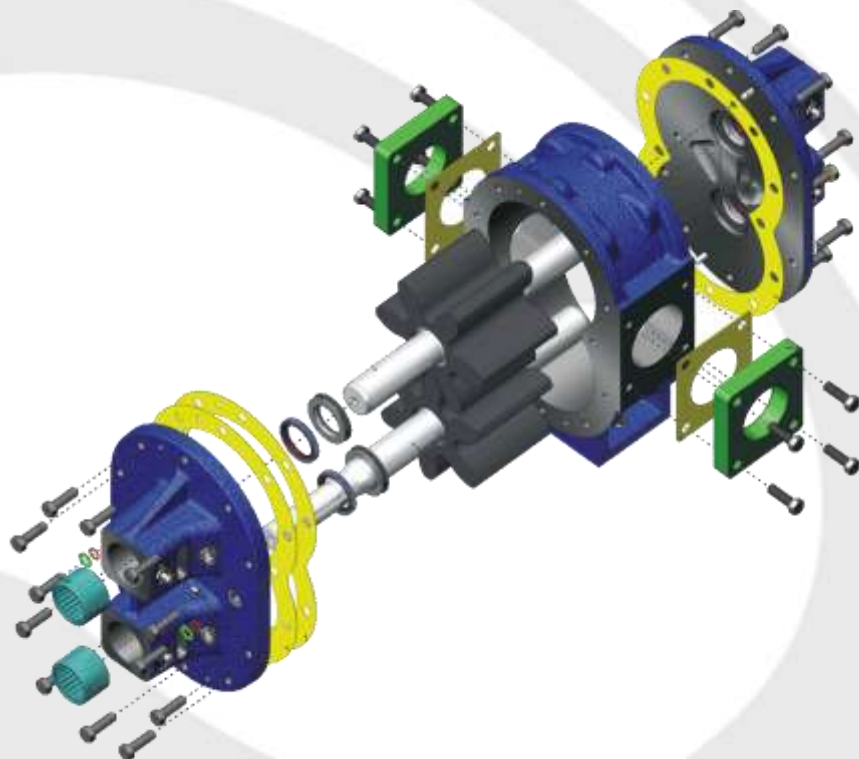




MULTI TORQUE INDUSTRIES

1300 726 525



INSTALLATION, OPERATION AND
MAINTENANCE MANUAL

1

BORE  **BOSS** **POLY**  **BOSS** **MiTi**  **PUMPS** **MiTi**  **BLAST**

Contacts:

Sales - sales@multitorque.com
Accounts - accounts@multitorque.com
Web - www.multitorque.com

Queensland
Unit 5, 222 Mount Crosby Rd
Tivoli, 4305
Contact: 07 3812 9332

Western Australia
Unit 2, 40 Inspiration Dr
Wangara, 6065
Contact: 08 9302 2400



Contents

General Information	3
Operational Design of the Napco Rotary Gear Pump	3
Pump Capacities and Sizes	3
Pump Capabilities	3
Pump Materials	3
Installation	4
Maintenance	4
Lubrication	4
Gaskets	4
Seals	5
Drive Gear and Idler Gear Assemblies	5
Repair or Replacing Pump Parts	6
NAPCO Repair Kits	6&7
Repair/Installation Procedure	8&9
Engineering Data	9
Performance Data	9
Pump Materials & Composition	9
Dimensional	10
Napco Pump Parts Identification Chart	11
Pump Diagram	12

Contacts:

Sales - sales@multitorque.com
Accounts - accounts@multitorque.com
Web - www.multitorque.com

Queensland
Unit 5, 222 Mount Crosby Rd
Tivoli, 4305
Contact: 07 3812 9332

Western Australia
Unit 2, 40 Inspiration Dr
Wangara, 6065
Contact: 08 9302 2400



General Information

OPERATIONAL DESIGN OF THE NAPCO ROTARY GEAR PUMP

The NAPCO rotary gear pump is available in 316 stainless steel and ductile iron, and can handle a broad range of pumping applications from water to highly viscous or abrasive fluids. It can also handle some corrosive fluids. It comes fully lubricated and ready for use. It operates clockwise or counter-clockwise with equal efficiency. The rotary gears come standard in high temperature nitrile rubber, but neoprene, Viton and other gear material can be ordered to handle special higher temperature or corrosive fluid applications.

NAPCO rotary gear pumps are positive displacement pumps. As the rotary impeller turns, the gear teeth open, creating an expanding cavity on the inlet side to vacuum fluid into the pump chamber. The impellers carry the product around the pump cavity to the outlet side and, upon meshing on the outlet side, force the fluid out of the pump.

