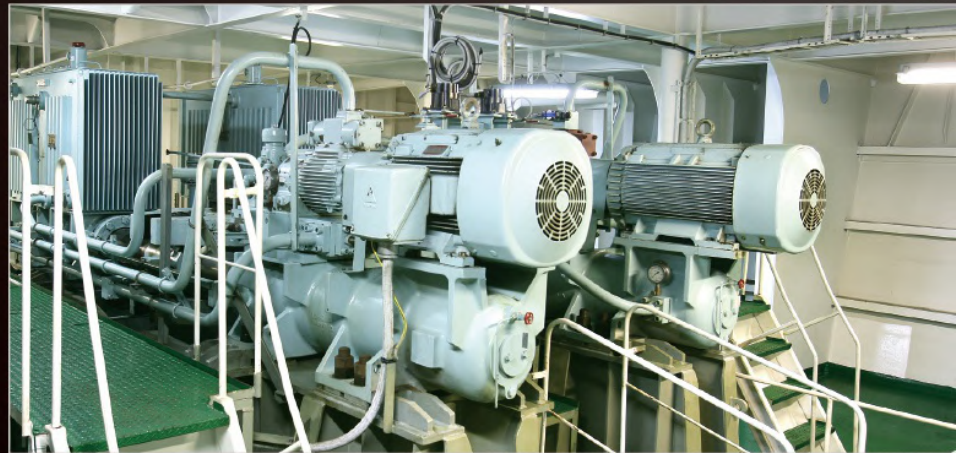




www.yoowonind.com



YOOWON-MITSUBISHI

Electro-Hydraulic Steering Gears



유원산업주식회사
YOOWON INDUSTRIES LTD.



YOOWON-MITSUBISHI **Electro-Hydraulic Steering Gears**



Meaning of Type designation

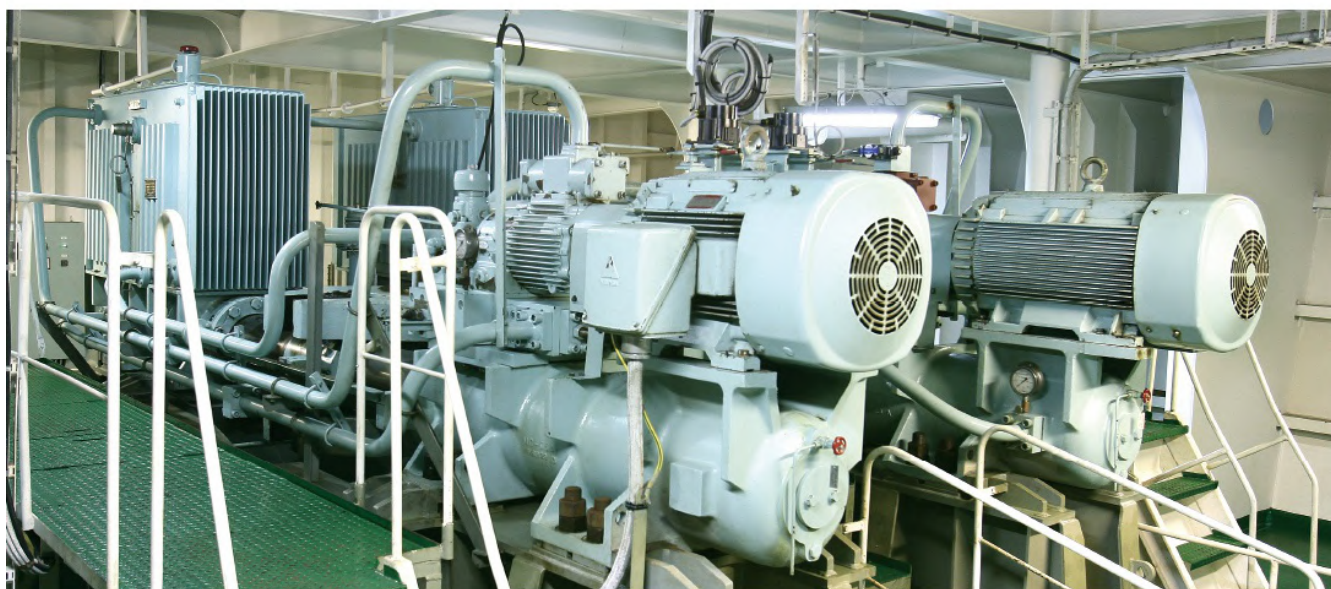
Y D F T - 6 0 - 1

- Y** Manufacturer's symbol
- D** DF Double Fork type (2 Ram-4 Cylinders)
- F** SF Single Fork type (1 Ram-2 Cylinders)
- T** C : Constant delivery pump valve control system
T : Variable pump torque motor control (Electrical pump control system)
- 6** Torque capacity (t-m)
- 0**
- 1**
 1. Without stand-by pump
 2. With main and stand-by pump
 3. With 3 pumps (1 pump stand-by)
 4. With 4 pumps (2 pumps stand-by)

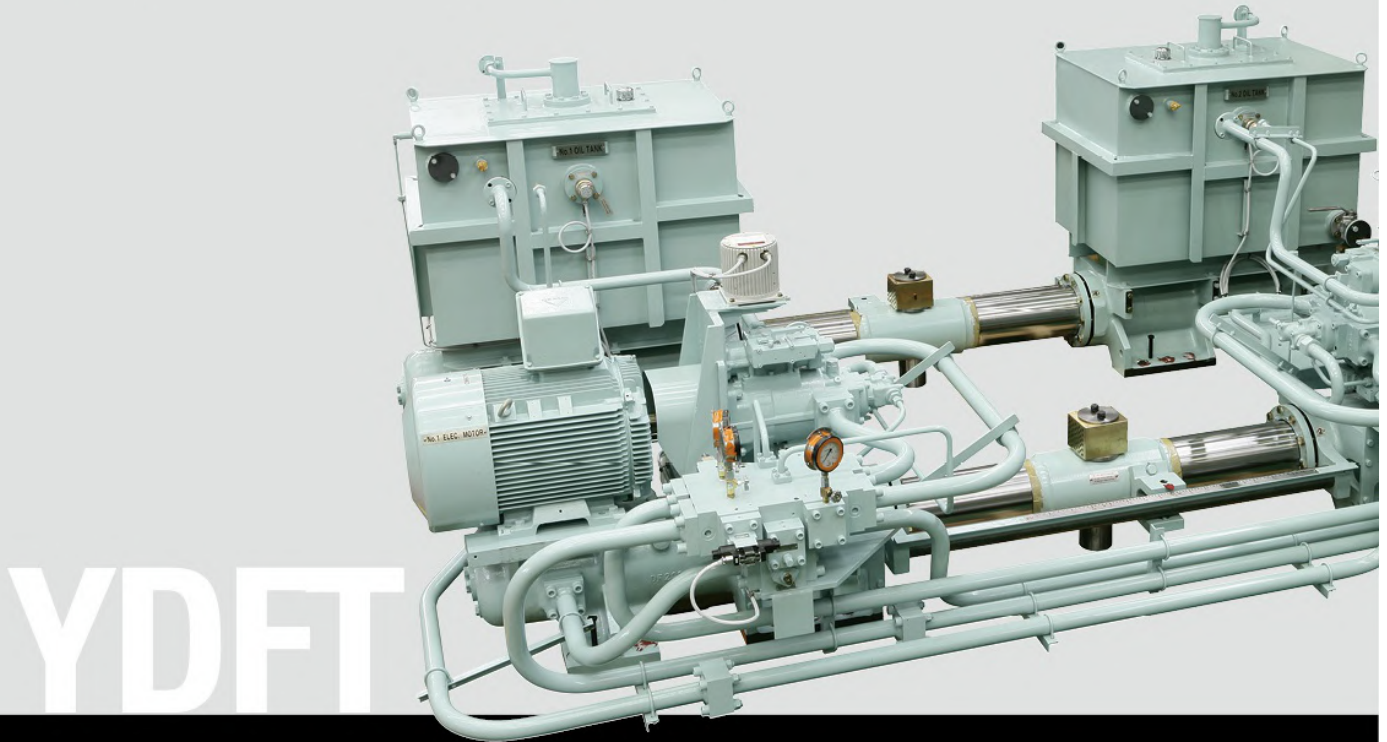


Features

Steering Gear	T Series [Electrical Pump Control S/G]	C Series [Valve Control S/G]
Instruction	The electric rudder command signal is compared with the feed-back signal of actual rudder angle in the steering stand. The rudder angle deviation signal from the steering stand is amplified by the amplifier and controls electrically the stroke of variable displacement type pump through torque motor.	The electric rudder command signal is compared with the feed-back signal of actual rudder angle in the steering stand. The rudder angle deviation signal from the steering stand operates the solenoid valve and controls the direction of oil from fixed displacement pump.
Trouble free	The maximum durability and reliability are guaranteed as steering gear.	
Adoption of pump	The adoption of Mitsubishi Janney pump (a variable delivery pump) with an integrated servo controller of higher pressure and longer life has enabled the design of high pressurization and durable steering gear.	Fixed displacement vane type Hydraulic pump.
No-load motor start up	Since the motor of the hydraulic pump can be started in the No-load condition, the emergency generator can be designed just that much smaller in capacity.	
Easy adaptability to classification societies regulation	Steering gear can be easily complied with specification of tanker over than 10,000GT by changing the valve block.	
Compact arrangement	Simple and compact constitution are gained since external pipings are minimized and oil tank and electric motor are installed on the hydraulic cylinder.	
	The power unit or receiver for remote control system is not required since the hydraulic pump is controlled by electric signal.	The power unit of remote control system is not required since the hydraulic pump is controlled by electric signal.
Easy installation	Steering gear is constructed with all pipings completed in the factory, requiring only a simple installation work on the ship.	
Maintenance free	Follow-up mechanisms of main parts of ram, hydraulic cylinder, etc. are especially of sturdy construction and full consideration is given to safety. Each joint portion is provided with oil-impregnated metal to facilitate maintenance.	
	The local steering can be performed by mechanical handle on the servo mechanism on the pump.	The local steering can be performed by pushing manually the push rod of solenoid valve,
Complete dual control system	The control system is made to meet ABS and other classification societies rule requirements within the limit of the standard design specification.	



