

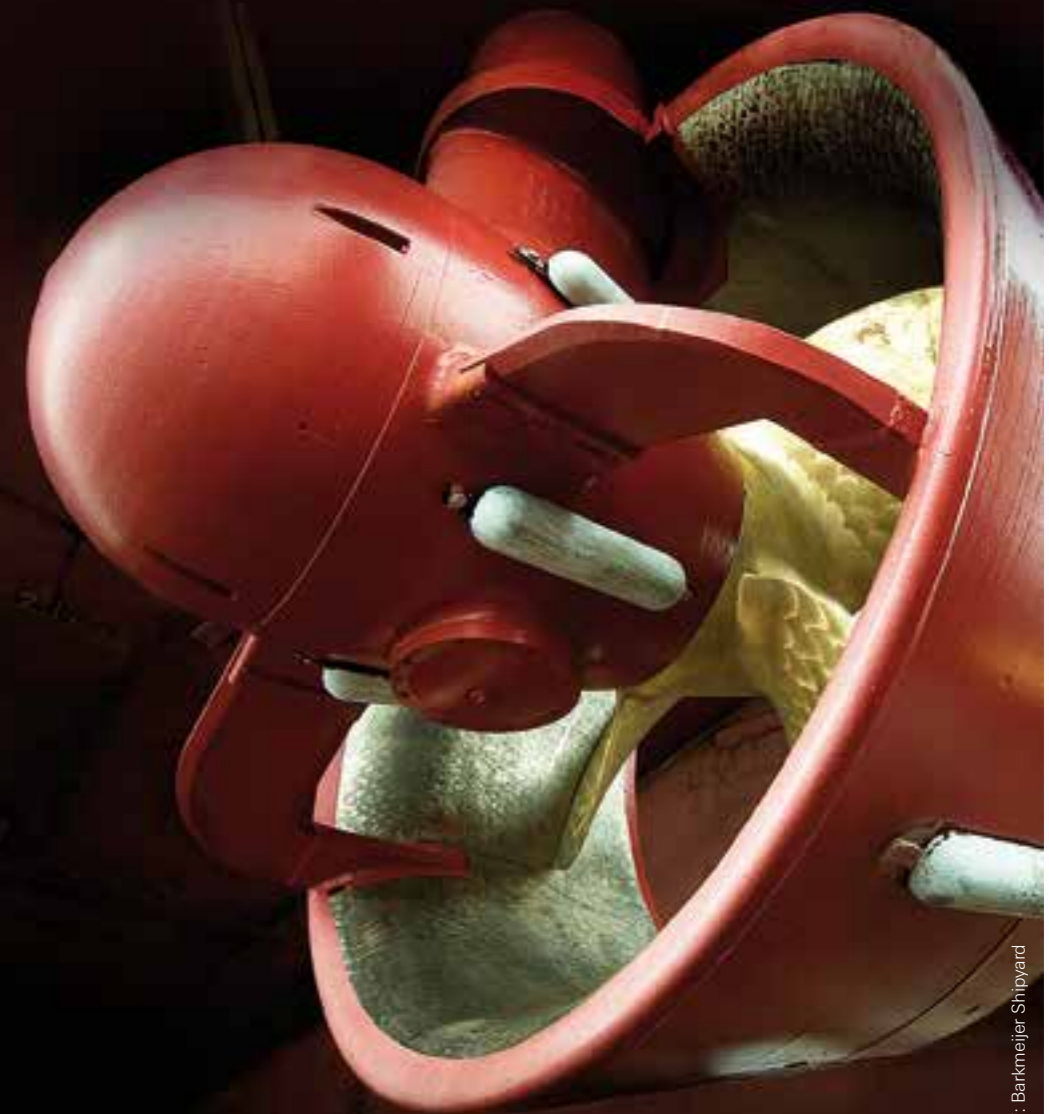
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August 2014



MOTION AND MOBILITY

COMMERCIAL CRAFT THRUSTER SYSTEMS



MARINE PROPULSION SYSTEMS
AUGUST 2014

Courtesy of: Barkmeijer Shipyard





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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 inputshaft



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.
Consult ZF Marine Krimpen's technical staff to determine applicable power for each specific use.

WELL MOUNTED AZIMUTH THRUSTERS

L-DRIVE Vertical inputshaft



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.
Consult ZF Marine Krimpen's technical staff to determine applicable power for each specific use.

CONTRA ROTATION AZIMUTH THRUSTERS

Z-DRIVE & L-DRIVE



MODEL	Max. power*		Propeller dia. pulling prop.		Propeller dia. pushing prop.	
	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.
Consult ZF Marine Krimpen's technical staff to determine applicable power for each specific use.

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 inputshaft



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	1150	45	1100	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	2100	83	2050	81

* Rating subject to classification and application.
Mentioned data for indication purposes only.
Consult ZF Marine Krimpen's technical staff to determine applicable power for each specific use.

RETRACTABLE AZIMUTH THRUSTERS

Z-DRIVE Horizontal inputshaft



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.
Consult ZF Marine Krimpen's technical staff to determine applicable power for each specific use.

RETRACTABLE AZIMUTH THRUSTERS

L-DRIVE Vertical inputshaft



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.
Consult ZF Marine Krimpen's technical staff to determine applicable power for each specific use.

FIXED PITCH TUNNEL THRUSTERS

Z-DRIVE Horizontal inputshaft



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 3000 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.
Consult ZF Marine Krimpen's technical staff to determine applicable power for each specific use.

FIXED PITCH TUNNEL THRUSTERS & CONTROLLABLE PITCH TUNNEL THRUSTERS

L-DRIVE Vertical inputshaft



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 3000 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 CP	500	670	1350	53	1425	56	16	0,6	1500	59
ZF TT 5000 CP	850	1139	1650	65	1730	68	18	0,7	2000	79

* Rating subject to classification and application.
Mentioned data for indication purposes only.
Consult ZF Marine Krimpen's technical staff to determine applicable power for each specific use.

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

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Mentioned data for indication purposes only.
Consult ZF Marine Krimpen's technical staff to determine applicable power for each specific use.

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

on 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.

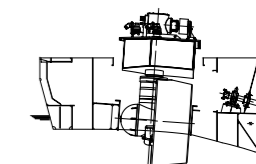
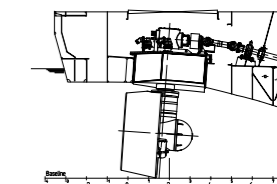
WELL MOUNTED FROM TOP

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.

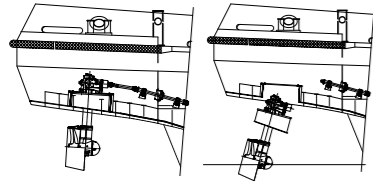


THRUSTER MOUNTING CONFIGURATIONS

WELL MOUNTED FROM BOTTOM

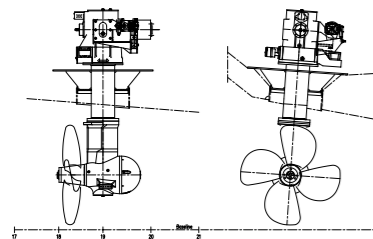
Well mounted bottom removal

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

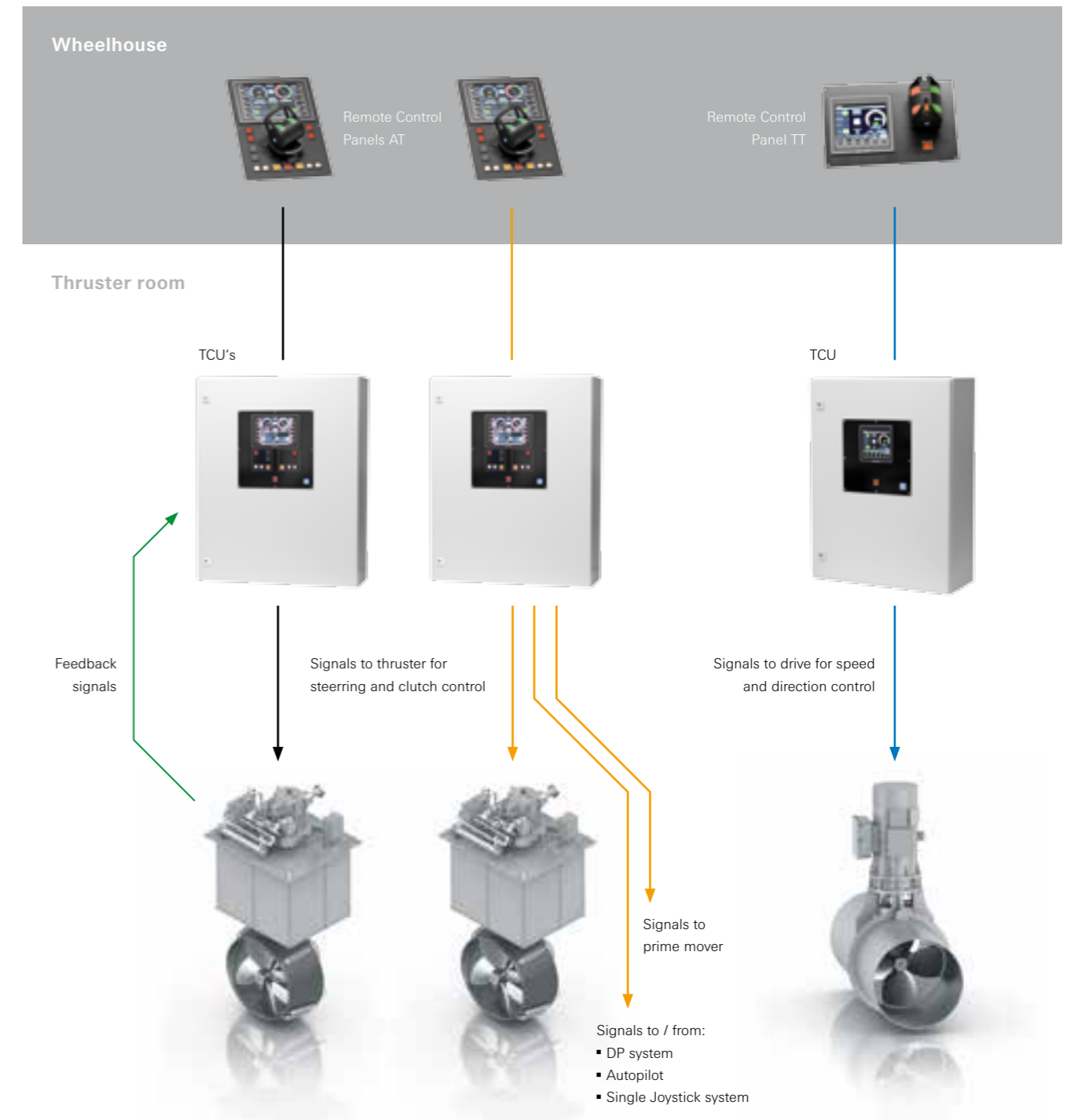


Standard control system consists of a Thruster Control Unit (TCU), which is to be placed in the immediate vicinity of the thruster, and one remote control panel on the bridge. Optionally a number of additional remote control panels can be connected.

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.



REFERENCES

WELL MOUNTED
AZIMUTH THRUSTERS

CONTRA ROTATION
AZIMUTH THRUSTERS

RETRACTABLE
AZIMUTH THRUSTERS

DECK MOUNTED
AZIMUTH THRUSTERS

TUNNEL THRUSTERS

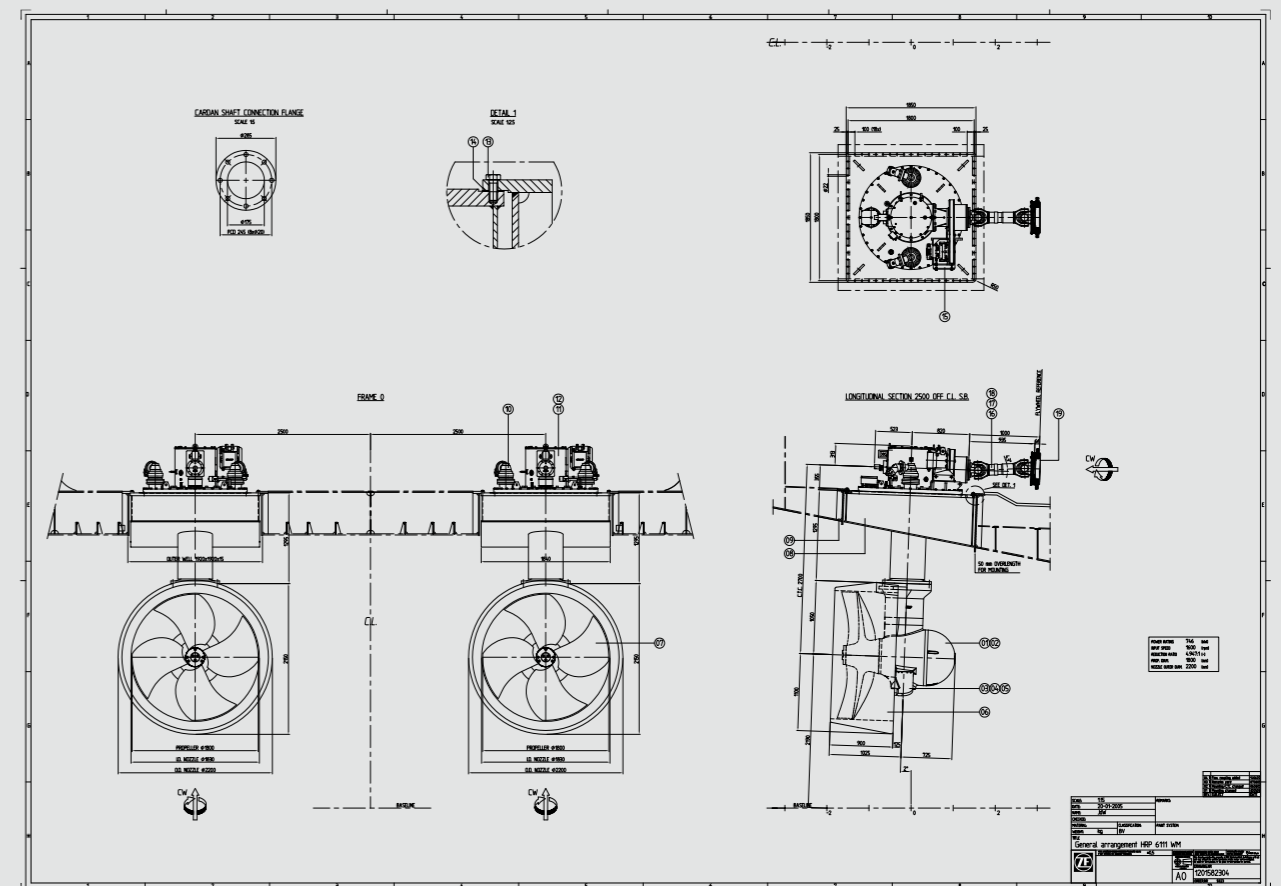
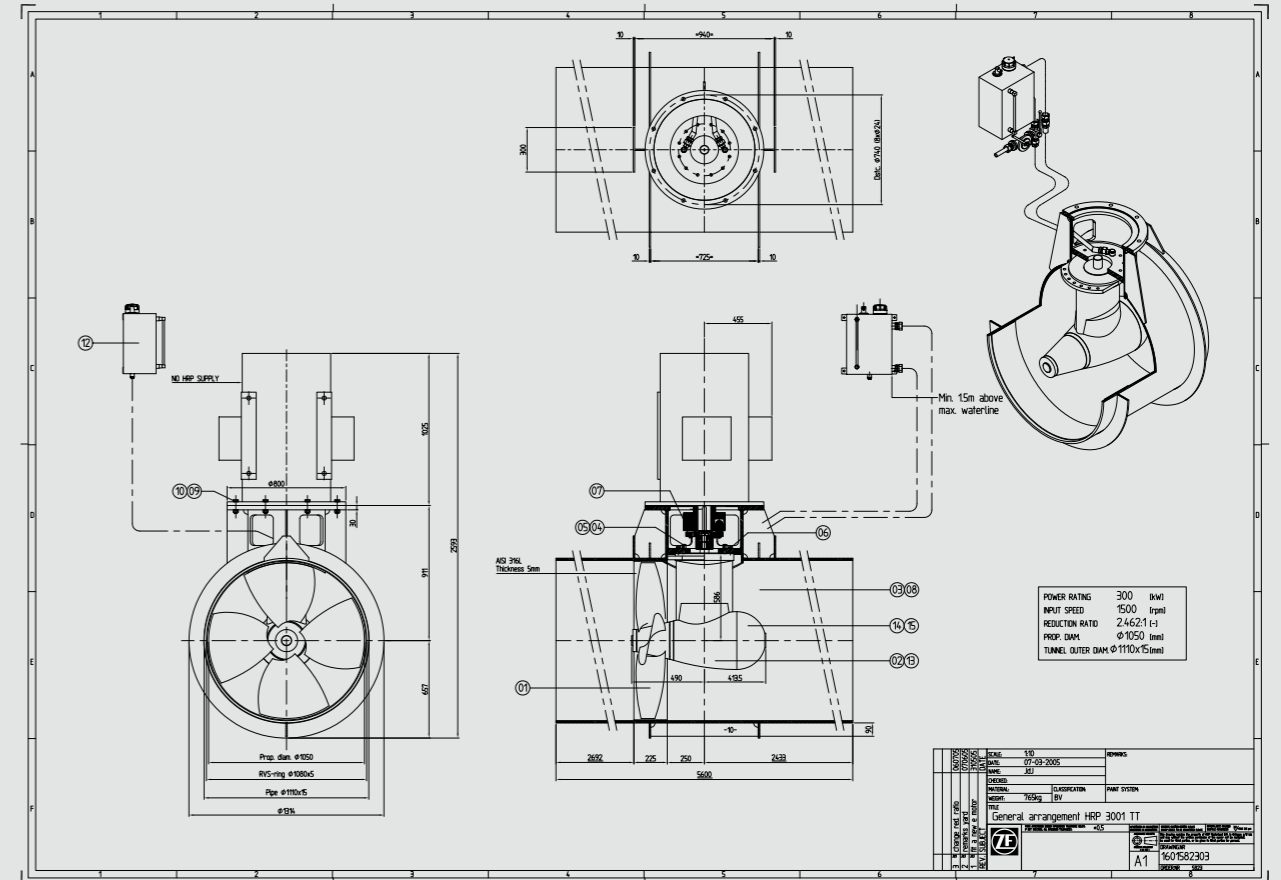
SHALLOW DRAUGHT
THRUSTERS

2880T HEAVY FUEL TANKER "NORDEN" – SWEDEN



Length o.a. : 79.95 m
Breadth : 13.40 m
Draught : 5.00 m
ZF-Reference : 5823
Model : ZF AT 6000 WM-FP / ZF TT 3000 FP
Rated power : 746 kW at 1600 rpm / 300 kW at 1500 rpm
Shipyard : Bodewes Shipyards – the Netherlands
Owner : OljOla AB – Sweden

Equipped with two (2) ZF AT 6111 well mounted azimuth thrusters and one (1) ZT TT 3001 electric driven tunnel thruster.

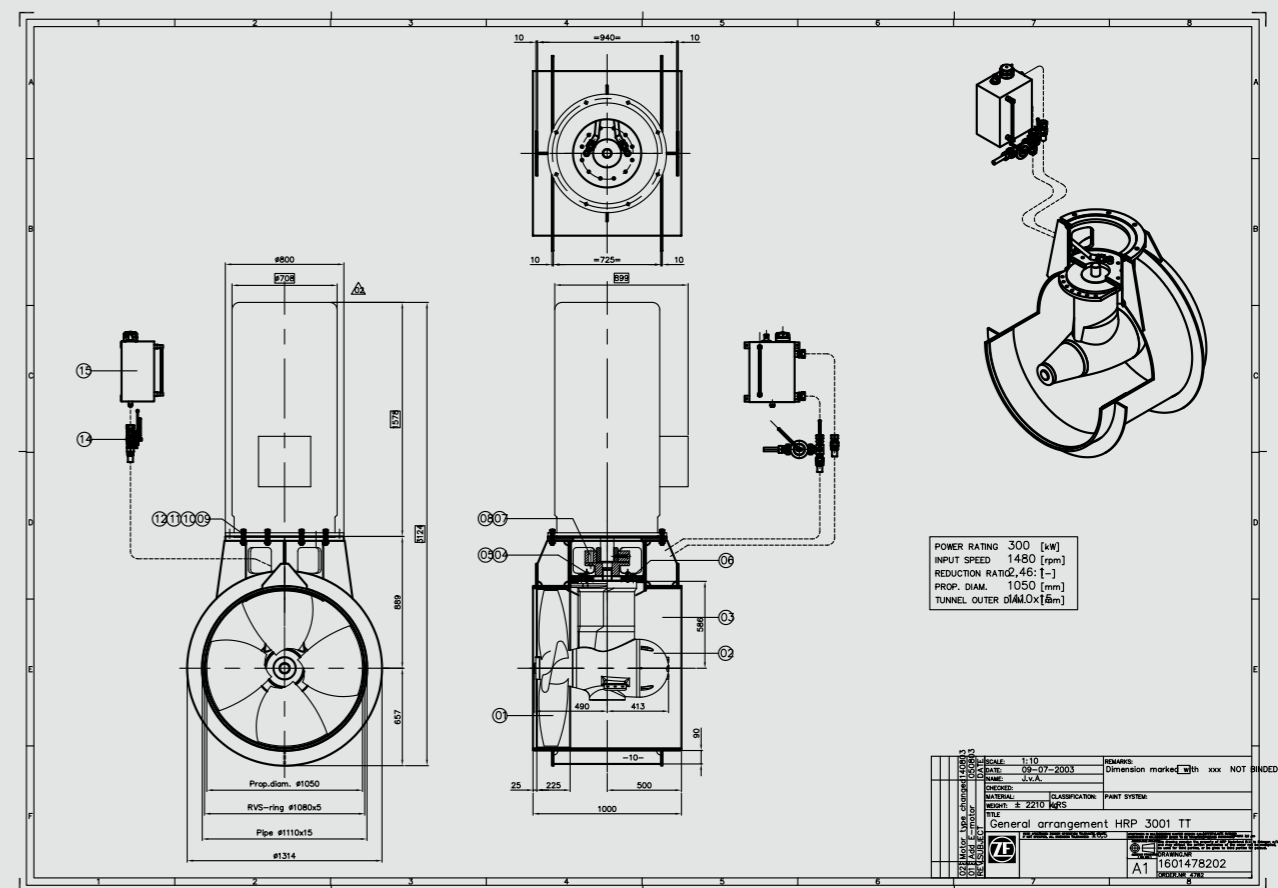
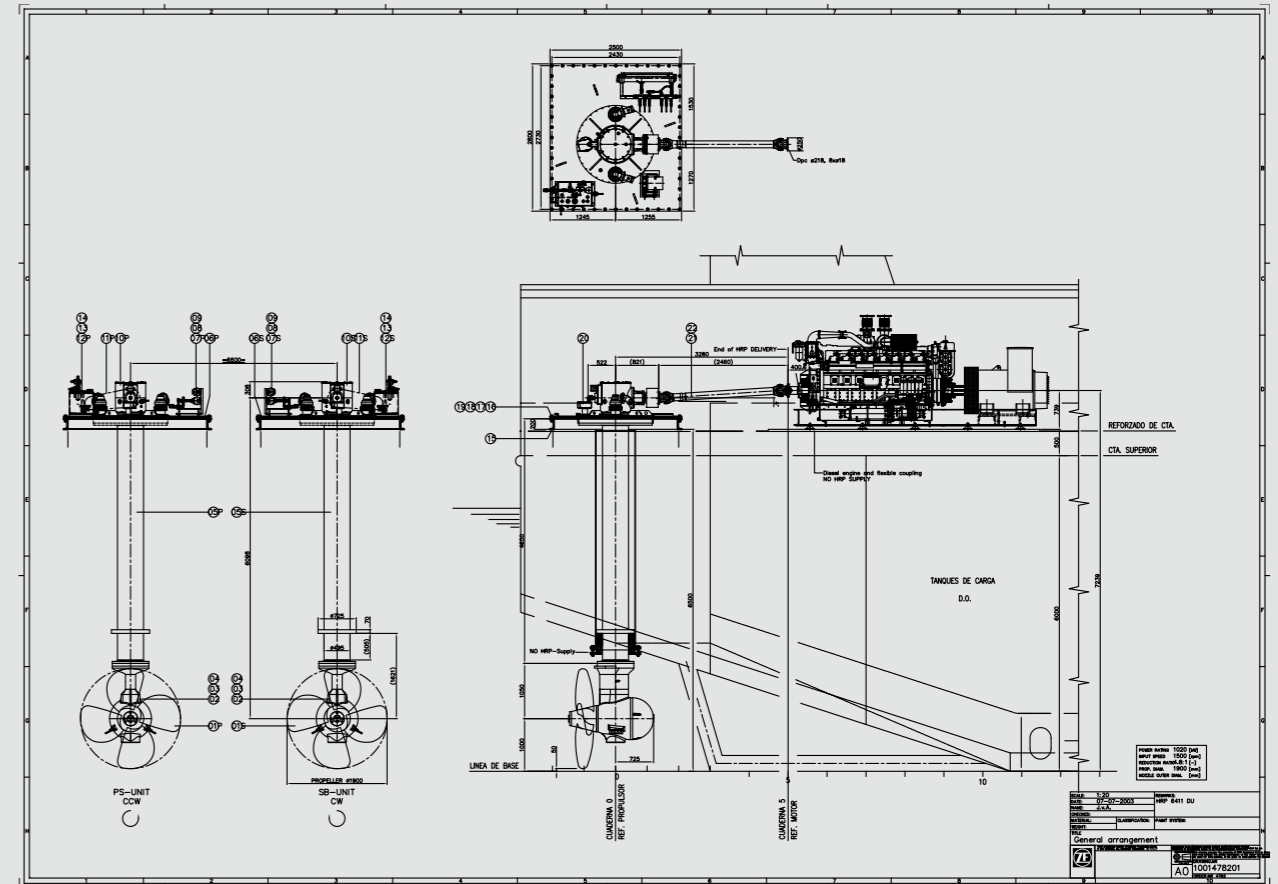


3000 M3 TANKER VESSEL "BARNOIL" – SPAIN



Length o.a. : 66.00 m
 Breadth : 15.00 m
 Draught : 5.00 m
 ZF-Reference : 4782
 Model : ZF AT 6000 WM-FP / ZF TT 3000 FP
 Rated power : 1020 kW at 1500 rpm / 300 kW at 1500 rpm
 Supplied to : Astilleros Zamakona – Spain

Equipped with two (2) ZF AT 6411 well mounted azimuth thrusters and one (1) ZF TT 3001 electric driven tunnel thruster.

