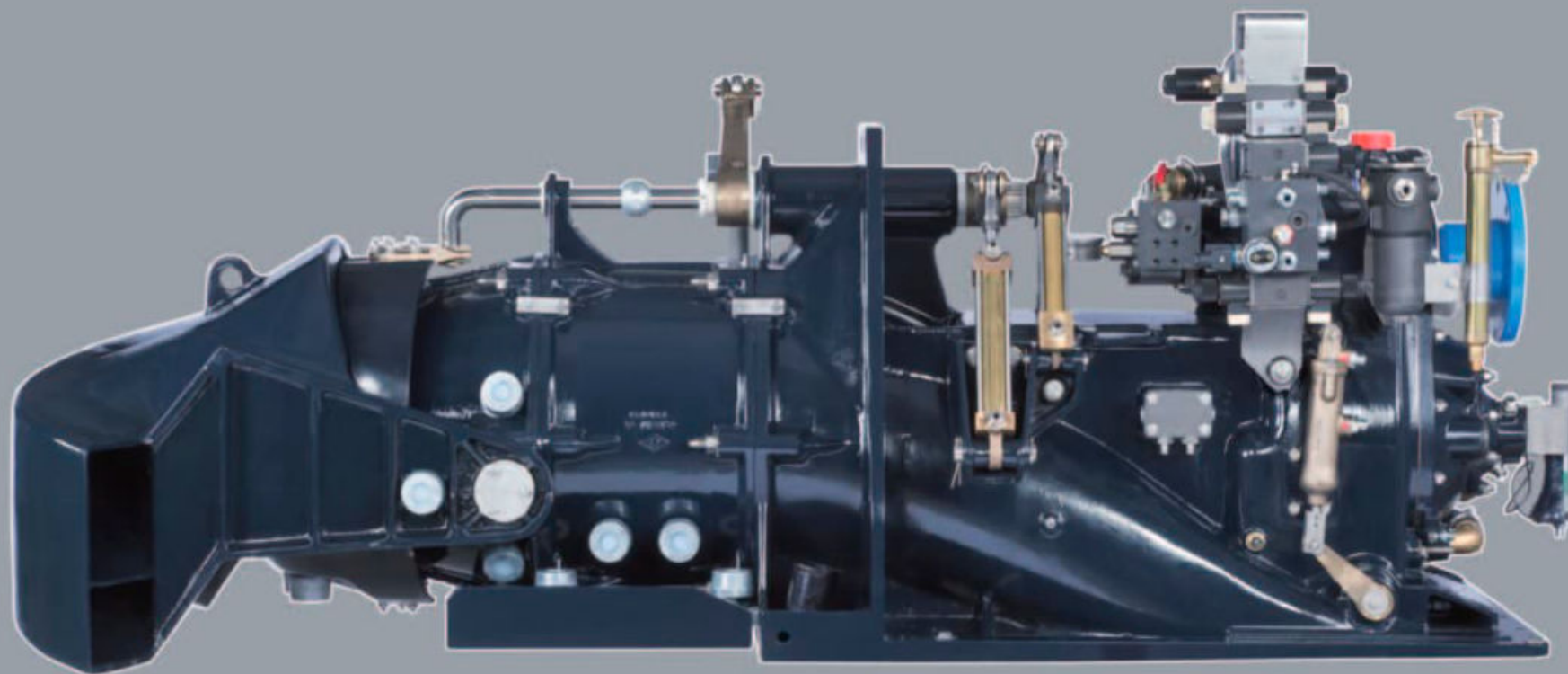


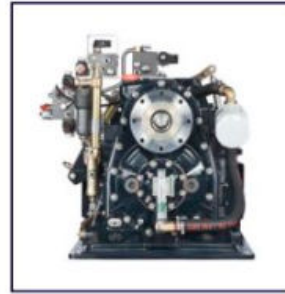
CASTOLDI JET

**ADVANCED HIGHLY EFFICIENT
MARINE PROPULSION SYSTEM**

TURBODRIVE

**400 H.C.
WATER JET UNIT**





The Castoldi "Turbodrives 400 H.C." is not only what is led to all the experiences gained since 1955 with the supply of more than 30.000 water jet units all around the world.

