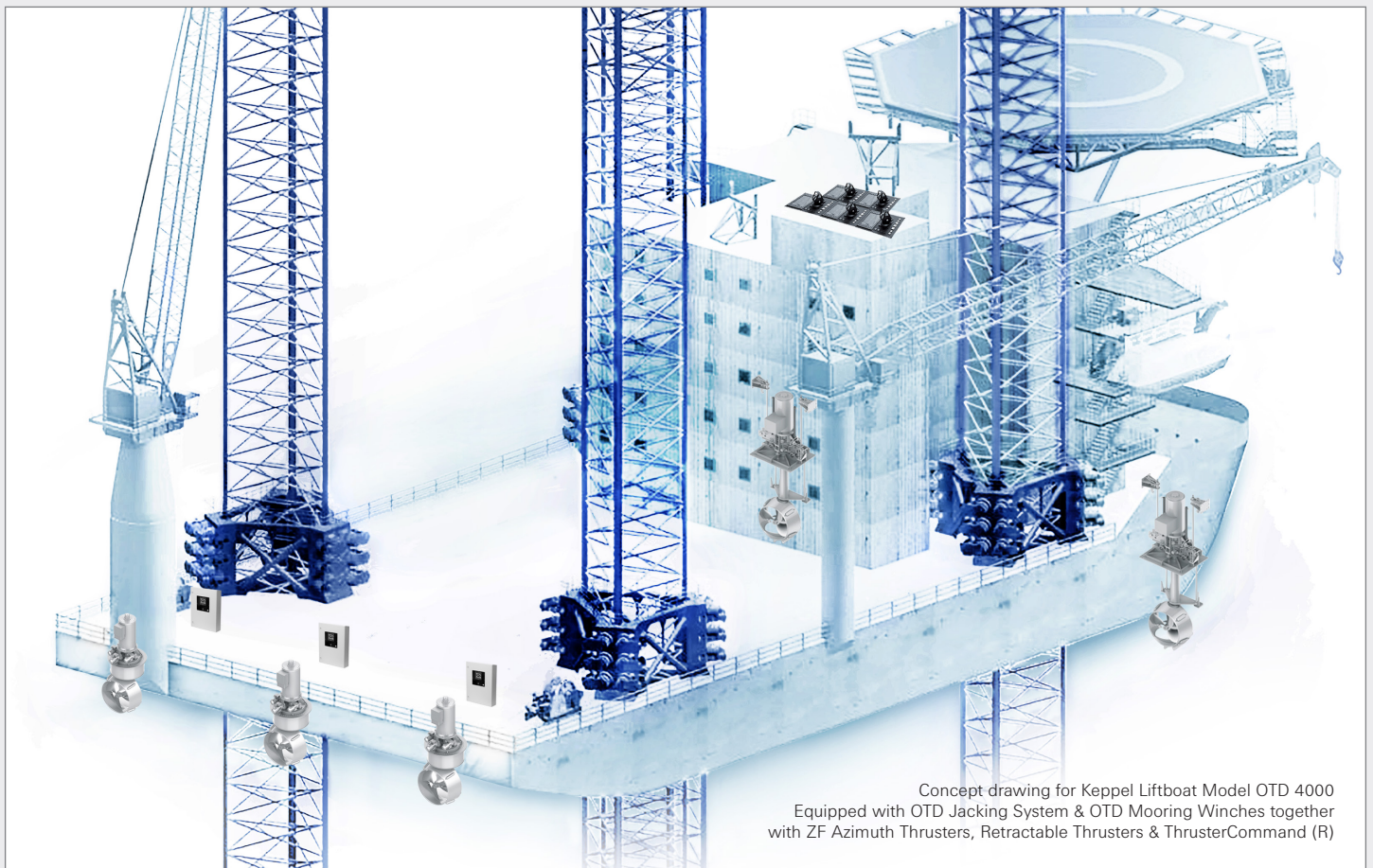


OTD & ZF MARINE; THRUSTER SOLUTION FOR LIFTBOAT APPLICATIONS

OFFSHORE TECHNOLOGY DEVELOPMENT (OTD) is one of the leading design and engineering and product company involved in design of vessel and delivery of associated equipment since 1994. We provide comprehensive solutions for our clients in the oil and gas market. With proven track records to date of over a hundred designed vessels delivered, our vessels have shown great reliability and performance in the offshore industry. Our orders solely on jacking gearboxes over the years which reached over the 4,000 marks, have shown the reliability of OTD designed product.

