASE LINE	M2A10017
18	1	DROP BEARING END CAP	M2A10018
19	8	HHCS, 1/2-13 X 1 1/2 LG	M2A10019
20	8	L'WASHER, 1/2	M2A10020
21	1	COUPLING, MOTOR SIDE 210 FRAME	633448
22	1	COUPLING SPIDER 210 FRAME	851200
23	1	SIGHT GLASS	122547
24	-	-	
25	1	INPUT SHAFT PLUG	241865
26	1	-	-
27	1	-	-
28	1	-	-
29	1	-	-
30	1	PINION GEAR & SHAFT ARE INTEGRAL	812554
31	1	INPUT GEAR	205450
32	1	SNAP RING	365258
33	1	INPUT BEARING, BALL	200657
34	1	INPUT SNAP RING	858854
35	1	INPUT BEARING, BALL	498485
36	1	SPACER/SHIM	153369
37	1	SNAP RING	651651
38	1	SEAL, INPUT	651874
39	1	GASKET	754951
40	1	PLUG	210241
41	1	HIGH TEMP SILICON	-
42	6	INPUT HOUSING BOLT	122556
43	1	INPUT CASING	521551
44	1	SNAP RING	858854
45	1	SPACER/SHIM	234187
46	1	BEARING, TAPER ROLLER	512245
47	1	OUTPUT SHAFT KEY	832588
48	1	OUTPUT SHAFT	M2A20002-V
49	1	OUTPUT GEAR	509289
50	1	SPACER RING	144887
51	1	BEARING, TAPER ROLLER	495248
52	1	BEARING, TAPER ROLLER	786925
53	1	KEY	125825
54	1	SPIRAL BEVEL SHAFT	351958
55	1	BEARING	984658
56	1	SPACER/SHIM	984710
57	1	SNAP RING	654651
58	1	CLOSED GREASE PLUG	465120
59	1	INSPECTION COVER	623598
60	10	COVER SCREW	989922
61	1	GEARBOX HOUSING	520505
62	1	OUTPUT SEAL	284555

Section 6 Parts List

Table 6.5: 15 & 20 hp Agitator Parts List

Item	Qty	Description	Part Number
6	1	SPACER	M2A30S
7	7	SHCS, M14 X 90	M2A1007
8	7	L'WASHER, M14	M2A1008
9	1	GREASE FITTING	M2A05009
10	1	DROP BEARING CASTING	M2A10010-V
11	1	GREASE ZERK	M2A05011
12	1	LIP SEAL	M2A10012
13	1	LIP SEAL	M2A10013
14	1	BEARING, SPHERICAL ROLLER	M2A10014
15	1	ORING	M2A10015
16	-	Grease	-
17	1	GREASE LINE	M2A10017
18	1	DROP BEARING END CAP	M2A10018
19	8	HHCS, 1/2-13 X 1 1/2 LG	M2A10019
20	8	L'WASHER, 1/2	M2A10020
21	1	COUPLING, MOTOR SIDE 250 FRAME	194465
22	1	COUPLING SPIDER 250 FRAME	851200
23	1	SIGHT GLASS	210241
24	-	-	-
25	1	INPUT SHAFT PLUG	241865
26	1	INPUT SHAFT	152515
27	1	-	-
28	1	-	-
29	1	-	-
30	1	PINION GEAR & SHAFT ARE INTEGRAL	842565
31	1	INPUT GEAR	515998
32	1	SNAP RING	849188
33	1	INPUT BEARING, BALL	200657
34	1	INPUT SNAP RING	858854
35	1	INPUT BEARING, BALL	498485
36	1	SPACER/SHIM	832259
37	1	SNAP RING	651651
38	1	SEAL, INPUT	651874
39	1	GASKET	754951
40	1	PLUG	122547
41	1	HIGH TEMP SILICON	-
42	6	INPUT HOUSING BOLT	122556
43	1	INPUT CASING	512551
44	1	SNAP RING	522157
45	1	SPACER/SHIM	832259
46	1	BEARING, TAPER ROLLER	155157
47	1	OUTPUT SHAFT KEY	130058
48	1	OUTPUT SHAFT	M2A20002-V
49	1	OUTPUT GEAR	622840
50	1	SPACER RING	412893
51	1	BEARING, TAPER ROLLER	513551
52	1	BEARING, TAPER ROLLER	354525
53	1	KEY	822558
54	1	SPIRAL BEVEL SHAFT	265840
55	1	BEARING	781655
56	1	SPACER/SHIM	641487
57	1	SNAP RING	651548
58	1	CLOSED GREASE PLUG	654112
59	1	INSPECTION COVER	421059
60	10	COVER SCREW	989922
61	1	GEARBOX HOUSING	843005
62	1	OUTPUT SEAL	825544

Section 6 Parts List

Table 6.6: 25 & 30 hp Agitator Parts List

Item	Qty	Description	Part Number
6	1	SPACER	M2A30S
7	7	SHCS, M14 X 90	M2A1007
8	7	L'WASHER, M14	M2A1008
9	1	GREASE FITTING	M2A05009
10	1	DROP BEARING CASTING	M2A10010-V
11	1	GREASE ZERK	M2A05011
12	1	LIP SEAL	M2A10012
13	1	LIP SEAL	M2A10013
14	1	BEARING, SPHERICAL ROLLER	M2A10014
15	1	ORING	M2A10015
16	-	Grease	-
17	1	GREASE LINE	M2A10017
18	1	DROP BEARING END CAP	M2A10018
19	8	HHCS, 1/2-13 X 1 1/2 LG	M2A10019
20	8	L'WASHER, 1/2	M2A10020
21	1	COUPLING, MOTOR SIDE 280 FRAME	662280
22	1	COUPLING SPIDER 280 FRAME	735132
23	1	SIGHT GLASS	210241
24	-	-	-
25	1	INPUT SHAFT PLUG	241865
26	1	INPUT SHAFT	215125
27	1	PINION SHAFT	351122
28	1	PINION SHAFT KEY	136696
29	1	PINION SNAP RING	281155
30	1	PINION GEAR	842565
31	1	INPUT GEAR	515998
32	1	SNAP RING	849188
33	1	INPUT BEARING, BALL	200657
34	1	INPUT SNAP RING	858854
35	1	INPUT BEARING, BALL	498485
36	1	SPACER/SHIM	832259
37	1	SNAP RING	651651
38	1	SEAL, INPUT	651874
39	1	GASKET	754951
40	1	PLUG	122547
41	1	HIGH TEMP SILICON	-
42	6	INPUT HOUSING BOLT	122556
43	1	INPUT CASING	521551
44	1	SNAP RING	522157
45	1	SPACER/SHIM	832259
46	1	BEARING, TAPER ROLLER	155157
47	1	OUTPUT SHAFT KEY	130058
48	1	OUTPUT SHAFT	M2A20002-V
49	1	OUTPUT GEAR	622840
50	1	SPACER RING	412893
51	1	BEARING, TAPER ROLLER	513551
52	1	BEARING, TAPER ROLLER	354525
53	1	KEY	822558
54	1	SPIRAL BEVEL SHAFT	265840
55	1	BEARING	781655
56	1	SPACER/SHIM	641487
57	1	SNAP RING	651538
58	1	CLOSED GREASE PLUG	654112
59	1	INSPECTION COVER	421059
60	10	COVER SCREW	989912
61	1	GEARBOX HOUSING	843005
62	1	OUTPUT SEAL	825544

Section 7 Recommended Spares

Below are tables listing recommended spare parts for PSI's vertical Max 2000 series mud agitators. PSI keeps all of these parts in stock at our Houston facility.

Table 7.1: MA-5

PART NO.	DESCRIPTION	1 YEAR QTY.
6207ZZ	First Input Bearing	1
6210ZZ	Second Input Bearing	1
35-62-7	Input Seal	1
30212	First Output Bearing	1
30213	Second Output Bearing	1
65-100-10	Output Seal	1
M2A05-14	Drop Bearing	1
412794	Motor Side Coupling	1
351225	Spider	1
05MTR-C	5 hp Explosion Proof, Specify Voltage and Frequency when Ordering.	1

Table 7.2: MA-7.5 & 10

PART NO.	DESCRIPTION	1 YEAR QTY.
6015ZZ	First Input Bearing	1
6310ZZ	Second Input Bearing	1
50-72-8	Input Seal	1
30212	First Output Bearing	1
30213	Second Output Bearing	1
65-100-10	Output Seal	1
M2A05-14	Drop Bearing	1
633458	Motor Side Coupling	1
851200	Spider	1
07MTR-C	7.5 hp Explosion Proof, Specify Voltage and Frequency when Ordering.	1
10MTR-C	10 hp Explosion Proof, Specify Voltage and Frequency when Ordering	1

Section 7 Recommended Spares

Table 7.3: MA-15 & 20		
PART NO.	**DESCRIPTION**	**1 YEAR QTY.**
6015ZZ	First Input Bearing	1
6310ZZ	Second Input Bearing	1
50-72-8	Input Seal	1
30218	First Output Bearing	1
32213	Second Output Bearing	1
90-120-12	Output Seal	1
M2A10-14	Drop Bearing	1
194465	Motor Side Coupling	1
851200	Spider	1
15MTR-C	15 hp Explosion Proof, Specify Voltage and Frequency when Ordering.	1
20MTR-C	20 hp Explosion Proof, Specify Voltage and Frequency when Ordering	1

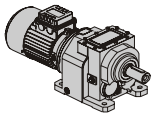
Table 7.4: MA-25 & 30		
PART NO.	**DESCRIPTION**	**1 YEAR QTY.**
6018ZZ	First Input Bearing	1
6312ZZ	Second Input Bearing	1
60-85-10	Input Seal	1
30218	First Output Bearing	1
32213	Second Output Bearing	1
90-120-12	Output Seal	1
M2A10-14	Drop Bearing	1
662280	Motor Side Coupling	1
735132	Spider	1
25MTR-C	25 hp Explosion Proof, Specify Voltage and Frequency when Ordering.	1
30MTR-C	30 hp Explosion Proof, Specify Voltage and Frequency when Ordering	1

Addendum: Gearbox IOM

MOTOVARIO

MAINTENANCE AND USE INSTRUCTIONS FOR GEAR AND GEARMOTORS SERIES:

PH - CH - IH



Warehouse storage

Protect external parts of the reducer from damage due to accidental knocks or falls when transporting the unit.
If the unit is stored in a hostile atmosphere or for long periods (2-4 months), apply protective and waterproofing products to avoid deterioration of shafts and rubber parts.
Before starting up the unit:

- Check the data shown on the name plate of the reducer and/or the electric motor
- Check for any lubricant leaks
- Remove any traces of dirt from the shaft and from the areas around the oil seal
- If the reducer is stored for long periods (4-6 months or more), make sure the oil seals are in contact with the reducer's internal lubricant. If the oil seal cannot contact the reducer's lubricant, change the oil seal before use. The seal's rubber coating may stick to the shaft or may lose the elasticity necessary to function properly.

Installation

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

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

Installation

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

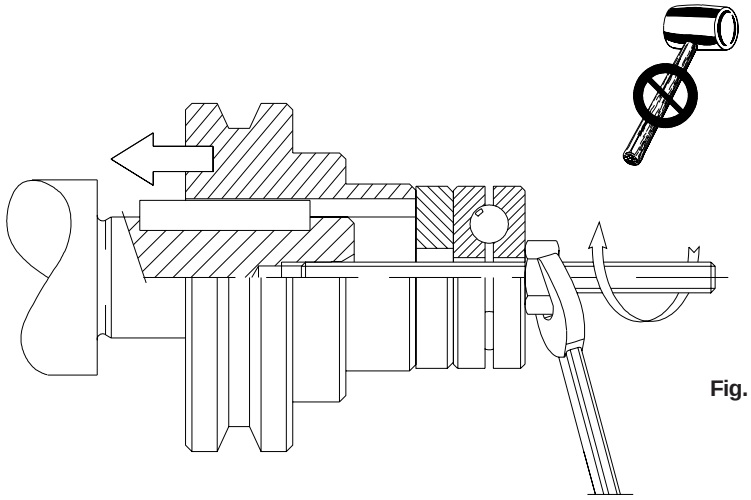


Fig. 1

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

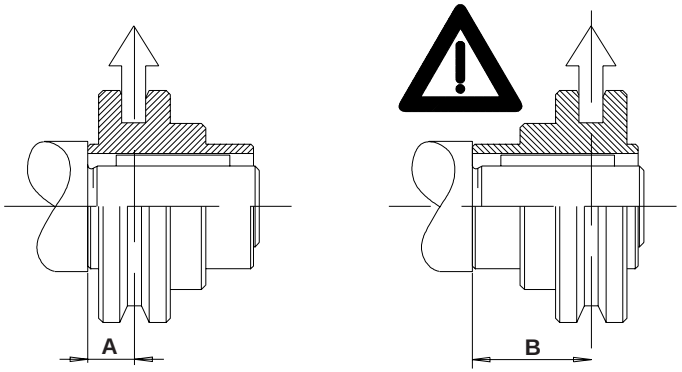
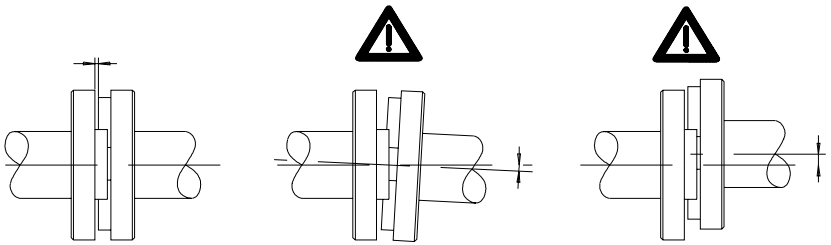


Fig. 2

Installation

Correct and incorrect examples of coupling connections

Fig. 3



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

Mounting the motor on the pam B5/B14 flange

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

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

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

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

Starting up

The unit should be started up gradually. Do not immediately apply the maximum application load. Start-up slowly whenever possible. Look for and correct any malfunction that may be caused by incorrect mounting during start-up.

Run-in is not essential for Motovario SmartBox units to function properly. The internal components are protected during start-up becasue of the construction technique for gears and castings, the extreme cleanliness of internal parts, and the excellent quality of the lubricants used.

Servicing

The precision finish of SmartBox components ensures that the unit will work correctly with minimum service.

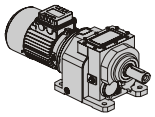
- Periodically check that the exterior of the assembly is clean, especially in the cooling areas
- Periodically check to see if there are any leaks, especially in the areas around the oil seals.
- Assemblies that are lubricated for life do not have any oil plugs and do not require any special maintenance.
- Assemblies not lubricated for life require an oil change at 8,000-10,000 hours of use. The timing of the oil change depends on the type of environment and application of the reducer.
- Keep the breaher plug clean and free of obstructions.
- Check for the correct level of the lubricant through the sight glass (if applicable).
- Always use the same type of lubricant that is already in the reducer (or a compatible lubricant) if it becomes necessary to top-off the lubrication. If the type of lubrication is unknown or in doubt, empty the oil from the reducer completely and wash out the unit to remove any residue before refilling with new oil.
- When changing the oil, empty the oil from the reducer completely and wash out the unit to remove any residue before refilling with new oil.

Troubleshooting

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

The following table shows a series of problems with a description of possible remedies. The information given is for reference only. All drives manufactured by Motovario are thoroughly tested and checked before leaving the factory.

Tampering with the assembly without prior authorization from Motovario immediately invalidates the warranty and makes it impossible to ascertain the causes of defect or malfunction.



Troubleshooting

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

Troubleshooting

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

Lubrication H

Applications operating in temperatures below -30°C (-22°F) or over 60°C (140°F), special oil seals must be used.
Applications operating in temperatures under 0°C (32°F) have special needs:

- Motors must be suitable for operation at the ambient temperature.
- Colder temperatures require more starting torque from the motor. The motor power must be adequate to exceed the required starting torque.
- Cast iron becomes fragile and brittle in temperatures under -15°C (5°F).

The viscosity of the reducer lubrication is higher at start-up. Whenever possible, run the reducer under no load for a few minutes to decrease oil viscosity.

Reducer maintenance should be performed after approximately 10,000 hours, including a change of the reducer's oil. The type of service and the environment of the application will determine the maintenance period.
Units supplied without oil plugs are lubricated for life and need no servicing.
All Motovario SmartBox™ reducers are supplied with lubricant. The mounting position of the reducers must be specified when ordering.

Motovario SmartBox™ maintenance-free reducers:

- H030
- H041
- H040
- H051
- H050
- H061

Lubrication H

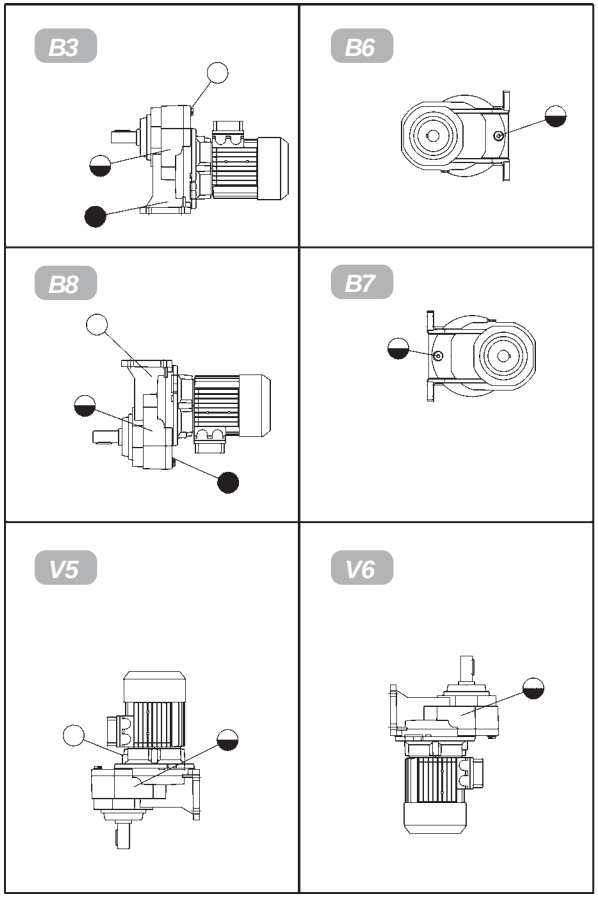
	Mineral oil	
Temp. (C°) Temp. (F°) ISO VG..	**-5 to +40 23 to 104 ISO VG220**	**-15 to +25 5 to 77 ISO VG150**
AGIP	BLASIA 220	BLASIA 150
SHELL	OMALA OIL 220	OMALA OIL 150
ESSO	SPARTAN EP220	SPARTAN EP150
MOBIL	MOBILGEAR 630	MOBILGEAR 629
CASTROL	ALPHA MAX 220	ALPHA MAX 150
BP	ENERGOL GR-XP220	ENERGOL GR-XP150

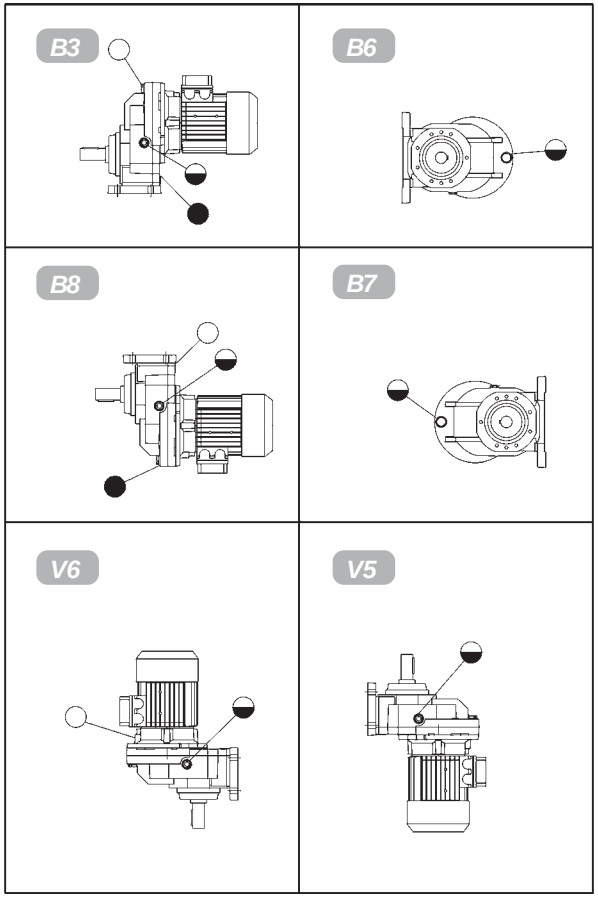
LUBRICATION QUANTITIES FOR GEAR REDUCER - H (LITERS)

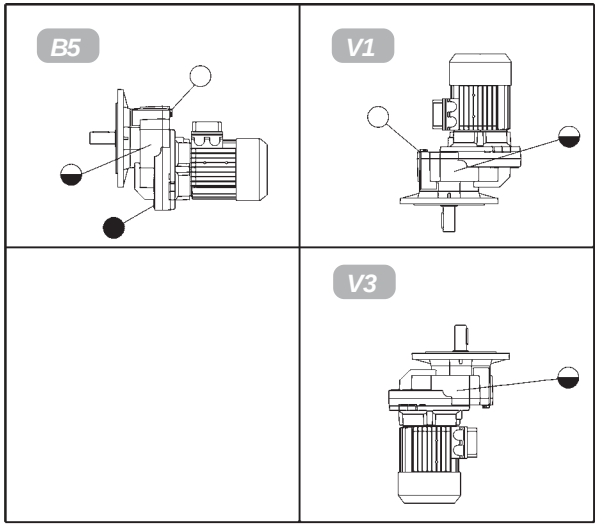
H - CH	032-033	041	042-043	051	052-053	061	062-063	081	082-083	101	102-103	121	122-123	142-143
B3-B5	0.8	0.5	1.2	0.7	1.4	0.7	2.4	1.45	4.5	3.5	8.1	4.7	12.5	22.5
B8	0.8	0.5	1.2	0.5	1.4	0.5	3.1	1.5	5	3.5	8.9	3.9	12.5	20
B6-B7	1	0.5	1.2	0.7	1.8	0.7	3	1.5	4.6	3.5	8.4	4.1	12.1	22.5
V5-V1	1.3	0.5	1.75	0.7	2.15	0.9	3.9	1.5	7.6	3.5	12.7	4.7	20.5	30.5
V6-V3	1.2	0.5	1.7	0.7	2.1	0.7	4.4	1.5	7.5	3.5	14.2	4.1	21	38

- Quantity of oil in litres

Mounting position, Single Stage 041-121







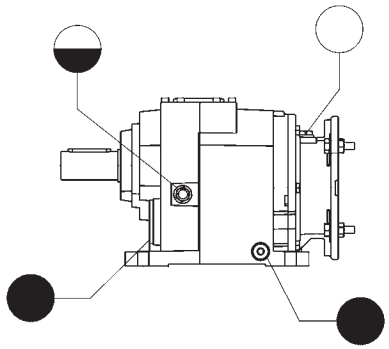
Oil fill / breather plug

Oil level plug

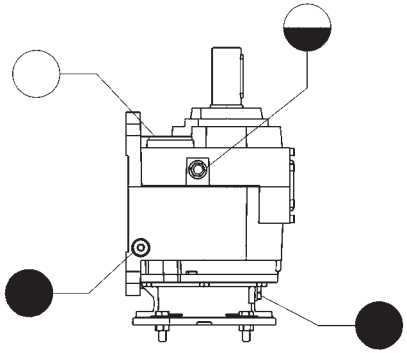
Oil drain plug

Mounting position, 2-3 Stage 030-140

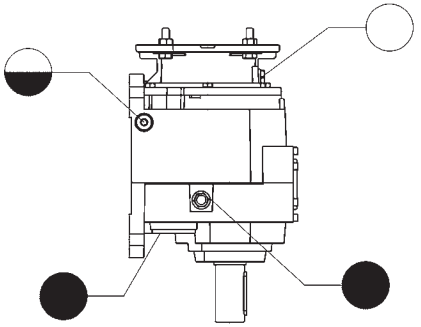
B3



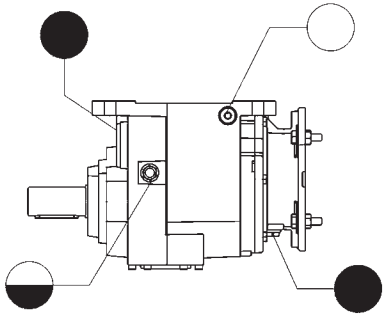
V6



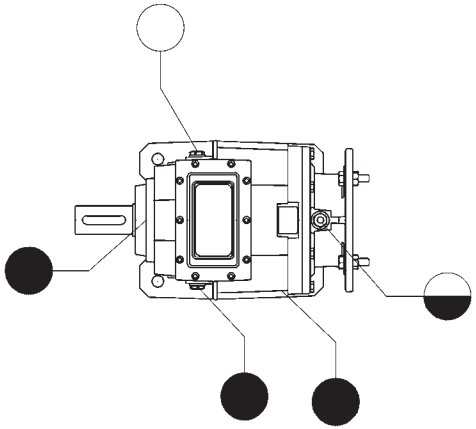
V5



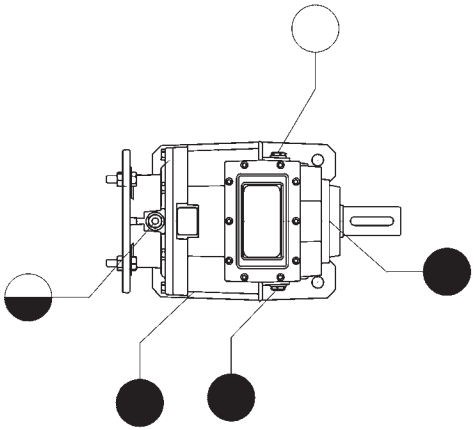
B8



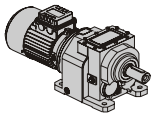
B7



B6



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



Critical applications

Performance ratings correspond to mounting position B3 or similar, i.e. when the first stage is not entirely immersed in oil. For other mounting positions and/or particular input speeds, refer to the tables that highlight different critical situations for each size reducer.

It is also necessary to consider the following applications by contacting MotovarioTechnical Service:

- Use as a speed increaser
- Use that could be hazardous for people if the reducer fails
- Applications with especially high inertia
- Use as a lifting winch
- Applications with high dynamic strain on the housing of the reducer
- In places with ambient temperatures below -5°C or over 40°C (below 23°F or over 104°F).
- Use in chemically aggressive or caustic environments
- Use in salty environments
- Use in radioactive environments
- Use in environments with pressures other than standard atmospheric pressure
- Mounting positions not described in this catalog

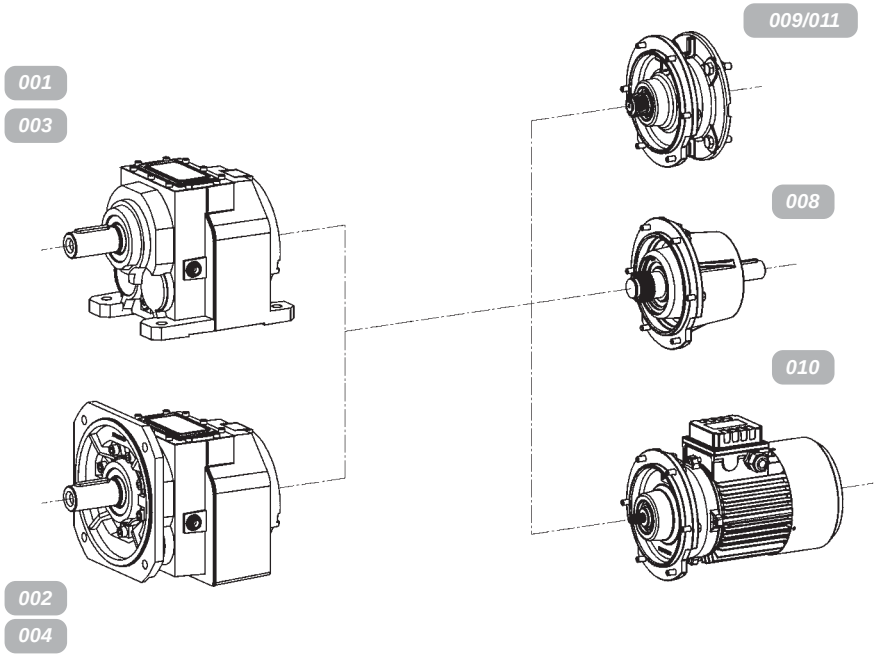
Avoid applications where even partial immersion of the reducer is required.

