

**HM SERIES**  
750kW to 3500kW

  
**HamiltonJet**

HamiltonJet HM series waterjets provide highly efficient propulsion for high speed vessels operating in the world's most demanding marine environments.

Combining quality materials and manufacturing with superior research, design and product support ensures HamiltonJet HM waterjets out-perform other models in their class.



# The HamiltonJet Promise

## Total Waterjet Solutions

With experience spanning six decades, HamiltonJet provides a totally integrated waterjet propulsion solution to the marine industry. From initial enquiry and right through the lifespan of a vessel, HamiltonJet offers a comprehensive customer support package that is second to none.

HamiltonJet has been providing waterjet propulsion solutions to the marine industry since the 1950s, and has installed more than 50,000 waterjets into vessels around the world. Through this experience HamiltonJet understands the wide range of conditions, situations and tasks a modern vessel needs to be able to undertake on a daily basis throughout its operating life.

The company also has more experience with designers and boat builders than any other waterjet manufacturer, and so provides the simplest installation package of any waterjet design in the market today.

Knowledge gained through unrivalled waterjet application experience means HamiltonJet is able to provide accurate performance predictions to ensure a vessel will deliver on its design criteria. This knowledge and experience is shared globally through HamiltonJet's extensive distributor sales and support network.

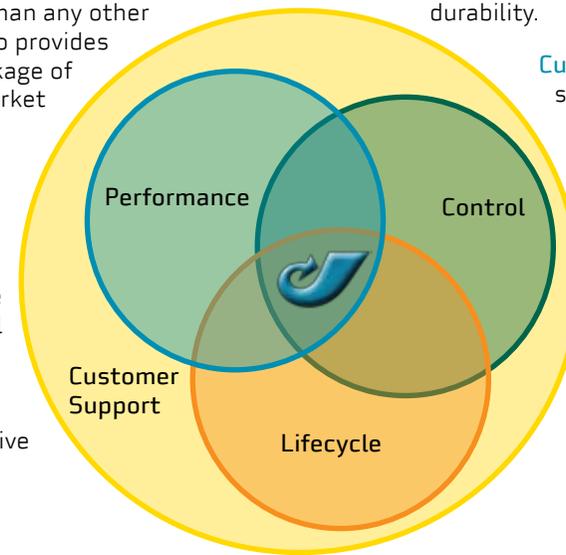
Evidence of HamiltonJet's success can be seen in the range of innovative designs the company has pioneered, each raising the standard of waterjet performance, control and lifecycle, all of which build on the HamiltonJet ethos of superior customer support.

**Performance** = high and low speed power and efficiency, load carrying capability and acceleration.

**Control** = high and low speed manoeuvrability, course keeping, close quarters manoeuvring and development of innovative control system technology.

**Lifecycle** = Pre-sales application engineering, simple installation, integrated features and maximum durability.

**Customer Support** = spare parts supply & advice in country, full spares warehouse & HamiltonJet technical staff in region, installation and commissioning service assistance, and training programmes.





WINDCAT 21

Vestas

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# The Waterjet Advantage

## EFFICIENCY

As vessel speed increases waterjets become more efficient compared to conventional propeller systems. Efficiency benefits are due to...

- No appendage drag – the waterjet intake sits flush with the hull bottom without struts, propeller shafts, rudders or any elements protruding beneath the hull to increase hull resistance, particularly as speed increases.
- Thrust generated by a waterjet is parallel to the direction of travel. For many propeller systems the shaft is angled down and thrust is generated in the direction of the shaft, so only a component of the total thrust is in the direction of travel.
- Energy lost from flow rotation is recovered by the stator section of the waterjet. This is energy that is lost in a propeller installation.

## MANOEUVRABILITY

Waterjet propulsion provides far superior manoeuvrability at both high and low speeds compared to a propeller boat...

- Waterjet thrust is independent of boat speed – thrust is determined by input power and astern deflector position and is available at all times, even at zero speed. Result – boat can be turned without moving ahead or astern, and the ability to move the reverse deflector slightly either side of the zero speed position also provides very fine ahead or astern control, all while maintaining full steering control.
- No need to change engine rotation to generate reverse thrust. A change from full forward thrust to full reverse thrust only requires the reverse duct to move from fully up to fully down position.
- Sideways thrust capability with two or more jets (with split duct reverse deflectors) without the need for a bow thruster.