ZF MARINE KRIMPEN, a company with more than 35 years experience in building azimuth propulsion units, has designed, produced and commissioned various models of thrusters, for a multitude of applications around the world. This brought ZF Marine Krimpen the reputation of being a reliable and renowned thruster supplier. All ZF Marine thruster systems are developed, designed, and produced in-house, built under the umbrella of constant quality control which guarantees product reliability.

OTD and ZF MARINE KRIMPEN have a joint collaboration since 2015 to market thruster technology. Together, both companies co-develop and offer engineering solution to tackle challenges faced and provide thrusters required for the specific performance.



Concept drawing for Keppel Liftboat Model OTD 4000
Equipped with OTD Jacking System & OTD Mooring Winches together
with ZF Azimuth Thrusters, Retractable Thrusters & ThrusterCommand (R)

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COMMERCIAL CRAFT THRUSTER SYSTEMS

ASIA PACIFIC VERSION

P014 ZF SG 2017

Courtesy of: Barkmeijer Shipyard



MOTION AND MOBILITY





Content

INTRODUCTION	page	4
SELECTION TABLE OF ZF THRUSTER RANGE	page	6
THRUSTER MOUNTING CONFIGURATIONS	page	15
REMOTE CONTROL SYSTEM	page	17
SALES AND SERVICE SUPPORT	page	20
REFERENCES	page	23
WELL MOUNTED AZIMUTH THRUSTERS	page	24
RETRACTABLE AZIMUTH THRUSTERS	page	31
DECK MOUNTED AZIMUTH THRUSTERS	page	32
TUNNEL THRUSTERS	page	36
SHALLOW DRAUGHT THRUSTERS	page	41
CONTACT LIST	page	42

ZF MARINE KRIMPEN is a company with more than 35 years experience in building azimuth propulsion units. Over the years, the company has designed, produced and commissioned various models of thrusters, for a multitude of applications around the world. This brought ZF Marine Krimpen the reputation of a reliable and renowned thruster supplier. All ZF marine thruster systems are developed, designed, and produced in-house, built under the umbrella of constant quality control which guarantees the reliability of the product.

THRUSTER PRODUCTS

The current range of thruster products up to a power of 2150 kW comprises:



Well Mounted Azimuth Thrusters



Contra Rotation Azimuth Thrusters



Deck Mounted Azimuth Thrusters



Retractable Azimuth Thrusters



Tunnel Thrusters



Shallow Draught Thrusters

WELL MOUNTED AZIMUTH THRUSTERS

Z-DRIVE Horizontal input shaft



MODEL	Max. power*		Typical prop. dia. open		Typical prop. dia. nozzle	
	kW	hp	mm	inch	mm	inch
ZF AT 2000 WM-FP	180	241	750	30	700	28
ZF AT 3000 WM-FP	300	402	1050	41	1000	39
ZF AT 400 WM-FP	440	590	1150	45	1100	43
ZF AT 4000 WM-FP	525	704	1350	53	1300	51
ZF AT 5000 WM-FP	825	1105	1700	67	1650	65
ZF AT 6000 WM-FP	1200	1608	1950	77	1900	75
ZF AT 7000 WM-FP	1650	2211	2300	91	2200	87
ZF AT 8000 WM-FP	2000	2680	2500	98	2400	94

* Rating subject to classification and application.
Mentioned data for indication purposes only.

WELL MOUNTED AZIMUTH THRUSTERS

L-DRIVE Vertical input shaft



MODEL	Max. power*		Typical prop. dia. open		Typical prop. dia. nozzle	
	kW	hp	mm	inch	mm	inch
ZF AT 2000 WM-FP	200	268	750	30	700	28
ZF AT 3000 WM-FP	300	402	1050	41	1000	39
ZF AT 400 WM-FP	440	590	1200	47	1150	45
ZF AT 4000 WM-FP	525	703	1350	53	1300	51
ZF AT 5000 WM-FP	825	1105	1700	67	1650	65
ZF AT 6000 WM-FP	1200	1608	1950	77	1900	75
ZF AT 7000 WM-FP	1650	2211	2300	91	2200	87
ZF AT 8000 WM-FP	2000	2680	2500	98	2400	94

* Rating subject to classification and application.
Mentioned data for indication purposes only.

CONTRA ROTATION AZIMUTH THRUSTERS

Z-DRIVE & L-DRIVE



MODEL	Max. power*		Typical prop. dia. open		Typical prop. dia. nozzle	
	kW	hp	mm	inch	mm	inch
ZF AT 2000 WM-CR	150	201	700	28	670	26
ZF AT 3000 WM-CR	300	402	1125	44	1000	39
ZF AT 400 WM-CR	385	516	1000	39	960	38
ZF AT 4000 WM-CR	435	583	1250	49	1150	45
ZF AT 5000 WM-CR	770	1032	1400	55	1250	49

* Rating subject to classification and application.
Mentioned data for indication purposes only.

