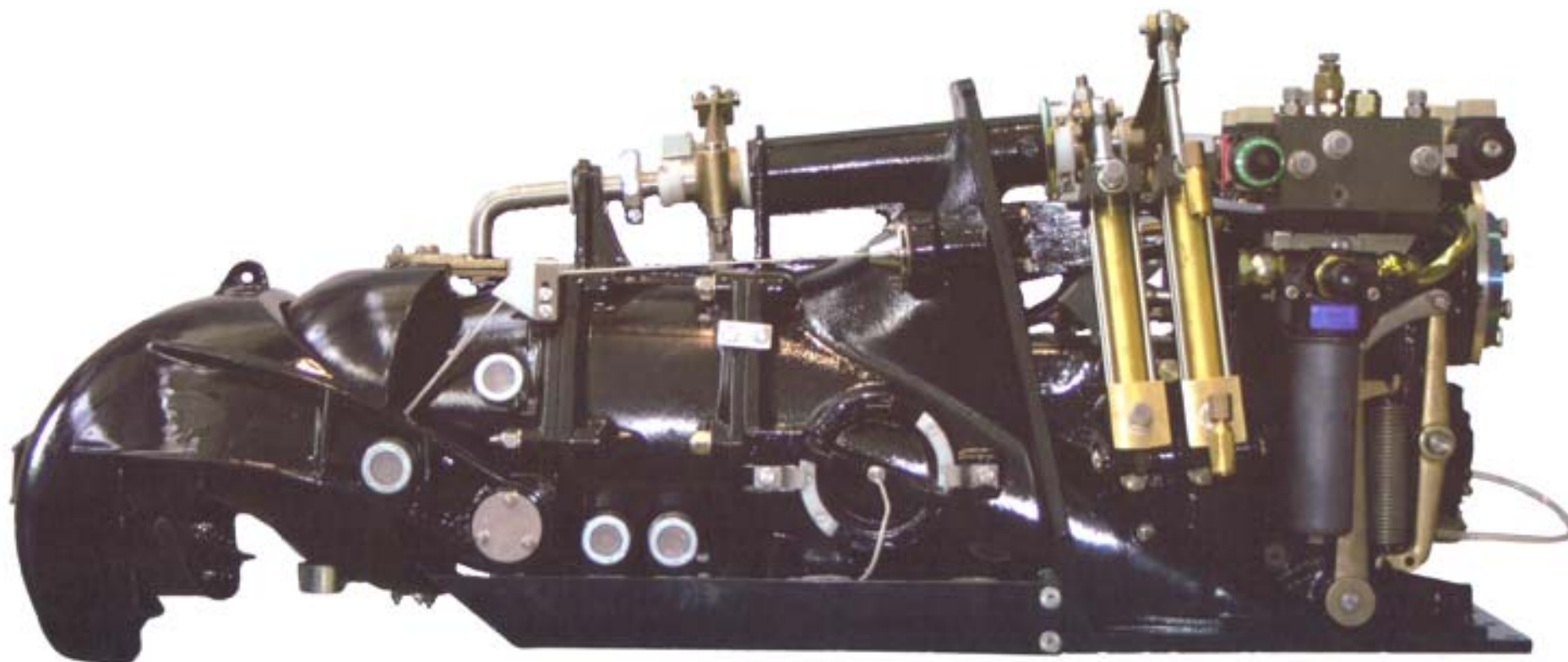
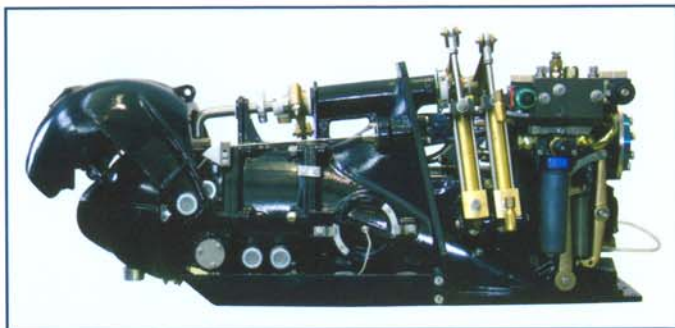


# CASTOLDI JET

## TURBODRIVE 238 H.C.

Advanced highly efficient propulsion system for fast boats.