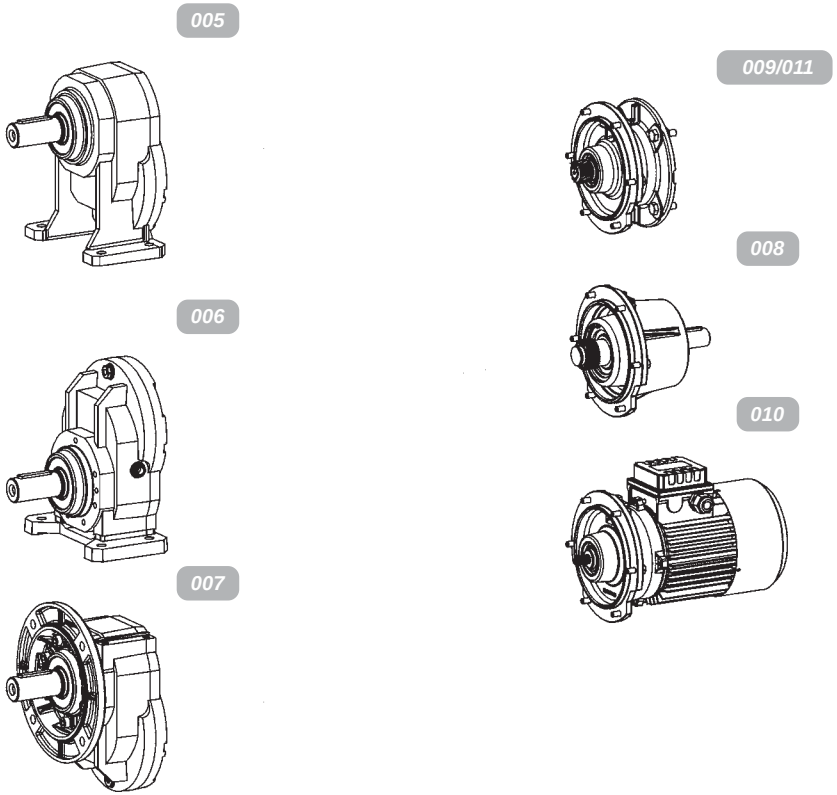
The maximum torque that the gear reducer can support must not exceed two times the nominal torque (when service factor = 1.0) stated in the performance tables. Maximum torque considers momentary overloads at full load start-up, braking, shocks or other causes, particularly dynamic shock.

H	030	040	050	060	080	100	125	140
mounting position: V5 - V1 input speed: 1500 - 3000 RPM	-	-	-	-	-	-	B	B
input speed: >3000 RPM	B	B	B	B	B	B	A	A
mounting position: V3 - V6	B	B	B	B	B	B	B	B

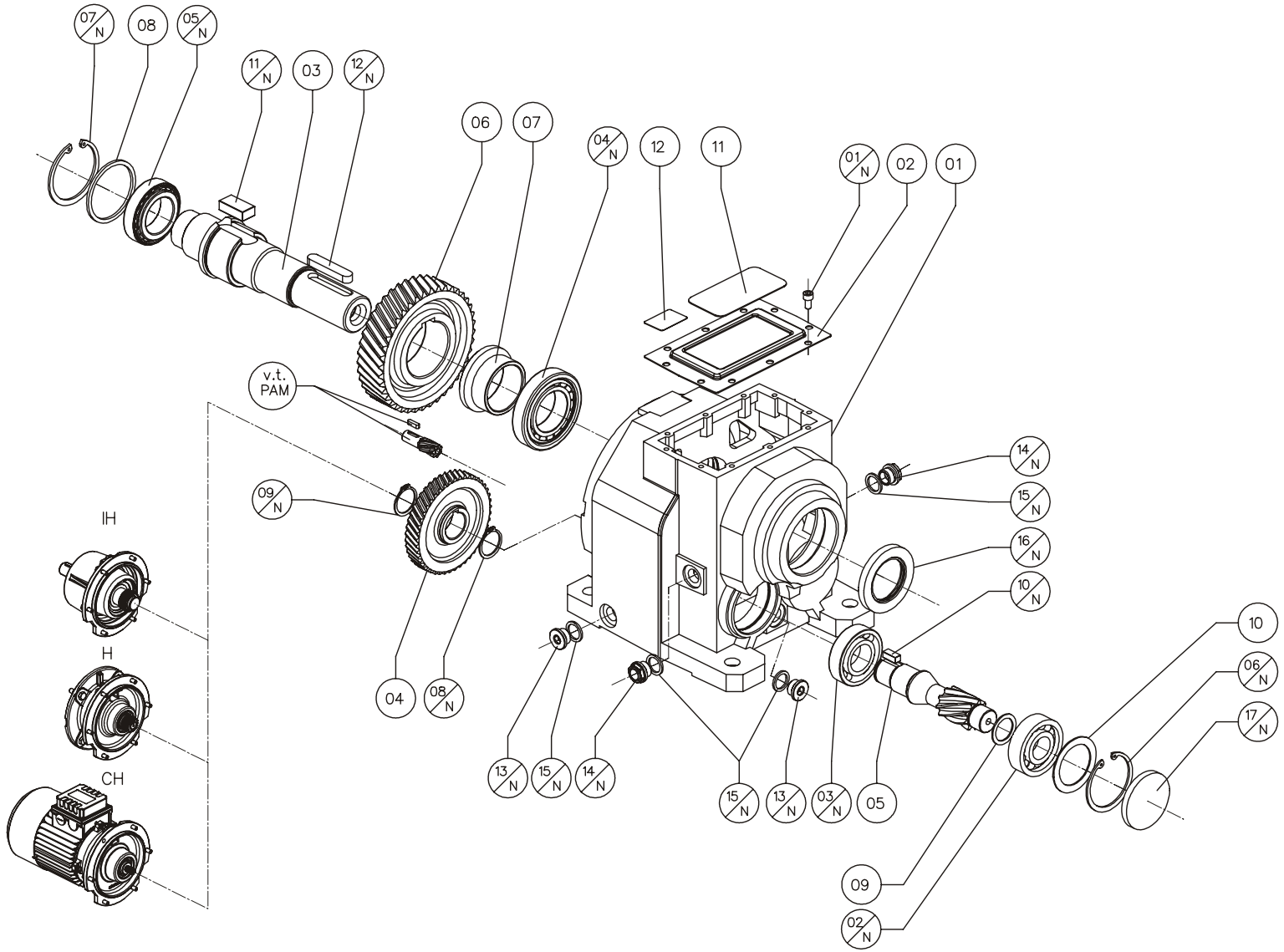
A Application not recommended

B Contact Motovario for assistance



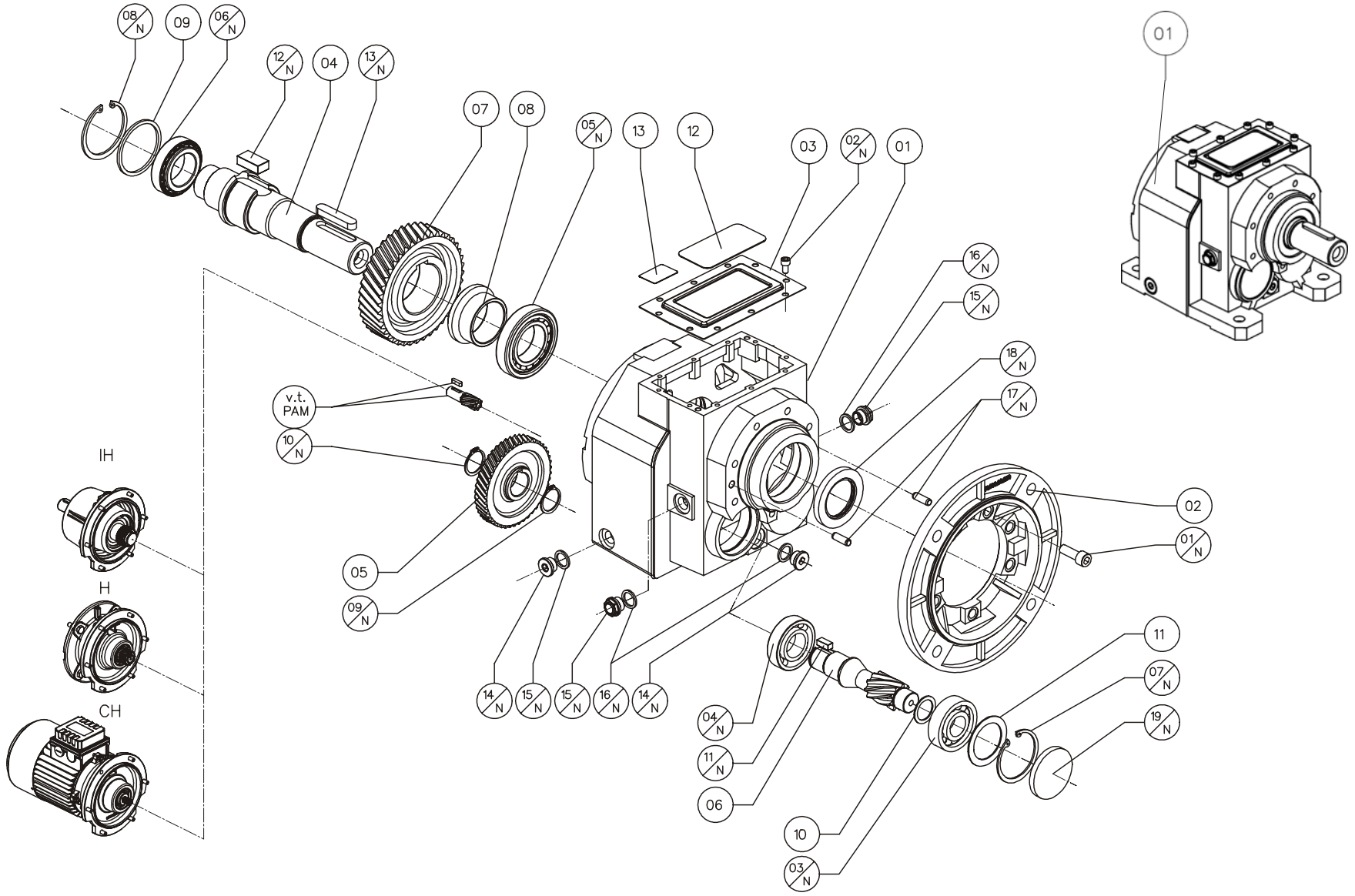


P = Project of pertinence
T = Reference table
C = Part number


07/N
08
05/N
11/N
03
12/N
06
07
04/N
12
11
01/N
02
01
v.t.
PAM
09/N
14/N
15/N
16/N
10/N
10
06/N
17/N
IH
H
CH
04
08/N
13/N
15/N
14/N
15/N
13/N
03/N
05
09
02/N

P	T	C	Built	032	042	052	062	082	102	122	142
H	001	01	Casing with foot	H.030.01	H.040.01	H.050.01	H.060.01	H.080.01	H.100.01	H.125.01	H.140.01
H	001	02	Cover	H.030.07	H.030.07	H.050.07	H.060.07	H.080.07	H.100.07	H.125.07	H.140.07
H	001	03	Output shaft	H.030.18.25.3	H.040.18.32.3	H.050.18.35.3	H.060.18.41.3	H.080.18.54.3	H.100.18.60.3	H.125.18.73.3	H.140.18.92.3
H	001	04	Gear	H.030.24	H.030.24	H.050.24	H.060.24	H.080.24	H.100.24	H.125.24	H.140.24
H	001	05	Pinion	H.030.25	H.030.25	H.050.25	H.060.25	H.080.25	H.100.25	H.125.25	H.140.25
H	001	06	Gear	H.030.26	H.040.26	8.070.26	H.060.26	H.080.26	H.100.26	H.125.26	H.140.26
H	001	07	Gear spacer	H.030.39	H.040.39	H.050.39	H.060.39	H.080.39	H.100.39	H.125.39	H.140.39
H	001	08	Bearing spacer	H.030.32	ADS 47x37x2	ADS 55x45x2	H.060.32	8.063.32	8.100.32	ADS 120x100x3,5	H.140.32
H	001	09	Bearing spacer	-	-	(ADS 28x20x1,5)	-	-	-	-	-
H	001	10	Bearing spacer	-	-	-	-	ADS 62x50x3	8.063.32	8.080.32	ADS 100x80x3,5
H	001	11	Plate	H.030.100	H.030.100	H.030.100	H.060.100	H.060.100	H.060.100	H.060.100	H.060.100
H	001	12	Plate	9.040.99	9.040.99	9.040.99	9.040.99	9.040.99	9.040.99	9.040.99	9.040.99
H	PAM	-	Pinion (tav.10)								

P	T	C	Commercial	032		042		052		062		082		102		122		142	
H	001	01/N	Screw DIN 912	M6x12	6	M6x12	6	M6x12	6	M6x12	10	M6x12	10	M6x12	10	M6x12	12	M8x16	12
H	001	02/N	Bearing	6202	1	6302	1	6304	1	6305	1	30206	1	30307	1	30308	1	30309	1
H	001	03/N	Bearing	6003	1	6003	1	6005	1	6206	1	32007x	1	30208	1	32210	1	32211	1
H	001	04/N	Bearing	32006x	1	32007x	1	32008x	1	30209	1	30211	1	30213	1	32018x	1	30220	1
H	001	05/N	Bearing	30203	1	32005x	1	32006x	1	32008x	1	32010x	1	30212	1	32213	1	30216	1
H	001	06/N	Circlip DIN 472	35	1	42	1	52	1	62	1	62	1	80	1	90	1	100	1
H	001	07/N	Circlip DIN 472	40	1	47	1	55	1	68	1	80	1	110	1	120	1	140	1
H	001	08/N	Circlip DIN 471	15	1	15	1	.	-	28	1	-	-	38	1	-	-	-	-
H	001	09/N	Circlip DIN 471	15	1	15	1	20	1	28	1	32	1	38	1	45	1	50	1
H	001	10/N	Key DIN 6885	B 5x5x12	1	B 5x5x12	1	B 6x6x14	1	B 8x7x18	1	B 10x8x25	1	B 10x8x30	-	B 14x9x40	-	B 14x9x45	-
H	001	11/N	Key DIN 6885	B 8x7x20	1	B 10x8x25	1	B16x10x30	1	B 18x11x34	1	B 20x12x40	1	B 25x14x50	1	B 28x16x60	1	816038	1
H	001	12/N	Key	1/4x1/4x1-1/2"	1	1/4x1/4x1-7/8"	1	5/16x5/16x2-1/8"	1	3/8x3/8x2-1/2"	1	1/2x1/2x2-7/8"	1	5/8x5/8x3-3/4"	1	3/4x3/4x4"	1	7/8x7/8x5"	1
H	001	13/N	Closing plug	-	-	-	-	-	-	3/8" gas	2	3/8" gas	2	1/2" gas	2	1/2" gas	2	1/2" gas	2
H	001	14/N	Oil level plug	-	-	-	-	-	-	3/8" gas	2	3/8" gas	2	1/2" gas	2	1/2" gas	2	1/2" gas	2
H	001	15/N	Gasket	-	-	-	-	-	-	3/8" gas	4	3/8" gas	4	1/2" gas	4	1/2" gas	4	1/2" gas	4
H	001	16/N	Oil seal DIN 3760	AS 30-47-7	1	AS 35-52-7	1	AS 40-62-8	1	AS 45-72-8	1	AS 55-80-8	1	AS 65-100-10	1	AS 90-120-12	1	AS 100-130-12	1
H	001	17/N	Cap	RCA 35-5	1	RCA 42-7	1	RCA 52-7	1	RCA 62-7	1	RCA 62-7	1	RCA 80-10	1	RCA 90-10	1	RCA 100-10	1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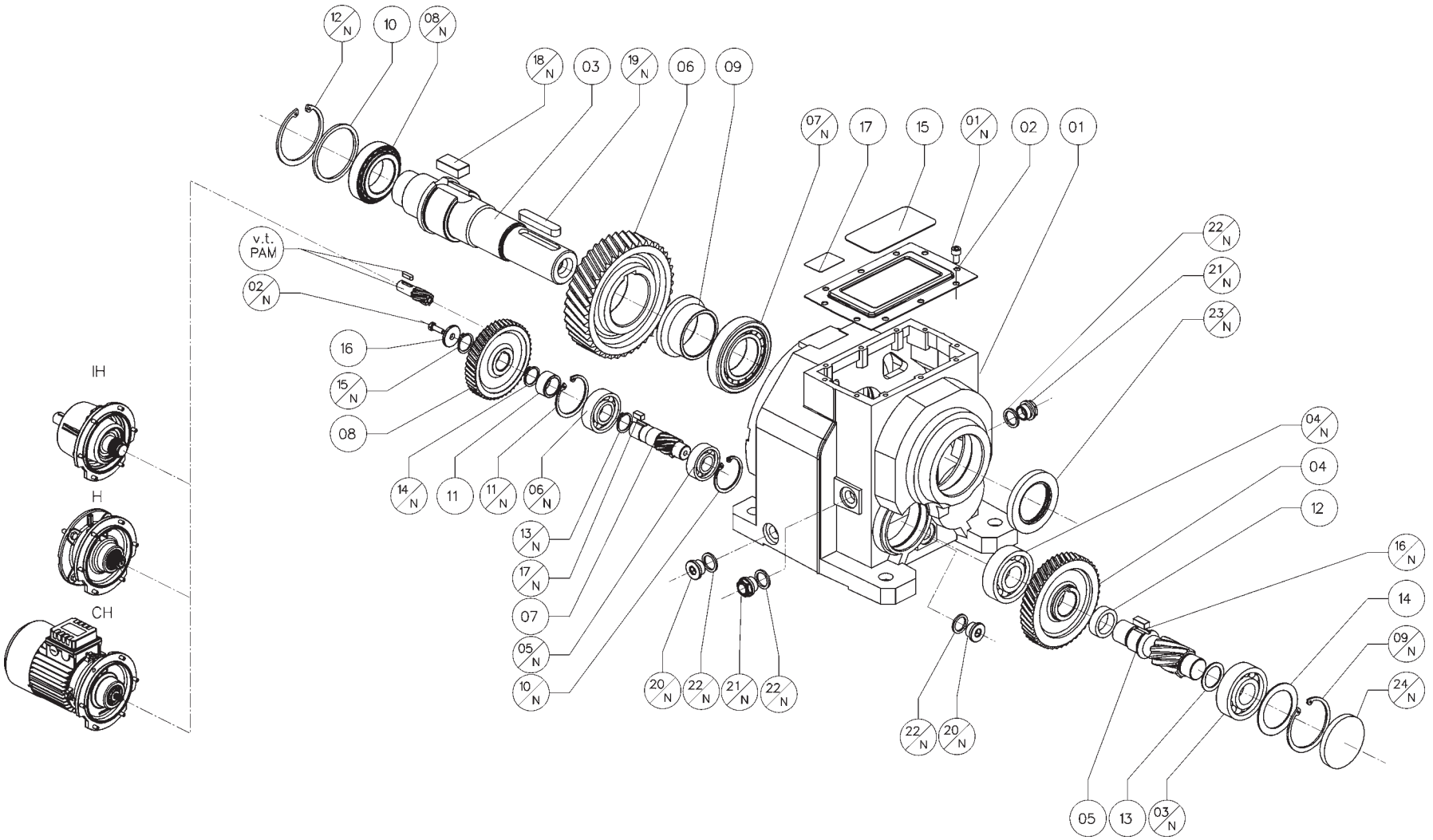
P	T	C	Built	032	042	052	062	082	102	122	142
H	002	1	Casing with flange	H.030.02	H.040.02	H.050.02	H.060.02	H.080.02	H.100.02	H.125.02	H.140.02
H	002	1	Casing universal	H.030.05	H.040.05	H.050.05	H.060.05	H.080.05	H.100.05	H.125.05	H.140.05
H	002	2	Flange FA	H.030.06.200	H.030.06.200	H.050.06.250	H.060.06.300	H.080.06.350	-	-	-
H	002	2	Flange FB	H.030.06.160	H.030.06.160	H.050.06.200	H.060.06.250	H.080.06.300	H.100.06.350	H.125.06.400	H.140.06.450
H	002	3	Flange FC	H.030.06.140	H.030.06.140	-	-	-	H.100.06.300	-	H.140.06.400
H	002	3	Cover	H.030.07	H.030.07	H.050.07	H.060.07	H.080.07	H.100.07	H.125.07	H.140.07
H	002	4	Output shaft	H.030.18.25.1.3	H.040.18.32.3	H.050.18.35.3	H.060.18.41.3	H.080.18.54.3	H.100.18.60.3	H.125.18.73.3	H.140.18.92.3
H	002	5	Gear	H.030.24	H.030.24	H.050.24	H.060.24	H.080.24	H.100.24	H.125.24	H.140.24
H	002	6	Pinion	H.030.25	H.030.25	H.050.25	H.060.25	H.080.25	H.100.25	H.125.25	H.140.25
H	002	7	Gear	H.030.26	H.040.26	8.070.26	H.060.26	H.080.26	H.100.26	H.125.26	H.140.26
H	002	8	Bearing spacer	H.030.39	H.040.39	H.050.39	H.060.39	H.080.39	H.100.39	H.125.39	H.140.39
H	002	9	Bearing spacer	H.030.32	ADS 47x37x2	ADS 55x45x2	H.060.32	8.063.32	8.100.32	ADS 120x100x3,5	H.140.32
H	002	10	Bearing spacer	-	-	(ADS 28x20x1,5)	-	-	-	-	-
H	002	11	Bearing spacer	-	-	-	-	ADS 62x50x3	806332	808032	ADS 100x80x3,5
H	002	12	Plate	H.030.100	H.030.100	H.030.100	H.060.100	H.060.100	H.060.100	H.060.100	H.060.100
H	002	13	Plate	9.040.99	9.040.99	9.040.99	9.040.99	9.040.99	9.040.99	9.040.99	9.040.99
H	PAM	-	Pinion (tav.10)								

