PHILADELPHIA GEAR

POWER SYSTEMS BY TIMKEN

COMMERCIAL MARINE APPLICATIONS






DESIGN.
MANUFACTURE.
SERVICE.
SUPPORT.

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QUALITY COMMITMENT. INDEPENDENTLY CERTIFIED.

Philadelphia Gear promotes a Quality Management System designed to provide consistently high levels of service to our customers and is compliant with the quality system models of ANSI/ISO/ASQ Q9001-2015.

Our commitment to the quality process is evidenced by the fact that each one of our sites has been *independently audited and ISO certified to the 2015 standard*. This multi-site quality strategy comes with a degree of risk – after all, if one site fails an audit – the whole organization's certification is placed in jeopardy.

Still, we have taken this unique approach to quality so customers have assurance that their mission critical equipment is in good hands anywhere within our network.

Simply put, our unwavering goal is to achieve customer satisfaction the way our customers define it. By delivering our products and services on the basis of ***100% TSB: 100% on-Time, 100% on-Spec, and 100% on-Budget***.

ISO 9001
Quality Certified

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DECADES OF EXPERIENCE. DECADES OF PERFORMANCE.

Founded in 1892, Philadelphia Gear can trace its service to the marine market back to 1916, and the important role it played in gear manufacturing during World War 1. The company would continue to grow into a world leader in the design and manufacture of industrial gearing and enclosed drives in virtually every application.

Now in its second century of operation, and as part of The Timken Company, Philadelphia Gear has never been better positioned to serve the marine markets. In fact, Philadelphia Gear is the exclusive OEM source for critical gearing applications on over 90% of the active U.S. Navy's fleet, including main propulsion reduction gears (MRGs) up to 60,000 horsepower. Whether it's an industrial, commercial or military marine application, Philadelphia Gear brings the same level of attention to detail and expertise to delivering engineered solutions to complex marine challenges.

Gearing Related Applications

- Main Reduction Gears (MRGs)
- Lube Oil Pump Systems
- Winch Drives
- Diesel Turbine Generator Drives
- Wet and Dry Clutches
- Propulsion Shafting and Couplings
- High Volume Marine (Jet) Pumps and Drives
- Bow Thruster Drives
- Compressor Gear Drives

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MORE UPTIME. LESS COST.

You don't have to be launching guided missiles from a destroyer to understand that the entire marine industry depends on high quality, reliable and top performing power transmission equipment. Our customers are continually challenged with lowering the cost of operation, while achieving the highest levels of "mission ready" status possible.

Downtime can be catastrophic. This challenge aligns perfectly with Philadelphia Gear's mission to provide the lowest lifecycle costs of operation with the highest degrees of reliability.

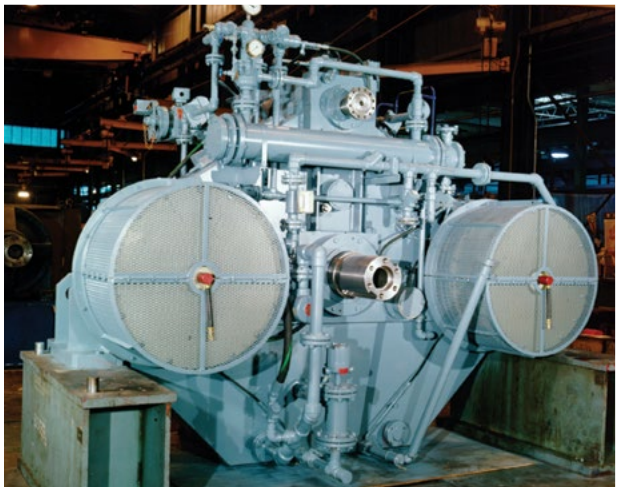
Our regional service and manufacturing approach, combined with a national network of engineering talent, allows us to meet both the daily and long-term pressures our customers face. Additionally, with our acquisitions of WesTech and Western Gear, and specific marine-related intellectual property from DeLaval and GE, we have one of the most comprehensive installed base of marine systems on the market today.

Extensive Product Experience

- Parallel Shaft Gearing
- Epicyclic Gearing
- Hydroviscous Clutches/Brakes
- Worm Gearing
- Bevel Gearing
- Couplings
- Internal Gearing
- Spur Gearing
- Single Helical Gearing
- Double Helical Gearing
- Cross Helical Gearing
- Herringbone Gearing

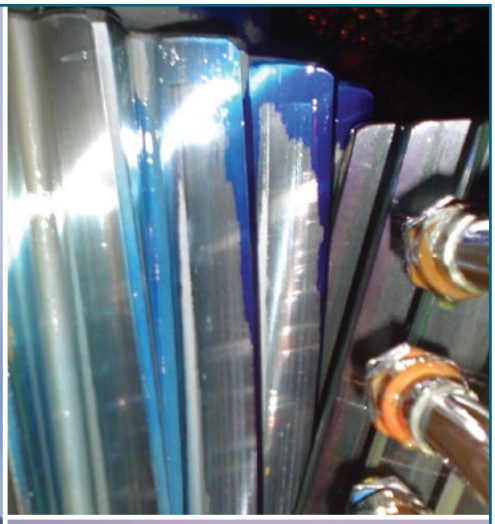






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PUNISH US. WE CAN TAKE IT.

Philadelphia Gear has custom-designed and manufactured marine gears ranging from 500 to 60,000 HP and they all have one thing in common: they're built to last. As the supplier of the broadest range of marine gearing of any U.S. power transmission supplier, we are uniquely suited to fulfilling the demands of the most extreme operating conditions in the world.

As suppliers of equipment for a wide variety of main propulsion, power generation, thruster and auxiliary applications – whether driven by diesel engines, gas turbines, steam turbines or electric motors – Philadelphia Gear has unique insight into the special problems of the ship designer and the builder. And, it equips us to deliver a reliable, easy-to-maintain drive that provides a low cost of ownership during its many decades of operation.

Upgrade capabilities, critical to staying competitive in the marine industry, are available at each regional service and manufacturing facility. Each facility communicates directly with our Engineering and Technical Center in King of Prussia, PA, and has Internet access to the company's vast library of drawings, engineering standards, manufacturing process standards and other related intellectual property.