### **SPECIFICATIONS**

*The Castoldi "Turbodrives 238 H.C." is not only what is led to all the experiences gained since 1958 with the supply of more than 23.000 water jet drives installed 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 water jet drives and pursued through self-propulsion trials (of really No. 24 scale models) performed by means of an instrumented laboratory boat.*

*The Castoldi "Turbodrives 238 H.C." turns out, therefore, as an advanced water jet unit of the best performance at high speed, fitted with a single stage axial flow impeller which can be driven by a gasoline or a diesel engine developing a maximum of 309 KW according to the boat speed.*

*"Turbodrives 238 H.C." is a mass produced unit in high strength marine aluminium alloy castings 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 and bronze aluminium alloy.*

*"Turbodrives 238 H.C." is equipped with exclusive particulars which make this model a complete, unique and real marine propulsion unit as: the built-in multi-ratios 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.*

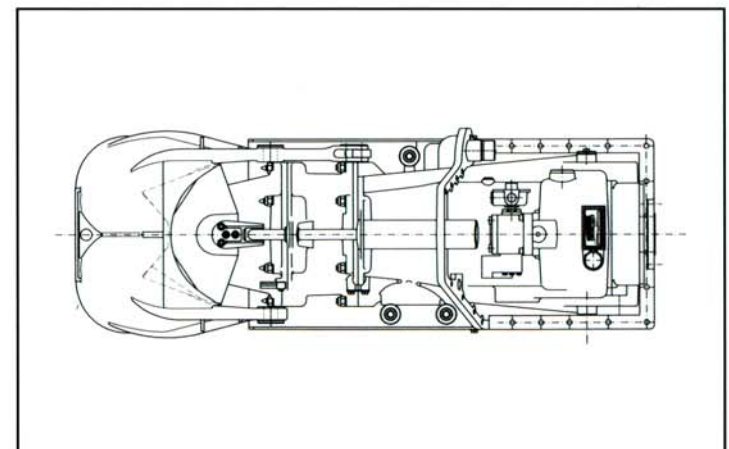
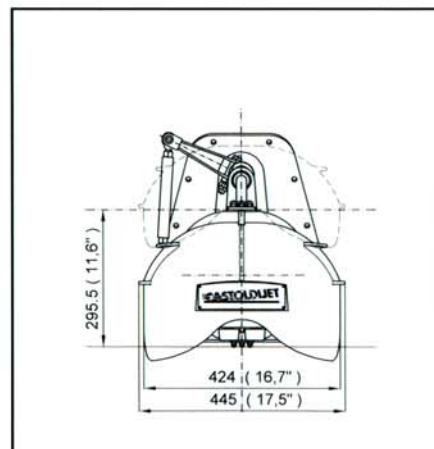
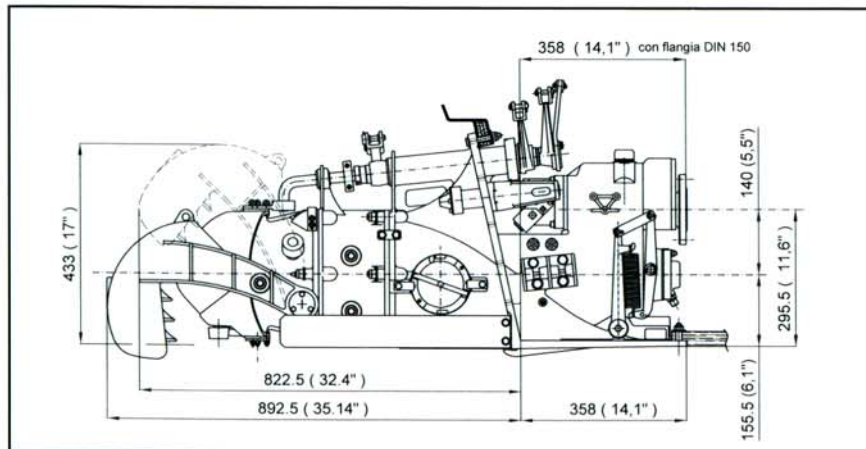
*It is also equipped with special developed packaged control system and equipment which allow to maximise its great inherent manoeuvring capabilities.*

