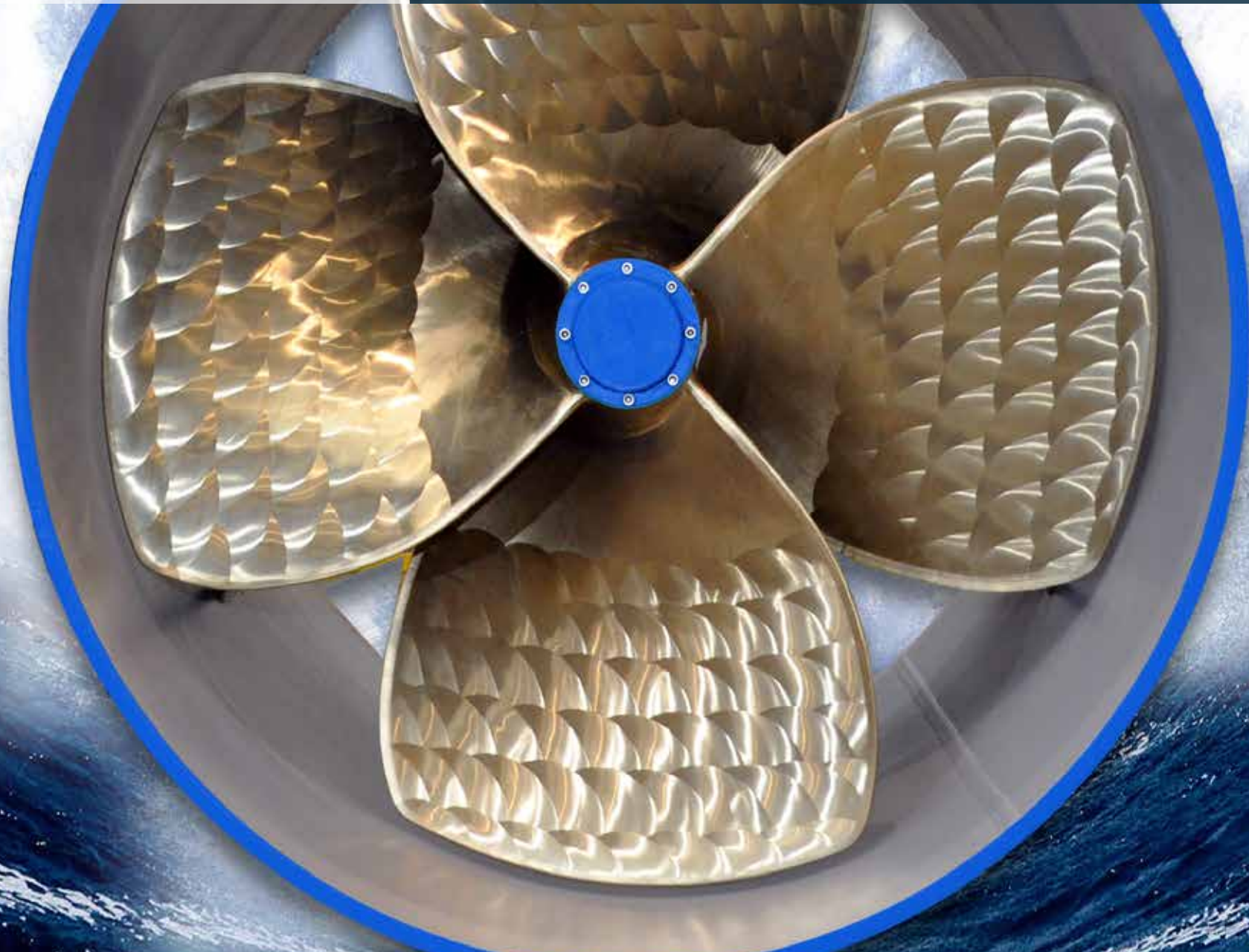




HYDRAULIC TUNNEL THRUSTERS



LET US INTRODUCE OURSELVES

For over 30 years, Thrustmaster of Texas has been designing, manufacturing and supporting marine propulsion systems for a global network of customers and continues to be the largest manufacturer of marine thrusters in the U.S.A.