Advantages compared to thruster with single propeller:

- Higher efficiency with same propeller diameter.
- Same efficiency with reduced propeller diameter beneficial for shallow-draught applications.
- Reduced noise due to lower blade load.

Typical applications are river going passenger vessels where noise is a critical issue, guaranteeing the comfort on board.

DECK MOUNTED AZIMUTH THRUSTERS

Z-DRIVE Horizontal input shaft



MODEL	Max. power*		Typical prop. dia. open		Typical prop. dia. nozzle	
	kW	hp	mm	inch	mm	inch
ZF AT 2000 DM-FP	180	241	750	30	700	28
ZF AT 3000 DM-FP	300	402	1050	41	1000	39
ZF AT 400 DM-FP	440	590	1200	45	1150	43
ZF AT 4000 DM-FP	525	703	1350	53	1300	51
ZF AT 5000 DM-FP	825	1105	1700	67	1650	65
ZF AT 6000 DM-FP	1200	1608	1950	83	1900	81

* Rating subject to classification and application.
Mentioned data for indication purposes only.

RETRACTABLE AZIMUTH THRUSTERS

Z-DRIVE Horizontal input shaft



MODEL	Max. power*		Typical prop. dia. nozzle	
	kW	hp	mm	inch
ZF AT 2000 RT-FP	180	241	700	28
ZF AT 3000 RT-FP	300	402	1000	39
ZF AT 400 RT-FP	440	590	1100	43
ZF AT 4000 RT-FP	525	703	1300	51
ZF AT 5000 RT-FP	825	1105	1650	65
ZF AT 6000 RT-FP	1200	1608	1900	75
ZF AT 7000 RT-FP	1650	2211	2200	87
ZF AT 8000 RT-FP	2000	2680	2400	94

* Rating subject to classification and application.
Mentioned data for indication purposes only.

RETRACTABLE AZIMUTH THRUSTERS

L-DRIVE Vertical input shaft



MODEL	Max. power*		Typical prop. dia. nozzle	
	kW	hp	mm	inch
ZF AT 2000 RT-FP	200	268	700	28
ZF AT 3000 RT-FP	300	402	1000	39
ZF AT 400 RT-FP	440	590	1150	45
ZF AT 4000 RT-FP	525	703	1300	51
ZF AT 5000 RT-FP	825	1105	1650	65
ZF AT 6000 RT-FP	1200	1608	1900	75
ZF AT 7000 RT-FP	1650	2211	2200	87
ZF AT 8000 RT-FP	2000	2680	2400	94

* Rating subject to classification and application.
Mentioned data for indication purposes only.

FIXED PITCH TUNNEL THRUSTERS

Z-DRIVE Horizontal input shaft



MODEL	Max. power*		Typical prop. dia.		Tunnel outer. dia.		Tunnel wall thickness stand.		Tunnel length stand.	
	kW	hp	mm	inch	mm	inch	mm	inch	mm	inch
ZF TT 1000 FP	100	134	600	24	660	26	15	0,6	1000	39
ZF TT 2000 FP	180	241	700	28	760	30	15	0,6	1000	39
ZF TT 300 FP	300	402	1050	41	1110	44	15	0,6	1000	39
ZF TT 400 FP	440	590	1150	45	1220	48	15	0,6	1000	39
ZF TT 4000 FP	525	703	1350	53	1420	60	16	0,6	1500	59
ZF TT 5000 FP	825	1105	1650	65	1730	70	18	0,7	2000	79
ZF TT 6000 FP	1200	1608	1900	75	1990	80	20	0,8	2000	79
ZF TT 7000 FP	1650	2211	2300	91	2400	90	22	0,9	2200	80
ZF TT 8000 FP	2000	2680	2450	97	2550	100	22	0,9	2550	100

* Rating subject to classification and application.
Mentioned data for indication purposes only.

FIXED PITCH TUNNEL THRUSTERS & CONTROLLABLE PITCH TUNNEL THRUSTERS

L-DRIVE Vertical input shaft



Fixed Pitch Tunnel Thrusters

MODEL	Max. power*		Typical prop. dia.		Tunnel outer. dia.		Tunnel wall thickness stand.		Tunnel length stand.	
	kW	hp	mm	inch	mm	inch	mm	inch	mm	inch
ZF TT 1000 FP	100	134	600	24	660	26	15	0,6	1000	39
ZF TT 2000 FP	200	268	700	28	760	30	15	0,6	1000	39
ZF TT 300 FP	300	402	1050	41	1110	44	15	0,6	1000	39
ZF TT 400 FP	440	590	1150	45	1220	48	15	0,6	1000	39
ZF TT 4000 FP	525	703	1350	53	1420	60	16	0,6	1500	59
ZF TT 5000 FP	825	1105	1650	65	1730	70	18	0,7	2000	79
ZF TT 6000 FP	1200	1608	1900	75	1990	80	20	0,8	2000	79
ZF TT 7000 FP	1650	2211	2300	91	2400	90	22	0,9	2200	80
ZF TT 8000 FP	2000	2680	2450	97	2550	100	22	0,9	2550	100