**CASTOLDI JET** **TURBODRIVE**  
**238 H.C.**



## TECHNICAL SPECIFICATIONS

- Water pump type: *three blades, single stage, axial flow.*
- Impeller diameter: *238 mm - at the inlet.*
- Built-in gear box: *with No. 18 gear wheels ratio available.*
- Water jet's impeller disconnecting/connecting system: *built-in multi-disc hydraulic clutch electrically operated:  
Allows to connect the engine idling.*
- Unit dry weight (including gear box, hydraulic clutch, anodes, levers, water intake, grid, duct, etc.): *Kg. 130 (version for remote coupling)  
Kg. 136 (version for close coupling)*
- Hydraulic weight (including oil pump, actuators, valves, brackets): *Kg. 21*
- Volume of entrained water: *lt. 26*
- Oil volume for water jet (gear box and hydraulics): *lt. 6 "SAE 30" Uni-Grade oil type.*
- Transom angle: *12°*
- Drive shaft rotation: *clockwise as seen from inboard towards outboard.*
- Inspection hatch: *outboard. Allows easy and effective inspection of the water duct, the impeller and the grid at the water intake.*
- Hydraulic actuators: *all inboard mounted on jet unit integrated bracket for reversing and steering control.*
- Water pick-up for engine cooling: *suit 1" 5/8 (40 mm) pipe.*
- Hydraulic pump: *mounted directly on the waterjet's input shaft.*
- Impeller shaft: *Aquamet 17 (17,4 PH) stainless steel rotating safe inside the fin's oil chamber; therefore it's perfectly protected from any debris should enter into the duct which could twine around it.*
- Impeller: *3 blade Aisi 316 L micro casted stainless steel.*
- Impeller housing: *Alluminium alloy with titanium removable jacket.*
- Nozzle: *No. 2 models: standard and narrow, both with 5 blades.*
- B.P.R.: *additional water intake for slow and/or heavy boats (optional).*



|   |   |
|---|---|
| – T.T.J.:   | mechanically operated trim allows, through the partial deviation of the nozzle's water flow, to reduce the planning time and the engine r.p.m. required to plan.  |
| – Water intake protection:                                    | debris screen grid with movable double set of mechanically actuated bars.   |
| – Internal levers:  | high resistance bronze aluminium.   |
| – Finishing and protection against corrosion:                 | hard anodising treatment (60 Micron) on all the aluminium alloy parts.<br>- 3 layers of special paint.<br>- Cathodic protection with sacrificial zinc anodes.   |
| – Reversing system:   | special compact and light Castoldi "Multi Duct" type reversing deflector (60% of the forward static thrust) hydraulically actuated.   |
| – Steering system:  | special balanced Castoldi "Cathead" steering nozzle, hydraulically actuated.  |
| – Input flange:   | suit up to 150 mm diameter drive shaft flange, or the engine's direct coupling joint.   |
| – Bearings:   | all oil lubricated.<br>- No. 1 front input shaft radial roller bearing.<br>- No. 1 front input shaft axial ball bearing.<br>- No. 1 tail input shaft radial roller bearing.<br>- No. 1 front impeller shaft thrust taper roller bearing.<br>- No. 1 intermediate impeller shaft radial roller bearing.<br>- No. 1 intermediate impeller shaft axial taper roller bearing.<br>- No. 1 tail impeller shaft radial roller bearing. |
| – Seals:  | - Input shaft seal: rubber lip seal.<br>- Hydraulic or pumps seal, rubber lip seal.<br>- Impeller shaft seal: high quality silicon carbide face type mechanical seal.   |
| – Impeller damper:  | Rubber, water lubricated.   |
| – Main parts' materials:                                      |   |
| Impeller shaft:   | Aquamet 17 (17,4 PH) stainless steel.   |
| Input shaft:  | 39 Ni.Cr.Mo.3. high grade steel.  |
| Steering and reversing shaft:                                 | Aisi 316 stainless steel.   |
| Impeller:   | Aisi 316 L micro casted stainless steel.  |
| Impeller housing wear ring:                                   | Titanium.   |
| Internal levers:  | High strength bronze aluminium.   |
| Stator blades with nozzle, steering and reversing deflectors: | G.Al.Si.7 marine grade aluminium alloy.   |
| Water jet body with gear case and impeller housing:           | G.Al.Si.9 marine grade aluminium alloy.   |
| Gear wheels:  | Surface carbo hardened high grade 18 Ni. Cr. Mo. 5 steel.   |
| Finishing and protection against corrosion:                   | Hard anodising treatment (60 Micron) on all the aluminium alloy parts.<br>- 3 layers of special paint.<br>- Cathodic protection with sacrificial zinc anodes.   |