P	T	C	Commercial	032		042		052		062		082		102		122		142	
H	002	01/N	Screw DIN 912	M8x20	5	M8x20	5	M8x25	5	M10x30	7	M12x35	7	M14x40	7	M14x40	7	M16x45	7
H	002	02/N	Screw DIN 912	M6x12	6	M6x12	6	M6x12	6	M6x12	10	M6x12	10	M6x12	10	M6x12	12	M8x16	12
H	002	03/N	Bearing	6202	1	6302	1	6304	1	6305	1	30206	1	30307	1	30308	1	30309	1
H	002	04/N	Bearing	6003	1	6003	1	6005	1	6206	1	32007x	1	30208	1	32210	1	32211	1
H	002	05/N	Bearing	32006x	1	32007x	1	32008x	1	30209	1	30211	1	30213	1	32018x	1	30220	1
H	002	06/N	Bearing	30203	1	32005x	1	32006x	1	32008x	1	32010x	1	30212	1	32213	1	30216	1
H	002	07/N	Circlip DIN 472	35	1	42	1	52	1	62	1	62	1	80	1	90	1	100	1
H	002	08/N	Circlip DIN 472	40	1	47	1	55	1	68	1	80	1	110	1	120	1	140	1
H	002	09/N	Circlip DIN 471	15	1	15	1	.	-	28	1	-	-	38	1	-	-	-	-
H	002	10/N	Circlip DIN 471	15	1	15	1	20	1	28	1	32	1	38	1	45	1	50	1
H	002	11/N	Key DIN 6885	B 5x5x12	1	B 5x5x12	1	B 6x6x14	1	B 8x7x18	1	B 10x8x25	1	B 10x8x30	-	B 14x9x40	-	B 14x9x45	-
H	002	12/N	Key	1/4x1/4x1-1/2"	1	1/4x1/4x1-7/8"	1	5/16x5/16x2-1/8"	1	3/8x3/8x2-1/2"	1	1/2x1/2x2-7/8"	1	5/8x5/8x3-3/4"	1	3/4x3/4x4"	1	7/8x7/8x5"	1
H	002	13/N	Key DIN 6885	A 8x7x35	1	A 8x7x50	1	A 10x8x50	1	A 12x8x60	1	A 14x9x80	1	A 18x11x100	1	A 20x12x110	1	A 25x14x140	1
H	002	14/N	Closing plug	-	-	-	-	-	-	3/8" gas	2	3/8" gas	2	1/2" gas	2	1/2" gas	2	1/2" gas	2
H	002	15/N	Oil level plug	-	-	-	-	-	-	3/8" gas	2	3/8" gas	2	1/2" gas	2	1/2" gas	2	1/2" gas	2
H	002	16/N	Gasket	-	-	-	-	-	-	3/8" gas	4	3/8" gas	4	1/2" gas	4	1/2" gas	4	1/2" gas	4
H	002	17/N	Dowel pin DIN 7344	6x16	2	6x16	2	6x16	2	8x24	2	10x30	2	12x36	2	12x36	2	14x40	2
H	002	18/N	Oil seal DIN 3760	AS 30-47-7	1	AS 35-52-7	1	AS 40-62-8	1	AS 45-72-8	1	AS 55-80-8	1	AS 65-100-10	1	AS 90-120-12	1	AS 100-130-12	1
H	002	19/N	Cap	RCA 35-5	1	RCA 42-7	1	RCA 52-7	1	RCA 62-7	1	RCA 62-7	1	RCA 80-10	1	RCA 90-10	1	RCA 100-10	1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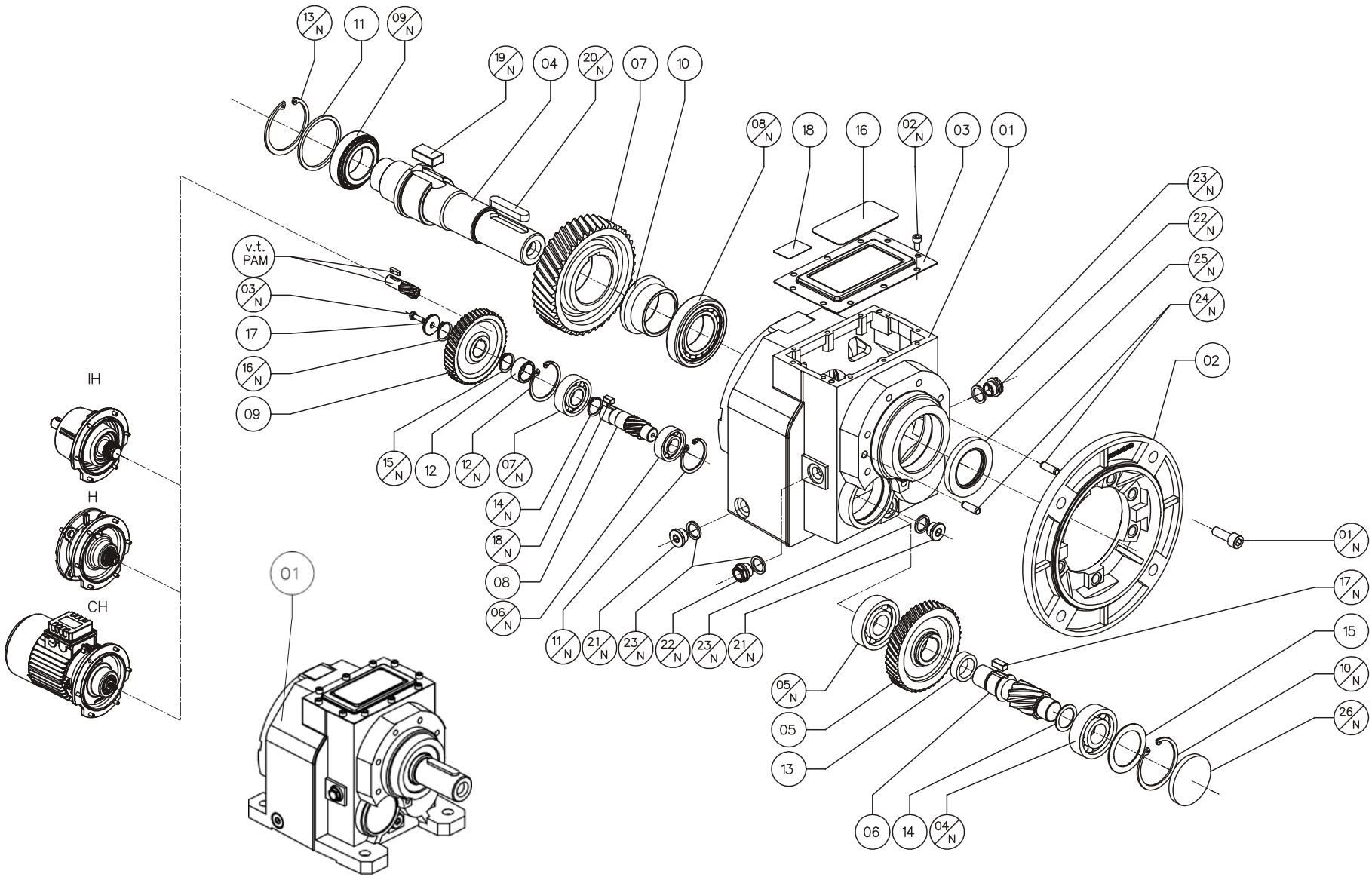
P	T	C	Built	033	043	053	063	083	103	123	143
H	003	1	Casing with foot	H.030.01	H.040.01	H.050.01	H.060.01	H.080.01	H.100.01	H.125.01	H.140.01
H	003	2	Cover	H.030.07	H.030.07	H.050.07	H.060.07	H.080.07	H.100.07	H.125.07	H.140.07
H	003	3	Output shaft	H.030.18.25.3	H.040.18.32.3	H.050.18.35.3	H.060.18.41.3	H.080.18.54.3	H.100.18.60.3	H.125.18.73.3	H.140.18.92.3
H	003	4	Gear	H.030.24	H.030.24	H.050.24	H.060.24	H.080.24	H.100.24	H.125.24	H.140.24
H	003	5	Pinion	H.030.28	H.030.28	8.070.25	H.060.28	H.080.28	H.100.28	H.125.28	H.140.28
H	003	6	Gear	H.030.26	H.040.26	8.070.26	H.060.26	H.080.26	H.100.26	H.125.26	H.140.26
H	003	7	Pinion	H.030.27.15_1	H.030.27.15_1	H.050.27.16_1	H.060.27.11	H.080.27.15	H.100.27.15	H.125.27.15	H.140.27.15
H	003	8	Gear	H.030.29.65	H.030.29.65	H.030.29.65	H.050.24.67	H.060.24.67	H.080.24.76	H.100.24.85	H.125.24.77
H	003	9	Bearing spacer	H.030.39	H.040.39	H.050.39	H.060.39	H.080.39	H.100.39	H.125.39	H.140.39
H	003	10	Bearing spacer	H.030.32	ADS 47x37x2	ADS 55x45x2	H.060.32	8.063.32	8.100.32	ADS 120x100x3,5	H.140.32
H	003	11	Bearing spacer	-	-	-	H.060.38	-	-	-	8.063.32
H	003	12	Bearing spacer	-	-	H05040	-	-	-	-	-
H	003	13	Bearing spacer	-	-	(ADS 28x20x1,5)	-	-	-	-	-
H	003	14	Bearing spacer	-	-	-	-	ADS 62x50x3	8.063.32	8.080.32	ADS 100x80x3,5
H	003	15	Plate	H.030.100	H.030.100	H.030.100	H.060.100	H.060.100	H.060.100	H.060.100	H.060.100
H	003	16	Retaining ring	-	-	-	2.080.27	0.080.34	8.125.34	8.125.34	0.160.34
H	003	17	Plate	9.040.99	9.040.99	9.040.99	9.040.99	9.040.99	9.040.99	9.040.99	9.040.99
H	PAM	-	Pinion (tav.10)								

P	T	C	Commercial	033		043		053		063		083		103		123		143	
H	003	01/N	Screw DIN 912	M6x12	6	M6x12	6	M6x12	6	M6x12	10	M6x12	10	M6x12	10	M6x12	12	M8x16	12
H	003	02/N	Screw DIN 931	-	-	-	-	-	-	M5x16	1	M8x20	1	M12x30	1	M12x35	1	M16x40	1
H	003	03/N	Bearing	6202	1	6302	1	6304	1	6305	1	30206	1	30307	1	30308	1	30309	1
H	003	04/N	Bearing	6202	1	6202	1	6204	1	6305	1	30206	1	30307	1	30308	1	30309	1
H	003	05/N	Bearing	6201	1	6201	1	6202	1	6203	1	6204	1	6205	1	6207	1	32008x	1
H	003	06/N	Bearing	6202	1	6202	1	6203	1	6204	1	6006	1	6207	1	6208	1	32010x	1
H	003	07/N	Bearing	32006x	1	32007x	1	32008x	1	30209	1	30211	1	30213	1	32018x	1	30220	1
H	003	08/N	Bearing	30203	1	32005x	1	32006x	1	32008x	1	32010x	1	30212	1	32213	1	30216	1
H	003	09/N	Circlip DIN 472	35	1	42	1	52		62	1	62	1	80	1	90	1	100	1
H	003	10/N	Circlip DIN 472	-	-	-	-	-	-	40	1	47	1	52	1	-	-	-	-
H	003	11/N	Circlip DIN 472	35	1	35	1	40		47	1	55	1	72	1	80	1	80	1
H	003	12/N	Circlip DIN 472	40	1	47	1	55		68	1	80	1	110	1	120	1	140	1
H	003	13/N	Circlip DIN 471	-	-	-	-	-	-	20	1	-	-	35	1	-	-	-	-
H	003	14/N	Circlip DIN 471	14	1	14	1	-	-	-	-	28	1	32	1	38	1	-	-
H	003	15/N	Circlip DIN 471	14	1	14	1	14	1	-	-	-	-	-	-	-	-	-	-

P	T	C	Commercial	033		043		053		063		083		103		123		143	
H	003	16/N	Key DIN 6885	B 5x5x12	1	B 5x5x12	1	B 6x6x14	1	B 8x7x18	1	B 10x8x25	1	B 10x8x30	-	B 14x9x40	-	B 14x9x45	1
H	003	17/N	Key DIN 6885	B 5x5x12	1	B 5x5x12	1	B 5x5x12	1	B 6x6x12	1	B 8x7x18	1	B 10x8x22	1	B 10x8x30	1	B 14x9x40	1
H	003	18/N	Key DIN 6885	B 8x7x20	1	B 10x8x25	1	B16x10x30	1	B 18x11x34	1	B 20x12x40	1	B 25x14x50	1	B 28x16x60	1	816038	1
H	003	19/N	Key	1/4x1/4x1-1/2"	1	1/4x1/4x1-7/8"	1	5/16x5/16x2-1/8"	1	3/8x3/8x2-1/2"	1	1/2x1/2x2-7/8"	1	5/8x5/8x3-3/4"	1	3/4x3/4x4"	1	7/8x7/8x5"	1
H	003	20/N	Closing plug	-	-	-	-	-	-	3/8" gas	2	3/8" gas	2	1/2" gas	2	1/2" gas	2	1/2" gas	2
H	003	21/N	Oil level plug	-	-	-	-	-	-	3/8" gas	2	3/8" gas	2	1/2" gas	2	1/2" gas	2	1/2" gas	2
H	003	22/N	Gasket	-	-	-	-	-	-	3/8" gas	4	3/8" gas	4	1/2" gas	4	1/2" gas	4	1/2" gas	4
H	003	23/N	Oil seal DIN 3760	AS 30-47-7	1	AS 35-52-7	1	AS 40-62-8	1	AS 45-72-8	1	AS 55-80-8	1	AS 65-100-10	1	AS 90-120-12	1	AS 100-130-12	1
H	003	24/N	Cap	RCA 35-5	1	RCA 42-7	1	RCA 52-7	1	RCA 62-7	1	RCA 62-7	1	RCA 80-10	1	RCA 90-10	1	RCA 100-10	1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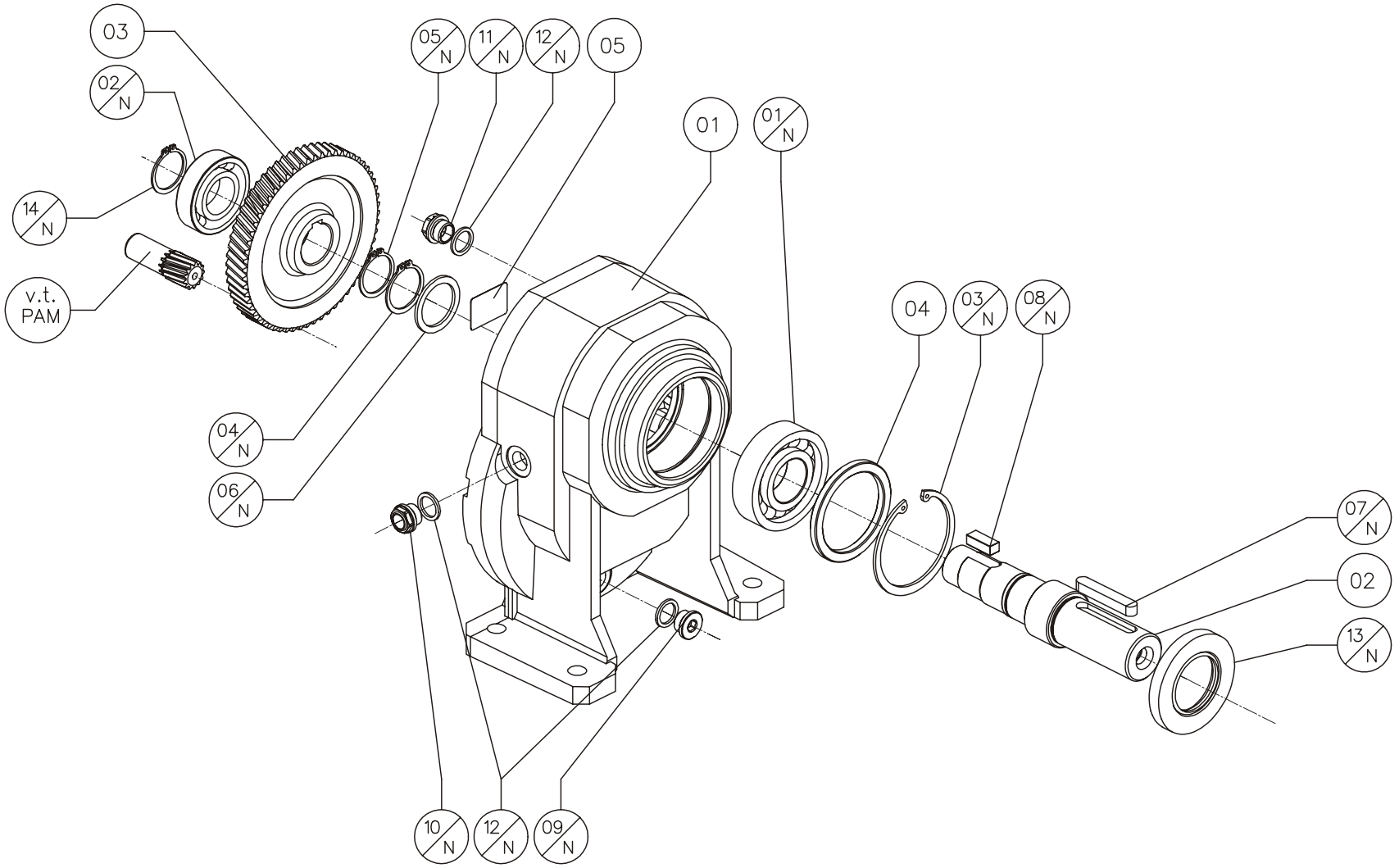
P	T	C	Built	033	043	053	063	083	103	123	143
H	004	1	Casing with flange	H.030.02	H.040.02	H.050.02	H.060.02	H.080.02	H.100.02	H.125.02	H.140.02
H	004	1	Casing universal	H.030.05	H.040.05	H.050.05	H.060.05	H.080.05	H.100.05	H.125.05	H.140.05
H	004	2	Flange FA	H.030.06.200	H.030.06.200	H.050.06.250	H.060.06.300	H.080.06.350	-	-	-
H	004	2	Flange FB	H.030.06.160	H.030.06.160	H.050.06.200	H.060.06.250	H.080.06.300	H.100.06.350	H.125.06.400	H.140.06.450
H	004	2	Flange FC	H.030.06.140	H.030.06.140	-	-	-	H.100.06.300	-	H.140.06.400
H	004	3	Cover	H.030.07	H.030.07	H.050.07	H.060.07	H.080.07	H.100.07	H.125.07	H.140.07
H	004	4	Output shaft	H.030.18.25.1.3	H.040.18.32.3	H.050.18.35.3	H.060.18.41.3	H.080.18.54.3	H.100.18.60.3	H.125.18.73.3	H.140.18.92.3
H	004	5	Gear	H.030.24	H.030.24	H.050.24	H.060.24	H.080.24	H.100.24	H.125.24	H.140.24
H	004	6	Pinion	H.030.28	H.030.28	8.070.25	H.060.28	H.080.28	H.100.28	H.125.28	H.140.28
H	004	7	Gear	H.030.26	H.040.26	8.070.26	H.060.26	H.080.26	H.100.26	H.125.26	H.140.26
H	004	8	Pinion	H.030.27.15_1	H.030.27.15_1	H.050.27.16_1	H.060.27.11	H.080.27.15	H.100.27.15	H.125.27.15	H.140.27.15
H	004	9	Gear	H.030.29.65	H.030.29.65	H.030.29.65	H.050.24.67	H.060.24.67	H.080.24.76	H.100.24.85	H.125.24.77
H	004	10	Spacer gear	H.030.39	H.040.39	H.050.39	H.060.39	H.080.39	H.100.39	H.125.39	H.140.39
H	004	11	Bearing spacer	H.030.32	ADS 47x37x2	ADS 55x45x2	H.060.32	8.063.32	8.100.32	ADS 120x100x3,5	H.140.32
H	004	12	Bearing spacer	-	-	-	H.060.38	-	-	-	8.063.32
H	004	13	Bearing spacer	-	-	H05040	-	-	-	-	-
H	004	14	Bearing spacer	-	-	(ADS 28x20x1,5)	-	-	-	-	-
H	004	15	Bearing spacer	-	-	-	-	ADS 62x50x3	806332	808032	ADS 100x80x3,5
H	004	16	Plate	H.030.100	H.030.100	H.030.100	H.060.100	H.060.100	H.060.100	H.060.100	H.060.100
H	004	17	Retaining ring	-	-	-	2.080.27	0.080.34	8.125.34	8.125.34	0.160.34
H	004	18	Plate	9.040.99	9.040.99	9.040.99	9.040.99	9.040.99	9.040.99	9.040.99	9.040.99
H	PAM	-	Pinion (tav.10)								

P	T	C	Commercial	033		043		053		063		083		103		123		143	
H	004	01/N	Screw DIN 912	M8x20	5	M8x20	5	M8x25	5	M10x30	7	M12x35	7	M14x40	7	M14x40	7	M16x45	7
H	004	02/N	Screw DIN 912	M6x12	6	M6x12	6	M6x12	6	M6x12	10	M6x12	10	M6x12	10	M6x12	12	M8x16	12
H	004	03/N	Screw DIN 931	-	-	-	-	-	-	M5x16	1	M8x20	1	M12x30	1	M12x35	1	M16x40	1
H	004	04/N	Bearing	6202	1	6302	1	6304	1	6305	1	30206	1	30307	1	30308	1	30309	1
H	004	05/N	Bearing	6202	1	6202	1	6204	1	6305	1	30206	1	30307	1	30308	1	30309	1
H	004	06/N	Bearing	6201	1	6201	1	6202	1	6203	1	6204	1	6205	1	6207	1	32008x	1
H	004	07/N	Bearing	6202	1	6202	1	6203	1	6204	1	6006	1	6207	1	6208	1	32010x	1
H	004	08/N	Bearing	32006x	1	32007x	1	32008x	1	30209	1	30211	1	30213	1	32018x	1	30220	1
H	004	09/N	Bearing	30203	1	32005x	1	32006x	1	32008x	1	32010x	1	30212	1	32213	1	30216	1
H	004	10/N	Circlip DIN 472	35	1	42	1	52		62	1	62	1	80	1	90	1	100	1
H	004	11/N	Circlip DIN 472	-	-	-	-	-	-	40	1	47	1	52	1	-	-	-	-
H	004	12/N	Circlip DIN 472	35	1	35	1	40		47	1	55	1	72	1	80	1	80	1
H	004	13/N	Circlip DIN 472	40	1	47	1	55		68	1	80	1	110	1	120	1	140	1
H	004	14/N	Circlip DIN 471	-	-	-	-	-	-	20	1	-	-	35	1	-	-	-	-
H	004	15/N	Circlip DIN 471	14	1	14	1	-	-	-	-	28	1	32	1	38	1	-	-

P	T	C	Commercial	033		043		053		063		083		103		123		143	
H	004	16/N	Circlip DIN 471	14	1	14	1	14	1	-	-	-	-	-	-	-	-	-	-
H	004	17/N	Key DIN 6885	B 5x5x12	1	B 5x5x12	1	B 6x6x14	1	B 8x7x18	1	B 10x8x25	1	B 10x8x30	-	B 14x9x40	-	B 14x9x45	1
H	004	18/N	Key DIN 6885	B 5x5x12	1	B 5x5x12	1	B 5x5x12	1	B 6x6x12	1	B 8x7x18	1	B 10x8x22	1	B 10x8x30	1	B 14x9x40	1
H	004	19/N	Key DIN 6885	B 8x7x20	1	B 10x8x25	1	B16x10x30	1	B 18x11x34	1	B 20x12x40	1	B 25x14x50	1	B 28x16x60	1	816038	1
H	004	20/N	Key	1/4x1/4x1-1/2"	1	1/4x1/4x1-7/8"	1	5/16x5/16x2-1/8"	1	3/8x3/8x2-1/2"	1	1/2x1/2x2-7/8"	1	5/8x5/8x3-3/4"	1	3/4x3/4x4"	1	7/8x7/8x5"	1
H	004	21/N	Closing plug	-	-	-	-	-	-	3/8" gas	2	3/8" gas	2	1/2" gas	2	1/2" gas	2	1/2" gas	2
H	004	22/N	Oil level plug	-	-	-	-	-	-	3/8" gas	2	3/8" gas	2	1/2" gas	2	1/2" gas	2	1/2" gas	2
H	004	23/N	Gasket	-	-	-	-	-	-	3/8" gas	4	3/8" gas	4	1/2" gas	4	1/2" gas	4	1/2" gas	4
H	004	24/N	Dowel pin DIN 7344	6x16	2	6x16	2	6x16	2	8x24	2	10x30	2	12x36	2	12x36	2	14x40	2
H	004	25/N	Oil seal DIN 3760	AS 30-47-7	1	AS 35-52-7	1	AS 40-62-8	1	AS 45-72-8	1	AS 55-80-8	1	AS 65-100-10	1	AS 90-120-12	1	AS 100-130-12	1
H	004	26/N	Cap	RCA 35-5	1	RCA 42-7	1	RCA 52-7	1	RCA 62-7	1	RCA 62-7	1	RCA 80-10	1	RCA 90-10	1	RCA 100-10	1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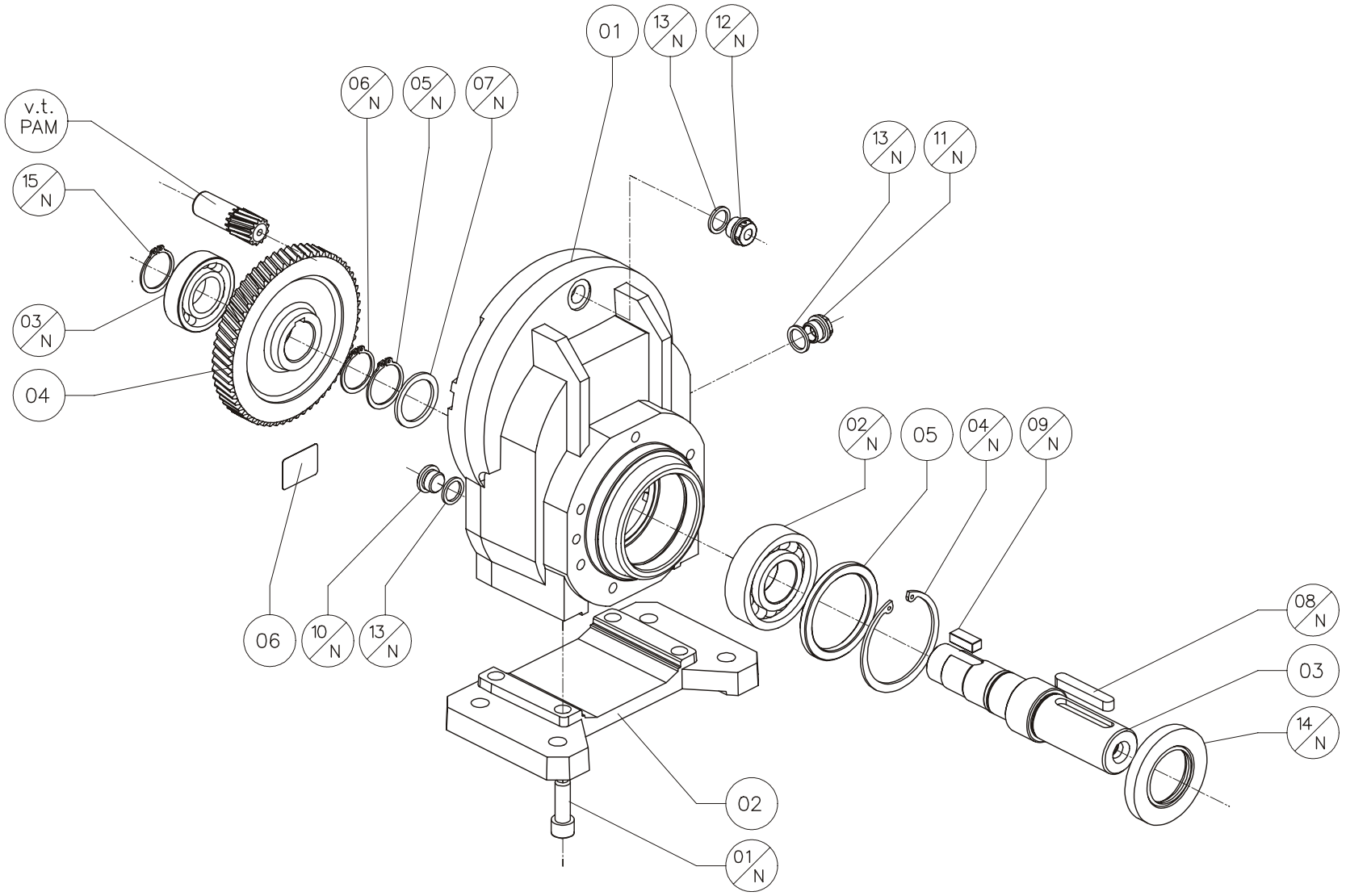
P	T	C	Built	041	051	061	081	101	121
H	005	1	Casing with foot	H.040.08	H.050.08	H.060.08	H.080.08	H.100.08	H.125.08
H	005	2	Output shaft	H.040.19.19.3	H.050.19.25.3	H.060.19.32.3	H.080.19.38.3	H.100.19.48.3	H.125.19.54.3
H	005	3	Gear	H.030.24	H.050.24	H.060.24	H.080.24	H.100.24	H.125.24
H	005	4	Gear spacer	H.040.41	H.050.41	H.060.41	H.080.41	H.100.41	H.125.41
H	005	5	Plate	9.040.99	9.040.99	9.040.99	9.040.99	9.040.99	9.040.99
H	PAM	-	Pinion (tav.10)						