Controllable Pitch Tunnel Thrusters

MODEL	Max. power*		Typical prop. dia.		Tunnel outer. dia.		Tunnel wall thickness stand.		Tunnel length stand.	
	kW	hp	mm	inch	mm	inch	mm	inch	mm	inch
ZF TT 4000 FP	500	670	1350	53	1425	56	16	0,6	1500	59
ZF TT 5000 FP	850	1139	1650	65	1730	68	18	0,7	2000	79

* Rating subject to classification and application.
Mentioned data for indication purposes only.

SHALLOW DRAUGHT THRUSTERS

Z-DRIVE & L-DRIVE



MODEL	Max. power*		Diameter outer well appr.		Height of outer well appr.	
	kW	hp	mm	inch	mm	inch
ZF SDT 2000 FP	100	134	1030	41	615	24
ZF SDT 3000 FP	195	261	1460	57	867	34
ZF SDT 4000 FP	350	469	1960	77	1158	46
ZF SDT 5000 FP	575	770	2520	99	1493	59
ZF SDT 6000 FP	825	1105	3060	120	1805	71

* Rating subject to classification and application.
Mentioned data for indication purposes only.

ZF Shallow Draught Thruster

- 360° steering, no thrust deduction in any angle.
- Compact design, water intake and nozzle within one circle.
- Thanks to the unique design a relatively low intake speed of water, reducing the chances of sucking-in foreign objects or debris. Also very safe for divers.

This thruster can be used as:

1. Main Propulsion

Ton ships required to be able to navigate in shallow waters e.g. ferries, pontoons, landing craft.

2. Auxiliary Propulsion

as steerable thruster for auxiliary or back-up type propulsion e.g. research vessels, offshore platforms, coasters (as 'get-you-home' unit), inland cargo ships.

3. Bow Thruster

as better alternative and also to replace (especially long) tunnel thrusters e.g. work pontoons, freighters (inland and ocean going), sheerlegs, dredgers.

ZF Thruster Systems offers you this thruster in combination with the other range of steerable thrusters (retractable, well mounted and deck mounted propulsion units) and tunnel thrusters.

THRUSTER MOUNTING CONFIGURATIONS



There are three different mounting configurations within the range of the ZF thrusters used for main propulsion.

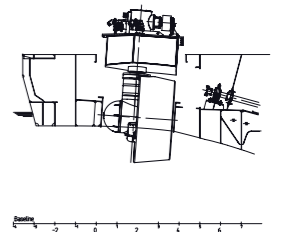
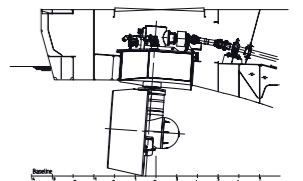
WELL MOUNTED FROM TOP

Well mounted top removal

Recommended for ships operating in areas with limited dry-docking facilities. This mounting configuration makes it possible to either install or remove the thruster from the ship while the vessel is still afloat.

Advantages of this configuration are:

- Easy maintenance or repair is possible since the thruster can be removed from the vessel without the need for dry-docking. This requires a permanent deck hatch or soft patch above the thruster.
- Downtime is limited since repair or replacement of a damaged thruster is easily accomplished in hours.

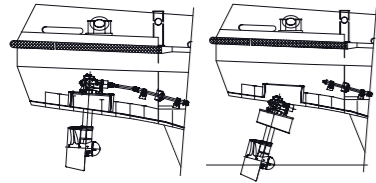


THRUSTER MOUNTING CONFIGURATIONS

WELL MOUNTED FROM BOTTOM

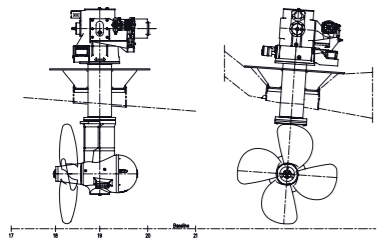
Well mounted bottom removal

When top mounting isn't possible due to design restrictions in the vessel's construction that make access via a deck hatch above the thruster impossible, the thruster can be installed from below with a bottom mounting flange arrangement. The main advantage of this design is that the thruster can still be withdrawn from the ship if required. Dry-docking of the vessel is usually required, unless its possible to trim the vessel sufficiently forward to allow the thruster to be removed from below while keeping the outer well flange and thruster upper gearbox above the waterline.