It is the outcome of specific intensive research and development activities begun in 1985 aimed to further improve the high efficiency of the Castoldi waterjet drives and pursued through self propulsion trials (of really No. 24 scale models) performed by means of an instrumented laboratory boat.

The Castoldi "Turbodrives 400 H.C." turns out, therefore, as an advanced waterjet unit of the best performance at planing speed, fitted with a single stage axial flow impeller which can be driven by a diesel engine or a gas turbine developing a power up to 882 KW according to the boat speed.

"Turbodrives 400 H.C." is a mass produced unit in high strength marine aluminium alloy casting to hit the target of light and strong propulsion system. It is protected by the most up dated and sophisticated anti-corrosion treatments.

The impeller, the shafts, the gear wheels and all the other metal items not in aluminium alloy are made of high grade stainless steel, steel, titanium and bronze aluminium alloy.

"Turbodrives 400 H.C." is equipped with exclusive particulars which make this model a complete, unique and real marine propulsion unit as: the built-in multiratio gear box to fine match the power and r.p.m. characteristics of the engine to the jet unit, the hydraulic multi-disc disconnecting clutch for engaging and disengaging the unit, the flush mounted movable grid for avoiding the aspiration of debris into the jet duct and for cleaning the jet water intake, and many others.

It is also fitted with special developed controls and equipment which allow to best perform its great manoeuvrability characteristics.

TECHNICAL SPECIFICATIONS

INPUT FLANGE: SUITS UP TO 8,86" (225 MM) DIAMETER DRIVE SHAFT FLANGE.

IMPELLER TYPE: THREE BLADES, SINGLE STAGE, AXIAL FLOW.

IMPELLER DIAMETER: 400 MM - AT THE INLET.

BUILT-IN GEAR BOX: WITH N.21 GEAR WHEELS-RATIO AVAILABLE.

WATER JET'S IMPELLER DISCONNECTING SYSTEM: BUILT-IN MULTI-DISC HYDRAULIC CLUTCH, ELECTRICALLY OPERATED.

UNIT WEIGHT - DRY: KG 469 INCLUDING: GEAR BOX, HYDRAULIC CLUTCH, WATER INTAKE, DUCT, ANODES, LEVERS.

HYDRAULICS WEIGHT: KG 50 INCLUDING: OIL PUMP, HYDRAULIC ACTUATORS, BRACKETS, VALVES AND PIPES.

VOLUME OF WATER JET OIL: LT 22 (GEAR BOX AND HYDRAULICS)

VOLUME OF ENTERTAINED WATER: LT 114

TRANSOM ANGLE: 90°

ROTATION: CLOCKWISE VIEWED ON INPUT SHAFT.

INSPECTION HATCH: INBOARD.

HYDRAULIC ACTUATORS: INBOARD, MOUNTED ON JET UNIT INTEGRATED BRACKETS FOR REVERSING, STEERING AND INTAKE GRID CONTROL.

NOZZLE: STANDARD WITH N. 5 BLADES.

WATER PICK-UP FOR ENGINE COOLING: SUIT 2,5" (65 MM). PIPE.

HYDRAULIC: DIRECTLY MOUNTED ON WATER JET ENGINE'S SHAFT PUMP

REVERSING SYSTEM: SPECIAL TWIN-DUCT TYPE DEFLECTOR. (75% OF THE FORWARD STATIC THRUST) HYDRAULICALLY ACTUATED.

STEERING SYSTEM: BALANCED STEERING NOZZLE HYDRAULICALLY ACTUATED.

WATER INTAKE PROTECTION: DEBRIS SCREEN GRID WITH MOVABLE BARS HYDRAULICALLY ACTUATED.

B.P.R.: ADDITIONAL WATER INTAKE FOR SLOW AND HEAVY VESSELS.

INPUT POWER: FOR PLANING BOATS UP TO 882KW (1200 HP) WITHOUT CERTIFICATION; UP TO 736KW (1000HP) WITH CERTIFICATION.

FOR DISPLACEMENT BOATS: UP TO 272KW (370HP).