Thrustmaster propulsion units are manufactured in Houston, TX with a variety of configurations including self-contained and portable deck-mounted propulsion units, thru-hull azimuthing thrusters, Z-drives, water jets, retractable thrusters and tunnel thrusters in power ranges from 35 to 10,740 hp (22 kW to 8 MW).

Special expertise has been developed in designing and manufacturing equipment for maneuvering, navigating and dynamic positioning of ships, boats and barges.

Thrustmaster pioneered the concept of hydraulic propulsion for the marine industry using technology originally employed in the offshore oil fields. Thrustmaster hydraulic tunnel thrusters are the benchmark for efficient and reliable maneuvering under severe marine conditions.



HYDRAULIC TUNNEL THRUSTERS

Thrustmaster hydraulic tunnel thrusters consist of a high thrust fixed pitch propeller on a husky propeller shaft directly coupled to Thrustmaster's exclusive podded hydraulic motor providing infinite propeller speed control in both directions of rotation. They come as complete units installed in a section of steel tunnel. They are available in tunnel diameters from 16 to 84 inches covering a power range from 30 to 2000HP. Thrusters from 16 to 36 inches are also available in aluminum. For detailed specifications, please ask for our Technical Specifications.

Thrustmaster hydraulic tunnel thrusters are simple, quiet, efficient and extremely smooth while exhibiting all the benefits of the ideal tunnel thruster.

Precise Control when you need it most

The variable-flow hydrostatic drive system allows for infinite propeller speed control in port and starboard direction. Whether in manual mode or DP mode, hydraulic thrusters allow perfect vessel station-keeping and instant thrust response. Full thrust can be reversed within 3 to 5 seconds. This instantaneous and fully proportional speed control gives performance superior to a controllable pitch propeller (CPP) without the cost, complexity, fragility or maintenance problems of the intricate CPP control system with all its drive shafts, levers and feedback mechanisms.