Vessels Using Our Equipment

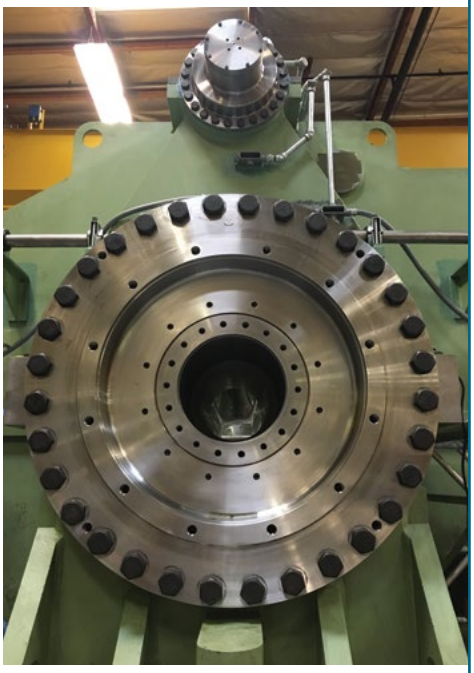
- Barges
- Commercial Fishing
- Container Ships
- Dredges
- Fast Ferries
- Ferries
- Fireboats
- LNG Tankers
- Oil Tankers
- Tugboats

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AROUND THE WORLD. AROUND THE CORNER.

Philadelphia Gear has seven manufacturing and service facilities in the U.S. and Canada, specifically positioned to put us near our customers. These include Houston, Texas (2); Birmingham, Alabama; Chicago, Illinois; New Castle, Delaware; Santa Fe Springs, California; and Saskatoon, Canada (Standard Machine).

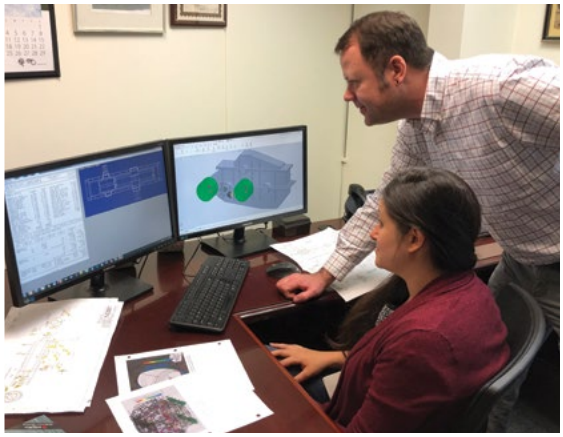


Throughout our history, Philadelphia Gear – and, by extension, our other proprietary brands Western/WesTech Gear, GE Marine, and DeLaval Steam Turbine – all have worked hard to stay on the leading edge of both manufacturing technologies and engineering practices.

Plant Equipment and Capabilities

- Test stands capable of running MRGs to 60,000 HP at full load
- 70-ton crane capacity
- Fully outfitted machine shops with precision equipment
- On-site engineering backed by corporate technical center in Philadelphia
- Machine capabilities
  - Turning shafts 36" in diameter and 10' in length
  - Jig mill capabilities for housings and components
  - Turning on CNC Vertical 56" VBM
  - Vertical Turning Lathe (VTL) to 300"
  - Shaft grinding 36" in diameter and 20' in length
  - Gear grinding to 4.0 meters and to DIN 1 quality standard
  - Gear hobbing to 5.0 meters and finished to AGMA Quality 12
  - In-house shaft balancing to 4.5 meters
  - 5-Axis machining centers
  - Multiple roll stands for gear contact checks
  - Paint booths and long-term preservation tanks
  - Certified welders and non-destructive testing capabilities on-site





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Military Grade Warranty

The U.S. Navy uses equipment produced by Philadelphia Gear in frontline combatant ships because failure is not an option. We believe the same is true for workboat applications, and that is why Philadelphia Gear brand gear systems are one of the smartest, most reliable investments you can make.

- 5-Year Standard Warranty comes with every new gearbox
- Warranty applies no matter how challenging the operating environment
- Peace of mind comes in having one of the longest and most robust standard gearbox warranties in the world
- Warranty backed by 125 years of unsurpassed experience
- In the unlikely event that one of our gearboxes does require service due to defect or workmanship, we'll repair it fast and cover 100% of our labor and material expense





Guaranteed Compliance

Philadelphia Gear and its proprietary brands work with a variety of organizations that ensure that all customer required quality and performance standards are met. These include, but are not necessarily limited to the following entities:

- ABS – American Bureau of Shipping
- AGMA – American Gear Manufacturers Association
- ANSI – American National Standards Institute
- ASTM – American Society for Testing and Materials
- DIN – Deutsches Institut für Normung
- DNV – Det Norske Veritas
- ISO – International Organization for Standardization
- JIS – Japanese Industrial Standards
- LR – Lloyds Register Marine and Shipping
- USCG – United States Coast Guard
- USN – United States Navy

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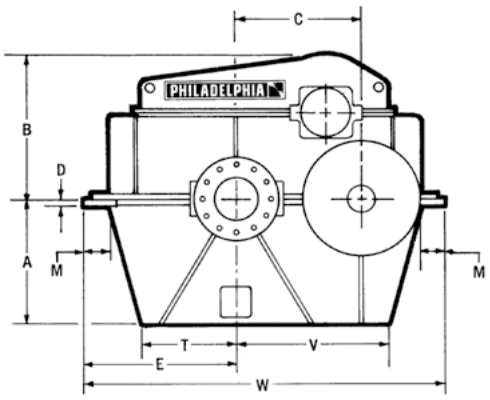
VRMG SHOWN