The drive gear and idler gear are the only moving parts in the pump. The outer lip seals (low pressure) and inner seals (high pressure) ride on especially hardened shaft surfaces. The four inner high pressure re seals seal the pump chamber and the four outer lip seals create lubrication chambers. The two shafts ride on four outboard roller bearings -one on each shaft end- that are spatially separated from the seals and pump chamber by weep holes in the bearing housings/side covers. Anti-cavitation traps on the inside walls of the bearing housings/side covers minimize shaft flex that would otherwise result from product being trapped between the meshing gears. The discharge ports are designed to allow the gears to rotate and move product in either direction through the pump chamber.

PUMP CAPACITIES AND SIZES

NAPCO rotary gear pumps come in 2" and 3" discharge port sizes and handle volume capacities ranging from approximately 60 to 350 GPM. They are designed to generally operate up to 300 RPM yielding pressures up to 100 psi. Running at speeds higher than 300 RPM will accelerate wear. Consult with NAPCO if operating pressures in excess of 150 psi are expected. Where the design application calls for pumping an abrasive product, increasing the NAPCO pump size and decreasing the pump speed is the most likely way to increase pump performance.

PUMP CAPABILITIES

NAPCO rotary gear pumps are designed to pump viscous and abrasive fluids and some corrosive fluids. The closely machined tolerances between the operating surfaces allow them to efficiently pump non-viscous fluids as well. The pumps can operate equally well in a clockwise or counter-clockwise rotation of the gears, and with the drive gear in the upper or lower chamber position.

PUMP MATERIALS

NAPCO rotary gear pumps are available in ductile iron and 316 stainless steel and come standard with high temperature nitrile rubber gears good for operating temperatures up to 240 degrees Fahrenheit. Where higher temperatures or corrosive fluid conditions are to be encountered, NAPCO can work with its customers to provide gear material out of various metals and elastomers, such as neoprene, EPDM, urethane and Viton. Please check with NAPCO or your local distributor as to the suitable gear and pump case for your particular product application. For further information on the material composition of NAPCO pump parts, see Section "Pump Materials and Composition" below.

Contacts:

Sales - sales@multitorque.com
Accounts - accounts@multitorque.com
Web - www.multitorque.com

Queensland
Unit 5, 222 Mount Crosby Rd
Tivoli, 4305
Contact: 07 3812 9332

Western Australia
Unit 2, 40 Inspiration Dr
Wangara, 6065
Contact: 08 9302 2400



INSTALLATION

NAPCO rotary gear pumps can be belt driven with a sheave installed directly on the drive shaft. However, a jack shaft will dramatically increase bearing life. An in-line gear reducer is the preferred method to reduce motor speed. The pump and any motor should be rigid so as not to flex when the pump is operating. The pump can also be operated on a truck power take-off with a flexible coupling. Improper alignment of the motor drive with the pump drive shaft will cause premature wear and/or failure of the gears, seals and/or bearings. To facilitate easy maintenance and repair of the pump, it should be installed with the grease zerks exposed, and with adequate clearances so the end plates can be accessed and removed. (See the "Dimensional Data in this Manual for mounting holes and pump ports.)

MAINTENANCE

NAPCO rotary gear pumps have been designed and equipped to provide satisfactory use. They come with especially hardened surfaces on the shafts where the seals and bearings ride to extend the operating life of those pump parts. The pump chamber, shafts, and gears have been molded and machined to exacting dimensional tolerances, and the seals and bearings selected, to provide greater operating efficiency and extended wear. Despite these features, the pump will still require proper maintenance and operation for safe, satisfactory performance.

LUBRICATION

NAPCO rotary gear pumps are designed with eight (8) easily accessible grease zerk fittings. Four of these zerk fittings allow grease to flow between the lip seals and high-pressure seals on each shaft (two seal grease cavities on each shaft). Four other zerk fittings lubricate the bearings. The pump comes fully lubricated with NGLI #2 grease and ready for use. **ONCE THE PUMP IS IN OPERATION IT IS ABSOLUTELY CRITICAL THAT A REGULAR LUBRICATION PROGRAM BE FOLLOWED BY THE USER TO ALLOW THE PUMP TO OPERATE AS DESIGNED AND PREVENT PREMATURE FAILURE OF THE MOVING PARTS**

GASKETS

NAPCO Rotary Gear Pumps come installed with one .016 chamber gasket on the drive side bearing housing/side cover and three .008-inch chamber gaskets on the non-drive side bearing housing/side cover. Efficiency can be improved where operation wear has occurred by removing one of the three .008-inch non-drive side gaskets to tighten clearances and restore operational efficiency. **UNLESS ESPECIALLY MODIFIED, NAPCO PUMPS LEAVE THE FACTORY WITH APPROXIMATELY A .008 INCH COMBINED CLEARANCE BETWEEN THE ENDS OF THE GEARS AND ADJACENT BEARING HOUSING SURFACES.** High temperature, or other unusual operating conditions, may dictate some variance in gear/housing clearances.