Simple, Efficient & Reliable

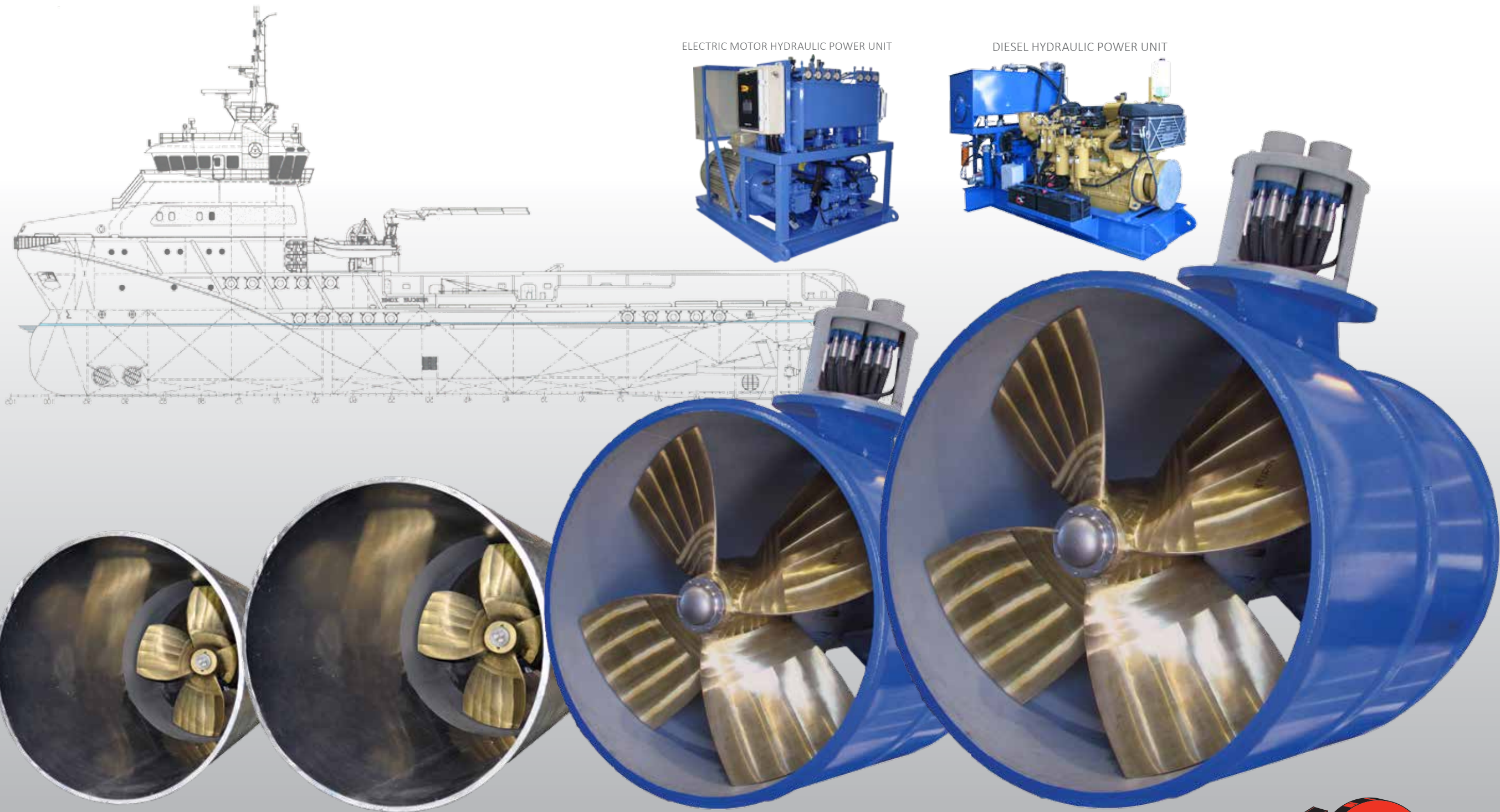
The prime mover drives a hydraulic pump. The propeller is driven by a hydraulic motor. In between are fluid conductors. There are no drive shafts, gears, bearings, or other mechanical components to fail. The hydraulics are virtually maintenance free and provide many years of reliable operation while performing in the harshest marine environments, as long as the hydraulic fluid is kept in clean and cool condition. Many Thrustmaster tunnel thrusters have been in continuous commercial use for more than 20 years, providing flawless operation without any component failures.

Highly Resistant to Damage

The hydraulic drive is extremely resistant to damage. Foreign objects ingested by the tunnel will not damage the hydraulic drive train, as the hydraulic system instantly relieves any transmission overloads.

Flexible & Convenient Installation

The prime mover doesn't need to be located next to the thruster like traditional tunnel thrusters, but can be placed anywhere in the vessel. This allows for optimization of weight distribution. The thruster room is reduced to a simple void space; it is not a machinery space. There are no shafts or couplings to align or requirements for additional ventilation, lighting or floor gratings. The hydraulic pump prime mover is a non-reversible electric motor or a diesel engine running at a constant speed as the hydraulic transmission controls propeller speed and direction of rotation.



NOISE SUPPRESSION

All tunnel thrusters, regardless of drive type, are inherently noisy during operation. Turbulent flow through the tunnel generates structure-borne noise to decks and bulkheads. Thrustmaster tunnel thrusters have very low mechanical noise since they do not use right angle gear transmissions.

The hydraulic transmission can be designed to operate quietly by generous sizing of fluid conductors, use of resilient piping supports and bulkhead penetrations, and by using intrinsically quiet hydraulic pumps.