## **SCOPE OF USE**

### **1) Planing boats**

Capable of at least 20 knots. Degrees of deadrise of the hull at the transom not less than 3 and not more than 22 (suggested).

| <b>Planing boats</b>   | <b>1 x TD 238</b>       | <b>2 x TD 238</b> |
|--|-------------------------|-------------------|
| Maximum suggested A.U.W. (ton.)<br>(All Up Weight of the boat, means its full displacement, including people, fuel, equipment - (B.P.R.) | 2,4 (2,8)               | 5,8 (7)           |
| Average length of the boat (meters)  | 6/7                     | 7/10              |
| Max suggested weight to power ratio (Kg per horse power)   | 15,5                    | 18,5              |
| Maximum suggested power input Kw (HP)<br>For certification<br>Without certifications   | 1258 (350)<br>309 (420) |                   |

### **2) Semi-planing boats**

Hull drag for these boats is usually higher than for planing ones. Therefore a lighter A.U.W. than for planing boats should be considered.

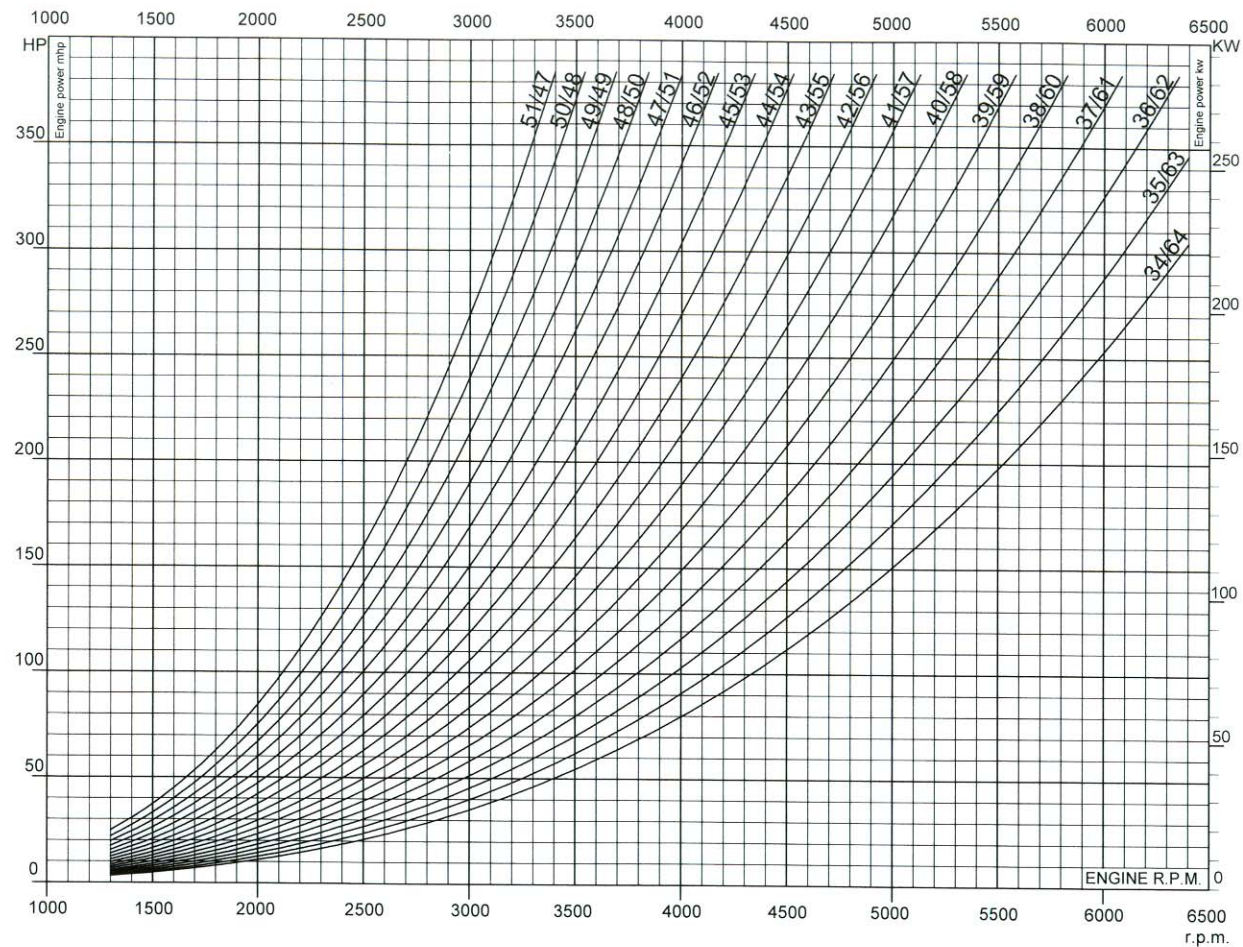
### **3) Displacement boats**

For these boats, the speed depends more on efficient hull shape than on input power or A.U.W.  
The input power should not exceed the suggested power value.  
A.U.W. can be increased for efficient long and narrow boats.

| <b>Displacement boats</b>             | <b>1 x TD 238</b> | <b>2 x TD 238</b> |
|---------------------------------------|-------------------|-------------------|
| Maximum suggested A.U.W. (Ton.)       | 4                 | 10                |
| Maximum suggested power input Kw (HP) | 96 (130)          |                   |



## Gear wheels ratio selection chart



### GEAR WHEELS RATIO SELECTION CHART

To match a given engine with the proper gear ratio, first locate net horse power of the engine on the vertical grid line, then locate operating r.p.m. on the horizontal grid line.

The point of intersection of the two grid lines will indicate the correct Jet gear ratio for the horse power and operating r.p.m. of the engine.

Diagrams which have been experimentally determined with a laboratory boat are furthermore available:

- Diagram showing the Water Powers as a function of boats speed.
- Diagram showing Jet dynamic thrust curves.

### **STANDARD EQUIPMENT**

- Hydraulic actuators for reversing and steering control.
- Hydraulic pump.