Contacts:

Sales - sales@multitorque.com
Accounts - accounts@multitorque.com
Web - www.multitorque.com

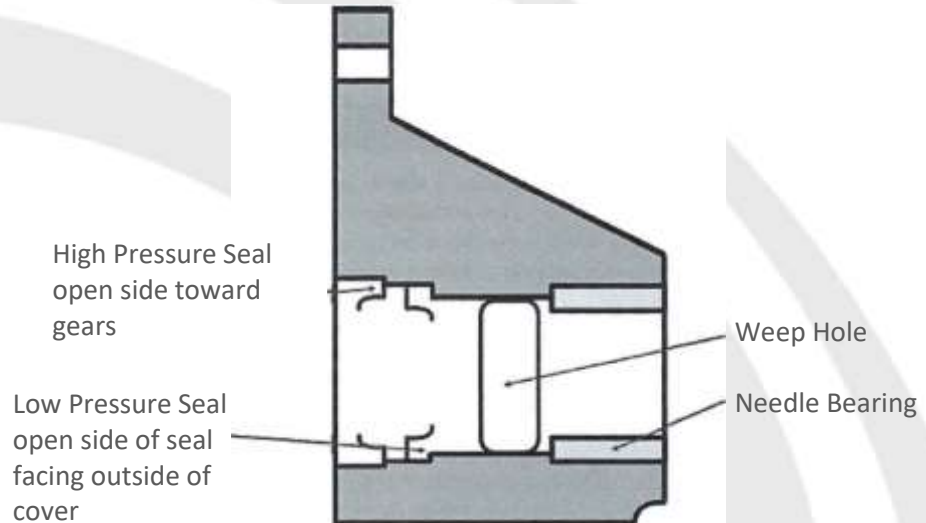
Queensland
Unit 5, 222 Mount Crosby Rd
Tivoli, 4305
Contact: 07 3812 9332

Western Australia
Unit 2, 40 Inspiration Dr
Wangara, 6065
Contact: 08 9302 2400



SEALS

NAPCO utilizes a combination of high pressure and low-pressure seals in its pumps. When re-installing or replacing these seals, it is very important that they be re-installed in the correct load-bearing direction to assure proper sealing of the pump chamber and elimination of excessive pressure buildup in the grease cavity. The diagram below shows the direction the open side of each seal should face in relation to the gears and pump chamber.



DRIVE GEAR AND IDLER GEAR ASSEMBLIES

NAPCO pump gears are pressure-fitted on to the shafts. Because most NAPCO customers lack the equipment to pull off and press a new gear on an existing pump shaft, NAPCO offers its customers drive gear and idler gear "assemblies" with the gear already mounted on the appropriate shaft. These assemblies are included in the NAPCO Spare Parts Kit, but the customer may also order them separately. Please identify the appropriate gear assembly and part number from the following list:

Identification No.	Description
2" ductile or stainless-steel pump (PA200C or PA200S)	
PA250C	2" ductile iron drive shaft with mounted nitrile gear
PA250S	2" stainless steel drive shaft with mounted nitrile gear
PA251C	2" ductile iron drive shaft with mounted nitrile gear
PA251S	2" stainless steel drive shaft with mounted nitrile gear
3" ductile iron or stainless-steel pump (PA300C or PA300S)	
PA350C	3" ductile iron drive shaft with mounted nitrile gear
PA350S	3" stainless steel drive shaft with mounted nitrile gear
PA351C	3" ductile iron idler shaft with mounted nitrile gear
PA351S	3" stainless steel idler shaft with mounted nitrile gear

Contacts:

Sales - sales@multitorque.com
 Accounts - accounts@multitorque.com
 Web - www.multitorque.com

Queensland
 Unit 5, 222 Mount Crosby Rd
 Tivoli, 4305
 Contact: 07 3812 9332

Western Australia
 Unit 2, 40 Inspiration Dr
 Wangara, 6065
 Contact: 08 9302 2400



REPAIR OR REPLACING PUMP PARTS

The NAPCO rotary gear pump will eventually lose operational efficiency as a result of wear of the moving parts, A bearing housing/side cover can be easily removed in order to observe the condition of the gears and inner pump chamber and determine whether any parts need replacement.