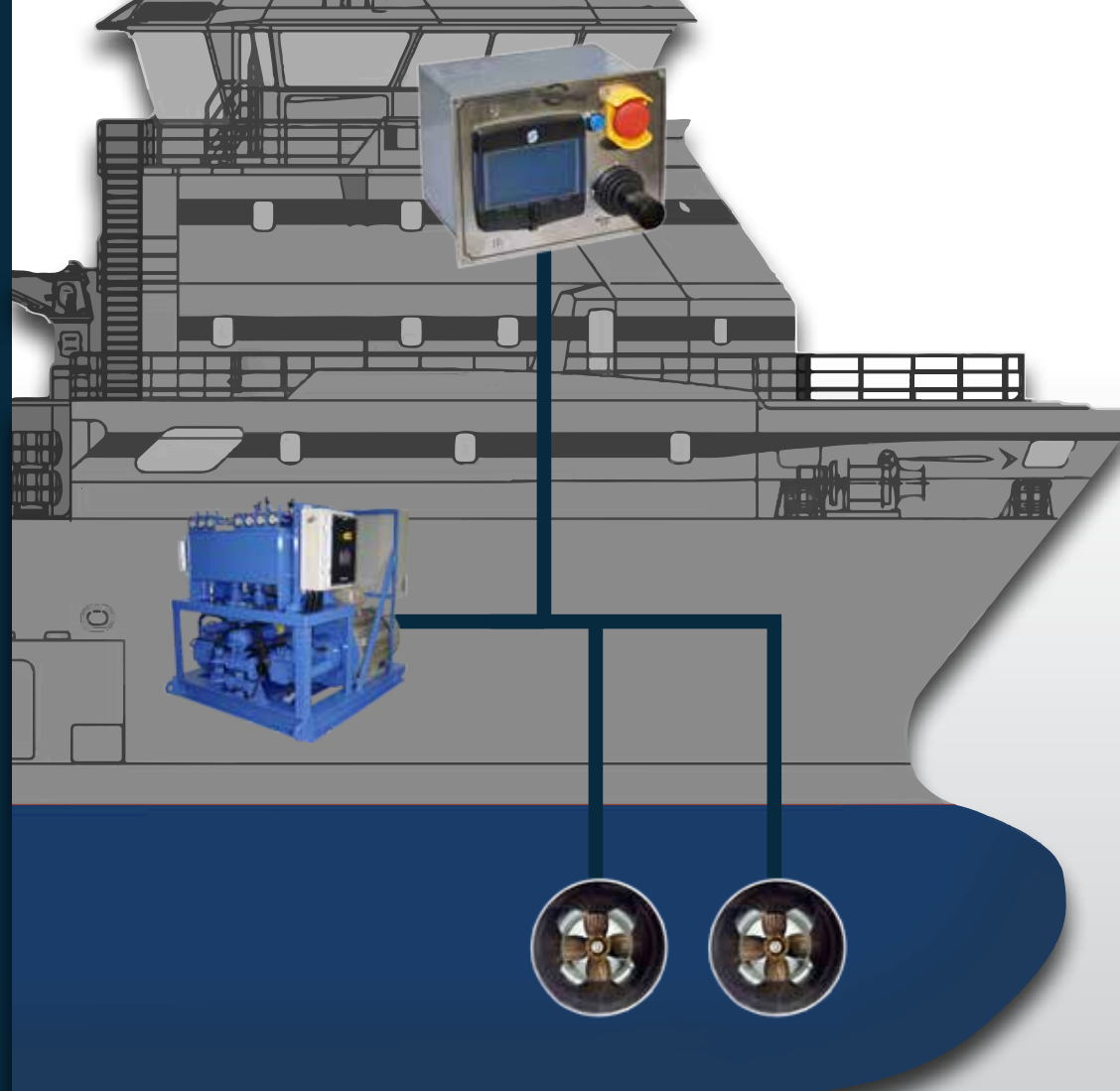
Because the tunnel thruster is primarily for intermittent, slow speed maneuvering, noise level is often considered to be less important. Where noise is critical, select the largest practical tunnel diameter for the thrust required. A large tunnel uses a large diameter propeller at slow speed with lower water velocities and less turbulence in the tunnel, resulting in lower noise levels.