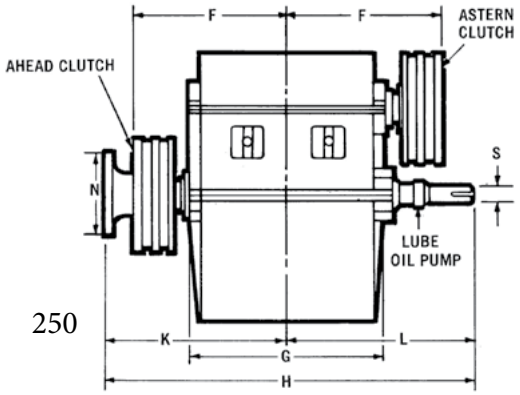
HRMG | HORIZONTAL REVERSE MARINE GEAR

VRMG | VERTICAL REVERSE MARINE GEAR

WITH AHEAD AND ASTERN CLUTCHES

HRMG

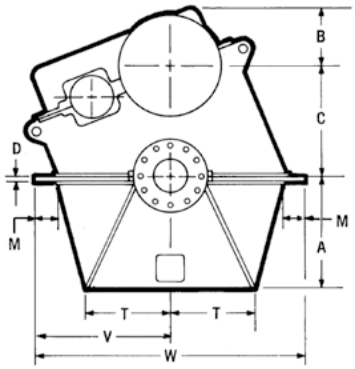


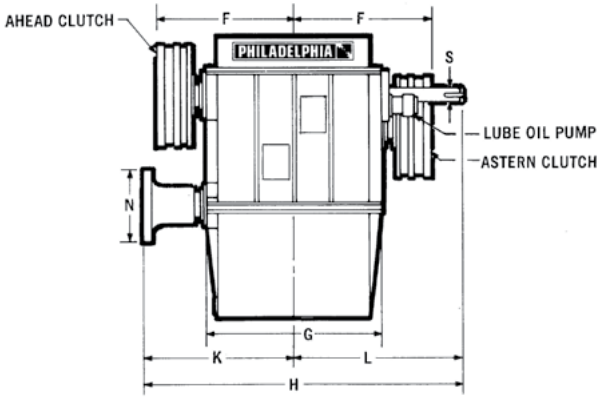


250

SIZE	A	B	C	D	E	F	G	H	K	L	M	N	S	T	V	W	WT.—LBS.
16	17.0	22.0	16.5	1.3	22.0	*	40.0	*	*	*	5.0	16.0	3.8	12.0	23.0	54.5	7,500
18	18.0	24.0	18.0	1.5	24.0	*	44.0	*	*	*	5.5	17.0	4.0	13.0	24.0	59.0	9,000
20	21.0	27.0	20.5	1.8	27.0	*	46.0	*	*	*	6.0	18.0	4.5	15.0	27.0	66.0	13,000
23	24.0	32.0	23.0	1.8	30.0	*	48.0	*	*	*	6.5	20.0	4.6	17.0	31.0	74.0	16,500
26	26.0	34.0	26.0	2.0	33.5	*	50.0	*	*	*	7.0	23.0	5.0	19.0	34.0	82.0	20,000
30	29.0	40.0	30.0	2.0	37.0	*	54.0	*	*	*	8.0	25.0	5.3	20.0	38.0	92.0	26,000
34	33.0	40.0	34.0	2.5	43.0	*	58.0	*	*	*	8.5	27.0	5.5	24.0	44.0	106.0	31,000
36	35.0	46.0	36.0	2.5	46.0	*	58.0	*	*	*	9.0	28.0	6.5	27.0	57.0	113.0	35,000
42	40.0	49.0	42.0	2.5	52.0	*	63.0	*	*	*	9.0	29.0	7.3	31.0	64.0	125.0	43,000
48	47.0	50.0	48.0	2.5	58.0	*	75.0	*	*	*	9.0	32.0	7.5	36.0	71.0	138.0	57,000

VRMG



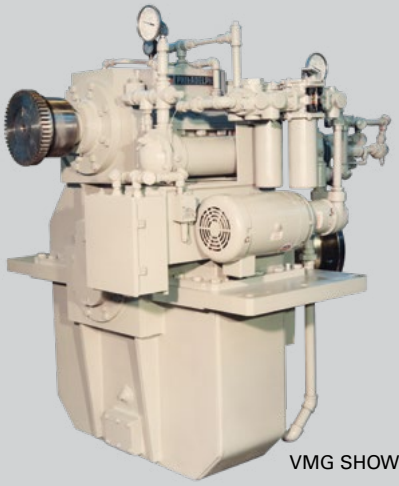


SIZE	A	B	C	D	F	G	H	K	L	M	N	S	T	V	W	WT.—LBS.
16	17.0	9.0	16.5	1.3	*	40.0	*	*	*	5.0	16.0	3.8	10.0	25.0	49.0	7,500
18	18.0	10.0	18.0	1.5	*	44.0	*	*	*	5.5	17.0	4.0	12.0	27.0	53.0	9,000
20	21.0	11.0	20.5	1.8	*	46.0	*	*	*	6.0	18.0	4.5	14.0	31.0	60.0	13,000
23	24.0	12.0	23.0	2.0	*	48.0	*	*	*	7.5	20.0	4.6	18.0	36.0	68.0	16,500
26	26.0	14.0	26.0	2.0	*	50.0	*	*	*	8.0	23.0	5.0	22.0	38.5	74.0	20,000
30	29.0	15.0	30.0	2.0	*	54.0	*	*	*	8.0	25.0	5.3	24.0	45.0	84.0	26,000
34	33.0	16.0	34.0	2.5	*	58.0	*	*	*	9.0	27.0	5.5	26.0	46.0	90.0	31,000
36	35.0	20.0	36.0	2.5	*	58.0	*	*	*	10.0	28.0	6.5	28.0	46.0	92.0	35,000
42	40.5	21.0	42.0	2.5	*	63.0	*	*	*	10.0	29.0	7.3	32.0	50.0	100.0	43,000
48	48.0	22.0	48.0	2.5	*	75.0	*	*	*	10.0	32.0	7.5	36.0	59.0	118.0	57,000

*Varies with clutch.

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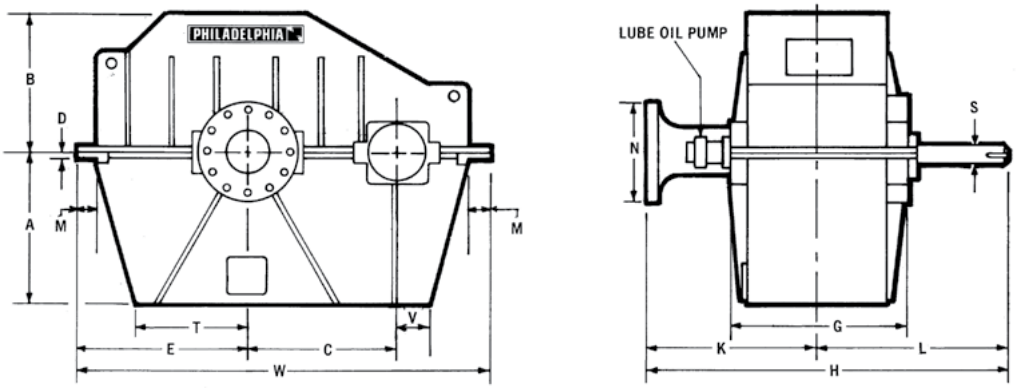
VMG SHOWN