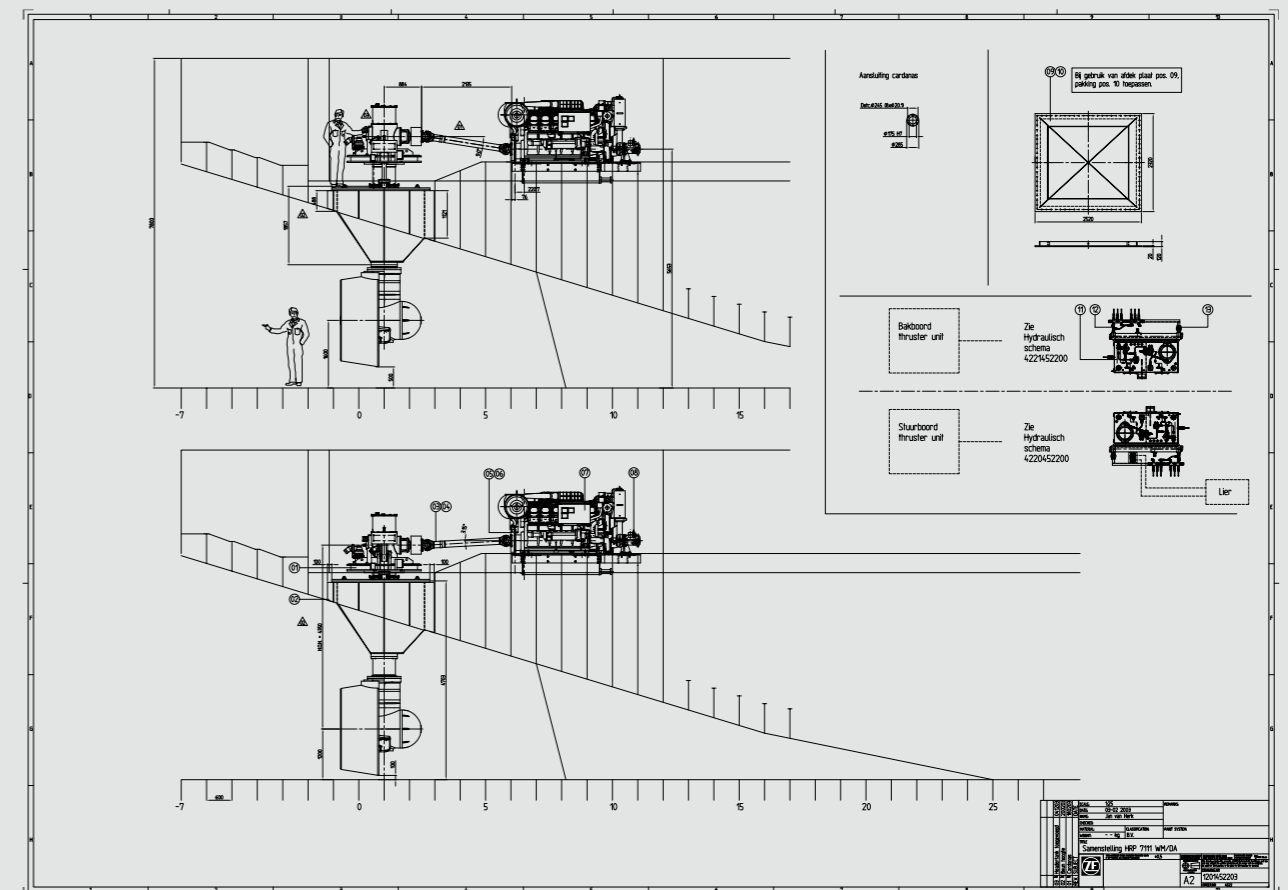
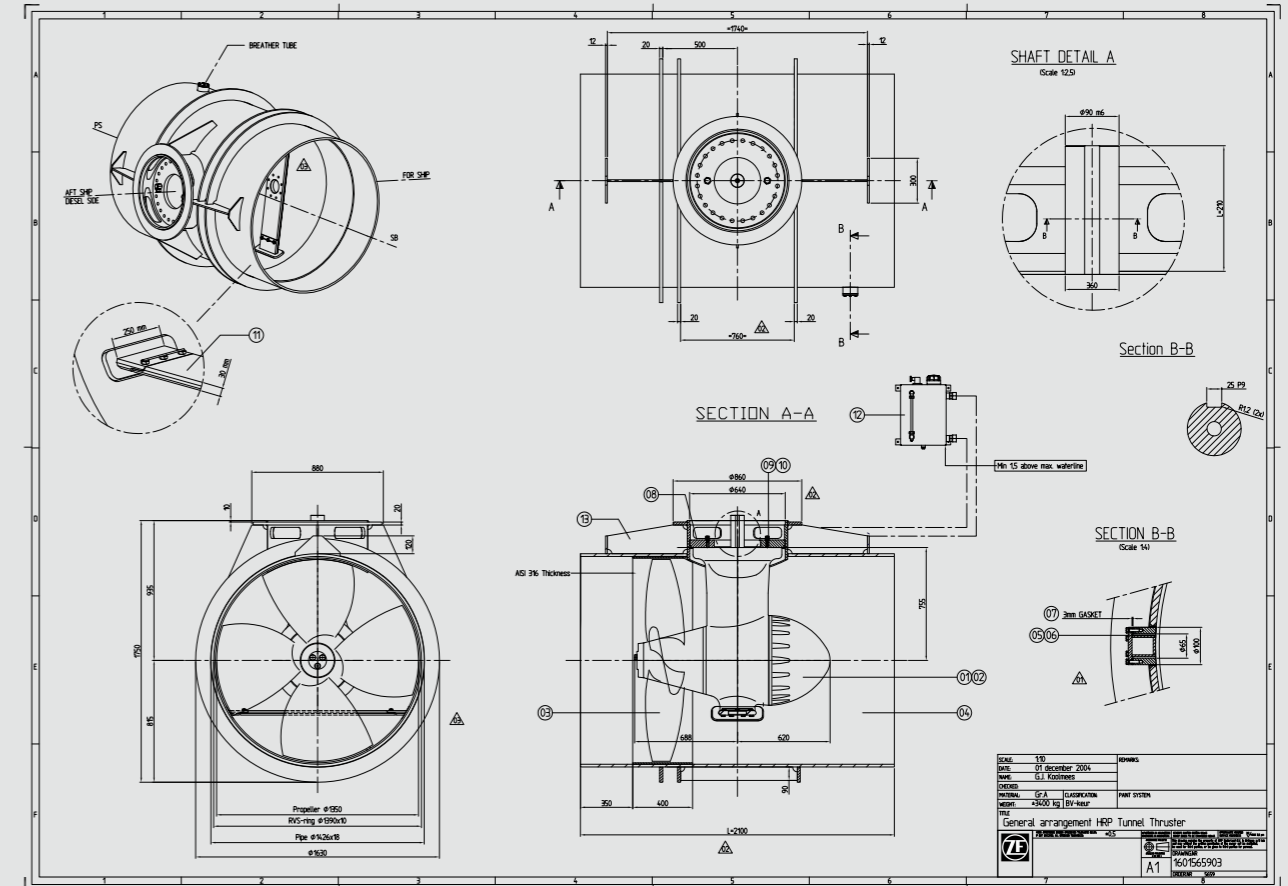


SUCTION HOPPER DREDGER "HEIN" – NETHERLANDS



Length o.a. : 100.22 m
Breadth : 15.54 m
Draught : 5.00 m
ZF-Reference : 4522
Model : ZF AT 7000 WM-FP (main propulsion) / ZF TT 5000 FP
Rated power : 1250 kW at 1800 rpm / 550 kW at 1225 rpm
Supplied to : Remontowa Shipyard – Poland
Owner : Van der Kamp B.V. – Netherlands

Equipped with two (2) ZF AT 7111 well mounted depth adjustable azimuth thrusters and one (1) ZF TT 5000 tunnel thruster complete with one (1) ZF Multi-Thruster Control System.

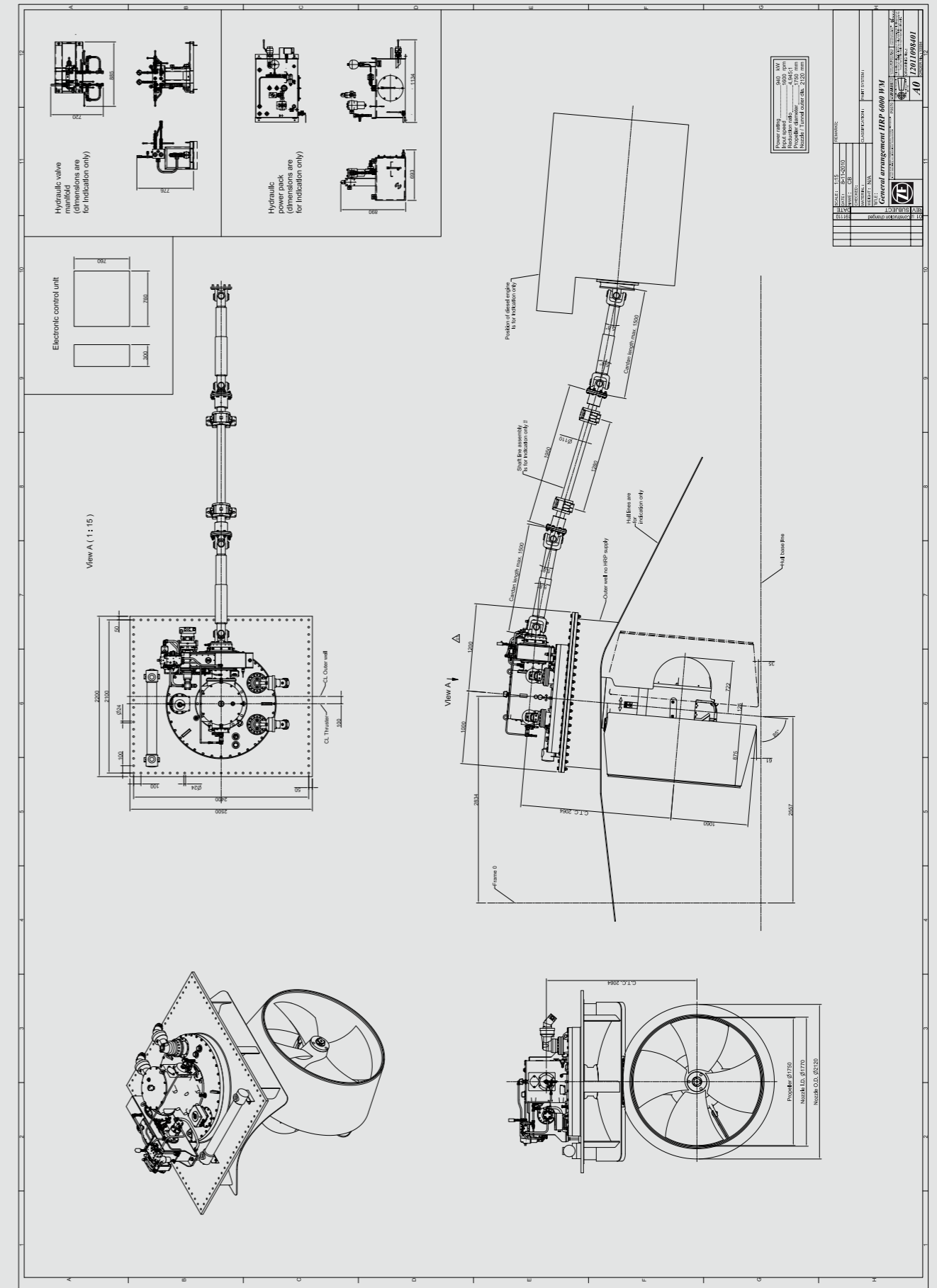


MULTI-PURPOSE SUPPORT VESSEL "ZWERVER III" – NETHERLANDS



Length o.a. : 35.10 m
Breadth : 15.00 m
Draught : 2.60 m
ZF-Reference : 10983 / 10984
Model : ZF AT 6000 WM-FP / ZF TT 3000 FP
Rated power : 940 kW at 1600 rpm / 220 kW at 1500 rpm
Supplied to : Shipyard Kooiman – Netherlands
Owner : HvS Dredging Support – Netherlands

Equipped with one (1) ZF AT 6311 well mounted azimuth thruster and two (2) ZF TT 3001 hydraulic driven tunnel thrusters.

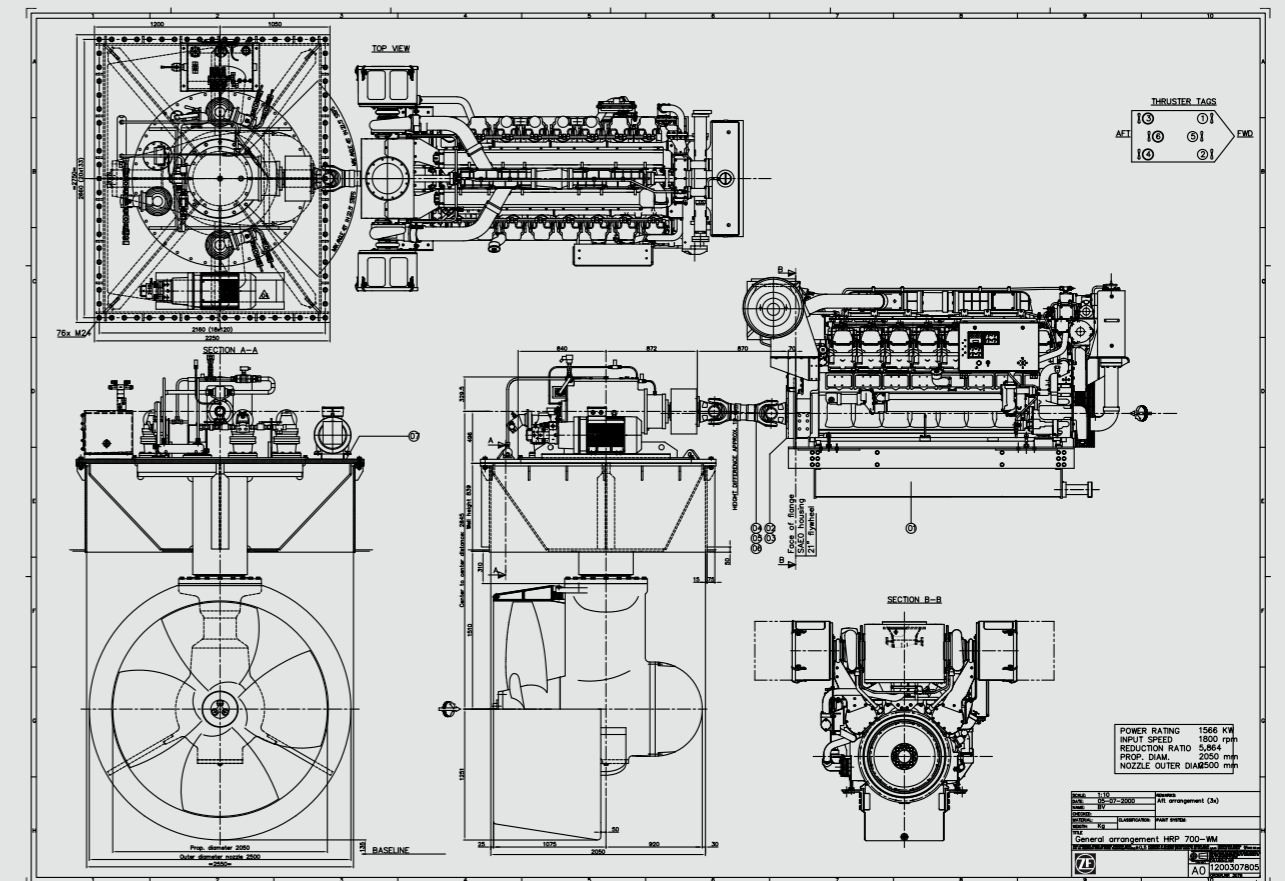
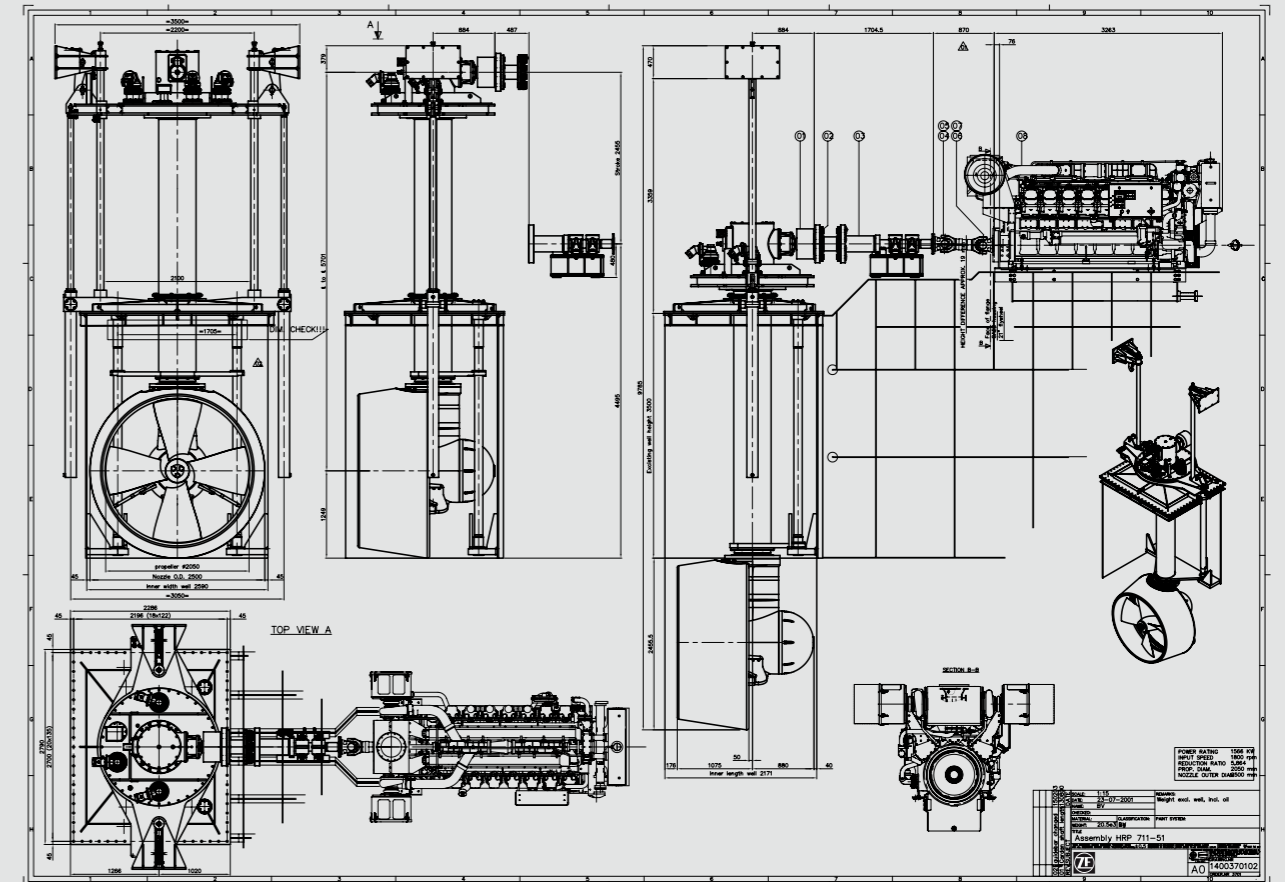


PIPE LAYING VESSEL "C MASTER" (EX JASCON 5) – NIGERIA



Length o.a. : 140.00 m
Breadth : 40.60 m
Draught : 5.80 m
ZF-Reference : 3701 / 3078
Model : HRP 700
Rated power : 1566 kW at 1800 rpm
Supplied to : Sembawang Shipyard – Singapore
Owner : Kito Enterprises – UAE

Equipped with three (3) HRP 711 well mounted azimuth thrusters (aft) and two (2) HRP 711 retractable azimuth thrusters (midship) and three (3) HRP 711 well mounted azimuth thrusters (fore).

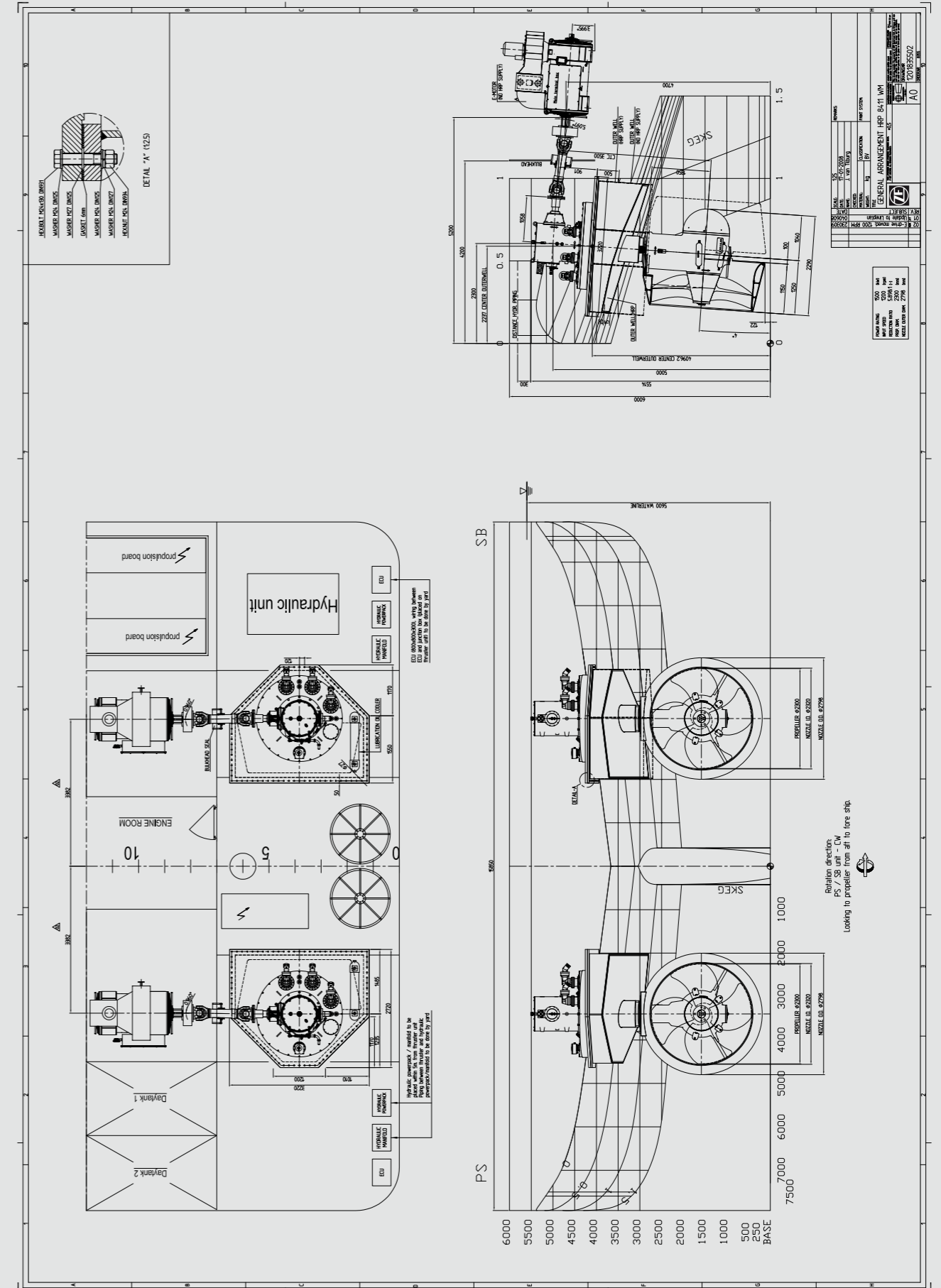


2300 M3 TRAILING SUCTION HOPPER DREDGER "UKD ORCA" – UK



Length o.a. : 78.00 m
Breadth : 15.85 m
Draught : 4.50 m
ZF-Reference : 8355
Model : ZF AT 8000 WM-FP / ZF TT 5000 FP
Rated power : 1500 kW at 1200 rpm / 500 kW at 1500 rpm
Supplied to : Barkmeijer – Netherlands
Owner : UK Dredging – UK

Equipped with two (2) ZF AT 8411 well mounted azimuth thrusters and one (1) ZF TT 5003 electric driven tunnel thruster.

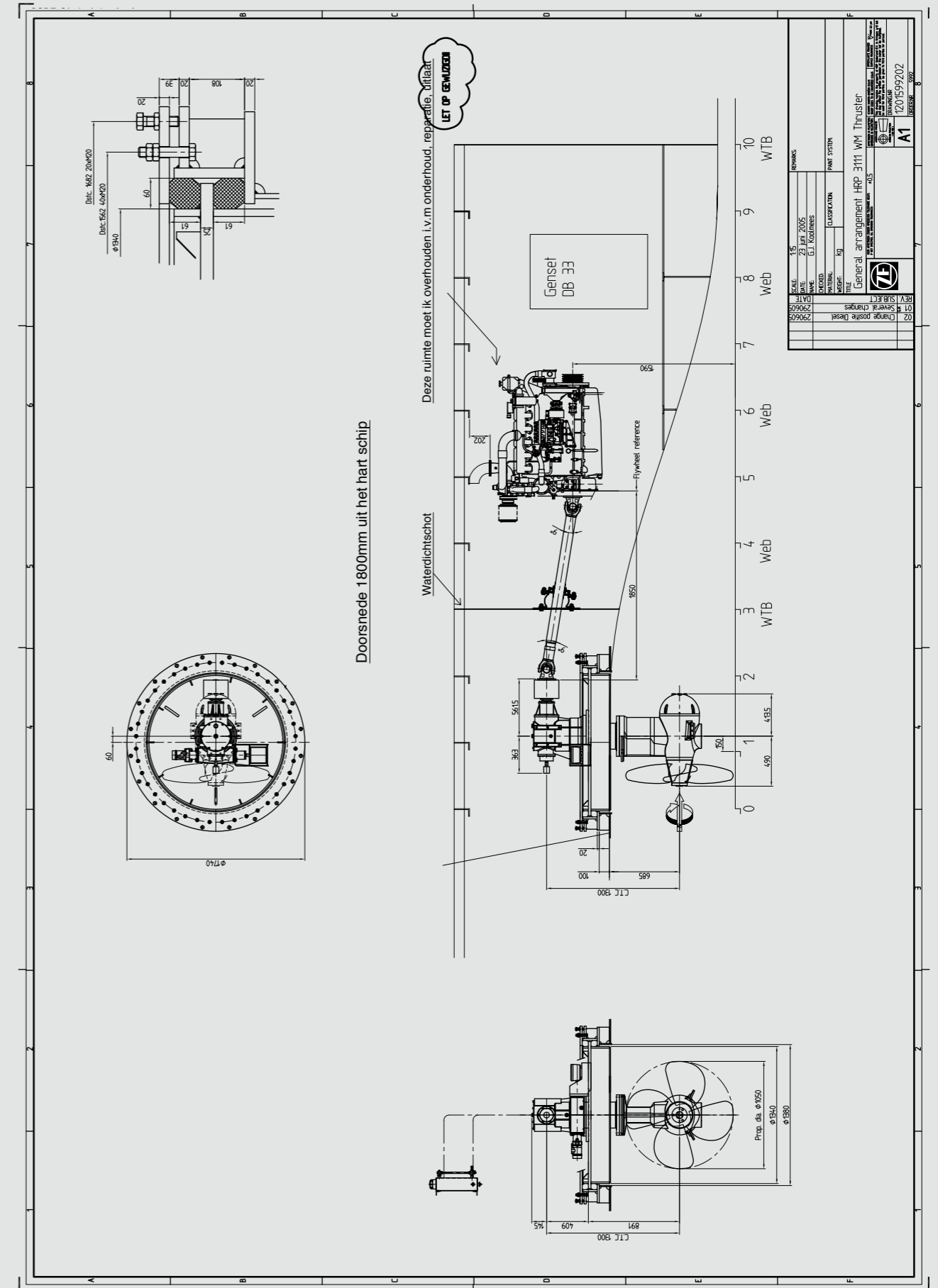


THAMES PASSENGER VESSEL "MERCURIA" – UK



Length o.a. : 35.00 m
Breadth : 7.25 m
Draught : 1.40 m
ZF-Reference : 5992
Model : ZF AT 3000 WM-FP
Rated power : 184 kW at 1800 rpm
Supplied to : Tinnemans B.V. – Netherlands
Owner : Westminster Party boats – UK

Equipped with two (2) ZF AT 3111
 well mounted azimuth thrusters.

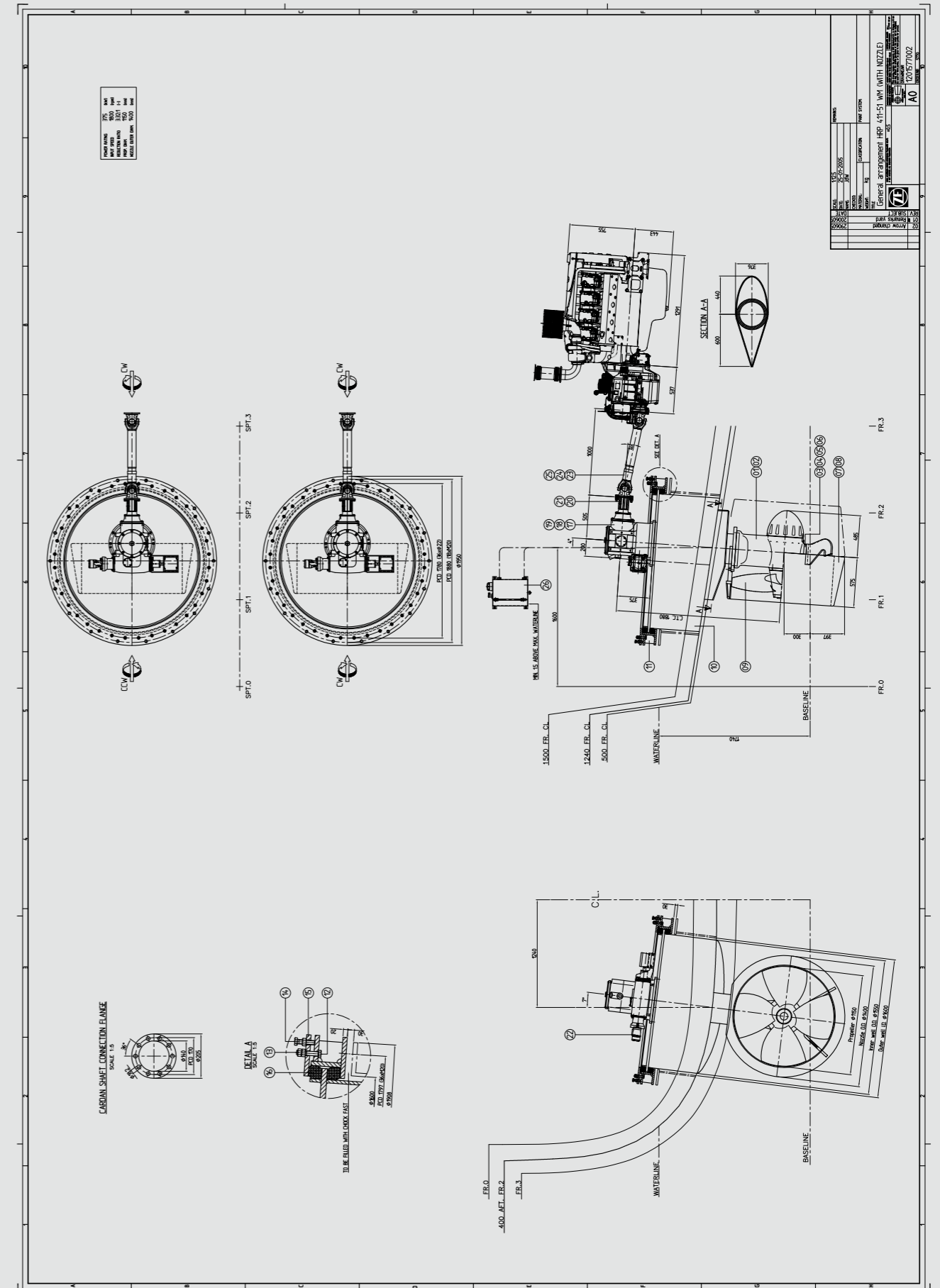


29M NAVY RESEARCH VESSEL "A 541" & "A 543" – DENMARK



Length o.a. : 28.90 m
Breadth : 6.30 m
Draught : 1.74 m
ZF-Reference : 5770
Model : ZF AT 400 WM-FP
Rated power : 375 kW at 1800 rpm
Supplied to : Nordhaven A/S – Denmark
Owner : Danish Navy

Each equipped with two (2) ZF 411-51 well mounted azimuth thrusters complete with Multi-Thruster Control System.