EFFICIENT & RELIABLE

A drop-in style bridge remote control panel comes with a proportional joystick for infinite thrust control in both port and starboard directions. Prime mover controls and dynamic positioning interface can be included on the thruster panel.

Additional bridge wing stations or other controls are also available.

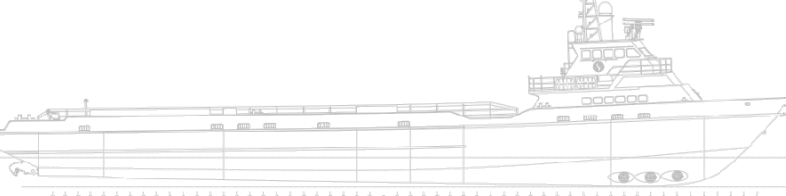


Model	Tunnel Data				Power		Nominal Thrust		Hydraulics Pressure / Flow at rated output				Weight Thruster	
	Diameter in	Diameter mm	Length in	Length mm	HHP	kW	lbf	kN	USGPM	l/min	PSID	bar	lbs	kg
16TT30-AL	16	400	36	900	30	22	600	2.7	32	120	1750	121	200	90
16TT40-AL	16	400	36	900	40	30	800	2.6	35	130	2100	144	200	90
16TT50-AL	16	400	36	900	50	37	1000	4.4	38	130	2500	172	200	90
16TT60-AL	16	400	36	900	60	45	1200	5.4	40	150	2800	193	200	90
16TT70-AL	16	400	36	900	70	52	1400	6.2	52	200	2450	169	200	90
24TT60-AL	24	600	36	900	60	45	1250	5.6	47	180	2200	152	280	120
24TT70-AL	24	600	36	900	70	52	1500	6.7	50	190	2450	169	280	120
24TT80-AL	24	600	36	900	80	60	1700	7.6	52	200	2650	162	280	120
24TT90-AL	24	600	36	900	90	67	1900	8.5	54	200	2900	200	280	120
24TT100-AL	24	600	36	900	100	75	3250	9.6	64	240	2700	186	280	120
24TT110-AL	24	600	36	900	112	84	2350	10.5	66	250	2900	200	280	120
30TT100-AL	30	750	36	900	100	75	2200	9.8	56	210	3000	207	540	250
30TT125-AL	30	750	36	900	125	93	2600	12	73	270	3000	207	540	250
30TT150-AL	30	750	36	900	150	112	3000	13	95	360	2700	186	540	250
30TT175-AL	30	750	36	900	175	130	3400	15	98	370	3100	214	540	250
30TT200-AL	30	750	36	900	200	150	3800	16.9	120	450	2900	200	540	250
36TT150-AL	36	900	36	900	150	112	3200	14	85	320	3000	207	620	280
36TT175-AL	36	900	36	900	175	130	3750	17	115	430	2600	179	620	280
36TT200-AL	36	900	36	900	200	149	4300	19	120	450	3000	206	620	280
36TT225-AL	36	900	36	900	225	168	4750	21	143	540	2700	186	620	280
36TT250-AL	36	900	36	900	250	186	5250	23	150	570	2900	200	620	280