Pump Control Type (T series)



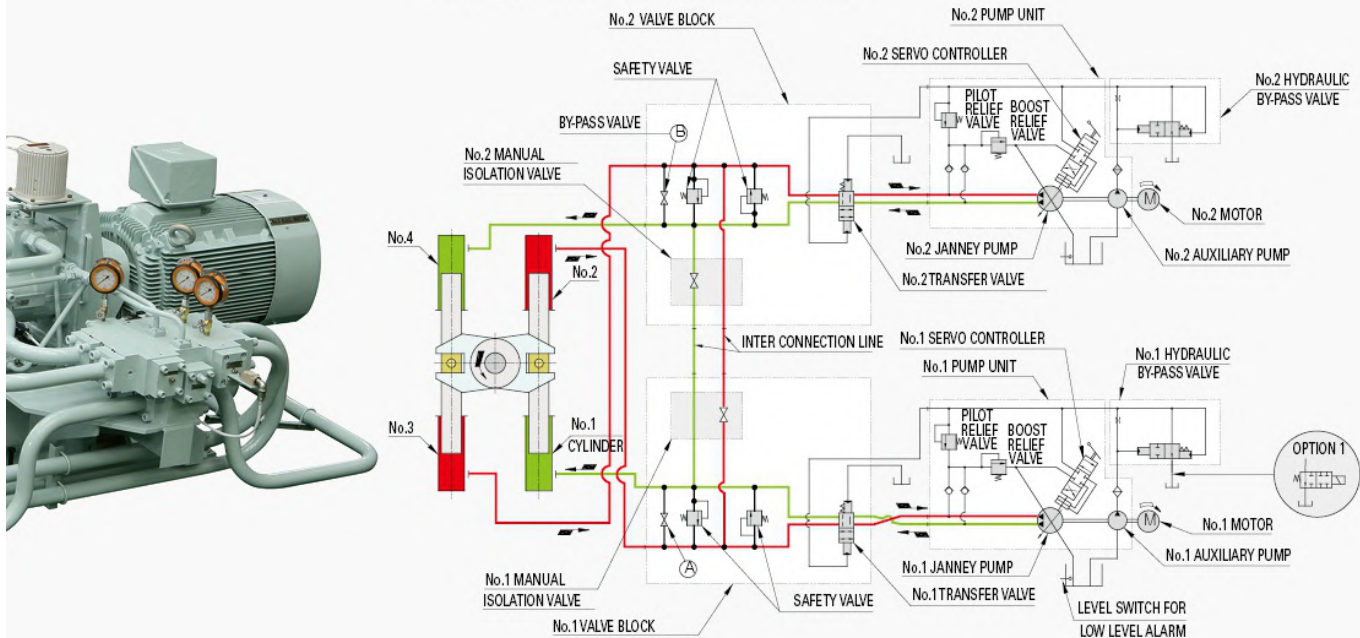
YDFT Type Electro-Hydraulic steering gears

System configuration and Functions

1. In both 1-ram 2-cylinder and 2-ram 4-cylinder types, the rudder actuator has a total capacity (torque) equivalent to 100% of design capacity and the power system is completely doubled.
2. When a single failure accompanying oil leakage occurs in the piping system, the low oil level detector of the oil tank connected to the power system in operation is actuated to send an alarm to the bridge and engine room. Valve adjustment of A~ F on the next page diagram is then done manually in the steering gear room in order to isolate the malfunctioning hydraulic system. Thus maintaining stable operation of the power system. In this manner, steering capacity is maintained.
3. Changing valves A and B to automatic isolation valves satisfies IMO regulation for over 10,000 GT tankers. In that case, when a single failure accompanying oil leakage occurs in the piping system, by the low oil level detector of the oil tank connected to the power system in operation, the other power system is started for parallel operation automatically or remotely. At the same time, the circuit isolation valves of both circuits actuate to isolate the malfunctioning piping system automatically. Thus, steering capability is maintained. And the power system in line with the malfunctioning piping system is stopped automatically by the second low level detector. At the same time, the related isolation valve also returns to its original position.
4. After a single failure as described above, the rudder actuator capacity is reduced to half to design capacity. It is necessary to reduce ship speed to half of max. speed or below 7 knots.

MHI Standards for IMO Hydraulic diagram

All ships excluding tanker above 10,000GT



Merits of YDFT type

1. Excellent Response and Energy-Saving

The torque motor system enables the steering gear to respond more accurately and more quickly to the steering command from steering stand than the hitherto-employed mechanical link system, especially in fine rudder angle. The pay off : no propensity of the ship meandering, hence no waste of precious fuel

2. Simple Construction and Compact Design

Pump discharge is controlled electrically by the torque motor. Without the auto-pilot receiver and mechanical link of the conventional system, the new system is simple in construction and compact in design

3. High Reliability

The torque motor employed is the brushless gearless type and a D.C motor with no rubbing parts. Non-follow-up steering by-passing the amplifier can be performed from the bridge. The hydraulic system remains identical to that of the conventional steering gear of proven design, with mechanical feedback links

4. Ease of Control in Emergency Steering

Emergency steering can be performed with the mechanical handle on the servo mechanism on the pump, with only limited physical effort

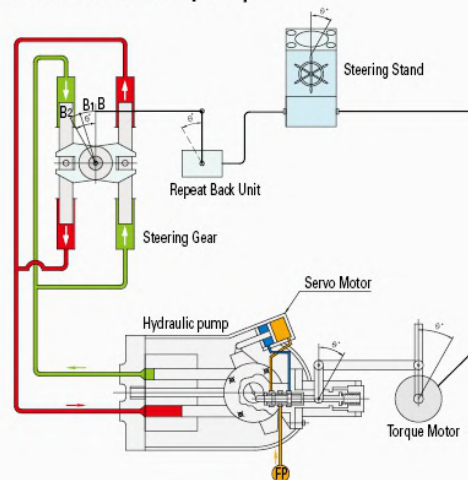
5. No-Load Motor Start-up

Since the motor of the hydraulic pump can be started in the no-load condition, the emergency generator can be designed just that much smaller in capacity

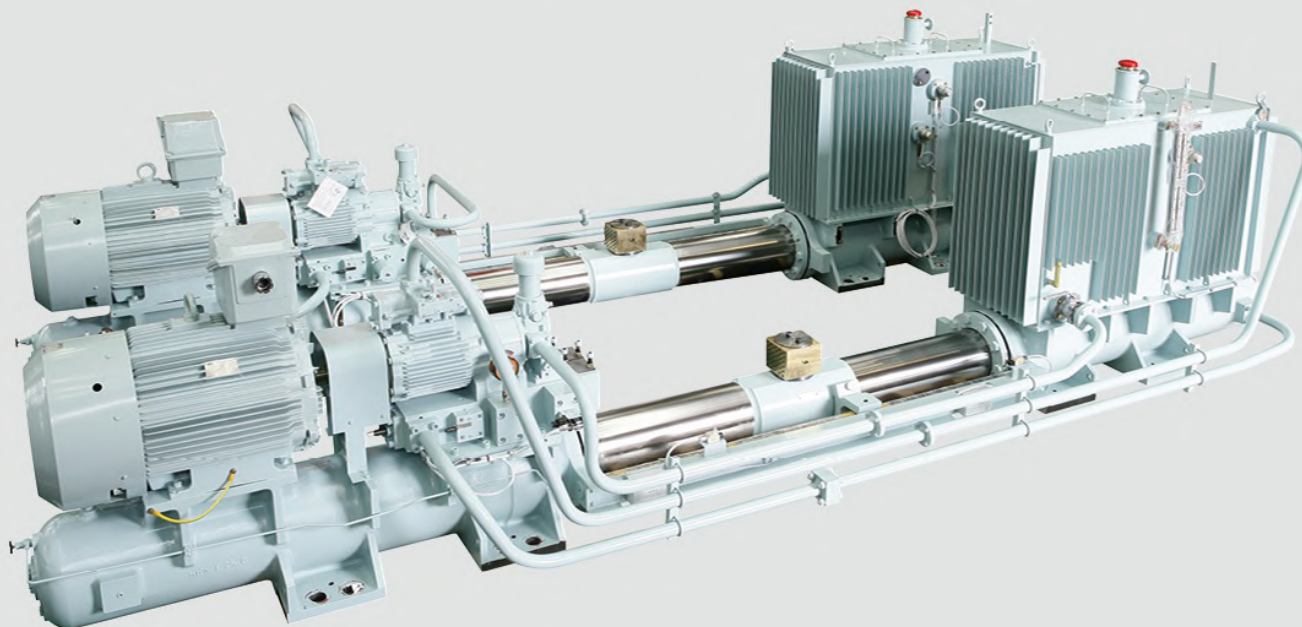
6. Complete Dual Control System

The complete control system is made to meet ABS and other classification societies rule requirements, with in the limit of the standard design specification.