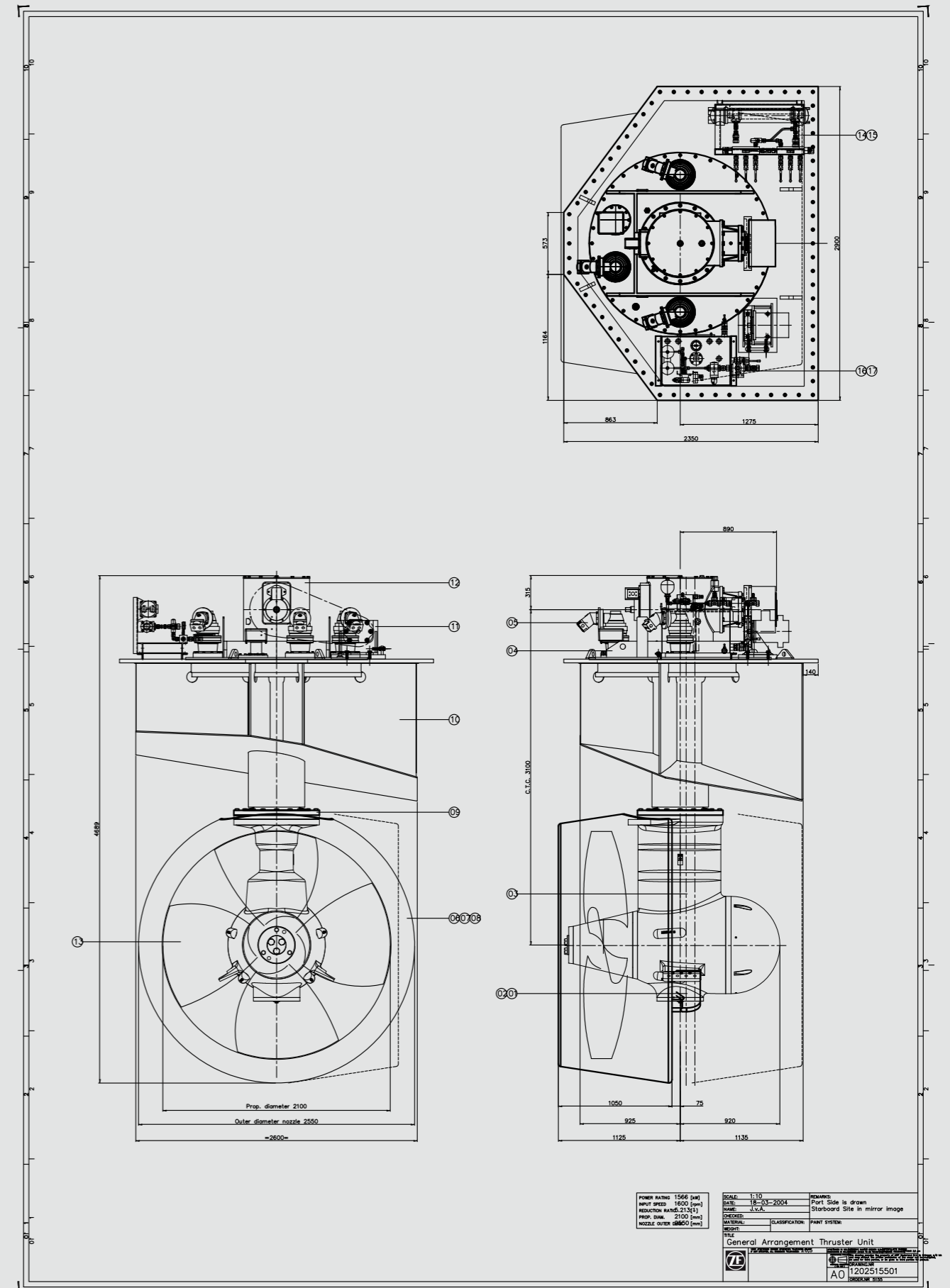


ASD TUGBOAT "TIGER 6" – HAWAII



Length o.a. : 21.00 m
Breadth : 8.50 m
Draught : 3.50 m
ZF-Reference : 5155
Model : ZF AT 7000 WM-FP
Rated power : 1566 kW at 1600 rpm
Supplied to : P&R Watertaxi – Hawaii
Owner : P&R Watertaxi – Hawaii

Equipped with two (2) ZF AT 7311 well mounted azimuth thrusters.

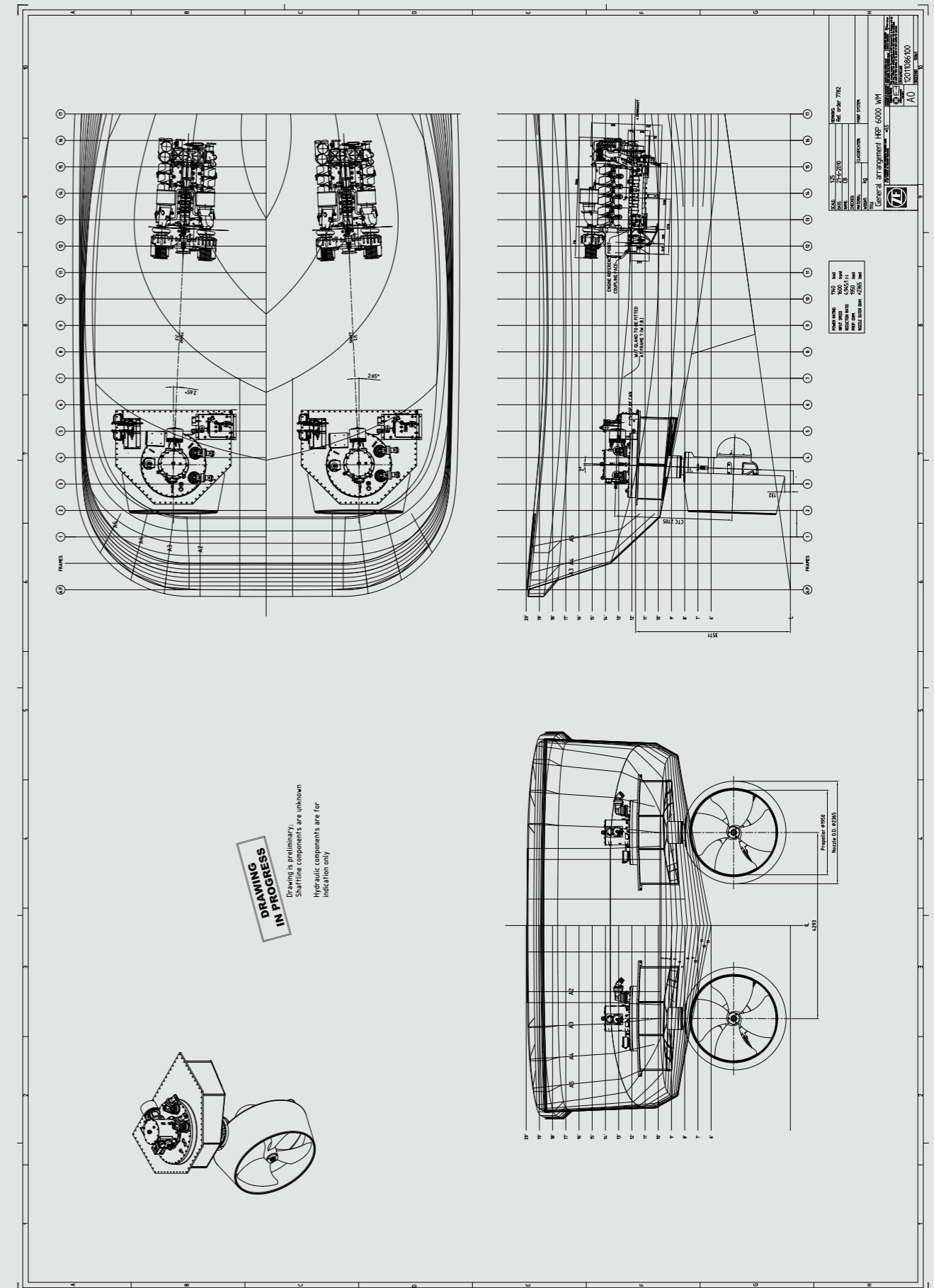


45 TONS BOLLARD PULL TUG "SHUSWAP" – CANADA



Length o.a. : 17.67 m
 Breadth : 8.58 m
 Draught : 3.81 m
 ZF-Reference : 10861
 Model : ZF AT 6000 WM-FP
 Rated power : 1200 kW at 1600 rpm
 Owner : Samson Tug Boats Inc. – Canada

Equipped with two (2) ZF AT 6311
 well mounted azimuth thrusters.

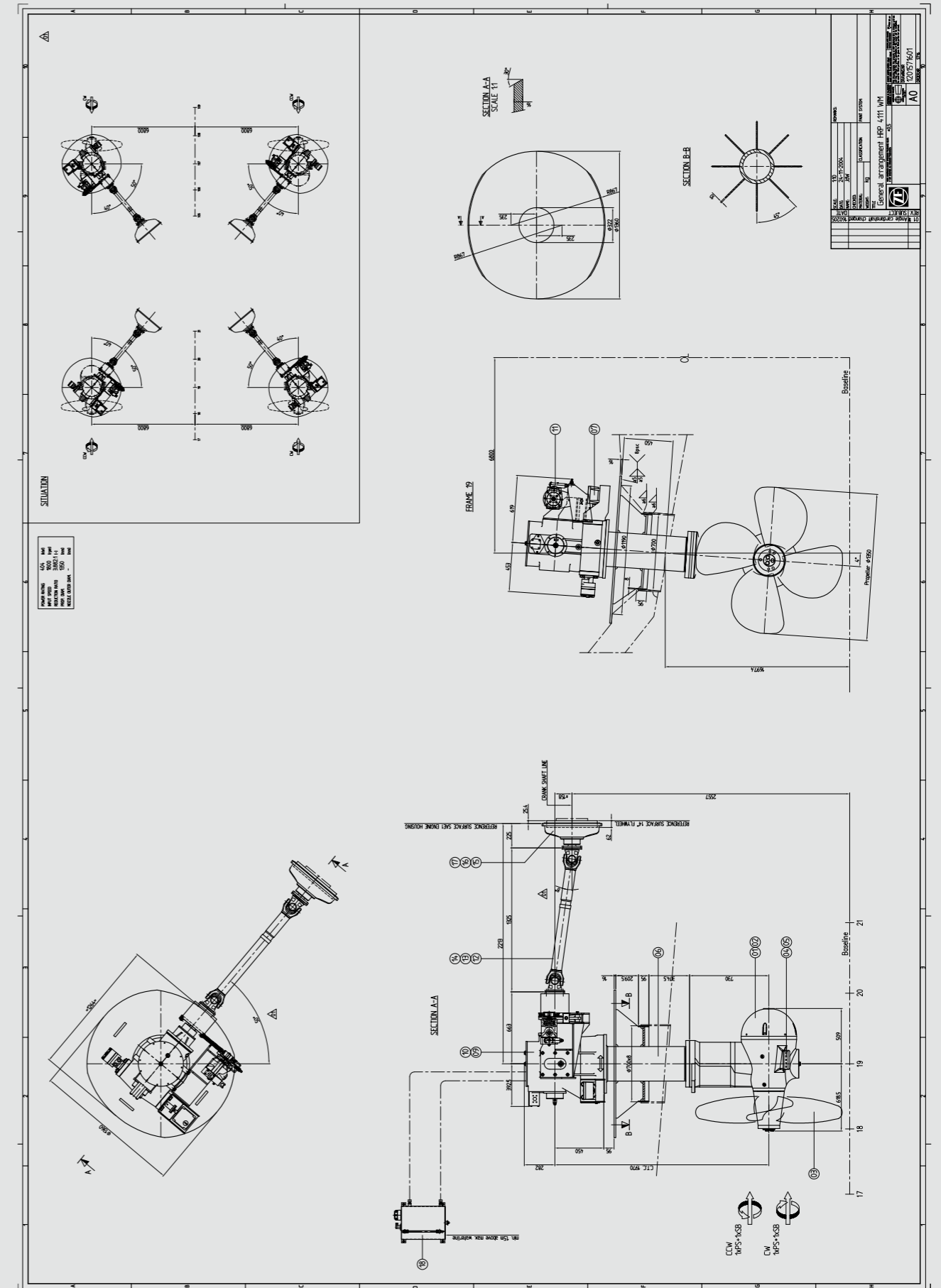


87M DOUBLE-ENDED FERRY "CRES" – CROATIA



Length o.a. : 87.60 m
Breadth : 17.50 m
Draught : 2.40 m
ZF-Reference : 5716
Model : ZF AT 4000 WM-FP
Rated power : 403 kW at 1800 rpm
Supplied to : Brodosplit – Croatia
Owner : JADROLINIJA – Croatia

Equipped with four (4) ZF AT 4111 well mounted azimuth thrusters.

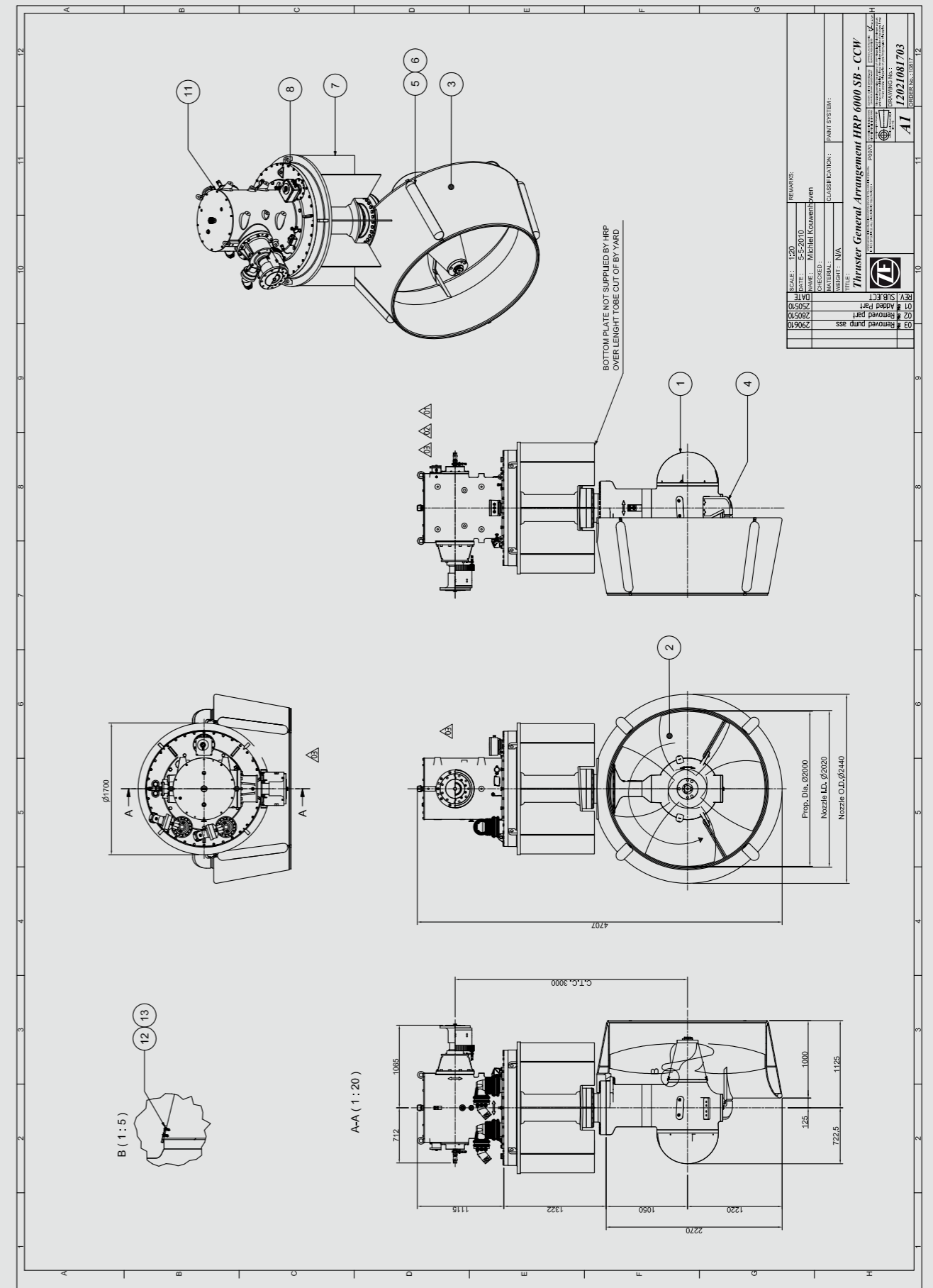


41 TONS BOLLARD PULL TRACTOR TUG "ARION" – NETHERLANDS



Length o.a. : 28.00 m
Breadth : 9.00 m
Draught : 5.20 m
ZF-Reference : 10817
Model : ZF AT 6000 WM-FP
Rated power : 1150 kW at 1000 rpm
Supplied to : Sleepdienst B. Iskes & Zn. BV – Netherlands
Owner : Sleepdienst B. Iskes & Zn. BV – Netherlands

Equipped with two (2) ZF AT 6611 well mounted azimuth thrusters.

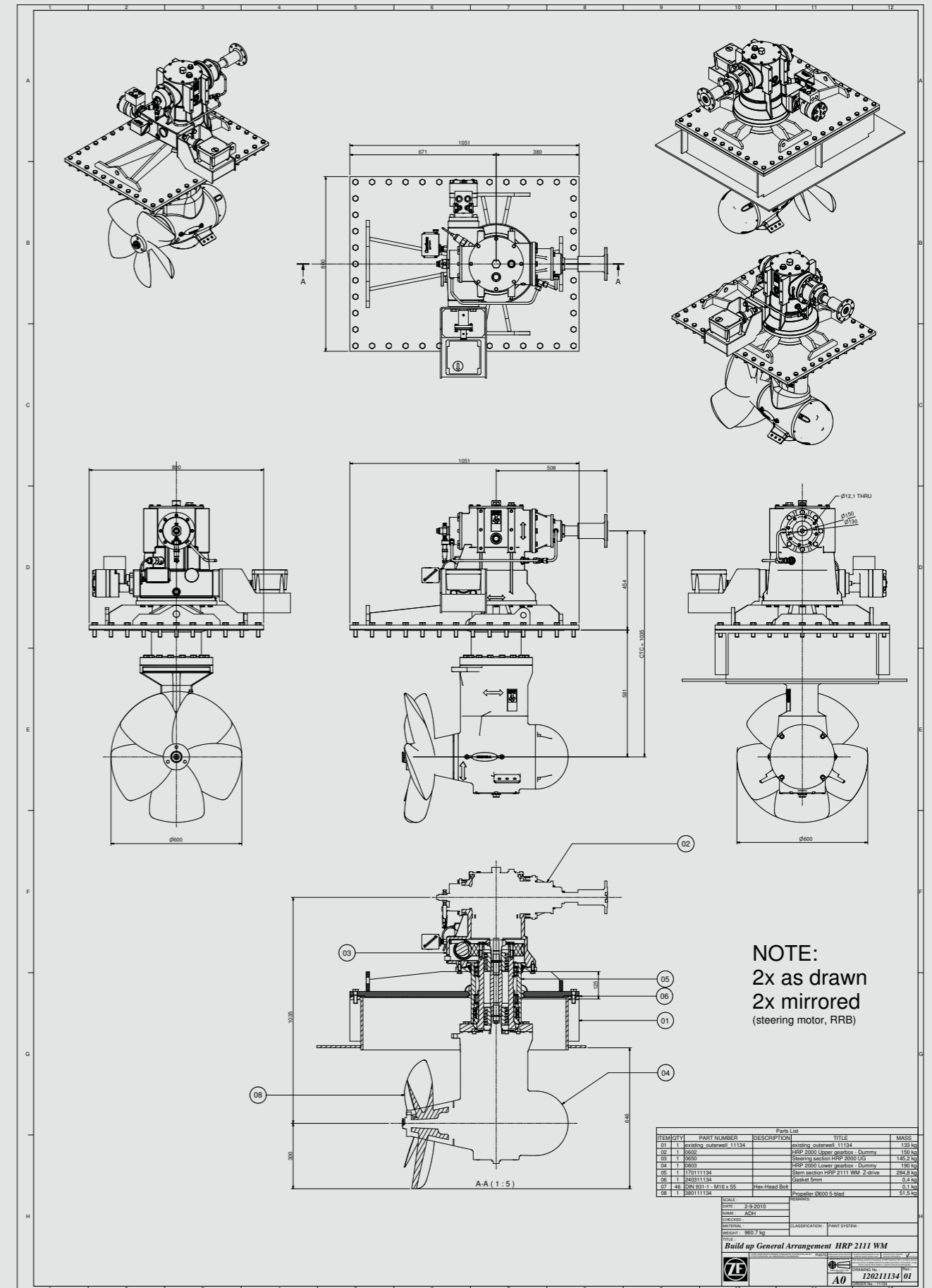


DOUBLE-ENDED FERRY "CHRISTINA" – NETHERLANDS



Length o.a. : 42.66 m
 Breadth : 10.50 m
 ZF-Reference : 11134
 Model : ZF AT 2000 WM-FP
 Rated power : 133 kW at 2200 rpm
 Owner : Veerbedrijf De Visser B.V. – Netherlands

Equipped with four (4) ZF AT 2111 well mounted azimuth thrusters.

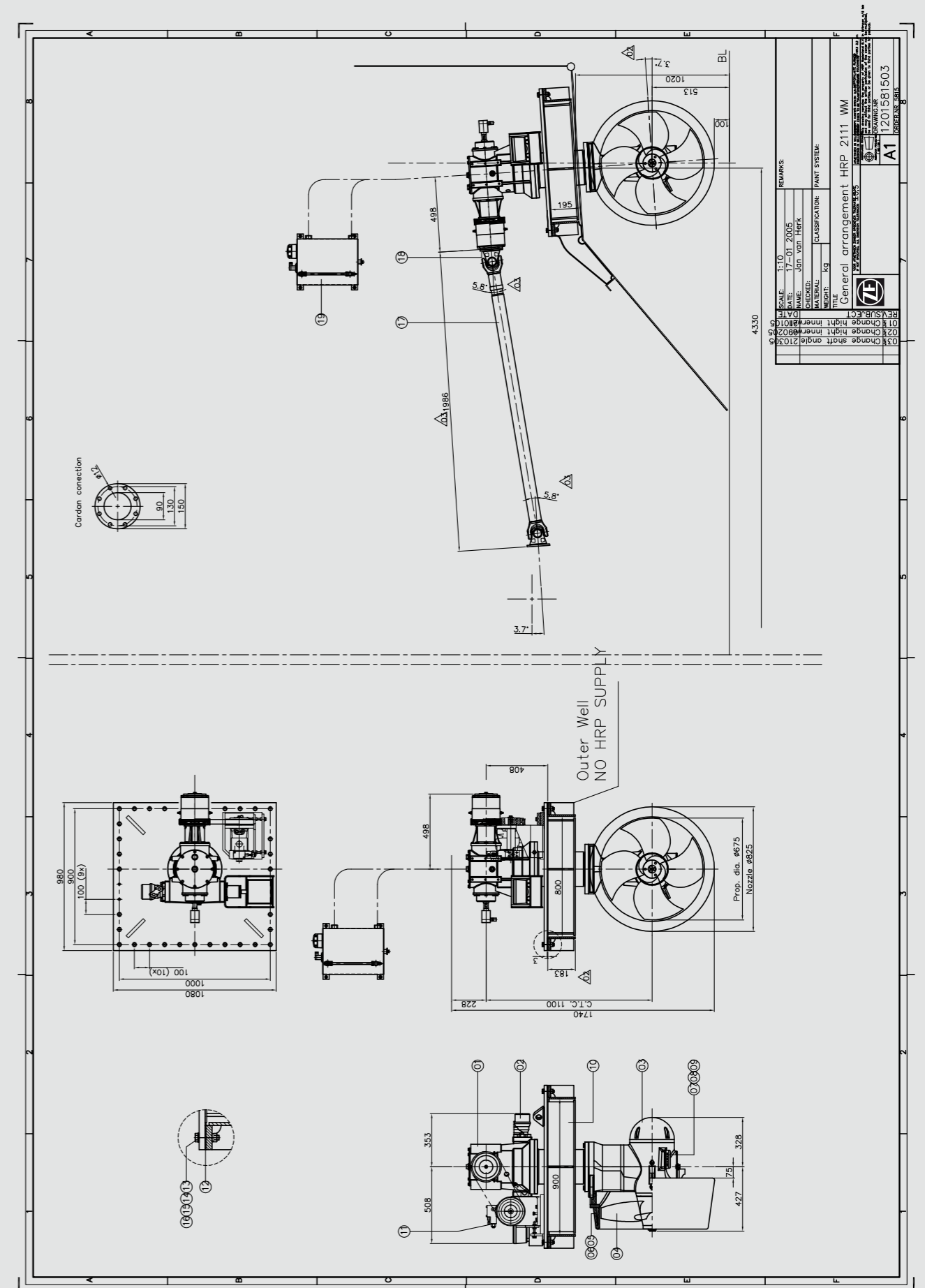


43M DOUBLE-ENDED FERRY "ARAWHITI" – NEW ZEALAND



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.

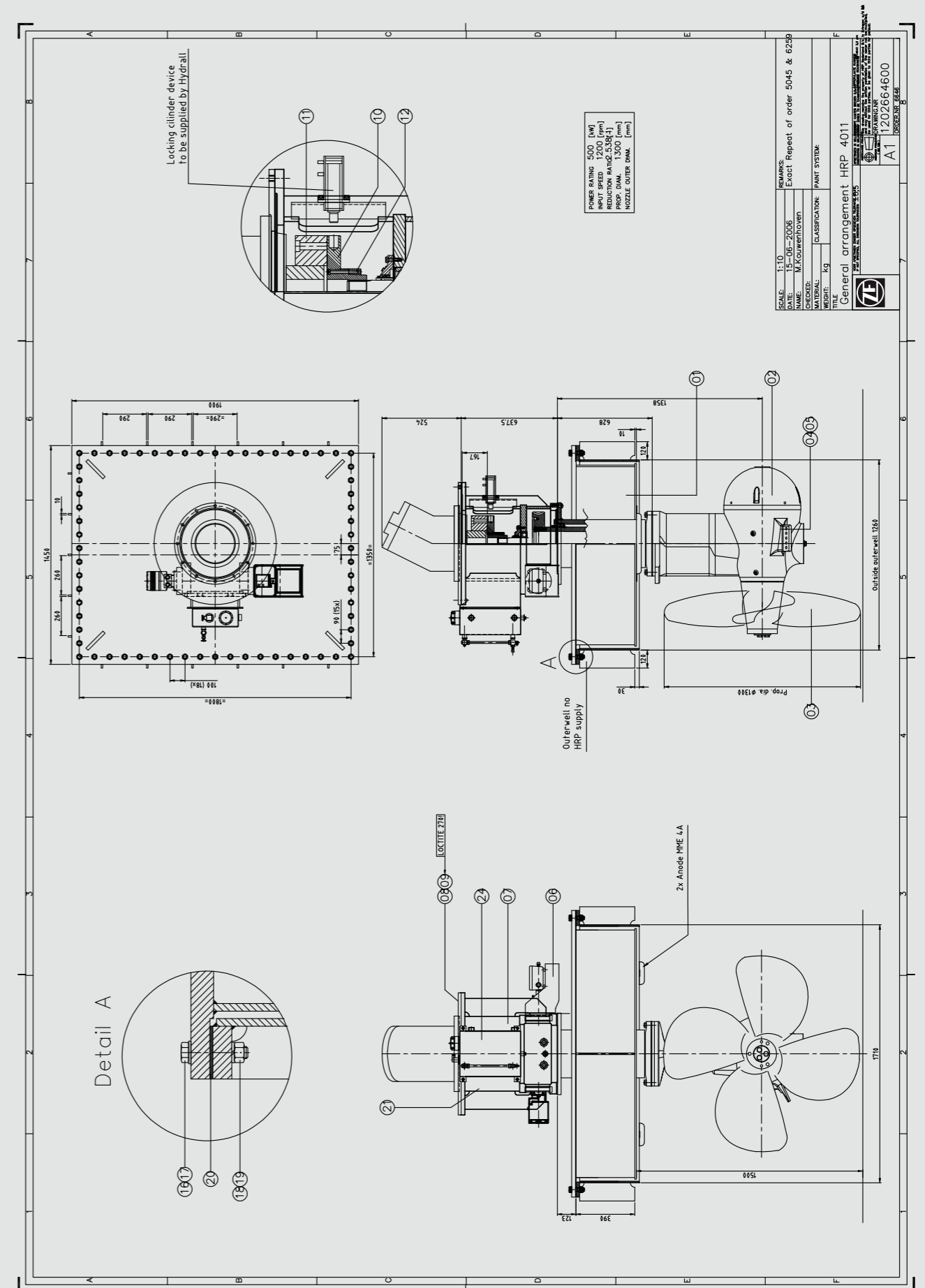


BACKHOE DREDGERS "VITRUVIUS" & "MIMAR SINAN" – BELGIUM



Length o.a. : 64.90 m
Breadth : 18.00 m
Draught : 3.35 m
ZF-Reference : 6646
Model : ZF AT 4000 WM-FP
Rated power : 500 kW at 1200 rpm
Supplied to : de Donge Shipyard – Netherlands
Owner : Jan de Nul – Belgium

Equipped with two (2) ZF AT 4011 well mounted azimuth thrusters.

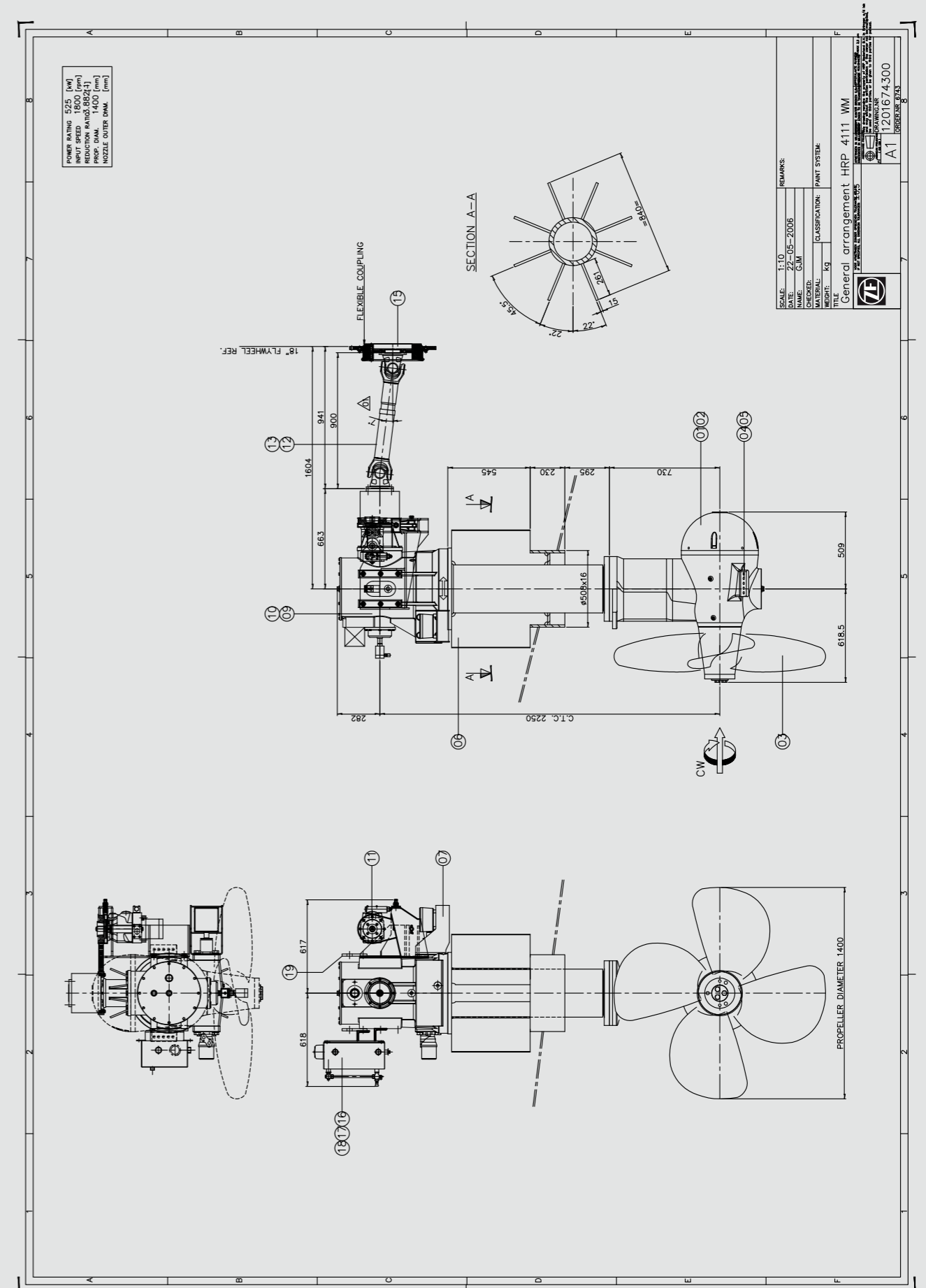


49.5M BUNKER BARGE "GIANNIS ARETI" – GREECE



Length o.a. : 49.50 m
Breadth : 10.00 m
Draught : 3.75 m
ZF-Reference : 6743
Model : ZF AT 4000 WI-FP
Rated power : 525 kW at 1800 rpm
Supplied to : Amilla Naftiki Eteria – Greece
Owner : Amilla Naftiki Eteria – Greece

Equipped with two (2) ZF AT 4111
 weld-in azimuth thrusters.