Whenever a bearing housing/side cover is removed and/or shafts and gears are replaced, it is extremely important, when pulling out or re-inserting the shafts, that care be taken that the shaft ends do not nick, damage or dislodge the seals and bearings in the bearing housing/side covers. Any such damage or movement will cause the pump to leak and quickly fail. NAPCO has tapered the ends of the shafts to facilitate their removal and insertion through the seals and bearings, NAPCO also recommends that a lubricant be applied to the tapered end of the shaft to further facilitate moving it through the seals and bearings. (See the "Repair/Installation Procedure" section below for further guidance on repair and maintenance.)

NAPCO REPAIR KITS

Individual pump spare or replacement parts can be ordered from NAPCO or its authorized distributors (See the "Spare Parts Identification Drawing and Chart" at the end of this brochure). NAPCO also offers "repair kits" that include all the moving or wear parts in a NAPCO pump typically needing replacement. A NAPCO Repair Kit contains:

- (1) drive gear assembly and one
- (1) idler gear assembly - both with gear mounted on hardened shaft.
- (4) roller bearings.
- (4) high pressure seals.
- (4) low pressure seals.
- (2) .016-inch-thick center case gaskets.
- (3) .008-inch-thick center case gaskets.

A NAPCO 2" pump (PA200C ductile iron pump or PA200S stainless pump) will require a PK200C (for ductile pump) or PK200S (for stainless pump) repair kit. A NAPCO 3" pump (PA300C ductile iron pump or PA300S stainless pump) will require a PK300C (for ductile pump) or PK300S (for stainless pump). If a customer has ordered a ductile iron pump modified to contain stainless steel shafts, that pump will require a stainless-steel pump Repair Kit.

Contacts:

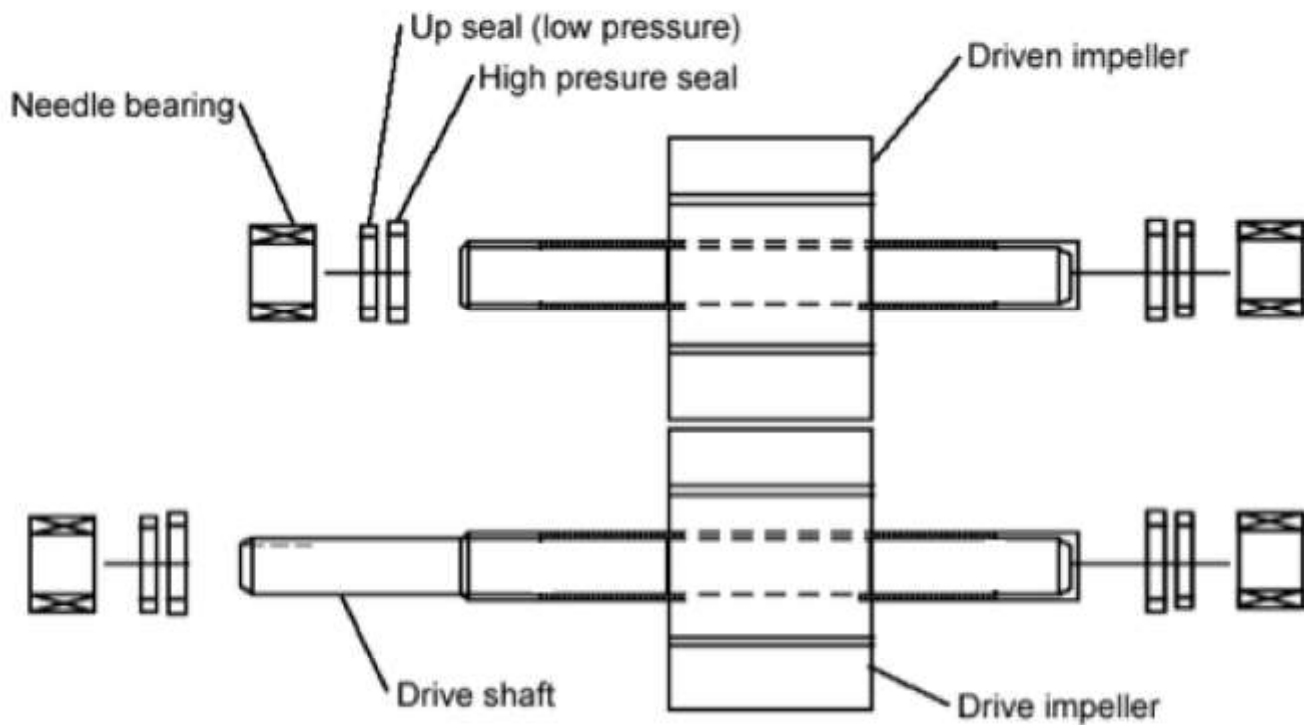
Sales - sales@multitorque.com
Accounts - accounts@multitorque.com
Web - www.multitorque.com