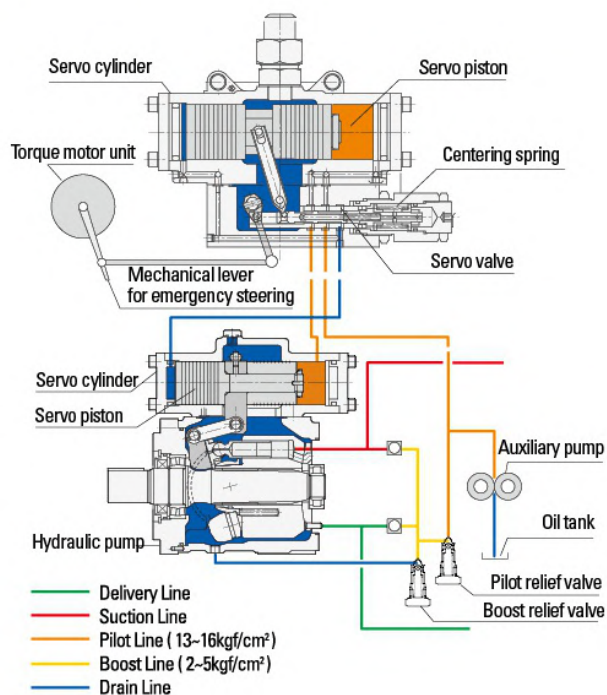
Mechanism of Solenoid Valve Control with Constant Delivery Pump



Pump Control Type (T series)

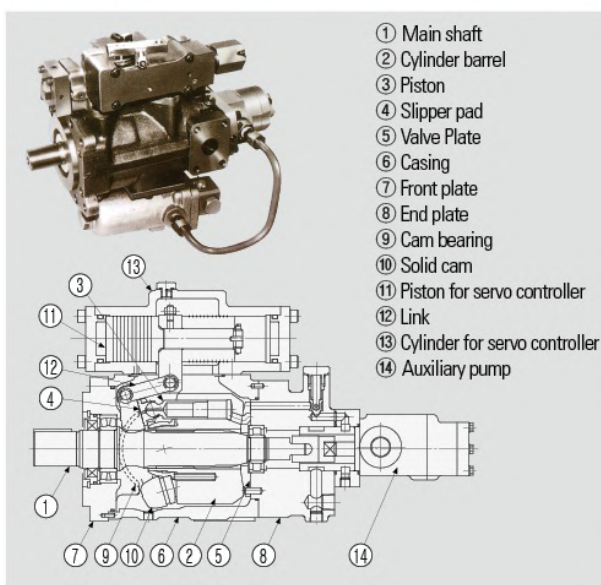


Hydraulic pump control mechanism

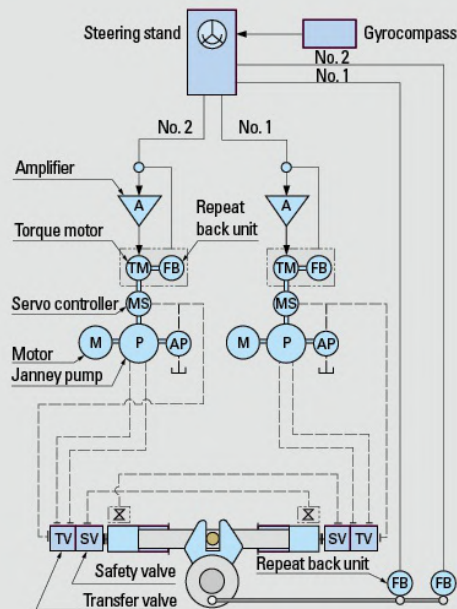


Hydraulic pumps

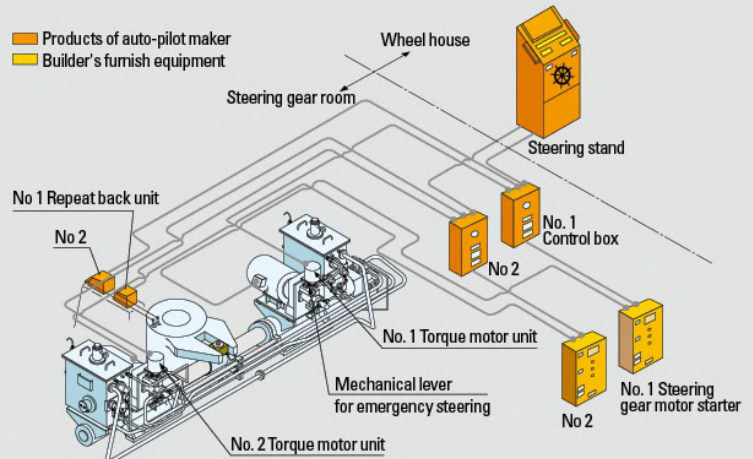
- 1) Pump structure is simple and easy to assemble, because quantity of main parts is greatly reduced.
- 2) Solid cam of high rigidity and strength is introduced, so the unit has epoch-making light-weight structure among all variable pumps.
- 3) The unit reduces the noise in a wide range of running conditions.



Torque motor control system

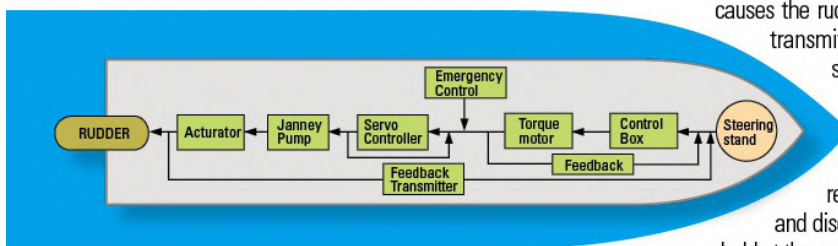


Yoowon-Mitsubishi torque motor control steering system



Torque motor control (single loop)

1. Excellent response and Energy-saving
2. Simple construction and compact design
3. High reliability
4. Greater freedom of Arrangement and ease of outfitting
5. Ease of control in emergency steerings
6. No-load motor start-up
7. Complete dual control system



Operation

Bridge Remote Control

The rudder angle electric command signal issued from the steering stand is amplified by the amplifier (A) and transmitted to the torque motor (TM). The torque motor then drives the hydraulic pump control mechanical servo (MS) only as much as directed by the command signal so that the tilting plate of the hydraulic pump (P) will be inclined accordingly for discharge of the required quantity of working oil. The working oil pressure thereby exerted causes the rudder to turn, and with feedback signal from the rudder tiller transmitted from the feedback detector (FB) to the steering stand signaling the rudder reaching the angle directed by the command signal, the torque motor drives the mechanical servo back to the neutral position (0 deg).

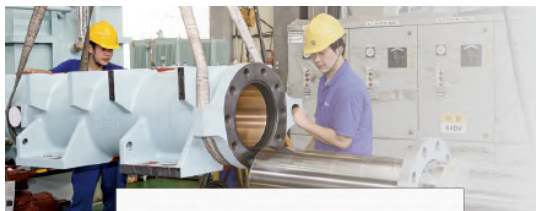
Consequently the hydraulic pump tilting plate also will return to the uninclined neutral position where the oil suction and discharge no longer take place, and the rudder therefore will be held at the angle to which it has been turned.

Local Control by the means of Mechanical Handle

In the local "HAND" control mode, it is not by the electric command signal but by direct manipulation of the mechanical handle on the hydraulic pump control mechanical servo that the hydraulic pump discharge is controlled. Since it is non-follow-up steering in this instance, releasing the mechanical handle upon turning the rudder to the desired angle will cause the mechanical servo centering function to automatically bring the hydraulic pump tilting plate back to the neutral position so that the rudder will be kept at the desired angle.

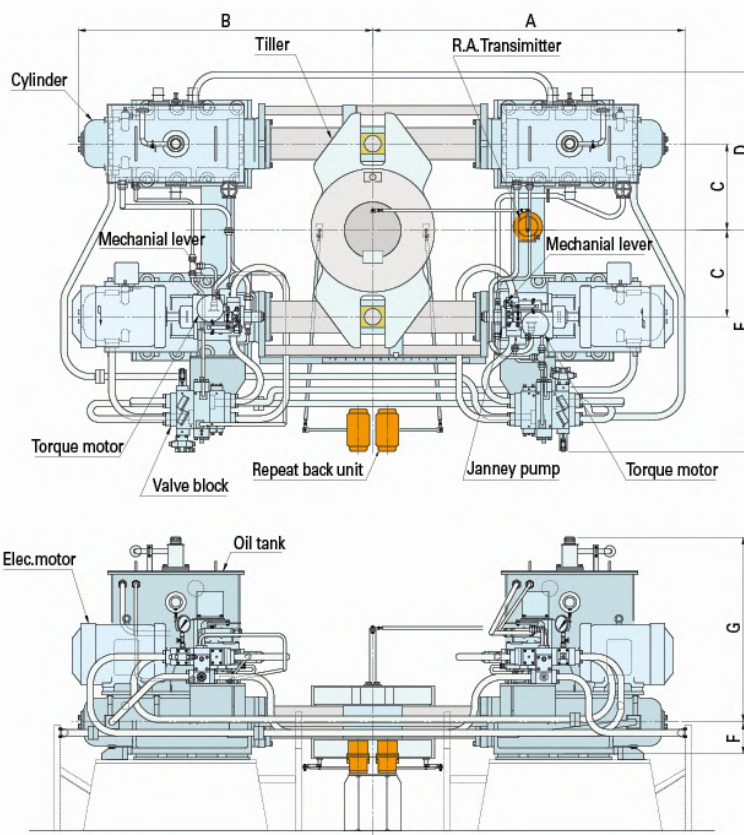
MODELS OF AUTO-PILOT FOR TORQUE MOTOR CONTROL

Maker	Models with Mitsubishi jnney pump
Tokyo keiki Co., Ltd.	PR-8406-DM, PR-8407-DM PR-8506-DM, PR-8507-DM
Yokogawa Denshikiki Co., Ltd.	PT100-Y (or Y3, Y4) PT200-Y (or Y3, Y4)



YDFT-TYPE (for 35 deg.)