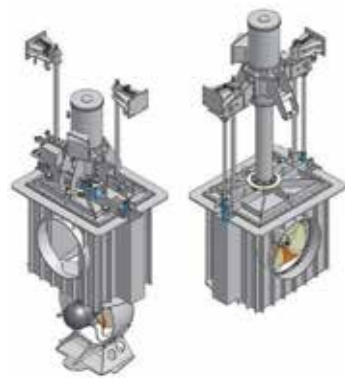
WELD IN

When neither a top mounting nor bottom mounting arrangement is possible or desired, the thruster can be delivered with a suitable welding structure around the vertical stem section, which will be incorporated into the vessel's hull construction and welded into place.



RETRACTABLE AZIMUTH THRUSTERS

A retractable thruster is used for auxiliary propulsion system or to increase the vessel's "station keeping" capabilities. Once deployed below the hull, the thruster operates in full azimuth mode and when retracted, the thruster is completely "parked" inside the hull. A retractable thrusters is most commonly installed in the bow of a vessel where a tunnel can be incorporated into the design of the outer well to allow the thruster to be used as a conventional side thruster when fully retracted in shallow water.



REMOVABLE TUNNEL THRUSTERS

In addition to the conventional tunnel thruster arrangement where the tunnel is welded integral to the vessel's structure with the gearbox bolted directly onto the mounting flange, it is also possible to suspend the thruster in rubber. In this manner the thruster is isolated from the hull and direct contact between tunnel and hull construction is avoided. This reduces "structure borne noise" significantly. The flange arrangement also makes it possible to remove the thruster from the vessel without drydocking, provided that the vessel can be trimmed so the outerwell flange is above the waterline for removal.



REMOTE CONTROL SYSTEM



REMOTE CONTROL SYSTEM

A complete remote control system is a standard item in the ZF scope of supply. It is designed to control a single azimuth thruster and provides follow-up steering- and propulsion control, as well as independent backup- and emergency stop functionality.

The system is capable of interfacing with diesel engines and electric or hydraulic motors as power source for propulsion. For steering the system interfaces with a hydraulic or electric steering system.