Queensland
Unit 5, 222 Mount Crosby Rd
Tivoli, 4305
Contact: 07 3812 9332

Western Australia
Unit 2, 40 Inspiration Dr
Wangara, 6065
Contact: 08 9302 2400



The following diagram illustrates the position of these replacement parts in the NAPCO pump:



Contacts:

Sales - sales@multitorque.com
Accounts - accounts@multitorque.com
Web - www.multitorque.com

Queensland
Unit 5, 222 Mount Crosby Rd
Tivoli, 4305
Contact: 07 3812 9332

Western Australia
Unit 2, 40 Inspiration Dr
Wangara, 6065
Contact: 08 9302 2400



REPAIR / INSTALLATION PROCEDURE

1. Periodic Inspection of Internal Working Parts

Periodically, or upon indication of loss of performance, pump can be easily opened, inspected and cleaned by following steps 2.1 and 2.2 below. Follow the applicable steps under 2. 3 to reassemble pump.

Quick internal inspection and pump cleanout

- Close valves, lock out drive.
- The non-drive bearing housing/side cover may be removed to remove blockages and/or inspect for damage.

2. Inspection and/or repair of pump.

2.1 Disassembly:

Remove non drive bearing housing/side cover. Bearing housing/side covers have 2 bolts with washer & O-rings.

Note location for reassembly. Caution, do not damage gaskets. Note how many on each side.

Remove top idler gear, pull by hand.

Remove drive gear. Take care during shaft removal not to damage seals with sharp keyway.

Unbolt and remove drive side bearing housing/side cover. Take care not to damage gaskets.

Remove bearing grub screws and bearings.

Remove high and low pressure seals, note orientation for correct reassembly.

2.2 Clean and inspection:

Clean all pump parts of product and old grease.

Inspect all parts, particularly:

Gear rubber for excessive wear or damage.

Bearings, seals, gaskets, grease nipples for rust, wear, damage

2.3 Reassembly

- Install 4 bearings: insert from external side of bearing housing/side cover using bearing tool NAPTOOO1. Secure with set screws with Loctite 222 on threads, then back off set screws 1/4 turn.
- Install 4 low pressure seals: grease seal OD and ID and insert from pump side of bearing housing/side cover using tool NAPTO003 till seal seats on lower shoulder. Be sure that open side of seal faces away from tool. Pre stretch seal ID with tool NAPTO005.
- Install 4 high pressure seals: grease seal OD and ID and insert from pump side of bearing housing/side cover using tool NAPTO002 until flush with upper shoulder. Be sure that open side of seal faces tool. Pre stretch seal ID with tool NAPTO005.
- Fit 1 x .016" or 0.4 mm. drive side gasket by adhering to bearing housing/side cover with grease. Note: bearing housing/side covers can be oriented to provide best access to grease nipples with pump in service.
- Fit drive side bearing housing/side cover, align with aligning pins, secure housing cover with 12 bolts tightening evenly to 35 ft/lbs. or 48 Nm. Remember that the two recessed bolts have washers and O-rings.
- Install gear assemblies. Grease both sides of shafts. Take care not to damage seals when inserting shafts through the seals in the bearing housing/side covers --particularly with sharp keyway edges.
- Adhere 2 x .008" (0.2mm.) gaskets to remaining bearing housing/side cover, locating over alignment pin.

8

Contacts:

Sales - sales@multitorque.com
Accounts - accounts@multitorque.com
Web - www.multitorque.com