Model	Tunnel Data				Power		Nominal Thrust		Hydraulics Pressure / Flow at rated output				Weight Thruster	
	Diameter in	Diameter mm	Length in	Length mm	HHP	kW	lbf	kN	USGPM	l/min	PSID	bar	lbs	kg
16TT30-CS	16	400	36	900	30	20	600	2.7	32	120	1750	121	250	110
16TT40-CS	16	400	36	900	40	30	800	2.6	35	130	2100	144	250	110
16TT50-CS	16	400	36	900	50	40	1000	4.4	38	140	2500	172	250	110
16TT60-CS	16	400	36	900	60	45	1200	5.4	40	150	2800	193	250	110
16TT70-CS	16	400	36	900	70	50	1400	6.2	52	200	2450	169	250	110
24TT60-CS	24	600	36	900	60	45	1250	5.6	47	180	2200	152	360	160
24TT70-CS	24	600	36	900	70	50	1500	6.7	50	190	2450	169	360	160
24TT80-CS	24	600	36	900	80	60	1700	7.6	52	200	2650	162	360	160
24TT90-CS	24	600	36	900	90	70	1900	8.5	54	210	2900	200	360	160
24TT100-CS	24	600	36	900	100	75	3250	9.6	64	240	2700	186	360	160
24TT110-CS	24	600	36	900	112	85	2350	10.5	66	250	2900	200	360	160
30TT100-CS	30	750	36	900	100	75	2200	9.8	56	210	3000	207	500	220
30TT125-CS	30	750	36	900	125	90	2600	12	73	270	3000	207	500	220
30TT150-CS	30	750	36	900	150	110	3000	13	95	360	2700	190	500	220
30TT175-CS	30	750	36	900	175	130	3400	15	98	370	3100	214	500	220
30TT200-CS	30	750	36	900	200	150	3800	16.9	120	450	2900	200	500	220
36TT150-CS	36	900	36	900	150	110	3200	14	85	320	3000	207	620	280
36TT175-CS	36	900	36	900	175	130	3750	17	115	430	2600	180	620	280
36TT200-CS	36	900	36	900	200	150	4300	19	120	450	3000	200	620	280
36TT225-CS	36	900	36	900	225	170	4750	21	143	540	2700	190	620	280
36TT250-CS	36	900	36	900	250	190	5250	23	150	570	2900	200	620	280
42TT300-CS	42	1100	36	900	300	220	7100	31.5	143	540	3600	250	925	420
42TT350-CS	42	1100	36	900	350	260	8250	36.6	150	560	4000	270	925	420
48TT350-CS	48	1200	76	1900	350	260	8300	36.9	184	700	3300	230	2400	1088
48TT400-CS	48	1200	76	1900	400	300	9100	40	178	670	3850	260	2400	1088
48TT450-CS	48	1200	76	1900	450	340	10300	46	186	700	4150	290	2400	1088
56TT500-CS	56	1400	78	1930	500	380	12000	53	230	870	3700	250	2900	1315
56TT600-CS	56	1400	78	1930	600	450	14200	63	276	1040	3750	260	2900	1315
66TT900-CS	66	1700	86	2200	900	670	21300	95	409	1550	3800	260	4600	2086
66TT1000-CS	66	1700	86	2200	1000	750	23600	105	409	1550	4200	290	4600	2086
77TT1500-CS	77	2000	114	2900	1500	1100	34200	152	819	3100	2825	200	6700	3039
77TT1800-CS	77	2000	114	2900	1800	1340	38900	173	1020	3900	2700	190	6700	3039
84TT2000-CS	84	2100	114	2900	2000	1500	42400	188	1118	4200	2600	180	9400	4263



features & benefits



FEATURE Infinite propeller speed control with variable- flow hydrostatic drive system.

BENEFIT Smooth and infinitely proportional control of thrust in port and starboard direction with instantaneous and accurate thrust response, facilitating perfect slow speed maneuvering and vessel station-keeping. Full thrust can be reversed in 3 to 5 seconds.

FEATURE Hydrostatic drive system using a fixed pitch propeller with stepless control of RPM from zero to maximum in both directions of rotation.

BENEFIT Performance better than a controllable pitch propeller (CPP) which runs at constant high RPM and has the associated complexity, fragility and maintenance problems of CPP. Better and less expensive than a diesel-electric system without the need for a frequency control drive.

FEATURE The hydraulic tunnel thruster's prime mover does not need to be located next to the thruster like with traditional tunnel thrusters.

BENEFIT The tunnel thruster can be installed at its most favorable location; even in a skeg or inside a bulbous bow. There is no need for any routine maintenance of the thruster, so the thruster location does not become a machinery space; it can be located in any void or tank. The prime mover with hydraulic pump can be installed in the engine room or any other convenient location, optimizing weight distribution.