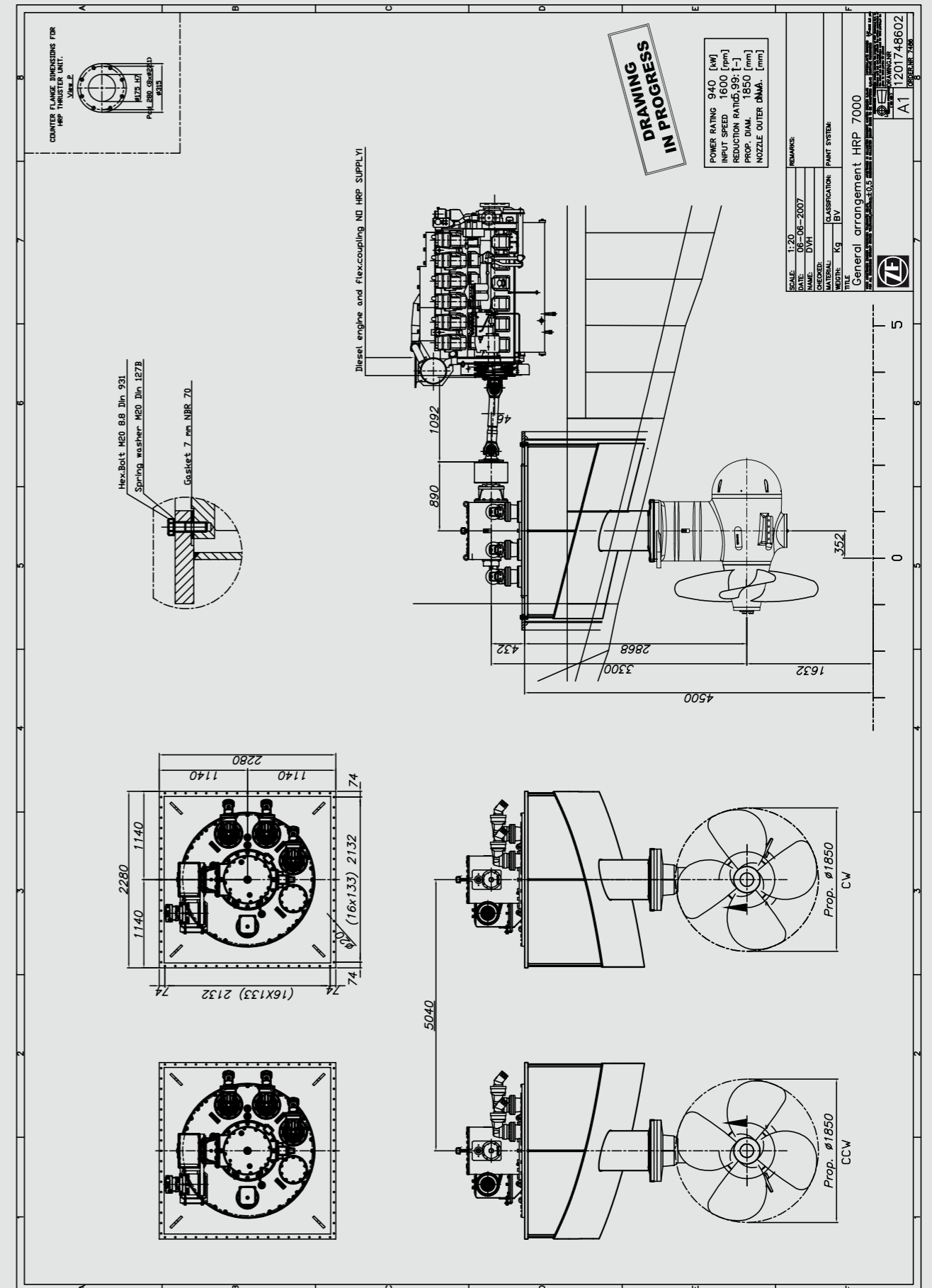


CHEMICAL TANKERS "CHEM FLOWER", "ROSE" & "VIOLET" – TURKEY



Length o.a. : 85.00 m
 Breadth : 12.60 m
 Draught : 5.30 m
 ZF-Reference : 7486 / 7646 / 7647
 Model : ZF AT 7000 WM-FP / ZF TT 2000 FP
 Rated power : 940 kW at 1600 rpm / 200 kW at 1480 rpm
 Supplied to : Cicek SY – Turkey

Each vessel equipped with two (2) ZF AT 7311 well mounted azimuth thrusters with ICE 1B classification and one (1) ZF TT 2001 tunnel thruster, electric driven.

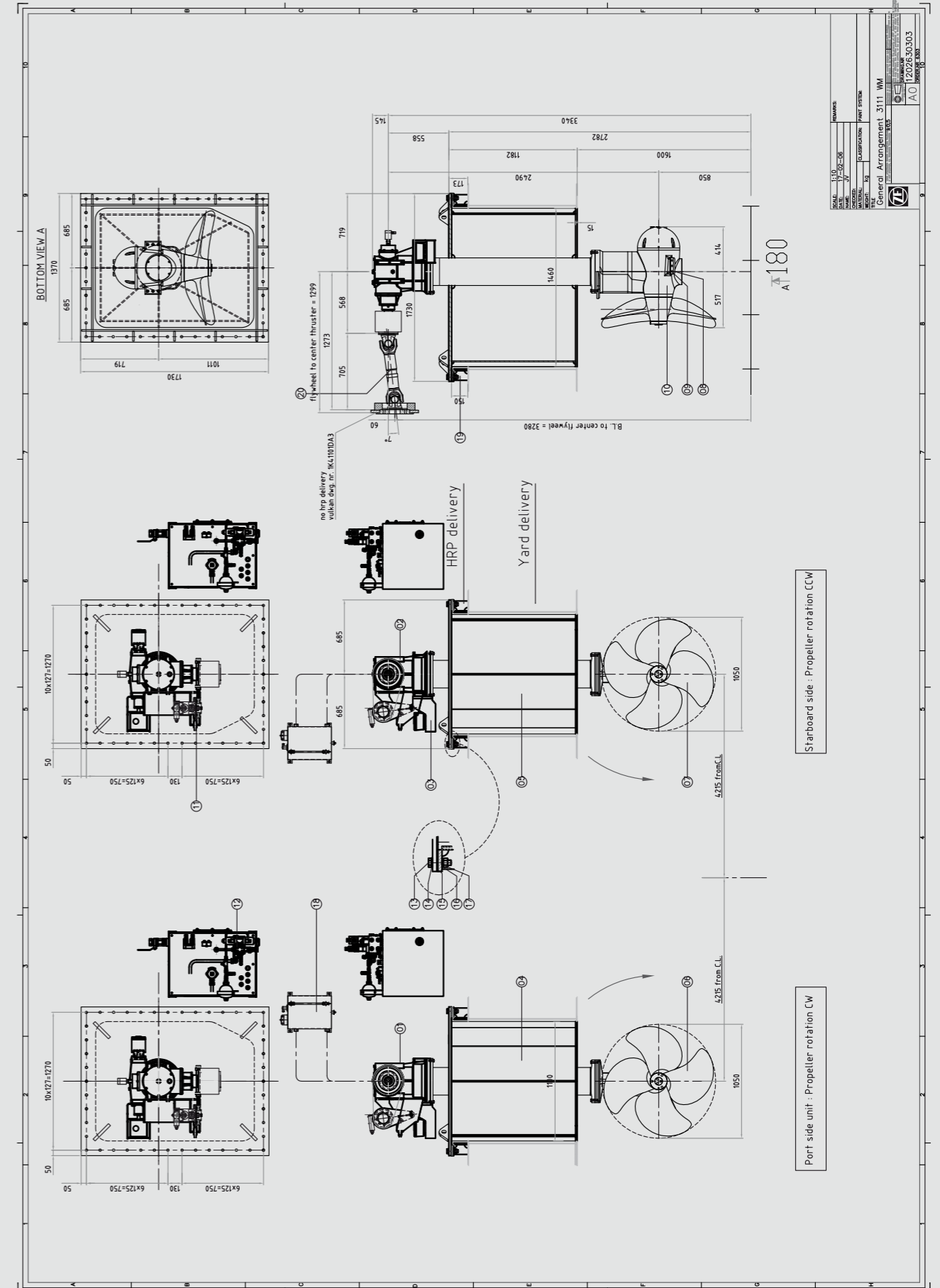


RIVER GOING TANKER VESSEL "TILL DEYMANN" – GERMANY



Length o.a. : 109.80 m
Breadth : 11.45 m
Draught : 3.75 m
ZF-Reference : 6303
Model : ZF AT 3000 WM-FP / ZF AT 4000 WM-FP
Rated power : 300 / 525 kW at 1800 rpm
Supplied to : Köterwerft – Germany
Owner : Reederei Deymann – Germany

Equipped with two (2) ZF AT 3111 well mounted azimuth thrusters and two (2) ZF AT 4111 well mounted azimuth thrusters.

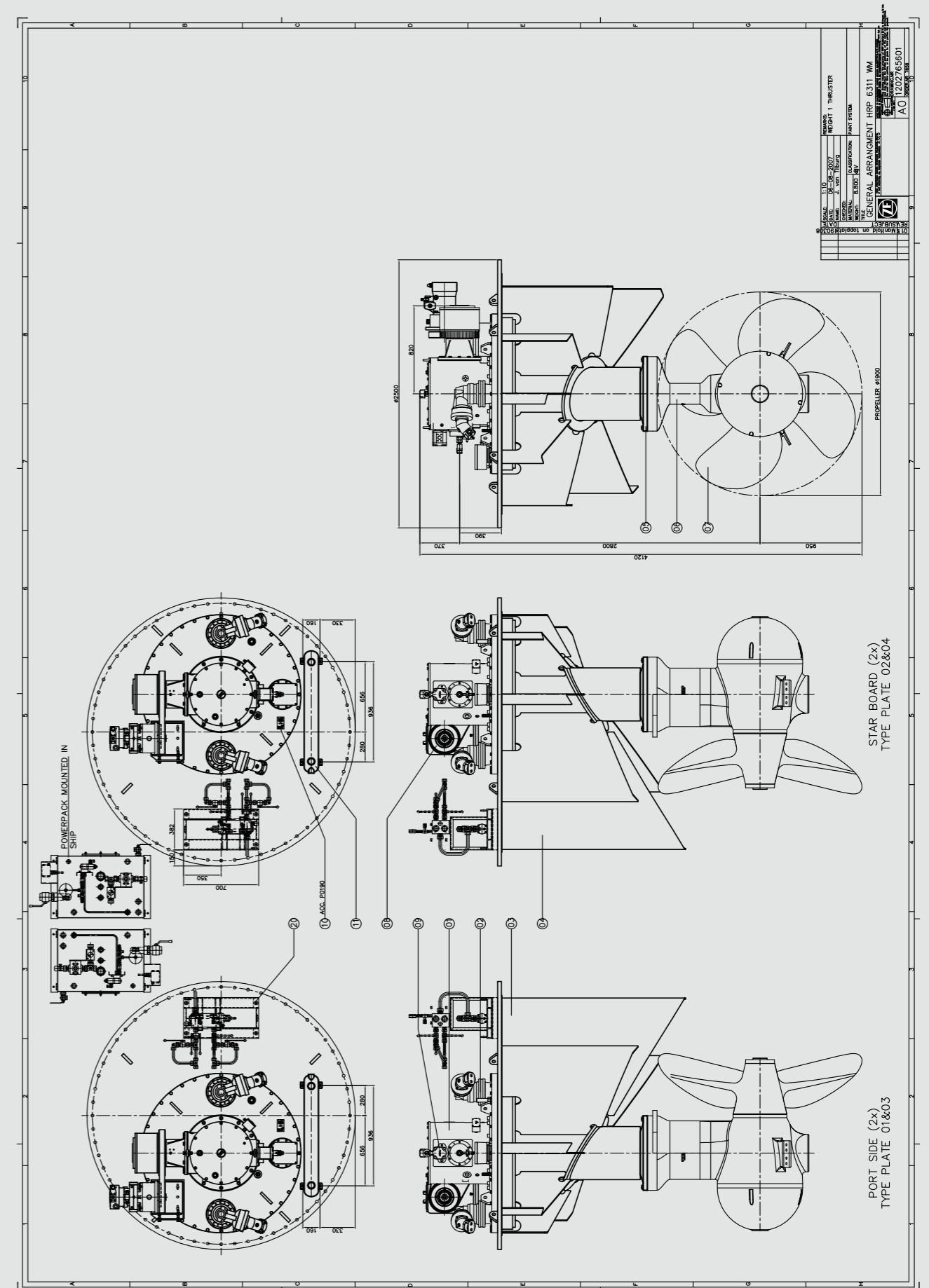


91M NORDIC FERRY "KANHAVE" – NORWAY



Length o.a. : 91.43 m
Breadth : 16.20 m
Draught : 3.20 m
ZF-Reference : 7656
Model : ZF AT 6000 WM-FP
Rated power : 1170 kW at 1600 rpm
Supplied to : Technical Office Petihakis – Greece
Owner : Bornholms Trafikken – Norway

Equipped with four (4) ZF AT 6311 WM-FP well mounted azimuth thrusters.

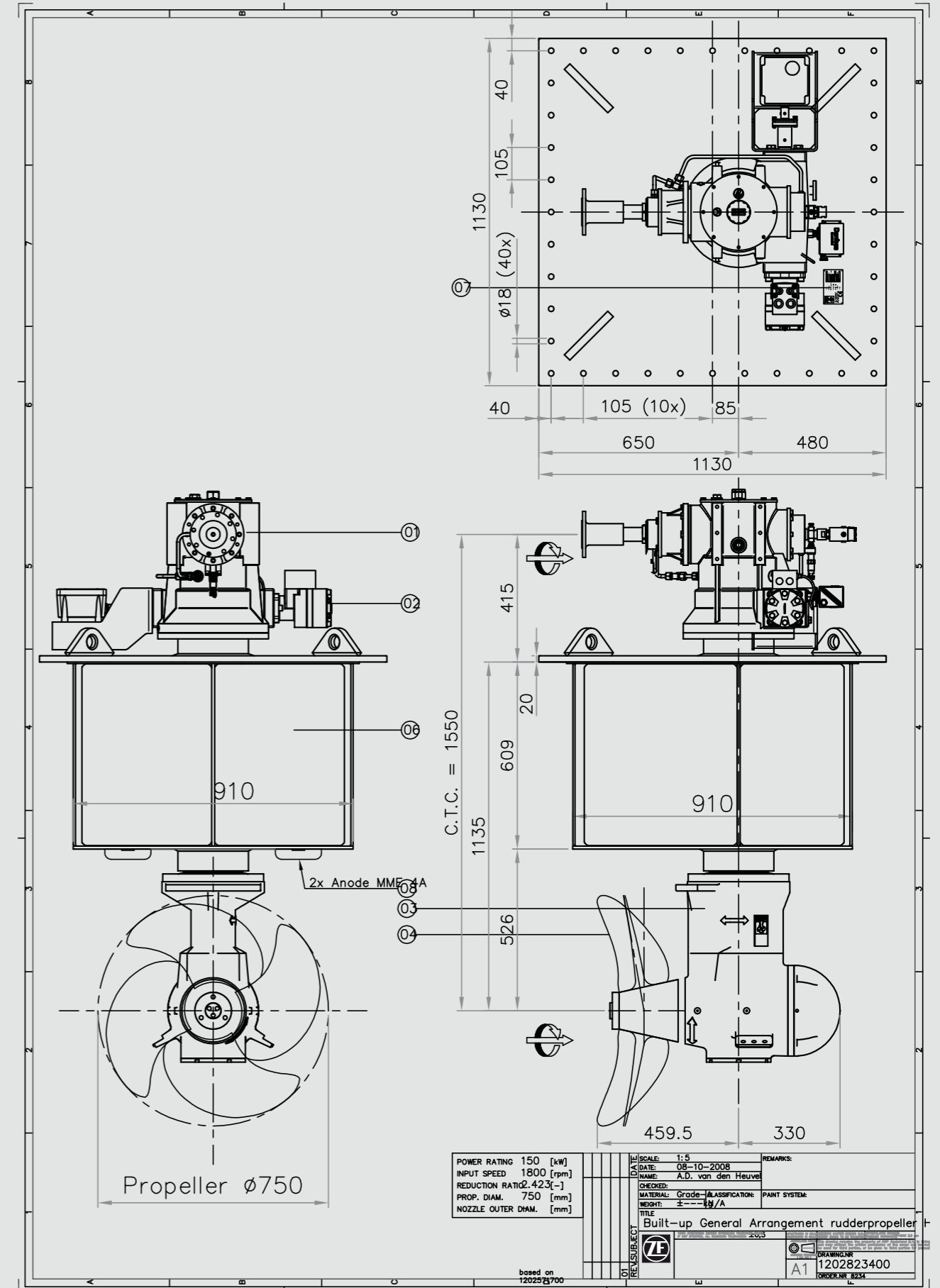


40M CAR/PASSENGER FERRY "REGINA FLUMINUM II" – NETHERLANDS



Length o.a. : 39.95 m
Breadth : 12.40 m
Draught : 1.55 m
ZF-Reference : 8234
Model : ZF AT 2000 WM-FP
Rated power : 180 kW at 1800 rpm
Supplied to : Shipyard Den Breejen – Netherlands
Owner : Veerdienst Eck & Wiel – Netherlands

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

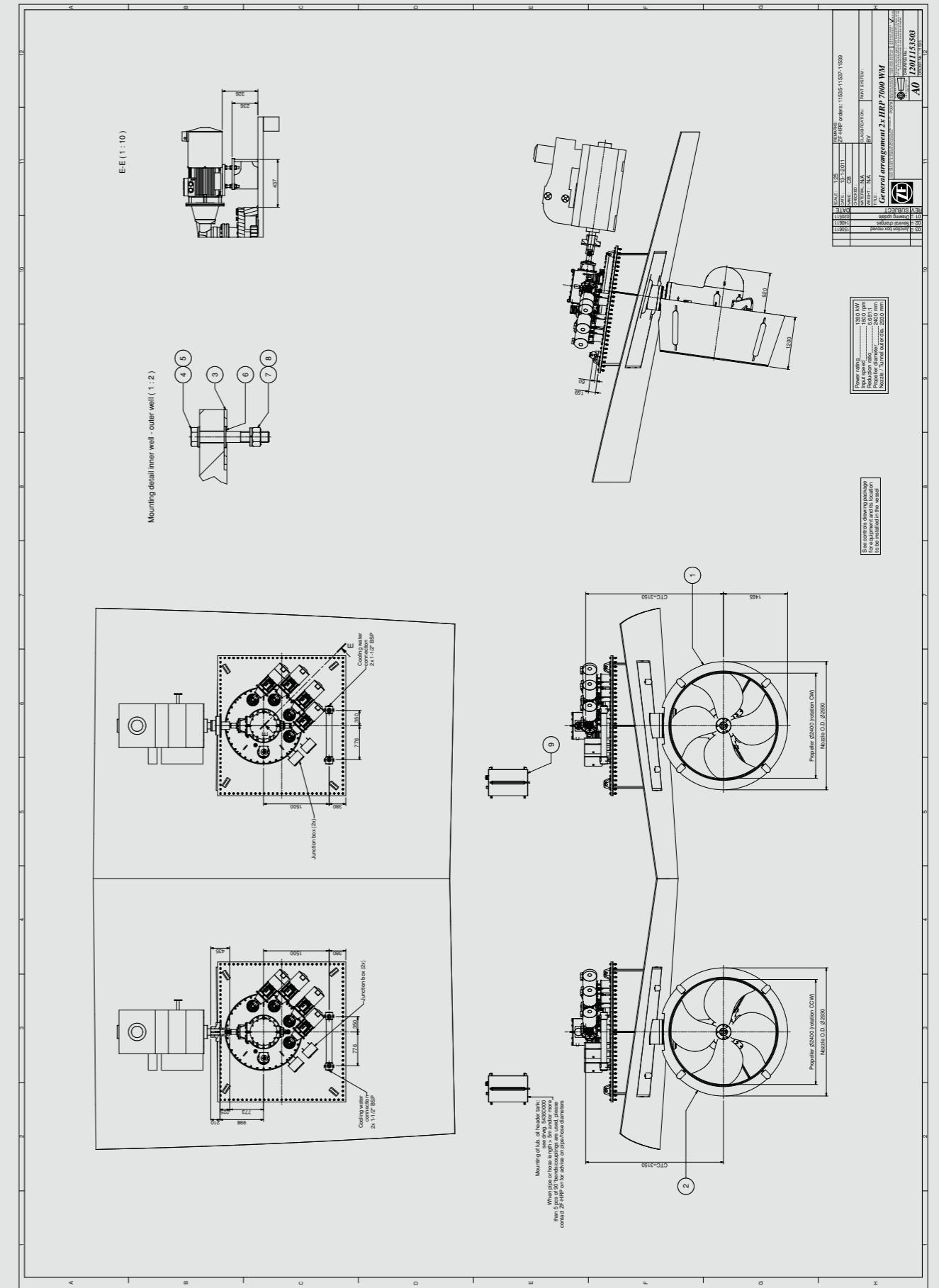


MULTI-PURPOSE CARGO VESSEL "JAGUAR" – NETHERLANDS



Length o.a. : 107.20 m
Breadth : 16.00 m
Draught : 6.45 m
ZF-Reference : 11535/11536
Model : ZF AT 7000 WM-FP & ZF TT 4000 FP
Rated power : 1445 kW at 1800 rpm / 400 kW at 1800 rpm
Supplied to : Shipkits B.V. – Netherlands
Owner : Jaguar Shipping – Netherlands

Equipped with two (2) ZF AT 7111 well mounted azimuth thrusters, electric driven and two (2) ZF TT 4004 tunnel thrusters, electric driven.

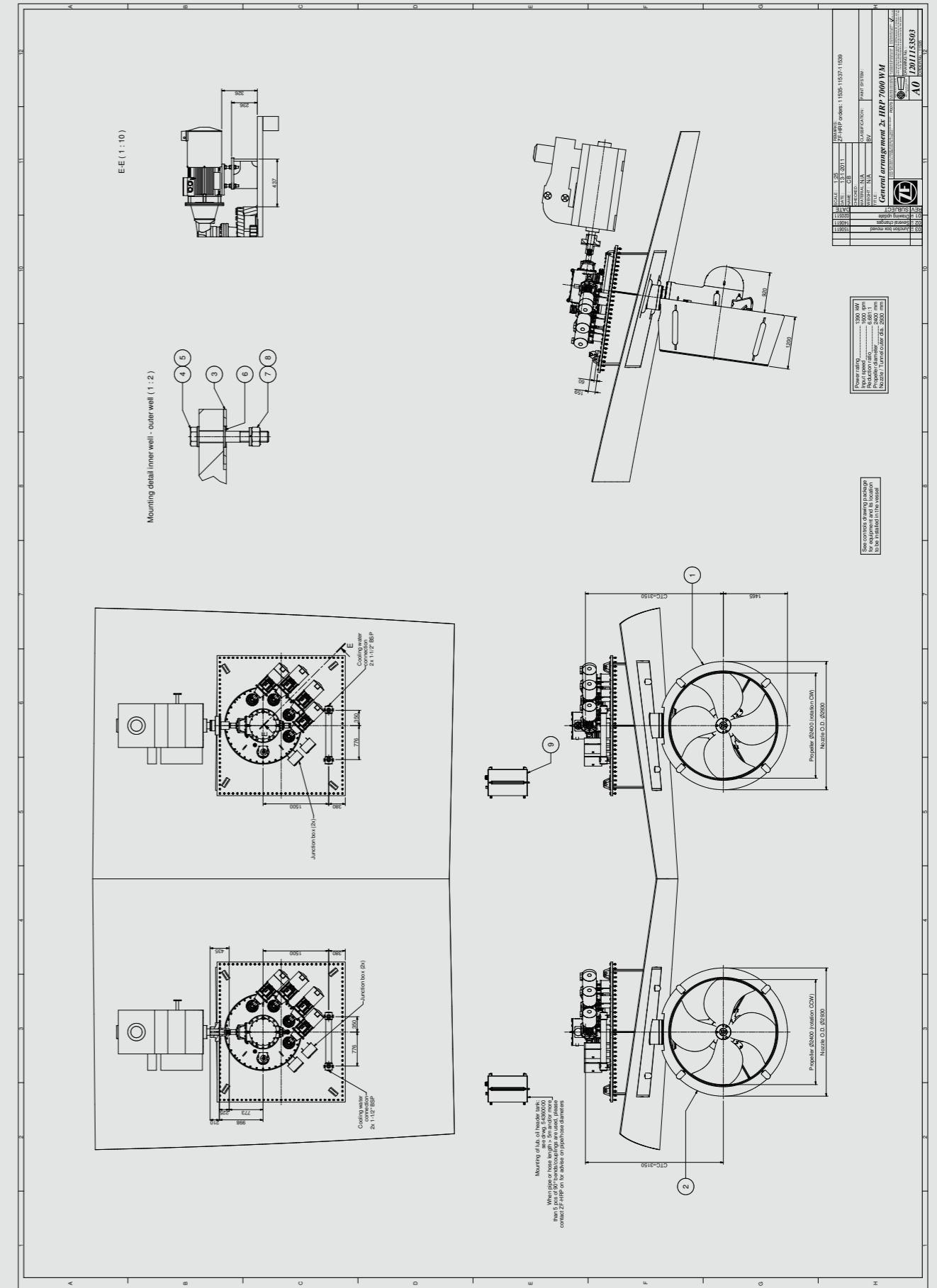


MULTI-PURPOSE CARGO VESSEL "ABIS DOVER" – NETHERLANDS



Length o.a. : 107.95 m
Breadth : 16.00 m
Draught : 9.30 m
ZF-Reference : 11537/11538
Model : ZF AT 7000 WM-FP & ZF TT 4000 FP
Rated power : 1445 kW at 1800 rpm / 400 kW at 1800 rpm
Supplied to : Shipkits B.V. – Netherlands
Owner : ABIS Shipping – Netherlands

Equipped with two (2) ZF AT 7111 well mounted azimuth thrusters, electric driven and two (2) ZF TT 4004 tunnel thrusters, electric driven.