- Hydraulic multi-disc clutch.
- Trim (T.T.J.).
- Water pick up for engine cooling.
- Switch for hydraulic clutch electric control.
- Reversing deflector position gauge.
- Vetus hydraulic steering helm with stainless steel steering wheel.
- Single lever box for engine throttle control with integrated switch for electric-hydraulic (E-HY) reversing deflector control.
- Handle for debris screen grid control.
- Proneness to additional water intake (B.P.R.) [optional].
- Knob for trim (T.T.J.) control.

### **EXTRA EQUIPMENT ON APPLICATION**

- Additional control station.
- Engine matching kit.
- Spare parts' kit.
- Cables of the requested length.
- Certification.
- Steering linkage for catamarans.
- Reversing deflectors' control system by joysticks.
- Hydraulic-Mechanic (Hydro-Mech) reversing deflector control system including twin lever box for reversing deflector and engine throttle control.
- Additional water intake (B.P.R.).

### **BENEFITS**

- The highest efficiency in the 25 to 60 knots speed range.
- Higher top speed versus subcavitating propellers and consequent better fuel economy.
- Power absorption at constant RPM is insensitive to boat speed; this means constant jet thrust at boat drag variation; engine is not over torqued or over speeded; engine wear is reduced.
- No interference in multiple installations.
- Reduced noise and lower vibration levels in the boat.
- Good acceleration and outstanding crash-stop capability.
- Improved manoeuvrability at all speed even with single propulsion system.
- Easier handling for docking (zero speed with high thrust availability all around 360°). In multiple installations boat can move sideways.
- Operation in shallow water and easy beaching. Insensitivity to debris in the water and in case of grounding thanks to the absence of any external appendages such as rudders, propellers shaft and brackets.
- Safe for divers and swimmers thanks to the absence of open rotating blades and any appendages under hull.
- Maximum protection from marine corrosion for a longest life.
- Easy installations and alignment.
- Minimum and easy service requirement.
- Limited in-board room requirement.





Castoldi S.p.A. withold the right to introduce, at any time and without previous a 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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