## SAFETY

Waterjets have no exposed high-speed moving components external to a vessel's hull, providing greater safety to people in the water and marine life, and allowing the propulsor to keep running when operating in such conditions. There is also less risk to equipment in the water.

## DURABILITY

A waterjet is inherently more durable than conventional propeller propulsion...

- No exposed appendages beneath the hull – allows the vessel to access shallow waterways, cross sandbars and reefs, and complete beach landings and launches.
- The impeller is protected inside the body of the jet – propulsion gear is not exposed to damage from floating debris or in the event of grounding.
- Maintenance can be predicted and planned in advance – with propeller systems there is always uncertainty as exposed propulsion gear could be damaged at any time. Waterjets reduce downtime for vessel maintenance and can mean fewer vessels are required in a fleet.



## FLEXIBILITY

Waterjets offer significant advantages for vessels subject to variable loads...

- Boat speed is determined by hull weight – when the vessel is running light it will travel faster or maintain service speed with reduced power input, resulting in fuel and time savings.
- Engines can not be overloaded when vessel is heavily laden – unlike propeller systems which can transfer load to the engine, a waterjet will always match available engine power. This results in less engine wear and consequently less maintenance and longer engine life.
- Secondary propulsion option – waterjets can be used as boost or loiter propulsion alongside other waterjets or propellers.

# The HamiltonJet Difference

## PERFORMANCE

**High speed performance and efficiency** – advanced impeller and intake designs provide peak efficiency and performance over a wide speed range.

**Low speed performance** – high thrust at low speeds ensures excellent station-keeping, bollard pull, load carrying and manoeuvring.

**Acceleration** – ability to apply full power at lower speeds ensures fast acceleration for patrol boats, rescue craft, pilot boats and recreational vessels.

## CONTROL

**Steering control** – HamiltonJet's JT steering system out-performs all others, reducing thrust losses when steering to give tighter turns and maintain vessel speed during the turn.

**Ahead / Astern control** – HamiltonJet's split duct reverse deflector provides up to 60% of forward thrust, resulting in highly responsive control at slow boat speeds where engine is set to higher than idle RPM and the reverse duct is used to regulate forward and aft thrust.

**Speed of the controls response** – HamiltonJet controls respond quickly to skipper input to improve manoeuvring control and safety. The company develops hydraulic and electronic control systems to maximise the control benefits of its waterjets.

## LIFECYCLE

**Material specifications** – all HamiltonJet waterjets are manufactured using high quality materials to ensure the best mix of durability, weight, corrosion resistance and cost.

**Impeller rating accuracy** – impellers are cast as a single piece to ensure more accurate ratings for all impellers and a better match to peak engine rating.

**Application engineering** – HamiltonJet provides the highest level of technical expertise and advice to builders, designers and end users throughout the entire vessel design, build and commissioning phases, and for the operational life of a vessel.

**Integrated Engineering** – Each HamiltonJet waterjet is a complete packaged, factory tested, propulsion module, with reverse and steering control systems fully integrated with the jet to simplify installation and maintenance.

## SUPPORT

**International Support** – HamiltonJet's service and support network extends around the globe to provide immediate assistance and spare parts supply.