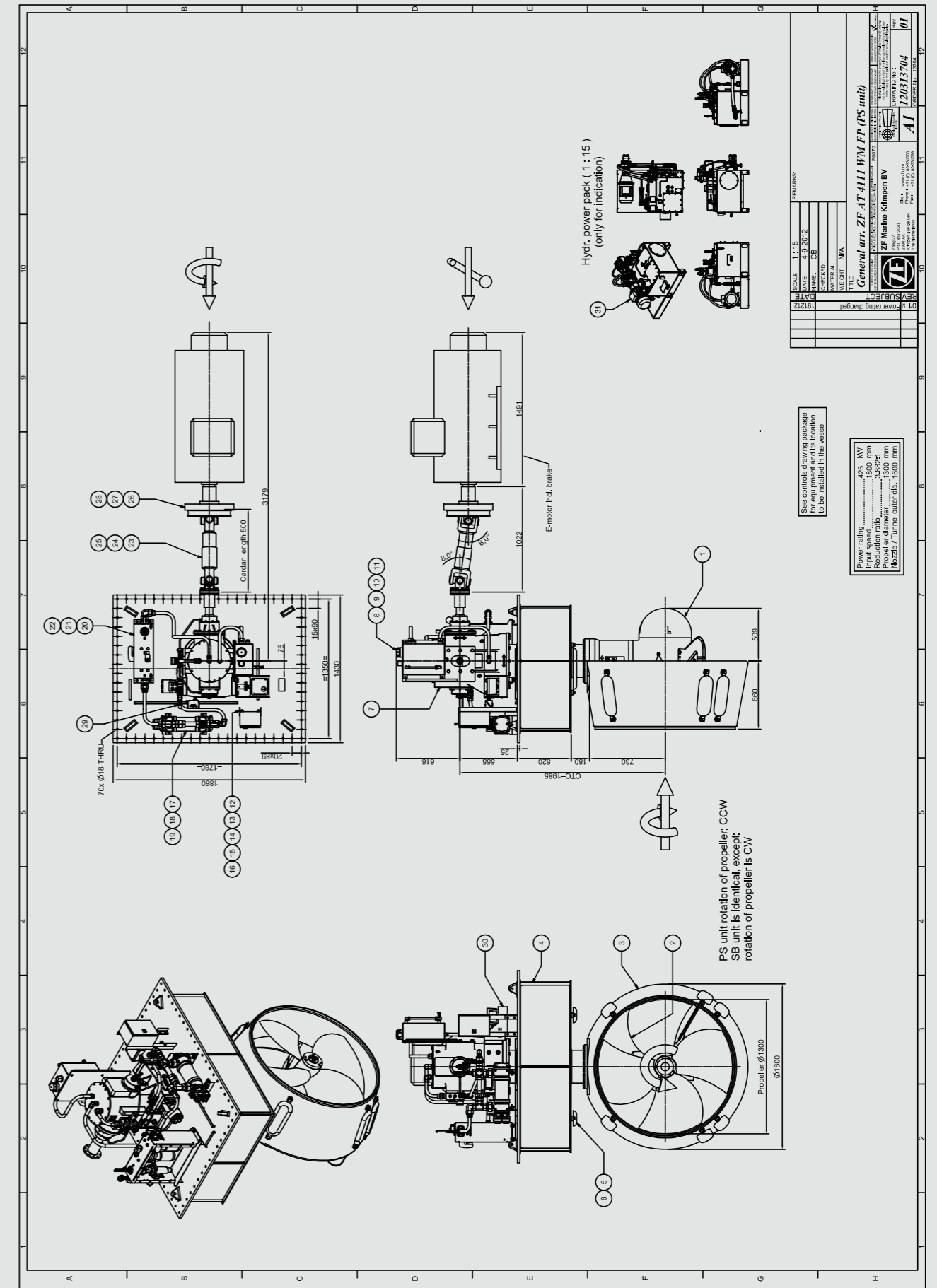


35 TON FLOAT CRANE BARGE "EXPERT 1" – MALTA



Length o.a. : 40.32 m
 Breadth : 20.00 m
 Draught : 4.00 m
 ZF-Reference : 13704
 Model : ZF AT 4000 WM-FP
 Rated power : 525 kW at 1800 rpm
 Supplied to : Ganz Danubius Shipyard – Budapest
 Owner : STS Expert Shipping Co. Ltd – Malta

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

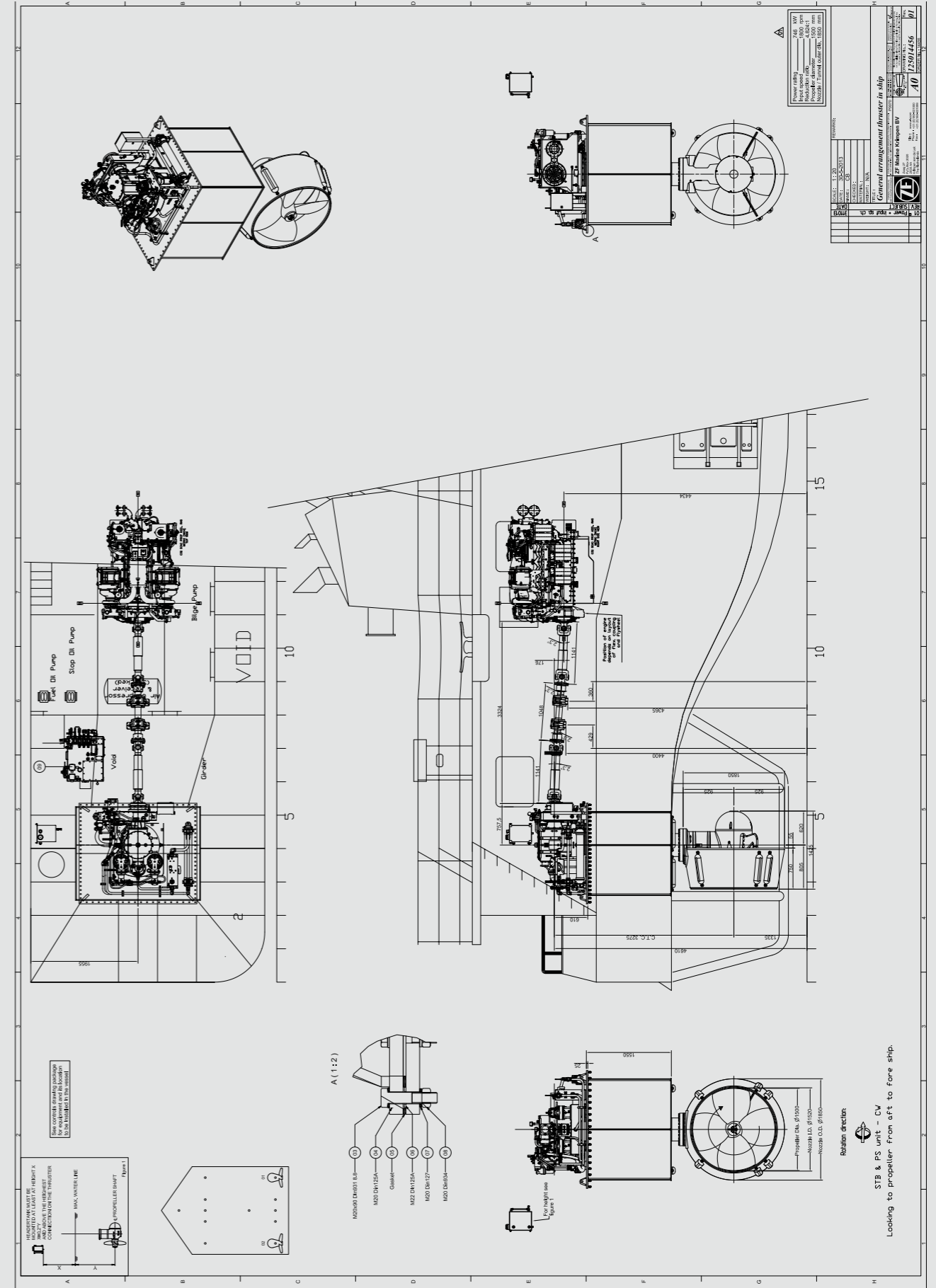


RIVER PUSHER TUG "M/V AMERICAN WAY" – USA



Length o.a. : 23.00 m
 Breadth : 9.00 m
 ZF-Reference : 14456
 Model : ZF AT 5000 WM-FP
 Rated power : 746 kW at 1800 rpm
 Shipyard : Steiner Construction – USA
 Owner : American Commercial Lines – USA

Equipped with two (2) ZF AT 5111 well mounted azimuth thrusters, diesel driven.

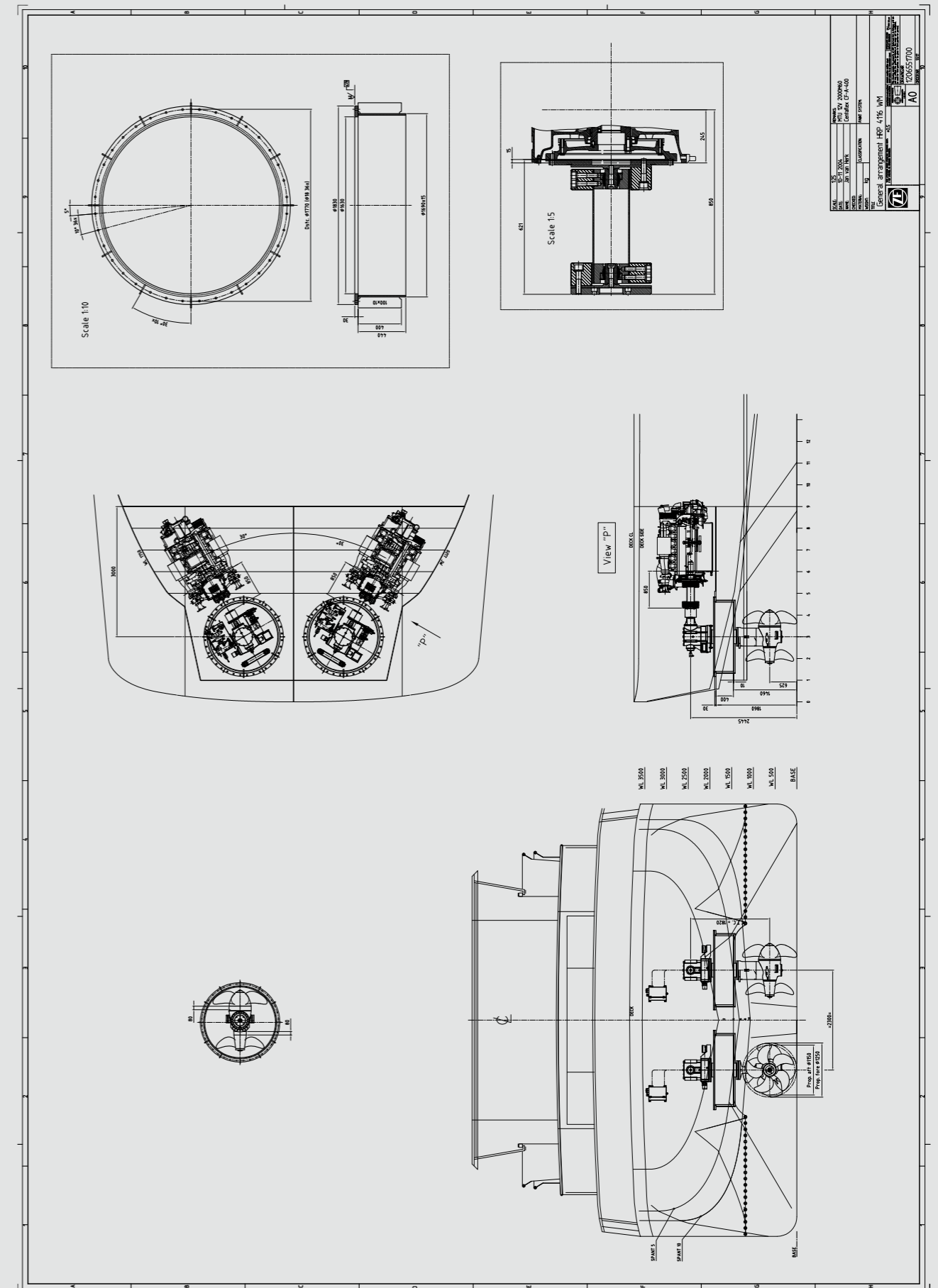


1180 M3 RIVER GOING TANKER VESSEL "SARDANA" – NETHERLANDS



Length o.a. : 84.70 m
Breadth : 9.98 m
Draught : 3.19 m
ZF-Reference : 5517
Model : ZF AT 4000 WM-CR
Rated power : 500 kW at 1800 rpm
Supplied to : Scheepswerf L.J. Boer – Netherlands
Owner : Xander Kleine – Netherlands

Equipped with two (2) ZF AT 4116 well mounted azimuth thrusters with contra-rotating propellers.

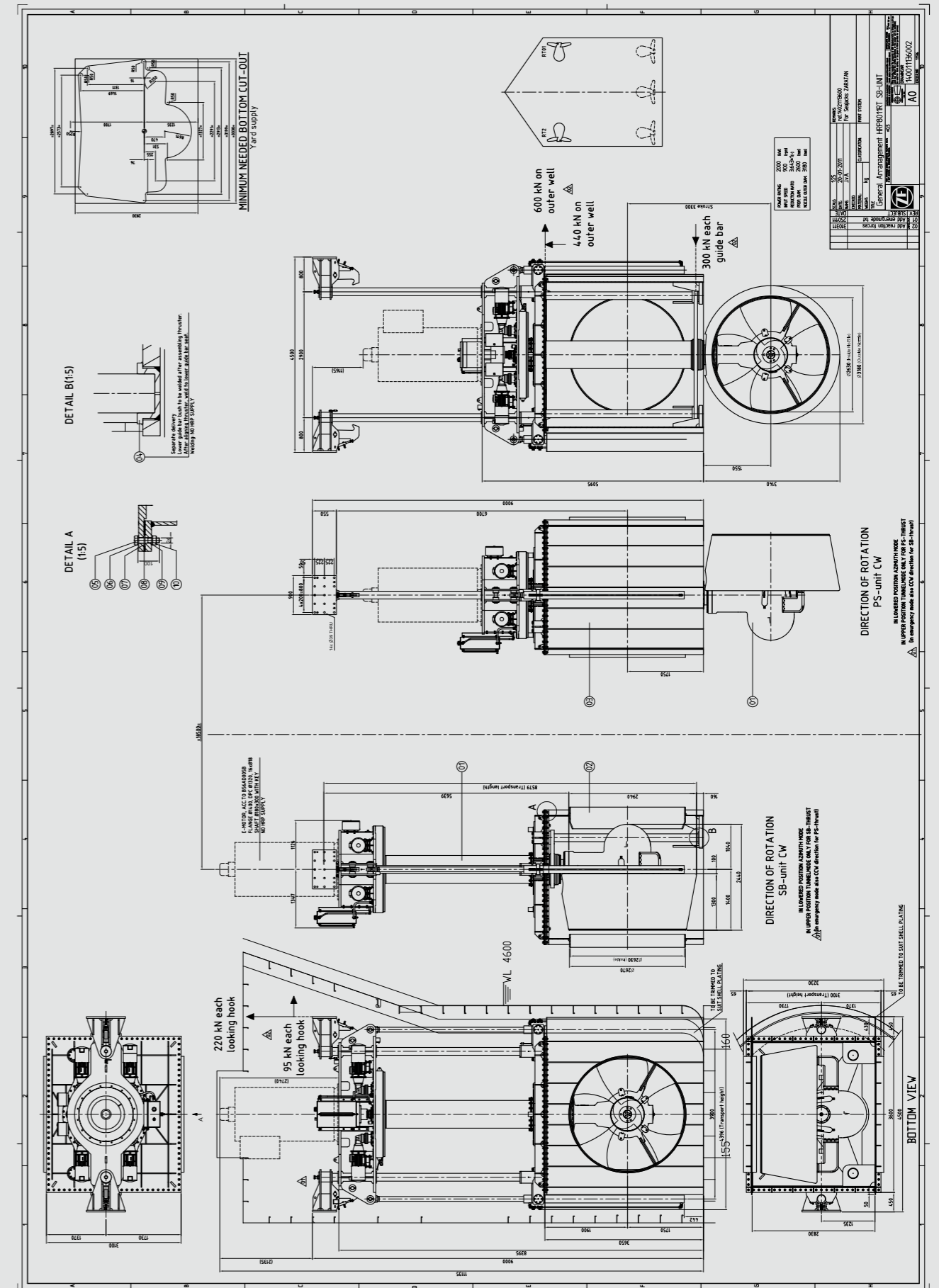


81M WIND FARM INSTALLATION VESSEL "ZARATAN" – PANAMA



Length o.a. : 81.00 m
Breadth : 41.00 m
Draught : 7.00 m
ZF-Reference : 11136
Model : ZF AT 8000 RT-FP / ZF AT 7000 WM-FP
Rated power : 2000 kW at 900 rpm / 1500 kW at 1000 rpm
Supplied to : Lamprell Energy – Dubai
Owner : Seajacks International Ltd – UK

Equipped with two (2) ZF AT 8011 retractable azimuth thrusters and three (3) ZF AT 7011 well mounted azimuth thrusters.



CABLE LAYING VESSEL "STEMAT SPIRIT" – NETHERLANDS



Length o.a. : 90.00 m

Breadth : 28.40 m

Draught : 4.90 m

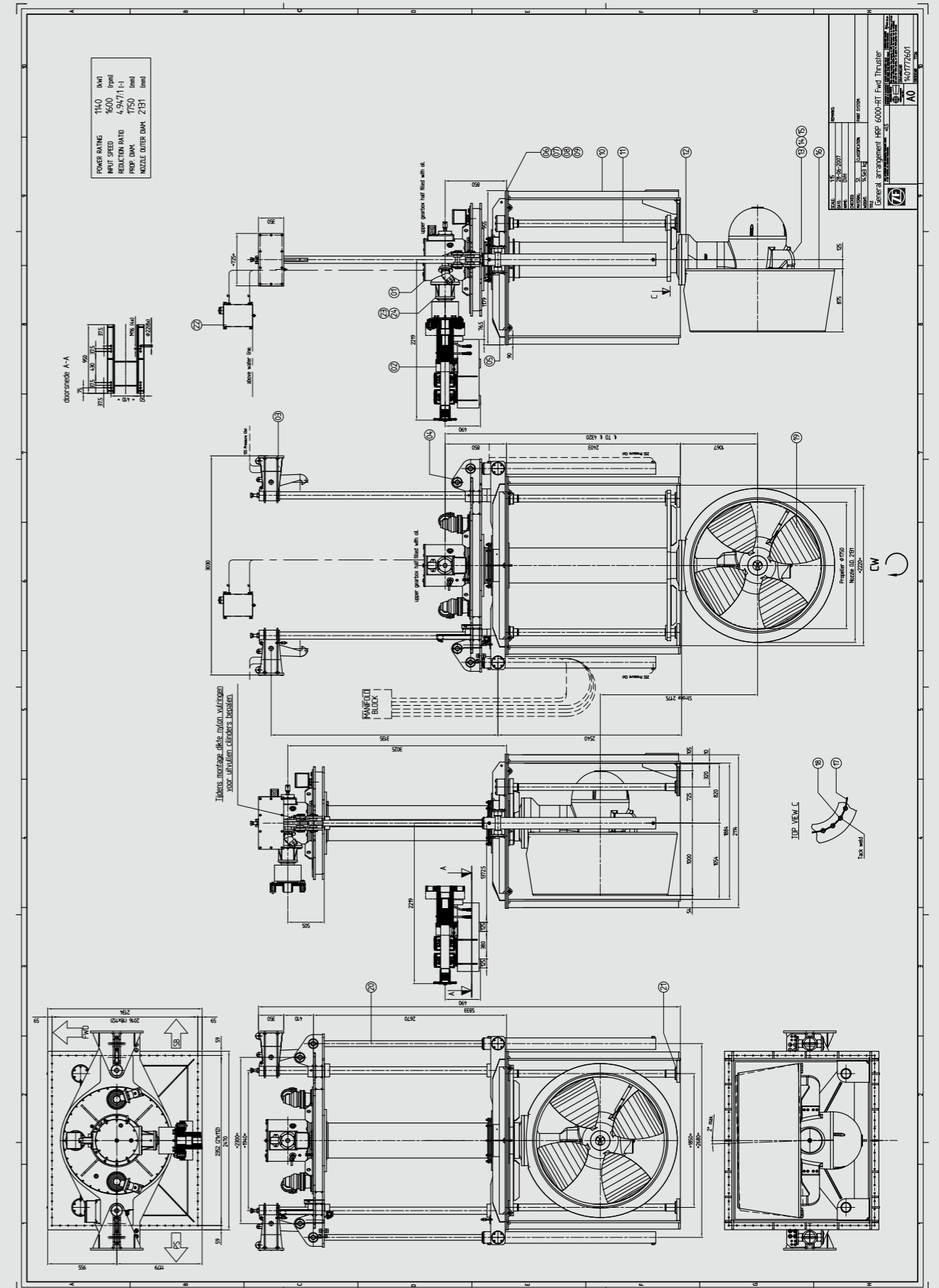
ZF-Reference : 7726

Model : ZF AT 6000 RT-FP / ZF AT 6000 WM-FP / ZF TT 5000 FP

Rated power : 1150 kW at 1600 rpm / 650 kW at 1200 rpm

Owner : Stemat Marine Services – Netherlands

Equipped with two (2) ZF AT 6111 retractable azimuth thrusters,
two (2) ZF AT 6111 well mounted azimuth thrusters and
one (1) ZF TT 5001 tunnel thruster.

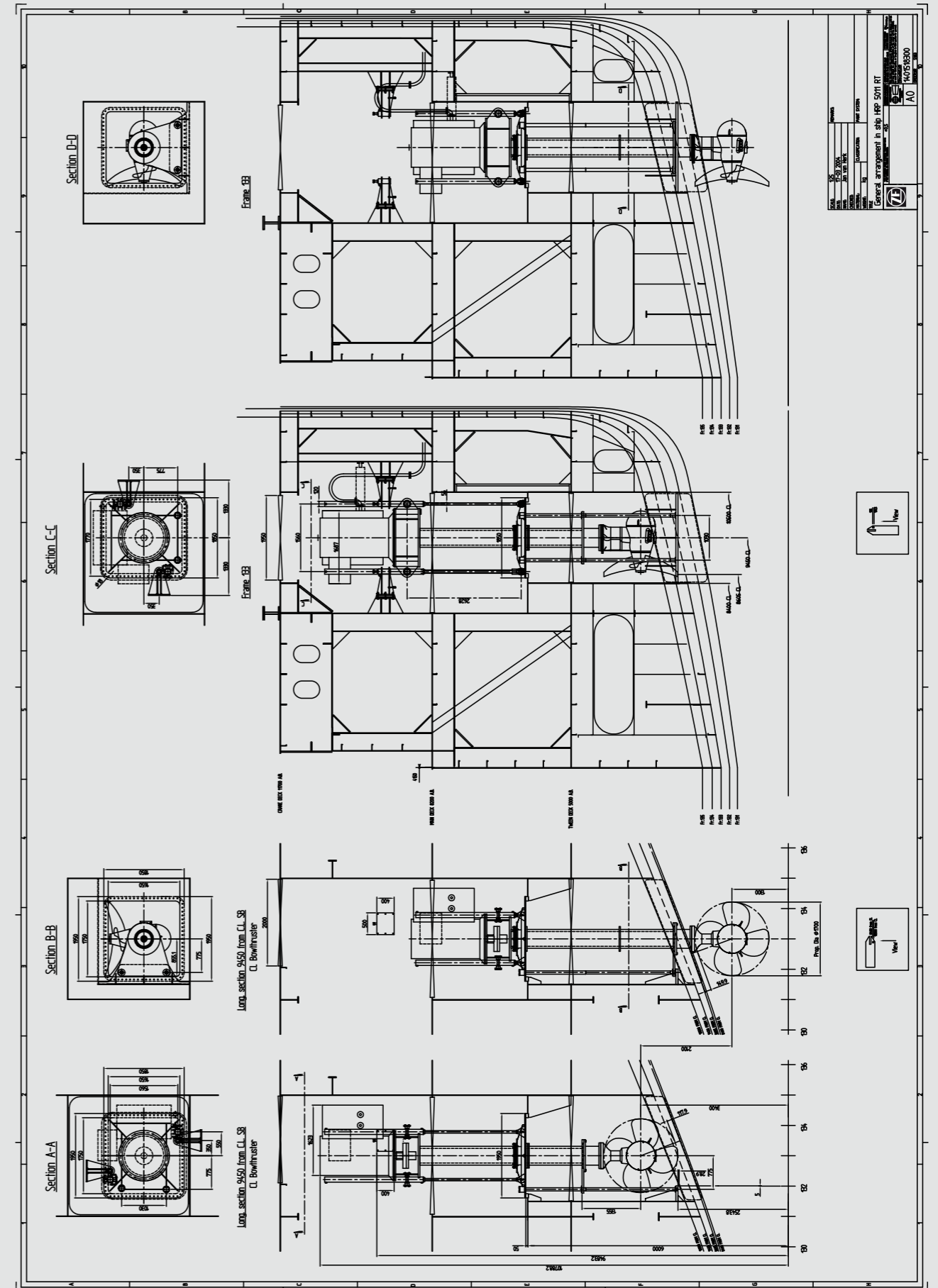


SEAGOING SUCTION DREDGER "D'ARTAGNAN" – BELGIUM



Length o.a. : 123.80 m
Breadth : 25.20 m
Draught : 6.20 m
ZF-Reference : 5183
Model : ZF AT 5000 RT-FP
Rated power : 1000 kW at 1500 rpm
Supplied to : IHC – Netherlands
Owner : DEME – Belgium

Equipped with one (1) ZF AT 5011
 retractable thruster, electric driven.

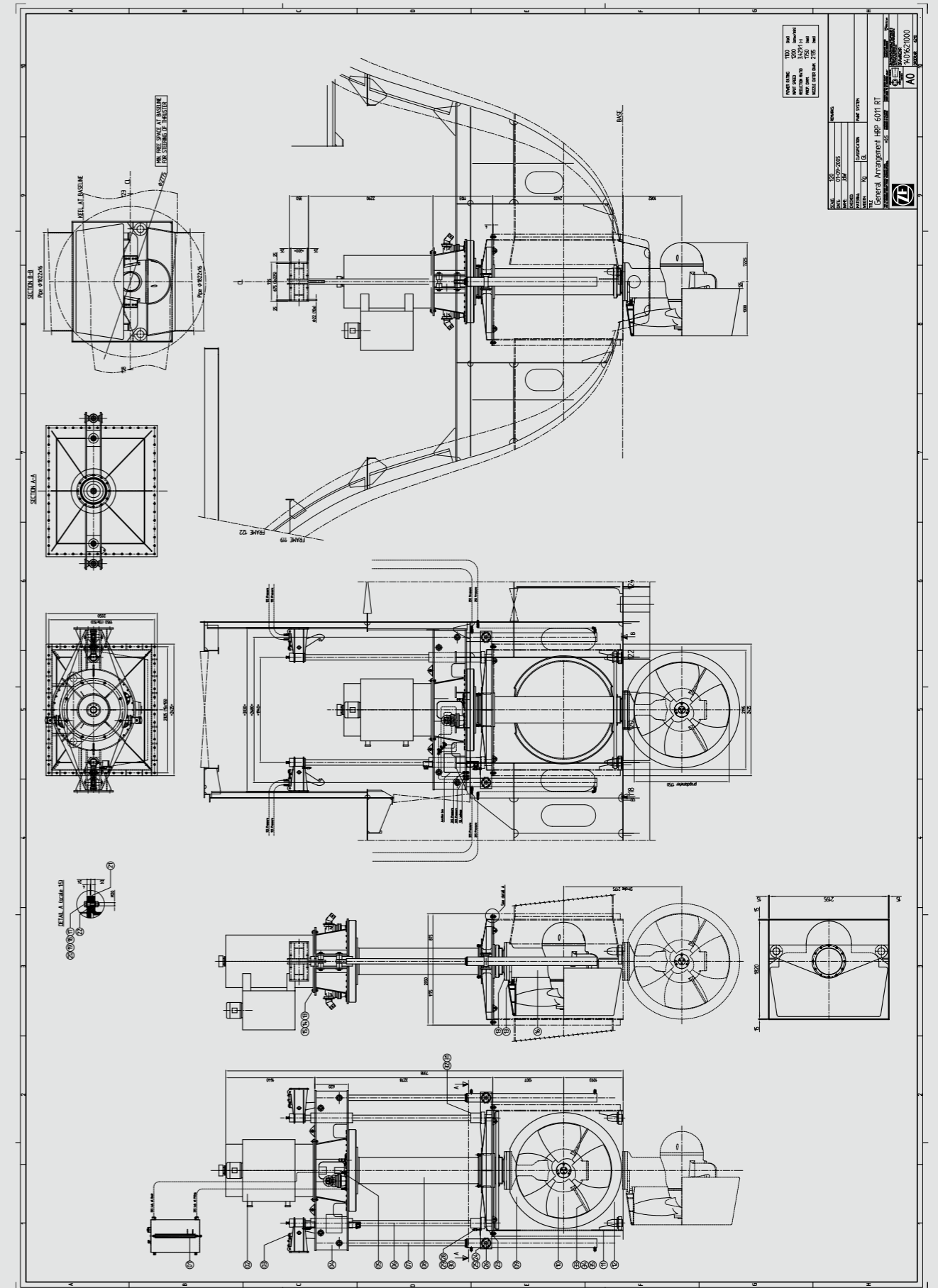


4280 GT RESEARCH VESSEL "METEOR" – GERMANY



Length o.a. : 97.50 m
Breadth : 16.50 m
Draught : 5.61 m
ZF-Reference : 6210
Model : ZF AT 6000 RT-FP
Rated power : 1100 kW at 1200 rpm
Owner : Ministry of Research and Technology – Germany

Equipped with one (1) ZF AT 6011 retractable azimuth thruster with tunnel mode.

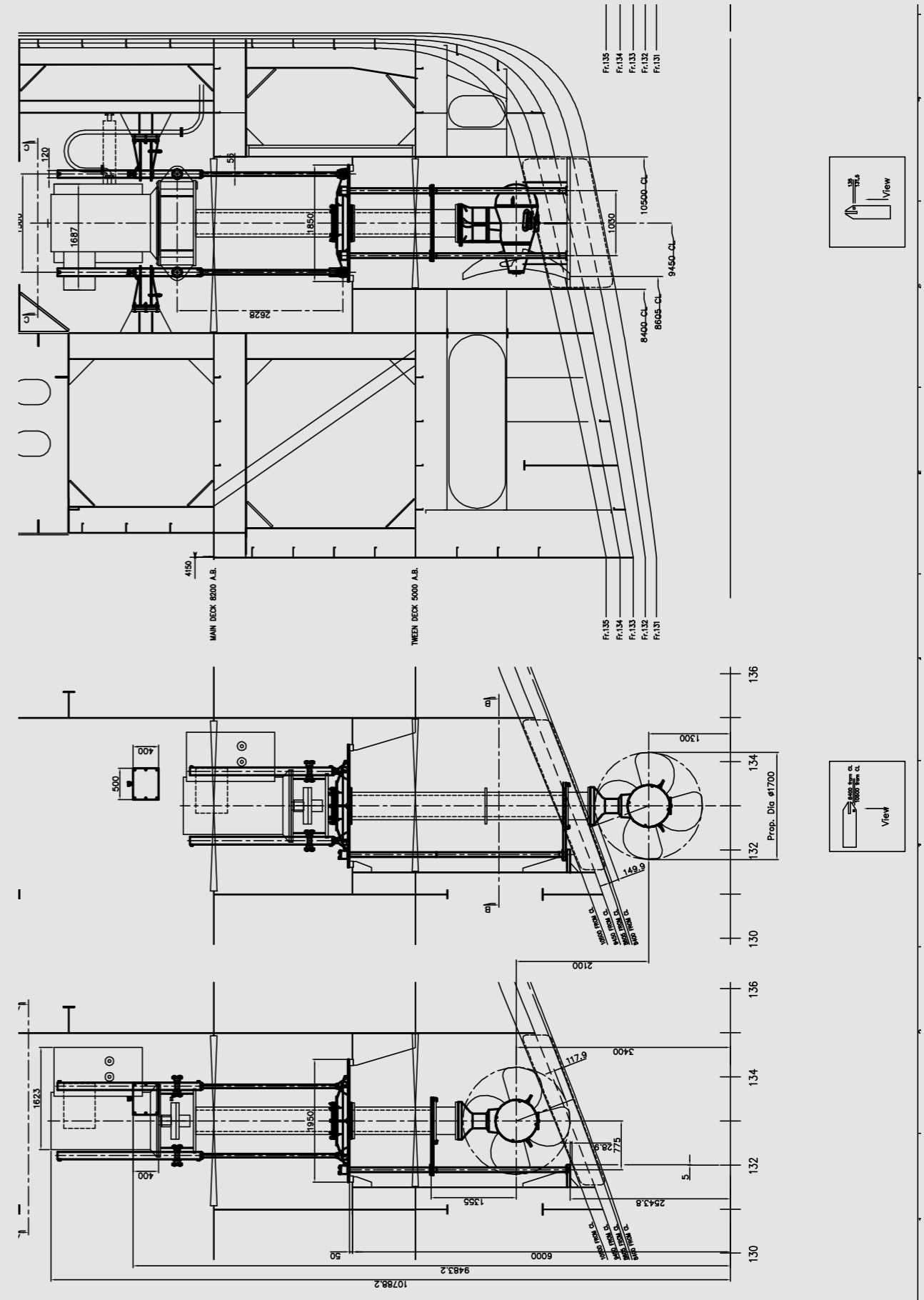


CUTTER SUCTION DREDGER "AMBIORIX" – BELGIUM



Length o.a. : 123.80 m
Breadth : 25.20 m
Draught : 8.20 m
ZF-Reference : 11499
Model : ZF AT 5000 RT-FP
Rated power : 1000 kW at 1650 rpm
Supplied to : IHC Dredgers B.V. – Netherlands
Owner : Deme N.V. – Belgium

Equipped with one (1) ZF AT 5013
 retractable azimuth thruster.