MAIN PARTS' MATERIALS

IMPELLER: DUPLEX STAINLESS STEEL

IMPELLER HOUSING: G.AI.SI.9 ALUMINIUM ALLOY

IMPELLER HOUSING WEAR RING: TITANIUM

IMPELLER SHAFT: AQUAMET 17 STAINLESS STEEL

INPUT SHAFT: 39 NI.CR.MO. 3 HIGH GRADE STEEL

STATOR: G.AI.SI.7 ALUMINIUM ALLOY

STEERING AND REVERSING DEFLECTORS: G.AI.SI.7 ALUMINIUM ALLOY

STEERING AND REVERSING SHAFTS: NITRONIC 50 AND AISI 316 L STAINLESS STEEL

REVERSING SHAFTS: AISI 316 L STAINLESS STEEL

WATER JET BODY: G.AI.SI.9 ALUMINIUM ALLOY

GEAR WHEELS: SURFACE CARBO HARDENED HIGH GRADE 18 NI.CR.MO. 5 STEEL

ALL ALUMINIUM ALLOY PARTS ARE PROTECTED AGAINST MARINE CORROSION BY HARD ANODIZING TREATMENT (60 MICRONS), 4 LAYERS OF SPECIAL PAINT AND SACRIFICIAL ZINC ANODES.

1 • Input shaft.

2 • Combined set of oil lubricated radial-axial bearings.

3 • Gear box with n.21 gear wheels ratio available for the best engine matching.

4 • Radial oil lubricated roller bearings.

5 • Hydraulic oil pump directly mounted on the input shaft for water jet unit control (steering, reversing, hydraulic multi disk clutch and intake cleaning).

6 • Inspection hatch for impeller, duct and inlet grid inboard inspection.

7 • Hydraulic actuator for steering control.

8 • Hydraulic actuator for reversing control.

9 • Impeller housing easy replaceable titanium wear ring.

10 • Axial flow impeller - it is of high flow rate and low pressure for a volume system operation and has a one unique three blades profile design free from direct engine matching constraints, to meet the best efficiency and cavitation resistance over the full power and boat speed operation range. Increased blades' tip clearance due to wear does not compromise impeller efficiency because of its volume design. Made in duplex stainless steel by lost wax casting process, the impeller has good mechanical tough and strong resistance to corrosion and erosion.

11 • Steering deflector - Balanced steerable nozzle hydraulically actuated for the best control and manoeuvring of the craft. It allows 30° steering each side both in ahead and reverse regardless of the reversing deflector position.

12 • Reversing deflector - Compact twin-duct type of special Castoldi design, hydraulically actuated for continuous and effective thrust from full ahead to full reverse (more than 75% of forward static thrust). Strong design to permit emergency crash stop at full power; it does not turn together with the nozzle thus allowing a full steering force even at zero speed and allows to perform sideways movements in multiple installations avoiding the need of bow-thrusters. A vectorial 360° direction manoeuvring force can be controlled by unison operation of both reversing and steering deflectors.

13 • Discharge nozzle with integrated blades stator - Five blades stator for recovering of the flow water swirling induced by the impeller to improve propulsion efficiency and to null torque effects.

14 • Impeller rubber dumper - It dumps vibrations if cavitation would occur at the impeller. Because this device has no shaft bearing function (all oil lubricated roller bearings are provided for this) it can withstand a large wear without affecting water jet integrity.

15 • Impeller shaft mechanical seal - High quality silicon-carbide face type mechanical seal.

16 • B.P.R. - This unique device gives an auxiliary water flow by-pass to the main intake able to increase the power operation range and thrust on low-speed vessels and to improve middle speed heavy boats' take-off. In these cases it does not affect full speed efficiency.