# HamiltonJet Features

## Material Specifications

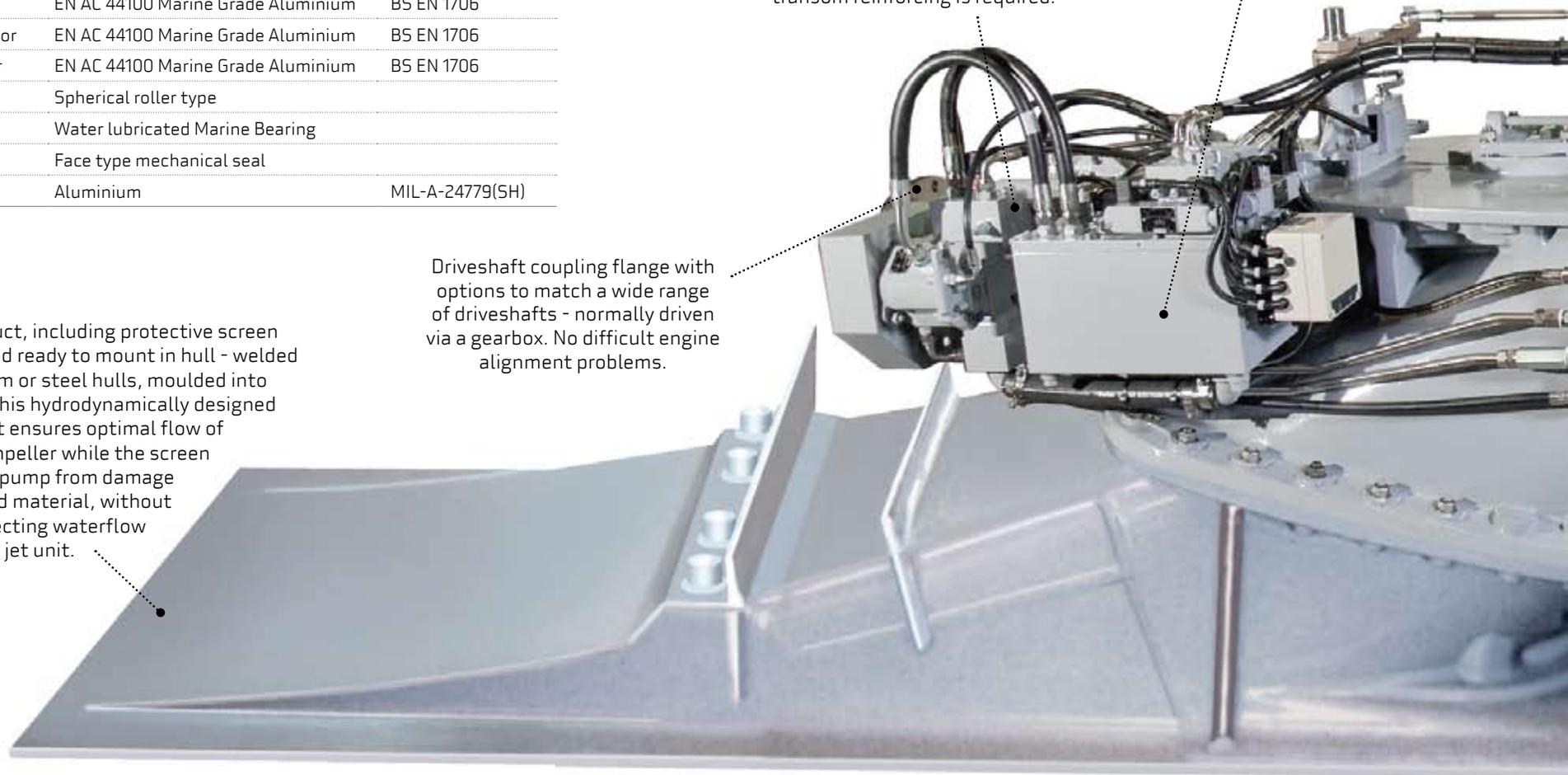
Component	Material	Standard
Transition Duct	To match hull material	
Impeller	CF8M Stainless Steel	ASTM A743
Wear Ring	2205 Stainless Steel	ASTM A240
Mainshaft	2205 Stainless Steel	ASTM A276
Stator	EN AC 44100 Marine Grade Aluminium	BS EN 1706
Nozzle	EN AC 44100 Marine Grade Aluminium	BS EN 1706
Steering Deflector	EN AC 44100 Marine Grade Aluminium	BS EN 1706
Astern Deflector	EN AC 44100 Marine Grade Aluminium	BS EN 1706
Thrust Bearing	Spherical roller type	
Rear Bearing	Water lubricated Marine Bearing	
Shaft Seal	Face type mechanical seal	
Anodes	Aluminium	MIL-A-24779(SH)