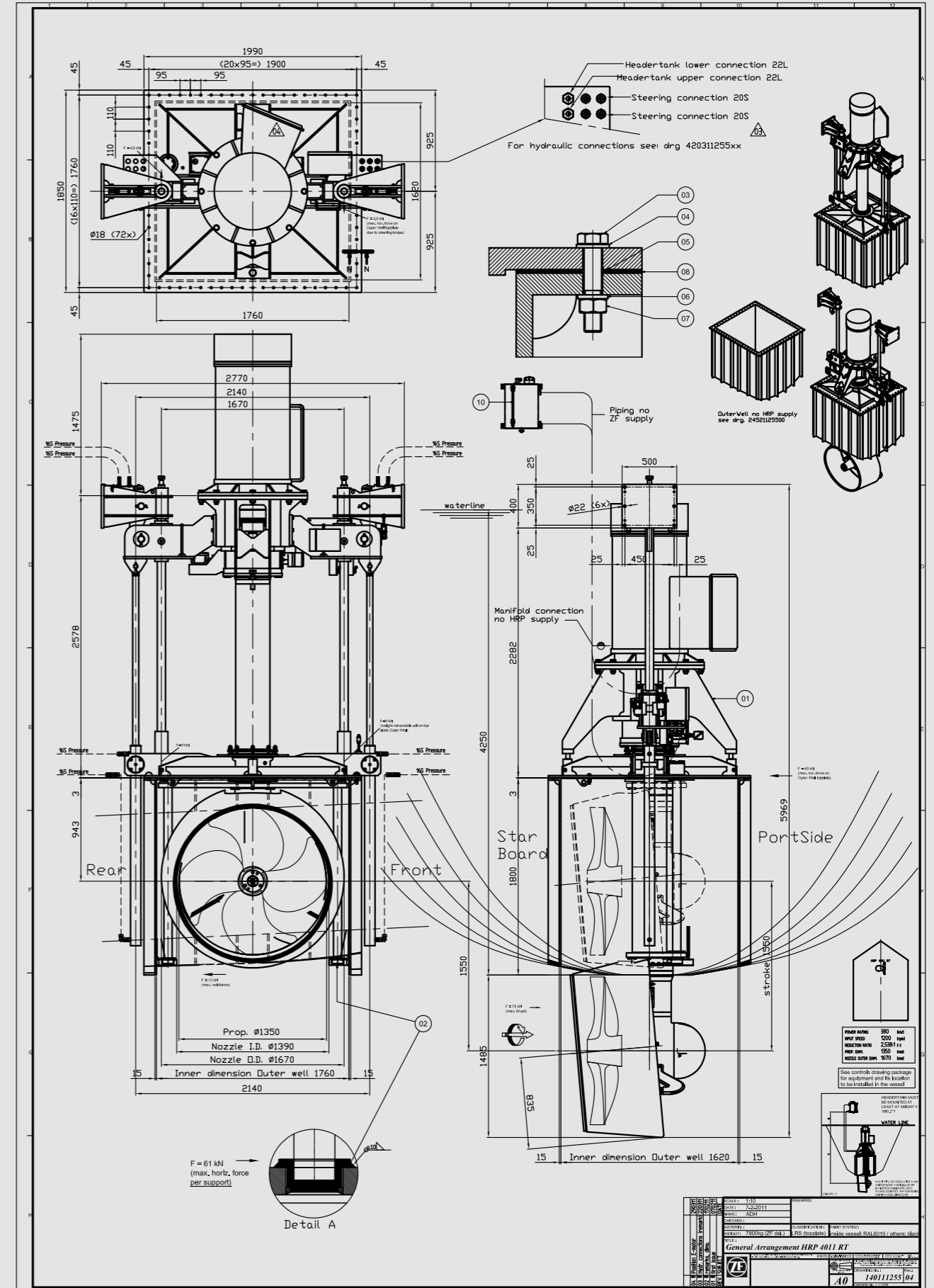


STANDBY VESSEL "GRAMPIAN DON" – SPAIN



Length o.a. : 50.70 m
 Breadth : 13.00 m
 Draught : 4.30 m
 ZF-Reference : 11255
 Model : ZF AT 4000 RT-FP
 Rated power : 380 kW at 1200 rpm
 Supplied to : Astilleros Balenciaga – Spain
 Owner : North Star Shipping – Spain

Equipped with one (1) ZF AT 4011 retractable azimuth thruster.

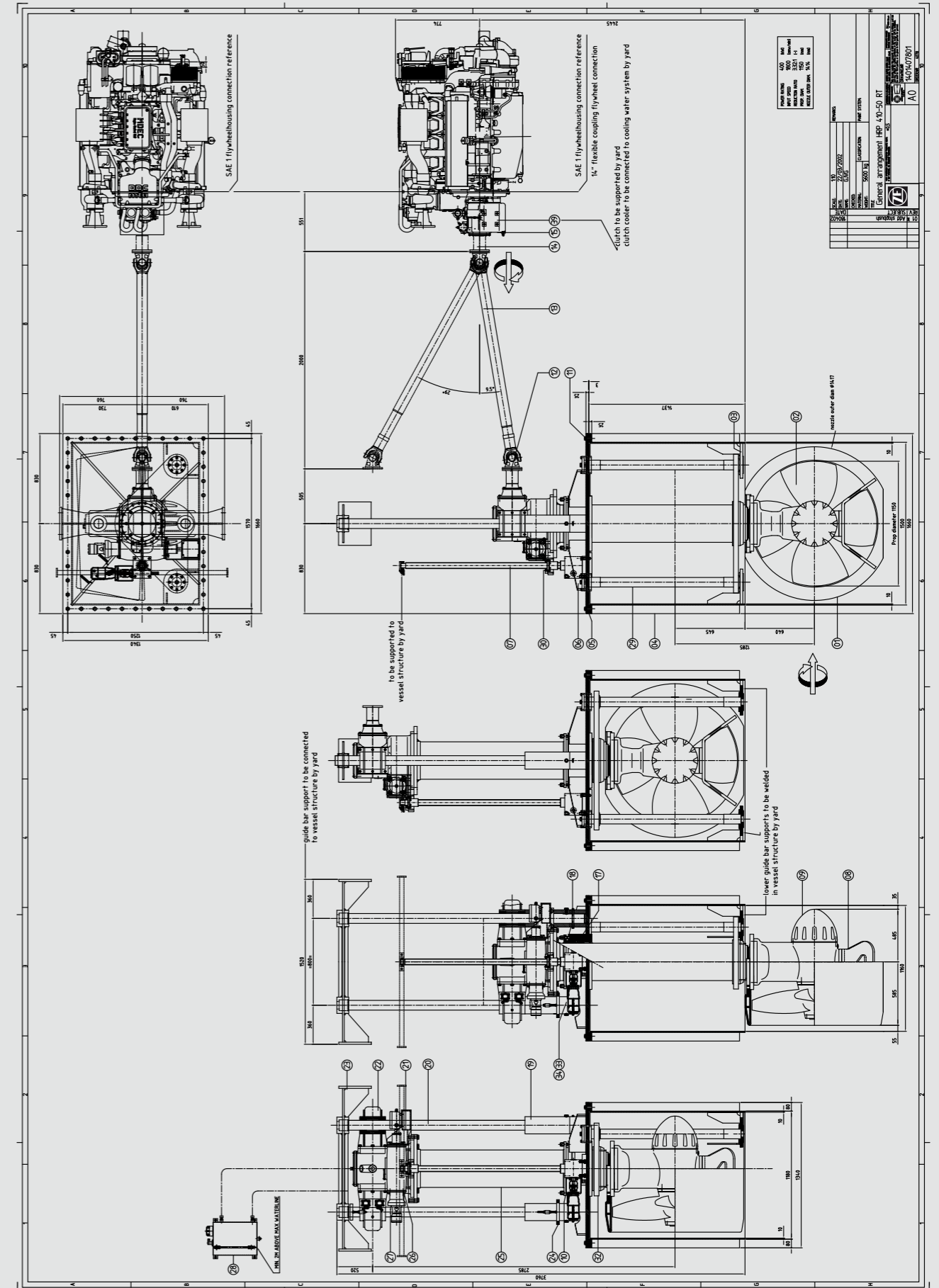


187M RIVER GOING VESSEL "CAMARO I & II" – NETHERLANDS



Length o.a. : 187.00 m
Breadth : 11.45 m
Draught : 3.00 m
ZF-Reference : 4078
Model : ZF AT 400 RT-FP
Rated power : 400 kW at 1800 rpm
Supplied to : Scheepswerf en Machinefabriek Gebr. Kooiman
Owner : Camaro B.V. – Netherlands

Equipped with one (1) ZF AT 410-50
 retractable azimuth thruster.

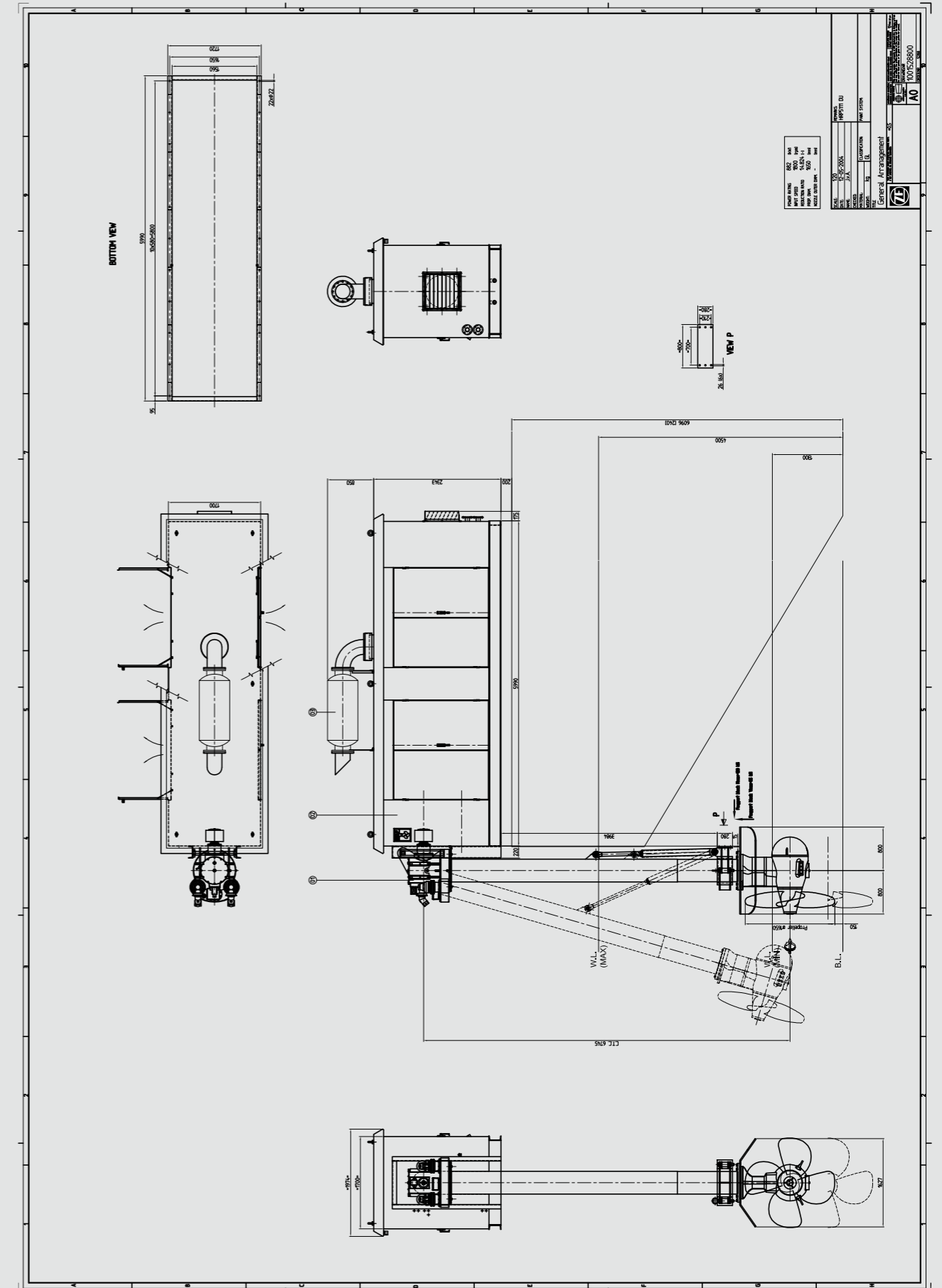


76M TRANSPORT VESSEL "TROPICAL DAWN" – SINGAPORE



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.

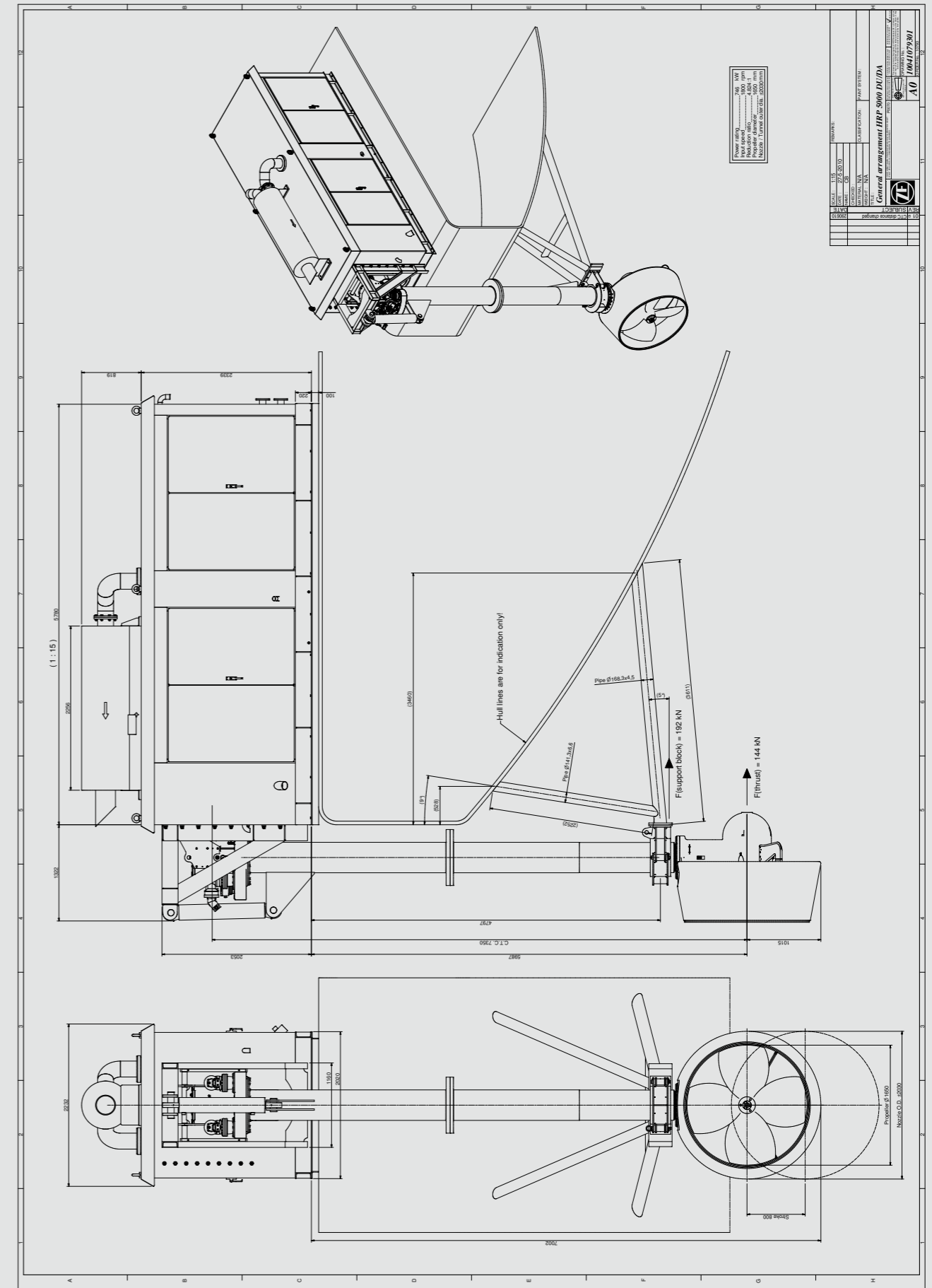


91M BARGE "ENERGY 7001" – NIGERIA



Length o.a. : 91.00 m
 Breadth : 20.00 m
 Draught : 3.90 m
 ZF-Reference : 10794
 Model : ZF AT 5000 DM-FP
 Rated power : 746 kW at 1800 rpm
 Supplied to : Maritec NV – Belgium
 Owner : Maritec NV – Belgium

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

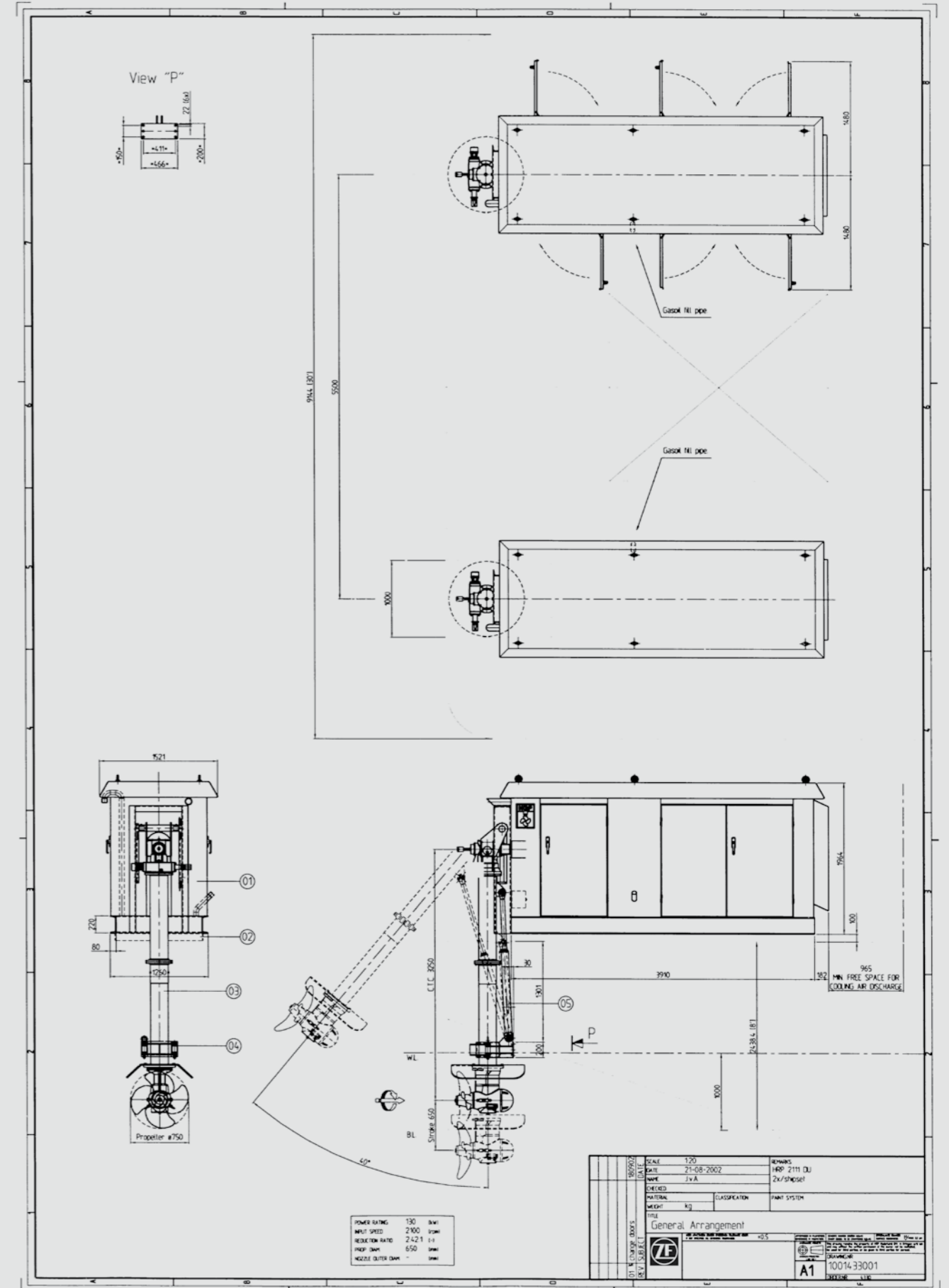


CEMENT CARRIERS "SHUTTEL 1 & 2" – BELGIUM



Length o.a. : 27.00 m
 Breadth : 9.15 m
 Draught : 1.00 m
 ZF-Reference : 4330
 Model : ZF AT 2000 DM-FP
 Rated power : 130 kW at 1800 rpm
 Supplied to : BESIX – Belgium

Equipped with four (2x2) ZF AT 2111
 deck mounted azimuth thrusters.

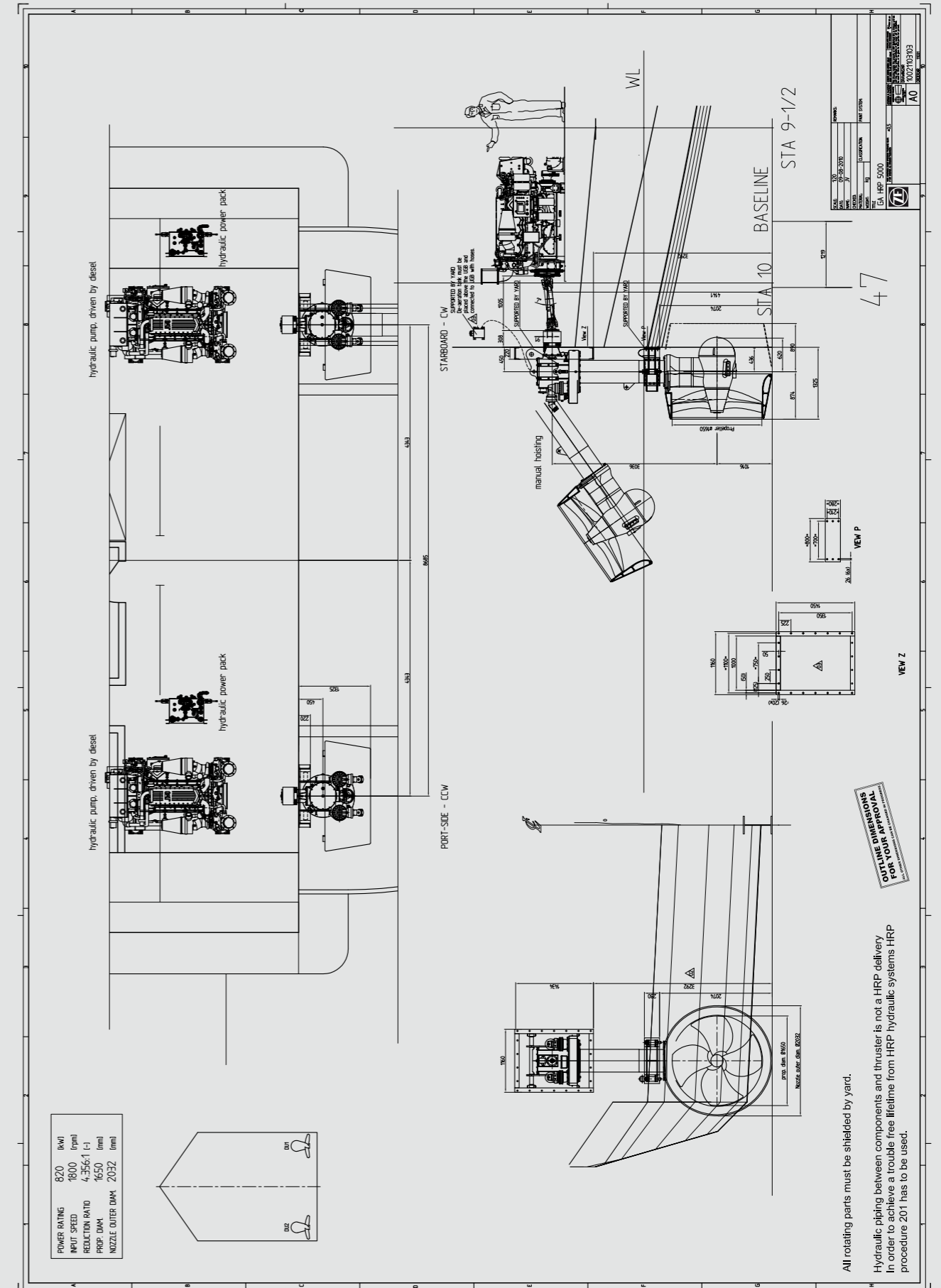


RIVER CRUISE VESSEL "QUEEN OF THE WEST" – USA



Length o.a. : 67.45 m
 Breadth : 16.00 m
 Draught : 2.50 m
 ZF-Reference : 11031
 Model : ZF AT 5000 SM-FP
 Rated power : 820 kW at 1800 rpm
 Owner : River Cruise Vessel – USA

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

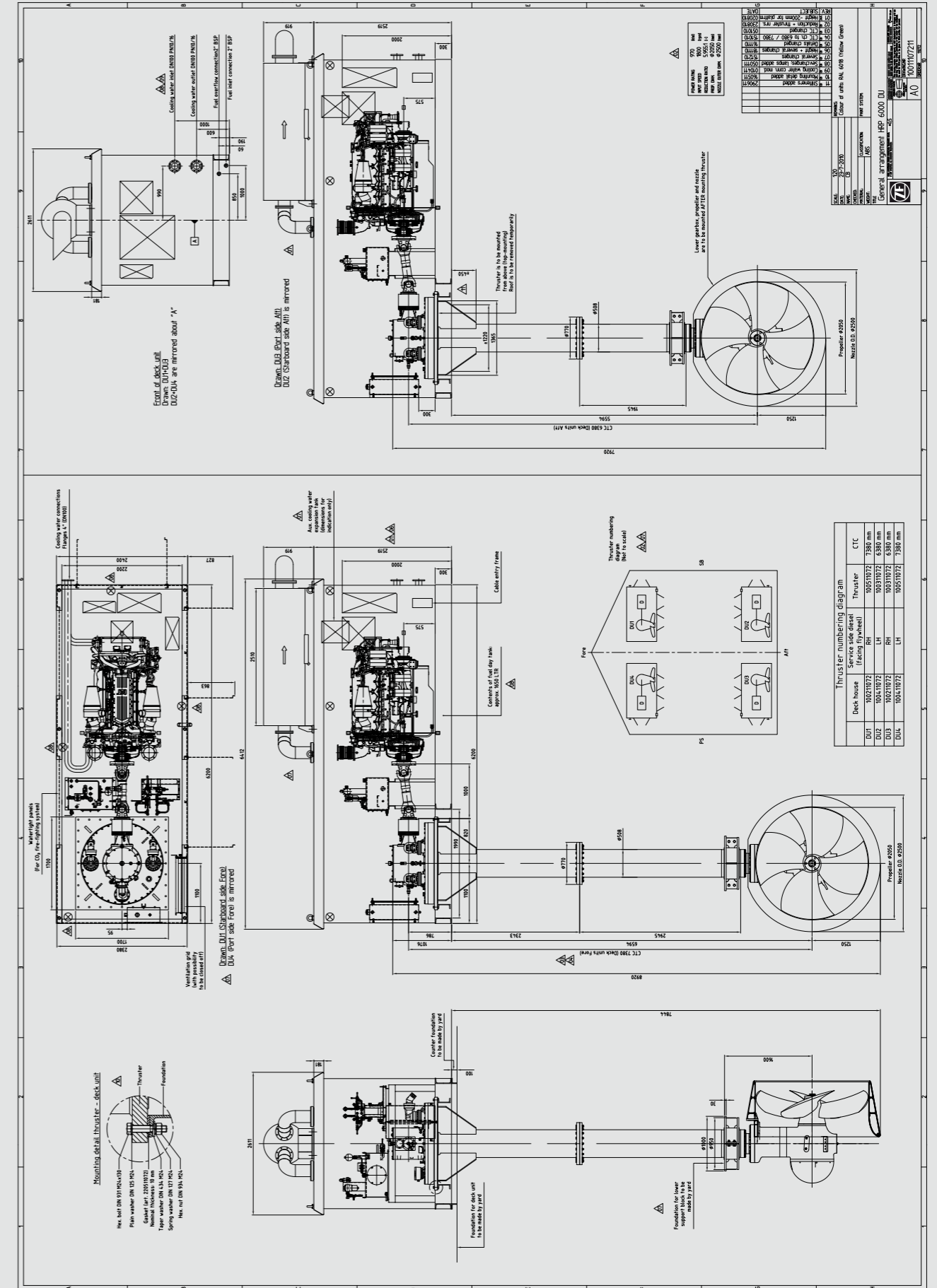


HEAVY LIFT JACK UP "GOLIATH" – LUXEMBOURG



Length o.a. : 55.50 m
 Breadth : 32.20 m
 Draught : 3.60 m
 ZF-Reference : 11072
 Model : ZF AT 6000 DM-FP
 Rated power : 970 kW at 1800 rpm
 Owner : Geo Sea – Luxembourg

Equipped with four (4) ZF 6111 deck mounted azimuth thrusters complete with Multi Thruster Control System.