Out of Scope of Supply



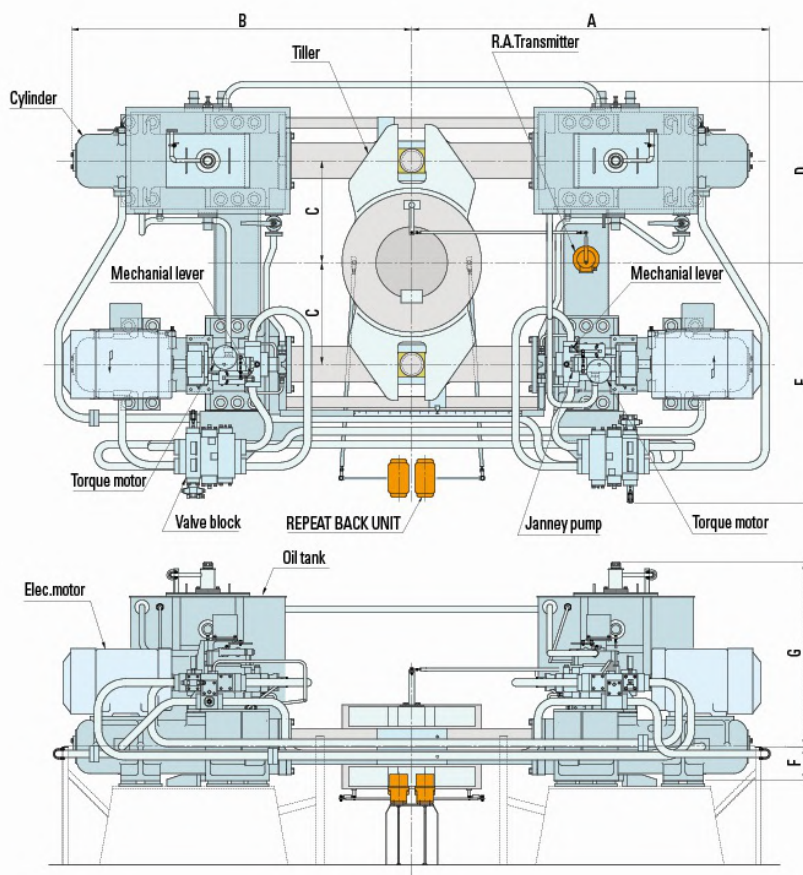
Specifications & Dimensions

Type			YDFT-60		YDFT-80		YDFT-125		YDFT-170		
	Torque at maximum working oil pressure	t-m	52	62	74	91	105	126	140	172	
		kN-m	510	608	726	892	1030	1236	1373	1687	
	Rudder turning speed	deg/sec	65/28								
	Normal tiller radius	mm	470		520		580		650		
	Diameter of ram	mm	170		195		220		240		
	Maximum working oil pressure	kgf/cm ²	185	220	180	220	180	215	180	220	
		Mpa	18.1	21.6	17.6	21.6	17.6	21.1	17.6	21.6	
	Safety valve pressure (Design pressure)	kgf/cm ²	232	275	225	275	225	269	225	275	
		Mpa	22.7	27	22.1	27	22.1	26.4	22.1	27	
With main and stand-by pumps	Motor	Output x Number	kW	15 × 2	18.5 × 2	22 × 2	25 × 2	30 × 2	37 × 2	45 × 2	50 × 2
		Number of revelations	rpm	1800							
	Rating	25% - Continuous, 100% - 1 Hour, 200% - 60 sec									
	Pump Type x Number	06V-FH2B-MK × 2					1V-FH2B-MK × 2				
Without stand-by pump	Motor	Output x Number	kW	11 × 2		11 × 2	15 × 2	15 × 2	18.5 × 2	22 × 2	25 × 2
		Number of revelations	rpm	1800							
	Rating	25% - Continuous, 100% - 1 Hour, 200% - 60 sec									
	Pump Type x Number	06V-FH2B-MK × 2									
	Dimensions	mm	A	1826		1931		2164		2344	
			B	1678		1838		2011		2213	
			C	470		520		580		650	
			D	941		991		1121		1191	
			E	1460		1510		1585		1660	
			F	190		205		220		240	
			G	1240		1250		1375		1390	

Note : The above list is complied with rudder turning angle ± 35 deg, and electric source of 60Hz. Steering gear for special particulars are available with us under high workmanship design.

YDFT-TYPE (for 35 deg.)

Out of Scope of Supply



Specifications & Dimensions

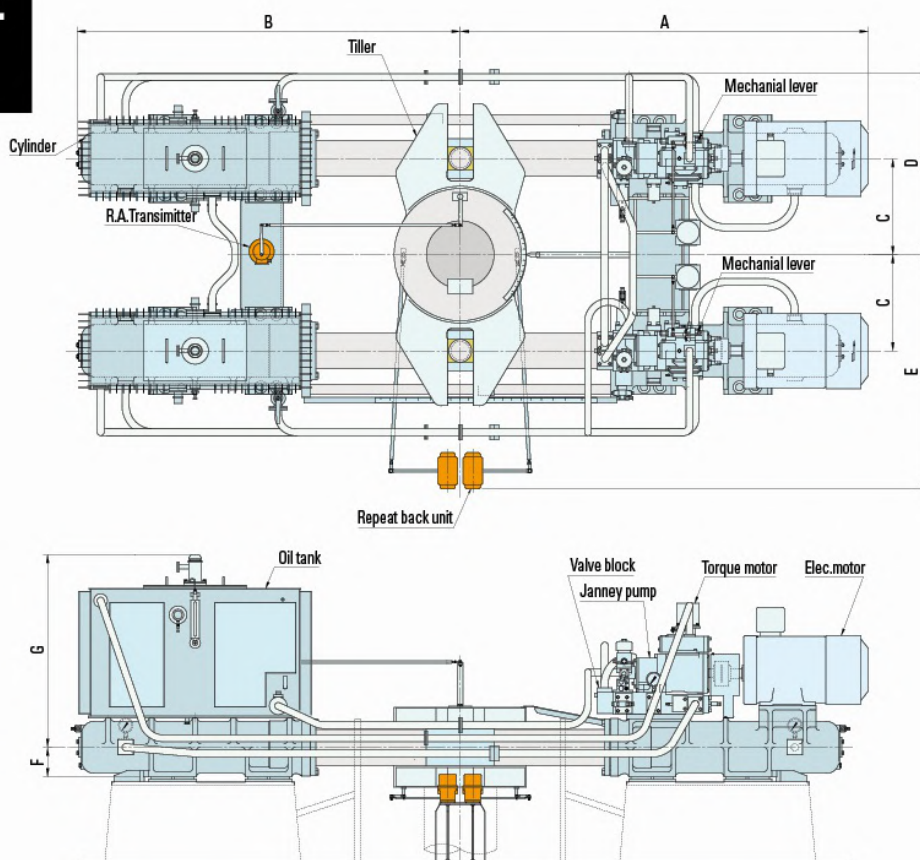
Type			YDFT-200	YDFT-250	YDFT-300	YDFT-335	
	Torque at maximum working oil pressure	t-m	207	244	291	351	
		kN-m	2030	2393	2854	3442	
	Rudder turning speed	deg/sec	65/28				
	Normal tiller radius	mm	715	730	780	850	
	Diameter of ram	mm	250	270	285	300	
	Maximum working oil pressure	kgf/cm ²	220	220	220	220	
		Mpa	21.6	21.6	21.6	21.6	
	Safety valve pressure (Design pressure)	kgf/cm ²	275	275	275	275	
		Mpa	27,0	27	27	27	
With main and stand-by pumps	Motor	Output x Number	kW	55 × 2	75 × 2	80 × 2	90 × 2
		Number of revelations	rpm	1200			
		Rating	25% - Continuous, 100% - 1 Hour, 200% - 60 sec				
	Pump Type x Number		3V-FH2B-MK X 2				
Without stand-by pump	Motor	Output x Number	kW	30 × 2	37 × 2	45 × 2	50 × 2
		Number of revelations	rpm	1800			
		Rating	25% - Continuous, 100% - 1 Hour, 200% - 60 sec				
	Pump Type x Number		06V-FH2B-MK × 2		1V-FH2B-MK × 2		
	Dimensions	mm	A	2533	2637	2807	2982
			B	2386	2505	2655	2842
			C	715	730	780	850
			D	1375	1392	1442	1512
			E	1872	1887	1937	2007
			F	255	260	275	285
			G	1510	1530	1540	1550

Note : The above list is complied with rudder turning angle ± 35 deg, and electric source of 60Hz. Steering gear for special particulars are available with us under high workmanship design.



YDFT-TYPE (for 35 deg.)