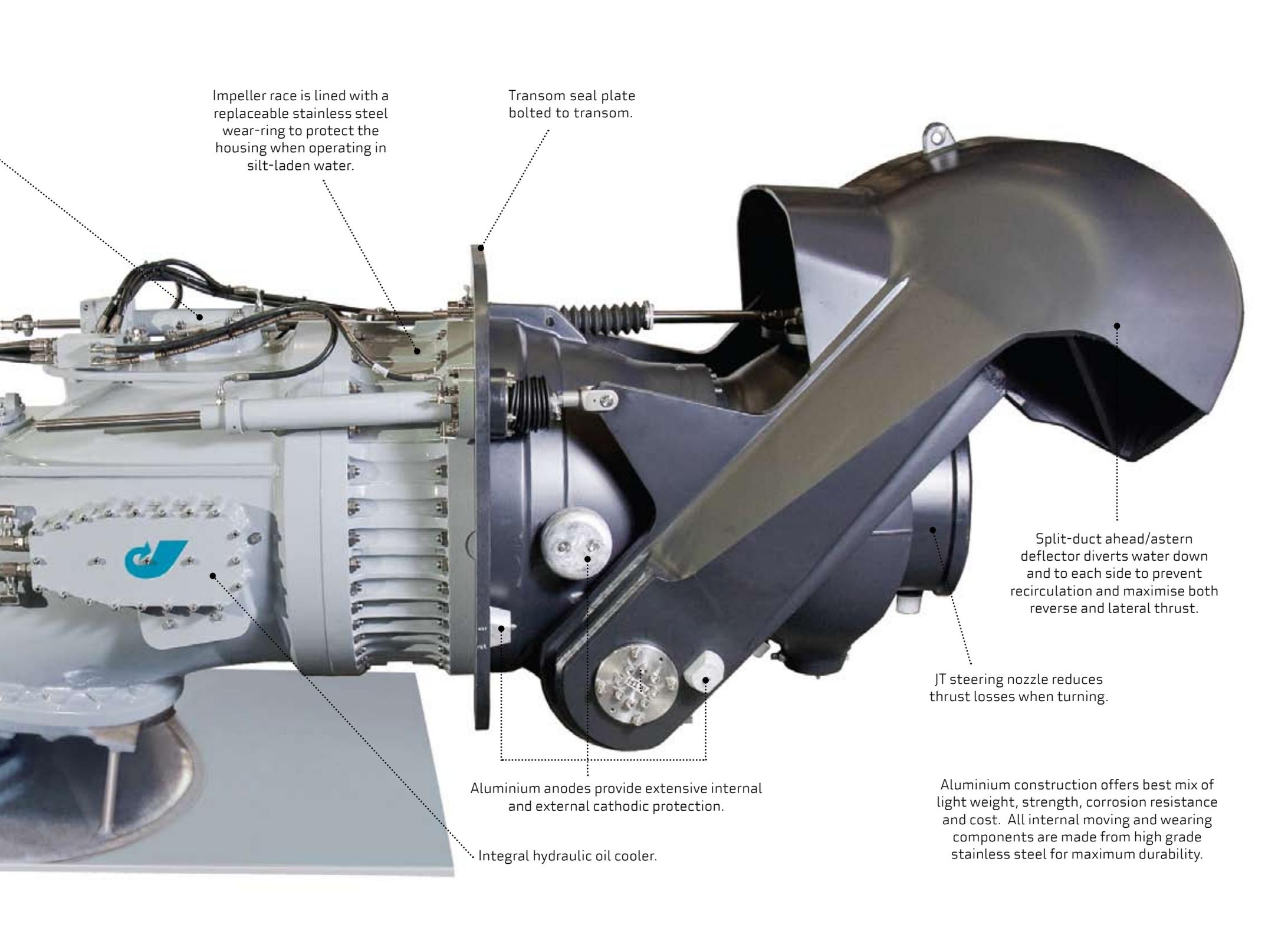
Transition duct, including protective screen bars, is supplied ready to mount in hull - welded in aluminium or steel hulls, moulded into GRP hulls. This hydrodynamically designed transition duct ensures optimal flow of water to the impeller while the screen protects the pump from damage due to ingested material, without adversely affecting waterflow into the jet unit.

Driveshaft coupling flange with options to match a wide range of driveshafts - normally driven via a gearbox. No difficult engine alignment problems.

Inboard thrust bearing assembly transfers thrust forces to intake block and hull bottom, not transom, so no additional hull or transom reinforcing is required.

All hydraulic components are mounted inboard where they are protected from corrosion and marine growth. The integral JHPU hydraulic pump and circuits are set up and tested in the factory prior to dispatch. No need for additional pumps and plumbing to be fitted.





Impeller race is lined with a replaceable stainless steel wear-ring to protect the housing when operating in silt-laden water.

Transom seal plate bolted to transom.