HMG | HORIZONTAL MARINE GEAR

VMG | VERTICAL MARINE GEAR

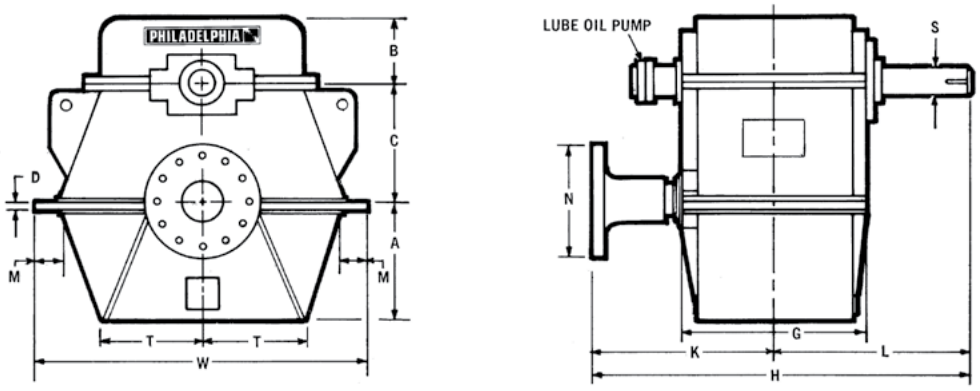
WITHOUT CLUTCH

HMG



SIZE	A	B	C	D	E	G	H	K	L	M	N	S	T	V	W	WT.—LBS.
16	17.0	17.0	16.5	1.3	22.0	28.0	56.0	29.0	27.0	5.0	16.0	3.8	12.0	5.0	48.0	5,000
18	18.0	18.0	18.0	1.5	24.0	29.0	58.0	30.0	28.0	5.5	17.0	4.0	13.0	5.0	52.0	6,000
20	21.0	21.0	20.5	1.8	27.0	30.0	60.0	31.0	29.0	6.0	18.0	4.5	15.0	6.0	60.0	9,000
23	24.0	24.0	23.0	1.8	30.0	32.0	66.0	34.0	32.0	6.5	20.0	4.6	17.0	8.0	68.0	11,500
26	26.0	26.0	26.0	2.0	33.5	35.0	72.0	37.0	35.0	7.0	23.0	5.0	19.0	9.0	76.0	15,000
30	29.0	28.0	30.0	2.0	37.0	37.0	78.0	40.0	38.0	8.0	25.0	5.3	20.0	10.0	86.0	17,000
34	33.0	31.0	34.0	2.0	43.0	40.0	82.0	40.0	42.0	8.0	27.0	5.5	24.0	10.0	98.0	19,000
36	36.0	32.0	36.0	2.5	45.0	42.0	86.0	42.0	44.0	9.0	28.0	6.5	27.0	10.0	110.0	20,000
42	42.0	40.0	42.0	2.5	52.0	44.0	90.0	44.0	46.0	9.0	28.0	7.3	31.0	10.0	125.0	25,000
48	48.0	46.0	48.0	2.5	56.0	52.0	102.0	52.0	50.0	9.0	30.0	7.5	34.0	10.0	136.0	34.000

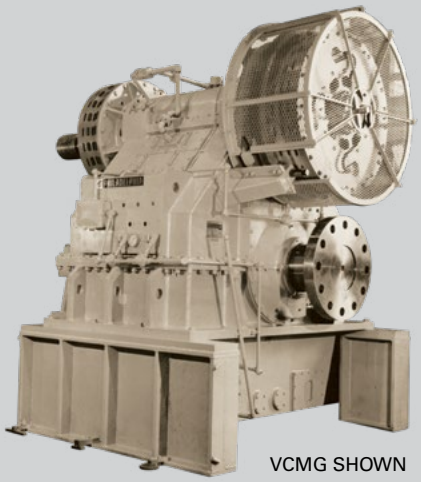
VMG



SIZE	A	B	C	D	G	H	K	L	M	N	S	T	W	WT.—LBS.
16	17.0	10.0	16.5	1.3	28.0	56.0	29.0	27.0	5.0	16.0	3.8	10.0	48.0	5,000
18	18.0	10.0	18.0	1.5	29.0	58.0	30.0	28.0	5.5	17.0	4.0	12.0	52.0	6,000
20	21.0	11.0	20.5	1.8	30.0	60.0	31.0	29.0	6.0	18.0	4.5	14.0	58.0	9,000
23	24.0	12.0	23.0	2.0	32.0	66.0	34.0	32.0	7.5	20.0	4.6	18.0	64.0	11,500
26	26.0	13.0	26.0	2.0	35.0	72.0	37.0	35.0	8.0	23.0	5.0	22.0	70.0	15,000
30	29.0	14.0	30.0	2.0	37.0	78.0	40.0	38.0	8.0	25.0	5.3	24.0	76.0	17,000
34	33.0	16.0	34.0	2.5	40.0	82.0	40.0	42.0	8.0	27.0	5.5	26.0	88.0	19,000
36	35.0	20.0	36.0	2.5	42.0	86.0	42.0	44.0	8.0	28.0	6.5	28.0	88.0	20,000
42	40.5	24.0	42.0	2.5	44.0	96.0	44.0	52.0	9.0	28.0	7.3	32.0	98.0	25,000
48	48.0	25.0	48.0	2.5	52.0	108.0	52.0	56.0	9.0	30.0	7.5	36.0	116.0	34,000

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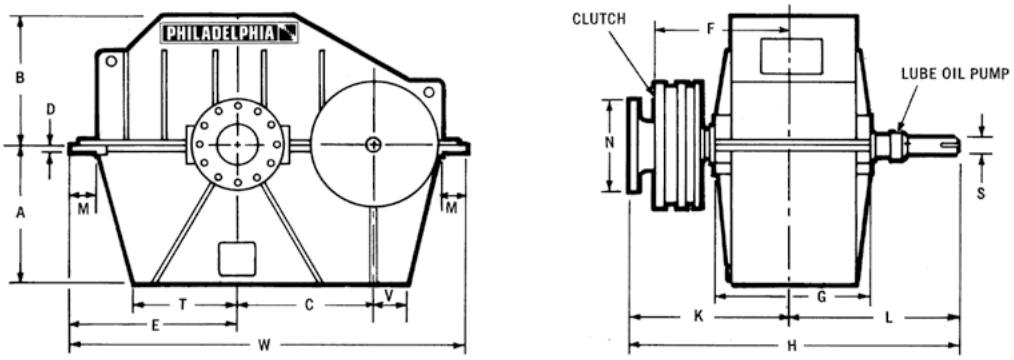
VCMG SHOWN