P	T	C	Commercial	041		051		061		081		101		121	
H	005	01/N	Bearing	6304	1	6305	1	6306	1	6307	1	6308	1	6310	1
H	005	02/N	Bearing	6203	1	6204	1	6206	1	6206	1	6207	1	6208	1
H	005	03/N	Circlip DIN 472	52	1	62	1	72	1	80	1	90	1	110	1
H	005	04/N	Circlip DIN 471	20	1	25	1	30	1	35	1	40	1	50	1
H	005	05/N	Circlip DIN 471	17	1	-	-	30	1	32	1	38	1	45	1
H	005	06/N	Bearing spacer	ADS 28x20x2	1	ADS 35x25x2	1	ADS 42x30x2,5	1	ADS 45x35x2,5	1	ADS 50x40x2,5	1	ADS 62x50x3	1
H	005	07/N	Key DIN 6885	A 6x6x30	1	A 8x7x35	1	A 8x7x45	1	A 10x8x60	1	A 14x9x90	1	A 16x10x90	1
H	005	08/N	Key	3/16x3/16x1-1/8"	1	1/4x1/4x1-1/2"	1	1/4x1/4x1-7/8"	1	3/8x3/8x2-1/2"	1	1/2x1/2x3-3/8"	1	1/2x1/2x3-3/8"	1
H	005	09/N	Closing plug	-	-	-	-	-	-	3/8" gas	1	1/2" gas	1	1/2" gas	1
H	005	10/N	Oil level plug	-	-	-	-	-	-	3/8" gas	1	1/2" gas	1	1/2" gas	1
H	005	11/N	Breather plug	-	-	-	-	-	-	3/8" gas	1	1/2" gas	1	1/2" gas	1
H	005	12/N	Gasket	-	-	-	-	-	-	3/8" gas	3	1/2" gas	3	1/2" gas	3
H	005	13/N	Oil seal DIN 3760	AS 25-52-7	1	AS 30-62-7	1	AS 40-72-10	1	AS 45-80-10	1	AS 55-90-10	1	AS 60-110-10	1
H	005	14/N	Circlip DIN 471	15	1	20	1	28	1	-	-	-	-	-	-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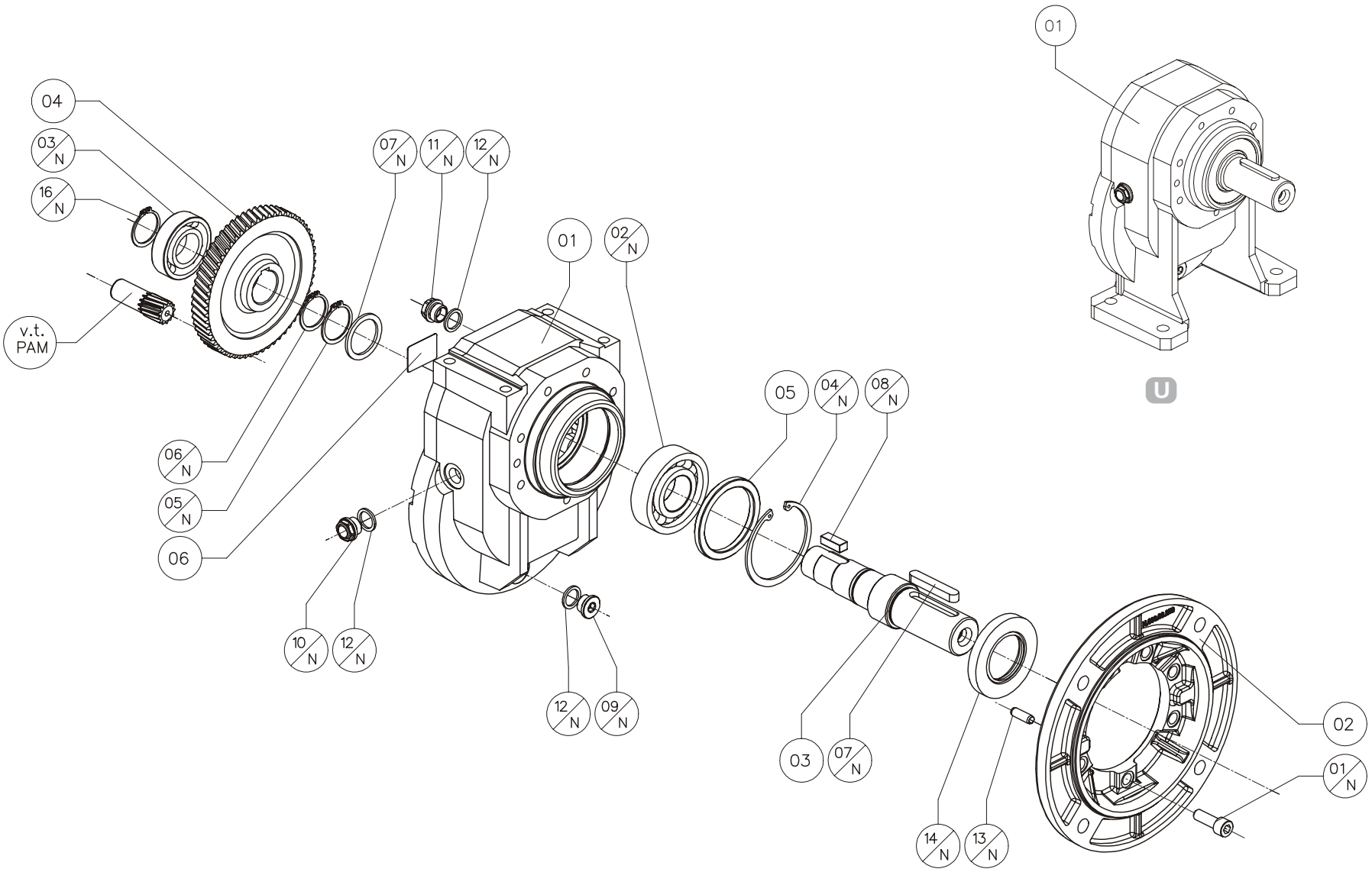
P	T	C	Built	041	051	061	081	101	121
H	006	1	Casing mono	H.040.09	H.050.09	H.060.09	H.080.09	H.100.09	H.125.09
H	006	2	Foot	H.040.10 / 10.1	H.050.10	H.060.10	H.080.10	H.100.10	H.125.10
H	006	3	Output shaft	H.040.19.19.3	H.050.19.25.3	H.060.19.32.3	H.080.19.38.3	H.100.19.48.3	H.125.19.54.3
H	006	4	Gear	H.030.24	H.050.24	H.060.24	H.080.24	H.100.24	H.125.24
H	006	5	Gear spacer	H.040.41	H.050.41	H.060.41	H.080.41	H.100.41	H.125.41
H	006	6	Plate	9.040.99	9.040.99	9.040.99	9.040.99	9.040.99	9.040.99
H	PAM	-	Pinion (tav.10)						

P	T	C	Commercial	041		051		061		081		101		121	
H	006	01/N	Screw DIN 912	M8x12 (DIN7984)	4	M10x20	4	M 10x25	4	M12x35	4	M 16x40	4	M 16x50	4
H	006	02/N	Bearing	6304	1	6305	1	6306	1	6307	1	6308	1	6310	1
H	006	03/N	Bearing	6203	1	6204	1	6206	1	6206	1	6207	1	6208	1
H	006	04/N	Circlip DIN 472	52	1	62	1	72	1	80	1	90	1	110	1
H	006	05/N	Circlip DIN 471	20	1	25	1	30	1	35	1	40	1	50	1
H	006	06/N	Circlip DIN 471	17	1	-	-	30	1	32	1	38	1	45	1
H	006	07/N	Bearing spacer	ADS 28x20x2	1	ADS 35x25x2	1	ADS 42x30x2,5	1	ADS 45x35x2,5	1	ADS 50x40x2,5	1	ADS 62x50x3	1
H	006	08/N	Key	3/16x3/16x1-1/8"	1	1/4x1/4x1-1/2"	1	1/4x1/4x1-7/8"	1	3/8x3/8x2-1/2"	1	1/2x1/2x3-3/8"	1	1/2x1/2x3-3/8"	1
H	006	09/N	Key DIN 6885	B 5x5x12	1	B 6x6x14	1	B 8x7x18	1	B 10x8x25	1	B 10x8x30	1	B 14x9x40	1
H	006	10/N	Closing plug	-	-	-	-	-	-	3/8" gas	1	1/2" gas	1	1/2" gas	1
H	006	11/N	Oil level plug	-	-	-	-	-	-	3/8" gas	1	1/2" gas	1	1/2" gas	1
H	006	12/N	Breather plug	-	-	-	-	-	-	3/8" gas	1	1/2" gas	1	1/2" gas	1
H	006	13/N	Gasket	-	-	-	-	-	-	3/8" gas	3	1/2" gas	3	1/2" gas	3
H	006	14/N	Oil seal DIN 3760	AS 25-52-7	1	AS 30-62-7	1	AS 40-72-10	1	AS 45-80-10	1	AS 55-90-10	1	AS 60-110-10	1
H	006	15/N	Circlip DIN 471	15	1	20	1	28	1	-	-	-	-	-	-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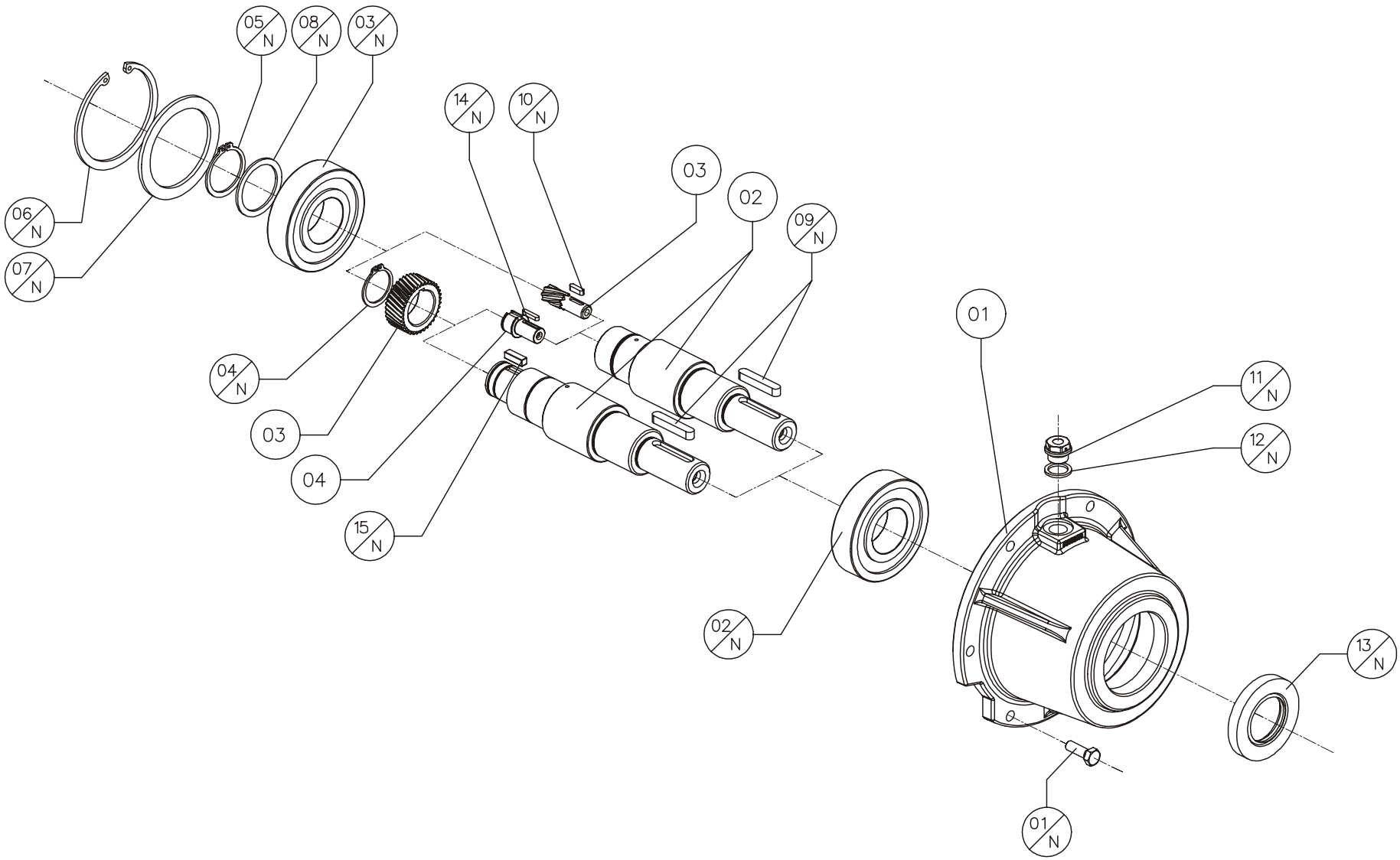
P	T	C	Built	041	051	061	081	101	121
H	007	1	Casing with flange	H.040.09	H.050.09	H.060.09	H.080.09	H.100.09	H.125.09
H	007	1	Casing universal	H.040.11	H.050.11	H.060.11	H.080.11	H.100.11	H.125.11
H	007	2	Flange	H.030.06.200	H.030.06.200	H.050.06.250	H.060.06.300	H.060.06.300	H.080.06.350
H	007	2	Flange	H.030.06.160	H.030.06.160	H.050.06.200	H.060.06.250	H.060.06.250	H.080.06.300
H	007	2	Flange	H.030.06.140	H.030.06.140	-	-	-	-
H	007	3	Output shaft	H.040.19.19.3	H.050.19.25.3	H.060.19.32.3	H.080.19.38.3	H.100.19.48.3	H.125.19.54.3
H	007	4	Gear	H.030.24	H.050.24	H.060.24	H.080.24	H.100.24	H.120.24
H	007	5	Gear spacer	H.040.41	H.050.41	H.060.41	H.080.41	H.100.41	H.120.41
H	007	6	Plate	9.040.99	9.040.99	9.040.99	9.040.99	9.040.99	9.040.99
H	PAM	-	Pinion (tav.10)						

P	T	C	Commercial	041		051		061		081		101		121	
H	007	01/N	Screw DIN 912	M8x20	5	M8x20	5	M8x25	5	M10x30	7	M 10x30	7	M 12x35	7
H	007	02/N	Bearing	6304	1	6305	1	6306	1	6307	1	6308	1	6310	1
H	007	03/N	Bearing	6203	1	6204	1	6206	1	6206	1	6207	1	6208	1
H	007	04/N	Circlip DIN 472	52	1	62	1	72	1	80	1	90	1	110	1
H	007	05/N	Circlip DIN 471	20	1	25	1	30	1	35	1	40	1	50	1
H	007	06/N	Circlip DIN 471	17	1	-	-	30	1	32	1	38	1	45	1
H	007	07/N	Bearing spacer	ADS 28x20x2	1	ADS 35x25x2	1	ADS 42x30x2,5	1	ADS 45x35x2,5	1	ADS 50x40x2,5	1	ADS 62x50x3	1
H	007	08/N	Key	3/16x3/16x1-1/8"	1	1/4x1/4x1-1/2"	1	1/4x1/4x1-7/8"	1	3/8x3/8x2-1/2"	1	1/2x1/2x3-3/8"	1	1/2x1/2x3-3/8"	1
H	007	09/N	Key DIN 6885	B 5x5x12	1	B 6x6x14	1	B 8x7x18	1	B 10x8x25	1	B 10x8x30	1	B 14x9x40	1
H	007	10/N	Closing plug	-	-	-	-	-	-	3/8" gas	1	1/2" gas	1	1/2" gas	1
H	007	11/N	Oil level plug	-	-	-	-	-	-	3/8" gas	1	1/2" gas	1	1/2" gas	1
H	007	12/N	Breather plug	-	-	-	-	-	-	3/8" gas	1	1/2" gas	1	1/2" gas	1
H	007	13/N	Gasket	-	-	-	-	-	-	3/8" gas	3	1/2" gas	3	1/2" gas	3
H	007	14/N	Dowel pin DIN 7344	6x16	2	6x16	2	6x16	2	8x24	2	8x24	2	10x30	2
H	007	15/N	Oil seal DIN 3760	AS 25-52-7	1	AS 30-62-7	1	AS 40-72-10	1	AS 45-80-10	1	AS 55-90-10	1	AS 60-110-10	1
H	007	16/N	Circlip DIN 471	15	1	20	1	28	1	-	-	-	-	-	-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P	T	C	Built	041	051	061	081	101	121
H	008	1	Cover	H.030.03	H.030.03	H.030.03	H.060.03	H.100.03	H.100.03
H	008	2	Input shaft	H.040.15.16.3	H.030.15.22.3	H.030.15.22.3	H.060.15.35.3	H.100.15.41.3	H.100.15.41.3
H	008	3	Pinion	H.030.23	H.050.23	H.060.23	H.080.23	H.100.23	H.125.23
H	008	4	Pinion hub	H.030.22	H.050.22	H.060.22	H.080.22	-	-

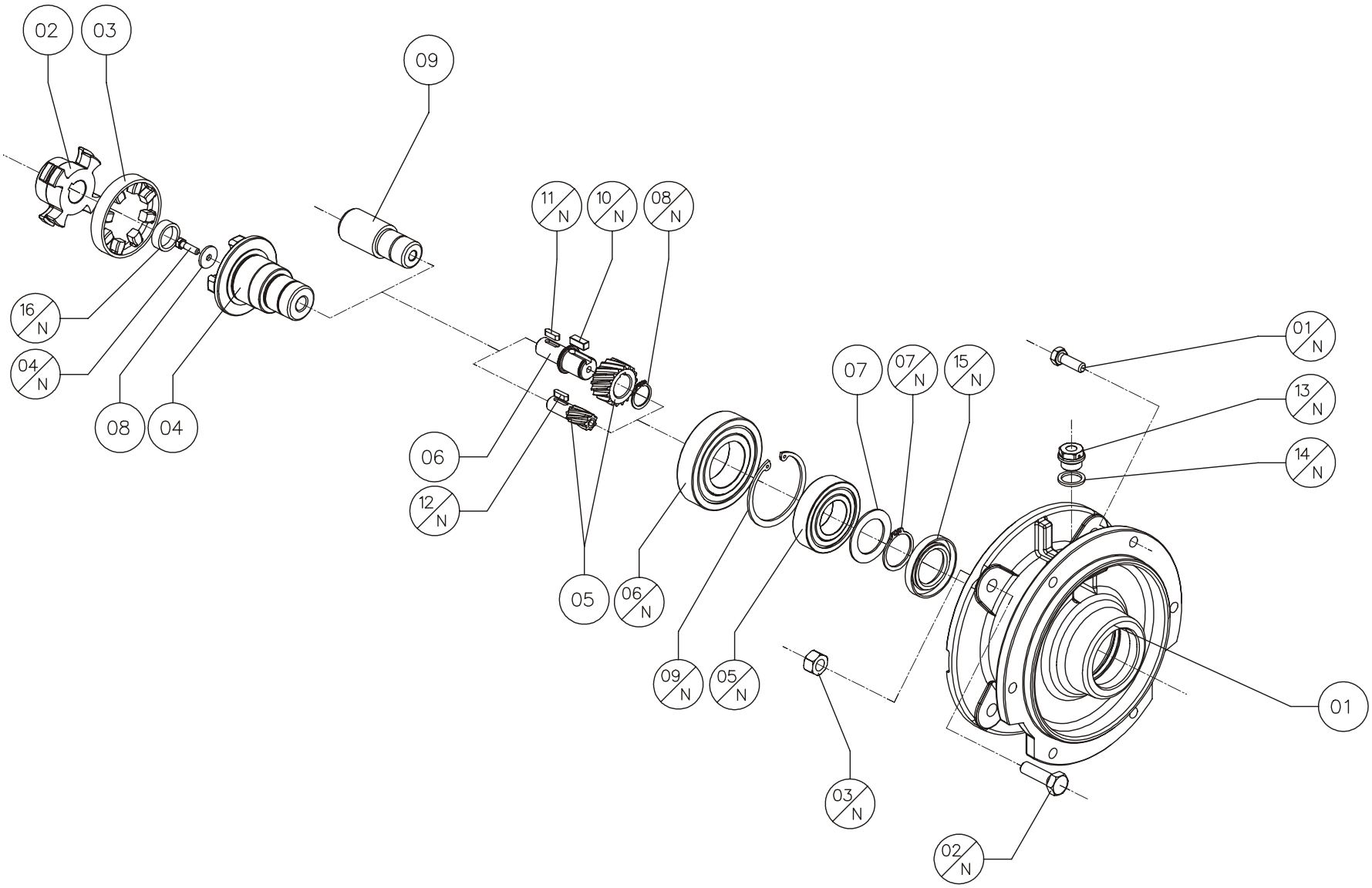
P	T	C	Commercial	041		051		061		081		101		121	
H	008	1/N	Screw DIN 931	M8x20	4	M8x20	4	M8x20	4	M8x25	6	M12x35	6	M12x35	6
H	008	2/N	Bearing	6206	1	6206	1	6206	1	6308	1	6309	1	6309	1
H	008	3/N	Bearing	6206	1	6206	1	6206	1	6308	1	6310	1	6310	1
H	008	4/N	Circlip DIN 471	16	1	19	1	24	1	30	1	40	1	40	1
H	008	5/N	Circlip DIN 471	-	-	-	-	-	-	-	-	-	-	-	-
H	008	6/N	Circlip DIN 472	62	1	62	1	62	1	90	1	110	1	110	1
H	008	7/N	Bearing spacer	ADS 62x50x2	1	ADS 62x50x2	1	ADS 62x50x2	1	ADS 90-70-3,5	1	ADS 110x90x2	1	ADS 110x90x2	1
H	008	8/N	Bearing spacer	-	-	-	-	-	-	-	-	-	-	-	-
H	008	9/N	Key	3/16x3/16x1-1/8"	1	3/16x3/16x1-1/8"	1	3/16x3/16x1-1/8"	1	5/16x5/16x2-1/8"	1	3/8x3/8x2-1/2"	1	3/8x3/8x2-1/2"	1
H	008	11/N	Breather plug	-	-	-	-	-	-	3/8" gas	1	1/2" gas	1	1/2" gas	1
H	008	12/N	Gasket	-	-	-	-	-	-	3/8" gas	1	1/2" gas	1	1/2" gas	1
H	008	13/N	Oil seal DIN 3760	ADT A 30-52-7	1	ADT A 30-52-7	1	ADT A 30-52-7	1	ADT AS 40-72-10	1	ADT AS 45-80-10	1	ADT AS 45-80-10	1
H	008	14/N	Key DIN 6885	-	-	-	-	-	-	-	-	A 8x7x40	1	A 8x7x40	1
H	008	15/N	Key DIN 6885	B 5x5x12	1	B 6x6x16	1	B 8x7x16	1	B 8x7x18	1	B 12x8x25	1	B 12x8x25	1

P	T	C	Built	032	042	052	062	082	102	122	142
H	008	1	Cover	H.030.03	H.030.03	H.030.03	H.060.03	H.060.03	H.100.03	H.100.03	H.140.03
H	008	2	Input shaft	H.030.15.22.3	H.030.15.22.3	H.030.15.22.3	H.060.15.35.3	H.060.15.35.3	H.100.15.41.3	H.100.15.41.3	H.140.15.41.3
H	008	3	Pinion	H.030.23	H.030.23	H.050.23	H.060.23	H.080.23	H.100.23	H.125.23	H.140.23
H	008	4	Pinion hub	H.030.22	H.030.22	H.050.22	H.060.22	H.080.22	-	-	-

P	T	C	Commercial	032		042		052		062		082		102		122		142	
H	008	1/N	Screw DIN 931	M8x20	4	M8x20	4	M8x20	4	M8x25	6	M8x25	6	M12x35	6	M12x35	6	M12x35	8
H	008	2/N	Bearing	6206	1	6206	1	6206	1	6308	1	6308	1	6309	1	6309	1	NJ310EC	1
H	008	3/N	Bearing	6206	1	6206	1	6206	1	6308	1	6308	1	6310	1	6310	1	6312	1
H	008	4/N	Circlip DIN 471	16	1	16	1	19	1	24	1	30	1	40	1	40	1	40	1
H	008	5/N	Circlip DIN 471	-	-	-	-	-	-	-	-	-	-	-	-	-	-	60	1
H	008	6/N	Circlip DIN 472	62	1	62	1	62	1	90	1	90	1	110	1	110	1	130	1
H	008	7/N	Bearing spacer	ADS 62x50x2	1	ADS 62x50x2	1	ADS 62x50x2	1	ADS 90-70-3,5	1	ADS 90-70-3,5	1	ADS 110x90x2	1	ADS 110x90x2	1	ADS 130x105x3,5	1
H	008	8/N	Bearing spacer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ADS 75x60x30	1
H	008	9/N	Key	3/16x3/16x1-1/2"	1	3/16x3/16x1-1/8"	1	3/16x3/16x1-1/2"	1	5/16x5/16x2-1/8"	1	5/16x5/16x2-1/8"	1	3/8x3/8x2-1/2"	1	3/8x3/8x2-1/2"	1	3/8x3/8x2-1/2"	1
H	008	11/N	Breather plug	-	-	-	-	-	-	3/8" gas	1	3/8" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1
H	008	12/N	Gasket	-	-	-	-	-	-	3/8" gas	1	3/8" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1
H	008	13/N	Oil seal DIN 3760	ADT A 30-52-7	1	ADT A 30-52-7	1	ADT A 30-52-7	1	ADT AS 40-72-10	1	ADT AS 40-72-10	1	ADT AS 45-80-10	1	ADT AS 45-80-10	1	ADT A 50-90-10	1
H	008	14/N	Key DIN 6885	-	-	-	-	-	-	-	-	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1
H	008	15/N	Key DIN 6885	B 5x5x12	1	B 5x5x12	1	B 6x6x16	1	B 8x7x16	1	B 8x7x18	1	B 12x8x25	1	B 12x8x25	1	B 12x8x30	1

P	T	C	Built	033	043	053	063	083	103	123	143
H	008	1	Cover	H.030.03	H.030.03	H.030.03	H.060.03	H.060.03	H.100.03	H.100.03	H.140.03
H	008	2	Input shaft	H.030.15.22.3	H.030.15.22.3	H.030.15.22.3	H.060.15.35.3	H.060.15.35.3	H.100.15.41.3	H.100.15.41.3	H.140.15.41.3
H	008	3	Pinion	0.030.23	0.030.23	0.030.23	H.050.23	H.060.23	H.080.23	H.100.23	H.125.23
H	008	4	Pinion hub	0.030.22	0.030.22	0.030.22	H.050.22	H.060.22	H.080.22	H.100.22	H.100.22

P	T	C	Commercial	033		043		053		063		083		103		123		143	
H	008	1/N	Screw DIN 931	M8x20	4	M8x20	4	M8x20	4	M8x25	6	M8x25	6	M12x35	6	M12x35	6	M12x35	8
H	008	2/N	Bearing	6206	1	6206	1	6206	1	6308	1	6308	1	6309	1	6309	1	NJ310EC	1
H	008	3/N	Bearing	6206	1	6206	1	6206	1	6308	1	6308	1	6310	1	6310	1	6312	1
H	008	4/N	Circlip DIN 471	-	-	-	-	-	-	19	1	24	1	30	1	40	1	40	1
H	008	5/N	Circlip DIN 471	-	-	-	-	-	-	-	-	-	-	-	-	-	-	60	1
H	008	6/N	Circlip DIN 472	62	1	62	1	62	1	90	1	90	1	110	1	110	1	130	1
H	008	7/N	Bearing spacer	ADS 62x50x2	1	ADS 62x50x2	1	ADS 62x50x2	1	ADS 90-70-3,5	1	ADS 90-70-3,5	1	ADS 110x90x2	1	ADS 110x90x2	1	ADS 130x105x3,5	1
H	008	8/N	Bearing spacer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	ADS 75x60x30	1
H	008	9/N	Key	3/16x3/16x1-1/2"	1	3/16x3/16x1-1/8"	1	3/16x3/16x1-1/2"	1	5/16x5/16x2-1/8"	1	5/16x5/16x2-1/8"	1	3/8x3/8x2-1/2"	1	3/8x3/8x2-1/2"	1	3/8x3/8x2-1/2"	1
H	008	10/N	Key DIN 6885	-	-	-	-	-	-	-	-	-	-	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1
H	008	11/N	Breather plug	-	-	-	-	-	-	3/8" gas	1	3/8" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1
H	008	12/N	Gasket	-	-	-	-	-	-	3/8" gas	1	3/8" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1
H	008	13/N	Oil seal DIN 3760	ADT A 30-52-7	1	ADT A 30-52-7	1	ADT A 30-52-7	1	ADT AS 40-72-10	1	ADT AS 40-72-10	1	ADT AS 45-80-10	1	ADT AS 45-80-10	1	ADT A 50-90-10	1
H	008	14/N	Key DIN 6885	-	-	-	-	-	-	-	-	-	-	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1
H	008	15/N	Key DIN 6885	-	-	-	-	-	-	B 6x6x16	1	B 8x7x16	1	B 8x7x18	1	B 12x8x25	1	B 12x8x25	1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IEC Input