Split-duct ahead/astern deflector diverts water down and to each side to prevent recirculation and maximise both reverse and lateral thrust.

JT steering nozzle reduces thrust losses when turning.

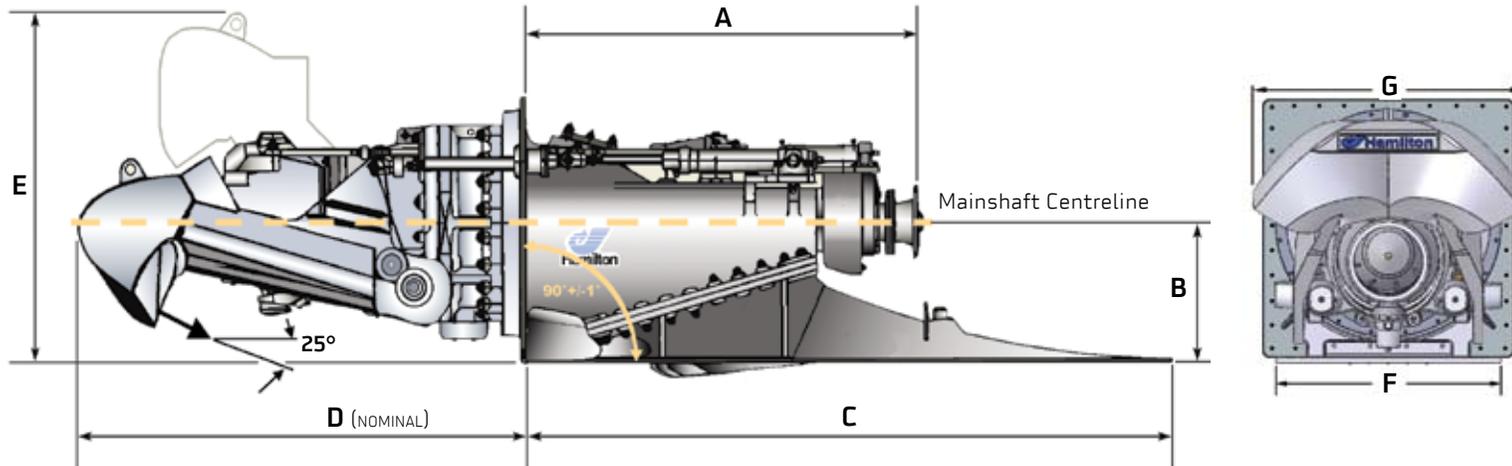
Aluminium anodes provide extensive internal and external cathodic protection.

Aluminium construction offers best mix of light weight, strength, corrosion resistance and cost. All internal moving and wearing components are made from high grade stainless steel for maximum durability.

Integral hydraulic oil cooler.

# HM Series Dimensions

The HM series comprises a range of highly efficient waterjet units suitable for propelling craft at speeds ranging from zero to up to 50 knots and typically of length between 20 and 60 metres.