HCMG | HORIZONTAL CLUTCH MARINE GEAR

VCMG | VERTICAL CLUTCH MARINE GEAR

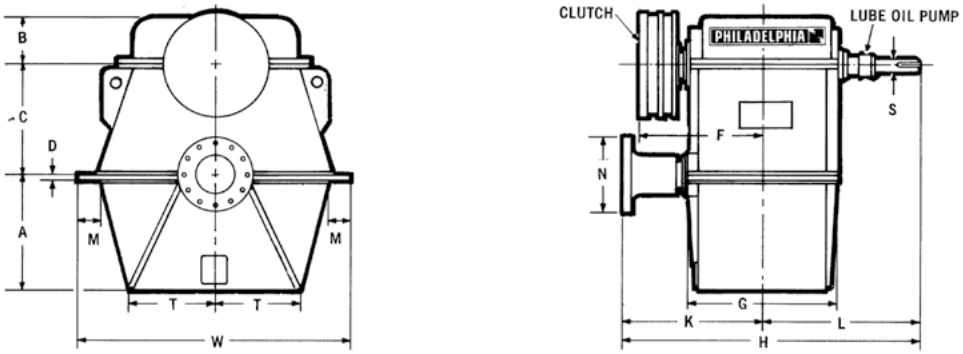
WITH DISCONNECT CLUTCH

HCMG



SIZE	A	B	C	D	E	F	G	H	K	L	M	N	S	T	V	W	WT.—LBS.
16	17.0	17.0	16.5	1.3	22.0	*	28.0	*	*	27.0	5.0	16.0	3.8	12.0	5.0	54.0	6,000
18	18.0	18.0	18.0	1.5	24.0	*	29.0	*	*	28.0	5.5	17.0	4.0	13.0	5.0	59.0	8,000
20	21.0	21.0	20.5	1.8	27.0	*	30.0	*	*	29.0	6.0	18.0	4.5	15.0	6.0	66.0	10,500
23	24.0	24.0	23.0	1.8	30.0	*	32.0	*	*	32.0	6.5	20.0	4.6	17.0	8.0	74.0	13,000
26	26.0	26.0	26.0	2.0	33.5	*	35.0	*	*	35.0	7.0	23.0	5.0	19.0	9.0	82.0	16,000
30	29.0	28.0	30.0	2.0	37.0	*	37.0	*	*	38.0	8.0	25.0	5.3	20.0	10.0	92.0	19,000
34	33.0	31.0	34.0	2.0	43.0	*	40.0	*	*	42.0	8.0	27.0	5.5	24.0	10.0	106.0	22,000
36	35.0	33.0	36.0	2.0	44.0	*	42.0	*	*	52.0	8.0	28.0	6.5	30.0	14.0	112.0	23,000
42	40.5	38.0	42.0	2.5	54.0	*	44.0	*	*	58.0	9.0	29.0	7.3	38.0	14.0	124.0	28,000
48	48.0	46.0	48.0	2.5	56.0	*	50.0	*	*	62.0	9.0	32.0	7.5	40.0	15.0	135.0	36,000

VCMG

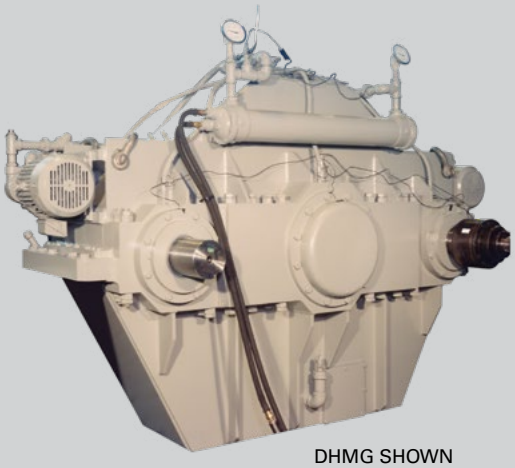


SIZE	A	B	C	D	F	G	H	K	L	M	N	S	T	W	WT.—LBS.
16	17.0	10.0	16.5	1.3	*	28.0	*	*	27.0	5.0	16.0	3.8	10.0	48.0	6,000
18	18.0	10.0	18.0	1.5	*	29.0	*	*	28.0	5.5	17.0	4.0	12.0	52.0	8,000
20	21.0	11.0	20.5	1.8	*	30.0	*	*	29.0	6.0	18.0	4.5	14.0	58.0	10,500
23	24.0	12.0	23.0	2.0	*	32.0	*	*	32.0	7.5	20.0	4.6	18.0	64.0	13,000
26	26.0	13.0	26.0	2.0	*	35.0	*	*	35.0	8.0	23.0	5.0	22.0	70.0	16,000
30	29.0	14.0	30.0	2.0	*	37.0	*	*	38.0	8.0	25.0	5.3	24.0	76.0	19,000
34	33.0	16.0	34.0	2.5	*	40.0	*	*	42.0	9.0	27.0	5.5	26.0	88.0	22,000
36	35.0	19.0	36.0	2.0	*	42.0	*	*	52.0	8.0	28.0	6.5	28.0	86.0	23,000
42	41.0	20.0	42.0	2.0	*	44.0	*	*	58.0	9.0	29.0	7.3	32.0	96.0	28,000
48	48.0	22.0	48.0	2.5	*	50.0	*	*	62.0	9.0	32.0	7.5	36.0	112.0	36,000

*Varies with clutch.

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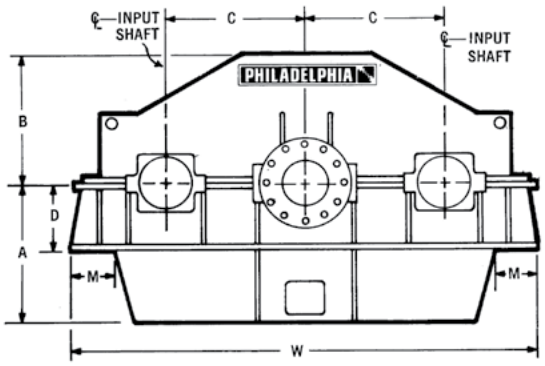
DHMG SHOWN