Out of Scope of Supply



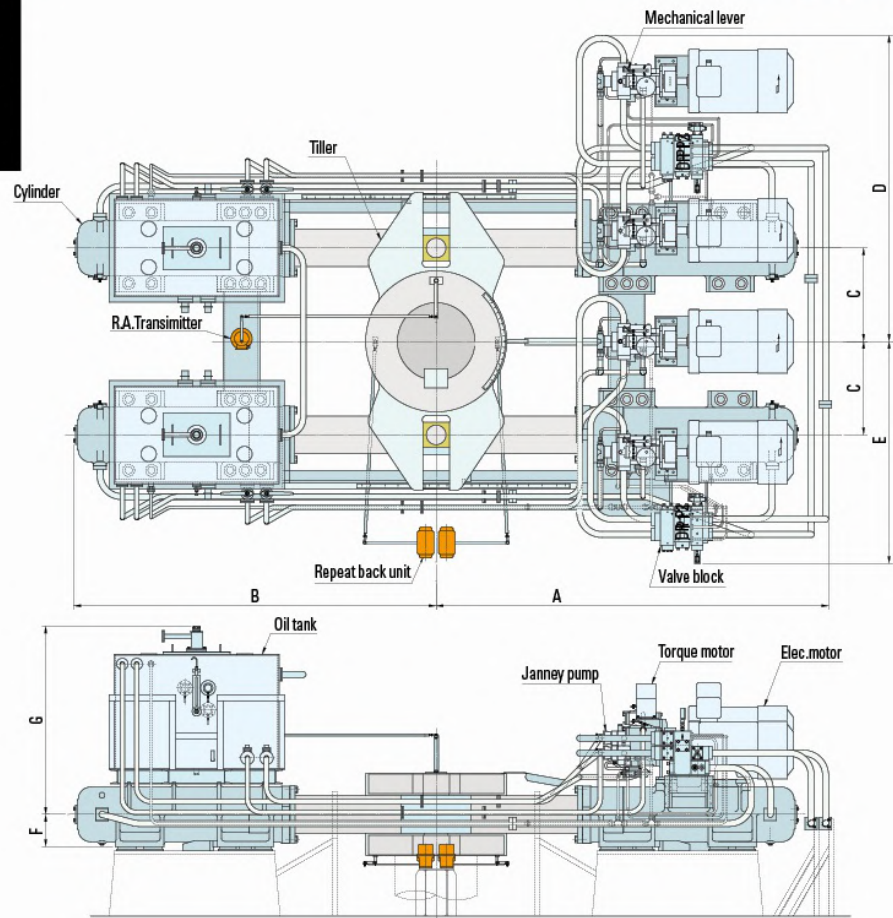
Specifications & Dimensions

Type				YDFT-400		YDFT-475		YDFT-530
	Torque at maximum working oil pressure	t-m		363	400	440	485	560
		kN-m		3560	3923	4315	4756	5492
	Rudder turning speed	deg/sec		65/28				
	Normal tiller radius	mm		900		940		970
	Diameter of ram	mm		315		335		355
	Maximum working oil pressure	kgf/cm ²		195	215	200	220	220
		Mpa		19.1	21.2	19.6	21.6	21.6
	Safety valve pressure (Design pressure)	kgf/cm ²		244	269	250	275	275
		Mpa		23.9	26.4	24.5	27	27
With main and stand-by pumps	Motor	Output x Number	kW	110 × 2	110 × 2	132 × 2	150 × 2	160 × 2
		Number of revolutions	rpm	1200				
	Pump Type x Number	Rating		25% - Continuous, 100% - 1 Hour, 200% - 60 sec				
				6V-FH2B-MK × 2				
Without stand-by pump	Motor	Output x Number	kW	50 × 2	55 × 2	63 × 2	75 × 2	75 × 2
		Number of revolutions	rpm	1200				
	Pump Type x Number	Rating		25% - Continuous, 100% - 1 Hour, 200% - 60 sec				
				3V-FH2B-MK × 2				
	Dimensions	mm	A	3176		3455		3595
			B	3155		3205		3255
			C	900		940		970
			D	1645		1685		1715
			E	2060		2110		2160
			F	260		275		285
			G	1695		1700		1710

Note : The above list is complied with rudder turning angle ± 35 deg, and electric source of 60Hz. Steering gear for special particulars are available with us under high workmanship design.

YDFT-TYPE (for 35 deg.)

Out of Scope of Supply



Specifications & Dimensions

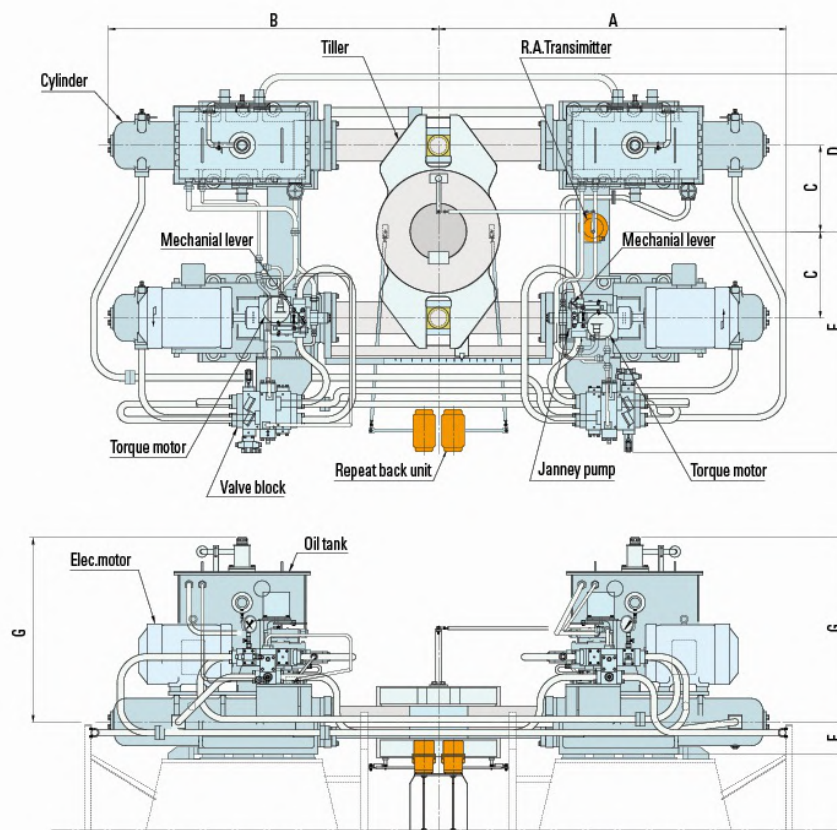
Type			YDFT-660	YDFT-760	YDFT-870	YDFT-1000		YDFT-1150	
	Torque at maximum working oil pressure	t-m	660	768	872	933	1000	1153	
		kN-m	6473	7532	8552	9150	9807	11307	
	Rudder turning speed	deg/sec	65/28						
	Normal tiller radius	mm	1050	1100	1130	1180		1240	
	Diameter of ram	mm	370	390	410	430		450	
	Maximum working oil pressure	kgf/cm ²	220	220	220	205	220	220	
		Mpa	21.6	21.6	21.6	20.1	21.6	21.6	
Safety valve pressure (Design pressure)	kgf/cm ²	275	275	275	256	275	275		
	Mpa	27	27	27.6	25.1	27	27		
With main and stand-by pumps	Motor	Output x Number	kW	90 × 4	110 × 4	125 × 4	132 × 4	150 × 4	
		Number of revelations	rpm	1200					
		Rating	25% - Continuous, 100% - 1 Hour, 200% - 60 sec						
	Pump Type x Number		3V-FH2B-MK × 4		6V-FH2B-MK × 4				
Without stand-by pump	Motor	Output x Number	kW	90 × 2	110 × 2	125 × 2	132 × 2	150 × 2	
		Number of revelations	rpm	1200					
		Rating	25% - Continuous, 100% - 1 Hour, 200% - 60 sec						
	Pump Type x Number		3V-FH2B-MK × 2		6V-FH2B-MK × 2				
Dimensions		mm	A	3767	3925	4142	4282	4443	
			B	3454	3612	3717	3857	4018	
			C	1050	1100	1130	1180	1240	
			D	3272	3553	3583	3633	3693	
			E	2397	2620	2650	2700	2760	
			F	325	335	345	355	370	
			G	2048	2098	2098	2098	2098	

Note : The above list is complied with rudder turning angle ± 35 deg, and electric source of 60Hz. Steering gear for special particulars are available with us under high workmanship design.



YDFT-TYPE (for 45 deg.)