REMOTE CONTROL SYSTEM

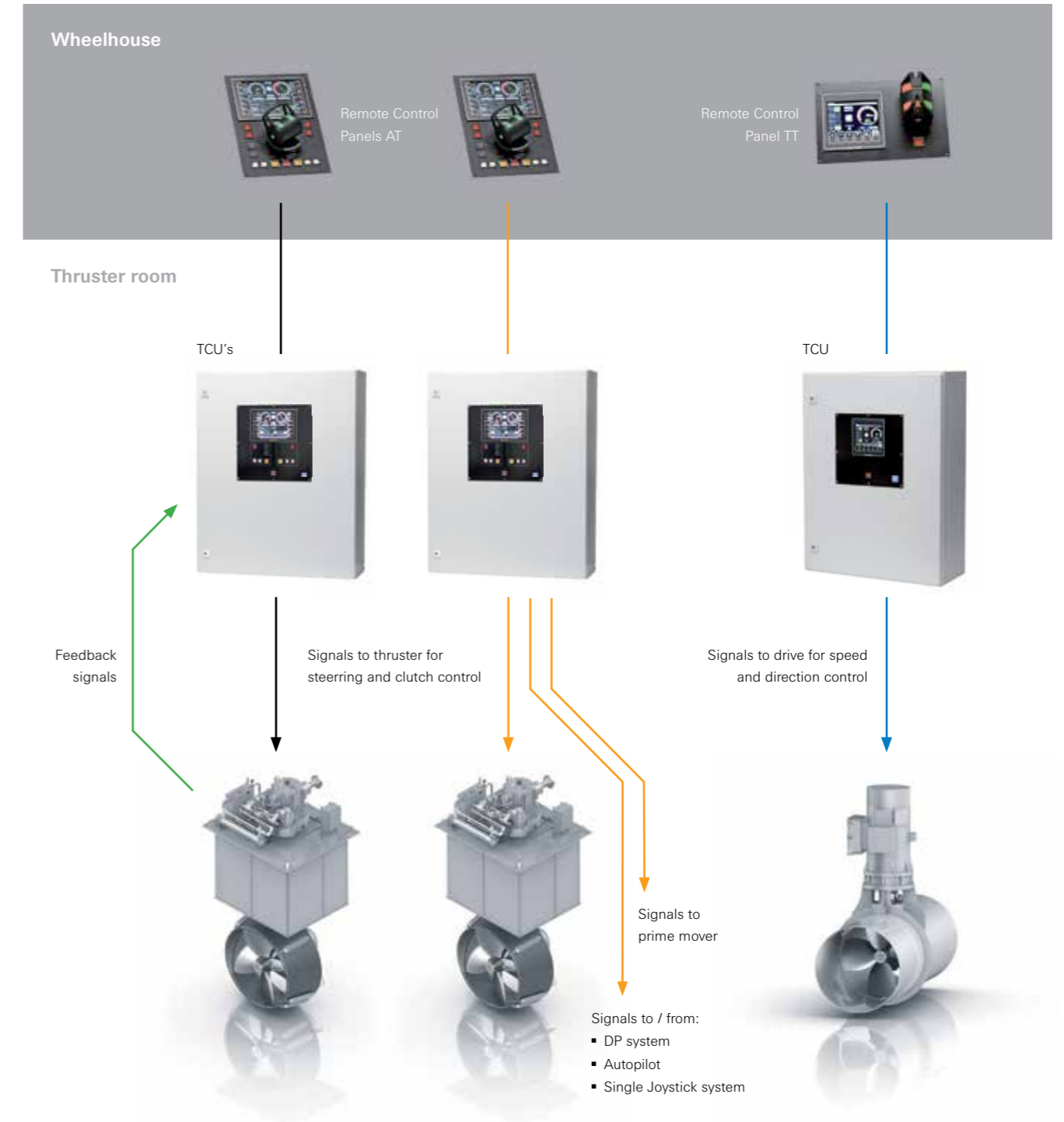


Standard control system consists of a Thruster Control Unit (TCU), which is to be placed in the immediate vicinity of the thruster, and one remote control panel on the bridge. Optionally a number of additional remote control panels can be connected.

The local control facility is mounted on the door of the TCU. The TCU houses the electronics for interfacing with the thruster and power sources for steering and propulsion, as well as vertical positioning.

INTERFACING

Interfacing to several other systems such as Dynamic Positioning, joystick system, auto pilot, Voyage Data Recorder (VDR), alarm- and monitoring etc. can be supplied as an option.



SALES AND SERVICE SUPPORT



HIGHLY TRAINED STAFF

ZF has established a superior service support team of highly skilled engineers to provide support to our clients. ZF engineers go through a comprehensive product training at the factories at Italy, Netherlands and Germany.

TRAINING PROGRAMS

Attending trainings led by ZF is a good compliment to new builds and upgrading projects, ensuring an in-depth working knowledge of the equipment or system before it enters service. ZF provides on-board training, preferably right after the commissioning. Training programs can cover:

- Introduction of the mechanics and hydraulics controls
- Training on operator's handling
- Basic operation
- Preventive and maintenance checks
- Self-check, filter change and oil change

SERVICE AGREEMENTS

ZF offers service agreements which can structure the customer's operational schedule. Service agreements can include:

- Maintenance schedule set up according to the specific equipment
- Life-time wear & tear for parts
- Customer requirements and class society requirements
- Delivery of original replacement spares
- Regular on-site inspections for planned maintenance



UPGRADES AND RETROFITS

ZF has the knowledge to handle complex rebuilding & retrofit of complete propulsion systems. The in-house designers and project managers can offer the best solutions for your ship



MECHANICAL UPGRADES AND RETROFITS

Mechanical upgrades are in line with the changes and improvements the factory has introduced. Our service representatives are trained to bring changes and improvements across to the vessel for the following products:

- Tunnel, Azimuth, Deck-mount units, Retractable, Shallow Draft thrusters
- Propeller Blade Designs
- Propeller shaft seals and bearings to meet environmental standards



CONTROLS (ELECTRICAL) UPGRADES

ZF offers service agreements which can structure the customer's operational schedule. The agreement includes:

- Early diagnosis covering physical check on the electronics and electrical components
- Upgrading software version to ensure optimum performance of the system



REFERENCES

WELL MOUNTED
AZIMUTH THRUSTERS

RETRACTABLE
AZIMUTH THRUSTERS

DECK MOUNTED
AZIMUTH THRUSTERS

TUNNEL THRUSTERS

SHALLOW DRAUGHT
THRUSTERS

LIFTBOAT "LEWEK LEADER" – SINGAPORE



Length o.a. : 56.00 m
Breadth : 44.00 m
Draught : 3.40 m
ZF-Reference : 7987
Model : ZF AT 6000 WM-FP / ZF TT 4000 FP
Rated power : 1100 kW at 1200 rpm / 440 kW at 1200 rpm
Supplied to : Ezra Marine Services Pte Ltd
Owner : Teras Cargo Transport – Singapore