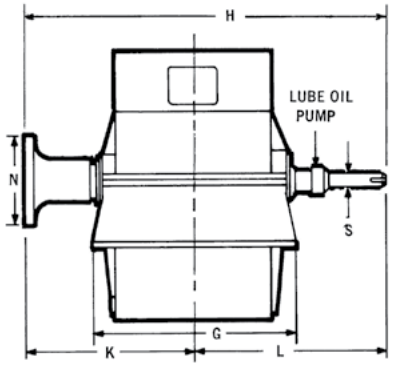
DHMG | DUAL-INPUT VERTICAL CLUTCH MARINE GEAR

DHCMG | DUAL-INPUT HORIZONTAL CLUTCH MARINE GEAR

COMPOUND GEARING

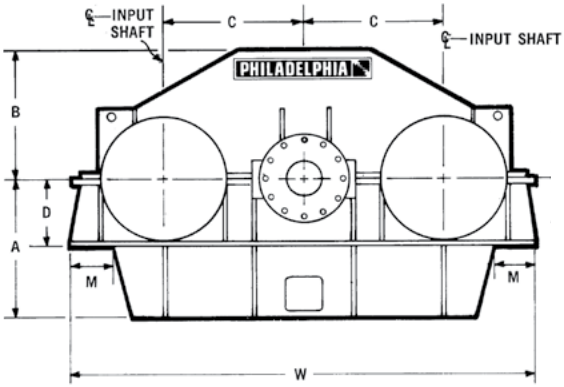
DHMG

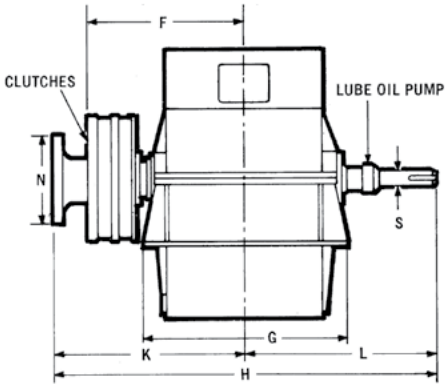




SIZE	A	B	C	D	G	H	K	L	M	N	S	W	WT.—LBS.
60	30.0	28.0	30.0	15.0	36.0	68.0	40.0	28.0	8.0	26.0	5.3	90.0	29,000
66	34.0	30.0	33.0	16.0	37.0	71.0	42.0	29.0	9.0	27.0	5.8	98.0	30,000
72	38.0	34.0	36.0	17.0	38.0	74.0	44.0	30.0	10.0	28.0	6.0	108.0	35,000
84	42.0	41.0	42.0	18.0	40.0	70.0	38.0	32.0	12.0	28.0	6.5	128.0	44,000
90	45.0	43.0	45.0	20.0	44.0	76.0	40.0	36.0	14.0	30.0	7.0	138.0	52,000
96	48.0	46.0	48.0	22.0	48.0	83.0	43.0	40.0	16.0	34.0	7.5	144.0	60,000
108	54.0	51.0	54.0	30.0	72.0	98.0	46.0	52.0	18.0	38.0	10.0	172.0	85,000
120	60.0	56.0	60.0	32.0	76.0	104.0	50.0	54.0	40.0	40.0	12.0	180.0	100,000
132	66.0	62.0	66.0	34.0	80.0	109.0	54.0	55.0	42.0	42.0	12.0	192.0	120,000
150	75.0	70.0	75.0	36.0	82.0	114.0	58.0	56.0	44.0	44.0	13.0	210.0	135,000
162	81.0	74.0	81.0	36.0	84.0	118.0	60.0	58.0	46.0	48.0	14.0	220.0	150,000

DHCMG





SIZE	A	B	C	D	F	G	H	K	L	M	N	S	W	WT.—LBS.
60	30.0	28.0	30.0	15.0	*	36.0	*	*	28.0	8.0	26.0	5.3	94.0	32,000
66	34.0	30.0	33.0	16.0	*	37.0	*	*	29.0	9.0	27.0	5.8	102.0	35,000
72	38.0	34.0	36.0	17.0	*	38.0	*	*	30.0	10.0	28.0	6.0	112.0	41,000
84	42.0	41.0	42.0	18.0	*	40.0	*	*	32.0	12.0	28.0	6.5	132.0	50,000
90	46.0	43.0	45.0	20.0	*	44.0	*	*	36.0	14.0	30.0	7.0	142.0	57,000
96	48.0	46.0	48.0	22.0	*	48.0	*	*	40.0	16.0	34.0	7.5	152.0	68,000
108	56.0	51.0	54.0	30.0	*	72.0	*	*	52.0	18.0	38.0	9.0	172.0	100,000
120	62.0	56.0	60.0	32.0	*	76.0	*	*	56.0	40.0	40.0	12.0	180.0	108,000
132	66.0	62.0	66.0	34.0	*	80.0	*	*	56.0	42.0	42.0	12.0	192.0	135,000
150	75.0	70.0	75.0	36.0	*	82.0	*	*	56.0	44.0	44.0	13.0	210.0	150,000
162	81.0	70.0	81.0	36.0	*	84.0	*	*	58.0	46.0	44.0	14.0	220.0	165,000

*Varies with clutch.

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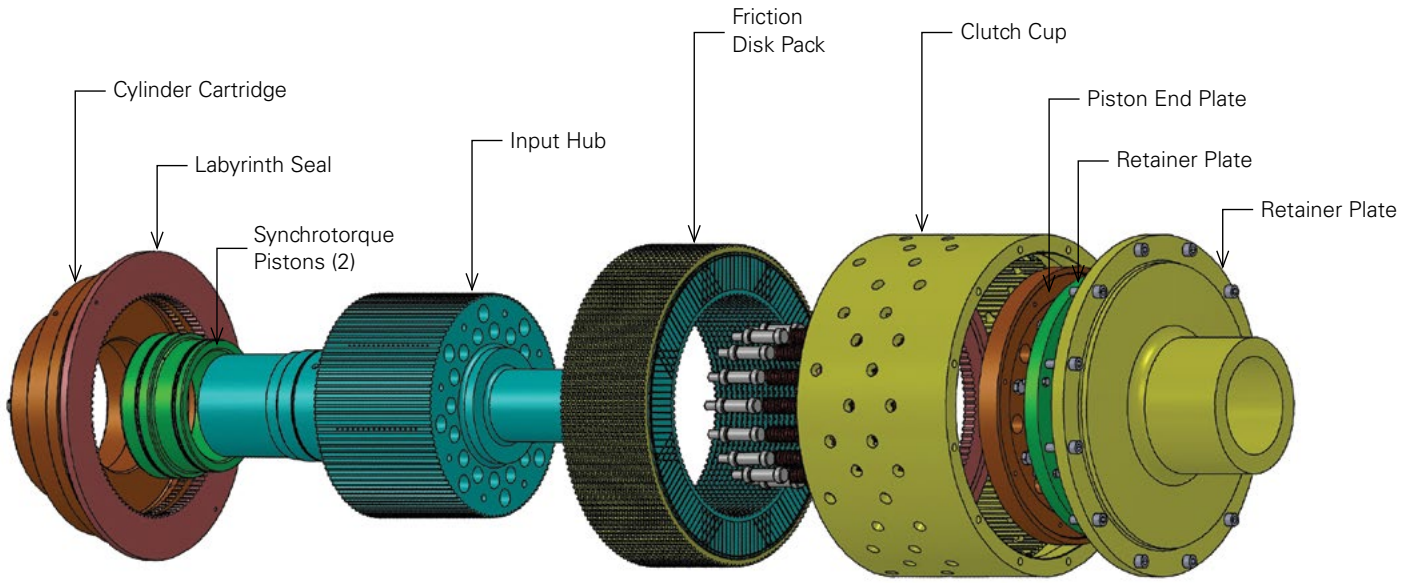
100% LOCK-UP. 0% FIXED-SLIP LOSSES.