Queensland
Unit 5, 222 Mount Crosby Rd
Tivoli, 4305
Contact: 07 3812 9332

Western Australia
Unit 2, 40 Inspiration Dr
Wangara, 6065
Contact: 08 9302 2400



- Mount the remaining bearing housing/side cover by sliding cover onto the protruding gear shafts. Take care not to damage seals, particularly with sharp keyway edges.
- Secure bearing housing/side cover to the pump center case with 4 equally spaced bolts, torque to 35 ft/lbs. or 48 Nm. Important: set the gap between gears and pump bearing housing/side covers to .006" to .008" or 0.1524mm. to 0.218mm. i.e. a small amount for gear free play. This is achieved by forcing each gear to one side by tapping the gear shaft, set depth gauge to '0' then forcing gear shafts to the other side and note length of travel. Adjust free play by adding or removing gaskets.
- Fit bearing housing/side cover when free play is correct and secure all 12 bolts to 35 ft/lbs. or 48 Nm.
- Grease all bearings (one stroke) and seals (7 strokes) with high quality bearing grease. Evidence of grease should be present in the weep hole and around the bearing seal.
- Rotate gears by hand. They should not bind.
- **Important: Ensure any drive coupling has free play to provide gear free play within the pump and the drive does not force the gear to one side.**
- Fit any guards.

2.4 Prime and test pump:

- Run the pump and ensure prime. It may be necessary to use the air bleed valve to achieve initial prime.
- Check for any abnormal noises or sound of gears rubbing or slapping which would indicate the pump having run dry or without product.

ENGINEERING DATA

PERFORMANCE DATA

The following pump data was tested with water (specific gravity 1.0). Consult NAPCO for specific pump size and speed recommendations for your application. Higher viscosity liquid products may require a lower pump RPM to achieve the desired GPM and discharge pressures.

Pump RPM	Discharge Pressure	Capacity GPM		Brake HP	
		2"	3"	2"	3"
190	All	69	104	.65	.98
190	30	65	97	1.8	2.7
190	50	64	95	3.2	4.5
190	70	62	93	4.0	6.2
190	100	60	89	5.7	8.4
280	10	105	158	.99	1.5
280	30	98	147	2.7	4.2
280	50	97	145	4.7	6.9
280	70	95	142	6.3	9.4
280	100	93	140	8.7	13.4

PUMP MATERIALS & COMPOSITION

Material	Shaft	Impeller	Housing	Center Case Gasket	High Pressure Seal	Low Pressure Seal	Bearings
Ductile Iron	Alloy Steel	Nitrile Rubber	Carbon Steel	Asbestos-free paper	Viton / Teflon	Viton	Chrome Needle
316 Stainless	440C Stainless	Nitrile Rubber	316 Stainless Steel	Asbestos-free paper	Viton / Teflon	Viton	Chrome Needle



Contacts:

Sales - sales@multitorque.com
 Accounts - accounts@multitorque.com
 Web - www.multitorque.com

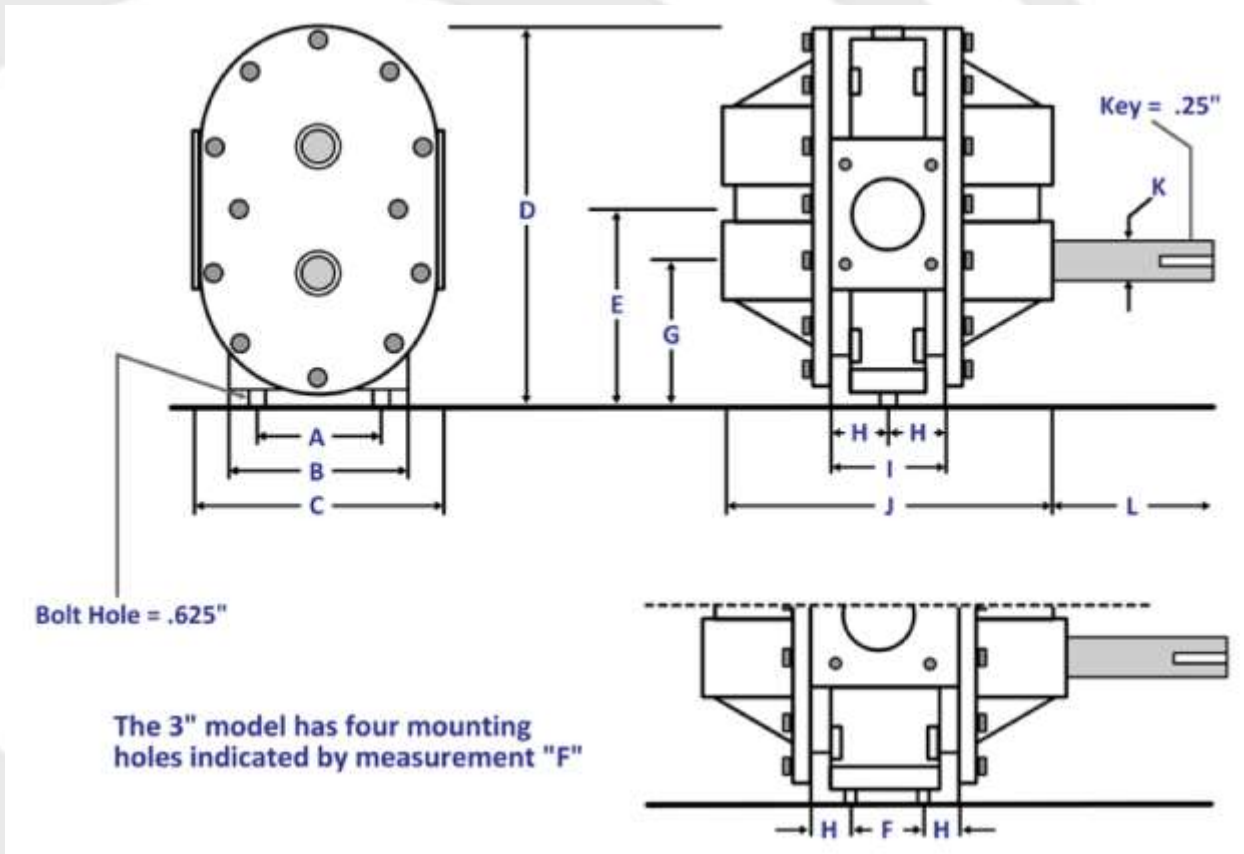
Queensland
 Unit 5, 222 Mount Crosby Rd
 Tivoli, 4305
 Contact: 07 3812 9332