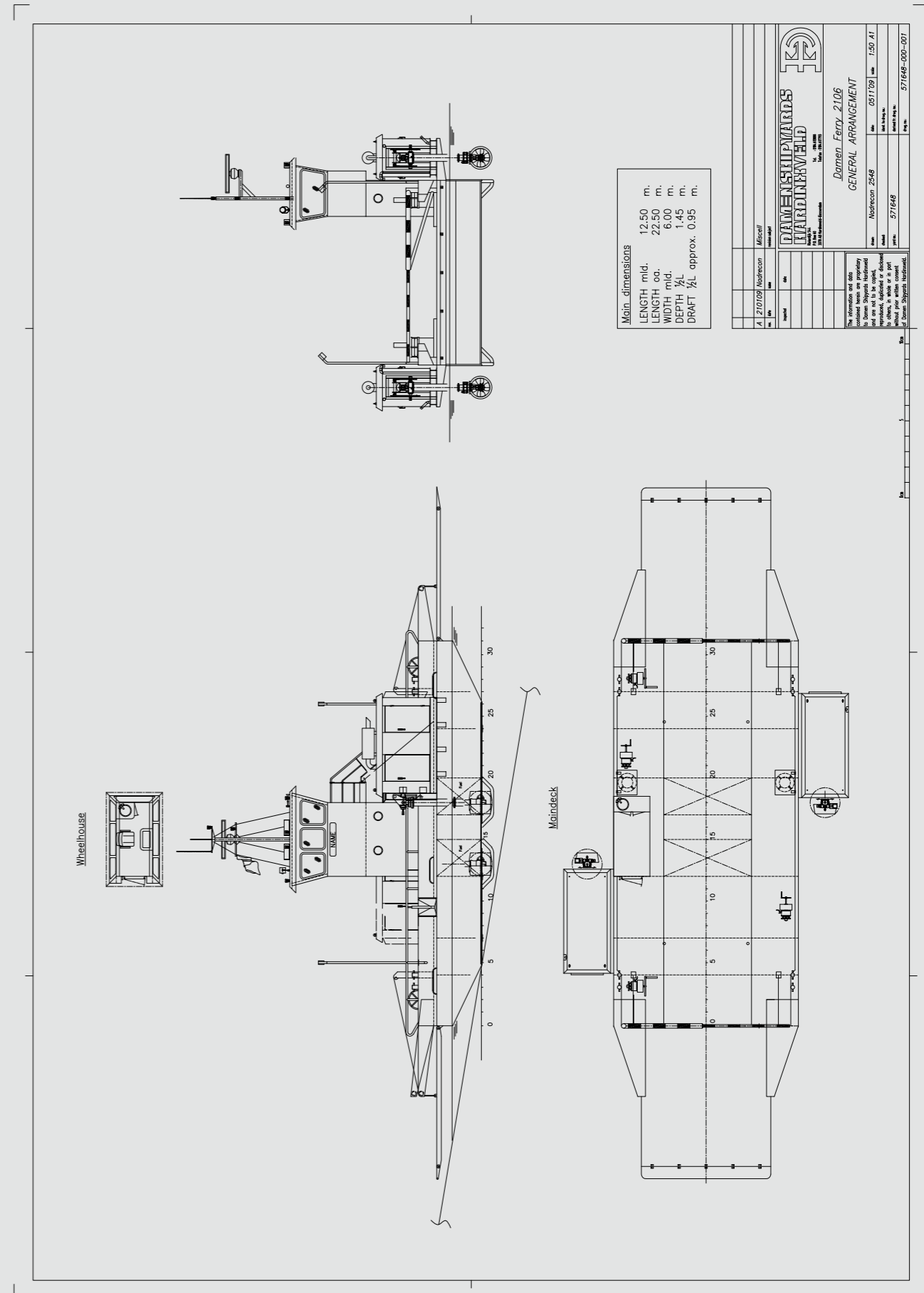


DAMEN MOTOR FERRY 2106 "GOLUBICA" – VUKOVAR, CROATIA



Length o.a. : 22.50 m
Breadth : 6.00 m
Draught : 1.45 m
ZF-Reference : 10552
Model : ZF AT 2000 DM-FP
Rated power : 130 kW at 1900 rpm
Supplied to : Damen Shipyard Hardinxveld – Netherlands

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



LAKE FERRY "PEARL" – UGANDA



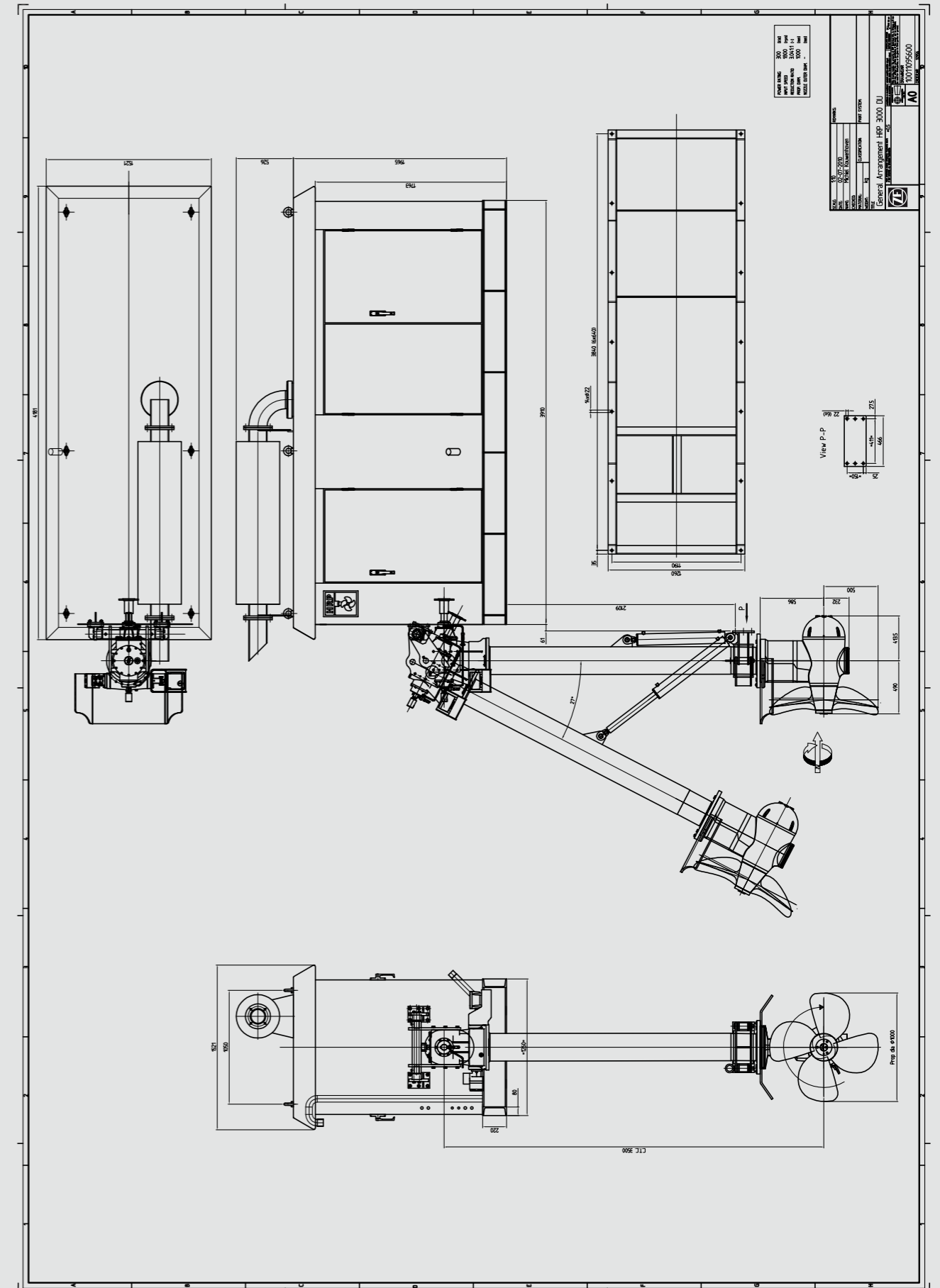
ZF-Reference : 10956

Model : ZF AT 3000 DM-FP

Rated power : 300 kW at 1800 rpm

Supplied to : Songoro Marine Transport Boatyard – Tanzania

Equipped with two (2) ZF AT 3111
deck mounted azimuth thrusters, diesel driven

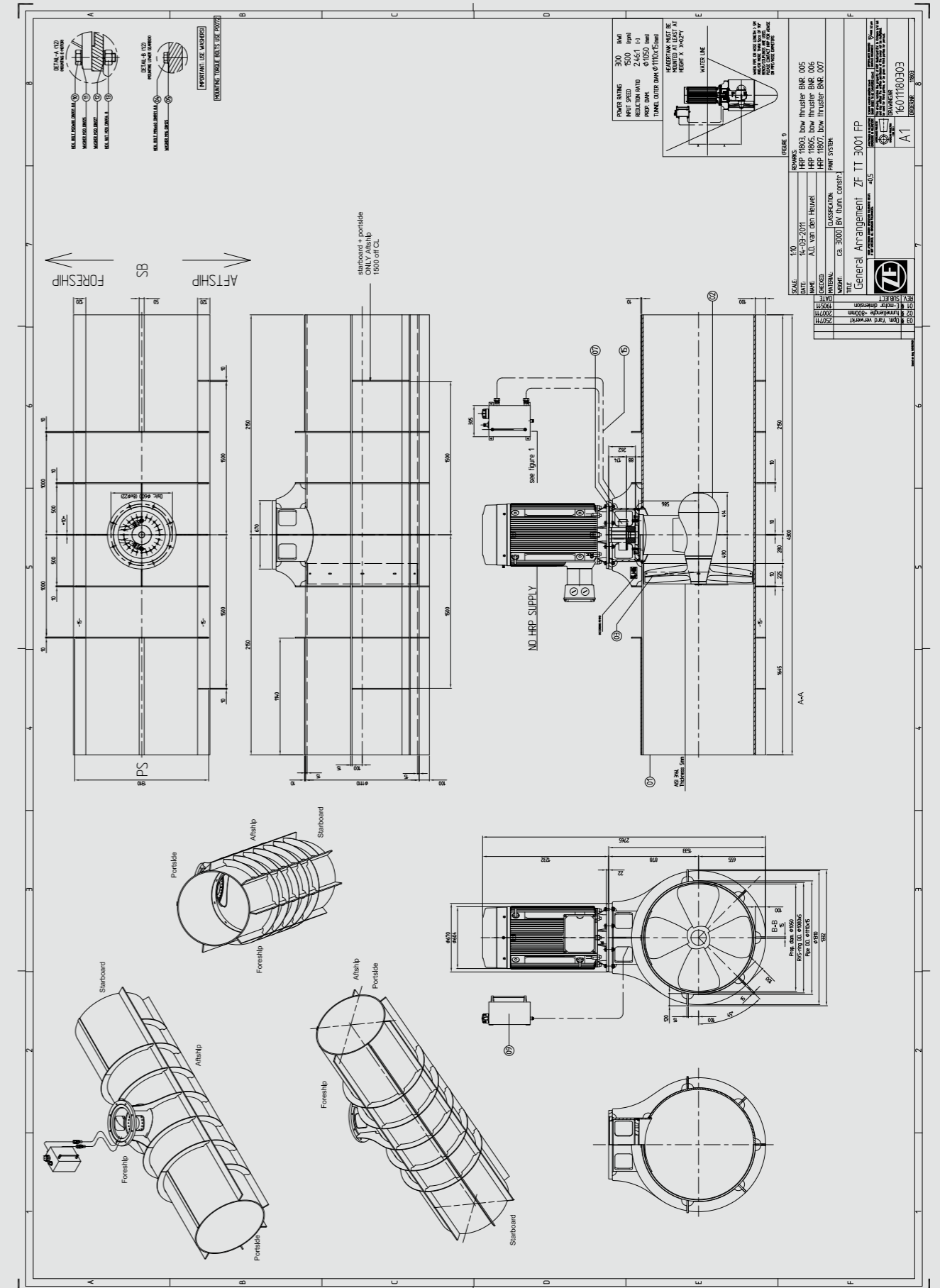


HEAVY CARGO SHIP "OCEANIC" – NETHERLANDS



Length o.a. : 92.90 m
Breadth : 15.30 m
Draught : 5.60 m
ZF-Reference : 11803
Model : ZF TT 3000 FP
Rated power : 300 kW at 1500 rpm
Supplied to : Hartman Marine Shipbuilding – Netherlands
Owner : Global Seatrade – Netherlands

Equipped with two (2) ZF TT 3001 tunnel thrusters, bow and stern.

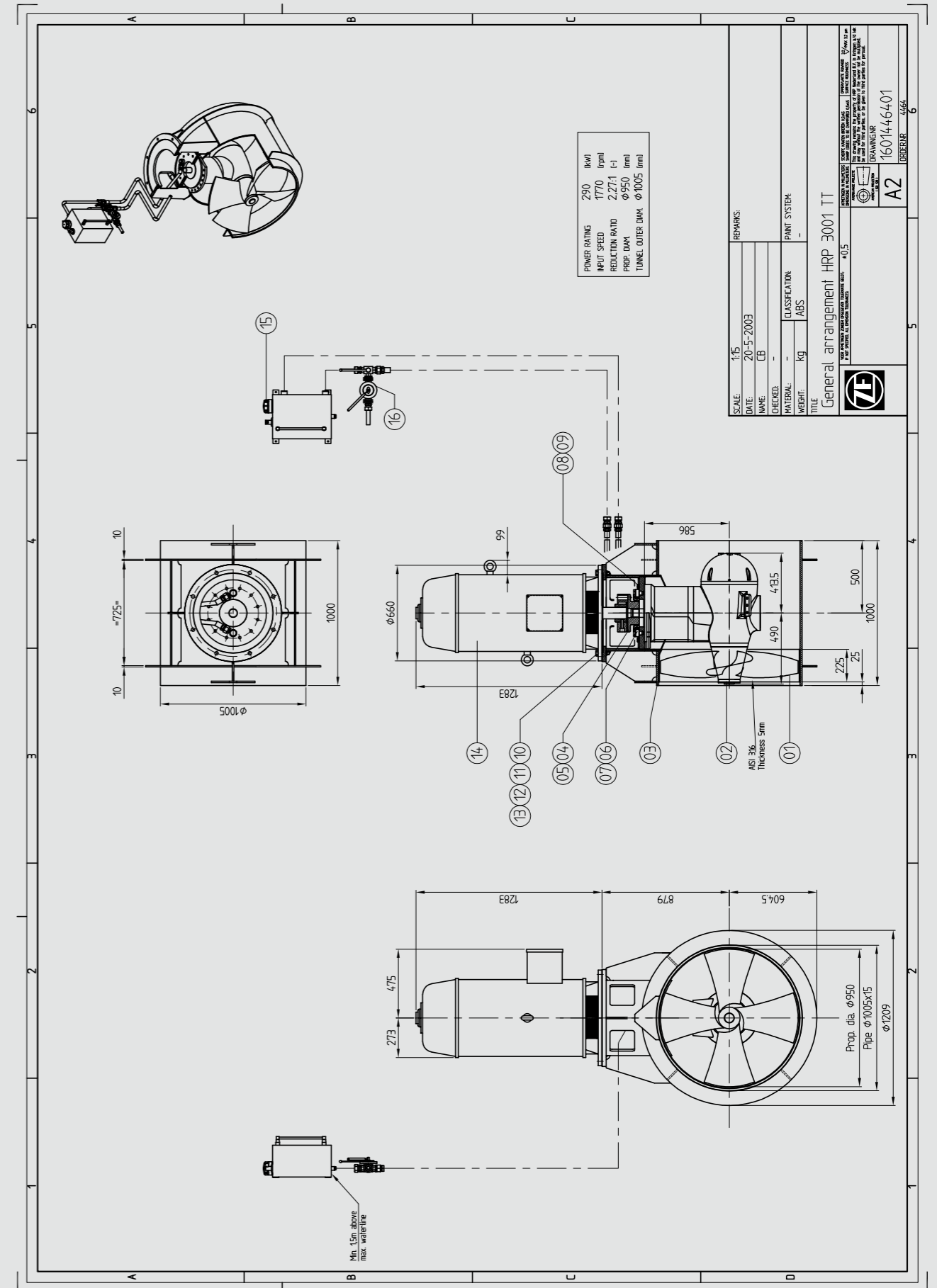


96M FERRY "AQUA JEWEL" – GREECE



Length o.a. : 96.00 m
 Breadth : 16.80 m
 Draught : 4.40 m
 ZF-Reference : 5941
 Model : ZF TT 3000 FP
 Rated power : 250 kW at 1800 rpm
 Supplied to : Alpha Ferries – Greece

Equipped with one (1) electric driven
 ZF TT 3001 tunnel thruster.

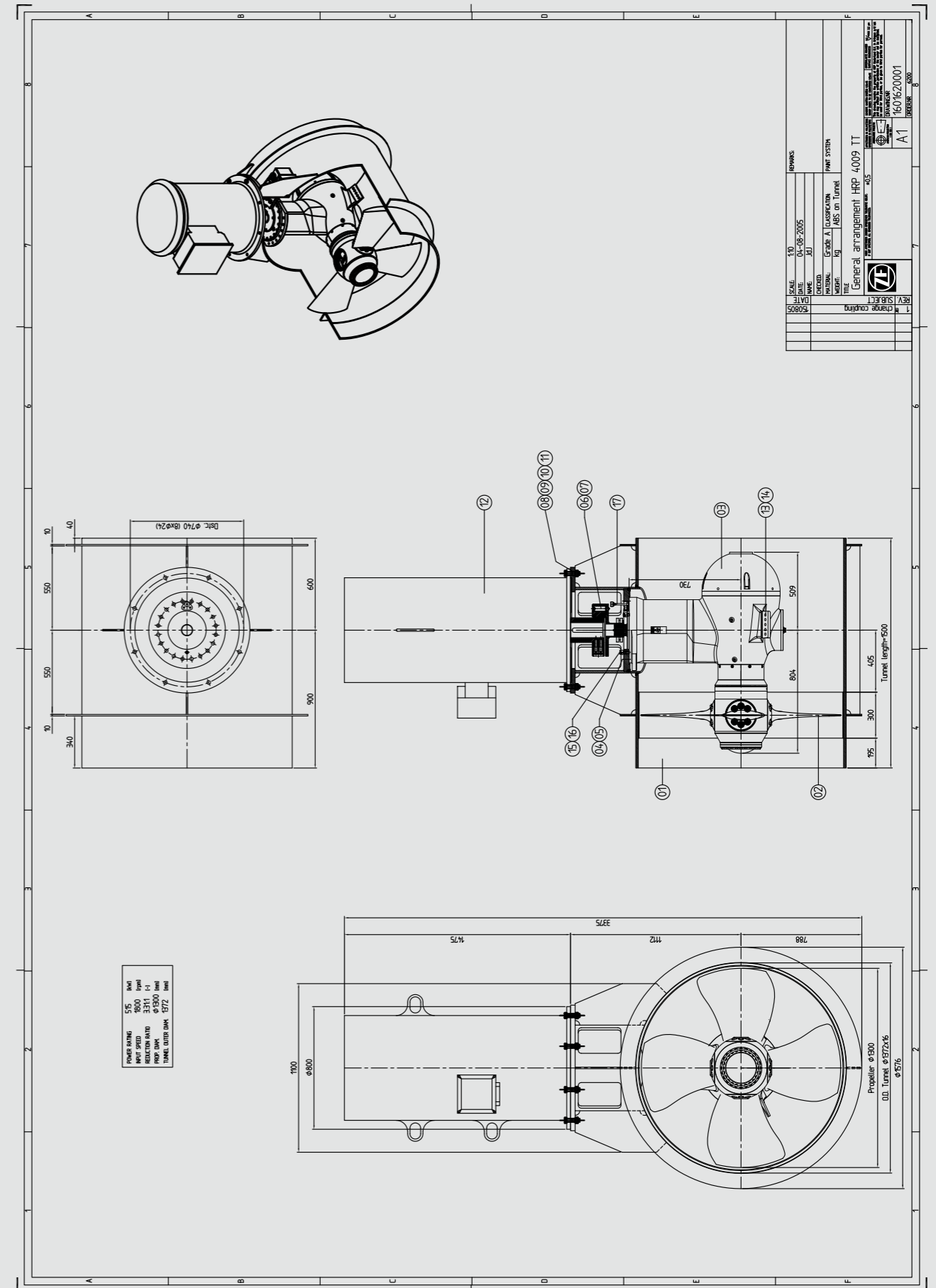


60M SUPPLY VESSEL "TANJUNG PINANG 1" – MALAYSIA



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.

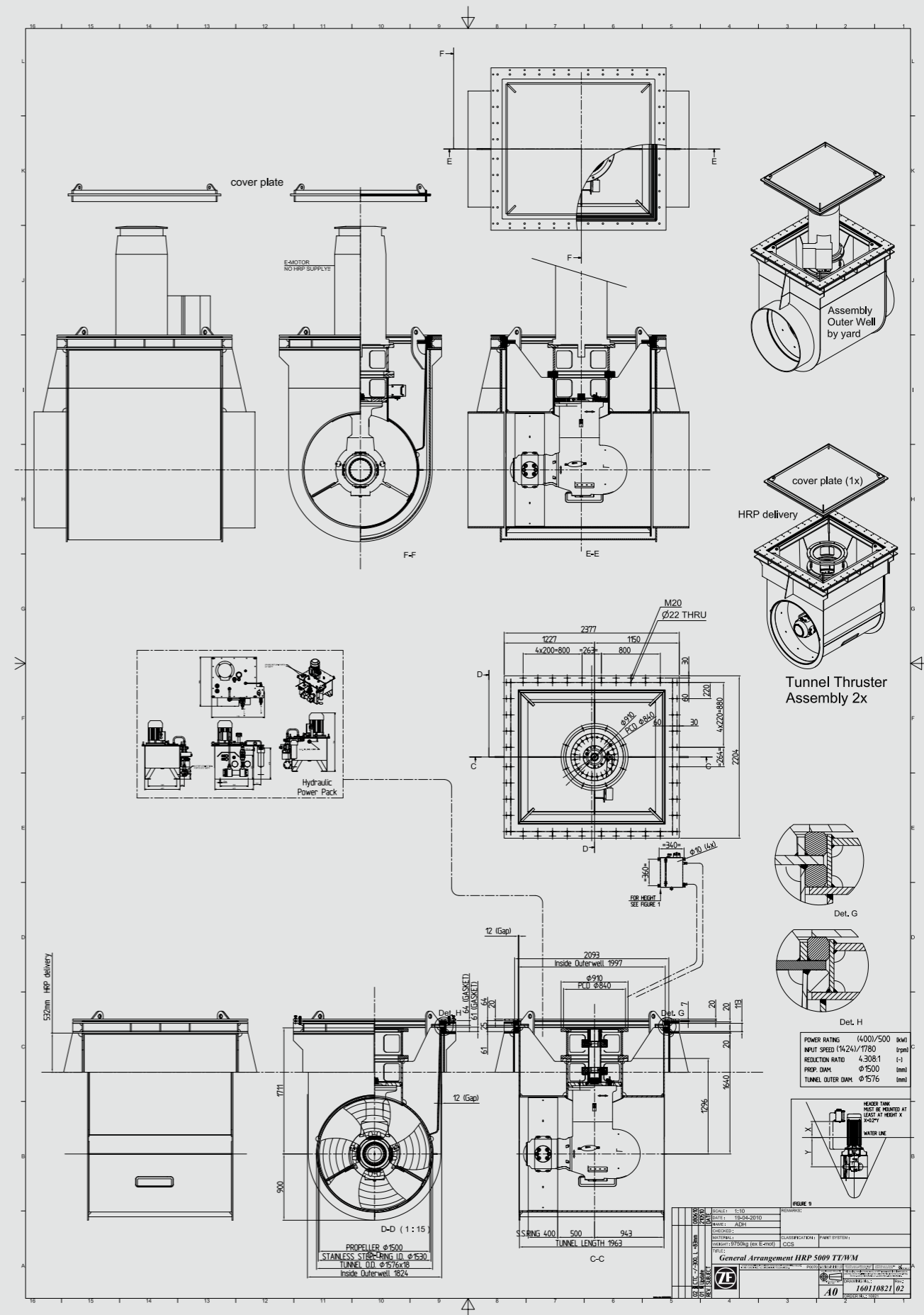


12.000M³ SUCTION HOPPER DREDGER "CHANG JIANG KOU 01" - CHINA



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.

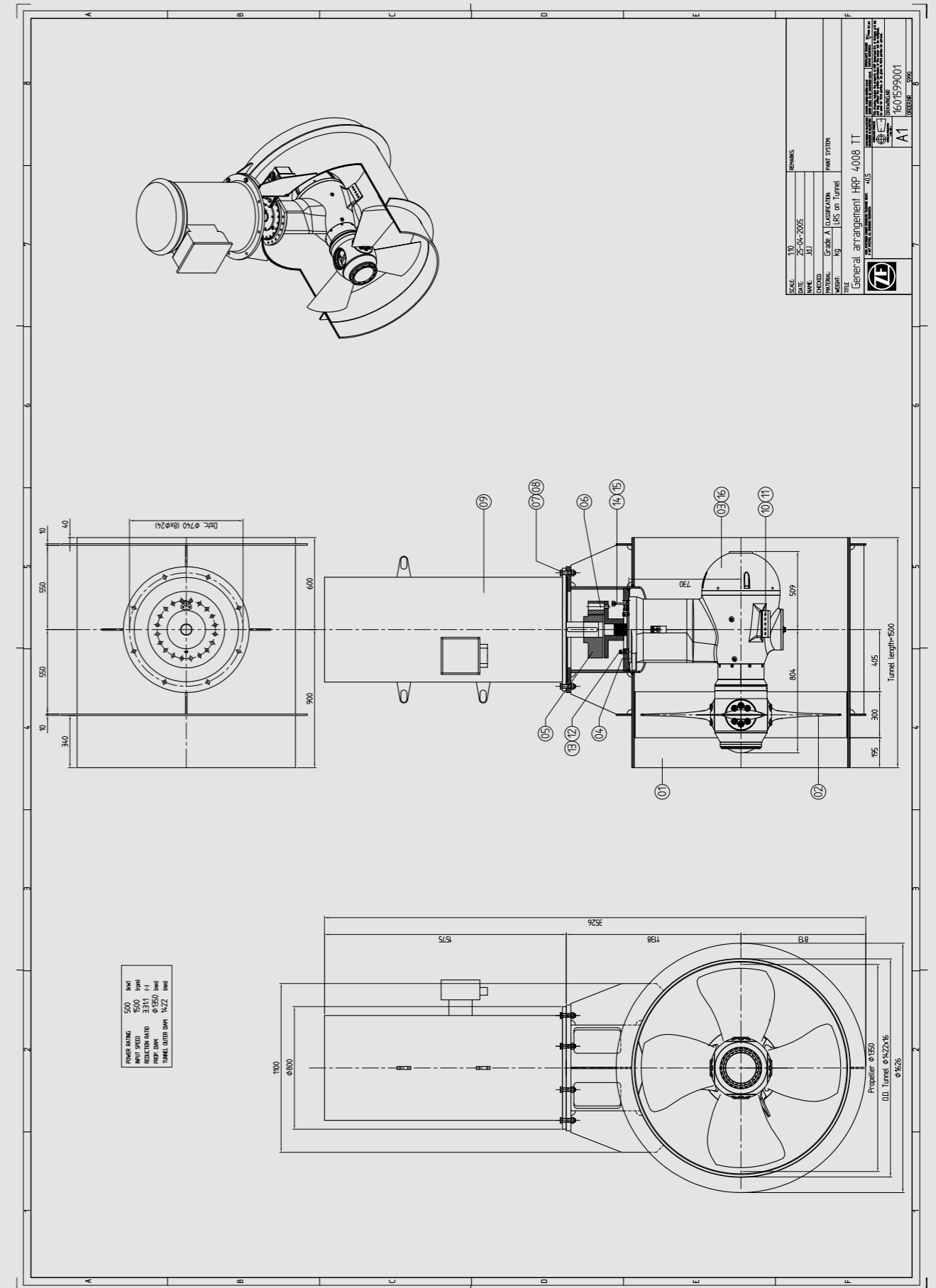


5400 HP AHSV "MORRISON TIDE" – USA



Length o.a. : 64.00 m
Breadth : 14.00 m
Draught : 4.00 m
ZF-Reference : 5266
Model : ZF TT 4000 CP
Rated power : 400 kW at 1800 rpm
Supplied to : P.T. Batamec Shipyard – Indonesia
Owner : Tidewater – USA

Equipped with two (2) electric driven ZF TT 4008 controllible pitch tunnel thrusters (bow and stern).

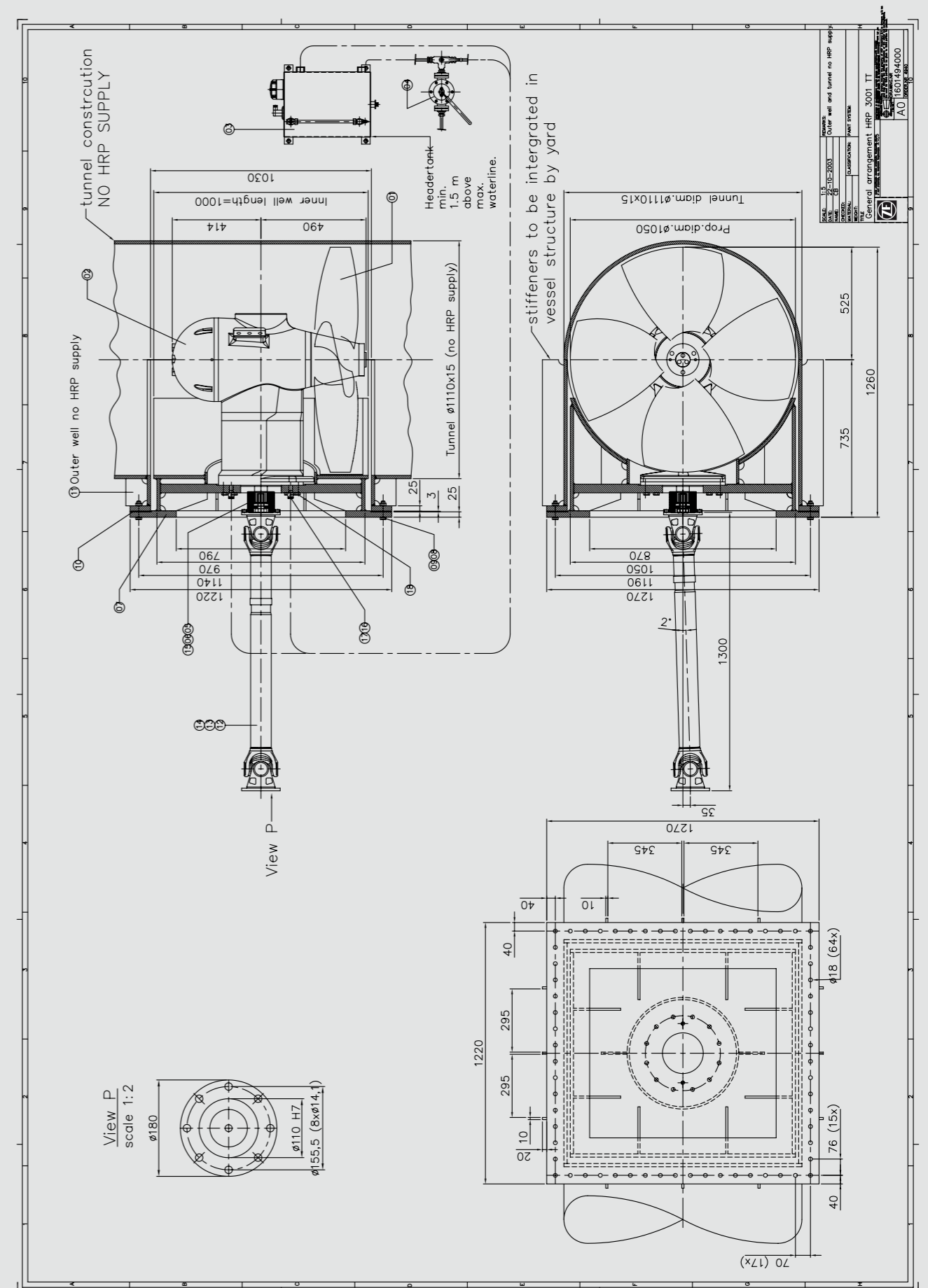


50M DECK CARGO VESSEL "MERLIN III" – ST. VINCENT & GRENADINES



Length o.a. : 49.80 m
Breadth : 10.90 m
Draught : 2.19 m
ZF-Reference : 4940
Model : ZF TT 3000 FP
Rated power : 254 kW at 1218 rpm
Supplied to : Gelibolu Shipyard – Turkey
Owner : Arabella Shipping Ltd – Kingstown

Equipped with two (2) diesel driven
 ZF TT 3001 tunnel thrusters.