	P	T	C	Commercial	063		071		080		090		100		112		132		160		180		200		225	
H030 H040 H041 H050 H051 H061	H	011	2/N	Screw DIN 931	M8x30	4	M8x30	4	M10x35	4	M10x35	4	M12x45	4	M12x45	4										
	H	011	3/N	Nut DIN 934/6	M8x8	4	M8x8	4	M10x10	4	M10x10	4	M12x12	4	M12x12	4										
	H	011	5/N	Bearing	6204 2Z	1	6205 2Z	1	6206 2Z	1	6206 2Z	1	6207 2Z	1	6207 2Z	1										
	H	011	6/N	Bearing	-	1	6006 2Z	1	6008 2Z	1	6008 2Z	1	6010 2Z	1	6010 2Z	1										
	H	011	7/N	Circlip DIN 471	20	1	25	1	30	1	30	1	35	1	35	1										
	H	011	9/N	Circlip DIN 472	47	1	52	1	62	1	62	1	72	1	72	1										
	P	T	C	Built	063		071		080		090		100		112		132		160		180		200		225	
	H	011	1	Flange	H.030.04		H.030.04		H.030.04		H.030.04		H.030.04		H.030.04											

	P	T	C	Commercial	063		071		080		090		100		112		132		160		180		200		225	
H060 H080 H081	H	011	2/N	Screw DIN 931			M8x30	4	M10x35	4	M10x35	4	M12x45	4	M12x45	4	M12x50	4	M16x50	4						
	H	011	3/N	Nut DIN 934/6			M8x8	4	M10x10	4	M10x10	4	M12x12	4	M12x12	4	M12x12	4	M16x16	4						
	H	011	5/N	Bearing			6205 2Z	1	6206 2Z	1	6206 2Z	1	6207 2Z	1	6207 2Z	1	6208 2Z	1	6310 2Z	1						
	H	011	6/N	Bearing			6006 2Z	1	6208 2Z	1	6208 2Z	1	6210 2Z	1	6210 2Z	1	6212 2Z	1	6015 2Z	1						
	H	011	7/N	Circlip DIN 471			25	1	30	1	30	1	35	1	35	1	40	1	50	1						
	H	011	9/N	Circlip DIN 472			52	1	62	1	62	1	72	1	72	1	80	1	110	1						
	P	T	C	Built	063		071		080		090		100		112		132		160		180		200		225	
	H	011	1	Flange			H.060.04		H.060.04		H.060.04		H.060.04		H.060.04		H.060.04		H.060.04							

	P	T	C	Commercial	063		071		080		090		100		112		132		160		180		200		225	
H100 H101 H121 H125	H	011	2/N	Screw DIN 931							M10x35	4	M12x45	4	M12x45	4	M12x50	4	M16x50	4	M16x50	4	M16x50	4		
	H	011	3/N	Nut DIN 934/6							M10x10	4	M12x12	4	M12x12	4	M12x12	4	M16x16	4	M16x16	4	M16x16	4		
	H	011	5/N	Bearing							6206 2Z	1	6207 2Z	1	6207 2Z	1	6208 2Z	1	6310 2Z	1	6310 2Z	1	6312 2Z	1		
	H	011	6/N	Bearing							6208 2Z	1	6210 2Z	1	6210 2Z	1	6212 2Z	1	6015 2Z	1	6015 2Z	1	6018 2Z	1		
	H	011	7/N	Circlip DIN 471							30	1	35	1	35	1	40	1	50	1	50	1	60	1		
	H	011	9/N	Circlip DIN 472							62	1	72	1	72	1	80	1	110	1	110	1	130	1		
	P	T	C	Built	063		071		080		090		100		112		132		160		180		200		225	
	H	011	1	Flange							H.100.04		H.100.04		H.100.04		H.100.04		H.100.04		H.100.04		H.100.04			

	P	T	C	Commercial	063		071		080		090		100		112		132		160		180		200		225	
H140	H	011	2/N	Screw DIN 931													M12x50	4	M16x50	4	M16x50	4	M16x50	4	M16x50	4
	H	011	3/N	Nut DIN 934/6													M12x12	4	M16x16	4	M16x16	4	M16x16	4	M16x16	4
	H	011	5/N	Bearing													6208 2Z	1	6310 2Z	1	6310 2Z	1	6312 2Z	1	6312 2Z	1
	H	011	6/N	Bearing													6212 2Z	1	6015 2Z	1	6015 2Z	1	6018 2Z	1	6018 2Z	1
	H	011	7/N	Circlip DIN 471													40	1	50	1	50	1	60	1	60	1
	H	011	9/N	Circlip DIN 472													80	1	110	1	110	1	130	1	130	1
	P	T	C	Built	063		071		080		090		100		112		132		160		180		200		225	
	H	011	1	Flange													H.140.04		H.140.04		H.140.04		H.140.04		H.140.04	

NEMA Input

	P	T	C	Commercial	56C		140TC		180TC		210TC		250TC		280TC		320TC		360TC	
	H	009	2/N	Screw DIN 931	-	-	-	-	-	-										
	H	009	3/N	Nut DIN 934/6	-	-	-	-	-	-										
H030	H	009	5/N	Bearing	6206 2Z	1	6206 2Z	1	6207 2Z	1										
H040	H	009	6/N	Bearing	6208 2Z	1	6208 2Z	1	6210 2Z	1										
H041	H	009	7/N	Circlip DIN 471	30	1	30	1	35	1										
H050	H	009	9/N	Circlip DIN 472	62	1	62	1	72	1										
H051																				
H061	P	T	C	Built	56C		140TC		180TC		210TC		250TC		280TC		320TC		360TC	
	H	009	1	Flange	H.030.04.165.3		H.030.04.165.3		H.030.04.229.3.1											
	H	009	2	Motor half coupling	H.060.12.056C_1		H.060.12.140TC_1		H.060.12.180TC_1											
	H	009	3	Flexible joint	H.060.13.080		H.060.13.080		H.060.13.112											

	P	T	C	Commercial	56C		140TC		180TC		210TC		250TC		280TC		320TC		360TC	
	H	009	2/N	Screw DIN 931	-	-	-	-	-	-	-	-	-	-						
	H	009	3/N	Nut DIN 934/6	-	-	-	-	-	-	-	-	-	-						
	H	009	5/N	Bearing	6206 2Z	1	6206 2Z	1	6207 2Z	1	6310 2Z	1	6310 2Z	1						
H060	H	009	6/N	Bearing	6208 2Z	1	6208 2Z	1	6210 2Z	1	6015 2Z	1	6015 2Z	1						
H080	H	009	7/N	Circlip DIN 471	30	1	30	1	35	1	50	1	50	1						
H081	H	009	9/N	Circlip DIN 472	62	1	62	1	72	1	110	1	110	1						
	P	T	C	Built	56C		140TC		180TC		210TC		250TC		280TC		320TC		360TC	
	H	009	1	Flange	H.060.04.165.3		H.060.04.165.3		H.060.04.229.3.1		H.060.04.229.3		H.060.04.229.3							
	H	009	2	Motor half coupling	H.060.12.056C_1		H.060.12.140TC_1		H.060.12.180TC_1		H.060.12.210TC_1		H.060.12.250TC_1							
	H	009	3	Flexible joint	H.060.13.080		H.060.13.080		H.060.13.112		H.060.13.160		H.060.13.160							

	P	T	C	Commercial	56C		140TC		180TC		210TC		250TC		280TC		320TC		360TC	
	H	009	2/N	Screw DIN 931			-	-	-	-	-	-	-	-	-	-	-	-		
	H	009	3/N	Nut DIN 934/6			-	-	-	-	-	-	-	-	-	-	-	-		
	H	009	5/N	Bearing			6206 2Z	1	6207 2Z	1	6310 2Z	1	6310 2Z	1	6312 2Z	1	6212 2Z	1		
H100	H	009	6/N	Bearing			6208 2Z	1	6210 2Z	1	6015 2Z	1	6015 2Z	1	6018 2Z	1	6018 2Z	1		
H101	H	009	7/N	Circlip DIN 471			30	1	35	1	50	1	50	1	60	1	60	1		
H121	H	009	9/N	Circlip DIN 472			62	1	72	1	110	1	110	1	130	1	130	1		
H125																				
	P	T	C	Built	56C		140TC		180TC		210TC		250TC		280TC		320TC		360TC	
	H	009	1	Flange			H.100.04.165.3		H.100.04.229.3.1		H.100.04.229.3		H.100.04.229.3		H.100.04.279.3.1		H.100.04.340.3.1			
	H	009	2	Motor half coupling			H.060.12.140TC_1		H.060.12.180TC_1		H.060.12.210TC_1		H.060.12.250TC_1		H.100.12.280TC_1		H.100.12.320TC_1			
	H	009	3	Flexible joint			H.060.13.080		H.060.13.112		H.060.13.160		H.060.13.160		H.100.13.200		H.100.13.200			

	P	T	C	Commercial	56C		140TC		180TC		210TC		250TC		280TC		320TC		360TC	
	H	009	2/N	Screw DIN 931					-	-	-	-	-	-	-	-	-	-	-	-
	H	009	3/N	Nut DIN 934/6					-	-	-	-	-	-	-	-	-	-	-	-
	H	009	5/N	Bearing					6207 2Z	1	6310 2Z	1	6310 2Z	1	6312 2Z	1	6312 2Z	1	6312 2Z	1
	H	009	6/N	Bearing					6210 2Z	1	6015 2Z	1	6015 2Z	1	6018 2Z	1	6018 2Z	1	6018 2Z	1
H140	H	009	7/N	Circlip DIN 471					35	1	50	1	50	1	60	1	60	1	60	1
	H	009	9/N	Circlip DIN 472					72	1	110	1	110	1	130	1	130	1	130	1
	P	T	C	Built	56C		140TC		180TC		210TC		250TC		280TC		320TC		360TC	
	H	009	1	Flange					H.140.04.229.3.1		H.140.04.229.3		H.140.04.229.3		H.140.04.279.3.1		H.140.04.340.3.1		H.140.04.340.3.1	
	H	009	2	Motor half coupling					H.060.12.180TC_1		H.060.12.210TC_1		H.060.12.250TC_1		H.100.12.280TC_1		H.100.12.320TC_1		H.100.12.360TC_1	
	H	009	3	Flexible joint					H.060.13.112		H.060.13.160		H.060.13.160		H.100.13.200		H.100.13.200		H.100.13.200	

IEC Input

032	P	T	C	Built	063	071	080	090	100	112	132
	H	011	4	Motor sleeve		H.060.16	H.060.16	H.060.16	H.060.16	H.060.16	
	H	011	5	Pinion 2st.		H.030.23	H.030.23	H.030.23	H.030.23	H.030.23	
	H	011	5	Pinion 2st. key		-	-	-	-	-	
	H	011	6	Pinion hub 2st.		H.030.22	H.030.22	H.030.22	H.030.22	H.030.22	
	H	011	6	Pinion hub 2st. key		-	-	-	-	-	
	H	011	7	Spacer		-	-	-	-	-	
	H	011	8	Ring		-	-	-	-	-	

032	P	T	C	Commercial	063	071		080		090		100		112		132
	H	011	1/N	Screw DIN 931		M8x20	4	M8x20	4	M8x20	4	M8x20	4	M8x20	4	
	H	011	4/N	Screw DIN 931		-	-	-	-	-	-	-	-	-	-	
	H	011	8/N	Circlip DIN471		16	1	16	1	16	1	16	1	16	1	
	H	011	10/N	Key DIN 6885		B 5x5x12	1	B 5x5x12	1	B 5x5x12	1	B 5x5x12	1	B 5x5x12	1	
	H	011	11/N	Key DIN 6885		-	-	-	-	-	-	-	-	-	-	
	H	011	12/N	Key DIN 6885		-	-	-	-	-	-	-	-	-	-	
	H	011	13/N	Closing plug		-	-	-	-	-	-	-	-	-	-	
	H	011	14/N	Gasket		-	-	-	-	-	-	-	-	-	-	
	H	011	15/N	Oil seal DIN 3760		ADT A 25-47-7	1	ADT A 30-52-7	1	ADT A 30-52-7	1	ADT A 35-62-7	1	ADT A 35-62-7	1	
	H	011	16/N	Cap		-	-	-	-	-	-	-	-	-	-	

NEMA Input

032	P	T	C	Built	56C	140TC	180TC	210TC	250TC	280TC	320TC
	H	009	4	Reduction half coupling	H.060.14	H.060.14	H.060.14				
	H	009	5	Pinion 2st.	H.030.23	H.030.23	H.030.23				
	H	009	5	Pinion 2st. key	-	-	-				
	H	009	6	Pinion hub 2st.	-	-	-				
	H	009	6	Pinion hub 2st. key	-	-	-				
	H	009	7	Spacer	-	-	-				
	H	009	8	Ring	-	-	-				

032	P	T	C	Commercial	56C		140TC		180TC		210TC	250TC	280TC	320TC
	H	009	1/N	Screw DIN 931	M8x20	4	M8x20	4	M8x20	4				
	H	009	4/N	Screw DIN 931	-	-	-	-	-	-				
	H	009	8/N	Circlip DIN471	-	-	-	-	-	-				
	H	009	10/N	Key DIN 6885	-	-	-	-	-	-				
	H	009	11/N	Key DIN 6885	-	-	-	-	-	-				
	H	009	12/N	Key DIN 6885	-	-	-	-	-	-				
	H	009	13/N	Closing plug	-	-	-	-	-	-				
	H	009	14/N	Gasket	-	-	-	-	-	-				
	H	009	15/N	Oil seal DIN 3760	ADT A 30-52-7	1	ADT A 30-52-7	1	ADT A 35-62-7	1				
	H	009	16/N	Cap	-	-	-	-	-	-				

IEC Input

033	P	T	C	Built	063	071	080	090	100	112	132
	H	011	4	Motor sleeve	0.030.16	H.030.16 / H.060.16	H.060.16	H.060.16			
	H	011	5	Pinion 2st.	0.030.23	0.030.23	0.030.23	0.030.23			
	H	011	5	Pinion 2st. key	-	-	-	-			
	H	011	6	Pinion hub 2st.	0.030.22	0.030.22	0.030.22	0.030.22			
	H	011	6	Pinion hub 2st. key	-	-	-	-			
	H	011	7	Spacer	-	-	-	-			
	H	011	8	Ring	-	-	-	-			

033	P	T	C	Commercial	063		071		080		090		100	112	132
	H	011	1/N	Screw DIN 931	M8x20	4	M8x20	4	M8x20	4	M8x20	4			
	H	011	4/N	Screw DIN 931	-	-	-	-	-	-	-	-			
	H	011	8/N	Circlip DIN471	-	-	-	-	-	-	-	-			
	H	011	10/N	Key DIN 6885	-	-	-	-	-	-	-	-			
	H	011	11/N	Key DIN 6885	-	-	-	-	-	-	-	-			
	H	011	12/N	Key DIN 6885	-	-	-	-	-	-	-	-			
	H	011	13/N	Closing plug	-	-	-	-	-	-	-	-			
	H	011	14/N	Gasket	-	-	-	-	-	-	-	-			
	H	011	15/N	Oil seal DIN 3760	ADT A 20-42-7	1	ADT A 25-47-7	1	ADT A 30-52-7	1	ADT A 30-52-7	1			
	H	011	16/N	Cap	-	-	-	-	-	-	-	-			

NEMA Input

033	P	T	C	Built	56C	140TC	180TC	210TC	250TC	280TC	320TC
	H	009	4	Reduction half coupling	H.060.14	H.060.14					
	H	009	5	Pinion 2st.	0.030.23.06	0.030.23					
	H	009	5	Pinion 2st. key	-	-					
	H	009	6	Pinion hub 2st.	-	-					
	H	009	6	Pinion hub 2st. key	-	-					
	H	009	7	Spacer	-	-					
	H	009	8	Ring	-	-					
	H	009	9	Motor sleeve	-	-					

033	P	T	C	Commercial	56C		140TC		180TC	210TC	250TC	280TC	320TC
	H	009	1/N	Screw DIN 931	M8x20	4	M8x20	4					
	H	009	4/N	Screw DIN 931	-	-	-	-					
	H	009	8/N	Circlip DIN471	-	-	-	-					
	H	009	10/N	Key DIN 6885	-	-	-	-					
	H	009	11/N	Key DIN 6885	-	-	-	-					
	H	009	12/N	Key DIN 6885	-	-	-	-					
	H	009	13/N	Closing plug	-	-	-	-					
	H	009	14/N	Gasket	-	-	-	-					
	H	009	15/N	Oil seal DIN 3760	ADT A 30-52-7	1	ADT A 30-52-7	1					
	H	009	16/N	Cap	-	-	-	-					

IEC Input

041	P	T	C	Built	063	071	080	090	100	112	132
	H	011	4	Motor sleeve		H.060.16	H.060.16	H.060.16			
	H	011	5	Pinion 2st.		H.030.23.08	H.030.23	H.030.23			
	H	011	5	Pinion 2st. key		-	-	-			
	H	011	6	Pinion hub 2st.		H.030.22	H.030.22	H.030.22			
	H	011	6	Pinion hub 2st. key		-	-	-			
	H	011	7	Spacer		-	-	-			
	H	011	8	Ring		-	-	-			

041	P	T	C	Commercial	063	071		080		090		100	112	132
	H	011	1/N	Screw DIN 931		M8x20	4	M8x20	4	M8x20	4			
	H	011	4/N	Screw DIN 931		-	-	-	-	-	-			
	H	011	8/N	Circlip DIN471		16	1	16	1	16	1			
	H	011	10/N	Key DIN 6885		B 5x5x12	1	B 5x5x12	1	B 5x5x12	1			
	H	011	11/N	Key DIN 6885		-	-	-	-	-	-			
	H	011	12/N	Key DIN 6885		-	-	-	-	-	-			
	H	011	13/N	Closing plug		-	-	-	-	-	-			
	H	011	14/N	Gasket		-	-	-	-	-	-			
	H	011	15/N	Oil seal DIN 3760		ADT A 25-47-7	1	ADT A 30-52-7	1	ADT A 30-52-7	1			
	H	011	16/N	Cap		-	-	-	-	-	-			

NEMA Input

041	P	T	C	Built	56C	140TC	180TC	210TC	250TC	280TC	320TC
	H	009	4	Reduction half coupling	H.060.14	H.060.14	H.060.14				
	H	009	5	Pinion 2st.	H.030.23.08	H.030.23.08	H.030.23.08				
	H	009	5	Pinion 2st. key	-	-	-				
	H	009	6	Pinion hub 2st.	-	-	-				
	H	009	6	Pinion hub 2st. key	-	-	-				
	H	009	7	Spacer	-	-	-				
	H	009	8	Ring	-	-	-				

041	P	T	C	Commercial	56C		140TC		180TC		210TC	250TC	280TC	320TC
	H	009	1/N	Screw DIN 931	M8x20	4	M8x20	4	M8x20	4				
	H	009	4/N	Screw DIN 931	-	-	-	-	-	-				
	H	009	8/N	Circlip DIN471	-	-	-	-	-	-				
	H	009	10/N	Key DIN 6885	-	-	-	-	-	-				
	H	009	11/N	Key DIN 6885	-	-	-	-	-	-				
	H	009	12/N	Key DIN 6885	-	-	-	-	-	-				
	H	009	13/N	Closing plug	-	-	-	-	-	-				
	H	009	14/N	Gasket	-	-	-	-	-	-				
	H	009	15/N	Oil seal DIN 3760	ADT A 30-52-7	1	ADT A 30-52-7	1	ADT A 35-62-7	1				
	H	009	16/N	Cap	-	-	-	-	-	-				

IEC Input

042	P	T	C	Built	063	071	080	090	100	112	132
	H	011	4	Motor sleeve		H.060.16	H.060.16	H.060.16	H.060.16	H.060.16	
	H	011	5	Pinion 2st.		H.030.23	H.030.23	H.030.23	H.030.23	H.030.23	
	H	011	5	Pinion 2st. key		-	-	-	-	-	
	H	011	6	Pinion hub 2st.		H.030.22	H.030.22	H.030.22	H.030.22	H.030.22	
	H	011	6	Pinion hub 2st. key		-	-	-	-	-	
	H	011	7	Spacer		-	-	-	-	-	
	H	011	8	Ring		-	-	-	-	-	

042	P	T	C	Commercial	063	071		080		090		100		112		132
	H	011	1/N	Screw DIN 931		M8x20	4	M8x20	4	M8x20	4	M8x20	4	M8x20	4	
	H	011	4/N	Screw DIN 931		-	-	-	-	-	-	-	-	-	-	
	H	011	8/N	Circlip DIN471		16	1	16	1	16	1	16	1	16	1	
	H	011	10/N	Key DIN 6885		B 5x5x12	1	B 5x5x12	1	B 5x5x12	1	B 5x5x12	1	B 5x5x12	1	
	H	011	11/N	Key DIN 6885		-	-	-	-	-	-	-	-	-	-	
	H	011	12/N	Key DIN 6885		-	-	-	-	-	-	-	-	-	-	
	H	011	13/N	Closing plug		-	-	-	-	-	-	-	-	-	-	
	H	011	14/N	Gasket		-	-	-	-	-	-	-	-	-	-	
	H	011	15/N	Oil seal DIN 3760		ADT A 25-47-7	1	ADT A 30-52-7	1	ADT A 30-52-7	1	ADT A 35-62-7	1	ADT A 35-62-7	1	
	H	011	16/N	Cap		-	-	-	-	-	-	-	-	-	-	

NEMA Input

042	P	T	C	Built	56C	140TC	180TC	210TC	250TC	280TC	320TC
	H	009	4	Reduction half coupling	H.060.14	H.060.14	H.060.14				
	H	009	5	Pinion 2st.	H.030.23.08	H.030.23.08	H.030.23.08				
	H	009	5	Pinion 2st. key	-	-	-				
	H	009	6	Pinion hub 2st.	-	-	-				
	H	009	6	Pinion hub 2st. key	-	-	-				
	H	009	7	Spacer	-	-	-				
	H	009	8	Ring	-	-	-				

042	P	T	C	Commercial	56C		140TC		180TC		210TC	250TC	280TC	320TC
	H	009	1/N	Screw DIN 931	M8x20	4	M8x20	4	M8x20	4				
	H	009	4/N	Screw DIN 931	-	-	-	-	-	-				
	H	009	8/N	Circlip DIN471	-	-	-	-	-	-				
	H	009	10/N	Key DIN 6885	-	-	-	-	-	-				
	H	009	11/N	Key DIN 6885	-	-	-	-	-	-				
	H	009	12/N	Key DIN 6885	-	-	-	-	-	-				
	H	009	13/N	Closing plug	-	-	-	-	-	-				
	H	009	14/N	Gasket	-	-	-	-	-	-				
	H	009	15/N	Oil seal DIN 3760	ADT A 30-52-7	1	ADT A 30-52-7	1	ADT A 35-62-7	1				
	H	009	16/N	Cap	-	-	-	-	-	-				

IEC Input

043	P	T	C	Built	063	071	080	090	100	112	132
	H	011	4	Motor sleeve	0.030.16	H.030.16 / H.060.16	H.060.16	H.060.16			
	H	011	5	Pinion 2st.	0.030.23	0.030.23	0.030.23	0.030.23			
	H	011	5	Pinion 2st. key	-	-	-	-			
	H	011	6	Pinion hub 2st.	0.030.22	0.030.22	0.030.22	0.030.22			
	H	011	6	Pinion hub 2st. key	-	-	-	-			
	H	011	7	Spacer	-	-	-	-			
	H	011	8	Ring	-	-	-	-			

043	P	T	C	Commercial	063		071		080		090		100	112	132
	H	011	1/N	Screw DIN 931	M8x20	4	M8x20	4	M8x20	4	M8x20	4			
	H	011	4/N	Screw DIN 931	-	-	-	-	-	-	-	-			
	H	011	8/N	Circlip DIN471	-	-	-	-	-	-	-	-			
	H	011	10/N	Key DIN 6885	-	-	-	-	-	-	-	-			
	H	011	11/N	Key DIN 6885	-	-	-	-	-	-	-	-			
	H	011	12/N	Key DIN 6885	-	-	-	-	-	-	-	-			
	H	011	13/N	Closing plug	-	-	-	-	-	-	-	-			
	H	011	14/N	Gasket	-	-	-	-	-	-	-	-			
	H	011	15/N	Oil seal DIN 3760	ADT A 20-42-7	1	ADT A 25-47-7	1	ADT A 30-52-7	1	ADT A 30-52-7	1			
	H	011	16/N	Cap	-	-	-	-	-	-	-	-			

NEMA Input

043	P	T	C	Built	56C	140TC	180TC	210TC	250TC	280TC	320TC
	H	009	4	Reduction half coupling	H.060.14	H.060.14	H.060.14				
	H	009	5	Pinion 2st.	0.030.23.06	0.030.23.06	0.030.23.06				
	H	009	5	Pinion 2st. key	-	-	-				
	H	009	6	Pinion hub 2st.	-	-	-				
	H	009	6	Pinion hub 2st. key	-	-	-				
	H	009	7	Spacer	-	-	-				
	H	009	8	Ring	-	-	-				
	H	009	9	Motor sleeve	-	-	-				

043	P	T	C	Commercial	56C		140TC		180TC		210TC	250TC	280TC	320TC
	H	009	1/N	Screw DIN 931	M8x20	4	M8x20	4	M8x20	4				
	H	009	4/N	Screw DIN 931	-	-	-	-	-	-				
	H	009	8/N	Circlip DIN471	-	-	-	-	-	-				
	H	009	10/N	Key DIN 6885	-	-	-	-	-	-				
	H	009	11/N	Key DIN 6885	-	-	-	-	-	-				
	H	009	12/N	Key DIN 6885	-	-	-	-	-	-				
	H	009	13/N	Closing plug	-	-	-	-	-	-				
	H	009	14/N	Gasket	-	-	-	-	-	-				
	H	009	15/N	Oil seal DIN 3760	ADT A 30-52-7	1	ADT A 30-52-7	1	ADT A 35-62-7	1				
	H	009	16/N	Cap	-	-	-	-	-	-				

IEC Input

051	P	T	C	Built	063	071	080	090	100	112	132
	H	011	4	Motor sleeve		H.060.16	H.060.16	H.060.16	H.060.16	H.060.16	
	H	011	5	Pinion 2st.		H.050.23	H.050.23	H.050.23	H.050.23	H.050.23	
	H	011	5	Pinion 2st. key		-	-	-	-	-	
	H	011	6	Pinion hub 2st.		-	H.050.22	H.050.22	H.050.22	H.050.22	
	H	011	6	Pinion hub 2st. key		-	-	-	-	-	
	H	011	7	Spacer		-	-	-	-	-	
	H	011	8	Ring		-	-	-	-	-	

051	P	T	C	Commercial	063	071		080		090		100		112		132
	H	011	1/N	Screw DIN 931		M8x20	4	M8x20	4	M8x20	4	M8x20	4	M8x20	4	
	H	011	4/N	Screw DIN 931		-	-	-	-	-	-	-	-	-	-	
	H	011	8/N	Circlip DIN471		-	-	19	1	19	1	19	1	19	1	
	H	011	10/N	Key DIN 6885		-	-	B 6x6x16	1	B 6x6x16	1	B 6x6x16	1	B 6x6x16	1	
	H	011	11/N	Key DIN 6885		-	-	-	-	-	-	-	-	-	-	
	H	011	12/N	Key DIN 6885		-	-	-	-	-	-	-	-	-	-	
	H	011	13/N	Closing plug		-	-	-	-	-	-	-	-	-	-	
	H	011	14/N	Gasket		-	-	-	-	-	-	-	-	-	-	
	H	011	15/N	Oil seal DIN 3760		ADT A 25-47-7	1	ADT A 30-52-7	1	ADT A 30-52-7	1	ADT A 35-62-7	1	ADT A 35-62-7	1	
	H	011	16/N	Cap		-	-	-	-	-	-	-	-	-	-	