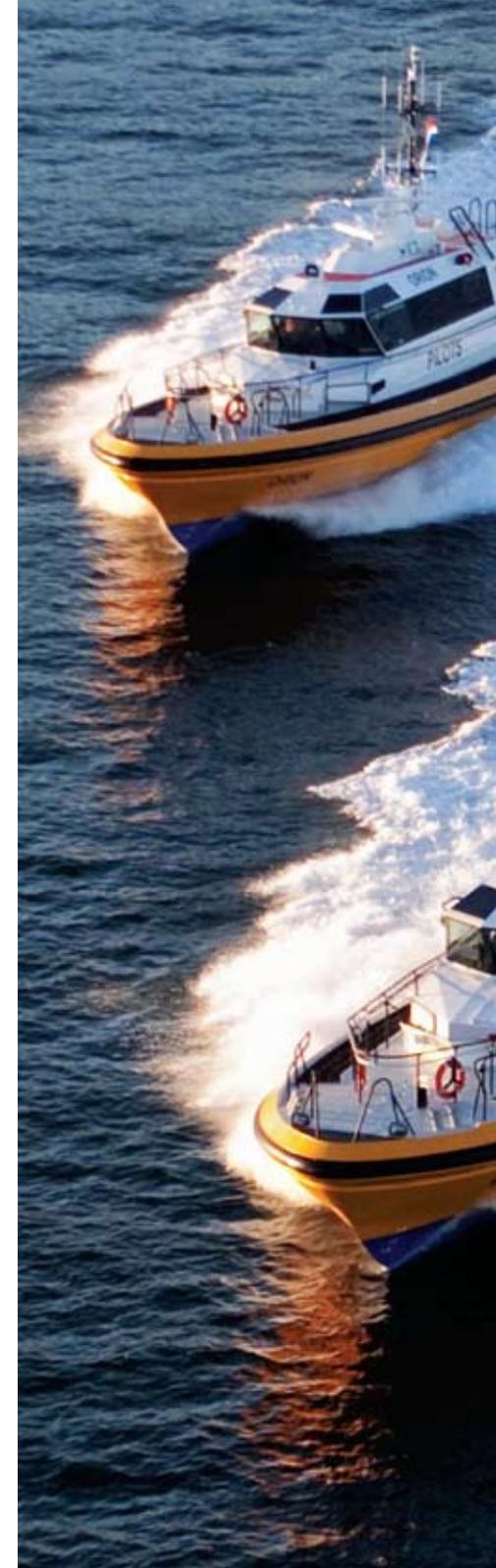


Model	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)	
HM422	1380	484	2082	1090	940	960	964	<b>IMPORTANT NOTE:</b> Dimensions shown above are indicative only for initial design purposes. All specifications are subject to change without notice or obligation. For detailed installation data and instructions consult HamiltonJet.
HM461	1280	420	2048	1440	1016	900	1040	
HM521	1424	475	2350	1630	1200	1000	1200	
HM571	1561	530	2585	1800	1300	1000	1285	
HM651	2105	593	3360	1650	1470	1100	1500	
HM721	2381	667	3779	1860	1612	1250	1660	
HM811	2672	750	4252	2100	1800	1400	2000	

## HM Series Total Package

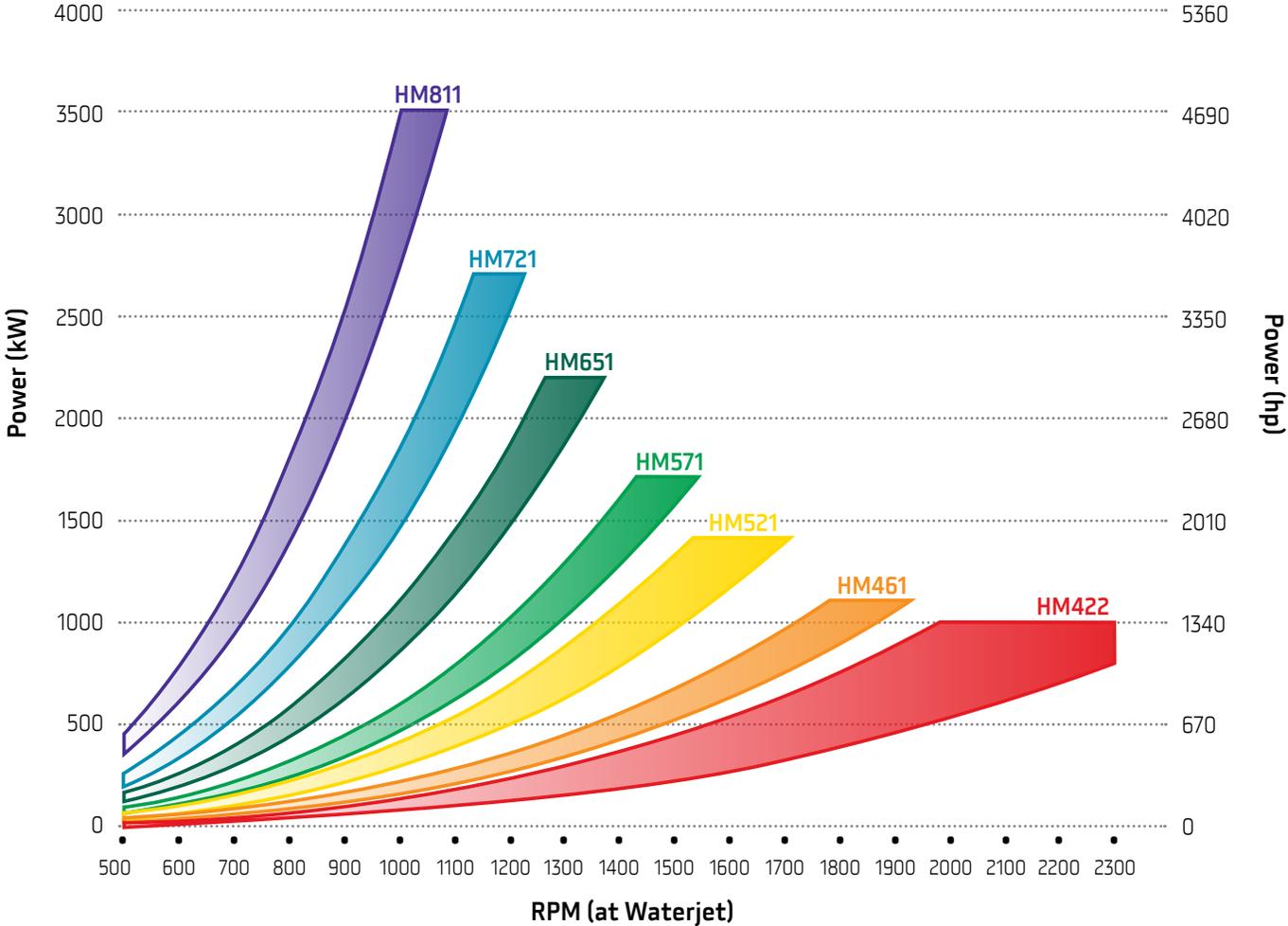
HM series waterjets are supplied as a completely packaged propulsion module - a design philosophy that simplifies installation procedures for the boat builder. The jet is installed as an assembly, being manoeuvred forward through the transom hole and bolted to the HamiltonJet supplied matching intake/transition duct, which has been welded or moulded into the hull. The builder is not required to fabricate any complex intake ducts. It is then only a matter of installing the driveline and completing the control system interface.