Out of Scope of Supply



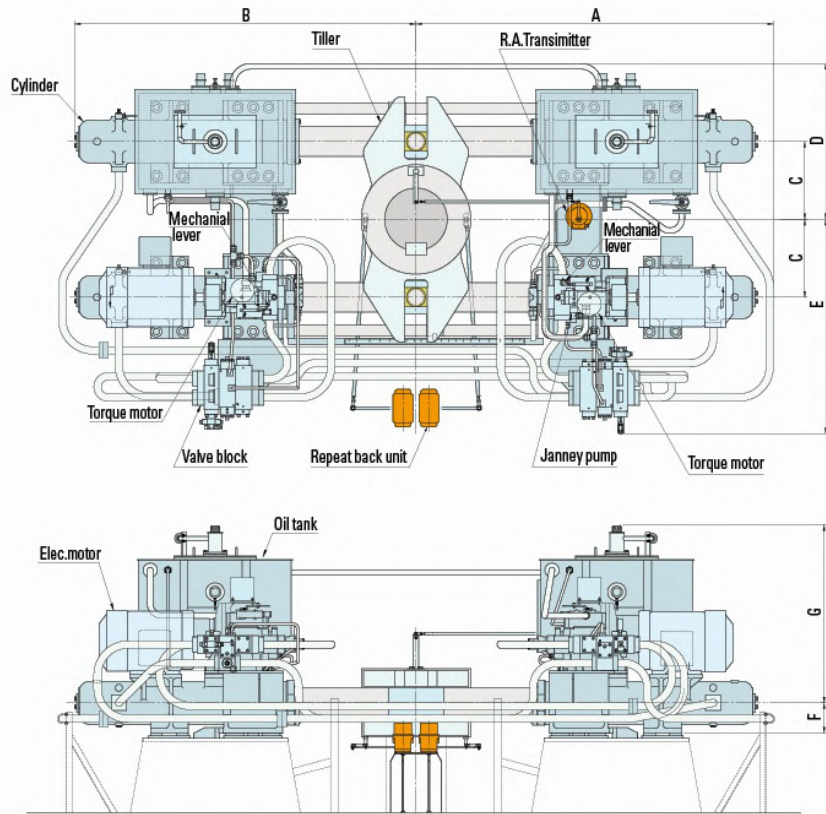
Specifications & Dimensions

Type				YDFT-60	YDFT-80	YDFT-125	YDFT-170
	Torque at maximum working oil pressure		t-m	44	65	94	127
			kN-m	431.5	637.5	922	1245.5
	Rudder turning speed		deg/sec	65/28			
	Normal tiller radius		mm	430	480	550	590
	Diameter of ram		mm	170	195	220	240
	Maximum working oil pressure		kgf/cm ²	170	170	170	180
			Mpa	16.7	16.7	16.7	17.7
	Safety valve pressure (Design pressure)		kgf/cm ²	213	213	213	225
			Mpa	20.9	20.9	20.9	22.1
With main and stand-by pumps	Motor	Output x Number	kW	15 × 2	18.5 × 2	30 × 2	37 × 2
		Number of revelations	rpm	1800			
		Rating	25% - Continuous, 100% - 1 Hour, 200% - 60 sec				
	Pump Type x Number			06V-FH2B-MK × 2			1V-FH2B-MK × 2
Dimensions		mm	A	2112	2286	2594	2708
			B	1964	2181	2441	2623
			C	430	480	550	590
			D	901	951	1091	1136
			E	1420	1470	1560	1600
			F	190	205	220	240
			G	1240	1250	1375	1390

Note : The above list is complied with rudder turning angle ± 45 deg, and electric source of 60Hz. Steering gear for special particulars are available with us under high workmanship design.

YDFT-TYPE (for 45 deg.)

Out of Scope of Supply



Specifications & Dimensions

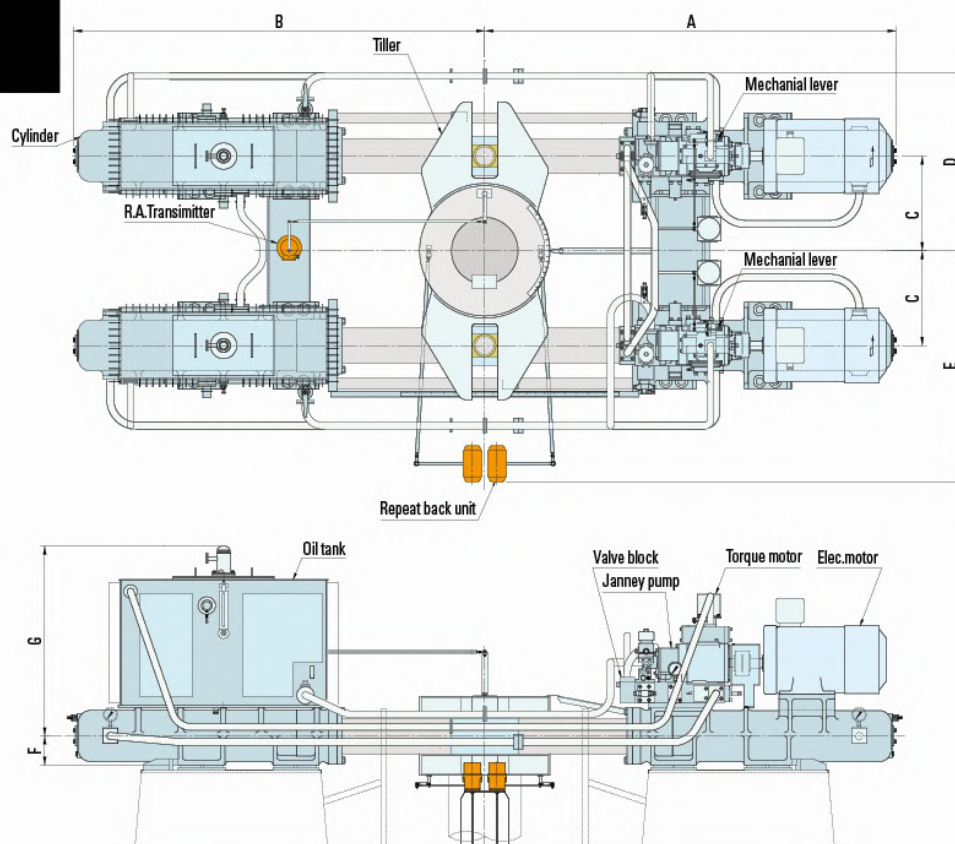
Type			YDFT-200	YDFT-250	YDFT-300	YDFT-335	
	Torque at maximum working oil pressure		t-m	172	207	244	295
			kN-m	1687	2030	2393	2893
	Rudder turning speed		deg/sec	65/28			
	Normal tiller radius		mm	660	680	720	785
	Diameter of ram		mm	250	270	285	300
	Maximum working oil pressure		kgf/cm ²	200	200	200	200
			Mpa	19.6	19.6	19.6	19.6
	Safety valve pressure (Design pressure)		kgf/cm ²	250	250	250	250
			Mpa	24.5	24.5	24.5	24.5
With main and stand-by pumps	Motor	Output x Number	kW	50 × 2	63 × 2	75 × 2	80 × 2
		Number of revelations	rpm	1200			
		Rating	25% - Continuous, 100% - 1 Hour, 200% - 60 sec				
	Pump Type x Number		3V-FH2B-MK × 2				
Dimensions		mm	A	3030	3150	3329	3556
			B	2883	3013	3187	3419
			C	660	680	720	785
			D	1322	1342	1382	1447
			E	1817	1837	1877	1942
			F	255	260	275	285
			G	1510	1530	1540	1550

Note : The above list is complied with rudder turning angle ± 45 deg, and electric source of 60Hz. Steering gear for special particulars are available with us under high workmanship design.



YDFT-TYPE (for 45 deg.)

Out of Scope of Supply



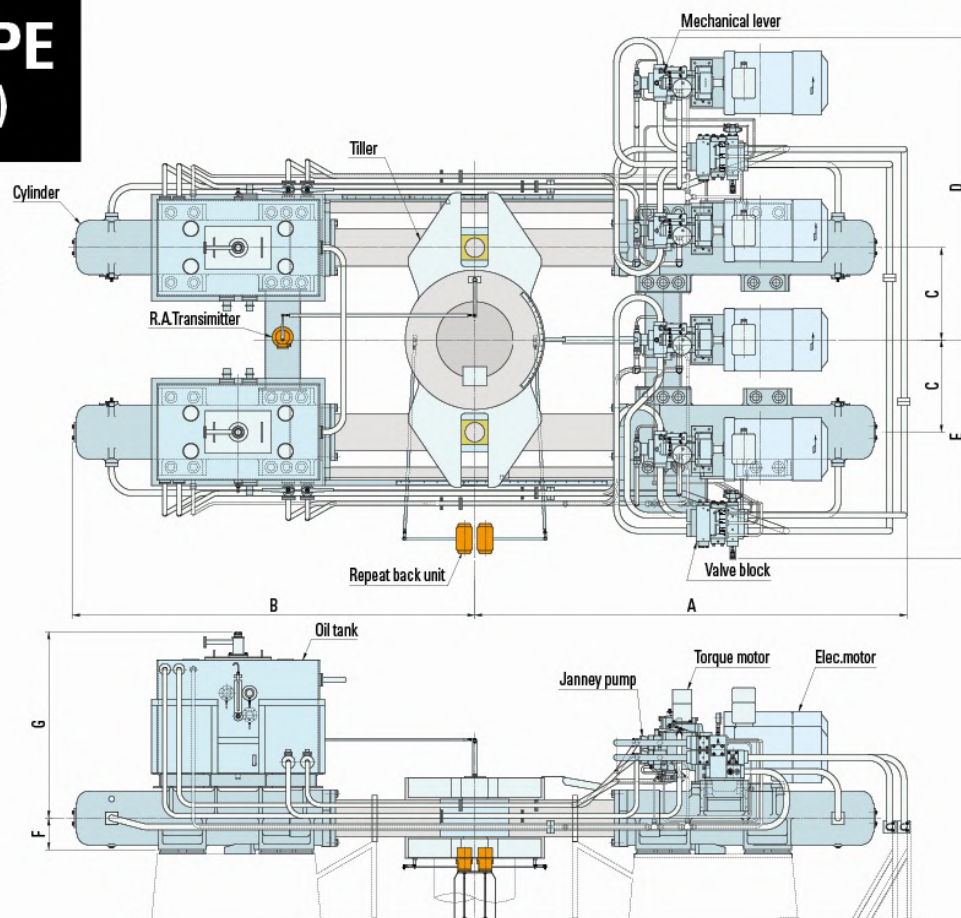
Specifications & Dimensions

Type			YDFT-400	YDFT-475	YDFT-530
	Torque at maximum working oil pressure	t-m	350	403	492
		kN-m	3432.5	3952	4825
	Rudder turning speed	deg/sec	65/28		
	Normal tiller radius	mm	845	860	890
	Diameter of ram	mm	315	335	355
	Maximum working oil pressure	kgf/cm ²	200	200	210
		Mpa	19.6	19.6	20.6
	Safety valve pressure (Design pressure)	kgf/cm ²	250	250	263
		Mpa	24.5	24.5	25.8
With main and stand-by pumps	Motor	Output x Number	110 × 2	125 × 2	150 × 2
		Number of revolutions	1200		
		Rating	25% - Continuous, 100% - 1 Hour, 200% - 60 sec		
	Pump Type x Number		6V-FH2B-MK × 2		
	Dimensions	mm	A	3669	3754
			B	3669	3764
			C	845	860
			D	1590	1605
			E	2060	2160
			F	260	275
			G	1695	1700

Note : The above list is complied with rudder turning angle ± 45 deg, and electric source of 60Hz. Steering gear for special particulars are available with us under high workmanship design.