Equipped with three (3) ZF AT 6011 well mounted azimuth thrusters and one (1) ZF TT 4001 tunnel thruster



43M DOUBLE-ENDED FERRY "ARAWHITI" – NEW ZEALAND



Length o.a. : 43.00 m
Breadth : 13.00 m
Draught : 1.40 m
ZF-Reference : 5815
Model : ZF AT 2000 WM-FP
Rated power : 186 kW at 2400 rpm
Supplied to : Shipco Marine Constructors Ltd
Owner : Fullers – Bay of Islands

Equipped with two (2) ZF AT 2111 well mounted azimuth thrusters



70M PLATFORM SUPPLY VESSEL "DMS COURAGEOUS" – QATAR



Length o.a. : 70.00 m
 Breadth : 16.80 m
 Draught : 5.70 m
 ZF-Reference : 6696
 Model : ZF AT 8000 WM-FP
 Rated power : 1835 kW at 1600 rpm
 Supplied to : Mawei Shipbuilding – China
 Owner : Doha Marine Services – Qatar

Equipped with two (2) ZF AT 8311
 well mounted azimuth thrusters



48M AHTS VESSEL "SWISSCO SUPERIOR" – SINGAPORE



Length o.a. : 48.00 m
 Breadth : 10.00 m
 Draught : 4.00 m
 ZF-Reference : 7121
 Model : ZT AT 8000 WM-FP / ZF TT 3000 FP
 Rated power : 1746 kW at 1600 rpm
 Supplied to : Lingshan Shipyard – China
 Owner : Swissco Offshore – Singapore

Equipped with two (2) ZF AT 8311 well mounted
 azimuth thrusters and one (1) ZF TT 3001 tunnel thruster
 and Multi-Thruster Control System



ACCOMMODATION JACKUP BARGE "GMS ENDURANCE" – ABU DHABI



Length o.a. : 76.00 m
Breadth : 36.00 m
Draught : 6.00 m
ZF-Reference : 8963
Model : ZF AT 6000 WM-FP
Rated power : 1200 kW at 1200 rpm
Owner : Gulf Marine Services – Abu Dhabi

Equipped with four (4) ZF AT 6011
well mounted azimuth thrusters



10 TON BOLLARD PULL TUG – INDIA



Length o.a. : 22.80 m
Breadth : 7.42 m
Draught : 2.35 m
ZF-Reference : 10915 - 10920
Model : 2 x ZF AT 4111 WM FP
Rated power : 2 x 525 kW @ 1800 rpm
Supplied to : Tebma Shipyards Limited, Chennai India
Owner : Indian Navy

Equipped with two (2) ZF AT 4111 WM FP well mounted
azimuth thrusters



WATER INJECTION DREDGER – INDIA



Length o.a. : 46.75 m
 Breadth : 11.20 m
 Draught : 2.50 m
 ZF-Reference : 12093 & 12094
 Model : a. 2 x ZF AT 4014 WM FP
 b. 1 x ZF SDT 4010 FP
 Rated power : 2 x 450 kW & 1 x 300 kW
 Supplied to : Shoft Shipyard Pvt. Limited, Bharuch India
 Owner : Adani Hazira Port Pvt. Limited, Surat India

Equipped with two (2) ZF AT 4014 WM FP and
 one (1) ZF SDT 4010 FP



75M MAINTENANCE & SUPPORT VESSEL “ARMADA FIRMAN 2” – SINGAPORE



Length o.a. : 75.00 m
 Breadth : 16.00 m
 Draught : 5.95 m
 ZF-Reference : 7137
 Model : ZF AT 5000 RT-FP / ZF TT 5000 FP
 Rated power : 705 kW at 1500 rpm / 735 kW at 1200 rpm
 Supplied to : Pan United Shipyard – Singapore
 Owner : Bumi Armada Navigation Sdn Bhd – Singapore

Equipped with two (2) ZF AT 5011 retractable azimuth
 thruster and two (2) ZF TT 5007 tunnel thrusters



76M TRANSPORT VESSEL "TROPICAL DAWN" – SINGAPORE



Length o.a. : 76.00 m
Breadth : 17.20 m
Draught : 3.00 m
ZF-Reference : 6183
Model : ZF AT 5000 DM-FP
Rated power : 882 kW at 1800 rpm
Supplied to : Sembawang Kimtrans Ltd – Singapore
Owner : Tropical Shipping – Singapore