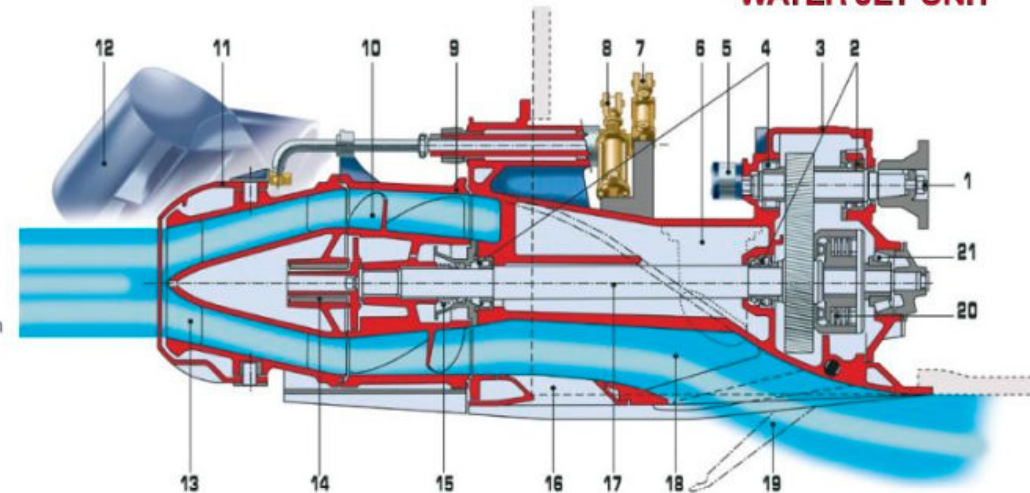
17 • Impeller shaft - Fully protected inside the fin's oil chamber; no twining problem by fishing treads or plastics can affect the surrounding water stream. The shaft runs only on safe oil lubricated roller bearings granting long life also in sandy waters.

18 • Inlet duct - Special designed with computer aid. Developed and optimized through several model's trials on Castoldi laboratory boat together to its water intake for a wide range of power and speed operations. Its design is superior for rejecting air suction and improving cavitation resistance.

19 • Movable water intake protection grid - This grid protects the water intake from suction of debris and performs self cleaning operations trough the shift opening of the two alternated set of bars hydraulically actuated from the helm. The flush mounted grid's bars have smooth hydrodinamic profile, able to control the water flow with minimal losses. This is absolutely the most efficaceous anti-clogging system as it prevents debris to enter into the jet duct, driving it away.

20 • Disconnecting multi-disc hydraulic clutch - The lightest and most effective device for disengaging the water jet for: warming-up the engine, checking the working of all controls, performing several daily stops while maintaining the boat perfectly standstill and without injecting debris or sand if mooring in dirty or shallow waters. It can be engaged with engine idling.

21 • Taper thrust oil lubricated roller bearing.



BENEFITS

PERFORMANCE

- ✓ The highest efficiency in the 25 to 60 knots speed range
- ✓ Higher top speed versus subcavitating propellers and consequent better fuel economy (from 25 knots, up)
- ✓ Acceleration
- ✓ No interference in multiple installations
- ✓ Jet power absorption insensitive to boat speed means constant jet thrust at boat drag variation

SAFETY

- ✓ Absence of open rotating blades
- ✓ Absence of any appendage under hull
- ✓ Unrivalled emergency crash stop capability
- ✓ Minimal damage susceptibility to floating debris and in case of grounding

PRACTICABILITY

- ✓ Maximum endurance and protection from marine corrosion
- ✓ Ease of installation and alignment
- ✓ Operation in shallow waters and easy beaching
- ✓ Minimum service requirement
- ✓ Ease of maintenance
- ✓ Limited in-board room requirement
- ✓ Reduced magnetic signature
- ✓ More uniform engine loading allows for longer engine's life