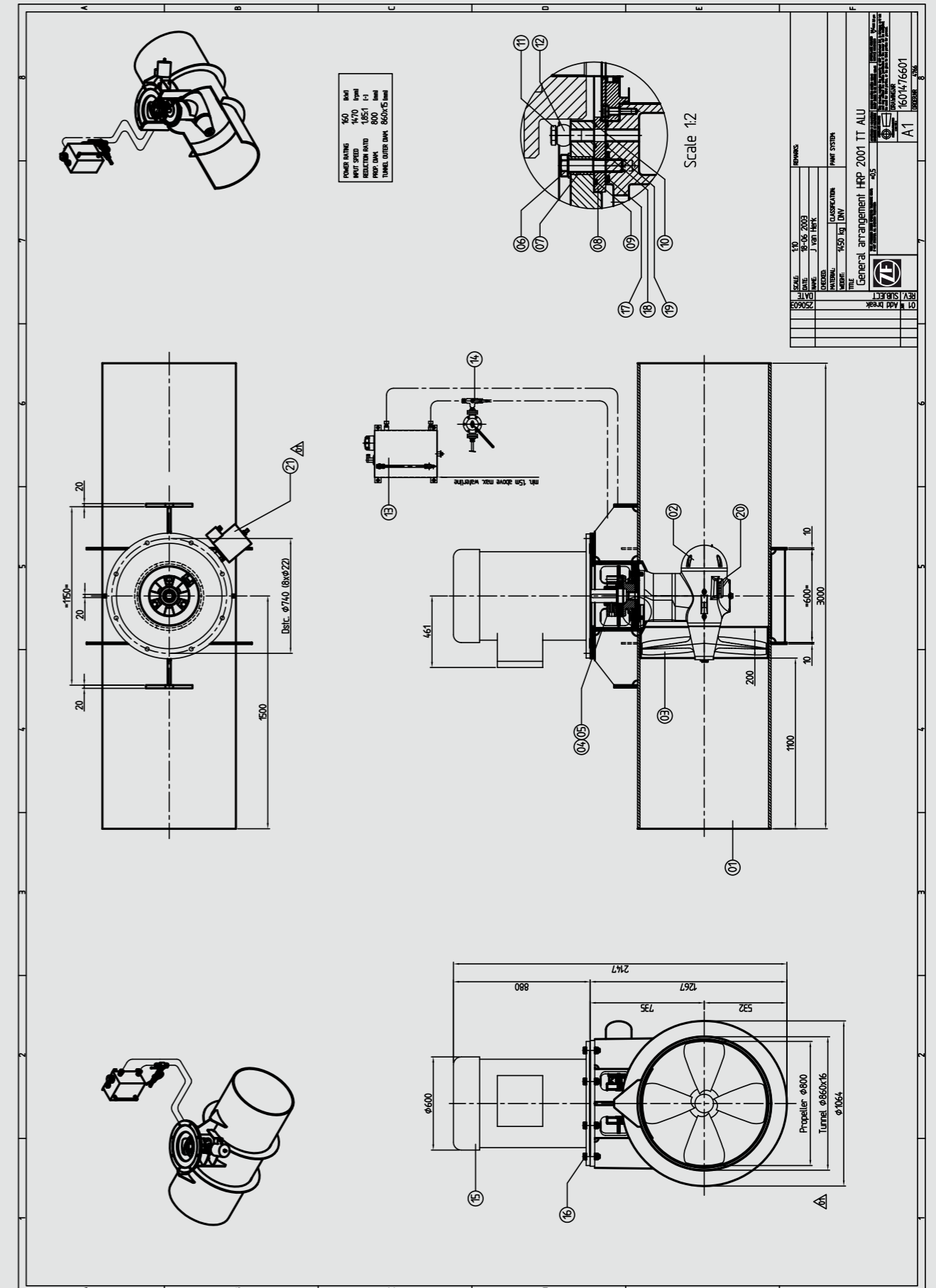


CATAMARAN FERRYBOAT "SPIRIT OF KANGAROO ISLAND" – AUSTRALIA



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.

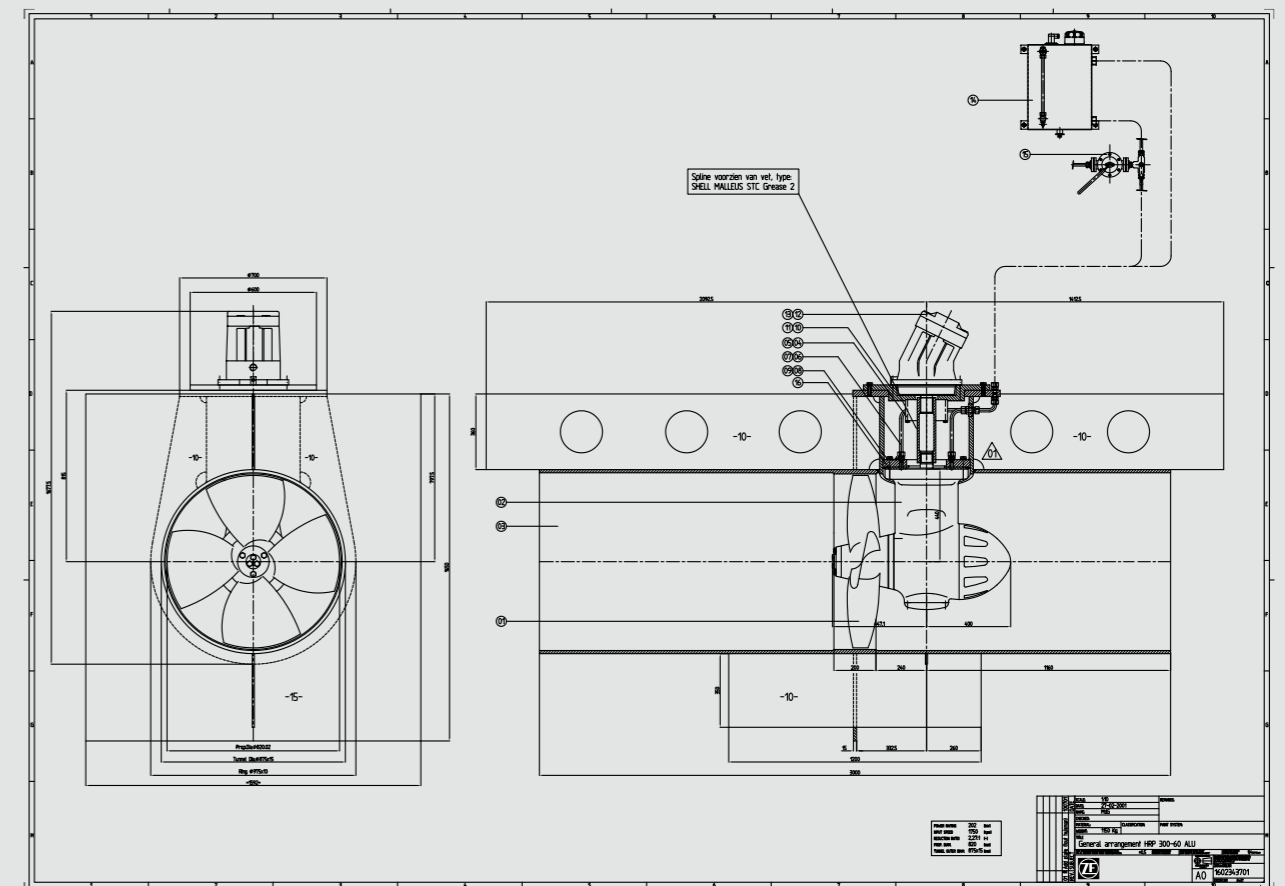
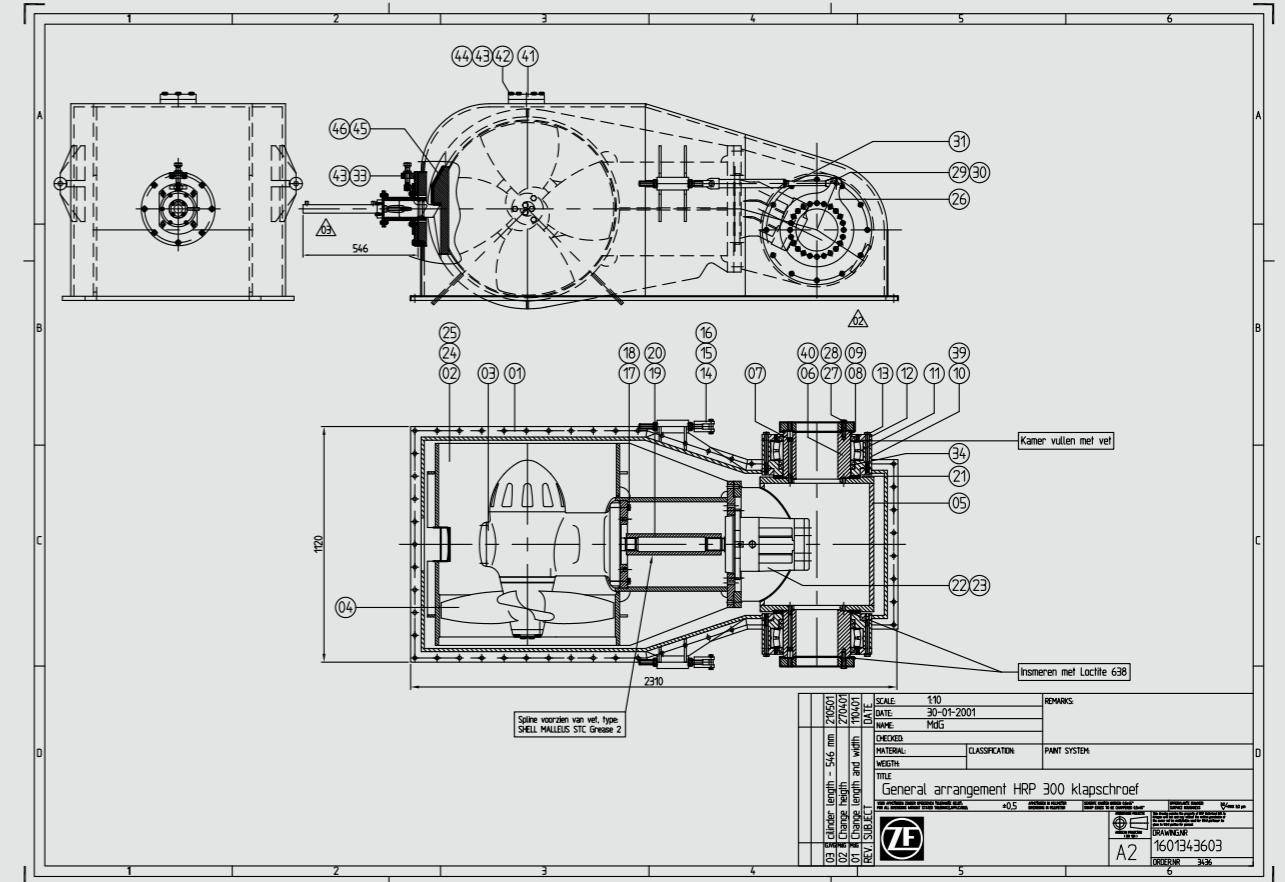


90M THREE MAST SCHOONER "ATHENA" – NETHERLANDS



Length : 90.00 m
Breadth : 12.20 m
Draught : 5.50 m
ZF-Reference : 3436
Model : HRP 300-60
Rated power : 220 kW
Supplied to : Royal Huisman Shipyard – Netherlands

Equipped with two (2) hydraulic driven
 HRP 300-60 bow and stern tunnel thrusters.



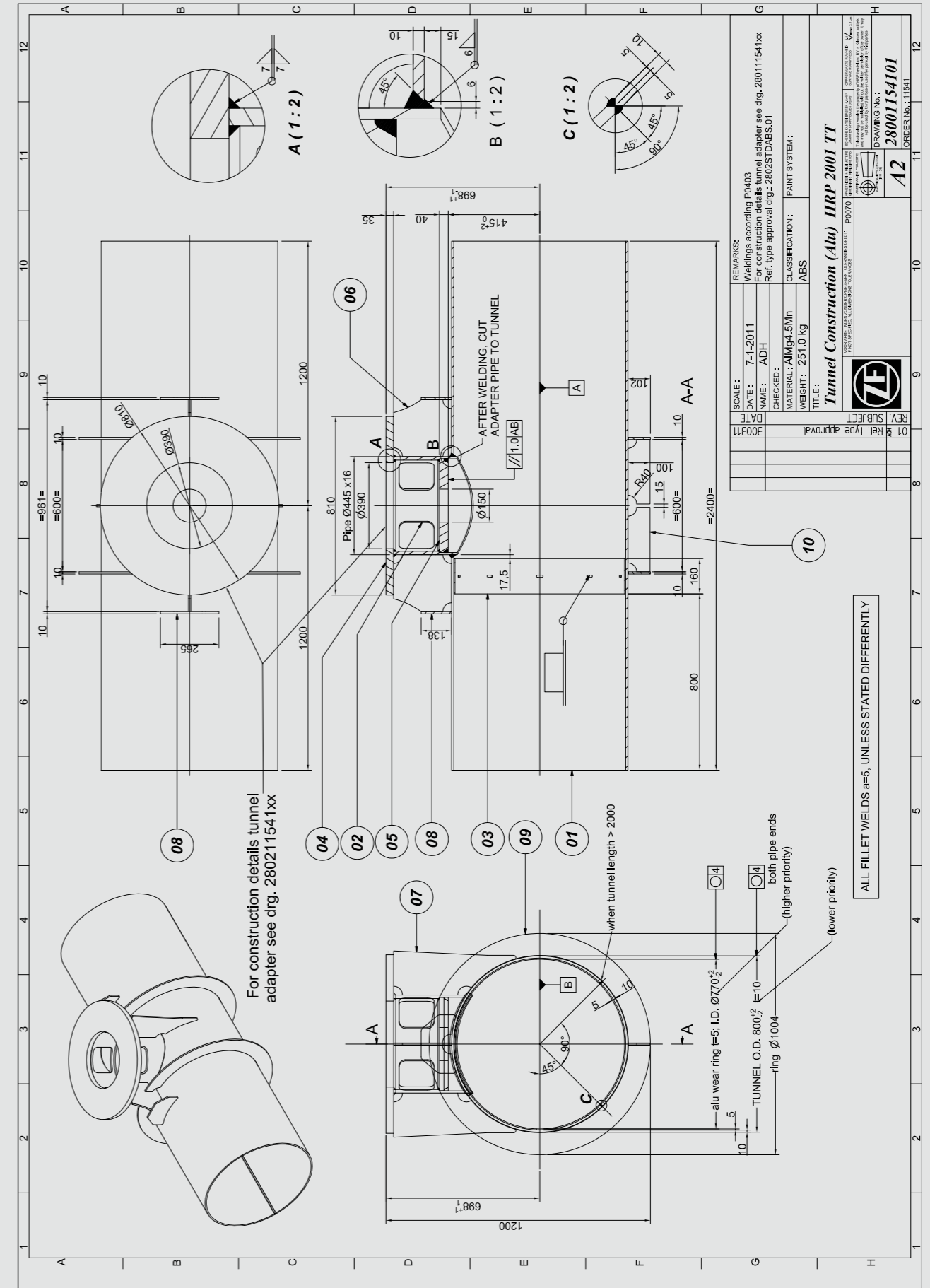
65M ALUMINIUM YACHT "GALATICA STAR" – NETHERLANDS



The revolutionary 65m Fast Displacement Galactica Star
Photo credits: Jeff Brown – courtesy of Heesen Yacht

Length o.a. : 65.00 m
 Breadth : 11.30 m
 Draught : 3.10 m
 ZF-Reference : 11541
 Model : ZF TT 2000 ALU-FP
 Rated power : 165 kW at 1500 rpm
 Supplied to : Heesen Yachts – Netherlands

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



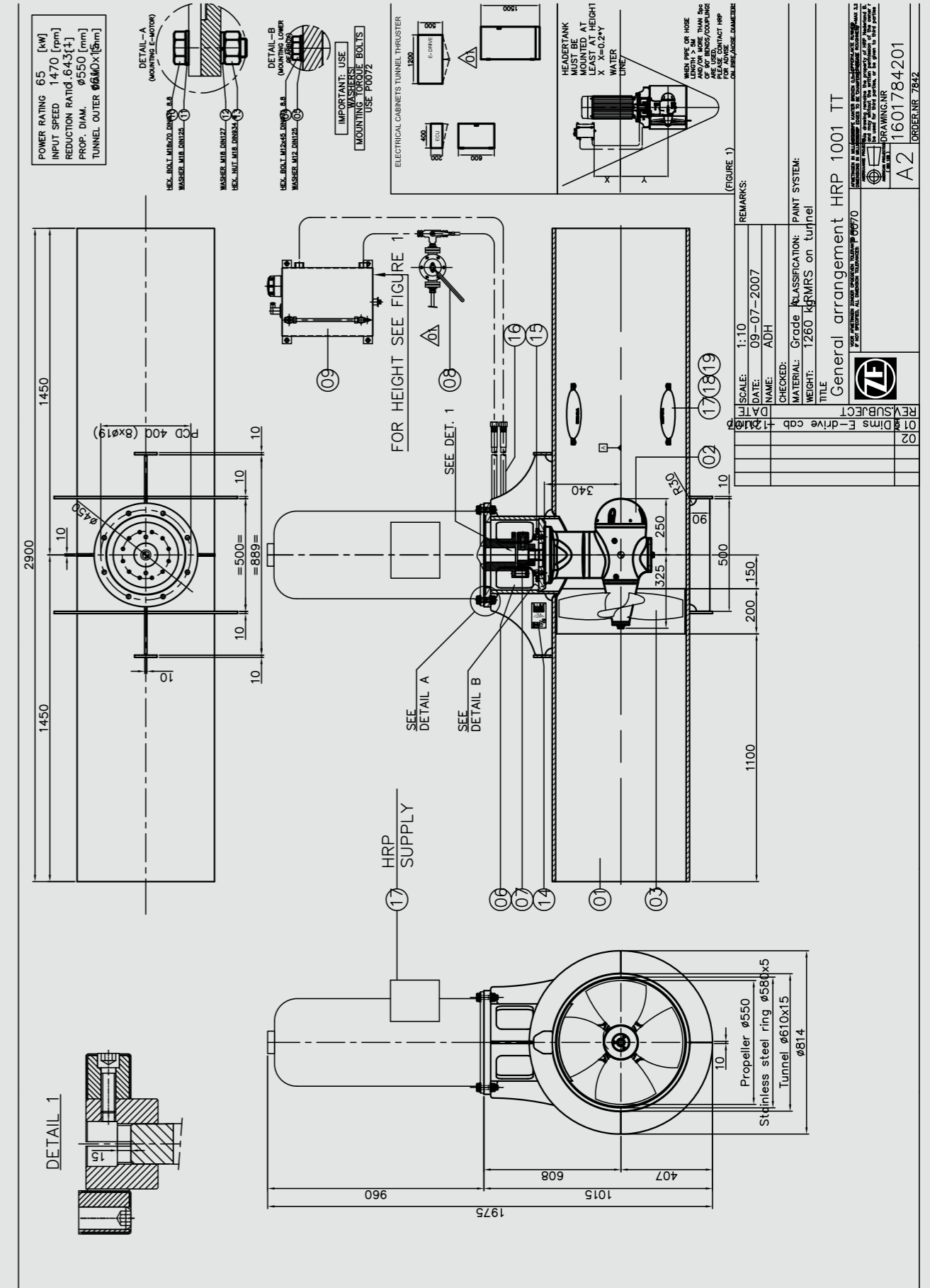
ALL FILLET WELDS a=5, UNLESS STATED DIFFERENTLY

MOTOR MEGA YACHT "ULBA" – RUSSIA



Length o.a. : 48.40 m
 ZF-Reference : 7842
 Model : ZF TT 1000 FP
 Rated power : 65 kW
 Supplied to : Samussy Shipbuilding – Russia
 Design : Proline – Ukraine

Equipped with one (1) ZF TT 1001 tunnel thruster.

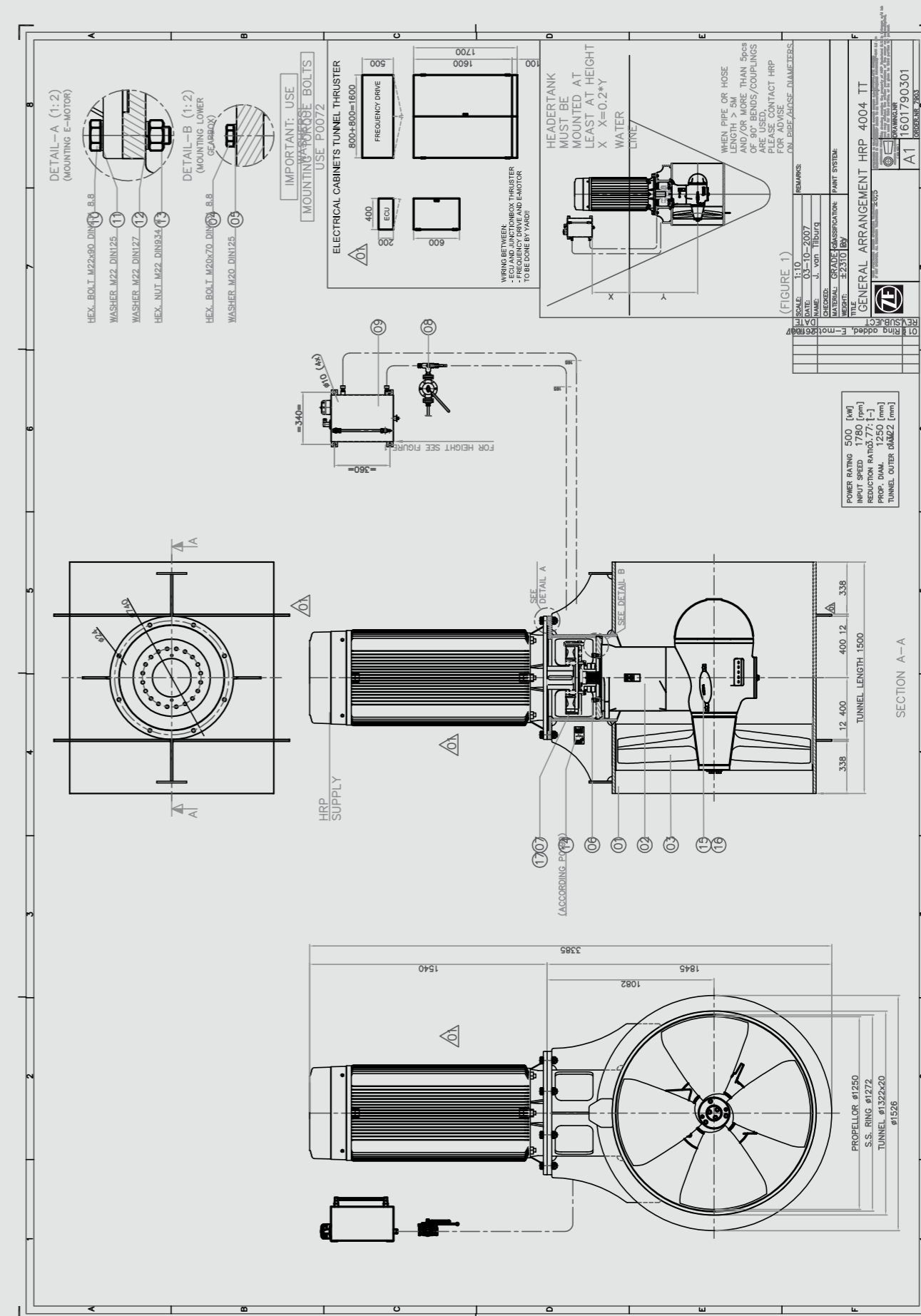


10.900 DWT OIL/CHEMICAL TANKERS "T. GÖNÜL" & "T. SEVGI" – TURKEY



Length o.a. : 131.85 m
 Breadth : 18.90 m
 Draught : 7.98 m
 ZF-Reference : 7903
 Model : ZF TT 4004 FP
 Rated power : 500 kW at 1780 rpm
 Supplied to : RMK Marine – Turkey

Each vessel equipped with one (1) ZF TT 4004 electric driven tunnel thruster.

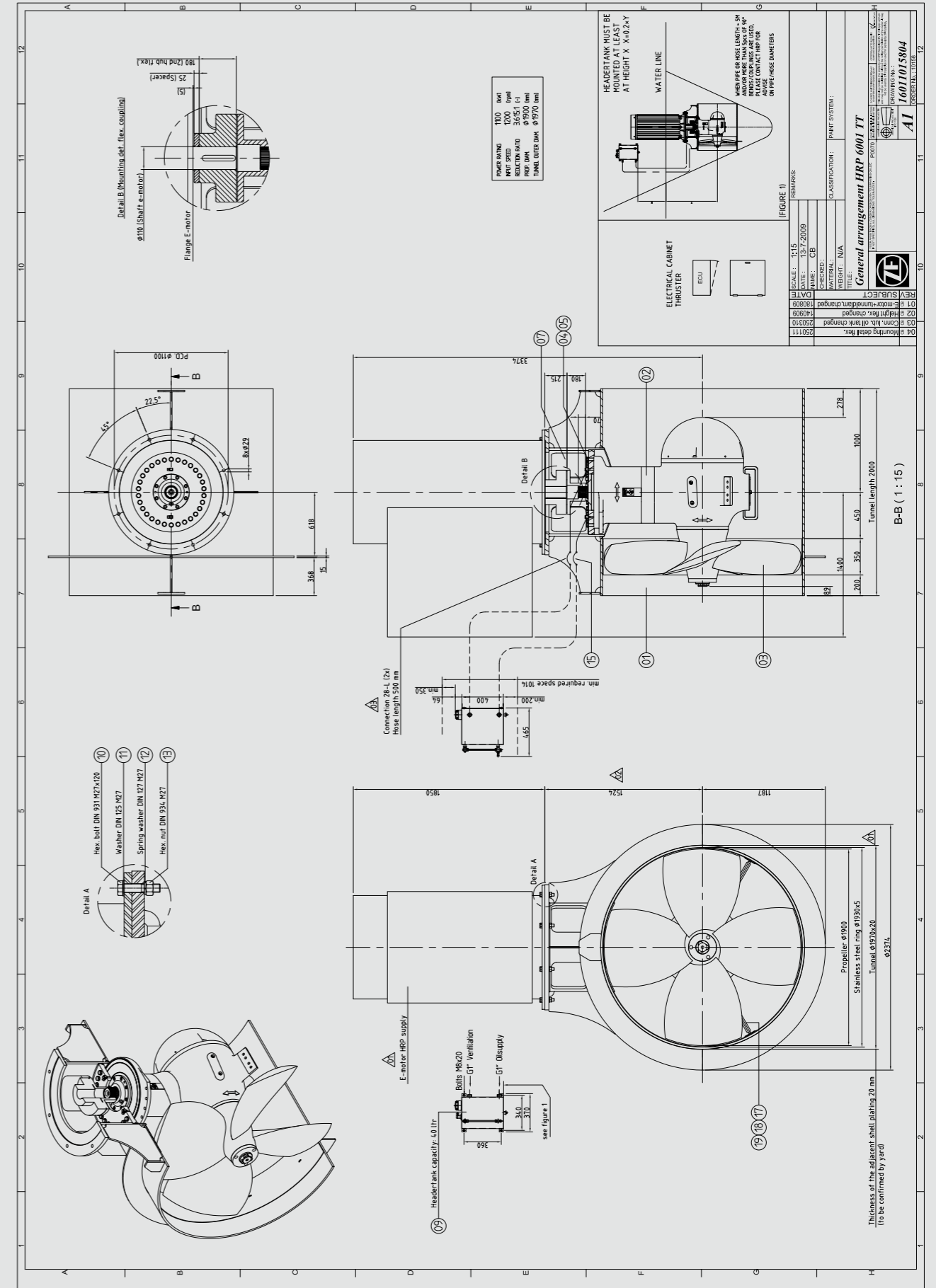


217M CONTAINER SHIP "LOG-IN JACARANDA" – BRAZIL



Length o.a. : 217.00 m
 Breadth : 28.00 m
 Draught : 8.90 m
 ZF-Reference : 10158
 Model : ZF TT 6000 FP
 Rated power : 1100 kW at 1200 rpm
 Supplied to : Eisa Shipyard, Rio de Janeiro
 Owner : Log-In Logistica, Rio de Janeiro

Equipped with one (1) ZF TT 3001
 electric driven tunnel thruster.



HIGH-PURPOSE/ANCHOR HANDLING VESSEL "SIDI C" – NETHERLANDS



Length o.a. : 32.00 m
Breadth : 11.10 m
Draught : 3.50 m
ZF-Reference : 6291
Model : ZF SDT 4000 FP
Rated power : 350 kW at 1800 rpm
Supplied to : Neptune Marine Service B.V. – Netherlands

Equipped with one (1) ZF SDT 4110
 shallow draught thruster.