YDFT-TYPE (for 45 deg.)

Out of Scope of Supply



Specifications & Dimensions

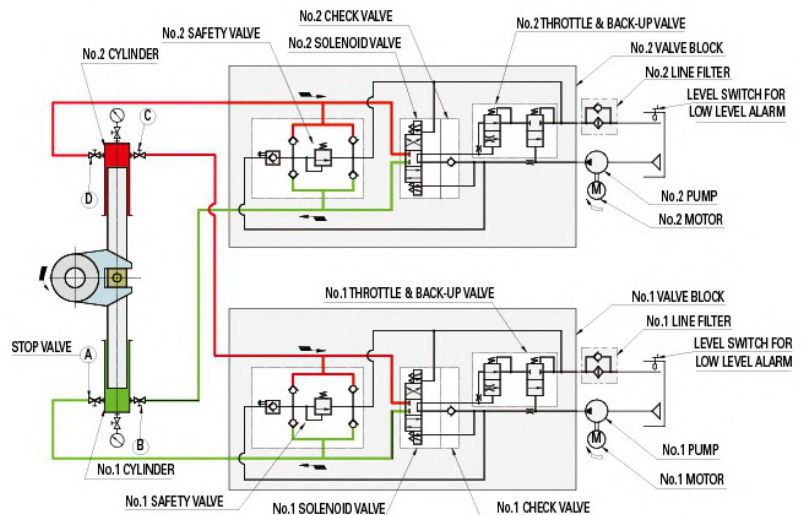
Type			YDFT-400	YDFT-475	YDFT-530	YDFT-660	YDFT-760	YDFT-870	YDFT-1000	
	Torque at maximum working oil pressure		t-m	350	403	492	560	650	751	860
			kN-m	3432.5	3952	4825	5492	6375	7365	8434
	Rudder turning speed		deg/sec	65/28						
	Normal tiller radius		mm	845	860	890	930	975	1020	1060
	Diameter of ram		mm	315	335	355	370	390	410	430
	Maximum working oil pressure		kgf/cm²	200	200	210	210	210	210	210
			Mpa	19.6	19.6	20.6	20.6	20.6	20.6	20.6
	Safety valve pressure (Design pressure)		kgf/cm²	250	250	263	263	263	263	263
Mpa			24.5	24.5	25.8	25.8	25.8	25.8	25.8	25.8
With main and stand-by pumps	Motor	Output x Number	kW	55 × 4	55 × 4	75 × 4	75 × 4	85 × 4	110 × 4	125 × 4
		Number of revelations	rpm	1200						
		Rating	25% - Continuous, 100% - 1 Hour, 200% - 60 sec							
	Pump Type x Number			3V-FH2B-MK x 4					6V-FH2B-MK x 4	
Dimensions		mm	A	4000	4095	4247	4390	4565	4853	5000
			B	3669	3764	3916	4067	4252	4424	4575
			C	845	860	890	930	975	1020	1060
			D	3037	3052	3082	3182	3227	3463	3503
			E	2162	2177	2207	2277	2322	2497	2537
			F	285	300	315	325	335	345	355
			G	2003	2018	2033	2048	2068	2088	2098

Note : The above list is complied with rudder turning angle ± 45 deg, and electric source of 60Hz. Steering gear for special particulars are available with us under high workmanship design.

Valve Control Type (C series)

YSFC

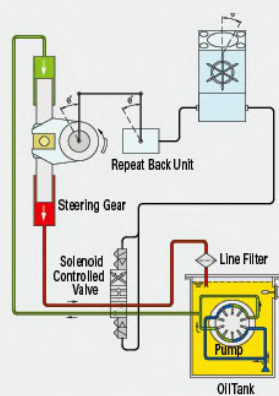
Hydraulic diagram



YSFC Type Electro-Hydraulic steering gears

SFC-type steering gears satisfy IMO regulations. They allow the source of any failure in pipes or a power unit to be easily isolated, so that steering capability can be rapidly regained. The rudder actuator is of the ram-cylinder type, and constant delivery hydraulic pumps are fitted. A single loop direct control system with solenoid valves ensures superior responsiveness and energy savings as well. An optional auto. isolation system is available for vessels such as oil tankers.

Mechanism of Solenoid Valve Control with Constant Delivery Pump



Auto-pilot comparison

Maker	SFC-Type
Tokyo Keiki Co., Ltd.	PR-8000-E
Yokogawa Denshikiki Co., Ltd.	PT-100-N2F, PT-200-N2F

Merits of YSFC type

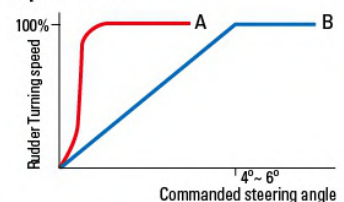
1. High Reliability and Durability

The ram cylinder type actuator and the simply designed vane type constant delivery pump are capable of withstanding high pressure, and will prove to be exceptionally durable.

2. Excellent Response

The solenoid valve control system enables the steering gear to respond more quickly to the steering command from steering stand than the mechanical link system hitherto employed, especially in fine rudder angle.

Response curve



3. Substantial Economic Advantage

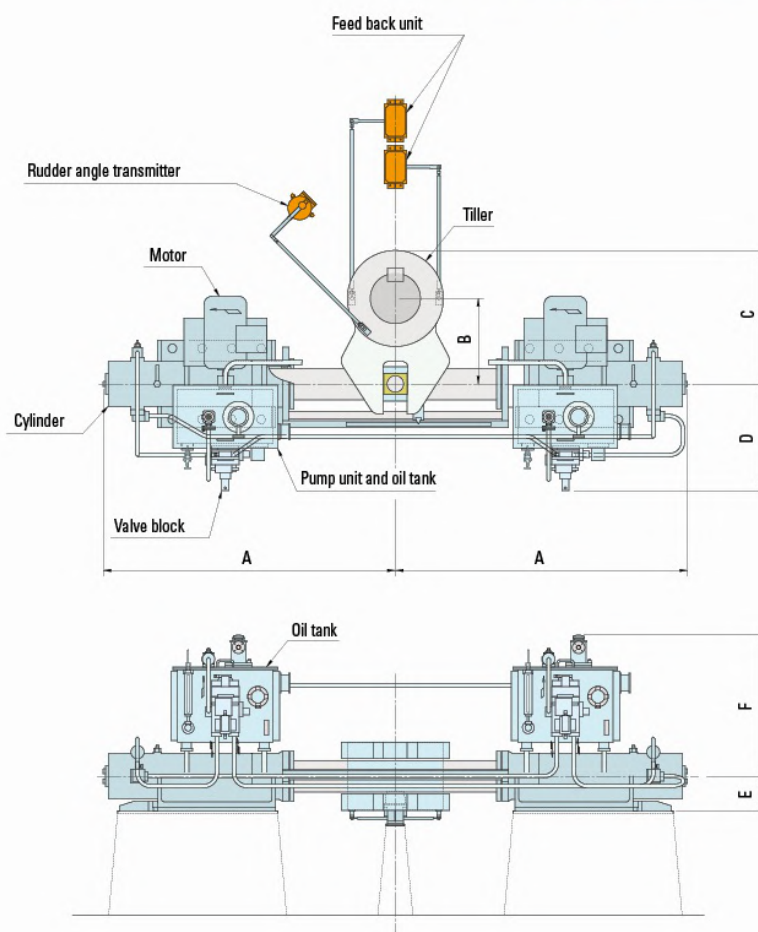
The use of direct control system with solenoid valves eliminates the need for such equipment as an auto-pilot power unit or hunting lever. The rudder limiter system satisfies IACS regulations. A timer relay (builder's furnish) may be installed in the starter motor circuit for a easy no-load start-up f

4. Simple Design and Compact configuration

All hydraulic equipment is installed on the oil tank, and external piping has minimized for a simple, compact configuration.