COMFORT

- ✓ Absence of vibrations and reduced internal noise

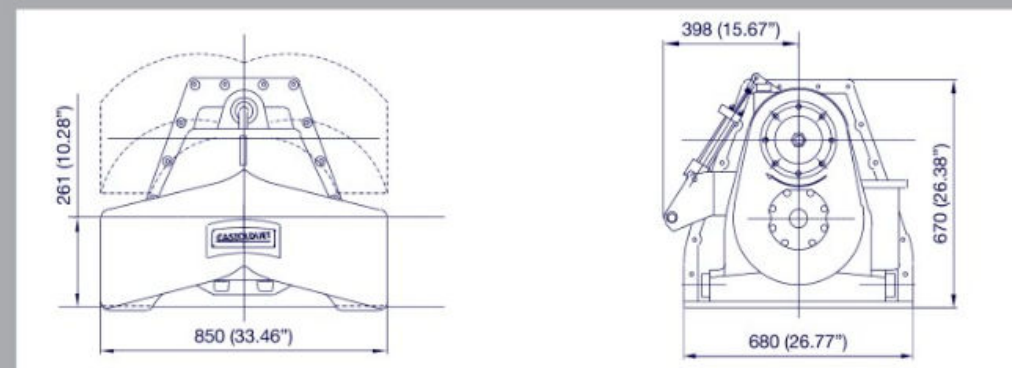
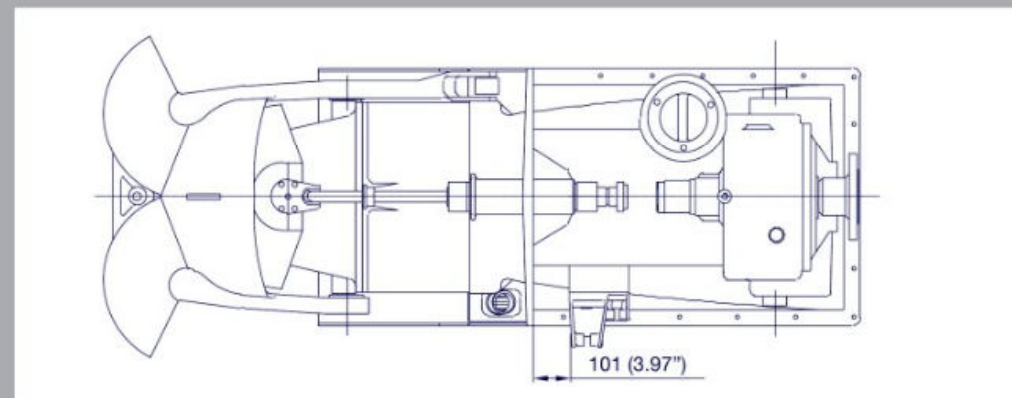
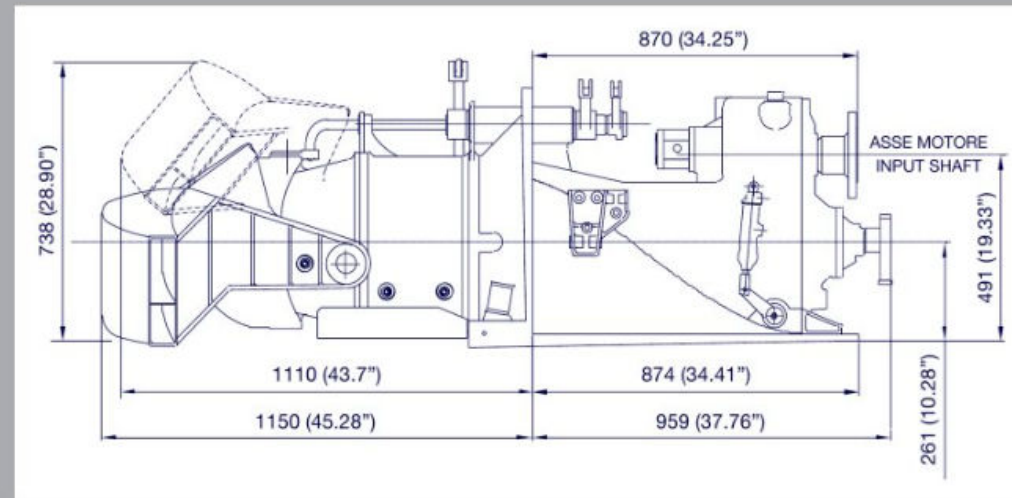
MANOEUVRABILITY

- ✓ Outstanding manoeuvrability at all speed
- ✓ Easier handling for docking (zero speed with high thrust availability all around 360°)
- ✓ In multiple installation vessel can even move sideways (no need of bow thruster)

Castoldi S.p.A. without the right to introduce, at any time and without previous notice, such modifications of components and accessories as might be deemed necessary for technical or commercial reasons, without any obligation to bring up-to-date this leaflet.

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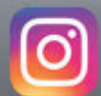
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