No additional strengthening of the hull or transom is required as HM series waterjets are of robust cast construction capable of transmitting the full force of generated thrust to the hull bottom via the intake/transition. The jet's main thrust bearing is incorporated in the cast body and is unaffected by hull movement. Jets and matching control systems can be configured for up to quadruple main propulsion installations, or can be employed with other propulsors for loiter and boost applications.





# HM Series Power / RPM Curves



Jet Model	HM422	HM461	HM521	HM571	HM651	HM721	HM811
Max Sprint Power (skW)	1000	1100	1400	1700	2200	2700	3500
Input rpm range	2030-2300	1795-1900	1587-1710	1448-1569	1305-1407	1149-1236	1030-1104
Max Continuous Power (skW)	750	900	1150	1380	1750	2200	2800
Input rpm range	2000-2300	1680-1800	1508-1624	1357-1470	1220-1316	1073-1154	955-1025

NOTE: Input rpm are subject to suitable cavitation limits. The lower rpm figure is always preferred. Higher power inputs will restrict the input rpm range.

Left: New pilot boats in The Netherlands each use twin HamiltonJet HM651 waterjets.



# HM Series Control Systems

## JT Steering

All HM series waterjets incorporate HamiltonJet's JT steering nozzle to optimise both steering efficiency and delivery of propulsive thrust. Compared with other waterjet steering systems, the JT nozzle provides outstanding steering response at all boat speeds. This is particularly noticeable at low speeds due to the absence of a central "deadband". The design reduces nozzle flow disturbance, resulting in lower energy losses and minimal loss of forward thrust when steering. These factors mean higher overall efficiency through improved course-keeping and, coupled with low steering loads and noise level, make the JT system highly effective and reliable under all conditions.

## Ahead / Astern

The ahead/astern function is an integral part of HM series waterjets, utilising a split-duct deflector to provide maximum astern thrust under all conditions. The splitter incorporated in the deflector divides the flow to two outlet ducts angled down to clear the transom and to the sides to retain steering thrust. Vectoring the astern thrust away from the jet intake avoids recirculation and the resulting astern thrust is equivalent to up to 60% of ahead thrust - maintainable up to high throttle settings.