Philadelphia Gear's Synchrotorque® line of hydroviscous clutches operates on the principle of shearing an oil film to transmit torque. This hydroviscous effect transmits torque in proportion to a variable clamping force. For unrestrained loads, the higher the clamping force, the faster the output speed. The input drive plates function as the driver. The output friction discs are faced with a suitably grooved resilient material and act as a driven member.



Precisely controlled clamping pressure between input drive plates and output friction discs allows virtually infinite speed control right up to 100% of input speed. This simple phenomenon, based on hydrodynamic bearing principles, is the basis for controlled torque transmission in the Synchrotorque hydroviscous clutch.

- Works for 100 HP to 20,000 HP applications
- Range of sizes for a variety of mounting configurations
- Output speed equals 100% of input speed to maximize energy efficiency
- No fixed-slip losses
- Can transmit torque in either direction
- Can remain running while disconnected from load
- Maximizes torque transfer in compact space
- Protects drivetrain from excessive loads with automatic torque limiting feature
- Appropriate for adverse environments



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CONTINUOUS OIL RESCUE EQUIPMENT.

Philadelphia Gear's CORE™ System Virtually Eliminates Ferrous Metal Contamination as a Cause of Lubrication Related Failures in Gearboxes

The smallest particle that can be seen by the human eye is 40 microns. But ferrous metal particles much smaller than this can cause extraordinary amounts of damage to shipboard rotating equipment over time.

By upgrading the existing filtration system to include CORE, which can remove particles as small as one micron, ferrous particles can be removed before causing damage and premature failure.



How the Technology Works

At the center of the Continuous Oil Rescue Equipment is a series of annular magnets with larger steel plates shrouding them. These plates, which have a series of flow channels running through them, become fully magnetized. When the oil is filtered through the plates, it is subjected to a high magnetic flux that focuses the magnetic field at the tips of the plates. The result is that the contaminants are drawn into collection areas between the plates and permanently removed.

Additionally, the filter creates little to no pressure drop because CORE is designed so that the flow channels sum to a greater volume than that of the inlet pipe. Because the debris is stored out of the oil flow it also helps prevent "wash off" since the contaminant is isolated and cannot wash back into the oil.

Unique Characteristics of CORE

- No pressure drop means filter can be placed on suction side of pump if space constraints dictate
- Accessible for condition monitoring of the power transmission system
- Pressure drop is avoided even when the filter element is full
- Oil viscosity does not affect the filter performance
- Can hold up to 2.2 lbs. of debris
- Won't clog even when full
- Easily cleaned with compressed air
- Magnets have 50-year half life



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LOCAL

LOCAL SERVICE. NATIONAL SUPPORT. GLOBAL EXPERTISE.

The maritime world is increasingly complex, and so too are the demands placed on the equipment used in today's marine industry. From fireboats used to combat disasters, to tugs guiding ever-larger container ships into safe harbor, to the LNG and oil tankers charged with keeping the world supplied with energy, or dredges helping to restore hurricane ravaged beaches, downtime cannot be tolerated. Simple as that.

At Philadelphia Gear, now part of Timken Power Systems (TPS), our goal is to help you with that burden so you can stay focused on your core mission. Regardless of your application, you can rely on our 125 years of experience to keep you operational.

Our one-stop-shop aftermarket solution is comprised of three major offerings (discussed in detail on the next page), and applies to all of TPS's proprietary brands: Philadelphia Gear, Western Gear, WesTech Gear, DeLaval Steam Turbine, and GE Marine gearing.

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Inspect, Repair and Upgrade Services

Quick turnaround times for the inspection and overhaul of mission critical gearboxes is at the heart of our value proposition. Each one of our service centers is equipped with world-class machinery and technicians to ensure we hold to our exact OEM specifications, and to fulfill our service promise.

Staffed with engineers and shop personnel – gear experts thoroughly skilled in performing gearbox failure root cause analysis – we provide full disassembly and cleaning, inspection and measurement, engineering evaluation and scope of work recommendations, performance of repairs, and full-speed spin tests. And all work done in our service and manufacturing centers is backed by a 3-year warranty.

OEM Renewal Parts

The engineering team at Philadelphia Gear has centuries of technical expertise in power transmission equipment design and support. This diversified experience has been developed over decades by supplying a full range of product offerings from high-speed MRGs, to turning gears, to clutches, to auxiliary lube oil pumps and more.

Experienced in virtually every type of power transmission application, our engineers understand the critical relationships between elements of a gear drive and the demands of specific marine applications. Additionally, each facility has immediate online access to over 4 million technical documents, as well as 24/7 access to design engineering staff at the Corporate Engineering and Technical Center in King of Prussia, Pennsylvania.

Onsite Technical Services (OTS)

Because Philadelphia Gear understands marine gearbox applications better than anyone, we know it's not always feasible to remove a gearbox and send it to one of our service centers. That's why we invented OTS. Designed to help our marine customers resolve their gearbox related issues while the vessel remains in the water, the OTS team is capable of a wide array of on-site solutions, including: removing and reinstalling equipment, rebuilding units in-place, re-boring housings, machining thrust faces, honing gear teeth, etc., and can be deployed globally on a rapid-response basis.

Customers now have the option of cutting a single P.O. for us to accomplish an agreed upon scope of work on a fixed-price basis. Simply put, our mission is the same as yours – to extend the longevity and reliability of critical rotating equipment as quickly and cost effectively as possible.





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CONTROLS. MOTORS. GENERATORS.

Staffed with professionals that have an extensive knowledge of electric motor repair from fractional to multi-thousand horsepower, the Timken Power Systems (TPS) family of electrical brands form a coast-to-coast network designed to cover every aspect of marine electrical needs.

Our brands include H&N Electric, Smith Services, Wazee Electric, and Schulz Electric, together representing centuries of combined hands-on experience: from equipment maintenance and repair, to engineering, to design and manufacture, and to help with material management.

Core competencies of the TPS motor network include:

- 24/7/365 Onsite Technical Services support (OTS)
- Electric motor repair to 50,000 HP
- Rewinding of both AC and DC apparatus
- Motor circuit evaluation testing
- Electronic control systems design
- Thermographic surveys
- In-house or field retrofits, and AC or DC equipment consulting
- Motor redesign, upgrade and precision balancing
- Brush replacement and maintenance
- Dry-type transformer repair
- New motor sales of all top OEM brands





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INSPECT. REPAIR. TEST.