Equipped with two (2) ZF AT 5111
deck mounted azimuth thrusters



4700 DWT COAL BARGES "SINAR BARITO/ BORNEO/BANJAR" – INDONESIA



Length o.a. : 82.30 m
Breadth : 21.40 m
Draught : 3.71 m
ZF-Reference : 4401
Model : ZF AT 4000 DM-FP
Rated power : 529 kW at 1800 rpm
Supplied to : ASL Shipyard Batam – Indonesia
Owner : PT Cumawis – Indonesia

Equipped with two (2) ZF AT 4111
deck mounted azimuth thrusters



106 TEU COASTAL CONTAINER FEEDER - INDIA



Length o.a. : 67.20 m
 Breadth : 13.30 m
 Draught : 3.20 m
 ZF-Reference : 14549 and 14550
 Model : 2 x ZF AT 3111 DM FP
 Rated power : 2 x 294 KW @ 1800 rpm
 Supplied to : Chowgule & Co. Pvt. Limited
 (Shipbuilding Division), Goa India
 Owner : Chowgule & Co. Pvt. Limited
 (Shipping Division), Goa - India

Equipped with two (2) ZF AT 3111 DM-FP
 deck mounted azimuth thrusters



8 POINT MOORING MULTI PURPOSE WORK BARGE - UAE



Length o.a. : 77.00 m
 Breadth : 30.00 m
 Draught : 4.15 m
 ZF-Reference : 10921
 Model : 4 x ZF AT 4111 DM FP
 Rated power : 4 x 525 kW @ 1800 rpm
 Supplied to : Dubai Shipbuilding & Engineering LLC
 Owner : Mubarak Marine LLC

Equipped with four (4) ZF AT 4111 DM-FP deck mounted
 azimuth thrusters



60M SUPPLY VESSEL "TANJUNG PINANG 1" – MALAYSIA



Length o.a. : 60.00 m
 Breadth : 20.00 m
 Draught : 5.20 m
 ZF-Reference : 6200
 Model : ZF TT 4000 CP
 Rated power : 515 kW at 1800 rpm
 Supplied to : Muhibbah Marine Engineering – Malaysia
 Owner : Tanjung Offshore – Malaysia

Equipped with one (1) ZF TT 4009
 tunnel thruster, electric driven



12.000M³ SUCTION HOPPER DREDGER "CHANG JIANG KOU 01" – CHINA



Length o.a. : 132.00 m
 Breadth : 27.30 m
 Draught : 8.37 m
 ZF-Reference : 10821
 Model : ZF TT 5000 CP
 Rated power : 500 kW at 1780 rpm
 Supplied to : IHC Dredgers – Netherlands
 Owner : Yangtze Estuary Waterway
 Administration Bureau MOT – China

Equipped with two (2) ZF TT 5009 WM-CP
 electric driven controllable pitch tunnel thrusters



56M NAVY PATROL BOAT "LARRAKIA" – AUSTRALIA



Length o.a. : 56.80 m
 ZF-Reference : 4766
 Model : ZF TT 2000 ALU-FP
 Rated power : 160 kW
 Supplied to : Austral – Australia
 Owner : Royal Australian Navy

Equipped with one (1) ZF TT 2001 ALU-FP
 electric driven aluminium tunnel thruster



CATAMARAN FERRYBOAT "SPIRIT OF KANGAROO ISLAND" – AUSTRALIA



Length o.a. : 50.40 m
 Breadth : 17.80 m
 Draught : 2.50 m
 ZF-Reference : 4766
 Model : ZF TT 2000 FP
 Rated power : 160 kW at 1500 rpm
 Supplied to : AUSTAL Ships – Australia
 Owner : Sealink Kangaroo Island – Australia

Equipped with two (2) ZF TT 2001
 electric driven tunnel thrusters



CUTTER SUCTION DREDGER "AL BAHAR C/D HUTA 12" – SAUDI ARABIA



Length o.a. : 122.50 m
Breadth : 21.70 m
Draught : 6.80 m
ZF-Reference : 14412 / 14413
Model : ZF TT 3000 FP / ZF AT 7000 WM-FP
Rated power : 250 kW at 1485 rpm / 1590 kW at 1000 rpm
Supplied to : IHC Holland B.V.
Owner : Huta Marine Works – Saudi Arabia

Equipped with one (1) ZF TT 3001 electric driven tunnel thruster and two (2) ZF AT 7011 well mounted azimuth thrusters



59M SUPPLY VESSEL "PERMINT AMAN" & "PERMINT DAMAI" – MALAYSIA



Length o.a. : 59.00 m
Breadth : 13.80 m
Draught : 4.75 m
ZF-Reference : 5651
Model : ZF SDT 5000 FP
Rated power : 537 kW at 1800 rpm
Supplied to : Muhibbah Marine Engineering – Malaysia

Equipped with one (1) ZF SDT 5110 shallow draught thruster



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