FEATURE Thrustmaster hydraulic tunnel thrusters use podded design concept. The propeller shaft is directly driven by the hydraulic motor in the thruster .

BENEFIT High propulsion efficiency, no gear losses. Reliable due to its simplicity & limited number of moving parts. Lateral & torsional critical speeds are far above operating speeds. Runs smooth, no vibration.

FEATURE Thrustmaster tunnel thrusters can operate in either open or closed-loop hydraulic systems at intermediate or high pressures.

BENEFIT A dedicated thruster hydraulic system is not necessarily required. An existing hydraulic system may be used to drive the thruster or Thrustmaster can furnish a system that powers a variety of devices in addition to the thruster.

FEATURE The hydraulic drive train can instantly relieve any transmission overloads making the tunnel thruster extremely resilient and durable.

BENEFIT Foreign objects ingested by the tunnel will not damage the hydraulic drive train as the hydraulic system instantly relieves any transmission overloads.

FEATURE Noise suppression - Thrustmaster tunnel thrusters have very low mechanical noise since they do not use right angle gear transmissions

BENEFIT In noise critical situations - the hydraulic transmission can be designed to operate quietly by generous sizing of fluid conductors, use of resilient piping supports and bulkhead penetrations, and by using intrinsically quiet hydraulic pumps.

FEATURE Bi-directional rope cutters installed on every thruster.

BENEFIT Rope cutters prevent binding of propeller and damage to seals by cutting through lines and ropes that would otherwise become intertwined in the thruster propeller and seal cavity during operation.



Hydraulic tunnel thrusters installed on the ECO III, a 442 ft x 68 ft (135m x 21m) vessel that was converted into an FPSO. It is DP-2 class using two 2000 HP (1500 kW) tunnel thrusters model 84TT2000. Above picture shows the thrusters being installed in a new skeg in the bow. The podded hydraulic drive facilitates this type of installation, whereby the diesel engine driven hydraulic pumps are installed in a new machinery space in the stern section of the vessel, about 300 ft (91m) aft of the thrusters. These thrusters have been operating continuously in DP-2 service since they were installed in 2008 without interruption. (more than 50,000 hours of operation and counting...)

applications



200 HP (150 kW) aluminum hydraulic tunnel thruster model 30TT200-AL and a 400 HP (300 kW) retractable azimuth thruster model TH400RN-AL installed on the 190 ft (58 m) DPS-2 Fast Supply Vessel Alice G. McCall.



Two 70 HP (52 kW) aluminum hydraulic tunnel thrusters model 16TT70HAL classed by Lloyds installed on a crew boat.



250 HP (190 kW) hydraulic tunnel thruster model 36TT250-CS classed by ABS installed on 150 ft (45 m) DPS-1 Offshore Supply Vessel Mr. Ed.





Two 900 HP (670 kW) hydraulic tunnel thrusters model 66TT900-CS installed on the multi-purpose oil field construction and intervention vessel Helix Q-4000.



Four 250 HP (185 kW) aluminum hydraulic tunnel thrusters model 36TT250-AL installed on Seaworks' diving support vessel "Seamaster". For main propulsion, the vessel uses two Thrustmaster azimuth thrusters model TH1000MZ of 1000HP (750kW) each.



200 HP (150 kW) model 30TT200 hydraulic tunnel thruster installed on the research vessel Polaris along with two hydraulic azimuth thrusters model TH300N.





Two 200 HP (150 kW) aluminum hydraulic tunnel thrusters model 30TT200-AL classed by ABS for DPS-2 installed on the Fast Goliath.



Two 200 HP (150 kW) aluminum hydraulic tunnel thrusters model 30TT200-AL installed on the 201 ft (61 m) Fast Supply Vessel Miss Jolie with ABS classed DPS-2 capability with FiFi 1.



350 HP (260 kW) hydraulic tunnel thruster model 42TT350H-CS classed by ABS installed on 260 ft (80 m) passenger/cargo vessel Tuhaa Pae IV.





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