NEMA Input

051	P	T	C	Built	56C	140TC	180TC	210TC	250TC	280TC	320TC
	H	009	4	Reduction half coupling	H.060.14	H.060.14	H.060.14				
	H	009	5	Pinion 2st.	H.050.23.08	H.050.23.08	H.050.23.08				
	H	009	5	Pinion 2st. key	-	-	-				
	H	009	6	Pinion hub 2st.	-	-	-				
	H	009	6	Pinion hub 2st. key	-	-	-				
	H	009	7	Spacer	-	-	-				
	H	009	8	Ring	-	-	-				

051	P	T	C	Commercial	56C		140TC		180TC		210TC	250TC	280TC	320TC
	H	009	1/N	Screw DIN 931	M8x20	4	M8x20	4	M8x20	4				
	H	009	4/N	Screw DIN 931	-	-	-	-	-	-				
	H	009	8/N	Circlip DIN471	-	-	-	-	-	-				
	H	009	10/N	Key DIN 6885	-	-	-	-	-	-				
	H	009	11/N	Key DIN 6885	-	-	-	-	-	-				
	H	009	12/N	Key DIN 6885	-	-	-	-	-	-				
	H	009	13/N	Closing plug	-	-	-	-	-	-				
	H	009	14/N	Gasket	-	-	-	-	-	-				
	H	009	15/N	Oil seal DIN 3760	ADT A 30-52-7	1	ADT A 30-52-7	1	ADT A 35-62-7	1				
	H	009	16/N	Cap	-	-	-	-	-	-				

IEC Input

052	P	T	C	Built	063	071	080	090	100	112	132
	H	011	4	Motor sleeve		H.060.16	H.060.16	H.060.16	H.060.16	H.060.16	
	H	011	5	Pinion 2st.		H.050.23	H.050.23	H.050.23	H.050.23	H.050.23	
	H	011	5	Pinion 2st. key		-	-	-	-	-	
	H	011	6	Pinion hub 2st.		-	H.050.22	H.050.22	H.050.22	H.050.22	
	H	011	6	Pinion hub 2st. key		-	-	-	-	-	
	H	011	7	Spacer		-	-	-	-	-	
	H	011	8	Ring		-	-	-	-	-	

052	P	T	C	Commercial	063	071		080		090		100		112		132
	H	011	1/N	Screw DIN 931		M8x20	4	M8x20	4	M8x20	4	M8x20	4	M8x20	4	
	H	011	4/N	Screw DIN 931		-	-	-	-	-	-	-	-	-	-	
	H	011	8/N	Circlip DIN471		-	-	19	1	19	1	19	1	19	1	
	H	011	10/N	Key DIN 6885		-	-	B 6x6x16	1	B 6x6x16	1	B 6x6x16	1	B 6x6x16	1	
	H	011	11/N	Key DIN 6885		-	-	-	-	-	-	-	-	-	-	
	H	011	12/N	Key DIN 6885		-	-	-	-	-	-	-	-	-	-	
	H	011	13/N	Closing plug		-	-	-	-	-	-	-	-	-	-	
	H	011	14/N	Gasket		-	-	-	-	-	-	-	-	-	-	
	H	011	15/N	Oil seal DIN 3760		ADT A 25-47-7	1	ADT A 30-52-7	1	ADT A 30-52-7	1	ADT A 35-62-7	1	ADT A 35-62-7	1	
	H	011	16/N	Cap		-	-	-	-	-	-	-	-	-	-	

NEMA Input

052	P	T	C	Built	56C	140TC	180TC	210TC	250TC	280TC	320TC
	H	009	4	Reduction half coupling	H.060.14	H.060.14	H.060.14				
	H	009	5	Pinion 2st.	H.050.23.08	H.050.23.08	H.050.23.08				
	H	009	5	Pinion 2st. key	-	-	-				
	H	009	6	Pinion hub 2st.	-	-	-				
	H	009	6	Pinion hub 2st. key	-	-	-				
	H	009	7	Spacer	-	-	-				
	H	009	8	Ring	-	-	-				

052	P	T	C	Commercial	56C		140TC		180TC		210TC	250TC	280TC	320TC
	H	009	1/N	Screw DIN 931	M8x20	4	M8x20	4	M8x20	4				
	H	009	4/N	Screw DIN 931	-	-	-	-	-	-				
	H	009	8/N	Circlip DIN471	-	-	-	-	-	-				
	H	009	10/N	Key DIN 6885	-	-	-	-	-	-				
	H	009	11/N	Key DIN 6885	-	-	-	-	-	-				
	H	009	12/N	Key DIN 6885	-	-	-	-	-	-				
	H	009	13/N	Closing plug	-	-	-	-	-	-				
	H	009	14/N	Gasket	-	-	-	-	-	-				
	H	009	15/N	Oil seal DIN 3760	ADT A 30-52-7	1	ADT A 30-52-7	1	ADT A 35-62-7	1				
	H	009	16/N	Cap	-	-	-	-	-	-				

IEC Input

053	P	T	C	Built	063	071	080	090	100	112	132
	H	011	4	Motor sleeve	0.030.16	H.030.16 / H.060.16	H.060.16	H.060.16			
	H	011	5	Pinion 2st.	0.030.23	0.030.23	0.030.23	0.030.23			
	H	011	5	Pinion 2st. key	-	-	-	-			
	H	011	6	Pinion hub 2st.	0.030.22	0.030.22	0.030.22	0.030.22			
	H	011	6	Pinion hub 2st. key	-	-	-	-			
	H	011	7	Spacer	-	-	-	-			
	H	011	8	Ring	-	-	-	-			

053	P	T	C	Commercial	063		071		080		090		100	112	132
	H	011	1/N	Screw DIN 931	M8x20	4	M8x20	4	M8x20	4	M8x20	4			
	H	011	4/N	Screw DIN 931	-	-	-	-	-	-	-	-			
	H	011	8/N	Circlip DIN471	-	-	-	-	-	-	-	-			
	H	011	10/N	Key DIN 6885	-	-	-	-	-	-	-	-			
	H	011	11/N	Key DIN 6885	-	-	-	-	-	-	-	-			
	H	011	12/N	Key DIN 6885	-	-	-	-	-	-	-	-			
	H	011	13/N	Closing plug	-	-	-	-	-	-	-	-			
	H	011	14/N	Gasket	-	-	-	-	-	-	-	-			
	H	011	15/N	Oil seal DIN 3760	ADT A 20-42-7	1	ADT A 25-47-7	1	ADT A 30-52-7	1	ADT A 30-52-7	1			
	H	011	16/N	Cap	-	-	-	-	-	-	-	-			

NEMA Input

053	P	T	C	Built	56C	140TC	180TC	210TC	250TC	280TC	320TC
	H	009	4	Reduction half coupling	H.060.14	H.060.14	H.060.14				
	H	009	5	Pinion 2st.	0.030.23.06	0.030.23.06	0.030.23.06				
	H	009	5	Pinion 2st. key	-	-	-				
	H	009	6	Pinion hub 2st.	-	-	-				
	H	009	6	Pinion hub 2st. key	-	-	-				
	H	009	7	Spacer	-	-	-				
	H	009	8	Ring	-	-	-				
	H	009	9	Motor sleeve	-	-	-				

053	P	T	C	Commercial	56C		140TC		180TC		210TC	250TC	280TC	320TC
	H	009	1/N	Screw DIN 931	M8x20	4	M8x20	4	M8x20	4				
	H	009	4/N	Screw DIN 931	-	-	-	-	-	-				
	H	009	8/N	Circlip DIN471	-	-	-	-	-	-				
	H	009	10/N	Key DIN 6885	-	-	-	-	-	-				
	H	009	11/N	Key DIN 6885	-	-	-	-	-	-				
	H	009	12/N	Key DIN 6885	-	-	-	-	-	-				
	H	009	13/N	Closing plug	-	-	-	-	-	-				
	H	009	14/N	Gasket	-	-	-	-	-	-				
	H	009	15/N	Oil seal DIN 3760	ADT A 30-52-7	1	ADT A 30-52-7	1	ADT A 35-62-7	1				
	H	009	16/N	Cap	-	-	-	-	-	-				

IEC Input

061	P	T	C	Built	063	071	080	090	100	112	132
	H	011	4	Motor sleeve			H.060.16	H.060.16	H.060.16	H.060.16	
	H	011	5	Pinion 2st.			H.060.23	H.060.23	H.060.23	H.060.23	
	H	011	5	Pinion 2st. key			-	-	-	-	
	H	011	6	Pinion hub 2st.			H.060.22	H.060.22	H.060.22	H.060.22	
	H	011	6	Pinion hub 2st. key			-	-	-	-	
	H	011	7	Spacer							
	H	011	8	Ring			-	-	-	-	

061	P	T	C	Commercial	063	071	080		090		100		112		132
	H	011	1/N	Screw DIN 931			M8x20	4	M8x20	4	M8x20	4	M8x20	4	
	H	011	4/N	Screw DIN 931			-	-	-	-	-	-	-	-	
	H	011	8/N	Circlip DIN471			24	1	24	1	24	1	24	1	
	H	011	10/N	Key DIN 6885			B 8x7x16	1	B 8x7x16	1	B 8x7x16	1	B 8x7x16	1	
	H	011	11/N	Key DIN 6885			-	-	-	-	-	-	-	-	
	H	011	12/N	Key DIN 6885			-	-	-	-	-	-	-	-	
	H	011	13/N	Closing plug			-	-	-	-	-	-	-	-	
	H	011	14/N	Gasket			-	-	-	-	-	-	-	-	
	H	011	15/N	Oil seal DIN 3760			ADT A 30-52-7	1	ADT A 30-52-7	1	ADT A 35-62-7	1	ADT A 35-62-7	1	
	H	011	16/N	Cap			-	-	-	-	-	-	-	-	

NEMA Input

061	P	T	C	Built	56C	140TC	180TC	210TC	250TC	280TC	320TC
	H	009	4	Reduction half coupling	H.060.14	H.060.14	H.060.14				
	H	009	5	Pinion 2st.	H.060.23	H.060.23	H.060.23				
	H	009	5	Pinion 2st. key	H.060.23	H.060.23	H.060.23				
	H	009	6	Pinion hub 2st.	H.060.22	H.060.22	H.060.22				
	H	009	6	Pinion hub 2st. key	-	-	-				
	H	009	7	Spacer	-	-	-				
	H	009	8	Ring	-	-	-				

061	P	T	C	Commercial	56C		140TC		180TC		210TC	250TC	280TC	320TC
	H	009	1/N	Screw DIN 931	M8x20	4	M8x20	4	M8x20	4				
	H	009	4/N	Screw DIN 931	-	-	-	-	-	-				
	H	009	8/N	Circlip DIN471	24	1	24	1	24	1				
	H	009	10/N	Key DIN 6885	B 8x7x16	1	B 8x7x16	1	B 8x7x16	1				
	H	009	11/N	Key DIN 6885	-	-	-	-	-	-				
	H	009	12/N	Key DIN 6885	-	-	-	-	-	-				
	H	009	13/N	Closing plug	-	-	-	-	-	-				
	H	009	14/N	Gasket	-	-	-	-	-	-				
	H	009	15/N	Oil seal DIN 3760	ADT A 30-52-7	1	ADT A 30-52-7	1	ADT A 35-62-7	1				
	H	009	16/N	Cap	-	-	-	-	-	-				

IEC Input

062	P	T	C	Built	063	071	080	090	100	112	132
	H	011	4	Motor sleeve			H.060.16	H.060.16	H.060.16	H.060.16	H.060.16
	H	011	5	Pinion 2st.			H.060.23	H.060.23	H.060.23	H.060.23	H.060.23
	H	011	5	Pinion 2st. key			-	-	-	-	-
	H	011	6	Pinion hub 2st.			H.060.22	H.060.22	H.060.22	H.060.22	H.060.22
	H	011	6	Pinion hub 2st. key			-	-	-	-	-
	H	011	7	Spacer			-	-	-	-	-
	H	011	8	Ring			-	-	-	-	-

062	P	T	C	Commercial	063	071	080		090		100		112		132	
	H	011	1/N	Screw DIN 931			M8x25	6	M8x25	6	M8x25	6	M8x25	6	M8x25	6
	H	011	4/N	Screw DIN 931			-	-	-	-	-	-	-	-	-	-
	H	011	8/N	Circlip DIN471			24	1	24	1	24	1	24	1	24	1
	H	011	10/N	Key DIN 6885			B 8x7x16	1	B 8x7x16	1	B 8x7x16	1	B 8x7x16	1	B 8x7x16	1
	H	011	11/N	Key DIN 6885			-	-	-	-	-	-	-	-	-	-
	H	011	12/N	Key DIN 6885			-	-	-	-	-	-	-	-	-	-
	H	011	13/N	Closing plug			3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1
	H	011	14/N	Gasket			3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1
	H	011	15/N	Oil seal DIN 3760			ADT A 30-52-7	1	ADT A 30-52-7	1	ADT A 35-62-7	1	ADT A 35-62-7	1	ADT A 40-72-10	1
	H	011	16/N	Cap			-	-	-	-	-	-	-	-	-	-

NEMA Input

062	P	T	C	Built	56C	140TC	180TC	210TC	250TC	280TC	320TC
	H	009	4	Reduction half coupling	H.060.14	H.060.14	H.060.14	H.060.14			
	H	009	5	Pinion 2st.	H.060.23	H.060.23	H.060.23	H.060.23			
	H	009	5	Pinion 2st. key	H.060.23	H.060.23	H.060.23	H.060.23			
	H	009	6	Pinion hub 2st.	H.060.22	H.060.22	H.060.22	H.060.22			
	H	009	6	Pinion hub 2st. key	-	-	-	-			
	H	009	7	Spacer	-	-	-	ADS 62x50x3			
	H	009	8	Ring	-	-	-	-			

062	P	T	C	Commercial	56C		140TC		180TC		210TC		250TC	280TC	320TC
	H	009	1/N	Screw DIN 931	M8x25	6	M8x25	6	M8x25	6	M8x25	6			
	H	009	4/N	Screw DIN 931	-	-	-	-	-	-	-	-			
	H	009	8/N	Circlip DIN471	24	1	24	1	24	1	24	1			
	H	009	10/N	Key DIN 6885	B 8x7x16	1	B 8x7x16	1	B 8x7x16	1	B 8x7x16	1			
	H	009	11/N	Key DIN 6885	-	-	-	-	-	-	-	-			
	H	009	12/N	Key DIN 6885	-	-	-	-	-	-	-	-			
	H	009	13/N	Closing plug	3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1			
	H	009	14/N	Gasket	3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1			
	H	009	15/N	Oil seal DIN 3760	ADT A 30-52-7	1	ADT A 30-52-7	1	ADT A 35-62-7	1	ADT A 50-72-8	1			
	H	009	16/N	Cap	-	-	-	-	-	-	RCA 40-7	1			

IEC Input

063	P	T	C	Built	063	071	080	090	100	112	132
	H	011	4	Motor sleeve		H.060.16	H.060.16	H.060.16	H.060.16	H.060.16	
	H	011	5	Pinion 2st.		H.050.23	H.050.23	H.050.23	H.050.23	H.050.23	
	H	011	5	Pinion 2st. key		-	-	-	-	-	
	H	011	6	Pinion hub 2st.		-	H.050.22	H.050.22	H.050.22	H.050.22	
	H	011	6	Pinion hub 2st. key		-	-	-	-	-	
	H	011	7	Spacer		-	-	-	-	-	
	H	011	8	Ring		-	-	-	-	-	

063	P	T	C	Commercial	063	071		080		090		100		112		132
	H	011	1/N	Screw DIN 931		M8x25	6	M8x25	6	M8x25	6	M8x25	6	M8x25	6	
	H	011	4/N	Screw DIN 931		-	-	-	-	-	-	-	-	-	-	
	H	011	8/N	Circlip DIN471		-	-	19	1	19	1	19	1	19	1	
	H	011	10/N	Key DIN 6885		-	-	B 6x6x16	1	B 6x6x16	1	B 6x6x16	1	B 6x6x16	1	
	H	011	11/N	Key DIN 6885		-	-	-	-	-	-	-	-	-	-	
	H	011	12/N	Key DIN 6885		-	-	-	-	-	-	-	-	-	-	
	H	011	13/N	Closing plug		3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1	
	H	011	14/N	Gasket		3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1	
	H	011	15/N	Oil seal DIN 3760		ADT A 25-47-7	1	ADT A 30-52-7	1	ADT A 30-52-7	1	ADT A 35-62-7	1	ADT A 35-62-7	1	
	H	011	16/N	Cap		-	-	-	-	-	-	-	-	-	-	

NEMA Input

063	P	T	C	Built	56C	140TC	180TC	210TC	250TC	280TC	320TC
	H	009	4	Reduction half coupling	H.060.14	H.060.14	H.060.14	H.060.14			
	H	009	5	Pinion 2st.	H.050.23	H.050.23	H.050.23	H.050.23			
	H	009	5	Pinion 2st. key	-	-	-	-			
	H	009	6	Pinion hub 2st.	-	-	-	-			
	H	009	6	Pinion hub 2st. key	-	-	-	-			
	H	009	7	Spacer	-	-	-	ADS 62x50x3			
	H	009	8	Ring	-	-	-	-			

063	P	T	C	Commercial	56C		140TC		180TC		210TC		250TC	280TC	320TC
	H	009	1/N	Screw DIN 931	M8x25	6	M8x25	6	M8x25	6	M8x25	6			
	H	009	4/N	Screw DIN 931	-	-	-	-	-	-	-	-			
	H	009	8/N	Circlip DIN471	-	-	-	-	-	-	-	-			
	H	009	10/N	Key DIN 6885	-	-	-	-	-	-	-	-			
	H	009	11/N	Key DIN 6885	-	-	-	-	-	-	-	-			
	H	009	12/N	Key DIN 6885	-	-	-	-	-	-	-	-			
	H	009	13/N	Closing plug	3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1			
	H	009	14/N	Gasket	3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1			
	H	009	15/N	Oil seal DIN 3760	ADT A 30-52-7	1	ADT A 30-52-7	1	ADT A 35-62-7	1	ADT A 50-72-8	1			
	H	009	16/N	Cap	-	-	-	-	-	-	RCA 40-7	1			

IEC Input

081	P	T	C	Built	063	071	080	090	100	112	132
	H	011	4	Motor sleeve			H.060.16	H.060.16	H.060.16	H.060.16	H.060.16
	H	011	5	Pinion 2st.			H.080.23	H.080.23	H.080.23	H.080.23	H.080.23
	H	011	5	Pinion 2st. key			-	-	-	-	-
	H	011	6	Pinion hub 2st.			-	-	-	-	H.080.22
	H	011	6	Pinion hub 2st. key			-	-	-	-	-
	H	011	7	Spacer			-	-	-	-	-
	H	011	8	Ring			-	-	-	-	-

081	P	T	C	Commercial	063	071	080		090		100		112		132	
	H	011	1/N	Screw DIN 931			M8x25	6	M8x25	6	M8x25	6	M8x25	6	M8x25	6
	H	011	4/N	Screw DIN 931			-	-	-	-	-	-	-	-	-	-
	H	011	8/N	Circlip DIN471			-	-	-	-	-	-	-	-	30	1
	H	011	10/N	Key DIN 6885			-	-	-	-	-	-	-	-	B 8x7x18	1
	H	011	11/N	Key DIN 6885			-	-	-	-	-	-	-	-	-	-
	H	011	12/N	Key DIN 6885			-	-	-	-	-	-	-	-	-	-
	H	011	13/N	Closing plug			3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1
	H	011	14/N	Gasket			3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1
	H	011	15/N	Oil seal DIN 3760			ADT A 30-52-7	1	ADT A 30-52-7	1	ADT A 35-62-7	1	ADT A 35-62-7	1	ADT A 40-72-10	1
	H	011	16/N	Cap			-	-	-	-	-	-	-	-	-	-

NEMA Input

081	P	T	C	Built	56C	140TC	180TC	210TC	250TC	280TC	320TC
	H	009	4	Reduction half coupling	H.060.14	H.060.14	H.060.14	H.060.14			
	H	009	5	Pinion 2st.	H.080.23	H.080.23	H.080.23	H.080.23			
	H	009	5	Pinion 2st. key	H.080.23	H.080.23	H.080.23	H.080.23			
	H	009	6	Pinion hub 2st.	-	-	-	-			
	H	009	6	Pinion hub 2st. key	-	-	-	H.080.22			
	H	009	7	Spacer	-	-	-	ADS 62x50x3			
	H	009	8	Ring	-	-	-	-			

081	P	T	C	Commercial	56C		140TC		180TC		210TC		250TC	280TC	320TC
	H	009	1/N	Screw DIN 931	M8x25	6	M8x25	6	M8x25	6	M8x25	6			
	H	009	4/N	Screw DIN 931	-	-	-	-	-	-	-	-			
	H	009	8/N	Circlip DIN471	30	1	30	1	30	1	30	1			
	H	009	10/N	Key DIN 6885	B 8x7x18	1	B 8x7x18	1	B 8x7x18	1	B 8x7x18	1			
	H	009	11/N	Key DIN 6885	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1			
	H	009	12/N	Key DIN 6885	-	-	-	-	-	-	-	-			
	H	009	13/N	Closing plug	3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1			
	H	009	14/N	Gasket	3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1			
	H	009	15/N	Oil seal DIN 3760	ADT A 30-52-7	1	ADT A 30-52-7	1	ADT A 35-62-7	1	ADT A 50-72-8	1			
	H	009	16/N	Cap	-	-	-	-	-	-	RCA 40-7	1			

IEC Input

082	P	T	C	Built	063	071	080	090	100	112	132	160
	H	011	4	Motor sleeve			H.060.16	H.060.16	H.060.16	H.060.16	H.060.16	H.060.16
	H	011	5	Pinion 2st.			H.080.23	H.080.23	H.080.23	H.080.23	H.080.23	-
	H	011	5	Pinion 2st. key			-	-	-	-	-	H.080.23
	H	011	6	Pinion hub 2st.			-	-	-	-	H.080.22	-
	H	011	6	Pinion hub 2st. key			-	-	-	-	-	H.080.22
	H	011	7	Spacer			-	-	-	-	-	ADS 62x50x3
	H	011	8	Ring			-	-	-	-	-	-

082	P	T	C	Commercial	063	071	080		090		100		112		132		160	
	H	011	1/N	Screw DIN 931			M8x25	6	M8x25	6	M8x25	6	M8x25	6	M8x25	6	M8x25	6
	H	011	4/N	Screw DIN 931			-	-	-	-	-	-	-	-	-	-	-	-
	H	011	8/N	Circlip DIN471			-	-	-	-	-	-	-	-	30	1	30	1
	H	011	10/N	Key DIN 6885			-	-	-	-	-	-	-	-	B 8x7x18	1	B 8x7x18	1
	H	011	11/N	Key DIN 6885			-	-	-	-	-	-	-	-	-	-	A 8x7x40	1
	H	011	12/N	Key DIN 6885			-	-	-	-	-	-	-	-	-	-	A 8x7x40	1
	H	011	13/N	Closing plug			3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1
	H	011	14/N	Gasket			3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1
	H	011	15/N	Oil seal DIN 3760			ADT A 30-52-7	1	ADT A 30-52-7	1	ADT A 35-62-7	1	ADT A 35-62-7	1	ADT A 40-72-10	1	ADT A 50-72-8	1
	H	011	16/N	Cap			-	-	-	-	-	-	-	-	-	-	RCA 40-7	1

NEMA Input

082	P	T	C	Built	56C	140TC	180TC	210TC	250TC	280TC	320TC	360TC
	H	009	4	Reduction half coupling	H.060.14	H.060.14	H.060.14	H.060.14	H.060.14			
	H	009	5	Pinion 2st.	H.080.23	H.080.23	H.080.23	H.080.23	H.080.23			
	H	009	5	Pinion 2st. key	H.080.23	H.080.23	H.080.23	H.080.23	H.080.23			
	H	009	6	Pinion hub 2st.	-	-	-	H.080.22	H.080.22			
	H	009	6	Pinion hub 2st. key	-	-	-	-	-			
	H	009	7	Spacer	-	-	-	ADS 62x50x3	ADS 62x50x3			
	H	009	8	Ring	-	-	-	-	-			

082	P	T	C	Commercial	56C		140TC		180TC		210TC		250TC		280TC	320TC	360TC
	H	009	1/N	Screw DIN 931	M8x25	6	M8x25	6	M8x25	6	M8x25	6	M8x25	6			
	H	009	4/N	Screw DIN 931	-	-	-	-	-	-	-	-	-	-			
	H	009	8/N	Circlip DIN471	30	1	30	1	30	1	30	1	30	1			
	H	009	10/N	Key DIN 6885	B 8x7x18	1	B 8x7x18	1	B 8x7x18	1	B 8x7x18	1	B 8x7x18	1			
	H	009	11/N	Key DIN 6885	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1			
	H	009	12/N	Key DIN 6885	-	-	-	-	-	-	-	-	-	-			
	H	009	13/N	Closing plug	3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1			
	H	009	14/N	Gasket	3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1			
	H	009	15/N	Oil seal DIN 3760	ADT A 30-52-7	1	ADT A 30-52-7	1	ADT A 35-62-7	1	ADT A 50-72-8	1	ADT A 50-72-8	1			
	H	009	16/N	Cap	-	-	-	-	-	-	RCA 40-7	1	RCA 40-7	1			

IEC Input

083	P	T	C	Built	063	071	080	090	100	112	132
	H	011	4	Motor sleeve			H.060.16	H.060.16	H.060.16	H.060.16	H.060.16
	H	011	5	Pinion 2st.			H.060.23	H.060.23	H.060.23	H.060.23	H.060.23
	H	011	5	Pinion 2st. key			-	-	-	-	-
	H	011	6	Pinion hub 2st.			H.060.22	H.060.22	H.060.22	H.060.22	H.060.22
	H	011	6	Pinion hub 2st. key			-	-	-	-	-
	H	011	7	Spacer			-	-	-	-	-
	H	011	8	Ring			-	-	-	-	-

083	P	T	C	Commercial	063	071	080		090		100		112		132	
	H	011	1/N	Screw DIN 931			M8x25	6	M8x25	6	M8x25	6	M8x25	6	M8x25	6
	H	011	4/N	Screw DIN 931			-	-	-	-	-	-	-	-	-	-
	H	011	8/N	Circlip DIN471			24	1	24	1	24	1	24	1	24	1
	H	011	10/N	Key DIN 6885			B 8x7x16	1	B 8x7x16	1	B 8x7x16	1	B 8x7x16	1	B 8x7x16	1
	H	011	11/N	Key DIN 6885			-	-	-	-	-	-	-	-	-	-
	H	011	12/N	Key DIN 6885			-	-	-	-	-	-	-	-	-	-
	H	011	13/N	Closing plug			3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1
	H	011	14/N	Gasket			3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1
	H	011	15/N	Oil seal DIN 3760			ADT A 30-52-7	1	ADT A 30-52-7	1	ADT A 35-62-7	1	ADT A 35-62-7	1	ADT A 40-72-10	1
	H	011	16/N	Cap			-	-	-	-	-	-	-	-	-	-