YSFC-TYPE

Out of Scope of Supply

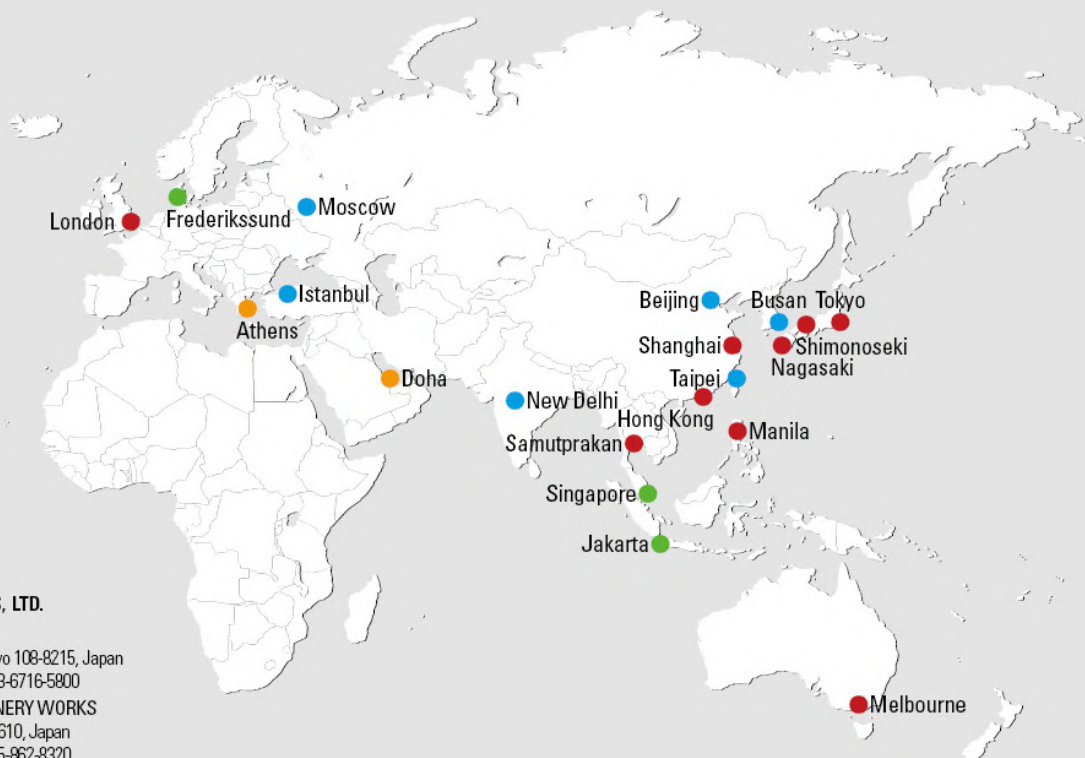


Specifications & Dimensions

Type		YSFC-20	YSFC-30	YSFC-40	YSFC-50	YSFC-60	YSFC-80	
Torque at maximum working oil pressure	t-m	23	32	45	53	63	72	86
	kN-m	226	314	441	520	618	706	844
Rudder turning speed	deg/sec	65/28						
Normal tiller radius	mm	430	470	520	560	580	650	
Diameter of ram	mm	155	170	195	205	220	240	
Maximum working pressure	kgf/cm ²	210	220	220	215	215	185	220
	Mpa	20.6	21.6	21.6	21.1	21.1	18.1	21.6
Safety valve pressure (Design pressure)	kgf/cm ²	263	275	275	269	269	232	275
	Mpa	25.8	27	27	26.4	26.4	22.7	27
Motor	Output	kW	7.5 × 2	11 × 2	15(7.5) × 2	18.5(11) × 2	22(11) × 2	25(11) × 2
	Number of revolutions	rpm	1,800					
	Rating		25% - Continuous, 100% - 1 Hour, 200% - 60 sec					
Pump Type x Number		T6C-005 × 2	T6C-006 × 2	T6C-010 × 2 (T6C-005 × 2)		T6C-014 × 2 (T6C-006 × 2)		T6C-017 × 2 (T6C-008 × 2)
Dimensions	mm	A	1520	1685	1845	1945	2020	2225
		B	430	470	520	560	580	650
		C	675	740	815	880	910	1015
		D	785	815	815	815	1000	1000
		E	175	190	205	215	220	240
		F	1020	1030	1040	1050	1200	1220

Note : The above list is complied with rudder turning angle ± 35 deg, and electric source of 60Hz. Steering gear for special particulars are available with us under high workmanship design.

Service Networks of Y00WON-Mitsubishi Electro-hydraulic Steering Gear



MITSUBISHI HEAVY INDUSTRIES, LTD.

HEAD OFFICE

16-5, Konan 2-chome, Minato-ku, Tokyo 108-8215, Japan
Phone : 81-3-6716-3111 Telefax : 81-3-6716-5800

NAGASAKI SHIPYARD & MACHINERY WORKS

1-1, Akunoura-machi, Nagasaki 850-8610, Japan
Phone : 81-95-828-412 Telefax : 81-95-862-8320

SERVICE CENTER

MHI MARINE ENGINEERING, LTD. (Overseas)

Tokyo Overseas Division & Engineering Dept. 34-6,
Shiba 5-chome, Minato-ku, Tokyo 108-0014, Japan
Phone : 81-3-3798-5941 Telefax : 81-3-3798-5943

SAMAYU CO., LTD. (Domestic)

6-58, Chofu-Ohgi-machi, Shimonoseki-city, 752-0927, Japan
Phone : 81-832-48-3411 Telefax : 81-832-48-2771

OVERSEAS OFFICES

BEIJING LIAISON OFFICE

Phone : 86-10-6505-4321 Telefax : 86-10-6505-1222

JAKARTA LIAISON OFFICE

Phone : 62-21-515-3221 Telefax : 62-21-515-3219

TAIPEI LIAISON OFFICE

Phone : 10-886-2-2700-3466 Telefax : 10-886-2-2700-3499

NEW DELHI LIAISON OFFICE

Phone : 011-5102-1234 Telefax : 011-5102-5150

OVERSEAS REPRESENTATIVES

SOUTH AMERICA REPRESENTATIVE

Phone : 55-11-3884-8011 Telefax : 55-11-3885-9040

MOSCOW REPRESENTATIVE

Phone : 7-095-937-8435 Telefax : 7-095-937-8433

ISTANBUL REPRESENTATIVE

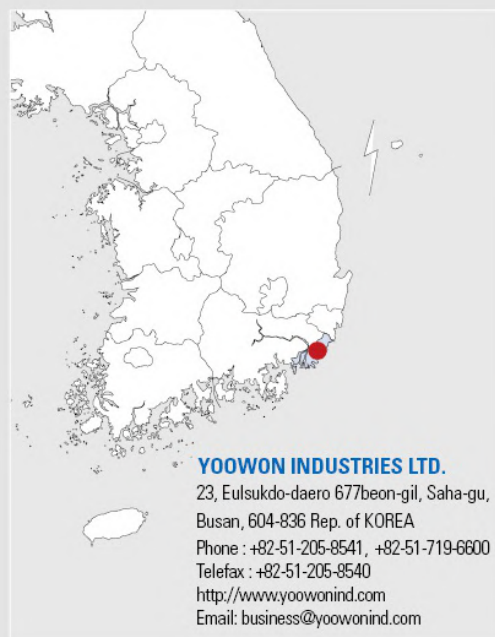
Phone : 90-212-279-2535 Telefax : 90-212-279-2603

BUSAN REPRESENTATIVE

Phone : 82-51-442-0801 Telefax : 82-51-462-7317

HO CHI MINH CITY REPRESENTATIVE

Phone : 84-8-8243279 Telefax : 84-8-8242874



OVERSEAS SUBSIDIARY COMPANYS

MITSUBISHI HEAVY INDUSTRIES AMERICA, INC. (MHIA)
 Headquarters_Phone : 1-212-969-9000 Telefax : 1-212-262-3301
 Los Angeles Office_Phone : 1-949-856-8500 Telefax : 1-949-856-4469
 Houston Office_phone : 1-713-652-9224 Telefax : 1-713-652-9305

MITSUBISHI HEAVY INDUSTRIES EUROPE, LTD. (MHIE)
 Phone : 44-20-7842-8100 Telefax : 44-20-7842-8101

MITSUBISHI HEAVY INDUSTRIES, (HONG KONG) LTD. (MHIH)
 Phone : 852-2525-5202 Telefax : 852-2868-1469

MITSUBISHI HEAVY INDUSTRIES(THAILAND) LTD. (MHIT)
 Phone : 66-2-751-9800 Telefax : 66-2-751-9801

MITSUBISHI HEAVY INDUSTRIES PHILIPPINES INC. (MHIP)
 Phone : 63-2-889-3500 Telefax : 63-2-889-3491

MITSUBISHI HEAVY INDUSTRIES AUSTRALIA, PTY. LTD. (MHIAU)
 Phone : 61-3-9670-9799 Telefax : 61-3-9670-4197

MITSUBISHI HEAVY INDUSTRIES(SHANGHAI) CO., LTD. (MHISHI)
 Phone : 86-21-6841-3080 Telefax : 86-21-6841-5222

MITSUBISHI HEAVY INDUSTRIES DE MEXICO, S.A. DE C.V. (MHIMEX)
 Phone : 52-55-5511-4193 Telefax : 52-55-5511-3425

COLLABORATION COMPANYS FOR REPAIR

TURBO MARINE (Denmark)
 Phone : 45-4738-6501 Telefax : 45-4738-6501

KINOSHITA MARINE SERVICES (Singapore)
 Phone : 65-6383-0268 Telefax : 65-6383-0610

DAIKI (Singapore)
 Phone : 65-6863-2856 Telefax : 65-6863-2876

FUJI TRADING (America), INC.
 Phone : 1-757-873-4110 Telefax : 1-757-873-4123

COLLABORATION COMPANYS

Singapore Branch
 Phone : 65-338-1100 Telefax : 65-338-6685

Doha Office
 Phone : 974-621710 Telefax : 974-621394

Mitsubishi Hellas (Greece)
 Phone : 30-1-32-48115 Telefax : 30-1-324-8586



No.1 & No.2 Factory



No.3 Factory



유원산업주식회사
YOOWON INDUSTRIES LTD.

Head Office and Factory

23, Eulsukdo-daero 677beon-gil, Saha-gu, Busan,
604-836 Rep. of KOREA
TEL : +82-51-205-8541, +82-51-719-6600
FAX : +82-51-205-8540
<http://www.yoowonind.com>
Email: business@yoowonind.com

YOOWON'S PRODUCTS

- Piston type steering gear
- Rapson slide ram steering gear
- Rotary vane type steering gear
- Deck machinery
- Auto filter & fine filter