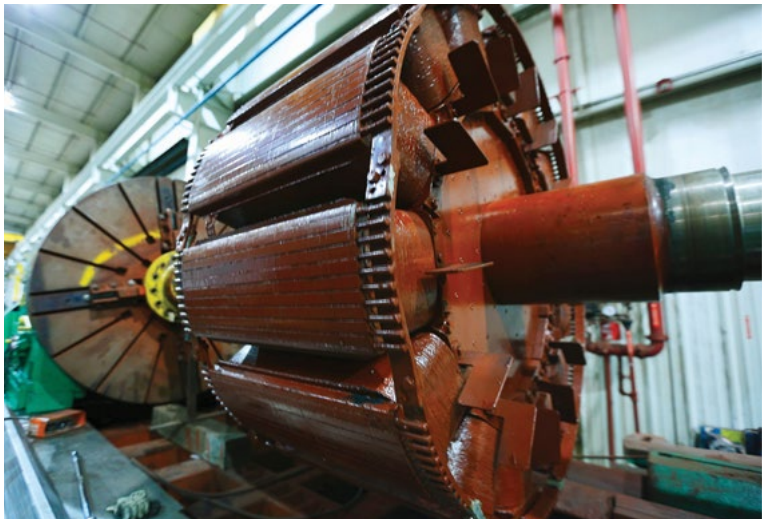


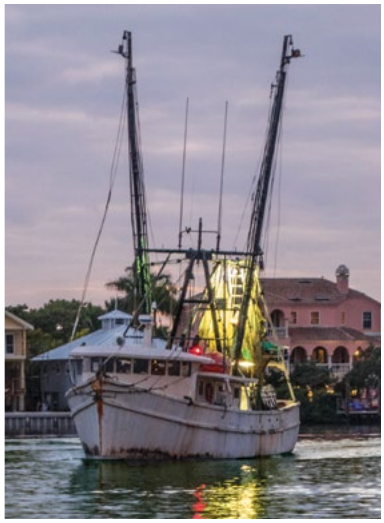
It is often more economical to repair or rewind than replace motors and generators. Our team will inspect and advise as to what is the most cost effective option. All coils are inspected for fit, finish, electrical soundness and dielectric integrity, as well as being hipot tested to ensure insulation values, and surge tested at 100% of the original test voltage.

Windings that undergo vacuum pressure impregnation (VPI), with engineered or application specific resins, are virtually impervious to oil, moisture and chemical contaminates. The VPI system results in the greatest mechanical strength for windings, a cooler running motor, improves performance and extends machine life. At up to 12' in diameter, the TPS network has some of the largest VPI tanks in the country.

All of this investment in technology, machinery, SOPs, and manpower are in place to achieve one goal: to provide our customers with the assurance that their equipment is returned to them in "as new" condition, and with the peace of mind that our work is backed by the Timken Power Systems one-year warranty.

Finally, TPS sites incorporate a wide variety of testing programs to ensure that our customers' motors or generators meet or exceed their performance expectations. Additionally, our brands are registered with Underwriter Laboratories (508A UL), are members of the Electrical Apparatus Service Association (EASA), and have all been independently ISO 9001:2015 certified.





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BEARING REPAIR. BY BEARING EXPERTS.

Timken has designed and manufactured bearings for more than a century, and is proud to offer that unsurpassed experience and reputation for quality to the marine market. Our highly trained and professional staff of field service engineers will help you identify bearing failure modes, conduct root cause analysis and determine the correct repair solution for shipboard applications.

Timken's remanufacturing program is designed to provide bearings faster, and at a lower cost than newly manufactured bearings. By using this proprietary service, customers may increase bearing life up to four times, save up to 50% over the cost of new, and ensure availability in a fraction of the time.

Additionally, we can remanufacture any bearing type or brand, certify them to OEM standards – and we back that promise with a "same as new" one-year warranty. Prior to preservation and packaging for return shipment, repair solutions include the following processes:

- Recertification – Bearing assemblies are cleaned, visually inspected and measured to verify internal clearances.
- Reclamation – Bearing components are polished using Timken's proprietary vibratory process.
- Reconditioning – Bearings are cleaned, visually inspected, and components are polished and measured to verify internal clearances.
- Remanufacture – Bearing components are cleaned and visually inspected, raceways are re-ground, new roller sets are manufactured, and internal clearances are re-set.
- Modification – Special features are added to existing bearing assemblies to enhance performance, retrofit to special applications, or upgrade to meet current Timken design standards.

Types of Repairable Bearings

Regardless of who the original manufacturer was, we can repair most types of bearings found in marine applications including:

- Ball bearings
- Class 3 precision bearings (all types)
- Cross roller bearings
- Cylindrical roller bearings
- Spherical roller bearings
- Tapered roller bearings
- Thrust bearings (all types)
- Triple ring bearings





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ANY BRAND. ANYTIME.

Philadelphia Gear's network of regional service and manufacturing centers can work on any brand of gearbox found in the marine market. That has been the case for decades. But now, as part of the Timken Power Systems family of brands, we offer solutions for other critical power transmission problems related not only to gears, but to bearings and motors as well.

By using the latest diagnostic condition assessment techniques, and world-class engineering, our proven inspect and repair methods can dramatically increase the life and reliability of your rotating equipment. So, regardless of brand, our service centers can return your gearbox, motor, coupling or bearing to its original OEM specification. And we back all of our work by a warranty that often exceeds that of the original manufacturer.

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PHILADELPHIA GEAR COMMERCIAL MARINE SUPPORT LOCATIONS

Main Office and Technical Center

King of Prussia, Pennsylvania | 800.766.5120

OEM Manufacturing

Santa Fe Springs, California | 800.605.1002

Regional Aftermarket Support

New Castle, Delaware | 800.388.1824
Birmingham, Alabama | 888.742.2476
Mokena, Illinois | 800.833.4429
Houston, Texas | 800.874.0270
Santa Fe Springs, California | 800.605.1002
Saskatoon, Canada | 306.931.3343

International Sales and Service

King of Prussia, Pennsylvania | +1 610.265.3000






TIMKEN

The Timken team applies their know-how to improve the reliability and performance of machinery in diverse markets worldwide. The company designs, makes and markets high-performance mechanical components, including bearings, gears, belts, chain and related mechanical power transmission products and services.

Stronger. **Commitment.** Stronger. **Value.** Stronger. **Worldwide.** Stronger. **Together.** | **Stronger.** By Design.

www.philagear.com

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