NEMA Input

083	P	T	C	Built	56C	140TC	180TC	210TC	250TC	280TC	320TC
	H	009	4	Reduction half coupling	H.060.14	H.060.14	H.060.14	H.060.14	H.060.14		
	H	009	5	Pinion 2st.	H.060.23	H.060.23	H.060.23	H.060.23	H.060.23		
	H	009	5	Pinion 2st. key	-	-	-	-	-		
	H	009	6	Pinion hub 2st.	-	-	-	-	-		
	H	009	6	Pinion hub 2st. key	-	-	-	-	-		
	H	009	7	Spacer	-	-	-	ADS 62x50x3	ADS 62x50x3		
	H	009	8	Ring	-	-	-	-	-		

083	P	T	C	Commercial	56C		140TC		180TC		210TC		250TC		280TC	320TC
	H	009	1/N	Screw DIN 931	M8x25	6	M8x25	6	M8x25	6	M8x25	6	M8x25	6		
	H	009	4/N	Screw DIN 931	-	-	-	-	-	-	-	-	-	-		
	H	009	8/N	Circlip DIN471	-	-	-	-	-	-	-	-	-	-		
	H	009	10/N	Key DIN 6885	-	-	-	-	-	-	-	-	-	-		
	H	009	11/N	Key DIN 6885	-	-	-	-	-	-	-	-	-	-		
	H	009	12/N	Key DIN 6885	-	-	-	-	-	-	-	-	-	-		
	H	009	13/N	Closing plug	3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1		
	H	009	14/N	Gasket	3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1	3/8" gas	1		
	H	009	15/N	Oil seal DIN 3760	ADT A 30-52-7	1	ADT A 30-52-7	1	ADT A 35-62-7	1	ADT A 50-72-8	1	ADT A 50-72-8	1		
	H	009	16/N	Cap	-	-	-	-	-	-	RCA 40-7	1	RCA 40-7	1		

IEC Input

101	P	T	C	Built	080	090	100	112	132	160	180
	H	011	4	Motor sleeve			H.060.16	H.060.16	H.060.16	H.060.16	H.060.16
	H	011	5	Pinion 2st.			H.100.23	H.100.23	H.100.23	-	-
	H	011	5	Pinion 2st. key			-	-	-	H.100.23	H.100.23
	H	011	6	Pinion hub 2st.			-	-	H.100.22	-	-
	H	011	6	Pinion hub 2st. key			-	-	-	H.100.22	H.100.22
	H	011	7	Spacer			-	-	-	ADS 62x50x3	ADS 62x50x3
	H	011	8	Ring			-	-	-	-	-

101	P	T	C	Commercial	080	090	100		112		132		160		180	
	H	011	1/N	Screw DIN 931			M12x35	6	M12x35	6	M12x35	6	M12x35	6	M12x35	6
	H	011	4/N	Screw DIN 931			-	-	-	-	-	-	-	-	-	-
	H	011	8/N	Circlip DIN471			-	-	-	-	40	1	40	1	40	1
	H	011	10/N	Key DIN 6885			-	-	-	-	B 12x8x25	1	B 12x8x25	1	B 12x8x25	1
	H	011	11/N	Key DIN 6885			-	-	-	-	-	-	A 8x7x40	1	A 8x7x40	1
	H	011	12/N	Key DIN 6885			-	-	-	-	-	-	A 8x7x40	1	A 8x7x40	1
	H	011	13/N	Closing plug			1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1
	H	011	14/N	Gasket			1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1
	H	011	15/N	Oil seal DIN 3760			ADT A 35-62-7	1	ADT A 35-62-7	1	ADT A 40-72-10	1	ADT A 50-72-8	1	ADT A 50-72-8	1
	H	011	16/N	Cap			-	-	-	-	-	-	RCA 40-7	1	RCA 40-7	1

NEMA Input

101	P	T	C	Built	180TC	210TC	250TC	280TC	320TC	360TC
	H	009	4	Reduction half coupling	H.060.14	H.060.14	H.060.14			
	H	009	5	Pinion 2st.	H.100.23	H.100.23	H.100.23			
	H	009	5	Pinion 2st. key	-	H.100.23	H.100.23			
	H	009	6	Pinion hub 2st.	-	-	-			
	H	009	6	Pinion hub 2st. key	-	H.100.22	H.100.22			
	H	009	7	Spacer	-	ADS 62x50x3	ADS 62x50x3			
	H	009	8	Ring	-	-	-			

101	P	T	C	Commercial	180TC		210TC		250TC		280TC	320TC	360TC
	H	009	1/N	Screw DIN 931	M12x35	6	M12x35	6	M12x35	6			
	H	009	4/N	Screw DIN 931	-	-	-	-	-	-			
	H	009	8/N	Circlip DIN471	40	1	40	1	40	1			
	H	009	10/N	Key DIN 6885	B 12x8x25	1	B 12x8x25	1	B 12x8x25	1			
	H	009	11/N	Key DIN 6885	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1			
	H	009	12/N	Key DIN 6885	-	-	-	-	-	-			
	H	009	13/N	Closing plug	1/2" gas	1	1/2" gas	1	1/2" gas	1			
	H	009	14/N	Gasket	1/2" gas	1	1/2" gas	1	1/2" gas	1			
	H	009	15/N	Oil seal DIN 3760	ADT A 50-72-8	1	ADT A 50-72-8	1	ADT A 50-72-8	1			
	H	009	16/N	Cap	-	-	RCA 40-7	1	RCA 40-7	1			

IEC Input

102	P	T	C	Built	080	090	100	112	132	160	180
	H	011	4	Motor sleeve			H.060.16	H.060.16	H.060.16	H.060.16	H.060.16
	H	011	5	Pinion 2st.			H.100.23	H.100.23	H.100.23	-	-
	H	011	5	Pinion 2st. key			-	-	-	H.100.23	H.100.23
	H	011	6	Pinion hub 2st.			-	-	H.100.22	-	-
	H	011	6	Pinion hub 2st. key			-	-	-	H.100.22	H.100.22
	H	011	7	Spacer			-	-	-	ADS 62x50x3	ADS 62x50x3
	H	011	8	Ring			-	-	-	-	-

102	P	T	C	Commercial	080	090	100		112		132		160		180	
	H	011	1/N	Screw DIN 931			M12x35	6	M12x35	6	M12x35	6	M12x35	6	M12x35	6
	H	011	4/N	Screw DIN 931			-	-	-	-	-	-	-	-	-	-
	H	011	8/N	Circlip DIN471			-	-	-	-	40	1	40	1	40	1
	H	011	10/N	Key DIN 6885			-	-	-	-	B 12x8x25	1	B 12x8x25	1	B 12x8x25	1
	H	011	11/N	Key DIN 6885			-	-	-	-	-	-	A 8x7x40	1	A 8x7x40	1
	H	011	12/N	Key DIN 6885			-	-	-	-	-	-	A 8x7x40	1	A 8x7x40	1
	H	011	13/N	Closing plug			1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1
	H	011	14/N	Gasket			1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1
	H	011	15/N	Oil seal DIN 3760			ADT A 35-62-7	1	ADT A 35-62-7	1	ADT A 40-72-10	1	ADT A 50-72-8	1	ADT A 50-72-8	1
	H	011	16/N	Cap			-	-	-	-	-	-	RCA 40-7	1	RCA 40-7	1

NEMA Input

102	P	T	C	Built	180TC	210TC	250TC	280TC	320TC	360TC
	H	009	4	Reduction half coupling	H.060.14	H.060.14	H.060.14	H.100.14		
	H	009	5	Pinion 2st.	H.100.23	H.100.23	H.100.23	H.100.23		
	H	009	5	Pinion 2st. key	-	H.100.23	H.100.23	H.100.23		
	H	009	6	Pinion hub 2st.	-	-	-	-		
	H	009	6	Pinion hub 2st. key	-	H.100.22	H.100.22	H.100.22		
	H	009	7	Spacer	-	ADS 62x50x3	ADS 62x50x3	ADS 75x60x3		
	H	009	8	Ring	-	-	-	8.100.34		

102	P	T	C	Commercial	180TC		210TC		250TC		280TC		320TC	360TC
	H	009	1/N	Screw DIN 931	M12x35	6	M12x35	6	M12x35	6	M12x35	6		
	H	009	4/N	Screw DIN 931	-	-	-	-	-	-	M10x25	1		
	H	009	8/N	Circlip DIN471	40	1	40	1	40	1	40	1		
	H	009	10/N	Key DIN 6885	B 12x8x25	1	B 12x8x25	1	B 12x8x25	1	B 12x8x25	1		
	H	009	11/N	Key DIN 6885	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1		
	H	009	12/N	Key DIN 6885	-	-	-	-	-	-	-	-		
	H	009	13/N	Closing plug	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1		
	H	009	14/N	Gasket	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1		
	H	009	15/N	Oil seal DIN 3760	ADT A 50-72-8	1	ADT A 50-72-8	1	ADT A 50-72-8	1	ADT A 60-85-8	1		
	H	009	16/N	Cap	-	-	RCA 40-7	1	RCA 40-7	1	RCA 40-7	1		

IEC Input

103	P	T	C	Built	071	080	090	100	112	132	160
	H	011	4	Motor sleeve			H.060.16	H.060.16	H.060.16	H.060.16	H.060.16
	H	011	5	Pinion 2st.			H.080.23	H.080.23	H.080.23	H.080.23	-
	H	011	5	Pinion 2st. key			-	-	-	-	H.080.23
	H	011	6	Pinion hub 2st.			-	-	-	H.080.22	-
	H	011	6	Pinion hub 2st. key			-	-	-	-	H.080.22
	H	011	7	Spacer			-	-	-	-	ADS 62x50x3
	H	011	8	Ring			-	-	-	-	-

103	P	T	C	Commercial	071	080	090		100		112		132		160	
	H	011	1/N	Screw DIN 931			M12x35	6	M12x35	6	M12x35	6	M12x35	6	M12x35	6
	H	011	4/N	Screw DIN 931			-	-	-	-	-	-	-	-	-	-
	H	011	8/N	Circlip DIN471			-	-	-	-	-	-	30	1	30	1
	H	011	10/N	Key DIN 6885			-	-	-	-	-	-	B 8x7x18	1	B 8x7x18	1
	H	011	11/N	Key DIN 6885			-	-	-	-	-	-	-	-	A 8x7x40	1
	H	011	12/N	Key DIN 6885			-	-	-	-	-	-	-	-	A 8x7x40	1
	H	011	13/N	Closing plug			1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1
	H	011	14/N	Gasket			1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1
	H	011	15/N	Oil seal DIN 3760			ADT A 30-52-7	1	ADT A 35-62-7	1	ADT A 35-62-7	1	ADT A 40-72-10	1	ADT A 50-72-8	1
	H	011	16/N	Cap			-	-	-	-	-	-	-	-	RCA 40-7	1

NEMA Input

103	P	T	C	Built	140TC	180TC	210TC	250TC	280TC	320TC	360TC
	H	009	4	Reduction half coupling	H.060.14	H.060.14	H.060.14	H.060.14			
	H	009	5	Pinion 2st.	-	-	-	-			
	H	009	5	Pinion 2st. key	H.080.23	H.080.23	H.080.23	H.080.23			
	H	009	6	Pinion hub 2st.	-	-	-	-			
	H	009	6	Pinion hub 2st. key	H.080.22	H.080.22	H.080.22	H.080.22			
	H	009	7	Spacer	-	-	ADS 62x50x3	ADS 62x50x3			
	H	009	8	Ring	-	-	-	-			

103	P	T	C	Commercial	140TC		180TC		210TC		250TC		280TC	320TC	360TC
	H	009	1/N	Screw DIN 931	M12x35	6	M12x35	6	M12x35	6	M12x35	6			
	H	009	4/N	Screw DIN 931	-	-	-	-	-	-	-	-			
	H	009	8/N	Circlip DIN471	30	1	30	1	30	1	30	1			
	H	009	10/N	Key DIN 6885	B 8x7x18	1	B 8x7x18	1	B 8x7x18	1	B 8x7x18	1			
	H	009	11/N	Key DIN 6885	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1			
	H	009	12/N	Key DIN 6885	-	-	-	-	-	-	-	-			
	H	009	13/N	Closing plug	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1			
	H	009	14/N	Gasket	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1			
	H	009	15/N	Oil seal DIN 3760	ADT A 30-52-7	1	ADT A 50-72-8	1	ADT A 50-72-8	1	ADT A 50-72-8	1			
	H	009	16/N	Cap	-	-	-	-	RCA 40-7	1	RCA 40-7	1			

IEC Input

121	P	T	C	Built	090	100	112	132	160	180	200
	H	011	4	Motor sleeve				H.060.16	H.060.16	H.060.16	H.100.16
	H	011	5	Pinion 2st.				H.125.23	-	-	-
	H	011	5	Pinion 2st. key				-	H.125.23	H.125.23	H.125.23
	H	011	6	Pinion hub 2st.				-	-	-	-
	H	011	6	Pinion hub 2st. key				-	H.100.22	H.100.22	H.100.22
	H	011	7	Spacer				-	ADS 62x50x3	ADS 62x50x3	ADS 75x60x3
	H	011	8	Ring				-	-	-	8.100.34

121	P	T	C	Commercial	090	100	112	132		160		180		200	
	H	011	1/N	Screw DIN 931				M12x35	6	M12x35	6	M12x35	6	M12x35	6
	H	011	4/N	Screw DIN 931				-	-	-	-	-	-	M10x25	1
	H	011	8/N	Circlip DIN471				-	-	40	1	40	1	40	1
	H	011	10/N	Key DIN 6885				-	-	B 12x8x25	1	B 12x8x25	1	B 12x8x25	1
	H	011	11/N	Key DIN 6885				-	-	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1
	H	011	12/N	Key DIN 6885				-	1	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1
	H	011	13/N	Closing plug				1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1
	H	011	14/N	Gasket				1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1
	H	011	15/N	Oil seal DIN 3760				ADT A 40-72-10	1	ADT A 50-72-8	1	ADT A 50-72-8	1	ADT A 60-85-10	1
	H	011	16/N	Cap				-	-	RCA 40-7	1	RCA 40-7	1	RCA 40-7	1

NEMA Input

121	P	T	C	Built	210TC	250TC	280TC	320TC	360TC
	H	009	4	Reduction half coupling	H.060.14	H.060.14	H.100.14		
	H	009	5	Pinion 2st.	H.125.23	H.125.23	H.125.23		
	H	009	5	Pinion 2st. key	H.125.23	H.125.23	H.125.23		
	H	009	6	Pinion hub 2st.	-	-	-		
	H	009	6	Pinion hub 2st. key	H.100.22	H.100.22	H.100.22		
	H	009	7	Spacer	ADS 62x50x3	ADS 62x50x3	ADS 75x60x3		
	H	009	8	Ring	-	-	8.100.34		

121	P	T	C	Commercial	210TC		250TC		280TC		320TC	360TC
	H	009	1/N	Screw DIN 931	M12x35	6	M12x35	6	M12x35	6		
	H	009	4/N	Screw DIN 931	-	-	-	-	M10x25	1		
	H	009	8/N	Circlip DIN471	40	1	40	1	40	1		
	H	009	10/N	Key DIN 6885	B 12x8x25	1	B 12x8x25	1	B 12x8x25	1		
	H	009	11/N	Key DIN 6885	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1		
	H	009	12/N	Key DIN 6885	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1		
	H	009	13/N	Closing plug	1/2" gas	1	1/2" gas	1	1/2" gas	1		
	H	009	14/N	Gasket	1/2" gas	1	1/2" gas	1	1/2" gas	1		
	H	009	15/N	Oil seal DIN 3760	ADT A 50-72-8	1	ADT A 50-72-8	1	ADT A 60-85-8	1		
	H	009	16/N	Cap	RCA 40-7	1	RCA 40-7	1	RCA 40-7	1		

IEC Input

122	P	T	C	Built	090	100	112	132	160	180	200
	H	011	4	Motor sleeve				H.060.16	H.060.16	H.060.16	H.100.16
	H	011	5	Pinion 2st.				H.125.23	-	-	-
	H	011	5	Pinion 2st. key				-	H.125.23	H.125.23	H.125.23
	H	011	6	Pinion hub 2st.				-	-	-	-
	H	011	6	Pinion hub 2st. key				-	H.100.22	H.100.22	H.100.22
	H	011	7	Spacer				-	ADS 62x50x3	ADS 62x50x3	ADS 75x60x3
	H	011	8	Ring				-	-	-	8.100.34

122	P	T	C	Commercial	090	100	112	132		160		180		200	
	H	011	1/N	Screw DIN 931				M12x35	6	M12x35	6	M12x35	6	M12x35	6
	H	011	4/N	Screw DIN 931				-	-	-	-	-	-	M10x25	1
	H	011	8/N	Circlip DIN471				-	-	40	1	40	1	40	1
	H	011	10/N	Key DIN 6885				-	-	B 12x8x25	1	B 12x8x25	1	B 12x8x25	1
	H	011	11/N	Key DIN 6885				-	-	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1
	H	011	12/N	Key DIN 6885				-	1	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1
	H	011	13/N	Closing plug				1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1
	H	011	14/N	Gasket				1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1
	H	011	15/N	Oil seal DIN 3760				ADT A 40-72-10	1	ADT A 50-72-8	1	ADT A 50-72-8	1	ADT A 60-85-10	1
	H	011	16/N	Cap				-	-	RCA 40-7	1	RCA 40-7	1	RCA 40-7	1

NEMA Input

122	P	T	C	Built	210TC	250TC	280TC	320TC	360TC
	H	009	4	Reduction half coupling	H.060.14	H.060.14	H.100.14	H.100.14	
	H	009	5	Pinion 2st.	H.125.23	H.125.23	H.125.23	H.125.23	
	H	009	5	Pinion 2st. key	H.125.23	H.125.23	H.125.23	H.125.23	
	H	009	6	Pinion hub 2st.	-	-	-	-	
	H	009	6	Pinion hub 2st. key	H.100.22	H.100.22	H.100.22	H.100.22	
	H	009	7	Spacer	ADS 62x50x3	ADS 62x50x3	ADS 75x60x3	ADS 75x60x3	
	H	009	8	Ring	-	-	8.100.34	8.100.34	

122	P	T	C	Commercial	210TC		250TC		280TC		320TC		360TC
	H	009	1/N	Screw DIN 931	M12x35	6	M12x35	6	M12x35	6	M12x35	6	
	H	009	4/N	Screw DIN 931	-	-	-	-	M10x25	1	M10x25	1	
	H	009	8/N	Circlip DIN471	40	1	40	1	40	1	40	1	
	H	009	10/N	Key DIN 6885	B 12x8x25	1	B 12x8x25	1	B 12x8x25	1	B 12x8x25	1	
	H	009	11/N	Key DIN 6885	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1	
	H	009	12/N	Key DIN 6885	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1	
	H	009	13/N	Closing plug	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1	
	H	009	14/N	Gasket	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1	
	H	009	15/N	Oil seal DIN 3760	ADT A 50-72-8	1	ADT A 50-72-8	1	ADT A 60-85-8	1	ADT A 60-85-8	1	
	H	009	16/N	Cap	RCA 40-7	1	RCA 40-7	1	RCA 40-7	1	RCA 40-7	1	

IEC Input

123	P	T	C	Built	080	090	100	112	132	160	180	200
	H	011	4	Motor sleeve			H.060.16	H.060.16	H.060.16	H.060.16	H.060.16	H.100.16
	H	011	5	Pinion 2st.			H.100.23	H.100.23	H.100.23	-	-	-
	H	011	5	Pinion 2st. key			-	-	-	H.100.23	H.100.23	H.100.23
	H	011	6	Pinion hub 2st.			-	-	H.100.22	-	-	-
	H	011	6	Pinion hub 2st. key			-	-	-	H.100.22	H.100.22	H.100.22
	H	011	7	Spacer			-	-	-	ADS 62x50x3	ADS 62x50x3	ADS 75x60x3
	H	011	8	Ring			-	-	-	-	-	8.100.34

123	P	T	C	Commercial	080	090	100		112		132		160		180		200	
	H	011	1/N	Screw DIN 931			M12x35	6	M12x35	6	M12x35	6	M12x35	6	M12x35	6	M12x35	6
	H	011	4/N	Screw DIN 931			-	-	-	-	-	-	-	-	-	-	M10x25	1
	H	011	8/N	Circlip DIN471			-	-	-	-	40	1	40	1	40	1	40	1
	H	011	10/N	Key DIN 6885			-	-	-	-	B 12x8x25	1	B 12x8x25	1	B 12x8x25	1	B 12x8x25	1
	H	011	11/N	Key DIN 6885			-	-	-	-	-	-	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1
	H	011	12/N	Key DIN 6885			-	-	-	-	-	-	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1
	H	011	13/N	Closing plug			1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1
	H	011	14/N	Gasket			1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1
	H	011	15/N	Oil seal DIN 3760			ADT A 35-62-7	1	ADT A 35-62-7	1	ADT A 40-72-10	1	ADT A 50-72-8	1	ADT A 50-72-8	1	ADT A 60-85-10	1
	H	011	16/N	Cap			-	-	-	-	-	-	RCA 40-7	1	RCA 40-7	1	RCA 40-7	1

NEMA Input

123	P	T	C	Built	180TC	210TC	250TC	280TC	320TC	360TC
	H	009	4	Reduction half coupling	H.060.14	H.060.14	H.060.14	H.100.14	H.100.14	
	H	009	5	Pinion 2st.	H.100.23	H.100.23	H.100.23	H.100.23	H.100.23	
	H	009	5	Pinion 2st. key	-	H.125.23	H.125.23	H.125.23	H.125.23	
	H	009	6	Pinion hub 2st.	-	-	-	-	-	
	H	009	6	Pinion hub 2st. key	-	H.100.22	H.100.22	H.100.22	H.100.22	
	H	009	7	Spacer	-	ADS 62x50x3	ADS 62x50x3	ADS 75x60x3	ADS 75x60x3	
	H	009	8	Ring	-	-	-	8.100.34	8.100.34	

123	P	T	C	Commercial	180TC		210TC		250TC		280TC		320TC		360TC
	H	009	1/N	Screw DIN 931	M12x35	6	M12x35	6	M12x35	6	M12x35	6	M12x35	6	
	H	009	4/N	Screw DIN 931	-	-	-	-	-	-	M10x25	1	M10x25	1	
	H	009	8/N	Circlip DIN471	-	-	40	1	40	1	40	1	40	1	
	H	009	10/N	Key DIN 6885	-	-	B 12x8x25	1	B 12x8x25	1	B 12x8x25	1	B 12x8x25	1	
	H	009	11/N	Key DIN 6885	-	-	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1	
	H	009	12/N	Key DIN 6885	-	-	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1	
	H	009	13/N	Closing plug	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1	
	H	009	14/N	Gasket	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1	
	H	009	15/N	Oil seal DIN 3760	ADT A 50-72-8	1	ADT A 50-72-8	1	ADT A 50-72-8	1	ADT A 60-85-8	1	ADT A 60-85-8	1	
	H	009	16/N	Cap	-	-	RCA 40-7	1	RCA 40-7	1	RCA 40-7	1	RCA 40-7	1	

IEC Input

142	P	T	C	Built	090	100	112	132	160	180	200	225
	H	011	4	Motor sleeve					H.060.16	H.060.16	H.100.16	H.100.16
	H	011	5	Pinion 2st.					-	-	-	-
	H	011	5	Pinion 2st. key					H.140.23	H.140.23	H.140.23	H.140.23
	H	011	6	Pinion hub 2st.					-	-	-	-
	H	011	6	Pinion hub 2st. key					H.140.22	H.140.22	H.140.22	H.140.22
	H	011	7	Spacer					ADS 62x50x3	ADS 62x50x3	ADS 75x60x3	ADS 75x60x3
	H	011	8	Ring					-	-	8.100.34	8.100.34

142	P	T	C	Commercial	090	100	112	132	160		180		200		225	
	H	011	1/N	Screw DIN 931					M12x35	8	M12x35	8	M12x35	8	M12x35	8
	H	011	4/N	Screw DIN 931					-	-	-	-	M10x25	1	M10x25	1
	H	011	8/N	Circlip DIN471					40	1	40	1	40	1	40	1
	H	011	10/N	Key DIN 6885					B 12x8x30	1	B 12x8x30	1	B 12x8x30	1	B 12x8x30	1
	H	011	11/N	Key DIN 6885					A 8x7x40	1	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1
	H	011	12/N	Key DIN 6885					A 8x7x40	1	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1
	H	011	13/N	Closing plug					1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1
	H	011	14/N	Gasket					1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1
	H	011	15/N	Oil seal DIN 3760					ADT A 50-72-8	1	ADT A 50-72-8	1	ADT A 60-85-10	1	ADT A 60-85-10	1
	H	011	16/N	Cap					RCA 40-7	1	RCA 40-7	1	RCA 40-7	1	RCA 40-7	1

NEMA Input

142	P	T	C	Built	210TC	250TC	280TC	320TC	360TC
	H	009	4	Reduction half coupling	H.060.14	H.060.14	H.100.14	H.100.14	H.140.14
	H	009	5	Pinion 2st.	H.140.23	H.140.23	H.140.23	H.140.23	H.140.23
	H	009	5	Pinion 2st. key	H.140.23	H.140.23	H.140.23	H.140.23	H.140.23
	H	009	6	Pinion hub 2st.	-	-	-	-	-
	H	009	6	Pinion hub 2st. key	H.140.22	H.140.22	H.140.22	H.140.22	H.140.22
	H	009	7	Spacer	ADS 62x50x3	ADS 62x50x3	ADS 75x60x3	ADS 75x60x3	ADS 75x60x3
	H	009	8	Ring	-	-	8.100.34	8.100.34	8.100.34

142	P	T	C	Commercial	210TC		250TC		280TC		320TC		360TC	
	H	009	1/N	Screw DIN 931	M12x35	8	M12x35	8	M12x35	8	M12x35	8	M12x35	8
	H	009	4/N	Screw DIN 931	-	-	-	-	M10x25	1	M10x25	1	M10x25	1
	H	009	8/N	Circlip DIN471	40	1	40	1	40	1	40	1	40	1
	H	009	10/N	Key DIN 6885	B 12x8x30	1	B 12x8x30	1	B 12x8x30	1	B 12x8x30	1	B 12x8x30	1
	H	009	11/N	Key DIN 6885	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1
	H	009	12/N	Key DIN 6885	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1
	H	009	13/N	Closing plug	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1
	H	009	14/N	Gasket	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1
	H	009	15/N	Oil seal DIN 3760	ADT A 50-72-8	1	ADT A 50-72-8	1	ADT A 60-85-8	1	ADT A 60-85-10	1	ADT A 60-85-10	1
	H	009	16/N	Cap	RCA 40-7	1	RCA 40-7	1	RCA 40-7	1	RCA 40-7	1	RCA 40-7	1