Western Australia
 Unit 2, 40 Inspiration Dr
 Wangara, 6065
 Contact: 08 9302 2400



DIMENSIONAL DATA

	A	B	C	D	E	F	G	H	I	J	K	L
2"	4.25	6.25	8.38	12.75	6.63	--	4.50	2.0	4.0	12.0	1.125	4.50
3"	4.37	6.25	8.38	12.75	6.63	3.63	4.50	1.187	6.0	14.0	1.125	4.50



Contacts:

Sales - sales@multitorque.com
 Accounts - accounts@multitorque.com
 Web - www.multitorque.com

Queensland
 Unit 5, 222 Mount Crosby Rd
 Tivoli, 4305
 Contact: 07 3812 9332

Western Australia
 Unit 2, 40 Inspiration Dr
 Wangara, 6065
 Contact: 08 9302 2400



NAPCO PUMP PARTS IDENTIFICATION CHART

In addition to the NAPCO Spare Part Repair Kits and Gear Assemblies discussed above, a customer may also order specific spare parts from NAPCO. Please consult the blow-out diagram below to identify the specific part needed, including name and identification number. Many parts are available in ductile iron or stainless-steel material. Ductile iron parts have a "C" letter in their part number. stainless steel parts have an "s" letter in their part number.

Description	Part Number	Reference	Number per pump
3" Pump.	PA300C or S		
3" Service Kit	PK300Cor S		
Idler Shaft	PM304CorS	4	1
Drive Shaft	PM303CorS	3	1
Pump Housing 3"	PM0301C or S	1	1
Driver Gear 3"	PM306N	9	1
Idler Gear 3"	PM306N	9	1
Port Bolt	5/8-11 x 1.5" hex bolt C or S	16	4
Port Gasket	PB316	14	2
2" Pump	PA200CorS		
2" Service Kit #	PK200C or S		
Idler Shaft	PM204CorS	4	1
Drive Shaft	PM203CorS	3	1
Pump Housing 2"	PM0201C or S	1	
Driver Gear 2"	PM206N	9	1
Idle Gear 2"	PM206N	9	1
Port Bolt	3/8-16 x 1.25" hex bolt C or S	16	4
Port Gasket	PB216	14	2
Common Parts			
Bearing Housing! Side	PM002CorS	2	2
Set Screw	NAP-I/4-2.8 x .5snss	5	2
Gasket .016"	PM007G02	7	4
Gasket .008"	PM007GOI	7	3
Roller Bearing	PM038	8	4
Seal Low Pressure	PM037	10	4
Seal High Pressure	PM036	11	4
Side Cover Bolt	3/8-16 x 1.25" hex bolt C or S	17	24
Grease Nipple ss	H1610S	18	8
Aligning Pin	PB42	19	2
O-ring	PB43	25	4
Backing Washer	PM226	27	4



Contacts:

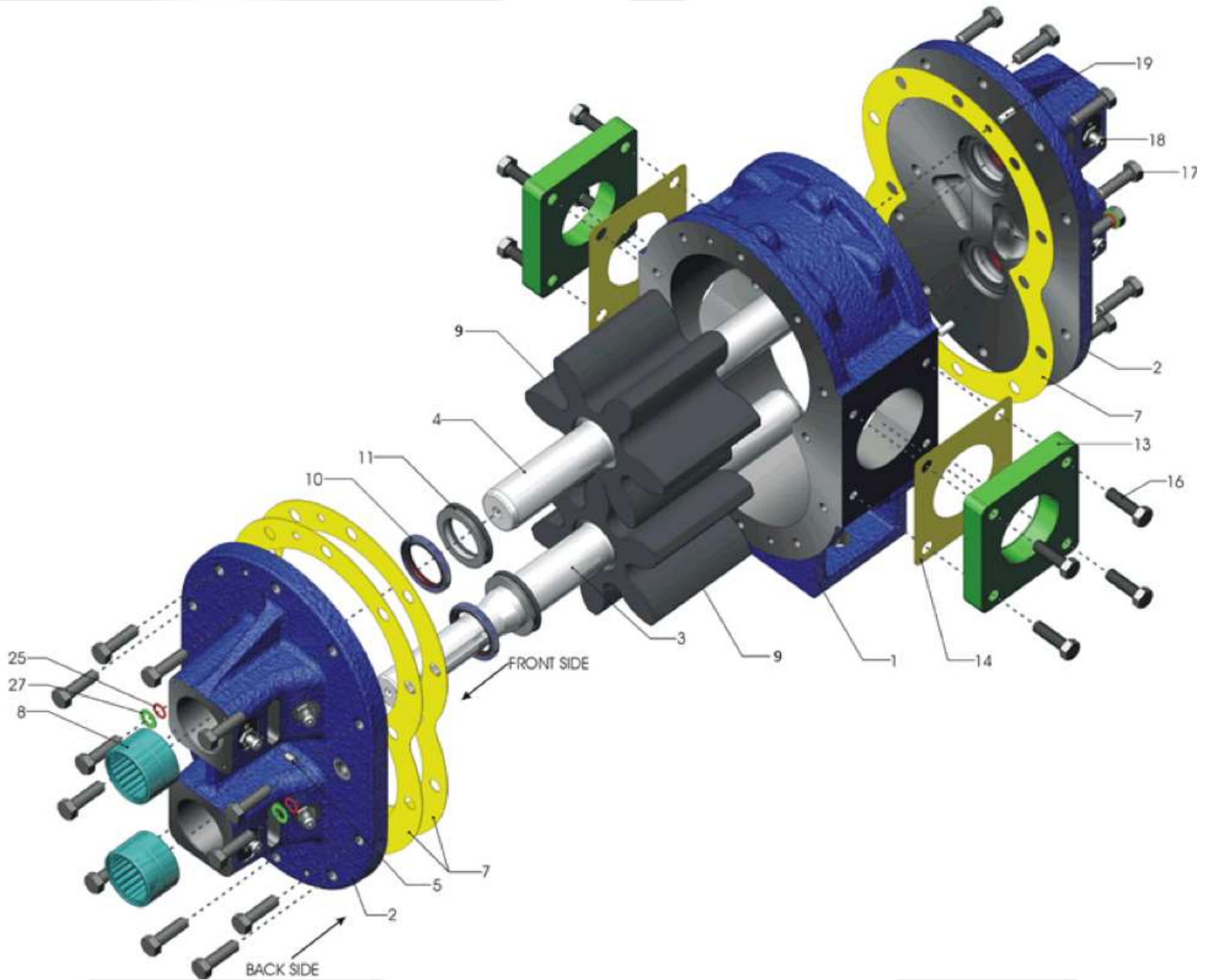
Sales - sales@multitorque.com
 Accounts - accounts@multitorque.com
 Web - www.multitorque.com

Queensland
 Unit 5, 222 Mount Crosby Rd
 Tivoli, 4305
 Contact: 07 3812 9332

Western Australia
 Unit 2, 40 Inspiration Dr
 Wangara, 6065
 Contact: 08 9302 2400



PUMP DIAGRAM



12

BORE  **BOSS** **POLY**  **BOSS** **MiTi**  **PUMPS** **MiTi**  **BLAST**

Contacts:

Sales - sales@multitorque.com
Accounts - accounts@multitorque.com
Web - www.multitorque.com

Queensland
Unit 5, 222 Mount Crosby Rd
Tivoli, 4305
Contact: 07 3812 9332

Western Australia
Unit 2, 40 Inspiration Dr
Wangara, 6065
Contact: 08 9302 2400