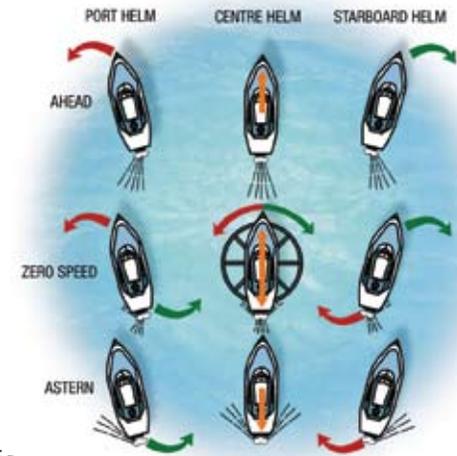
The shift from full ahead to full astern is a smooth transition as the deflector is lowered through the jetstream, eliminating any delay or shock loading normally associated with propeller/gearbox drives. Designed to withstand the loads imposed when the deflector is lowered at full speed ahead, the arrangement provides a powerful braking function for emergencies.

The separation of steering and ahead/astern functions offer the opportunity for unlimited combinations of translational and rotational movements for outstanding control of multiple-jet propelled vessels.

## Control Functions

Since steering and ahead/astern functions are separate and have independent effects, they may be used together to enable complex vessel manoeuvres without complex combinations of control inputs by the operator.

With the astern deflector fully raised, full forward thrust is available. With the deflector in the lower position, full astern thrust is generated. In both positions full independent steering is available for rotating the craft. By setting the deflector in the intermediate "zero-speed" position, ahead and astern thrusts are equalised for holding the craft on station, but with independent steering effect still available for rotational control. Infinitely variable adjustment either side of "zero-speed" enables the craft to be crept ahead or astern, and in multiple jet installations appropriate thrust vectoring alone can be used to induce true sideways movement.



## Control Systems

### HFRC Follow-up Reverse Control (HM422 to HM571 only)

Provides unsynchronised "follow-up" positional control of the astern deflector. This means the control lever can be moved quickly without restriction and the deflector will follow at its own speed to find the required position. The operator can pre-set astern lever position prior to engine start, then at start up the deflector will immediately move to the correct position. What's more, unlike synchronised controls, the system cannot be strained or forced by the operator. Steering control is achieved through the use of a Seastar power-assisted steering system (application limitations may apply - consult HamiltonJet for more information).

### MECS Electronic Control

The HamiltonJet Modular Electronic Control System (MECS) is a software configurable control system for waterjet steering and reverse, engine throttle and gearbox control. It comprises a number of standard modules that may be connected together in varying combinations to build a control system customised to that particular vessel and its operational requirements. In addition to the electronic modules, a complete system includes a Jet mounted and driven Hydraulic Power Unit (JHPU) on each jet, inboard hydraulic steering and reverse actuators, including feedback units, engine and gearbox interfaces (or actuators). The system is also capable of interfacing with other proprietary Autopilot and vessel management systems such as Dynamic Positioning and Voyage Data Recorders.

WORLD HEADQUARTERS

**HamiltonJet Global**

PO Box 709  
Christchurch  
New Zealand  
Phone: +64 3 962 0530  
Fax: +64 3 962 0534  
Email: [marketing@hamjet.co.nz](mailto:marketing@hamjet.co.nz)  
[www.hamiltonjet.co.nz](http://www.hamiltonjet.co.nz)

REGIONAL OFFICES

**HamiltonJet Americas**

14680 NE North Woodinville Way  
Suite 100  
Woodinville WA 98072  
United States of America  
Phone: +1 425 527 3000  
Toll Free: 800 423 3509  
Fax: +1 425 527 9188  
Email: [marketing@hamiltonjet.com](mailto:marketing@hamiltonjet.com)  
[www.hamiltonjet.com](http://www.hamiltonjet.com)

**HamiltonJet Europe**

Unit 26, The Birches Industrial Estate  
East Grinstead  
West Sussex RH19 1XZ  
United Kingdom  
Phone: +44 1342 313 437  
Fax: +44 1342 313 438  
Email: [marketing@hamjetuk.com](mailto:marketing@hamjetuk.com)

**HamiltonJet Asia**

30 Toh Guan Road,  
#08-08B ODC Building,  
Singapore 608840  
Phone: +65 9185 5755  
Email: [hamiltonjet.asia@hamjet.co.nz](mailto:hamiltonjet.asia@hamjet.co.nz)

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Cover: Police Patrol vessel with triple HamiltonJet HM721 waterjets.