IEC Input

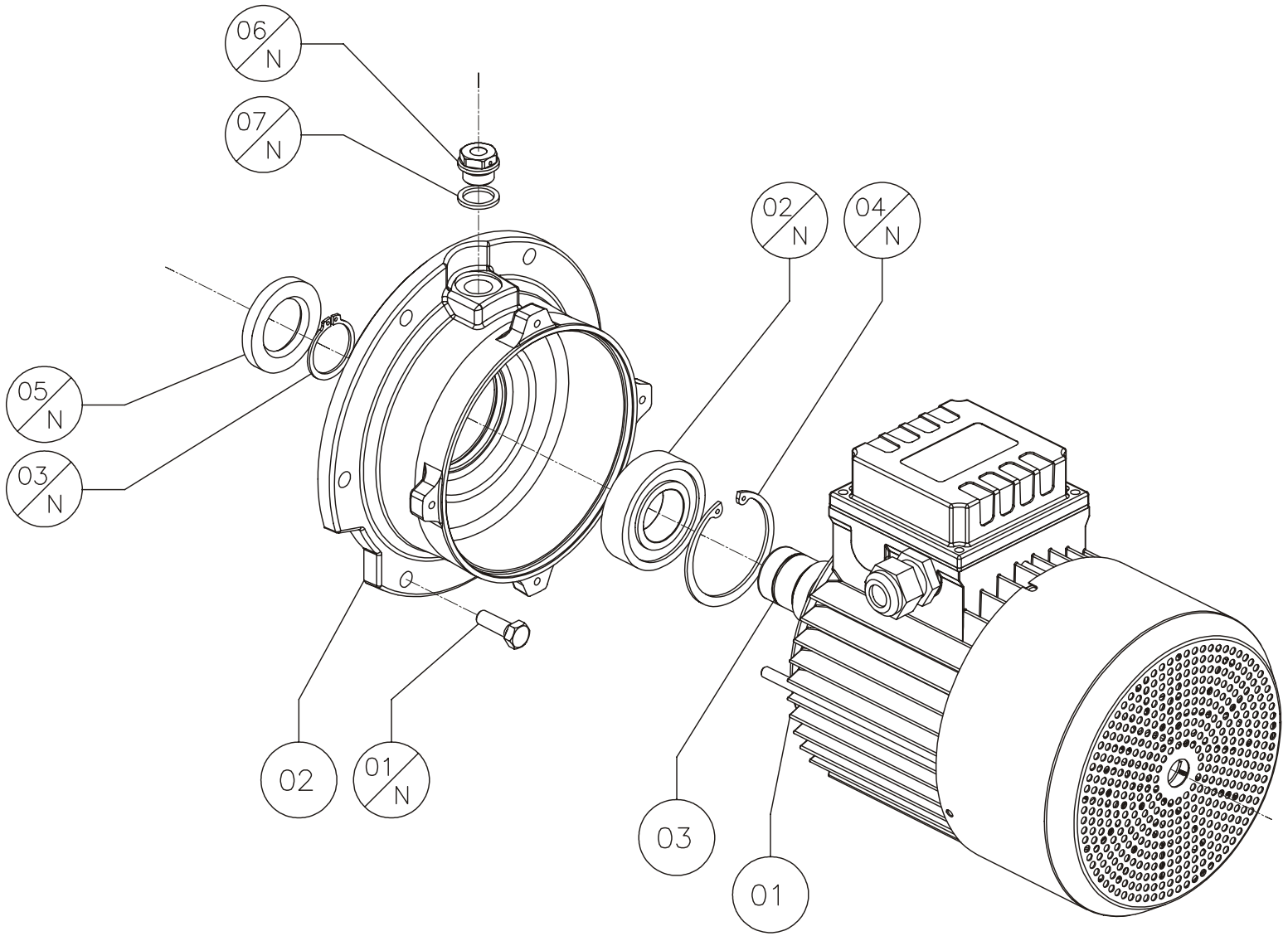
143	P	T	C	Built	080	090	100	112	132	160	180	200
	H	011	4	Motor sleeve					H.060.16	H.060.16	H.060.16	H.100.16
	H	011	5	Pinion 2st.					H.125.23	-	-	-
	H	011	5	Pinion 2st. key					-	H.125.23	H.125.23	H.125.23
	H	011	6	Pinion hub 2st.					-	-	-	-
	H	011	6	Pinion hub 2st. key					-	H.100.22	H.100.22	H.100.22
	H	011	7	Spacer					-	ADS 62x50x3	ADS 62x50x3	ADS 75x60x3
	H	011	8	Ring					-	-	-	8.100.34

143	P	T	C	Commercial	080	090	100	112	132		160		180		200	
	H	011	1/N	Screw DIN 931					M12x35	8	M12x35	8	M12x35	8	M12x35	8
	H	011	4/N	Screw DIN 931					-	-	-	-	-	-	M10x25	1
	H	011	8/N	Circlip DIN471					-	-	40	1	40	1	40	1
	H	011	10/N	Key DIN 6885					-	-	B 12x8x25	1	B 12x8x25	1	B 12x8x25	1
	H	011	11/N	Key DIN 6885					-	-	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1
	H	011	12/N	Key DIN 6885					-	-	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1
	H	011	13/N	Closing plug					1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1
	H	011	14/N	Gasket					1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1
	H	011	15/N	Oil seal DIN 3760					ADT A 40-72-10	1	ADT A 50-72-8	1	ADT A 50-72-8	1	ADT A 60-85-10	1
	H	011	16/N	Cap					-	-	RCA 40-7	1	RCA 40-7	1	RCA 40-7	1

NEMA Input

143	P	T	C	Built	180TC	210TC	250TC	280TC	320TC	360TC
	H	009	4	Reduction half coupling	H.060.14	H.060.14	H.060.14	H.100.14	H.100.14	H.140.14
	H	009	5	Pinion 2st.	H.125.23	H.125.23	H.125.23	H.125.23	H.125.23	H.125.23
	H	009	5	Pinion 2st. key	-	H.140.23	H.140.23	H.140.23	H.140.23	H.140.23
	H	009	6	Pinion hub 2st.	-	-	-	-	-	-
	H	009	6	Pinion hub 2st. key	-	H.140.22	H.140.22	H.140.22	H.140.22	H.140.22
	H	009	7	Spacer	-	ADS 62x50x3	ADS 62x50x3	ADS 75x60x3	ADS 75x60x3	ADS 75x60x3
	H	009	8	Ring	-	-	-	8.100.34	8.100.34	8.100.34

143	P	T	C	Commercial	180TC		210TC		250TC		280TC		320TC		360TC	
	H	009	1/N	Screw DIN 931	M12x35	8	M12x35	8	M12x35	8	M12x35	8	M12x35	8	M12x35	8
	H	009	4/N	Screw DIN 931	-	-	-	-	-	-	M10x25	1	M10x25	1	M10x25	1
	H	009	8/N	Circlip DIN471	-	-	40	1	40	1	40	1	40	1	40	1
	H	009	10/N	Key DIN 6885	-	-	B 12x8x30	1	B 12x8x30	1	B 12x8x30	1	B 12x8x30	1	B 12x8x30	1
	H	009	11/N	Key DIN 6885	-	-	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1
	H	009	12/N	Key DIN 6885	-	-	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1	A 8x7x40	1
	H	009	13/N	Closing plug	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1
	H	009	14/N	Gasket	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1	1/2" gas	1
	H	009	15/N	Oil seal DIN 3760	ADT A 35-62-7	1	ADT A 50-72-8	1	ADT A 50-72-8	1	ADT A 60-85-8	1	ADT A 60-85-10	1	ADT A 60-85-10	1
	H	009	16/N	Cap	-	-	RCA 40-7	1	RCA 40-7	1	RCA 40-7	1	RCA 40-7	1	RCA 40-7	1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063 B11

P	T	C	Built	030	040	050	060	080	100	125
H	010	01	Casing	3.063.01	3.063.01	3.063.01				
H	010	02	Flange	3.063.04.030	3.063.04.030	3.063.04.030				
H	010	03	Shaft	3.063.18.6	3.063.18.6	3.063.18.6				

P	T	C	Commercial	030		040		050		060	080	100	125
H	010	1/N	Screw DIN 931	M8x20	4	M8x20	4	M8x20	4				
H	010	2/N	Bearing	6204 2z	1	6204 2z	1	6204 2z	1				
H	010	3/N	Circlip DIN 471	20	1	20	1	20	1				
H	010	4/N	Circlip DIN 472	47	1	47	1	47	1				
H	010	5/N	Oil seal DIN 3760	A 20-42-7	1	A 20-42-7	1	A 20-42-7	1				
H	010	6/N	Breather plug	-	-	-	-	-	-				
H	010	7/N	Gasket	-	-	-	-	-	-				

071 B11

P	T	C	Built	041	051	061	081	101	121
H	010	01	Casing	3.071.01	3.071.01				
H	010	02	Flange	3.071.04.030	3.071.04.030				
H	010	03	Shaft	3.071.18.6	3.071.18.6				

P	T	C	Commercial	041		051		061	081	101	121
H	010	1/N	Screw DIN 931	M8x20	4	M8x20	4				
H	010	2/N	Bearing	6205 2z	1	6205 2z	1				
H	010	3/N	Circlip DIN 471	25	1	25	1				
H	010	4/N	Circlip DIN 472	52	1	52	1				
H	010	5/N	Oil seal DIN 3760	A 25-47-7	1	A 25-47-7	1				
H	010	6/N	Breather plug	-	-	-	-				
H	010	7/N	Gasket	-	-	-	-				

071 B11

P	T	C	Built	030	040	050	060	080	100	125
H	010	01	Casing	3.071.01	3.071.01	3.071.01	3.071.01			
H	010	02	Flange	3.071.04.030	3.071.04.030	3.071.04.030	3.071.04.060			
H	010	03	Shaft	3.071.18.6	3.071.18.6	3.071.18.6	3.071.18.6			

P	T	C	Commercial	030		040		050		060		080	100	125
H	010	1/N	Screw DIN 931	M8x20	4	M8x20	4	M8x20	4	M8x25	6			
H	010	2/N	Bearing	6205 2z	1	6205 2z	1	6205 2z	1	6205 2z	1			
H	010	3/N	Circlip DIN 471	25	1	25	1	25	1	25	1			
H	010	4/N	Circlip DIN 472	52	1	52	1	52	1	52	1			
H	010	5/N	Oil seal DIN 3760	A 25-47-7	1	A 25-47-7	1	A 25-47-7	1	A 25-47-7	1			
H	010	6/N	Breather plug	-	-	-	-	-	-	3/8" gas	1			
H	010	7/N	Gasket	-	-	-	-	-	-	3/8" gas	1			

080 B11

P	T	C	Built	041		051		061		081		101	121
H	010	01	Casing	3.080.01		3.080.01		3.080.01		3.080.01			
H	010	02	Flange	3.080.04.030		3.080.04.030		3.080.04.030		3.080.04.060			
H	010	03	Shaft	3.080.18.6		3.080.18.6		3.080.18.6		3.080.18.6			

P	T	C	Commercial	041		051		061		081		101	121
H	010	1/N	Screw DIN 931	M8x20	4	M8x20	4	M8x20	4	M8x25	6		
H	010	2/N	Bearing	6206 2z	1	6206 2z	1	6206 2z	1	6206 2z	1		
H	010	3/N	Circlip DIN 471	30	1	30	1	30	1	30	1		
H	010	4/N	Circlip DIN 472	62	1	62	1	62	1	62	1		
H	010	5/N	Oil seal DIN 3760	A 30-52-7	1	A 30-52-7	1	A 30-52-7	1	A 30-52-7	1		
H	010	6/N	Breather plug	-	-	-	-	-	-	3/8" gas	1		
H	010	7/N	Gasket	-	-	-	-	-	-	3/8" gas	1		

080 B11

P	T	C	Built	030	040	050	060	080	100	125
H	010	01	Casing	3.080.01	3.080.01	3.080.01	3.080.01	3.080.01		
H	010	02	Flange	3.080.04.030	3.080.04.030	3.080.04.030	3.080.04.060	3.080.04.060		
H	010	03	Shaft	3.080.18.6	3.080.18.6	3.080.18.6	3.080.18.6	3.080.18.6		

P	T	C	Commercial	030		040		050		060		080		100	125
H	010	1/N	Screw DIN 931	M8x20	4	M8x20	4	M8x20	4	M8x25	6	M8x25	6		
H	010	2/N	Bearing	6206 2z	1	6206 2z	1	6206 2z	1	6206 2z	1	6206 2z	1		
H	010	3/N	Circlip DIN 471	30	1	30	1	30	1	30	1	30	1		
H	010	4/N	Circlip DIN 472	62	1	62	1	62	1	62	1	62	1		
H	010	5/N	Oil seal DIN 3760	A 30-52-7	1	A 30-52-7	1	A 30-52-7	1	A 30-52-7	1	A 30-52-7	1		
H	010	6/N	Breather plug	-	-	-	-	-	-	3/8" gas	1	3/8" gas	1		
H	010	7/N	Gasket	-	-	-	-	-	-	3/8" gas	1	3/8" gas	1		

090S B11

P	T	C	Built	041		051		061		081		101	121
H	010	01	Casing	3.090.01		3.090.01		3.090.01		3.090.01			
H	010	02	Flange	3.090.04.030		3.090.04.030		3.090.04.030		3.090.04.060			
H	010	03	Shaft	3.090.18.6		3.090.18.6		3.090.18.6		3.090.18.6			

P	T	C	Commercial	041		051		061		081		101	121
H	010	1/N	Screw DIN 931	M8x20	4	M8x20	4	M8x20	4	M8x25	6		
H	010	2/N	Bearing	6206 2z	1	6206 2z	1	6206 2z	1	6206 2z	1		
H	010	3/N	Circlip DIN 471	30	1	30	1	30	1	30	1		
H	010	4/N	Circlip DIN 472	62	1	62	1	62	1	62	1		
H	010	5/N	Oil seal DIN 3760	A 30-52-7	1	A 30-52-7	1	A 30-52-7	1	A 30-52-7	1		
H	010	6/N	Breather plug	-	-	-	-	-	-	3/8" gas	1		
H	010	7/N	Gasket	-	-	-	-	-	-	3/8" gas	1		

090S B11

P	T	C	Built	030	040	050	060	080	100	125
H	010	01	Casing	3.090.01	3.090.01	3.090.01	3.090.01	3.090.01	3.090.01	
H	010	02	Flange	3.090.04.030	3.090.04.030	3.090.04.030	3.090.04.060	3.090.04.060	3.090.04.100	
H	010	03	Shaft	3.090.18.6	3.090.18.6	3.090.18.6	3.090.18.6	3.090.18.6	3.090.18.6	

P	T	C	Commercial	030		040		050		060		080		100		125
H	010	1/N	Screw DIN 931	M8x20	4	M8x20	4	M8x20	4	M8x25	6	M8x25	6	M12x35	6	
H	010	2/N	Bearing	6206 2z	1	6206 2z	1	6206 2z	1	6206 2z	1	6206 2z	1	6206 2z	1	
H	010	3/N	Circlip DIN 471	30	1	30	1	30	1	30	1	30	1	30	1	
H	010	4/N	Circlip DIN 472	62	1	62	1	62	1	62	1	62	1	62	1	
H	010	5/N	Oil seal DIN 3760	A 30-52-7	1	A 30-52-7	1	A 30-52-7	1	A 30-52-7	1	A 30-52-7	1	A 30-52-7	1	
H	010	6/N	Breather plug	-	-	-	-	-	-	3/8" gas	1	3/8" gas	1	1/2" gas	1	
H	010	7/N	Gasket	-	-	-	-	-	-	3/8" gas	1	3/8" gas	1	1/2" gas	1	

090L B11

P	T	C	Built	041	051	061	081	101	121
H	010	01	Casing	3.091.01	3.091.01	3.091.01	3.091.01		
H	010	02	Flange	3.090.04.030	3.090.04.030	3.090.04.060	3.090.04.060		
H	010	03	Shaft	3.091.18.6	3.091.18.6	3.091.18.6	3.091.18.6		

P	T	C	Commercial	041		051		061		081		101	121
H	010	1/N	Screw DIN 931	M8x20	4	M8x20	4	M8x20	4	M8x25	6		
H	010	2/N	Bearing	6206 2z	1	6206 2z	1	6206 2z	1	6206 2z	1		
H	010	3/N	Circlip DIN 471	30	1	30	1	30	1	30	1		
H	010	4/N	Circlip DIN 472	62	1	62	1	62	1	62	1		
H	010	5/N	Oil seal DIN 3760	A 30-52-7	1	A 30-52-7	1	A 30-52-7	1	A 30-52-7	1		
H	010	6/N	Breather plug	-	-	-	-	-	-	3/8" gas	1		
H	010	7/N	Gasket	-	-	-	-	-	-	3/8" gas	1		

090L B11

P	T	C	Built	030	040	050	060	080	100	125
H	010	01	Casing	3.091.01	3.091.01	3.091.01	3.091.01	3.091.01	3.091.01	
H	010	02	Flange	3.090.04.030	3.090.04.030	3.090.04.030	3.090.04.060	3.090.04.060	3.090.04.100	
H	010	03	Shaft	3.091.18.6	3.091.18.6	3.091.18.6	3.091.18.6	3.091.18.6	3.091.18.6	

P	T	C	Commercial	030		040		050		060		080		100		125
H	010	1/N	Screw DIN 931	M8x20	4	M8x20	4	M8x20	4	M8x25	6	M8x25	6	M12x35	6	
H	010	2/N	Bearing	6206 2z	1	6206 2z	1	6206 2z	1	6206 2z	1	6206 2z	1	6206 2z	1	
H	010	3/N	Circlip DIN 471	30	1	30	1	30	1	30	1	30	1	30	1	
H	010	4/N	Circlip DIN 472	62	1	62	1	62	1	62	1	62	1	62	1	
H	010	5/N	Oil seal DIN 3760	A 30-52-7	1	A 30-52-7	1	A 30-52-7	1	A 30-52-7	1	A 30-52-7	1	A 30-52-7	1	
H	010	6/N	Breather plug	-	-	-	-	-	-	3/8" gas	1	3/8" gas	1	1/2" gas	1	
H	010	7/N	Gasket	-	-	-	-	-	-	3/8" gas	1	3/8" gas	1	1/2" gas	1	

100 B11

P	T	C	Built	041	051	061	081	101	121
H	010	01	Casing		3.100.01	3.100.01	3.100.01	3.100.01	
H	010	02	Flange		3.100.04.030	3.100.04.030	3.100.04.060	3.100.04.100	
H	010	03	Shaft		3.101.18.6	3.101.18.6	3.100.18.6	3.100.18.6	

P	T	C	Commercial	041	051		061		081		101		121
H	010	1/N	Screw DIN 931		M8x20	4	M8x20	4	M8x25	6	M8x25	6	
H	010	2/N	Bearing		6207 2z	1	6207 2z	1	6207 2z	1	6207 2z	1	
H	010	3/N	Circlip DIN 471		35	1	35	1	35	1	35	1	
H	010	4/N	Circlip DIN 472		72	1	72	1	72	1	72	1	
H	010	5/N	Oil seal DIN 3760		A 35-62-7	1	A 35-62-7	1	A 35-62-7	1	A 35-62-7	1	
H	010	6/N	Breather plug		-	-	-	-	3/8" gas	1	1/2" gas	1	
H	010	7/N	Gasket		-	-	-	-	3/8" gas	1	1/2" gas	1	

100 B11

P	T	C	Built	030	040	050	060	080	100	125
H	010	01	Casing	3.100.01	3.100.01	3.100.01	3.100.01	3.100.01	3.100.01	3.100.01
H	010	02	Flange	3.100.04.030	3.100.04.030	3.100.04.030	3.100.04.060	3.100.04.060	3.100.04.100	3.100.04.100
H	010	03	Shaft	3.101.18.6	3.101.18.6	3.101.18.6	3.100.18.6	3.100.18.6	3.100.18.6	3.100.18.6

P	T	C	Commercial	030		040		050		060		080		100		125	
H	010	1/N	Screw DIN 931	M8x20	4	M8x20	4	M8x20	4	M8x25	6	M8x25	6	M12x35	6	M12x35	6
H	010	2/N	Bearing	6207 2z	1	6207 2z	1	6207 2z	1	6207 2z	1	6207 2z	1	6207 2z	1	6207 2z	1
H	010	3/N	Circlip DIN 471	35	1	35	1	35	1	35	1	35	1	35	1	35	1
H	010	4/N	Circlip DIN 472	72	1	72	1	72	1	72	1	72	1	72	1	72	1
H	010	5/N	Oil seal DIN 3760	A 35-62-7	1	A 35-62-7	1	A 35-62-7	1	A 35-62-7	1	A 35-62-7	1	A 35-62-7	1	A 35-62-7	1
H	010	6/N	Breather plug	-	-	-	-	-	-	3/8" gas	1	3/8" gas	1	1/2" gas	1	1/2" gas	1
H	010	7/N	Gasket	-	-	-	-	-	-	3/8" gas	1	3/8" gas	1	1/2" gas	1	1/2" gas	1

112 B11

P	T	C	Built	041	051	061	081	101	121
H	010	01	Casing		3.112.01	3.112.01	3.112.01	3.112.01	
H	010	02	Flange		3.112.04.030	3.112.04.030	3.112.04.060	3.112.04.100	
H	010	03	Shaft		3.113.18.6	3.113.18.6	3.112.18.6	3.112.18.6	

P	T	C	Commercial	041	051		061		081		101		121
H	010	1/N	Screw DIN 931		M8x20	4	M8x20	4	M8x25	6	M12x35	6	
H	010	2/N	Bearing		6207 2z	1	6207 2z	1	6207 2z	1	6207 2z	1	
H	010	3/N	Circlip DIN 471		35	1	35	1	35	1	35	1	
H	010	4/N	Circlip DIN 472		72	1	72	1	72	1	72	1	
H	010	5/N	Oil seal DIN 3760		A 35-62-7	1	A 35-62-7	1	A 35-62-7	1	A 35-62-7	1	
H	010	6/N	Breather plug		-	-	-	-	3/8" gas	1	1/2" gas	1	
H	010	7/N	Gasket		-	-	-	-	3/8" gas	1	1/2" gas	0	

112 B11

P	T	C	Built	030	040	050	060	080	100	125
H	010	01	Casing	3.112.01	3.112.01	3.112.01	3.112.01	3.112.01	3.112.01	3.112.01
H	010	02	Flange	3.112.04.030	3.112.04.030	3.112.04.030	3.112.04.060	3.112.04.060	3.112.04.100	3.112.04.100
H	010	03	Shaft	3.113.18.6	3.113.18.6	3.113.18.6	3.112.18.6	3.112.18.6	3.112.18.6	3.112.18.6

P	T	C	Commercial	030		040		050		060		080		100		125	
H	010	1/N	Screw DIN 931	M8x20	4	M8x20	4	M8x20	4	M8x25	6	M8x25	6	M12x35	6	M12x35	6
H	010	2/N	Bearing	6207 2z	1	6207 2z	1	6207 2z	1	6207 2z	1	6207 2z	1	6207 2z	1	6207 2z	1
H	010	3/N	Circlip DIN 471	35	1	35	1	35	1	35	1	35	1	35	1	35	1
H	010	4/N	Circlip DIN 472	72	1	72	1	72	1	72	1	72	1	72	1	72	1
H	010	5/N	Oil seal DIN 3760	A 35-62-7	1	A 35-62-7	1	A 35-62-7	1	A 35-62-7	1	A 35-62-7	1	A 35-62-7	1	A 35-62-7	1
H	010	6/N	Breather plug	-	-	-	-	-	-	3/8" gas	1	3/8" gas	1	1/2" gas	1	1/2" gas	1
H	010	7/N	Gasket	-	-	-	-	-	-	3/8" gas	1	3/8" gas	1	1/2" gas	1	1/2" gas	1

132M B11

P	T	C	Built	041	051	061	081	101	121
H	010	01	Casing				3.132.01	3.132.01	3.132.01
H	010	02	Flange				3.132.04.060	3.132.04.100	3.132.04.100
H	010	03	Shaft				3.132.18.6	3.132.18.6	3.132.18.6

P	T	C	Commercial	041	051	061	081		101		121	
H	010	1/N	Screw DIN 931				M8x25	6	M12x35	6	M12x35	6
H	010	2/N	Bearing				6308 2z	1	6308 2z	1	6308 2z	1
H	010	3/N	Circlip DIN 471				40	1	40	1	40	1
H	010	4/N	Circlip DIN 472				90	1	90	1	90	1
H	010	5/N	Oil seal DIN 3760				A 40-72-10	1	A 40-72-10	1	A 40-72-10	1
H	010	6/N	Breather plug				3/8" gas	1	1/2" gas	1	1/2" gas	1
H	010	7/N	Gasket				3/8" gas	1	1/2" gas	1	1/2" gas	1

132M B11

P	T	C	Built	030	040	050	060	080	100	125
H	010	01	Casing				3.132.01	3.132.01	3.132.01	3.132.01
H	010	02	Flange				3.132.04.060	3.132.04.060	3.132.04.100	3.132.04.100
H	010	03	Shaft				3.132.18.6	3.132.18.6	3.132.18.6	3.132.18.6

P	T	C	Commercial	030	040	050	060		080		100		125	
H	010	1/N	Screw DIN 931				M8x25	6	M8x25	6	M12x35	6	M12x35	6
H	010	2/N	Bearing				6308 2z	1	6308 2z	1	6308 2z	1	6308 2z	1
H	010	3/N	Circlip DIN 471				40	1	40	1	40	1	40	1
H	010	4/N	Circlip DIN 472				90	1	90	1	90	1	90	1
H	010	5/N	Oil seal DIN 3760				A 40-72-10	1	A 40-72-10	1	A 40-72-10	1	A 40-72-10	1
H	010	6/N	Breather plug				3/8" gas	1	3/8" gas	1	1/2" gas	1	1/2" gas	1
H	010	7/N	Gasket				3/8" gas	1	3/8" gas	1	1/2" gas	1	1/2" gas	1

132L B11

P	T	C	Built	041	051	061	081	101	121
H	010	01	Casing					3.132.01	3.132.01
H	010	02	Flange					3.132.04.100	3.132.04.100
H	010	03	Shaft					3.133.18.6	3.133.18.6

P	T	C	Commercial	041	051	061	081	101		121	
H	010	1/N	Screw DIN 931					M12x35	6	M12x35	6
H	010	2/N	Bearing					6308 2z	1	6308 2z	1
H	010	3/N	Circlip DIN 471					40	1	40	1
H	010	4/N	Circlip DIN 472					90	1	90	1
H	010	5/N	Oil seal DIN 3760					A 40-72-10	1	A 40-72-10	1
H	010	6/N	Breather plug					1/2" gas	1	1/2" gas	1
H	010	7/N	Gasket					1/2" gas	1	1/2" gas	1

132L B11

P	T	C	Built	030	040	050	060	080	100	125
H	010	01	Casing				3.132.01	3.132.01	3.132.01	3.132.01
H	010	02	Flange				3.132.04.060	3.132.04.060	3.132.04.100	3.132.04.100
H	010	03	Shaft				3.133.18.6	3.133.18.6	3.133.18.6	3.133.18.6

P	T	C	Commercial	030	040	050	060		080		100		125	
H	010	1/N	Screw DIN 931				M8x25	6	M8x25	6	M12x35	6	M12x35	6
H	010	2/N	Bearing				6308 2z	1	6308 2z	1	6308 2z	1	6308 2z	1
H	010	3/N	Circlip DIN 471				40	1	40	1	40	1	40	1
H	010	4/N	Circlip DIN 472				90	1	90	1	90	1	90	1
H	010	5/N	Oil seal DIN 3760				A 40-72-10	1	A 40-72-10	1	A 40-72-10	1	A 40-72-10	1
H	010	6/N	Breather plug				3/8" gas	1	3/8" gas	1	1/2" gas	1	1/2" gas	1
H	010	7/N	Gasket				3/8" gas	1	3/8" gas	1	1/2" gas	1	1/2" gas	1

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